Cessna
A Textron Company

Service Manual

1978 thru 1983

MODEL P210 SERIES

Member of GAMA

FAA APPROVAL HAS BEEN OBTAINED ON TECHNICAL DATA IN THIS PUBLICATION THAT AFFECTS AIRPLANE TYPE DESIGN.

REVISION 2 TO THE BASIC MANUAL IS BEING SUPPLIED TO PROVIDE ADDITIONAL INFORMATION NECESSARY TO MAINTAIN THE AIRPLANE AND INCORPORATES TEMPORARY REVISION NUMBER 1, DATED 1 APRIL 1992, TEMPORARY REVISION NUMBER 2, DATED 1 DECEMBER 1992, AND TEMPORARY REVISION NUMBER 3, DATED 3 OCTOBER 1994.

24 SEPTEMBER 1982

D2058-2-13
(RGI-50-4/01

REVISION 2

3 JUNE 1996

TEMPORARY REVISION NUMBER 7

DATE 5 April 2004

MANUAL TITLE Model P210 Series 1978 Thru 1983 Service Manual

MANUAL NUMBER - PAPER COPY D2058-2-13

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TEMPORARY REVISION NUMBER D2058-2TR7

MANUAL DATE 24 September 1982 **REVISION NUMBER** 2 **DATE** 3 June 1996

This Temporary Revision consists of the following pages, which affect and replace existing pages in the paper copy manual and supersede aerofiche information.

SECTION	PAGE	AEROFICHE FICHE/FRAME	SECTION	PAGE	AEROFICHE FICHE/FRAME
2	24	1/B20			
2	29	1/C01			

REASON FOR TEMPORARY REVISION

1. To add the cleaning interval of the engine fuel injection nozzles.

FILING INSTRUCTIONS FOR THIS TEMPORARY REVISION

1. For Paper Publications, file this cover sheet behind the publication's title page to identify the inclusion of the Temporary Revision into the manual. Insert the new pages into the publication at the appropriate locations and remove and discard the superseded pages.

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TEMPORARY REVISION NUMBER 6

DATE 7 October 2002

MANUAL TITLE	Model P210 Series 1978 Thru 1983 Service Manual
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TEMPORARY REVISION NUMBER	D2058-2TR6

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SECTION	PAGE	AEROFICHE FICHE/FRAME	SECTION	PAGE	AEROFICHE FICHE/FRAME
2	24	1/B20			
2	24A/Deleted	NA			
2	29	1/C01			
2	30	Added			
2	30A/Deleted	NA			
2	31	Added			
2	32	Added			
2	33	Added			
16	20C	Added			
16	20D	Added			

REASON FOR TEMPORARY REVISION

1. To add a Component Time Limits section and a fuel quantity indicating system operational test.

FILING INSTRUCTIONS FOR THIS TEMPORARY REVISION

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TEMPORARY REVISION NUMBER 5

DATED 7 January 2000

MANUAL TITLE MODEL P210 SERIES 1978 THRU 1983 SERVICE MANUAL

MANUAL NUMBER - PAPER COPY D2058-2-13 **AEROFICHE** D2058-2-13AF

TEMPORARY REVISION NUMBER PAPER COPY D2058-2TR5 **AEROFICHE** N/A

MANUAL DATE 24 SEPTEMBER 1982 **REVISION NUMBER** 2 **DATE** 3 JUNE 1996

This Temporary Revision consists of the following pages, which affect existing pages in the paper copy manual and supersede aerofiche information.

SECTION	PAGE	AEROFICHE FICHE/FRAME	SECTION	PAGE	AEROFICHE FICHE/FRAME
2	24A	Added			
2	30A	Added			

REASON FOR TEMPORARY REVISION

To include the inspection requirements of Cessna Service Bulletin SEB99-18.

FILING INSTRUCTIONS FOR THIS TEMPORARY REVISION

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TEMPORARY REVISION NUMBER 4

DATED 2 March, 1998

MANUAL TITLE MODEL P210 SERIES 1978 THRU 1983 SERVICE MANUAL

MANUAL NUMBER - PAPER COPY D2058-2-13 **AEROFICHE** D2058-2-13AF

TEMPORARY REVISION NUMBER - PAPER COPY D2058-2TR4-13 **AEROFICHE** N/A

MANUAL DATE 24 September, 1982 **REVISION NUMBER** 2 **DATE** 3 June, 1996

This Temporary Revision consists of the following pages, which affect and replace existing pages in the paper copy manual and supersede aerofiche information.

CHAPTER/ SECTION/ SUBJECT	PAGE	AEROFICHE FICHE/FRAME	CHAPTER/ SECTION/ SUBJECT	PAGE	AEROFICHE FICHE/FRAME
2	27	1 B-23			
2	29	1 C-01			

REASON FOR TEMPORARY REVISION

To add Parker Hannifin Vacuum Manifold Check Valve inspection/replacement times to inspection section.

FILING INSTRUCTIONS FOR THIS TEMPORARY REVISION

For Paper Publications:

File this cover sheet behind the publication's title page to identify inclusion of the temporary revision in the manual. Insert the new pages in the publication at the appropriate locations and remove and discard the superseded pages.

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LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES, DESTROY SUPERSEDED PAGES

NOTE: The portion of the text affected by the Revision is indicated by a vertical line in the outer margine of the page. Revised to illustrations are indicated by miniture pointing hands.

Dates of issue for original and revised pages are:
Original . . . . 0 . . . 24 September 1982
Revision . . . .1 . . . 6 June 1983
Revision . . . .2 . . . 3 June 1996

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 696, CONSISTING OF THE FOLLOWING:

Page No.	Revision No.	Page No.	Revision No.	Page No.	Revision No.
*Title	2	*5A-30	2	15-18D	1
*A	2	5A-31 thru 5A-38	0	15-19	0
i	1	6-1 thru 6-12	0	15-20 thru 15-22	1
*ii thru iv	2	7-1 thru 7-9	0	15-22A thru 15-22B	0
1-1 thru 1-5	0	7-10 Blank	0	15-22C thru 15-22F	1
1-6 Blank	0	8-1 thru 8-7	0	15-23	1
2-1 thru 2-6	0	8-8 Blank	0	15-24 thru 15-25	0
*2-7	2	9-1	1	15-26 thru 15-27	1
2-8	0	9-2 thru 9-15	0	15-28 thru 15-29	0
*2-9 thru 2-10	2	9-16 Blank	0	15-29A thru 15-29B	0
*2-10A	2	10-1	1	15-30 thru 15-32	0
*2-10B blank	2	10-2 thru 10-8	0	15-33 thru 15-36	1
2-11	0	11-1	1	16-1	1
2-12	1	11-2 thru 11-4	0	16-2 thru 16-14	0
2-13 thru 2-14	0	12-1 thru 12-2	1	16-14A thru 16-14B	1
2-15	1	12-3 thru 12-4	0	16-15	0
2-16 thru 2-22	0	*12-5	2	*16-16	2
*2-23 thru 2-29	2	12-6 thru 12-29	0	16-17	0
*2-30 Blank	2	*12-30 thru 12-31	2	*16-18	2
3-1 thru 3-5	0	12-32 thru 12-57	0	16-19	0
*3-6	2	*12-58	2	*16-20	2
3-7 thru 3-31	0	12-59 thru 12-60	0	*16-20A thru 16-20B	2
3-32 Blank	0	13-1	1	16-21 thru 16-30	0
4-1 thru 4-6	0	13-2 thru 13-5	0	17-1 thru 17-2	1
5-1 thru 5-20	0	*13-6 thru 13-7	2	17-3 thru 17-7	0
*5-20A	2	13-8 thru 13-15	0	*17-8	2
*5-20B Blank	2	*13-16	2	17-9 thru 17-40	0
5-21 thru 5-37	0	13-17 thru 13-33	0	*17-41	2
*5-38	2	13-34 Blank	0	17-42 thru 17-51	0
*5-38A	2	14-1	1	*17-52	2
*5-38B blank	2	14-2 thru 14-6	0	17-53 thru 17-67	0
5-39 thru 5-49	0	15-1 thru 15-2	1	*17-68	2
*5-50	2	15-2A thru 15-2B	0	17-69 thru 17-70	0
5-51 thru 5-87	0	15-3 thru 15-8	0	18-1	1
5-88 Blank	0	15-8A thru 15-8D	0	18-2 thru 18-5	0
*5A-1 thru 5A-2	2	15-9 thru 15-12	0	18-5A Blank	0
5A3 thru 5A-11	0	15-13 thru 15-16	1	18-5B thru 18-5D	0
5A-11A thru 5-11B	0	15-16A	1	18-6 thru 18-24	0
5A-12 thru 5A-18	0	15-16B Blank	1	19-1	1
5A18A thru 5A-18B	0	15-17 thru 15-18	0	19-2 thru 19-3	0
5A-19 thru 5A-26	0	15-18A thru 15-18B	1	19-4 Blank	0
*5A-27	2	*15-18C	2	20-1 thru 20-2	1
5A-28 thru 5A-29	0			20-3 thru 20-130	0

Upon receipt of the second and subsequent revisions to this book, personnel responsible for maintaining this publication in current status should ascertain that all previous revisions have been received and incorporated.

* The asteric indicates pages revised, added or deleted by the current revision

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WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

CROSS REFERENCE LISTING OF POPULAR NAME VS. MODEL NUMBERS AND SERIALS

All aircraft, regardless of manufacturer, are certificated under model number designations. However, popular names are often used for marketing purposes. To provide a consistent method of referring to these aircraft, the model number will be used in this publication unless the popular name is necessary to differentiate between versions of the same basic model. The following table provides a listing of popular name, model number, and serial number.

POPULAR NAME	MODEL YEAR	MODEL	SERIAL BEGINNING	SERIAL ENDING
PRESSURIZED CENTURION PRESSURIZED CENTURION II	1978	P210N	P21000001	P21000150
PRESSURIZED CENTURION PRESSURIZED CENTURION II	1979	P210N	P21000151	P21000385
PRESSURIZED CENTURION PRESSURIZED CENTURION II	1980	P210N	P21000386	P21000590
PRESSURIZED CENTURION PRESSURIZED CENTURION II	1981	P210N	P21000591	P21000760
PRESSURIZED CENTURION PRESSURIZED CENTURION II	1982	P210N	P21000761	P21000811
PRESSURIZED CENTURION PRESSURIZED CENTURION II	1983	P210N	P21000812	P21000834

INTRODUCTION

This manual contains factory-recommended procedures and instructions for ground handling, servicing, and maintaining the airplane. Besides serving as a reference for the experienced mechanic, this book also covers step-by-step procedures for the less experienced.

This service manual is designed for aerofiche presentation. To facilitate the use of the aerofiche, refer to the aerofiche header for basic information.

IMPORTANT INFORMATION CONCERNING KEEPING CESSNA PUBLICATIONS CURRENT

The information in this publication is based on data available at the time of publication and is updated, supplemented, and automatically amended by all information issued in service news letters, service bulletins, supplier service notices, publication changes, revisions, reissues and temporary revisions. All such amendments become part of and are specifically incorporated within this publication. Users are urged to keep abreast of the latest amendments to this publication through information available at Cessna Authorized Service Stations or through the Cessna Product Support subscription which provide disassembly, overhaul, and parts breakdowns for some of the various suppliers equipment items. Suppliers publications are updated, supplemented, and specifically amended by supplier issued revisions and service information which may be reissued by Cessna; thereby automatically amending this publication and is communicated to the field through Cessna Authorized Service Stations and/or Cessna subscription service.

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ALL INSPECTION INTERVALS, REPLACEMENT TIME LIMITS, OVERHAUL TIME LIMITS, THE METHOD OF INSPECTION, LIFE LIMITS, CYCLE LIMITS, ETC., RECOMMENDED BY CESSNA ARE SOLELY BASED ON THE USE OF NEW, REMANUFACTURED, OR OVERHAULED CESSNA APPROVED PARTS. IF PARTS ARE DESIGNED, MANUFACTURED, REMANUFACTURED, OVERHAULED, AND/OR APPROVED BY ENTITIES OTHER THAN CESSNA, THEN THE DATA IN CESSNAS MAINTENANCE/SERVICE MANUALS NO LONGER APPLICABLE AND THE PURCHASER IS WARNED NOT TO RELY ON SUCH DATA FOR NON-CESSNA PARTS. ALL INSPECTION INTERVALS REPLACEMENT TIME LIMITS, OVERHAUL TIME LIMITS, THE METHOD OF INSPECTION, LIFE LIMITS, CYCLE LIMITS, ETC., FOR SUCH NON-CESSNA PARTS MUST BE OBTAINED FROM THE MANUFACTURER AND/OR SELLER OF SUCH NON-CESSNA PARTS.

REVISIONS.

1. Revisions/changes are issued as required, and include only pages that require updating.

REISSUE.

1. A reissued manual is a complete manual incorporating all the latest information and outstanding revisions and temporary revisions. It supersedes and replaces previous issue(s) of the manual.

REVISIONS and REISSUES.

1. Individual copies can be purchased from your Cessna Service Station or directly from Cessna Parts Distribution, Dept 701, Cessna Aircraft Company, P.O. Box 949, Wichita, KS. 67201 (walk in address: 5800 East Pawnee, Wichita, Kansas 67218).
2. Subscriptions, service bulletin listing, revision status checkcards, and temporary revisions may be purchased through Propeller Aircraft Production Support, P.O. Box 7706, Wichita, KS. 67277, phone (316) 941-7674 or fax (316) 942-9006.

TEMPORARY REVISIONS.

1. Additional information which becomes available may be provided by temporary revisions. This service is used to provide, without delay, new information which will assist in maintaining safe flight/ground operations. Temporary revisions are designed to replace or add to existing pages in the manual and are numbered to match pages in the manual. Temporary revisions are normally incorporated into this manual at the next scheduled change, revision, or reissue.

REVISION BARS.

1. Additions, or revisions to text in an existing section will be identified by a revision bar on the page adjacent to the change.
2. When technical changes cause unchanged text to appear on a different page/pages, a revision bar will be placed in the margin opposite the page number of all affected pages providing no other revision bar appears on the page.
3. When extensive technical changes are made to text in an existing section that requires a complete retype of copy, revision bars will appear the full length of the page.
4. When art in an existing illustration is revised, a pointing hand will appear in the illustration and will point to the area of the art revision.
5. New art added to an existing section will be identified by a single pointing hand adjacent to the figure title and figure number.
6. Revision bars are not shown for:
   a. Introductory material, indexes and tabular data.
   b. Blank spaces which are the result of text, illustration or table deletion.
   c. Correction of minor inaccuracies, such as punctuation, etc., unless such a correction changes the meaning of instructive information and procedures.

CUSTOMER CARE SUPPLIES AND PUBLICATIONS CATALOG

A Customer Care Supplies and Publications Catalog is available from your Cessna Service Station or directly from the Cessna Propeller Aircraft Product Support, P.O. Box 7706, Wichita, KS. 67277, phone (316) 941-7950 or fax (316) 942-9006. This catalog lists all publications and Customer Care Supplies available from Cessna for prior year models as well as new products. To maintain this catalog in a current status, it is revised yearly and issued on Aerofiche.

SUPPLEMENTAL TYPE CERTIFICATE INSTALLATIONS

Inspection, maintenance and parts required for (STC) installations are not included in this manual. When an STC installation is incorporated on the aircraft, those portions of the aircraft affected by the installation must be inspected in accordance with the inspection program published by the owner of the STC. Since STC installations may change systems interface, operating characteristics and component loads or stress on adjacent structures. Cessna provided inspection criteria may not be valid for aircraft with STC installations.

CUSTOMER COMMENTS ON MANUAL

Cessna Aircraft Company has endeavored to furnish you with an accurate, useful, up-to-date manual. This manual can be improved with your help. Please use the return card, provided with your manual, to report any errors, discrepancies, and omissions in this manual as well as any general comments you wish to make.

SECTION I

GENERAL DESCRIPTION

GENERAL DESCRIPTION 1A8/1-1
PRESSURIZED CENTURION 1A8/1-1
Description 1A8/1-1
Aircraft 1A8/1-1
Stations 1A8/1-1
Bolt Torques 1A11/1-4

1-1. GENERAL DESCRIPTION.

1-2. MODEL PRESSURIZED CENTURION SERIES.

1-3. DESCRIPTION. The Cessna Pressurized, Centurion and Centurion II (P210 Series) Aircraft described in this manual, are high-wing, single-engine, monoplanes of all metal, semi-monocoque construction. Wings are full cantilever with integral fuel bays (wet wing). The fully retractable landing gear consists of tubular-spring steel main gear struts, and a steerable air/hydraulic nose gear strut. Seating arrangement is six place conventional. Powering the Pressurized Centurion Series is a Continental, air-cooled, horizontally-opposed, six-cylinder, fuel-injected, turbocharged engine, driving a constant speed, three blade propeller. The pressurization system is designed for maximum passenger comfort at altitudes up to aircraft ceiling, by maintaining a 3.35 psi maximum cabin pressure, or the equivalent to a 10,000 ft cabin altitude at 20,000 ft actual.

1-4. AIRCRAFT SPECIFICATIONS. Leading particulars of these aircraft, with dimensions based on gross weight, are given in figure 1-1. If these dimensions are to be used in computing clearance for construction of a hangar or other shelter, it should be noted that strut inflation, tire pressure, tire size, and load distribution will change some dimensions significantly.

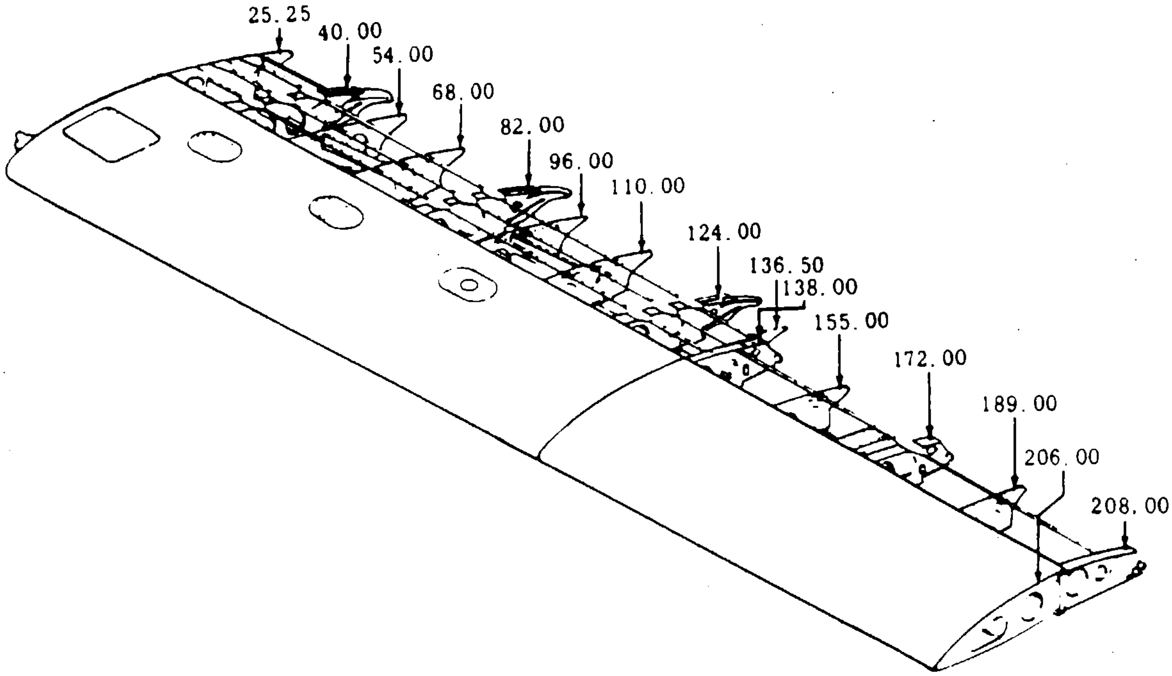
1-5. STATIONS. A station diagram is shown in figure 1-2 to assist in locating equipment, when a written description is inadequate or impractical.

MODEL P210

GROSS WEIGHT	
Takeoff	4000 lb
Landing	3800 lb
FUEL CAPACITY	
Total	90 gal
Usable	87 gal
OIL CAPACITY	11 qt
ENGINE MODEL	CONTINENTAL TSIO-520
PROPELLER (Constant-Speed) (Three Blades)	80" McCAULEY
LANDING GEAR (Retractable, Hydraulically-Actuated)	Tricycle
MAIN WHEEL TIRES	6.00 x 6
Pressure	55 psi
NOSE WHEEL TIRE	5.00 x 5
Pressure	88 psi
NOSE GEAR STRUT PRESSURE (Strut Extended)	90 psi
WHEEL ALIGNMENT (At Empty Weight)	
Camber	4° ± 1° 30'
Toe-in	0" to .06"
AILERON TRAVEL	
Up	20° ± 2°
Down	15° ±2°
WING FLAP TRAVEL (Electrically-Actuated)	0° ±0° to 30°, +1° -2°
RUDDER TRAVEL (Measured parallel to water line)	
Right	24° ± 1°
Left	24° ± 1°
RUDDER TRAVEL (Measured perpendicular to hinge line)	
Right	27° 13' ± 1°
Left	27° 13' ± 1°
ELEVATOR TRAVEL	
Up	23° ± 1°
Down	17° ± 1°
ELEVATOR TRIM TAB TRAVEL	
Up	25° ± 1°
Down	10° ± 1°
PRINCIPAL DIMENSIONS	
Wing Span	441.75"
Tail Span	156,32"
Length	337.96"
Fin Height (Maximum with Nose Gear Depressed and Flashing Beacon Installed on Fin)	112.92"
Track Width	104.20"
BATTERY LOCATION	Left Side of Firewall

Figure 1-1. Aircraft Specifications

P210 SERIES



•WING SPAR ℄

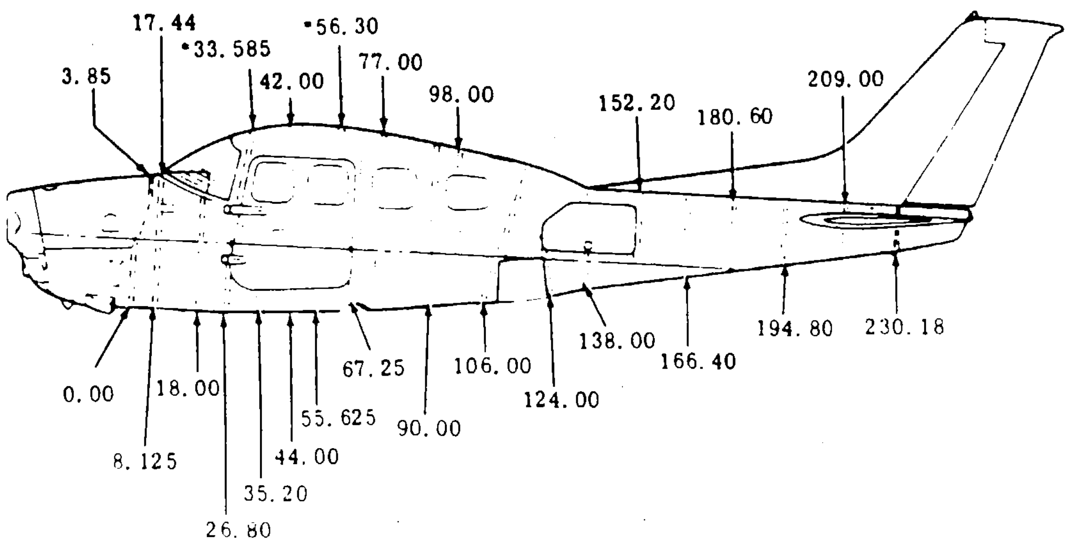


Figure 1-2. Aircraft Specifications.

1-6. BOLT TORQUES. The importance of correct application cannot be over emphasized. Under-torque can result in unnecessary wear of nuts and bolts as well as parts they are holding together. When insufficient pressures are applied, uneven loads will be transmitted throughout assembly, which may result in excessive wear or premature failure due to fatigue. Over-torque can be equally damaging because of failure of a bolt or nut from overstressing threaded areas. There are a few simple, but very important, procedures that should be followed to assure that correct torque is applied:

a. Calibrate torque wrench periodically to assure accuracy; and recheck frequently.

b. Be sure that bolt and nut threads are clean and dry unless otherwise specified.

c. Run nut down to near contact with washer or bearing surface and check "friction drag torque" required to turn nut.

d. Add friction drag torque to desired torque recommended or obtain desired torque as shown in figure 1-3. This is referred to as final torque which should register on indicator or setting for a snapover type wrench.

e. Apply a smooth even pull when applying torque pressure. If chattering or a jerking motion occurs during final torque, back off and re-torque.

f. When installing a castle nut, start alignment with cotter pin hole at minimum recommended torque, plus friction drag torque, and do not exceed maximum plus friction drag. If hole and nut castellation do not align change washers or nut and try again. Exceeding maximum recommended torque is not recommended unless specifically allowed or recommended for that particular installation.

BOLTS Steel Tension	BOLTS Steel Tension
AN 3 thru AN 20 AN 42 thru AN 49 AN 73 thru AN 81 AN 173 thru AN 186 MS 20033 thru MS 20046 MS 20073 MS 20074 AN 509 NK9 MS 24694 AN 525 NK525 MS 27039	MS 20004 thru MS 20024 NAS 144 thru NAS 158 NAS 333 thru NAS 340 NAS 583 thru NAS 590 NAS 624 thru NAS 644 NAS 1303 thru NAS 1320 NAS 172 NAS 174 NAS 517 Steel shear bolt NAS 464

NUTS Steel Tension	NUTS Steel Shear	NUTS Steel Tension	NUTS Steel Shear
AN 310 AN 315 AN 363 AN 365 NAS 1021 MS 17825 MS 21045 MS 20365 MS 20500 NAS 679	AN 320 AN 364 NAS 1022 MS 17826 MS 20364	AN 310 AN 315 AN 363 AN 365 MS 17825 MS 20365 MS 21045 NAS 1021 NAS 679 NAS 1291	AN 320 AN 364 NAS 1022 MS 17826 MS 20364

FINE THREAD SERIES

Nut-bolt size	Torque Limits in.-lbs.		Torque Limits in.-lbs.		Torque Limits in.-lbs.		Torque Limits in.-lbs	
	Min.	Max.	Min.	Max.	Min.	Max.	Min	Max
8-36	12	15	7	9	25	30	15	20
10-32	20	25	12	15	80	100	50	60
1/4-28	50	70	30	40	120	145	70	90
5/16-24	100	140	60	85	200	250	120	150
3/8-24	160	190	95	110	520	630	300	400
7/16-20	450	500	270	300	770	950	450	550
1/2-20	480	690	290	410	1100	1300	650	800
9/16-18	800	1000	480	600	1250	1550	750	950
5/8-18	1100	1300	660	780	2650	3200	1600	1900
3/4-16	2300	2500	1300	1500	3550	4350	2100	2600
7/8-14	2500	3000	1500	1800	4500	5500	2700	3300
1-14	3700	4500	2200	3300	6000	7300	3600	4400
1-1/8-12	5000	7000	3000	4200	11000	13400	6600	8000
1-1/4-12	9000	11000	5400	6600				

COARSE THREAD SERIES

	Torque Limits in.-lbs.		Torque Limits in.-lbs	
	Min	Max	Min.	Max.
8-32	12	15	7	9
10-24	20	25	12	15
1/4-20	40	50	25	30
5/16-18	80	90	48	55
3/8-16	160	185	95	110
7/16-14	235	255	140	155
1/2-13	400	480	240	290
9/16-12	500	700	300	420
5/8-11	700	900	420	540
3/4-10	1150	1600	700	950
7/8-9	2200	3000	1300	1800
1-8	3700	5000	2200	3000
1-1/8-8	5500	6500	3300	4000
1-1/4-8	6500	8000	4000	5000

Figure 1-3. Bolt Torques.

SECTION 2

GROUND HANDLING, SERVICING, CLEANING, LUBRICATION AND INSPECTION

WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

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2-1. GROUND HANDLING.

2-2. TOWING. Moving the aircraft by hand is accomplished by using the landing gear struts as push points. A tow bar attached to the nose gear should be used for steering and maneuvering the aircraft.

CAUTION

When towing the aircraft, never turn the nose wheel more than 35 degrees either side of center, or the nose gear will be damaged. Do not push on control surfaces or outboard empennage surfaces. When pushing on the tailcone, always apply pressure at a bulkhead to avoid buckling the skin.

2-3. HOISTING. The aircraft may be hoisted with a hoist of two-ton capacity by using suitable slings. The front sling should be hooked to the engine lifting eye, and the aft sling should be positioned around the fuselage at the first bulkhead forward of the leading edge of the stabilizer.

2-4. JACKING. Refer to figure 2-2 for jacking procedures.

CAUTION

When using the landing gear strut jack pad flexibility of the gear strut will cause the main wheel to slide inboard as the wheel is raised, tilting the jack. The jack must then be lowered for a second jacking operation. Jacking both wheels simultaneously with landing gear strut jack pad is not recommended.

TOW BAR: PART NUMBER 0501019-1 OR 0700315-4 (TELESCOPING) IS AVAILABLE FROM THE CESSNA SERVICE PARTS CENTER.

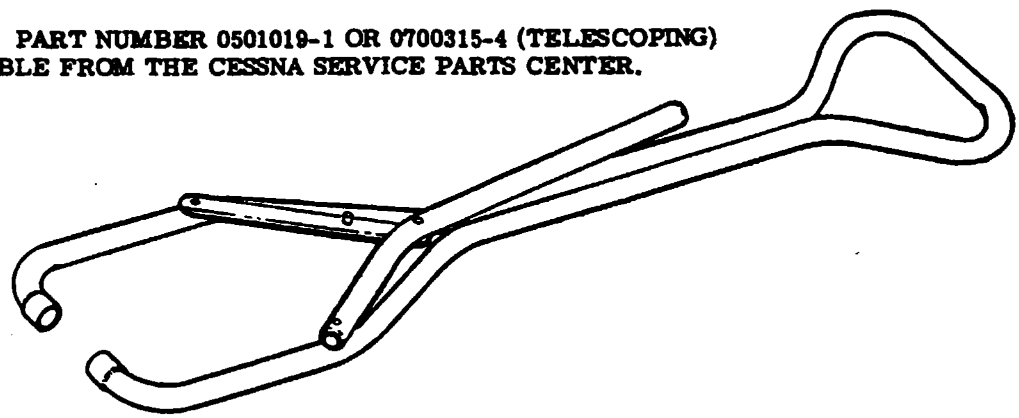


Figure 2-1. Typical Tow Bar

2-4A. LEVELING. Longitudinally leveling of the aircraft is accomplished by backing out the two screws on the left side of the fuselage and then placing a level across the screws. Corresponding points on either the upper or lower main door sills may be used to level the aircraft laterally.

2-4B. WEIGHING AIRCRAFT. Refer to Pilot's Operating Handbook.

2-5. PARKING. Parking precautions depend principally on local conditions. As a general precaution, it is wise to set the parking brake or chock the wheels, and install the control lock. In severe weather, and high wind conditions, tie down the aircraft as outlined in paragraph 2-6 if a hangar is not available.

2-6. TIE-DOWN. When mooring the aircraft in the open, head into the wind if possible. Secure control surfaces with the internal control lock and set brakes.

CAUTION

Do not set parking brakes during cold weather when accumulated moisture may freeze the brakes or when the brakes are overheated.

a. Tie ropes, cables or chains to the wing tie-down fittings located midwing in line with the outboard edge of the flaps. Secure the opposite ends of ropes, cables or chains to ground anchors.
b. Secure a tie-down rope (no chains or cables) to upper trunnion of the nose gear, and secure opposite end of rope to ground anchor.
c. Secure the middle of a rope to the tail tie-down ring. Pull each end of rope away at a 45-degree angle and secure to ground anchors at each side of tail.
d. Secure control lock on pilot control column. If control lock is not available, tie pilot control wheel back with front seat belt.
e. These aircraft are equipped with a spring-loaded steering bungee which affords protection against normal wind gusts. However, if extremely high wind gusts are anticipated, additional locks may be installed.

2-7. FLYABLE STORAGE. Flyable storage is defined as a maximum of 30 days non-operational storage and/or the first 25 hours of intermittent engine operation.

NOTE

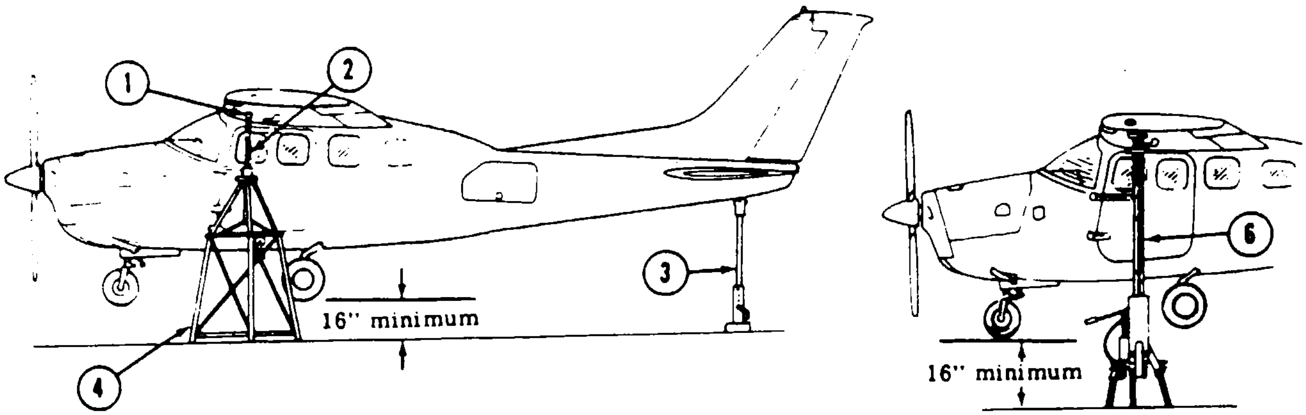
The aircraft is delivered from Cessna with a Corrosion Preventive Aircraft Engine Oil (Military Specification MIL-C-6529, Type II). This engine oil is a blend of aviation grade straight mineral oil and a corrosion preventive compound. This engine oil should be used for the first 25 hours of operation use only aviation grade straight mineral oil of the correct viscosity.

During the 30 day non-operational storage or the first 25 hours of intermittent engine operation, every seventh day the propeller shall be rotated by hand without running the engine. After rotating the engine five revolutions, stop the propeller 45° to 90° from the position it was in. If the aircraft is stored outside, tie-down in accordance with paragraph 2-6. In addition, the pitot tube, static air vents, air vents, openings in the engine cowling, and other similar openings shall have protective covers installed to prevent entry of foreign material. If at the end of thirty (30) days aircraft will not be removed from storage, the engine shall be started and run. The preferred method would be to fly the aircraft for thirty (30) minutes, and up to, but not exceeding normal oil and cylinder temperatures.

CAUTION

Excessive ground operation shall be avoided.

2-8. RETURNING AIRCRAFT TO SERVICE. After flyable storage, returning the aircraft to service is accomplished by performing a thorough pre-flight inspection. At the end of the first 25 hours of engine operation, drain engine oil and change external oil filter element. Service engine with correct grade and quantity of oil. Refer to figure 2-4 and paragraph 2-20 for correct grade of engine oil.



ITEM NUMBER	TYPE AND PART NUMBER	REMARKS
1	Block Cessna #1200028-1	1 x 4 x 4 padded with 1/4" rubber Jack point (SEE NOTE 1)
2	Jack	Any short jack of capable capacity (SEE NOTE 1)
3	Cessna #SE-767	Universal tail stand (SEE NOTE 2)
4	Cessna #SE-576 (41-1/2" high)	Universal jack stand (FOR USE WITH ITEM 2)
5	#2-170 Basic jack #2-109 Leg Extension #2-70 Slide tube extension	Closed height: 69-1/2 inches; extended height: 92" (Insert slide tube extension into basic jack)

1. Provisions are furnished on the bottom of each wing for installation of optional 1200028-1 jack points.
2. Weighted adjustable stand attaches to tie-down ring.

   Wing jack points are aft of the aircraft center-of-gravity. This causes the aircraft to be nose heavy when on jacks. Place additional weights (shot bags or sand bags) on the weighted tail stand to hold the tail down. In addition, the base of adjustable tail stand (SE767) is to be filled with concrete for additional weight as a safety factor.

3. Items (1), (3), (4) and (5) are available from the Cessna Service Parts Center.

Figure 2-2. Jacking Details (Sheet 1 of 2)

JACKING AIRCRAFT

1. Lower the aircraft tail so that wing jack and stands can be placed at wing jack points.
2. Raise aircraft tail and attach tail stand to tail tie-down ring. BE SURE the tail stand weighs enough to keep the tail down under all conditions and that it is strong enough to support any weight that may be placed upon it.
3. Raise jacks evenly until desired height is reached. When jacking the aircraft, the main landing gear wheels must be a minimum of 16" above shop floor for landing gear retraction.
4. The jack point on the bottom of the step may be used to raise only one main wheel. Do not use brake casting as a jack point.
5. The nose may be raised by weighting down the tail. Place weight on each side of stabilizer, next to fuselage.
6. Whenever the landing gear is to be operated in the shop, use the wing jack and tail jack points to raise the aircraft.
7. The aircraft may be hoisted as outlined in paragraph 2-3.

REMOVING AIRCRAFT FROM JACKS.

1. Place landing gear control handle in gear down position.
2. Operate ground hydraulic power source or aircraft emergency hydraulic hand pump until landing gear is down and locked, and the green (DOWN) light is illuminated.
3. Disconnect ground hydraulic power source and/or stow emergency hydraulic hand pump handle.
4. Ascertain that green (DOWN) light is illuminated; then place master switch in OFF position.
5. Lower jacks evenly until aircraft rests on the landing gear and remove wing jacks and tail stand.
6. Compress nose landing gear shock strut to static position.

SHOP NOTES:

Figure 2-2. Jacking Details (Sheet 2 of 2)

2-9. TEMPORARY STORAGE. Temporary storage is defined as aircraft in a non-operational status for a maximum of 90 days. The aircraft is constructed of corrosion-resistant alclad aluminum, which will last indefinitely under normal conditions if kept clean. However, these alloys are subject to oxidation. The first indication of corrosion on unpainted surfaces is in the form of white deposits or spots. On painted surfaces, the paint is discolored or blistered. Storage in a dry hangar is essential to good preservation and should be procured, if possible. Varying conditions will alter the measures of preservation, but under normal conditions in a dry hangar, and for storage periods not to exceed 90 days, the following methods of treatment are suggested.

a. Fill fuel bays with correct grade of gasoline.
b. Clean and wax aircraft thoroughly.
c. Clean any oil or grease from tires, and coat tires with a tire preservative. Cover tires to protect against grease or oil.
d. Either block up fuselage to relieve pressure on tires or rotate wheels every 30 days to prevent flat spotting the tires.
e. Lubricate all airframe items and seal or cover all openings which could allow moisture and/or dust to enter.

NOTE

The aircraft battery serial number is recorded in the aircraft equipment list. To assure accurate warranty records, the battery should be reinstalled in the same aircraft from which it was removed. If the battery is returned to service in a different aircraft, appropriate record changes must be made and notification sent to the Cessna Claims Department.

f. Remove battery and store in a cool, dry place; service battery periodically and charge as required.

NOTE

An engine treated in accordance with the following may be considered being protected against normal atmospheric corrosion for a period not to exceed 90 days.

g. Disconnect spark plug leads and remove upper and lower spark plugs from each cylinder.

NOTE

The preservative oil must be Lubricating Oil-Contact and Volatile, Corrosion Inhibited, MIL-L-46002, Grade 1, or equivalent.

h. Using a portable pressure sprayer, spray preservative oil through the upper spark plug hole of each cylinder with the piston in a down position. Rotate crankshaft as each pair of cylinders is sprayed.
i. After completing step "h," rotate crankshaft so that no piston is at a top position.
j. Again, spray each cylinder without moving the crankshaft, to thoroughly cover all interior surfaces of the cylinder above the piston.
k. Install spark plugs and connect spark plug leads.
l. Apply preservative oil to the engine interior by spraying approximately two ounces of the preservative oil through the oil filler tube.
m. Seal all engine openings exposed to the atmosphere, using suitable plugs or non-hygroscopic tape. Attach a red streamer at each point that a plug or tape is installed.
n. If the aircraft is to be stored outside, perform the procedures outlined in paragraph 2-6. In addition, the pitot tube, static source vents, air vents, openings in the engine cowling, and other similar openings should have protective covers installed to prevent entry of foreign material.
o. Attach a warning placard to the propeller to the effect that the propeller shall not be moved while the engine is in storage.

2-10. INSPECTION DURING STORAGE.

a. Inspect airframe for corrosion at least once a month. Remove dust collections as frequently as possible. Clean and wax aircraft as required.
b. Inspect the interior of at least one cylinder through the spark plug hole for corrosion at least once each month.

NOTE

Do not move crankshaft when inspecting interior of cylinder for corrosion.

c. If at the end of the 90 day period, the aircraft is to be continued in non-operational storage, repeat the procedural steps "g" thru "o" of paragraph 2-9.

2-11. RETURNING AIRCRAFT TO SERVICE. After temporary storage, use the following procedure to return the aircraft to service.

a. Remove aircraft from blocks. Check tires for proper inflation.
b. Check and install battery.
c. Check that oil sump has proper grade and quantity of engine oil.
d. Service induction air filter and remove warning placard from propeller.
e. Remove materials used to cover openings.
f. Remove, clean and gap spark plugs.
g. While spark plugs are removed, rotate propeller several revolutions to clear excess rust preventive oil from cylinders.
h. Clean, gap and install spark plugs. Torque plugs to value listed in Section 12.
i. Check fuel strainer. Remove and clean filter screen, if necessary. Check fuel bays and fuel lines for moisture and sediment. Drain enough fuel to eliminate moisture and sediment.
j. Perform a thorough pre-flight inspection, then start and warm-up engine.

2-12. INDEFINITE STORAGE. Indefinite storage is defined as aircraft in a non-operational status for an indefinite period of time. Engines treated in accordance with the following may be considered protected against normal atmospheric corrosion, provided the procedures outlined in paragraph 2-13 are performed at the intervals specified.

a. Operate engine until oil temperature reaches normal operating range. Drain engine oil sump and reinstall drain plug.
b. Fill oil sump to normal operating capacity with corrosion preventive mixture.

NOTE

Corrosion preventive mixture consists of one part compound MIL-C-6529, Type I, mixed with three parts new lubricating oil of the grade recommended for service.

c. Immediately after filling the oil sump with corrosion preventative mixture, fly the aircraft for a period of time not to exceed a maximum of 30 minutes.
d. With engine operating at 1200 to 1500 rpm and induction air filter removed, spray corrosion preventive mixture into induction airbox, at the rate of one-half gallon per minute, until heavy smoke comes from exhaust stack, then increase the spray until the engine is stopped.

CAUTION

Injecting corrosion-preventive mixture too fast can cause a hydrostatic lock.

e. Do not rotate propeller after completing step "d."
f. Remove all spark plugs and spray corrosion-preventive mixture, which has been pre-heated (221° to 250°F), into all spark plug holes.

NOTE

To throughly cover all surfaces of the cylinder interior, move the nozzle of the spray gun from the top to the bottom of the cylinder. If by accident the propeller is rotated following this spraying, respray the cylinders to insure an unbroken coverage on all surfaces.

g. Install lower spark plugs or install solid plugs, and install dehydrator plugs in upper spark plug holes. Be sure that dehydrator plugs are blue in color when installed
h. Cover spark plug lead terminals with shipping plugs (AN4060-1) or other suitable covers.
i. With throttle in full open position, place a bag of desiccant in the induction air intake and seal opening with moisture resistant paper and tape.
j. Place a bag of desiccant in the exhaust tailpipe and seal opening with moisture resistant tape.
k. Seal cold air inlet to the heater muff with moisture resistant tape.
l. Seal engine breather by inserting a protex plug in the breather hose and clamping in place.
m. Seal all other engine openings exposed to atmosphere using suitable plugs or non-hygroscopic tape.

NOTE

Attach a red streamer to each place plugs or tape is installed. Either attach red streamers outside of the sealed area with tape or to the inside of the sealed area with safety wire to prevent wicking of moisture into the sealed area.

n. Drain corrosion-preventive mixture from engine sump and reinstall drain plug.

NOTE

The corrosion-preventive mixture is harmful to paint and should be wiped from painted surfaces immediately.

o. Attach a warning placard on the throttle control knob, to the effect that the engine contains no lubricating oil. Placard the propeller to the effect that it should not be moved while the engine is in storage.
p. Prepare airframe for storage as outlined in paragraph 2-9 thru step "f."

NOTE

As an alternate method of indefinite storage, the aircraft may be serviced in accordance with paragraph 2-9 providing the aircraft is run up at maximum intervals of 90 days and then reserviced per paragraph 2-9.

2-13. INSPECTION DURING STORAGE. Aircraft in an indefinite storage shall be inspected as follows:
a. Inspect cylinder protex plugs each 7 days.
b. Change protex plugs if their color indicates an unsafe condition.
c. If the dehydrator plugs have changed color in one half of the cylinders, all desiccant material in the engine shall be replaced with new material.
d. Every 6 months respray the cylinder interiors with corrosion-preventive mixture and replace all desicant and Protex plugs.

NOTE

Before spraying, inspect the interior of one cylinder for corrosion through the spark plug hole and remove at least one rocker box cover and inspect the valve mechanism.

2-14. RETURNING AIRCRAFT TO SERVICE. After indefinite storage, use the following procedure to return the aircraft to service.
a. Remove aircraft from blocks and check tires for correct inflation. Check for correct nose gear strut inflation.
b. Check battery and install.
c. Remove all materials used to seal and cover openings.
d. Remove warning placards posted at throttle and propeller

e. Remove oil sump drain plug and drain sump Install and safety drain plug.
f. Remove and clean engine oil screen, then reinst reinstall and safety. Install new oil filter.

NOTE

The corrosion-preventive mixture will mix with the engine lubricating oil, so flushing the oil system is not necessary. Draining the oil sump will remove enough of the corrosion-preventive mixture.

g. Service and install the induction air filter.
h. Remove dehydrator plugs and spark plugs or plugs installed in spark plug holes and rotate propeller by hand several revolutions to clear corrosion-preventive mixture from cylinders.
i. Clean, gap and install spark plugs. Torque plugs to value listed in Section 12.
j. Check fuel strainer. Remove and clean filter screen. Check fuel tanks and fuel lines for moisture and sediment. and drain enough fuel to eliminate.
k. Perform a thorough pre-flight inspection. then start and warm-up engine.
l. Thoroughly clean aircraft and flight test aircraft.

2-15. SERVICING.

2-16. DESCRIPTION. Servicing requirements are shown in figure 2-4. The following paragraphs supplement this figure by adding details not included in the figure.

2-17. FUEL TANKS. An area of each wing is sealed to form an integral fuel tank. Recommended fuel grade is listed in figure 2-4. and fuel capacities are given in figure 1-1. Fuel bays should be filled immediately after flight to lessen condensation in the bays and lines.

2-18. USE OF FUEL ADDITIVES FOR COLD WEATHER OPERATION. Strict adherence to recommended preflight draining instructions will eliminate any free water accumulations from the tank sumps. While small amounts of water may still remain in solution in the gasoline, it will normally be consumed and go unnoticed in the operation of the engine.

One exception to this can be encountered when operating under the combined effect of: 1) use of certain fuels, with 2) high humidity conditions on the ground 3) followed by flight at high altitude and low temperature. Under these unusual conditions small amounts of water in solution can precipitate from the fuel stream and freeze in sufficient quantities to induce partial icing of the engine fuel system.

While these conditions are quite rare and will not normally pose a problem to owners and operators, they do exist in certain areas of the world and consequently must be dealt with when encountered.

Therefore, to alleviate the possibility of fuel icing occurring under these unusual conditions it is permissible to add isopropyl alcohol or ethyelene glycol monomethyl ether (EGME) compound to the fuel supply. See figure 2-3 for fuel additive mixing ratio.

The introduction of alcohol or EGME compound into the fuel provides two distinct effects: 1) it absorbs the dissolved water from the gasoline and 2) alcohol has a freezing temperature depressant effect.

Alcohol, if used, is to be blended with the fuel in a concentration of 1% by volume. Concentrations greater than 1% are not recommended since they can be detrimental to fuel tank materials.

The manner in which the alcohol is added to the fuel is significant because alcohol is most effective when it is completely dissolved in the fuel. To insure proper mixing the following is recommended.

1. For best results the alcohol should be added during the fueling operation by pouring the alcohol directly on the fuel stream issuing from the fuel nozzle.
2. An alternate method that may be used is to premix the complete alcohol dosage with some fuel in a separate clean container (approximately 2-3 gallon capacity) and then transfer this mixture to the tank prior to the fuel operation.

Any high quality isopropyl alcohol may be used, such as: Anti-icing fluid (MIL-F-5566) or Isopropyl alcohol (Federal Specification TT-I-735a).

Ethylene glycol monomethyl ether (EGME) compound in compliance with MIL-I-27686 or Phillips PFA-55MB, if used, must be carefully mixed with the fuel in concentrations not to exceed 0.15% by volume.

CAUTION

Mixing of the EGME compound with the fuel is extremely important because concentration in excess of that recommended (0.15 percent by volume maximum) will result in detrimental affects to the fuel tanks, such as deterioration of protective primer and sealants and damage to O-rings and seals in the fuel system and engine components. Use only blending equipment that is recommended by the manufacturer to obtain proper proportioning.

Do not allow the concentrated EGME compound to come in contact with the airplane finish or fuel cell as damage can result.

Prolonged storage of the airplane will result in a water buildup in the fuel which "leeches out" the additive. An indication of this is when an excessive amount of water accumulates in the fuel tank sumps. The concentration can be checked using a differential refractometer. It is imperative that the technical manual for the differential refractometer be followed explicitly when checking the additive concentration.

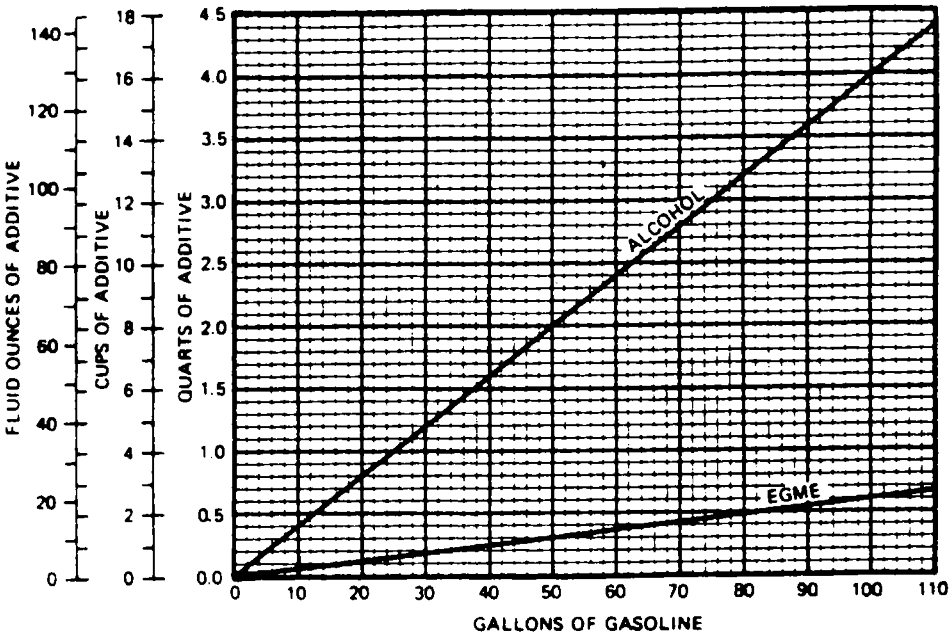


Figure 2-3. Fuel Additive Mixing Ratio Chart

2-19. FUEL DRAINS. Drains are located at various places throughout the fuel system. Refer to Section 13 for locations of the various drains in the system.

Remove drain plugs, actuate strainer drain and open all drain valves at the intervals specified in figure 2-4. Drain valves are installed in the fuel bays and in the reservoirs, and a fuel sampler cup is furnished. To activate the drain for sampling, place cup to valve and depress valve with rod protruding from cup. If water is found during daily inspection of the fuel strainer and fuel bay sump drains, open all drain valves and remove all fuel drain plugs to drain all water from the fuel system.

2-20 ENGINE OIL. Check engine lubricating oil with the dipstick five to ten minutes after the engine has been stopped. The aircraft should be in as near a level position as possible when checking the engine oil so that a true reading is obtained. Engine oil should be drained while the engine is still hot, and the nose of the aircraft should be raised slightly for more positive draining of any sludge which may have collected in the engine oil sump. Engine oil should be changed every six months, even though less than the specified hours have accumulated. Reduce these intervals for prolonged operations in dusty areas and in cold climates where sludging conditions exist, or where short flights and long idle periods are encountered, which cause sludging conditions. Always change oil and change external filter element whenever oil on the dipstick appears dirty. Aviation grade ashless dispersant oil conforming to Continental Motors Specification MHS-24, and all revisions or supplements thereto, and conforming with current Continental Aircraft Engine Service Bulletins shall be used.

NOTE

The aircraft is delivered from Cessna with a corrosion preventive aircraft engine oil (MIL-C-6259, Type II). If oil must be added during the first 25 hours of operation, use only aviation grade straight mineral oil conforming to Specification MIL-L-6082. After the first 25 hours of operation, drain engine oil sump and change filter element. Refill sump with correct quantity and grade of ashless dispersant oil conforming to Continental Motors Specification MHS-24 and with current Continental Aircraft Engine Service Bulletins. Newly overhauled engines should also be operated on aviation grade straight mineral oil conforming to Specification MIL-L-6082 until a total of 25 hours have accumulated.

When changing engine oil, install a new filter element. To drain oil, proceed as follows:

a. Operate engine until oil temperature is at normal operating temperature.
b. Remove oil drain plug from engine sump and allow oil to drain into a container.
c. After engine oil has drained, install and safety drain plug.
d. Change external oil filter element.
e. Service engine with correct quantity and viscosity of aviation grade engine oil.

NOTE

Refer to inspection charts for intervals for changing engine oil and external filter elements. Refer to figure 2-4 for correct viscosities and capacities of aviation grade engine oil.

2-20A. HYDRAULIC FLUID. Refer to figure 2-4.

2-21. ENGINE INDUCTION AIR FILTER. The induction air filter keeps dust and dirt from entering the induction system. The value of maintaining the air filter in a good clean condition can never be over stressed. More engine wear is caused through the use of a dirty or damaged air filter than is generally believed. The frequency with which the filter should be removed, inspected , and cleaned will be determined primarily by aircraft operating conditions. A good general rule, however, is to remove, inspect , and clean filter at least every 50 hours of engine operating time, and more frequently if warranted by operating conditions. Under extremely dusty conditions, daily service of the filter, is recommended. To service the induction air filter proceed as follows:

a. Remove filter from aircraft.

NOTE

Use care to prevent damage to filter element when cleaning filter with compressed air.

b. Clean filter by blowing with compressed air (not over 100 psi) from direction opposite of normal air flow. Arrows on filter case indicate direction of normal air flow.

c. Check bonding of the paper pleats to the face screen. The bonding holds the paper pleats in place and if broken, the pleats are free to shift which can impair filtration. A face screen that is loose or gapping away from the paper pleats is indicative of broken bonding and is cause to replace the filter element.

CAUTION

Do not use solvent or cleaning fluids to wash filter. Use only a water and household detergent solution when washing the filter.

d. After cleaning as outlined in step "b.", the filter may be washed, if necessary, in a solution of warm water and a mild household detergent. A cold water solution may be used.

NOTE

The filter assembly may be cleaned with compressed air a maximum of 30 times or it may be washed a maximum of 20 times. A new filter should be installed after using 500 hours of engine operating time or one year, whichever occurs first. However, a new filter should be installed anytime the existing filter is damaged. A damaged filter may have sharp or broken edges in the filtering panels which would allow unfiltered air to enter the induction system. Any filter that appears doubtful, shall have a new filter installed in its place.

e. After washing, rinse filter with clear water until rinse water draining from filter is clear. Allow water to drain from filter and dry with compressed air (not over 100 psi).

NOTE

The filtering panels of the filter may become distorted when wet, but they will return to their original shape when dry.

f. Be sure airbox is clean, and inspect filter. If filter is damaged, a new filter should be installed.

g. Install filter at entrance to airbox with gasket on aft face of filter frame and with flow arrows on filter frame pointed in the same direction.

2-22. VACUUM SYSTEM CENTRAL AIR FILTER. The disposable type central air filter keeps dust and dirt from entering the vacuum operated flight instruments. Inspect the filter every 200 hours for damage. The filter should be replaced every 500 hours of operation and whenever it becomes sufficiently clogged to cause suction gage readings to drop below 4.6 in hg. The system should not be operated at any time without a filter, nor are any lines to be left open when performing maintenance on the system, as minute particles of dust or other foreign materials may enter the lines and could severely damage the gyro instruments.

CAUTION

Excessive smoking will cause premature filter clogging.

2-23. BATTERY. Battery servicing involves adding distilled water to maintain the electrolyte even with the horizontal baffle plate or split ring at the bottom of the filler holes checking cable connections, and neutralizing and cleaning off any spilled electrolyte or corrosion. Use bicarbonate of soda (baking soda) and clean water to neutralize electrolyte or corrosion. Follow with a thorough flushing with clean water. Do not allow bicarbonate of soda to enter battery. Brighten cable and terminal connection with a wire brush, then coat with petroleum jelly before connecting. Check the battery every 50 hours (or at least every 30 days), more often in hot weather. Add only distilled water, not acid or rejuvenators, to maintain electrolyte level in the battery. Inspect the battery box and clean and remove any evidence of corrosion.

2-24. TIRES. Maintain tire pressure at the value specified in Section 1. When checking pressure, examine tire for wear, cuts, bruises and slippage.

NOTE

Recommended tire pressure should be maintained. Especially in cold weather. Remember that any drop in temperature of the air inside a tire causes a corresponding drop in pressure.

2-25. NOSE GEAR STRUT. The nose gear strut requires periodic checking to ascertain that the strut is filled with hydraulic fluid and is inflated to the correct air pressure. To fill the nose gear strut with hydraulic fluid and air, proceed as follows:

a. Remove valve cap and release all air.
b. Remove valve housing assembly.
c. Compress strut completely (stops in contact with outer barrel hub).
d. Oil level.
   1. Fluid used should comply with specification MIL-O-5606.
   2. Fill strut to bottom of valve installation hole.
   3. Maintain oil level at bottom of valve installation hole.
e. Fully extend strut.
f. Replace valve housing assembly.
g. With strut fully extended and nose wheel clear of ground, inflate strut to 80 PSI.

NOTE

The nose landing gear shock strut will normally require only minimum amount of service. Maintain the strut extension pressure as shown in Section 1. Lubricate landing gear as shown in figure 2-5. Check the landing gear daily for general cleanliness, security of mounting, and for hydraulic fluid leakage. Keep machined surfaces wiped free of dirt and dust, using a clean lint-free cloth saturated with hydraulic fluid (MIL-H-5606) or kerosene. All surfaces should be wiped free of excessive hydraulic fluid.

2-26. NOSE GEAR SHIMMY DAMPENER. The shimmy dampener should be serviced at least every 100 hours. The dampener must be filled completely with hydraulic fluid, free of entrapped air with the compensating piston bottomed in the rod. Check that piston is completely bottomed as follows:

a. Remove shimmy dampener from the aircraft.
b. while holding the shimmy dampener in a vertical position with the filler plug pointed upward, loosen the filler plug.
c. Allow the spring to bottom out the floating piston inside the shimmy dampener rod.
d. When the fluid stops flowing, insert a length of stiff wire through the air bleed hole in the setscrew at the end of the piston rod until it touches the floating piston. The depth should be 3-13/16 inches.

NOTE

If the wire insertion is less than 3-13/16 inches, the floating piston is lodged in the shaft. If the wire cannot be used to free the piston, the rod assembly and piston should be replaced.

e. Service the shimmy dampener as follows:
   1. Remove filler plug from dampener.
   2. Move piston completely to opposite end from filler plug.
   3. Fill dampener with clean hydraulic fluid completely full.
   4. Reinstall filler plug and safety.
   5. Wash dampener in solvent and wipe dry with a cloth.
   6. Reinstall shimmy dampener in aircraft.

NOTE

Keep shimmy dampener, especially the exposed portion of the dampener piston shaft clean to prevent collection of dust and grit which could cut the seals in the dampener barrel. Keep machined surfaces wiped free of dirt and dust, using a clean lint-free cloth saturated with hydraulic fluid (MIL-H-5606) or kerosene. All surfaces should be wiped free of excessive hydraulic fluid.

2-27. HYDRAULIC BRAKE SYSTEMS. Check brake master cylinders and refill with hydraulic fluid as specified in the inspection charts. Bleed the brake system of entrapped air whenever there is a spongy response to the brake pedals. Refer to Section 5 for filling and bleeding the brake systems.

2-28. LANDING GEAR HYDRAULIC RETRACTION SYSTEM. Draining, filling, and bleeding of the landing gear hydraulic system can be accomplished by the following method.

a. Place aircraft master switch in OFF position and place aircraft on jacks as shown in figure 2-2. Bleed pressure from system by moving landing gear selector valve to gear UP position.

CAUTION

Do not turn master switch ON while hydraulic system is open to atmosphere. The pump will automatically start, causing hydraulic fluid to spray from any open lines.

b. Drain system by removing cap from elbow on right side of power pack (behind access cover) and attaching a drain hose to the elbow. Place end of hose in a container of at least one gallon capacity and using emergency hand pump, pump fluid into container. When power pack reservoir is empty, replace cap.
c. Fill power pack reservoir with MIL-H-5606 hydraulic fluid by inserting a funnel or filler hose in dipstick opening on top of power pack body.
d. Bleed system by cycling landing gear through several cycles. Refill power pack reservoir with MIL-H-5606 hydraulic fluid and remove aircraft from jacks.

2-29. HYDRAULIC FLUID SAMPLING AND CONTAMINATION CHECK. At the first 50 and first 100 hour inspection and thereafter at each 500 hour inspection or one year, whichever should occur first, a sample of fluid should be taken and examined for sediment and discoloration. This may be done as follows:

a. Place aircraft master switch in OFF position and place aircraft on jacks as shown in figure 2-2. Bleed pressure from system by moving landing gear selector valve to gear UP position.

CAUTION

Do not turn master switch ON while hydraulic system is open to atmosphere. The pump will automatically start, causing hydraulic fluid to spray from open line.

b. Remove cap from elbow on right side of power pack (behind access cover) and place a nonmetal container below opening.
c. Place landing gear selector valve in DOWN position and operate emergency hand pump to pump fluid into container.
d. If the drained fluid is clear and not appreciably darker in color than new fluid, continue to use the present fluid.
e. If the fluid color is doubtful, place a fluid sample in a nonmetallic container and insert a strip of polished copper in the fluid.
f. Keep copper in the fluid for six hours at a temperature of 70°F or more. A slight darkening of the copper is permissible, but there should be no pitting or etching evident, if so drain fluid from power pack reservoir. Fill power pack with MIL-H-5606 hydraulic fluid and bleed air from system.

2-30. OXYGEN SYSTEM. Refer to Section 15.

2-31. FACE MASKS. Refer to Section 15.

2-32. CLEANING.

2-33. GENERAL DESCRIPTION. Keeping the aircraft clean is important. Besides maintaining the trim appearance of the aircraft, cleaning lessens the possibility of corrosion and makes inspection and maintenance easier.

2-34. UPHOLSTERY AND INTERIOR. Cleaning prolongs the life of upholstery fabrics and interior trim. To clean the interior, proceed as follows;
a. Empty all the ash trays.
b. Brush out or vacuum clean the upholstery and carpeting to remove dirt.
c. Wipe leather and plastic surfaces with a damp cloth.
d. Soiled upholstery fabrics and carpet may be cleaned with a foam-type detergent, used according to the manufacturers instructions.
e. Oily spots and stains may be cleaned with household spot removers, used sparingly. Before using any solvent, read the instructions on the container, and test it on an obscure place in the fabric to be cleaned. Never saturate the fabric with a volatile solvent, it may damage the packing and backing material.
f. Scrape off sticky materials with a dull knife, then spot clean the area.

2-35. PLASTIC TRIM. The instrument panel, plastic trim and control knobs need only be wiped off with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with Stoddard solvent.

CAUTION

Do not use gasoline, alcohol, benzene, acetone, carbon tetrachloride, fire extinguisher fluid, de-icer fluid, lacquer thinner, or glass window cleaning spray. These solvents will soften and craze the plastic.

2-36. WINDSHIELD AND WINDOWS.

2-36A. REQUIRED MATERIALS.

NAME	MANUFACTURER	USE
Mild soap or detergent (hand dishwashing type without abrasives)	Commercially available	Cleaning windshields and windows.
Aliphatic naphtha Type II conforming to Federal Specification TT-N-95	Commercially available	Removing deposits which cannot be removed with mild soap solution on acrylic windshields and windows.
Polishing Wax: (Refer to Note 1)		Waxing acrylic windshields and windows.
Turtle Wax (paste)	Turtle Wax, Inc. 5655 W 73 RD St. Chicago, IL 60638	
Great Reflections Paste Wax	E. I. Du-Pont De Nemours and Co. (Inc.) Wilmington, DE 19898	
Slip-stream Wax (paste)	Classic Chemical 3131 Turtle Creek Suit 1010 Dallas, TX 75050	

2-36A. REQUIRED MATERIALS. (Cont.)

NAME	MANUFACTURER	USE
Acrylic Polish conforming to Federal Specification P-P-560 such as: Permatex plastic cleaner Number 403D Mirror Glaze MGH-7	 Loctite Corp/North America Group 1001 Trout Brook Crossing Rocky Hill, CT 06067 Meguiars Mirror Bright Polish 210 N Firt Ave. Arcadia, CA 91006	Cleaning and polishing acrylic windshields and windows.
Soft cloth, such as: Cotton flannel or cotton terry cloth material	Commercially available	Applying and removing wax and polish.

NOTE 1 These are the only polishing waxes tested and approved for use by Cessna Aircraft Company.

2-36B. CLEANING INSTRUCTIONS.

CAUTION

Windshields and windows (Acrylic Faced) are easily damaged by improper handling and cleaning techniques.

a. Place aircraft inside hanger or in shaded area and allow to cool from heat of suns direct rays.

b. Using clean (preferably running) water, flood the surface. Use bare hands, with no jewelry, to feel and dislodge any dirt or abrasive materials.

c. Using mild soap or detergent(such as a dishwashing liquid) in water, wash the surface. Again use only the bare hand to provide rubbing force. A clean cloth may be used to transfer the soap solution to the surface, but extreme care must be exercised to prevent scratching the surface.

d. On acrylic windshields and windows only, if soils which cannot be removed by a mild detergent remain, Type II aliphatic naphtha applied with a soft cloth may be used as a cleaning solvent. Be sure to frequently refold the cloth to avoid redepositing soil and/or scratching windshield with any abrasive particles.

e. Rinse surface thoroughly with clean fresh water and dry with a clean cloth.

CAUTION

Do not use any of the following on or for cleaning windshields and windows: Methanol, Denatured Alcohol, Gasoline, Benzene, Xylene, MEK, Acetone, Carbon Tetrachloride, Lacquer Thinners, commercial or household window cleaning sprays. Additionally, strong acids or bases may destroy antistatic coatings on glass windshields. When in doubt, DO NOT USE IT.

f. Hard polishing wax should be applied to acrylic surfaces (The wax has an index of refraction nearly the same as transparent acrylic and will tend to mask any shallow scratches on the windshield surface).

g. Acrylic surfaces may be polished using a polish meeting Federal Specification P-P-560, applied per the manufacturers instructions.

NOTE

When applying and removing wax and polish, use a clean soft cloth.

h. Do not use rain repellent on acrylic surfaces.

2-36C. WINDSHIELD AND WINDOW PREVENTIVE MAINTENANCE.

NOTE

Utilization of the following techniques will help minimize windshield and window crazing.

a. Keep all surfaces of windshields and windows clean.

b. If desired, wax acrylic surfaces.

c. Carefully cover all surfaces during any painting, powerplant cleaning or other procedure that calls for the use of any type of solvents or chemicals. The following coatings are approved for use in protecting surfaces from solvent attack.

1. White Spray Lab, MIL-C-6799, Type I, Class II
2. WPL-3 Masking Paper - St. Regis, 156 Oak St. Newton Upperfalls, MA, 02164-1440
3. 5x N - Poly-Spotstick - St. Regis, 156 Oak St. Newton Upperfalls, MA, 02164-1440
4. Protex 40 - Mask Off Company, 345 Maple Av. Monrovia, CA, 91016-3331 and Southwest Paper Co., 3930 N. Bridgeport Cir.Wichita, KS 67219
5. Protex 10VS - Mask Off Company, 345 Maple Av. Monrovia, CA,91016-3331 and Southwest Paper Co., 3930 N. Bridgeport Cir. Wichita, KS 67219
6. Scotch 344 Black Tape - 3M Company

d. Do not park or store aircraft where it might be subjected to direct contact with or vapors from: methanol, denatured alcohol, gasoline, benzene, xylene, MEK, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays, paint strippers, or other types of solvents.

e. Do not use solar screens or shields installed inside of aircraft, or leave sun visors up against windshield. The reflected heat from these items cause elevated temperatures which accelerate crazing and may cause formation of bubbles in the inner ply of multiple ply windshields.

f. Do not use a power drill motor or other powered device to clean, polish, or wax surfaces.

2-37. ALUMINUM SURFACES. The aluminum surfaces require a minimum of care, but should never be neglected. The aircraft may be washed with clean water to remove dirt and may be washed with nonalkaline grease solvents to remove oil and/or grease. Household type detergent soap powders are effective cleaners, but should be used cautiously since some of them are strongly alkaline. Many good aluminum cleaners, polishes, and waxes are available from commercial suppliers or aircraft products.

2-38. PAINTED SURFACES. The painted exterior surfaces of your new Cessna have a durable, long lasting finish. Approximately 10 days are required for the paint to cure completely; in most cases, the curing period will have been completed prior to delivery of the aircraft. In the event that polishing or buffing is required within the curing period, it is recommended that work be done by someone experienced in handling uncured paint. Any Cessna Service Station can accomplish this work.

Generally, painted surfaces can be kept bright by washing with water and mild soap, followed by a rinse with water and drying with cloths or a chamois. Harsh or abrasive soaps or detergents which could cause corrosion or scratches should never be used. Remove stubborn oil and grease with a cloth moistened with Stoddard solvent.

To seal any minor surface chips or scratches and protect against corrosion, the aircraft should be waxed regularly with a good automotive wax applied in accordance with the manufacturers instructions. If the aircraft is operated in a seacoast or other salt water environment, it must be washed and waxed more frequently to assure adequate protection. Special care should be taken to seal around rivet heads and skin laps, which are the areas most susceptible to corrosion. A heavier coating of wax on the leading edges of the wings and tail and on the cowl nose cap and propeller spinner will help reduce the abrasion encountered in these areas. Reapplication of wax will generally be necessary after cleaning with soap solutions or after chemical deicing operations.

2-43. ENGINE AND ENGINE COMPARTMENT. An engine and accessories washdown should be accomplished during each 100-hour inspection to remove oil, grease, salt corrosion or other residue that might conceal component defects during inspection. Also, periodic cleaning can be very effective in preventive maintenance.

Precautions should be taken when working with cleaning agents such as wearing of rubber gloves, an apron or coveralls and a face shield or goggles. Use the least toxic of available cleaning agents that will satisfactorily accomplish the work. These cleaning agents include: (1) Stoddard Solvent (Specification P-D-680 type II), (2) A water alkaline detergent cleaner (MIL-C-25769J) mixed, 1 part cleaner, 2 to 3 parts water and 8 to 12 parts Stoddard Solvent or (3) A solvent base emulsion cleaner (MIL-C-43616B) mixed 1 part cleaner and 3 parts Stoddard Solvent.

CAUTION

Do not use gasoline or other highly flammable substances for washdown.

Perform all cleaning operations in well ventilated work areas and ensure that adequate fire fighting and safety equipment is available. Do not smoke or expose a flame, within 100 feet of cleaning area. Compressed air, used for cleaning agent, application or drying, should be regulated to the lowest practical pressure. Use of a stiff bristle brush rather than a steel brush is recommended if cleaning agents do not remove excess grease and grime during spraying. A recommended procedure for cleaning an engine and accessories is as follows:

CAUTION

Do not attempt to wash an engine which is hot or running. Allow engine to cool before cleaning.

a. Remove engine cowling.
b. Carefully cover the coupling area between the vacuum pump and engine drive shaft so that cleaning solvent cannot reach the coupling or seal.
c. Cover the open end of the vacuum discharge tube.
d. Cover the vacuum relief valve filter, if installed in the engine compartment.
e. Use fresh water for wash down when the engine is contaminated with salt or corrosive chemicals. A cleaning agent such as described previously may then be used to remove oil and grime.

CAUTION

Care should be exercised to not direct cleaning agents or water streams at openings on the starter, magnetos, alternator, vacuum pump or turbocharger relief valve.

f. Thoroughly rinse with clean warm water to remove all traces of cleaning agents.

CAUTION

Cleaning agents should never be left on engine components for an extended period of time. failure to remove them may cause damage to fire sleeves, and could cause additional corrosion.

g. Completely dry engine and accessories using clean, dry compressed air.
h. Remove the cover over the coupling area.
i. Remove the cover from the vacuum discharge tube.
j. Remove the cover from the vacuum relief valve filter, if installed.
k. If desired, engine cowling may be washed with the same cleaning agents, then rinsed thoroughly and wiped dry. After cleaning engine, relubricate all control arms and moving parts required.
l. Reinstall engine cowling.

WARNING

For maximum safety, check that the magneto switches are OFF, the throttle is closed, the mixture control is in the idle cut-off position, and the airplane is secured before rotating the propeller by hand. Do not stand within the arc of the propeller blades while turning the propeller.

m. Before starting engine rotate the propeller by hand no less than four complete revolutions.

2-40. PROPELLER. The propeller should be wiped occasionally with an oily cloth to remove grass and bug stains. In salt water areas, this will assist in corrosion-proofing the propeller.

2-41. WHEELS. The wheels should be washed periodically and examined for corrosion, chipped paint, and cracks or dents in the wheel halves or in the flanges or hubs. If defects are found remove and repair in accordance with Section 5. Discard cracked wheel halves, flanges or hubs and install new parts.

2-42. LUBRICATION.

2-43. GENERAL DESCRIPTION. Lubrication requirements are outlined in figure 2-5. Before adding lubricant to a fitting, wipe the fitting free of dirt. Lubricate until grease appears around part being lubricated and wipe excess grease from parts. The following paragraphs supplement figure 2-5 by adding details not shown in the figure.

2-44. NOSE GEAR TORQUE LINKS. Lubricate torque links every 50 hours. When operating in dusty conditions, more frequent lubrication is recommended.

2-45. TACHOMETER DRIVE SHAFT. Refer to Section 16 for lubrication instructions.

2-46. WHEEL BEARING LUBRICATION. Clean and repack wheel bearings at the first 100-hour inspection and at each 500-hour inspection thereafter. If more than the usual number of take-off and landings are made, extensive taxiing is required or the aircraft is operated in dusty areas or under seacoast conditions, clean and lubricate wheel bearings at each 100-hour inspection.

2-47. WING FLAP ACTUATOR. Clean and lubricate wing flap actuator jack screw each 100 hours as follows:

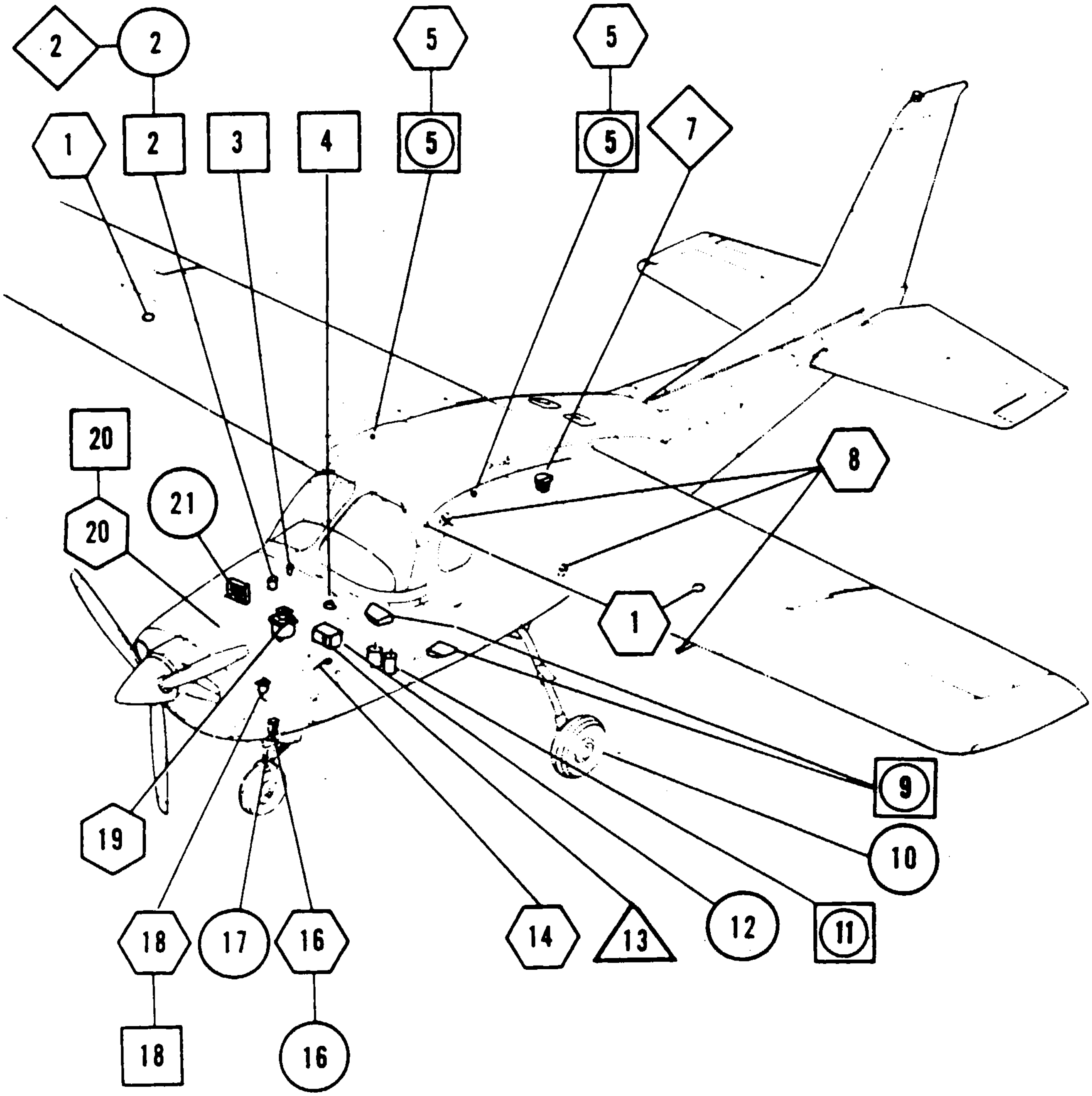
a. Expose jack screw by operating flaps to full-down position.
b. Clean jack screw threads with solvent rag and dry with compressed air.

NOTE

It is not necessary to remove actuator from aircraft to clean or lubricate threads.

c. With oil can, apply light coat of No. 10 weight, non-detergent oil to threads of jack screw.

2-48. ROD END BEARINGS. Periodic inspection and lubrication is required to prevent corrosion of the bearing in the rod end. At each 100-hour inspection, disconnect the control rods at the aileron and inspect each rod end for corrosion. If no corrosion is found, wipe the surface of the rod end balls with general purpose oil and rotate ball freely to distribute the oil over its entire surface and connect the control rods to the aileron. If corrosion is detected during inspection, install new rod ends.



(REFER TO SHEET 3 FOR NOTES)

Figure 2-4. Servicing (Sheet 1 of 4)

HYDRAULIC FLUID:
SPEC. NO. MIL-H-5606

SPECIFIED AVIATION GRADE FUELS:

WARNING

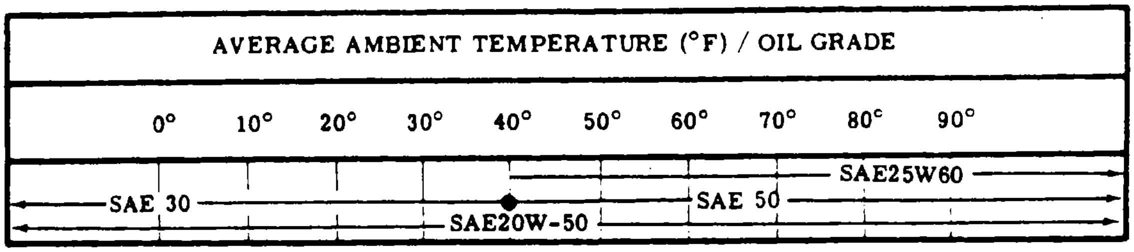
ONLY AVIATION GRADE FUELS ARE APPROVED FOR USE.

ENGINE MODEL	APPROVED FUEL GRADES	NOTE
Continental TSIO-520-P	100LL (blue)	1
	100 (green) (formerly 100/130)	1

NOTE

1. Compliance with Continental Aircraft Engine Service Bulletin M81-11, and all supplements or revisions thereto, must be accomplished.

SPECIFIED AVIATION GRADE OIL:



Aviation grade ashless dispersant oil, conforming to Continental Motors Specification MHS-24, and all revisions or supplements thereto, must be used except as noted in paragraph 2-20, herein. Refer to Continental Aircraft Engine Service Bulletin M81-11, and any superseding bulletins, revisions or supplements thereto, for further recommendations.

Oil capacities for the aircraft are given in the following chart. To minimize loss of oil through the breather, fill to specified oil level on dipstick for normal operation (flight of less than three hours duration). For extended flight, fill to FULL mark on dipstick. Do not operate with less than MINIMUM FOR FLIGHT quantities listed. If an external oil filter is installed, one additional quart of oil is required when filter is changed.

CAPACITY (TOTAL)	CAPACITY (TOTAL WITH FILTER)	NORMAL OPERATION	MINIMUM FOR FLIGHT
10	11	8	7

Figure 2-4. Servicing (Sheet 2 of 4)

DAILY

1 FUEL BAYS:
Service after each flight. Keep full to retard condensation. Refer to paragraph 2-18 for details.

5 FUEL BAY SUMP DRAINS:
Drain off any water and sediment before first flight of the day.

18 FUEL STRAINER:
Drain off any water and sediment before first flight of the day.

14 OIL DIPSTICK:
Check on preflight. Add oil as necessary. Refer to paragraph 2-20 for details. Check that filler cap is tight and oil filler is secure.

8 PITOT AND STATIC PORTS:
Check for obstructions before first flight of the day.

16 NOSE GEAR SHOCK STRUT:
Check on preflight. Check inner barrel showing below outer barrel to be 1.00-2.00 (approximately 1.20) inches after bouncing. Deviation from these dimensions is cause to check and service strut per paragraph 2-25.

25 HOURS

20 ENGINE OIL SYSTEM: FIRST 25 HOURS
Refill with ashless dispersant oil.

19 HYDRAULIC POWER PACK:
Check every 25 hours and after a gear extension which uses the hydraulic hand pump.

50 HOURS

21 INDUCTION AIR FILTER:
Clean filter per paragraph 2-21. Replace as required.

12 BATTERY:
Check electrolyte level and clean battery compartment each 50 hours or each 30 days.

17 SHIMMY DAMPENER:
Check fluid level and refill as required in accordance with paragraph 2-26.

10 TIRES:
Maintain correct tire inflation as listed in Section 1. Refer to paragraph 2-24 for details.

16 NOSE GEAR SHOCK STRUT:
Keep strut filled and inflated to correct pressure. Refer to paragraph 2-25 for details.

2 HYDRAULIC FLUID RESERVOIR:
At first 50 and first 100 hours, thereafter at each 500 hours or one year, whichever comes first, a sample of hydraulic fluid should be examined for sediment and discoloration as outlined in paragraph 2-29.

Figure 2-4. Servicing (Sheet 3 of 4)

100 HOURS

2 HYDRAULIC FLUID RESERVOIR:
At first 50 and first 100 hours, thereafter at each 500 hours or one year, whichever comes first, a sample of hydraulic fluid should be examined for sediment and discoloration as outlined in paragraph 2-29.

3 FUEL/AIR CONTROL UNIT SCREEN:
Remove and clean screen.

18 FUEL STRAINER:
Disassemble and clean strainer bowl and screen.

20 ENGINE OIL SYSTEM:
Change oil and filter each 100 hours or every 6 months, whichever comes first.

4 VACUUM SYSTEM RELIEF VALVE URETHANE FILTER:
Replace every 100 hours.

200 HOURS

7 VACUUM SYSTEM CENTRAL AIR FILTER:
Inspect every 200 hours for damage. Refer to paragraph 2-22.

5 FUEL BAY SUMP DRAINS:
Drain off any water or sediment.

9 FUEL RESERVOIR TANK DRAIN:
Open drain valves and drain off water and sediment.

11 BRAKE MASTER CYLINDERS:
Check fluid level and fill as required with hydraulic fluid.

500 HOURS

7 VACUUM SYSTEM CENTRAL AIR FILTER:
Replace every 500 hours. Refer to paragraph 2-22.

2 HYDRAULIC FLUID RESERVOIR:
At first 50 and first 100 hours, thereafter at each 500 hours or one year, whichever comes first, a sample of hydraulic fluid should be examined for sediment and discoloration as outlined in paragraph 2-29.

AS REQUIRED

13 GROUND SERVICE RECEPTACLE
Connect to 24-volt, D.C. negative-ground power unit for cold weather starting and lengthy ground maintenance of the aircraft's electrical equipment with the exception of electronic equipment. Master switch should be turned on before connecting a generator-type or battery-type external power source. Refer to Section 17.

Figure 2-4. Servicing (Sheet 4 of 4)

FREQUENCY (HOURS)

50 100 500 1000 200

METHOD OF APPLICATION

HAND | GREASE GUN | OIL CAN | SYRINGE (FOR POWDERED GRAPHITE)

WHERE NO INTERVAL IS SPECIFIED, LUBRICATE AS REQUIRED AND WHEN ASSEMBLED OR INSTALLED.

NOTE

The military specifications listed below are not mandatory, but are intended as guides in choosing satisfactory materials. Products of most reputable manufacturers meet or exceed these specifications.

LUBRICANTS

PG	SS-G-659	POWDERED GRAPHITE
GR	MIL-G-81322A	GENERAL PURPOSE GREASE
GH	MIL-G-23827A	AIRCRAFT AND INSTRUMENT GREASE
GL	MIL-G-21164C	HIGH AND LOW TEMPERATURE GREASE
OG	MIL-L-7870A	GENERAL PURPOSE OIL
PL	VV-P-236	PETROLATUM
GT		NO. 10WT NON-DETERGENT OIL
OL	VV-L-800A	LIGHT OIL

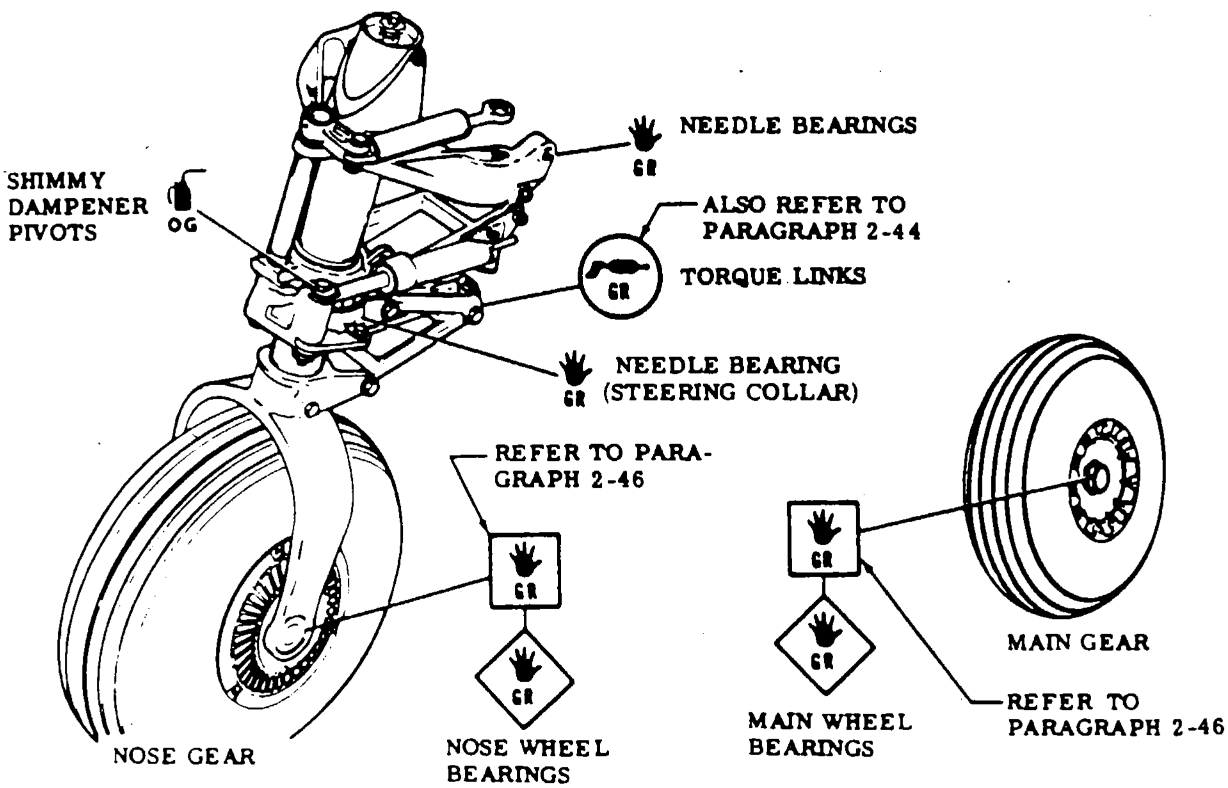


Figure 2-5. Lubrication (Sheet 1 of 4)

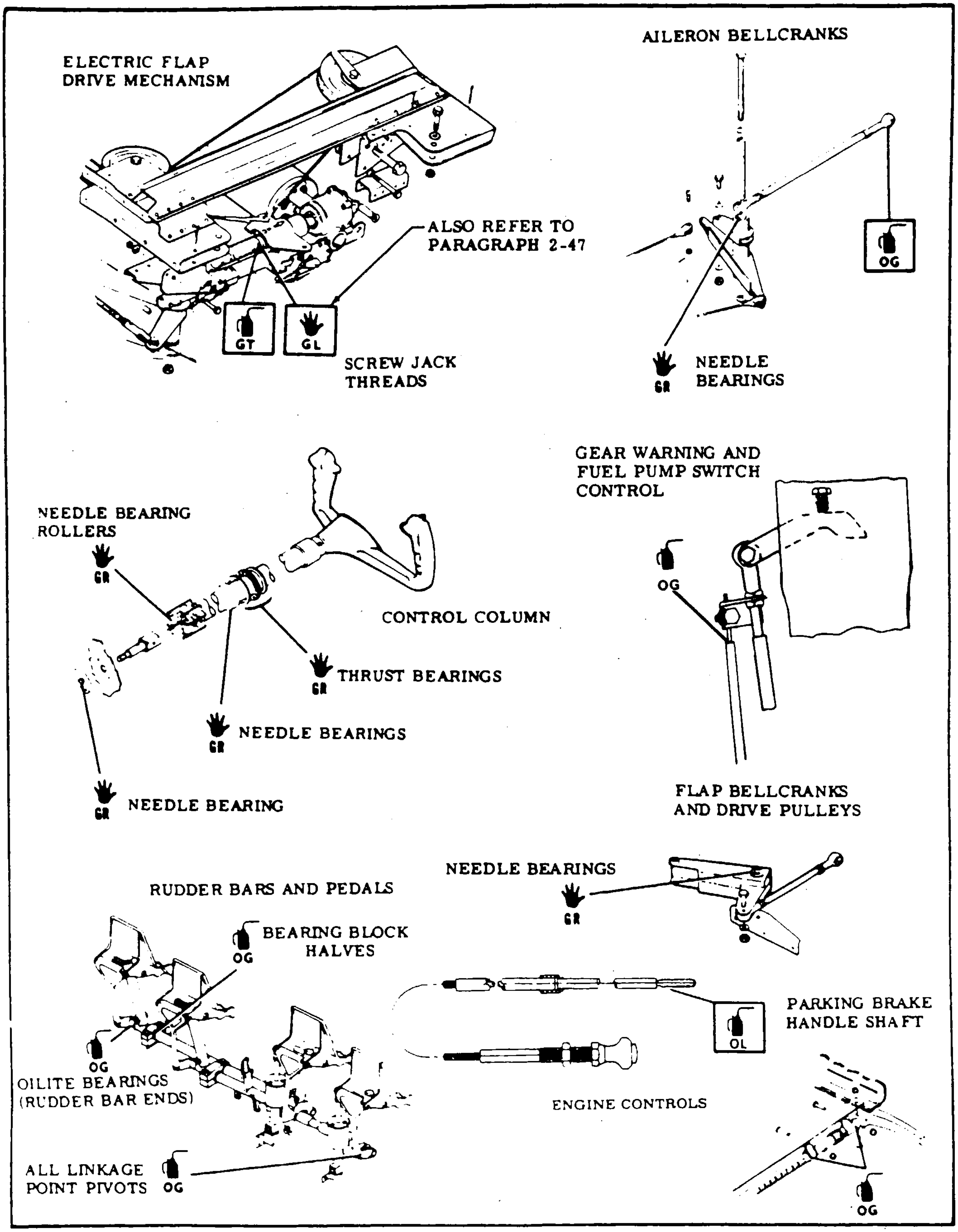


Figure 2-5. Lubrication (Sheet 2 of 4)

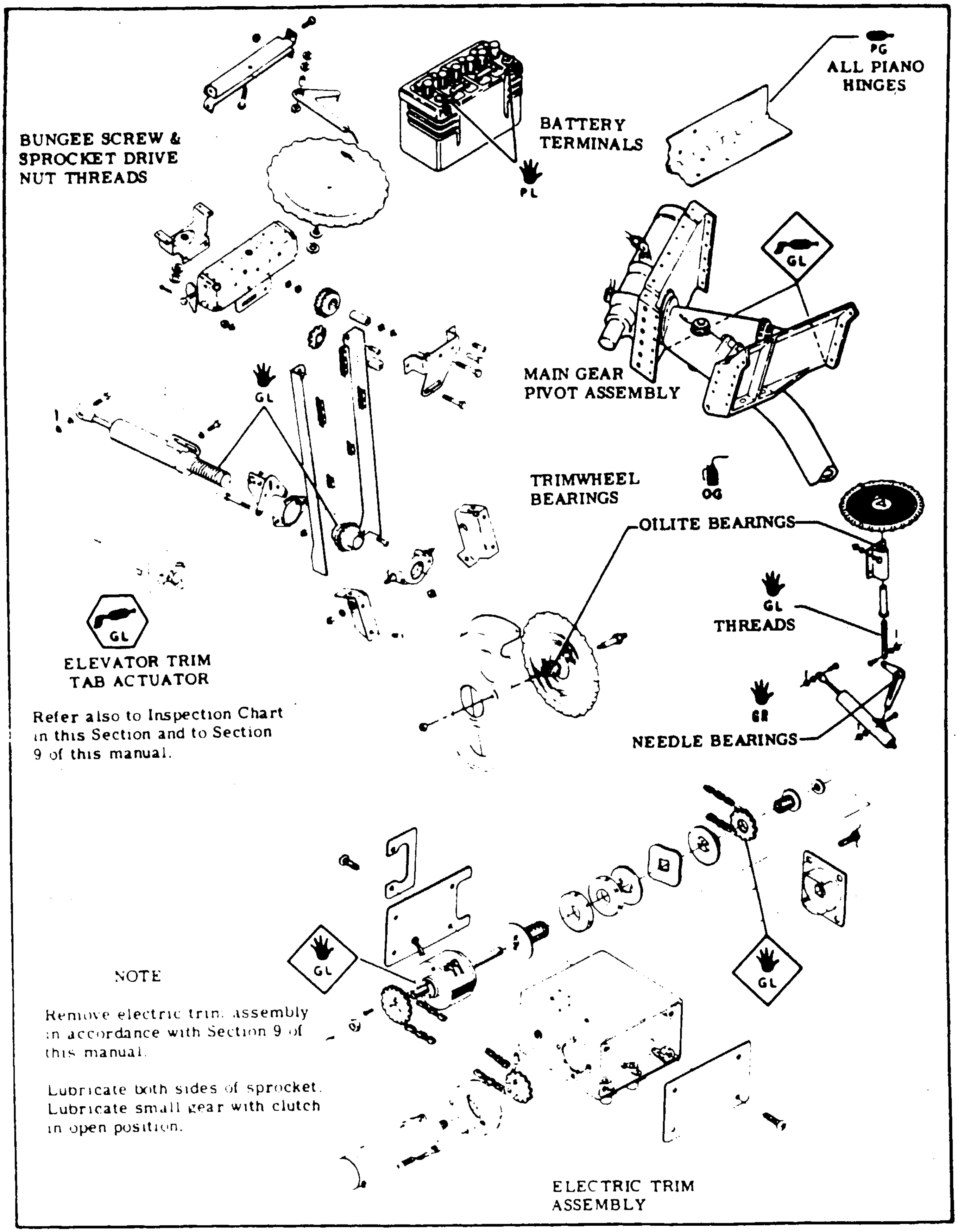
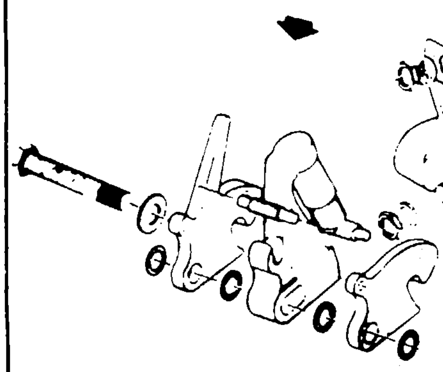
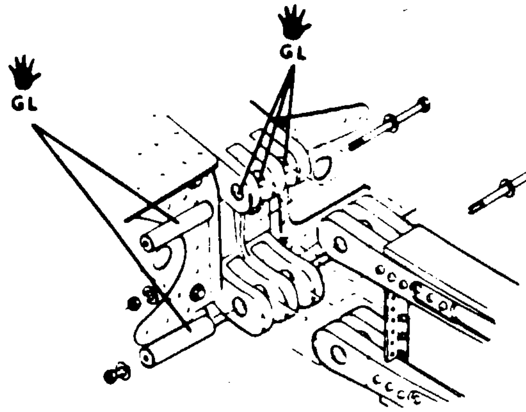


Figure 2-5. Lubrication (Sheet 3 of 4)

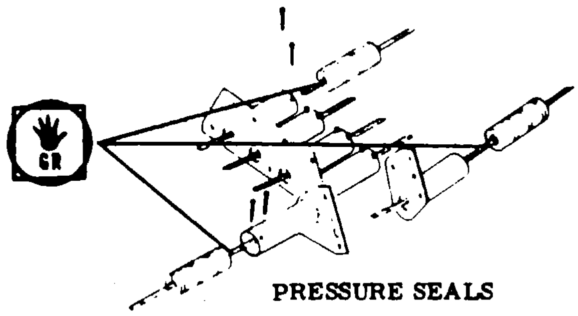
SPRAY BOTH SIDES OF SHADED AREAS WITH ELECTROFILM LUBRI-BOND "A" WHICH IS AVAILABLE IN AEROSOL SPRAY CANS, OR AN EQUIVALENT LUBRICANT. TORQUE ATTACHING BOLT TO 10-20 LB-IN.



NOSE GEAR DOWNLOCK MECHANISM



WING ATTACH



PRESSURE SEALS

NOTES

Sealed bearings require no lubrication.

McCauley propellers are lubricated at overhaul and require no other lubrication.

Do not lubricate roller chains or cables except under seacoast conditions. Wipe with a clean, dry cloth.

Lubricate unsealed pulley bearings, Oilite bearings, pivot and hinge points, and any other friction point obviously needing lubrication, with general purpose oil every 1000 hours or oftener, if required.

Paraffin wax rubbed on seat rails will ease sliding the seats fore and aft.

Lubricate door latching mechanism with MIL-S-8660 silicone compound or equivalent lubricant, applied sparingly to friction points, every 1000 hours or oftener if binding occurs.
No lubrication is recommended for the rotary clutch.

Apply DOOR - EZE - lubricant to latch bolt.

Figure 2-5. Lubrication (Sheet 4 of 4)

I INSPECTION REQUIREMENTS.

As required by Federal Aviation Regulations, all civil aircraft of U.S. registry must undergo a COMPLETE INSPECTION (ANNUAL) each twelve calendar months. In addition to the required ANNUAL inspection, aircraft operated commercially (for hire) must also have a COMPLETE AIRCRAFT INSPECTION every 100 hours of operation.

In lieu of the above requirements, an aircraft may be inspected in accordance with a progressive inspection schedule, which allows the work load to be divided into smaller operations that can be accomplished in shorter time periods.

Therefore, the Cessna Aircraft Company recommends PROGRESSIVE CARE for aircraft that are being flown 200 hours or more per year, and the 100 HOUR inspection for all other aircraft.

II INSPECTION CHARTS.

The following charts show the recommended intervals at which items are to be inspected.

As shown in the charts, there are items to be checked each 50 hours, each 100 hours, each 200 hours, and also Special Inspection items which require servicing or inspection at intervals other than 50, 100 or 200 hours.

a. When conducting an inspection at 50 hours, all items marked under EACH 50 HOURS would be inspected, serviced or otherwise accomplished as necessary to insure continuous airworthiness.

b. At each 100 hours, the 50 hour items would be accomplished in addition to the items marked under EACH 100 HOURS as necessary to insure continuous airworthiness.

c. An inspection conducted at 200 hour intervals would likewise include the 50 hour items and 100 hour items in addition to those at EACH 200 HOURS.

d. The numbers appearing in the SPECIAL INSPECTION ITEMS column refer to data listed at the end of the inspection charts. These items should be checked at each inspection interval to insure that applicable servicing and inspection requirements are accomplished at the specified intervals.

e. A COMPLETE AIRCRAFT INSPECTION includes all 50, 100 and 200 hour items plus those Special Inspection Items which are due at the time of the inspection.

III INSPECTION PROGRAM SELECTION.

AS A GUIDE FOR SELECTING THE INSPECTION PROGRAM THAT BEST SUITS THE OPERATION OF THE AIRCRAFT, THE FOLLOWING IS PROVIDED.

1 **IF THE AIRCRAFT IS FLOWN LESS THAN 200 HOURS ANNUALLY.**

a **IF FLOWN FOR HIRE**

An aircraft operating in this category must have a COMPLETE AIRCRAFT INSPECTION each 100 hours and each 12 calendar months of operation. A COMPLETE AIRCRAFT INSPECTION consists of all 50, 100, 200 and Special Inspection Items shown in the inspection charts as defined in paragraph II above.

b **IF NOT FLOWN FOR HIRE**

An aircraft operating in this category must have a COMPLETE AIRCRAFT INSPECTION each 12 calendar months (ANNUAL). A COMPLETE AIRCRAFT INSPECTION consists of all 50, 100, 200 and Special Inspection Items shown in the inspection charts as defined in paragraph II above. In addition, it is recommended that between annual inspections, all items be inspected at the intervals specified in the inspection charts.

2. IF THE AIRCRAFT IS FLOWN MORE THAN 200 HOURS ANNUALLY.
Whether flown for hire or not, it is recommended that aircraft operating in this category be placed on the CESSNA PROGRESSIVE CARE PROGRAM. However, if not placed on Progressive Care, the inspection requirements for aircraft in this category are the same as those defined under paragraph III 1. (a) and (b).

Cessna Progressive Care may be utilized as a total concept program which insures that the inspection intervals in the inspection charts are not exceeded. Manuals and forms which are required for conducting Progressive Care inspections are available from the Cessna Service Parts Center.

IV INSPECTION GUIDE LINES.

(a) MOVABLE PARTS for: lubrication, servicing, security of attachment, binding, excessive wear, safetying, proper operation, proper adjustment, correct travel, cracked fittings, security of hinges, defective bearings, cleanliness, corrosion, deformation, sealing and tension.

(b) FLUID LINES AND HOSES for: leaks, cracks, dents, kinks, chafing, proper radius, security, corrosion, deterioration, obstruction and foreign matter.

(c) METAL PARTS for: security of attachment, cracks, metal distortion, broken spotwelds, corrosion, condition of paint and any other apparent damage.

(d) WIRING for: security, chafing, burning, defective insulation, loose or broken terminals, heat deterioration and corroded terminals.

(e) BOLTS IN CRITICAL AREAS for: correct torque in accordance with torque values given in the chart in Section 1, when installed or when visual inspection indicates the need for a torque check.

NOTE

Torque values listed in Section 1 are derived from oil-free cadmium-plated threads, and are recommended for all installation procedures contained in this book except where other values are stipulated. They are not to be used for checking tightness of installed parts during service.

(f) FILTERS, SCREENS & FLUIDS for: cleanliness, contamination and/or replacement at specified intervals.

(g) AIRCRAFT FILE.

Miscellaneous data, information and licenses are a part of the aircraft file. Check that the following documents are up-to-date and in accordance with current Federal Aviation Regulations. Most of the items listed are required by the United States Federal Aviation Regulations. Since the regulations of other nations may require other documents and data, owners of exported aircraft should check with their own aviation officials to determine their individual requirements.

To be displayed in the aircraft at all times:
1. Aircraft Airworthiness Certificate (FAA Form 8100-2).
2. Aircraft Registration Certificate (FAA Form 8050-3).
3. Aircraft Radio Station License, if transmitter is installed (FCC Form 556).

To be carried in the aircraft at all times:
1. Weight and Balance, and associated papers (Latest copy of the Repair and Alteration Form, FAA Form 337, if applicable).
2. Aircraft Equipment List.
3. Pilot's Operating Handbook

To be made available upon request:
1. Aircraft Log Book and Engine Log Book.

(h) ENGINE RUN-UP.

Before beginning the step-by-step inspection, start, run up and shut down the engine in accordance with instructions in the Pilot's Operating Handbook. During the run-up observe the following, making note of any discrepancies or abnormalities:

1. Engine temperatures and pressures.
2. Static rpm. (Also refer to Section 12 of this Manual.)
3. Magneto drop. (Also refer to Section 12 of this Manual).
4. Engine response to changes in power.
5. Any unusual engine noises.
6. Fuel selector and/or shut-off valve; operate engine on each tank (or cell) position and OFF position long enough to insure shut-off and/or selector valve functions properly.
7. Idling speed and mixture; proper idle cut-off.
8. Alternator and ammeter.
9. Suction gage.
10. Fuel flow indicator.

After the inspection has been completed, an engine run-up should again be performed to determine that any discrepancies or abnormalities have been corrected.

IMPORTANT
READ ALL INSPECTION REQUIREMENTS PARAGRAPHS PRIOR TO USING THESE CHARTS.

	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTION ITEM
PROPELLER				
1. Spinner	●			
2. Spinner bulkhead			●	
3. Blades	●			
4. Bolts and nuts			●	
5. Hub			●	
6. Governor and control			●	11
7. Anti-Ice electrical wiring	●			
8. Anti-Ice brushes, slip ring and boots	●			
ENGINE COMPARTMENT				
Check for evidence of oil and fuel leaks, then clean entire engine and compartment, if needed, prior to inspection.				
1. Engine oil screen filler cap, dipstick, drain plug and external filter element	●			1
2. Oil cooler		●		
3. Induction air filter	●			2
4. Induction airbox, air valves, doors and controls		●		25
5. Cold and hot air hoses			●	

Item	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTION ITEM
6. Engine baffles	•			
7. Cylinders, rocker box covers and push rod housings		•		
8. Crankcase, oil sump, accessory section and front crankshaft seal		•		
9. Engine hoses	•			3
10. Intake and exhaust systems	•			4
11. Ignition harness		•		
12. Spark plugs		•		
13. Compression check			•	
14. Crankcase and vacuum system breather lines			•	
15. Electrical wiring		•		
16. Vacuum pump		•		
17. Deleted				
18. Engine controls and linkage				6
19. Engine shock mounts, mount structure and ground straps			•	
20. Cabin heat valves, doors and controls			•	
21. Starter, solenoid and electrical connections		•		
22. Starter brushes, brush leads and commutator			•	
23. Alternator and electrical connections		•		21
24. Alternator brushes, brush leads, and commutator or slip ring				7
25. Voltage regulator mounting and electrical leads		•		
26. Magnetos (external) and electrical connections		•		
27. Magneto timing				8
28. Fuel-air (metering) control unit		•		
29. Firewall			•	
30. Firewall pulley brackets				27
31. Fuel injection system	•			
32. Engine cowl flaps and controls	•			
33. Engine cowling		•		
34. Turbocharger			•	9
35. Turbocharger oil reservoir and oil lines to turbocharger, waste gate and controller		•		20

Item	Each 50 Hours	Each 100 Hours	Each 200 Hours	Special Inspection Item
36. Waste gate, actuator and controller		•		
37. Turbocharger pressurized vent lines to fuel pump, discharge nozzles and fuel flow gage	•			
38. Turbocharger mounting brackets and linkage	•			
39. Alternator support bracket for security	•			
40. Turbocharger oil line check valve				42
41. Fuel manifold valve, valve cover, and fuel system		•		43
42. Fuel injection nozzles				46
FUEL SYSTEM				
1. Fuel strainer, drain valve and control, bay vents, caps and placards	•			22
2. Fuel strainer screen and bowl		•		
3. Fuel injector screen	•			
4. Fuel reservoirs			•	
5. Drain fuel and check bay interior, attachment and outlet screens				5
6. Fuel bays and sump drains			•	41
7. Fuel selector valve and placards	•			
8. Auxiliary fuel pump and throttle switches		•		
9. Engine-driven fuel pump	•			
10. Fuel quantity indicators and sensing units	•			
11. Fuel lines, check valve and vapor return line		•		23
12. Turbocharger vent system		•		
13. Engine primer		•		
14. Perform a fuel quantity indicating system operational test. Refer to Section 16 for detailed accomplishment instructions.				45
LANDING GEAR				
1. Brake fluid, lines and hose, linings, disc, brake assemblies and master cylinders			•	19
2. Main gear wheels	•			
3. Main landing gear bulkheads				28
4. Wheel bearings				10
5. Main gear springs			•	
6. Tires	•			
7. Torque link lubrication	•			
8. Parking brake system			•	
9. Nose gear strut and shimmy dampener (service as required)	•			

Item	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTIONS ITEM
10. Nose gear wheel	●			
11. Nose gear fork			●	
12. Nose gear steering system			●	
13. Park brake and toe brakes operational test	●			

LANDING GEAR RETRACTION SYSTEM

NOTE

When performing an inspection of the landing gear retraction system, the aircraft must be placed on jacks and an external electrical power source of at least 60 amp should be used to prevent drain on the aircraft battery while operating the system.

Item	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTIONS ITEM
1. Operate the landing gear through five fault-free cycles			●	
2. Check landing gear doors for positive clearance with any part of the landing gear during operation, and for proper fit when closed	●			
3. Check all hydraulic system components for security, hydraulic leaks and any apparent damage to components or mounting structure			●	19
4. Check doors, hinges, hinge pins and linkage for evidence of wear, other damage and security of attachment			●	
5. Inspect internal wheel well and tunnel structure for cracks, dents, loose rivets, bolts and nuts, corrosion or other damage			●	
6. Check electrical wiring and switches for security of connections, switch operation, and check gear position indicator lights for proper operation. Check wiring for proper routing and support			●	
7. Perform operational check and ensure proper rigging of all systems and components including downlocks, uplocks, doors, switches, actuators, and power pack (observing cycle time)			●	
8. Check main gear strut-to-pivot attachment		●		
9. Check condition of all springs		●		
10. Hydraulic fluid contamination check				12
11. Clean power pack self relieving check valve filter		●		
12. Landing gear and door manifold solenoids (mounted on power pack)				19

AIRFRAME

Item	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTIONS ITEM
1. Aircraft exterior	●			
2. Cabin skins				29
3. Belly skins				30
4. Aircraft structure			●	
5. Bulkheads; 55.625, 80.5 and 90.0				31

Item	EACH 50 HOURS	EACH 100 HOURS	EACH 200 HOURS	SPECIAL INSPECTIONS ITEM
6. Bulkheads; 125, 27, 35, 103, and aft pressure				32
7. Front carry-thru spar and front door post intersection				33
8. Windows, windshield, doors and seals	●			
9. Main cabin door and hinge screws				34
10. Main cabin door fillet				35
11. Main cabin door jamb				36
12. Emergency exit door jamb				37
13. Emergency exit door assembly				38
14. Seat stops, seat rails, upholstery, structure and mounting			●	26
15. Seat belts and shoulder harnesses	●			
16. Control column bearings, sprockets, pulleys, cables, chains, and turnbuckles			●	
17. Control lock, control wheel, and control column mechanism			●	
18. Instruments and markings	●			
19. Vacuum system central air filter			●	13
20. Magnetic compass compensation				5
21. Instrument wiring and plumbing			●	
22. Instrument panel, shock mounts, ground straps, cover, decals, and labeling			●	
23. Instrument panel and bulkhead 18.00				39
24. Defrosting, heating and ventilating system, and controls	●			
25. Cabin upholstery, trim, sunvisors, and ash trays			●	
26. Area beneath floor, lines, hoses, wires, an control cables			●	
27. Lights, switches, circuit breakers, fuses, and spare fuses	●			
28. Exterior lights	●			
29. Pitot and static systems			●	
30. Stall warning unit and pitot heater			●	
31. Radios, radio controls, avionics, and flight instruments	●			
32. Antennas and cables		●		
33. Battery, battery box, and battery cables	●			
34. Battery electrolyte				14
35. Emergency locator transmitter		●		

Item	Each 50 Hours	Each 100 Hours	Each 200 Hours	Special Inspections Item
36. Oxygen system			•	
37. Oxygen supply, masks and hose	•			16
38. Deice system plumbing			•	
39. Deice system components			•	43
40. Deice light lens				40
41. Deice system boots			•	
42. Vacuum Maniflold Check Valve (If so equipped)				44

CONTROL SYSTEMS

In addition to the items listed below, always check for correct direction of movement, correct travel, and correct cable tension.

Item	Each 50 Hours	Each 100 Hours	Each 200 Hours	Special Inspections Item
			•	
1. Cables, terminals, pulleys, pulley brackets, cable guards, turnbuckles, and fairleads			•	
2. Chains, terminals, sprockets, and chain guards	•			
3. Trim control wheels, indicators, actuator, and bungee			•	
4. Travel stops			•	
5. Decals and labeling	•			
6. Flap control switch, flap rollers and flap position indicator			•	
7. Flap motor, transmission, limit switches, structure, linkage, bellcranks etc				17
8. Flap actuator jackscrew threads	•			
9. Elevator, trim tab, hinges, and push-pull tube				18
10. Elevator trim tab actuator lubrication and tab freeplay inspection			•	25
11. Rudder pedal assemblies and linkage	•			
12. External skins of control surfaces and tabs	•			
13. Ailerons, hinges, and control rods		•		
14. Internal structure of control surfaces		•		
15. Balance weight attachment				

SPECIAL INSPECTION ITEMS

1 First 25 hours: refill with ashless dispersant oil.

2 Clean filters per paragraph 2-22. Replace as required.

3 Replace engine compartment rubber hoses (Cessna installed only) every 5 years or at engine overhaul whichever occurs first. This does not include drain hoses. Hoses which are beyond these limits and are in a serviceable condition, must be placed on order immediately and then replaced within 120 days after receiving the new hose(s) from Cessna. Replace drain hoses on condition Engine flexible hoses (Continental installed) (Refer to Continental Maintenance Manual and Continental Engine Service Bulletins).

4 General inspection every 50 hours. Refer to Section 12 for inspection procedures. Compliance with Cessna Single Engine Service Information Letter SE82-3 is mandatory for serials P21000001 thru P21000860.

5 Each 1000 hours, or to coincide with engine overhaul.

6 Each 100 hours for general condition, lubrication, and freedom of movement. These controls are not repairable. Replace every 1500 hours or sooner if required.

7 Inspect each 500 hours.

8 If magneto-to-engine timing is correct within plus zero degrees to minus two degrees, internal timing need not be checked. If timing is out of tolerance, remove magneto and set internal timing, then install and time to the engine. Maintenance and overhaul information covering Slick magnetos is available from Cessna Parts Distribution (CPD 2). Order 1037C1-13 for 4200/6200 series magnetos, or 1020-13 for 400/600 series magnetos.

9 Remove insulation blanket or heat shields and inspect for burned area, bulges or cracks. Remove tailpipe and ducting; inspect turbine for coking, carbonization, oil deposits and impeller for damage.

10 First 100 hours and each 500 hours thereafter. More often if operated under prevailing wet or dusty conditions.

11 If leakage is evident, refer to McCauley Governor Service Manual.

12 At first 50 hours, first 100 hours, and thereafter each 500 hours or one year, which ever comes first.

13 Replace each 500 hours.

14 Check electrolyte level and clean battery compartment each 50 hours or each 30 days.

15 Refer to Section 17 of this manual.

16 Inspect masks, hose and fittings for condition, routing and support.

17 Refer to paragraph 2-47 for detailed instructions.

18 Lubrication of the actuator is required each 1000 hours or three years, whichever comes first. Refer to figure 2-5 for grease specifications. Refer to Section 9 of this manual for freeplay limits, inspection and replacement.

19 Each five years replace all rubber packings, backups and hydraulic hoses in both the retraction and brake systems. Overhaul all retraction and brake system components.

20 Replace check valves in turbocharger oil lines each 1000 hours.

21 Check alternator belt tension, Refer to Section 17.

22 Beginning with P21000390 and earlier aircraft modified by SK210-93. Check fuel strainer insulation for security.

23. Beginning with P21000390 and earlier aircraft modified by SK210-93. Check that the fuel line insulation in the nose gear tunnel is in good condition. All fuel lines and vapor return lines are as far from exhaust system components as the installation will permit.
24. Compliance with Cessna Service Letter SE80-65 is required.
25. Refer to Cessna Service Letter SE80-64.
26. Inspect seat rails for cracks every 50 hours. Refer to Section 3.
27. First 12,000 hours and each 1000 hours thereafter. Check structure where pulley brackets attach to the firewall.
28. First 10,000 hours and each 500 hours thereafter. Check main landing gear bulkheads and rear door post channels for cracking.
29. First 12,000 hours and each 500 hours thereafter. Check cabin skin adjacent to cabin windows, emergency exit door and main cabin door.
30. First 10,000 hours and each 500 hours thereafter. Check belly skin for cracking and rivet failure.
31. First 10,000 hours and each 500 hours thereafter. Check for cracks.
32. First 12,000 hours and each 1,000 hours thereafter. Check for cracks.
33. First 10,000 hours and each 500 hours thereafter. Check for rivet failure.
34. First 10,000 hours and each 500 hours thereafter. Check for failure of screws.
35. First 4,000 hours and each 200 hours thereafter. Check for cracks and rivet failure.
36. First 6,000 hours and each 200 hours thereafter. Check for cracks.
37. First 10,000 hours and each 500 hours thereafter. Check for cracks.
38. First 12,000 hours and each 1,000 hours thereafter. Check for cracking.
39. First 4,000 hours and each 200 hours thereafter. Check for cracking and rivet failure.
40. First 12,000 hours and each 1,000 hours thereafter. Check for cracking.
41. Compliance with Cessna Single Engine Customer Care, Service Information Letter SE82-36 and Owner Advisory SE82-36 is required.
42. Replace turbocharger oil line check valves every 1000 hours. Refer to Cessna Single Engine Service Bulletin SEB92-7.
43. Each 100 hours or whenever fuel flow fluctuation is encountered, inspect fuel manifold valve, valve cover, and fuel system components and lines for signs of leaks. Refer to Teledyne Continental Motors Service Bulletin SB95-7.
44. Check condition and operation of check valve manifold, beginning five years from date of manufacture, and every twelve months thereafter; replace check valve manifold ten years from date of manufacture. Refer to Airborne Product Reference Memo #39 for date of manufacture information.
45. Fuel quantity indicating system operational test is required every 12 months. Refer to Section 16 for detailed accomplishment instructions.
46. At the first 100-hour inspection on new, rebuilt or overhauled engines, remove and clean the fuel injection nozzles. Thereafter, the fuel injection nozzles must be cleaned at 300-hour intervals or more frequently if fuel stains are found.

2-46. COMPONENT TIME LIMITS

1. General

A. Most components listed throughout Section 2 should be inspected as detailed elsewhere in this section and repaired, overhauled or replaced as required. Some components, however, have a time or life limit, and must be overhauled or replaced on or before the specified time limit.

NOTE: The terms overhaul and replacement as used within this section are defined as follows:

Overhaul - Item may be overhauled as defined in FAR 43.2 or it can be replaced.

Replacement - Item must be replaced with a new item or a serviceable item that is within its service life and time limits or has been rebuilt as defined in FAR 43.2.

B. This section provides a list of items that must be overhauled or replaced at specific time limits. Table 1 lists those items that Cessna has mandated must be overhauled or replaced at specific time limits. Table 2 lists component time limits that have been established by a supplier to Cessna for the supplier's product.

C. In addition to these time limits, the components listed herein are also inspected at regular time intervals set forth in the Inspection Charts, and may require overhaul/replacement before the time limit is reached based on service usage and inspection results.

2. Cessna-Established Replacement Time Limits

A. The following component time limits have been established by Cessna Aircraft Company.

Table 1: Cessna-Established Replacement Time Limits

COMPONENT	REPLACEMENT TIME	OVERHAUL
Restraint Assembly Pilot, Copilot, And Passenger Seats	10 years	NO
Trim Tab Actuator	1,000 hours or 3 years, whichever occurs first	YES
Vacuum System Filter	500 hours	NO
Vacuum System Hoses	10 years	NO
Pitot and Static System Hoses	10 years	NO
Vacuum Relief/Regulator Valve Filter (If Installed)	500 hours	NO
Engine Compartment Flexible Fluid Carrying Teflon Hoses (Cessna-Installed) Except Drain Hoses (Drain hoses are replaced on condition)	10 years or engine overhaul, whichever occurs first (Note 1)	NO

COMPONENT	REPLACEMENT TIME	OVERHAUL
Engine Compartment Flexible Fluid Carrying Rubber Hoses (Cessna-Installed) Except Drain Hoses (Drain hoses are replaced on condition)	5 years or engine overhaul, whichever occurs first (Note 1)	NO
Engine Air Filter	500 hours or 36 months, whichever occurs first (Note 9)	NO
Engine Mixture, Throttle, and Propeller Controls	At engine TBO	NO
Oxygen Bottle - Lightweight Steel (ICC-3HT, DOT-3HT)	Every 24 years or 4380 cycles, whichever occurs first	NO
Oxygen Bottle - Composite (DOT-E8162)	Every 15 years	NO
Engine Driven Dry Vacuum Pump Drive Coupling (Not lubricated with engine oil)	6 Years	NO
Engine Driven Dry Vacuum Pump Drive Coupling (Not lubricated with engine oil)	6 years or at vacuum pump replacement, whichever occurs first	NO
Engine Driven Dry Vacuum Pump (Not lubricated with engine oil)	500 hours (Note 10)	NO
Standby Dry Vacuum Pump	500 hours or 10 years, whichever occurs first (Note 10)	NO
Check Valve (Turbocharger Oil Line Check Valve)	Every 1,000 hours of operation (Note 11)	NO

3. Supplier-Established Replacement Time Limits

A. The following component time limits have been established by specific suppliers and are reproduced as follows:

Table 2: Supplier-Established Replacement Time Limits

COMPONENT	REPLACEMENT TIME	OVERHAUL
ELT Battery	(Note 3)	NO
Vacuum Manifold	(Note 4)	NO

COMPONENT	REPLACEMENT TIME	OVERHAUL
Magnetos	(Note 5)	YES
Engine	(Note 6)	YES
Engine Flexible Hoses (TCM-Installed)	(Note 2)	NO
Auxiliary Electric Fuel Pump	(Note 7)	YES
Propeller	(Note 8)	YES

NOTES:

Note 1: This life limit is not intended to allow flexible fluid-carrying Teflon or rubber hoses in a deteriorated or damaged condition to remain in service. Replace engine compartment flexible Teflon (AE3663819BXXXX series hose) fluid-carrying hoses (Cessna-installed only) every ten years or at engine overhaul, whichever occurs first. Replace engine compartment flexible rubber fluid-carrying hoses (Cessna-installed only) every five years or at engine overhaul, whichever occurs first (this does not include drain hoses). Hoses which are beyond these limits and are in a serviceable condition, must be placed on order immediately and then be replaced within 120 days after receiving the new hose from Cessna.

Note 2: For TCM engines, refer to Teledyne Continental Service Bulletin SB97-6, or latest revision.

Note 3: Refer to FAR 91.207 for battery replacement time limits.

Note 4: Refer to Airborne Air & Fuel Product Reference Memo No. 39, or latest revision, for replacement time limits.

Note 5: For airplanes equipped with Slick magnetos, refer to Slick Service Bulletin SB2-80C, or latest revision, for time limits.

For airplanes equipped with TCM/Bendix magnetos, refer to Teledyne Continental Motors Service Bulletin No. 643, or latest revision, for time limits.

Note 6: Refer to Teledyne Continental Service Information Letter SIL98-9, or latest revision, for time limits.

Note 7: Refer to Cessna Service Bulletin SEB94-7 Revision 1/Dukes Inc. Service Bulletin NO. 0003, or latest revision.

Note 8: Refer to the applicable McCauley Service Bulletins and Overhaul Manual for replacement and overhaul information.

Note 9: The air filter may be cleaned, refer to Section 2 of this service manual and for airplanes equipped with an air filter manufactured by Donaldson, Refer to Donaldson Aircraft Filters Service Instructions P46-9075 for detailed servicing instructions.
The address for Donaldson Aircraft Filters is:
Customer Service
115 E. Steels Corners RD
Stow OH. 44224

Do not overservice the air filter; overservicing increases the risk of damage to the air filter from excessive handling. A damaged/worn air filter may expose the engine to unfiltered air and result in damage/excessive wear to the engine.

Note 10: Replace engine driven dry vacuum pump not equipped with a wear indicator every 500 hours of operation, or replace according to the vacuum pump manufacturer's recommended inspection and replacement interval, whichever occurs first.

Replace standby vacuum pump not equipped with a wear indicator every 500 hours of operation or 10 years, whichever occurs first, or replace according to the vacuum pump manufacturer's recommended inspection and replacement interval, whichever occurs first.

For a vacuum pump equipped with a wear indicator, replace pump according to the vacuum pump manufacturer's recommended inspection and replacement intervals.

Note 11: Replace the turbocharger oil line check valve every 1,000 hours of operation (Refer to Cessna Service Bulletin SEB91-7 Revision 1, or latest revision).

SECTION 3

FUSELAGE

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3-1. FUSELAGE.

3-2. WINDOWS AND WINDSHIELD.

3-3. DESCRIPTION. The windshield and windows are single-piece acrylic plastic panels held by formed retainers, secured to the fuselage with screws and nuts. Sealer EC-1608 B and A (accelerator) (3 M Co), or equivalent sealers are used throughout the pressurized cabin construction.

3-4. CLEANING (Refer to Section 2).

3-5. WAXING. Waxing will fill in minor scratches in clear plastic and help protect the surface from further abrasion. Use a good grade of commercial wax applied in a thin, even coat. Bring wax to a high polish by rubbing lightly with a clean, dry flannel cloth.

3-6. REPAIRS.

WARNING

If temporary repairs are made, aircraft must be operated in unpressurized mode until replacement of windows can be made.

No repairs of any kind are recommended on highly stressed or compounded curves where the repair would be likely to affect the pilots or copilots field of vision.

Damaged window panels and windshield may be removed and replaced if the damage is extensive. However, certain repairs as prescribed in the following paragraphs can be made successfully without removing the damaged part from the aircraft. Curved areas are more difficult to repair than flat areas and any repaired area is both structurally and optically inferior to the original surface.

3-7. SCRATCHES. Scratches on clear plastic surfaces can be removed by hand-sanding operations followed by buffing and polishing, if steps below are followed carefully.

a. Wrap a piece of No. 320 (or finer) sandpaper or abrasive cloth around a rubber pad or wood block. Rub the surface around the scratch with a circular motion, keeping the abrasive constantly wet with clean water to prevent scratching the surface further. Use minimum pressure and cover an area large enough to prevent the formation of "bull's-eyes" or other optical distortions.

b. Continue the sanding operation, using progressively finer grade of abrasives until the scratches disappear.

c. When the scratches have been removed, wash the area thoroughly with clean water to remove all gritty particles. The entire sanded area will be clouded with minute scratches which must be removed to restore transparency.

d. Apply fresh tallow or buffing compound to a motor-driven buffing wheel. Hold the wheel against the plastic surface, moving it constantly over the damaged area until cloudy appearance disappears. A 2000-foot-per-minute surface speed is recommended to prevent overheating and distortion.

NOTE

Polishing can be accomplished by hand but it will require a considerably longer period of time to attain the same result as a buffing wheel.

e. When buffing is finished, wash the area thoroughly and dry with a soft flannel cloth. Allow the surface to cool and inspect the area to determine if full transparency has been restored. Then apply a thin coat of hard wax and polish the surface lightly with a clean flannel cloth.

NOTE

Rubbing the plastic surface with a dry cloth will build up an electrostatic charge which attracts dirt particles and may eventually cause scratching of the surface. After the wax has hardened, dissipate this charge by rubbing the surface with a slightly damp chamois. This will also remove the dust particles which have collected while the wax is hardening.

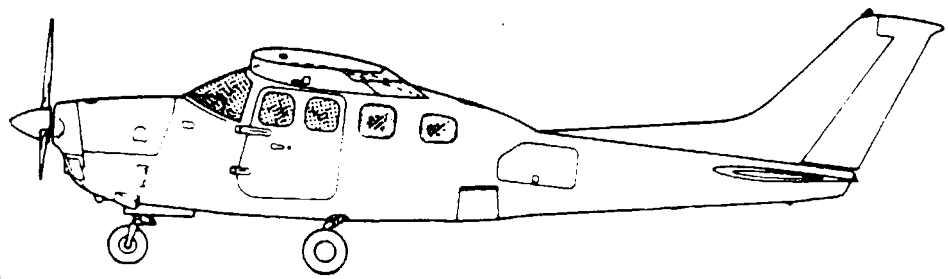
f. Minute hairline scratches can often be removed by rubbing with commercial automobile body cleaner or fine-grade rubbing compound. Apply with a soft, clean, dry cloth or imitation chamois.

3-8. PLASTIC WINDOWS INSPECTION CRITERIA.

DEFECTS	CRITICAL VISION AREA		NON-CRITICAL VISION AREA	
	MAXIMUM REPAIRABLE	MAXIMUM PERMISSIBLE WITHOUT REPAIRING	MAXIMUM REPAIRABLE	MAXIMUM PERMISSIBLE WITHOUT REPAIRING
NICKS AND DENTS				
Maximum Diameter.	Not repairable.	0.025 inch.	0.250 inch.	0.125 inch.
Depth.	Not repairable.	0.016 inch.	0.060 inch.	0.032 inch.
Frequency.	None	2 per sq. ft.	2 per sq. ft.	1 per sq. ft.
SCRATCHES.				
Length.	12 inches total per area.	12 inches total per area.	24 inches total per area.	24 inches total per area.
Width.	0.020 inch.	0.020 inch.	0.050 inch.	0.020 inch.
Depth.	0.016 inch.	0.008 inch.	0.008 inch.	0.008 inch.
Frequency.	12 inches total per area.	12 inches total per area.	20% of total area.	Total length of scratches equals 3 times longest dimension of area.
CRACKS.				
Length.	Not repairable.	None.	Not repairable.	None.
Frequency.	Not repairable.	None.	Not repairable.	None.

3-8. PLASTIC WINDOWS INSPECTION CRITERIA (Cont).

DEFECTS	CRITICAL VISION AREA		NON-CRITICAL VISION AREA	
	MAXIMUM REPAIRABLE	MAXIMUM PERMISSIBLE WITHOUT REPAIRING	MAXIMUM REPAIRABLE	MAXIMUM PERMISSIBLE WITHOUT REPAIRING
CRAZING.				
Slight.	Not repairable.	Crazing adjacent to the edges of the glass must not extend more than 1 inch into the critical vision area.	Not repairable.	Shall be contained in a 9.00 inch circle.
Severe.	Not repairable.	Crazing adjacent to the edge of the glass must not extend more than 1 inch into the critical vision area.	Not repairable.	Shall be contained in a 6.00 inch circle.
DISCOLORATION.				
	Not repairable.	None.	Not repairable.	May extend 1 inch from all edges of non-critical areas.



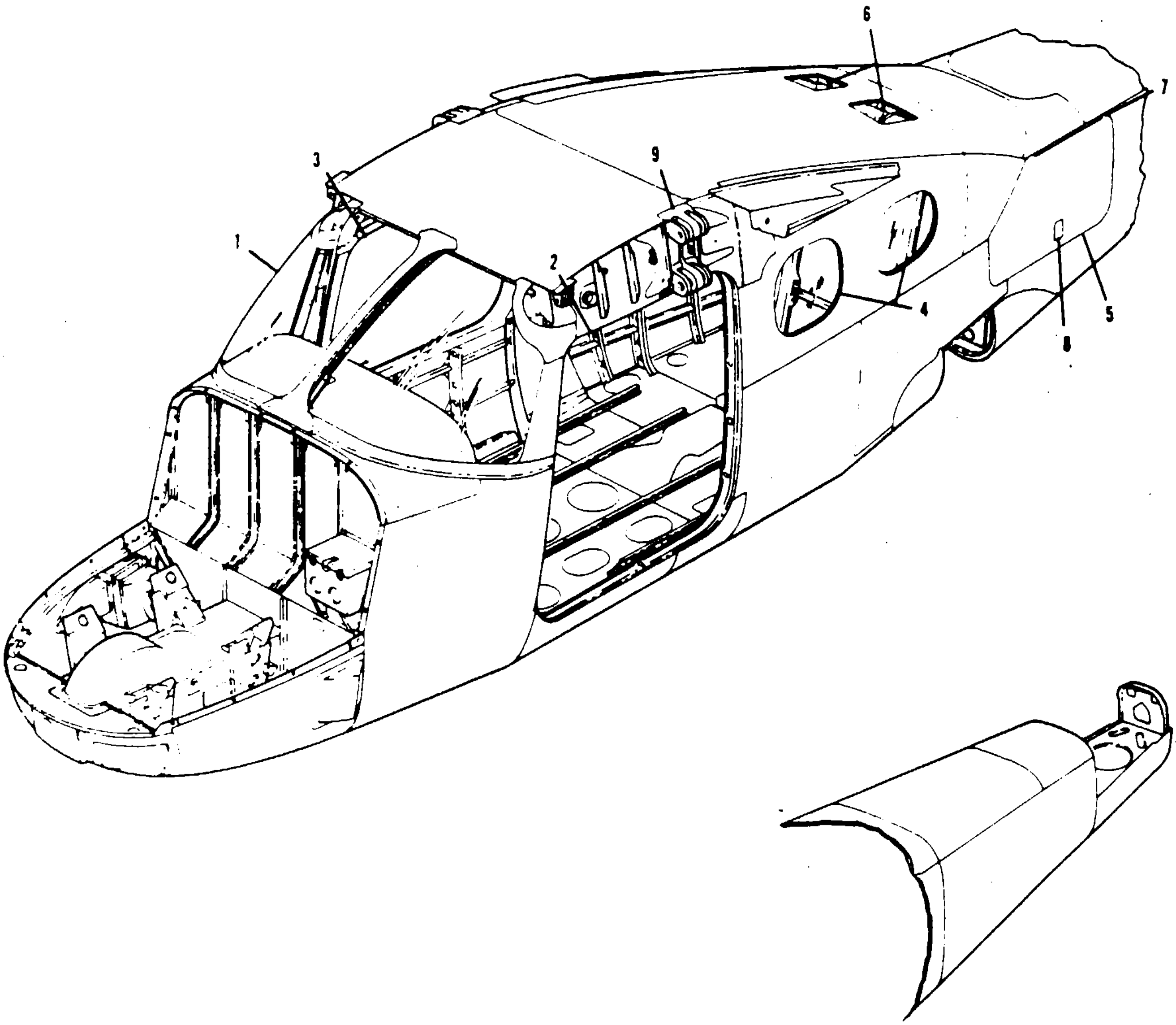
CRITICAL VISION AREA

NON-CRITICAL VISION AREA

NOTE

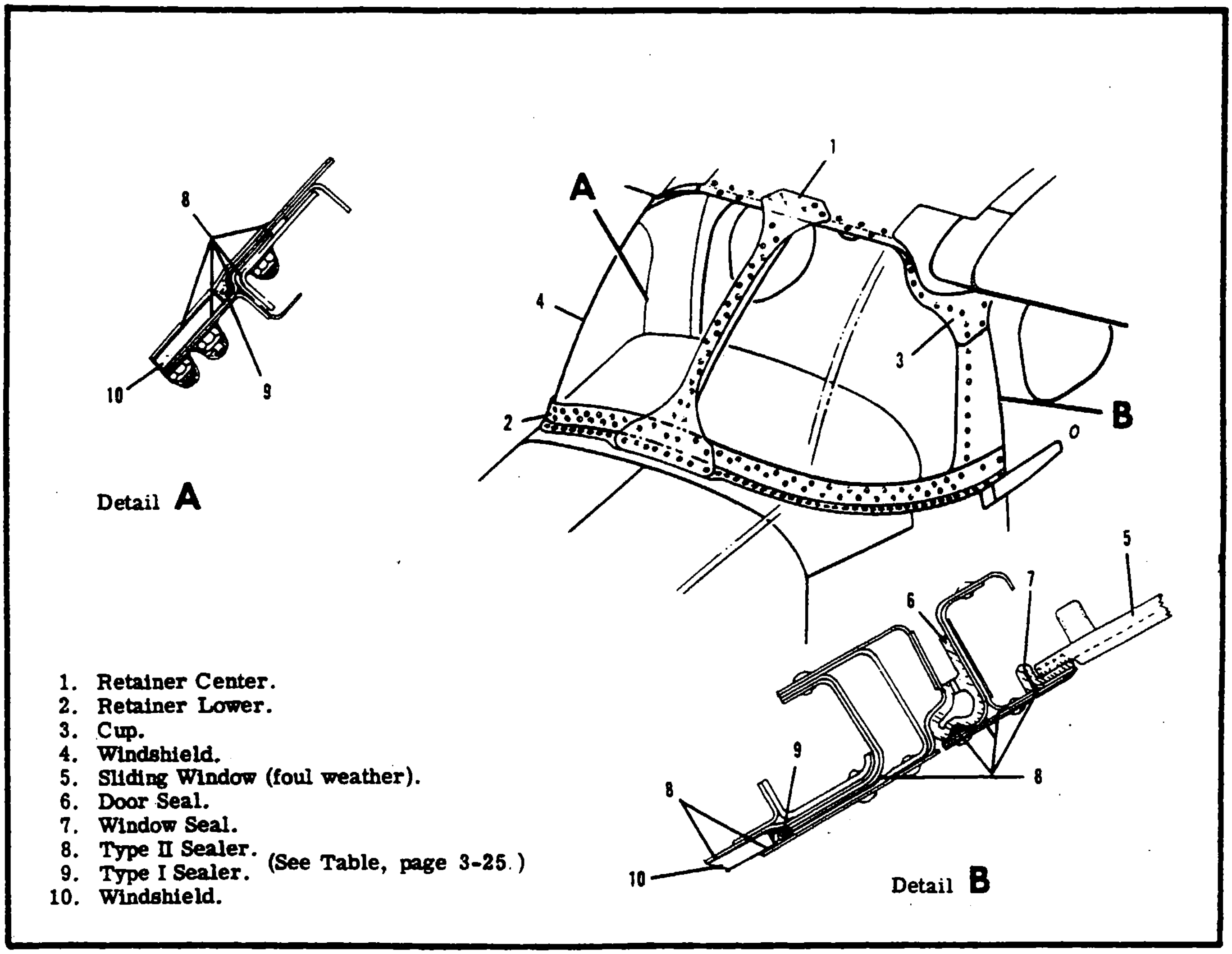
Left windows typical for right windows.

Figure 3-1. Critical Vision Diagram



1. Windshield
2. Main Cabin Door
3. Emergency Door
4. Side Windows
5. Baggage Door
6. Rear Windows
7. Hinge Pin.
8. Latch
9. Main Spar.

Figure 3-1 A. Fuselage Assembly.



1. Retainer Center.
2. Retainer Lower.
3. Cup.
4. Windshield.
5. Sliding Window (foul weather).
6. Door Seal.
7. Window Seal.
8. Type II Sealer. (See Table, page 3-25.)
9. Type I Sealer.
10. Windshield.

Figure 3-2. Windshield Installation.

3-9. WINDSHIELD. (Refer to figure 3-2).

3-10. REMOVAL AND INSTALLATION.

a. Remove sun visors and upper windshield moulding.
b. Remove screws securing upper inside retainer.
c. Remove screws securing outside center strip.
d. Remove screws securing lower outside retainer.
e. Ease windshield forward, at the bottom, out of the side retainer strips and from under the cabin top skin.
f. Clean all retainer strips and channels using procedures in Section 16.
g. Inspect all retainers for damage and repair or replace as necessary.
h. Reverse the preceding steps for installation.
i. When installing a new windshield check fit and carefully file or grind away excess plastic.
j. Install new plastic sleeves over screws and dip screw heads in sealer before installing.
k. After installation remove excess sealer from inside and outside of windshield.

3-11. WINDOWS. Only the foul weather window is movable in its mount, the others are stationary. The foul weather window, most forward on main cabin door, unlatches at the rear edge, swings outward, and slides aft to open.

3-12. FOUL WEATHER WINDOW REMOVAL AND INSTALLATION.

a. Unlatch, pull outward, and slide window aft.
b. Remove four screws from inside trim, and remove trim.
c. Remove stop bolts from slide and pull window assembly from slide.
d. Replace or repair as necessary, inspect seal condition, and reverse above sequence for installation.

3-13. REMOVAL AND REPLACEMENT OF MAIN CABIN WINDOWS.

a. Remove trim from inside windows.
b. Remove all screws around window periphery from out side.

c. Remove retainer inside, and push window from outside to remove.
d. To install, reverse above procedures. Seal as directed in applicable illustrations.

3-14. CABIN DOOR

3-15. DESCRIPTION. Entry is provided through the left main cabin door. The right half door is for emergency exit only. Both doors use the same type latches, three (3) holding the emergency door, and nine (9) on the main cabin door. Anytime parts are removed and replaced, or latch push-pull rods are disconnected, the rigging should be checked to ensure positive latching prior to next flight. Refer to paragraph 3-18 for rigging procedures. All latches are operated with a three-position handle: OPEN, CLOSE, and LATCH.

3-16. REMOVAL AND INSTALLATION. (Refer to figure 3-3).
a. Remove door travel limit.
b. Disconnect door stop arm.
c. Hold door firmly, and remove six (6) hinge mount screws.
d. To reinstall, reverse above sequence.

NOTE

When fitting a new door, be cautious, because seal must make a definite contact, and door contour must be trimmed to fair.

e. With new door set to contour by removing the receptacle assembly from the door jamb; loosen the inner receptacle nut and adjust inboard or outboard as required. Retorque nut 50 to 70 lb-in. On final fitting of door, check side clearance between bolts and their receptacles (use grease to check clearance). Readjust inner receptacle sideways as required, note inboard and outboard position before loosening receptacle nut.
f. Refer to paragraph 3-18 for rigging.

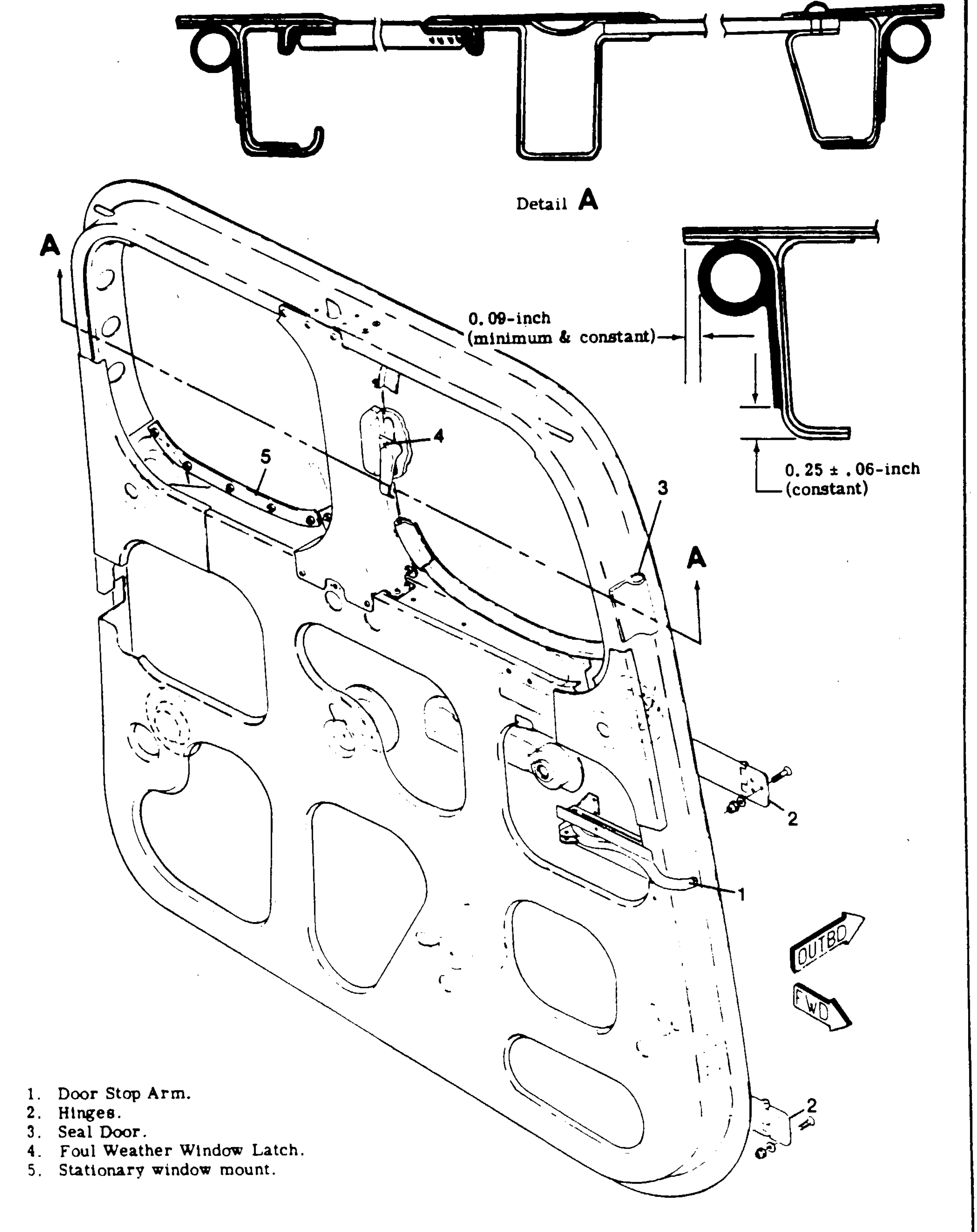
3-17. REMOVAL AND INSTALLATION OF DOOR LATCHES.
a. Remove inside trim to expose latch mount screws.
b. Disconnect latch mechanisms: push-pull rods, cables, bellcranks, etc. There are nine (9) latches on the main door and three on the emergency exit door.
c. If replacing door, refer to paragraph 3-17A.
d. To install door latches, reverse procedures outlined in steps "a" and "b".

3-17A. INSTALLING NEW DOOR. (Refer to figure 3-5.) When installing a new door, lock plates and latches, mounted on the door posts and upper and lower door frames, will have to be rigged to receive lock bolts. There are nine (9) door latches in the cabin door. The following information will be helpful and assist in door installation.
a. There are two types of lockplates and receptacles used to secure the main cabin door. A seven degree (7°) plate/receptacle assembly and a three degree (3°) plate/receptacle are utilized in the main cabin door installation. The differences are shown in the installation (figure 3-5A). The three degree (3°) assemblies are used on the forward and aft faces of the door jamb. The seven degree assemblies are used on the top and bottom faces of the door jamb.
b. Adjustment of the lock plate/receptacle is accomplished by moving the receptacle up or down or inboard or outboard. Maximum adjustment is limited to two teeth in any one direction.

3-18. RIGGING MAIN DOOR LATCH. If replacing latch or parts of a latch, the push-pull rods will be disconnected. If realignment is primary, then disconnect push-pull rods as necessary to allow rig pin installation, and with the door latch in the CLOSE position complete the following:
a. Install rigging pins in bellcranks and rotary clutch bolt guide assembly.
b. Rig all latch pins to dimensions shown in figure 3-5.
c. Rig upper center latch pin to dimensions specified in detail A.
d. With rigging pins installed, adjust push-pull rods to fit, and connect to latch pins and bellcranks.
e. Remove rigging pins and check travel dimensions specified in detail A.
f. Check rotary clutch and bolt dimensions specified in detail C.

3-19. MAIN DOOR LOCK.
a. The outside door key-lock consists of locking the outside door handle with a cam sliding into a slot in the door handle. It does not lock the door latching mechanism in any other manner. Maintenance consists of removal and replacement only.
b. The interior door lock, immobilizes both latch handles. It is activated on the inside by pushing a tab IN until flush with door. An emergency release is located on the outside immediately above the door handle. It is in the form of a push button, and functions to UNLOCK the inside lock mechanism from the outside if required for an emergency entry. The push button is sealed to maintain cabin pressure when operating in the pressurized mode.
c. If the lock is to be replaced, the new lock may be modified to accept the original key. This is desirable, because the same key is used for the ignition switch and the cabin door lock. After removing the old lock from the door, proceed as follows:
1. Remove the lock cylinder from new housing.
2. Insert the original key into the new cylinder, and file off any protruding tumblers flush with cylinder. Without removing key, check that cylinder rotates freely in the housing.
3. Install the lock assembly in door and check lock operates with door open.
4. Destroy the new key and discard the code number on the cylinder.

3-23. DOOR SEALS. This airplane uses adhesive only to fasten seals to doors. Seal is placed with small pressurizing holes toward pressure source (cabin). As the cabin is pressurized, the seal is inflated at the same rate to ensure a constant seal between doors and door frames.



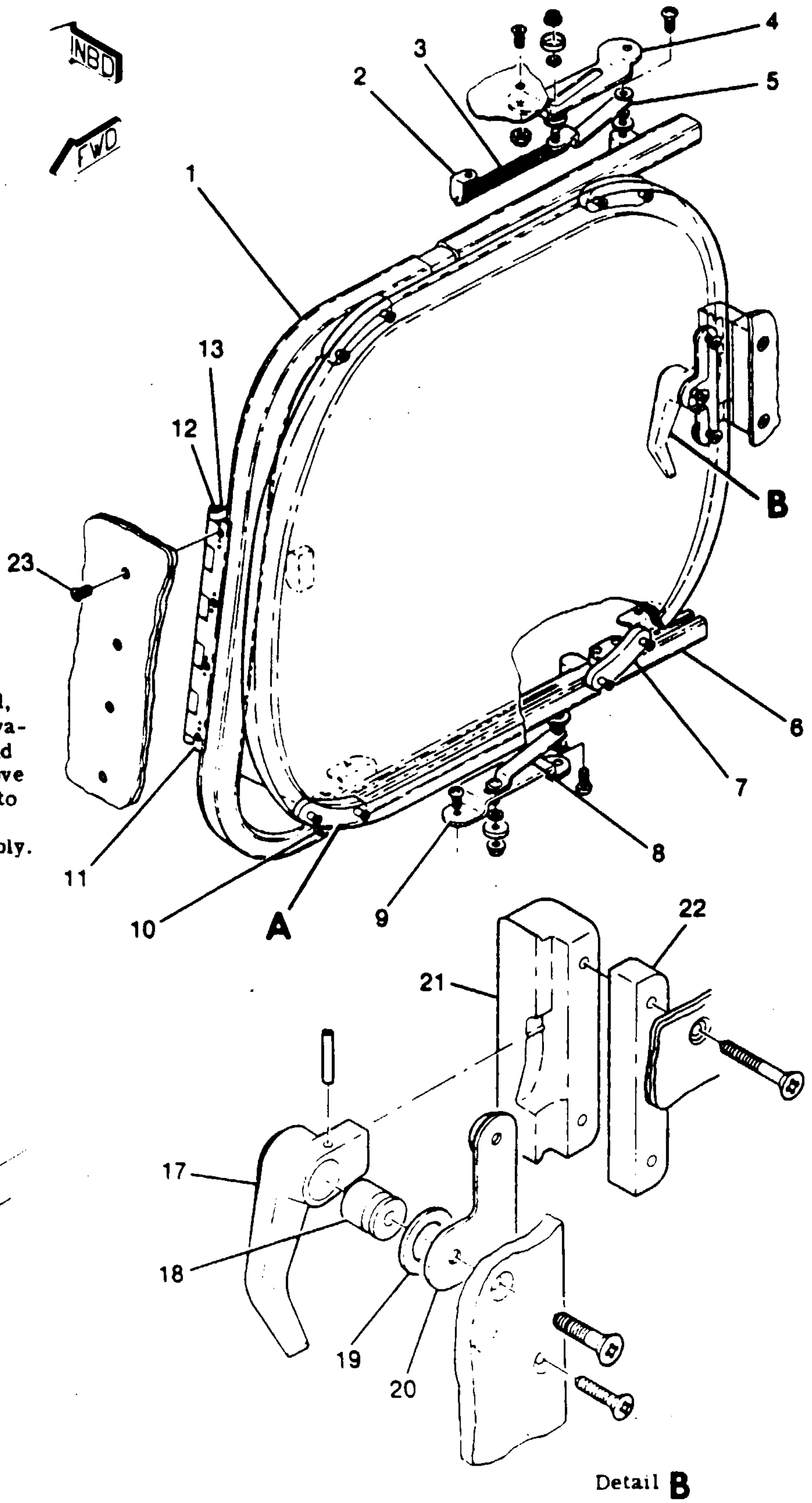
1. Door Stop Arm.
2. Hinges.
3. Seal Door.
4. Foul Weather Window Latch.
5. Stationary window mount.

Figure 3-3. Main Cabin Door Assembly.

1. Window Mount
2. Spring-Attach Anchor
3. Spring
4. Upper Bracket
5. Upper Link
6. Frame Assmbly
7. Mount
8. Lower Link
9. Lower Bracket
10. Stop Nut
11. Hinge Half
12. Hinge Pin
13. Hinge Half
14. Mount
15. Link Spacer
16. Slide Bar
17. Handle
18. Insert
19. Spring Washer
20. Doubler
21. Striker
22. Spacer
23. Screws

NOTE

With cabin door closed and latched, check area of sliding window for water leaks. If water leaks in around seal, loosen 4 screws (23) and move window frame assembly outboard to maximum allowed by the floating nutplates on window frame assembly. Retorque screws and recheck for water leaks.



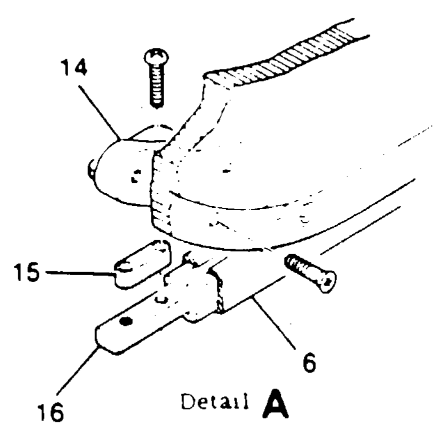
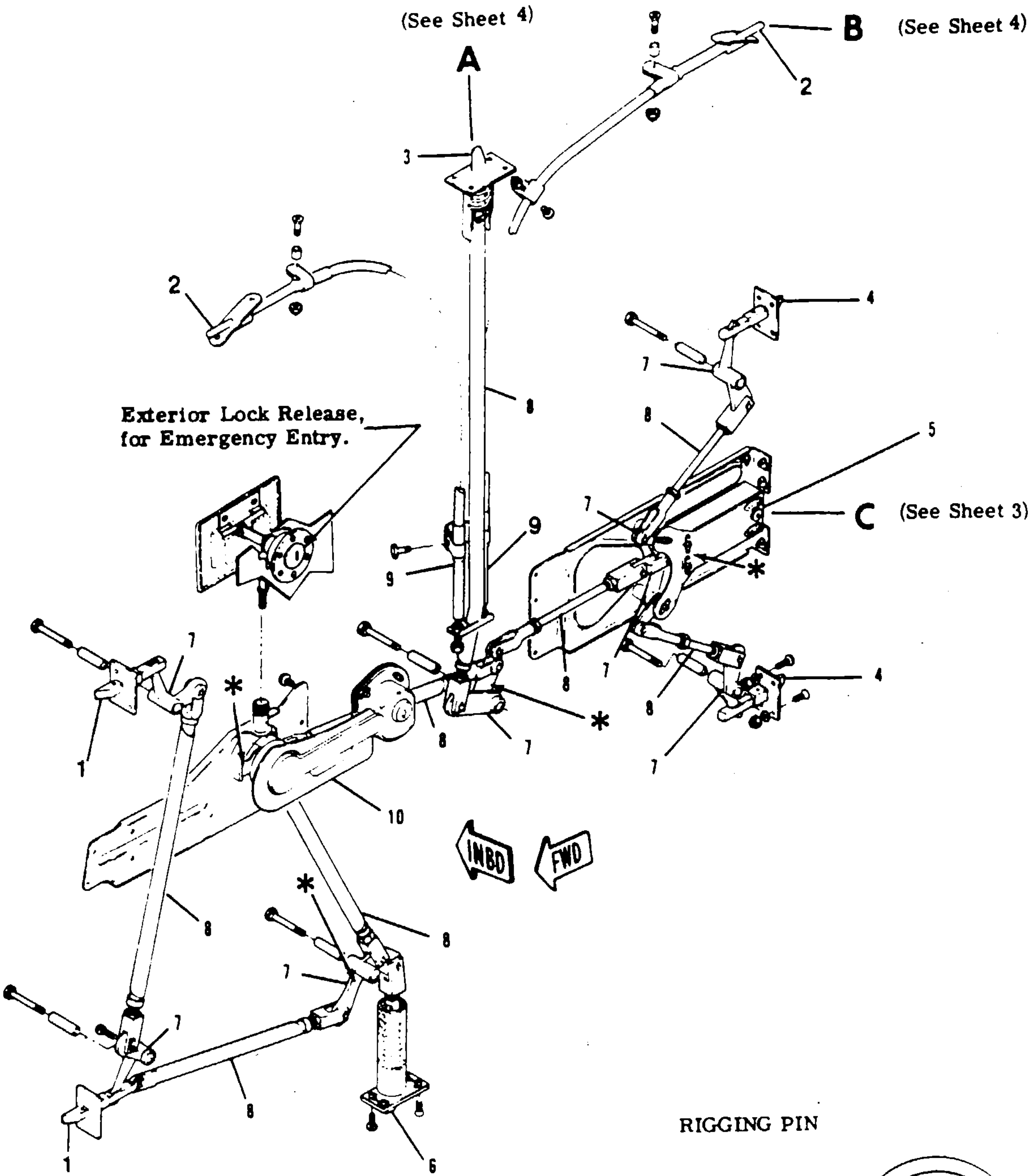
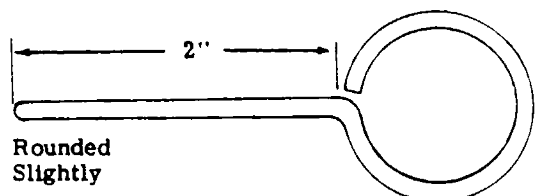


Figure 3-4. Cabin Door Sliding Window Installation



1. Front Latch Pins.
2. Cable Latch Pins.
3. Upper Center Latch Pins.
4. Aft Latch Pins.
5. Rotary Clutch Bar Latch.
6. Lower Center Latch Pin.
7. Bell Cranks.
8. Push-Pull Rods.
9. Pull Cables.
10. Lock Mechanism.

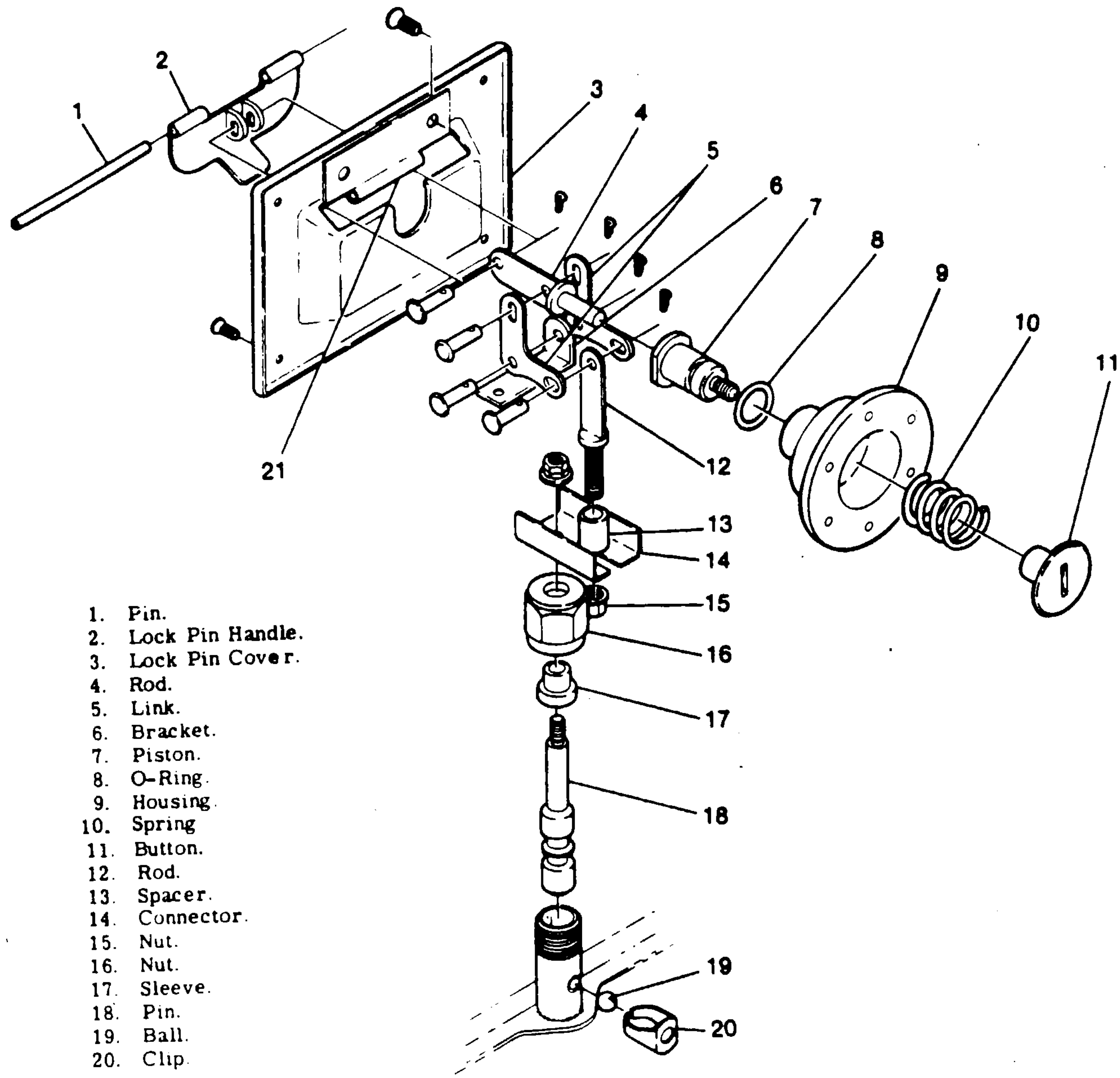
RIGGING PIN



Fabricate from .125 diameter welding rod.

* Rigging pins required at these points.

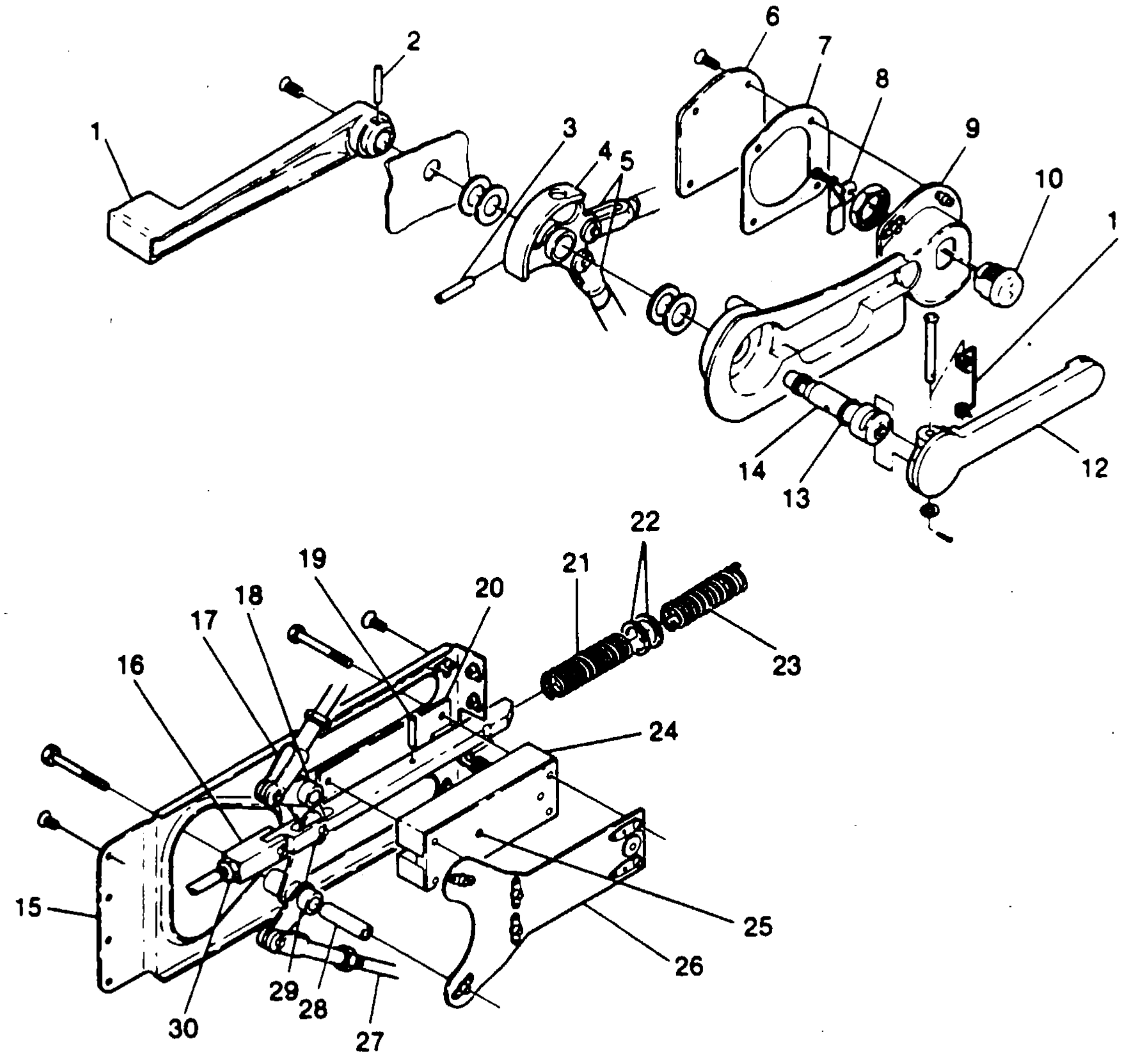
Figure 3-5. Door Latch Mechanism (Sheet 1 of 4)



1. Pin.
2. Lock Pin Handle.
3. Lock Pin Cover.
4. Rod.
5. Link.
6. Bracket.
7. Piston.
8. O-Ring.
9. Housing.
10. Spring
11. Button.
12. Rod.
13. Spacer.
14. Connector.
15. Nut.
16. Nut.
17. Sleeve.
18. Pin.
19. Ball.
20. Clip.

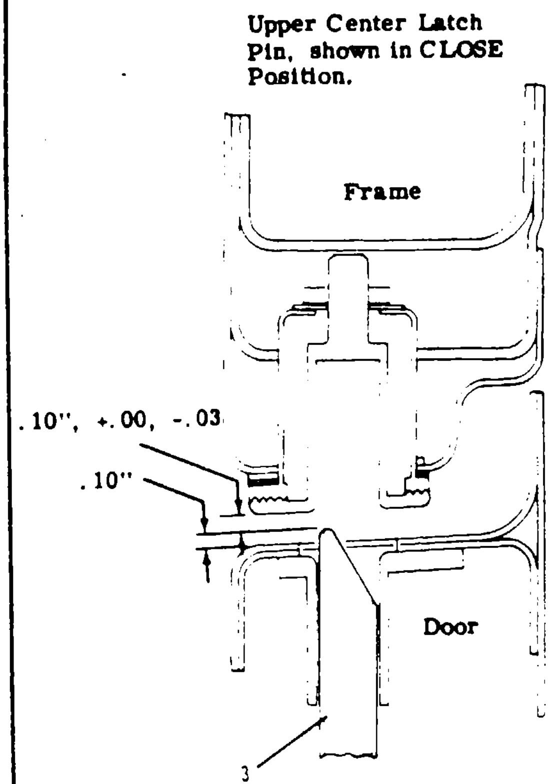
Cabin Door Pin Lock Installation

Figure 3-5. Door Latch Mechanism (Sheet 2 of 4).

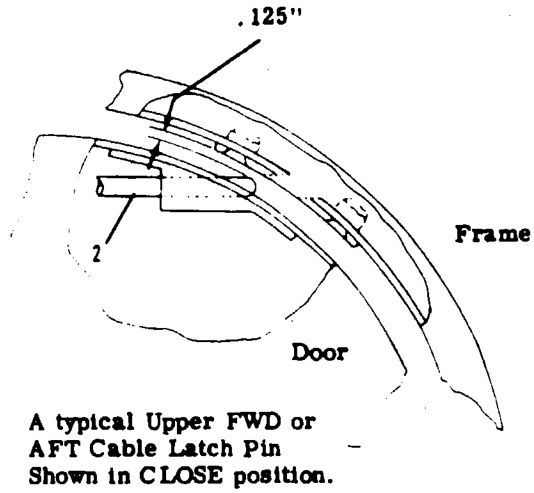


1. Inside Door Handle.
2. Pin.
3. Pin.
4. Bellcrank.
5. Clevis.
6. Cover.
7. Gasket.
8. Cabin Door Lock Cam.
9. Cabin Door Structure.
10. Cabin Door Lock Assembly.
11. Spring.
12. Handle.
13. Packing.
14. Cabin Door Handle Spindle.
15. Rotary Latch Base Plate.
16. Clevis.
17. Clevis.
18. Upper Bell Crank.
19. Pin.
20. Bolt Guide Assembly.
21. Forward Spring.
22. Washer.
23. Aft Spring.
24. Bolt Guide.
25. Setscrew.
26. Outer Plate Assembly.
27. Rod.
28. Bushing.
29. Lower Bell Crank.
30. Check Nut.

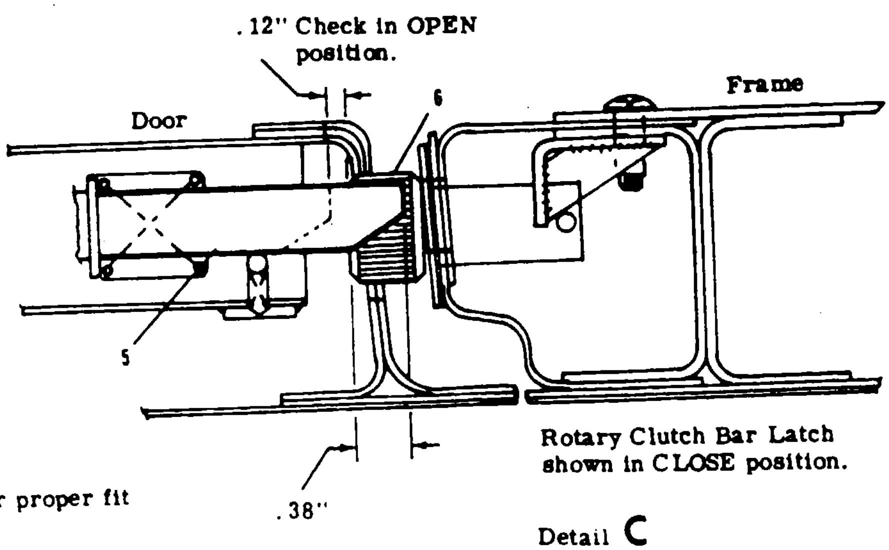
Figure 3-5. Door Latch Mechanism (Sheet 3 of 4).



Detail A



Detail B



Detail C

2. Cable Latch Pin.
3. Upper Center Latch Pin.
5. Rotary Clutch Bar Latch.
6. Rotary Clutch.

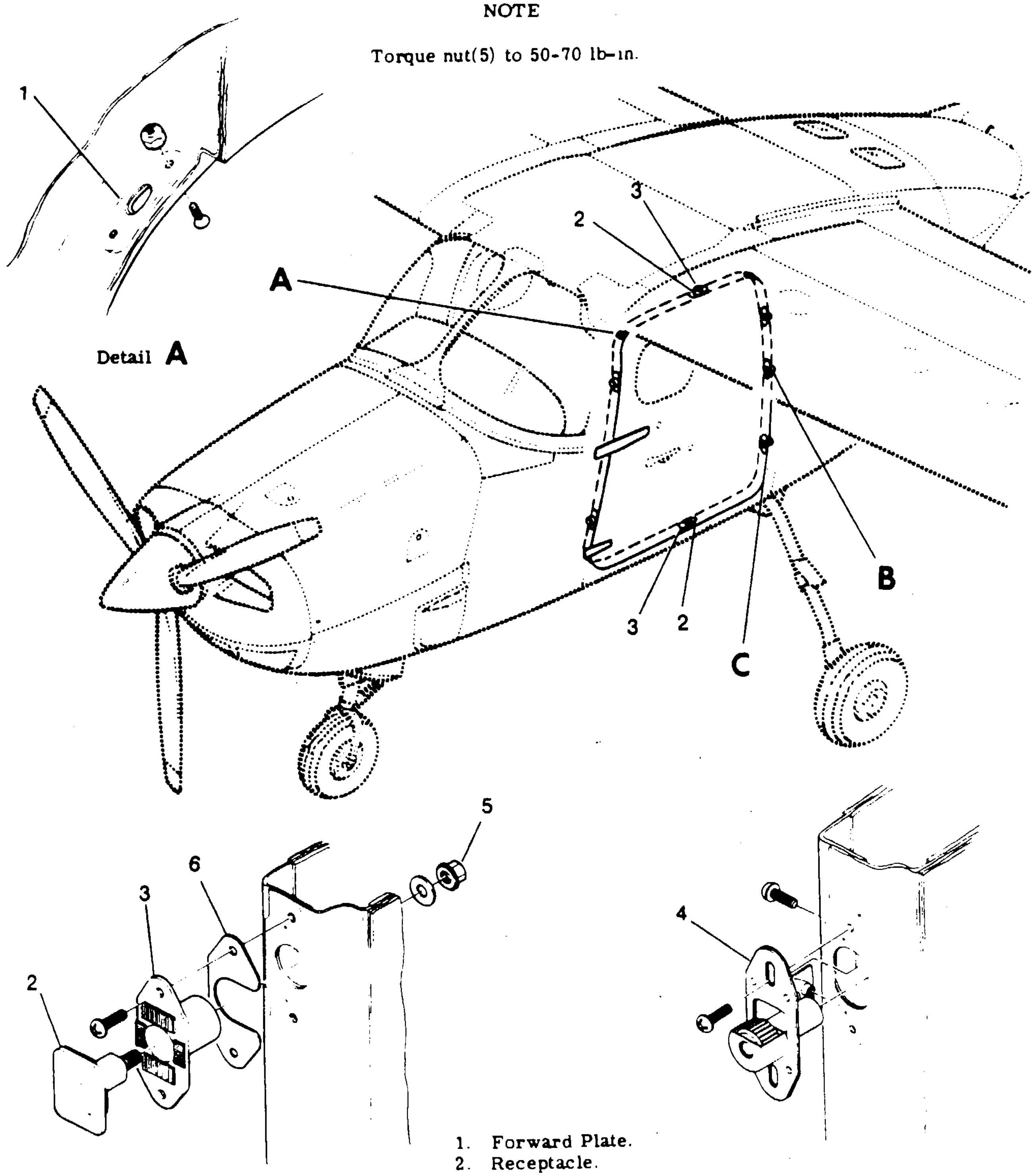
NOTE

Remove or Install Shims for proper fit as indicated by dimensions.

Figure 3-5. Door Latch Mechanism (Sheet 4 of 4).

NOTE

Torque nut(5) to 50-70 lb-in.



1. Forward Plate.
2. Receptacle.
3. Lock Plate.
4. Cover and Clutch Assembly.
5. Nut.
6. Shim.

Figure 3-5A. Main Door Receptacle Installation (Sheet 1 of 2).

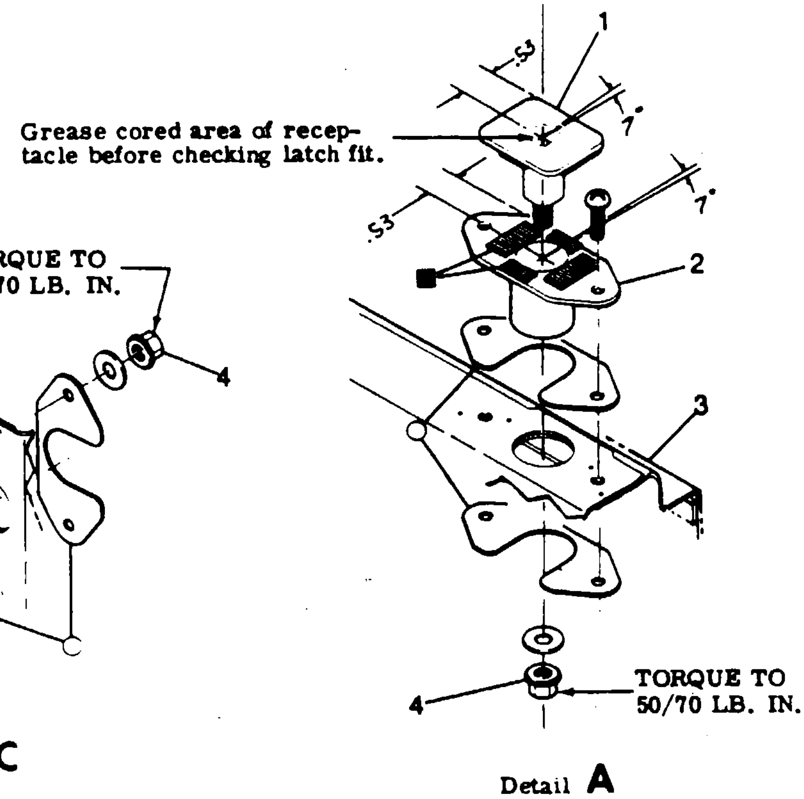
○ Shim, .040 or .080, combination shall not exceed .160 maximum build-up.

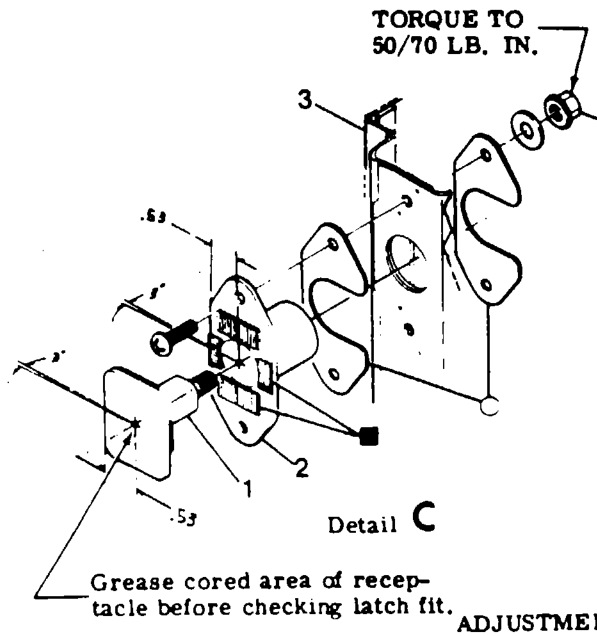
Install .53 dimension side of parts on outboard side of door jamb.

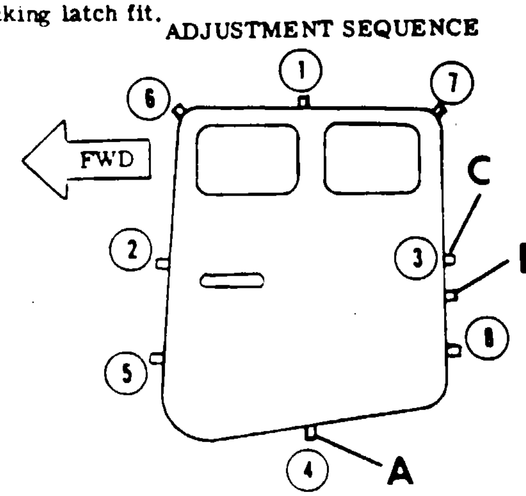
Install parts with 7° dimension on top and bottom faces of door jamb.

Install parts with 3° dimension on forward and aft faces of door jamb.

■ Maximum adjustment, two teeth in any direction from center.







1. Receptacle
2. Plate
3. Door Jamb
4. Nut

Scribe a pencil line around periphery of cover assembly prior to removal to facilitate reinstallation.

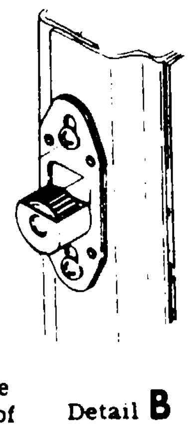
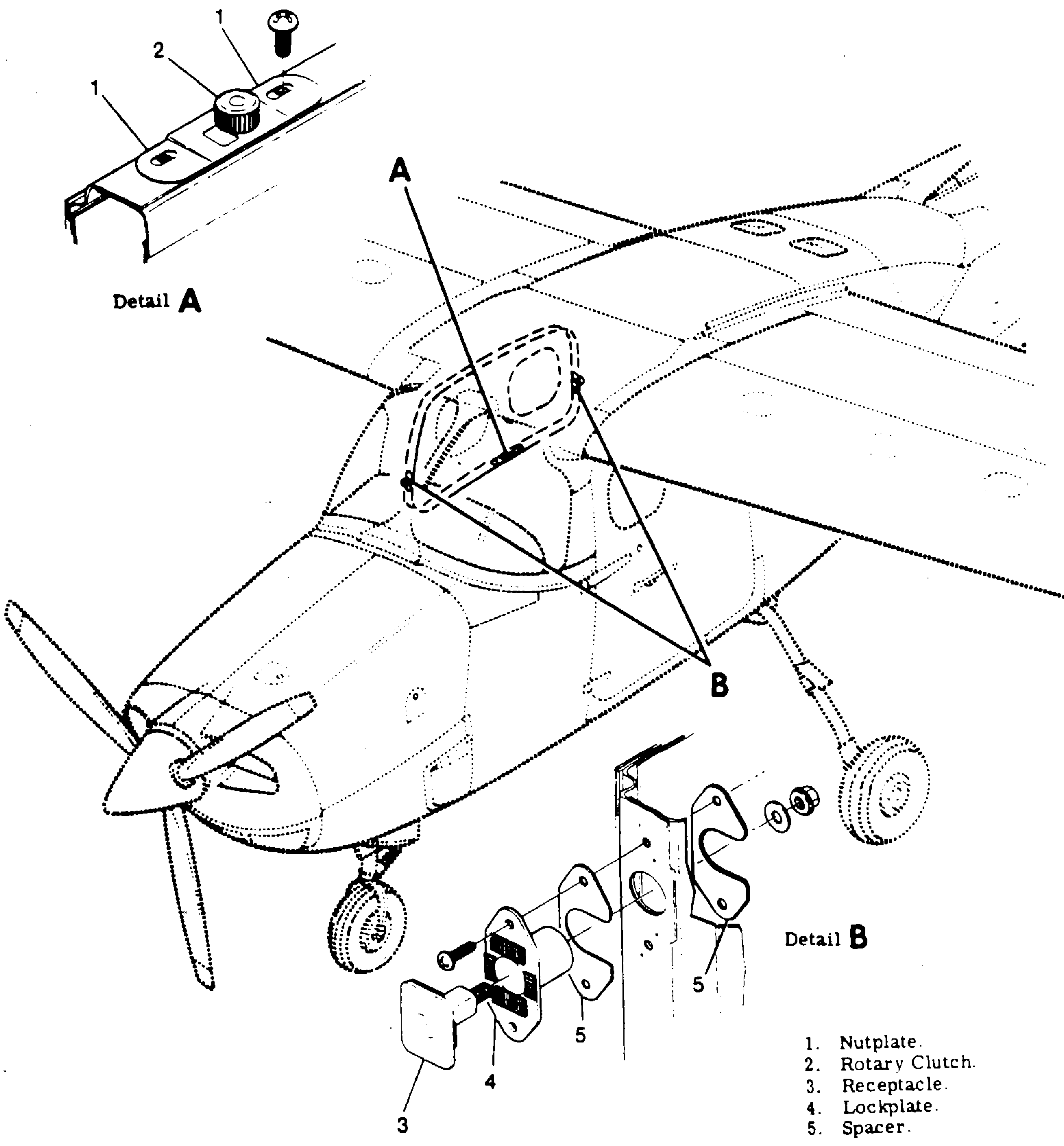


Figure 3-5A. Main Door Receptacle Installation (Sheet 2 of 2)



1. Nutplate.
2. Rotary Clutch.
3. Receptacle.
4. Lockplate.
5. Spacer.

Figure 3-6. Emergency Exit Door Installation (Sheet 1 of 2).

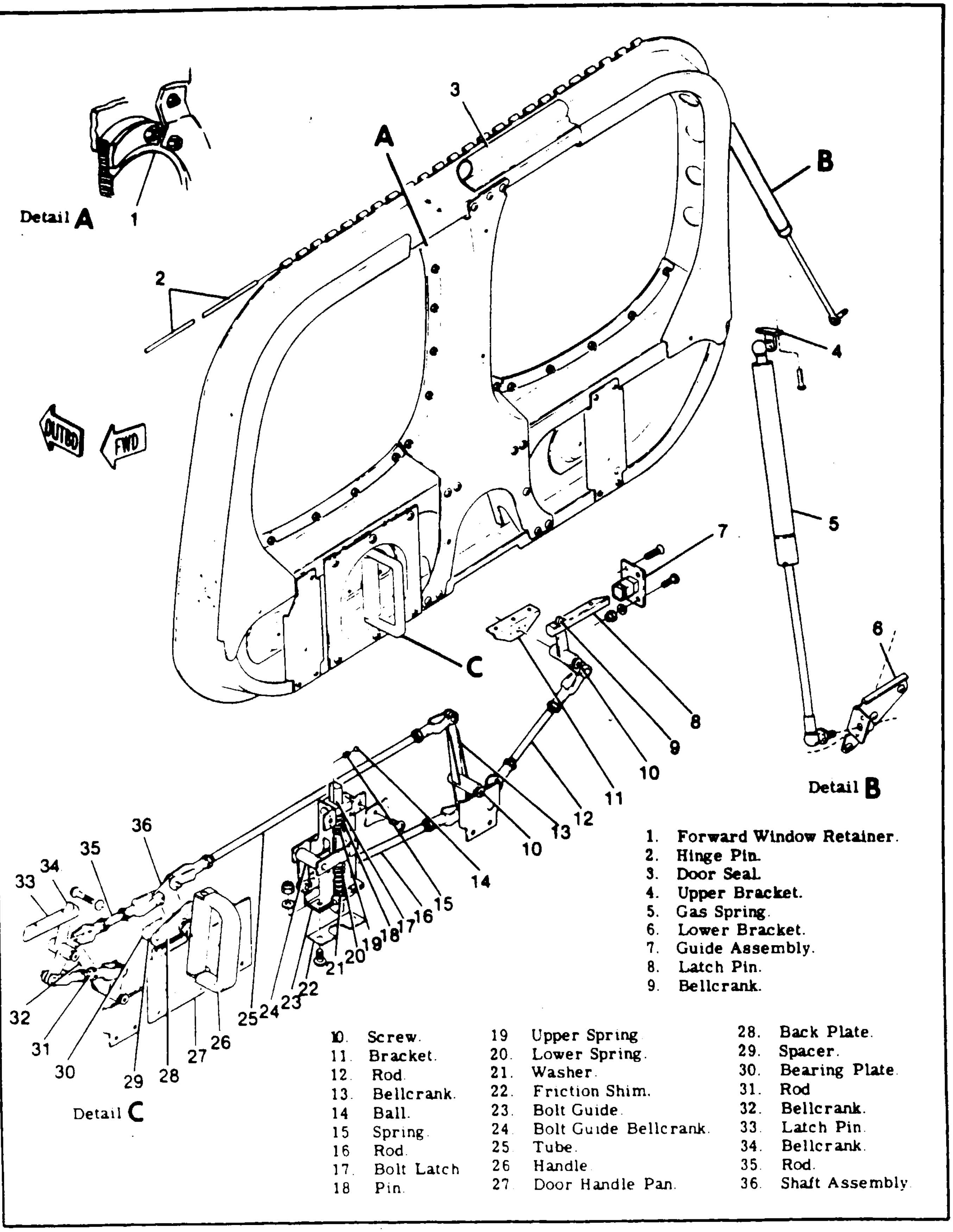


Figure 3-6. Emergency Exit Door Installation (Sheet 2 of 2)

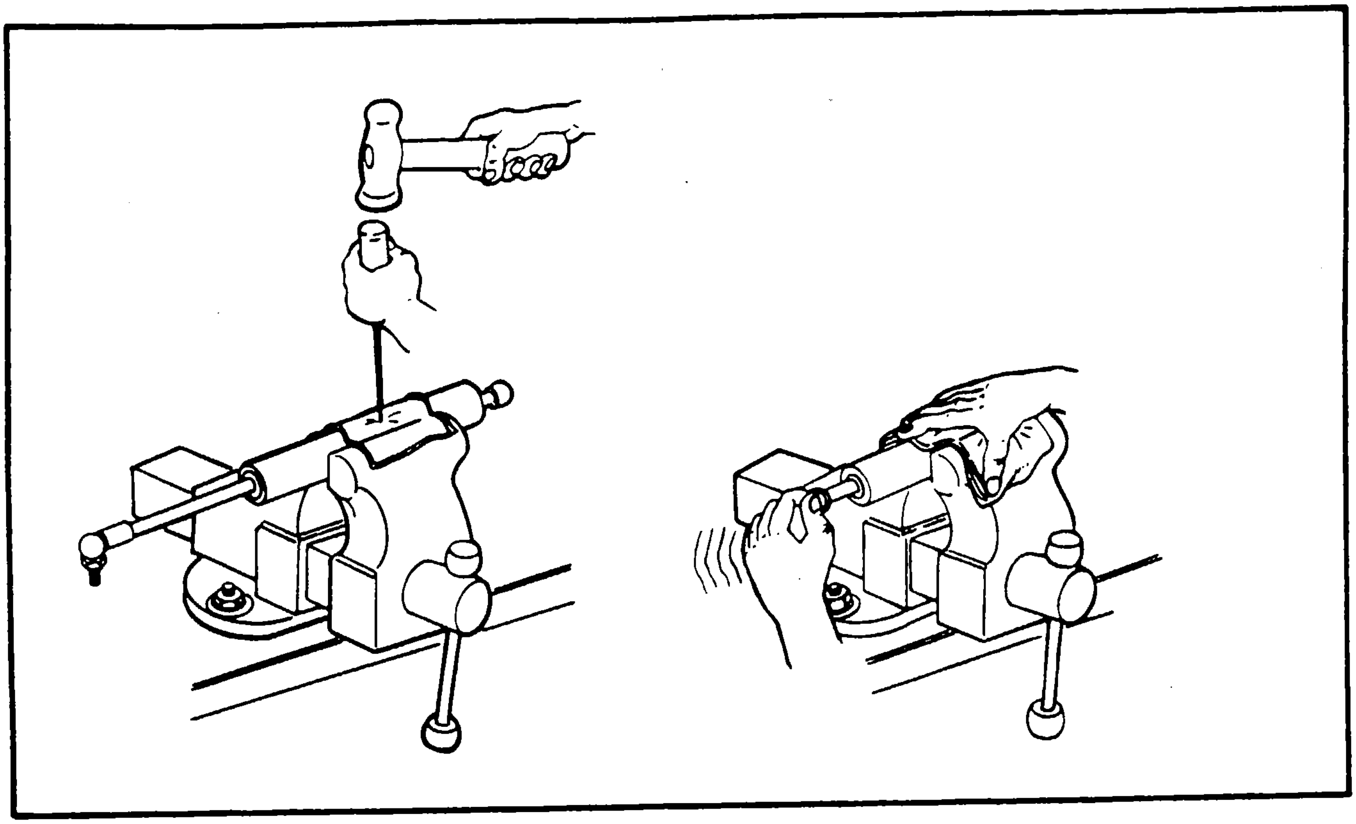


Figure 3-6A. Disposal of Gas Spring Assembly

3-21. EMERGENCY EXIT DOOR. The right cabin half door is for exiting from the inside only, there is no provision for entry. Two stationary windows are mounted in the emergency door. A preloaded gas cylinder door lift assist is utilized, because no maintenance is required; simply remove and replace when defective.

3-22. REMOVAL AND INSTALLATION.

a. Remove the nut from the door lift assist cylinder piston rod (lower end). Door must be supported as this is removed.
b. Remove the hinge screws, and the door.
c. To install, reverse above procedures.

3-22A. DISPOSAL OF GAS SPRING. (See figure 3-6A.)

WARNING

When removed, depressurize the gas spring as described before discarding. Protective eye covering must be worn while performing the following steps.

a. Place cylinder horizontally in bench vise and tighten vise.
b. Place several layers (4 layers minimum) of shop towels or rags over end of cylinder in vise.
c. Measure 1 1/2" in from fixed end of cylinder and, using a scratch awl or pointed center punch and hammer, drive awl or punch through the towels and into the cylinder until the gas begins to escape.
d. Hold the towels and scratch awl in place until all gas has escaped (a few seconds). Then, slowly remove scratch awl. Escaping oil will be absorbed by the towels.
e. While still holding towels over hole, push bright shaft completely into cylinder to purge remaining oil.
f. Remove from vise and discard.

3-23. BAGGAGE DOOR. (See figure 3-7A.)

3-24. REMOVAL (See figure 3-7A.)
a. Disconnect door stop rod (23).
b. Remove hinge pin (4).

3-24A. INSTALLATION. (See figure 3.7A.)
a. Install hinge pin (4) from aft end of door, with end bent inboard of hinge.
b. Install shims (2) as required to obtain engagement shown in detail C between striker (1) and baggage door latch (20).

NOTE

The baggage door is of bonded construction. Reforming of this door is not permissible, as material separation may occur in the flange area.

3-25. SEATS. (Refer to figure 3-8.)

3-26. PILOT.
a. ARTICULATING RECLINE/VERTICAL ADJUST.

3-27. COPILOT.
a. ARTICULATING RECLINE.

b. ARTICULATING RECLINE/VERTICAL ADJUST.

. 3RD AND 4TH.
a. ARTICULATING RECLINE.

3-29. DESCRIPTION. These seats are manually-operated throughout their full range of operation. Seat stops are provided to limit fore-and-aft travel.

3-30. REMOVAL AND INSTALLATION.
a. Remove seat stops.
b. Disengage the seat adjustment pin.
c. Slide seat fore-and-aft to disengage seat rollers from rails.
d. Lift seat out.
e. Reverse preceding steps for reinstallation. Ensure all seat stops are reinstalled.

WARNING

It is extremely important that the pilot's seat stops are installed. Acceleration and deceleration could possibly permit seat to become disengaged from the seat rails and create a hazardous situation, especially during take-off and landing.

3-31. BENCH. (5TH AND 6TH.)
a. DOUBLE-WIDTH BOTTOM/DOUBLE-WIDTH BACK.

3-32. DESCRIPTION. These seats are permanently bolted to the cabin structure and incorporate no adjustment provisions.

3-33. REMOVAL AND INSTALLATION.
a. Pull up on knob (1) to unlatch seat back.
b. Remove pin (10) from guide (8) on each side of seat back.
c. Remove bolts (14) from the three seat legs.
d. Remove bolts (9) from both sides of seat bottom.

NOTE

Bolts (9) are located inside the main gear wheel well.

e. With the seat back folded down, use care and slide the two inside seat belts out from between the seat back and bottom. Remove seat from aircraft.
f. Reverse preceding steps for reinstallation.

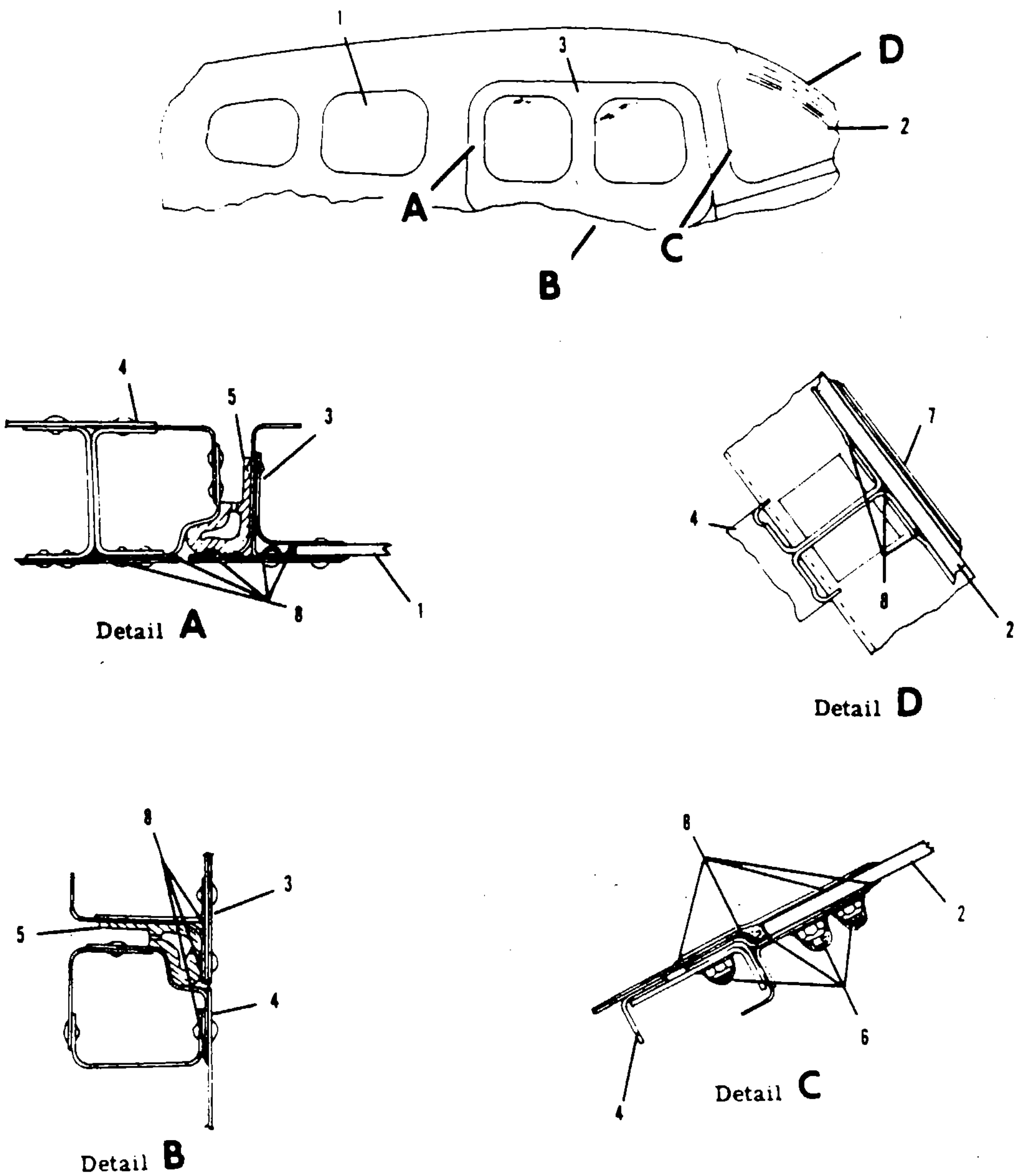
3-34. REPAIR. Replacement of defective parts is recommended in repair of seats. However, a cracked framework may be welded, provided the crack is not in an area of stress concentration (close to a hinge or bearing point). The square-tube framework is 6061 aluminum, heat-treated to a T-6 condition. Use a heliarc weld on these seats, as torch welds will destroy heat-treatment of frame structure.

3-35. CABIN UPHOLSTERY. Due to the wide selection of fabrics, styles and colors, it is impossible to depict each particular type of upholstery. The following paragraphs describe general procedures which will serve as a guide in removal and replacement of upholstery. Major work, if possible, should be done by an experienced mechanic. If the work must be done by a mechanic unfamiliar with upholstery practices, the mechanic should make careful notes during removal of each item to facilitate replacement later.

3-36. MATERIALS AND TOOLS. Materials and tools will vary with the job. Scissors for trimming upholstery to size and a dull-bladed putty knife for wedging material beneath retainer strips are the only tools required for most trim work. Use industrial rubber cement to hold soundproofing mats and fabric edges in place. Refer to Section 18 for thermoplastic repairs.

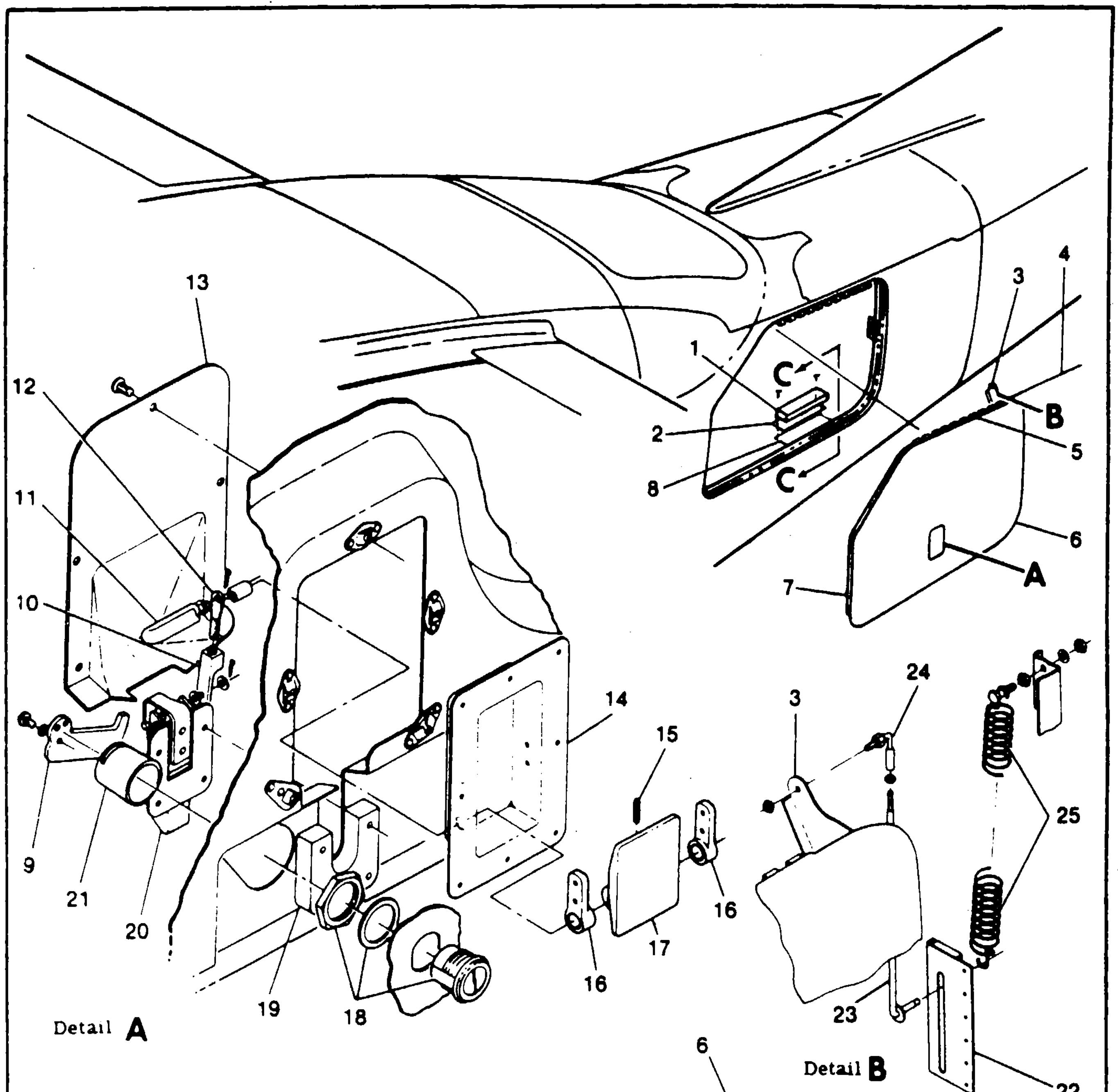
3-37. SOUNDPROOFING. The aircraft is insulated with spun glass mat-type insulation and a sound deadener compound applied to inner surfaces of the skin in most areas of the cabin and baggage compartment. All soundproofing material should be replaced in its original position any time it is removed. A soundproofing panel is placed in the gap between wing and fuselage and held in place by the wing root fairings.

SHOP NOTES:



1. Window.
2. Windshield.
3. Door.
4. Frame.
5. Seal.
6. Sealer (Type I). (See Table, page 3-17)
7. Retainer.
8. Sealer (Type II). (See Table, page 3-17)

Figure 3-7. Door and Window Sealing.



1. Striker.
2. Shim.
3. Bracket Assembly.
4. Hinge Pin.
5. Hinge Half.
6. Baggage Door.
7. Seal.
8. Striker Plate Reinforcement
9. Cam.
10. Link Nut.
11. Handle Shaft.
12. Link Bolt.
13. Latch Cover.
14. Door Handle Pan.
15. Pin.
16. Bearing Assembly.
17. Handle.
18. Lock Assembly.
19. Spacer.
20. Latch Assembly.
21. Lock Cap.
22. Rod Support Bracket.
23. Rod.
24. Ball Joint.
25. Balance Spring.

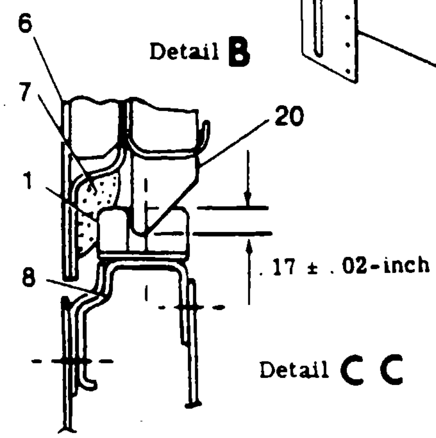
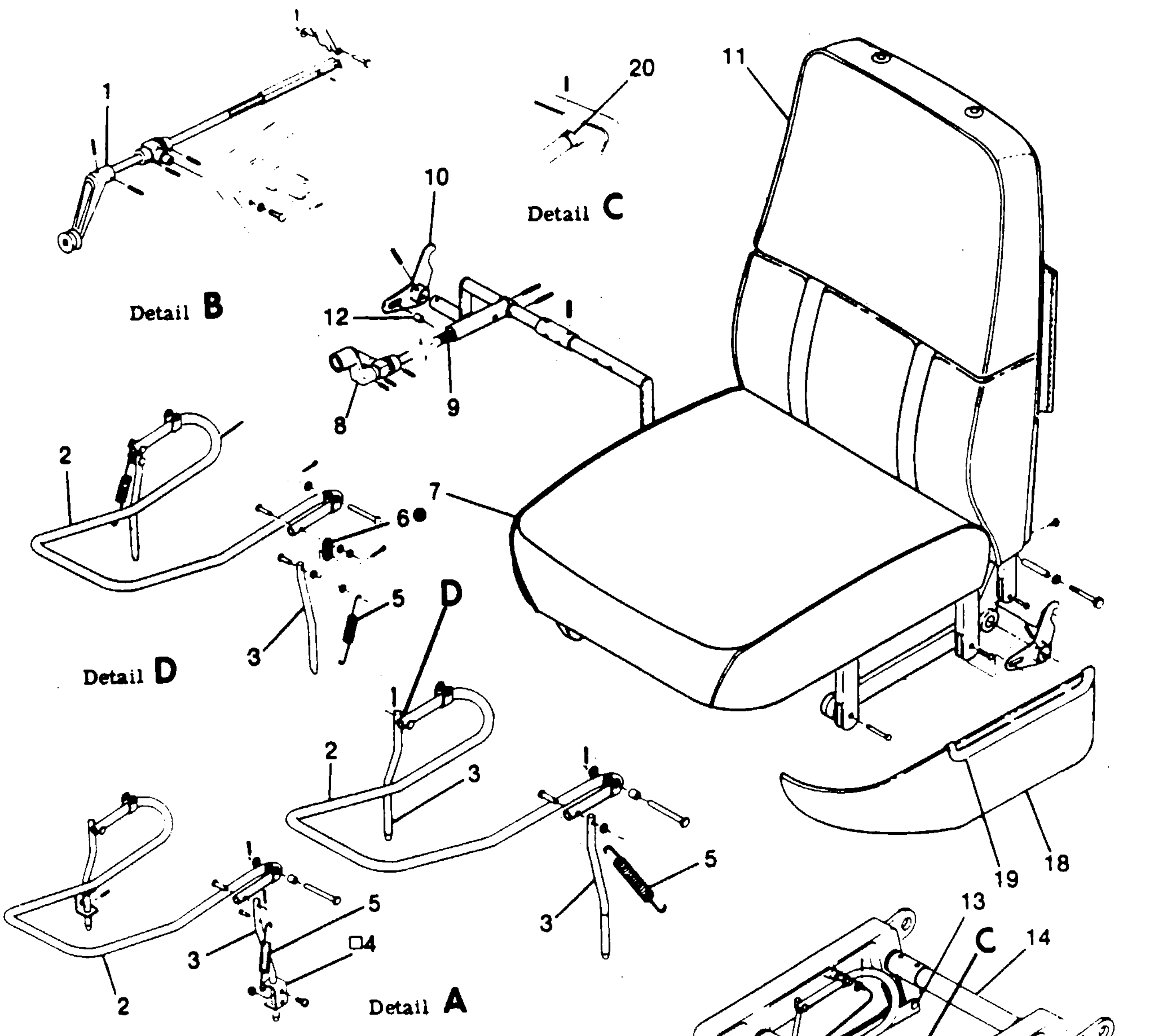
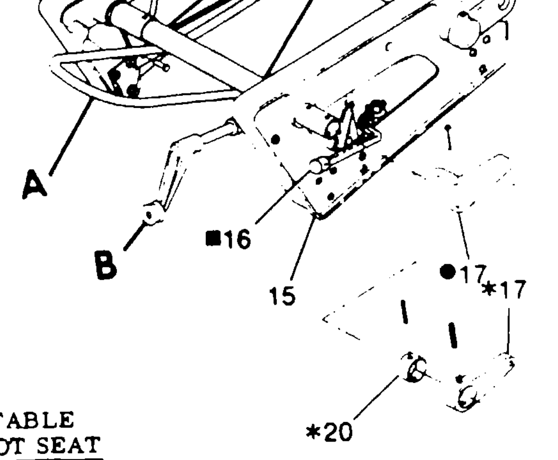


Figure 3-7A. Baggage Door Installation





1. Vertical Adjustment Handle
2. Fore/Aft Adjustment Handle
3. Adjustment Pin
4. Guide
5. Spring
6. Link
7. Seat Bottom
8. Articulating Adjustment Handle
9. Adjustment Screw
10. Bellcrank
11. Seat Back
12. Spacer
13. Channel
14. Torque Tube
15. Seat Frame
16. Cam Stop Lever
17. Bellcrank
18. Trim
19. Seat Belt Retainer
20. Collar

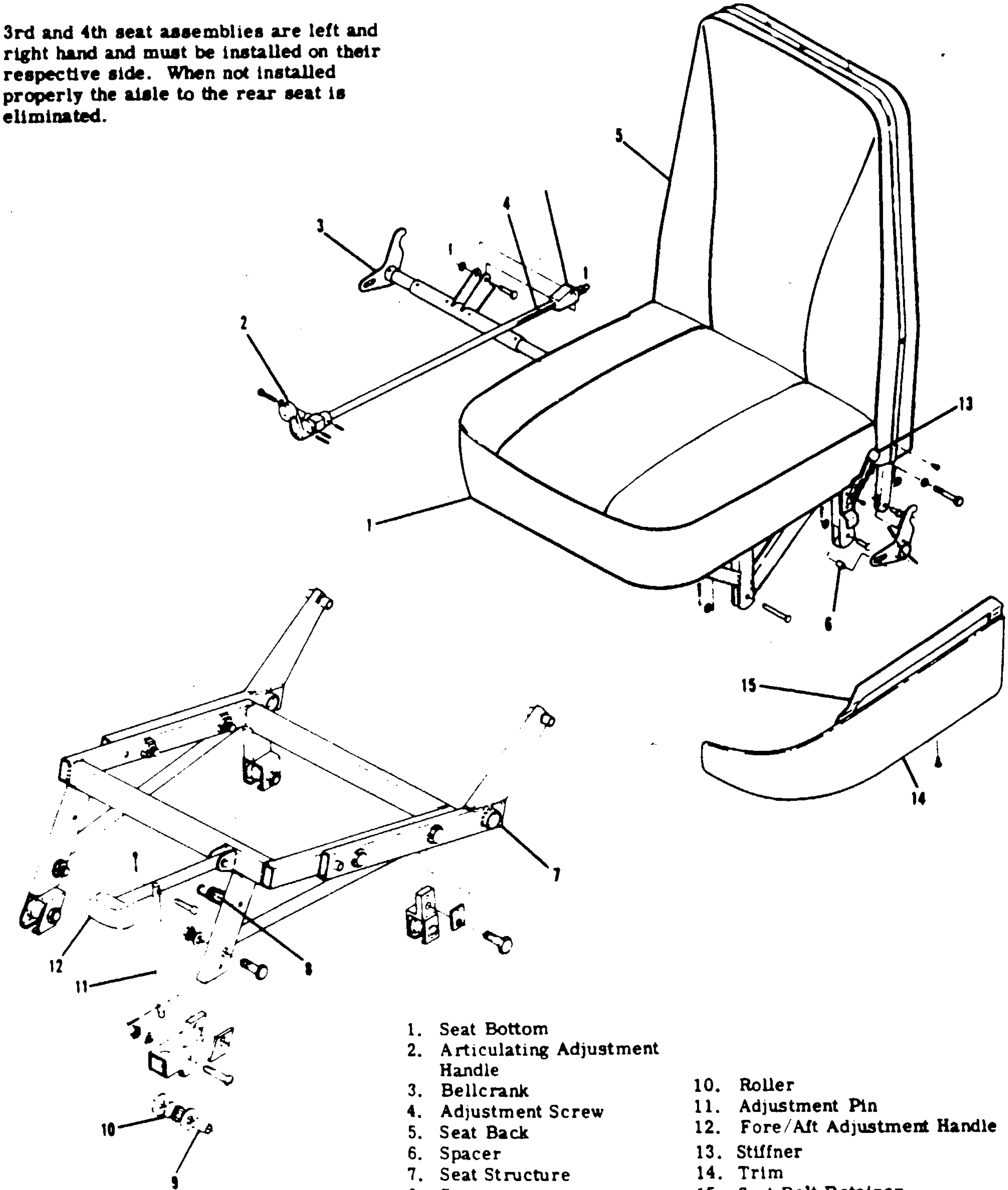
□ THRU P21000102
● P21000812 & ON
■ P21000151 & ON
∗ THRU P21000811

INFINTTELY ADJUSTABLE PILOT AND CO-PILOT SEAT

Figure 3-8. Seat Installation (Sheet 1 of 3)

NOTE

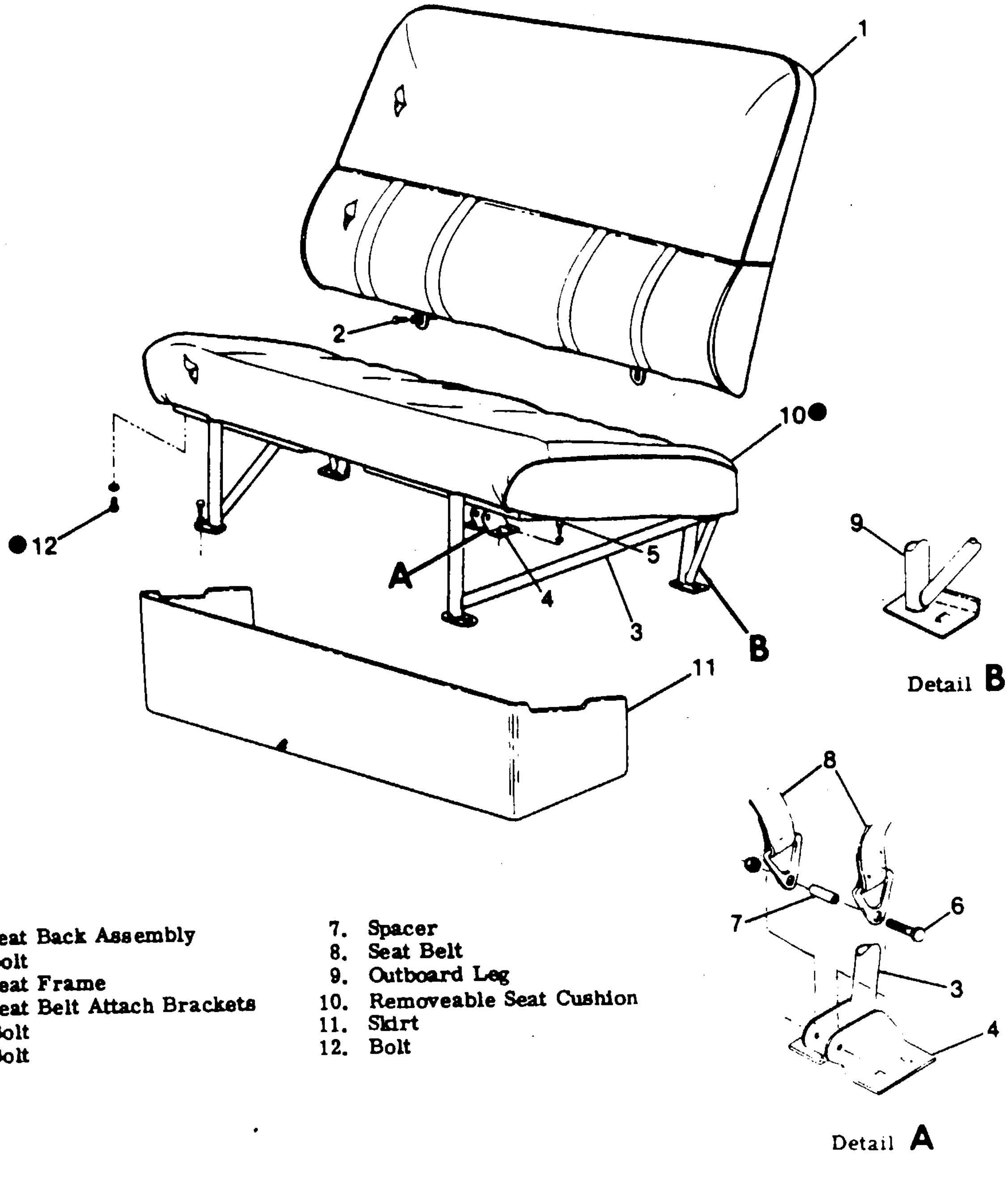
3rd and 4th seat assemblies are left and right hand and must be installed on their respective side. When not installed properly the aisle to the rear seat is eliminated.



1. Seat Bottom
2. Articulating Adjustment Handle
3. Bellcrank
4. Adjustment Screw
5. Seat Back
6. Spacer
7. Seat Structure
8. Spring
9. Bushing
10. Roller
11. Adjustment Pin
12. Fore/Aft Adjustment Handle
13. Stiffner
14. Trim
15. Seat Belt Retainer

ARTICULATING
<u>3RD AND 4TH SEATS</u>

Figure 3-8. Seat Installation (Sheet 2 of 3)



1. Seat Back Assembly
2. Bolt
3. Seat Frame
4. Seat Belt Attach Brackets
5. Bolt
6. Bolt
7. Spacer
8. Seat Belt
9. Outboard Leg
10. Removeable Seat Cushion
11. Skirt
12. Bolt

● BEGINNING WITH 1983 MODELS

BENCH (5TH AND 6TH)

Figure 3-8. Seat Installation (Sheet 3 of 3)

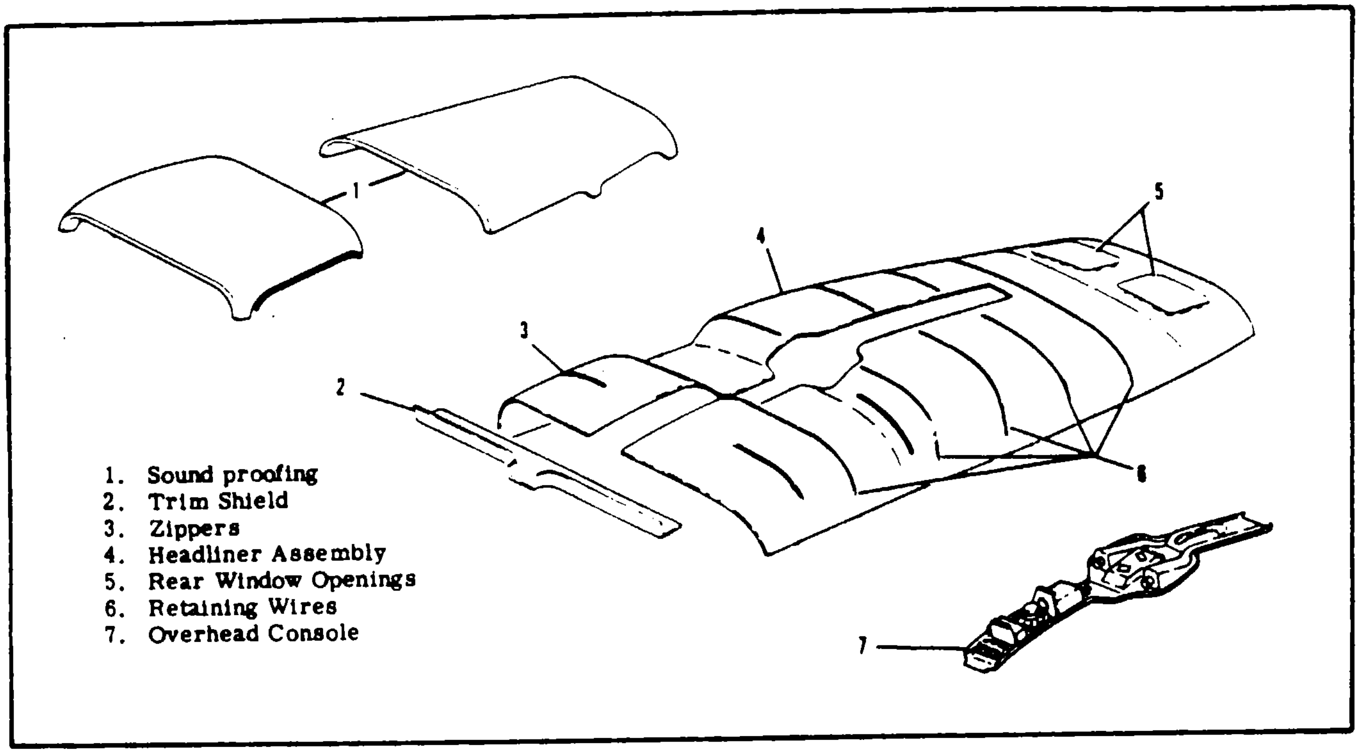


Figure 3-9. Cabin Headliner Installation

3-38. CABIN HEADLINER. (Refer to figure 3-9.)

3-39. REMOVAL.

a. Remove all overhead oxygen, ventilating and light consoles, sun visors, dome lights, all inside finish strips and plates and any other visable retainers securing headliner.

b. Work edges of headliner free from metal teeth which hold fabric.

c. Starting at the front of headliner and working toward the rear, work headliner down, removing screws through the metal tabs which hold the wire bows to cabin top. Pry outer ends of bows loose from retainers above doors. Detach each wire bow in succession.

d. Remove headliner assembly and bows from the aircraft.

NOTE

Due to the difference in length and contour of wire bows, each bow should be tagged to assure proper location in the headliner.

e. Remove the spun glass soundproofing panels.

NOTE

The lightweight soundproofing panels are held in place with industrial rubber cement.

3-40. INSTALLATION.

a. Before installation, check all items concealed by headliner for security. Use wide cloth tape to secure loose wires to the fuselage and to seal any openings in the wing roots. Straighten tabs bent during removal of headliner.

b. Apply cement to inside of skin in the areas where soundproofing panels are not supported by wire bows and press soundproofing in place.

c. Insert wire bows into headliner seams and secure the two bows at rear of headliner. Stretch the material along edges to properly center, but do not stretch it tight enough to destroy ceiling contours or distort wire bows. Secure edges of headliner with the metal teeth.

d. Work headliner forward, installing each wire bow in place with the metal tabs. Wedge ends of wire bows into the retainer strips. Stretch headliner just taut enough to avoid wrinkles and maintain a smooth contour.

e. When all bows are in place and fabric edges are secured, trim off excess fabric and reinstall all items removed.

3-41. UPHOLSTERY PANELS.

3-42. REMOVAL AND INSTALLATION. Removal of the upholstery side panels is accomplished by removing the seats for access and removing screws, retaining strips and ash trays as required to free the panels. When reinstalling side panels, do not overtighten screws. Larger screws may be used in enlarged holes as long as the area behind the hole is checked for wiring, fuel lines and other components which might be damaged by using a longer screw. Automotive type spring clips attach the door panels and a dull putty knife makes an excellent tool for prying the clips loose. The rear baggage panel is secured to the aft cabin wall with cloth retaining strips for easy removal.

3-43. CARPETING.

3-44. REMOVAL AND INSTALLATION. Cabin area and baggage compartment carpeting is held in place by rubber cement, small sheet metal screws and retaining strips. Cloth retaining strips are also installed on some aircraft near access plate locations for quick-removal of the carpeting and inspection in these areas. When fitting a new carpet, use the old one as a pattern for trimming and marking screw holes.

3-45. SAFETY PROVISIONS.

3-46. BAGGAGE RETAINING NET.

3-47. DESCRIPTION. A nylon baggage net having a frame and hinges retains the baggage in the area behind the main gear wheel wells.

3-48. SAFETY BELTS. (See figure 3-9A.)

3-49. DESCRIPTION.
Safety belts should be replaced if frayed or cut, latches are defective or stiching is broken. Attaching parts should be replaced if excessively worn or defective. The pilot and copilot seat safety belts are attached to brackets bolted to the cabin floor. The 3rd and 4th seat belts are attached to brackets bolted to the cabin floor and fuselage structure. The bench seat belts are attached to a bracket bolted to the cabin floor and to the seats themselves.

NOTE

The belt half with the buckle should be installed on the outboard side of the seat to ensure proper operation of the shoulder harness.

3-50. SHOULDER HARNESS.

3-51. DESCRIPTION. (See figure 3-9A.) Individual shoulder harnesses may be installed for each seat. The pilot and copilot harnesses are bolted to the upper console reel, and the 3rd, 4th and bench seat harnesses are bolted to the aft cabin structure. Component parts should be replaced as outlined in paragraph 3-54.

3-52. INERTIA REEL HARNESS.

3-53. DESCRIPTION. (See figure 3-9B.)
An inertia reel harness assembly may be installed for the Pilot and Co-Pilot positions. The inertia reels are installed in a mounting base located in the aft center overhead console. The shoulder and lap belt are one assembly with an adjuster to position the shoulder harness. The reel is designed to lock and hold when a 2 to 3 "g" force is applied and 12 inches of webbing remain on the reel. The reel can be checked for proper operation by giving webbing a quick tug, the reel should lock and hold.

3-54. REMOVAL AND INSTALLATION.
a. Remove the screws retaining the escutcheon on aft center console and remove the oxygen outlet covers by rotating counter-clockwise if installed.
b. Remove screws in mounting bracket and remove (2) screws in each reel assembly and pull belt through bracket.
c. Re-install by reversing the procedure.

3-55. TABLE OF RECOMMENDED SEALERS.

TYPE I	TYPE II
890 and 890 A Accelerator Coast Pro-Seal, Los Angeles, Ca.	EC-1608 Part A and B (3M Co) Minnesota Minning & Mfg Co.
CS3204 Part A and B Chem Seal Corp., Los Angeles, Ca.	Pro-Seal 706 Coast Pro-Seal, Compton, Ca.
GC-408 Part A and B Churchill Chemical Co., Vernon, Ca.	GC-200 Churchill Chemical Corp., Los Angeles, Ca.
PR-1440 Part A and B Products Research Co., Burbank, Ca.	
FIREWALL SEALANT	
Dapocast *18-4 D Aircraft Products Co., Anaheim, Calif.	TBS-758 Thermal Coating General Electric, Waterford, Connecticut

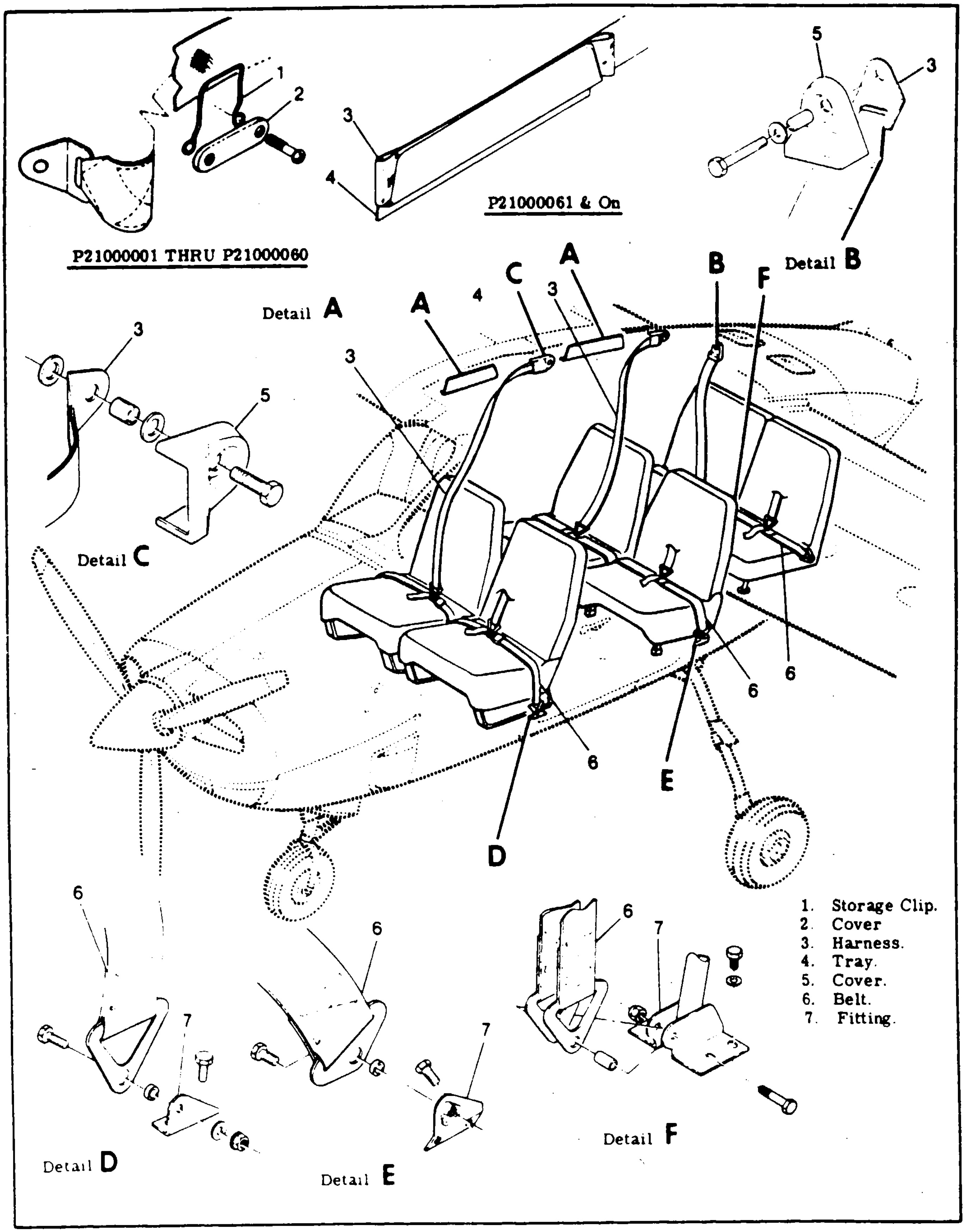
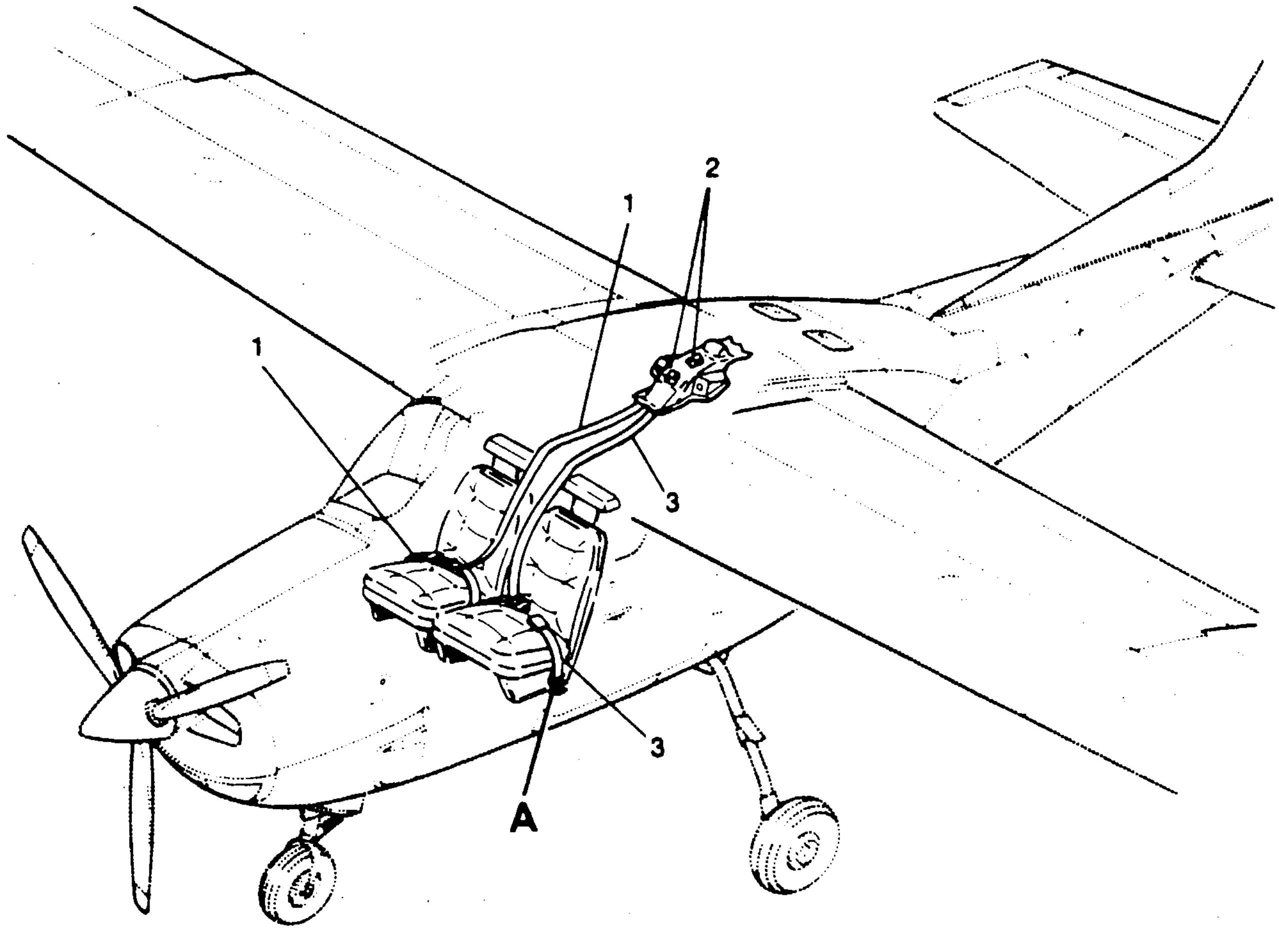
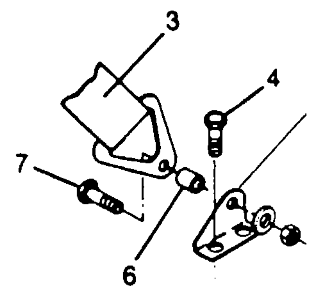


Figure 3-9A. Safety Belts

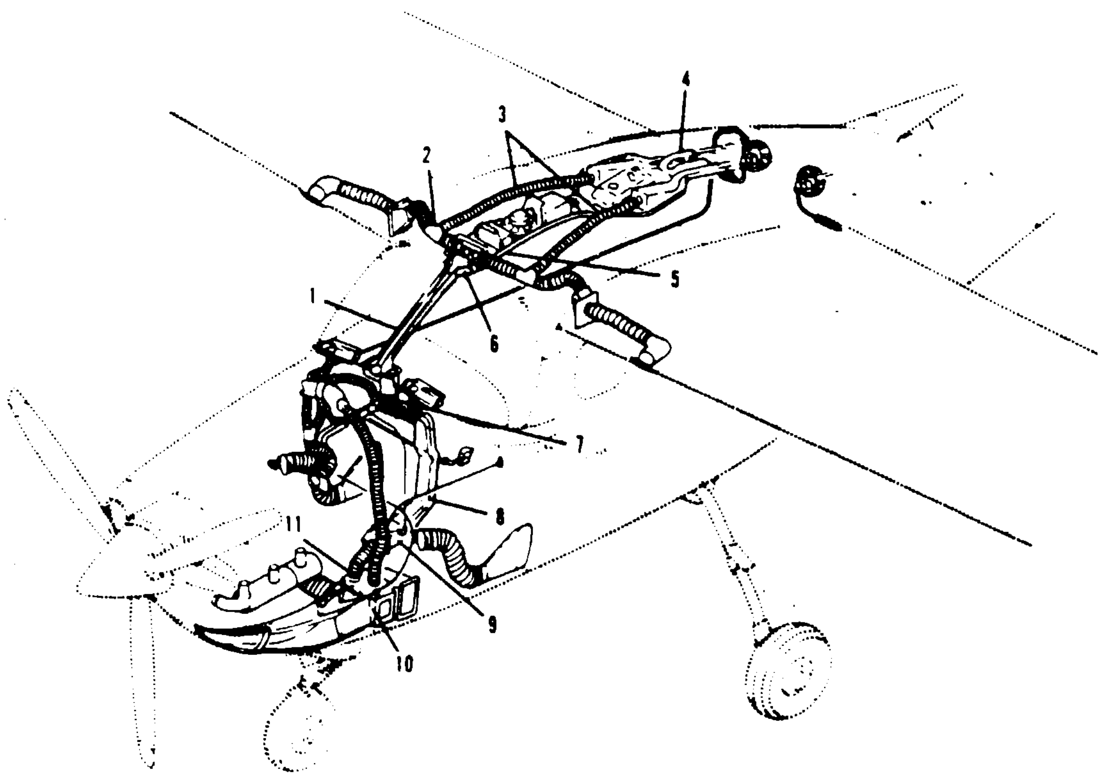


1. Inertia Reel-Belt Assembly(Right Hand).
2 Inertia Reel.
3. Inertia Reel-Belt Assembly(Left Hand).
4. Bolt.
5 Seat Belt Fitting.
6. Spacer.
7. Bolt.



Detail A

Figure 3-9B. Inertia Reel Harness



THRU P21000150

1. Windshield Center Post Cover
2. "T" Duct Assembly
3. Air Ducts to Aft Console
4. Aft Console
5. Forward Console
6. Air Vent Support Housing
7. Adapter
8. Vertical Duct
9. Firewall Dump Valve
10. Heat Exchanger
11. Duct Heat Exchanger Outlet

Figure 3-10. Ventilation System (Sheet 1 of 2)

3-56. SEALING VENTILATING SYSTEM.

3-57. CHECKING FOR LEAKS. If low output from the overhead ventilation system is suspected, use the following procedures to isolate the leakage.

a. Remove engine cowling as necessary to allow access to heat exchanger.

b. Disconnect the short air duct (11) from the top inboard fitting of the heat exchanger (10). Leave the duct connected to the firewall dump valve (9).

c. Connect a blower to the duct (11) to move air thru the ventilation distribution system without running the engine.

d. Place the overhead floor control in the IN over-head position.

e. Turn the external blower ON, if connected in step c above.

f. Feel for escaping air at the following areas, and if found, seal as indicated.

1. Vertical duct (8) at junction of selector valve, seal with RTV or Type I Sealer.

2. Adapter (7) for seal around compass wiring at left bottom 0.25" hole, seal with RTV or Type I Sealer, after compass wiring is installed.

3. Bottom of forward end of windshield center post cover (1) and along edges. Seal with 0.5" pressure sensitive tape, manufactured by Norton Company, Tape Division.

4. Remove cabin headliner per paragraph 3-39.

5. Pilot and Co-pilot's air vent support housing (6), leakage between housing and cabin top skin, spar, and windshield retainers. Seal with RTV or Type I Sealer. DO NOT SEAL aileron cable holes thru air vent support housing (6).

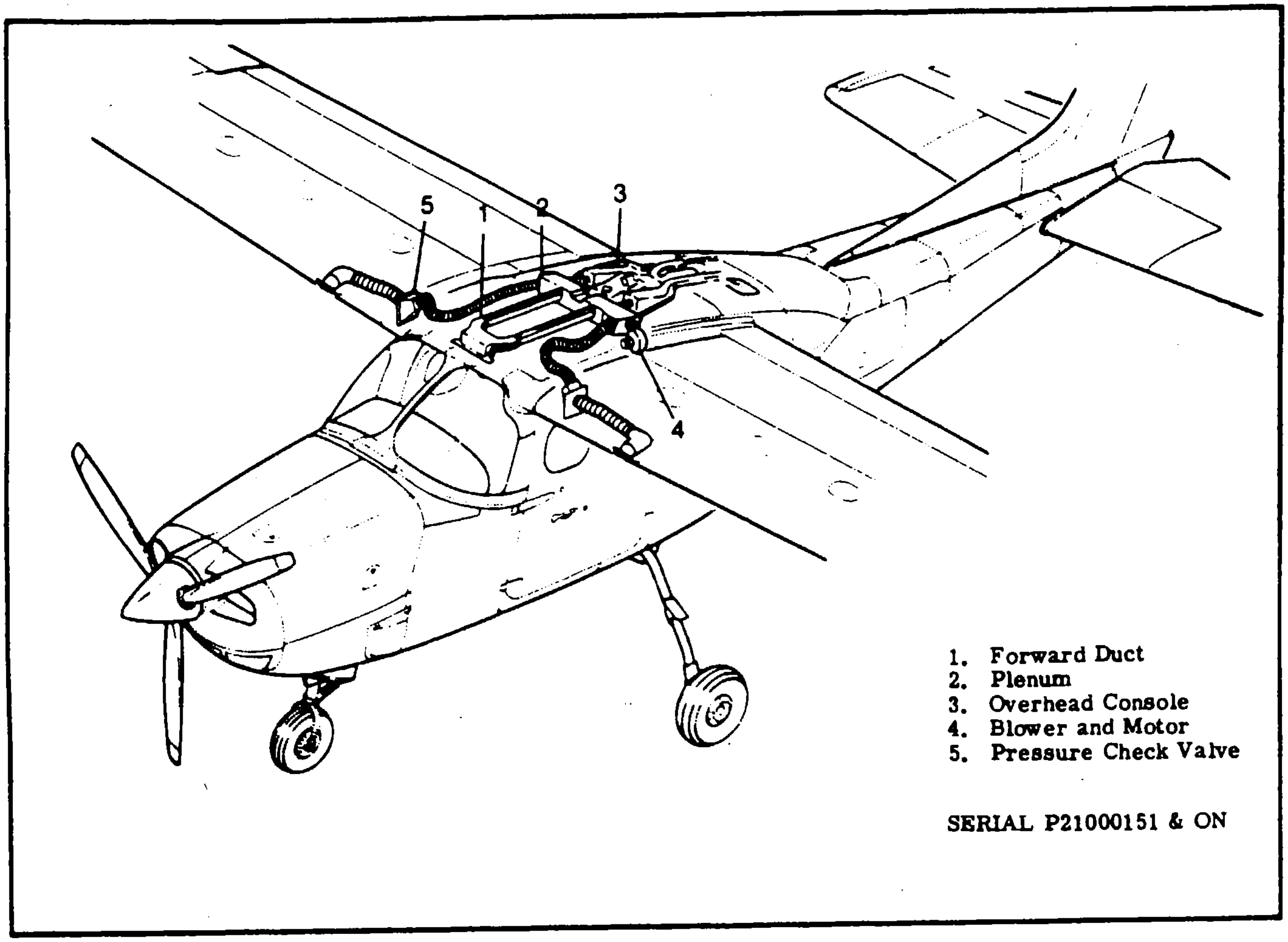


Figure 3-10. Ventilation System (Sheet 2 of 2)

6. Trim upper forward edges of housing to clear windshield retaining nuts, so housing will set against retainer.

7. Check gap between air vent support housing (6) and windshield center post cover (1). Seal with 0.5" pressure sensitive tape, manufactured by Norton Company, Tape Division. This will require removal of forward overhead console.

8. Leakage around overhead console (4) edges should be sealed with RTV.

9. Both air ducts (3) between the "T" duct assembly (2) and the overhead console (4) fittings have sharp turns and bends that restrict ventilating air flow. Remove existing duct ties, behind carry thru spar, pull ducts (3) forward, and trim approximately six inches from forward end.

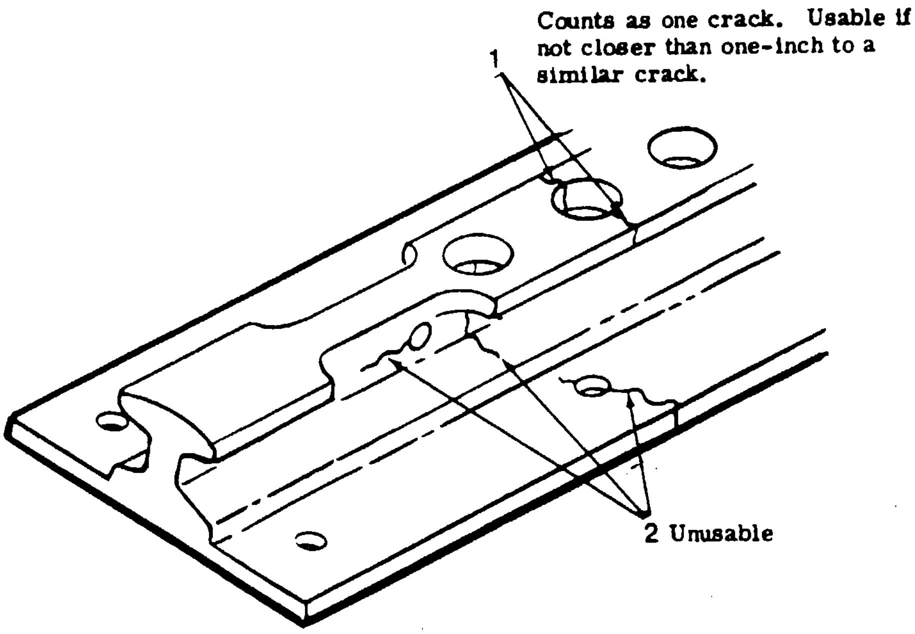
10. Install flap cable guards and duct ties, and connect air ducts (3) to "T" duct assemblies (2).

11. Reinstall headliner per instructions in paragraph 3-40.

g. The coolest ventilating air is distributed thru the overhead vent system, because it is ram air. When operating during summer months, the overhead/floor defrost (diverter) control should be IN to the overhead position. If flying, the cabin altitude selector should be set to an altitude where temperatures are cooler, and the pressurization system should be OFF, or the dump valve pushed IN until approaching the set altitude. This procedure allows use of cooler ventilating air while climbing thru warmer air at lower altitudes. A similar procedure should be used during hot weather descents. BEGINNING WITH SERIAL P21000151 a two-speed blower is included in the system. Whenever increased ventilating airflow is desired either on the ground or in pressurized or unpressurized flight, utilize the fan switch labeled: OVERHEAD VENT FAN. The fan switch is located on the comfort control panel and has three positions: HIGH, OFF, and LOW.

3-58. SEAT RAIL INSPECTION. A special inspection of the seat rails should be conducted each 50 hours. See figure 3-11 for inspection procedures.

SHOP NOTES:



REPLACE SEAT RAIL WHEN:

a. Any portion of web or lower flange is cracked, (index 2).
b. Any crack in crown of rail is in any direction other than right angle to length of rail.
c. Number of cracks on any one rail exceeds four, or any two cracks (index 1) are closer than one-inch.

NOTE

Use of seat rail cargo tie-downs is not permissible on seat rails with cracks.

Figure 3-11. Seat Rail Inspection

SECTION 4

WINGS AND EMPENNAGE

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4-1. WINGS AND EMPENNAGE.

4-2. WINGS. (Refer to figure 4-1.)

4-3. DESCRIPTION. Each all metal wing panel is a full cantilever type, with a single main spar, two fuel spars, formed ribs and stringers. The front fuel spar also serves as an auxiliary spar and provides the forward attachment point for the wing. An inboard section of the wing, forward of the main spar, is sealed to form an integral fuel bay area. Stressed skin is riveted to the spars, ribs, and stringers to complete the structure. An all-metal, balanced aileron, flap, and a detachable wing tip are part of each wing assembly. A navigation light is mounted in each wing tip.

4-4. REMOVAL. Wing panel removal is most easily accomplished if four men are available to handle the wing. Otherwise, the wing should be supported with a sling or maintenance stand when the fastenings are loosened.

a. Remove wing gap fairings and fillets.
b. Drain fuel from wing being removed. (Observe precautions outlined in Section 13.)
c. Remove cabin headliner in accordance with procedures outlined in Section 3.
d. Disconnect:
   1. Electrical wires at wing root disconnects.
   2. Fuel lines at wing root.
   3. Pitot line (left wing only) at wing root.
   4. Cabin ventilation hose at wing root.
   5. Aileron carry-thru cable and aileron direct cables of wing being removed, at turnbuckles behind headliner front shield and doorpost shield.

NOTE

To ease rerouting the cables, a guide wire may be attached to each cable before it is pulled free from the wing. Then disconnect cable from wire and leave the guide wire routed through the wing; it may be attached again to the cable during reinstallation and used to pull the cable into place.

f. If right wing is being removed, disconnect flap cables from right flap drive pulley, and remove cable guards and/or pulleys as required to pull flap cables into right wing root area.
g. If left wing is being removed, relieve tension on right flap cables at right flap drive pulley. Disconnect right flap cables at flap actuator in left wing and remove pulleys to pull flap cables into left wing root area.

NOTE

Rigging of flap actuator and components in left wing need not be disturbed to remove either wing. It is recommended that flap be secured in streamlined position with tape during wing removal to prevent damage, since flap will swing freely.

h. Remove nut, washer and bolt attaching front fuel spar to fuselage.
i. Remove bolts, washers, and retainers holding main spar dowel pins in position.
j. Support wing at inboard and outboard ends, and

remove dowel pins that attach main wing spar to fuselage. It is recommended to remove the top dowel pin first, then lower outboard end of wing before removing bottom dowel pin.

NOTE

It may be necessary to use a long punch to drive out main wing spar attaching dowel pins, or to rock wing slightly while removing pins. Care must be taken not to damage dowel pins, spar fittings or spar carry-thru fittings as these are reamed holes and close tolerance dowel pins.

k. Remove wing and lay on padded stand.

4-5. REPAIR. A damaged wing panel may be repaired in accordance with instructions outlined in Section 18. Extensive repairs of wing skin or structure are best accomplished by using the wing repair jig, which may be obtained from Cessna. The jig serves not only as a holding fixture, making work on the wing easier, but also assures absolute alignment of the repaired wing.

4-6. INSTALLATION.

NOTE

Refer to figure 4-1 for lubrication of dowel pins prior to installation.

a. Hold wing in position with wing tip low.
b. Install:
  1. Dowel pins attaching main spar to fuselage. (Install bottom pin first, then rotate wing tip up, and install top pin.)
  2. Bolts, washers and nuts that hold main spar attach dowel pins in position.
  3. Front fuel spar attach bolt, washer and nut.
c. Route flap and aileron cables and make proper connections.
d. Connect:
  1. Electric wires at wing root disconnects.
  2. Fuel lines at wing root.
  3. Pitot line (if left wing is being installed.)
  4. Cabin ventilator hose at wing root.
  5. Aileron carry-thru cable and aileron direct cables of wing being installed, at turnbuckles behind headliner front shield and doorpost shield.
e. Rig aileron system (Section 6).
f. Rig flap system (Section 7).
g. Refill wing fuel bays and check all connections for leaks.
h. Check operation of navigation, courtesy and landing lights.
i. Check operation of fuel quantity indicator.
j. Install wing gap fairings and fillets.

NOTE

Be sure to install soundproofing panel in wing gap before replacing fairing.

k. Install headliner, interior panels, upholstery and inspection plates.
l. Test operation of flap and aileron systems.

4-7. ADJUSTMENT (CORRECTING "WING-HEAVY" CONDITION). If considerable control wheel pressure is required to keep the wings level in normal flight, a wing-heavy condition exists. Refer to Section 6 for adjustment of aileron tabs.

4-8. VERTICAL FIN. (See figure 4-2.)

4-9. DESCRIPTION. The fin is primarily of metal construction, consisting of ribs and spars covered with skin. Fin tips are glass fiber/ABS construction. Hinge brackets at the rear spar attach the rudder.

4-10. REMOVAL. The fin may be removed without first removing the rudder. However, for access and ease of handling, the rudder may be removed if desired, following the procedures outlined in Section 10.
a. Remove fairings on both sides of fin.
b. Disconnect flashing beacon lead, tail navigation light lead, antennas and antenna leads and rudder cables if rudder has not been removed.
c. Remove screws attaching dorsal fin to fuselage.
d. Remove bolts attaching fin front and rear spars to fuselage.
e. Remove fin.

4-11. REPAIR. (Refer to Section 18.)

4-12. INSTALLATION. Reverse procedures outlined in paragraph 4-10 to install the fin. Be sure to check and reset rudder and elevator travel if any stop bolts were removed or settings distrubed. Refer to Sections 8 and 10 respectively for setting elevator and rudder travel. Refer to figure 1-1 for control surface travels.

4-13. HORIZONTAL STABILIZER. (See figure 4-3.)

4-14. DESCRIPTION. The horizontal stabilizer is primarily of metal construction, consisting of ribs and a front and rear spar which extends throughout the full span of the stabilizer. The skin is riveted to both spars and ribs. Stabilizer tips are constructed of ABS. The elevator tab actuator screw is contained within the horizontal stabilizer assembly, and is supported by a bracket riveted to the rear spar. The underside of the stabilizer contains an opening which provides access to the elevator tab actuator screw. Hinges on the rear spar support the elevator.

4-15. REMOVAL.

a. Remove elevators and rudder in accordance with procedures outlined in Sections 8 and 10.
b. Remove vertical fin in accordance with procedures outlined in paragraph 4-10.
c. Disconnect elevator trim control cables at clevis, turnbuckle and clamps inside tailcone, remove pulleys which route the aft cables into horizontal stabilizer, and pull cables out of tailcone.
d. Remove bolts securing horizontal stabilizer to fuselage.
e. Remove horizontal stabilizer.

4-16. REPAIR. (Refer to Section 18.)

4-17. INSTALLATION. Reverse the procedures outlined in paragraph 4-15 to install the horizontal stabilizer. Rig the control systems as necessary, following instructions outlined in applicable sections. Set control surface travels to values listed in figure 1-1.

4-18. STABILIZER ABRASION BOOTS.

NOTE

An Accessory Kit (AK182-217) is available from the Cessna Service Parts Center for installation of abrasion boots on aircraft not so equipped.

4-19. DESCRIPTION. The aircraft may be equipped with two extruded rubber abrasion boots, one on the leading edge of each horizontal stabilizer. These boots are installed to protect the stabilizer leading edge from damage caused by rocks thrown back by the propeller.

4-20. REMOVAL. The abrasion boots can be removed by loosening one end of the boot and pulling it off the stabilizer with an even pressure. Excess adhesive or rubber can be removed with Methyl-Ethyl-Keytone.

4-21. INSTALLATION. Install abrasion boots as outlined in the following procedures.

a. Trim boots to desired length.
b. Mask off boot area on leading edge of stabilizer with one-inch masking tape, allowing 1/4-inch margin.
c. Clean metal surfaces of stabilizer, where boot is to be installed, with Methyl-Ethyl-Ketone.
d. Clean inside of abrasion boot with Methyl-Ethyl Ketone and a Scotch Brite pad to ensure complete removal of paraffin/talc. Then a normal wipe down with MEK on a cloth will leave surface suitable for bonding to the aluminum.

NOTE

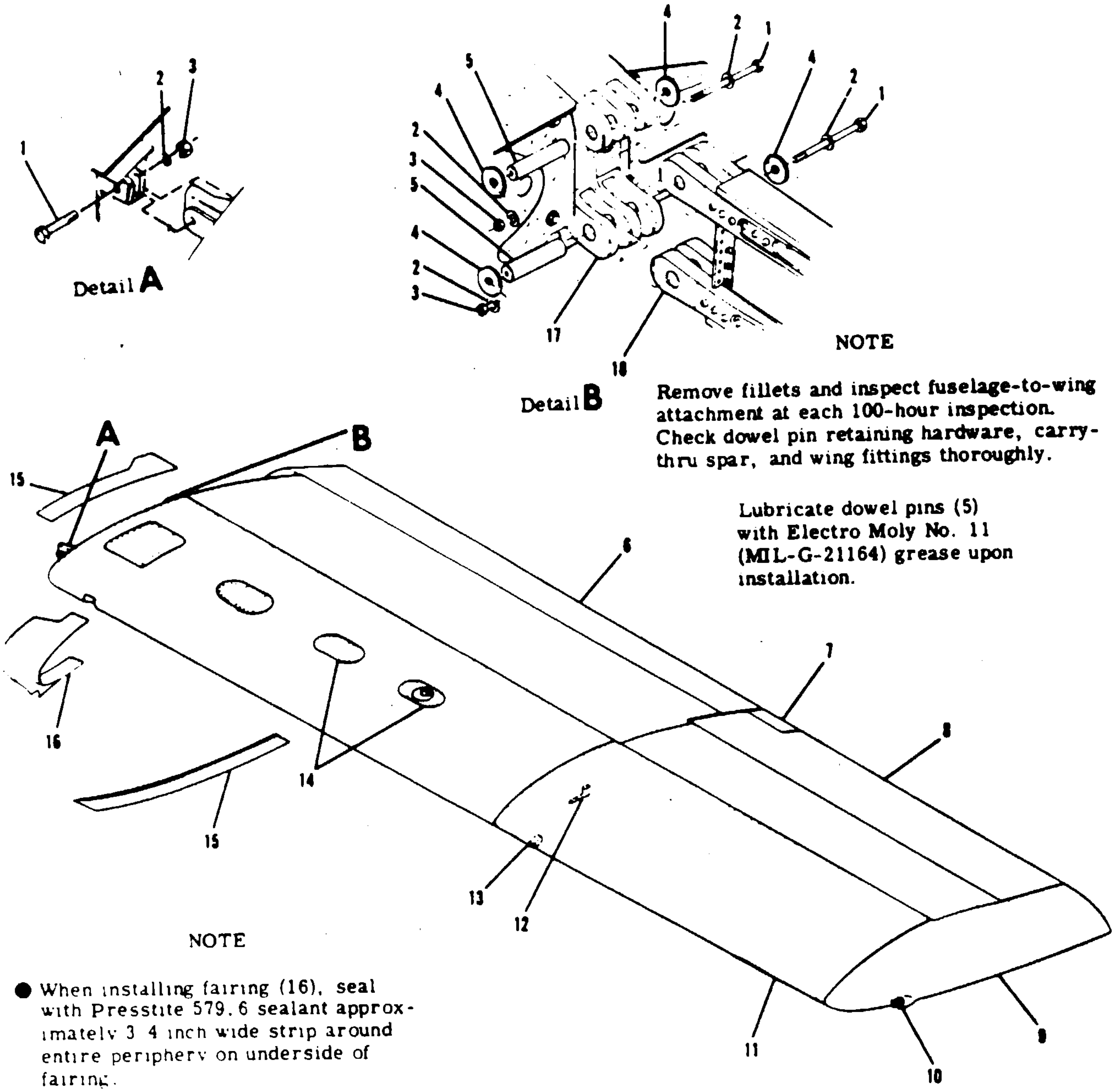
Boots may be applied over epoxy primer, but if the surface has been painted, the paint shall be removed from the bond area. This shall be done by wiping the surfaces with a clean, lint-free rag, soaked with solvent, and then wiping the surfaces dry, before the solvent has time to evaporate, with a clean, dry lint-free rag.

e. Stir cement (EC-1300, Minnesota Mining and Manufacturing Co.) thoroughly.
f. Apply one even brush coat to the metal and the inner surface of the boot. Allow cement to air-dry for a minimum of 30 minutes, and then apply a second coat to each surface. Allow at least 30 minutes (preferably one hour) for drying.
g. After the cement has thoroughly dried, reactivate the surface of the cement on the stabilizer, and boot, using a clean, lint-free cloth, heavily moistened with Toluol. Avoid excess rubbing, which would remove the cement from the surfaces.
h. Position the boot against leading edge, exercising care not to trap air between boot and stabilizer.

NOTE

Should boot be attached "off-course", pull it up immediately, with a quick motion, and reposition it properly.

i. Press roll entire surface of boot to assure positive contact between the two surfaces.
j. Apply a coat of GACO N700A sealer, or equivalent, conforming to MIL-C-21067, along the trailing edges of the boot to the surface of the skin to form a neat, straight fillet.
k. Remove masking tape and clean stabilizer of excess material.
l. Mask to the edge of the boot for painting stabilizer.



NOTE

Remove fillets and inspect fuselage-to-wing attachment at each 100-hour inspection. Check dowel pin retaining hardware, carry-thru spar, and wing fittings thoroughly.

Lubricate dowel pins (5) with Electro Moly No. 11 (MIL-G-21164) grease upon installation.

NOTE

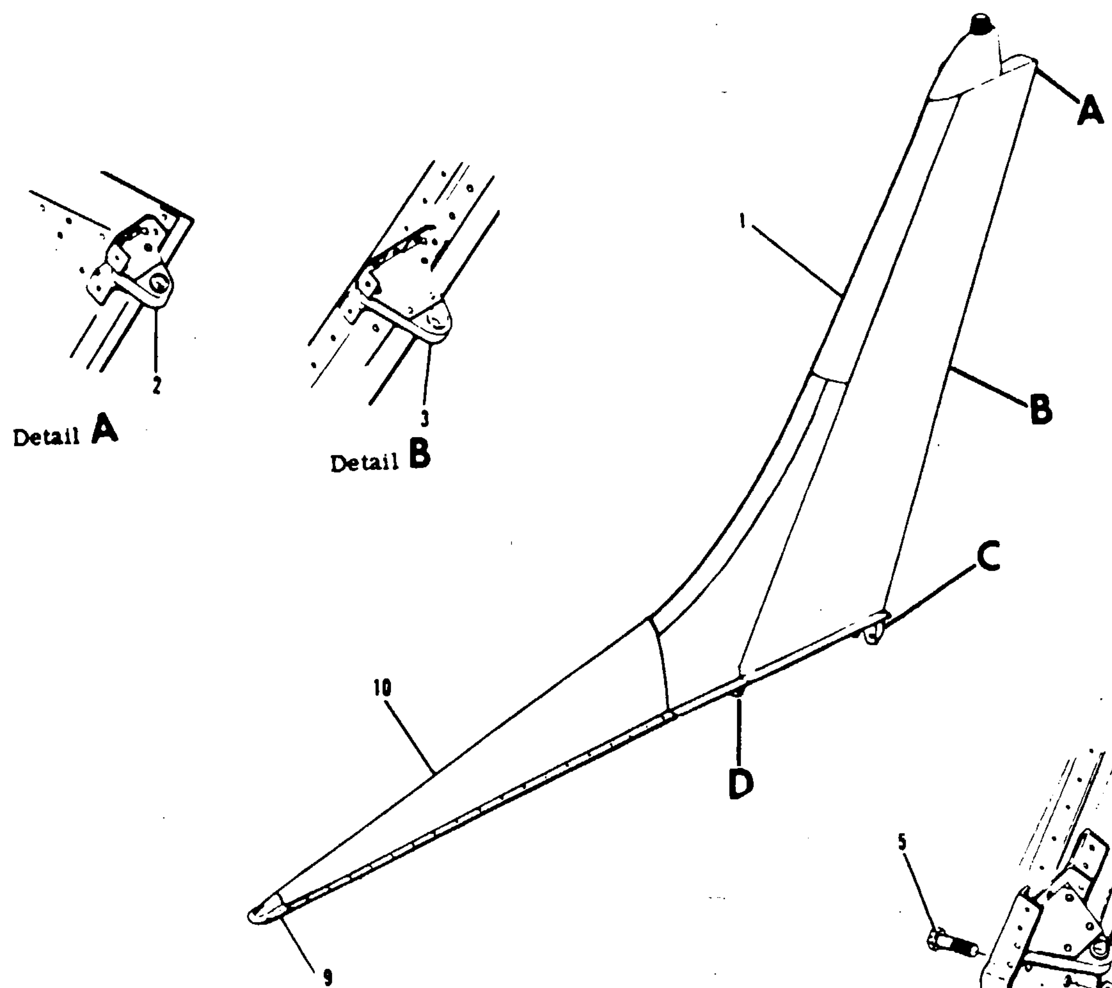
- When installing fairing (16), seal with Presstite 579.6 sealant approximately 3/4 inch wide strip around entire periphery on underside of fairing.
- When installing fillets (15), apply Permacel 672 tape 5/8 inch wide 3/16 inch from edge, around entire periphery on underside of fillet and seal with Inmont Corp. 576.1 sealant between tape and edge of fillet.

NOTE

If there is damage to bushings in fittings (17) or (18), notify factory before anticipating replacement, as these are critical areas.

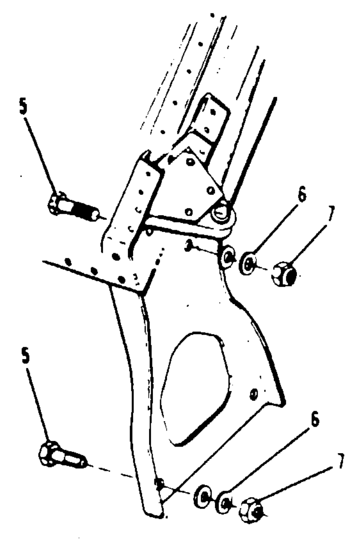
1. Bolt
2. Washer
3. Nut
4. Retainer
5. Dowel Pin
6. Flap
7. Trim Tab
8. Aileron
9. Tip Assembly
10. Navigation Light
11. Bonded Leading Edge
12. Pitot Tube
13. Stall Warning Unit
14. Access Plate
15. Fillet
16. Fairing
17. Fuselage Fitting
18. Wing Fitting

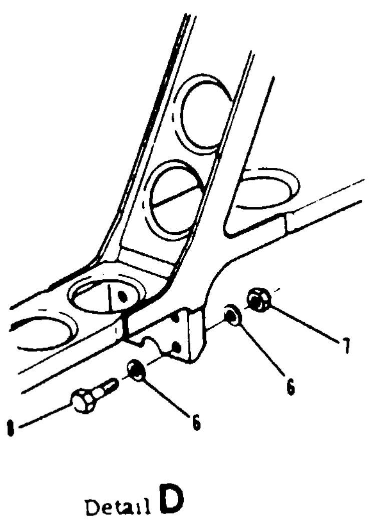
Figure 4-1. Wing Installation



NOTE

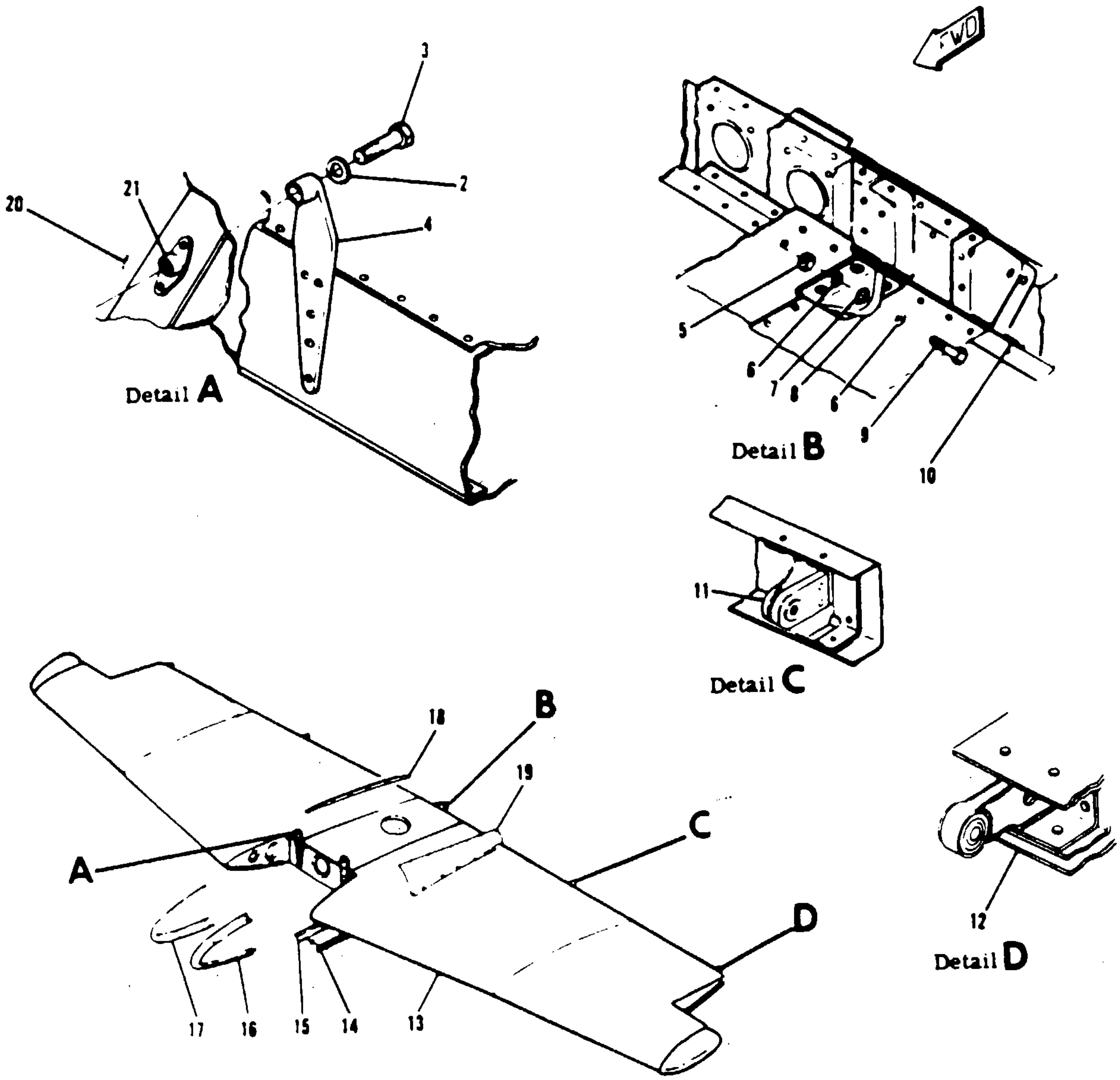
Torque bolts (5) to 70-100 lb inches





1. Fin Assembly
2. Upper Rudder Hinge
3. Center Rudder Hinge
4. Lower Rudder Hinge
5. Bolt
6. Washer
7. Nut
8. Bolt
9. Fairing

Figure 4-2. Vertical Fin Installation



1. Nut
2. Washer
3. Bolt
4. Bracket
5. Nut
6. Washer
7. Bushing
8. Bracket
9. Bolt
10. Elevator Pylon Bracket
11. Elevator Inboard Hinge
12. Elevator Outboard Hinge
13. Stabilizer Assembly
14. Lower Left Fairing
15. Lower Right Fairing
16. Forward Left Fairing
17. Forward Right Fairing
18. Upper Right Fairing
19. Upper Left Fairing
20. Bulkhead
21. Nutplate

Figure 4-3. Horizontal Stabilizer Installation

SECTION 5

LANDING GEAR, BRAKES AND HYDRAULIC SYSTEM (THRU 1978 MODELS)

WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

NOTE

Beginning with 1979 models, major changes were made in the aircraft hydraulic system. To avoid the confusion of serialization, Section 5A has been added following this section. Section 5A covers 1979 thru 1983 changes. However, Section 5 contains information which is still applicable to the aircraft described in Section 5A. To avoid repetition of information, in Section 5A, the reader is referred back to this section.

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WARNING

Before working in landing gear wheel wells, PULL-OFF hydraulic pump circuit breaker.The pump circuit breaker is located in the Circuit breaker panel, located immediately forward of the left forward doorpost. The hydro electric power pack system is designed to pressurize the landing gear DOOR CLOSE SYSTEM (1978 Models) to 1500 psi at anytime the master switch is turned on. Injury might occur to someone working in wheel well area if master switch is turned on for any reason.

It is sometimes necessary to open the landing gear doors while the aircraft in on the ground with the engine stopped. Operate the doors with the landing gear handle in the "DOWN" position. To open the doors, turn off the master switch and operate hand pump until doors open. To close the doors, turn the master switch on.

Position of the master switch for gear door operation is easily remembered by the following rule: OPEN CIRCUIT = OPEN DOORS; CLOSED CIRCUIT = CLOSED DOORS.

WARNING

Before working in landing gear wheel wells, PULL-OFF hydraulic pump circuit breaker. Circuit breaker is located in the circuit breaker panel on the left side wall. The hydro-electric power pack system is designed to pressurize the landing gear "DOOR CLOSE" system to 1500 psi at any time the master switch is turned on. Injury might occur to someone working in wheel well area if master switch is turned on for any reason.

5-1. LANDING GEAR SYSTEM.

5-2. DESCRIPTION. A hydraulically-operated, retractable landing gear is employed on the aircraft. The hydraulic power system includes equipment required to provide a flow of pressurized hydraulic fluid to the landing gear system. The Cessna-manufactured, self-contained, hydro-electric pack is located in the pedestal with the hand pump remotely located between the two front seats on the floorboard. The gear selector handle is located on the lower instrument panel. The hydraulic pump circuit breaker is located in the circuit breaker panel on the left side wall. It is necessary to pull out on the gear selector handle prior to moving the handle up or down. The right side of the pedestal cover is fitted with a quick-removable access door for checking and servicing the hydraulic fluid level.

5-3. SYSTEM OPERATION.

NOTE

Refer to the hydraulic schematic diagrams at the end of this section to trace the flow of hydraulic fluid as outlined in the following paragraph.

When the aircraft master switch is closed, the hydraulic power pack is ready to operate. When the gear-up position is selected with the selector handle the selector valve connects the gear-up line to the system pressure, and the gear-down line to return. At the same time, the electric motor that powers the hydraulic pump is turned on. The hydraulic pressure is passed through a filter, and is then divided between the selector valve and door valve. Before hydraulic pressure can reach the selector valve, a priority valve must open. The priority valve can open only under two conditions:

1. There can be no pressure in the door close line, because door close pressure is applied to a piston to hold priority valve closed.

2. System pressure must build up to 750 psig before the valve can open. Pressure therefore, must go to the door-open line. Pressure in the door-close line is prevented from returning by the door-close lock check valve, and the valve is opened by a piston that senses door-open pressure. When the pressure reaches 400 psig, the door-close lock check valve opens and the doors on the aircraft open. At 750 psig, the priority valve opens and the landing gear begins to retract. As soon as the landing gear is locked in the UP position, the landing gear up limit switches sequence the door solenoid valve to the door close position. When pressure in the door-close line reaches 1500 psig, the pressure switch shuts off the motor and the GEAR-DOWN cycle is similar to the GEAR-UP cycle. The system has been designed so that at any time during system operation, the direction of system of operation may be reversed. Under these conditions, the first operation of the system after the selector handle is moved is to completely open the doors, and then move the gear into the newly-selected position, after which, the doors will close again. There is no danger of interference between the gear and doors of the aircraft, since the gear does not receive hydraulic pressure unless the doors are in the fully-opened position.

SHOP NOTES:

5-4. TROUBLE SHOOTING.

Just because this chart lists a probable cause, proper checkout procedures cannot be deleted and the replacement of a part is not necessarily the proper solution to the problem. The mechanic should always look for obvious problems such as loose or broken parts, external leaks, broken wiring, etc. To find the exact cause of a problem, a mechanic should use a hand pump, pressure gage and a voltmeter to isolate each item in the system. Hydraulic fluid will foam if air is pumped into system, causing fluid to be blown overboard thru pack vent line.

The problems listed are all with the systems controls in their normal operating position: Master switch ON, hydraulic pump breaker IN and landing gear breaker IN. During landing gear system servicing, a power supply capable of maintaining 27.5 volts throughout the gear cycle must be used to augment the ship's battery.

TROUBLE	PROBABLE CAUSE	REMEDY
MOTOR PUMP WILL NOT OPERATE GEAR BUT EMERGENCY HAND PUMP WILL OPERATE GEAR.	Low voltage (in flight).	Check alternator and wiring.
	Fluid level low in reservoir.	Refill reservoir.
	Motor pump failure.	Replace pump.
	Faulty check valve.	Replace Valve
	Loose or clogged suction screen assembly in power pack	Remove power pack, disassemble and clean suction screen. Check screen for contamination, determine cause of contamination and remedy. Replace screen assembly or seal existing assembly. Prime parts to be assembled with Grade T Primer, using care to avoid getting primer on screen. Seal with hydraulic sealant (Catalog #69: Loctite Corp.) upon installation. Allow 15-30 minutes cure time if primed: 2-4 hours if unprimed.
	NOTE Motor and pump are not repairable and must be replaced.	
	Pump frozen.	Remove motor and coupling from top of power pack and replace pump.
	Broken pump or motor drive shaft or coupling.	Remove motor and pump from top of power pack and replace motor, pump and coupling.

TROUBLE SHOOTING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
MOTOR PUMP WILL NOT OPERATE GEAR BUT EMERGENCY HAND PUMP WILL OPERATE GEAR (Cont).	If motor was not turning, check wiring and motor.	Check motor for loose or broken connections; check for frozen pump or coupling. Check circuit breaker in left side wall.
	Bad pump shaft seal.	Replace pump.
	External leakage around top of pump assembly.	Remove motor and pump assemblies from top of power pack and replace upper packing and/or back-up rings.
	Air lock in pump (new pack installation or pump replacement.	Remove filter and intermittenly bump start switch until fluid flows. Replace filter.
	Bad pump body O-rings.	Remove motor and pump assemblies from top of power pack and replace lower packing and/or back-up rings.
PUMP OR EMERGENCY PUMP WILL NOT BUILD PRESSURE IN SYSTEM.	No fluid in reservoir.	Refill reservoir.
	Broken hydraulic line.	Check for evidence of leakage and repair or replace line. Flush out system and refill reservoir.
	Filter in outlet check valve improperly positioned in filter body, or seal between filter and check valve improperly positioned.	Replace seal and position filter in retainer with Petrolatum.
	Bad O-ring actuator piston; O-ring left out after repair.	Disconnect line upstream from actuator and check for pressure. Perform this check for all actuators in system.
	Bad O-ring on priority valve in gear manifold assembly. O-ring left out or damaged during repair of valve.	Disassemble manifold and replace O-ring.
	Bad O-ring on gear or door control valve.	Replace O-ring.
	Thermal relief valve stuck open.	Replace valve.
DOORS WILL NOT CLOSE GEAR INDICATOR LIGHT NOT ILLUMINATED.	Master switch not on.	Turn master switch on.
	Broken or loose door close hydraulic line.	Locate and repair or replace defective line.

TROUBLE SHOOTING (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
DOORS WILL NOT CLOSE GEAR INDICATOR LIGHT NOT ILLUMINATED. (Cont)	Defective limit switch circuit.	Check limit switch settings; locate and repair or replace limit switch circuit.
	Landing gear did not lock into position.	Check landing gear uplock and/or downlock mechanism for proper operation.
	Broken ground wire at socket or lamp not making contact in socket.	Repair or replace wire; check lamp contact.
GEAR AND DOORS OPERATE PROPERLY BUT INDICATOR LIGHT IS NOT ILLUMINATED.	Lamp burned out.	Replace lamp.
	Defective wiring.	Check circuit and repair wiring.
	NOTE If press-to-test operates, pull wire bundle toward lamp socket.	
DOORS WILL NOT CLOSE GEAR INDICATOR LIGHT IS ILLUMINATED.	Improper wiring at gear control switch.	Check circuitry and repair or rewire.
	Door control valve stuck.	Repair or replace control valve unit.
	Broken or loose door lines.	Tighten or replace lines.
PUMP OPERATES BUT DOORS WILL NOT OPEN	Refer to second listed trouble in this chart.	Use same remedies.
	Improper wiring installation.	Check door control valve wiring circuitry.
	Door solenoid valve jammed or stuck in door - close position.	Disassemble valve and replace defective parts.
	Crossed hydraulic lines in aircraft belly.	Most common place is aft and left of hand pump.
GEAR UNLOCKS BEFORE DOORS ARE FULLY OPEN.	Priority valve setting too low.	Check for weak spring, dull seat or replace entire valve.
	Binding in door system.	Disconnect door actuators and manually move doors and check for binding in linkage.
	Stiff operation of door actuators.	Check operation of actuator piston and rod.

TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
GEAR UNLOCKS BEFORE DOORS ARE FULLY OPEN.	Restriction in door open or door close line.	Using pressure gage, check pressure in door open or door close line, when gear unlocks. If pressure is greater than 700 psi, check for restrictions. Locate restrictions and remove. If contaminates are in line, investigate cause and remedy; flush system.
DOORS OPEN BUT GEAR DOES NOT OPERATE.	Priority valve setting too high or stuck closed.	Check valve componets for defects. Replace as necessary.
	Faulty O-rings downstream of priority valve (anywhere in system).	Locate faulty unit and replace O-rings.
DOORS OPEN BUT GEAR DOES NOT OPERATE (DOWN AND LOCKED ONLY).	Faulty or stuck squat switch.	Check switch wiring or setting.
HAND PUMP DOES NOT BUILD PRESSURE, BUT ELECTRIC PUMP OPERATES PROPERLY.	Check valve in hand pump sticking.	Inspect check valve.
	Defective hand pump outlet check valve.	Replace valve.
	Main gear or downlock actuator O-ring leaking.	Disassemble actuator and replace O-rings.
LANDING GEAR OPERATION EXTREMELY SLOW.	Fluid level low in reservoir.	Refill reservoir.
	Downlock rod adjustment incorrect (mainly LH rod).	Adjust rod end to lengthen actuator one turn.
	Pump failure.	Replace pump.
	Low voltage in electrical system.	Check alternator and wiring.
	Pump motor brushes worn.	Replace pump motor.
	Downlocks not in full unlock position.	Adjust downlocks.
	Fluid leak in door or gear line.	Locate and repair or replace broken line or fitting.
	O-ring leakage inside gear selector valve.	Check valve for leakage; repair as necessary.

TROUBLE SHOOTING (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
LANDING GEAR OPERATION EXTREMELY SLOW (Cont)	Air leakage around pump suction screen assembly.	Either replace suction screen assembly or seal and install existing assembly as follows: Prime parts to be assembled with Grade T Primer, using care to avoid getting primer on screen. Seal with hydraulic sealant (Catalog #69; Loctite Corp.) upon installation. Allow 15-30 minutes cure time if primed; 2-4 hours if unprimed.
	Defective piston seal in gear or door cylinder.	Replace with new seal.
	Excessive internal power pack leakage.	Remove and repair or replace power pack.
PUMP OPERATES, DOORS OPEN AND GEAR STARTS TO EXTEND. DOORS CLOSE BEFORE GEAR IS COMPLETELY EXTENDED; HAND PUMP WILL NOT PUMP GEAR DOWN.	Downlock switch makes contact before gear is down and locked.	Reset downlock actuator switches; replace if damaged.
	Interference between downlock and gear saddle clamp bolt head.	Remove interference.
POWER PACK EXTERNAL LEAKAGE.	Static seals (all fittings).	Remove and replace O-rings and/or back-up rings as required. Check tubing flares for leaks.
	Gear or door solenoid.	Replace O-rings.
	Transfer tubes between manifold and power pack body.	Disassemble power pack and replace O-rings.
	Reservoir cover.	Remove power pack and remove cover; replace seals.
GEAR DOWN-LOCK WILL NOT RETURN TO FULL-LOCK POSITION.	Binding in spring and tube assemblies.	Check operation to locate binding and eliminate.
DOORS CLOSE BEFORE ALL GEARS ARE FULLY LOCKED.	Faulty limit switch.	Replace switch.
	Short in wiring.	Check wiring continuity.
	Cracked terminal block.	Replace terminal block.
DOORS WILL OPEN BUT GEAR WILL NOT RETRACT.	Lines between downlock actuators crossed.	Properly route lines.
	Lines crossed at gear uplock valve.	Properly route lines.
	Gear uplock valve installed backward.	Install properly.

TROUBLE SHOOTING (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
DOORS WILL OPEN BUT GEAR WILL NOT RETRACT (Cont).	Improper setting of right and left downlock actuators.	Reset in accordance with applicable paragraph in this Section.
NOSE GEAR WILL NOT UPLOCK IN FLIGHT.	Restricted line.	Blow out line.
	Faulty nose gear actuator.	Replace actuator.
	Improper setting of downlock.	Reset in accordance with applicable paragraph in this Section.
	NOTE On ground test, nose gear should have constant movement from downlock to uplock position.	
NOSE WHEEL DOOR AND MAIN WHEEL DOORS OPERATE IN REVERSE.	Crossed lines.	Check main gear door lines in wheel well at forward bulkhead; lines are very easy to cross at this location.
NOSE GEAR HITS HARD IN UPLOCK POSITION.	RH downlock actuator improperly rigged.	Reset RH downlock actuator.
RH GEAR UNLOCKS BUT LH GEAR WILL NOT UNLOCK.	Improper setting of RH downlock actuator rod.	Check rigging procedures outlined in this Section.
BOTH RH AND LH MAIN GEAR UNLOCK BUT ONLY NOSE GEAR WILL RETRACT.	Improper setting of LH downlock actuator rod.	Check rigging procedures outlined in this Section.
MOTOR PUMP TURNS OFF AFTER GEARS UNLOCK; WILL NOT TURN ON BY WORKING SELECTOR SWITCH. HAND PUMP WILL PUT GEAR DOWN.	Defective pressure switch circuit.	Check circuit continuity.
		Check switch adjustment
POWER PACK WILL OPERATE SYSTEM AFTER BEING STARTED BY HAND PUMP.	Broken wire or defective diode in wire from " DOWN " side of selector switch to contactor. (Refer to wiring diagrams in this Section or Section 20.)	Replace diode. Repair or replace wiring.
SET SCREW ON CAM NOT EXTENDED ENOUGH FOR GEAR TO MOVE CAM OVER CENTER.	Check washers under bolt on downlock arm assembly.	Add AN960-10 washer under bolt downlock arm assembly.
MAIN GEAR WILL NOT LOCK OVER CENTER.	Main gear not centered in support.	Rerig saddle per rigging instructions.
MAIN GEARS HIT UPLOCK HOOK VERY HARD.	Insufficient main gear actuator snubbing action.	Adjust flow control valve in gear manifold.

TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
MALFUNCTION OF GEAR INDICATOR LIGHTS.	1. Both lights on at same time. 2. Light will change from green to amber or in reverse when gear control switch is moved.	Check ground wire for proper connection.

SYSTEM WORKS NORMALLY EXCEPT MOTOR TURNS ON AND OFF AT REGULAR INTERVALS. (GEAR IN EITHER UP OR DOWN POSITION). GEAR DOORS SAG WHILE AIRCRAFT IS ON GROUND. ENGINE AND ELECTRICITY OFF.

1. Support aircraft on jacks or secure tail in the event something might unlock nose wheel and allow it to collapse.
2. Remove console cover and sheet metal cover from power pack support.
3. Master switch OFF.
4. Remove cap from pressure port on pedestal structure and install pressure gage to port.
5. Open doors as required to bleed any pressure in system.
6. Remove hand pump line from power pack port fitting (left-hand aft fitting).
7. Attach flex line to disconnected line. (have port open)
8. Remove door line from its fitting on power pack (right-hand aft fitting).
9. Connect flex line to door port (fitting) on power pack and pressurize to 1500 psi with hand pump.
10. Observe pressure gage for leak-down; pressure should hold for better than 10 minutes.
    (a) Master switch OFF - if leakage comes from hand pump fitting (open) 3 or 4 drops - thermal relief valve leaking; replace.
    (b) No leaks above - pull hydraulic circuit breaker out, master switch ON - repressurize system with hand pump to 1500 PSI.
        1. If hand pump port leaks in this configuration, lock out valve is leaking.
11. With the preceding checks completed, and whether leaks were found or not, make this final check while working in this area:

    Remove flex line from door fitting and attach to door line and apply pressure to system. There might be a slight bleed-down on first application of pressure pump to 1500 PSI a second time. Pressure should hold.
12. The preceding procedure checks the door cylinders for leakage. If the system does not bleed down, disconnect added equipment and reconnect lines and pressure cap to pressure port and reinstall console covers. If on this last test, pressure does not hold, one or more of the door cylinders are leaking. They will have to be checked individually. TEST SYSTEM BEFORE FLIGHT.

TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
UNEVEN FALL OF MAIN GEAR.	Air in system.	Bleed system of air.
	Cold operating temperatures.	Operate power pack until fluid has reached operating temperature.
	Improper snubber adjustment.	Adjust flow control valve in gear manifold.

5-5 MAIN LANDING GEAR.

5-6 DESCRIPTION The tubular main landing gear struts rotate aft and inboard to stow the main wheels below the baggage compartment. Struts are down locked by an overcenter lock, actuated by a hydraulic cylinder for each strut. Uplocks are located on the main wheel stowage bay forward

SHOP NOTES:

bulkhead. Uplocking the gear pawls here, hold the struts in the stowed position. Rotation of the landing gear to extend or retract the struts is achieved through pivot assemblies, which are in turn bolted through a splined shaft, to the hydraulic rotary actuators.

5-7. MAIN GEAR STRUT REMOVAL. (Refer to figure 5-1.)

a. Jack aircraft in accordance with procedures outlined in Section 2.

b. Disconnect brake line at wheel cylinder and drain brake system of strut being removed.

c. Place landing gear handle up, with master switch off, and operate emergency hand pump until main gear downlocks release.

d. Remove bolt and nut securing strut to pivot assembly.

e. Work strut and wheel from pivot assembly.

5-8. MAIN GEAR STRUT INSTALLATION. (Refer to figure 5-1.)

NOTE

The following procedure installs the landing gear as a complete assembly. Refer to applicable paragraphs for installation of individual components.

a. Using new O-rings on and in end plug (20), position plug aligning pin (special tool #SE934) through end plug. Special tool # SE934 is available from Cessna Supply Division.

NOTE

Install new O-rings and existing attaching bolt lubricated with a film of Petrolatum VV-P 236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7. Do not use DC-7 on surfaces to be painted.

b. Work strut and wheel assembly into pivot assembly, aligning attach hole in strut and pivot assembly.

NOTE

If a new pivot assembly is being installed, it is permissible to burnish the 2.100" I.D. bore to facilitate assembly of landing gear spring into pivot.

c. With threaded end of attach bolt in counterbore of plug aligning pin, push pin from pivot assembly with bolt.

d. Install nut and washer on bolt; tighten nut.

e. Connect brake line at wheel cylinder. Fill and bleed brake system in accordance with applicable paragraph in this Section.

f. Rig landing gear in accordance with applicable paragraph in this Section.

5-9. MAIN LANDING GEAR ACTUATOR.

5-10. REMOVAL OF MAIN GEAR ACTUATOR.

a. Remove seats and peel back carpet as necessary to gain access to plate above actuator; remove access plate.

b. Remove access plate from bulkhead forward of actuator.

c. Disconnect and drain hydraulic brake line at wheel brake cylinder.

d. Place landing gear control handle UP, with master switch off, and operate emergency hand pump until main gear downlocks release.

e. Disconnect and cap or plug all the hydraulic lines at the actuator.

f. Remove bolts attaching actuator mounting flange to bulkhead forging.

g. Work actuator free of forging and pivot assembly; remove actuator.

5-11. DISASSEMBLY OF ACTUATOR. (Refer to figure 5-2.)

NOTE

Leading particulars of the actuator are as follows:

Cylinder Bore Diameter	2.250 in.
Piston Rod Diameter	.998 in.
Piston Stroke	2.970 in.

a. Remove screw (23). Remove end gland (22) by unscrewing end gland from cylinder body (15).

b. Remove end cap (6). Remove AN316-4R nuts (9), if installed, and remove cap (5) by pulling from cylinder body (15). Using a small rod, push piston (18) from cylinder body (15).

c. Remove cap (5) from shaft (14) by removing retainer (2) and washer (3).

d. Remove shaft (14), sector (12) and washer (11) from cylinder body (15).

e. Remove setscrew (13) from sector (12). Remove sector from shaft (14).

NOTE

Unless defective, do not remove name plate, bearing (7) and (10) or roller (8).

f. Remove and discard O-ring (17) and back-up ring (16) from cylinder body (15).

g. Remove and discard O-ring (20 and back-up ring (21) from end gland.

h. Remove and discard O-ring (19) from piston (18).

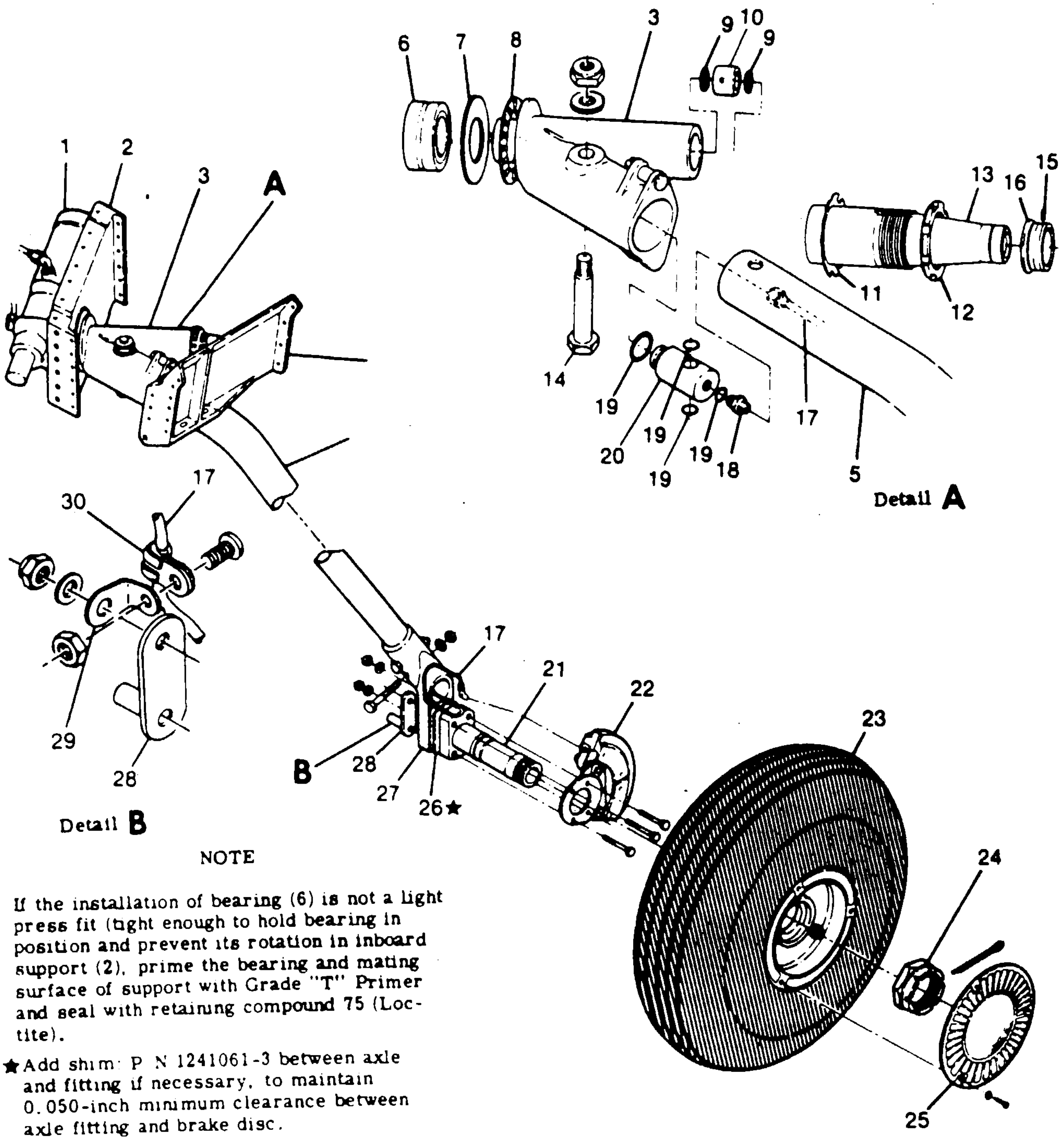
5-12. INSPECTION OF PARTS.

a. Thoroughly clean all parts in cleaning solvent (Federal Specification PS-661, or equivalent.)

b. Inspect all threaded surfaces for cleanliness, cracks and wear.

c. Inspect cap (5), washers (3) and (11), sector (12), shaft (14), piston (18), roller (8), if removed, and cylinder body (15) for cracks, chips, scratches, scoring, wear or surface irregularities which may affect their function or the overall operation of the actuator.

d. Inspect bearings (7) and (10), if removed, for



NOTE

If the installation of bearing (6) is not a light press fit (tight enough to hold bearing in position and prevent its rotation in inboard support (2), prime the bearing and mating surface of support with Grade "T" Primer and seal with retaining compound 75 (Loctite).

★Add shim P/N 1241061-3 between axle and fitting if necessary, to maintain 0.050-inch minimum clearance between axle fitting and brake disc.

1. Main Gear Actuator
2. Inboard Support
3. Pivot Assembly
4. Outboard Support
5. Strut
6. Bearing
7. Bearing Race
8. Bearing
9. O-Ring
10. Collar
11. Tab Washer
12. Nut
13. Pivot Shaft
14. Strut Bolt
15. Setscrew
16. Bushing
17. Brake Line
18. Brake Line Fitting
19. O-Ring
20. Plug
21. Axle
22. Brake Assembly
23. Wheel and Tire Assembly
24. Nut
25. Hub Cap
26. Shims
27. Fitting
28. Uplock Stud
29. Bracket
30. Clamp

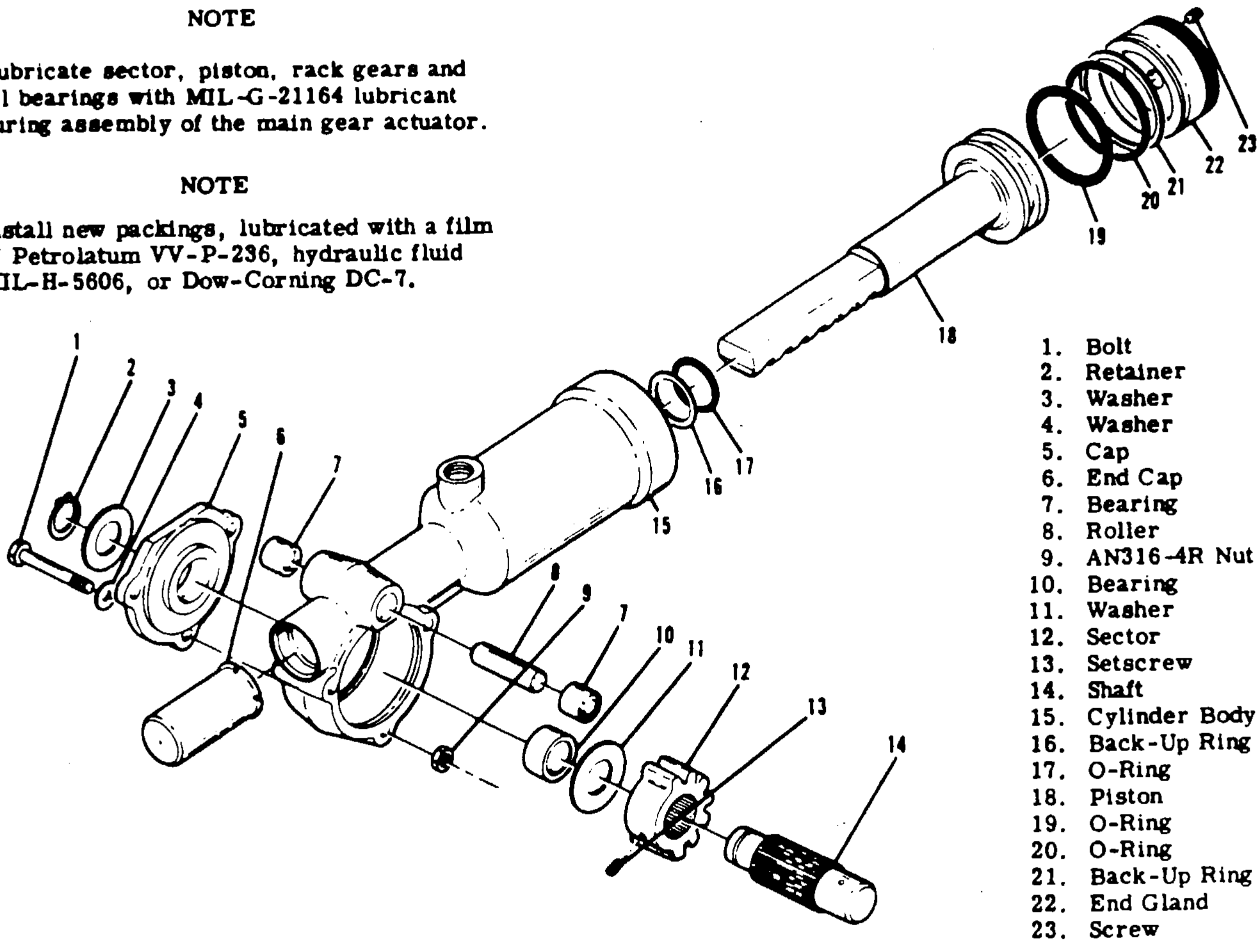
Figure 5-1. Main Landing Gear Installation.

NOTE

Lubricate sector, piston, rack gears and all bearings with MIL-G-21164 lubricant during assembly of the main gear actuator.

NOTE

Install new packings, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.



1. Bolt
2. Retainer
3. Washer
4. Washer
5. Cap
6. End Cap
7. Bearing
8. Roller
9. AN316-4R Nut
10. Bearing
11. Washer
12. Sector
13. Setscrew
14. Shaft
15. Cylinder Body
16. Back-Up Ring
17. O-Ring
18. Piston
19. O-Ring
20. O-Ring
21. Back-Up Ring
22. End Gland
23. Screw

Figure 5-2. Main Landing Gear Actuator Assembly

freedom of motion, scores, scratches or Brinnel marks.

5-13. PARTS REPAIR/REPLACEMENT. Repair of small parts of the main landing gear actuator is impractical. Replace all defective parts. Minor scratches or score marks may be removed by polishing with abrasive crocus cloth (Federal Specification P-C-458), providing their removal does not affect operation of the unit. During assembly, install all new packings.

5-14. MAIN GEAR ACTUATOR REASSEMBLY. (Refer to figure 5-2.)

NOTE

Use MIL-G-2116C lubricant on roller (8), bearings (7) and (10), if removed, and sector (12) when installing in cylinder body (15).

a. If bearings (7) and roller (8) were removed, press one bearing (7) into cylinder body (15) until it is flush. Install roller (8) and press second bearing (7) in place to hold roller. Use care to prevent damage to bearings and roller.

b. If bearing (10) was removed, press bearing into cap (5) until flush.

c. Assemble sector (12) on shaft (14), aligning index marks on shaft and sector. Install setscrew (13), making sure that setscrew enters shaft.

d. Position washer (11) and cap (5) on shaft (14). Install washer (3) and retainer (2) on shaft.

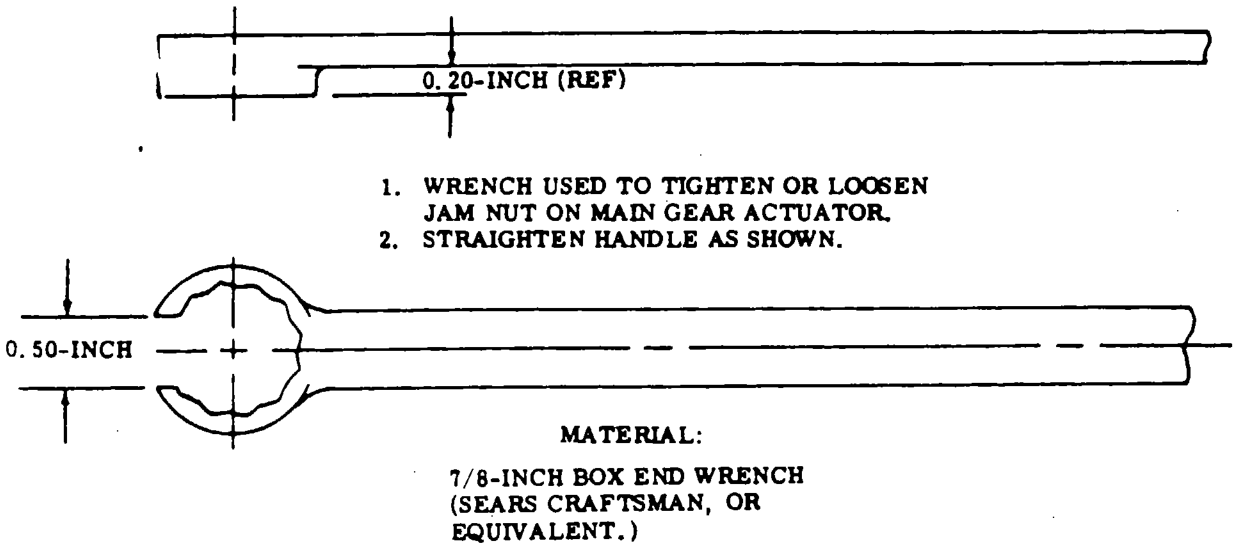
e. If actuator is to be installed in aircraft, install cap and shaft assembly on cylinder body with bolts (1) and washers (4). If actuator is not to be installed in aircraft, install cap and shaft assembly on cylinder body with bolts (1), washers (4) and AN316-4R nuts (9).

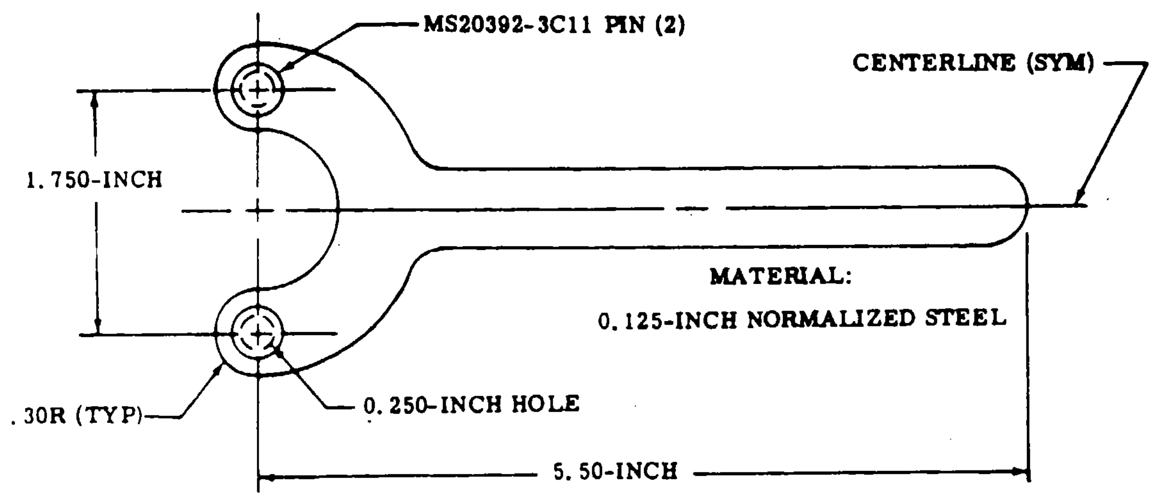
f. Install back-up ring (16) and O-ring (17) in cylinder body bore. Install new O-ring (19) on piston (18).

NOTE

Install new packings, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

g. Rotate shaft (14) so that teeth on sector (12) are toward cylinder body.





1. WRENCH USED TO INSTALL OR REMOVE END GLAND ON MAIN GEAR ACTUATOR.
2. INSERT PINS THROUGH HOLES IN WRENCH AND TORCH BRAZE USING BRAZING ROD (SIL-BOND 45, UNITED WIRE AND SUPPLY) OR EQUIVALENT.

TORCH BRAZING - Flux joint and filler material thoroughly. Filler material may be either pre-positioned or hand fed. The torch shall be adjusted for a non-oxidizating flame, and manipulated in such a manner as to braze in the direction the flame is pointing. This will tend to prevent flux inclusion and entrapment of foreign particles. After the assembly has solidified the excess flux shall be removed with hot water. (180° F. approximately.)

Figure 5-3. Fabrication of Main Landing Gear Actuator End Gland Removal Tool

h. Slide piston (18) into cylinder body, rotating shaft (14) as necessary to engage first tooth on sector (12) with first tooth on piston rack. Use care to prevent damage to packings in cylinder bore and on piston.

NOTE

Lubricate sector and piston rack gears with MIL-G-21164C lubricant. Apply lubricant sparingly. Over-greasing might cause contamination of hydraulic cylinder assembly with grease which might work past packing (7).

i. Install back-up ring (21) and new O-ring (20) on end gland (22).
j. Install end gland in cylinder and tighten until end of gland is flush with end of cylinder body. Install and tighten screw (23).
k. Install end cap (6) at end of actuator assembly.

5-15. MAIN GEAR ACTUATOR INSTALLATION. (Refer to figure 5-1).
a. With main gear pivot assembly rotating freely, match pivot and actuator sector gear markings together and slide actuator in place. Make sure that index marks are aligned.
b. Install bolts attaching mounting flange to bulkhead forging. Torque bolts to 50-70 lb-in.
c. Connect hydraulic lines to actuator.
d. Install access plates on bulkhead forward of actuator.
e. Connect brake line at wheel cylinder. Fill and bleed brake system in accordance with instructions in applicable paragraph in this Section.
f. Rig landing gear in accordance with procedures outlined in applicable paragraph in this Section.
g. Remove aircraft from jacks and install access covers, carpeting and seats removed for access.

5-16. MAIN LANDING GEAR STRUT-TO-ACTUATOR LINKAGE. (Refer to figure 5-1.)

5-17. DESCRIPTION. Each main landing gear actuator attaches directly to a pivot assembly, which in turn is attached to, and rotates its own main landing gear strut.

5-18. PIVOT ASSEMBLY REMOVAL. (Refer to figure 5-1.)
a. Remove main landing gear strut as outlined in paragraph 5-7.
b. Loosen nut (12) and telescope pivot shaft (13) inboard to free pivot assembly (3) from bearing (6) in inboard support (2).
c. Remove pivot assembly (3), bearing (8), bearing race (7) and spacer (14).

5-19. PIVOT ASSEMBLY INSTALLATION. (Refer to figure 5-1.)
a. Install bearing (8) and race (7) on shaft of pivot assembly (3); install tab washer (11) and nut (12) on pivot shaft (13).
b. Position shaft of pivot assembly (3) into bearing (6) in inboard support (2). Lubricate bearing (6) with MIL-G-21164 grease. Be sure thrust bearing and race are correctly positioned.
c. Telescope pivot shaft (13) and fit shaft (13) into bearing (16) in outboard support (4).
d. Tighten nut (12) firmly and safety in place, bending corresponding tangs of washer (11). Pivot assembly shall rotate freely.

5-20. MAIN GEAR UPLOCK MECHANISM. (Refer to figure 5-4.)

5-21. DESCRIPTION. The uplock actuator cylinder and latches for the main landing gear are located on the aft side of canted bulkhead station 106.00 (refer to Section 1 of this manual.) The latches are controlled by a single actuator, located on the aircraft centerline, by means of bellcrank and linkage assemblies.

5-22. REMOVAL AND INSTALLATION OF MAIN GEAR UPLOCK MECHANISM. (Refer to figure 5-4.)

WARNING

Before working in landing gear wheel wells, PULL-OFF hydraulic pump circuit breaker. The pump circuit breaker is located in the circuit breaker panel, located immediately forward of the left forward doorpost. The hydro-electric power pack system is designed to pressurize the landing gear DOOR CLOSE SYSTEM (1978 Models) to 1500 psi at any time the master switch is turned on. Injury might occur to someone working in wheel well area if master switch is turned on for any reason.

a. Turn master switch OFF and, using hand pump, open landing gear doors.
b. Components of the main landing gear uplock system are readily accessible on the aft side of canted bulkhead station 106.00 (refer to Section 1 of this manual.)
c. Components may be removed or installed using figure 5-4 as a guide.
d. Upon installation, rig uplocks in accordance with applicable paragraph in this Section.

5-23. UPLOCK ACTUATOR DISASSEMBLY. (Refer to figure 5-5.)

NOTE

Leading particulars of the actuators are as follows:

Cylinder Bore Diameter . . .	0.749 +.002,-.000 in.
Piston Diameter	0.747+.000,-.001 in
Stroke (to unseat valve)	0.719 ± .031 in.

a. Remove fitting (5), spring (7) and balls (8) and (9).
b. Cut safety wire and unscrew end plug (19) from barrel and valve body (12).
c. If end fitting (1) is installed, loosen nut (2) and remove end fitting from barrel and valve body.
d. Remove springs (18) and (17) and push piston (13) from barrel and valve body.

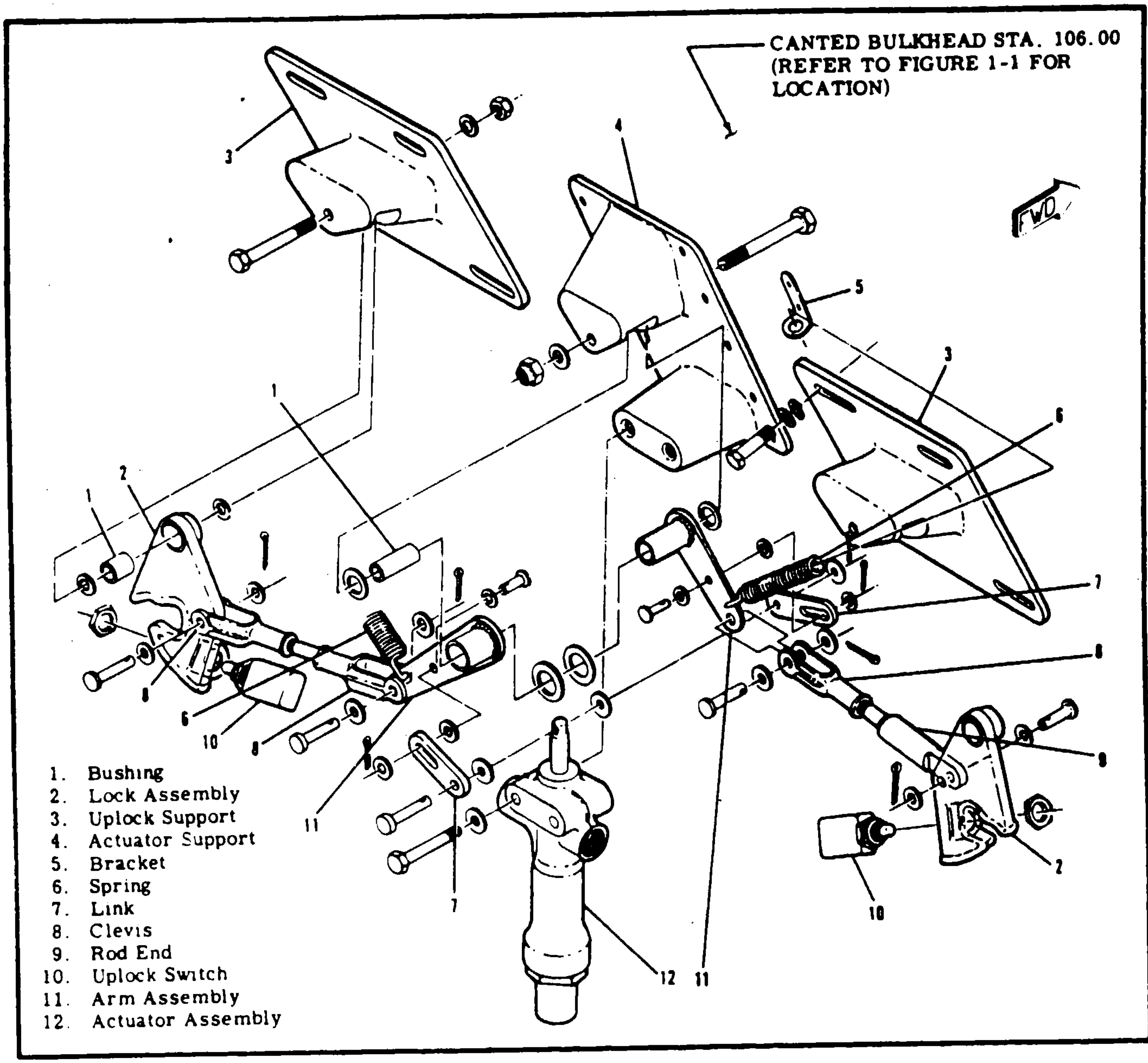


Figure 5-4. Main Landing Gear Uplock Installation

e. Remove and discard all O-rings and back-up rings.

5-24. INSPECTION OF PARTS. (Refer to figure 5-5.)

a. Inspect all threaded surfaces for cleanliness and for freedom of cracks and excessive wear.

b. Inspect ball spring (7) for evidence of breaks and distortion.

c. Inspect inner and outer piston springs (18) and (17) for evidence of breaks and distortion.

d. Inspect end fitting, piston and rod, barrel, valve body, balls and ball seats for cracks, scratches, scoring, wear or surface irregularities which might affect their function or the overall function of the unit.

e. Repair of most parts of the uplock actuator is impractical. Replace defective parts. Minor scratches and scores may be removed by polishing with fine abrasive crocus cloth (Federal Specification PC-458), providing their removal does not affect operation of the unit.

5-25. UPLOCK ACTUATOR REASSEMBLY. (Refer to figure 5-5.)

NOTE

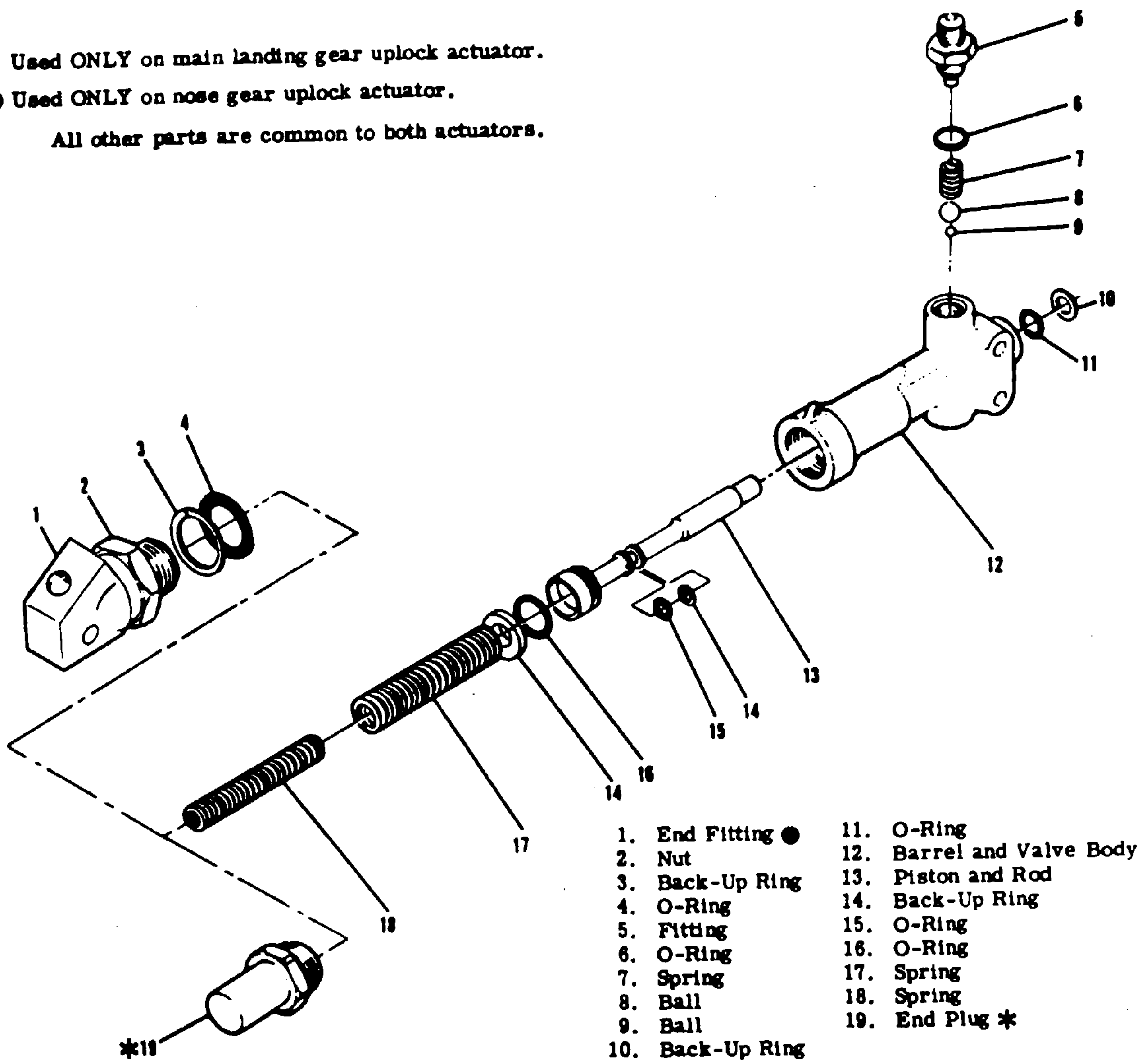
Install all new O-rings and back-up rings during reassembly of the actuator.

a. Install new O-rings and back-up rings in grooves of piston and rod (13).

b. Install new O-ring and back-up rings in grooves of barrel and valve body (12).

c. Slide piston and rod into barrel and valve

✱ Used ONLY on main landing gear uplock actuator.
● Used ONLY on nose gear uplock actuator.
All other parts are common to both actuators.



1. End Fitting ●
2. Nut
3. Back-Up Ring
4. O-Ring
5. Fitting
6. O-Ring
7. Spring
8. Ball
9. Ball
10. Back-Up Ring
11. O-Ring
12. Barrel and Valve Body
13. Piston and Rod
14. Back-Up Ring
15. O-Ring
16. O-Ring
17. Spring
18. Spring
19. End Plug ✱

Figure 5-5. Lock and Unlock Actuators

body. Use care to prevent damage to O-rings and back-up rings.

d. Insert piston springs (18) and (17), then install end fitting (1) or end plug (19) to barrel and valve body.

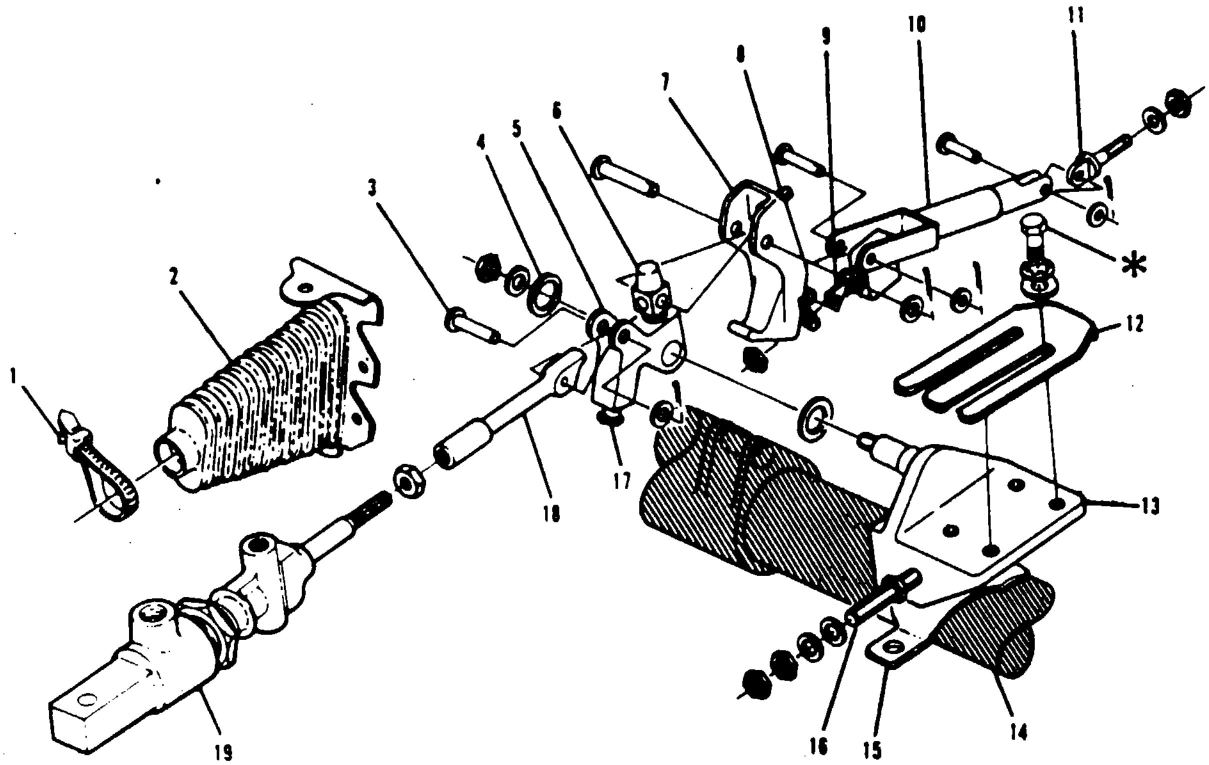
e. Insert balls (8) and (9) and spring (7) in barrel and valve body.

f. Install new O-ring (6) on fitting (5). Install and tighten fitting.

5-26. DOWNLOCK MECHANISM. (Refer to figure 5-6.)

5-27. DESCRIPTION. The downlock mechanism is comprised of hydraulic actuators connected to arm assemblies, which trip downlock hooks, releasing the main landing gear struts. Figure 5-6 illustrates the downlock mechanism and may be used as a guide for determining relationship of parts. A locator illustration is also provided, which shows station numbers, bulkheads, ribs and parts of the downlock mechanism. To locate a specific fuselage station, refer to the station diagram in Section 1 of this manual.

5-28. REMOVAL AND INSTALLATION OF COMPONENTS. (Refer to figure 5-6.) The downlock mechanisms located just forward and aft of the rear door post under the floorboard. Access to the mechanism is gained by removing the seats, peeling back the carpet and removing the access plates immediately forward and aft of the rear door post on either side of the aircraft. Figure 5-6 may be used as a guide for removal and installation of components of the downlock mechanism. Upon complete reassembly of the downlock mechanisms,



* Install internal tooth washer under bolt heads.

* Prime bolts with LOCTITE GRADE "T" PRIMER and seal with LOCTITE CV or CATALOG #85 or #83.

1. Tie
2. Boot
3. Pin
4. Spacer
5. Arm Assembly
6. Downlock Adjustment Screw
7. Hook
8. Setscrew
9. Downlock Switch
10. Spring Assembly
11. Eyebolt
12. Shim
13. Support Assembly
14. Landing Gear Strut
15. Shell Assembly
16. Stud
17. Bolt
18. Rod End
19. Actuator

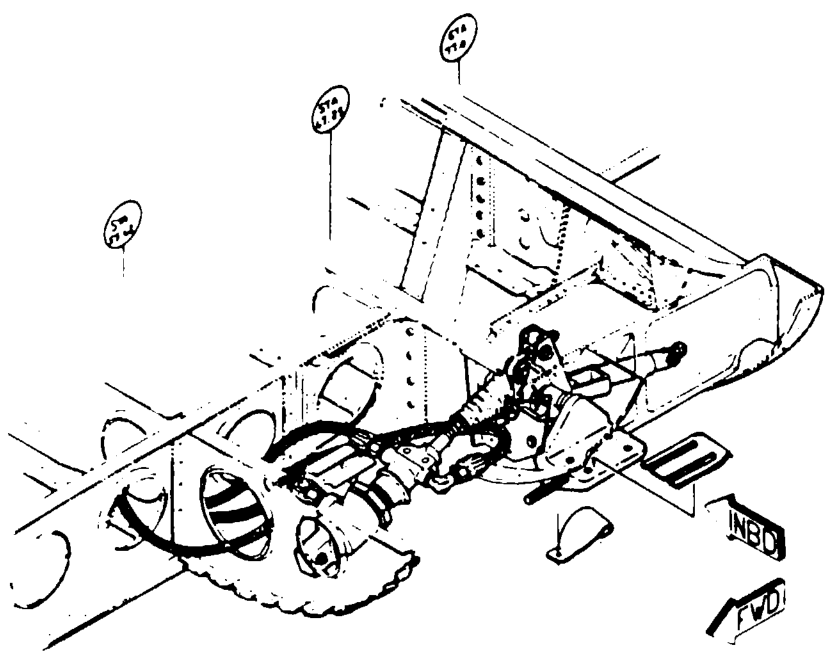


Figure 5-6. Main Landing Gear Downlock Installation

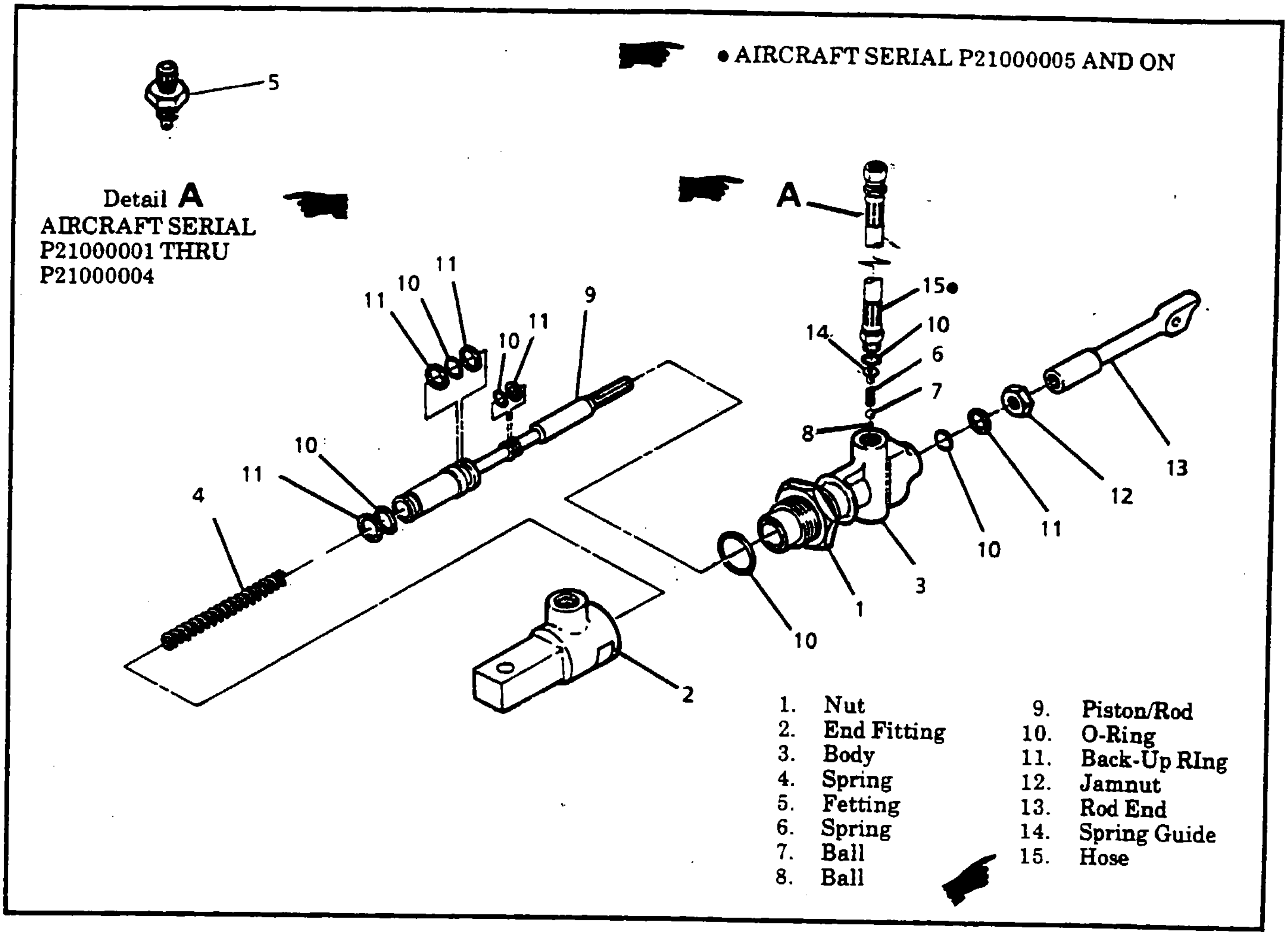


Figure 5-6A. Main Landing Gear Downlock Actuator.

rig the main landing gear in accordance with procedures outlined in the applicable paragraph in this Section.

5-28A. DOWNLOCK ACTUATOR.

5-29. DISASSEMBLY. (Refer to figure 5-6A.)

a. Loosen nut (1) and unscrew end fitting (2) from body (3). Spring (4) can also be removed

b. Aircraft serial P21000001 thru P21000004 remove fitting (5), spring (6), ball (7), and ball (8) from body (3).

c. Aircraft serial P21000005 and on remove hose (15) spring guide (14), spring (6), ball (7), and ball (8) from body (3)

d. Remove piston/rod (9) from body (3).

e. Remove and discard all packings and back-up rings from end fitting (2), body (3) and piston/rod (9).

5-29A. INSPECTION AND REPAIR.

a. Inspect all threaded surfaces for cleanliness and for freedom of cracks and excessive wear.

b. Inspect ball spring (6) for evidence of breaks and distortion.

c. Inspect piston spring (4) for evidence of breaks and distortion.

d. Inspect end fitting, piston/rod, barrel, valve body, balls and ball seats for cracks, scratches, scoring, wear or surface irregularities which might affect their function or the overall function of the unit.

e. Repair of most parts of the uplock actuator is impractical. Replace defective parts. Minor scratches and scores may be removed by polishing with fine abrasive crocus cloth (Federal Specification PC-458), providing their removal does not affect operation of the unit.

5-29B. REASSEMBLY.

NOTE

Install new O-rings and back-up rings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

a. Assemble by reversing procedures outlined in paragraph 5-29.

5-30 MAIN LANDING GEAR DOOR SYSTEM.

5-31. DESCRIPTION. Main gear doors open for main gear retraction or extension and return to closed positions at the close of either cycle. The strut doors are opened and closed by a double-acting hydraulic actuator. The wheel doors are actuated by a double-actuating hydraulic actuator for each door. The actuators are held closed by the door close system accumulator.

5-32. REMOVAL AND INSTALLATION OF MAIN GEAR STRUT AND WHEEL DOORS. (Refer to figure 5-7.)

a. Open landing gear doors.
b. Disconnect door from actuator linkage by removing pin or bolt.
c. Remove door hinge pins or bolts.
d. Install door by reversing the preceding steps.
e. Rig doors in accordance with applicable paragraph.

5-33. MAIN GEAR STRUT DOOR ACTUATOR REMOVAL AND INSTALLATION.

WARNING

Turn master switch "off" and pull pump motor circuit breaker before disconnecting any hydraulic lines in the landing gear system.

a. Peel back carpet as required and remove access cover in center of floorboard just forward of rear seat.
b. Open doors using hand pump then disconnect hydraulic lines at actuator. Cap or plug lines and fittings.
c. Remove bolts at each end of actuator attaching rod end to bellcrank and actuator body to mounting bracket. Remove actuator from aircraft.
d. Reverse procedure to install actuator.

5-34. DISASSEMBLY. (Refer to figure 5-8.)

a. Remove retaining ring (1) from end of cylinder (6).
b. Pull piston rod (5), end gland (4) from cylinder (6). A sharp blast of air applied to the hydraulic port at bearing end of cylinder may be used to remove piston rod.
c. Remove end gland (4) from piston rod (5).
d. Remove and discard back-up rings and O-rings from gland and piston rod.

5-35. INSPECTION. (Refer to figure 5-8.)

a. Inspect all threaded surfaces for cleanliness and for freedom of cracks and excessive wear or damage.
b. Inspect end gland (4), piston rod (5) and cylinder (6) for cracks, chips, scratches, scoring, wear or surface irregularities which might affect their function or the overall function of the door actuator.
c. Repair of most parts of the landing gear door actuator assembly is impractical. Replace defective parts with new parts.
d. Minor scratches may be removed by polishing with fine abrasive crocus cloth (Federal Specification PC-458), providing their removal does not affect the operation of the unit.

5-36. REASSEMBLY. (Refer to figure 5-8.)

NOTE

Install new O-rings and back-up rings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

a. Install new O-ring and back-up ring in gland and install gland on piston rod. Use care to prevent damage to O-rings and back-up rings.
b. Install new O-rings and back-up rings on piston and on gland.
c. Install piston rod and gland into cylinder and install retaining ring. Use care to prevent damage to O-rings and back-up rings.

5-37. MAIN GEAR WHEEL DOOR ACTUATOR REMOVAL AND INSTALLATION. (Refer to figure 5-9.)

WARNING

Turn master switch "off" and pull pump motor circuit breaker before disconnecting any hyraulic lines in the landing gear system.

a. Open doors using hand pump then disconnect hydraulic lines at actuator. Cap or plug lines and Fittings.
b. Remove bolts attaching actuator to mounting brackets and remove actuator from aircraft.
c. Reverse procedure to install actuator.

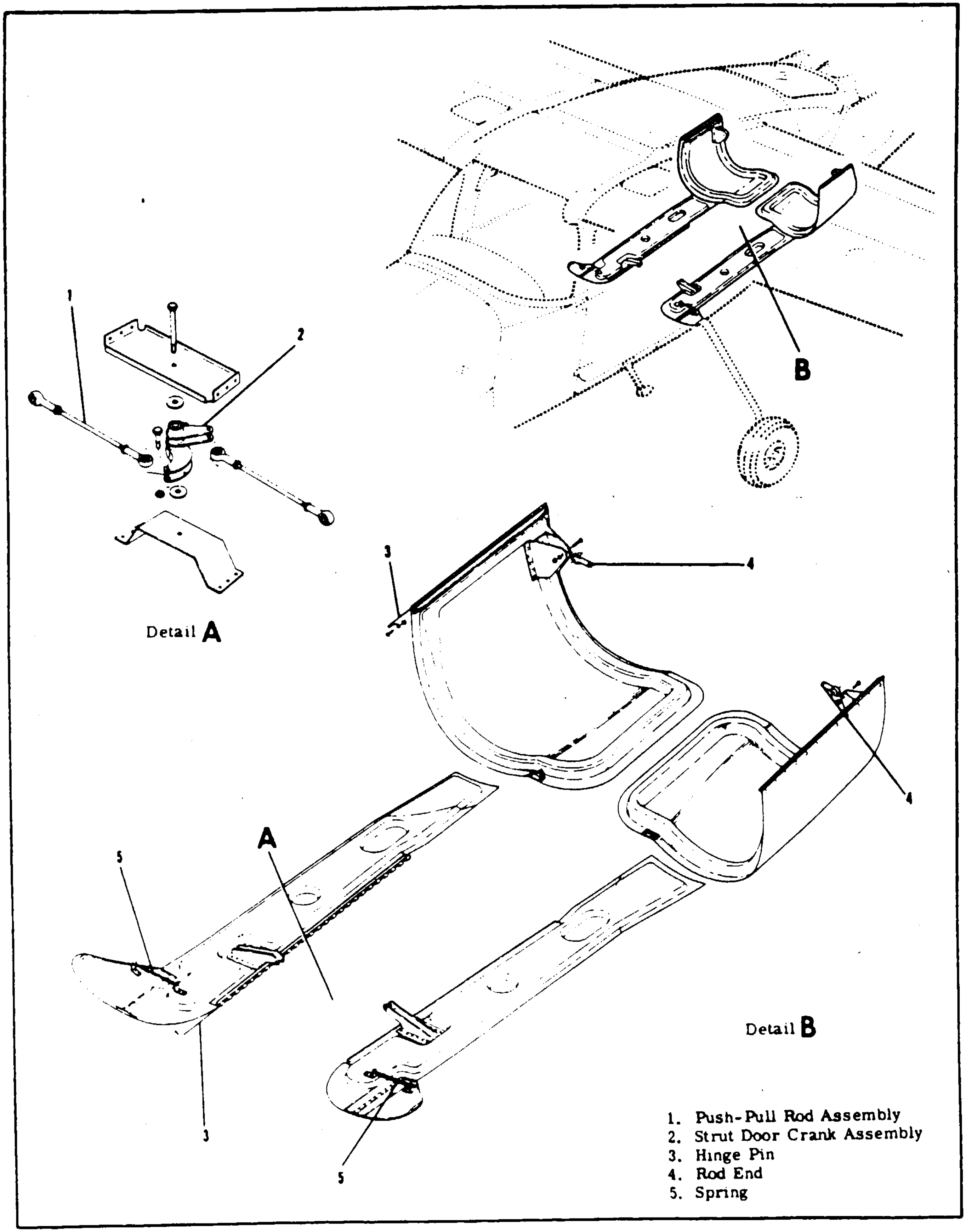


Figure 5-7. Main Landing Gear Doors Installation

5-38. DISASSEMBLY. (Refer to figure 5-9.)

a. Loosen lock nut (2) and remove rod end (1).
b. Remove safety wire from end fitting (3) unscrew end fitting from actuator cylinder (10).
c. Pull piston rod (8) from cylinder.
d. Remove and discard back-up rings and O-rings from end fitting and piston rod.
e. Do not remove bearing (9) unless it is defective.

5-39. INSPECTION. (Refer to figure 5-9.)

a. Inspect all threaded surfaces for cleanliness and for freedom of cracks and excessive wear or dammage.
b. Inspect end fitting, piston rod and cylinder for cracks, chips, scratches, scoring, wear or surface irregularities which might affect their function or the overall function of the door actuator.
c. Repair of most parts of the gear door actuator is impractical. Replace defective parts with new parts.
d. Minor scratches may be removed by polishing with fine abrasive crocus cloth (Federal Specification PC-458, providing their removal does not affect the operation of the unit.

5-40. REASSEMBLY. (Refer to figure 5-9.)

a. Install new O-ring and back-up ring inside end fitting. Install new O-ring on outside of end fitting.
b. Install new O-rings and back-up rings on piston.
c. Install piston in cylinder using care to avoid dammaging O-rings and back-up rings.
d. Install end fitting on piston rod and screw into cylinder. Use care to prevent dammage to O-ring and back-up ring inside end fitting.
e. Tighten end fitting and install new safety wire.

NOTE

If bearing (9) was removed, install and stake six places, three on each side.

5-41. MAIN WHEEL AND TIRE ASSEMBLY.

5-42. DESCRIPTION. The aircraft may be equipped with either Cleveland or McCauley wheel and tire assemblies. Separate disassembly, inspection and reassembly instructions are provided for each type.

CAUTION

Use of recapped tires or new tires not listed on the aircraft equipment list are not recommended due to possible interference between the tire and structure when landing gear is in the retracted position.

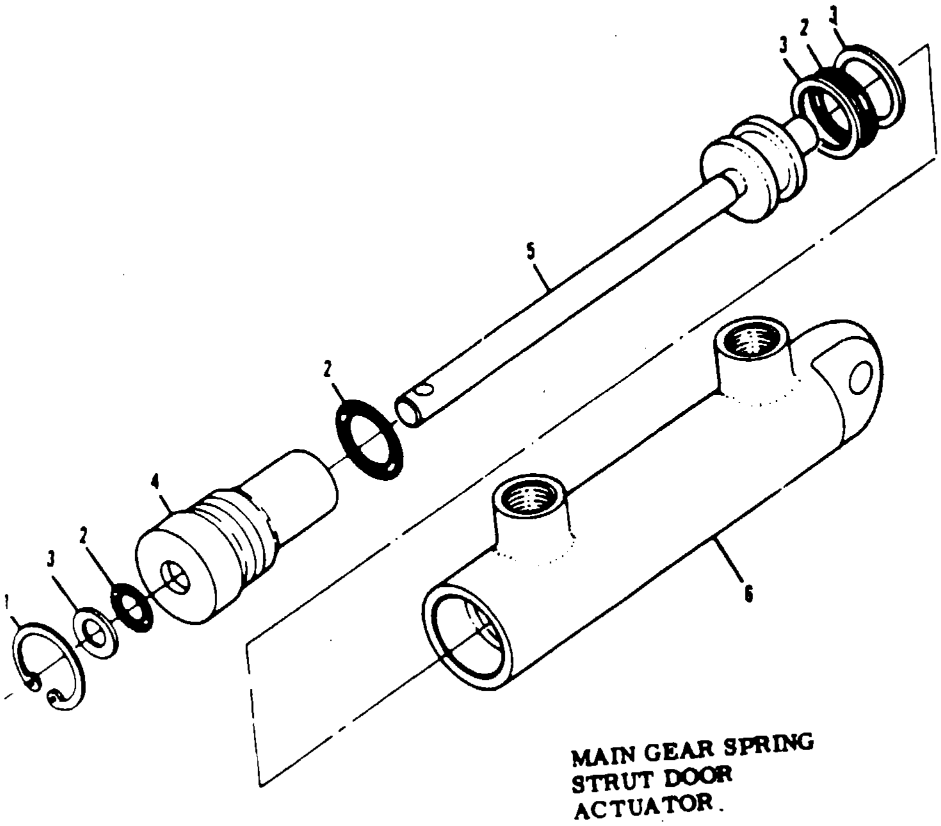
5-43. REMOVAL OF MAIN WHEEL AND TIRE ASSEMBLY. (Refer to figure 5-10.)

NOTE

It is not necessary to remove the main wheel to reline brakes or remove brake parts, other than the brake disc or torque plate.

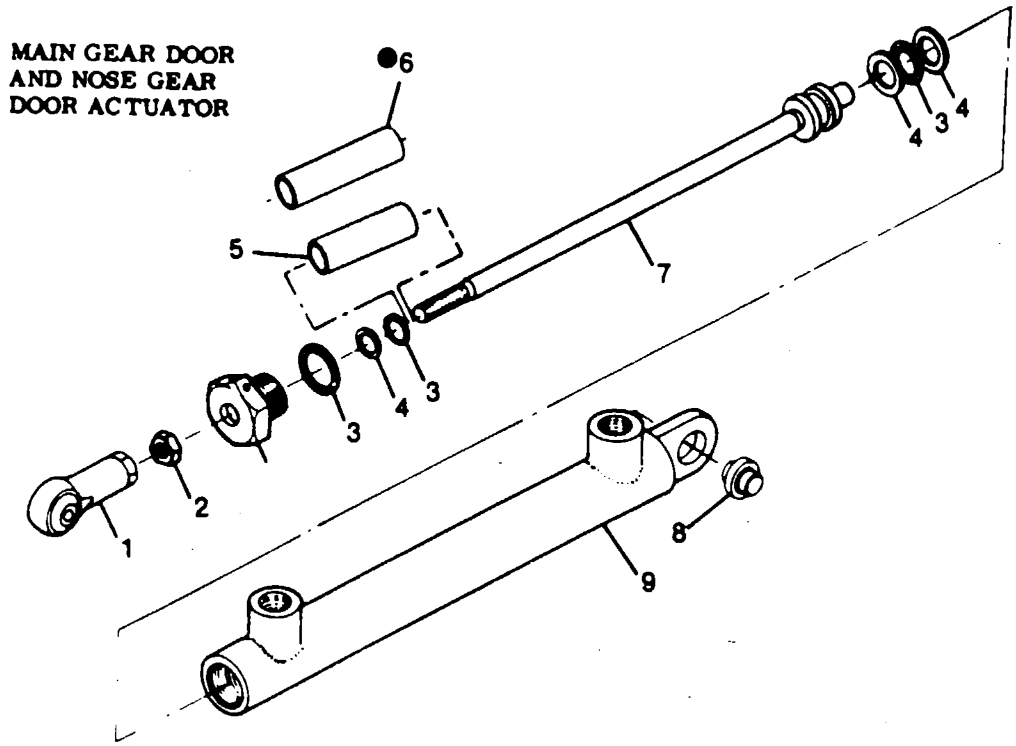
a. Using the jack point under step on main gear strut, jack-up wheel being removed.
b. Remove hub caps.
c. Remove cotter pin and axle nut.
d. Remove bolts and washers attaching back plate and remove back plate.
e. Pull wheel from axle.

SHOP NOTES:



1. Retaining Ring
2. O-Ring
3. Back-Up Ring
4. Gland
5. Piston Rod
6. Cylinder

Figure 5-8 Main Strut Door Actuator



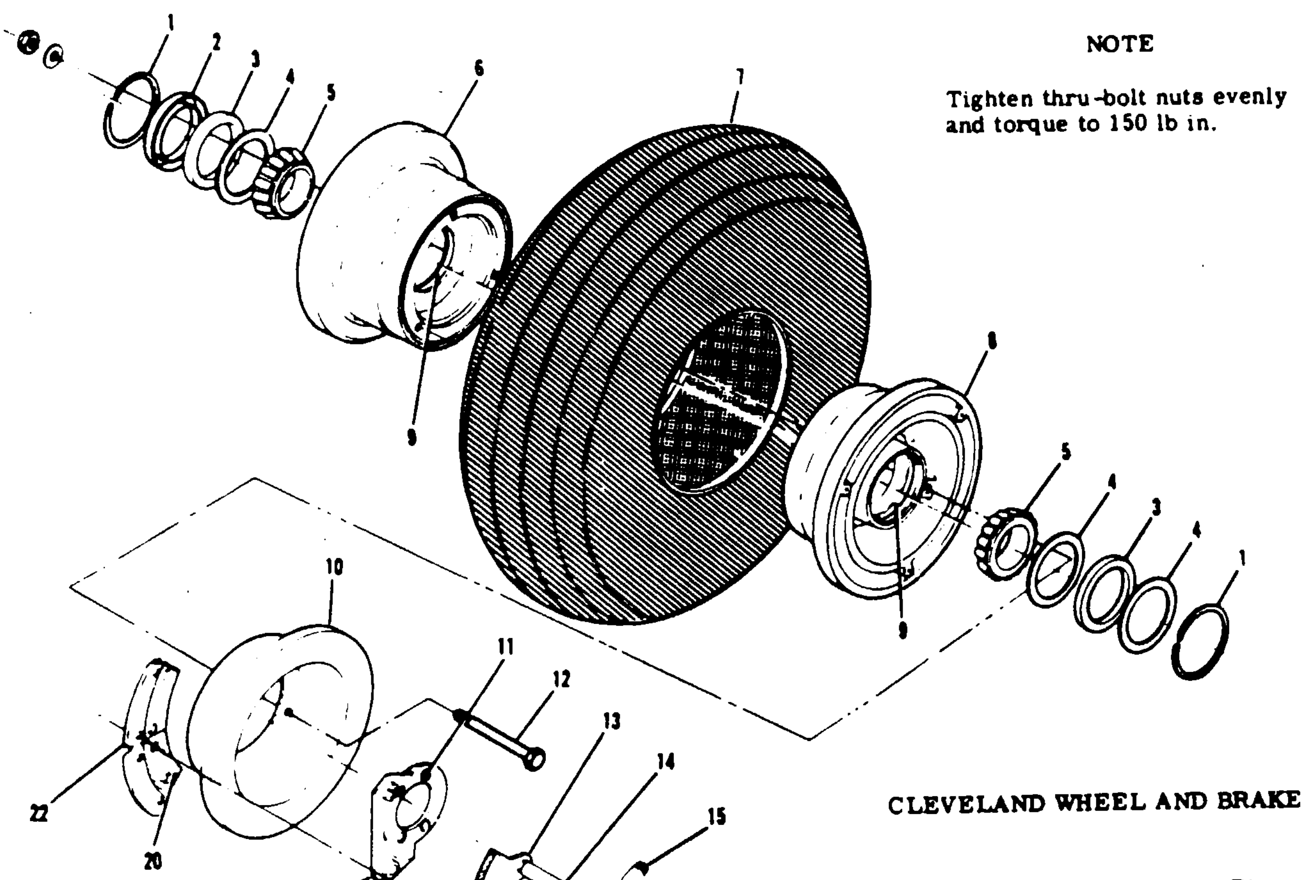
1. Rod End
2. Jam Nut
3. O-Ring
4. Back-Up Ring
5. Spacer
●6. Spacer
7. Piston Rod
8. Bearing
9. Body

● USED IN NOSE GEAR DOOR ACTUATOR

Figure 5-9 Main Wheel Door Actuator

NOTE

Tighten thru-bolt nuts evenly and torque to 150 lb in.



CLEVELAND WHEEL AND BRAKE

1. Snap Ring
2. Grease Seal Ring
3. Grease Seal Felt
4. Grease Seal Ring
5. Bearing Cone
6. Outer Wheel Half
7. Tire and Tube
8. Inner Wheel Half
9. Bearing Cup
10. Brake Disc
11. Bushing
12. Thru-Bolt
13. Pressure Plate
14. Anchor Bolt
15. Hydraulic Fitting
16. Brake Bleeder
17. Brake Cylinder
18. Brake Piston
19. O-Ring
20. Brake Lining
21. Torque Plate
22. Back Plate
23. Retaining Ring
24. Grease Seal Retainer
25. Wheel Flange
26. Spacer
27. Hub Assembly
28. Guide Pin
29. Bleeder Fitting
30. Bleeder Screw
31. Dust Cap
32. Capscrew

Figure 5-10 Main Landing Gear Wheel, Tire and Brake Assembly (Sheet 1 of 3)

5-44. DISASSEMBLY OF CLEVELAND MAIN WHEEL AND TIRE ASSEMBLY. (Refer to figure 5-10.)

a. Deflate tire and break tire beads loose.

CAUTION

Avoid damaging wheel flanges when breaking tire beads loose. A scratch, gouge or nick may cause wheel failure.

b. Remove thru-bolts and separate wheel halves, removing tire, tube and brake disc.

c. Remove grease seal rings, felts and bearing cones from wheel halves.

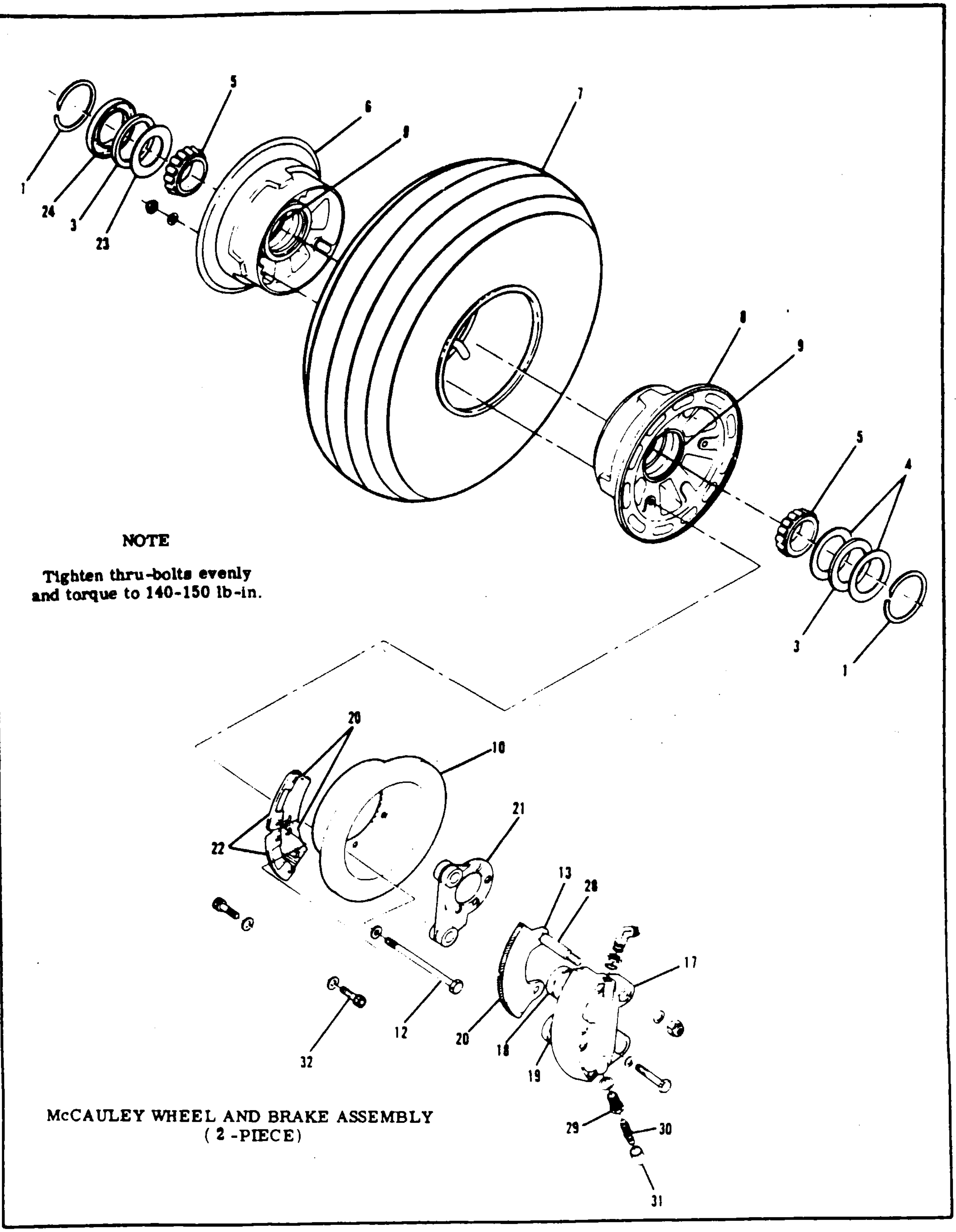
NOTE

The bearing cups are a press fit in the wheel halves and should not be removed unless replacement is necessary. To remove the bearing cups, heat the wheel half in boiling water for 15 minutes. Using an arbor press, if available, press out the bearing cup and press in the new cup while the wheel is still hot.

5-45. INSPECTION AND REPAIR OF CLEVELAND MAIN WHEEL AND TIRE ASSEMBLY. (Refer to figure 5-10.)

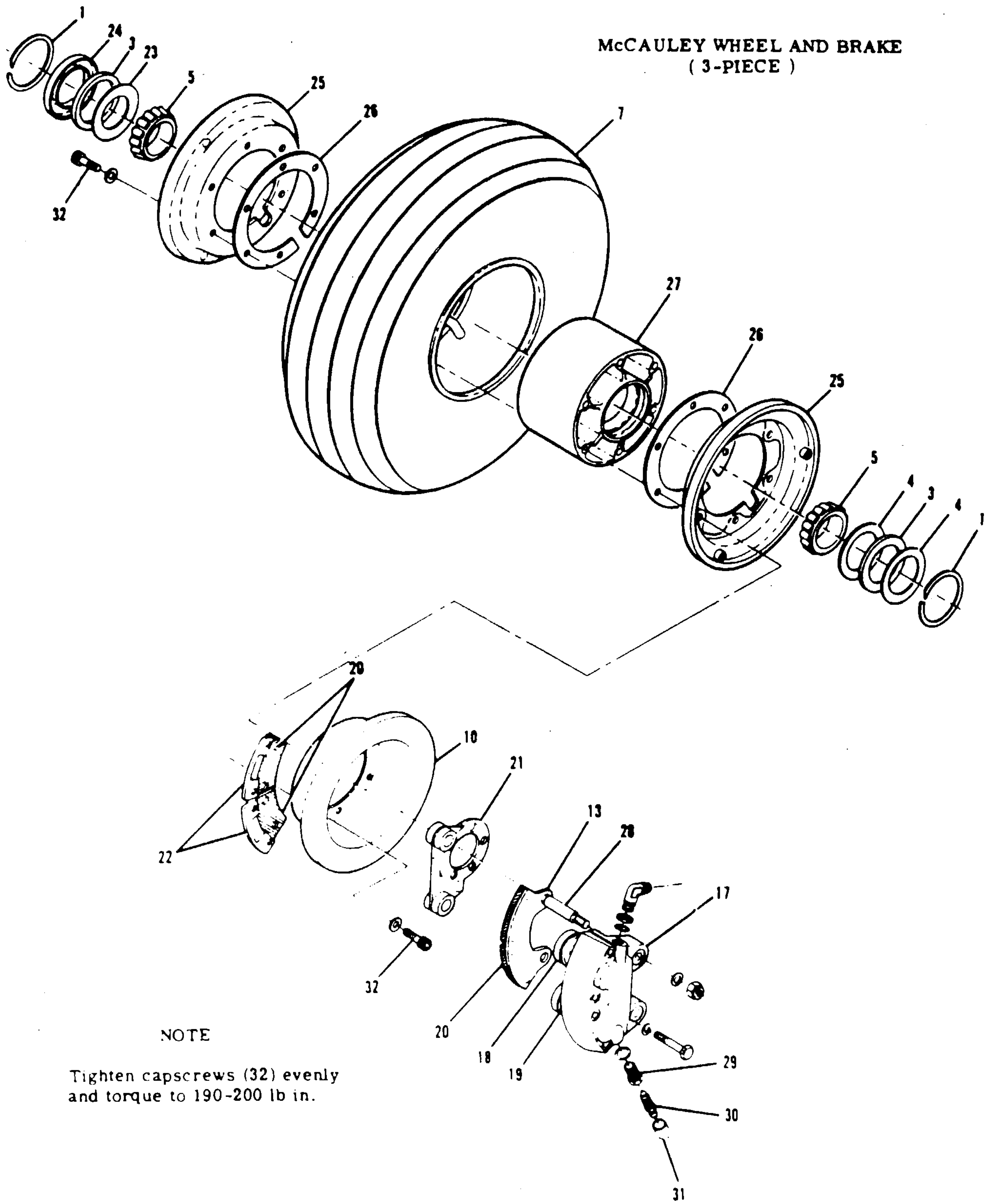
a. Clean all metal parts and the grease seal felts in solvent and dry thoroughly.

b. Inspect wheel halves for cracks. Cracked wheel halves should be replaced. Sand out nicks, gouges and corroded areas. When the protective



McCAULEY WHEEL AND BRAKE ASSEMBLY
(2-PIECE)

Figure 5-10 Main Landing Gear, Tire and Brake Assembly (Sheet 2 of 3)



NOTE

Tighten capscrews (32) evenly and torque to 190-200 lb in.

Figure 5-10 Main Landing Gear Wheel, Tire and Brake Assembly (Sheet 3 of 3) coating has been removed, the area should be cleaned thoroughly, primed with zinc chromate and repainted with aluminum lacquer.

c. Brake disc should be replaced if excessively scored or warped. Small nicks and scratches should be sanded smooth.

d. Bearing cups and cones should be inspected carefully for damage and discoloration. After cleaning, repack cones with clean aircraft wheel bearing grease (Section 2) before installation in the wheel.

5-46. REASSEMBLY OF CLEVELAND MAIN WHEEL AND TIRE ASSEMBLY. (Refer to figure 5-10.)

a. Insert thru-bolts through brake disc and position in the inner wheel half, using the bolts to guide the disc. Assure the disc is bottomed in wheel half.

b. Position tire and tube with the inflation valve through hole in outboard wheel half. Place inner wheel half in position. Apply a light force to bring wheel halves together. Maintaining the light force, assemble a washer and nut on one thru-bolt and tighten snugly. Assemble remaining washers and nuts on thru-bolts and torque to 150 lb-in.

CAUTION

Uneven or improper torque of thru-bolt nuts may cause failure of bolts, with resultant wheel failure.

c. Clean and repack bearing cones with clean aircraft wheel bearing grease (refer to Section 2 of this manual).

d. Assemble bearing cones, grease seal felts and rings into wheel halves.

e. Inflate tire to seat tire beads, then adjust to correct pressure.

5-47. DISASSEMBLY OF McCAULEY TWO PIECE MAIN WHEEL AND TIRE ASSEMBLY (Refer to figure 5-10.)

a. Deflate tire and break tire beads loose.

CAUTION

Avoid damaging wheel flanges when breaking tire beads loose. A scratch, gouge or nick may cause wheel failure.

b. Remove thru-bolts and separate wheel halves, removing tire, tube and brake disc.

c. Remove grease seal rings, felts and bearing cones from wheel halves.

NOTE

The bearing cups are a press fit in the wheel halves and should not be removed unless replacement is necessary. To remove the bearing cups, heat the wheel half in boiling water for 15 minutes. Using an arbor press, if available, press out the bearing cup and press in the new cup while the wheel is still hot.

5-48. INSPECTION AND REPAIR OF McCAULEY TWO PIECE MAIN WHEEL AND TIRE ASSEMBLY (Refer to figure 5-10.)

a. Clean all metal parts and the grease seal felts in solvent and dry thoroughly.

b. Inspect wheel halves for cracks. Cracked wheel halves should be replaced. Sand out nicks, gouges and corroded areas. When the protective coating has been removed, the area should be cleaned thoroughly, primed with zinc chromate and repainted with aluminum lacquer.

c. Brake disc should be replaced if excessively scored or warped. Small nicks and scratches should be sanded smooth.

d. Bearing cups and cones should be inspected carefully for damage and discoloration. After cleaning, repack cones with clean aircraft wheel bearing grease (Section 2) before installation in the wheel.

5-49. REASSEMBLY OF McCAULEY TWO PIECE MAIN WHEEL AND TIRE ASSEMBLY. (Refer to figure 5-10.)

a. Insert thru-bolts through brake disc and position in the inner wheel half, using the bolts to guide the disc. Assure the disc is bottomed in wheel half.

b. Position tire and tube with the inflation valve through hole in outboard wheel half. Place inner wheel half in position. Apply a light force to bring wheel halves together. Maintaining the light force, assemble a washer and nut on one thru-bolt and tighten snugly. Assemble remaining washers and nuts on thru-bolts and torque to 150 lb-in.

CAUTION

Uneven or improper torque of thru-bolt nuts may cause failure of bolts, with resultant wheel failure.

c. Clean and repack bearing cones with clean aircraft wheel bearing grease (refer to Section 2 of this manual).

d. Assemble bearing cones, grease seal felts and rings into wheel halves.

e. Inflate tire to seat tire beads, then adjust to correct pressure.

5-50. DISASSEMBLY OF McCAULEY THREE PIECE MAIN WHEEL AND TIRE ASSEMBLY. (Refer to figure 5-10.)

a. Remove screws attaching hub cap; remove hub cap.

WARNING

Injury can result from attempting to remove wheel flanges with the tire and tube inflated. Avoid damaging wheel flanges when breaking tire beads loose. A scratch, gouge or nick in wheel flanges could cause wheel failure.

b. Remove valve core and deflate tire and tube. Break tire beads loose from wheel flanges.

c. Remove cap screws.

d. Remove brake disc.

e. Separate wheel flanges from wheel hub. Retain spacers on each side of wheel hub.

f. Remove wheel hub from tire.

g. Remove retainer rings and remove grease seal retainers, grease seal felts and bearing cones.

NOTE

The bearing cups (races) are a press fit in the wheel hub and should not be removed unless a new part is to be installed. To remove the bearing cup, heat wheel hub in boiling water for 30 minutes, or in an oven not to exceed 121°C (250°F). Using an arbor press, if available, press out the bearing cup and press in the new bearing cup while the wheel is still hot.

5-51. INSPECTION AND REPAIR OF McCAULEY THREE PIECE MAIN WHEEL AND TIRE ASSEMBLY. (Refer to figure 5-10.)

a. Clean all metal parts, grease seal felts and phenolic spacers in cleaning solvent and dry thoroughly.

b. Inspect wheel flanges and wheel hub for cracks. Cracked wheel flanges or hub shall be discarded and new parts installed.

c. Sand out smooth nicks, gouges and corroded areas. When the protective coating has been removed, the area should be cleaned thoroughly, primed with zinc chromate and painted with aluminum lacquer.

d. The brake disc should be replaced if excessively scored or warped. Small nicks and scratches should be sanded smooth. Refer to paragraph 5-79.

e. Carefully inspect bearing cones and cups for damage and discoloration. After cleaning, pack with bearing grease (refer to Section 2 of this manual) before installing in the wheel hub.

5-52. REASSEMBLY OF McCAULEY THREE PIECE MAIN WHEEL AND TIRE ASSEMBLY. (Refer to figure 5-10.)

a. Place wheel hub in tire and tube with tube inflation stem in cutout of wheel hub.

b. Place spacer and wheel flange on inboard side of wheel hub (opposite of tube inflation stem), then place washer under head of each capscrew and start capscrew into hub threads.

c. Place spacer and wheel flange on other side and align valve stem in cutout in wheel flange.

d. Place washer under head of each capscrew and start capscrews into hub threads.

CAUTION

Be sure that spacers and wheel flanges are seated on flanges of wheel hub. Uneven or improper torque of capscrews can cause failure of the capscrews or hub threads with resultant wheel failure.

e. Tighten capscrews evenly and torque to 190-200 lb in.

f. Clean and pack bearing cones with clean aircraft wheel bearing grease. Refer to Section 2 of this manual for grease type.

g. Assemble bearing cones, grease seal felts and retainer into wheel hub.

h. Inflate tire to seat tire beads, then adjust to correct pressure specified in figure 1-1.

5-53. INSTALLATION OF MAIN WHEEL AND TIRE ASSEMBLY.

SHOP NOTES:

a. Place wheel on axle.
b. Install axle nut and tighten until a slight bearing drag is obvious when the wheel is rotated. Back off nut to nearest castellation and install cotter pin.
c. Place brake back plate in position and secure with bolts and washers. Safety wire the bolts.
d. Install hub caps.

5-54. MAIN WHEEL DOOR CLOSE SYSTEM ACCUMULATOR. (Refer to figure 5-11.)

5-55. DESCRIPTION. The accumulator serves two purposes. This unit maintains pressure in the door-close system, keeping the main wheel doors up and closed. The accumulator also dampens pressure surge and serves as a reservoir to offset normal leak-down in the system.

WARNING

BEFORE WORKING IN WHEEL WELL AREA, PULL HYDRAULIC PUMP CIRCUIT BREAKER OFF.

5-56. REMOVAL OF ACCUMULATOR. (Refer to figure 5-11.)

WARNING

Valve (8) does not contain a core. To release accumulator pressure, loosen nut on end of valve. If the valve installed contains a core, the valve should be replaced with a valve which does not contain a core. Injury can occur if pressure is not released properly.

a. Open main gear doors. This will drop hydraulic pressure to zero.
b. Relieve accumulator pressure by turning nut on end of valve approximately 1/4 turn.
c. Disconnect and plug or cap hydraulic line at accumulator.
d. Remove bolt, washer, spacer and nut at outboard end and remove clamp, screw and nut at inboard end; remove accumulator.

5-57. DISASSEMBLY AND REASSEMBLY OF ACCUMULATOR. (Refer to figure 5-11.)
a. Remove retainer (18) only after insuring that pressure has been relieved. Remove gland (19), piston (20) and valve (8) if required.
b. Remove and discard packings (22) and back-up rings (23).
c. Reverse the preceding steps, using new packings and back-up rings, for reassembly of the accumulator.

NOTE

Install new packings and back-up rings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

5-58 INSTALLATION OF ACCUMULATOR. (Refer to figure 5-11.)

WARNING

BEFORE WORKING IN WHEEL WELL AREA, PULL HYDRAULIC PUMP CIRCUIT BREAKER OFF.

a. Install bolt, washer, spacer and nut at outboard end and clamp screw and nut at inboard end.
b. Connect hydraulic line at accumulator.
c. Pressurize accumulator with nitrogen or dry air to 500 ± 50 psig. Hydraulic pressure should be zero.

NOTE

Adapter hose and fitting kit (nitrogen bottle to accumulator) number ZN216, available from the Cessna Service Parts Center, can be used to charge the accumulator.

5-59. MAIN WHEEL AND AXLE REMOVAL. (Refer to figure 5-1.)
a. Remove hub caps.
b. Remove wheel and tire in accordance with applicable paragraph of this Section.
c. Disconnect, drain and plug hydraulic brake line at the brake cylinder.
d. Remove bolts, washers, nuts and stud secruing axle and brake components to fitting at lower end of strut.

NOTE

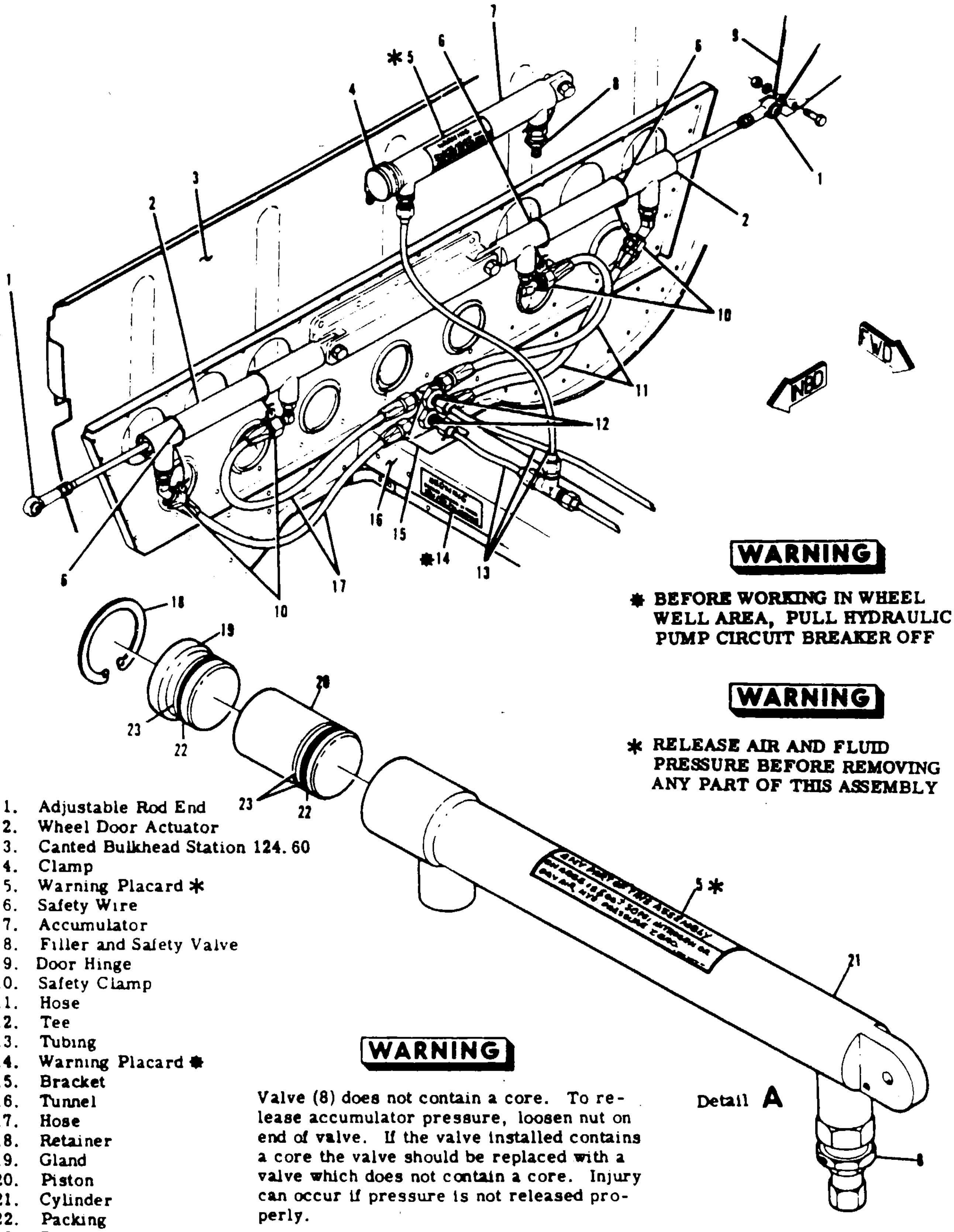
When removing axle from strut fitting, note number and position of wheel alignment shim. Mark these shims or tape together carefully so they can be reinstalled in exactly the same position to ensure that wheel alignment is not disturbed. Also, note position of stud attaching axle to fitting so that the stud may be installed in the same position. Stud is the uplock for the main gear.

5-60 MAIN WHEEL AND AXLE INSTALLATION. (Refer to figure 5-1.)
a. Secure axle and brake components to strut fitting, making sure that wheel alignment shims and stud are reinstalled in their original position.

NOTE

Shim: P/N 1241061-3, available from the Cessna Supply Division, can be installed between axle and fitting, if necessary, to maintain .050 inch minimum clearance between axle fitting and brake disc.

b. Install wheel assembly on axle in accordance with applicable paragraph of this Section.
c. Connect hydraulic brake line to brake cylinder.
d. Fill and bleed affected brake system.
e. Install hub caps.
f. Check wheel alignment.



WARNING

✱ BEFORE WORKING IN WHEEL WELL AREA, PULL HYDRAULIC PUMP CIRCUIT BREAKER OFF

WARNING

✱ RELEASE AIR AND FLUID PRESSURE BEFORE REMOVING ANY PART OF THIS ASSEMBLY

1. Adjustable Rod End
2. Wheel Door Actuator
3. Canted Bulkhead Station 124.60
4. Clamp
5. Warning Placard ✱
6. Safety Wire
7. Accumulator
8. Filler and Safety Valve
9. Door Hinge
10. Safety Clamp
11. Hose
12. Tee
13. Tubing
14. Warning Placard ✱
15. Bracket
16. Tunnel
17. Hose
18. Retainer
19. Gland
20. Piston
21. Cylinder
22. Packing
23. Back-Up Ring

WARNING

Valve (8) does not contain a core. To release accumulator pressure, loosen nut on end of valve. If the valve installed contains a core the valve should be replaced with a valve which does not contain a core. Injury can occur if pressure is not released properly.

Figure 5-11. Main Landing Gear Wheel Door Close System Accumulator

5-61. MAIN WHEEL ALIGNMENT. Correct main wheel alignment is obtained through the use of tapered shims between the landing gear strut and the flange of the axle. Refer to figure 5-12 for procedures to use in checking alignment. Wheel shims, and the correction imposed on the wheel by the various shims, are listed in the illustration.

NOTE

Failure to obtain acceptable wheel alignment through the use of the shims indicates a deformed main gear strut or a bent axle.

5-62 WHEEL BALANCING. Since uneven tire wear is usually the cause of wheel unbalance, replacing the tire probably will correct this condition. Tire and tube manufacturing tolerances permit a specified amount of static unbalance. The lightweight point of the tire is marked with a red dot on the tire sidewall, and the heavyweight point of the tube is marked with a contrasting color line(usually near the valve stem). When installing a new tire, place these marks adjacent to each other. If a wheel becomes unbalanced during service, it may be statically balanced. Wheel balancing equipment is available from the Cessna Supply Division.

5-63. BRAKE SYSTEM.

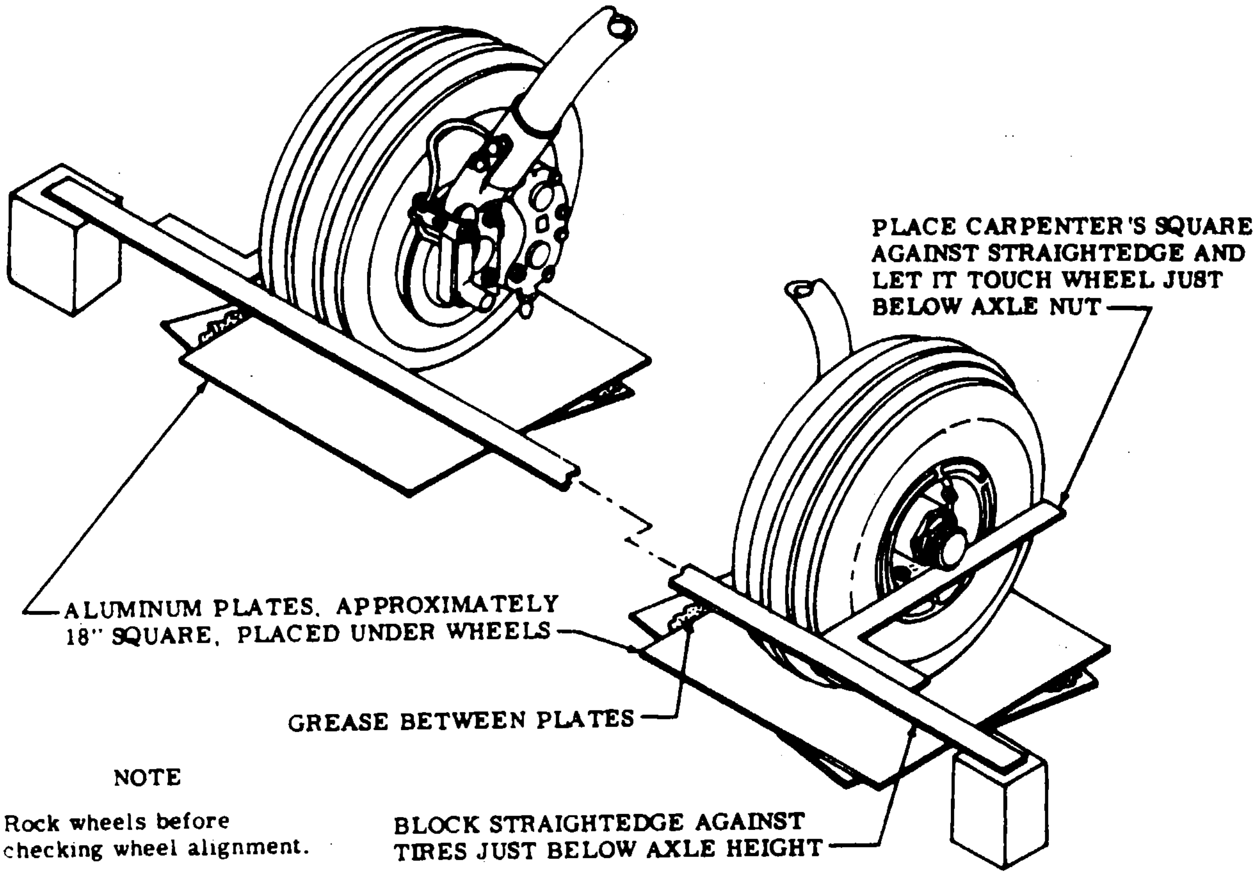
5-64. DESCRIPTION. The hydraulic brake system consists of two master cylinders, brake lines, connecting each master cylinder to its corresponding wheel brake cylinder, and the single, disc-type brake assembly, located at each main landing gear wheel.

CAUTION

After connecting brake hose, ensure that hose does not contact or rub against brake disc, causing brake hose failure.

5-65. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
DRAGGING BRAKES.	Brake pedal binding.	Check and adjust properly.
	Parking brake linkage holding brake pedal down.	Check and adjust properly.
	Worn or broken piston return spring. (In master cylinder.)	Repair or replace master cylinder.
	Insufficient clearance at Lock-O-Seal in master cylinder.	Adjust as shown in figure 5-13.
	Restriction in hydraulic lines or restriction in compensating port in master brake cylinder.	Drain brake lines and clear the inside of the brake line with filtered compressed air. Fill and bleed brakes. If cleaning the lines fail to give satisfactory results, the master cylinder may be faulty and should be repaired.
	Worn, scored, or warped brake discs.	Replace brake disc and linings.
	Damage or accumulated dirt restricting free movement of wheel brake parts.	Clean and repair or replace parts as necessary.
BRAKES FAIL TO OPERATE.	Leak in system.	Check entire system for leaks If brake master cylinders or wheel assemblies are leaking, they should be repaired or replaced.
	Air in system.	Bleed system.
	Lack of fluid in master cylinders.	Fill and bleed systems.

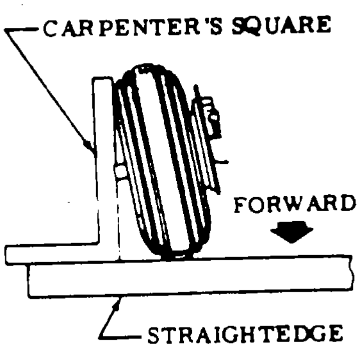


NOTE

Rock wheels before checking wheel alignment.

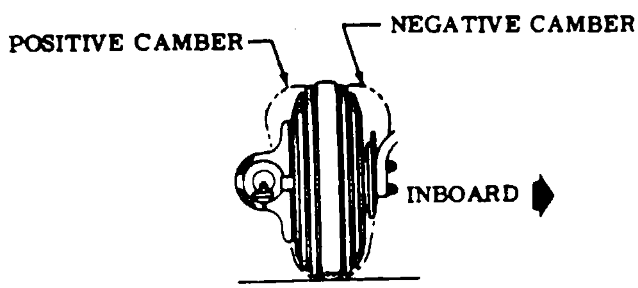
TOP VIEW OF TOE-IN CHECK

Measure toe-in at edges of wheel flange. Difference in measurements is toe-in for one wheel. (half of toe-in.)



FRONT VIEW OF CAMBER CHECK

Measure camber by reading protractor level held vertically against outboard flanges of wheel.



NOTE

Setting toe-in and camber within these tolerances while the cabin and fuel tanks are empty will give approximately zero toe-in and zero camber at gross weight. Ideal setting is zero toe-in and zero camber at normal operating weight. Therefore, if normally operated at less than gross weight and abnormal tire wear occurs, realign the wheels to attain the ideal setting for the load conditions under which the airplane normally operates. Refer to the following page for shims available and their usage. Always use the least number of shims possible to obtain the desired result.

Figure 5-12. Wheel Alignment (Sheet 1 of 2)

SHIM CHART

SHIM PART NO.	POSITION OF THICKEST CORNER OR EDGE OF SHIM	CORRECTION IMPOSED ON WHEEL			
		TOE-IN	TOE-OUT	POS. CAMBER	NEG. CAMBER
0541157-1	AFT FWD	.06" ----	---- .06"	---- 0°3'	0°3' ----
0541157-2	UP DOWN	.006" ----	---- .006"	0°30' ----	---- 0°30'
1241061-1	UP & FWD UP & AFT DOWN & FWD DOWN & AFT	.03" .06" ---- ----	---- ---- .06" .03"	2°50' 2°49' ---- ----	---- ---- 2°49' 2°50'
0411139-5	UP & FWD UP & AFT DOWN & FWD DOWN & AFT	---- .12" ---- .11"	.11" ---- .12" ----	0°25' 0°11' ---- ----	---- ---- 0°11' 0°25'
0441139-6	UP & FWD UP & AFT DOWN & FWD DOWN & AFT	---- .24" ---- .22"	.22" ---- .24" ----	0°50' 0°22' ---- ----	---- ---- 0°22' 0°50'
0541157-3	AFT FWD	.12" ----	---- .12"	---- 0°7'	0°7' 0°7'

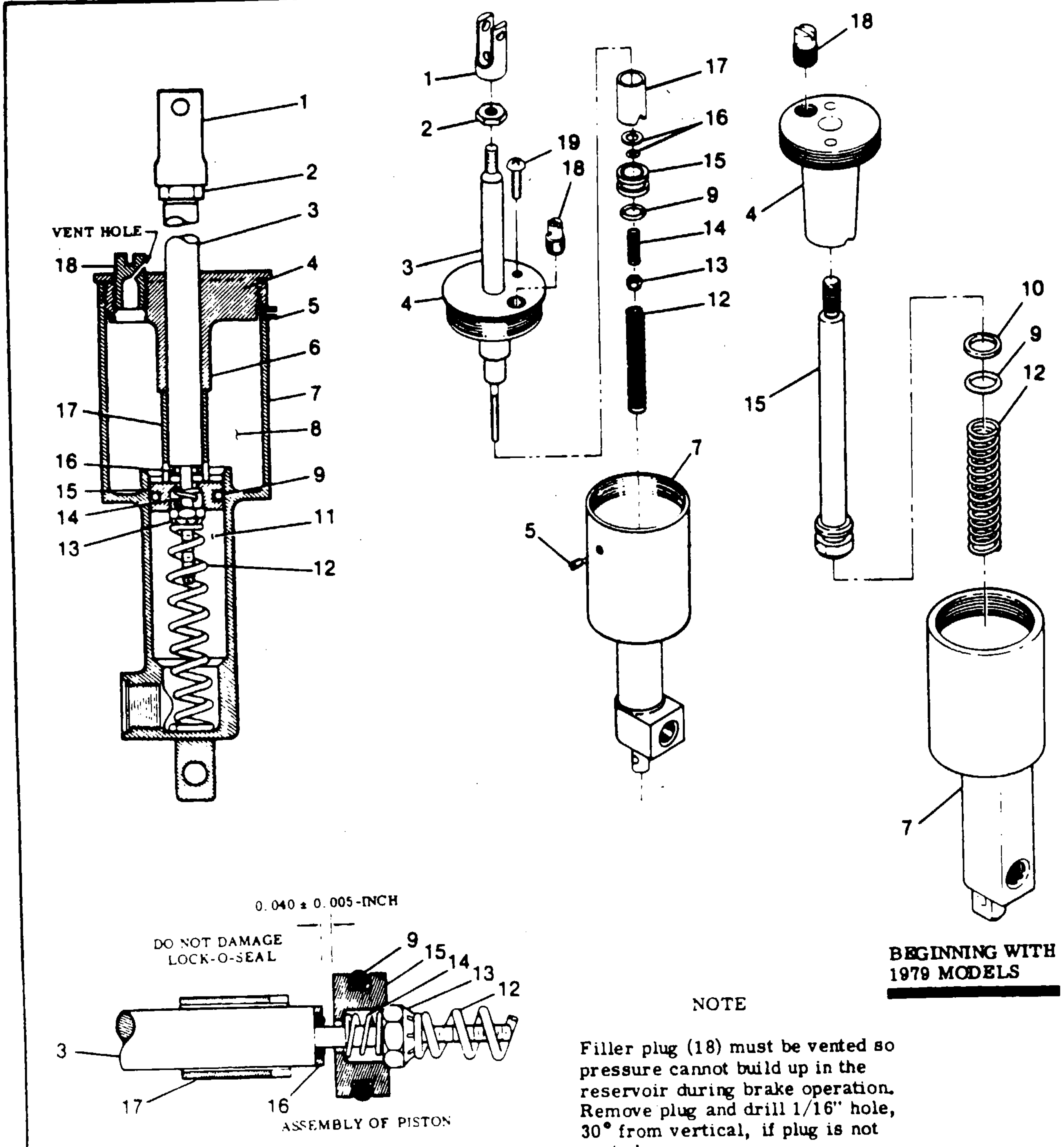
SHIM NO. (COLUMN 1)	1241061-1	0441139-6	0441139-5	0541157-2	0541157-1	0541157-3
1241061-1	0	0	0	0	0	0
0441139-6	0	0	0	1	1	0
0441139-5	0	0	1	1	2	0
0541157-2	0	1	1	2	2	0
0541157-1	0	1	1	2	2	0
0541157-3	0	0	1	2	1	0

COLUMN 2: Max. number of shims to be used with shims in column 1.

NOTE

USE 0541111-2 OR 0441139-6 ALONE AND/OR 0541157 (-1, -2 & -3) OR 0441139-5 SHIMS IN ANY COMBINATION AS REQUIRED TO OBTAIN ZERO TOE-IN AND ZERO CAMBER AT NORMAL OPERATING WEIGHT. TOTAL THICKNESS OF SHIMS AT UPPER BOLTS MUST NOT EXCEED .195-INCH. IF ANY TAPERED SHIMS ARE USED, ALL AN960 WASHERS ON UPPER BOLTS MUST BE DELETED.

Figure 5-12. Wheel Alignment (Sheet 2 of 2)



NOTE

Filler plug (18) must be vented so pressure cannot build up in the reservoir during brake operation. Remove plug and drill 1/16" hole, 30° from vertical, if plug is not vented.

1. Clevis
2. Jamb Nut
3. Piston Rod
4. Cover
5. Setscrew
6. Cover Boss
7. Body
8. Reservoir
9. O-Ring
10. Back-up Ring
11. Cylinder
12. Piston Return Spring
13. Nut
14. Piston Spring
15. Piston
16. Lock-O-Seal
17. Compensating Sleeve
18. Filler Plug
19. Screw

Figure 5-13. Brake Master Cylinder

5-66. BRAKE MASTER CYLINDER.

5-67. DESCRIPTION. The brake master cylinders, located immediately forward of the pilots rudder pedals, are actuated by applying pressure at the top of the rudder pedals. A small reservoir is incorporated into each master cylinder for the fluid supply. When dual brakes are installed, mechanical linkage permits the copilot pedals to operate the master cylinders.

5-68. BRAKE MASTER CYLINDER REMOVAL.

a. Remove bleeder screw at wheel brake assembly and drain hydraulic fluid from brake cylinders.
b. Remove front seats and rudder bar shield for access to brake master cylinders.
c. Disconnect parking brake linkage and disconnect brake master cylinders from rudder pedals.
d. Disconnect hydraulic hoses from brake master cylinders and remove cylinders.
e. Plug or cap hydraulic fittings, hoses and, lines to prevent entry of foreign materials.

5-69. BRAKE MASTER CYLINDER DISASSEMBLY. (Refer to figure 5-13.)

a. Unscrew clevis (1) and jamb nut (2).
b. Remove screw (19).
c. Remove filler plug (18) and setscrew (5).
d. Unscrew cover (4) and remove up over piston rod (3).
e. Remove piston rod (3) and compensating sleeve (17).
f. Slide sleeve (17) up over rod (3).
g. Unscrew nut (13) from threads of piston rod (3).
h. Remove piston spring (14) and O-ring (9) from piston (15).

5-70. BRAKE MASTER CYLINDER INSPECTION AND REPAIR. (Refer to figure 5-13.) Repair is limited to installation of new parts, cleaning and adjusting. (Refer to reassembly paragraph for adjustment). Use clean hydraulic fluid (MIL-H-5606) as a lubricant during reassembly of the cylinders. Inspect Lock-O-Seal (Parker Seal Co. P/N 800-001-6) and replace if damaged. Replace all O-rings. Filler plug must be vented so pressure cannot build up in the reservoir during brake operation. Remove plug and drill 1/16-inch hole, 30° from vertical, if plug is not vented.

5-71. BRAKE MASTER CYLINDER REASSEMBLY.

a. Install Lock-O-Seal (16) at bottom of piston rod (3).
b. Install O-ring (9) in grove in piston (15), insert piston spring (14) into piston, and slide assembly up on bottom threaded portion of piston rod (3).
c. Run nut (13) up threads to spring (14). Tighten nut enough to obtain 0.040 inch, + 0.005 or -0.005 inch clearance between top of piston and bottom of Lock-O-Seal, as shown in the figure.
d. Install piston return spring (12) into cylinder (11) portion of body (7).
e. Install piston rod (3) through spring (12).
f. Slide compensating sleeve (17) over rod (3).
g. Install cover (4) and screw (19).
h. Install jamb nut (2) and clevis (1).
i. Install filler plug (18) making sure vent hole is open.
j. Install setscrew (5).

5-72. BRAKE MASTER CYLINDER INSTALLATION.

a. Connect hydraulic hoses to brake master cylinders and install cylinders.
b. Connect brake master cylinders to rudder pedals and connect parking brake linkage.
c. Install rudder bar shield and install front seats.
d. Install bleeder screw at wheel brake assembly and fill and bleed brake system in accordance with applicable paragraph in this Section..

5-73. HYDRAULIC BRAKE LINES.

5-74. DESCRIPTION. The brake lines are of rigid tubing, except for flexible hose used at the brake master cylinders. A separate line is used to connect each brake master cylinder to its corresponding wheel brake cylinder.

WARNING

After connecting brake hose, ensure that hose does not contact or rub against brake disc, causing brake hose failure.

5-75. WHEEL BRAKE ASSEMBLIES. (Refer to figure 5-10.)

5-76. DESCRIPTION. The wheel brake assemblies employ a floating brake assembly and a disc which is attached to the main wheel.

5-77. WHEEL BRAKE REMOVAL. (Refer to figure 5-10.) Wheel brake assemblies can be removed by disconnecting the brake line (drain fluid when disconnecting line) and removing the brake back plate. The brake disc is removed after the wheel is removed and disassembled. To remove the torque plate, remove wheel and axle.

5-78. WHEEL BRAKE DISASSEMBLY. Refer to figure 5-10 for a breakdown of wheel brake parts. This figure may be used as a guide for disassembling the wheel brakes.

5-79. WHEEL BRAKE INSPECTION AND REPAIR.

a. Clean all parts except brake linings and O-rings in dry cleaning solvent and dry thoroughly.
b. Install all new O-rings. If O-ring reuse

is necessary, wipe with a clean cloth saturated in hydraulic fluid and inspect for damage.

NOTE

Thorough cleaning is important. Dirt and chips are the greatest single cause of malfunction in the hydraulic brake system..

c. Check brake lining for deterioration and maximum permissible wear. (Refer to applicable paragraph for maximum wear limits.)
d. Inspect brake cylinder bore for scoring. A scored cylinder will leak or cause rapid O-ring wear. Install a new brake cylinder if the bore is scored.
e. If the anchor bolts of the brake assembly are nicked or gouged, they shall be sanded smooth to prevent binding with the pressure plate or torque plate. When new anchor bolts are to be installed, press out old bolts and install new bolts with a soft mallet.
f. Inspect wheel brake disc for minimum thickness. If disc is below minimum thickness, install a new part. Minimum thickness of Cleveland disc No. 164-15A is 0.340 inch. Minimum thickness of McCauley disc, No. C30398 and No. C30615 is 0.325 inch.

5-80. WHEEL BRAKE REASSEMBLY. (Refer to figure 5-10.)

NOTE

Lubricate parts with clean hydraulic fluid during brake reassembly.

a. Refer to figure 5-10 as a guide while reassembling wheel brakes.

5-81. WHEEL BRAKE INSTALLATION.
a. Place brake assembly in position with pressure plate in place.

NOTE

If torque plate was removed, install as the axle is installed, or install on axle. If the brake disc was removed, install as wheel is assembled.

5-82. CHECKING BRAKE LINING WEAR. New brake lining should be installed when the existing lining has worn to a thickness of 3/32-inch. A 3/32-inch strip of material held adjacent to each lining can be used to determine amount of wear. The shank end of a drill bit of the correct size can also be used to determine wear of brake linings.

5-83. BRAKE LINING INSTALLATION. (Refer to figure 5-10.)
a. Remove bolts securing back plate, and remove back plate.
b. Pull brake cylinder out of torque plate an slide pressure plate off anchor bolts.
c. Place back plate on a table with lining side down flat. Center a 9/64-inch (or slightly smaller) punch in the rolled rivet, and hit the punch sharply with a hammer. Punch out all rivets securing the linings to the back plate in the same manner.

NOTE

A rivet setting kit, part No. R561, is available from the Cessna Supply Division. This kit contains a punch and an anvil.

d. Clamp the flat side of the anvil in a vise.
e. Align new lining on back plate and place brake rivet in hole with rivet head in the lining. Place the head against the anvil.
f. Center rivet setting punch on lips of rivet. While holding back plate down firmly against lining, hit punch with a hammer to set rivet. Repeat blows on punch until lining is firmly against back plate.
g. Realign the lining on the back plate and install and set rivets in the remaining holes.
h. Install a new lining on pressure plate in the same manner.
i. Position pressure plate on anchor anchor bolts and place cylinder in position so that anchor bolts slide into the torque plate.
j. Install back plate with bolts and washers.

WARNING

After reinstallation of the brake assembly, check brake line clearance to the disc in the area above the axle.

5-83A. BRAKE LINING CONDITIONING. The brake lining pads used in this assembly are either non-asbestos organic composition or iron based metallic composition. Brake pads must be properly conditioned (glazed) before use in order to provide optimum service life. This is a-complished by a brake burn-in. Burn-in also wears off brake high spots prior to operational use. If brake use is required before burn-in, use breaks intermittently at LOW taxi speeds.

CAUTION

Brake burn-in must be performed by a qualified person familiar with acceleration and stop distance of the aircraft.

a. Non-asbestos Organic Composition Burn-in.
   1. Taxi the aircraft for 1500 feet, with engine at 1700 rpm, applying brake pedal forces as needed to maintain 5 to 10 MPH. (5 to 9 knots).
   2. Allow brakes to cool for 10 to 15 minutes.
   3. Apply brakes and check to see if a high throttle static engine runup can be held with normal pedal force. If so, conditioning burn-in is complete.
   4. If static runup cannot be held, repeat Steps 1 thru 3 as needed.
b. Metallic Composition Burn-in.
   1. Taxi the aircraft at 34 to 40 MPH. (30 to 35 knots) and perform full stop braking application.
   2. Without allowing brake disc to cool substantially, repeat Step 1 for second full stop braking application.
   3. Apply brakes and check to see if a high throttle static engine runup can be held with normal pedal force. If so, conditioning burn-in is complete.
   4. If static runup cannot be held, repeat Steps 1 thru 3 as needed.

NOTE

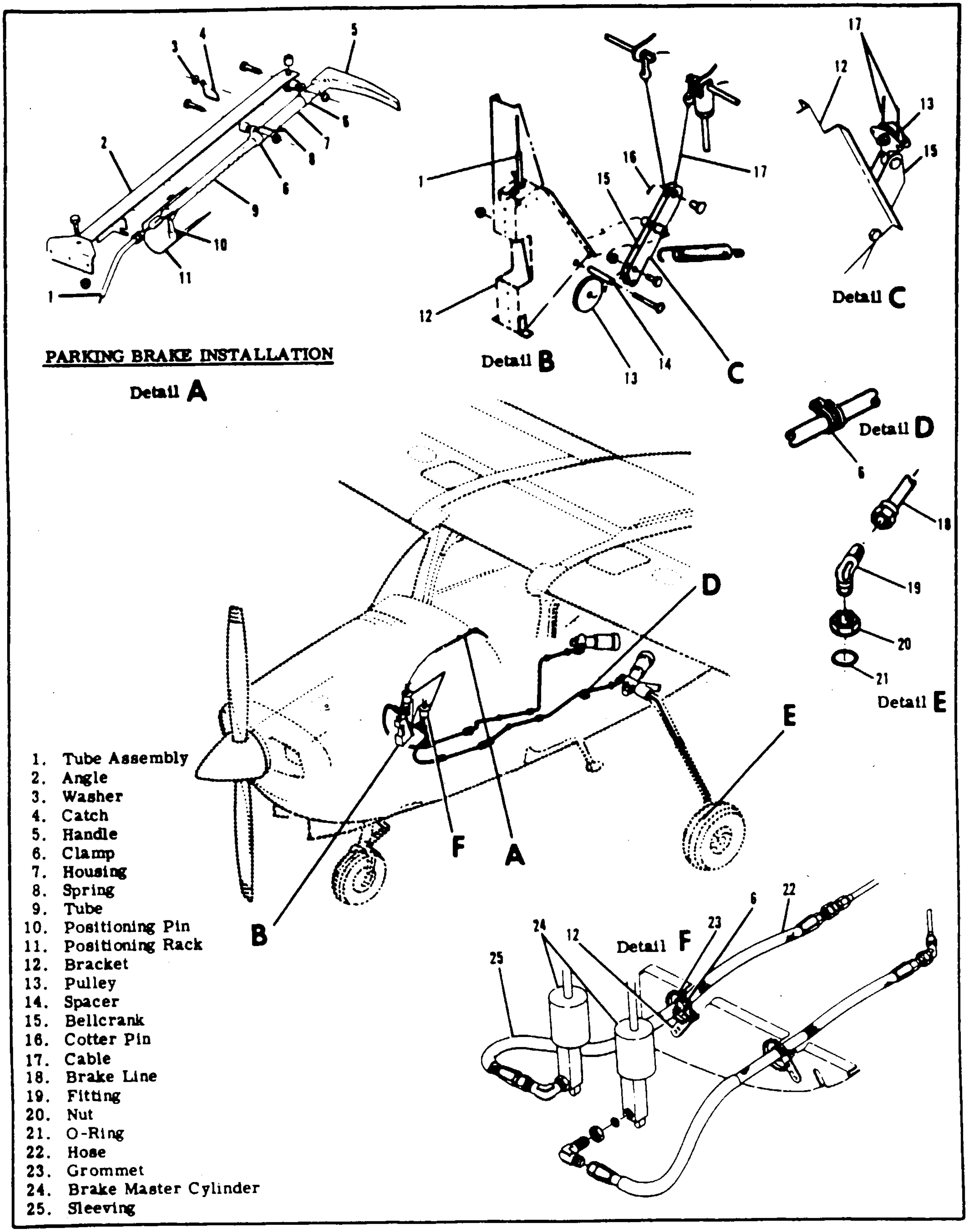
Normal brake usage should generate enough heat to maintain the glaze throughout the life of the lining. Light brake usage can not cause the glaze to wear off, resulting in reduced brake performance. In such cases, the lining may be conditioned again following the instructions set forth above.

5-84. BRAKE SYSTEM BLEEDING.

NOTE

Bleeding with a clean hydraulic pressure source connected to the wheel cylinder bleeder is recommended.

a. Remove brake master cylinder filler plug and screw flexible hose with appropriate fitting into the filler hole at top of the brake master cylinder.
b. Immerse opposite end of flexible hose into a container with enough hydraulic fluid to cover end of the hose.
c. Connect a clean hydraulic pressure source, such as a hydraulic hand pump or Hydro-Fill unit to the bleeder valve in the wheel cylinder.
d. As fluid is pumped into the system, observe the immersed end of the hose at the master cylinder



1. Tube Assembly
2. Angle
3. Washer
4. Catch
5. Handle
6. Clamp
7. Housing
8. Spring
9. Tube
10. Positioning Pin
11. Positioning Rack
12. Bracket
13. Pulley
14. Spacer
15. Bellcrank
16. Cotter Pin
17. Cable
18. Brake Line
19. Fitting
20. Nut
21. O-Ring
22. Hose
23. Grommet
24. Brake Master Cylinder
25. Sleeving

Figure 5-14. Parking Brake System

for evidence of air bubbles being forced from the brake system. When bubbling has ceased, remove bleeder source from wheel cylinder and tighten the bleeder valve.

5-85. PARKING BRAKE SYSTEM. (Refer to figure 5-14.)

5-86. DESCRIPTION. The parking brake system consists of a handle and ratchet mechanism, connected by a cable to linkage at the brake master cylinders. Pulling out on the handle depresses both brake master cylinder piston rods and the handle ratchet locks the handle in this position until the handle is turned and released.

5-87. REMOVAL AND INSTALLATION OF COMPONENTS. Refer to figure 5-14 for relative location of system components. The illustration may be used as a guide during removal and installation of components.

5-88. INSPECTION AND REPAIR OF SYSTEM COMPONENTS. Inspect lines for leaks, cracks, dents, chafing, improper radius, security, corrosion, deterioration, obstructions and foreign matter. Check brake master cylinders and repair or replace as outlined in applicable paragraph in this Section. Check parking brake handle and ratchet for proper operation and release. Replace worn or damaged parts.

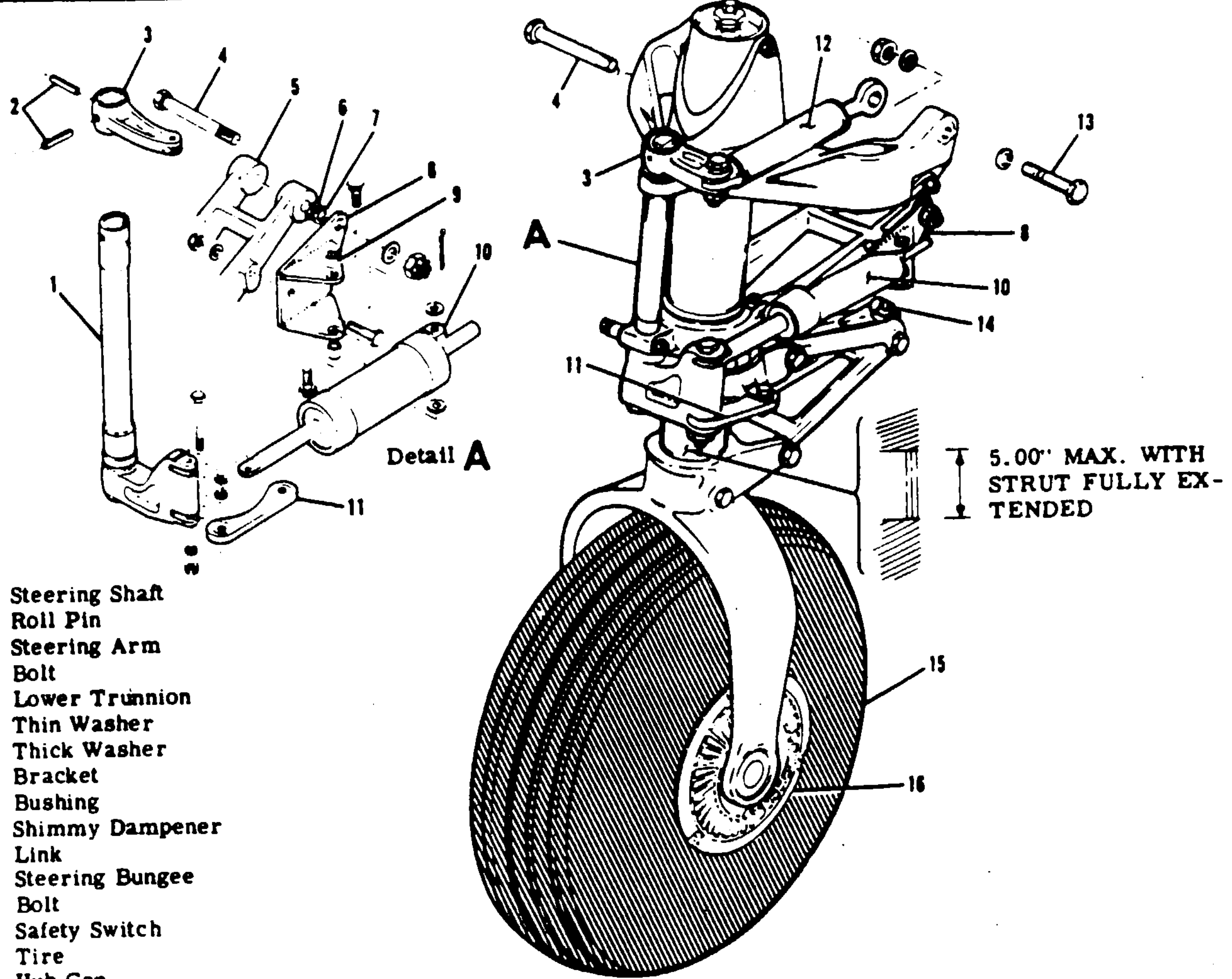
5-89. NOSE GEAR SYSTEM.

5-90. DESCRIPTION. The nose gear consists of a pneudraulic shock strut assembly, mounted in a trunnion assembly, a steering arm and bungee, shimmy dampener, uplock mechanism, nose wheel, tire and tube, hub cap, bearings, seals and a double-acting hydraulic actuator for extension and retraction. A claw-like hook on the actuator serves as a downlock for the nose gear.

5-91. OPERATION. The nose gear shock strut is pivoted just forward of the firewall. Retraction and extension of the nose gear is accomplished by a double-acting hydraulic cylinder, the forward end of which contains the nose gear downlock. Initial action of the cylinder disengages the downlock before retraction begins. A separate single-acting hydraulic cylinder unlocks the nose gear uplock hook.

5-92. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
HYDRAULIC FLUID LEAKAGE FROM NOSE STRUT.	Defective strut seals and/or defects in lower strut.	Replace defective seals; stone out small defects in lower strut. Replace lower strut if badly scored or damaged.
NOSE STRUT WILL NOT HOLD AIR PRESSURE.	Defective filler valve or valve not tight.	Check gasket and tighten loose valve. Replace defective valve.
	Defective O-ring at top of strut.	Replace O-ring.
	Result of fluid leakage at bottom of strut.	Replace defective seals; stone out small defects in lower strut. Replace lower strut if badly scored or damaged.
NOSE WHEEL SHIMMY.	Nose strut attachment loose.	Secure attaching parts.
	Shimmy dampener lacks fluid.	Service shimmy dampener.
	Defective shimmy dampener.	Repair or replace dampener.
	Loose or worn steering components.	Tighten loose parts; replace if defective.
	Loose torque links.	Add shim washers and replace parts as necessary.
	Loose wheel bearings.	Replace bearings if defective; tighten axle nut properly.
	Nose wheel out of balance.	Refer to applicable paragraph.



1. Steering Shaft
2. Roll Pin
3. Steering Arm
4. Bolt
5. Lower Trunnion
6. Thin Washer
7. Thick Washer
8. Bracket
9. Bushing
10. Shimmy Dampener
11. Link
12. Steering Bungee
13. Bolt
14. Safety Switch
15. Tire
16. Hub Cap

Figure 5-15. Nose Gear Installation

5-93. REMOVAL OF NOSE GEAR ASSEMBLY.

a. Jack aircraft or weight the tail of aircraft to raise nose wheel off the ground.

WARNING

Before working in landing gear wheel wells, PULL-OFF hydraulic pump circuit breaker. The pump circuit breaker is located in the circuit breaker panel, located immediately forward of the left forward doorpost. The hydro-electric power pack system is designed to pressurize the landing gear DOOR CLOSE SYSTEM (1978 Models) to 1500 psi at any time the master switch is turned on. Injury might occur to someone working in wheel well area if master switch is turned on for any reason.

b. Open landing gear doors and disconnect nose wheel door push-pull rods.

c. Tag for identification and disconnect electrical wires at gear-down microswitch located on forward end of nose gear safety switch on torque links, and remove clamps attaching wires to nose strut.

d. Tag for identification and disconnect electrical wires at nose gear safety switch on torque links, and remove clamps attaching wires to nose gear strut.

e. Disconnect steering bungee from steering bellcrank.

f. Disconnect nose gear actuator from strut by removing cotter pin, castellated nut (aircraft equipped with retractable step, remove spring clip, after removing safety wire from turnbuckle and loosening turnbuckle barrel), washers and bolt.

NOTE

Retain spacer washers between downlock hooks on end of actuator.

g. Disconnect nose gear strut door tie rods from nose gear. Remove trunnion bolts.

NOTE

Trunnion bolts are accessible from inside the cabin, at the very forward end of the tunnel cover at the firewall. Two men will be required to remove these bolts, one working inside the cabin, the other working in the nose wheel well.

h. Work entire nose gear assembly free of the aircraft.

5-94. DISASSEMBLY OF NOSE GEAR STRUT. (Refer to figure 5-16.)

NOTE

The following procedure applies to the nose gear shock strut after it has been removed from the aircraft, and the nose wheel has been removed. In many cases, separating the upper and lower struts will permit inspection and parts replacement without removal or complete strut disassembly.

WARNING

Deflate strut completely before removing bolt (33), lock ring (31) or bolt (2). Also deflate strut before disconnecting torque links.

a. Remove torque links. Note position of washers, shims, spacers and bushings.
b. Remove shimmy dampener and steering bungee.
c. Remove link from steering shaft and collar.
d. Remove lock ring from groove inside lower end of upper strut. A small access hole is provided at the lock ring groove to facilitate removal of lock ring.

NOTE

Hydraulic fluid will drain from strut as lower strut is pulled from upper strut.

e. Using a straight, sharp pull, remove lower strut from upper strut. Invert lower strut and drain hydraulic fluid from strut.
f. Remove lock ring and bearing from lower strut.
g. Slide shims, if used, packing support ring, scraper ring, retaining ring and lock ring from lower strut.

NOTE

Note number of shims, relative position and top side of each ring and bearing to aid in reassembly.

h. Remove and discard O-rings and back-up rings from packing support ring.
i. Remove metering pin and base plug by removing bolt from lower strut and fork assembly.

NOTE

Lower strut and fork are a press fit, drilled on assembly. Separation of these parts is not recommended, except for replacement of parts.

j. Remove and discard O-rings from metering pin and base plug.

k. Remove orifice support by removing bolt at top of strut. Remove and discard O-ring from orifice support.
l. Remove collar from upper strut. To remove collar, remove bolt and tab washer. Remove washers, shims, if installed, and steering collar.

NOTE

Upper and lower trunnions are press fitted to the upper strut with braces installed during assembly. Pin is also press fitted to the lower trunnion.

5-95. INSPECTION AND REPAIR OF SHOCK STRUT COMPONENTS. (Refer to figure 5-16.)

a. Bushings and bearings in upper trunnion and lower trunnion may be replaced as required. Needle bearing in collar should not be replaced. Replace entire steering collar if needle bearing is defective.
b. Thoroughly clean all parts in solvent and inspect them carefully. Replace all worn or defective parts and all O-rings, seals and back-up rings with new parts.
c. Sharp metal edges should be smoothed with No. 400 emery paper, then cleaned with solvent.

5-96. REASSEMBLY OF NOSE GEAR STRUT. (Refer to figure 5-15.)

NOTE

Install new seals and existing lock ring, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

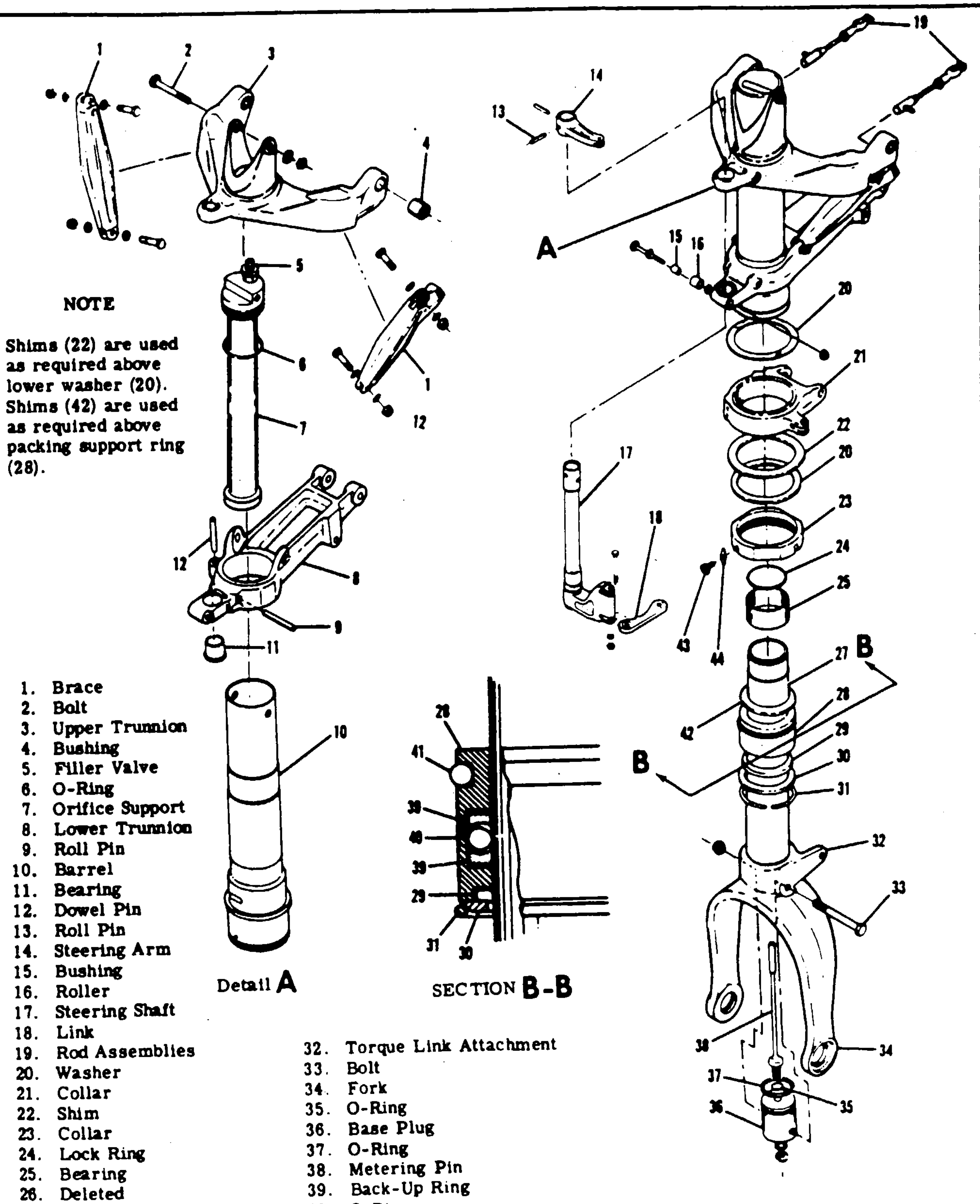
a. Install top washer (20), steering collar (21), shims (22) (as many as were removed), and collar (23). Screw collar (23) up threads on lower end of upper strut (10) until it is flush with the lower end of the strut, to the nearest one-third turn. Use shims as required above lower washer, to fill gap between collars. Shims are available from the Cessna Supply Division, as follows:

1243030-5	0.006"
1243030-6	0.012"
1243030-7	0.020"

NOTE

When correct number of shims are installed, secure collar (23) with bolt (43) and secure bolt with tab washer (44) by bending tabs of washer.

b. Install O-ring (37) on base plug (36).
c. Install O-ring (35) on metering pin (38), and install in base plug (36).
d. Install bolt (33) through holes in fork (34) and base plug (36). Install nut on bolt.
e. Install lock ring (31), retaining ring (30) and scraper ring (29) down over lower strut (27). Ensure they are installed in same positions as they were when removed.



NOTE

Shims (22) are used as required above lower washer (20). Shims (42) are used as required above packing support ring (28).

1. Brace
2. Bolt
3. Upper Trunnion
4. Bushing
5. Filler Valve
6. O-Ring
7. Orifice Support
8. Lower Trunnion
9. Roll Pin
10. Barrel
11. Bearing
12. Dowel Pin
13. Roll Pin
14. Steering Arm
15. Bushing
16. Roller
17. Steering Shaft
18. Link
19. Rod Assemblies
20. Washer
21. Collar
22. Shim
23. Collar
24. Lock Ring
25. Bearing
26. Deleted
27. Lower Strut
28. Packing Support Ring
29. Scraper Ring
30. Retaining Ring
31. Lock Ring
32. Torque Link Attachment
33. Bolt
34. Fork
35. O-Ring
36. Base Plug
37. O-Ring
38. Metering Pin
39. Back-Up Ring
40. O-Ring
41. O-Ring
42. Shim
43. Bolt
44. Tab Washer

Figure 5-16. Nose Gear Shock Strut Assembly

f. Install O-rings (40) and (41) and back-up rings (39) in packing support ring (28).

NOTE

Install contoured back-up rings (39), one on each side of O-ring (40) with concave surface of back-up rings next to O-ring.

g. Install bearing (25) and lock ring (24) at upper end of lower strut assembly.

NOTE

Ensure that beveled edge of bearing is installed up next to lock ring.

h. Install upper strut assembly over lower strut assembly.
i. Install lock ring (31) in groove in lower end of barrel (10). Position lock ring so that one of its ends covers the small access hole in the lock ring groove.
j. Install steering shaft (17) up through hole in lower trunnion (8) and hole in upper trunnion (3).
k. Install steering arm (14) over steering shaft (17) and secure with roll pins.
l. Install link (18) to bottom of steering shaft (17) and attach opposite end to steering collar (21).
m. If braces (1) were removed, they should be installed, connecting at upper trunnion (3) and lower trunnion (8).
n. Attach lower torque link to torque link fitting (32) and upper torque link to steering collar (21).
o. Install O-ring (6) and filler valve (5) on orifice support (7).
p. Install orofice support in barrel (10), install bolt (2).
q. Service shock strut as outlined in Section 2 of this manual.

5-97. INSTALLATION OF NOSE GEAR STRUT.

WARNING

Before working in landing gear wheel wells, PULL-OFF hydraulic pump circuit breaker. The pump circuit breaker is located in the circuit breaker panel, located immediately forward of the left forward doorpost. The hydro electric power pack system is designed to pressurize the landing gear DOOR CLOSE SYSTEM (1978 Models) to 1500 psi at any time the master switch is turned on. Injury might occur to someone working in wheel well area if master switch is turned on for any reason.

a. Work entire nose gear assembly into nose gear wheel well.

NOTE

Trunnion bolts are accessible from inside the cabin, at the very forward end of the tunnel cover at the firewall. Two men will be require to install these bolts, one inside the cabin, the other in the nose wheel well.

b. Install trunnion bolts.
c. Install nose gear strut door tie rods.

NOTE

On aircraft equipped with retractable step, install right-hand tie rod on outboard side of eyebolt only, when connecting nose gear strut doors. Left-hand tie rod should be installed in normal manner.

d. Install nose gear actuator and install castellated nut and cotter pin. On aircraft equipped with retractable step, rig step in accordance with applicable paragraph, after nose strut is installed and rigged.

NOTE

When connecting nose gear actuator to strut, lubricate and torque bolt as outlined in Section 2 of this manual.

e. Install steering bungee to steering bellcrank.
f. Identifying tagged applicable electrical wires, connect wires at safety switch on torque links and install clamps attaching wires to nose strut.
g. Identifying tagged applicable electrical wires, connect wires at gear-down microswitch located on forward end of nose gear actuator at bracket on bearing end.

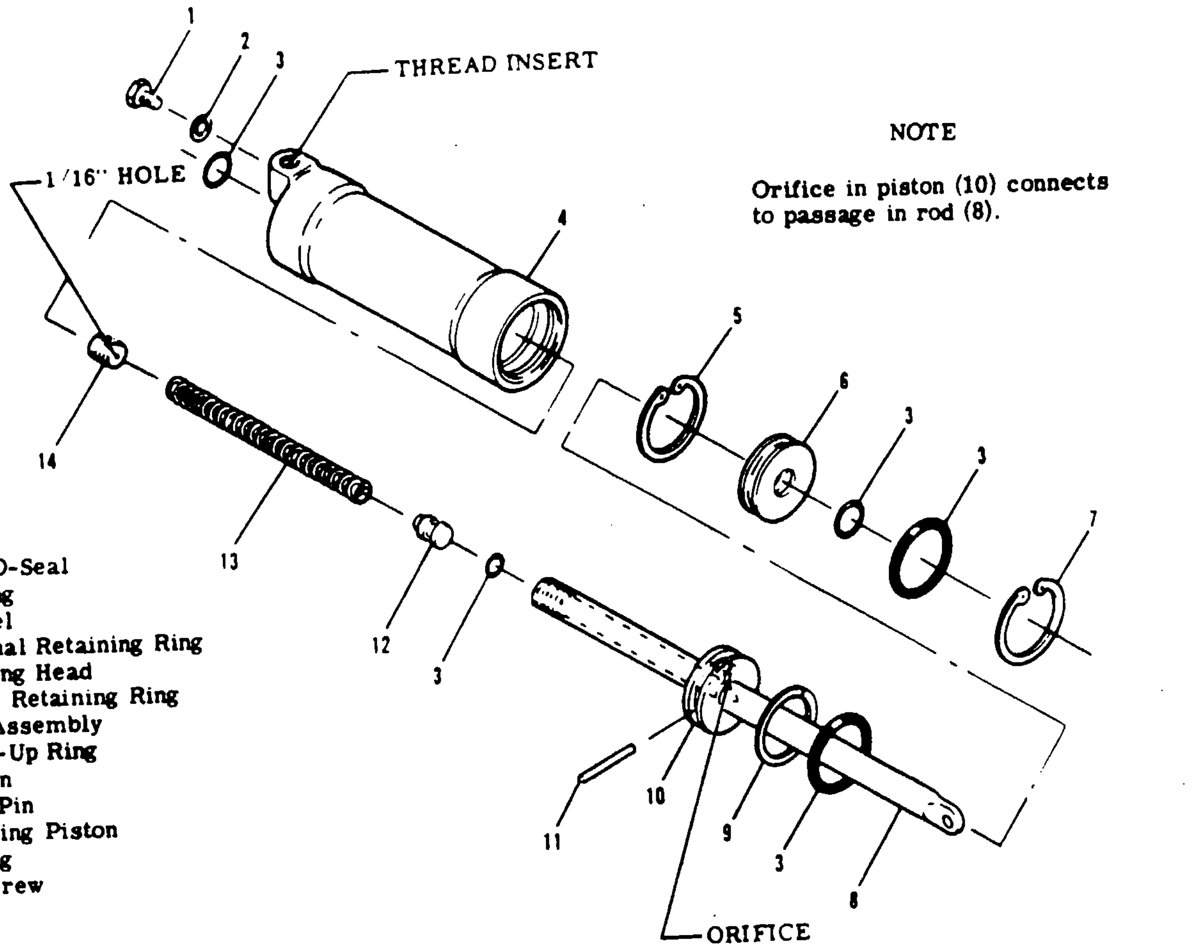
h. Connect nose wheel door push-pull rods.
i. Rig nose gear and nose gear doors in accordance with procedures outlined in applicable paragraph in this Section.
j. On aircraft equipped with retractable step, rig cable as outlined in applicable paragraph. Be sure to safety turnbuckle after rigging step cable.

5-98. SHIMMY DAMPENER. (Refer to figure 5-17.)

5-99. DESCRIPTION. The shimmy dampener is a self-contained hydraulic cylinder which acts as a restrictor. When the steering system reacts too rapidly, the shimmy dampener maintains pressure against the steering arm by means of a piston which permits a restricted flow of hydraulic fluid from either end of the cylinder to the other through an orifice in the piston.

100. REMOVAL. (Refer to figure 5-15.)
a. Remove bolt securing shimmy dampener to steering shaft.
b. Remove bolt attaching dampener to bracket. attached to lower trunnion.
c. Remove shimmy dampener from aircraft.

101. DISASSEMBLY. (Refer to figure 5-17.)
a. Remove outer retaining ring (7).
b. Remove bearing head (6).
c. Remove O-rings (3) from bearing head.
d. Remove internal retaining ring (5).
e. Remove rod assembly (8).



1. Bolt
2. Stat-O-Seal
3. O-Ring
4. Barrel
5. Internal Retaining Ring
6. Bearing Head
7. Outer Retaining Ring
8. Rod Assembly
9. Back-Up Ring
10. Piston
11. Roll Pin
12. Floating Piston
13. Spring
14. Setscrew

Figure 5-17. Shimmy Dampener

f. Remove O-ring (3), and back-up ring (9).
g. Remove setscrew (14), spring (13), floating piston (12) and O-ring (3).
h. Remove bolt (1) and Stat-O-Seal (2).
i. Remove O-ring (3).

5-102. INSPECTION AND REPAIR OF SHIMMY DAMPENER. (Refer to figure 5-17.)
a. Thoroughly clean all parts in solvent and inspect carefully.
b. Sharp metal edges should be smoothed with No. 400 emery paper, then thoroughly cleaned with solvent.
c. Replace all worn or defective parts.

5-103. REASSEMBLY OF SHIMMY DAMPENER (Refer to figure 5-17.)

NOTE

Install new seals, O-rings, and back-up rings, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

a. If piston (10) was removed, install piston and install roll pin (11).

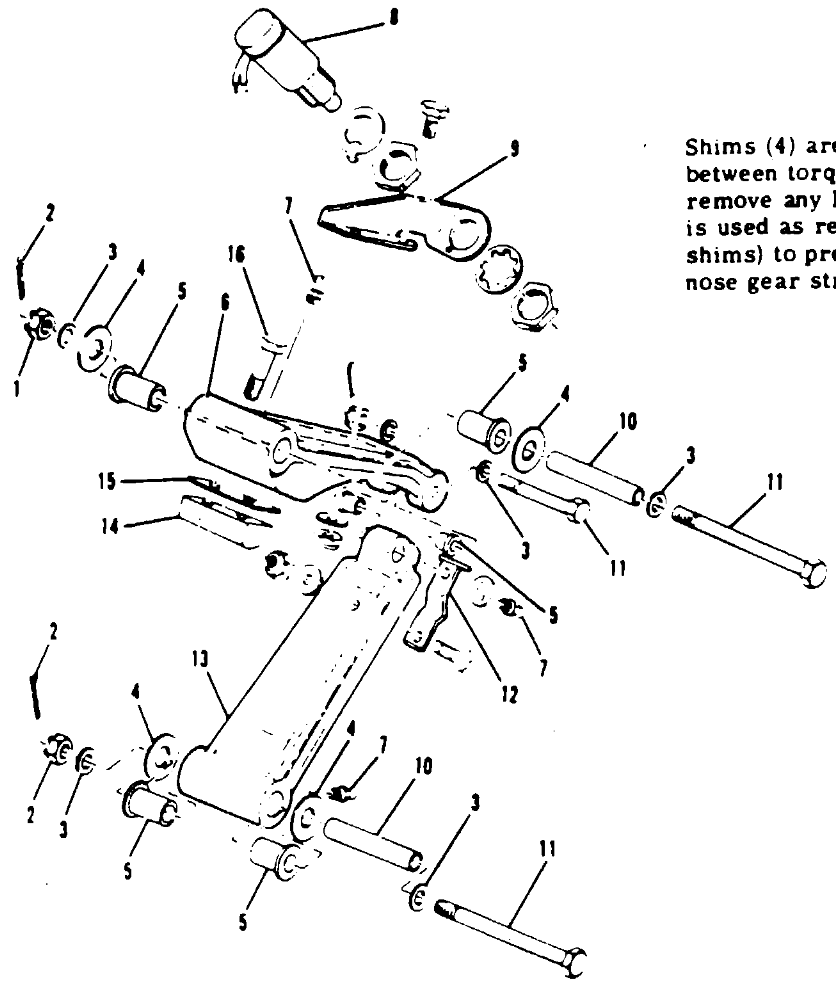
NOTE

Orifice in piston (10) connects to passage in rod (8).

b. Install O-ring (3), floating piston (12), spring (13) and setscrew (14) in rod assembly (8).
c. Install O-ring (3) in barrel (4).
d. Install rod assembly (8) in barrel (4).
e. Install back-up ring (9) and O-ring (3).
f. Install internal retaining ring (5).
g. Install O-rings (3) on bearing head (6).
h. Install bearing head (6) over shaft assembly (8) in barrel (4).
i. Install outer retaining ring (7).
j. Install Stat-O-Seal (2) on bolt (1).
k. Install bolt (1) in barrel (4).
l. Service shimmy dampener in accordance with procedures outlined in Section 2 of this manual.

5-104. TORQUE LINKS. (Refer to figure 5-18.)

5-105. DESCRIPTION. The torque links align the lower strut with the nose gear steering system, but



NOTE

Shims (4) are available to use as required between torque link and nose gear fork to remove any looseness. Also, shim (15) is used as required (maximum of three shims) to prevent over extension of the nose gear strut. Refer to figure 5-13.

1. Nut
2. Cotter Pin
3. Washer
4. Shim
5. Bushing
6. Upper Torque Link
7. Grease Fitting
8. Safety Switch
9. Bracket
10. Spacer
11. Bolt
12. Switch Actuator
13. Lower Torque Link
14. Centering Lug
15. Shim
16. Bolt

Figure 5-18. Nose Gear Torque Links

permit shock strut action.

5-106. REMOVAL OF TORQUE LINKS. (Refer to figure 5-18.)

NOTE

DEFLATE NOSE GEAR SHOCK STRUT COMPLETELY BEFORE REMOVING TORQUE LINKS

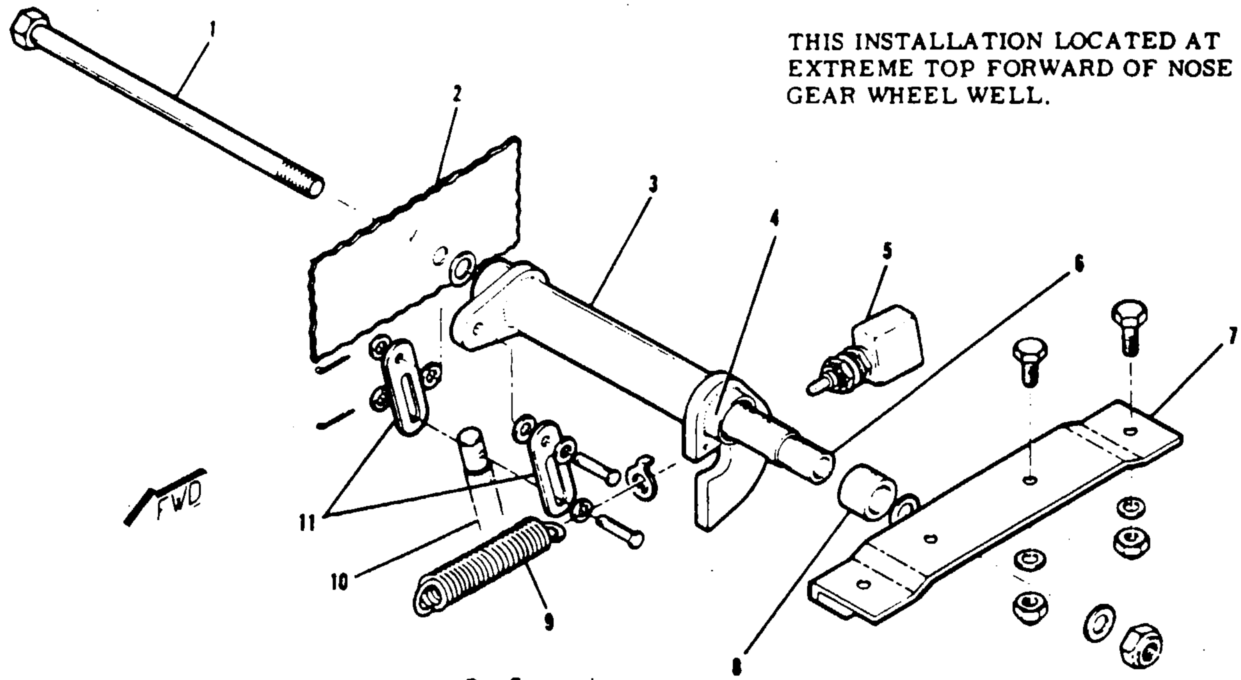
a. Remove nuts and washers attaching safety switch (8) to bracket (9), remove switch from bracket.
b. Remove washers, shims, spacers, bolts and nuts. Note position of attaching hardware for reinstallation.

5-107. DISASSEMBLY AND REASSEMBLY. (Refer to figure 5-18.) The figure may be used as a guide for disassembly and reassembling the torque links. Bushings should not be removed except for replacement of parts. Replace any parts if excessively worn.

5-108. INSTALLATION OF TORQUE LINKS.
a. With shock strut completely deflated, install upper torque link to collar on nose gear strut.
b. Install lower torque link to torque link attach point on nose gear fork.
c. Install upper key washer and nut on safety switch, install switch in bracket, and install star washer and nut on threads of switch.
d. Tighten attaching bolt nuts snugly, then tighten to align next castellation with cotter pin hole in bolt.
e. Check upper and lower torque links for looseness. If looseness is apparent, remove attaching nuts and install shims (4) as necessary to take up any looseness. This will assist in preventing nose wheel shimmy.
f. Retighten attaching nuts snugly, then tighten to align next castellation with cotter pin hole in bolt; install cotter pin.
g. Fill and inflate shock strut in accordance with procedures outlined in Section 2 of this manual.

NOTE

THIS INSTALLATION LOCATED AT EXTREME TOP FORWARD OF NOSE GEAR WHEEL WELL.



1. Bolt
2. RH Tunnel Wall
3. Bellcrank and Hook Assembly
4. Bracket (on opposite side of hook)
5. Uplock Switch
6. Inner Bearing Race
7. Support
8. Bearing
9. Spring
10. Actuator
11. Links

Figure 5-19. Nose Gear Uplock Mechanism

5-109. NOSE GEAR UPLOCK MECHANISM. (Refer to figure 5-19.)

5-110. DESCRIPTION. The nose gear uplock mechanism, located in the top of the nose wheel well, is a hydraulically-unlocked hook that is spring-loaded to the locked position. The nose gear indicator switch is attached to a bracket welded to the uplock hook.

5-111. REMOVAL OF NOSE GEAR UPLOCK MECHANISM. (Refer to figure 5-19.)

a. With master switch OFF, pump landing gear doors open.

NOTE

With doors open, all components are readily accessible at top forward end of the nose wheel well.

b. Disconnect links (11) from actuator (10).

c. Disconnect spring (9) from aircraft structure or from hook on bellcrank assembly (3).

d. Unscrew nut attaching uplock switch (5).

e. Remove bolt (1) through right-hand tunnel wall.

5-112. INSTALLATION OF NOSE GEAR UPLOCK MECHANISM. (Refer to figure 5-19.)

a. Place bellcrank and hook (3) assembly in position and install washer between bellcrank and right-hand tunnel wall, then install bellcrank and hook assembly; install bolt (1), bearing (8), washer and nut.

b. Install uplock switch (5).

c. Attach spring (9) to aircraft structure or to hook on bellcrank assembly (3).

d. Connect links (11) to actuator (10).

e. Rig system in accordance with applicable paragraph.

5-113. NOSE GEAR DOWNLOCK MECHANISM. (Refer to figure 5-19.)

5-114. DESCRIPTION. The nose gear downlock mechanism is a hook at the piston rod end of the nose gear actuator.

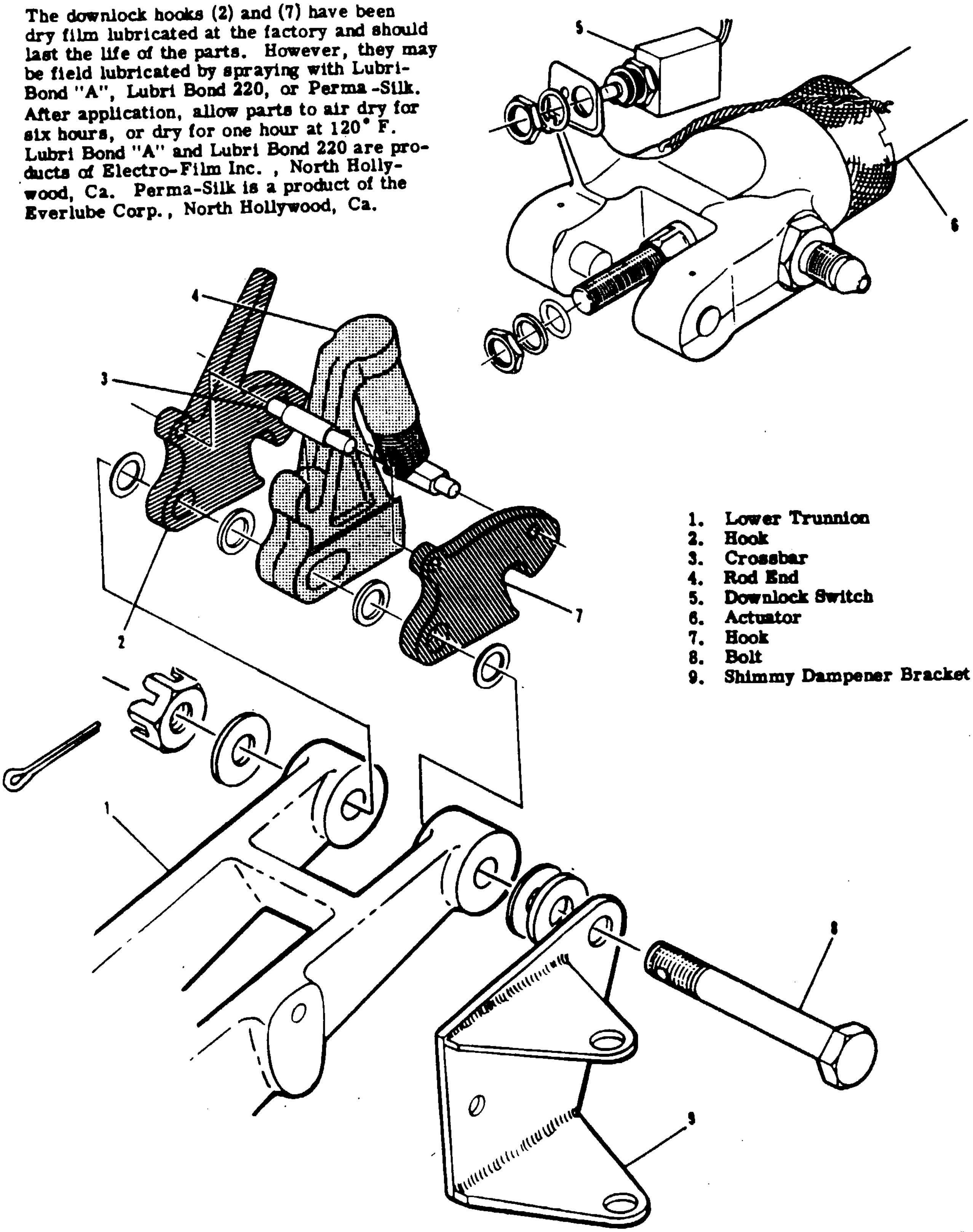
5-115. REMOVAL AND INSTALLATION OF NOSE GEAR DOWNLOCK MECHANISM. (Refer to figure 5-20.) Refer to " Removal of Nose Gear Actuator " paragraph of this Section.

5-116. NOSE GEAR ACTUATOR. (Refer to figure 5-21.)

5-117. DESCRIPTION. The nose gear actuator extends and retracts the nose gear and serves as a

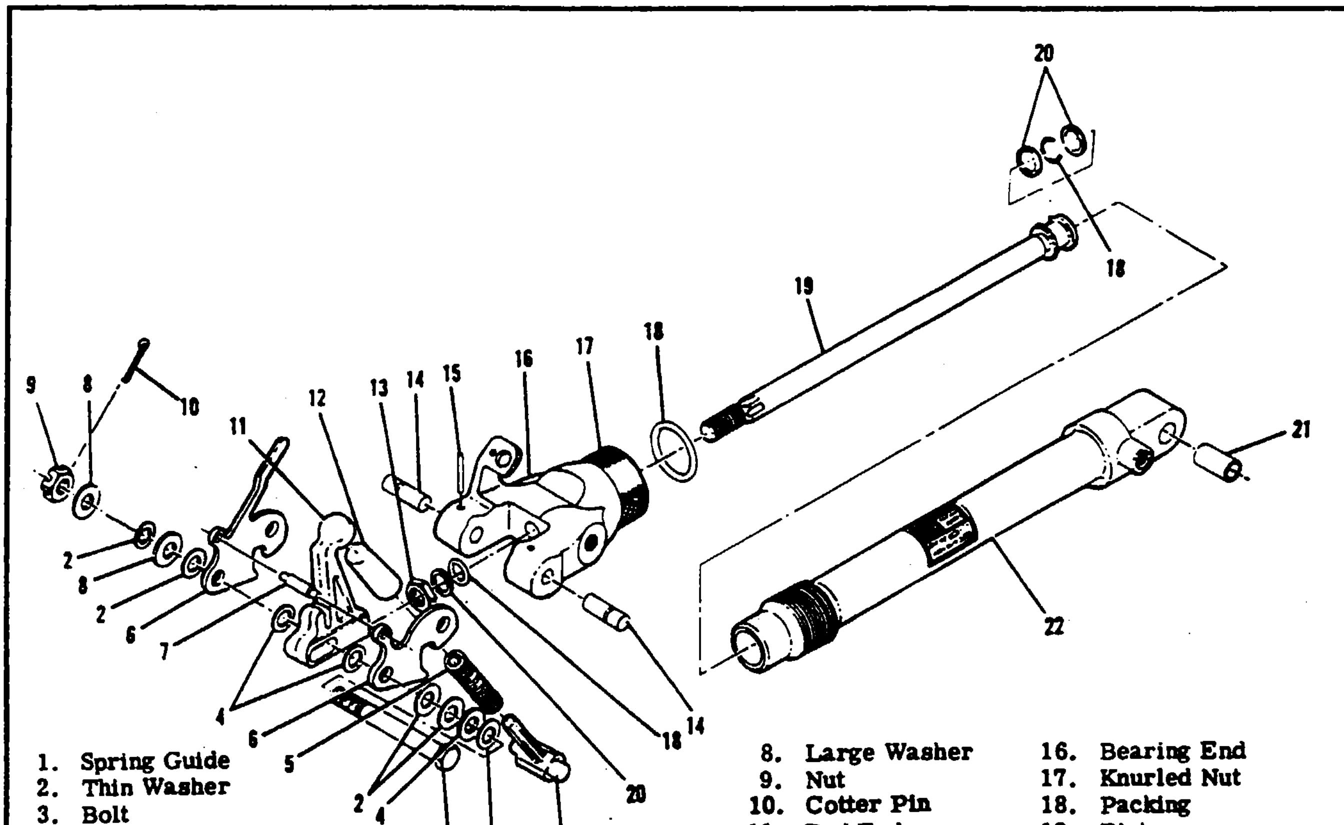
NOTE

The downlock hooks (2) and (7) have been dry film lubricated at the factory and should last the life of the parts. However, they may be field lubricated by spraying with Lubri-Bond "A", Lubri Bond 220, or Perma-Silk. After application, allow parts to air dry for six hours, or dry for one hour at 120° F. Lubri Bond "A" and Lubri Bond 220 are products of Electro-Film Inc., North Hollywood, Ca. Perma-Silk is a product of the Everlube Corp., North Hollywood, Ca.



1. Lower Trunnion
2. Hook
3. Crossbar
4. Rod End
5. Downlock Switch
6. Actuator
7. Hook
8. Bolt
9. Shimmy Dampener Bracket

Figure 5-20. Nose Gear Downlock Mechanism



1. Spring Guide
2. Thin Washer
3. Bolt
4. Thick Washer
5. Spring
6. Hook
7. Crossbar
8. Large Washer
9. Nut
10. Cotter Pin
11. Rod End
12. Shield
13. Nut
14. Pin
15. Roll Pin
16. Bearing End
17. Knurled Nut
18. Packing
19. Piston
20. Back-Up Ring
21. Bushing
22. Cylinder

Figure 5-21. Nose Gear Actuator

rigid drag strut in the gear-down position. A spring clip attaches the retractable step cable turnbuckle to the nose gear actuator.

5-118. REMOVAL OF NOSE GEAR ACTUATOR.

a. Open doors and jack aircraft or weight down tail to raise nose wheel off the ground.

b. Tag for identification and disconnect electrical wires at the gear-down switch, located at the forward end of the actuator.

c. Disconnect hydraulic hoses from actuator. cap or plug hose and fitting openings to prevent entry of foreign material.

d. Disconnect actuator from lower trunnion by removing cotter pin, castellated nut, washers, and bolt.

e. Retain components of downlock mechanism which will be freed by removing bolt.

5-119. DISASSEMBLY OF NOSE GEAR ACTUATOR. (Refer to figure 5-21.)

a. Loosen lock nut at end of piston rod and remove rod end assembly as a unit: remove lock nut from piston rod.

b. Remove safety wire from knurled nut, and loosen knurled nut.

c. Remove bearing end from cylinder, and remove nut from cylinder.

d. Pull piston from cylinder.

e. Remove O-rings and back-up rings from bearing end and piston.

f. Disassemble hook assembly.

5-120. INSPECTION AND REPAIR OF PARTS OF NOSE GEAR ACTUATOR.

a. Inspect all threaded surfaces for cleanliness and for cracks or excessive wear.

b. Inspect downlock hook spring for evidence of breaks and distortion. Free length of spring must be 2.406 inches +0.080 or -0.080 inches, and compressed to 2.00 inches under a 19.80 pound +2.0 or -2.0 pound load.

c. Inspect hooks, spring guide, bearing end, piston, cylinder, and bushing for cracks, chips, scratches, scoring, wear or surface irregularities which may affect their function or the overall function of the nose gear actuator.

d. Repair of most parts of the actuator assembly is impractical. Replace defective parts with serviceable parts.

e. Minor scratches and scores may be removed by polishing with fine abrasive crocus cloth (Federal Specification PC-458), providing their removal does not affect operation of the unit.

5-121. REASSEMBLY OF NOSE GEAR ACTUATOR. (Refer to figure 5-21.)

NOTE

Install new O-rings and back-up rings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

a. Install O-rings and back-up rings in bearing end.
b. Install O-rings and back-up rings on piston.
c. Insert piston into cylinder. Do not damage back-up rings and O-rings when inserting piston.
d. With knurled nut on cylinder, install bearing end of cylinder. Use care to avoid damage to O-rings and back-up rings when installing bearing end on cylinder.

NOTE

Centerline of hook pins and centerline of bushing hole must align within 0.005-inch with cylinder assembled at a length of 11.98 inches, +0.03 or -0.03 inches, measured from centerline of hook pins to centerline of bushing in cylinder in cylinder anchor end.

e. Tighten and safety wire knurled nut.
f. Install lock nut on end of piston.
g. Assemble and install hook assembly on piston.

5-122. INSTALLATION OF NOSE GEAR ACTUATOR

NOTE

Before installing nose gear actuator, check condition of fit and attaching bolts and bushings. Replace any defective parts. Fill actuator with hydraulic fluid.

a. Attach aft end of actuator to fuselage structure with bolt, washer, and nut. Safety nut with cotter pin.
b. Assemble and attach nose gear downlock mechanism to lower trunnion as shown in figure 5-18.

5-123. REMOVAL AND INSTALLATION OF NOSE GEAR UPLOCK AND RELEASE ACTUATOR.
a. Disconnect uplock spring.
b. Disconnect and cap or plug hydraulic lines at actuator.
c. Disconnect and tag up-limit switch electrical wires.
d. Remove cotter pin and clevis pin attaching actuator link to bellcrank arm. Note position of spacer washers and direction of clevis pin.
e. Remove nuts, washers, and bolts attaching actuator to wheel well tunnel wall. Note and retain shims between actuator and tunnel wall.
f. Remove bolt, washer, and nut attaching bellcrank at top of nose wheel.

NOTE

Use care to avoid dropping bearings in bellcrank assembly. Retain washers used as shims at each end of bellcrank.

g. Install uplock mechanism and actuator by reversing the preceding steps. Install shims and washers as noted during removal.

5-124. DISASSEMBLY, INSPECTION AND REPAIR OF PARTS AND REASSEMBLY OF NOSE GEAR UPLOCK AND RELEASE ACTUATOR. Refer to figure 5-6 and paragraphs 5-23 thru 5-25.

5-125. NOSE GEAR DOOR SYSTEM. (Refer to figure 5-22.)

5-126. DESCRIPTION. The nose gear door system consists of a right and left forward door, actuated by push-pull rods, a torque tube assembly and a right and left aft door, mechanically linked to the nose gear trunnion.

5-127. OPERATION. The nose gear forward doors open for nose gear retraction or extension and close again when the cycle is completed. These doors are held in the closed position by the door lock valve, located in the door manifold assembly, mounted on the power pack, by trapping fluid in the door lines. Actuation of the forward nose gear doors is accomplished by a double-acting hydraulic cylinder. The nose gear aft doors are mechanically linked to the nose gear trunnion. These doors open as the nose gear extends and close as it is retracted.

5-128. REMOVAL AND INSTALLATION OF NOSE WHEEL DOORS. (Refer to figure 5-22.)
a. Open landing gear doors.
b. Remove engine cowl.
c. Disconnect push-pull rod from bracket on door by removing nut, bolt, and washer.
d. Except for the left forward hinge, remove nuts, and bolts attaching each hinge pivot. Work from upper side of cowl opening to remove bolts. Retain bushings in hinge pivot. Prior to aircraft serial P21000151, the engine must be removed to gain access to the left forward hinge pivot. Beginning with aircraft serial P21000151, bracket, attached to left door, is equipped with three screws which attach hinge to bracket. Remove screws to remove door, leaving hinge attached to aircraft structure. If hinge point bolt must be removed, engine will have to be removed.
e. Reverse preceding steps to install nose wheel doors.

5-129. REMOVAL AND INSTALLATION OF NOSE WHEEL DOOR MECHANISM. (Refer to figure 5-22.)
a. Open landing gear doors.
b. Disconnect actuator at torque tube by

NOTE

Each time turbine access door is removed and replaced on turbocharged aircraft, check to assure that gap between access door and nose gear door is .12" to .15". Also, gap between left-hand side of nose gear door and fuselage skin should be .12" to .15".

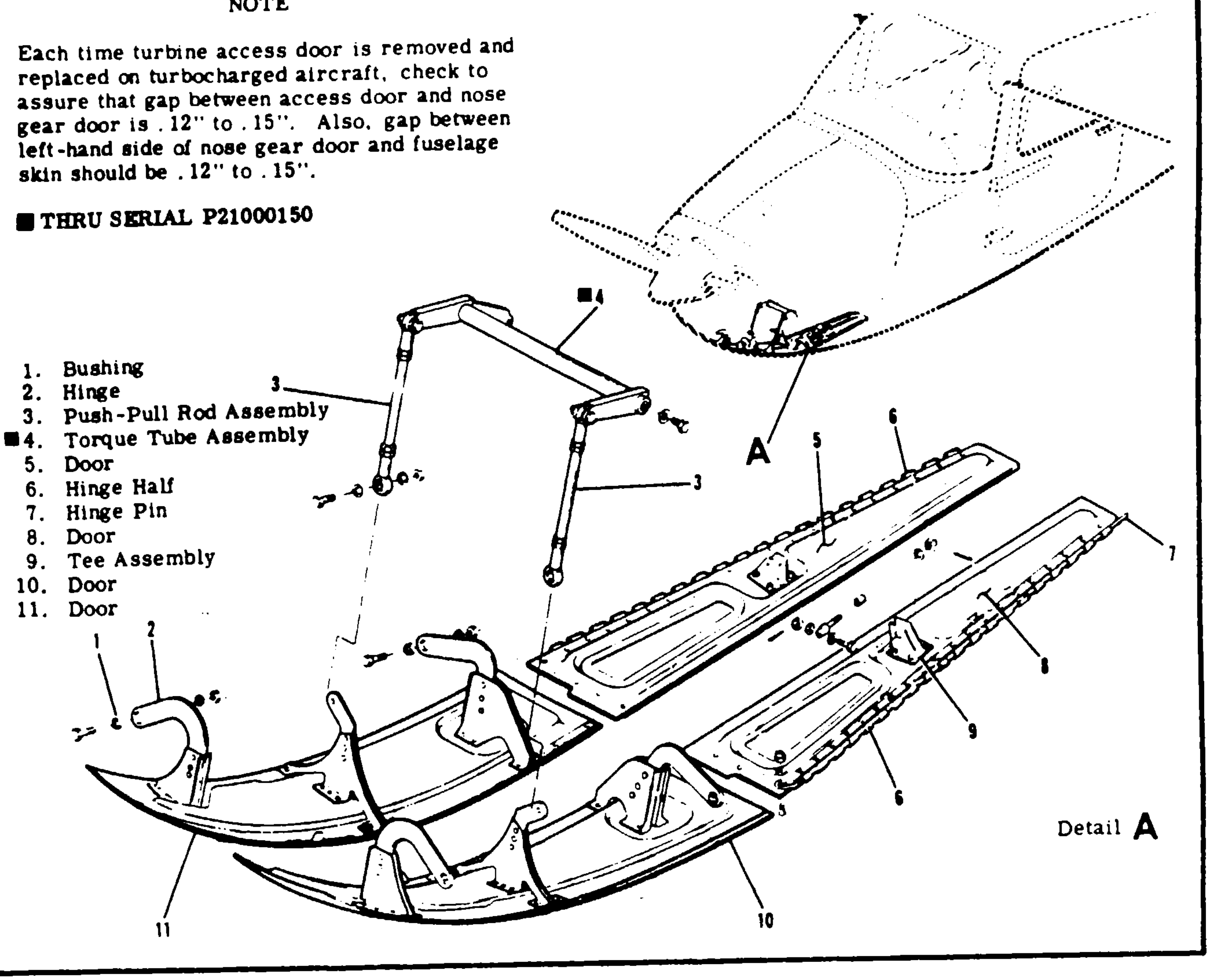


Figure 5-22. Nose Gear Door System

removing nut, washer and bolt.

c. Disconnect and cap or plug hydraulic hose at actuator.

d. Remove nut, washer and bolt attaching actuator to its mounting bracket in nose wheel well.

NOTE

Refer to paragraphs 5-38, 5-39 and 5-40 for disassembly, inspection and repair of nose wheel door actuator.

e. Disconnect door push-pull rods at door bracket.

f. Remove torque tube by removing nuts, washers and bolts securing it to mounting brackets.

g. Reverse preceding steps for installation.

5-130. REMOVAL AND INSTALLATION OF NOSE GEAR STRUT DOORS. (Refer to figure 5-22.)

a. Disconnect tie rod assemblies from door.

b. Remove screw, washer and nut securing door hinge pin and pull hinge pin from door hinge, allowing door to be removed.

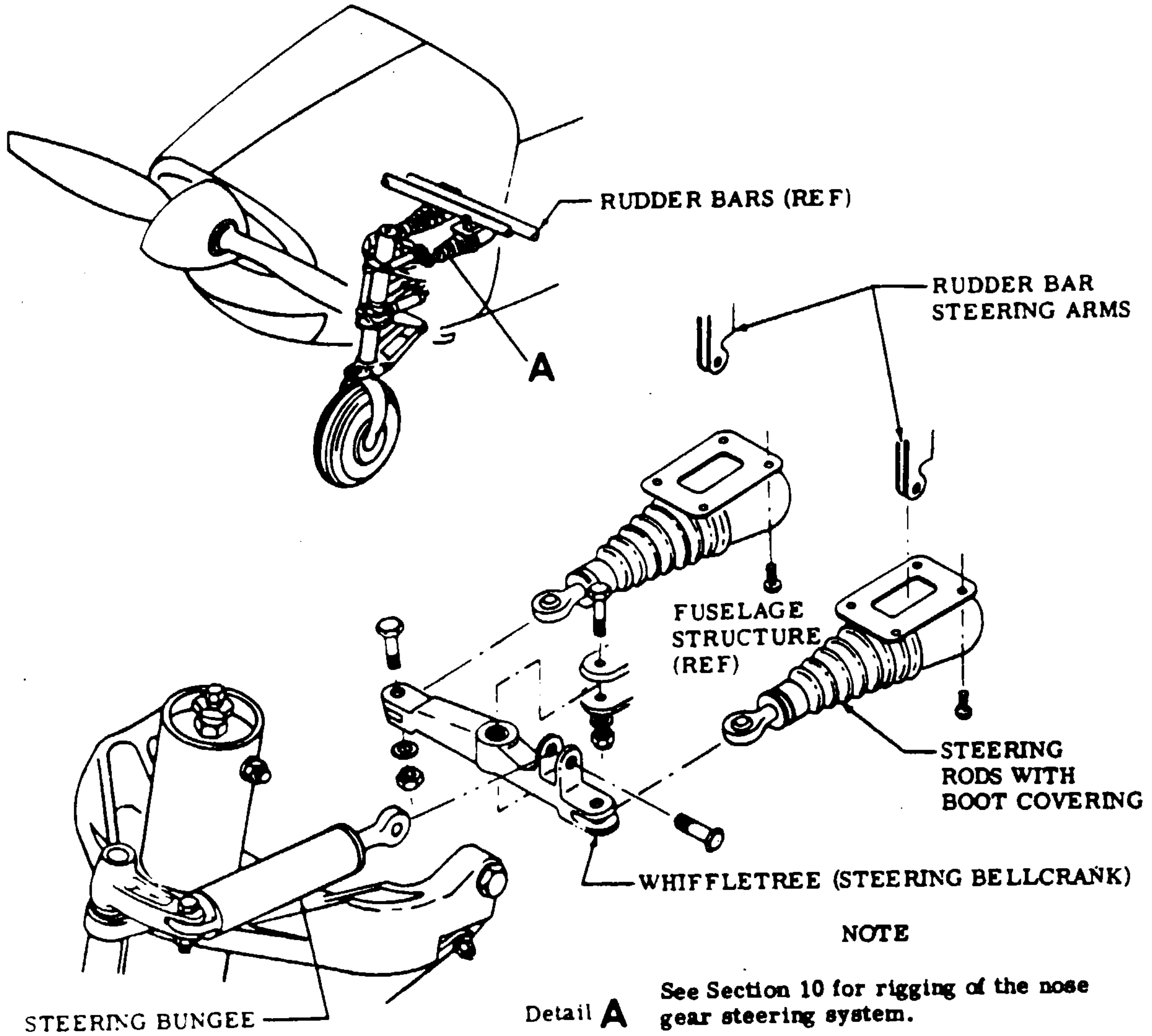
c. To remove tie rod assemblies, remove ball end stud securing tie rod to nose gear trunnion. Do not change length of rod assembly unless necessary. Changing rod assembly length will make readjustment necessary on installation.

d. Install strut doors and linkage by reversing preceding steps.

e. Observe note in figure 5-22.

5-131. NOSE WHEEL STEERING SYSTEM. (Refer to figure 5-23.)

5-132. DESCRIPTION. The nose wheel steering system links the rudder pedals to the nose wheel fork, affording steering control through use of the rudder pedals. The nose gear torque links straighten the nose wheel as the landing gear is retracted.



NOTE

See Section 10 for rigging of the nose gear steering system.

Figure 5-23. Nose Wheel Steering System

5-133. REMOVAL AND INSTALLATION OF NOSE WHEEL STEERING SYSTEM COMPONENTS (Refer to figure 5-23.) Refer to the figure as a guide in determining relationship of steering system components. Also, the illustration may be used as a guide during removal and installation of system components.

5-134. RIGGING OF NOSE WHEEL STEERING SYSTEM. Since the nose wheel steering system is connected with the rudder control system, adjustment to one system would directly affect the other. Refer to Section 10 of this manual for rigging procedures for the rudder system and the nose wheel steering system.

5-135. TROUBLE SHOOTING. (Refer to paragraph 5-92).

5-136. NOSE WHEEL AND TIRE ASSEMBLY (Refer to figure 5-24.)

5-137. DESCRIPTION. The aircraft may be equipped with either Cleveland or McCauley wheel assemblies. Separate disassembly, inspection and reassembly procedures are provided for each type.

NOTE

Use of recapped tires or new tires not listed on the aircraft equipment list are not recommended due to possible interference between the tire and structure when landing gear is in the retraced position.

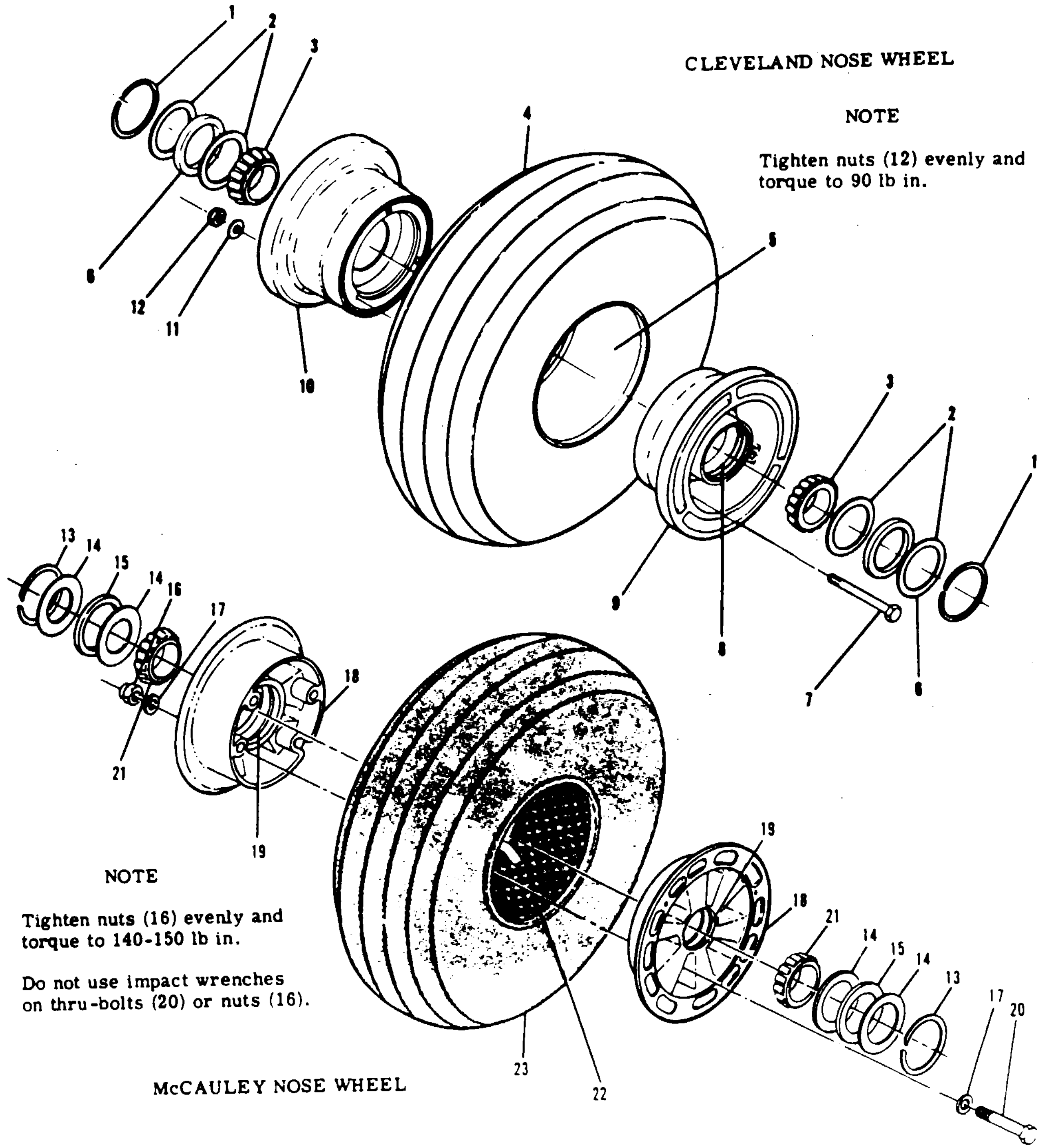
5-138. OPERATION. The nose gear wheel is free-rolling on an independent axle and is used to steer the aircraft while taxiing by means of the nose wheel steering system.

5-139. REMOVAL OF NOSE WHEEL AND TIRE ASSEMBLY

CLEVELAND NOSE WHEEL

NOTE

Tighten nuts (12) evenly and torque to 90 lb in.



NOTE

Tighten nuts (16) evenly and torque to 140-150 lb in.

Do not use impact wrenches on thru-bolts (20) or nuts (16).

McCAULEY NOSE WHEEL

1. Snap Ring
2. Grease Seal Ring
3. Bearing
4. Tire
5. Tube
6. Grease Seal Felt
7. Thru-Bolt
8. Bearing Cup
9. Male Wheel Half
10. Female Wheel Half
11. Washer
12. Nut
13. Retainer Ring
14. Grease Seal Retainer
15. Felt Grease Seal
16. Nut
17. Washer
18. Wheel Half
19. Bearing Cup
20. Bolt
21. Bearing Cone
22. Tibe
23. Tire

Figure 5-24. Nose gear Wheel and Tire Assembly

a. Weight tail of aircraft to raise nose wheel off the ground.
b. Remove nose wheel axle bolt.
c. Use a rod or long punch inserted in ferrule to tap opposite ferrule out of nose wheel fork.
d. Remove spacers, axle tube and hub caps before disassembling nose wheel.
e. Reverse preceding steps to install nose wheel. Tighten axle bolt until a slight bearing drag is obvious when the wheel is turned. Back off nut to nearest castellation and install cotter pin.

5-140. DISASSEMBLY OF CLEVELAND NOSE WHEEL AND TIRE ASSEMBLY. (Refer to figure 5-24.)

WARNING

Injury can result from attempting to separate wheel halves with the tire inflated. Avoid damaging wheel flanges when breaking tire beads loose.

a. Remove valve core, completely deflate tire, and break tire beads loose.
b. Remove thru-bolts and separate wheel halves.
c. Remove tire and tube.
d. Remove bearing retaining rings, grease seals and bearing cones.

NOTE

The bearing cups are a press fit in the wheel halves and should not be removed unless replacement is necessary. To remove, heat wheel half in boiling water for 15 minutes. Using an arbor press, if available, press out bearing cup and press in the new one while the wheel is still hot.

5-141. INSPECTION AND REPAIR OF CLEVELAND NOSE WHEEL AND TIRE ASSEMBLY. Procedures outlined in paragraphs regarding the main wheel and tire assemblies may be used as a guide for inspection and repair of the nose wheel and tire assembly.

5-142. REASSEMBLY OF CLEVELAND NOSE WHEEL AND TIRE ASSEMBLY. (Refer to figure 5-24.)
a. Place tube inside tire and align balance marks on tire and tube.
b. Place tire and tube on wheel half with tube valve stem through hole in wheel half.

CAUTION

Uneven or improper torque of the thru-bolt nuts may cause bolt failure with resultant wheel failure.

c. Insert thru-bolts, position other wheel half and secure with nuts and washers. Torque bolts to value stipulated in figure 5-24.
d. Clean and repack bearing cones with clean wheel bearing grease.
e. Assemble bearing cones, seals, and retainers into wheel half.
f. Inflate tire to seat tire beads, then adjust to correct pressure.

5-143. DISASSEMBLY OF McCAULEY NOSE WHEEL AND TIRE ASSEMBLY. (Refer to figure 5-24.)
a. Remove hub caps, completely deflate tire, and break tire beads loose at wheel flanges.

WARNING

Injury can result from attempting to remove wheel flanges with tire and tube inflated. Avoid damaging wheel flanges when breaking tire beads loose. A scratch, gouge or nick in wheel flange could cause wheel failure.

b. Remove nuts and washers.
c. Remove thru-bolts and washers.
d. Separate and remove wheel halves from tire and tube.
e. Remove retaining ring, grease seal retainer, felt grease seal, grease retainer and bearing cone from each wheel half.

NOTE

The bearing cups (races) are a press fit in the wheel hub and should not be removed unless a new part is to be installed. To remove the bearing cup, heat wheel hub in boiling water for 30 minutes, or in an oven not to exceed 121°C (250°F). Using an arbor press, if available, press out the bearing cup and press in the new bearing cup while the wheel hub is still hot.

5-144. INSPECTION AND REPAIR OF McCAULEY NOSE WHEEL AND TIRE ASSEMBLY.
a. Clean all metal parts and felt grease seals in Stoddard solvent, or equivalent, and dry thoroughly.

NOTE

A soft bristle brush may be used to remove hardened grease, dust or dirt.

b. Inspect wheel halves for cracks or damage.
c. Inspect bearing cones, cups, retaining rings and seals for wear or damage.
d. Inspect thru-bolts and nuts for cracks in threads or cracks in radius under bolt head.
e. Replace cracked or damaged wheel halves.
f. Replace damaged retaining rings and seals.
g. Replace any worn or cracked thru-bolts or nuts.
h. Replace any worn or damaged bearing cups or cones.
i. Remove any corrosion or small nicks.
j. Repair reworked areas of wheel by cleaning thoroughly, then applying one coat of clear lacquer paint.
k. Pack bearings with grease specified in Section 2 of this manual.

5-145. REASSEMBLY OF McCAULEY NOSE WHEEL AND TIRE ASSEMBLY. (See figure 5-24.)
a. Assemble bearing cone, grease seal retainer, felt grease seal, grease seal retainer and retaining ring into both wheel halves.
b. Insert tube in tire, aligning index marks on tire and tube.

c. Place wheel half into tire and tube (side opposite valve stem), aligning base of valve stem in valve slot. With washer under head of thru-bolt, insert bolt through wheel half.

d. Place wheel half into other side of tire and tube, aligning valve stem in valve slot.

e. Install washers and nuts on thru-bolts and pre-torque to 10-50 lb. in.

CAUTION

Uneven or improper torque of nuts can cause failure of bolts with resultant wheel failure. Do not use impact wrench on thru-bolts or nuts.

f. Prior to torquing nuts, inflate tire to 10-15 psi air pressure to seat tire.

g. Dry torque nuts evenly to 140-150 in lb.

h. Inflate tire to pressure specified in Section 1.

5-146. INSTALLATION OF NOSE WHEEL AND TIRE ASSEMBLY.

a. Install nose wheel in fork and install ferrules.

b. Install axle stud.

c. Tighten axle stud until a slight bearing drag is obvious when the wheel is turned. Back off nut to nearest castellation and install cotter pins.

5-147. HYDRAULIC POWER SYSTEM COMPONENTS. (Refer to figure 5-25.)

5-148. GENERAL DESCRIPTION. The hydraulic power system includes equipment required to provide a flow of pressurized hydraulic fluid to the retractable landing gear system. Main components of the hydraulic power system include the power pack and the emergency hand pump.

5-149. HYDRAULIC COMPONENTS REPAIR. Since emphasis here is on repair and not overhaul of the basic components of the hydraulic system, it is unlikely that the mechanic will go through all of the procedures outlined. Instead, he will repair the particular item which is causing the difficulty.

5-150. REPAIR VERSUS REPLACEMENT. Often, the moderate trade-in price for a factory-rebuilt component is less than the accumulated cost of labor, parts and (often time consuming) trial and error adjustment. Repair or replacement of a component will depend on the time, equipment and skilled labor that is locally available.

5-151. REPAIR PARTS AND EQUIPMENT. Repair parts may be ordered from the applicable Parts Catalog. Test equipment may be ordered from the Special Tools and Support Equipment Catalog. Both publications are available from the Cessna Supply Division.

5-152. EQUIPMENT AND TOOLS

5-153. HAND TOOLS. The following hand tools are necessary for repair work on the power pack and other hydraulic components.

Snap Ring Pliers

Strap Wrench (for removing door solenoids and various cylinder barrels of the hydraulic actuators.)

Needle-Nose Pliers

Pin Punches

Duck-bill Pliers

Box end and Open end Wrenches

Locally-fabricated items, handy for power pack repair, are various 1/4-inch aluminum rods, ground to a gradual taper, and hooks formed from brass welding rod to extricate small plungers from hydraulic ports. Hooks formed from brass welding rod must not be over 1/16-inch in length, so as not to scratch or score the bore. Various sizes of Allen wrenches may be welded to "T" handles for use when removing, installing or adjusting the various internal wrenches, plugs or valves.

5-154. COMPRESSED AIR. The simplest method of removing some hydraulic parts in inaccessible galleries of the power pack is a quick blast of compressed air from behind. Parts can be blown out in seconds, which would otherwise take endless "fishing" operation to extricate. An air hose and nozzle are common-sense tools.

5-155. POWER PACK.

5-156. DESCRIPTION. The hydraulic power pack, located in the pedestal, is a multi-purpose control unit in the hydraulic system. It contains a hydraulic reservoir and valves which control flow of pressurized fluid to the various actuators in the door and landing gear systems.

5-157. REMOVAL OF POWER PACK. (Refer to figure 5-26.)

NOTE

As hydraulic lines are connected or removed, plug or cap all openings to prevent entry of foreign material in the lines or fittings.

a. Remove front seats and spread drip cloth over front carpet.

b. Remove decorative cover from pedestal as outlined in Section 9 of this manual.

c. Remove upper panel assembly from aft face of panel.

d. Remove screws attaching indicator assembly at top of pedestal; remove indicator assembly.

e. Remove four bolts attaching wheel and gear box assembly; remove wheel and gear box assembly.

f. Loosen idler sprocket asembly by loosening bolt and sliding sprocket inboard in slot.

g. Disconnect chain at connecting link.

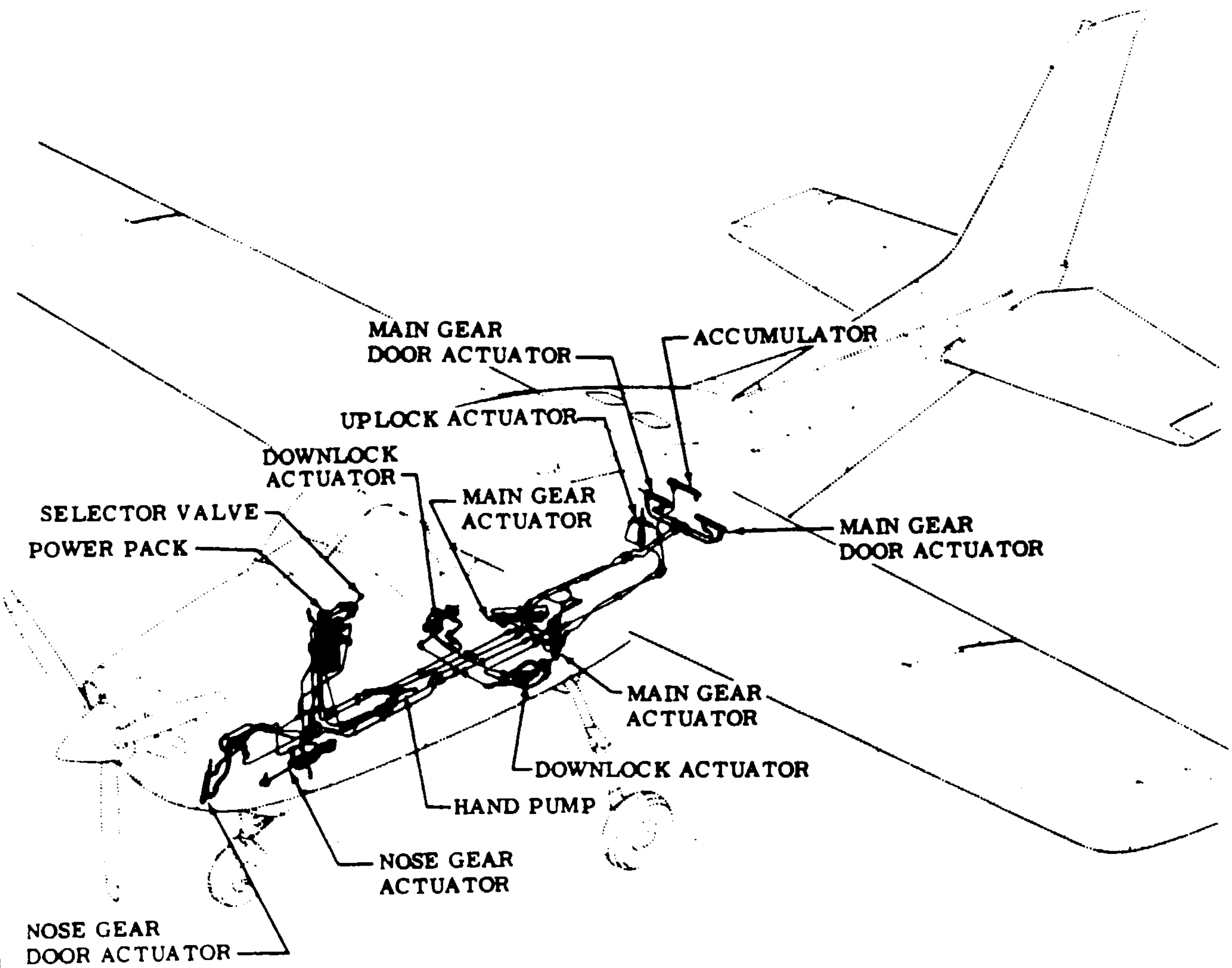
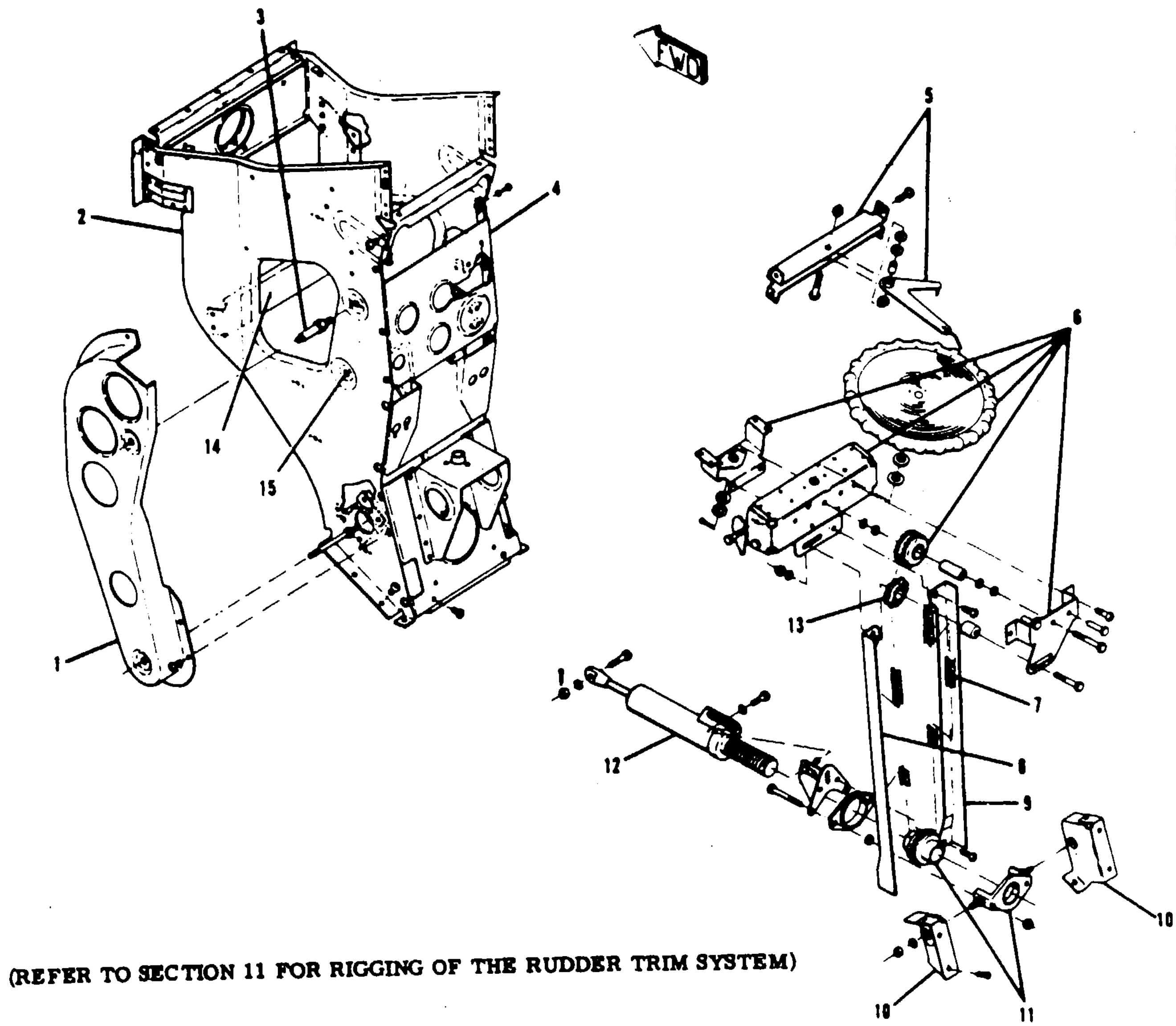


Figure 5-25. Hydraulic System Components



1. Chain Guard
2. Pedestal
3. Stud
4. Upper Panel
5. Indicator Assembly
6. Wheel and Gearbox Assembly
7. Chain
8. Left-Hand Chain Guard
9. Right-Hand Chain Guard
10. Bearing Bracket
11. Gimbal and Sprocket Assembly
12. Bungee
13. Idler Sprocket
14. Power Pack Attach Bracket
15. Power Pack Attach Hole (2)

Figure 5-26. Power Pack Removal and Installation

h. Remove left-hand and right-hand chain guards.

i. Allow chain to remain on gimbal assembly in lower pedestal area.

j. Position gallon container under drain elbow at right-hand forward side of pedestal.

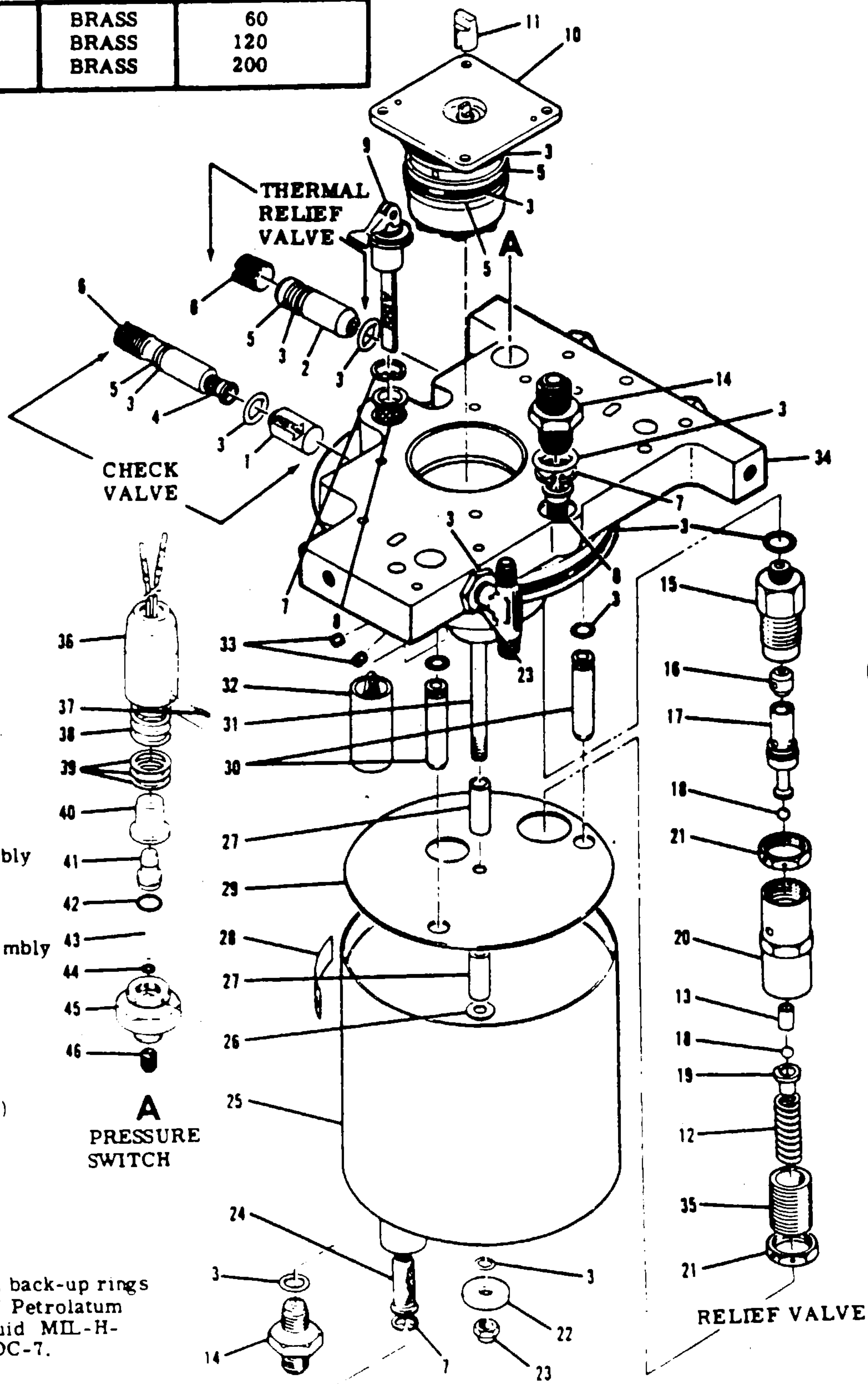
k. Remove cap from elbow and attach drain hose.

l. Using hand pump, drain reservoir fluid into container.

SHIM APPLICABILITY

SHIM PART NO.	THICKNESS	MATERIAL	EFFECT IN PRESSURE (PSI)
9880705-1	.005	BRASS	60
9880705-2	.010	BRASS	120
9880705-3	.016	BRASS	200

1. Check Valve
2. Thermal Relief Valve
3. Packing
4. Self-Relieving Filter
5. Back-Up Ring
6. Retainer
7. Retainer Ring
8. Screen Assembly
9. Dipstick
10. Pump Assembly
11. Coupling
12. Spring
13. Piston
14. Union
15. Adapter
16. Orifice
17. Poppet
18. Ball
19. Spring Guide
20. Housing
21. Nut
22. Reservoir Washer
23. Nut
24. Screen
25. Reservoir
26. Washer
27. Spacer
28. Nameplate
29. Baffle
30. Return Tube
31. Stud
32. Suction Screen Assembly
33. Plug
34. Body Assembly
35. Adjustment Screw
36. Cap and Housing Assembly
37. Pin
38. Spring
39. Shim
40. Stop
41. Guide
42. Packing
43. Piston (Needle Roller)
44. Packing
45. Fitting
46. Snubber



NOTE

Install new packings and back-up rings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

Figure 5-27. Power Pack Disassembly and Reassembly

m. Disconnect and cap or plug all hydraulic lines at power pack.
n. Disconnect wiring from pressure switch.
o. Remove three mounting bolts, one on each side of pedestal, and one through mounting bracket on forward side of pedestal.

NOTE

It is not necessary to disturb the studs on the left and right sides of the pedestal to remove the power pack.

5-157. DISASSEMBLY OF POWER PACK. (Refer to figure 5-27.)

a. Remove fittings from body assembly and place body assembly in vise.
b. Remove nut (23), washer (22) and packing (3) at attaching stud (31) at bottom of reservoir; remove reservoir.

NOTE

If reservoir will not disengage from body assembly, replace fittings and cap or plug all fittings except vent fitting. Attach air hose at vent fitting and apply pressure (not to exceed 15 psi: reservoir proof pressure); remove reservoir. A strap clamp is not recommended as clamp may damage reservoir.

c. Remove door manifold assembly and gear manifold assembly from body assembly of power pack.
d. Remove pressure switch and dipstick from body assembly.
e. Remove large packing (3) from bottom of body assembly.
f. Remove baffle (29), spacers (27) and washer (26).
g. Remove union (14), packing (3), retainer ring (7) and screen (24) at bottom of reservoir (25).
h. Remove motor and pump assembly (10) from body assembly.
i. Remove packings and back-up rings from pump assembly (10); remove coupling (11).
j. Remove return tubes (30) and packings from body assembly.
k. Remove relief valve assembly from body assembly.

NOTE

Suction screen (32) need not be removed from body assembly to be cleaned. However, if screen assembly is damaged, it should be removed as outlined in step "l" of this paragraph observing the following caution.

CAUTION

Use extreme caution in removing suction screen assembly. Damage to screen assembly or clearance between screen assembly and body will cause slow landing gear retraction.

l. Working through center hole in top of body assembly, and using a drift or punch made of soft material, tap out suction screen assembly (32).
m. Remove fittings from body assembly, if still installed, union (14), packing (3), retainer ring (7) and screen assembly (8) from body assembly.
n. Remove thermal relief valve and check valve from body assembly.

NOTE

To remove thermal relief valve when power pack is installed in aircraft, remove retainer (6). While holding your hand to catch valve, gently pump hand pump. Valve will be ejected out into your hand. Be careful not to pump hand pump too hard.

5-158. INSPECTION AND REPAIR OF POWER PACK COMPONENTS.

a. Wash all parts in cleaning solvent (Federal Specification P-S-661, or equivalent) and dry with filtered air.
b. Inspect seating surfaces. They should have very sharp edges. Seats may be lapped, if necessary, to obtain sharp edges.
c. Inspect all threaded surfaces for serviceable condition and cleanliness.
d. Inspect all parts for scratches, scores, chips, cracks and indications of excessive wear.

5-159. REASSEMBLY OF POWER PACK. (Refer to figure 5-27.)

NOTE

Install new packings and back-up rings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

a. Assemble and install thermal relief valve and check valve in body assembly.
b. Install screen (8), retainer ring (7), packing (3) and union (14) in top of body assembly (34).
c. Install suction screen assembly (32), if removed.

CAUTION

Use extreme caution when installing suction screen assembly. Damage to screen assembly or clearance between screen assembly and body will cause slow landing gear retraction.

d. Install relief valve assembly in body assembly.
e. Install packings and return tubes (30) in body assembly.
f. Install packings and back-up rings on pump assembly (10): install coupling (11).
g. Install pump assembly (10) and motor on body assembly.

h. Install screen (24), retainer ring (7), packing (3) and union (14) on bottom of reservoir assembly (25).
i. Install washer (28), spacers (27) and baffle (29).
j. Install large packing on bottom of body assembly.
k. Install dipstick (9), pressure switch, door manifold assembly and gear manifold assembly on body assembly.
l. Attach reservoir (25) to body assembly with packing (3), washer (22) and nut (23).

5-160. INSTALLATION OF POWER PACK. (Refer to figure 5-26.)
a. Work power pack into position and install three bolts that secure power pack to pedestal.
b. Connect all hydraulic lines to power pack fittings. Ensure that all fittings are properly installed, with jamb nuts tight, after lines are tightened.
c. Install wheel and gear box assembly and indicator assembly in top of pedestal.
d. Install left-hand and right-hand chain guards for rudder trim chain.
e. Connect chain at connecting link after stringing chain over idler sprocket.
f. Tighten idler sprocket assembly by sliding sprocket outboard in slot and tightening bolt.
g. Connect ground wire to pressure switch and wire to motor.
h. Connect power pack wiring to plug.
i. Install upper panel assembly on pedestal.
j. Fill reservoir on right-hand side of power pack with clean hydraulic fluid in accordance with procedures outlined in Section 2 of this manual.
k. Jack aircraft as outlined in Section 2 of this manual.
l. Operate gear thru several cycles to bleed system Check for correct operation and signs of fluid leakage. A 28V power supply should be used to augment the ship's battery.

5-161. PRESSURE SWITCH. (Refer to figure 5-27.)

5-162. DESCRIPTION. When installed in the aircraft, the pressure switch is mounted on the right-hand (aft) side of the power pack in the console. This switch senses pressure in the DOOR-CLOSE line. After gear extension or retraction (after the doors close), pressure builds in the DOOR-CLOSE line. At approximately 1500 psi, the pressure switch opens, turning off the power pack. The pressure switch will continue to hold the electrical circuit open until pressure in the system drops to a preset value, at which time, the pump will again operate to build up pressure to approximately 1500 psi.

5-163. DISASSEMBLY OF PRESSURE SWITCH. (Refer to figure 5-27.)
a. Remove pin (37).
b. Unscrew cap and housing assembly (36) from fitting (45).
c. Remove spring (38).
d. Remove shims (39) from flange of guide (41).

NOTE

The chart in figure 5-26 lists shims (39) by part number, thickness and effect on operating pressure (psi).

e. Unscrew guide (41) from fitting (45).

CAUTION

Do not damage lip of guide (41). Guide threads and threads of fitting (45) are primed with Loctite Grade T primer and sealed with Loctite Grade AV sealer.

f. Remove piston (43).
g. Remove packings (42) and (44).
h. Remove snubber (46) from fitting (45).

CAUTION

Threads of snubber (46) and fitting (45) are primed with Loctite Grade T primer and sealed with Loctite Grade AV sealer.

5-164. CLEANING, INSPECTION AND REPAIR OR PRESSURE SWITCH. (Refer to figure 5-27.)
a. Clean sealant from threads of snubber (46), fitting (45) and guide (41) with wire brush.
b. Clean all parts with cleaning solvent (Federal Specification P-S-661, or equivalent) and dry thoroughly.
c. Discard all removed packings (42) and (44) and replace with new packings.
d. Inspect all pressure switch parts for scratches, scores, chips, cracks and indications of wear.
e. All damaged parts shall be replaced with new parts.

NOTE

Thorough cleaning is important. Dirt and chips are the greatest single cause of malfunctions in hydraulic systems. Carefulness and proper handling of parts to prevent damage must be observed at all times.

f. Snubber (46) can be cleaned with solvent, then blown out with high pressure compressed air.
g. Assure that .062-inch vent hole is open in stop (40).

5-165. ASSEMBLY OF PRESSURE SWITCH. (Refer to figure 5-27.)
a. Prime threads of snubber (46) and internal threads of fitting (45) with Loctite Grade T primer and apply Loctite Grade AV sealer to threads of snubber (46). Install snubber into fitting with a slotted screwdriver.

NOTE

Install new packing (42) lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

b. Install packing (42) in fitting (45).

c. Lubricate packing (44) with Dow CorningDC7. and install in guide (41).
d. Lubricate guide (41) with Petrolatum (excluding threads). Prime threads of guide and internal threads of fitting (45) with Loctite Grade T primer and apply Loctite Grade AV sealer to threads of guide (41). Install guide into fitting and finger tighten.
e. Install test gage in power pack body fitting.
f. Assure that sealant in fitting (45) is dry; screw fitting assembly in console.
g. Pump emergency hand pump just enough for fluid to seep from top of guide (41).
h. Lubricate piston (43) with Dow Corning DC7, and insert piston into hole in guide (41).
i. Lubricate stop (40) with Petrolatum and install over guide (41).
j. Install exact number and thickness of shims (39) as were removed.

NOTE

If same number of shims (39) are installed as were removed, pressure should not require adjustment. If readjustment is necessary, a chart of shim part numbers, thickness and effect in pressure adjustment is illustrated in figure 5-26.

k. Lubricate spring (38) with Petrolatum and install over shims (39).
l. Screw cap and housing assembly (36) on fitting (45).

NOTE

Do not install pin (37) until pressure adjustment has been checked.

5-166. ADJUSTMENT OF PRESSURE SWITCH. (Refer to figure 5-27.)

a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
b. Screw cap and housing assembly (36) on fitting (45) enough to bottom piston (43) out in stop (40).
c. Turn cap and piston assembly back from full thread engagement one turn, plus 0, minus one-fourth turn to locate hole in fitting (45) in slot in skirt of cap and piston assembly.
d. Attach electrical connections to pressure switch and attach external power source.
e. Turn on master switch.
f. Pump hand pump to obtain 1500 psi on test gage.
g. The switch should open the electrical circuit to the pump solenoid when pressure in the system increases to approximately 1500 psi.
h. If switch opens electrical circuit to solenoid prematurely, disassemble pressure switch down to shims (39) and add shims as necessary to obtain desired pressure; repeat steps "b" and "c".

NOTE

The chart in figure 5-27 lists shims by part number, thickness and the effect in psi each shim will have on switch operation.

i. If switch opens electrical circuit to solenoid later than 1500 ±50 psi, disassemble pressure switch down to shims (39) and remove shims as necessary to obtain desired pressure; repeat steps "b" and "c".
j. Turn off master switch.
k. Drive new pin (37) through slot in housing skirt and hole in fitting (45).
l. Remove aircraft from jacks.

5-167. RELIEF VALVE ASSEMBLY. (Refer to figure 5-27.)

5-168. DISASSEMBLY.

NOTE

The relief valve assembly is preset by the factory and normally will not require disassembly. Refer to steps " h " and " i " of paragraph 5-170 , to determine if disassembly or adjustment is necessary.

a. Remove jam nut (21) and adjustment screw (35) from housing (20).
b. Remove spring (12), guide (19), balls (18) and pistion (13) from housing (20).
c. Loosen jam nut (21) and remove adapter (15) from housing (20).
d. Remove poppet (17) and orifice (16) from adapter (15).

5-169. INSPECTION.

a. Wash all parts in cleaning solvent (Federal Specification P-S-661 or equivalent) and dry with filtered air.
b. Inspect all threaded surfaces for servicable condition and cleanliness.
c. Inspect all parts for scratches, scores, chips, cracks and indications of excessive wear.

5-170. ASSEMBLY AND ADJUSTMENT. (Refer to figure 5-27.)

NOTE

Install new packings and existing threaded parts, except as noted, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

a. Install orifice (16) and poppet (17) into adapter (15). (New packing must be installed on poppet.)
b. Install jam nut (21) and housing (20) on adapter (15).
c. Tighten adapter (15) into housing (20) and torque to 100-150 lbs-in (jam nut must not contact housing during torqueing.)
d. Tighten jam nut (21) against housing (20) and torque to 100-150 lb-in.
e. Install one ball (18) into housing (20) so that it rests on poppet (17). Install piston (13) into housing (20) then install remaining ball (18) into end of piston (13).

f. Insert guide (19) and spring (12) into housing (20) making sure that balls (18) and piston (13) remain in correct position.

g. Turn adjustment screw (35) into housing (20) until it just contacts spring (12) then turn in one additional turn. Start jam nut (21) onto adjustment screw (35) and snug against housing (20).

h. Connect a hydraulic pump with a flow rate of 5 to 7 gal-per-min, and a pressure gage with 2500 psi capacity to relief valve. Apply pressure slowly to insure that relief valve assembly opens and resets at the following pressure readings.

OPEN . . . . 1800 + 00 - 50 PSI
RESET . . . . 1300 PSI
(Leakage not to exceed 10 drops per min.)

i. If adjustment of relief valve is necessary, turn adjustment screw (35) in to increase pressure; back adjustment screw out to decrease pressure. Tighten jam nut (21) against housing (20) and torque to 100-150 lb-in. Recheck pressure adjustment.

5-171. DOOR SYSTEM THERMAL RELIEF VALVE. (Refer to figure 5-27.) The relief valve is located in the power pack assembly. The valve is preset at the factory to open at 2050 ± 100 psi. No further adjustment should be necessary.

5-172. LANDING GEAR AND DOOR MANIFOLD ASSEMBLIES. (Refer to figures 5-28 and 5-29.)

5-173. DESCRIPTION. The manifolds are mounted on the pressure pack in the console. Refer to the schematic diagrams at the end of this Section for system operation.

5-174. LANDING GEAR MANIFOLD.

5-175. DISASSEMBLY. (Refer to figure 5-28.)

NOTE

As gear manifold assembly is removed from body of power pack, transfer tube (18) will fall free.

a. Remove packing from bottom of manifold.
b. Remove packings from transfer tube.
c. Remove retainer (10) from gear manifold assembly.

NOTE

Retainer (10) is sealed in manifold assembly with Loctite Hydraulic Sealant or STA-LOK No. 550, or equivalent sealant.

d. Remove AN316-4R nut (2) and remove screw (1).
e. Using a blunt tool or welding rod, push flow valve assembly (4 and 11), spring (13) and spring guide (16) through bottom of manifold assembly.

NOTE

Use care to prevent damage to spring guide (16), flow valve spool (11) or flow valve sleeve (4).

f. Remove flow valve spool (11) from sleeve (4).
g. Remove packings and back-up rings from sleeve (4).
h. Remove packing from spool (11).
i. Remove packing and back-up ring from spring guide (16).

5-176. INSPECTION AND REPAIR.

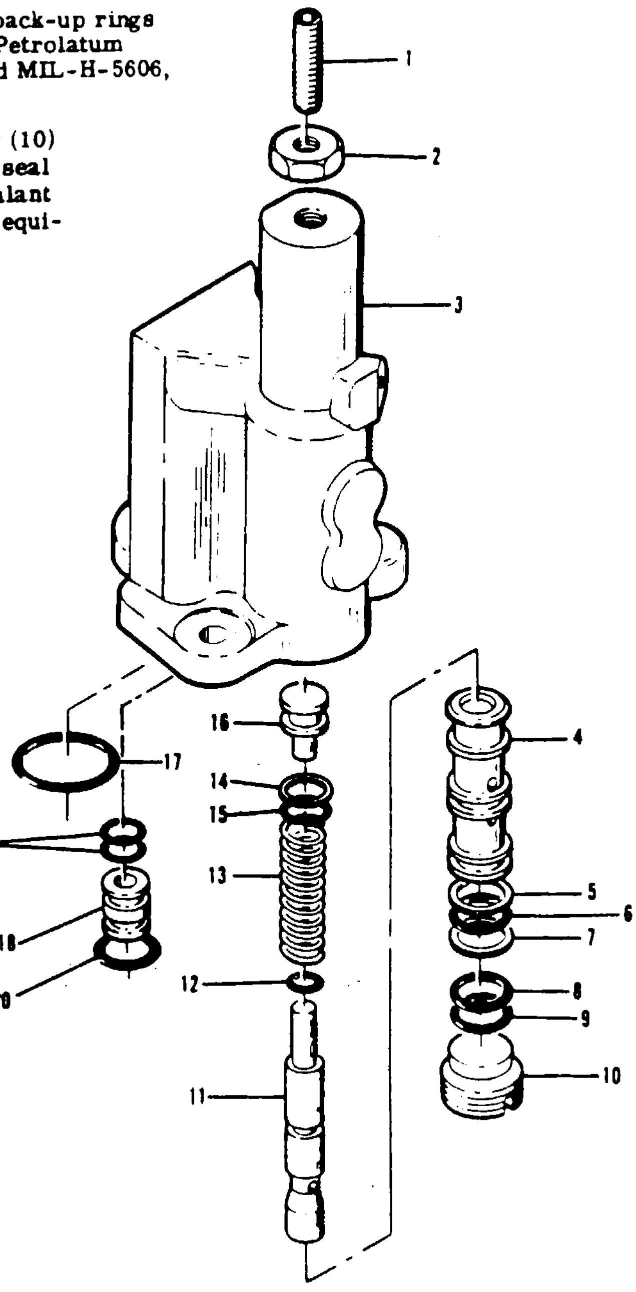
a. Wash all parts in cleaning solvent (Federal Specification P-S-661, or equivalent) and dry with filtered air.
b. Inspect seating surfaces. They should have very sharp edges. Seats may be lapped, if necessary, with No. 1200 lapping compound.
c. Inspect all threaded surfaces for serviceable condition and cleanliness. Clean sealant from retainer threads.
d. Inspect all parts for scratches, scores, chips, cracks and indications of excessive wear.

5-177. REASSEMBLY.

a. Install screw (1) and AN316-4R nut (2) in top of manifold.
b. Install packing (15) and back-up ring (14) on spring guide (16).
c. Install spring guide (16).
d. Install spring (13).
e. Install packings (6 and 8) and back-up rings (5 and 7) on flow valve sleeve (4).
f. Install packing (12) on spool (11).
g. Install spool (11) in sleeve (4): install assembly in bottom of manifold.
h. Install packing (9) on retainer (10).
i. Prime threads of retainer (10) with Grade T Primer and seal with Loctite Hydraulic Sealant or STA-LOK No. 550, or equivalent sealer.
j. Install retainer (10).
k. Install packings (19) on transfer tube (18).
l. Prior to installing manifold on body of power pack, install transfer tube (18) in body of pack.

Install new packings and back-up rings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

Prime threads of retainer (10) with Grade T Primer and seal with Loctite Hydraulic Sealant or STA-LOK No. 550, or equivalent sealant

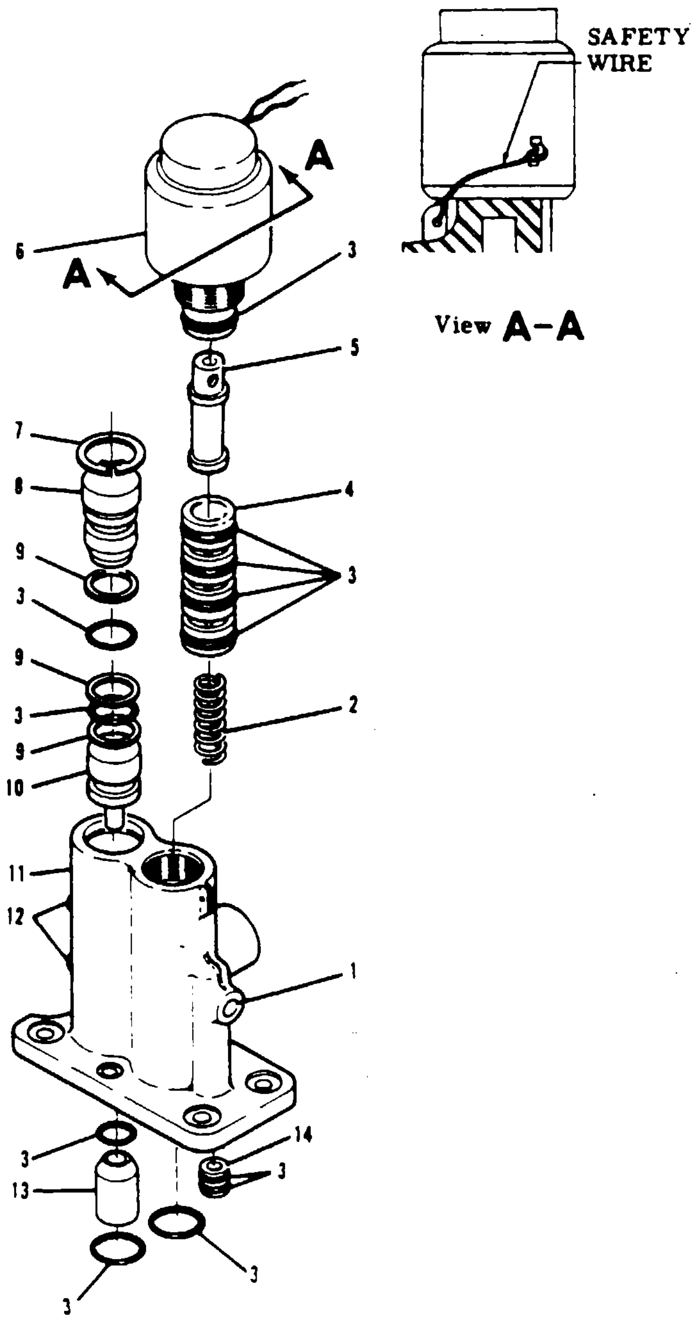


GEAR MANIFOLD ASSEMBLY

1. Adjustment Screw
2. Jam Nut
3. Body
4. Sleeve
5. Back-Up Ring
6. Packing
7. Back-Up Ring
8. Packing
9. Packing
10. Retainer
11. Spool
12. Packing
13. Spring
14. Back-Up Ring
15. Packing
16. Spring Guide
17. Packing
18. Transfer Tube
19. Packing
20. Packing

Figure 5-28. Gear Manifold Assembly

Install new packings and back-up rings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.



1. Plug
2. Spring
3. Packing
4. Selector Valve
5. Spool
6. Door Open - Close Solenoid
7. Retainer Ring
8. End Gland
9. Back-Up Ring
10. Piston
11. Door Manifold Assembly
12. Plug
13. Door Lock Valve

Figure 5-29. Door Manifold Assembly

5-178. ADJUSTMENT OF GEAR MANIFOLD ASSEMBLY (Refer to figure 5-28.)

NOTE

With manifolds installed on power pack and power pack installed on aircraft, if main landing gear moves into the up or down locks with sufficient force to jar the aircraft, the flow control valve in the landing gear manifold should be adjusted in accordance with the following procedures.

a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual, and attach external power source.
b. Loosen AN 316-4R nut (2).
c. Back off screw (1) counterclockwise to maximum snub position.
d. Rotate screw (1) clockwise to increase speed of gear rotation and counterclockwise to slow speed of gear rotation. Make necessary adjustments to obtain desired cycling time.

NOTE

Desired cycling time is specified in inspection charts in Section 2 of this manual under LANDING GEAR RETRACTION SYSTEM.

e. When desired setting has been achieved, tighten AN 316-4R nut (2).

5-179. DOOR MANIFOLD ASSEMBLY. (Refer to figure 5-29.)

5-180. DISASSEMBLY OF DOOR MANIFOLD. (Refer to figure 5-29.)

NOTE

As door manifold assembly is removed from body of power pack, transfer tube (14) will fall free.

a. Remove packings (3) from transfer tube (14).
b. Remove packings from bottom of manifold, and remove door lock valve (13).
c. Remove spring (2).
d. Cut safety wire and remove solenoid (6); remove packing (3) from solenoid.
e. Using a hook, formed from brass welding rod, and inserted into oil hole in selector valve (4), withdraw selector valve from manifold.

CAUTION

Be sure that end of hook is not over 1/16-inch long. Use with care to prevent scratching bore in manifold. Removal of selector valve will be difficult due to friction caused by packings.

f. Remove packings (3) from selector valve (4).
g. Remove spool (5) from selector valve.
h. Remove retainer ring (7).
i. Remove end gland (8).
j. Remove piston (10).
k. Remove packings and back-up rings from end gland and piston.

5-181. CLEANING AND INSPECTION OF DOOR MANIFOLD COMPONENTS.
a. Wash all parts in cleaning solvent (Federal Specification P-S-661, or equivalent) and dry with filtered air.
b. Inspect seating surfaces. They should have very sharp edges. Seats may be lapped, if necessary, to obtain sharp edges.
c. Inspect all threaded surfaces for serviceable condition and cleanliness.
d. Inspect all parts for scratches, scores, chips, cracks and indication of excessive wear.

5-182. REASSEMBLY OF DOOR MANIFOLD. (Refer to figure 5-29.)

NOTE

Install new packings, back-up rings and existing threaded parts, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

a. Install new packings on end gland (8), piston (10), selector valve (4) and transfer tube (14).
b. Install packings and door lock valve in bottom of manifold.
c. Install spring (2) and selector valve (4) in manifold.

NOTE

Be sure spool (5) is installed in selector valve (4) in position shown in figure 5-28.)

d. Install packing (3) on solenoid (6).
e. Install solenoid on manifold and safety wire
f. Install piston (10) and end gland (8) in manifold.
g. Install retainer ring (7).
h. Prior to installing manifold on body of power pack, install transfer tube (14) in body of power pack.

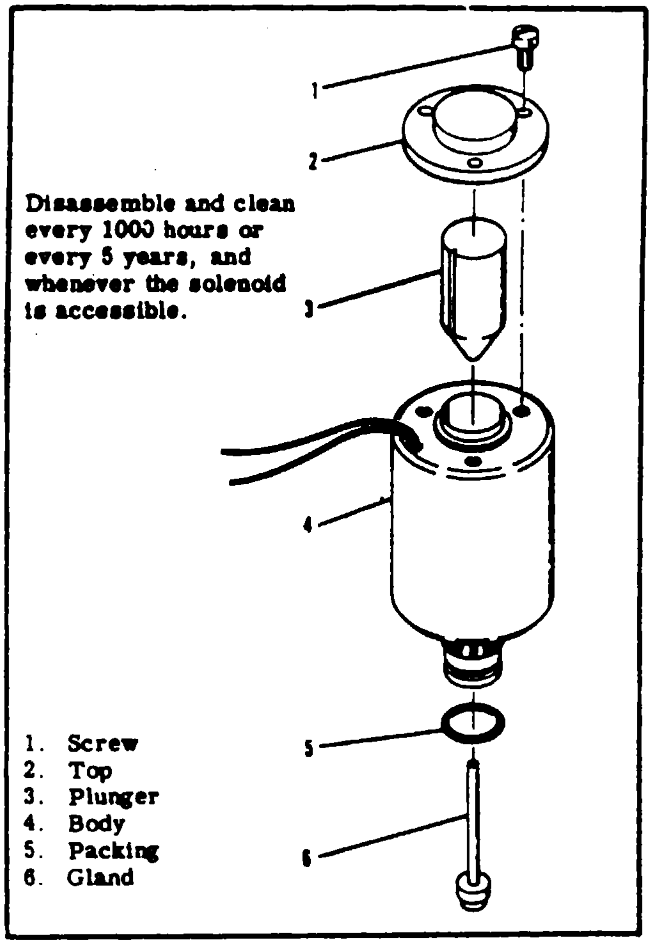


Figure 5-30. Door Solenoid

5-183. DOOR SOLENOID. The solenoid is mounted on top of the door manifold, and should be disassembled, cleaned and reassembled every 1000 hours or 5 years, and whenever the solenoid is accessible.

5-184. DISASSEMBLY OF SOLENOID. (Refer to figure 5-30.)

a. Cut safety wire and remove solenoid from manifold.
b. Remove screws (1).
c. Remove top (2).
d. Remove plunger (3).
e. Remove gland (6).
f. Remove and discard packing (5).
g. Reverse this procedure to reassemble solenoid.

5-185. INSPECTION AND CLEANING OF SOLENOID COMPONENTS. Wash all parts in solvent (Federal Specification P-S-661, or equivalent) and dry with filtered air. If any parts are found defective or worn, replace the entire solenoid assembly. (Replace packing (5).

5-186. LANDING GEAR HAND PUMP. (Refer to figure 5-31.)

5-187. DESCRIPTION. The hand pump is located in the cabin floor area between the pilot and copilot seats. The pump supplies a flow of pressurized hydraulic fluid to open the doors and extend the landing gear if hydraulic pressure should fail.

5-188. REMOVAL OF LANDING GEAR HAND PUMP. (Refer to figure 5-31.)

a. Remove seats as required for access.
b. Remove screws attaching cover over hand pump and remove cover.
c. Pull back carpet as required for access to pump mounting bolts.
d. Wedge cloth under hydraulic fittings to absorb fluid, then disconnect the two hydraulic lines and plug or cap open fittings to prevent entry of foreign material.
e. Remove two bolts, washers and nuts securing pump to mounting bracket.
f. Work pump from aircraft.
g. Install hand pump by reversing the preceding steps, bleeding lines and pump as lines are connected.
h. Fill reservoir as required.

5-189. DISASSEMBLY OF HAND PUMP.

NOTE

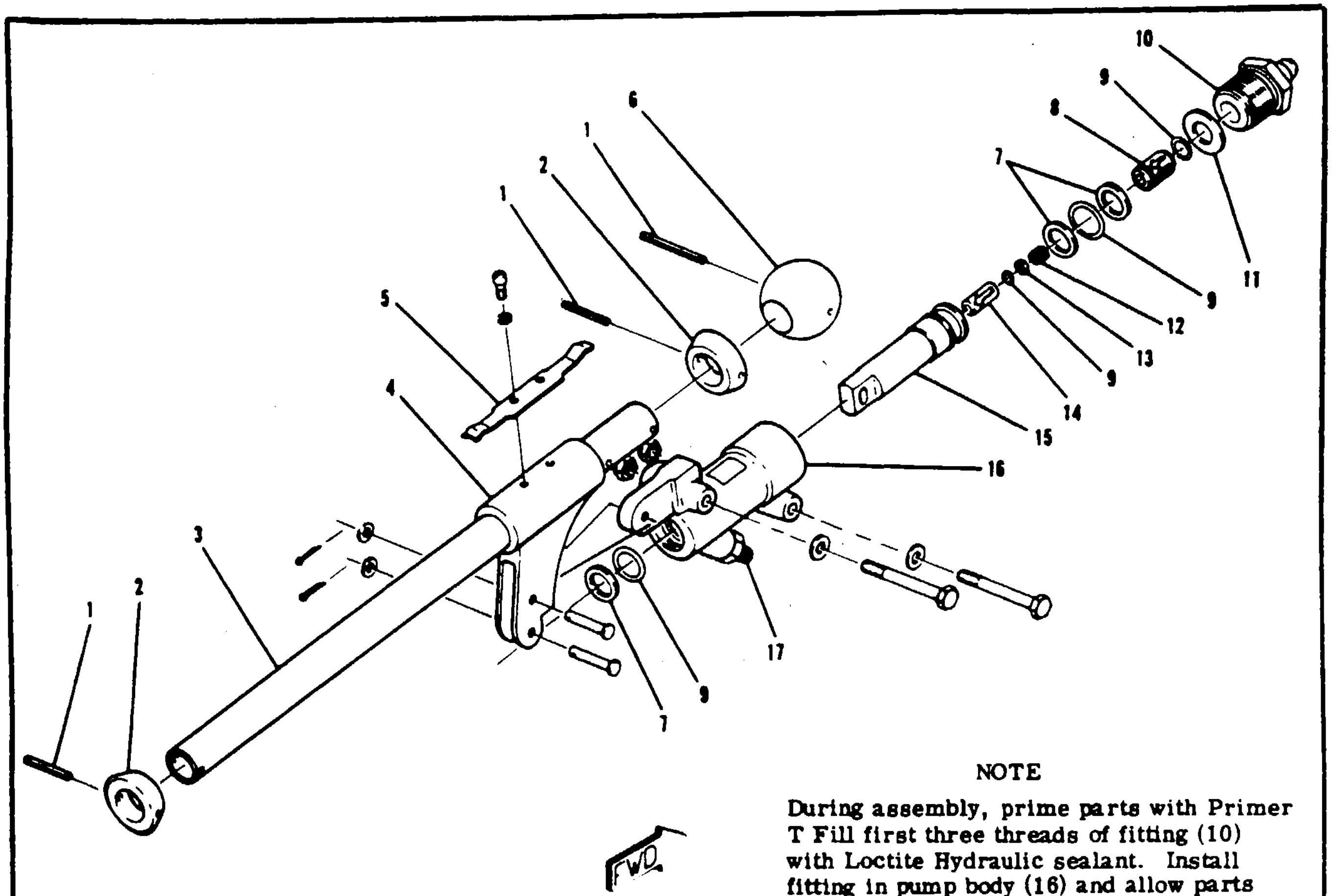
After emergency hand pump has been removed from aircraft and ports are capped or plugged, spray with cleaning solvent (Federal Specification P-S-661, or equivalent) to remove all accumulated dust or dirt. Dry with filtered compressed air.

a. Remove hand pump handle by removing pivot and linkage pins after removing cotter pins.
b. Remove end fitting from body assembly.
c. Push piston from body assembly.
d. Remove retaining ring from end fitting to remove valve assemblies.
e. Remove and discard all O-rings and back-up rings.

5-190. INSPECTION OF PARTS.

a. Inspect seating surfaces of valves.
b. Inspect piston for scores, burrs or scratches which could cut O-rings. This is a major cause of external and internal leakage. The piston may be polished with extremely fine emery paper. Never use paper coarser than No. 600 to remove scratches or burrs. If defects do not polish out, replace piston.

5-191. REASSEMBLY. (Refer to figure 5-31.) Assemble the emergency hand pump, using the figure as a guide. Also, for detailed instructions, reverse the procedures outlined in paragraph 5-189. Lubricate all parts with hydraulic fluid during reassembly.



NOTE

During assembly, prime parts with Primer T Fill first three threads of fitting (10) with Loctite Hydraulic sealant. Install fitting in pump body (16) and allow parts to set up for one hour at 72°F. Pump should be held vertically, with fitting (10) at top during setting up of sealant.

1. Roll Pin
2. Stop
3. Handle
4. Fork
5. Spring
6. Knob
7. Back-Up Ring
8. Check Valve
9. Packing
10. Fitting
11. Washer
12. Setscrew
13. Spacer
14. KEP-O-SEAL Valve
15. Piston
16. Pump Body
17. Union and Gasket

Figure 5-31. Landing Gear Hand Pump

SHOP NOTES:

5-192. LANDING GEAR POSITION SELECTOR VALVE. (Refer to figure 5-32.) A mechanical gear position selector valve is located in the switch panel. The pilot shuttles the valve mechanically when he changes gear handle position. The handle must be pulled out prior to selecting gear position. Moving the selector handle opens and closes ports in the valve, enabling fluid under pressure to flow to the various system components to retract or extend the landing gear. A microswitch, mounted on the selector valve, is also actuated by movement of the selector handle and directs electrical current to the door close solenoid and pump motor. Refer to the hydraulic system schematics at the end of this section for switch circuitry.

5-193. REMOVAL AND INSTALLATION. (Refer to figure 5-32.)

a. Loosen nut (18) and remove knob (19).

As hydraulic lines are disconnected, fluid will leak. Precautions must be taken to prevent excessive leakage, such as spreading drip cloths under fittings and capping lines and fittings. Tag all electrical leads to insure correct re-installation.

b. Disconnect four hydraulic lines routed to valve and all electrical leads to micro-switch.

c. Remove screws attaching valve to instrument panel.

d. Remove selector valve.

e. Reverse preceding steps to install gear selector valve.

5-194. DISASSEMBLY AND REASSEMBLY. (Refer to figure 5-32.)

a. Remove cover (1), retaining ring (3), cap (4), race (5) and bearing (6).

b. Remove cotter pin (7), washer (8) and spring (9).

c. Pull handle (17) from disc (15); remove disc.

d. Remove pucks (11) and springs (12).

e. Reverse preceding steps for reassembly.

5-195. INSPECTION OF PARTS. Replace packings (10), (13) and (16). Check valve for wear, foreign or abrasive materials. Disc (15) may be refaced (lapped) if worn or abraded. Check bearing rollers (6).

5-196. INSTALLATION OF LANDING GEAR STRUT STEP. (Refer to figure 5-33.)

NOTE

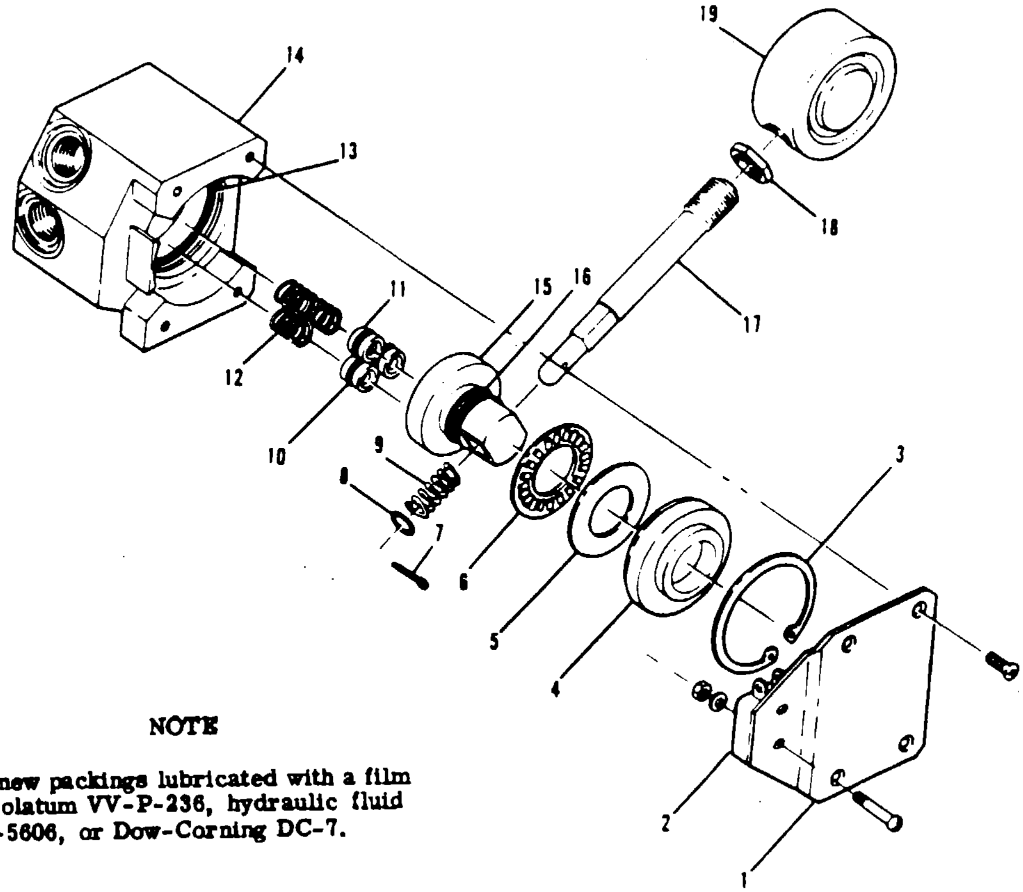
The step assembly is bonded to the landing gear spring strut with EC-2216, or equivalent.

a. Remove wheel, axle and fitting in accordance with applicable paragraphs of this section.

b. Mark position on inboard side of step that was removed so that new step assembly will be installed in as nearly the same position on the strut.

c. Remove all traces of the original bracket and adhesive as well as any rust, paint or scale, with a

SHOP NOTES:



NOTE

Install new packings lubricated with a film or Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

1. Cover
2. Motor/Door Solenoid Switch
3. Lock Ring
4. Cap
5. Race
6. Bearing
7. Cotter Pin
8. Washer
9. Spring
10. Packing
11. Puck
12. Spring
13. Packing
14. Body
15. Disc
16. Packing
17. Handle
18. Jam Nut
19. Knob

Figure 5-32. Gear Selector Valve

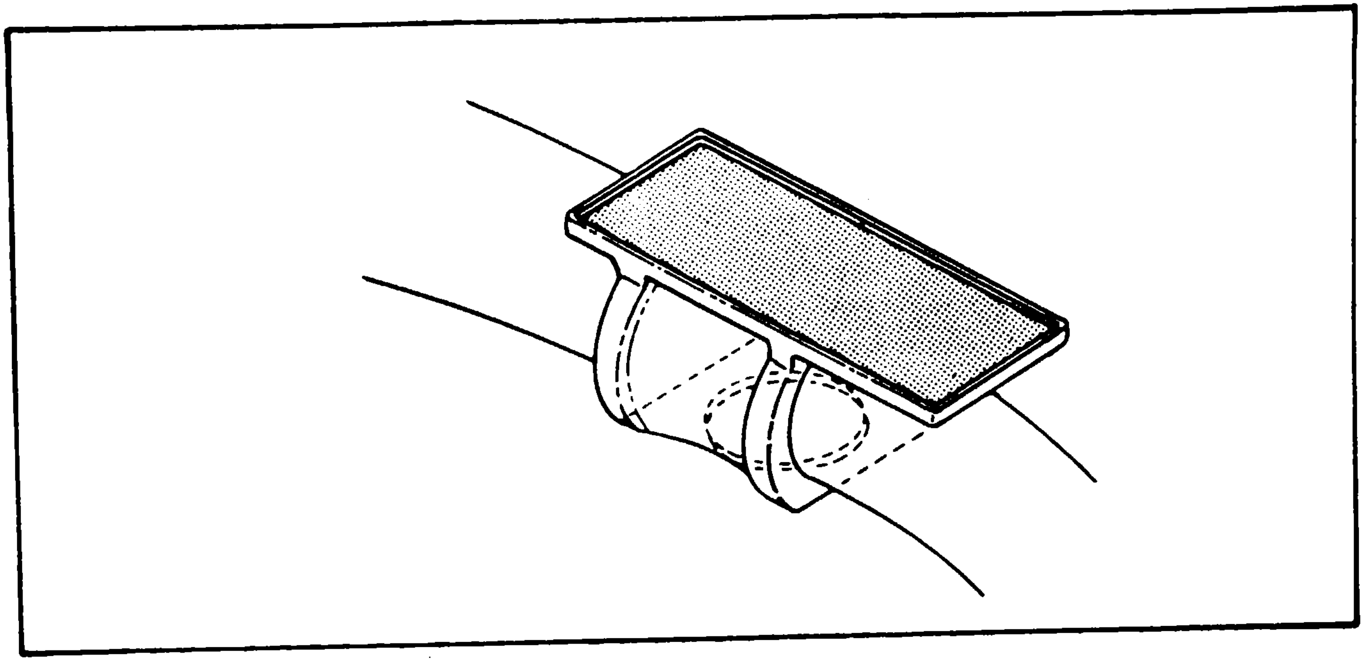


Figure 5-33. Landing Gear Strut Step Installation

wire brush and coarse sandpaper.

d. Leave surfaces of strut slightly roughened or abraded, but deep scratches or nicks should be avoided. Also, roughen bonding surface of the new step.

e. Clean surfaces to be bonded together thoroughly. If a solvent is used, remove all traces of the solvent with a clean, dry cloth. It is important that the bonding surfaces be clean and thoroughly dry.

f. Apply zinc chromate primer - green or yellow to cleaned area on strut. Dry film thickness to be .0003 to .0005 inch.

g. Mix adhesive (Uralite 3121 or 3M EC-2216 per manufacturer's instructions. Note pot life.

h. Spread a coat of mixed adhesive on bonding surfaces of strut and step assembly.

i. Slide new step up strut as far as it will go, then use soft mallet to drive step to mark on strut. Be sure step is level.

CAUTION

It is important to install step in as nearly the same location as old step. If step is not installed high enough on strut, during landing gear retraction, step will contact top of strut well wall.

j. Remove excess adhesive with lacquer thinner.

k. Allow adhesive to thoroughly cure according to the manufacturer's recommendations before flexing gear spring strut or apply loads to the step.

l. Paint gear spring and step after curing is completed.

m. Install wheel, axle and fitting.

5-197 RIGGING THROTTLE-OPERATED MICROSWITCHES. (Refer to figure 5-34.) Rigging procedures for sea level or turbocharged aircraft are outlined in the figure.

5-198. RIGGING OF MAIN LANDING GEAR. (Refer to figure 5-36.)

NOTE

All of the following rigging adjustments shall be accomplished with the aircraft on jacks and in a level condition, using the ship's power-pack to supply pressure. A ground power source should augment the ship's battery.

a. With main gear unlocked and main landing gear support forging assembled loose to the outboard support assembly, bring main landing gear strut into "DOWN" position and adjust as follows:

1. Center and shim simultaneously main landing gear support, using shims (P/N 1241629) between outboard forging and landing gear support assembly. The following shims are available from the Cessna Supply Division:

1241629-1	0.016 inch
1241629-2	0.025 inch
1241629-3	0.050 inch
1241629-4	0.071 inch

2. Use shims between downlock support assembly and outboard support assembly, to level wings and assure that end points of main landing gear wheel axle points are within ±0.25 inch.

NOTE

This measurement may be made from a point beneath the wing main spar on the upper door sill to the top bolt attaching ankle bone to the spring strut. Make measurements from corresponding points on the upper door sills. Shim thickness between downlock support and outboard support assembly shall not exceed 0.075 inch with a minimum thickness of 0.025 inch for either main gear.

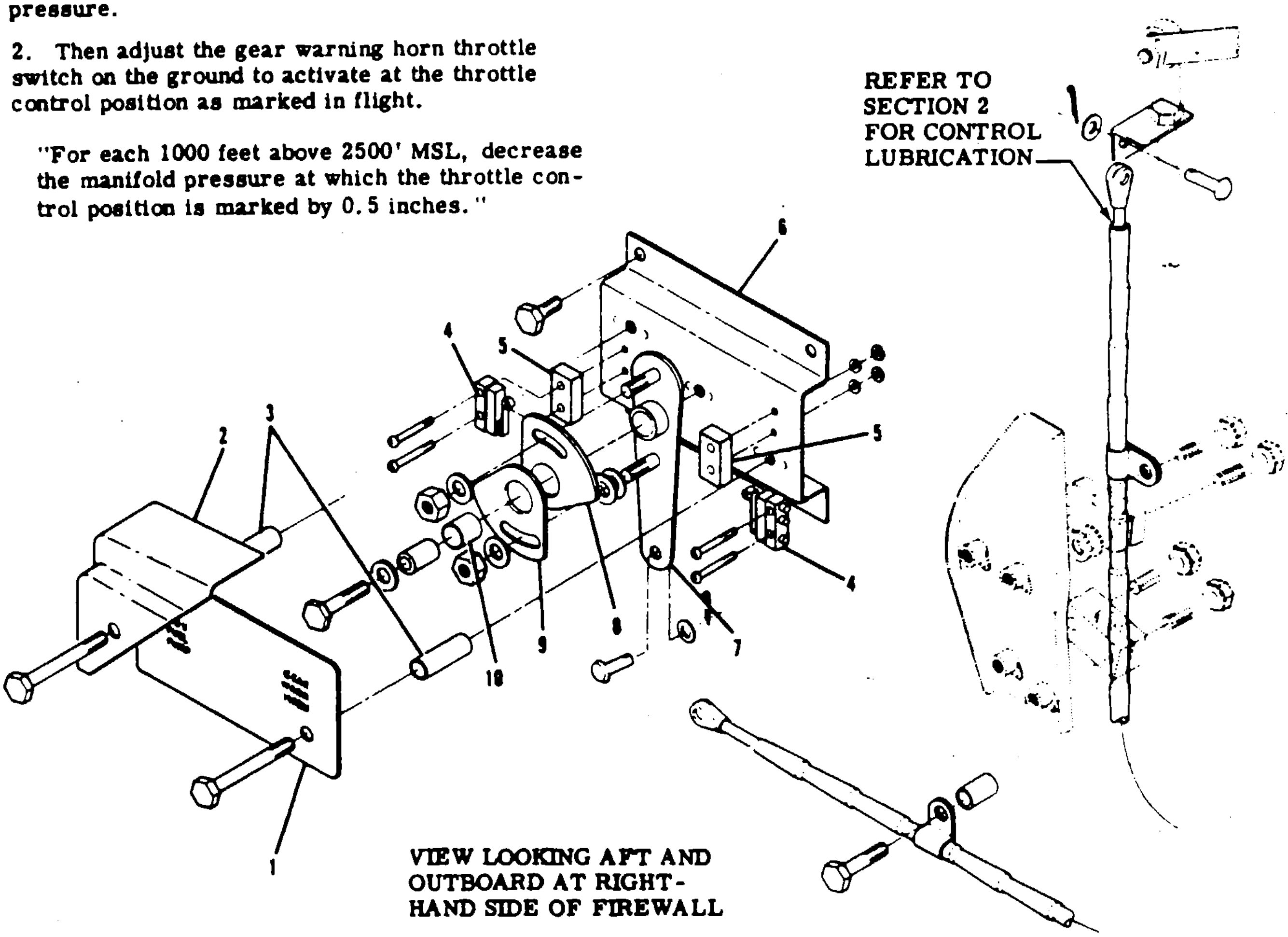
3. Before installing downlock hook assembly, adjusting screw and arm assembly, adjust downlock

SETTING THROTTLE SWITCHES

1. During flight at 120 MPH (IAS), 2500', prop control full forward for maximum RPM, and with the gear and flaps up, mark the throttle control position corresponding to 15.0" ± 1.0" manifold pressure.

2. Then adjust the gear warning horn throttle switch on the ground to activate at the throttle control position as marked in flight.

"For each 1000 feet above 2500' MSL, decrease the manifold pressure at which the throttle control position is marked by 0.5 inches."



1. Switch Cover
2. Switch Cover
3. Spacer
4. Switch
5. Switch Spacer
6. Switch Mounting Bracket
7. Arm Assembly
8. Gear Warning Cam
9. Fuel Pump Cam
10. Bushing

Figure 5-34. Rigging Throttle-Operated Microswitch

NOTE

If it is planned to use the aircraft power system during rigging procedures, outlined in the following paragraphs, the following steps should be considered.

IMPORTANT POINTS CONCERNING ELECTRO-HYDRAULIC SYSTEM INTERRELATIONSHIP

1. The electrical system is a 24-28 volt system (24 volt battery and 28 volt alternator). The alternator is regulated to 27.7 volts, so bus voltage during engine operation will be 27.5 ± 0.5 volts.

2. The electro-hydraulic power pack motor requires a nominal 20 amps at 27.5 volts during gear operation with starting current peaking out at 30 amps.

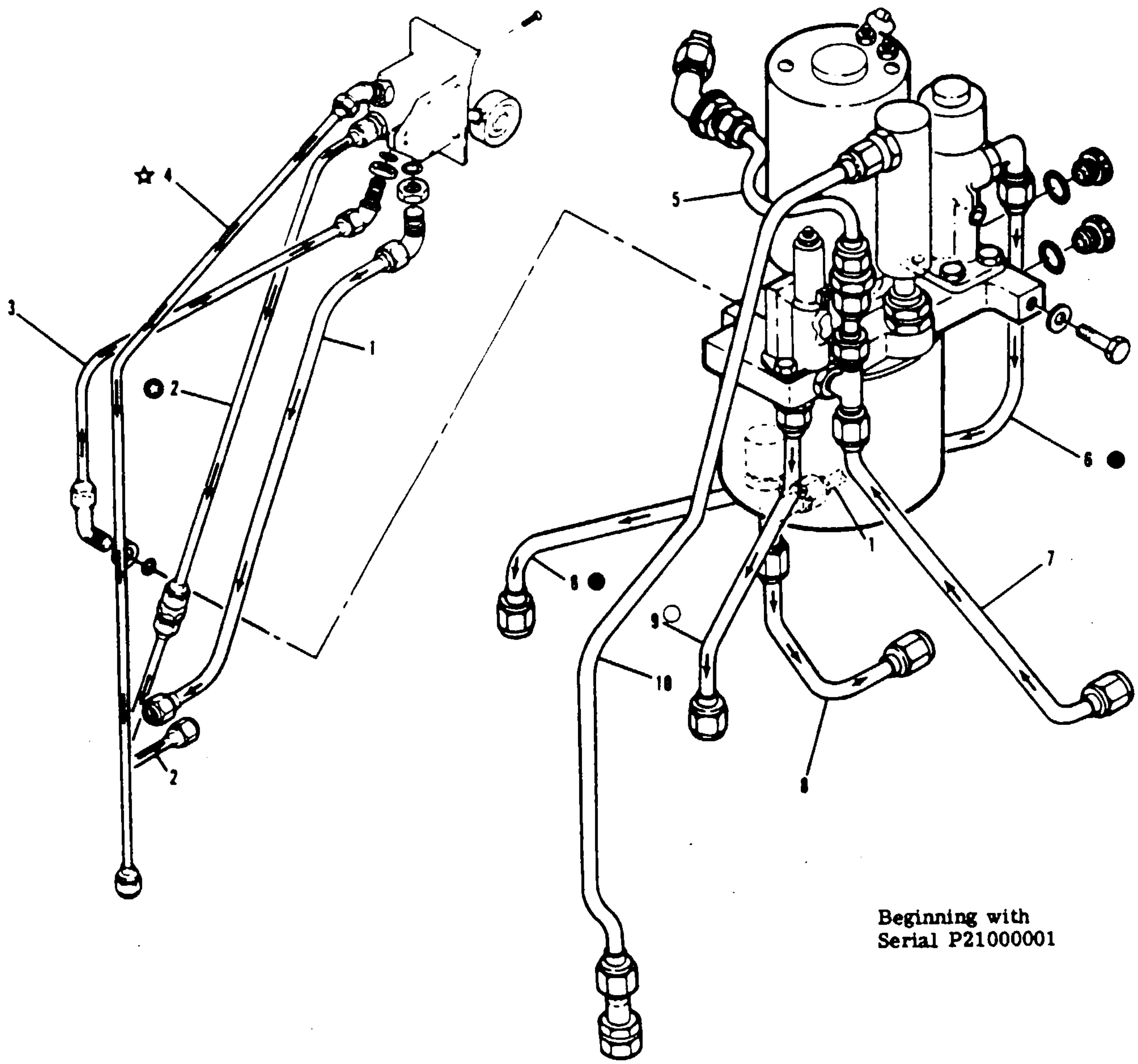
   If the motor is operated in the shop on the ship's battery (engine not running), then system voltage is only 22 to 24 volts during first and second gear cycles. It may be even less if the ship's battery is old or partially discharged.

   During landing gear system servicing, a power supply capable of maintaining 27.5 volts throughout the gear cycle must be used to augment the ship's battery.

3. The power pack includes an electrically-driven pump and two electric solenoid shuttle valves. These valves are normally energized during flight (gear retracted, doors closed). The door valve is de-energized during the doors open and gear cycling action. The door valve is re-energized at the end of the gear extension or retraction cycle, causing the doors to close.

   The pump motor is putting forth its maximum effort at about the same time the door valve is energized. If the battery-alternator combination is not maintaining 27.5 volts, the gear valve may not shuttle. The doors remain open and the pump continues to run.

   The typical door solenoid will operate at 21.0 to 21.5 volts when hot. In a service shop, when cycling the gear using a limited capability power source, the voltage required to energize the door solenoid may not be developed.



Beginning with
Serial P21000001

1. Return
2. Gear Up
3. Pressure
4. Gear Down
5. Test Fitting & Line
6. Door Open
7. Hand Pump Pressure
8. Hand Pump Suction
9. Door Close
10. Vent

☆ Flow reverses during gear up cycle.
● Flow reverses during gear down cycle.
○ Flow reverses during door open cycle.
● Flow reverses during door close cycle.

Figure 5-35. Hydraulic Power Pack Line Routing setscrew to stop hook assembly .06+.03, -.02 inch overcenter, as shown in figure 5-36.

4. Adjust downlock hook to clear inboard side of gear pivot ear to a minimum of 0.06 inch.

NOTE

A spacer (P/N 1241614-1) is installed on each side of the downlock arm assembly. Spacer may be relocated to the inboard or outboard side of the downlock arm assembly to obtain the 0.06 inch clearance between hook assembly and the inboard of gear pivot ear. After adjustment, both spacers MIGHT end up on either the inboard or outside of downlock arm assembly.

b. A new downlock actuator assembly is received with a preassembled length of 12.45 inches, and the three hydraulic ports in the same plane. Install actuator assembly, attaching it to fuselage structure and downlock hook arm assembly.

c. With landing gear free, hydraulic pressure off, and downlock system in position shown in figure 5-36, swing gear into "DOWN" position and adjust adjusting screw as follows:

NOTE

To relieve hydraulic pressure, pull hydraulic pump circuit breaker off, and move gear selector switch up and down two or three times.

1. If downlock locks, turn adjusting screw 1/4 turn OUT at a time until lock will not lock; then turn IN 1/4 turn and secure pin.

2. If downlock does not lock, turn adjusting screw 1/4 turn IN at a time until lock will lock, and secure pin.

d. Readjust downlock hook setscrew to stop hook assembly .06+.03, -.02 inch overcenter as shown in figure 5-36.

e. When checking overcenter measurement of downlock arm assembly, landing gear should be as shown in figure 5-36, with nut, washer and spacer removed, which retains downlock arm assembly. Use downlock overcenter gages (P/N SE960) to determine if downlock hook assembly is still within tolerance as shown on sheet 2 of figure 5-36. Use gages as follows:

NOTE

A downlock gage, part *SE960, is available from the Cessna Supply Division.

1. Remove nut, washer and spacer which retain arm assembly to support assembly.

2. Install 0.090 downlock gage (SE960) on inboard side of downlock hook as shown in figure 5-36. Upper portion of gage should rest against head of pin attaching adjusting screw. If downlock hook is under maximum overcenter tolerance, green area of gage will contact spacer on gear pivot, while red area will not make contact with 0.50-inch diameter shoulder, as shown in figure 5-36. When downlock hook is on maximum overcenter tolerance, both green and red areas will make contact. If red area makes contact and green area does not, the downlock hook setscrew should be adjusted INWARD to bring overcenter dimension to within tolerance.

3. Install 0.040 downlock gage (SE960) on inboard side of downlock hook as shown in figure 5-36. If downlock hook is over minimum overcenter tolerance, green area of gage will contact shoulder, while red area will not make contact with spacer.

4. When downlock hook is on minimum overcenter tolerance, both green and red areas will make contact.

5. If overcenter tolerance is less than 0.040 inch, the red area will make contact, while the green area will not. If this condition exists, the next step is to determine if the downlock hook adjusting screw is making contact with the setscrew. This is accomplished by lifting the landing gear spring upward off the hook assembly and checking for possible rotation of the hook assembly, by hand, with hydraulic pressure off.

6. If a slight rotation is possible, setscrew is not contacting adjusting screw. If contact is not being made, downlock actuator will have to be readjusted by backing off actuator's rod end one-half turn at a time (one and one-half turn maximum adjustment) until hook assembly is 0.040 inch or more overcenter and contact is being made between setscrew and adjusting screw. If contact is being made, the setscrew should be adjusted outward to increase overcenterness within tolerance.

NOTE

For correct rigging, downlock hook setscrew must make contact with adjusting screw and green areas of both gages must contact as shown in figure 5-36 for overcenterness to be within tolerance.

f. Now that downlock hook adjusting screw has been adjusted, and downlock hook setscrew has been set to stop hook at .06+.03, -.02 overcenter, check downlock actuator rod end adjustment as follows:

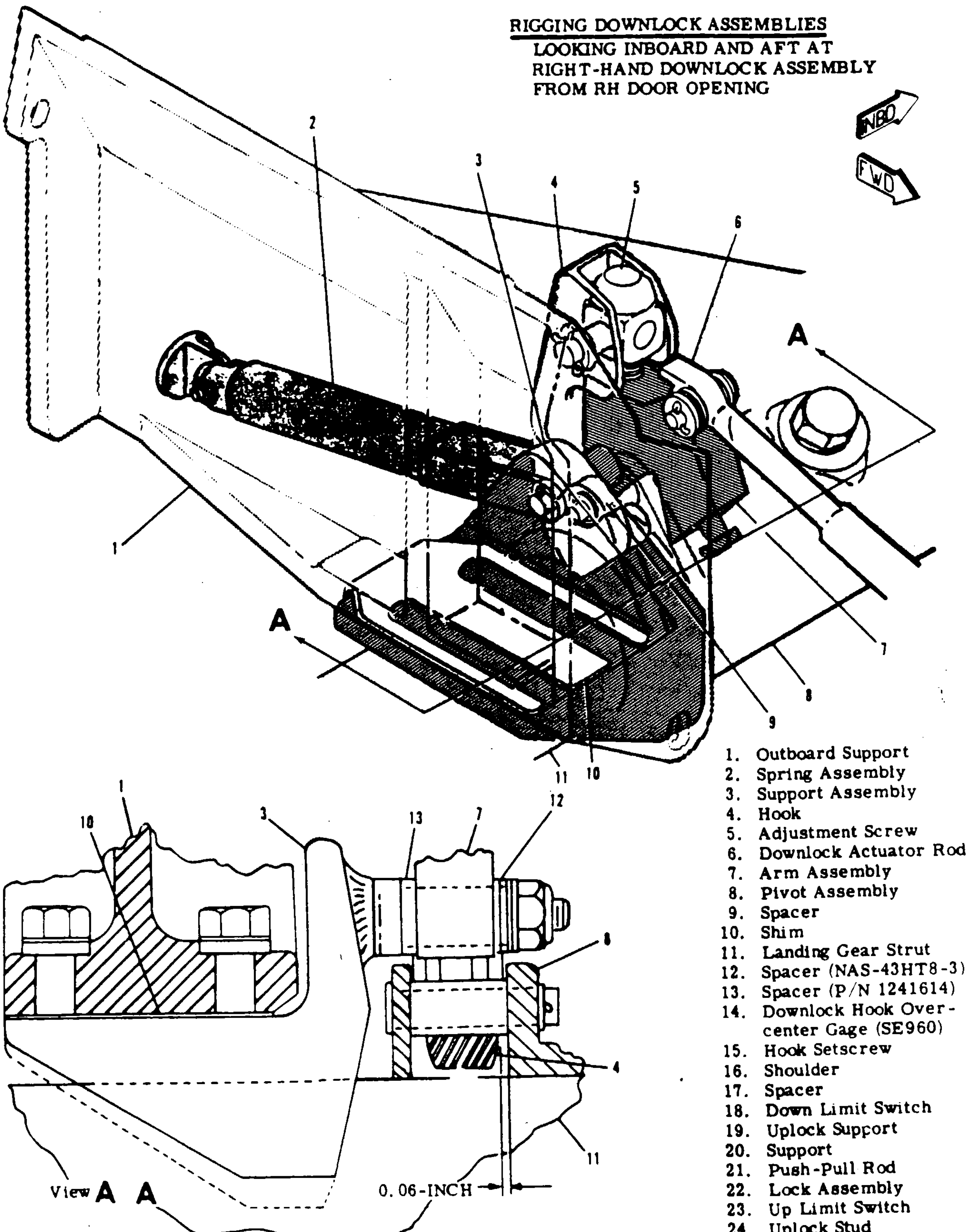
1. Connect all hydraulic lines, fill system with MIL-H-5606 hydraulic fluid and purge system of air by cycling gear through several cycles.

NOTE

Check fluid level in power-pack reservior frequently during purging and rigging procedures.

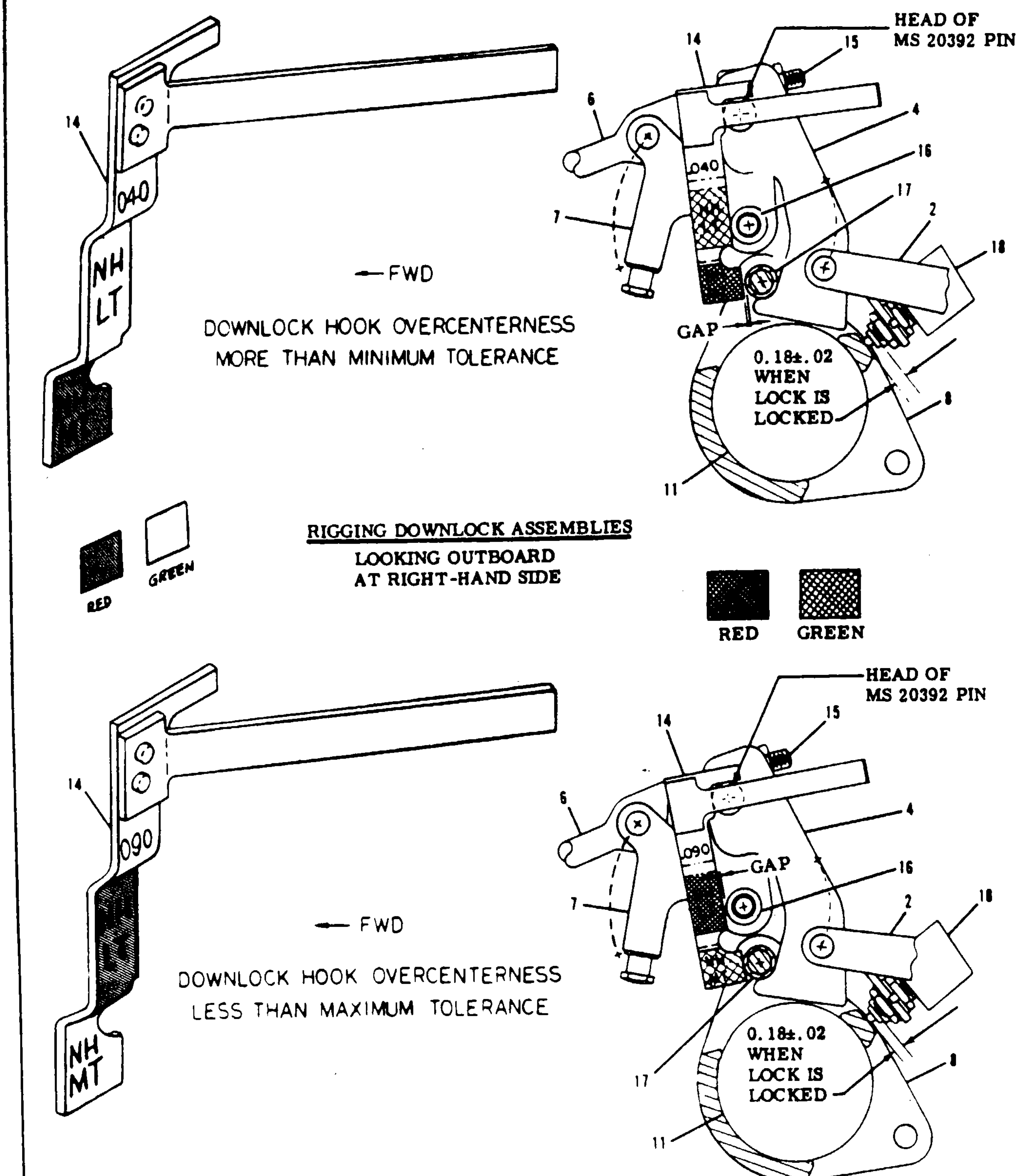
2. Pull hydraulic pump circuit breaker off.

3. With gear in the down and locked position, move the gear selector handle to the "GEAR UP"



1. Outboard Support
2. Spring Assembly
3. Support Assembly
4. Hook
5. Adjustment Screw
6. Downlock Actuator Rod
7. Arm Assembly
8. Pivot Assembly
9. Spacer
10. Shim
11. Landing Gear Strut
12. Spacer (NAS-43HT8-3)
13. Spacer (P/N 1241614)
14. Downlock Hook Over-center Gage (SE960)
15. Hook Setscrew
16. Shoulder
17. Spacer
18. Down Limit Switch
19. Uplock Support
20. Support
21. Push-Pull Rod
22. Lock Assembly
23. Up Limit Switch
24. Uplock Stud
25. Actuator

Figure 5-36. Rigging Main Landing Gear (Sheet 1 of 4)

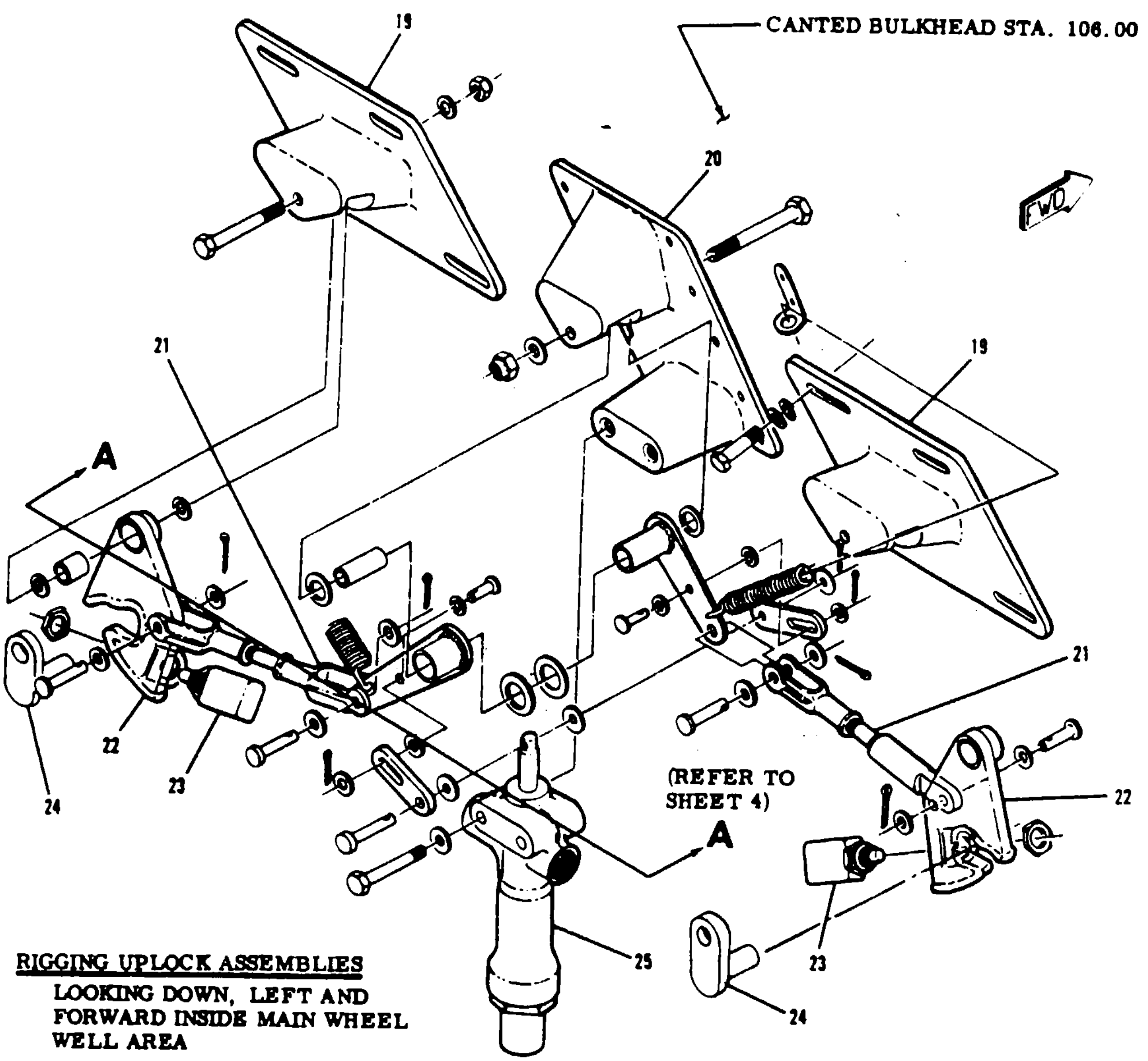


ABBREVIATIONS ON GAGES:

NHLT - NOT HITTING, LESS THAN DIMENSION STAMPED ON GAGE

NHMT - NOT HITTING, MORE THAN DIMENSION STAMPED ON GAGE

Figure 5-36. Rigging Main Landing Gear (Sheet 2 of 4)



RIGGING UPLOCK ASSEMBLIES
LOOKING DOWN, LEFT AND FORWARD INSIDE MAIN WHEEL WELL AREA

WARNING

Before working in landing gear wheel wells, PULL-OFF hydraulic pump circuit breaker. The pump circuit breaker is located in the circuit breaker panel, located immediately forward of the left forward doorpost. The hydro-electric power pack system is designed to pressurize the landing gear DOOR CLOSE SYSTEM (1978 Models) to 1500 psi at any time the master switch is turned on. Injury might occur to someone working in wheel well area if master switch is turned on for any reason.

Figure 5-36. Rigging Main Landing Gear (Sheet 3 of 4)

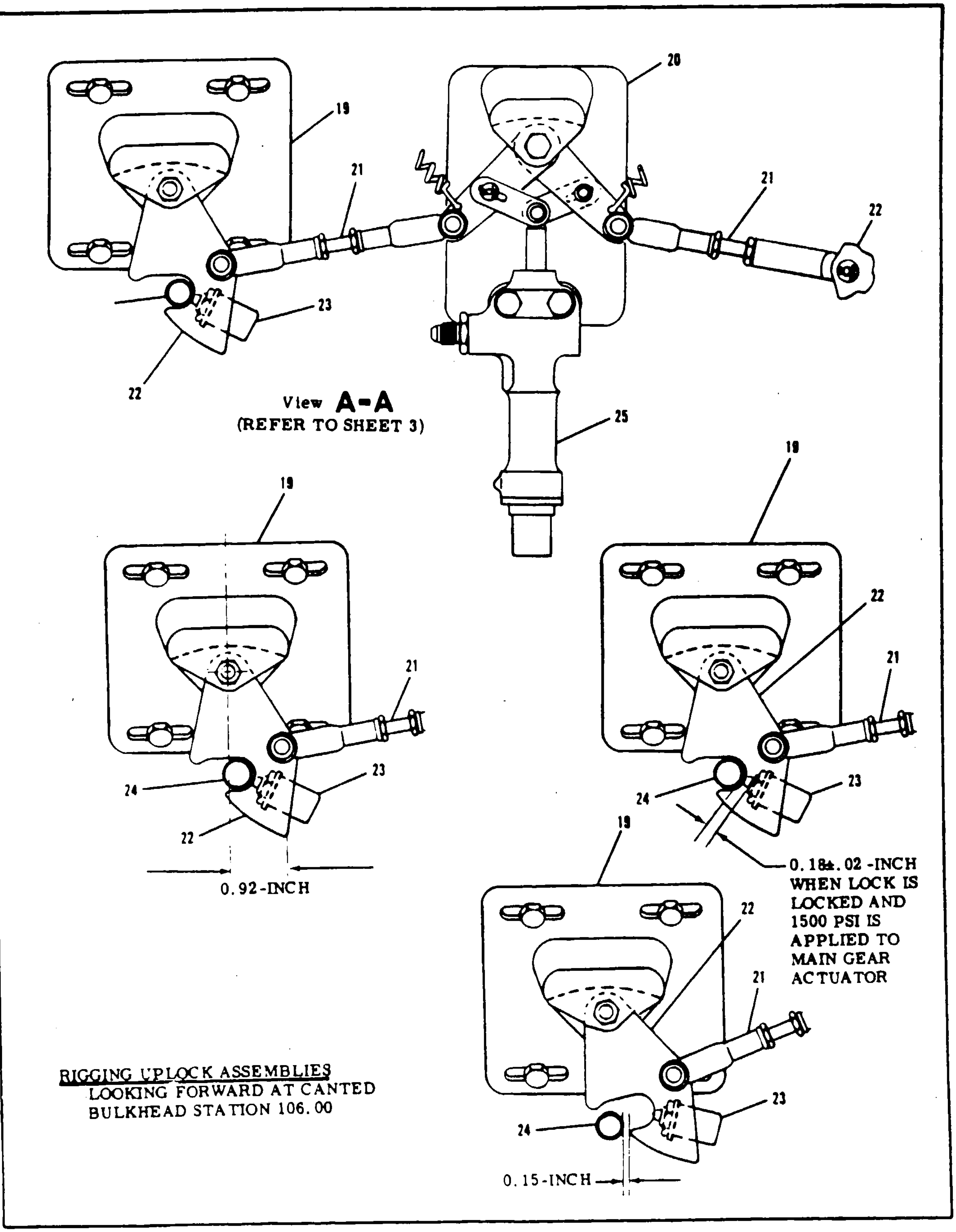


Figure 5-36. Rigging Main Landing Gear (Sheet 4 of 4)

position and note the actuation of main gear downlock hooks.

4. As soon as left downlock hook is actuated to unlock left gear, move gear selector handle back to "GEAR DOWN" position to simulate what would occur if the pilot were to select gear down before the gear was fully retracted.

5. If downlock hooks do not lock the gear in the down position, check downlock system for misalignment.

g. With main gear in up-locked position, and system pressure released, adjust uplock supports such that ends of lock hooks are 0.92 inch inboard of lock hook attach bolt. (Refer to figure 5-36.)

h. Adjust uplock system push-pull rods such that when uplock latches are disengaged, both main gear struts are released simultaneously and uplock studs clear latches 0.15 inch minimum.

5-199. RIGGING OF NOSE LANDING GEAR. (Refer to figure 5-37.)

NOTE

The nose gear downlock mechanism is basically a claw hook at the end of the piston rod end of the nose gear actuator.

a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.

NOTE

The nose gear shock strut must be correctly inflated prior to rigging the nose gear. Refer to Section 1 of this manual for correct nose shock strut inflation.

b. The external claw locks on the nose gear actuator shall completely engage lock pins without drag, and crossbar shall rotate freely to indicate it is not bearing on either side of slot in rod end. Adjust rod end of actuator as required.

CAUTION

The piston rod is flattened near the threads to provide a wrench pad. Do not grip the piston rod with pliers, as tool marks will cut the O-ring seal in the actuator.

5-200. RIGGING OF NOSE GEAR DOORS. Nose gear door adjustments are accomplished by adjusting push-pull rods as required to cause the doors to close snugly. Doors must fair when the nose gear is fully retracted. Link rods are to be adjusted so that the doors, when in the open position, clear any part of the nose gear assembly by a minimum of 0.25-inch during retraction. Trim outboard edge of nose gear doors, so that door-to-skin clearance is 0.18-inch minimum to 0.21-inch maximum. Nose gear strut doors shall fair when nose gear lock bushing is fully engaged with the uplock hook.

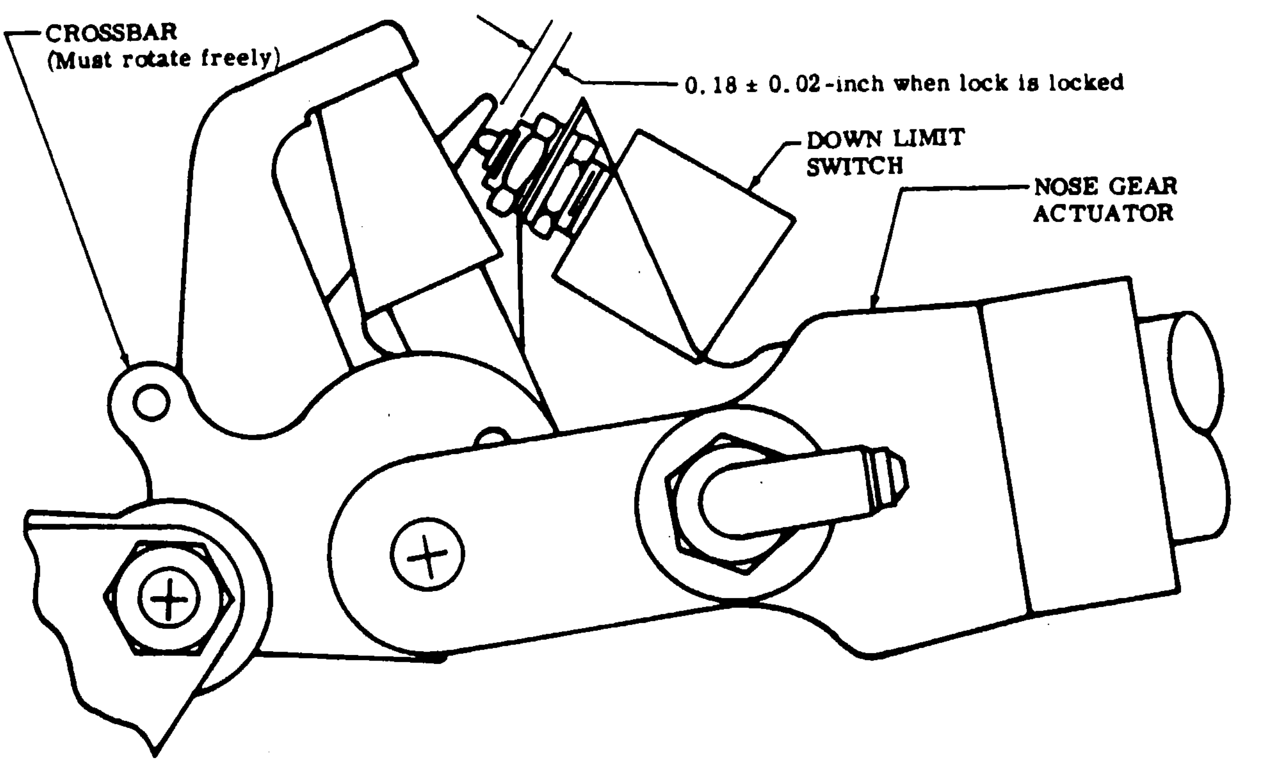
NOTE

Each time turbine access door is removed and replaced on turbocharged aircraft, check to assure that gap between access door is 0.12-inch to 0.15-inch. Gap between forward nose gear doors and fuselage skin is to be from 0.18-inch minimum to 0.21-inch maximum.

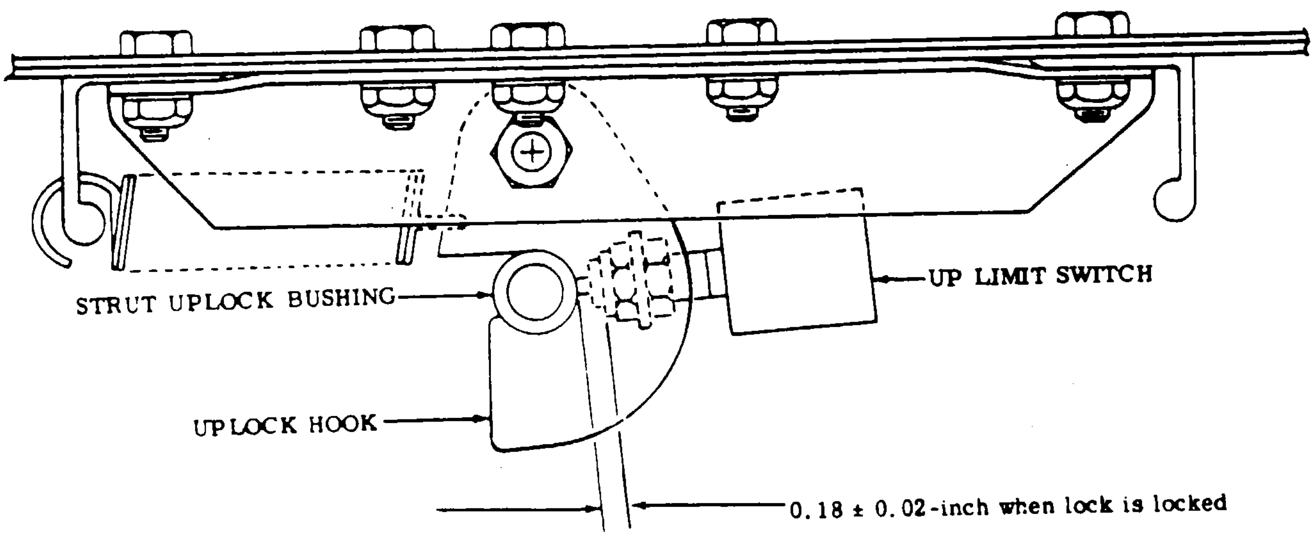
5-201. RIGGING OF NOSE GEAR LIMIT SWITCHES. (Refer to figure 5-37.) The nose gear down lindicator switch is operated by an arm on the downlock mechanism. The nose gear up indicator switch is attached to the uplock hook in the top of the nose wheel well. After jacking the aircraft, adjust the switches as shown in figure 5-37.

5-202. RIGGING OF NOSE GEAR SQUAT SWITCH. The nose gear squat switch, electrically-connected to the landing gear lockout solenoid, is operated by an actuator, attached to the nose gear lower torque link. Adjust the squat switch contacts to close when the strut is between 0.12 and 0.25-inch from fully extended.

SHOP NOTES:



NOSE GEAR IN DOWNLOCK POSITION



NOSE GEAR IN UPLOCK POSITION

Figure 5-37. Rigging Nose Landing Gear

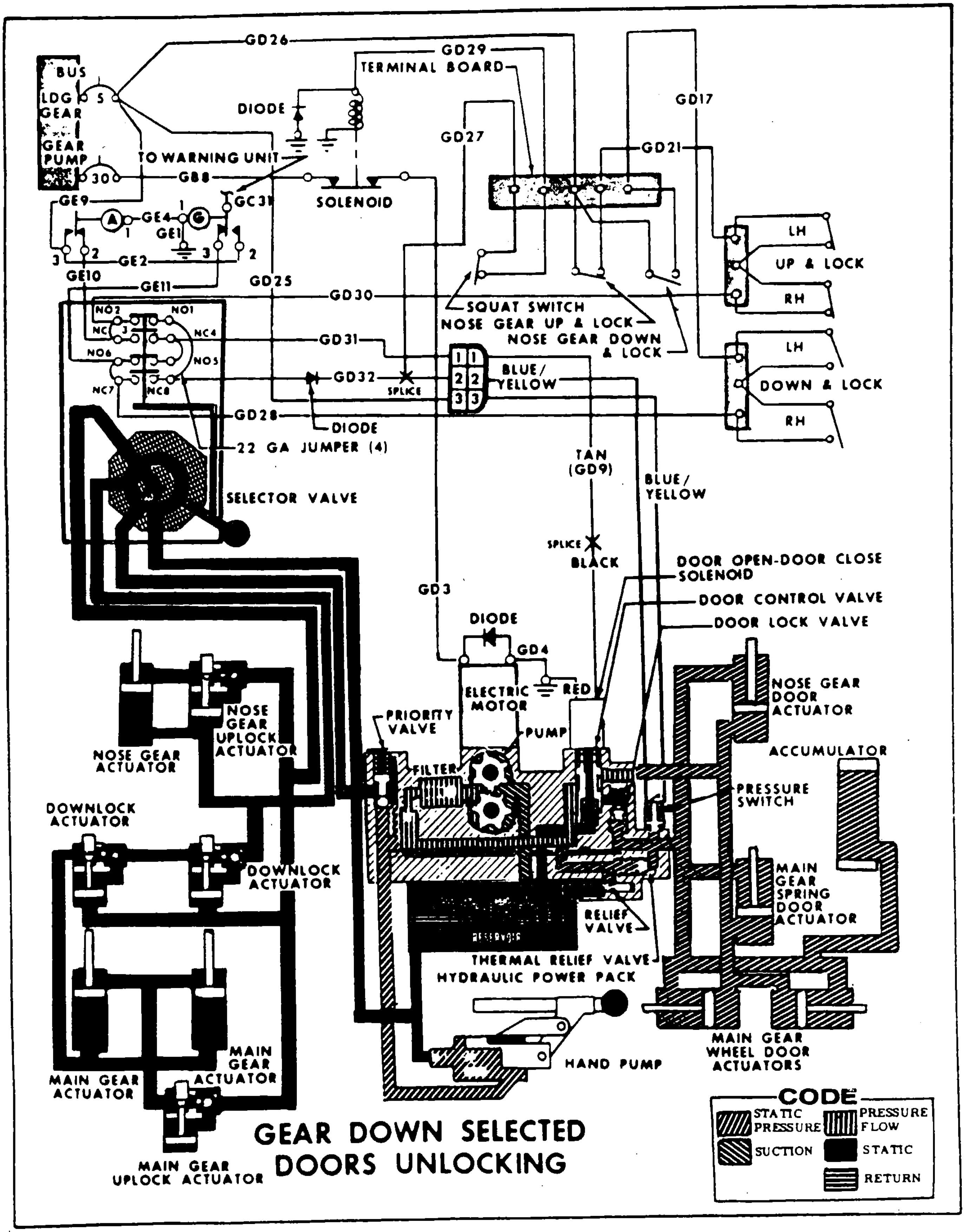


Figure 5-38. Hydraulic and Electrical System Schematic (Sheet 1 of 7)

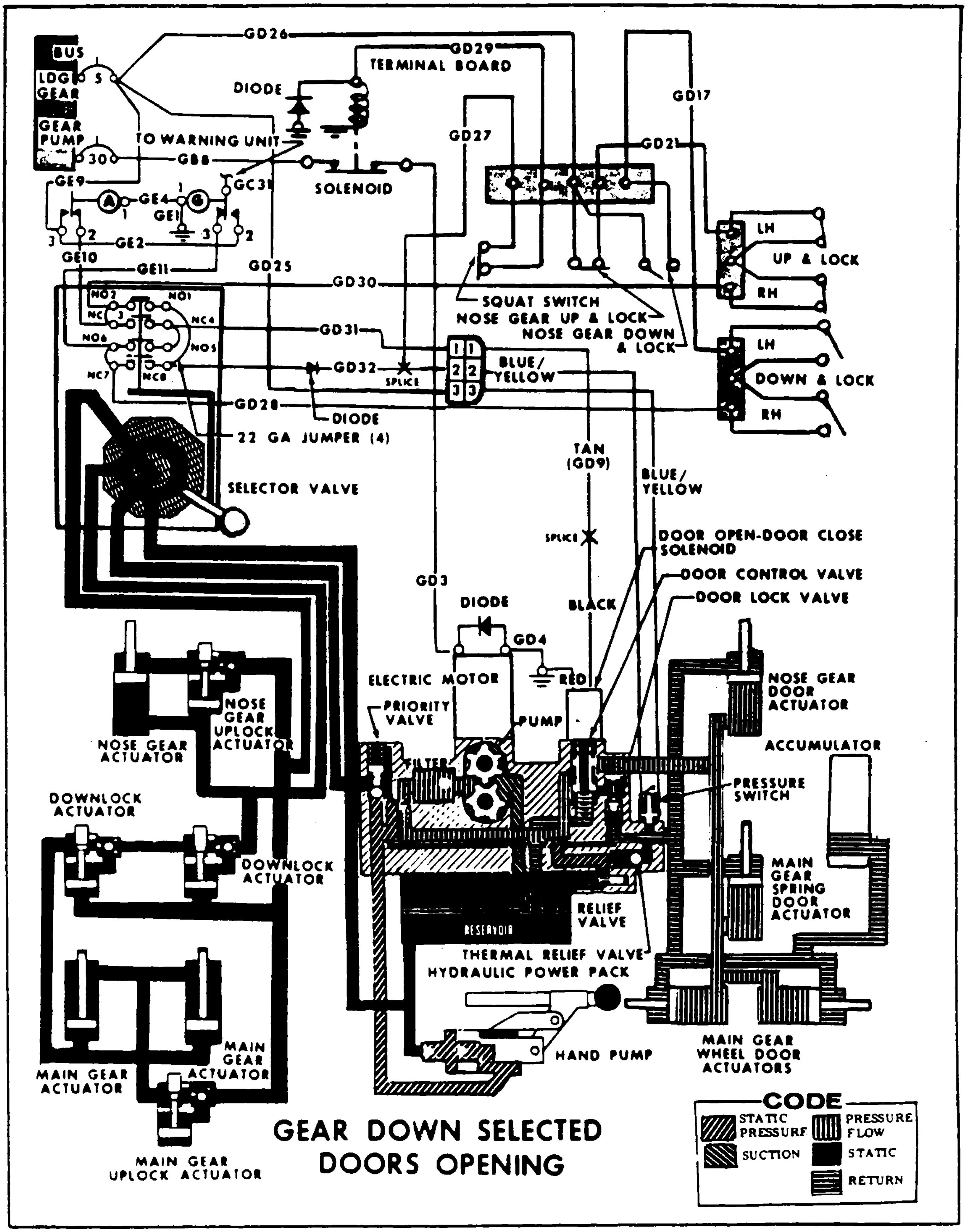


Figure 5-38. Hydraulic and Electrical System Schematic (Sheet 2 of 7)

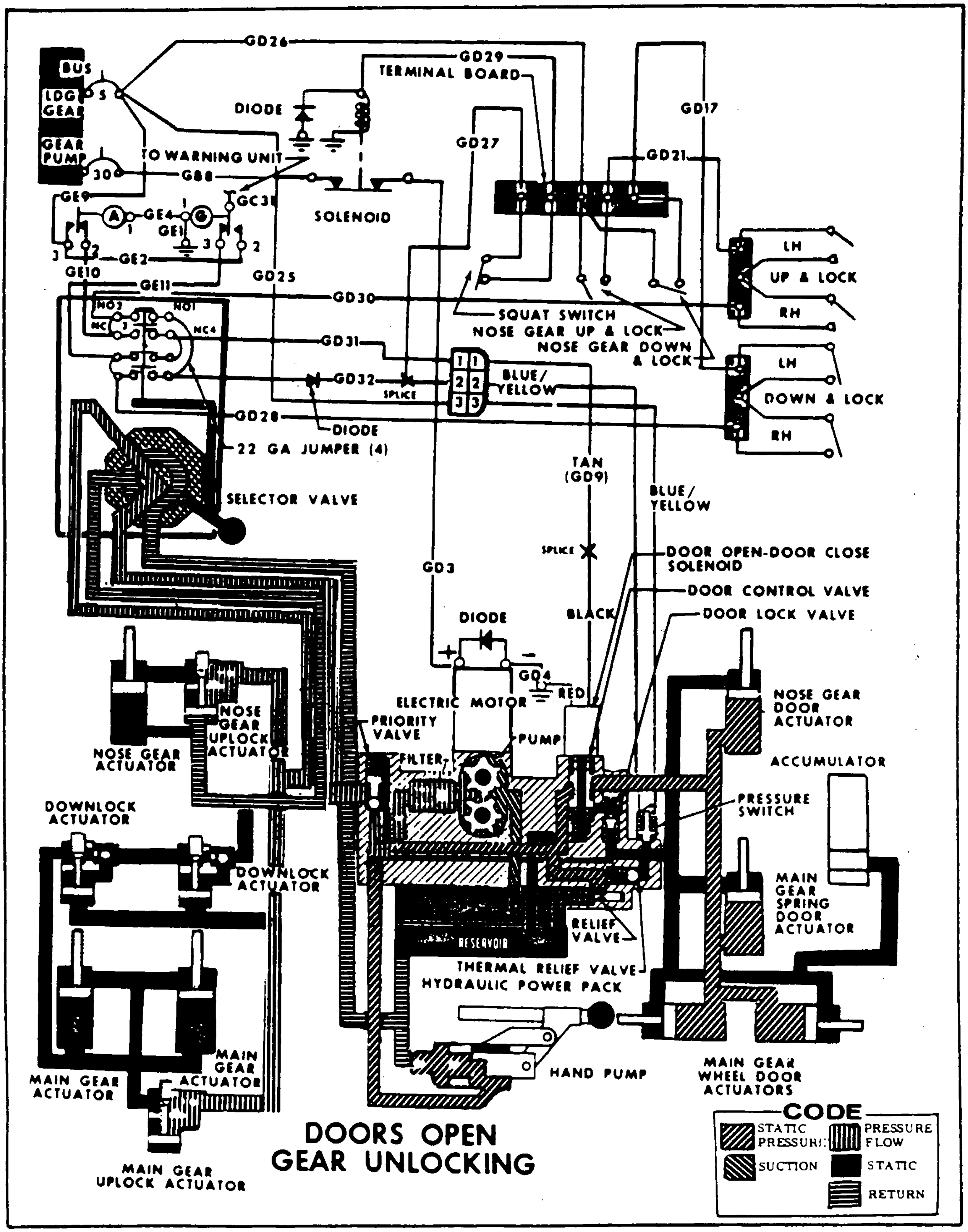


Figure 5-38. Hydraulic and Electrical System Schematic (Sheet 3 of 7)

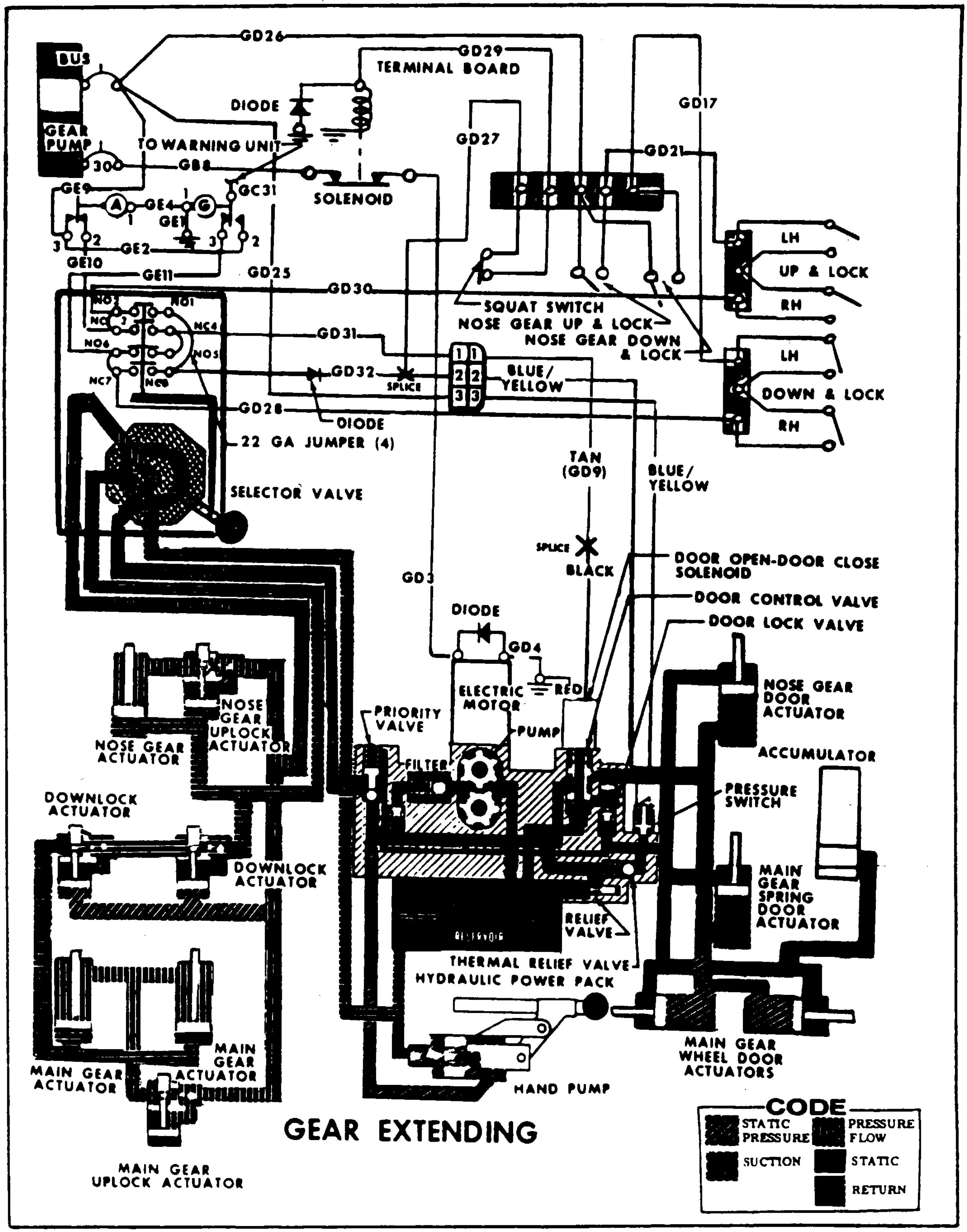


Figure 5-38. Hydraulic and Electrical System Schematic (Sheet 4 of 7)

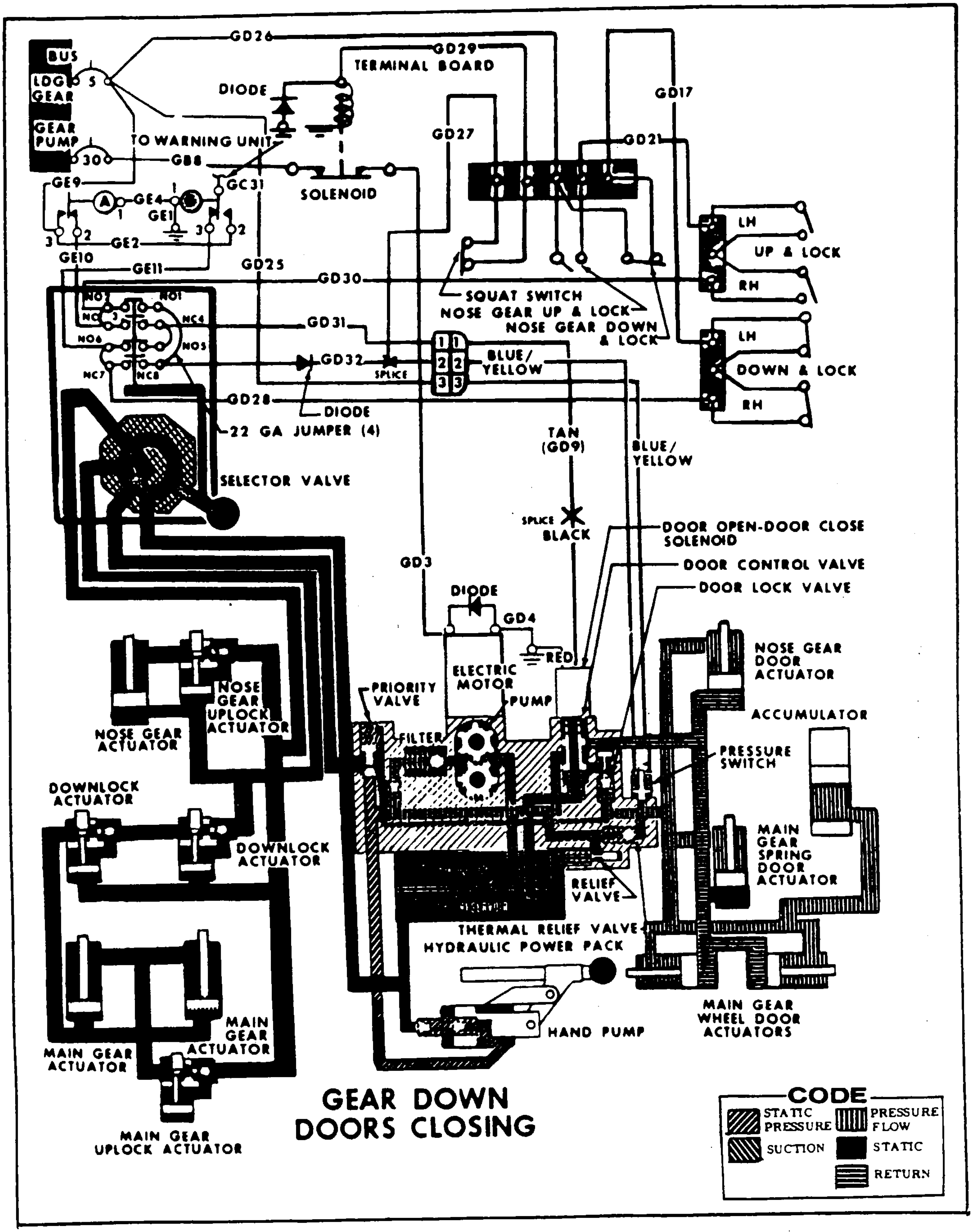


Figure 5-38. Hydraulic and Electrical System Schematic (Sheet 5 of 7)

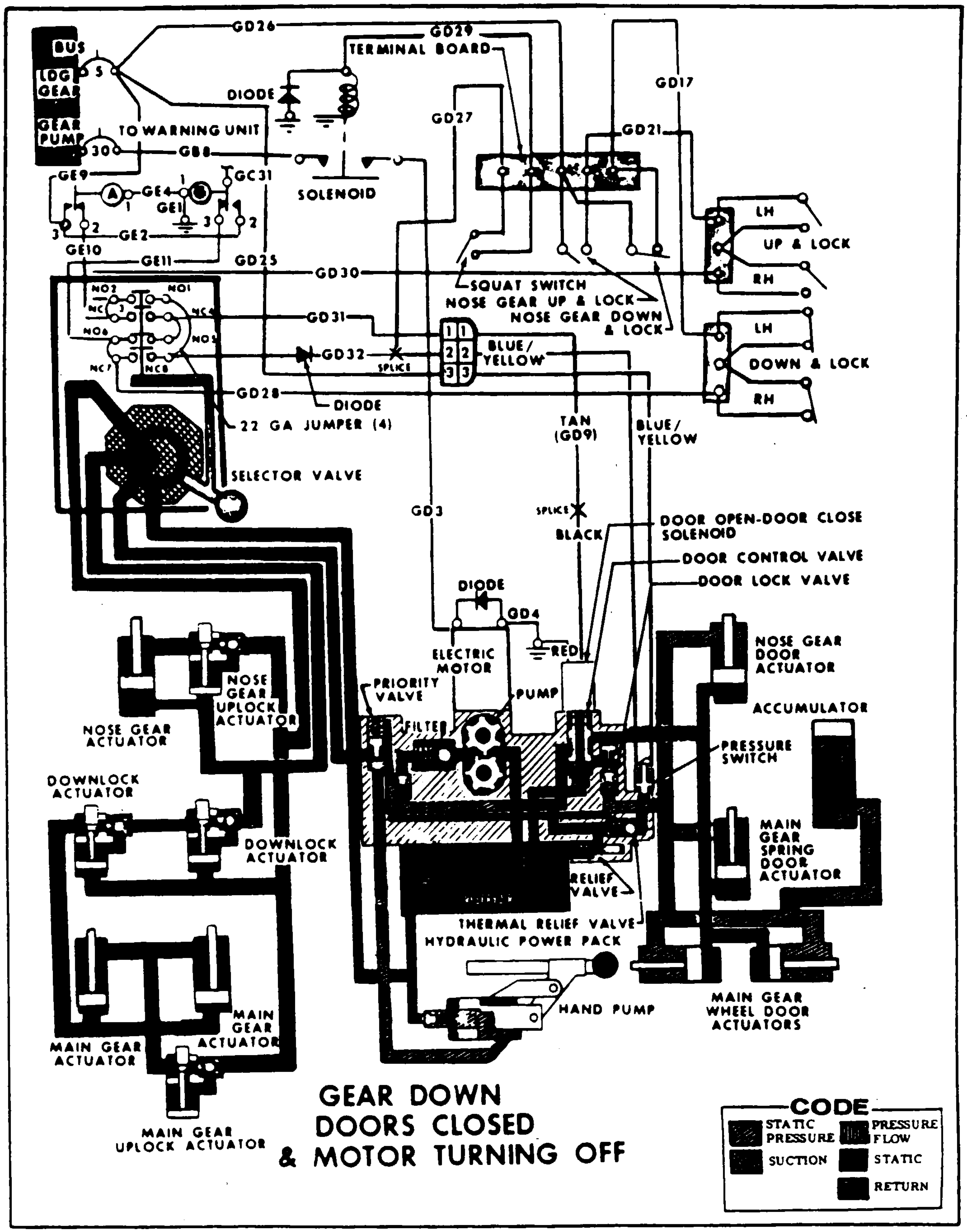


Figure 5-38. Hydraulic and Electrical System Schematic (Sheet 6 of 7)

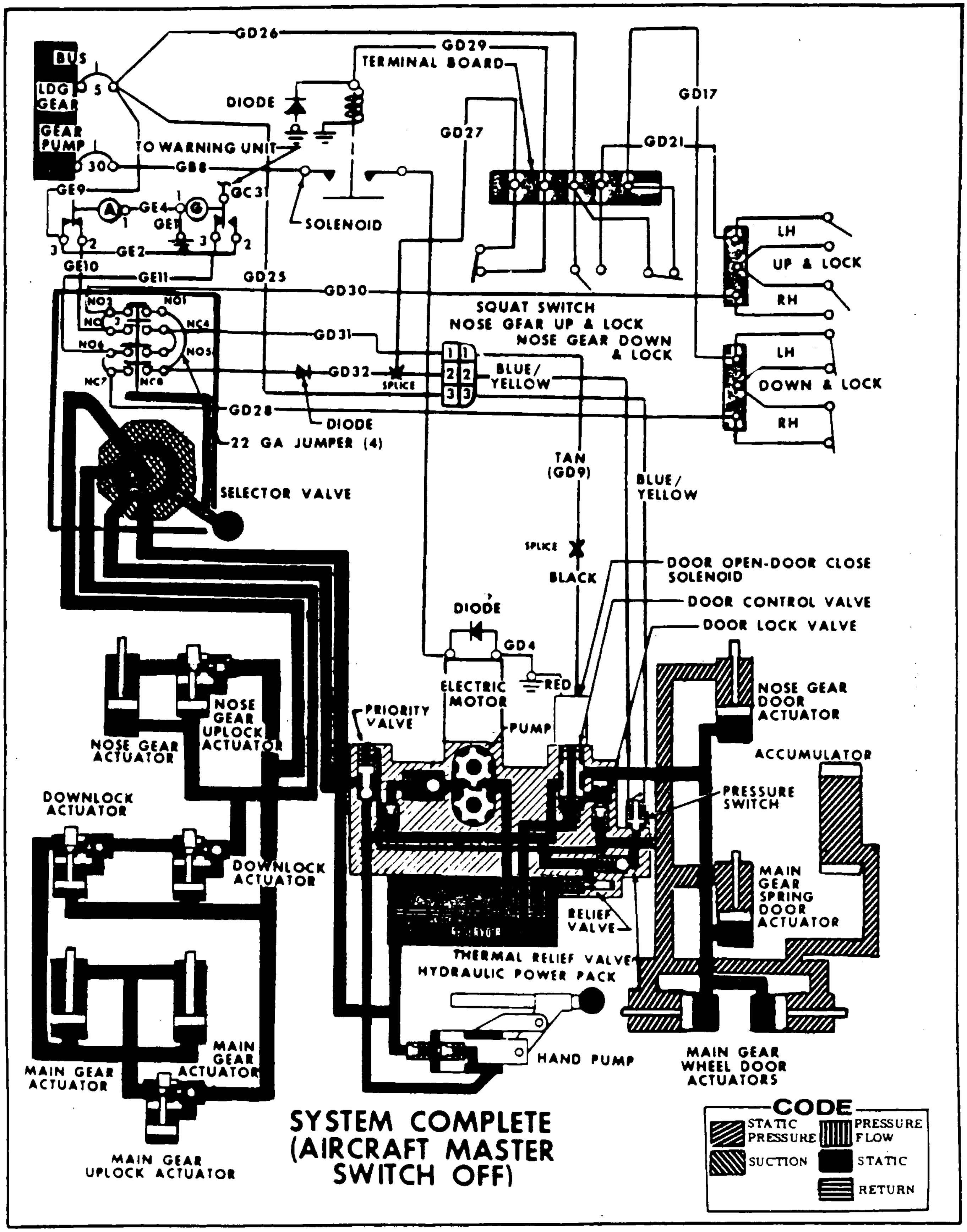


Figure 5-38. Hydraulic and Electrical System Schematic (Sheet 7 of 7)

SECTION 5A

LANDING GEAR, BRAKES AND HYDRAULIC SYSTEM (BEGINNING WITH 1979 MODELS)

WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

NOTE

This section covers 1979 thru 1983 models, and was added to avoid the confusion of serialization caused by major changes in the airplane hydraulic system. However, Section 5 contains information which is also applicable to these models. To avoid repetition, the reader is referred back to Section 5 for this information.

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5A-1. LANDING GEAR SYSTEM.

5A-2. DESCRIPTION. Retraction and extension of the landing gear is accomplished by a hydraulically-powered system, integrated with electrical circuits which help control and indicate gear position. Retraction and extension of the landing gear incorporates a nose gear actuator and two main gear actuators. The main gear actuators control the main gear struts through a sector gear arrangement. The nose gear doors are mechanically-operated. The doors are closed with the gear retracted and are open with the landing gear extended. The main gears have no doors. Hydraulic fluid is supplied to the landing gear actuating cylinders by an electrically-powered power pack assembly, located inside the center console. The hydraulic reservoir is an integral part of the power pack assembly. Gear selection is accomplished manually by moving a gear selector handle, located immediately left of center, in the switch panel. It is necessary to pull out on the gear selector to move the handle up or down. For emergency extension of the gear, the selector handle must be in the DOWN position before the hand pump will energize the system. A pressure switch is mounted on the pump body. This switch opens the electrical circuit to the pump solenoid when pressure in the system increases to approximately 1500 psi. The pressure switch will continue to hold the electrical circuit open until pressure in the system drops to approximately 1000 psi. This will occur whether the gear selector handle is in either the UP or DOWN position. During a normal cycle, landing gear extended and locked can be detected by illumination of the gear DOWN indicator (green) light. Indication of gear retracted is provided by illumination of the UP indicator (amber) light. The nose gear squat switch, activated by the nose gear, electrically averts inadvertent retraction whenever the nose gear strut is compressed by the weight of the aircraft. Beginning with 1983 models the up indicator (amber) light is replaced with a GEAR UNSAFE indicator (red) light. The GEAR UNSAFE (red) light is on anytime the gear is in transit (retract or extend), or whenever system pressure drops below 1000 PSI with the safety (squat) switch closed.

NOTE

It is possible to have the red and green lights on momentarily at the same time after the completion of the extend cycle, or when rotating during takeoff. However, if both stay on after the completion of the extend cycle, or if the red light stays on longer than 5 to 7 seconds during the retract cycle, a malfunction has occurred.

SHOP NOTES:

5A-3. TROUBLE SHOOTING.

Just because this chart lists a probable cause, proper checkout procedures cannot be deleted and the replacement of a part is not necessarily the proper solution to the problem. The mechanic should always look for obvious problems such as loose or broken parts, external leaks, broken wiring, etc. To find the exact cause of a problem, a mechanic should use a hand pump, pressure gage and a voltmeter to isolate each item in the system. Hydraulic fluid will foam if air is pumped into system, causing fluid to be blown overboard thru pack vent line.

The problems listed are all with the systems controls in their normal operating position: Master switch ON, hydraulic pump breaker IN and landing gear breaker IN. During landing gear system servicing, a power supply capable of maintaining 27.5 volts throughout the gear cycle must be used to augment the ship's battery.

CAUTION

Prior to using Hydro-Test unit with power pack, remove and dry off filler plug and dipstick. Adjust cap tension so that no movement of cap is apparent. Failure to accomplish these procedures could result in filler cap coming loose from power pack.

TROUBLE	PROBABLE CAUSE	REMEDY
MOTOR PUMP WILL NOT OPERATE GEAR BUT EMERGENCY HAND PUMP WILL OPERATE GEAR.	Low voltage (in flight).	Check alternator and wiring.
	Fluid level low in reservoir.	Refill reservoir.
	Motor pump failure.	Replace pump.
	Faulty check valve	Replace valve
	NOTE Motor and pump are not repairable and must be replaced.	
	Pump frozen.	Remove motor and coupling from top of power pack and replace pump.
	Broken pump or motor drive shaft or coupling.	Remove motor and pump from top of power pack and replace motor, pump and coupling.
	If motor was not turning, check wiring and motor.	Check motor for loose or broken connections; check for frozen pump or coupling. Check circuit breaker in pedestal.
	Bad pump shaft seal.	Replace pump.
	External leakage around top of pump assembly	Remove motor and pump assemblies from top of power pack and replace upper packing and/or back-up rings
	Air lock in pump (new pack installation or pump replacement).	Remove filter and intermittenly bump start switch until fluid flows. Replace filter.
PUMP OR EMERGENCY PUMP WILL NOT BUILD PRESSURE IN SYSTEM.	No fluid in reservoir.	Refill reservoir.

TROUBLE SHOOTING (Cont)

TROUBLE	PROBABLE CAUSE	REMEDY
PUMP OR EMERGENCY PUMP WILL NOT BUILD PRESSURE IN SYSTEM. (Cont).	Broken hydraulic line.	Check for evidence of leakage and repair or replace line. Flush out system and refill reservoir.
	Bad O-ring actuator piston; O-ring left out after repair.	Disconnect line upstream from actuator and check for pressure. Perform this check for all actuators in system.
	Bad O-ring on gear control valve.	Replace O-ring.
	Thermal relief valve stuck open.	Replace valve.
HAND PUMP DOES NOT BUILD PRESSURE, BUT ELECTRIC PUMP OPERATES PROPERLY.	Check valve in hand pump sticking.	Inspect check valve.
	Defective hand pump outlet check valve.	Replace valve.
	Main gear or downlock actuator O-ring leaking.	Disassemble actuator and replace O-rings.
	Filter in outlet check valve improperly positioned in filter body, or seal between filter and check valve improperly positioned.	Replace seal and position filter in retainer with Petrolatum.
LANDING GEAR OPERATION EXTREMELY SLOW.	Downlock rod adjustment incorrect (mainly LH rod).	Adjust rod end to lengthen actuator one turn.
	Pump failure.	Replace pump.
	Low voltage in electrical system.	Check alternator and wiring.
	Pump motor brushes worn.	Replace pump motor.
	Fluid leak in gear line.	Locate and repair or replace broken line or fitting.
	Excessive internal power pack leakage.	Remove and repair or replace power pack.
POWER PACK EXTERNAL LEAKAGE.	Static seals (all fittings).	Remove and replace O-rings and/or back-up rings as required. Check tubing flares for leaks.
	Reservoir cover.	Remove power pack and remove cover: replace seals.
GEAR DOWN-LOCK WILL NOT RETURN TO FULL-LOCK POSITION.	Binding in spring and tube assemblies.	Check operation to locate binding and eliminate.

5A-3. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
LANDING GEAR FAILS TO RETRACT.	Hydraulic pump motor circuit breaker open.	Reset, determine cause for opening. Repair or replace components as necessary.
	Instrument panel gear indicator circuit breaker open.	Reset breaker. Determine cause for tripped breaker.
	Hydraulic pump motor circuit wires disconnected or broken.	Repair or replace wiring.
	Instrument panel gear indicator circuit wires disconnected or open.	Repair or replace wiring.
	Nose gear squat switch inoperative.	Install new switch.
	Pressure switch defective.	Install new switch.
	Hydraulic pump motor solenoid defective.	Install new solenoid.
	Hydraulic pump motor ground.	Check for ground.
	Hydraulic pump motor defective.	Replace motor.
	Reservoir fluid level below operating level.	Fill reservoir with hydraulic fluid.
	Battery low or dead.	Check battery condition. Install new battery.
GEAR RETRACTION OR EXTENSION EXTREMELY SLOW.	Reservoir fluid level below operating level.	Fill reservoir with hydraulic fluid (Refer to Section 2).
	Restriction in hydraulic system.	Isolate and remove restrictions.
PUMP MOTOR STOPS BEFORE GEAR IS RETRACTED.	Hydraulic pump motor circuit breaker open.	Reset, determine cause for opening. Repair or replace components as necessary.
	Instrument panel gear indicator circuit breaker open.	Reset circuit breaker. Determine cause of tripped circuit breaker.
	Pressure switch out of adjustment.	Remove, adjust or install new switch.
	Restriction in hydraulic system, allowing pressure to build up and shut off pump motor before gear is retracted.	Isolate and determine cause. Remove restriction.
PUMP MOTOR STOPS BEFORE GEAR IS EXTENDED.	Hydraulic pump motor circuit breaker open.	Reset, determine cause for opening. Repair or replace components as necessary.
	Instrument panel gear indicator circuit breaker open.	Reset circuit breaker. Determine cause of tripped circuit breaker.

TROUBLE SHOOTING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
PUMP MOTOR CONTINUES TO RUN AFTER GEAR IS FULLY RETRACTED OR EXTENDED.	Pressure switch defective.	Install new switch.
	Pressure switch out of adjust.	Remove, adjust or install new switch.
	Hydraulic pump motor solenoid defective.	Install new solenoid.
	Internal leakage in system.	Check actuators for internal leakage. Repair or install new actuators.
	External system leakage.	Check all lines and hose for leakage. Repair or install new parts.
	Power pack relief valve out of adjustment.	Disassemble and repair or replace valve assembly.
	Hydraulic motor solenoid defective.	Install new solenoid.
PUMP MOTOR CYCLES EXCESSIVELY AFTER GEAR IS RETRACTED.	Pressure switch out of adjustment.	Remove, adjust or install new switch.
	Internal leakage in system.	Check actuators for internal leakage. Repair or install new actuators.
	External system leakage.	Check all lines and hose for leakage. Repair or install new parts.
GEAR DOES NOT FULLY RETRACT, BUT PUMP MOTOR CONTINUES TO RUN.	Internal leakage in system.	Check actuators for internal leakage. Repair or install new actuators.
	Reservoir fluid level below operating level.	Fill reservoir with hydraulic fluid (Refer to Section 2).
LANDING GEAR FAILS TO EXTEND.	Battery low or dead.	Check battery condition. Install new battery.
	Hydraulic pump motor circuit breaker open.	Reset, determine cause for opening. Repair or replace components as necessary.
	Instrument panel gear indicator circuit breaker open.	Reset circuit breaker. Determine cause of tripped circuit breaker.
	Hydraulic pump motor circuit wires disconnected or broken.	Repair or replace wiring.
	Hydraulic pump motor solenoid defective.	Install new solenoid.

TROUBLE SHOOTING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
LANDING GEAR FAILS TO EXTEND (cont).	Hydraulic pump motor ground.	Check ground.
	Hydraulic pump motor defective.	Replace motor.
	Reservoir fluid level below operating level.	Fill reservoir with hydraulic fluid (Refer to Section 2.)
	Nose gear contacts stop bolts.	Adjust stop bolts to obtain proper clearance. (Refer to paragraph 5A-87).
RH GEAR UNLOCKS BUT LH GEAR WILL NOT UNLOCK.	Improper setting of RH downlock actuator rod.	Check rigging procedures outlined in this Section.
BOTH RH AND LH MAIN GEAR UNLOCK BUT ONLY NOSE GEAR WILL RETRACT.	Improper setting of LH downlock actuator rod.	Check rigging procedures outlined in this Section.
MOTOR PUMP WILL NOT TURN ON BY WORKING SELECTOR SWITCH. HAND PUMP WILL PUT GEAR DOWN.	Defective pressure switch circuit.	Check circuit continuity.
		Check switch adjustment
SET SCREW ON CAM NOT EXTENDED ENOUGH FOR GEAR TO MOVE CAM OVER CENTER.	Check washers under bolt on downlock arm assembly.	Add AN960-10 washer under bolt downlock arm assembly
MAIN GEAR WILL NOT LOCK OVER CENTER.	Main gear not centered in support.	Rerig saddle per rigging instructions.
MALFUNCTION OF GEAR INDICATOR LIGHTS.	1. Both lights on at same time. 2. Light will change from green to amber or in reverse when gear control switch is moved.	Check ground wire for proper connection.

5A-3A. HYDRAULIC SYSTEM LEAK CHECK.

a. Jack aircraft in accordance with procedures outlined in Section 2 of this Manual.

b. To relieve system pressure, pull the GEAR PUMP circuit breaker to OFF and move the gear selector handle to UP and back to the DOWN position.

c. Install a 0-2000 PSI gage at the service tee on the right-hand side of the power pack.

d. Push the GEAR PUMP circuit breaker to the ON position, turn ON the master switch and move the gear selector handle to the UP position.

e. Monitor pressure gage after retraction cycle is complete for pressure bleed down.

f. If bleed down occurs, it can be an internal or external leak anywhere in the system.

NOTE

When any line is disconnected, be prepared for fluid leakage.

g. Disconnect the return line from the gear selector. If fluid comes from the selector, the internal leak is in the system.

h. If no leak is found, it can be assumed there is an internal leak in the power pack. If leak is found proceed to step "j". Reconnect the return line.

i. Power pack internal leakage can only be attributed to a bad thermal relief valve, check valve or check valve O-ring. There is no way to isolate the part that is leaking, so, first replace check valve O-ring, check valve and then thermal relief valve. Repeat leak test after replacement of each part to ensure leak correction.

j. Remove gear DOWN line from the selector. If fluid comes from the line, one or more of the gear actuators is leaking. To locate the leaking actuator, disconnect the return line from each actuator, the leaking actuator will have fluid draining from the actuator port. Following the appropriate paragraphs in this section, remove, overhaul and reinstall the actuator.

k. Reconnect gear down line to the selector.

l. Recheck all lines that were disconnected for security.

m. Lower the landing gear. Following the procedures in step "b", relieve the system pressure.

n. Remove the pressure gage from the service tee.

o. In accordance with the procedures in Section 2 of this Manual, replenish the power pack reservoir with MIL-H-5606 hydraulic fluid and bleed the system.

p. Remove aircraft from jacks.

5A-4. POWER PACK. (Refer to figure 5A-3.)

5A-5. DESCRIPTION. The power pack assembly, located in the center console, is a multi-purpose unit. It contains a hydraulic reservoir, valves, an electrically-driven motor and the pump. An emergency hand pump, located between the pilot and copilot seats, uses reservoir fluid to permit extension of the landing gear.

5A-6. REMOVAL. (Refer to figure 5A-3.)

a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.

b. Turn master switch OFF and place gear selector handle in a neutral position to relieve system pressure. After 15 seconds, return gear selector handle to DOWN position.

NOTE

As hydraulic lines are disconnected or removed, plug or cap all openings to prevent entry of foreign material into the lines or fittings.

c. Remove front seats and spread drip cloth over front carpet.

d. Remove decorative cover from pedestal as outlined in Section 9 of this manual.

e. Remove upper panel assembly from aft face of pedestal.

f. Remove screws attaching indicator assembly at top of pedestal; remove indicator assembly.

g. Remove four bolts attaching wheel and gear box assembly; remove wheel and gear box assembly.

h. Loosen idler sprocket assembly by loosening bolt and sliding sprocket inboard in slot.

i. Disconnect chain at connecting link.

j. Remove left-hand and right-hand chain guards.

k. Allow chain to remain on gimbal assembly in lower pedestal area.

l. Position gallon container under drain elbow at right-hand side of pedestal.

m. Remove cap from elbow and attach drain hose.

n. Using hand pump, drain reservoir fluid into container.

o. Disconnect and cap or plug all hydraulic lines at power pack.

p. Disconnect wiring at pressure switch.

q. Remove three mounting bolts, one at the forward side of power pack, and two, attaching power pack bracket to sides of pedestal.

r. Remove power pack and bracket from pedestal as a unit.

NOTE

It should not be necessary to disturb studs on left and right sides of pedestal to remove power pack.

5A-7. DISASSEMBLY. (Refer to figure 5A-3.)

a. Remove bolts (24), washers (25), and packing (26) from reservoir (1).

b. Remove reservoir (1) from body assembly (19).

NOTE

If reservoir will not disengage from body, install a capped fitting in the pressure and return openings of the power pack assembly and attach an air hose to vent fitting at top of body assembly (19). Apply air pressure (not to exceed 15 psi, reservoir proof pressure), and remove reservoir. A strap clamp is not recommended as clamp may damage reservoir.

c. Remove packing (20) from body assembly (19).

NOTE

Disassembly of relief valves (5) and (23) is normally not required. Refer to applicable paragraphs for specific instructions regarding relief valves. Before removal, tag each relief valve (primary) or (thermal) to ensure correct reinstallation.

d. Cut safety wire and remove relief valve assemblies (5) and (23) from body assembly (19).

e. Remove dipstick (15) and screen (16) from body assembly (19).

f. Remove retainer (12), filter assembly (11), back-up ring (13), packing (14), packing (10) and check valve (9) from body assembly (19).

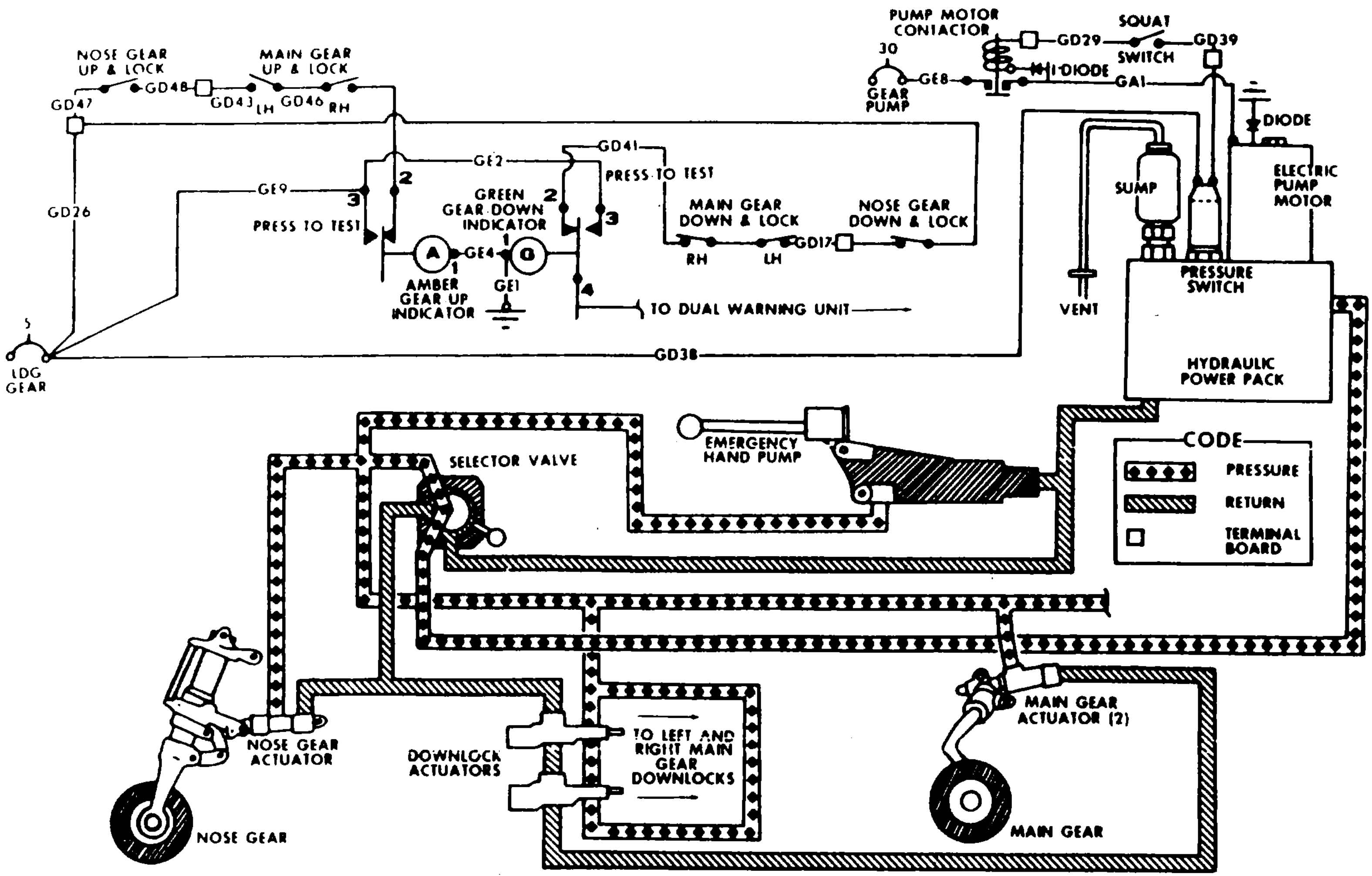


Figure 5A-1. Landing Gear Schematic (Sheet 1 of 4)

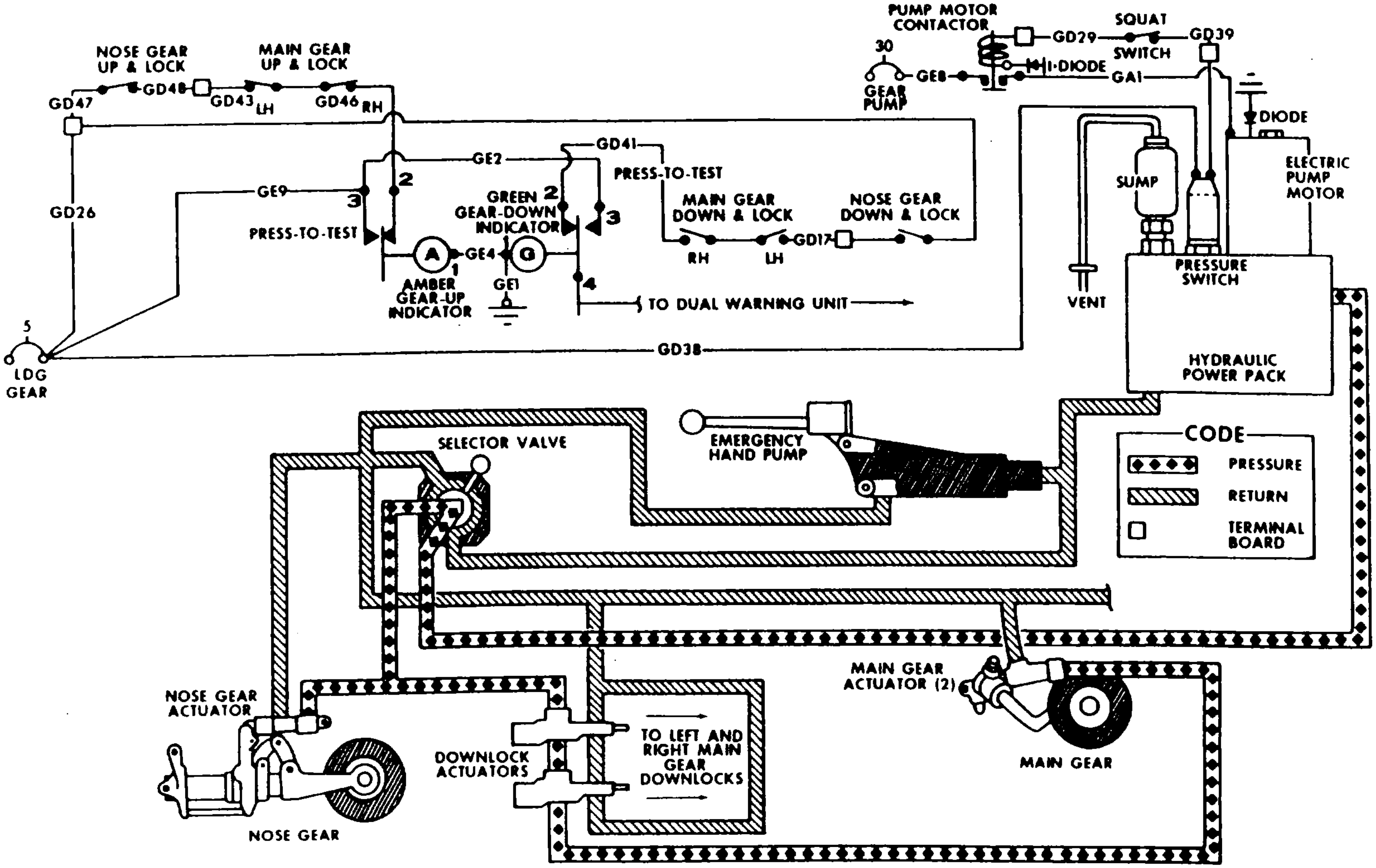


Figure 5A-1. Landing Gear Schematic (Sheet 2 of 4)

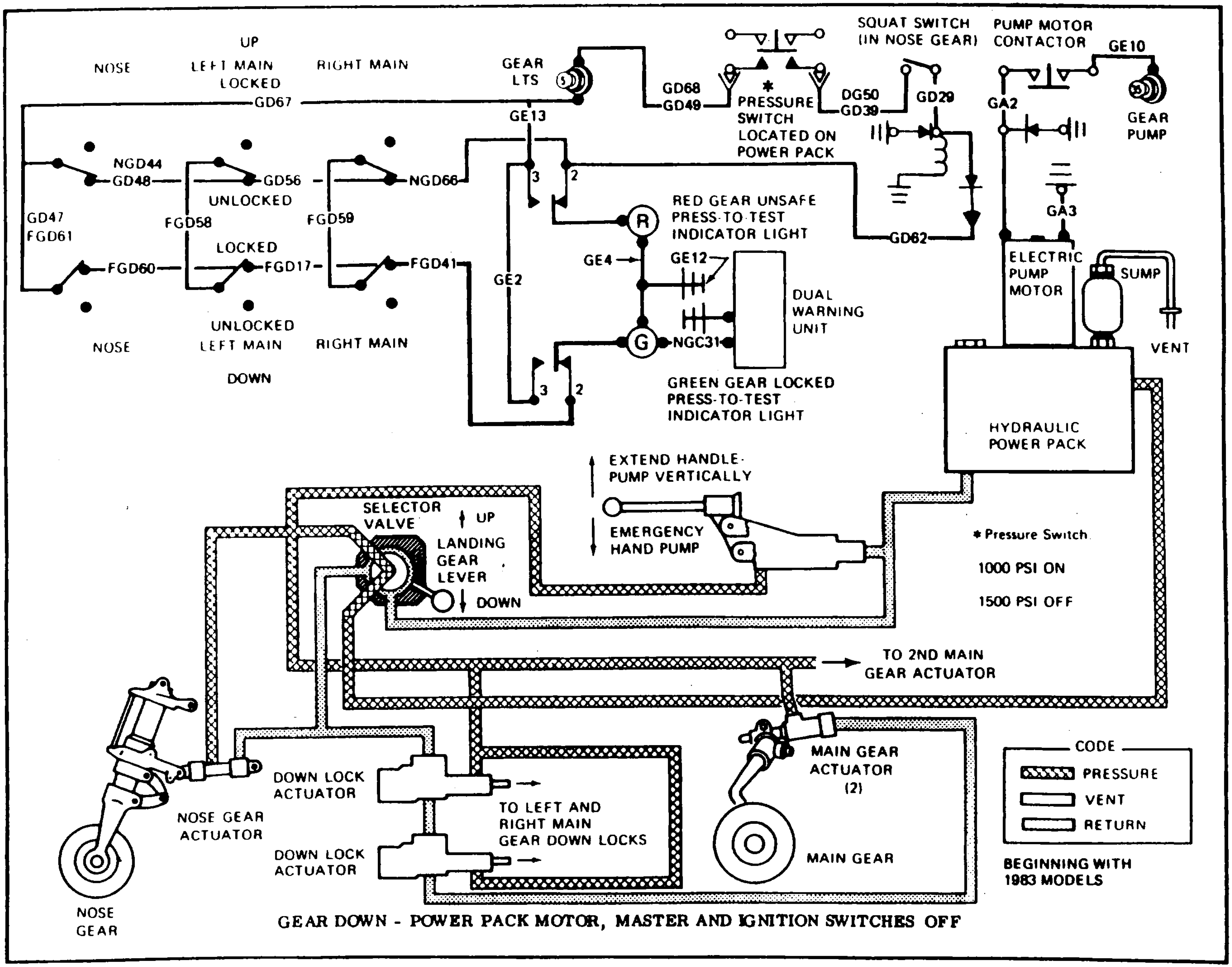


Figure 5A-1. Landing Gear Schematic (Sheet 3 of 4)

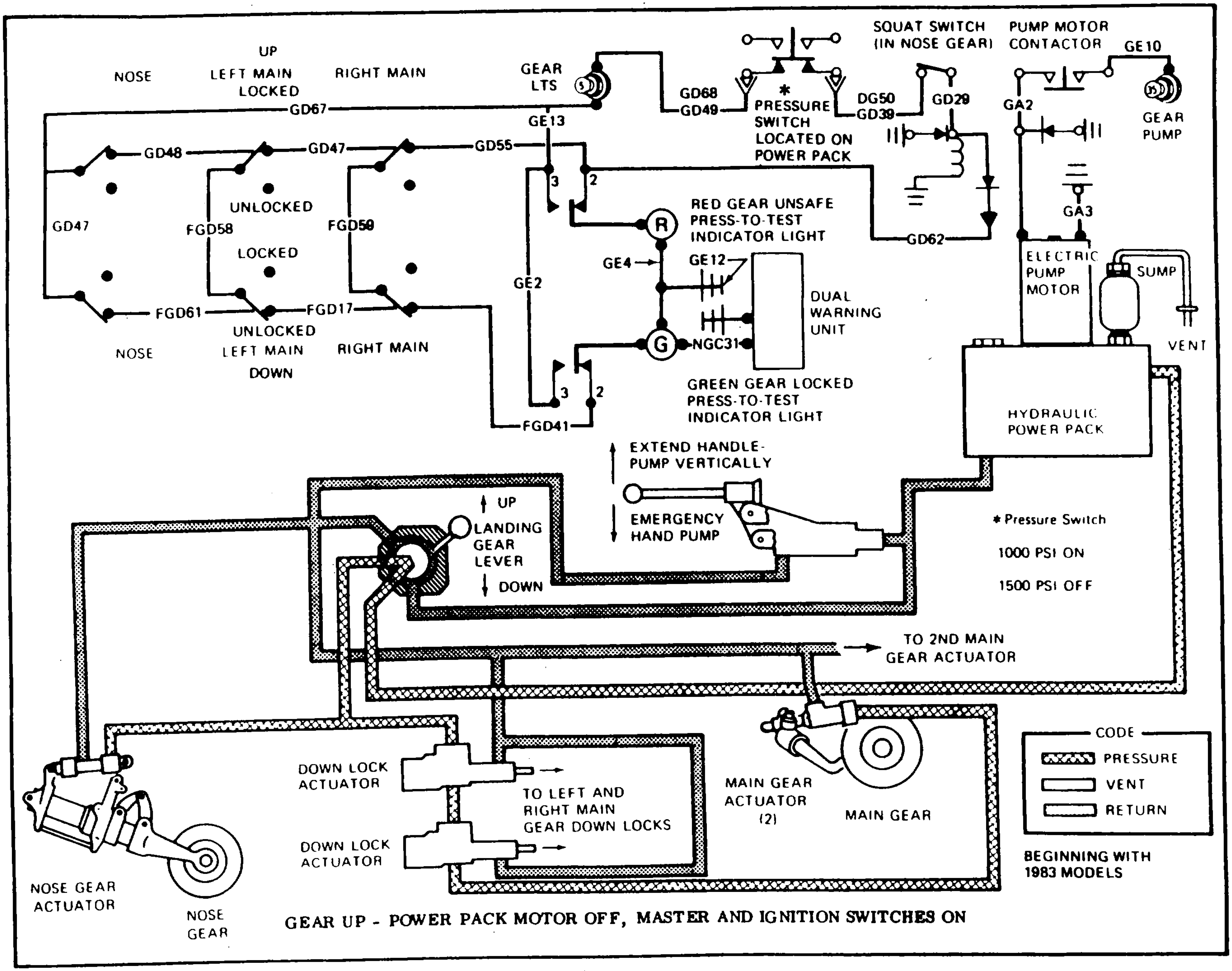


Figure 5A-1. Landing Gear Schematic (Sheet 4 of 4)

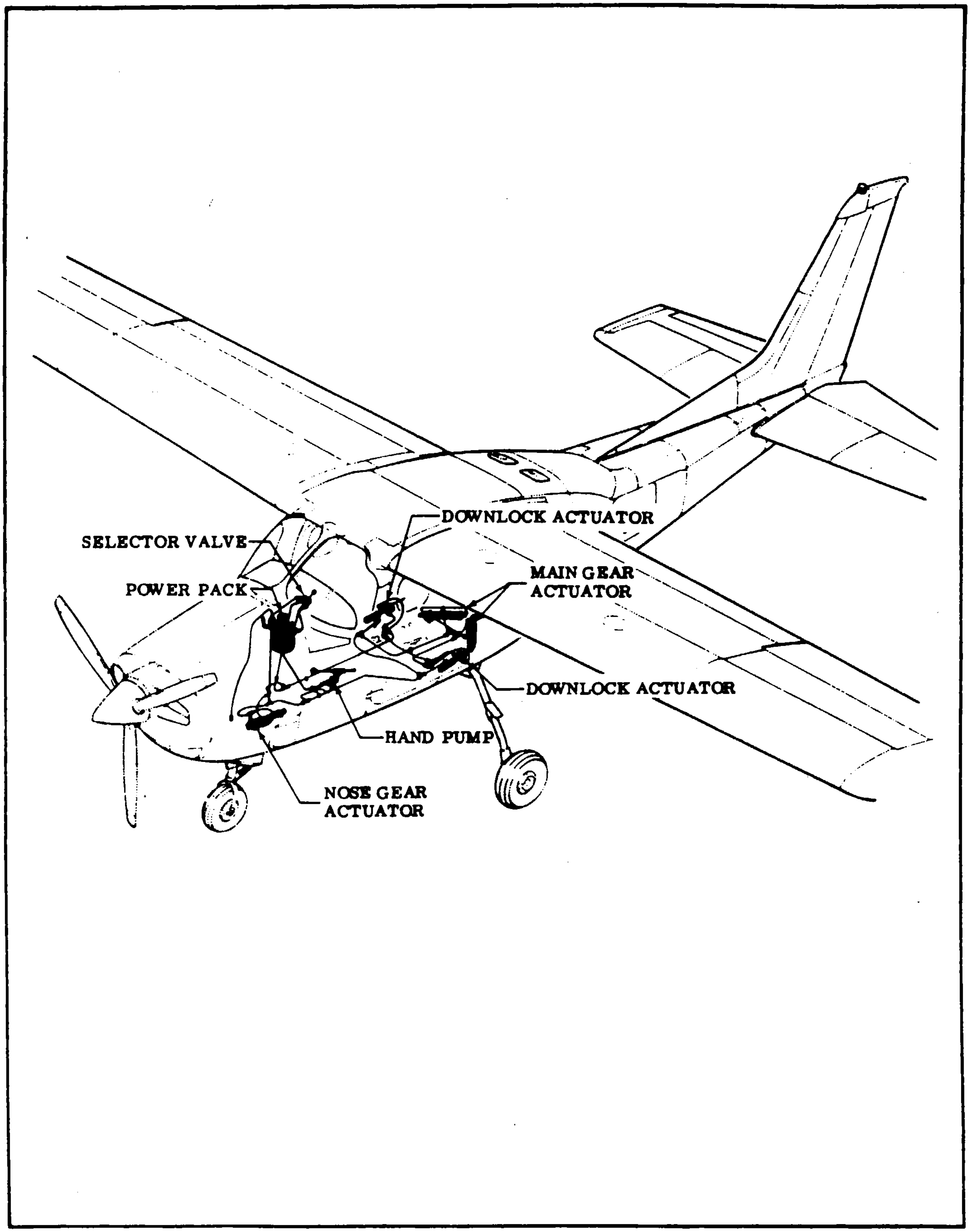


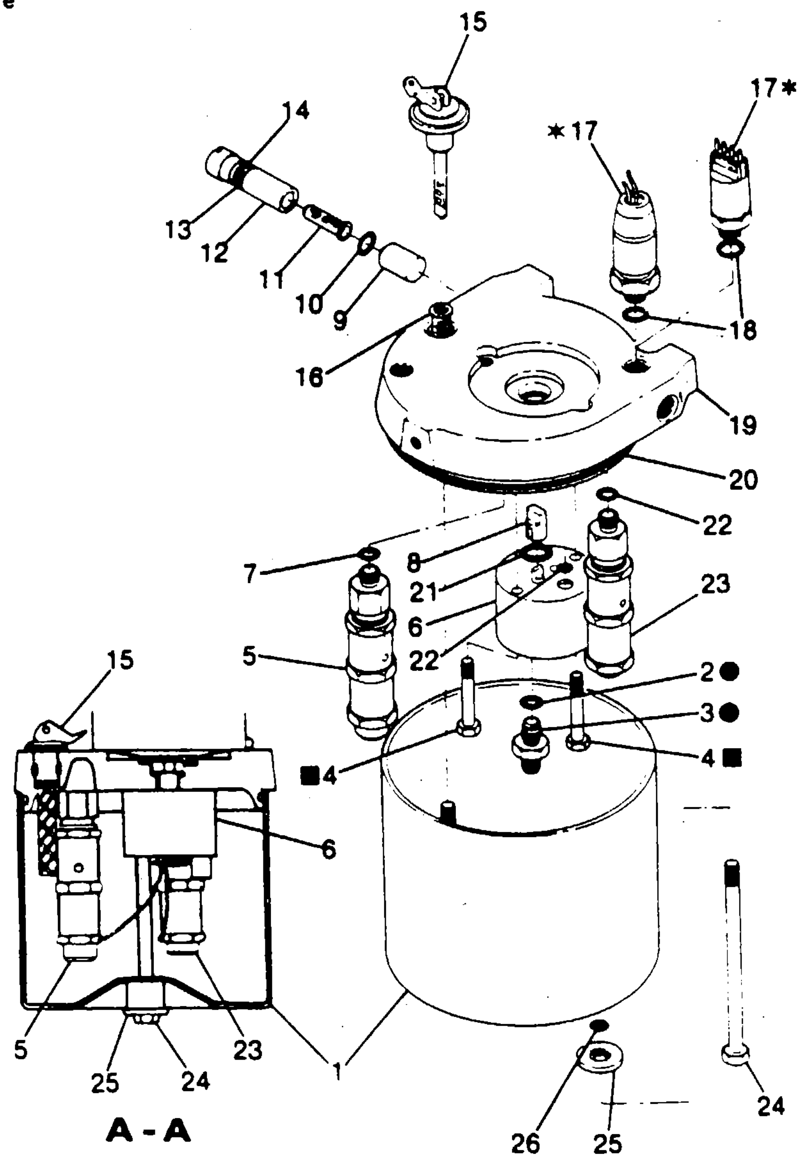
Figure 5A-2. Landing Gear System Component Locator

✱ THRU SERIAL P21000501

✱ SERIAL P21000502 & ON

● THRU SERIAL P21000751 & P21000762 THRU P21000778

■ Beginning with serial P21000752 thru P21000761 and serial P21000779 & ON, bolts (4) have drilled heads and must be safety wired.



1. Reservoir
2. Union
3. Packing
4. Bolt
5. Primary Relief Valve
6. Hydraulic Pump
7. Packing
8. Coupling
9. Check Valve
10. Packing
11. Filter Assembly
12. Retainer
13. Back-Up Ring
14. Packing
15. Dipstick
16. Screen
17. Pressure Switch
18. Packing
19. Body Assembly
20. Packing
21. Packing
22. Packing
23. Thermal Relief Valve
24. Bolt
25. Washer
26. Packing
27. Motor
28. Bolt

NOTE

Install new packings and back-up rings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

Figure 5A-3. Hydraulic Power Pack Assembly (Sheet 1 of 2)

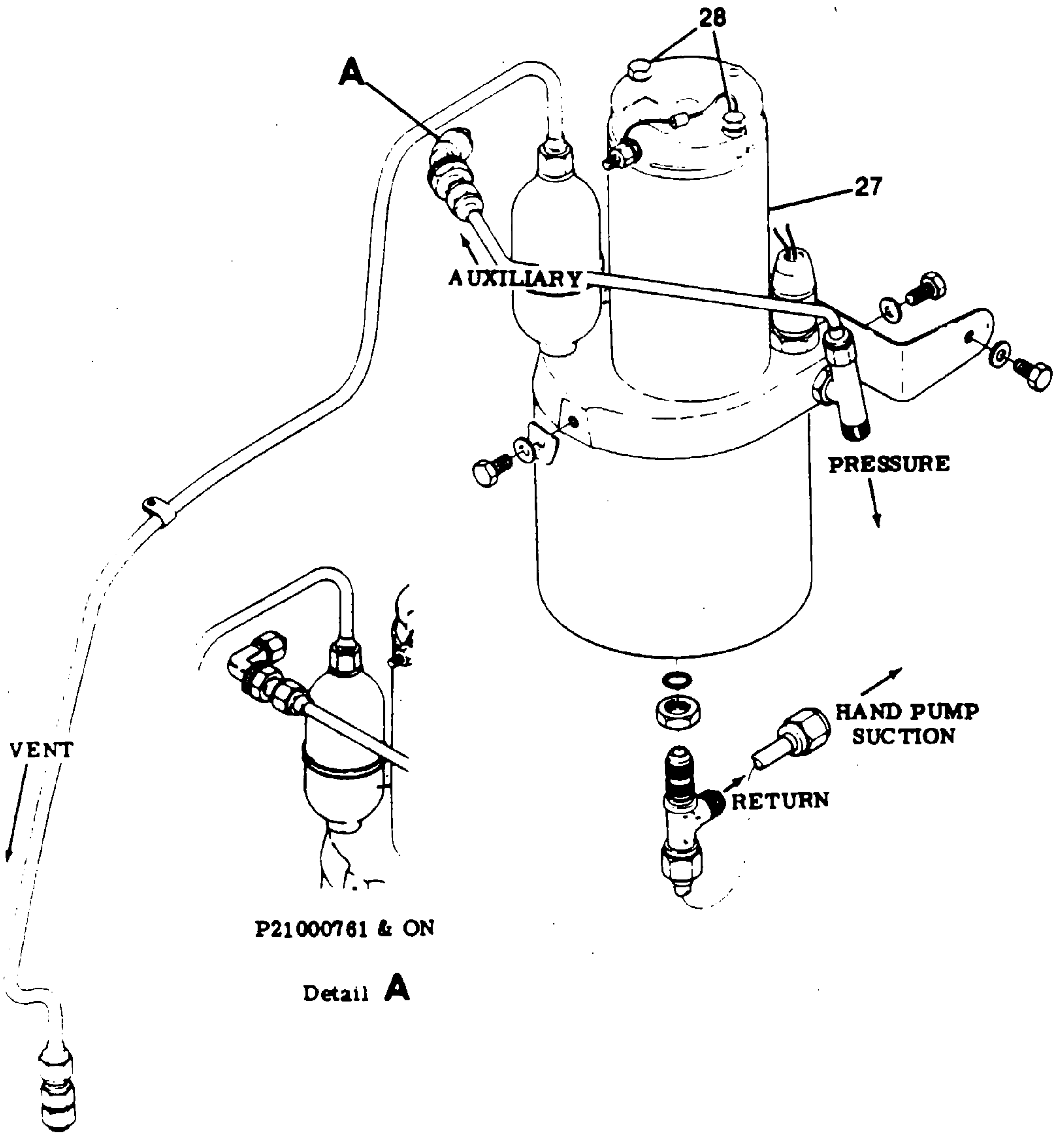


Figure 5A-3. Hydraulic Power Pack Assembly (Sheet 2 of 2)

NOTE

If check valve (9) will not fall from hole in body assembly, place a drift or punch made of soft material into the pressure opening of body assembly and tap spacer from body.

g. Remove pressure switch (17) and packing (18) from body assembly.
h. Remove bolts (4) attaching hydraulic pump (6) to body assembly, and remove pump and coupling (8) from body. Remove packings (21) and (22).
i. Remove motor assembly from body assembly by removing attaching bolts.

5A-8. INSPECTION. (Refer to figure 5A-3.)
a. Wash all parts in cleaning solvent (Federal Specification P-S-611, or equivalent) and dry with filtered air.
b. Inspect all threaded surfaces for serviceable condition and cleanliness.
c. Inspect all parts for scratches, scores, chips, cracks and indications of excessive wear.
d. Clean to ensure that all screens and filters are completely clean and undamaged.

5A-9. REASSEMBLY. (Refer to figure 5A-3.)

NOTE

Install new packings and back-up rings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

a. Using new packings (21) and (22), install hydraulic pump (6) and coupling (8) into body assembly (19) with bolts (4).
b. Install motor (27) on top of body assembly (19) after aligning coupling (8) to match mating connection in motor. Secure motor to body with bolts (27), safety wire bolts.
c. Using new packing (18), install and tighten pressure switch (17) onto body (19).
d. Using new back-up ring (13) and packings (14) and (10), install and tighten check valve (9), filter assembly (11) and retainer (12) into body (19).
e. Install relief valve assemblies (5) and (23), along with packings (7) and (22) onto body assembly (19).

CAUTION

Ensure that relief valves are installed in their correct location. Refer to view A-A.

f. Install screen assembly (18) and dipstick (15) into body (19).

NOTE

Safety wire relief valves (5) and (23) to hydraulic pump mounting bolts (4) as shown in view A-A.

g. Using new packing (20), washer (25) and packing (26), install and tighten reservoir (1) onto body assembly (19).

5A-10. INSTALLATION. (Refer to figure 5A-3.)
a. Work power pack and bracket assembly into position and install three bolts, securing power pack to pedestal.
b. Connect all hydraulic lines to power pack fittings. Ensure that all fittings are properly installed, with jam nuts tight, after lines are tightened.
c. Install wheel and gear box assembly and indicator assembly in top of pedestal.
d. Install left-hand and right-hand chain guards for rudder trim chain.
e. Connect chain at connecting link after stringing chain over idler sprocket.
f. Tighten idler sprocket assembly by sliding sprocket outboard in slot and tightening bolt.
g. Connect ground wire to pressure switch, and wire to motor.
h. Connect power pack wiring to plug.
i. Install upper panel assembly on pedestal.
j. Fill reservoir on right-hand side of power pack with clean hydraulic fluid in accordance with procedures outlined in Section 2 of this manual.
k. Operate gear through several cycles to bleed system. Check for correct operation and signs of fluid leakage. A 28 volt power supply should be used to augment the ship's battery.

5A-11. PRIMARY AND THERMAL RELIEF VALVE ASSEMBLIES. (Refer to figure 5A-4.) The primary relief valve, located between the check valve and pump, serves to limit that amount of pressure which can be generated by the pump. The thermal relief valve, located on the system side of the check valve, serves to limit the system pressure. System pressure can increase due to thermal expansion. Both valves are identical, the only difference being the pressure setting.

NOTE

To determine if disassembly or adjustment is necessary, the relief valves can be bench-tested. The thermal relief valve can be tested with a hand pump, connected to a hydraulic reservoir, a pressure gage with 2500 psi capacity and a hose with appropriate fittings, connected from the hand pump to the fitting on the thermal relief valve. The thermal relief valve shall be set not to open in excess of 2250 psi. If adjustment of thermal relief valve is necessary, loosen jam-nut (13) and turn adjustment screw (12) in to increase pressure; back adjustment screw out to decrease pressure. Tighten jam-nut (13) against housing (8) and torque jam-nut from 100 to 150 lb. in. Recheck pressure adjustments. Testing the primary relief valve will require a hydraulic pump with a flow rate of 0.5 to 0.7 gal.-per-min., connected to a hydraulic reservoir, a pressure gage with 2500 psi capacity, and a hose with appropriate fittings, connected from the hydraulic pump to the fitting on the primary relief valve. Adequate precautions whould be taken to recover hydraulic fluid which will be expelled from the primary relief valve while under pressure. The primary relief valve shall be set to open at 1800, +0., -50 psi. If adjustment of primary relief valve is necessary, loosen jam-nut (13) and turn adjustment screw in to increase pressure; back adjustment screw out to decrease pressure. Tighten jam-nut against housing (8) and torque jam-nut from 100 to 150 lb. in. Recheck pressure adjustments.

5A-12. REMOVAL. (Refer to figure 5A-4.)
a. Cut safety wire and remove valve assemblies from body (19).

5A-13. DISASSEMBLY. (Refer to figure 5A-4.)

NOTE

Relief valve assemblies are preset by the factory and normally will not require disassembly.

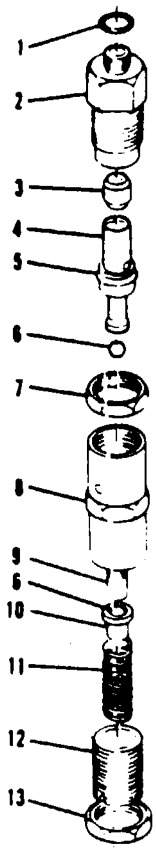
a. Remove jam nut (13) and adjustment screw (12) from housing (8).
b. Remove spring (11), guide (10), balls (6) and piston (9) from housing (8).
c. Loosen jam nut (7) and remove adapter (2) from housing (8).
d. Remove poppet (4) and orifice (3) from adapter (2).

5A-14. INSPECTION. (Refer to figure 5A-4.)
a. Wash all parts in cleaning solvent (Federal Specification P-S-611 or equivalent) and dry with filtered air.

Torque adapter (2) to housing (8), and jam nuts (7) and (13), to housing (8) to 100-150 psi.

Primary relief valve shall relieve at 1800, +00, -50 psi. After flow is terminated, valve shall reset at 1300 psi minimum.

Thermal relief valve shall relieve at 2200, +50, -00 psi.



1. Packing
2. Adapter
3. Orifice
4. Poppet
5. Packing
6. Ball
7. Jam Nut
8. Housing
9. Piston
10. Guide
11. Spring
12. Adjustment Screw
13. Jam Nut

Figure 5A-4. Relief Valve Assembly

b. Inspect all threaded surfaces for serviceable condition and cleanliness.
c. Inspect all parts for scratches, scores, chips, cracks and indications of excessive wear.

5A-15. ASSEMBLY AND ADJUSTMENT. (Refer to figure 5A-4.)

NOTE

Install new packings lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

a. Install orifice (3) and poppet (4) into adapter (2). (New packing (5) must be installed on poppet.)
b. Install jam nut (7) and housing (8) on adapter (2).
c. Tighten adapter (2) into housing (8) and torque to 100-150 lb-in.
d. Tighten jam nut (7) against housing (8) and torque to 100-150 lb-in.
e. Install one ball (6) into housing (8), so that it rests on poppet (4). Install piston (9) into housing (8), then install remaining ball (6) into end of piston (9).
f. Insert guide (9) and spring (11) into housing (8) making sure that balls (6) and piston (9) remain in correct position.
g. Turn adjustment screw (12) into housing (8) until it just contacts spring (11), then turn in one additional turn. Start jam nut (13) onto adjustment screw (12) and snug against housing (33).
h. Connect a hydraulic pump with a flow rate of 0.5 to 0.7 gal-per-min. and a pressure gage with 2500 psi capacity to relief valve. Apply pressure slowly to ensure that relief valve assembly opens at correct pressure reading. PRIMARY RELIEF VALVE opens at 1800, +00 −50 PSI and resets at 1500 PSI MINIMUM (no leakage).
i. If adjustment of relief valve is necessary, turn adjustment screw (12) into increase pressure; back adjustment screw out to decrease pressure. Tighten jam nut (13) against housing (8) and torque to 100-150 lb-in. Recheck pressure adjustments.

5A-16. INSTALLATION. (Refer to figure 5A-3.)
a. Install relief valve assemblies along with packings onto body assembly.

CAUTION

Ensure that relief valves are installed in their correct locations. (Refer to view A-A). Safety wire relief valves as shown in view A-A.

5A-17. PRESSURE SWITCH. (Refer to figure 5A-5.)

5A-18. DESCRIPTION. A pressure switch is located in the cover of the power pack. The switch opens the electrical circuit to the pump solenoid when the pressure in the system increases to approximately 1500 psi. The pressure switch will continue to hold the electrical circuit open until pressure in the system drops to approximately 1000 psi, at which time, the pump will again operate to build up pressure to approximately 1500 psi, regardless of gear selector handle position.

5A-19. REMOVAL. (Thru P21000501.) (See figure 5A3.)
a. Move left seat to full aft position.
b. Remove decorative cover from pedestal as outlined in Section 9 of this manual.
c. Remove upper panel assembly from aft face of pedestal.
d. Through opening created by removal of upper panel assembly, and assuring that master switch is off, disconnect wires from pressure switch.
e. Disconnect and remove pressure switch and packing from power pack.

5A-20. DISASSEMBLY. (Refer to figure 5A-5.)
a. Remove pin (11).
b. Unscrew cap and housing assembly (10) from fitting (2).
c. Remove spring (9).
d. Remove washers (8) from flange of stop (7).

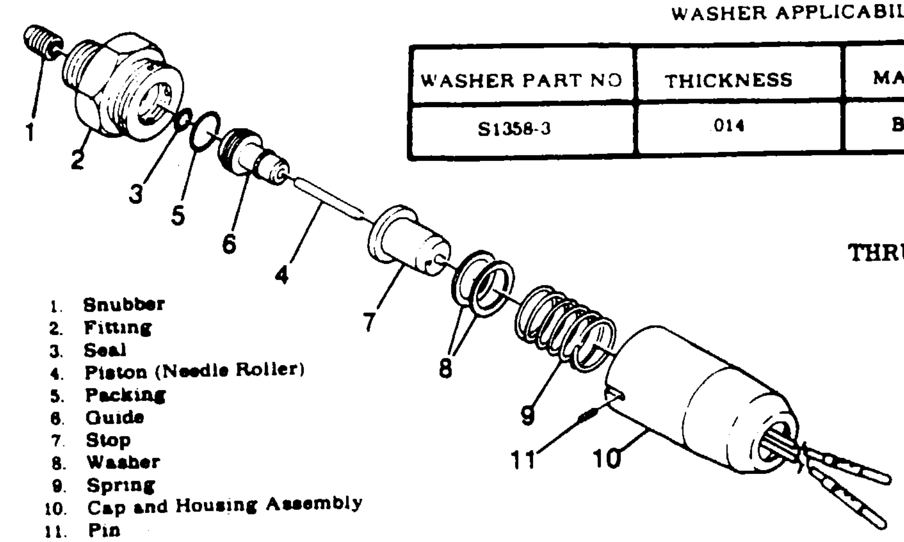
NOTE

Chart in figure 5A-5 lists washers (8) by part number, thickness and effect on operating pressure (psi).

e. Unscrew guide (6) from fitting (2).

WASHER APPLICABILITY

WASHER PART NO	THICKNESS	MATERIAL	EFFECT IN PRESSURE (PSI)
S1358-3	.014	BRASS	55



THRU SERIAL P21000501

1. Snubber
2. Fitting
3. Seal
4. Piston (Needle Roller)
5. Packing
6. Guide
7. Stop
8. Washer
9. Spring
10. Cap and Housing Assembly
11. Pin

Figure 5A-5. Pressure Switch

CAUTION

Do not damage lip of guide (6). Guide threads and threads of fitting (2) are primed with Loctite Grade T Primer and sealed with Loctite Grade AV Sealer.

f. Remove piston (4).
g. Remove seal (3) and packing (5).
h. Remove snubber (1) from fitting (2).

CAUTION

Threads of snubber (1) and fitting (2) are primed with Loctite Grade T Primer and sealed with Loctite Grace AV Sealer.

5A-21. INSPECTION AND REPAIR. (Refer to figure 5A-5.)

a. Clean sealant from threads of snubber (1), fitting (2) and guide (6) with wire brush.
b. Clean all parts with cleaning solvent (Federal Specification P-S-661, or equivalent) and dry thoroughly.
c. Discard seal (3) and packing (5) and replace with new parts.
d. Inspect all pressure switch parts for scratches, scores, chips, cracks and indications of wear.
e. All damaged parts shall be replaced with new parts.
f. Snubber (1) can be cleaned with solvent, then blown out with high pressure compressed air.
g. Assure that 0.062-inch vent hole is open in stop (7).

5A-22. REASSEMBLY. (Refer to figure 5A-5.)

NOTE

Threads of snubber (1), guide (6), and internal threads of fitting (2) are to be primed with Loctite grade T primer and sealed with Loctite grade AV sealant. Allow primer to cure for a minimum of three minutes before sealant application. Allow sealant to set from five to 40 minutes after assembling parts.

NOTE

Install new seal (3) and packing (5) and existing piston (4), stop (7) and spring (9), lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7. Lubricate guide (6), however, keep lubricant away from threaded end of part.

a. Install snubber (1) into fitting (2) and tighten with slotted screwdriver.
b. Install packing (5) in fitting (2).
c. Install seal (3) in guide (6).
d. Install guide (6) into fitting (2) and finger tighten.

NOTE

It is possible to assemble, fill and test the pressure switch in the aircraft. This can be accomplished by the installation of a test fitting, located on the side of the power pack, and pumping the emergency hand pump. Master switch must be off and selector handle in down position.

e. After installing test fitting and assuring that sealant in fitting (2) is dry, screw fitting assembly into power pack.
f. Pump emergency hand pump just enough for fluid to seep from top of guide (6). (Refer to Section 2.)
g. Insert piston (4) into hole in guide (6).
h. Install stop (7) over guide (6).
i. Install exact number and thickness of washers removed.

NOTE

If same number of washers (8) is installed as was removed, pressure should not require readjustment. If readjustment is necessary, a chart of washer part numbers, thickness and effect in pressure adjustment is shown in figure 5A-5.

5A-23. ADJUSTMENT. (Refer to figure 5A-5.)

a. Jack aircraft in accordance with procedure outlined in Section 2 of this manual.

b. Screw cap and housing assembly on fitting (2) enough to bottom piston out in stop (7).

c. Turn cap and housing assembly (10) back from full thread engagement one turn, plus 0, minus one-fourth turn to locate hole in fitting (2) in slot in skirt of cap and housing. Drive pin (11) into hole in fitting.

d. Attach electrical connections to pressure switch and attach external power source.

e. Turn on master switch.

f. Pump hand pump to obtain 1500 psi on test gage.

g. Switch should open electrical circuit to pump solenoid when pressure in system increases to approximately 1500 psi.

h. If switch opens electrical circuit to solenoid prematurely, disassemble pressure switch down to washers (8) and add shims as necessary to obtain desired pressure; repeat steps (b) and (c).

NOTE

Chart in figure 5A-5 lists washers by part number, thickness and effect in psi each washer will have on switch operation.

i. If switch opens electrical circuit to solenoid later than 1500 ± 50 psi, disassemble pressure switch down to washers (8) and remove washers as necessary to obtain desired pressure; repeat steps (b) and (c).

j. Turn off master switch.

k. Lower aircraft to ground.

5A-24. INSTALLATION. (Refer to figure 5A-3.) Since pressure switch will normally be left in power pack after adjustment, described in the preceding paragraph, all that needs to be accomplished is to reassemble the center console. This may be accomplished by installing the upper panel assembly on the aft face of the pedestal and installing the decorative cover as outlined in Section 9 of this manual.

5A-24A. REMOVAL AND INSTALLATION. (Beginning with P21000502.) (See figure 5A-3.)

a. Move left seat to full aft position and spread a drip cloth beneath power pack.

b. Assure that master switch is OFF, and disconnect leads at terminals at pressure switch.

c. Remove pressure switch from power pack.

d. Reverse procedures for installation.

5A-24B. DISASSEMBLY. (See figure 5A-5A.)

a. Remove pin (10).

b. Unscrew housing (11) from fitting (2).

c. Remove spring (9).

d. Remove washers (8) from flange of stop (7).

NOTE

Chart in figure 5A-5A lists washers by part number, thickness and effect on operating pressure (psi).

e. Unscrew guide (5) from fitting (2).

NOTE

Do not damage lip of guide (5). Threads of guide (5), snubber (1), and internal threads of fitting (2) are primed with Loctite grade T primer and sealed with Loctite grade AV sealer.

f. Remove needle roller (6).

g. Remove seal (3) and packing (4).

h. Remove snubber (1) from fitting (2).

5A-24C. INSPECTION AND REPAIR. (See figure 5A-5A.)

a. Clean sealant from threads of snubber (1), fitting (2) and guide (5) with wire brush.

b. Clean all parts with cleaning solvent (Federal Specification P-S-661, or equivalent, and dry thoroughly.

c. Discard seal (3) and packing (4), and replace with new parts.

d. Inspect all pressure switch parts for scratches, scores, chips, cracks and indications of wear.

e. All damaged parts shall be replaced with new parts.

f. Snubber (1) can be cleaned with solvent, then blown out with high pressure compressed air.

g. Assure that 0.062-inch vent hole is open in stop (7).

5A-24D. REASSEMBLY. (See figure 5A-5A.)

NOTE

Threads of snubber (1), guide (5), and internal threads of fitting (2) are to be primed with Loctite grade T primer and sealed with Loctite grade AV sealant. Allow primer to cure for a minimum of three minutes before sealant application. Allow sealant to set from five to 40 minutes after assembling parts.

NOTE

Install new seal (3) and packing (4) and existing piston (6), stop (7) and spring (9), lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7. Lubricate guide (5), however, keep lubricant away from threaded end of part.

a. Install snubber (1) into fitting (2) and tighten with slotted screwdriver.

b. Install packing (4) in fitting (2).

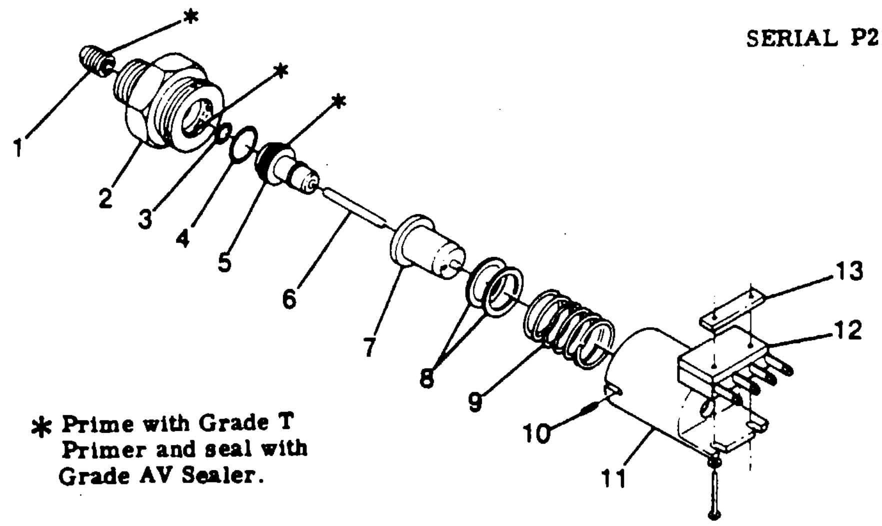
c. Install seal (3) in guide (5).

d. Install guide (5) into fitting (2) and finger tighten.

NOTE

It is possible to assemble, fill and test the

SERIAL P21000502 & ON



1. Snubber
2. Fitting
3. Seal
4. Packing
5. Guide
6. Piston
7. Stop
8. Washer
9. Spring
10. Roll Pin
11. Housing
12. Switch
13. Plate

* Prime with Grade T Primer and seal with Grade AV Sealer.

WASHER APPLICABILITY

WASHER PART NO.	THICKNESS	MATERIAL	EFFECT IN PRESS. (PSI)
S1358-7	.014-inch	"MYLAR POLYESTER FILM TYPE A"	55
S1358-8	.005-inch	"MYLAR POLYESTER FILM TYPE A"	20

Figure 5A-5A. Pressure Switch

pressure switch in the aircraft. This can be accomplished by the installation of a test gage in the capped port of the tee fitting on the right-hand side of the power pack, and pumping the emergency hand pump. Master switch must be OFF and selector handle must be in DOWN position.

e. After installing test fitting and assuring that sealant in fitting (2) is dry, screw fitting assembly into power pack body.
f. Pump emergency hand pump just enough for fluid to seep from top of guide (5). (Refer to Section 2 of this Manual.)
g. Insert piston (6) into hole in guide(5).
h. Install stop (7) over guide (5).
i. Install exact number and thickness of washers removed.
j. Install spring (9) over washers (8).
k. Screw housing (11) on fitting (2).

NOTE

If same number of washers (8) are installed as were removed, pressure should not require readjustment. If readjustment is necessary, the washer applicability table lists washer part numbers, thickness, and effect in pressure. Washers are available from the Cessna Supply Division.

l. Check fluid level in power pack reservoir. (Refer to Section 2 of this Manual.)

5A-24E. ADJUSTMENT. (See figure 5A-5A.)
a. Jack aircraft as outlined in Section 2 of this Manual.
b. Screw housing assembly on fitting (2), enough to bottom needle roller out in stop (7).
c. Turn housing (11) back from full-thread engagement one turn, plus 0, minus one-fourth turn to locate hole in fitting (2) in slot of skirt in housing. Install pin (10) in housing.
d. Attach electrical connections to pressure switch at attach external power source.
e. Turn master switch ON.
f. Pump hand pump to obtain 1500±50 psi on test gage.
g. The switch should open the electrical circuit to the pump solenoid when pressure in the system in-

creases to approximately 1500±50 psi.

h. If switch opens electrical circuit prematurely, disassemble pressure switch down to washers (8) and add washers as necessary to obtain desired pressure, repeat steps "b" and "c".

i. If switch opens electrical circuit later than 1500 ±50 psi, disassemble pressure switch down to washers (8) and remove washers as necessary to obtain desired pressure; repeat steps "b" and "c".

j. Turn master switch OFF.

5A-25. EMERGENCY HAND PUMP. (Refer to figure 5A-6.)

5A-26. DESCRIPTION. The emergency hand pump is mounted below the floor between the pilot and co-pilot seats. The pump handle extends to the cabin. The pump supplies a flow of pressurized hydraulic fluid to extend the landing gear in the event of normal hydraulic pump failure.

5A-27. REMOVAL AND INSTALLATION.

a. Remove seats as required for access.

b. Remove screws attaching cover over hand pump and remove cover.

c. Peel back carpet as required for access to pump mounting bolts.

d. Wedge cloth under hydraulic fittings to absorb fluid, then disconnect the two hydraulic lines and plug or cap open fittings to prevent entry of foreign material.

e. Remove two bolts, washers and nuts securing pump to mounting bracket.

f. Work pump from aircraft.

g. Install hand pump by reversing the preceding steps, bleeding lines and pump as lines are connected.

h. Fill reservoir as required.

5A-28. DISASSEMBLY. (Refer to figure 5A-6.)

NOTE

After emergency hand pump has been removed from aircraft, and ports are capped or plugged, spray with cleaning solvent (Federal Specification P-S-611, or equivalent) to remove all accumulated dust or dirt. Dry with filtered compressed air.

a. Remove hand pump handle by removing pivot and linkage pins after removing cotter pins.

b. Remove end fitting from body assembly.

c. Push piston from body assembly.

d. Remove retaining ring from end fitting to remove valve assemblies.

e. Remove and discard all O-rings and back-up rings.

5A-29. INSPECTION AND REPAIR.

a. Inspect seating surfaces of valves.

b. Inspect piston for scores, burrs or scratches which could cut O-rings. This is a major cause of external and internal leakage. The piston may be polished with extremely fine emery paper. Never use paper coarser than No. 600 to remove scratches or burrs. If defects do not polish out, replace piston.

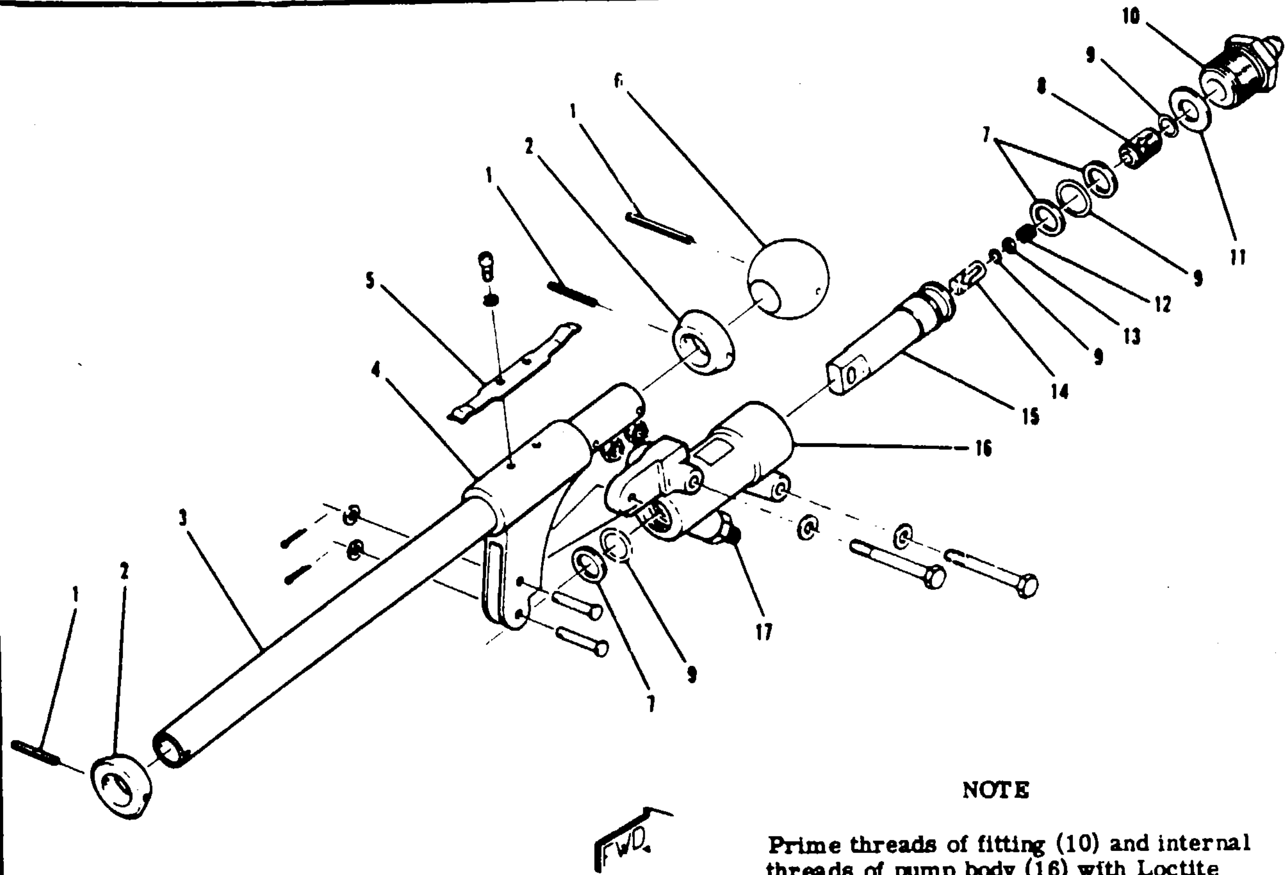
NOTE

Install new packing (9), (17), and back-up rings (7), lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606 or Dow-Corning DC-7.

5A-30. REASSEMBLY. (Refer to figure 5A-6). Assemble the emergency hand pump, using the figure as a guide. Also, for detailed instructions, reverse the procedures outlined in paragraph 5A-28.

5A-31. LANDING GEAR SELECTOR VALVE. (Refer to figure 5A-7.)

5A-32. DESCRIPTION. A mechanical gear position selector valve is located on the switch panel. The pilot shuttles the valve mechanically when he changes



NOTE

Prime threads of fitting (10) and internal threads of pump body (16) with Loctite grade T primer and seal first three threads of fitting (10) with Loctite hydraulic sealant. Allow primer to cure for a minimum of three minutes before sealant application. Allow sealant to set from five to 40 minutes after assembling parts.

1. Roll Pin
2. Stop
3. Handle
4. Fork
5. Spring
6. Knob
7. Back-Up Ring
8. Check Valve
9. Packing
10. Fitting
11. Washer
12. Setscrew
13. Spacer
14. KEP-O-SEAL Valve
15. Piston
16. Pump Body
17. Union and Packing

Figure 5A-6. Emergency Hand Pump Disassembly

gear handle position. The handle must be pulled out prior to selecting gear position. Moving the selector rod opens and closes ports in the valve, enabling fluid under pressure to flow to the various system components to retract or extend the gear.

5A-33. REMOVAL AND INSTALLATION. (Refer to figure 5A-7.)

a. Loosen nut (15) and remove rod (16).

CAUTION

As hydraulic lines are disconnected, fluid will leak. Precautions must be taken to prevent excessive leakage, such as spreading drip cloths under fittings and capping lines and fittings.

b. Disconnect hydraulic lines routed to valve.

c. Remove screws attaching valve to instrument panel.

d. Remove selector valve.

e. Reverse preceding steps to install gear selector valve.

5A-34. DISASSEMBLY AND REASSEMBLY. (Refer

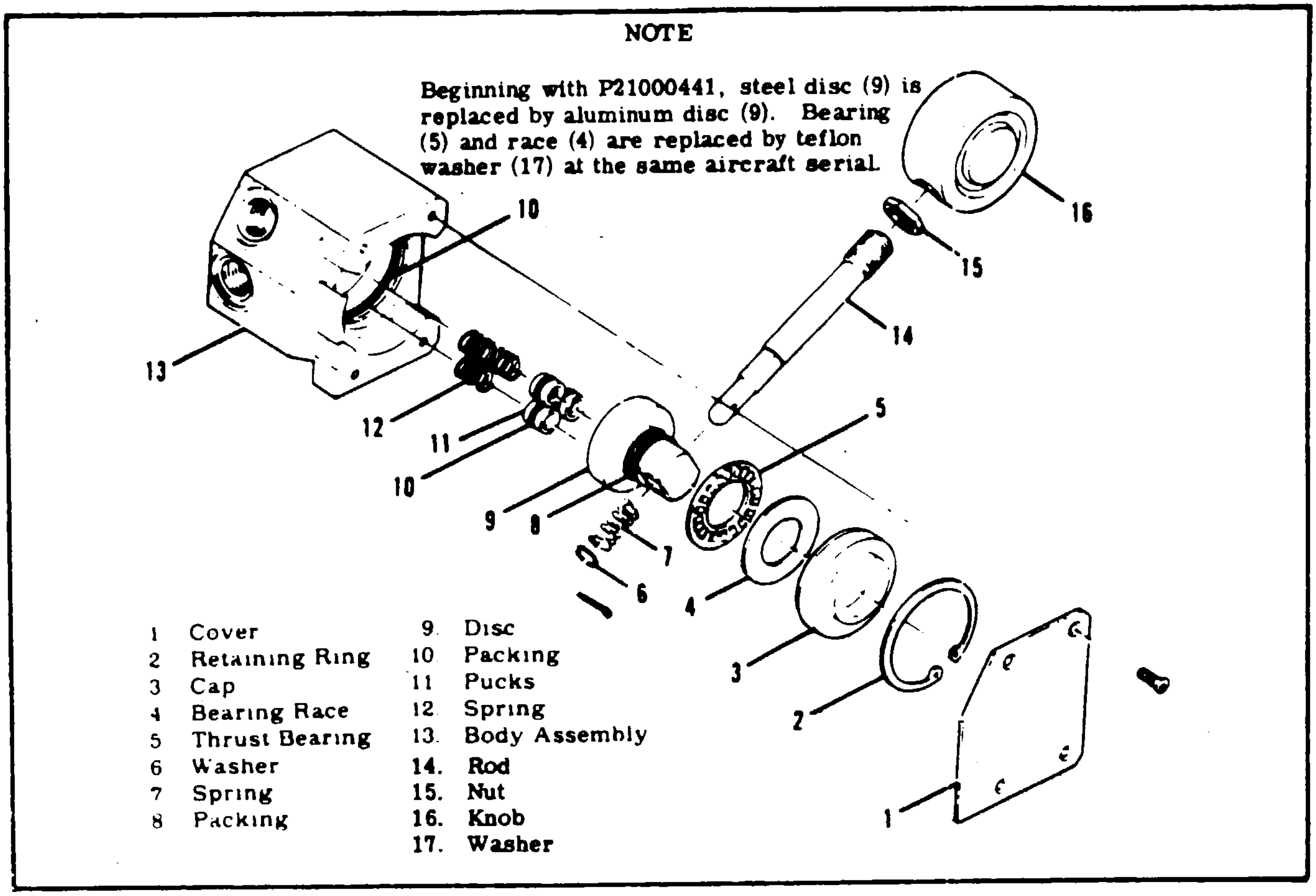


Figure 5A-7. Landing Gear Position Selector Valve

to figure 5A-7.)

a. Remove cover (1), retaining ring (2) and cap (3). Thru P21000440, remove race (4) and bearing (5). Beginning with P21000441, remove washer (17).
b. Remove cotter pin, washer (6) and spring (7).
c. Pull rod (14) from disc (9); remove disc.
d. Remove packs (11) and springs (12).
e. Reverse preceding steps for reassembly.

5A-35. INSPECTION AND REPAIR. (Refer to figure 5A-7.) Replace packings (8) and (10). Check valve for wear, foreign or abrasive materials. Disc (9) may be refaced (lapped) if worn or abraded. Check rollers in bearings (5).

5A-36. RIGGING THROTTLE-OPERATED GEAR WARNING HORN MICRO-SWITCH. (Refer to figure 5A-8.) Rigging procedures for sea level or turbo-charged aircraft are outlined in figure 5A-8.)

5A-37. MAIN LANDING GEAR. (Refer to figure 5A-9.)

5A-38. DESCRIPTION. The tubular main gear struts rotate aft and inboard to stow the main wheels beneath the baggage compartment. The main gear utilizes hydraulic pressure for positive uplock and mechanical downlocks. Main gear uplock pressure is maintained automatically by the pump assembly. Rotation of the gear to extend or retract the struts is achieved through pivot assemblies which in turn are bolted through a splined shaft, to the hydraulic main gear rotary actuators.

CAUTION

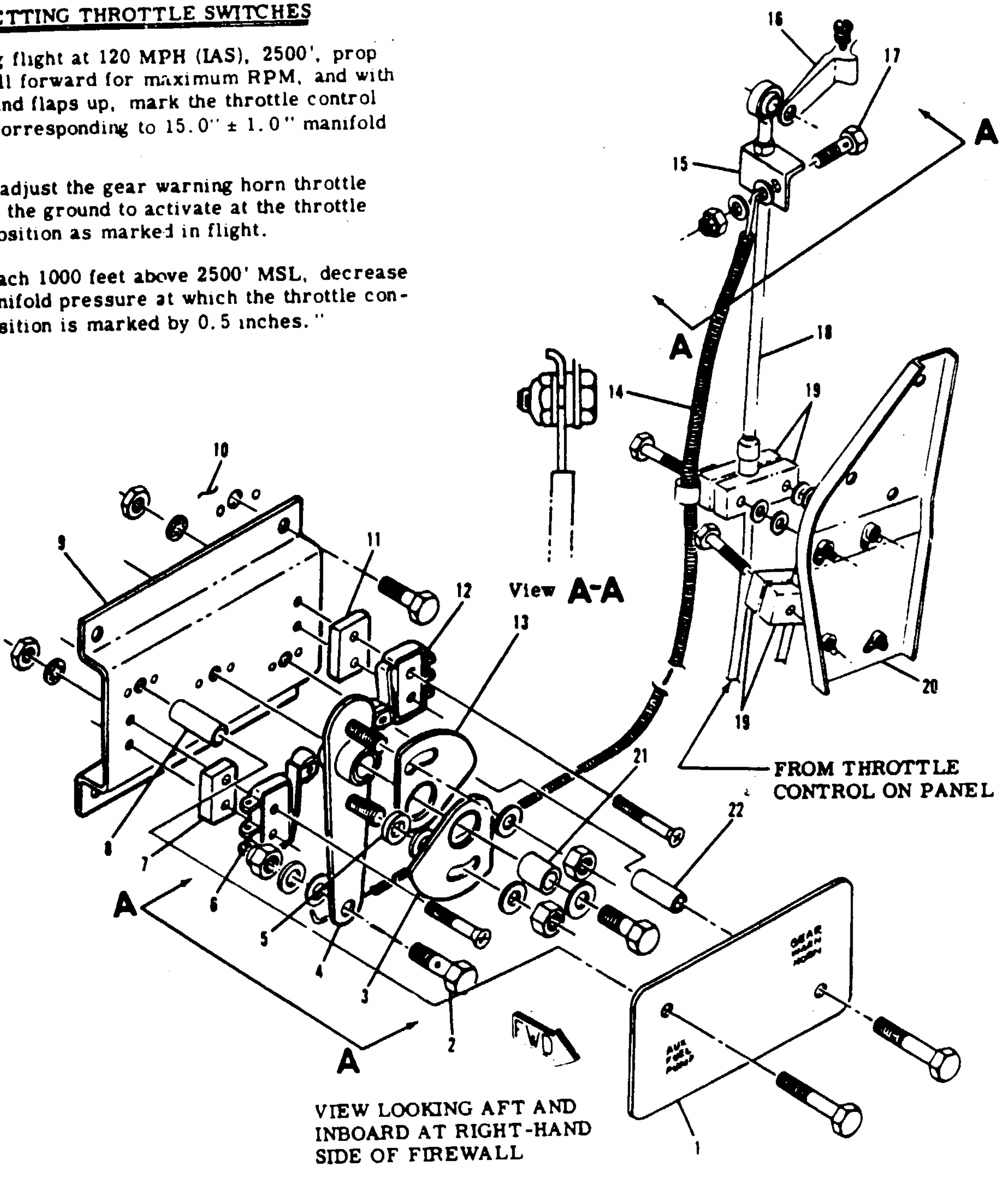
Use of recapped tires or new tires not listed on the aircraft equipment list are not recommended due to possible interference between the tire and structure when landing gear is in the retracted position.

SETTING THROTTLE SWITCHES

1. During flight at 120 MPH (IAS), 2500', prop control full forward for maximum RPM, and with the gear and flaps up, mark the throttle control position corresponding to 15.0" ± 1.0" manifold pressure.

2. Then adjust the gear warning horn throttle switch on the ground to activate at the throttle control position as marked in flight.

"For each 1000 feet above 2500' MSL, decrease the manifold pressure at which the throttle control position is marked by 0.5 inches."



1. Cover
2. Clamp Bolt
3. Fuel Pump Switch Cam
4. Arm Assembly
5. Thick Washer
6. Fuel Pump Switch
7. Spacer
8. Spacer
9. Mounting Bracket
10. Lower RH Firewall
11. Spacer
12. Gear Warning Switch
13. Gear Warning Cam
14. Throttle Control (Secondary)
15. Cable Clamp Mount
16. Throttle Lever
17. Clamp Bolt
18. Cabin Throttle Control
19. Clamp Half
20. Clamp Assembly
21. Bushing
22. Spacer

Figure 5A-8. Rigging Throttle-Operated Gear Warning Horn Switch

5A-39. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
AIRCRAFT LEANS TO ONE SIDE.	Incorrect tire inflation.	Inflate to correct pressure.
	Sprung main gear strut.	Remove and replace strut.
	Bent axle.	Install new axle.
UNEVEN OR EXCESSIVE TIRE WEAR.	Incorrect tire inflation.	Inflate to correct pressure.
	Wheel out of alignment.	Align wheels.
	Wheels out of balance.	Balance wheels.
	Sprung main gear strut.	Replace strut.
	Bent axle.	Install new axle.
	Dragging brakes.	Jack wheel and check brake.
	Wheel bearings not adjusted properly.	Tighten axle nut properly.

5A-40. REMOVAL. (Refer to figure 5A-9.)

a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.

b. Bleed fluid from brake line at wheel brake cylinder.

c. Turn master switch off; move gear position selector valve to up position, then turn master switch on until main gear downlocks disengage. Turn master switch off and pull pump motor circuit breaker to ensure that pump cannot be actuated accidentally. Place gear position selector handle in a neutral position so that gear rotates freely.

NOTE

If the pump motor cannot be used to unlock the main gear because of an opening in the hydraulic system, the spring-loaded main gear downlocks can be manually unlocked by pushing them forward with a screwdriver or other similar tool, and holding them forward, until the main gear has rotated past.

WARNING

It is advisable to have an assistant hold the gear strut up while the locks are pushed forward to prevent the strut from rotating suddenly, possibly causing personal injury. Ensure that master switch is OFF and pump motor circuit breaker pulled.

d. Remove strut attach bolt and work strut from pivot assembly.

5A-41. INSTALLATION. (Refer to figure 5A-9.)

NOTE

The following procedure installs the landing gear as a complete assembly. Refer to applicable paragraphs for installation of individual components.

NOTE

Install new packings, lubricated with a film of Petrolatum VV-P-236, hydraulic fluid MIL-H-5606, or Dow-Corning DC-7.

a. Using new packings (24), on and in end gland (25), position plug aligning pin (Special tool no. SE934) through end plug (25).

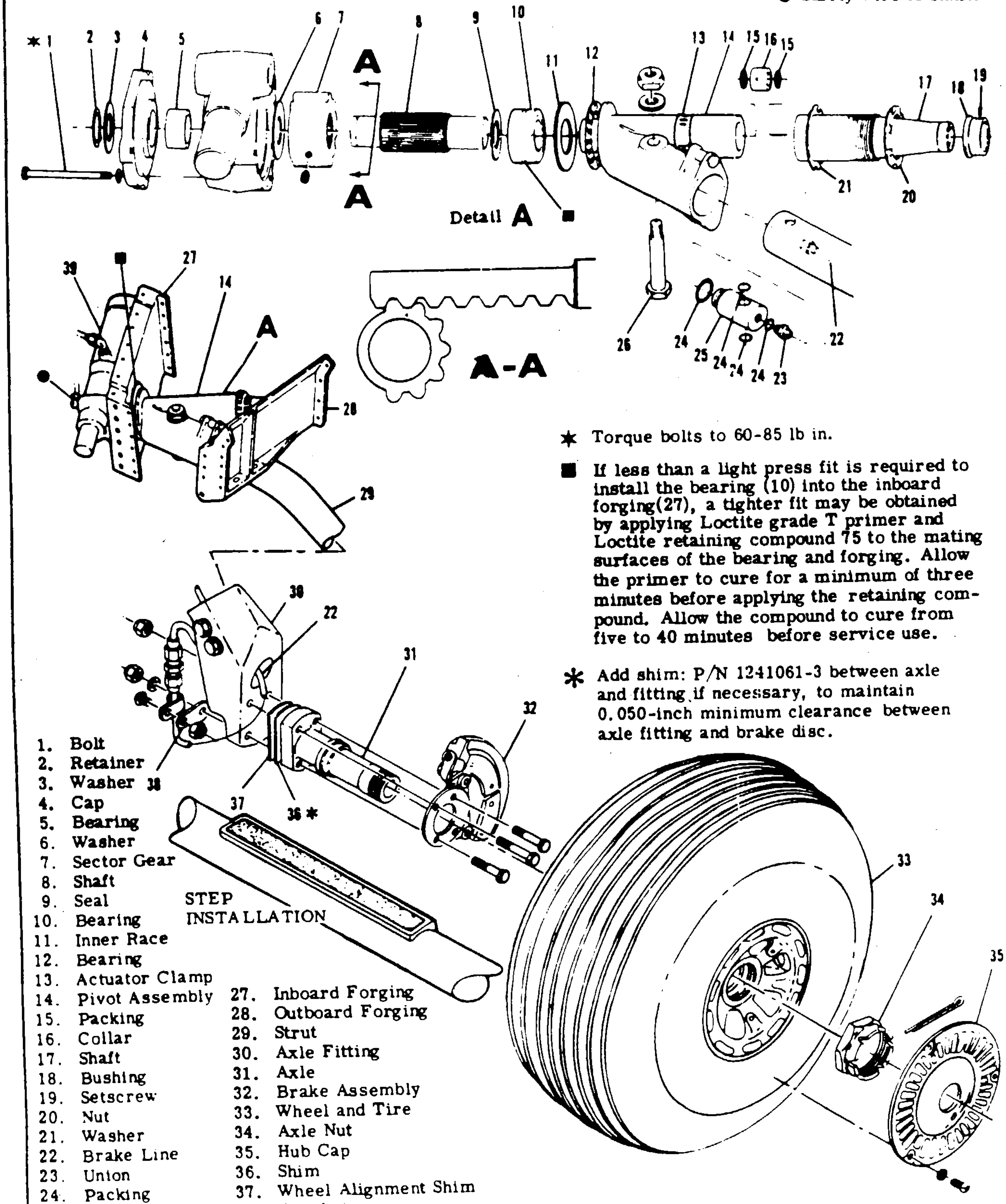
NOTE

Special tool # 934 is available from the Cessna Supply Division.

b. Work strut and wheel assembly into pivot assembly, aligning attach hole in strut and pivot assembly.

NOTE

If a new pivot assembly is being installed, it is permissible to burnish the 2.10-inch I.D. bore to facilitate assembly of landing gear spring into pivot.



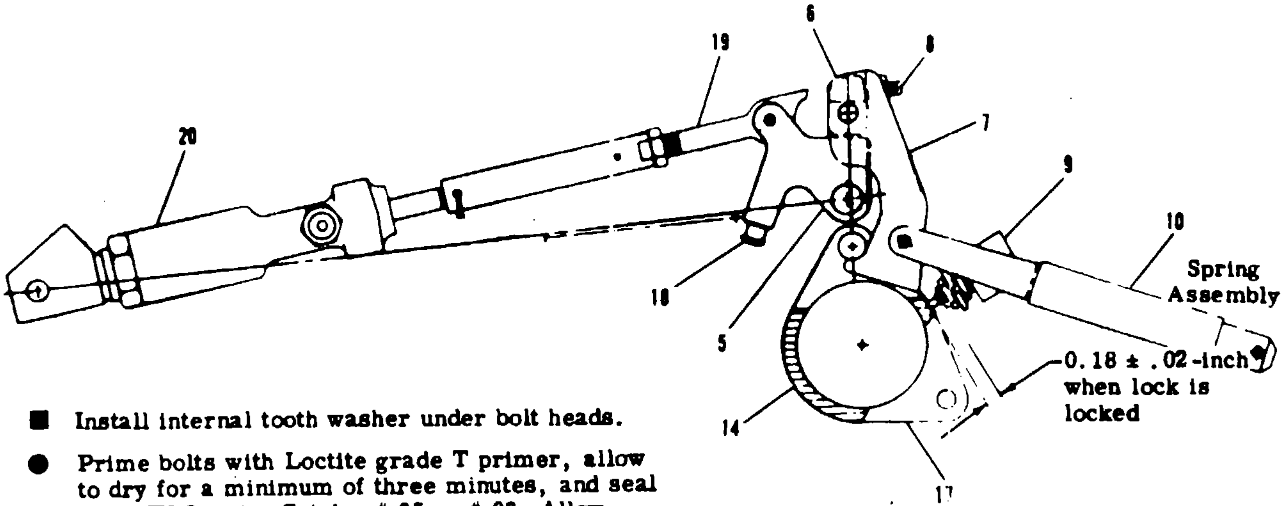
★ Torque bolts to 60-85 lb in.

■ If less than a light press fit is required to install the bearing (10) into the inboard forging(27), a tighter fit may be obtained by applying Loctite grade T primer and Loctite retaining compound 75 to the mating surfaces of the bearing and forging. Allow the primer to cure for a minimum of three minutes before applying the retaining compound. Allow the compound to cure from five to 40 minutes before service use.

✱ Add shim: P/N 1241061-3 between axle and fitting if necessary, to maintain 0.050-inch minimum clearance between axle fitting and brake disc.

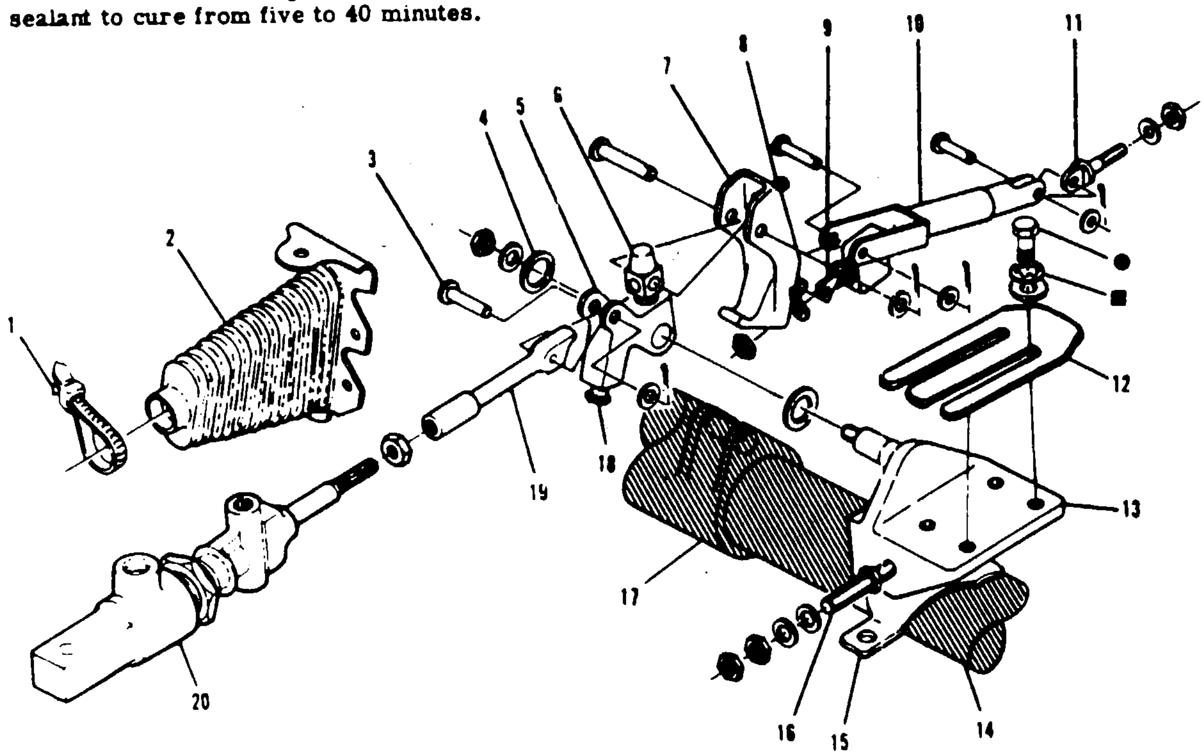
1. Bolt
2. Retainer
3. Washer
4. Cap
5. Bearing
6. Washer
7. Sector Gear
8. Shaft
9. Seal
10. Bearing
11. Inner Race
12. Bearing
13. Actuator Clamp
14. Pivot Assembly
15. Packing
16. Collar
17. Shaft
18. Bushing
19. Setscrew
20. Nut
21. Washer
22. Brake Line
23. Union
24. Packing
25. Plug
26. Bolt
27. Inboard Forging
28. Outboard Forging
29. Strut
30. Axle Fitting
31. Axle
32. Brake Assembly
33. Wheel and Tire
34. Axle Nut
35. Hub Cap
36. Shim
37. Wheel Alignment Shim
38. Bracket
39. Actuator

Figure 5A-9. Main Landing Gear



■ Install internal tooth washer under bolt heads.

● Prime bolts with Loctite grade T primer, allow to dry for a minimum of three minutes, and seal with CV Loctite Catalog # 85 or # 83. Allow sealant to cure from five to 40 minutes.



1. Tie
2. Boot
3. Pin
4. Spacer
5. Arm Assembly
6. Downlock Adjustment Screw
7. Hook
8. Setscrew
9. Downlock Switch
10. Spring Assembly
11. Eyebolt
12. Shim
13. Support Assembly
14. Landing Gear Strut
15. Shell Assembly
16. Stud
17. Pivot Assembly
18. Bolt
19. Rod End
20. Actuator

NOTE

Stud (16) and downlock support shell (15) attaching screws shall be sealed with grade AV Loctite 271, or Loctite Catalog # 87. Allow sealant to cure for 12 hours before service use.

Figure 5A-10. Rigging Main Landing Gear (Sheet 1 of 3)

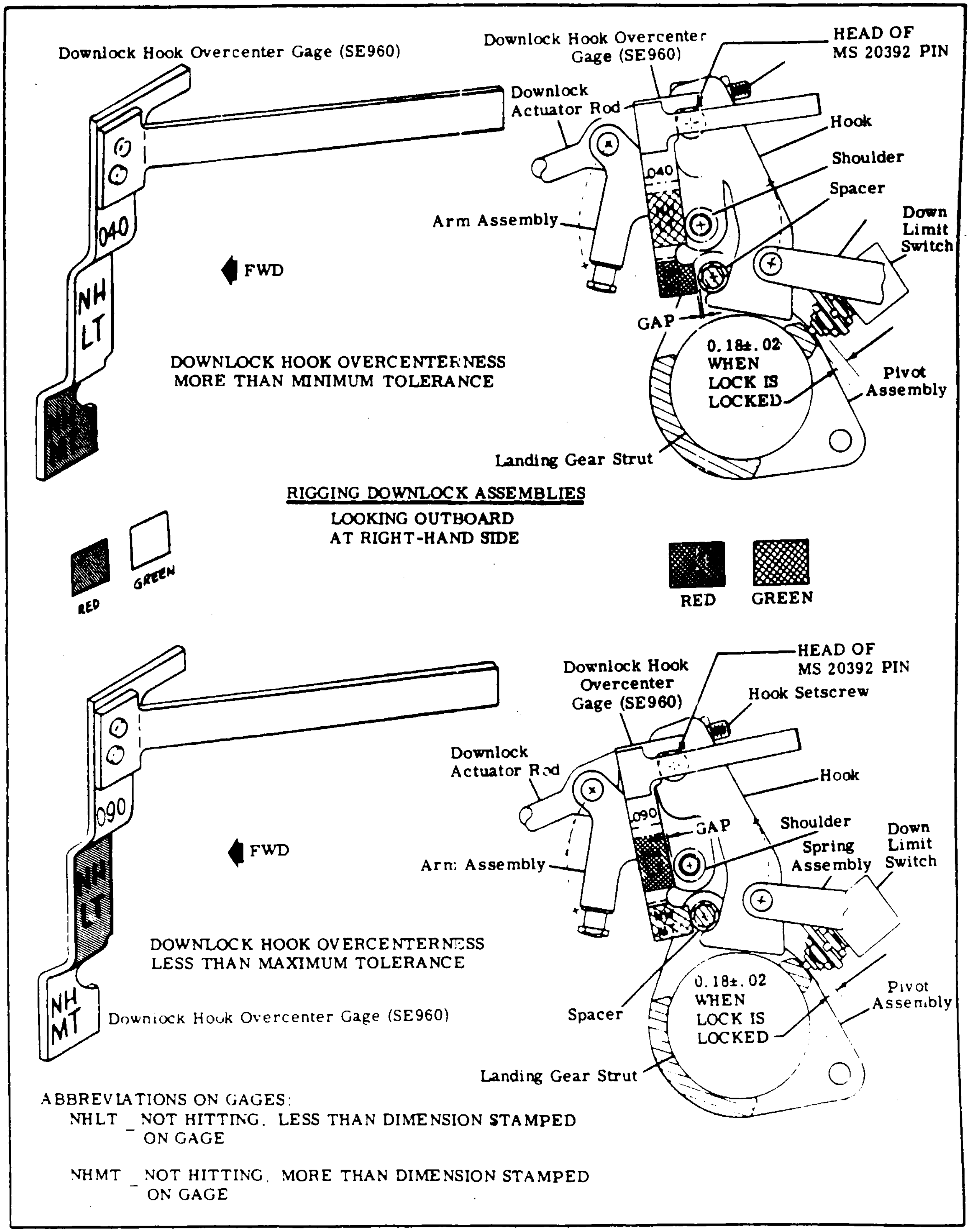


Figure 5A-10. Rigging Main Landing Gear (Sheet 2 of 3)

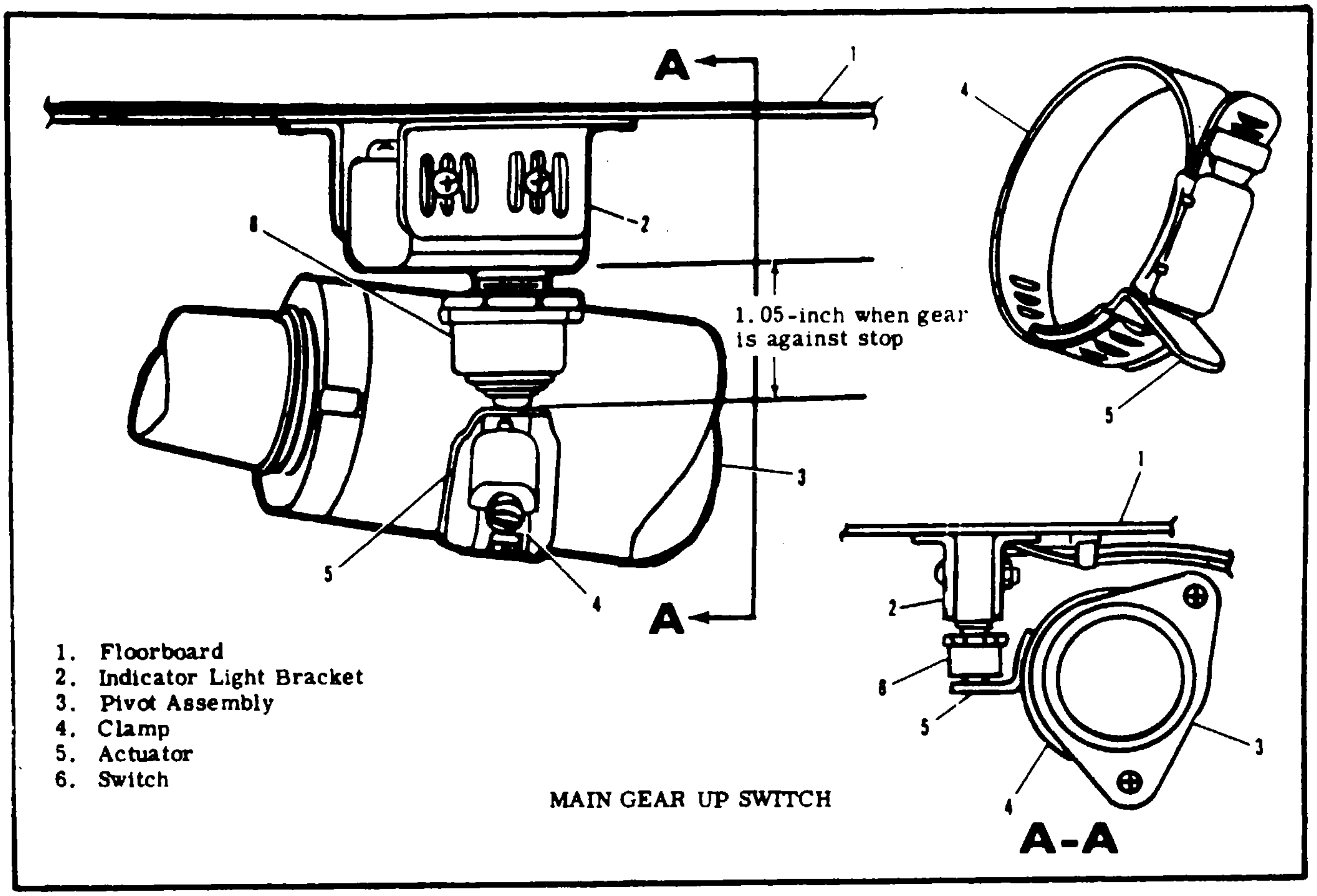


Figure 5A-10. Rigging Main Landing Gear (Sheet 3 of 3)

c. With threaded end of attach bolt in counterbore of plug-aligning pin, push pin from pivot assembly with bolt.
d. Install nut and washer on bolt; tighten nut.
e. Connect brake line at wheel cylinder. Fill and bleed brake system in accordance with applicable paragraph in Section 5.
f. Rig landing gear in accordance with procedures outlined in this Section.

5A-42. RIGGING. (Refer to figure 5A-10.)

NOTE

All of the following rigging adjustments shall be accomplished with the aircraft on jacks and in a level condition, using the ship's power pack to supply pressure. A ground power source should augment the ship's battery.

a. With main gear unlocked and main landing gear support forging assembled loose to the outboard support assembly, bring main landing gear strut into DOWN position and adjust as follows.

1. Center and shim simultaneously main landing gear support, using shims (P N 1241629) between outboard forging and landing gear support assembly as shown on sheet 1, to level wings and assure that end points of main landing gear wheel axles are within ±.25-inch of a water line plate. Total of shims to be within .025-inch to .075-inch. Check landing gear spring-to-support pad surface contact, and maintain surface contact at 75% or better. The following shims are available from the Cessna Supply Division.

1241629-1	0.016-inch
1241629-2	0.025-inch
1241629-3	0.050-inch
1241629-4	0.071-inch

b. Adjust downlock set screw to stop hook assembly .040 to .090-inch over center as shown on sheet 2.

NOTE

The downlock hook shall have positive clearance with both inboard and outboard ears of the gear pivot, in all conditions of hook operation, locked, normal operation and malfunction operation. Adjust downlock hook inboard or outboard as required, by locating spacers, installed on the required side of the hook. In some cases, all of the spacers will be installed on one side of the downlock hook to achieve the required clearance.

c. A new downlock actuator assembly is received with a preassembled length of 12.45-inches(refer to figure 5A-10, sheet 1 of 3), and the three hydraulic ports in the same plane. Install actuator assembly, attaching it to fuselage structure and downlock hook arm assembly.

d. With landing gear free, hydraulic pressure off, and downlock systems in position shown in figure 5A-10, sheet 1, swing landing gear into DOWN position and adjust adjusting screw as follows:

NOTE

To relieve hydraulic pressure, pull hydraulic pump circuit breaker off, and move gear selector handle up and down two or three times.

1. If downlock locks, turn adjusting screw 1/4 turn out at a time until lock will not lock, then turn back in 1/4 turn and secure pin.
2. If downlock does not lock, turn adjusting screw 1/4 turn in at a time until lock will lock, then secure pin.

e. Readjust downlock hook setscrew to stop hook assembly 0.040-inch to 0.090-inch overcenter. When checking overcenter measurement of downlock arm assembly, landing gear should be as shown in figure 5A-10, sheet 2. With nut, washer, and spacer removed, which retains the arm assembly. Use downlock overcenter gages (P/N SE960) to determine if downlock hook assembly is still within tolerances shown in figure 5A-10, sheet 2. Use gages as follows:

NOTE

Overcenter gages, part # SE960 are available from the Cessna Supply Division.

1. Remove nut, washer and spacer which retain arm assembly to support assembly.
2. Install 0.090-inch downlock gage (SE960) on inboard side of downlock hook as shown in figure 5A-10, sheet 2. Upper portion of gage should rest against head of pin attaching adjusting screw. If downlock hook is under maximum overcenter tolerance, green area of gage will contact spacer on gear pivot, while red area will not make contact with 0.50-inch diameter shoulder, as shown in the figure. When downlock hook is in maximum overcenter tolerance, both green and red areas will make contact. If red area makes contact and green area does not, the downlock hook setscrew should be adjusted INWARD to bring overcenter dimension within tolerance.
3. Install 0.040-inch downlock gage (SE960) on inboard side of downlock hook as shown in figure 5A-10, sheet 2. If downlock hook is over minimum overcenter tolerance, green area of gage will contact shoulder, while red area will not make contact with spacer.
4. When downlock hook is in minimum over center tolerance, both red and green areas will make contact.
5. If overcenter tolerance is less than 0.040-inch, the red area will make contact, while the green area will not. If this condition exists, the next step is to determine if the downlock hook adjusting screw is making contact with the setscrew. This is accomplished by lifting the landing gear spring upward off the hook assembly and checking for possible rotation of the hook assebly, by hand, with hydraulic pressure off.
6. If a slight rotation is possible, setscrew is not contacting adjusting screw. If contact is not being made, downlock actuator will have to be readjusted by backing off actuators rod end one-half turn at a time (one and one-half turn maximum adjustment) until hook assembly is 0.040-inch or more overcenter, and contact is being made between setscrew and adjusting screw. If contact is being made, setscrew should be adjusted outward to increase overcenter measurement to within tolerance.

NOTE

For correct rigging, downlock hook setscrew must make contact with adjusting screw and green areas of both gages must contact as shown in figure 5A-10, sheet 2.

f. Now that downlock hook adjusting screw has been adjusted following procedures outlined in step "e", check downlock actuator rod end adjustment as follows:

1. Connect all hydraulic lines, fill system with MIL-H-5606 hydraulic fluid and purge system of air by cycling gear through several cycles.

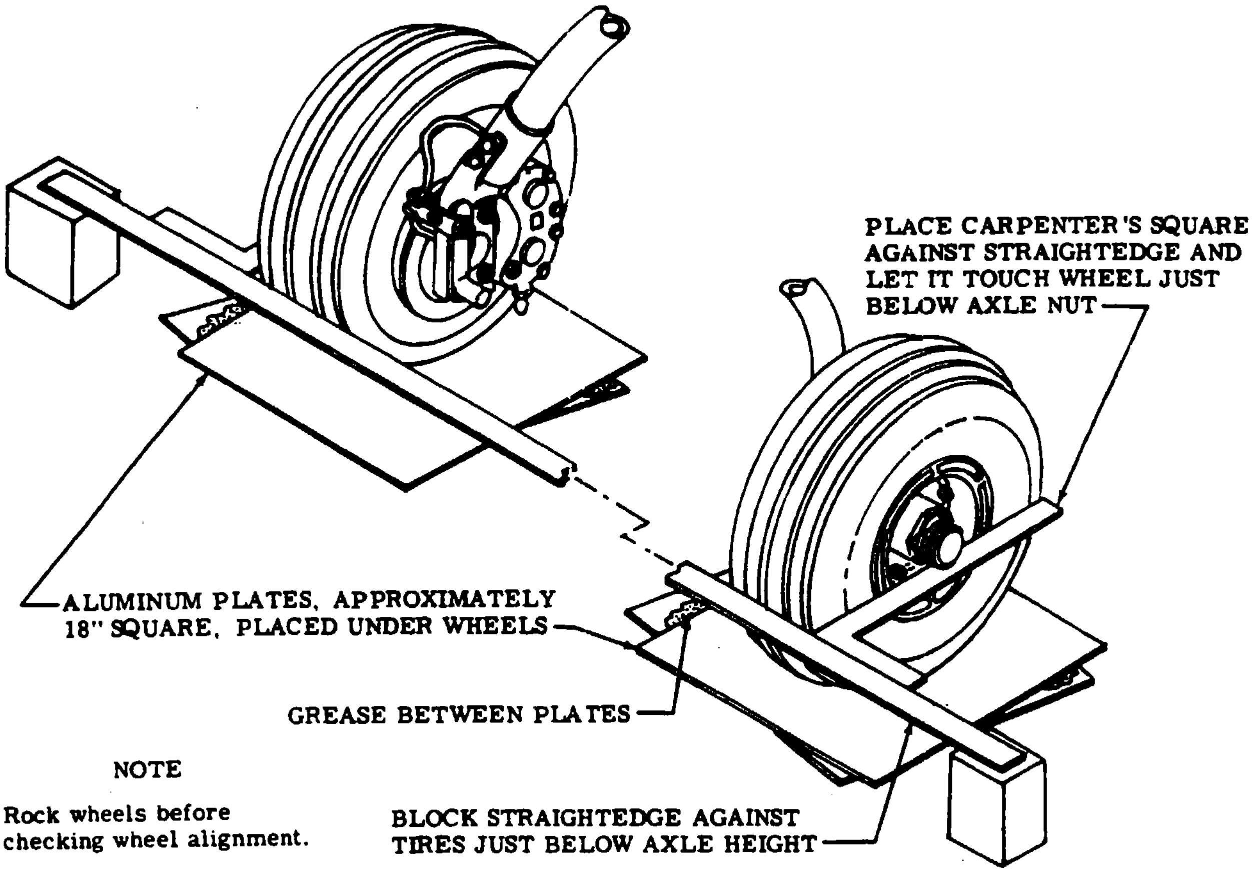
NOTE

Check fluid level in power pack reservoir frequently during purging and rigging procedures.

2. Reset hydraulic pump circuit breaker to ON.
3. With gear in down and locked position, move gear selector handle to GEAR UP position and note actuation of main gear downlock hooks.
4. As soon as left downlock hook is actuated to unlock the left gear, move gear selector handle back to GEAR DOWN position to simulate what would occur if the pilot were to select gear down before the gear was fully retracted. If downlock hooks do not lock the gear in the down position, check downlock system for misalignment.

5A-43. RIGGING MAIN GEAR DOWN UNIT SWITCHES. (Refer to figure 5A-10, sheet 3.) The main gear down limit switches are attached to brackets which are welded to the downlock hooks. Adjustment is accomplished by loosening the lock nut and either tightening or loosening the adjustment nut and re-tighten the lock nut against the bracket behind the adjustment nut. Down limit switches are to be adjusted to the dimension stipulated in the figure.

5A-44. RIGGING MAIN GEAR UP LIMIT SWITCHES. (Refer to figure 5A-10, sheet 3.) The main gear up limit switches are mounted in brackets which are attached to the underside of the removable floorboards, immediately above the main landing gear pivot assemblies. The switches are contacted by actuators, bonded to clamps, which are attached to the aft leg of the landing gear strut pivot assembly. When replacing a clamp/actuator assembly, adjust the actuator tab prior to bonding, so that it actuates the gear-up indicator light switch. Bond the actuator to the clamp with HYSOL EA-9309 or 3M EC-2216 adhesive. Trim off excess end tab of clamp and posi-

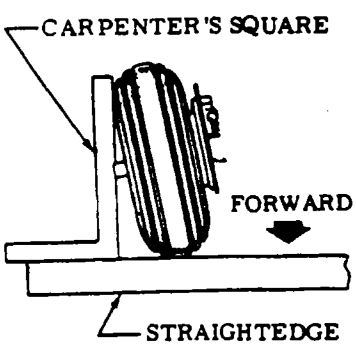


NOTE

Rock wheels before checking wheel alignment.

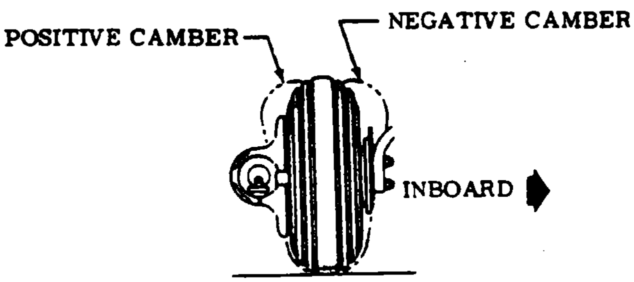
TOP VIEW OF TOE-IN CHECK

Measure toe-in at edges of wheel flange. Difference in measurements is toe-in for one wheel. (half of toe-in.)



FRONT VIEW OF CAMBER CHECK

Measure camber by reading protractor level held vertically against outboard flanges of wheel.



NOTE

Setting toe-in and camber within these tolerances while the cabin and fuel tanks are empty will give approximately zero toe-in and zero camber at gross weight. Ideal setting is zero toe-in and zero camber at normal operating weight. Therefore, if normally operated at less than gross weight and abnormal tire wear occurs, realign the wheels to attain the ideal setting for the load conditions under which the airplane normally operates. Refer to the following page for shims available and their usage. Always use the least number of shims possible to obtain the desired result.

Figure 5A-11 Wheel Alignment (Sheet 1 of 2)

SHIM CHART

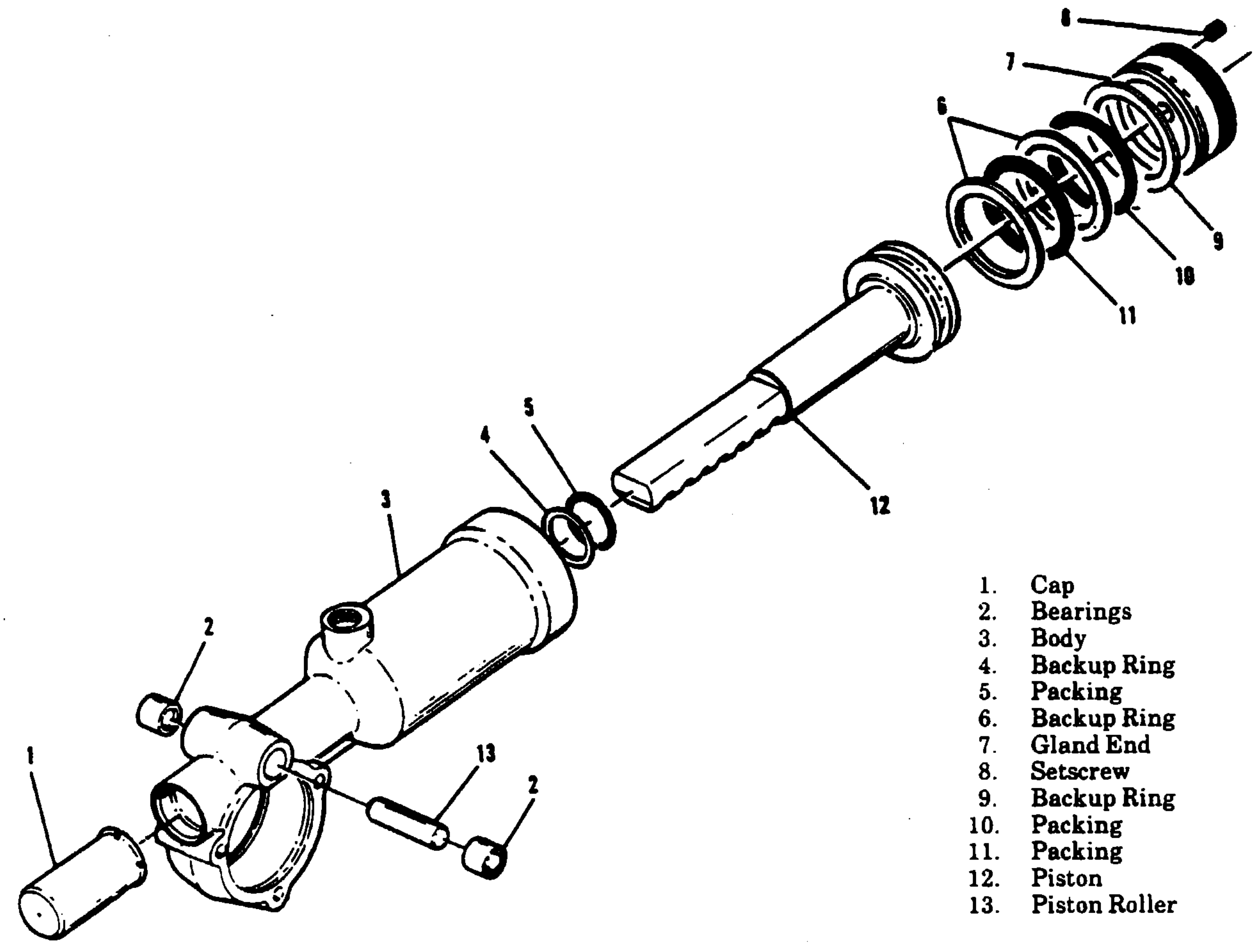
SHIM PART NO.	POSITION OF THICKEST CORNER OR EDGE OF SHIM	CORRECTION IMPOSED ON WHEEL			
		TOE-IN	TOE-OUT	POS. CAMBER	NEG. CAMBER
0541157-1	AFT FWD	.06" ----	---- .06"	---- 0°3'	0°3' ----
0541157-2	UP DOWN	.006" ----	---- .006"	0°30' ----	---- 0°30'
0411139-5	UP & FWD UP & AFT DOWN & FWD DOWN & AFT	---- .12" ---- .11"	.11" ---- .12" ----	0°25' 0°11' ---- ----	---- ---- 0°11' 0°25'
0441139-6	UP & FWD UP & AFT DOWN & FWD DOWN & AFT	---- .24" ---- .22"	.22" ---- .24" ----	0°50' 0°22' ---- ----	---- ---- 0°22' 0°50'
0541157-3	AFT FWD	.12" ----	---- .12"	---- 0°7'	0°7' 0°7'

COLUMN 1	COLUMN 2			
SHIM NO.	0441139-5	0541157-2	0541157-1	0541157-3
0541111-2	0	0	0	0
0441139-6	0	0	0	0
0441139-5	1	1	2	0
0541157-2	1	2	2	0
0541157-1	1	2	2	0
0541157-3	1	2	1	0
SHIM NO.	Max. number of shims to be used with shims in column 1.			

NOTE

USE 0541111-2 OR 0441139-6 ALONE AND/OR 0541157 (-1, -2 & -3) OR 0441139-5 SHIMS IN ANY COMBINATION AS REQUIRED TO OBTAIN ZERO TOE-IN AND ZERO CAMBER AT NORMAL OPERATING WEIGHT. TOTAL THICKNESS OF SHIMS AT UPPER BOLTS MUST NOT EXCEED .195-INCH. IF ANY TAPERED SHIMS ARE USED, ALL AN960 WASHERS ON UPPER BOLTS MUST BE DELETED.

Figure 5A-11 Wheel Alignment (Sheet 2 of 2)



1. Cap
2. Bearings
3. Body
4. Backup Ring
5. Packing
6. Backup Ring
7. Gland End
8. Setscrew
9. Backup Ring
10. Packing
11. Packing
12. Piston
13. Piston Roller

Figure 5A-12. Main Landing Gear Actuator

tion clamp helix approximately as shown in the figure, to avoid interference with gear-up switch wiring. Additional switch adjustment is provided by slotted holes in the switch mounting brackets. Adjust actuator tab-to-switch clearance to dimension stipulated tn the figure. With landing gear full up and clearance as specified in figure, check that GEAR UP light is on (thru 1982 Models) or that GEAR UNSAFE light is out (1983 and on Models).

5A45. MAIN WHEEL AND TIRE ASSEMBLY.

5A-46. DESCRIPTION. The aircraft may be equipped with either Cleveland or McCauley wheel and tire assemblies. Separate Disassembly, inspection, and reassembly instructions are provided for each type in Section 5 of this manual.

CAUTION

Use of recapped tires or new tires not listed on the aircraft equipment list are not recommended due to possible interference between the tire and structure when landing gear is in the retracted position.

5A-47. MAIN WHEEL BALANCING AND ALIGNMENT. Wheel alignment procedures are outlined in figure 5A-11.

5A-48. MAIN WHEEL AND AXLE. Main wheel and axle removal and installation procedures are outlined in Section 2 of this manual.

5A-49. MAIN GEAR ACTUATOR. (Refer to figure 5A-12.)

5A-50. REMOVAL.

a. Remove seats and peel back carpet as necessary to gain access to plate above actuator, remove access plate.
b. Remove access plate from bulkhead forward of actuator.
c. Disconnect and drain hydraulic fluid at wheel brake cylinders.
d. Place landing gear control handle UP, with master switch OFF, and operate emergency hand pump until main gear downlocks release.
e. Disconnect and cap or plug all hydraulic lines at the actuator.
f. Remove bolts attaching actuator mounting flange to bulkhead forging.
g. Work actuator free of forging and pivot assembly, remove actuator.

5A51. DISASSEMBLY. (Refer to figure 5A-12.)

a. Remove setscrew (8) and remove end gland (7)

by unscrewing from actuator body (3).
b. Remove cap (1) from end of actuator.
c. Using a small rod, push piston (12) from actuator body.

NOTE

Unless defective, do not remove nameplate, bearings (2) or roller (13).

d. Remove packing (5) and back-up ring (4) from cylinder body (3). Discard packing (10).
e. Remove packing (10) and back-up ring (9) from end gland (8). Discard packing (10).
f. Remove and discard packing (11) from piston (12).

5A-52. INSPECTION.
a. Thoroughly clean all parts in cleaning solvent (Federal Specification PS-661, or equivalent.)
b. Inspect all threaded surfaces for cleanliness, cracks and wear.
c. Inspect cap (1), piston (12), roller (13), if removed, and actuator body (3) for cracks, chips, scratches, scoring, wear or surface irregularities which may affect their function or the overall operation of the actuator.
d. Inspect bearings (2), if removed, for freedom of motion, scores, scratches or Brinnel marks.

5A-53. PARTS REPAIR/REPLACEMENT. Repair of small parts of the main landing gear actuator is impractical. Replace all defective parts. Minor scratches or score marks may be removed by polishing with abrasive crocus cloth (Federal Specification P-C-458), providing their removal does not affect operation of the unit. During assembly, install all new packings.

5A-54. REASSEMBLY. (Refer to figure 5A-12.)

NOTE

Use MIL-G-2116C lubricant on roller (13) and bearings (2), if removed.

a. If bearings (2) and roller (13) were removed, press one bearing into actuator body until it is flush. Install roller and press second bearing in place to hold roller. Use care to prevent damage to bearings or roller.
b. Install back-up ring (4) and packing (5) in actuator body core. Install new packing (11) and back-up rings (6) on piston (12).

NOTE

Lubricate piston rack gears with MIL-G-21164C lubricant. Apply lubricant sparingly. Over-greasing might cause contamination of hydraulic cylinder assembly with grease which might work past packing.

c. Slide piston (12) into cylinder body (3).
d. Install back-up ring (9) and new packing (10) on end gland.
e. Install end gland in cylinder and tighten until end of gland is flush with end of cylinder body. Install and tighten setscrew (8).
f. Install cap (1) at end of actuator assembly.

5A-55. INSTALLATION.
a. With main landing gear in the down and locked position, install actuator into bulkhead forging so that piston rack gear and sector gear engage as shown in figure 5A-9, Section A-A.
b. Lubricate swivel fitting on actuator with MIL-G-21164 lubricant, install packing in fitting.
c. Install cap (4), washer (3), retainer (2) and swivel fitting on actuator as shown in figure 5A-9.
d. Install bolts (1) and torque to 60-85 lb in. Safety wire swivel fitting to shaft (8).
e. Connect all hydraulic lines to their source locations. Lubricate threads with Petrolatum.
f. Connect brake line at wheel cylinder. Fill and bleed brake system in accordance with procedures outlined in applicable paragraph in this section.
g. Rig landing gear in accordance with procedures outlined in applicable paragraph in this section.
h. Remove aircraft from jacks and install access covers, carpeting and seats removed for access.

5A-56. MAIN GEAR PIVOT ASSEMBLY.

5A-57. REMOVAL. (Refer to figure 5A-9.)
a. Remove strut from pivot assembly in accordance with procedures outlined in applicable paragraph in this section.
b. Remove actuator in accordance with procedures outlined in applicable paragraph in this section.
c. Remove setscrew from sector gear (7).
d. Bend tangs of washer (21) from notches in nut (20) and completely unscrew nut (20) from threaded area of shaft (17).
e. Push shaft (17) into pivot assembly (14) and pull pivot assembly free of shaft (8).

5A-58. INSPECTION AND REPAIR. (Refer to figure 5A-9.)
a. Thoroughly clean all parts in cleaning solvent (Federal Specification PS-661 or equivalent.)
b. Inspect all parts for indications of damage, cracks or excessive wear and replace as necessary.
c. Inspect outboard pivot bushing and inboard pivot bearing (10) (pressed into bulkhead forgings in aircraft) for damage and excessive wear. Replace bushing or bearing as required.

NOTE

The outboard pivot bushing is locked into the bulkhead forging by a setscrew located above the bushing. This setscrew must be turned out several turns before the bushing can be removed.

5A-59. INSTALLATION. (Refer to figure 5A-9.)
a. Lubricate all bushings and bearings with MIL-G-21164 grease. Slide shaft (17) into pivot assembly (14).
b. Install pivot with bearing (12) and race (11) installed, into inboard bearing in bulkhead forging. Pull shaft from pivot and install washer (21) and nut (20) on shaft.

c. Insert end of shaft into outboard bushing in bulkhead forging. Hand-tighten nut to remove all end play and safety in place by bending corresponding tang of washer into notch of nut. Pivot must rotate freely.
d. Install seal (9) and sector gear (7) on inboard end of pivot assembly so that setscrew hole in sector gear lines up with setscrew hole in shaft (8); install setscrew into sector gear and shaft with Loctite 242 locking compound and tighten screw.

5A-60. GEAR POSITION INDICATOR SWITCHES.

5A-61. DESCRIPTION. The gear down indicator switches are attached to brackets which are welded to the downlock hooks. The main gear up limit switches are mounted in brackets which are attached to the underside of the removable floorboards immediately above the main landing gear pivot assemblies. Refer to the paragraphs in this section which outline procedures for rigging the main gear up and down switches.

5A-62. MAIN GEAR DOWNLOCK ACTUATOR. (Refer to Section 5.)

5A-63. DESCRIPTION. The main gear downlock actuators for the 1979 Models is the same actuator used on Models thru 1973. Function and operation are the same. The only difference between the actuators is the replacement of the MS28778-4 fitting with a hose assembly. Refer to Section 5 for actuator removal, disassembly, inspection and repair and installation. Adjustment of the actuator rod end is discussed in the main landing gear rigging paragraph in Section 5A.

5A-64. MAIN GEAR STRUT STEP. (Refer to figure 5A-9.)

5A-65. DESCRIPTION. The step is constructed of Uralite 3121 polyurethane casting, with a molded depression area, located in the top of the step. An adhesive-backed "Walkway" material with rough surface is pressed into the depressed area of the strut.

5A-66. REMOVAL.

NOTE

The step is bonded to the landing gear with Uralite 3121 bonding material.

a. Using a heat gun, heat step at a temperature of 200° - 250° F, until step material becomes pliable.
b. Using a sharp knife, remove step material down to the metal strut.
c. Clean off remaining step material with a wire wheel and sandpaper. Leave surface slightly rough or abraded. Clean oil and grease from strut with solvent, wipe off excess solvent with dry cloth and let surface dry.
d. Apply zinc chromate primer - green or yellow, to cleaned area on strut. Dry film thickness to be .0003 to .0005 inch.

5A-67. INSTALLATION.
a. Jack aircraft in accordance with procedures outlined in Section 2 of this manual.
b. Mark position of removed step so new step will be installed in approximately the same position on the strut.
c. Clean surfaces to be bonded together thoroughly. If a solvent is used, remove all traces of the solvent with a clean, dry cloth. It is important that the bonding surfaces be clean and thoroughly dry.
d. Mix adhesive (Uralite 3121), in accordance with manufacturer's direction. Note pot life.
e. Spread a coat of mixed adhesive on bonding surfaces of strut and step; install step on strut.

NOTE

Top of strut should be parallel to the ground (±5°) when gear is in down position.

f. Cycle landing gear to check clearance of step in tunnel.
g. Form a small fillet of adhesive at all edges of bonding surfaces. Remove excess adhesive.
h. Remove aircraft from jacks.
i. Allow adhesive to thoroughly cure according to manufacturer's recommendations before flexing gear spring or applying loads to step.
j. Paint gear spring and step after curing is completed.

5A-68. NOSE GEAR SYSTEM.

5A-69. DESCRIPTION The nose gear consists of a pneudraulic shock assembly, mounted in a trunnion assembly, a steering arm and bungee, shimmy dampener, nose wheel, tire and tube, hub cap, bearing, seals and a double-acting hydraulic actuator for extension and retraction. A claw-like hook on the actuator serves as a downlock for the nose gear.

5A-70. OPERATION. The nose gear shock strut is pivoted just forward of the firewall. Retraction and extension of the nose gear is accomplished by a double-acting hydraulic cylinder, the forward end of which contains the nose gear downlock. Initial action of the cylinder disengages the downlock before retraction begins. Nose gear doors are mechanically closed as the nose gear retracts. As the nose gear extends, the doors are mechanically opened.

5A-71. TROUBLE SHOOTING. Refer to the nose gear system trouble shooting chart in Section 5.

5A-72. REMOVAL OF NOSE GEAR ASSEMBLY. Refer to applicable paragraphs in Section 5, outlining nose gear removal, disassembly, inspection and repair, reassembly and installation, disregarding the installation step regarding rigging of the retractable step.

5A-73. SHIMMY DAMPENER. Refer to applicable paragraphs in Section 5 outlining description, removal, disassembly, inspection, repair and reassembly of the shimmy dampener.

5A-74. TORQUE LINKS. Refer to applicable paragraphs in Section 5 outlining removal of torque links and squat switch.

5A-75 SQUAT SWITCH. Refer to applicable paragraphs in Section 5 outlining removal and installation of torque links for squat switch removal.

5A-76. NOSE GEAR DOWNLOCK MECHANISM. Refer to applicable paragraphs in Section 5 outlining description, removal, disassembly, inspection, repair and reassembly of the nose gear actuator.

5A-77. NOSE GEAR ACTUATOR. Refer to applicable paragraphs in Section 5 outlining description, removal, disassembly, inspection, repair and reassembly of the nose gear actuator.

5A-78. NOSE GEAR DOOR SYSTEM. (Refer to figure 5A-13.)

5A-79. DESCRIPTION. The nose gear door system consists of a right and left forward door, actuated by push-pull rods and a torque tube assembly. The aft doors are attached to the torque tube assembly with springs.

5A-80. REMOVAL AND INSTALLATION. (Refer to figure 5A-13.)

a. Remove hinge bolts, nuts, washers and bushings.
b. Remove nuts from push-pull rods and remove forward doors.
c. Disconnect spring from aft door eyebolt, and remove aft doors.
d. Reverse preceding steps to install nose gear doors.

NOTE

Upon completion of installation, safety wire bolts (*) to clips (23).

NOTE

Check nose gear door-to-cowling clearance to be 0.12-inch to 0.15-inch on the left and right sides of the nose gear doors each time the turbine access door on turbocharged models is re-installed.

5A-81. NOSE WHEEL STEERING SYSTEM.

5A-82. DESCRIPTION. Refer to applicable paragraphs in Section 5, outlining description, removal, installation and rigging of the nose wheel steering system.

5A-83. RIGGING NOSE LANDING GEAR. (Refer to figure 5A-14.)

NOTE

Nose gear shock strut must be correctly inflated prior to rigging the nose gear. Refer to Section 1 of this manual for correct nose gear shock strut inflation pressure.

a. Jack aircraft in accordance with procedures outlines in Section 2 of this manual.
b. Actuator locking hooks (1) on the nose gear actuator shall completely engage downlock pins (2) without drag, and cross bar (3) shall rotate freely to indicate it is not bearing on either side of slot in rod end (4). Adjust rod end of actuator as required.

CAUTION

The piston rod is flattened near the threads to provide a wrench pad. Do not grip the piston rod with pliers, as tool marks will cut the O-ring seal in the actuator.

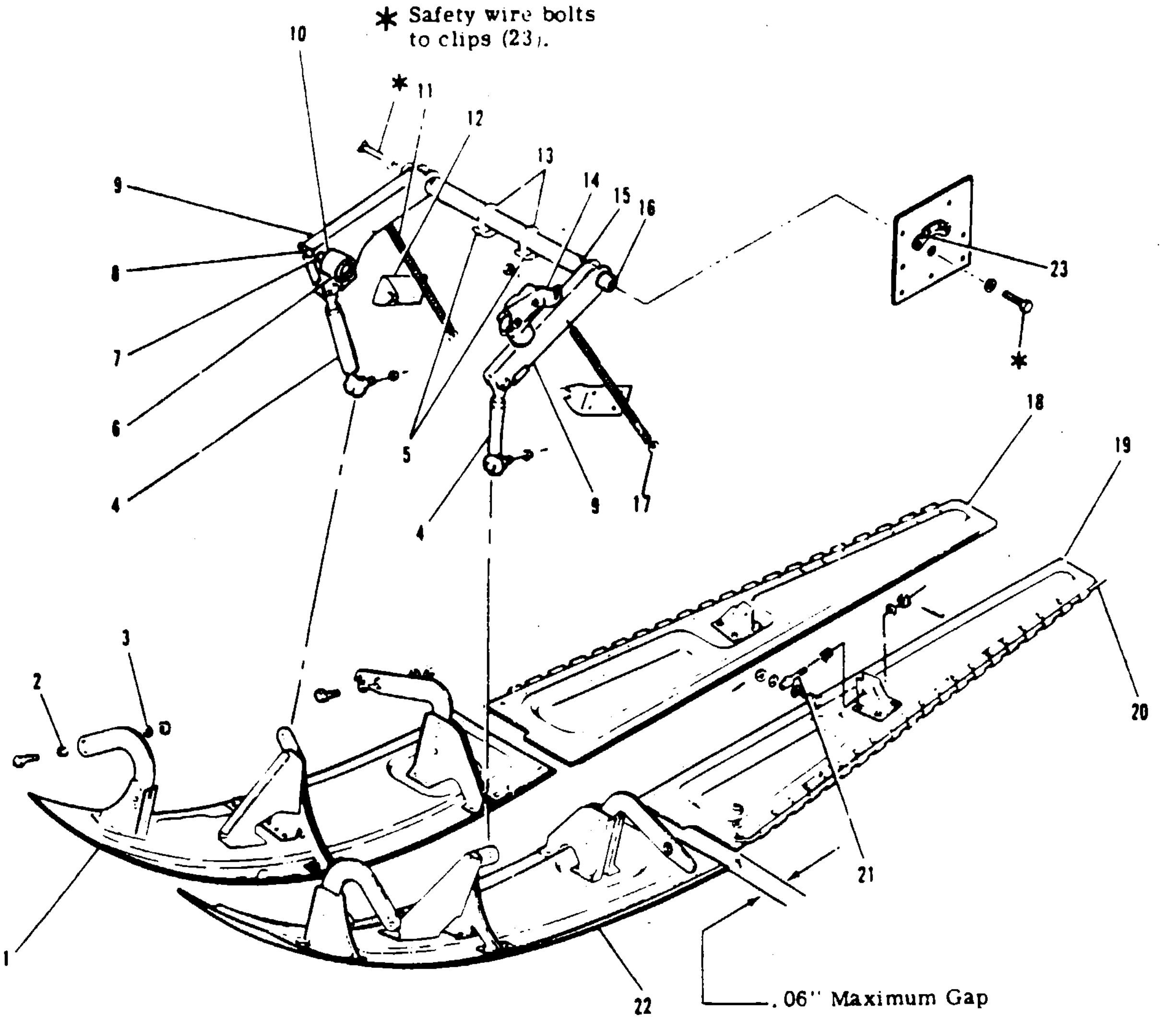
5A-84. RIGGING NOSE GEAR DOWN LIMIT SWITCH. (Refer to figure 5A-14.) The nose gear down limit switch is mounted on a tab which is a part of the bearing end (5) of the nose gear actuator. The switch is actuated by the right-hand actuator locking hook (1) Switch adjustment is accomplished by loosening the lock nut and either tightening or loosening the adjustment nut and re-tightening the lock nut against the tab behind the adjustment nut. Down limit switch is to be adjusted to the dimension stipulated in the figure.

5A-85. RIGGING NOSE GEAR UP LIMIT SWITCH. (Refer to figure 5A-14.) The nose gear up limit switch is mounted to a bracket, located in the left-hand forward area of the nose wheel well. The switch is activated by the left-hand arm of the bellcrank weld assembly. Switch adjustment is provided by slots in the switch mounting bracket. Up limit switch is to be adjusted to the dimension stipulated in the figure.

5A-86. RIGGING OF NOSE GEAR SQUAT SWITCH. (Refer to figure 5A-14.) The nose gear squat (safety) switch is mounted in a bracket, attached to the upper nose gear torque link. The switch is operated by an actuator, attached to the nose gear lower torque link. Adjust squat switch so that contacts close when nose gear strut is .12 to .25-inch from fully-extended position.

5A-87. RIGGING OF NOSE GEAR DOORS. (See figure 5A-13.) Nose gear door adjustments are accomplished by adjusting push-pull rod ends as required to cause the doors to close snugly. Doors must fair when the nose gear is fully retracted. Link rods are to be adjusted so that the doors, when in the open position, clear any part of the nose gear assembly by a minimum of 0.25-inch during retraction. Adjust stop bolts on stop assemblies (12) as required to contact arms (9) on bellcrank weld assembly (15) when forward nose gear doors are in FULL-OPEN position. Adjust barrel assemblies (4) as required to fair forward nose gear doors in closed position. Pack bearings (16) with MIL-G-21164 grease. Trim outboard edge of forward nose gear doors so that door-to-skin clearance is 0.18-inch minimum to 0.21-inch maximum. Safety wire bolts (*) to clips (23).

5A-88. FINAL LANDING GEAR SYSTEMS CHECK. After landing gear systems have been installed and rigged, prior to removal from jacks, cycle landing gear through 25 cycles using the system's emergency hand pump.

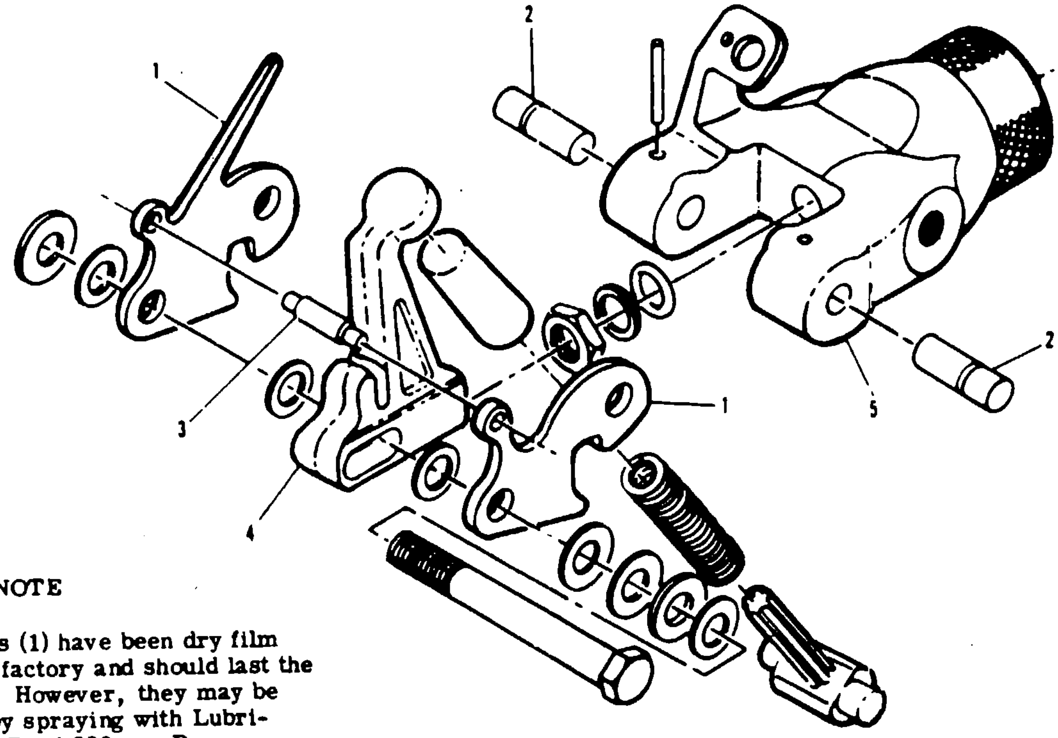


1. RH Fwd Door	13. Up-Stop
2. Bushing	14. Switch Assembly
3. Washer	15. Bellcrank Weld Assembly
4. Barrel Assembly	16. Bearing
5. Up-Stop	17. Washer
6. Bearing Assembly	18. RH Aft Door
7. Spacer	19. LH Aft Door
8. Spacer	20. Hinge Pin
9. Arm	21. Eyebolt
10. Bolt	22. LH Fwd Door
11. Spring	23. Clip
12. Stop Assembly	

NOTE

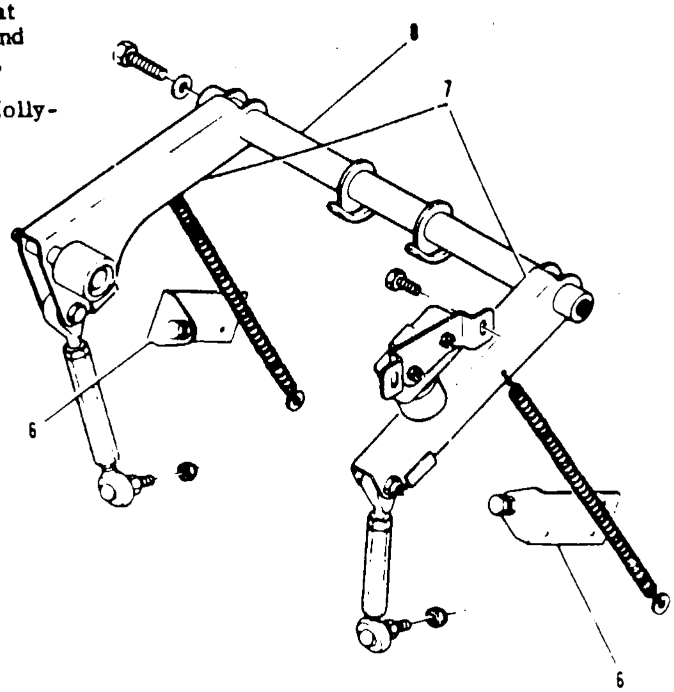
REFER TO PARAGRAPH 5A-87 FOR COMPLETE DOOR RIGGING PROCEDURES.

Figure 5A-13. Nose Gear Doors



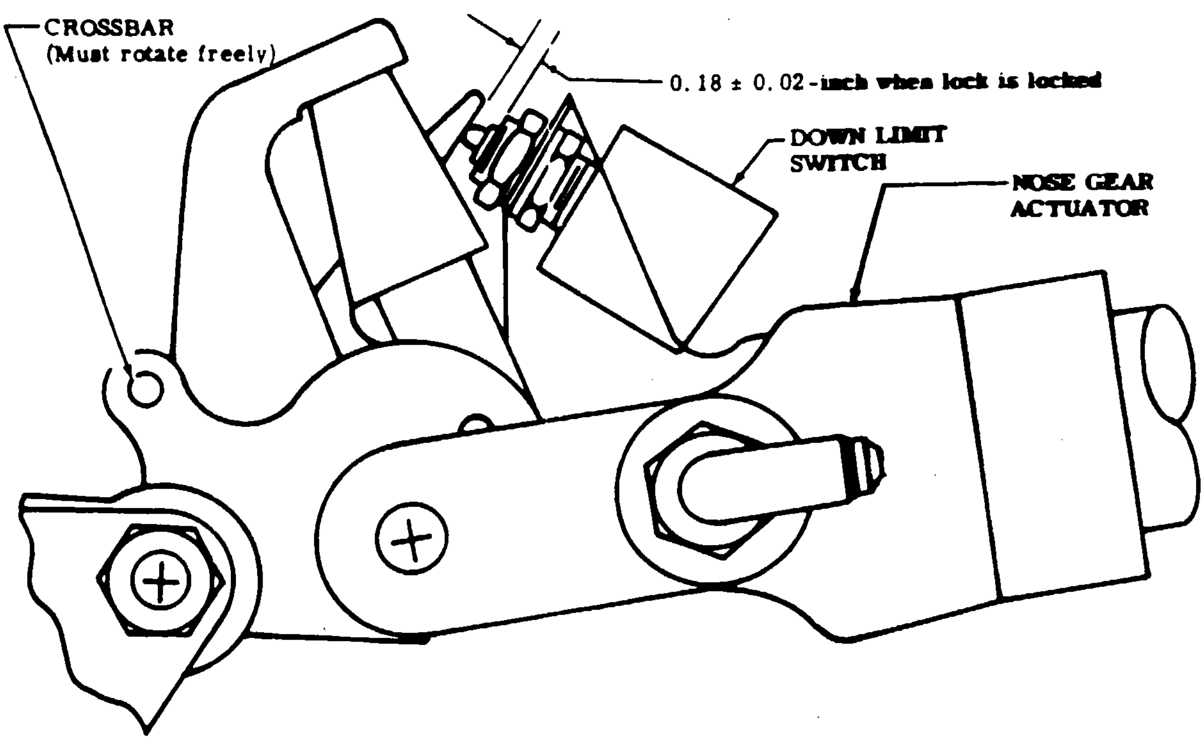
NOTE

The locking hooks (1) have been dry film lubricated at the factory and should last the life of the parts. However, they may be field lubricated by spraying with Lubri-Bond "A", Lubri Bond 220, or Perma-Silk. After application, allow parts to air dry for six hours, or dry for one hour at 120° F. Lubri Bond "A" and Lubri Bond 220 are products of Electro-Film Inc., North Hollywood, Ca. Perma-Silk is a product of the Everlube Corp., North Hollywood, Ca.

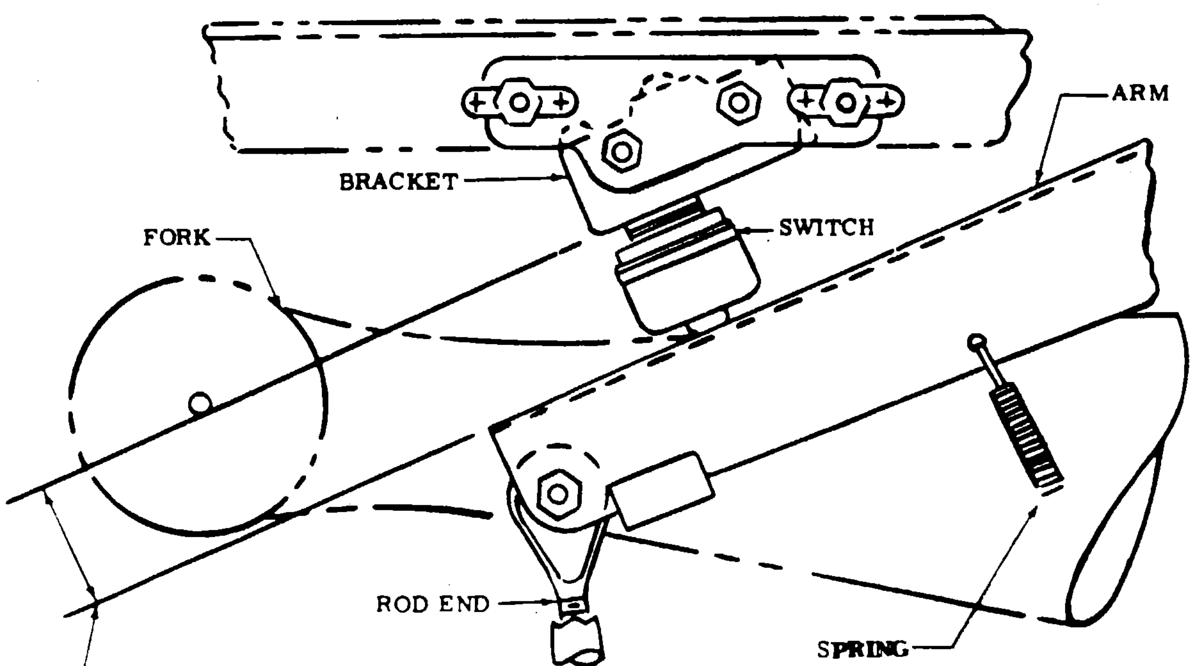


1. Locking Hook
2. Downlock Pin
3. Cross Bar
4. Rod End
5. Bearing End
6. Stop Assembly
7. Arm
8. Bellcrank Weld Assembly

Figure 5A-14. Rigging Nose Landing Gear (Sheet 1 of 2)



NOSE GEAR IN DOWNLOCK POSITION



NOSE GEAR IN UP POSITION

Figure 5A-14. Rigging Nose Landing Gear (Sheet 2 of 2)

NOTE

Check fluid level in power pack reservoir frequently during purging and system checks.

One of the 25 cycles shall consist of a downlock malfunction check, consisting of the following procedure, using a 28 volt DC, 60 amp electrical power supply.

a. Pull hydraulic circuit breaker off.

b. With gear in down and locked position, move gear selector handle to GEAR UP position and note actuation of main gear downlock hooks.

c. As soon as left downlock hook is actuated to unlock the left gear, move gear selector handle back to GEAR DOWN position to simulate what would occur if the pilot were to select gear down before the gear was fully retracted. If downlock hooks do not lock the gear in the down position, check downlock system for misalignment.

NOTE

This malfunction check is in addition to the check used during the rigging procedure.

d. Remove aircraft from jacks.

5A-89. NOSE WHEEL AND TIRE. Refer to applicable paragraphs in Section 5, outlining description, removal, disassembly, inspection, repair, reassembly and installation of nose wheels and tires.

5A-90. BRAKE SYSTEM. Refer to applicable paragraphs in Section 5 for description, trouble shooting removal, disassembly, inspection, repair, reassemgly, installation, checking lining wear, lining installation and bleeding of the brake system. Refer to the following note.

NOTE

Aircraft equipped with Cleveland brakes from Serial P21000151 thru P21000191 are equipped with 1/4 inch brake line fittings. Refer to Main Landing Gear Wheel & Brake Installation-Cleveland, Figure in the P210 Illustrated Parts Catalog for replacement parts.

5A-91. BRAKE MASTER CYLINDER. (Refer to figure 5A-15.)

5A-92. DESCRIPTION. The brake master cylinders, located immediately forward of the pilot's rudder pedals, are actuated by applying pressure at the top of the rudder pedals. A small reservoir is incorporated into each master cylinder for the fluid supply. When dual brakes are installed, mechanical linkage permits the copilot pedals to operate the master cylinders.

5A-93. REMOVAL.

a. Remove bleeder screw at wheel brake assembly and drain hydraulic fluid from brake cylinders.

b. Remove front seats and rudder bar shield for access to brake master cylinders.

c. Disconnect parking brake linkage and disconnect brake master cylinders from rudder pedals.

d. Disconnect hydraulic hose from brake master cylinders and remove cylinders.

e. Plug or cap hydraulic fittings, hose and lines to prevent entry of foreign material.

5A-94. DISASSEMBLY. (Refer to figure 5A-15.)

a. Unscrew clevis (1) and jam nut (2).

b. Remove filler plug (3).

c. Unscrew cover (4) and remove up over piston (5).

d. Remove piston (5) and spring (8).

e. Remove packing (7) and back-up ring (6) from piston (5).

5A-95. INSPECTION AND REPAIR. (Refer to figure 5A-15.) Repair is limited to installation of new parts and cleaning. Use clean hydraulic fluid (MIL-H-5606) as a lubricant during reassembly of the cylinder. Replace packings and back-up rings. Filler plug (3) must be vented so pressure cannot build up during brake operation. Remove plug and drill 1/16-inch hole, 30° from vertical, if plug is not vented. Refer to view A-A for location of hole.

5A-96. REASSEMBLY. (Refer to figure 5A-15.)

a. Install spring (8) into cylinder body (9).

b. Install back-up ring (6) and packing (7) in groove of piston (5).

c. Install piston (5) in cylinder body (9).

d. Install cover (4) over piston (5) and screw cover into cylinder body (9).

e. Install nut (2) and clevis (1).

f. Install filler plug (3), making sure vent hole is open.

5A-97. INSTALLATION.

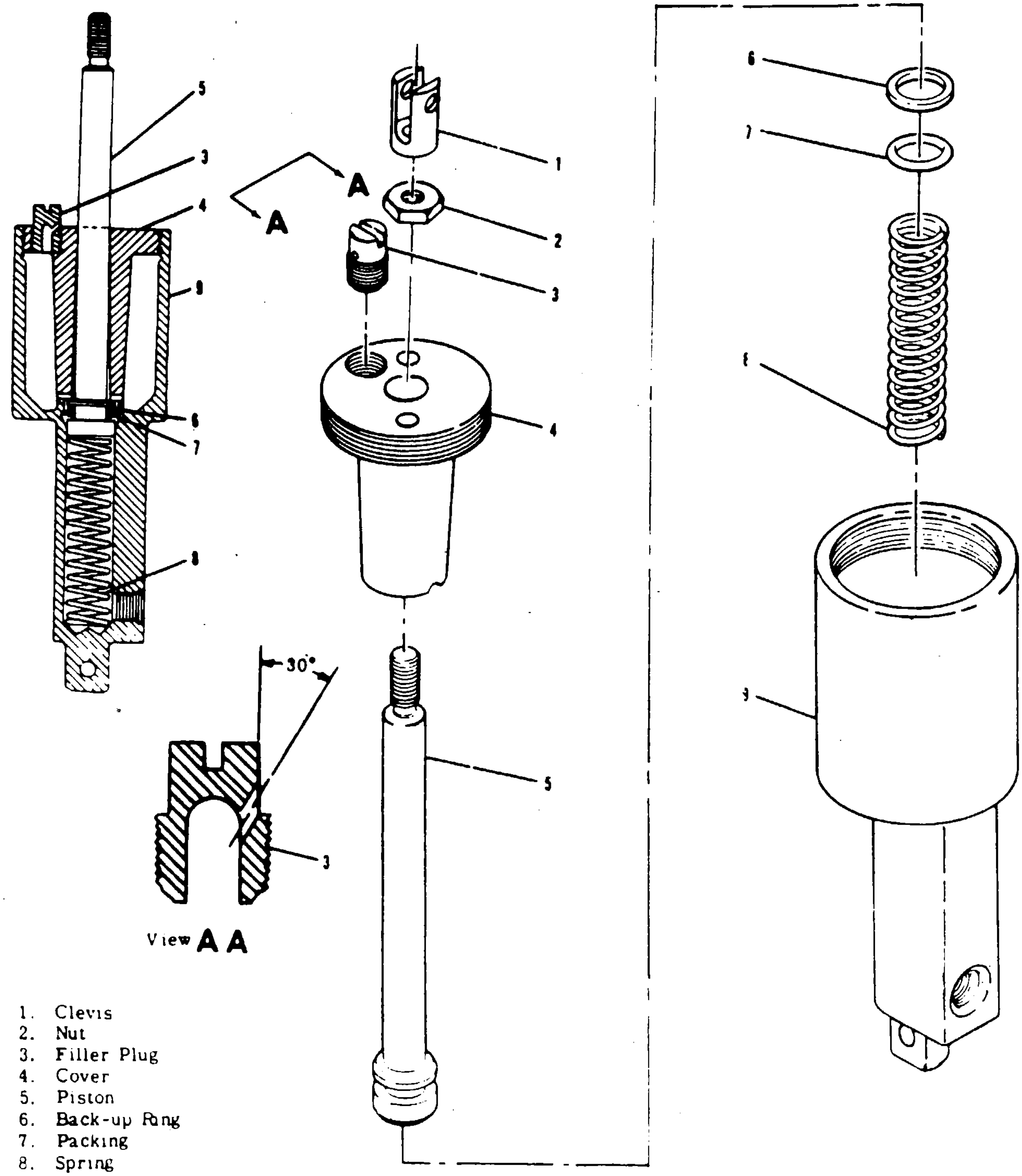
a. Connect hydraulic hoses to brake master cylinders.

b. Connect brake master cylinders to rudder pedals and connect parking brake linkage.

c. Install rudder bar shield and install front seats.

d. Install bleeder screw at wheel brake assembly and fill and bleed brake system in accordance with applicable paragraph in Section 5.

5A-96. PARKING BRAKE SYSTEM. Refer to applicable paragraphs in Section 5 for description, removal, installation, and inspection and repair of components of the parking brake system.



1. Clevis
2. Nut
3. Filler Plug
4. Cover
5. Piston
6. Back-up Ring
7. Packing
8. Spring
9. Cylinder Body

Figure 5A-15. Master Brake Cylinder

SECTION 6

AILERON CONTROL SYSTEM

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6-1. AILERON CONTROL SYSTEM. (Refer to figure 6-1.)

6-2. DESCRIPTION. The aileron control system is comprised of push-pull rods, bellcranks, cables, pulleys, quadrants and components forward of the instrument panel, all of which link the control wheels to the ailerons.

6-3. TROUBLE SHOOTING.

NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to rerig system. Refer to paragraph 6-17.

TROUBLE	PROBABLE CAUSE	REMEDY
LOST MOTION IN CONTROL WHEEL.	Loose control cables.	Check cable tension. Adjust cables to proper tension.
	Broken pulley or bracket, cable off pulley or worn rod end bearings.	Check visually. Replace worn or broken parts, install cables correctly.
RESISTANCE TO CONTROL WHEEL MOVEMENT.	Cables too tight.	Check cable tension. Adjust cables to proper tension.
	Pulleys binding or cable off.	Observe motion of the pulleys. Check cables visually. Replace defective pulleys. Install cables correctly.
	Bellcrank distorted or damaged.	Check visually. Replace defective bellcrank.
	Defective quadrant assembly.	Check visually. Replace defective quadrant.
	Clevis bolts in system too tight.	Check connections where used. Loosen, then tighten properly and safety.

6-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
CONTROL WHEELS NOT LEVEL WITH AILERONS NEUTRAL.	Improper adjustment of cables.	Refer to paragraph 6-17.
	Improper adjustment of aileron push-pull rods.	Adjust push-pull rods to obtain proper alignment.
DUAL CONTROL WHEELS NOT COORDINATED.	Cables improperly adjusted.	Refer to paragraph 6-17.
INCORRECT AILERON TRAVEL.	Push-pull rods not adjusted properly.	Refer to paragraph 6-17.
	Incorrect adjustment of travel stop bolts.	Refer to paragraph 6-17.

6-4. CONTROL COLUMN. (Refer to figure 6-2.)

6-5. DESCRIPTION. Rotation of the control wheel rotates four bearing roller assemblies (15) on the end of the control wheel tube (14), which in turn rotates a square control tube assembly (20) inside and extending from the control wheel tube (14). Attached to this square tube (20) is a quadrant (29) which operates the aileron system. This same arrangement is provided for both control wheels. Synchronization of the control wheels is obtained by the interconnect cable (32), turnbuckle (33) and adjustable terminals (28). The forward end of the square control tube (20) is mounted in a bearing block (31) on firewall (34) and does not move fore-and-aft, but rotates with the control wheel. The four bearing roller assemblies (15) on the end of the control wheel tube reduce friction as the control wheel is moved fore-and-aft for elevator system operation. A sleeve weld assembly (11) containing bearings which permit the control wheel tube to rotate within it, is secured to the control wheel tube by a sleeve and retaining ring in such a manner it moves fore-and-aft with the control wheel tube. This movement allows the push-pull tube (22) attached to the sleeve weld assembly (11) to operate an elevator arm assembly (23), to which one elevator cable (24) is attached. A torque tube (37) connects this arm assembly (23) to the one on the opposite end of the torque tube (37), to which the other elevator cable is attached. When dual controls are installed, the copilot's control wheel is linked to the aileron and elevator control systems in the same manner as the pilot's control wheel.

6-6. REMOVAL AND INSTALLATION. (Refer to figure 6-2, sheet 3)

a. Remove bolts securing adapter (3) to control wheel tube assembly.

b. Disconnect electrical wiring to map light, mike switch and electric trim switch at connector (8), if installed.

c. (Refer to figure 6-2, sheet 1.) Remove decorative cover from instrument panel.

d. Remove screw securing adjustable glide plug (18) to control tube assembly (20) and remove plug (18) and glide (19).

e. Disconnect push-pull tube (22) at sleeve weld assembly (11).

f. Remove screws securing cover plate (5) at instrument panel.

g. Using care, pull control wheel tube assembly (14) aft and work assembly out through instrument panel.

NOTE

To ease removal of control wheel tube assembly (14), snap rings (7) may be removed from their locking grooves to allow sleeve weld assembly (11) additional movement.

If removal of control tube assembly (20) or quadrant (29) is necessary, proceed to step "h."

h. Remove safety wire and relieve direct cable tension at turnbuckles (index 5, figure 6-1).

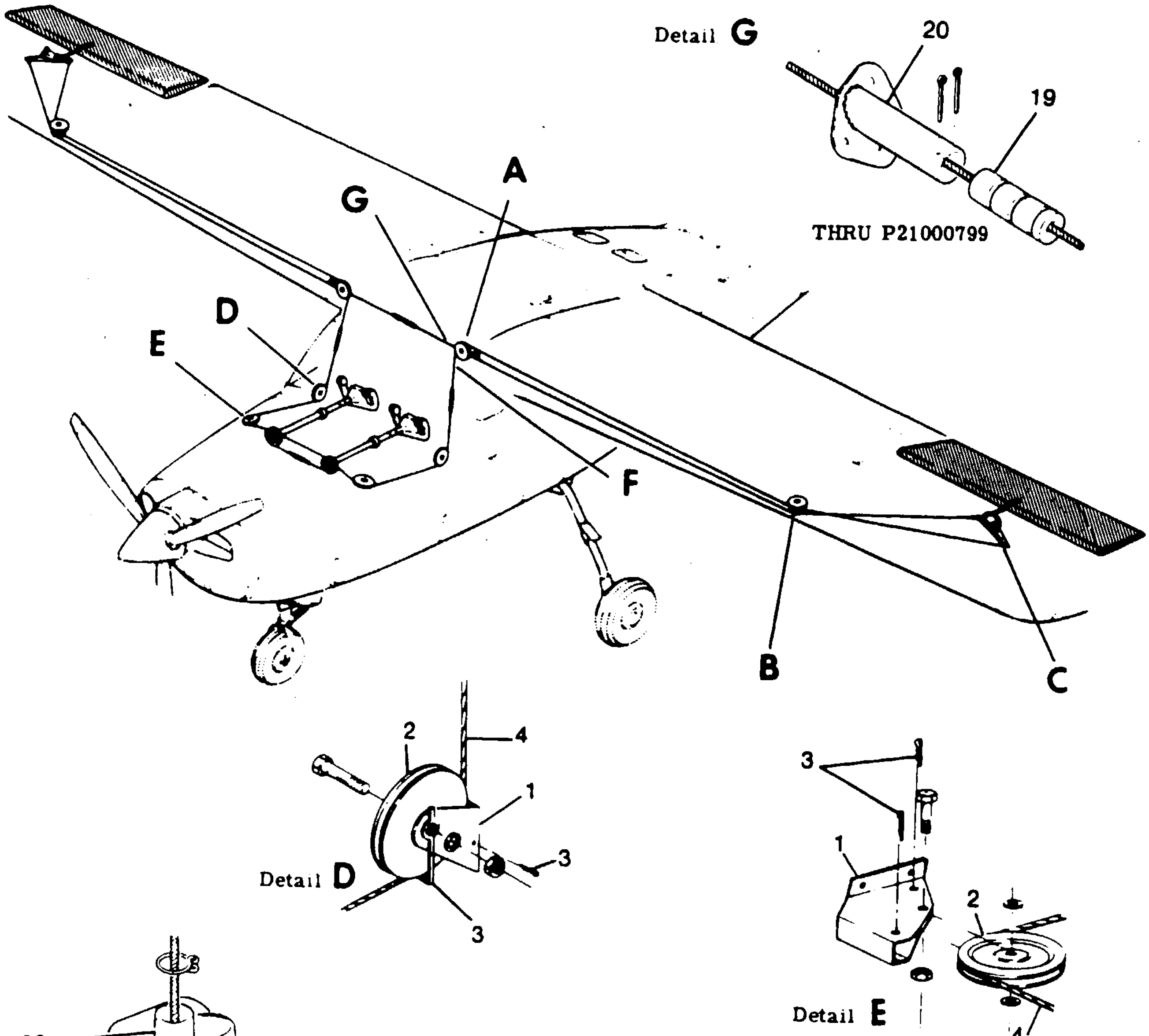
i. Remove safety wire, relieve interconnect cable tension at turnbuckle (33) and remove cables from quadrant (29).

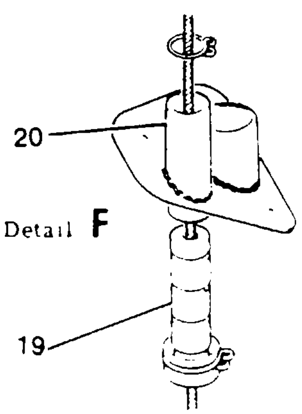
j. Remove safety wire and remove roll pin (25) through quadrant (29) and control tube assembly (20).

k. Remove pin, nut (30) and washer from control tube assembly (20) protruding through bearing block (31) on forward side of firewall (34).

l. Using care, pull control tube assembly (20) aft and remove quadrant (29).

m. Reverse the preceding steps for reinstallation. Rig aileron, interconnect and elevator control sys-





CAUTION

MAINTAIN SPECIFIED CONTROL CABLE TENSION

CABLE TENSION: 40 LBS ± 10 LBS ON AILERON CARRY-THRU CABLE (AT AVERAGE TEMPERATURE FOR THE AREA.) REFER TO FIGURE 1-1 FOR TRAVEL.

1. Bracket
2. Pulley
3. Cable Guard
4. Cable (Direct)
5. Turnbuckle (Direct Cable)
6. Bushing
7. Cable (Carry-Thru)
8. Turnbuckle (carry-Thru Cable)
9. Pivot Bolt
10. Upper Wing Skin
11. Upper Support
12. Brass Washer
13. Bushing
14. Needle Bearing
15. Travel Stop Bolt
16. Push-Pull Rod
17. Lower Support
18. Bellcrank
19. Pressure Seal
20. Retainer

Figure 6-1. Aileron Control System (Sheet 1 of 2)

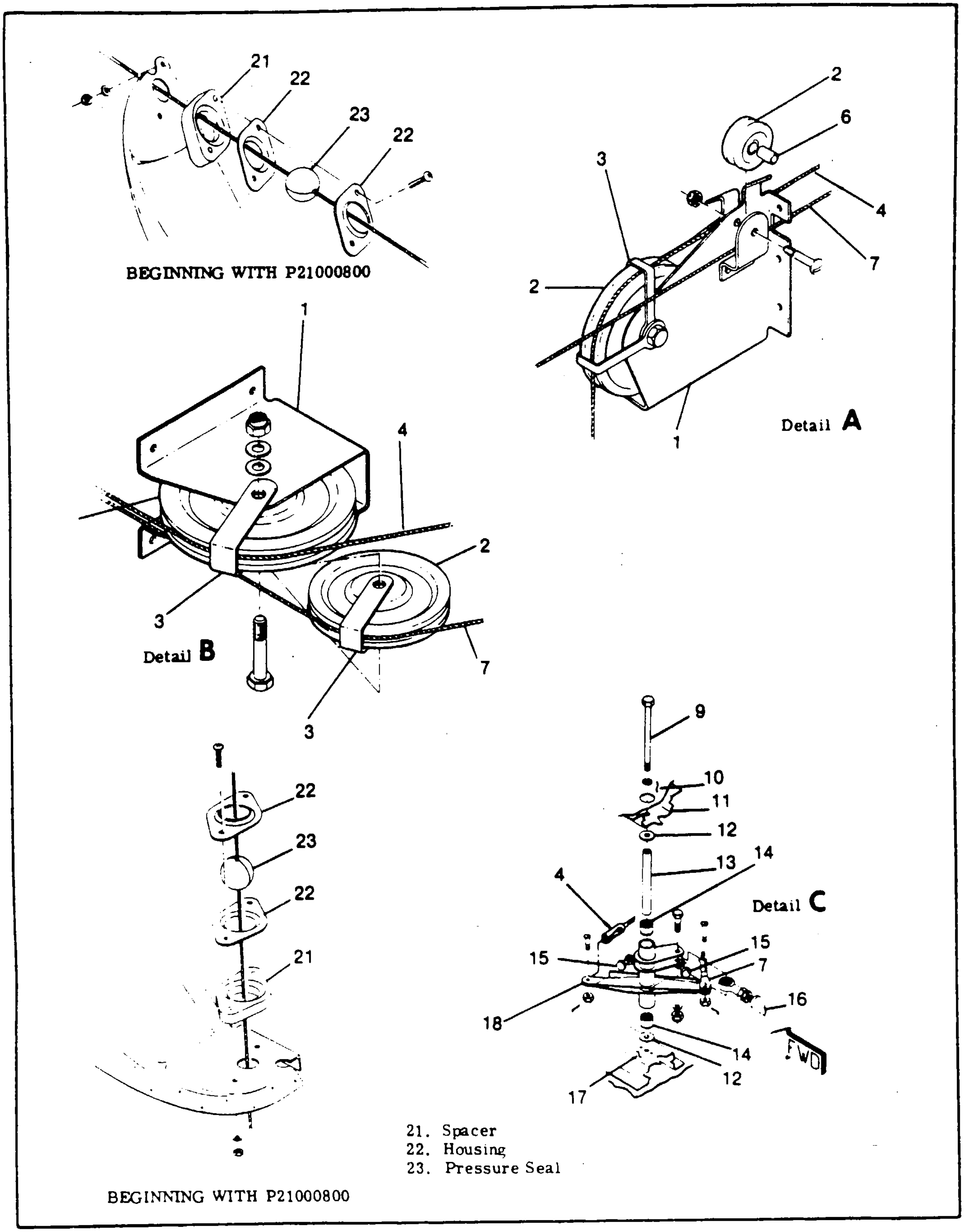
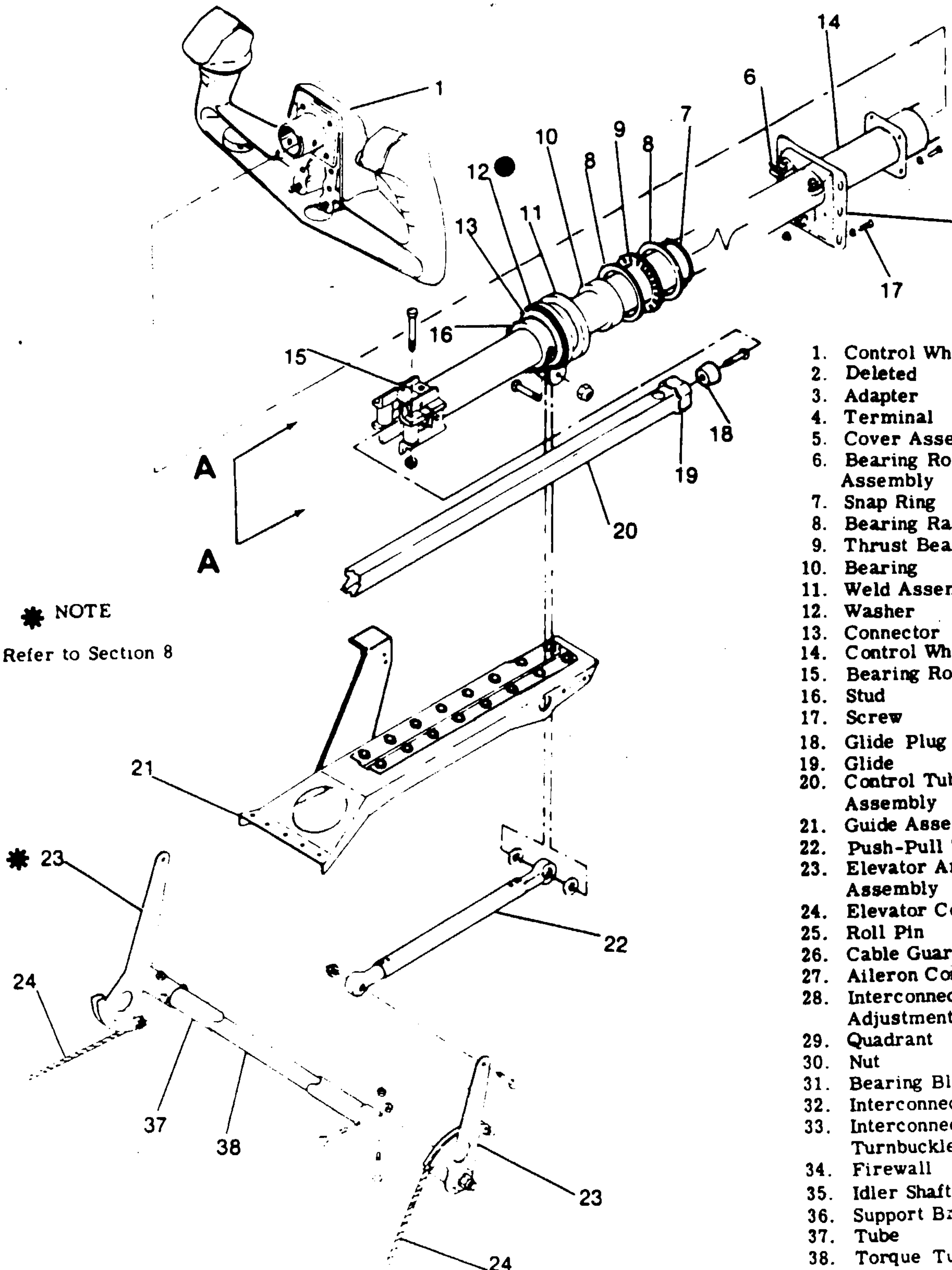


Figure 6-1. Aileron Control System (Sheet 2 of 2)



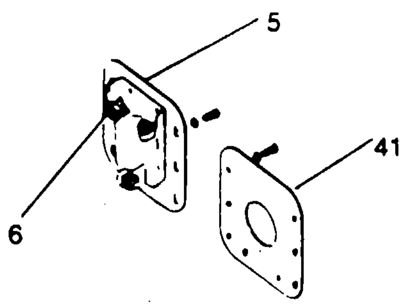
✱ NOTE

Refer to Section 8

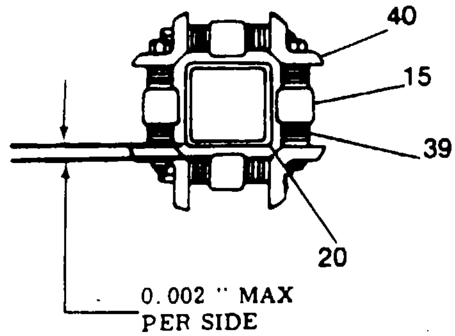
●Use as required to adjust free play.
(Do not exceed 4 washers per assembly.)

1. Control Wheel
2. Deleted
3. Adapter
4. Terminal
5. Cover Assembly
6. Bearing Roller Assembly
7. Snap Ring
8. Bearing Race
9. Thrust Bearing
10. Bearing
11. Weld Assembly
12. Washer
13. Connector
14. Control Wheel Tube
15. Bearing Roller
16. Stud
17. Screw
18. Glide Plug
19. Glide
20. Control Tube Assembly
21. Guide Assembly
22. Push-Pull Tube
23. Elevator Arm Assembly
24. Elevator Control Cable
25. Roll Pin
26. Cable Guard
27. Aileron Control Cable
28. Interconnect Cable Adjustment Terminal
29. Quadrant
30. Nut
31. Bearing Block
32. Interconnect Cable
33. Interconnect Cable Turnbuckle
34. Firewall
35. Idler Shaft
36. Support Bracket
37. Tube
38. Torque Tube
39. Washer
40. Retainer
41. Single Controls Cover Plate
42. Spacer

Figure 6-2. Control Column Installation (Sheet 1 of 5)



RIGHT HAND
CONTROL COLUMN



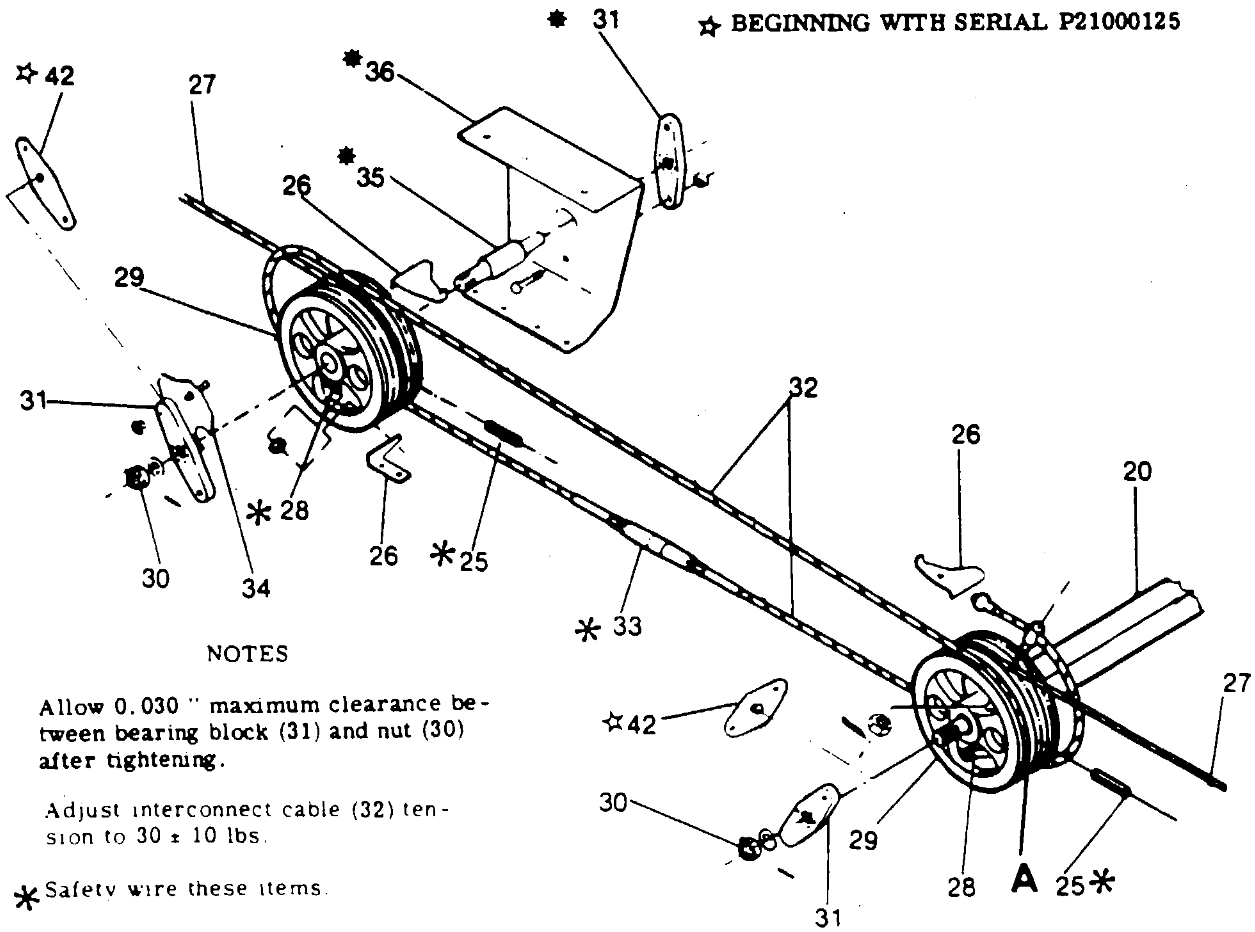
VIEW **A-A**

NOTES

Washers (39) are of various thicknesses and are used to obtain dimension shown in view A-A.

✱ Used only on aircraft NOT equipped with dual control wheel installation.

☆ BEGINNING WITH SERIAL P21000125



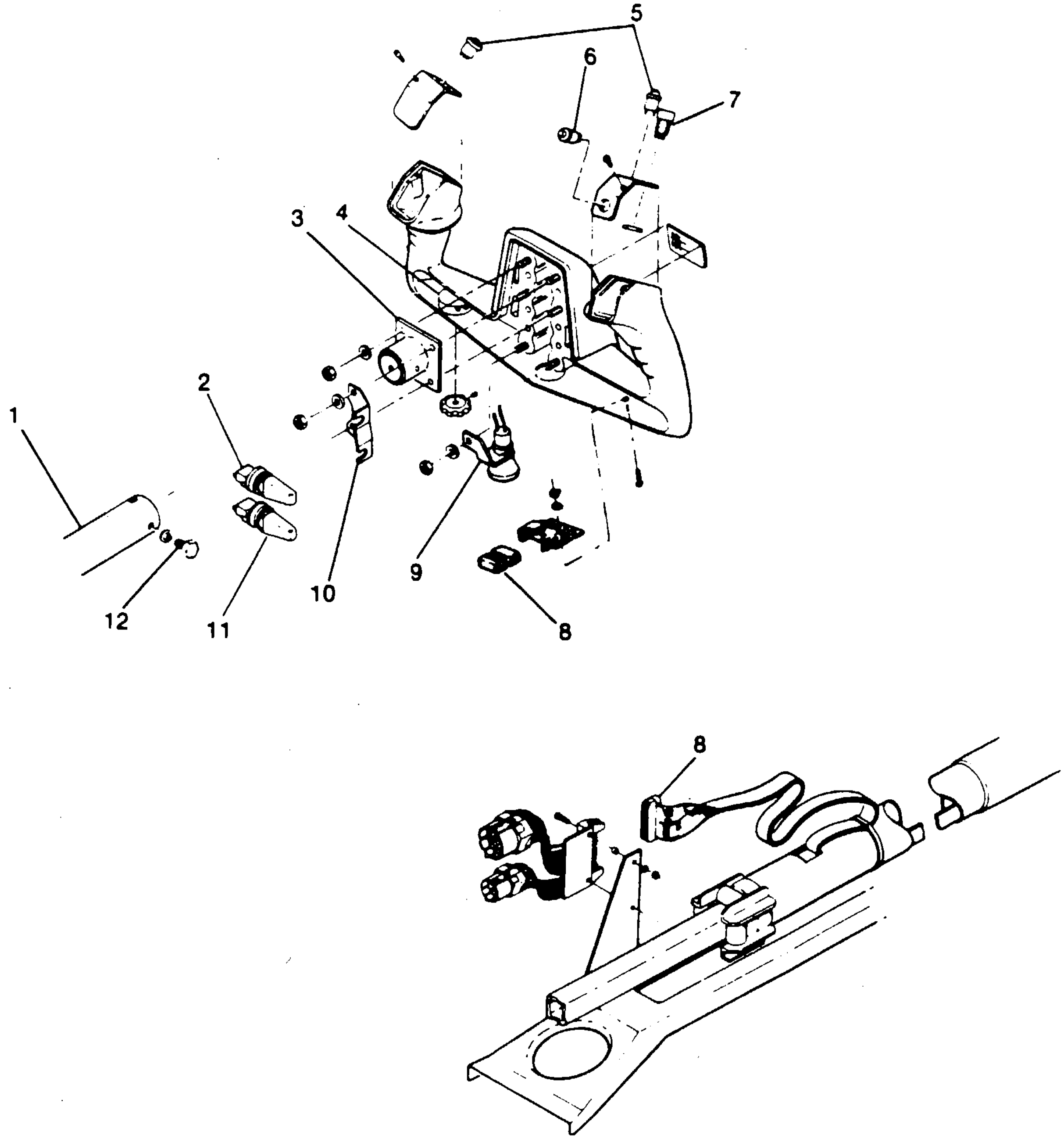
NOTES

Allow 0.030 " maximum clearance between bearing block (31) and nut (30) after tightening.

Adjust interconnect cable (32) tension to 30 ± 10 lbs.

✱ Safety wire these items.

Figure 6-2. Control Column Installation (Sheet 2 of 5)



1. Control Wheel Tube
2. Trim Disengage
3. Adapter
4. Map Light Rheostat
5. Pitch Stnc & Go Around
6. Mike Switch
7. Trim
8. Connector
9. Map Light Assembly
10. Switch Mounting Bracket
11. Auto Pilot Disengage
12. Bolt

THRU 1981 MODELS

Figure 6-2. Control Column Installation (Sheet 3 of 5)

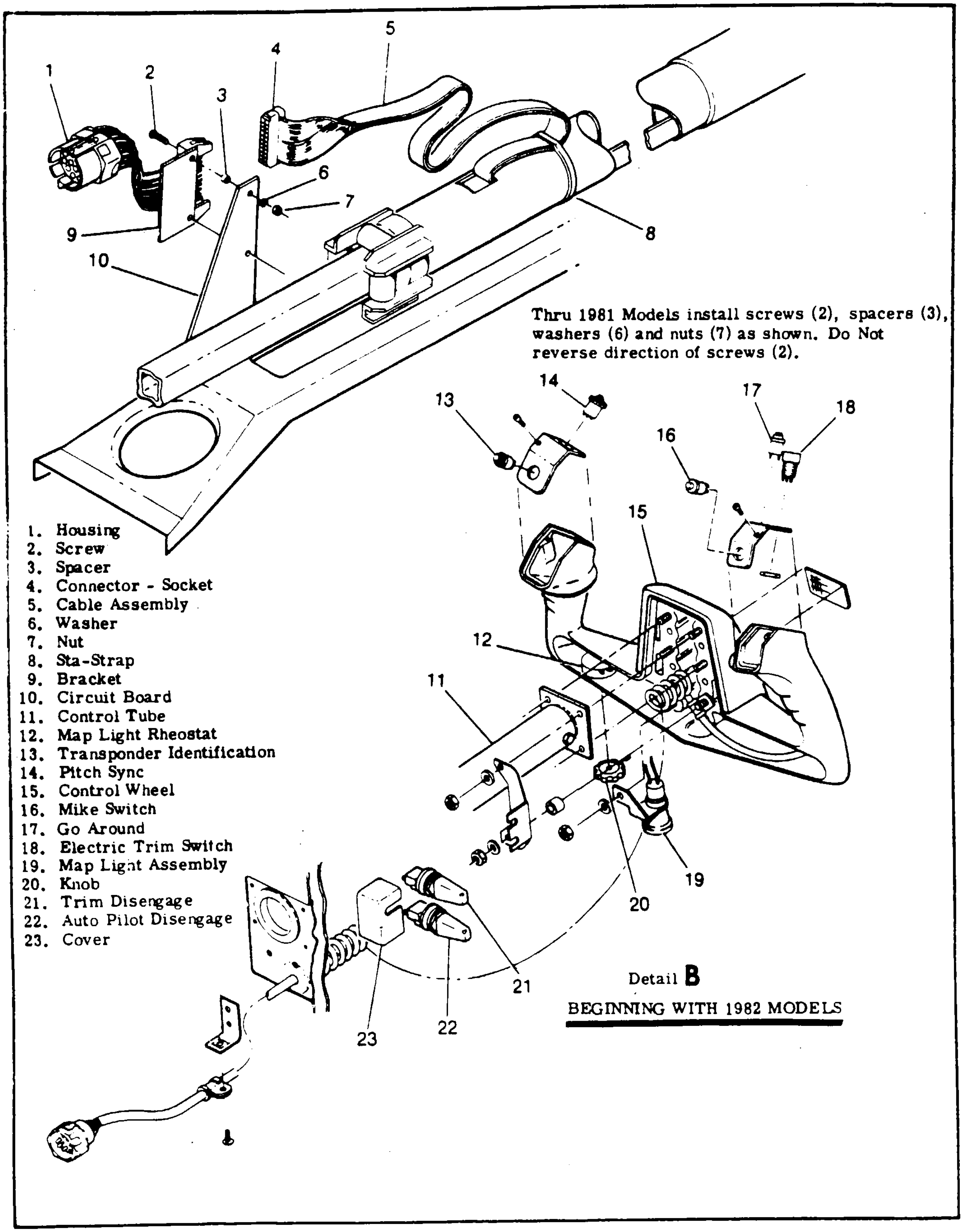
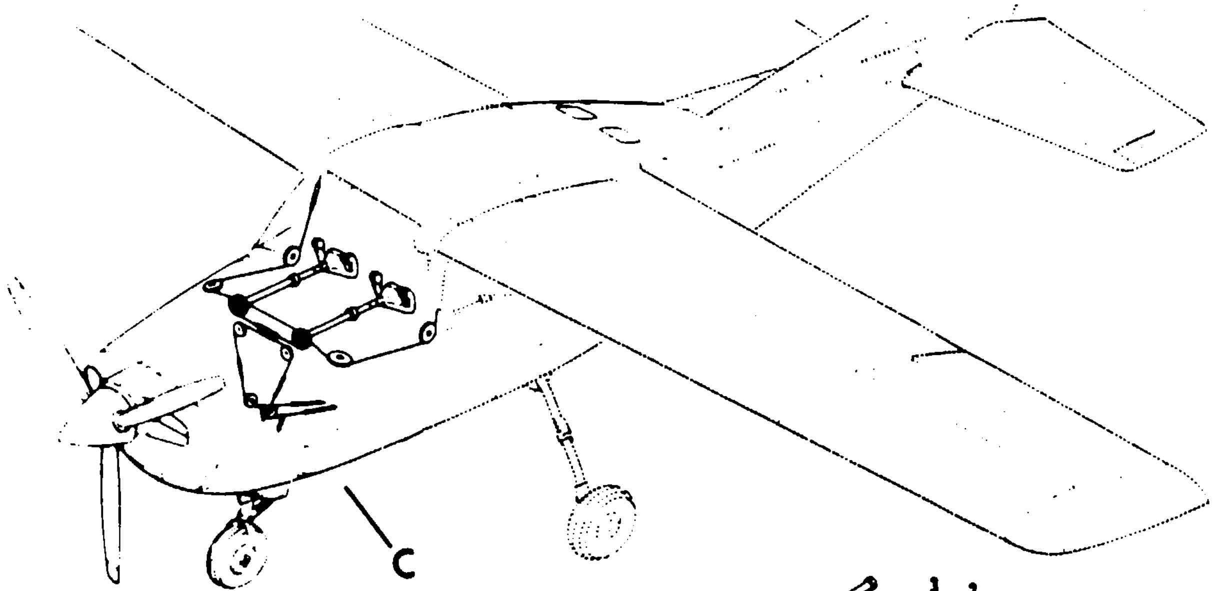
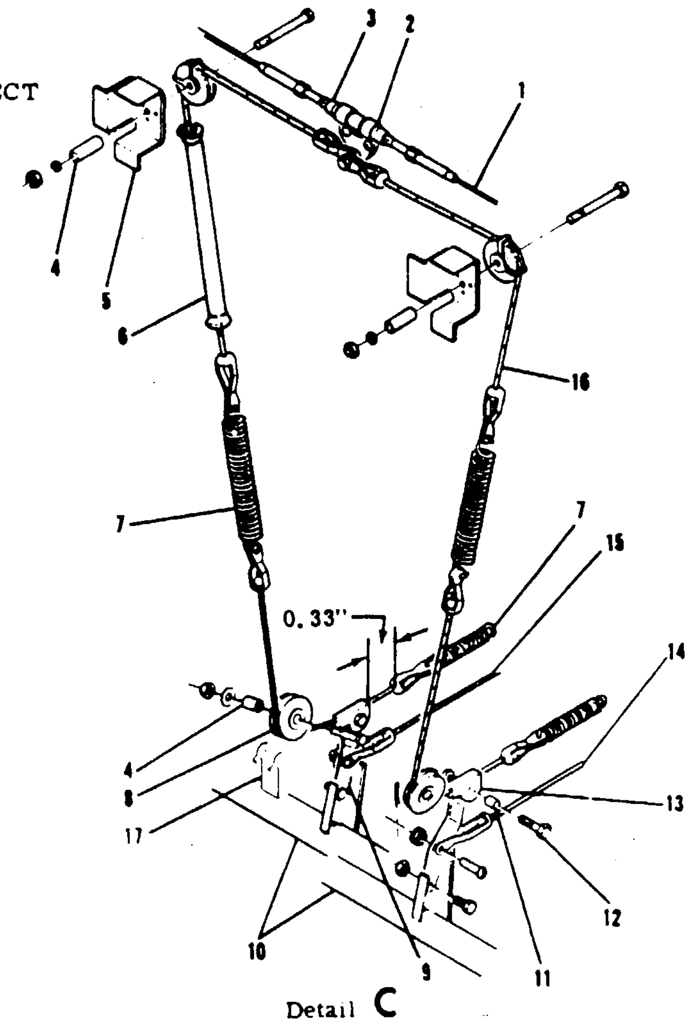


Figure 6-2. Control Column Installation (Sheet 4 of 5)



AILERON/RUDDER INTERCONNECT



1. Cable (Aileron Interconnect)
2. Clamp
3. Turnbuckle
4. Spacer
5. Bracket
6. Tube
7. Spring
8. Pulley
9. Strap
10. Rudder Bar
11. Bushing
12. Bolt
13. Fitting
14. Cable (Left Rudder)
15. Cable (Right Rudder)
16. Cable (Rudder Interconnect)
17. Cable Guard

NOTES

The aileron-rudder interconnect cables do not require adjustment. The cable slack is removed by the springs aft of the rudder bar attachment.

The 0.33 " dimension shown applies only with the aileron and rudder controls in the neutral position.

Fitting (13) must be free to rotate with bolt (12) tightened.

Figure 6-2. Control Column Installation (Sheet 5 of 5)

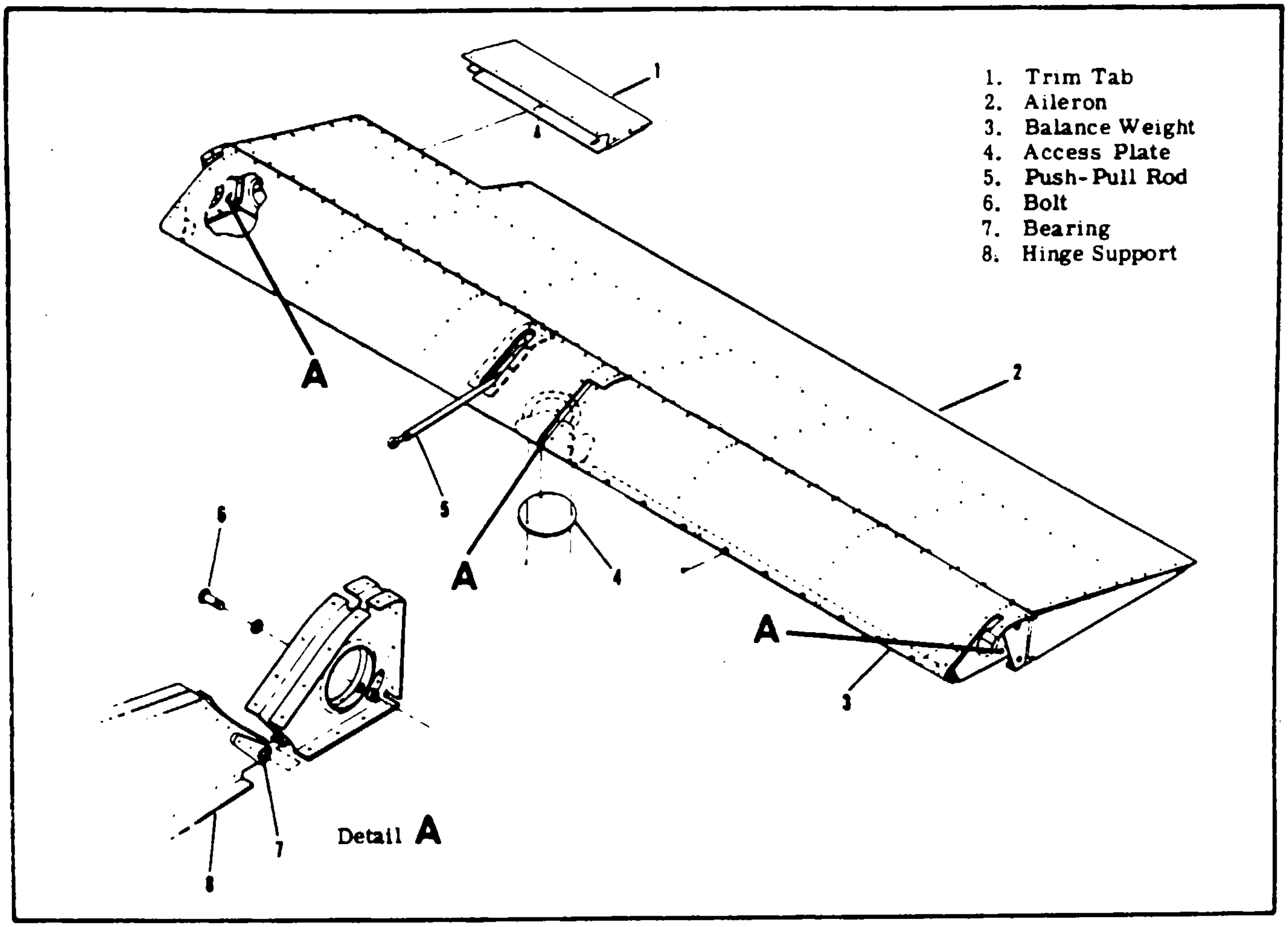


Figure 6-3. Aileron Installation

tems in accordance with paragraphs 6-17 and Section 8 respectively. Safety turnbuckles and all other items previously safetied. Tighten nut (30) securing control tube assembly (20) to firewall snugly, then loosen nut to 0.030" maximum clearance between nut and bearing block, align cotter pin hole and install pin.

6-7. REPAIR Worn, damaged or defective shafts, bearings, quadrants, cables or other components should be replaced. Refer to Section 2 for lubrication requirements.

6-8. BEARING ROLLER ADJUSTMENT. (Refer to figure 6-2.) Each bearing assembly (6) has an 0.062" eccentric adjustment when installed, for aligning the control tube weld assembly and push-pull tube (22) with the guide assembly (21). For alignment, proceed as follows:

a. Remove control wheel assembly in accordance with paragraph 6-6.

b. Install cover plate (5) backwards (bearings on aft side) and leave loose with instrument panel.

c. Align control wheel tube assembly (14) for free travel of push-pull tube (22) along full length of guide assembly (21).

d. Center cover plate (5) over tube and bearing assembly and secure plate to instrument panel.

e. Adjust each bearing (6) to control wheel tube assembly and tighten bearings in place.

f. Remove cover plate and reinstall with bearings facing forward.

6-9. AILERON BELLCRANK. (Refer to figure 6-1.)

6-10. REMOVAL.

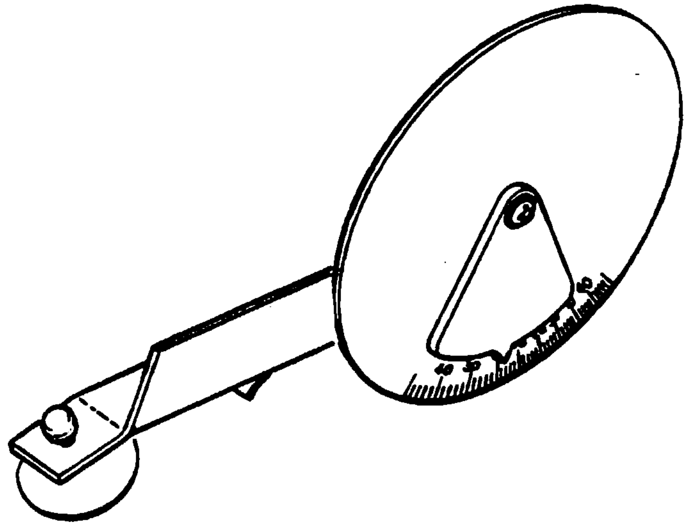
a. Remove access plate inboard of each bellcrank (18) on underside of wing.

b. Remove safety wire and relieve cable tension at turnbuckles (5).

c. Disconnect control cables from bellcrank (18).

d. Disconnect push-pull tube (16) at bellcrank (18).

e. Remove bolts (9) securing bellcrank to wing structure.



AVAILABLE FROM CESSNA PARTS DISTRIBUTION (CPD 2) THROUGH CESSNA SERVICE STATIONS (TOOL NO, SE 716)

Figure 6-4. Inclinometer for Measuring Control Surface Travel

f. Remove bellcrank through access opening, using care that bushing (13) is not dropped from bellcrank.

NOTE

Brass washers (12) may be used as shims between each end of bellcrank and supports (11 and 17). Retain these shims. Tape open ends of bellcrank to prevent dust and dirt from entering bellcrank needle bearings (14).

6-11. INSTALLATION.

a. Connect control cables (4 and 7) to bellcrank (18) prior to installing bellcrank.
b. Place bushing (13) in bellcrank and position bellcrank in wing.
c. Install brass washers (12) as required between upper and lower end of bellcrank and wing supports to shim out excess clearance.
d. Install bellcrank pivot bolt (9).
e. Connect push-pull rod (16) to bellcrank.
f. Re-rig aileron system in accordance with paragraph 6-17., safety turnbuckles and reinstall all items removed for access.

6-12. Repair. Repair of bellcranks consists of replacement of defective parts. If needle bearings are dirty and in need of lubrication, clean thoroughly and lubricate as outlined in Section 2.

6-13. AILERONS. (Refer to figure 6-3.)

6-14. REMOVAL AND INSTALLATION.

a. Remove access plates (4) and disconnect push-pull rod (5) at aileron.
b. Remove wing tip for access to outboard hinge bolt.
c. Run flaps to full down position for access to inboard hinge bolt.
d. Remove hinge bolts (6) securing aileron and carefully remove aileron from wing.
e. Reverse the preceding steps for reinstallation. Rig system, if necessary, in accordance with paragraph 6-17 and reinstall all items removed for access.

NOTE

If rigging was correct and push-pull rod adjustment was not disturbed, it should not be necessary to re-rig system.

6-16. REPAIR. Aileron repair and static balance may be accomplished in accordance with instructions outlined in Section 18. Before installation, ensure balance weights and hinges are securely attached.

6-16. AILERON TRIM TAB. (Refer to figure 6-3.)

6-17. REMOVAL AND INSTALLATION.

a. Remove screws on lower side of tab.
b. Drill out rivets on upper side of tab and remove tab.
c. Reverse the preceding steps for reinstallation.

6-18. ADJUSTMENT. Adjustment is accomplished by loosening the screws, shifting tab trailing edge up to correct for a wing-heavy condition or down to correct for a wing-light condition. Divide correction equally on both tabs. When installing a new wing or aileron, set tab in neutral and adjust as necessary after flight test.

6-19. CABLES AND PULLEYS. (Refer to figure 6-1.)

?0. REMOVAL AND INSTALLATION.

a. Remove access plates, wing root fairings and upholstery as required.

b. Remove safety wire and relieve cable tension at turnbuckles (5 and 8).

c. Disconnect cables from aileron bellcranks (18) and quadrants (index 29, figure 6-2).

d. Remove cable guards, pulleys and pressure seals as required to work cables from aircraft.

NOTE

To ease routing of cables, a length of wire may be attached to end of the cable before being withdrawn from the aircraft. Leave wire in place, routed through structure; then attach the cable being installed and use wire to pull cable into position.

e. Reverse the preceding steps for reinstallation.

f. After cables are routed in position, install pulleys and cable guards. Ensure cables are positioned in pulley grooves before installing guards.

g. Re-rig aileron system in accordance with paragraph 6-17, safety turnbuckles and install access plates, fairings, and upholstery removed in step "a."

6-17. RIGGING.

a. (Refer to figure 6-1.) Remove access plates and upholstery as required.

b. Remove safety wire and relieve all cable tension at turnbuckles (5 and 8).

c. Disconnect push-pull rods (16) at bellcranks (18).

d. (Refer to figure 6-2.) Adjust turnbuckle (33) and adjustment nuts (28) on interconnect cable (32) to remove slack, acquire proper tension (30 pounds, +10 or -10 pounds) and position both control wheels level (synchronized).

e. Tape a bar across both control wheels to hold them in neutral position.

f. (Refer to figure 6-1.) Adjust direct cable turnbuckles (5) and carry-thru cable turnbuckle (8) to position bellcranks (18) approximately in neutral while maintaining 40 pounds +10 or -10 pounds tension on carry-thru cable (7).

g. Streamline ailerons with reference to flaps (flaps full UP and disregarding aileron trim tabs), then adjust push-pull rods (16) to fit and install.

h. With ailerons streamlined, mount an inclinometer on trailing edge of aileron and set pointer to 0°.

NOTE

AN inclinometer for measuring control surface travel is available from the Cessna Service Parts Center. Refer to figure 6-4.

i. Remove bar from control wheels and adjust travel stop bolts (15) to degree of travel specified in figure 1-1.

j. Ensure all turnbuckles are saftied, all cables and cable guards are properly installed, all jamb nuts are tight and replace all parts removed for access.

WARNING

Be sure ailerons move in correct direction when operated by the control wheels.

SHOP NOTES:

SECTION 7

WING FLAP CONTROL SYSTEM

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7-1. WING FLAP CONTROL SYSTEM. (Refer to figure 7-1.)

7-2. DESCRIPTION. The wing flap control system consists of an electric motor and transmission assembly, drive pulleys, synchronizing push-pull tubes, bellcranks, push-pull rods, cables, pulleys and a follow-up control. Power from the motor and transmission assembly is transmitted to the flaps by a system of drive pulleys, cables and synchronizing tubes. Electrical power to the motor is controlled by two microswitches mounted on a "floating" arm, a control lever and a follow-up control. As the control lever is moved to the desired flap setting, a switch is tripped actuating the flap motor. As the flaps move, the floating arm is rotated by the follow-up control until the active switch clears the control lever cam, breaking the circuit. To reverse the direction of flap travel, the control lever is moved in the opposite direction. When the control lever cam contacts the second switch the flap motor is energized in the opposite direction. Likewise, the follow-up control moves the floating arm until the second switch is clear of the control lever cam.

7-3. OPERATIONAL CHECK.

a. Operate flaps through their full range of travel, observing for uneven or jumpy motion, binding, and lost motion in the system. Ensure flaps are moving together through their full range of travel.

b. Check for positive shut-off of motor at the flap travel extremes, FLAP MOTOR MUST STOP OR DAMAGE WILL RESULT.

c. Check wing flaps for sluggishness in operation.

d. With flaps full UP, mount an inclinometer on one flap and set to 0°. Lower flaps to full DOWN position and check flap angle as specified in figure 1-1. Check approximate mid-range percentage setting against degrees as indicated on inclinometer. Repeat the same procedure for the opposite flap.

NOTE

An inclinometer for measuring control surface travel is available from the Cessna Service Parts Center. Refer to Section 6.

e. Remove access plates and attempt to rock drive pulleys and bellcranks to check for bearing wear.

f. Inspect flap rollers and tracks for evidence of binding and defective parts.

7-4. TROUBLE SHOOTING.

NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to re-rig system, refer to paragraph 7-21.

TROUBLE	PROBABLE CAUSE	REMEDY
BOTH FLAPS FAIL TO MOVE.	Popped circuit breaker.	Reset and check continuity. Replace breaker if defective.
	Defective switch.	Place jumper across switch. Replace switch if defective.
	Defective motor.	Remove and bench test. Replace motor if defective.
	Broken or disconnected wires.	Run continuity check of wiring. Connect or repair wiring as necessary.
	Disconnected or defective transmission.	Connect transmission. Remove, bench test and replace transmission if defective.
	Defective limit switch.	Check continuity of switches. Replace switches found defective.
	Follow-up control disconnected or slipping.	Secure control or replace if defective.
BINDING IN SYSTEM AS FLAPS ARE RAISED AND LOWERED.	Cables not riding on pulleys.	Open access plates and observe pulleys. Route cables correctly over pulleys.
	Bind in drive pulleys.	Check drive pulleys in motion. Replace drive pulleys found defective.
	Broken or binding pulleys.	Check pulleys for free rotation or breaks. Replace defective pulleys.
	Frayed cable.	Check condition of cables. Replace defective cables.
	Flaps binding on tracks.	Observe flap tracks and rollers. Replace defective parts.
LEFT FLAP FAILS TO MOVE.	Disconnected or broken cable.	Check cable tension. Connect or replace cable.
	Disconnected push-pull rod.	Attach push-pull rod.
FLAPS FAIL TO RETRACT.	Disconnected or defective UP operating switch.	Check continuity of switch. Connect or replace switch.

7-4. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
FLAPS FAIL TO EXTEND.	Disconnected or defective DOWN operating switch.	Check continuity of switch. Connect or replace switch.
INCORRECT FLAP TRAVEL.	Incorrect rigging.	Refer to paragraph 7-21.
	Defective limit switch.	Check continuity of switches. Replace switches found defective.

7-5. FLAP MOTOR, TRANSMISSION AND ACTUATOR ASSEMBLY. (Refer to figure 7-1, sheet 2.)

7-6. REMOVAL AND INSTALLATION.
a. Run flaps to full DOWN position.
b. Disconnect battery cables at the battery and insulate cable terminals as a safety precaution.
c. Remove access plates from under actuator assembly on left wing and adjacent to the drive pulleys on both wings.
d. Relieve cable tension at turnbuckles (indexes 6, 7, 8 and 9, sheet 1.)

NOTE

Remove motor (3), transmission (18), actuator assembly (17) and lower support as a unit.

e. Disconnect cables from actuator cable drive assembly (17).
f. Remove bolt (11) securing follow-up control bellcrank (10) to actuator assembly (17). Retain spacer (9).
g. Disconnect flap motor and microswitch wiring and tag for reference on reinstallation.
h. Remove bolts (12 and 20) securing lower support to upper support. Retain spacer (9), bushing (19) and washers.
i. Remove bolt (21) securing motor and transmission assembly to upper support (7).

NOTE

Although not required, nuts (2) securing motor (3) to transmission (18) may be removed to swing motor clear of working area for easier removal of bolt (21).

j. Using care, work assembly out of wing through access opening.
k. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 7-21, safety turnbuckles and reinstall all items removed for access.

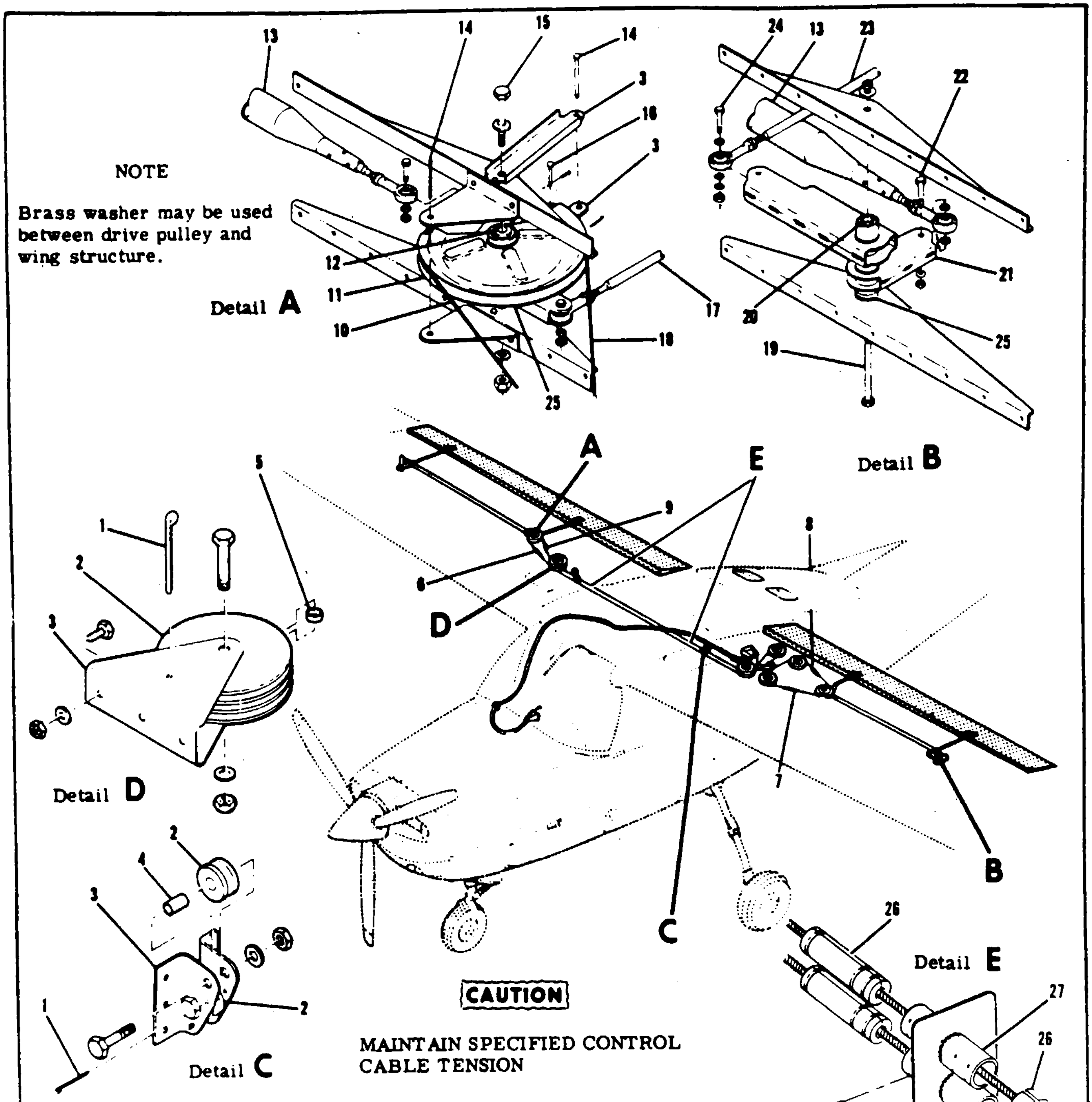
7-7. REPAIR. Repair consists of replacement of motor, transmission or coupling. Lubricate in accordance with Section 2.

7-8. FLAP CONTROL LEVER. (Refer to figure 7-1, sheet 3.)

7-9. REMOVAL AND INSTALLATION.
a. Remove follow-up control (8) from switch mounting arm (30).
b. Remove flap operating switches (28 and 29) from switch mounting arm (30). DO NOT disconnect electrical wiring at switches.
c. Remove knob (27) from control lever (26).
d. Remove remaining items by removing bolt (32). Use care not to drop parts into tunnel area.
e. Reverse the preceding steps for reinstallation. Do not overtighten bolt (32) causing lever (26) to bind. Rig system in accordance with paragraph 7-21.

7-10. DRIVE PULLEYS. (Refer to figure 7-1, sheet 1.)

7-11. REMOVAL AND INSTALLATION.
a. Run flaps to full DOWN position.
b. Remove access plates adjacent to drive pulley (11).
c. Relieve cable tension at turnbuckles (7 and 8) for removal of left hand drive pulley and relieve cable tension at turnbuckles (6 and 9) for removal of right hand drive pulley.
d. Remove bolt securing flap push-pull rod (17) to drive pulley.
e. Remove bolt securing synchronizing push-pull tube (13) to drive pulley.
f. Remove cable guards (14).
g. Remove cable lock pins (16) and disconnect cables (10 and 18) from drive pulley. Tag cables for reference on reinstallation.
h. Remove pivot bolt (15) attaching drive pulley to wing structure.
i. Remove drive pulley (11) through access opening, using care not to drop bushing (12). Retain brass washer between drive pulley and wing structure. Tape open ends of pulley to protect bearings.
j. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 7-21, safety turnbuckles and reinstall all items removed for access.



NOTE

Brass washer may be used between drive pulley and wing structure.

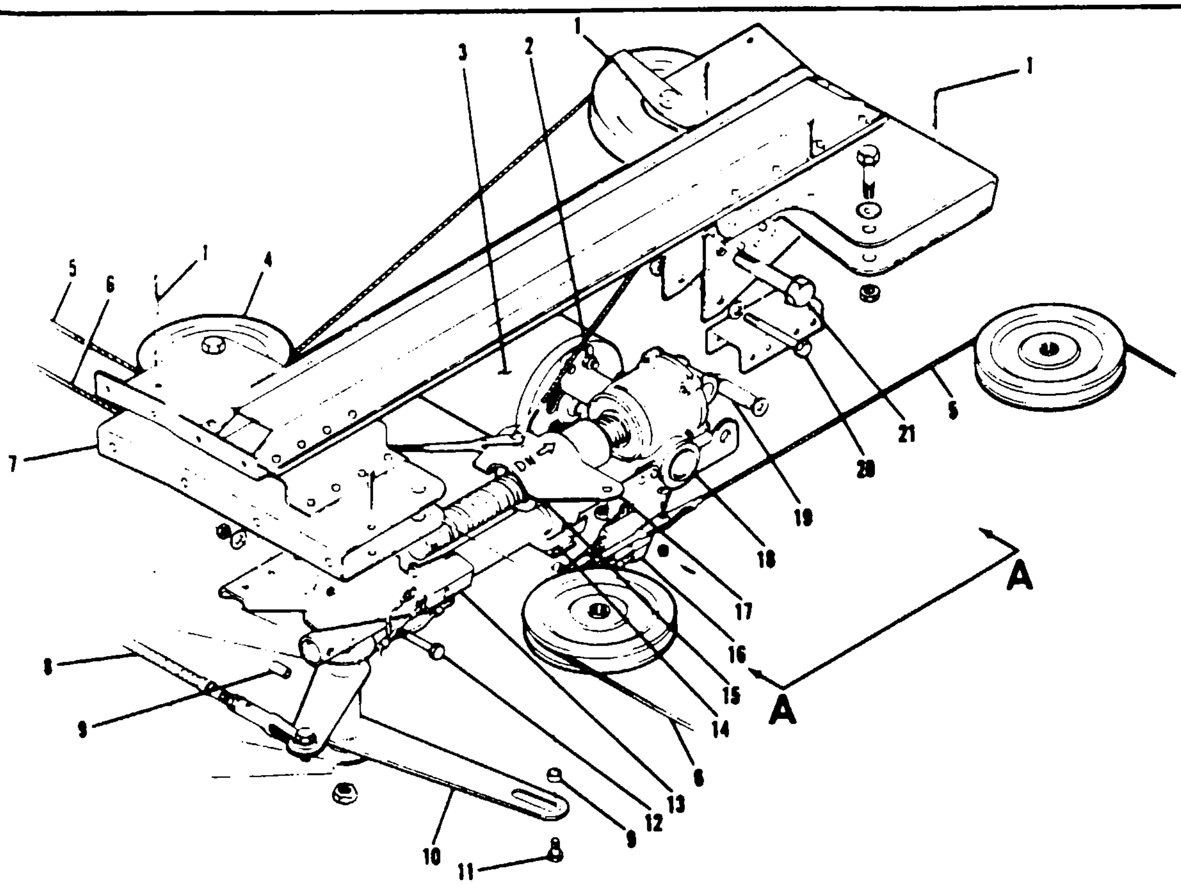
CAUTION

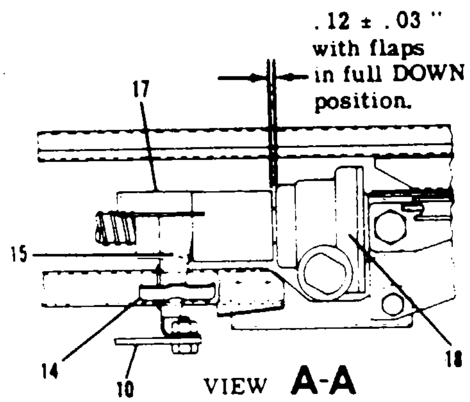
MAINTAIN SPECIFIED CONTROL CABLE TENSION

1. Cable Guard
2. Pulley
3. Bracket
4. Bushing
5. Spacer
6. Turnbuckle (Right Direct)
7. Turnbuckle (Left Direct)
8. Turnbuckle (Left Retract)
9. Turnbuckle (Right Retract)
10. Cable (Direct)
11. Drive Pulley
12. Bushing
13. Synchronizing Push-Pull Tube
14. Cable Guard
15. Pivot Bolt
16. Lock Pin
17. Inboard Push-Pull Rod
18. Cable (Retract)
19. Pivot Bolt
20. Bushing
21. Bellcrank
22. Bolt
23. Outboard Push-Pull Rod
24. Bolt
25. Brass Washer
26. Pressure Seal
27. Retainer

CABLE TENSION:
50 LBS ± 10 LBS (AT THE AVERAGE TEMPERATURE FOR THE AREA.)
REFER TO FIGURE 1-1 FOR TRAVEL.

Figure 7-1. Wing Flap Control System (Sheet 1 of 3)



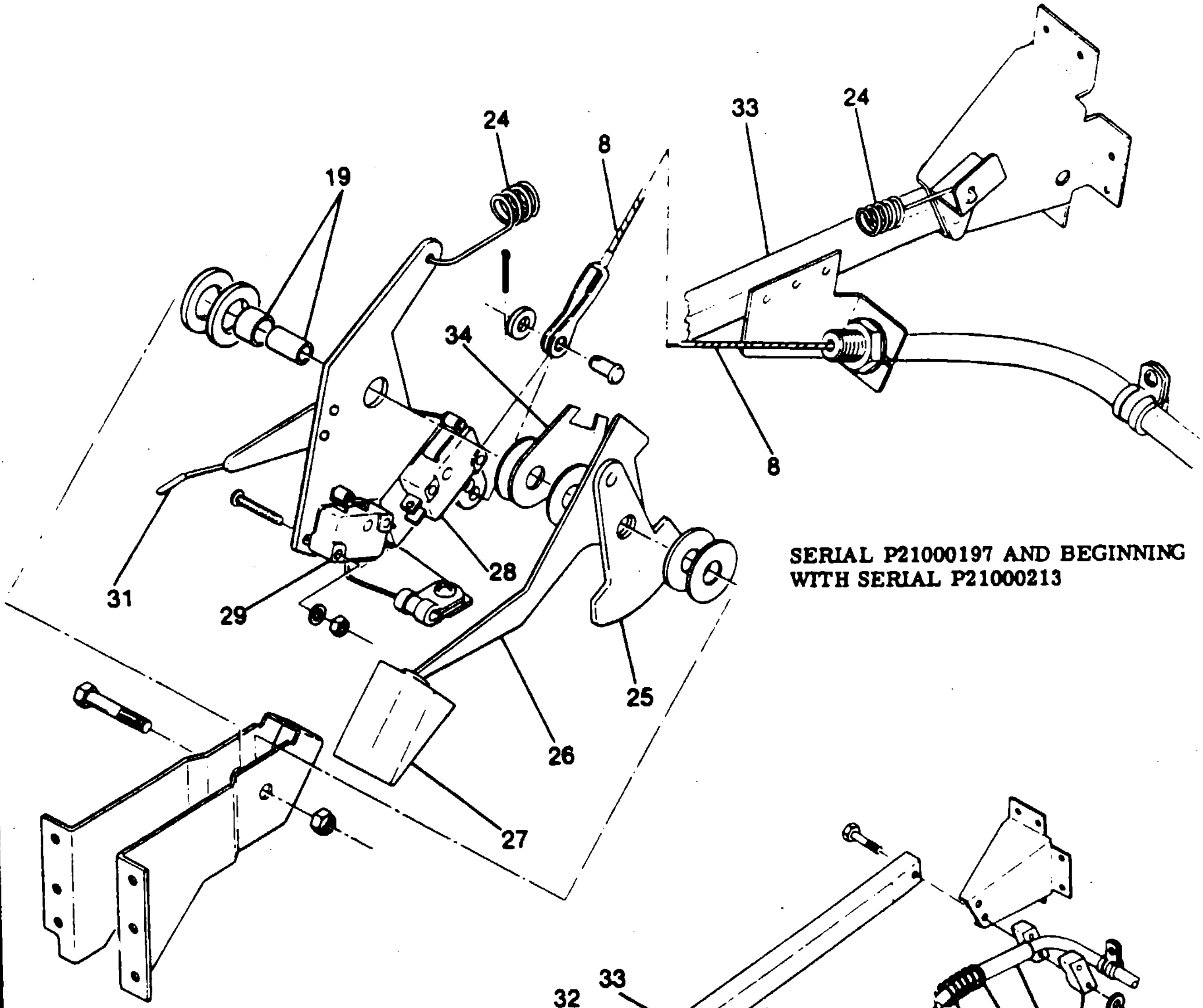


NOTE

Torque setscrew (15) to 40 inch-lbs. Apply Loctite Sealant, Grade CV to threads of setscrew (15) after final adjustment.

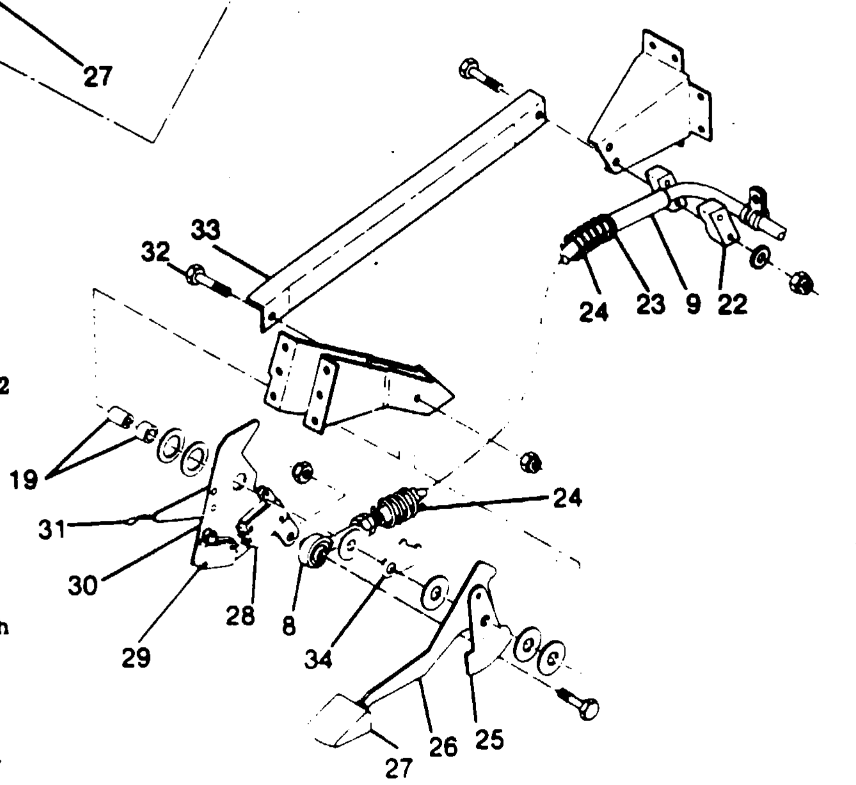
1. Cable Guard
2. Nut
3. Motor Assembly
4. Pulley
5. Cable (Retract)
6. Cable (Direct)
7. Upper Support Assembly
8. Follow-Up Control
9. Spacer
10. Bellcrank
11. Bolt
12. Bolt
13. Up-Limit Switch
14. Striker Plate (Cam)
15. Setscrew
16. Down-Limit Switch
17. Actuator Cable Drive Assembly
18. Actuator
19. Bushing
20. Bolt
21. Bolt
22. Clamp
23. Washer
24. Spring
25. Cam
26. Control Lever
27. Knob
28. Flaps Down Operating Switch
29. Flaps Up Operating Switch
30. Switch Mounting Arm
31. Position Indicator
32. Bolt
33. Stiffener
34. Bracket

Figure 7-1. Wing Flap Control System (Sheet 2 of 3).



SERIAL P21000197 AND BEGINNING WITH SERIAL P21000213

THRU SERIAL P21000196 AND SERIALS P21000198 THRU P21000212



NOTE

Insulators are installed between switches (13, 16, 28 and 29) and their mounting brackets. Install AN960-D4 washers (one per switch fastener) between the insulator and switches, 28 and 29 ONLY.

Apply Loctite Sealant, Grade CV, to threads of control lever (26) before installing knob (27).

Figure 7-1. Wing Flap Control System (Sheet 3 of 3)

7-12. REPAIR. Repair is limited to replacement of bearings. Cracked, bent or excessively worn drive pulleys must be replaced. Lubricate drive pulley bearings as outlined in Section 2.

7-13. BELLCRANKS. (Refer to figure 7-1, sheet 1.)

7-14. REMOVAL AND INSTALLATION.
a. Run flaps to full DOWN position.
b. Remove access plates adjacent to bellcrank (21).
c. Remove bolt (24) securing push-pull rod (23) to bellcrank (21).
d. Remove bellcrank pivot bolt (19) and position bellcrank as necessary to expose synchronizing push-pull tube attach point.
e. Remove bolt (22) securing synchronizing push-pull tube (13) to bellcrank (21) and work bellcrank out through access opening using care not to drop bushing (20). Tape open ends of bellcrank to protect needle bearings.

NOTE

To remove synchronizing push-pull tube (13), disconnect tube at bellcrank (21) and drive pulley (11). Position tube through lightening holes until removal is possible through access opening.

f. Reverse the preceding steps for reinstallation. If the push-pull rod and synchronizing tube adjustments are not disturbed, re-rigging of the system should not be necessary. Check flap travel and rig in accordance with paragraph 7-21, if necessary, and reinstall all items removed for access.

7-15. REPAIR. Repair is limited to replacement of bearings. Cracked, bent or excessively worn bellcranks must be replaced. Lubricate in accordance with Section 2.

7-16. FLAPS. (Refer to figure 7-2.)

7-17. REMOVAL AND INSTALLATION
a. Run flaps to full DOWN position.
b. Remove access plate (7) outboard of the inboard flap track.
c. Disconnect push-pull rod (3) at both flap attach points.
d. Remove bolt (6) at each aft flap track, pull flap aft and remove remaining bolts. As flap is removed from wing, all washers, rollers and bushings will fall free. Retain these for reinstallation.
f. If the push-pull rod adjustment is not disturbed, re-rigging of the system should not be necessary. Check flap travel and rig in accordance with paragraph 7-21, if necessary.

7-18. REPAIR. Flap repair may be accomplished in accordance with instructions outlined in Section 18.

7-19. CABLES AND PULLEYS. (Refer to figure 7-1, sheet 1.)

7-20. REMOVAL AND INSTALLATION.
a. Remove access plates, fairings and upholstery as required for access.
b. Relieve cable tension at turnbuckles (6, 7, 8 and 9).
c. Disconnect cables at drive pulleys (11).
d. Disconnect cables at actuator cable drive assembly (index 17, sheet 2).
e. Remove cable guards, pulleys and pressure seals as necessary to work cables free of aircraft.

NOTE

To ease routing of cables, a length of wire may be attached to the end of cable being withdrawn from the aircraft. Leave wire in place, routed through structure; then attach the cable being installed and use wire to pull cable into position.

f. After cable is routed in position, install pulleys and cable guards. Ensure cable is positioned in pulley grooves before installing guards.
g. Re-rig flap system in accordance with paragraph 7-21, safety turnbuckles and reinstall all items removed in step "a."

7-21. RIGGING.
a. (Refer to figure 7-1, sheet 1.) Using care, run flaps to full DOWN position.
b. Disconnect cables at turnbuckles (6, 7, 8 and 9).
c. Disconnect push-pull rods (17) at drive pulleys (11).
d. Disconnect push-pull rods (23) at bellcranks (21).
e. Disconnect synchronizing push-pull tubes (13) from drive pulleys (11) and bellcranks (21).
f. If cables are being replaced with drive pulleys (11) installed, rotate drive pulleys beyond their normal range of travel to permit cable attachment. If drive pulleys are not installed, it may be easier to attach the cables prior to installing the drive pulleys in the wings.
f. Attach the 1/8" direct cable to the forward side of drive pulleys and the 3/32" retract cable to the aft side of drive pulleys. (Refer to figure 7-3.)
h. Adjust synchronizing push-pull tubes (13) to 41.87" between centers of rod end holes, tighten jam nuts and install.
i. Adjust inboard push-pull rods (17) to 10.81" and outboard push-pull rods (23) to 10.39" between centers of rod end holes, tighten jam nuts and install. These dimensions may vary in order to obtain snug fitting of flap in "UP" position.
j. Ensure cables are properly routed and in pulley grooves and adjust turnbuckles to obtain specified cable tension.
k. (Refer to figure 7-1, sheet 2.)

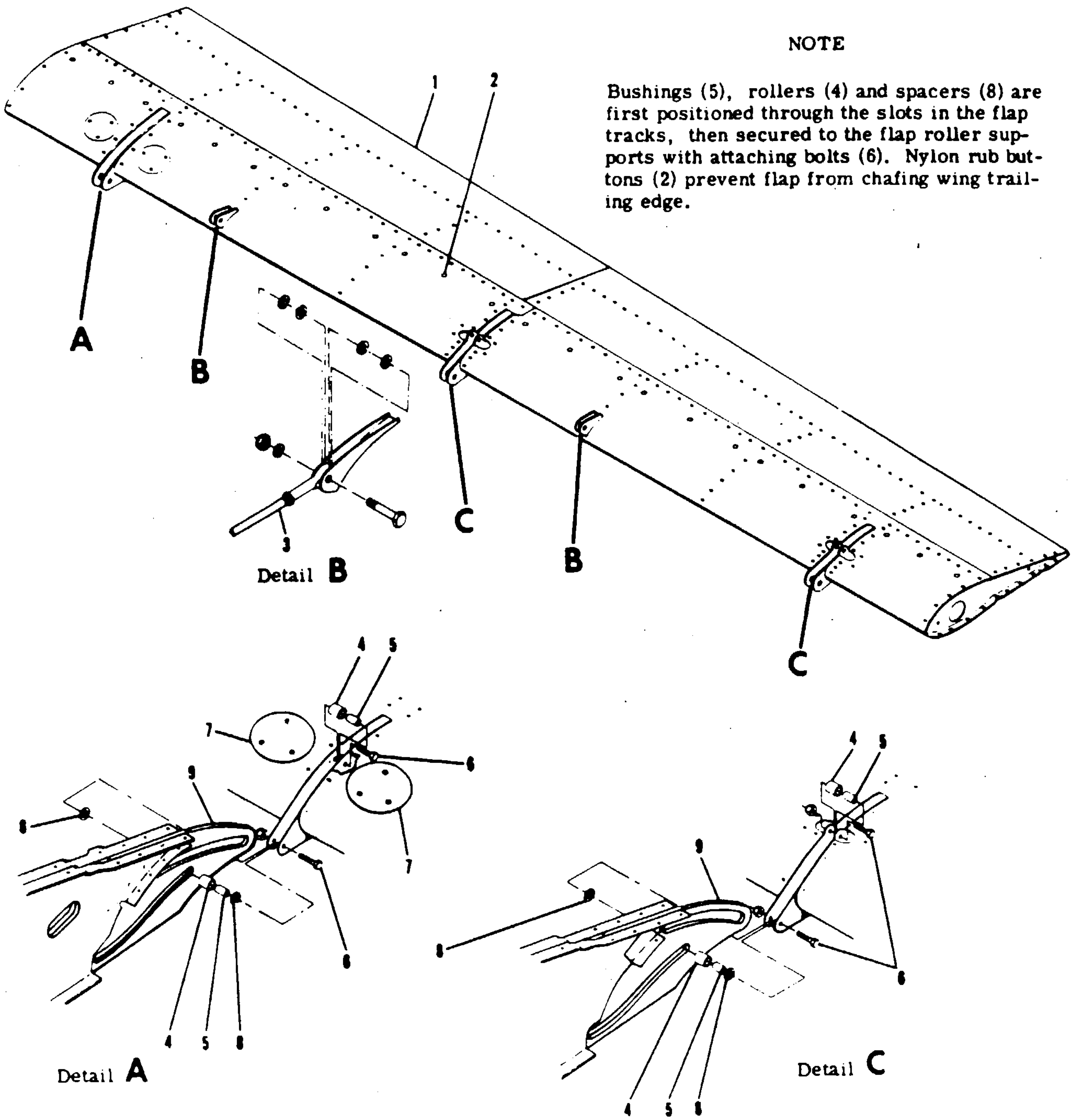
NOTE

The ball screw assembly does not have a free-wheeling feature. Therefore, the flap actuator motor MUST be shut-off at travel extremes or structural deformation will occur.

Carefully run flaps to full UP position and adjust

NOTE

Bushings (5), rollers (4) and spacers (8) are first positioned through the slots in the flap tracks, then secured to the flap roller supports with attaching bolts (6). Nylon rub buttons (2) prevent flap from chafing wing trailing edge.



1. Flap Assembly
2. Nylon Rub Button
3. Push-Pull Rod
4. Roller
5. Bushing
6. Bolt
7. Access Plate
8. Spacer
9. Flap Track

Figure 7-2. Flap Installation

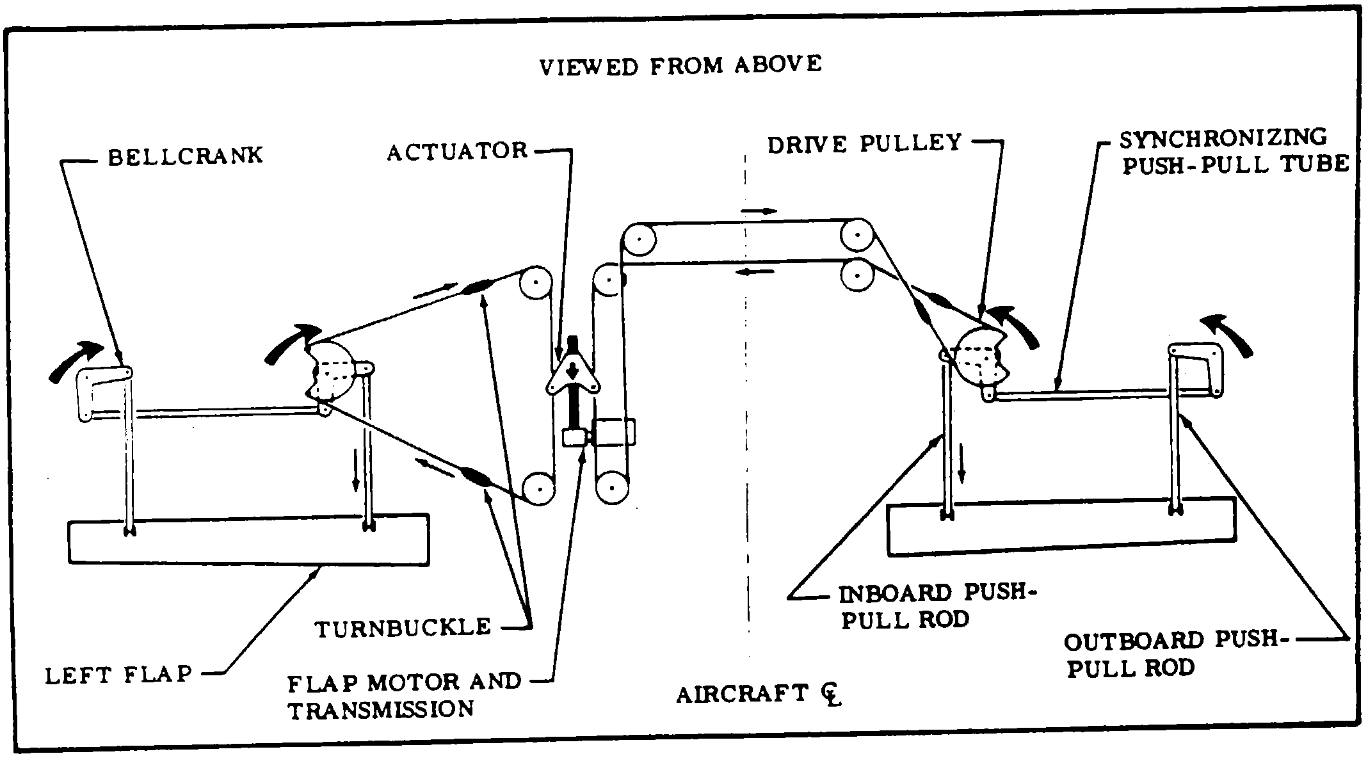


Figure 7-3. Flap System Schematic

UP-LIMIT switch to operate and shut-off motor at degree of travel specified in figure 1-1.

l. Mount an inclinometer on one flap and set to 0°.

NOTE

An inclinometer for measuring control surface travel is available from the Cessna Service Parts Center. Refer to Section 6.

m. Carefully run flaps to DOWN position and adjust DOWN-LIMIT switch (16) to operate and shut-off motor to .12±.03 inches between cable drive assembly (17) and transmission (18) as illustrated in VIEW A-A.

n. Operate control lever (26) and run flaps to full UP position.

o. Disconnect follow-up control (8) at switch mounting arm (30).

p. Without moving control lever (26), move arm (30) until cam (25) is centered between switches (28 and 29). Ensure switches are centered in their respective adjustment slots prior to centering cam (25).

q. Adjust flaps DOWN operating switch (28) in slotted holes until roller just clears cam (25) and secure. This adjustment should provide flaps down operation to 10°+0°-2° and 20°±2° thru 1981 Models and 10°+0° -2° and 20°+1°-2° beginning with 1982 Models. If not readjust switch (28) as necessary.

NOTE

The flaps must NEVER exceed 10° when the control lever (26) is moved from the 0° to 10° position.

r. Adjust flaps UP operating switch (29) in slotted holes to 0.062" clearance between switch roller and can (25) when the DOWN operating switch has just opened in the 10° and 20° position.

NOTE

Flap travel on UP cycle may deviate a maximum of 4° from indicated position.

s. Turn master switch ON and run flaps through several cycles, stopping at various mid-range settings, and checking that cable tension is within limits. Retract cable tension may increase to 90 pounds when flaps are fully retracted.

NOTE

Since flap rollers may not bottom in tracks with flaps fully extended, some free play may be noticed in this position.

t. Check all rod ends and clevis ends for sufficient thread engagement, all jam nuts are tight and reinstall all items removed for access.

u. Flight test aircraft and check that follow-up control does not cause automatic cycling of flaps. If cycling occurs, readjust operating switches as necessary per steps "q" and "r".

SECTION 8

ELEVATOR CONTROL SYSTEM

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8-1. ELEVATOR CONTROL SYSTEM. (Refer to figure 8-1.)

8-2. DESCRIPTION. The elevators are operated by power transmitted through fore-and-aft movement of the pilot or copilot control wheels. The system is comprised of control columns, an elevator torque tube, cables and pulleys. The elevator control cables, at their aft ends, are attached to a bellcrank mounted on a bulkhead in the tailcone. A push-pull tube connects this bellcrank to the elevator arm assembly, installed between the elevators. An elevator trim tab is installed in the trailing edge of the right elevator and is described in Section 9.

8-3. TROUBLE SHOOTING

NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to re-rig system, refer to paragraph 8-14.

TROUBLE	PROBABLE CAUSE	REMEDY
NO RESPONSE TO CONTROL WHEEL FORE-AND-AFT MOVEMENT	Forward or aft end of push-pull tube disconnected.	Check visually. Attach push-pull tube correctly.
	Cables disconnected.	Check visually. Attach cables and rig system in accordance with paragraph 8-14.

8-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
BINDING OR JUMPY MOTION FELT IN MOVEMENT OF ELEVATOR SYSTEM.	Defective bellcrank or arm assembly pivot bearings or push-pull tube attach bearings.	Move bellcrank or arm to check for play or binding. Disconnect push-pull tube and check that bearings rotate freely. Replace defective parts.
	Cables slack.	Check and adjust to tension specified in figure 8-1.
	Cables not riding correctly on pulleys.	Check visually. Route cables correctly over pulleys.
	Defective control column bearing rollers.	Check visually. Replace defective rollers.
	Defective control column torque tube bearings.	Disconnect necessary items and check that bearings rotate freely. Replace defective bearing.
	Control guide on aft end of control square tube adjusted too tightly.	Loosen screw and tapered plug in end of control tube enough to eliminate binding.
	Defective elevator hinges.	Disconnect push-pull tube and move elevators by hand. Replace defective hinges.
	Defective pulleys or cable guards.	Check visually. Replace defective parts and install guards properly.
ELEVATORS FAIL TO ATTAIN PRESCRIBED TRAVEL.	Stops incorrectly set.	Rig in accordance with paragraph 8-14.
	Cables tightened unevenly.	Rig in accordance with paragraph 8-14.
	Interference at instrument panel.	Rig in accordance with paragraph 8-14.

8-4. CONTROL COLUMN.
Section 6 outlines removal, installation and repair of control column.

8-5. ELEVATORS. (Refer to figure 8-2.)

8-6. REMOVAL AND INSTALLATION.

a. Remove stinger.

b. Disconnect trim tab push-pull tube at tab actuator. (Refer to Section 9.)

NOTE

If trim system is not moved and actuator screw is not turned, re-rigging of trim system should not be necessary after reinstallation of elevator.

c. Remove bolts (13) securing elevator torque tubes (7) to arm assembly (8). A heat gun may be required to soften epoxy adhesive on bolt (13).

d. Remove bolts (6) from elevator hinges (5).

e. Using care, remove elevator.

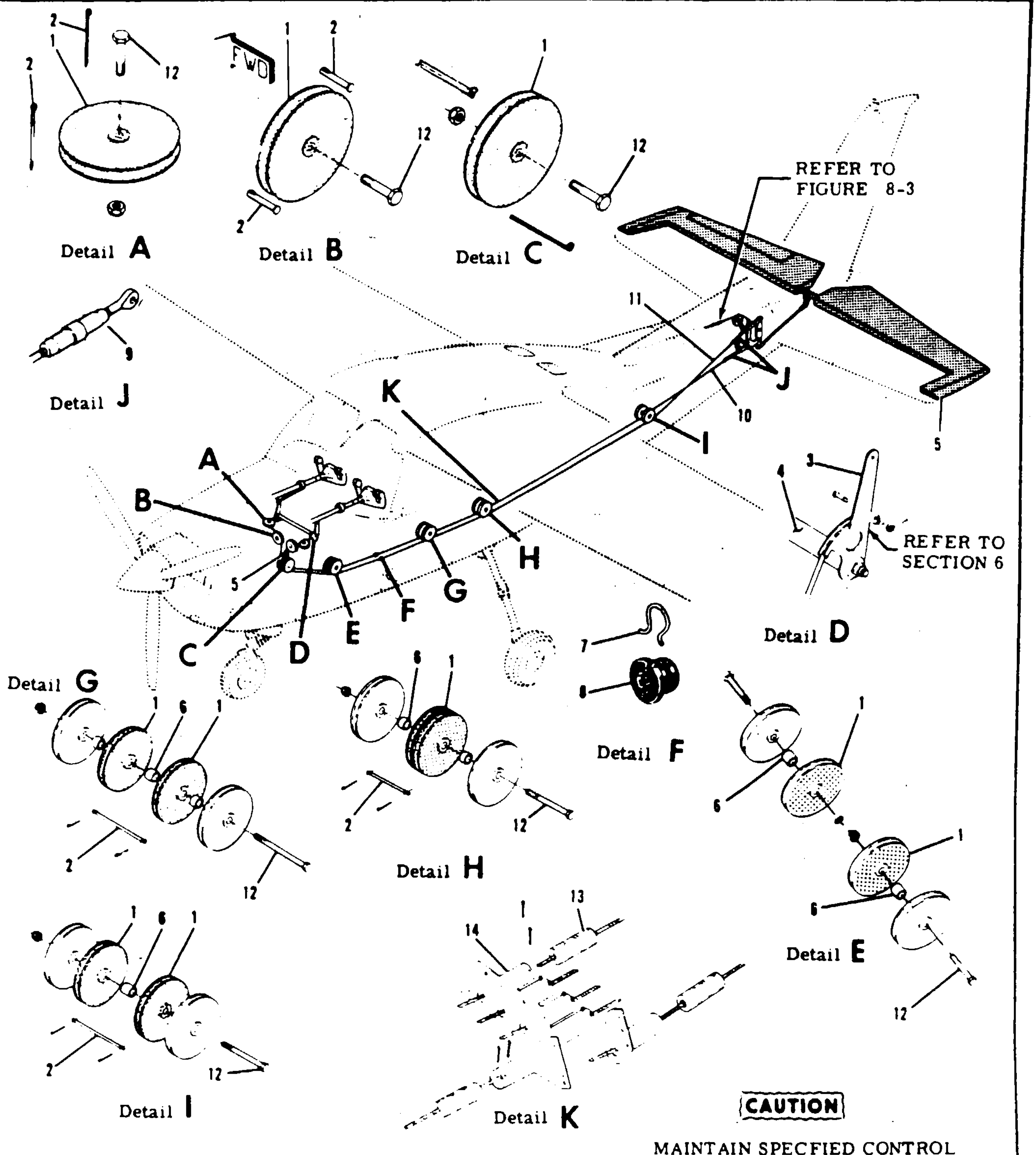
f. To remove left elevator use same procedure, omitting step "b".

g. Reverse the preceding steps for reinstallation.

h. Set right hand elevator maintaining 0.18" dimension specified in figure 8-2.

i. When reinstalling bolts (13) install a washer under the head of each bolt and under each nut. Apply Adhesive EA-9309 from Hysol Division, Dexter Corp., or its equivalent, only to the shanks of bolts (13). Wipe off excess adhesive after installation.

8-7. REPAIR. Repair may be accomplished as outlined in Section 18. Hinge bearings may be replaced as necessary. If repair has affected static balance, check and rebalance as required.



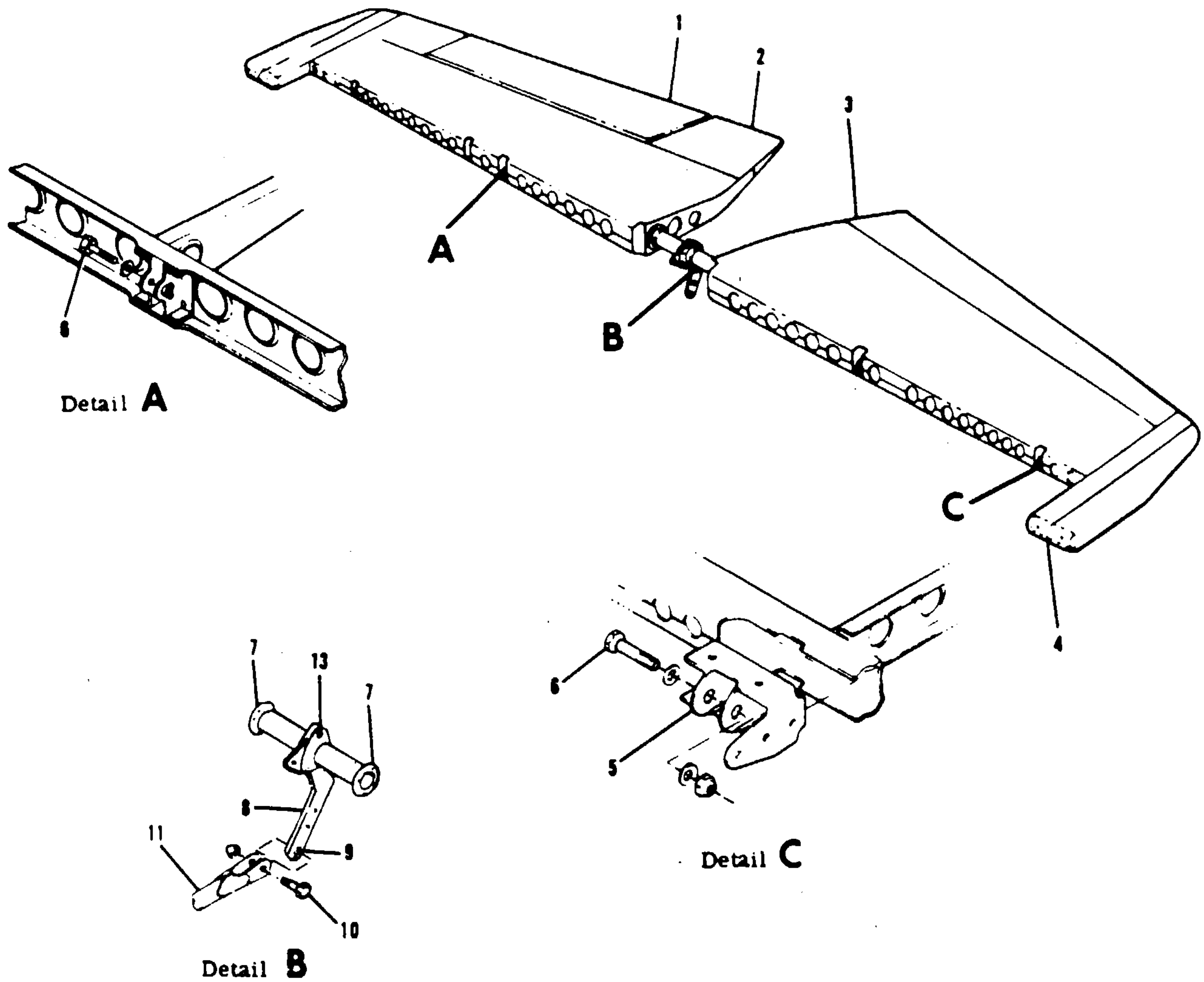
1. Pulley
2. Cable Guard
3. Arm Assembly
4. Elevator Torque Tube
5. Balance Weight
6. Spacer
7. Clip
8. Fairlead
9. Turnbuckle
10. Elevator DOWN Cable
11. Elevator UP Cable
12. Bolt
13. Pressure Seal
14. Retainer

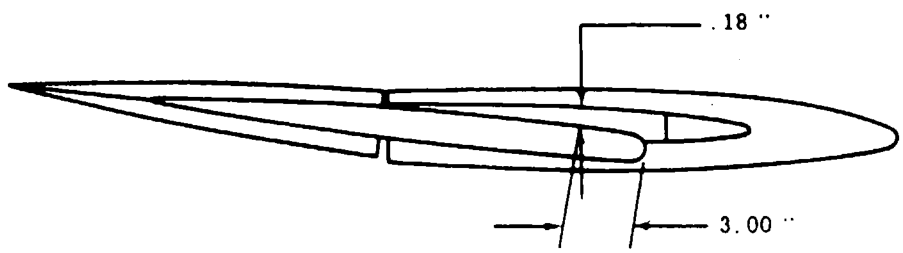
CAUTION

MAINTAIN SPECFIED CONTROL CABLE TENSION

CABLE TENSION:
30 LBS ± 10 LBS (AT THE AVERAGE TEMPERATURE FOR THE AREA.)
REFER TO FIGURE 1-1 FOR TRAVEL.

Figure 8-1. Elevator Control System





1. Trim Tab
2. Right Elevator
3. Left Elevator
4. Balance Weight
5. Hinge Assembly
6. Bolt
7. Torque Tube
8. Arm Assembly
9. Needle Bearing
10. Bolt
11. Push-Pull Tube
12. Pivot Bolt
13. Bolt

THIS VIEW APPLIES TO THE RIGHT HAND ELEVATOR WHEN THE LEFT HAND ELEVATOR IS STREAMLINED

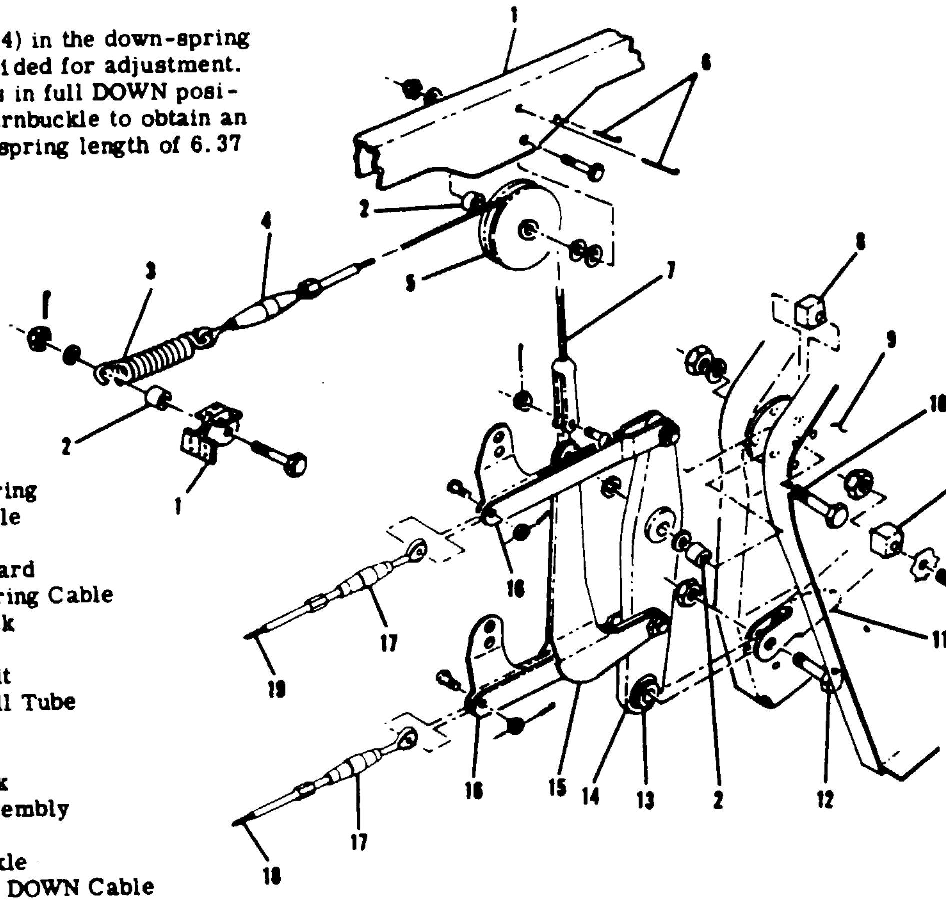
NOTE

Do not attempt to align the elevator trailing edges as there is a 0° 54' twist designed into the connecting torque tube. This twist causes the right elevator to be higher than the left.

Figure 8-2. Elevator Installation

NOTE

A turnbuckle (4) in the down-spring cable is provided for adjustment. With elevators in full DOWN position, adjust turnbuckle to obtain an overall down-spring length of 6.37 inches.



1. Bracket
2. Spacer
3. Down-Spring
4. Turnbuckle
5. Pulley
6. Cable Guard
7. Down-Spring Cable
8. Stop Block
9. Bracket
10. Pivot Bolt
11. Push-Pull Tube
12. Bolt
13. Bearing
14. Bellcrank
15. Link Assembly
16. Link
17. Turnbuckle
18. Elevator DOWN Cable
19. Elevator UP Cable

Figure 8-3. Elevator Bellcrank Installation

NOTE

Holes are drilled off center in bellcrank stops to provide elevator travel adjustments. 90° rotation of bellcrank stop provides approximately 1° of elevator travel.

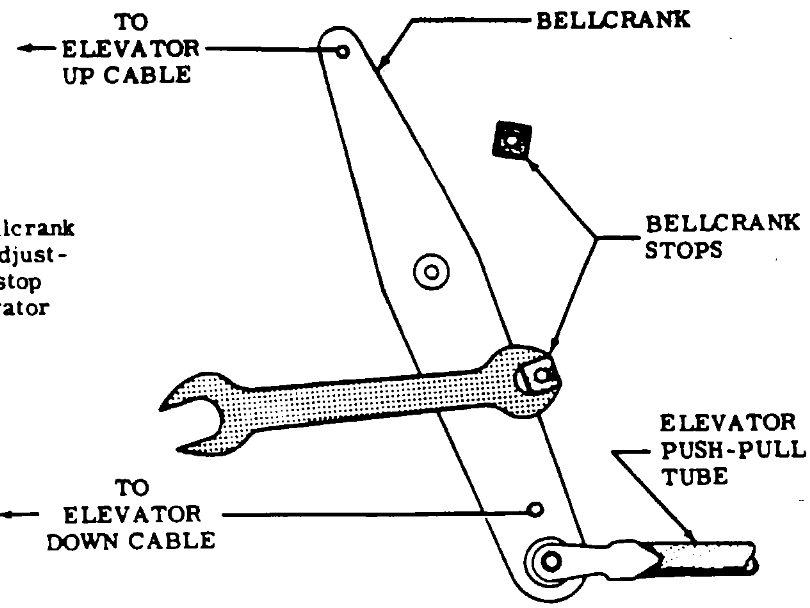
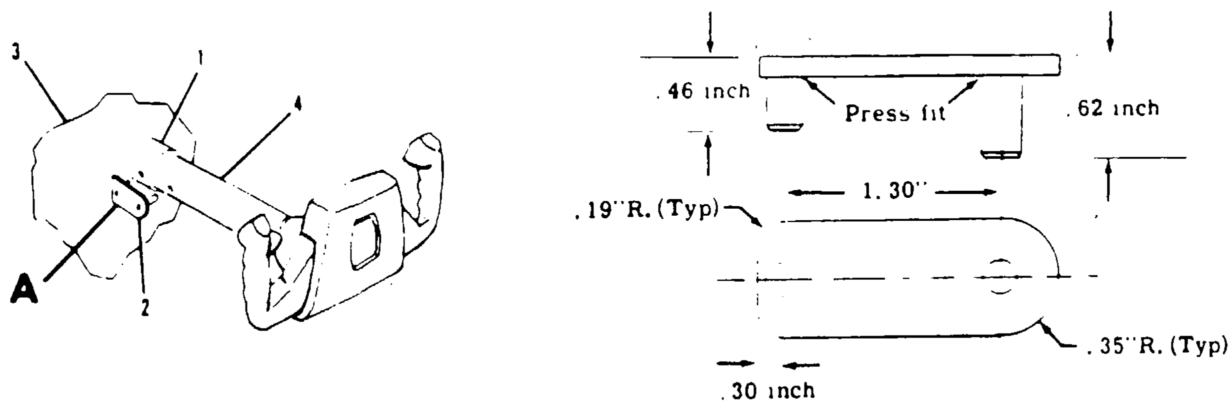


Figure 8-4. Elevator Bellcrank Travel Stop Adjustment



1. Support
2. Neutral Rigging Tool
3. Instrument Panel
4. Pilot's Control Column

Fabricate from .125 steel plate, the short pin is .209 drill rod, the long pin is .250 drill rod.

Figure 8-5. Control Column Neutral Position Rigging Tool

8-8. BELLCRANK. (Refer to figure 8-3.)

8-9. REMOVAL AND INSTALLATION.

a. Remove access plate below bellcrank on tailcone.

CAUTION

Position a support stand under tail tie-down ring to prevent the tailcone from dropping while working inside.

b. Remove safety wire, relieve cable tension at turnbuckles (17) and disconnect turnbuckle eyes at bellcrank links (16).
c. Remove safety wire, relieve cable tension at turnbuckle (4) and disconnect cable (7) at link assembly (15).
d. Remove bolt (12) securing push-pull tube (11) to bellcrank (14).
e. Remove pivot bolt (10) attaching bellcrank (14) to brackets (9) and remove bellcrank.
f. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 8-14. safety turnbuckles and reinstall all items removed for access.

8-10. ARM ASSEMBLY. (Refer to figure 8-2.)

8-11. REMOVAL AND INSTALLATION.

a. Remove stinger.
b. Remove bolt (10) securing push-pull tube (11) to arm assembly (8).
c. Remove bolts (13) securing elevator torque tubes (7) to arm assembly (8). A heat gun may be required to soften epoxy adhesive on bolt (13).
d. Remove pivot bolt (12) securing arm assembly (8) and slide assembly from between elevator torque tubes.
e. Reverse the preceding steps for reinstallation and reinstall all items removed for access.
f. Set right hand elevator maintaining 0.18" dimension specified in figure 8-2.
g. When reinstalling bolts (13) install a washer under the head of each bolt and under each nut. Apply Adhesive EA-9309 from Hysol Division, Dexter Corp., or its equivalent, only to the shanks of bolts (13). Wipe off excess adhesive after installation.

8-12. CABLES AND PULLEYS. (Refer to figure 8-1.)

8-13. REMOVAL AND INSTALLATION.

CAUTION

Position a support stand under tail tie-down ring to prevent the tailcone from dropping while working inside.

a. Remove seats, upholstery and access plates as necessary.
b. Remove safety wire and relieve cable tension at turnbuckles (9).
c. Disconnect cables at control column arm assemblies (3) and disconnect balance weight (5).
d. Disconnect cables at bellcrank links (index 16, figure 8-3).
e. Remove fairleads, cable guards, pulleys and pressure seals as required to work cables from aircraft.

NOTE

To ease routing of cables, a length of wire may be attached to the end of cable being withdrawn from aircraft. Leave wire in place, routed through structure; then attach the cable being installed and pull cable into position.

f. Reverse the preceding steps for reinstallation.
g. After cables are routed in position, install fairleads, pulleys and cable guards. Ensure cables are positioned in pulley grooves before installing guards.
h. Re-rig system in accordance with paragraph 8-14, safety turnbuckles and reinstall all items removed in step "a".

8-14. RIGGING. (Refer to figure 8-3.)

CAUTION

Position a support stand under tail tie-down ring to prevent the tailcone from dropping while working inside.

a. Lock control column in neutral position. (Refer to figure 8-5.)
b. Adjust turnbuckles (17) equally to streamline LEFT elevator with horizontal stabilizer (RIGHT elevator will be higher than the left as illustrated in figure 8-2) and to obtain 30±10 lbs cable tension. Safety turnbuckles.

NOTE

Disregard counterweight areas of elevators when streamlining. These areas are contoured to be streamlined at cruising speed (elevators approximately 3° down).

c. With LEFT elevator streamlined, mount an inclinometer on elevator and set to 0°.

NOTE

An inclinometer for measuring control surface travel is available from the Cessna Service Parts Center. Refer to figure 6-4.

d. Adjust bellcrank travel stop blocks (8) to obtain degree of elevator travel as specified in figure 1-1.

NOTE

The bellcrank stop blocks (8) are four-sided bushings, drilled off-center so they may be rotated to any one of four positions to attain correct elevator travel. Each 90-degree rotation of the stop, changes the elevator travel approximately one degree.

e. Move control wheel through full range of travel and check cable tension in various positions. Tension should not be less than 20 pounds or more than 40 pounds in any position.
f. Check all turnbuckles are safetied and all parts are secured, then reinstall all parts removed for access.

WARNING

Be sure elevators move in the correct direction when operated by the control wheels.

SHOP NOTES:

SECTION 9

ELEVATOR TRIM TAB CONTROL SYSTEM

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9-1. ELEVATOR TRIM TAB CONTROL SYSTEM. (Refer to figure 9-1.)

9-2. DESCRIPTION. The elevator trim tab, located on the trailing edge of the right elevator, is controlled by a trim wheel mounted in the pedestal. Power to operate the tab is transmitted from the trim control wheel by means of roller chains, cables, an actuator and a push-pull tube. A mechanical pointer, adjacent to the trim wheel indicates nose attitude of the aircraft. Forward rotation of the wheel trims the nose down and aft rotation of the wheel trims the nose up. An electric trim assist may be installed and is described in paragraph 9-17. When de-energized the electric trim assist has no effect on manual operation.

9-3. TROUBLE SHOOTING.

NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to re-rig system, refer to appropriate rigging paragraphs.

TROUBLE	PROBABLE CAUSE	REMEDY
TRIM CONTROL WHEEL MOVES WITH EXCESSIVE RESISTANCE.	Cable tension too high.	Check cable tension and adjust.
	Pulleys binding or rubbing.	Check pulleys visually. Repair or replace as necessary.
	Cables not in place on pulleys.	Check visually. Install cables correctly.
	Trim tab hinge binding.	Disconnect actuator and move tab up and down to check hinge resistance. Lubricate or replace hinge as necessary.
	Defective trim tab actuator.	Remove chain from actuator sprocket and operate actuator manually. Replace defective actuator.
	Rusty chain.	Check visually. Replace rusty chain.

9-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
TRIM CONTROL WHEEL MOVES WITH EXCESSIVE RESISTANCE (CONT).	Damaged sprocket.	Check visually. Replace damaged sprockets.
	Bent sprocket shaft.	Observe motion of sprockets. Replace defective shafts.
LOST MOTION BETWEEN CONTROL WHEEL AND TRIM TAB.	Cable tension too low.	Check cable tension and adjust.
	Broken pulley.	Check visually. Replace defective pulley.
	Cables not in place on pulleys.	Check visually. Install cables correctly.
	Worn trim tab actuator.	Disconnect trim tab and check for play in actuator. Replace defective actuator.
	Actuator attachment loose.	Check actuator for security and tighten.
TRIM INDICATION INCORRECT.	Indicator incorrectly engaged on wheel track.	Check visually. Reset indicator.
INCORRECT TRIM TAB TRAVEL.	Stop blocks loose or incorrectly adjusted.	Adjust stop blocks on cables. Refer to figure 9-5.
	Incorrect rigging.	Refer to paragraph 9-15.

9-4. TRIM TAB. (Refer to figure 9-2.)

9-5. REMOVAL AND INSTALLATION.

a. Disconnect push-pull tube (9) from horn assembly (6).

NOTE

If trim system is not moved and actuator screw is not turned, re-rigging of system should not be necessary after reinstallation of tab.

b. Remove screw (11) securing hinge pin (10), pull pin until free of tab and remove tab.

NOTE

It is not necessary to completely remove hinge pin.

c. Reverse the preceding steps for reinstallation. Rig system, if necessary, in accordance with paragraph 9-15.

9-6. TRIM TAB ACTUATOR. (Refer to figure 9-1.)

9-7. REMOVAL AND INSTALLATION.

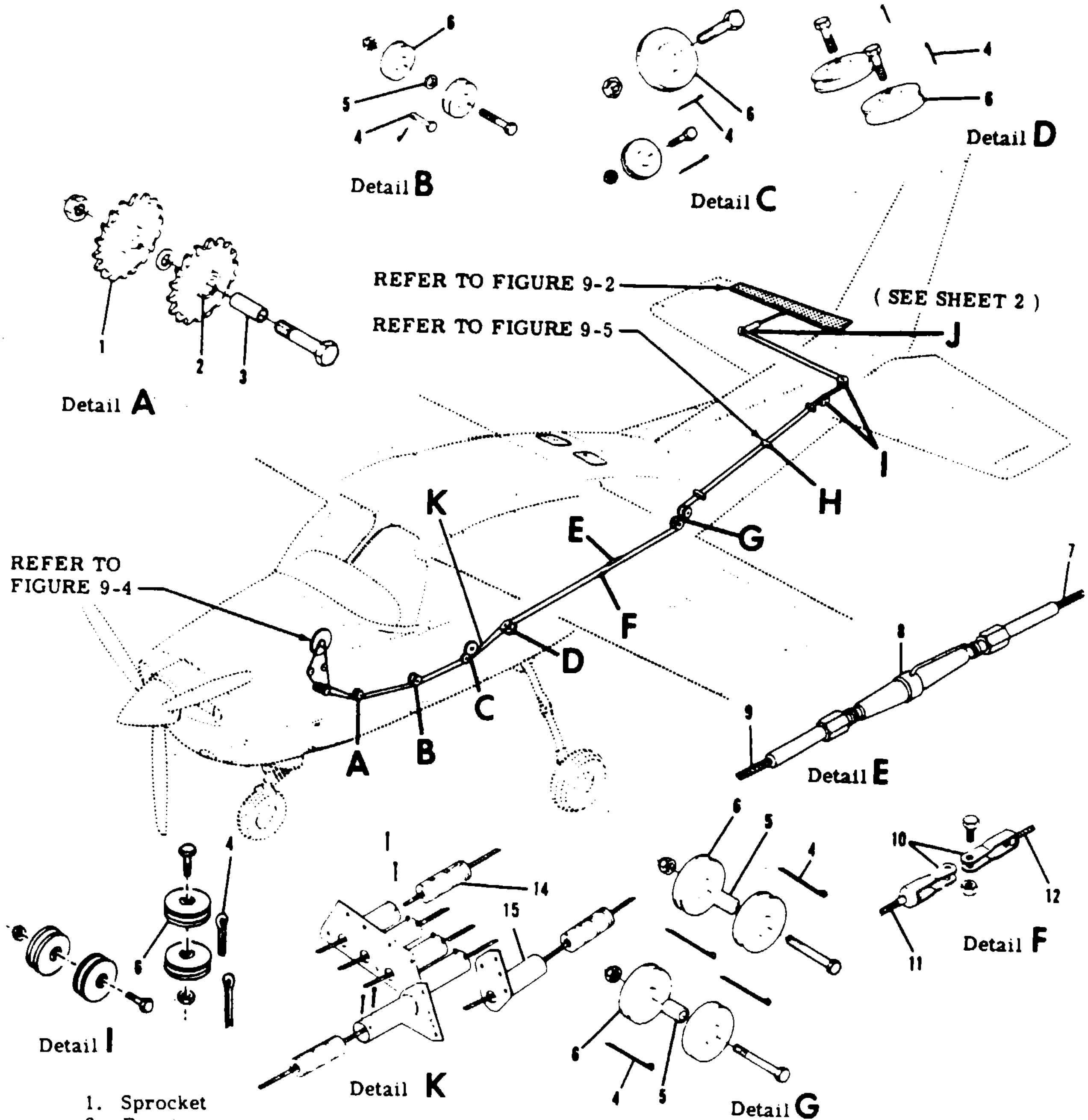
a. Relieve cable tension at turnbuckle (8).
b. Disconnect push-pull tube (15) at actuator (19).
c. Remove access plate beneath actuator.
d. Remove chain guard (21) and disengage roller chain (23) from actuator sprocket (20).
e. Remove screws attaching bracket (24) to bracket (18) and remove actuator (19) through access opening.
f. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 9-15, safety turnbuckle and reinstall all items removed for access.

9-8. TRIM TAB CONTROL WHEEL. (Refer to figure 9-4.)

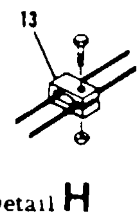
9-9. REMOVAL AND INSTALLATION.

a. Thru P21000760.

1. Remove pedestal cover as outlined in paragraph 9-14.
2. Remove screws (13) and nuts (9) securing chain guard (10) to pedestal structure (6).
3. Remove bolt (1) securing indicator (3) to pedestal structure (6). Retain washers (2) and spacer (4) for reinstallation.
4. Loosen bolts (11) securing idler sprockets (16) to pedestal structure (6), slide idler sprockets in slotted holes and disengage chain (19) from sprockets.



1. Sprocket
2. Bearing
3. Bushing
4. Cable Guard
5. Spacer
6. Pulley
7. Right Aft Cable
8. Turnbuckle
9. Right Forward Cable
10. Cable Ends
11. Left Forward Cable
12. Left Aft Cable
13. Travel Stop Block
14. Pressure Seal
15. Retainer



CAUTION

MAINTAIN SPECIFIED CONTROL CABLE TENSION.

CABLE TENSION:
20 -0. -5 LBS. (AT AVERAGE TEMPERATURE FOR THE AREA)
REFER TO FIGURE 1-1 FOR TRAVEL.

Figure 9-1. Elevator Trim Tab Control System (Sheet 1 of 2)

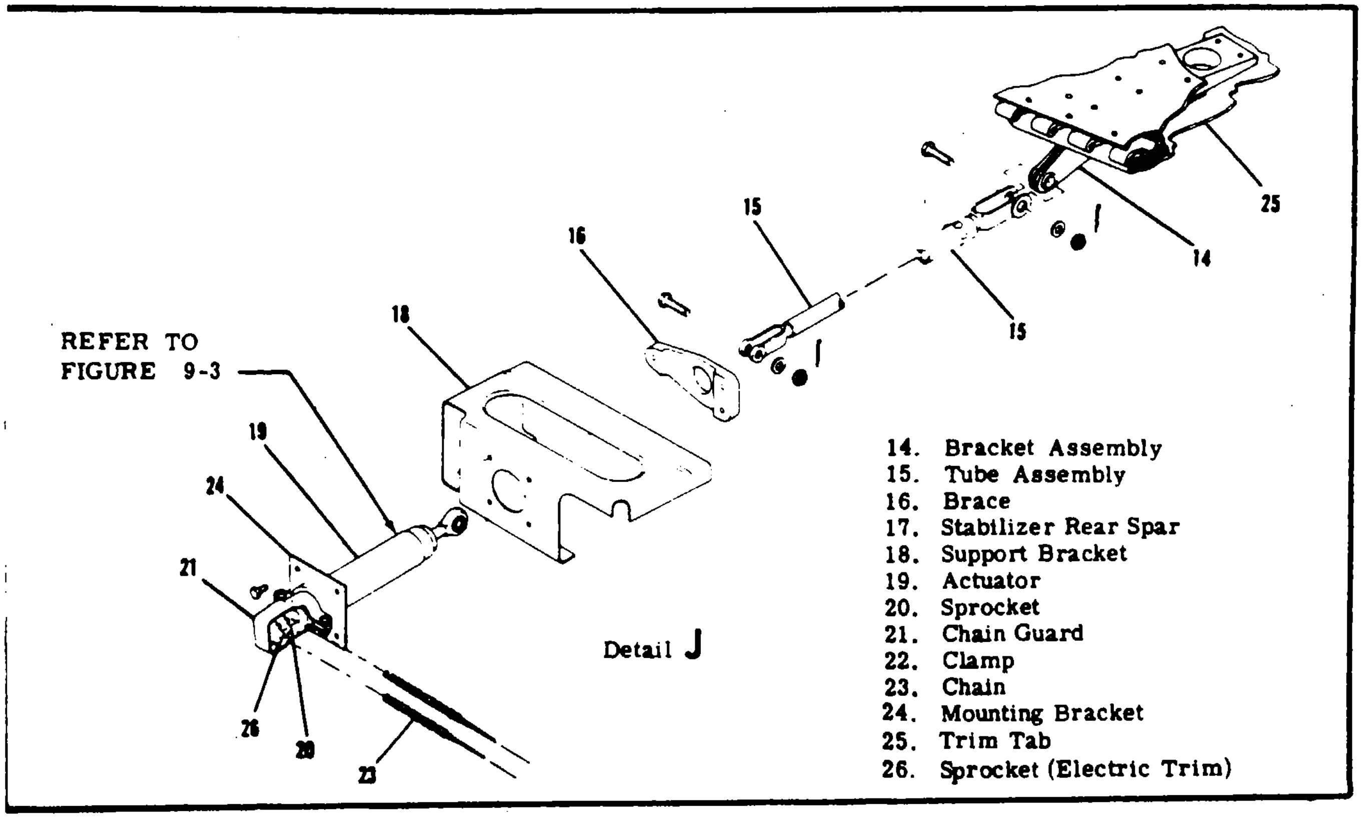


Figure 9-1. Elevator Trim Tab Control System (Sheet 2 of 2)

5. Remove bolts (11), chain guard (10) and indicator (3), using care not to bend indicator or drop parts into tunnel area.
6. Remove roller chain (19) from trim wheel sprocket and carefully slide wheel (7) from pivot stud (8).
7. Reverse the preceding steps for reinstallation. Remove roller chain (19) slack by adjusting idler sprockets (16) in slotted holes and reinstall all items removed for access.

b. Beginning with P21000761.
1. Remove pedestal cover as outlined in paragraph 9-14.
2. Remove screws (16) securing chain guard (9) to pedestal structure.
3. Remove bolts (1), washers (2), spacer (4) and indicator (3).
4. Loosen bolts (17) securing idler sprockets (6), slide sprockets together to relieve cable tension on roller chain (10).
5. Remove safety wire, relieve cable tension turnbuckle (8) (Sheet 1 of 5).
6. Remove bolt (18) and disengage roller chain (10) from trim wheel (5), remove trim wheel.
7. Remove bolts (17), washers (8), idler sprockets (6) and bushings (7).
8. Remove bolt (15), disengage roller chains (13) and (10) from drive sprocket (11).
9. Remove drive sprocket (11), bushing (14) and chain guard (9).
10. Reverse this procedure for reinstallation and rig system in accordance with paragraph 9-15.

9-10. CABLES AND PULLEYS.

9-11. REMOVAL AND INSTALLATION.

a. FORWARD CABLE. (Refer to figure 9-1.)
1. Peel back carpeting as necessary to expose access plates in cabin and baggage areas and remove plates.
2. Remove safety wire, relieve cable tension and disconnect turnbuckle (8).
3. Disconnect cable ends (10).
4. (Refer to figure 9-4.) Remove pedestal cover as outlined in paragraph 9-14.
5. Thru P21000760. Remove lower pedestal panel (14) and disengage roller chain (21) from drive sprocket assembly (18). Beginning with P21000761, disengage roller chain (3) from drive sprocket (11).
6. Remove cable guards, pulleys and pressure seals as required to remove cables from aircraft.

NOTE

To ease routing of cable, a length of wire may be attached to the end of cable before being withdrawn from aircraft. Leave wire in place, routed through structure; then attach the cable being installed and pull cable into position.

7. Reverse the preceding steps for reinstallation.
8. After cable is routed in position, install pulleys and cable guards. Ensure cable is positioned in pulley grooves before installing guards. Ensure roller chain (21) is positioned correctly over drive sprocket (18).

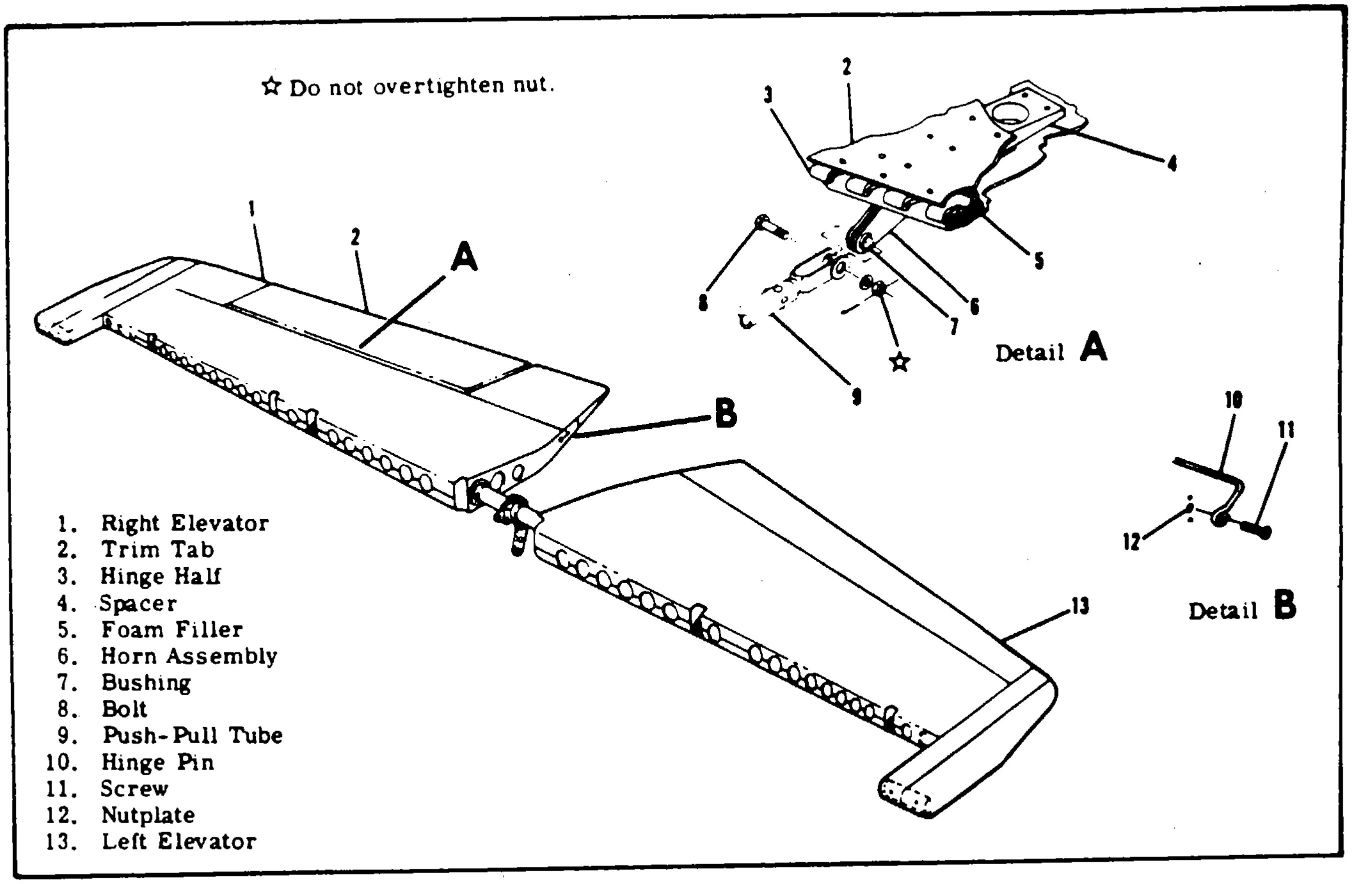


Figure 9-2. Elevator Trim Tab Installation

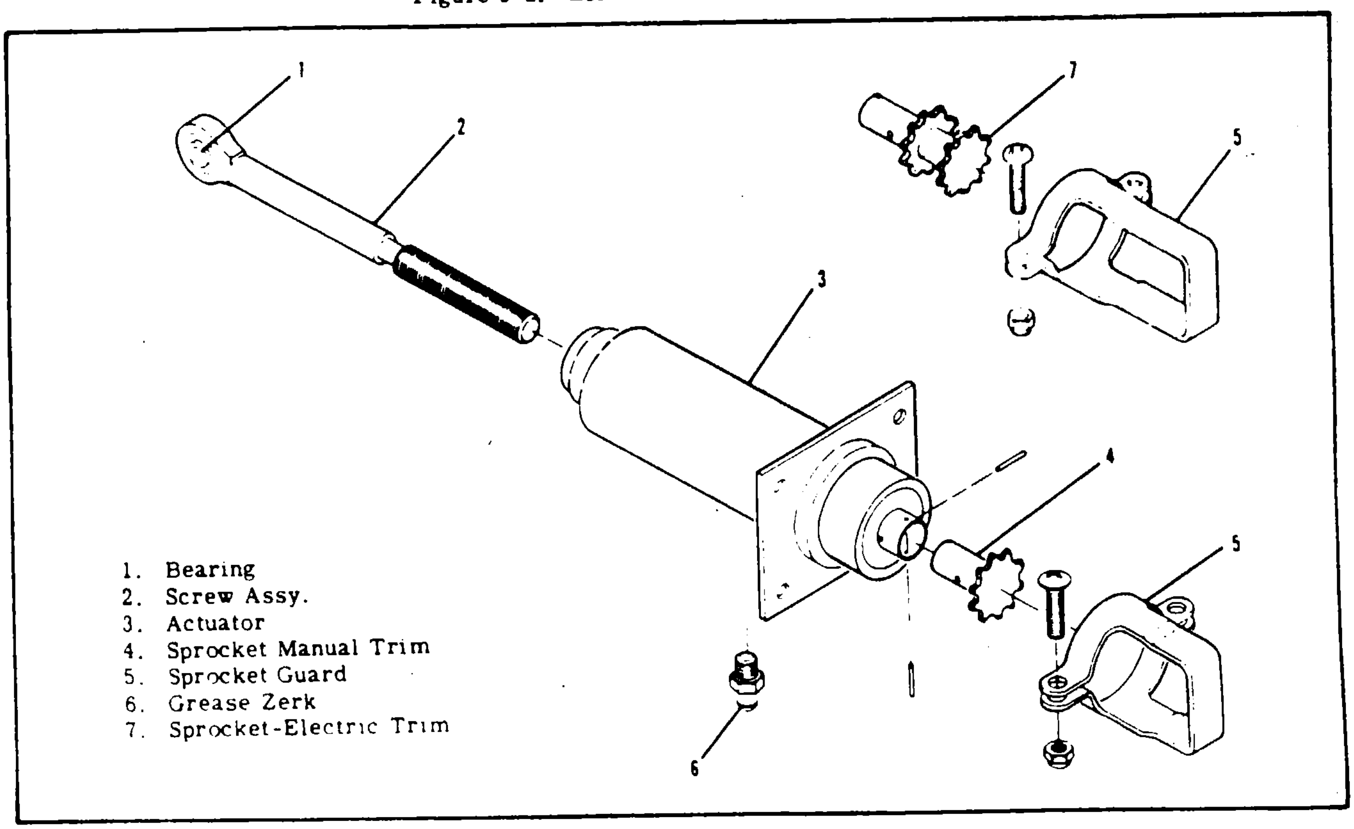
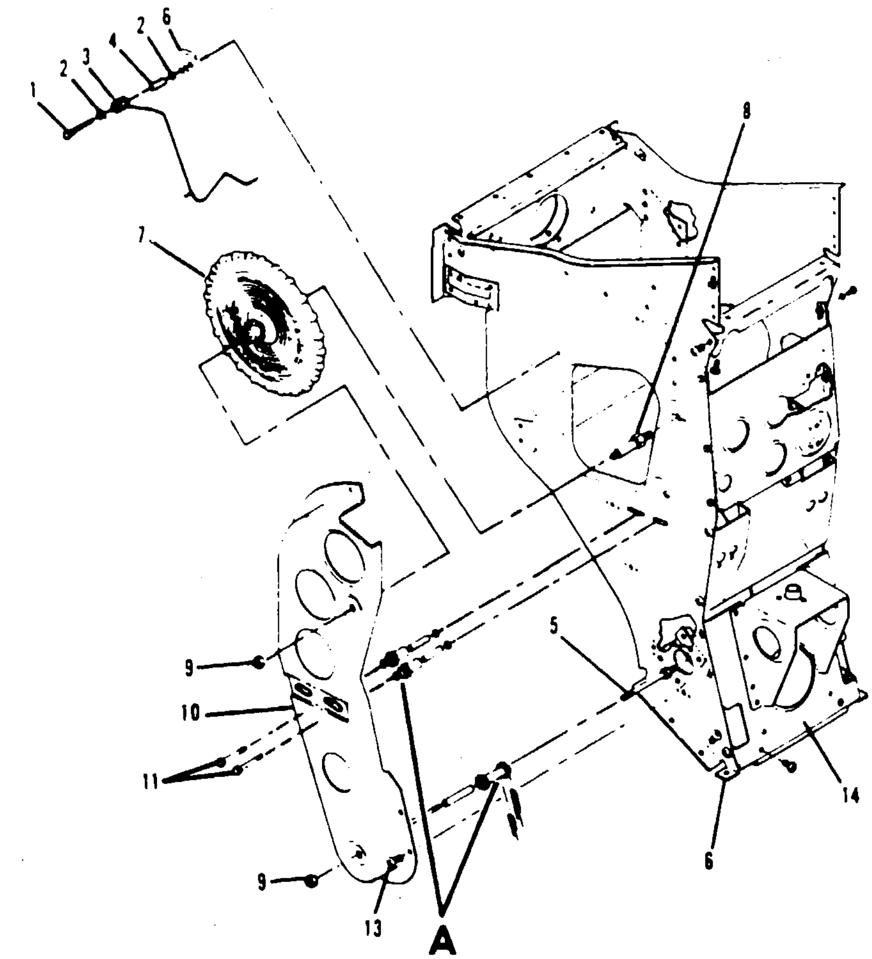
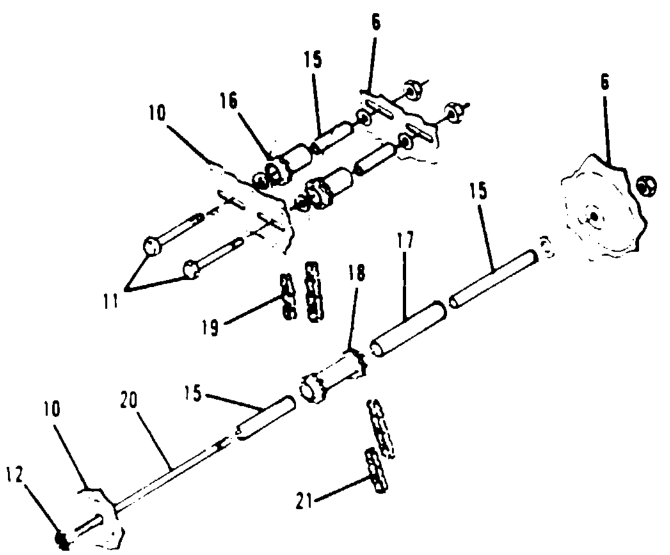


Figure 9-3. Elevator Trim Tab Actuator Assembly



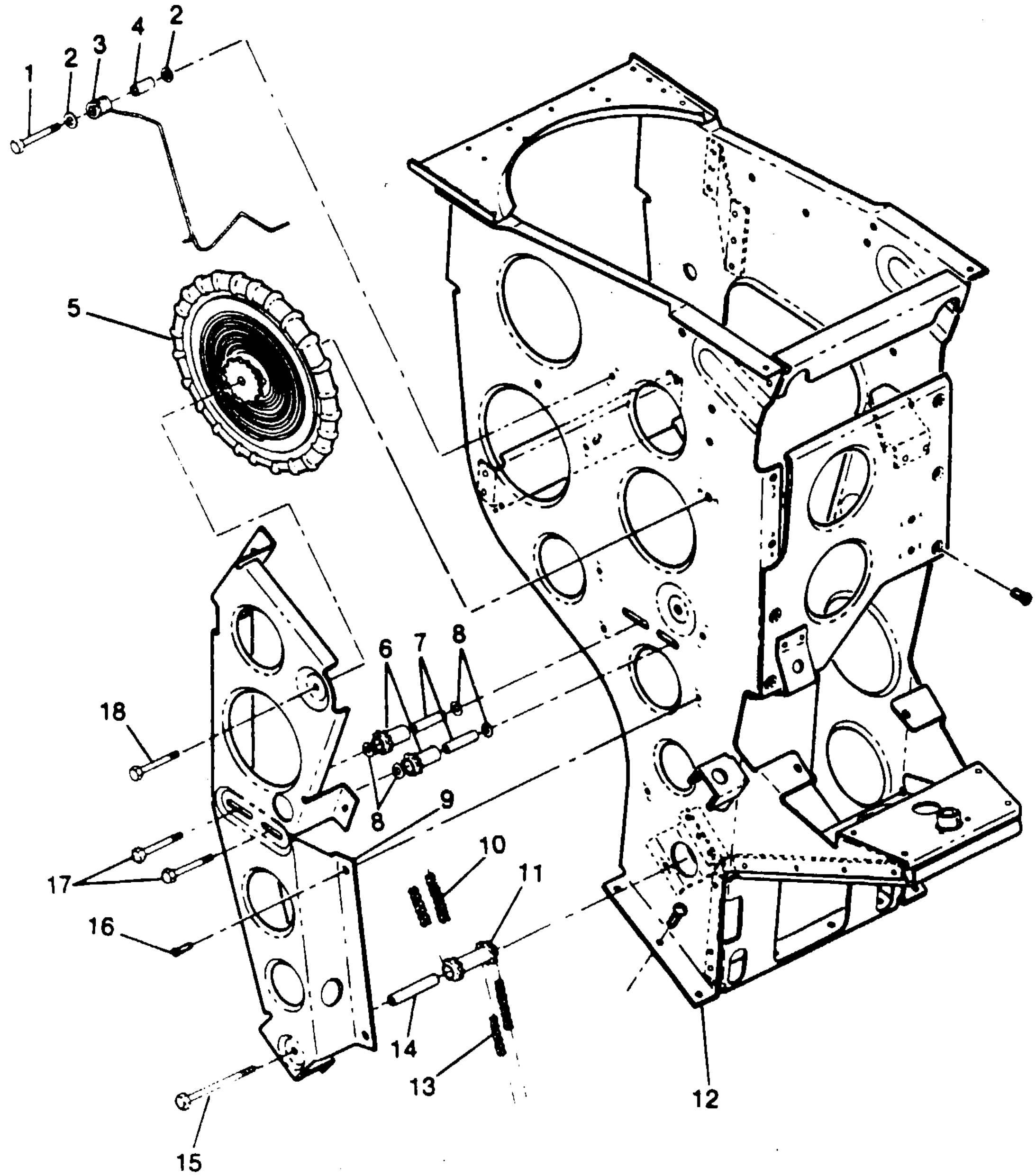


1. Bolt
2. Washer
3. Position Indicator
4. Spacer
5. Shaft
6. Pedestal Structure
7. Trim Wheel
8. Pivot Stud
9. Nut
10. Chain Guard
11. Bolt
12. Nut
13. Screw
14. Lower Pedestal Panel
15. Bushing
16. Idler Sprocket
17. Spacer
18. Drive Sprocket
19. Roller Chain
20. Shaft
21. Roller Chain

Detail **A**

THRU P21000760

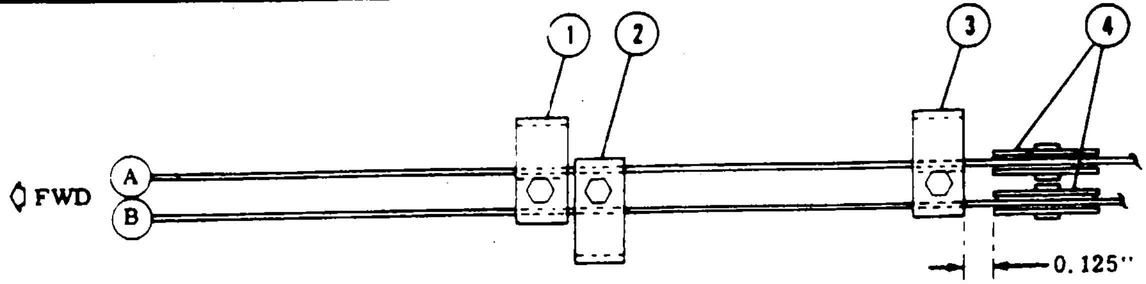
Figure 9-4. Elevator Trim Wheel Installation (Sheet 1 of 2)



BEGINNING WITH P21000761

1. Bolt
2. Washer
3. Position Indicator
4. Spacer
5. Trim Wheel
6. Idler Sprocket
7. Bushing
8. Washers
9. Chain Guard
10. Roller Chain
11. Drive Sprocket
12. Pedestal Structure
13. Roller Chain
14. Bushing
15. Bolt
16. Screw
17. Bolts
18. Bolt

Figure 9-4. Elevator Trim Wheel Installation (Sheet 2 of 2)



1. With elevators in neutral, set trim tab to neutral (split the non-faired difference between the inboard and outboard ends.

2. Place inclinometer on trim tab, adjust inclinometer to 0° and lower tab to degree of travel specified in figure 1-1.

3. Position stop block (3) on cable B, maintain 0.125 " between stop block (3) and pulleys (4) when elevator tab is in full down position and secure stop block (3) to cable B.

4. Raise trim tab to specified degree, place stop block (2) against stop block (3) and secure to cable A.

5. Place trim tab in full down position maintaining 0.125 " between stop block (3) and pulleys (4), place stop block (1) against stop block (2) and secure to cable B. (Recheck travel.)

Figure 9-5. Elevator Trim Tab Travel Stop Adjustment

9. Re-rig system in accordance with paragraph 9-15, safety turnbuckle (index 8, figure 9-1) and re-install all items removed for access.

b. AFT CABLE. (Refer to figure 9-1.)

1. Peel back carpeting as necessary to expose access plates in baggage area and remove plates.
2. Remove rear baggage compartment wall.
3. Remove safety wire, relieve cable tension and disconnect turnbuckle (8).

CAUTION

Position a support stand under tail tie-down ring to prevent tailcone from dropping while working inside.

4. Disconnect cable ends (10).
5. Remove travel stop blocks (13).
6. Disconnect electric trim clamps and keepers (indexes 15 and 16, figure 9-6), if installed.
7. Remove access plate beneath trim tab actuator (19) and remove chain guard (21).
8. Disengage roller chain (23) from actuator sprocket (20).
9. Remove cable guards and pulleys as necessary to work cable free of aircraft.

NOTE

To ease routing of cable, a length of wire may be attached to the end of cable before being withdrawn from aircraft. Leave wire in place, routed through structure; then attach the cable being installed and pull cable into position.

10. Reverse the preceding steps for reinstallation.
11. After cable is routed in position, install pulleys and cable guards. Ensure cable is positioned in pulley grooves before installing guards. Ensure roller chain (23) is positioned correctly over actuator sprocket (20).
12. Rerig system in accordance with paragraph 9-15, safety turnbuckle (8) and reinstall all items removed for access.

9-12. PEDESTAL COVER.

9-13. REMOVAL AND INSTALLATION.

a. Turn fuel selector valve to OFF position and drain fuel from strainer and lines.
b. Remove knurled nut from engine primer if installed and pull plunger from primer body. Protect primer from dirt.
c. Remove fuel selector handle and placard.
d. Remove cowl flap handle and knob.
e. Remove microphone mounting bracket.
f. Fold carpet back as necessary and remove screws securing cover to floor and pedestal.
g. Disconnect electrical wiring to pedestal lights.
h. Carefully work cover from pedestal to prevent damage.
i. Reverse the preceding steps for reinstallation.

9-14. TRIM TAB FREE-PLAY INSPECTION. (Refer to figure 9-5A.)

a. Place elevators and trim tab in neutral position and secure from movement.

b. Determine maximum allowable free-play using the following instructions.

1. Measure chord length of extreme inboard end of the trim tab as shown in detail A, figure 9-5A.
2. Multiply chord length by 0.025 to obtain maximum allowable free-play.

c. Using moderate pressure, move the trim tab trailing edge up and down by hand to check free-play.

NOTE

Measure free-play at the same point on trim tab that chord length was measured. Total free-play must not exceed maximum allowable. Refer to detail B, figure 9-5A.

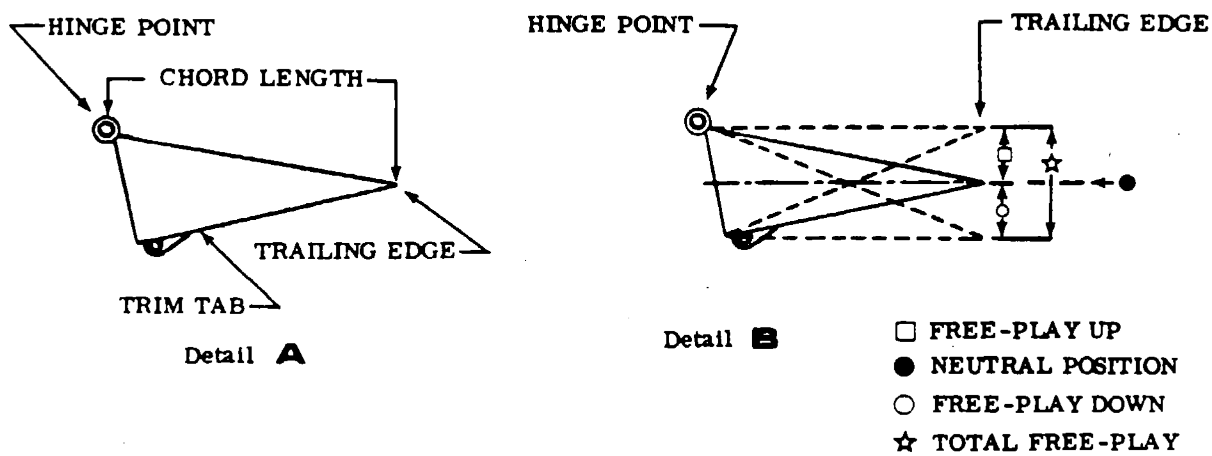
d. If the trim tab free-play is less than the maximum allowable the system is within the prescribed limits.

e. If the trim tab free-play is more than the maximum allowable, check the following items, for looseness while moving the trim tab up and down.

1. Check push-pull tube to trim tab horn assembly attachment for looseness.
2. Check push-pull tube to actuator assembly threaded rod end attachment for looseness.
3. Check actuator assembly threaded rod end for looseness in actuator assembly with push-pull tube disconnected.

f. If looseness is apparent while checking steps e-1 and e-2, repair by installing new parts.

g. If looseness is apparent while checking step e-3, refer to paragraphs 9-6 through 9-7. Recheck trim tab free-play.



1. Measure chord length at extreme inboard end of trim tab as shown in detail A.
2. Mulitiply chord length by 0.025 to obtain maximum allowable free-play.
3. Measure free-play at same point on trim tab that chord length was measured.
4. Total free-play must not exceed maximum allowable. Refer to detail B.

Figure 9-5A. Trim Tab Free-Play Inspection

9-15. RIGGING MANUAL TRIM. (Refer to figure 9-1.)

CAUTION

Position a support stand under tail tie-down ring to prevent tailcone from dropping while working inside.

a. Remove rear baggage compartment wall and access plates as necessary.
b. Loosen travel stop blocks (13) on trim tab cables (7 and 12).
c. Disconnect push-pull tube (15) from actuator (19).
d. Check cable tension for 20+0, -5 pounds and readjust turnbuckle (8) if necessary.

NOTE

If roller chains and/or cables are being installed, permit actuator screw to rotate freely as roller chains and cables are connected. Adjust cable tension and safety turnbuckle (8).

e. (Refer to figure 9-4.) Rotate trim control wheel (7) full forward (nose down). Ensure pointer (3) does not restrict wheel movement. If necessary to reposition pointer, proceed as follows:
1. Remove pedestal cover as outlined in paragraph 9-14.
2. Loosen nut (9) at trim wheel pivot stud (8).
3. Loosen screws (13) securing chain guard (10) far enough that trim wheel (7) can be moved approximately 1/8 inch, then reposition pointer (3) using a thin screwdriver to pry trailing leg of pointer out of groove in trim wheel. Reposition pointer as required.
4. Tighten nut (9) and screws (13) but do not reinstall pedestal cover until rigging is complete.

NOTE

Full forward (nose down) position of trim wheel is where further movement is prevented by the roller chain or cable ends contacting sprockets or pulleys.

f. With elevator and trim tab both in neutral (split the non-faired difference between the inboard and outboard ends), mount an inclinometer on trim tab and set to 0°. Disregard counterweight areas of elevators when streamlining. These areas are contoured so they will be approximately 3° down when the elevators are streamlined.

NOTE

An inclinometer for measuring control surface travel is available from the Cessna Service Parts Center. Refer to Section 6.

g. Rotate actuator screw in or out as required to place trim tab up with a maximum of 2° overtravel, with actuator screw connected to push-pull tube (index 15, figure 9-1).
h. Rotate trim wheel to position trim tab up and down, readjusting actuator screw as required to obtain overtravel in both directions.
i. Position stop blocks and adjust as illustrated in figure 9-5 to degree of trim tab travel specified in figure 1-1.
j. Install pedestal cover and adjust trim tab pointer (3) as follows:
1. Rotate trim control wheel (7) top place tab at 10° up position.
2. Locate the pointer (3) at the TAKE-OFF triangle as viewed from the pilot seat. (Refer to step "e," and reposition pointer if necessary.)
3. Bend pointer (3) as required to clear pedestal cover. (Pointer must NOT rub against pedestal cover or clear cover more than .125 inch maximum.)
k. Safety turnbuckle and reinstall all items revoved in step "a".

WARNING

Be sure trim tab moves in correct direction when operated by trim control wheel. Nose down trim corresponds to tab up position.

9-16. ELECTRIC TRIM ASSIST INSTALLATION. (Refer to figure 9-6.)

9-17. DESCRIPTION. The electric elevator trim assist installation consists of two switches mounted on the pilot's control column, a circuit breaker mounted on the left side panel, wiring running aft to the electric drive assembly and a chain connecting the drive assembly to an additional sprocket mounted on the standard manual elevator trim actuator. When the clutch (16) is not energized, the drive assembly "free wheels" and has no effect on manual trim operation.

9-18. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
SYSTEM INOPERATIVE.	Circuit breaker open.	Check visually. Reset breaker.
	Defective circuit breaker.	Check continuity. Replace defective breaker.
	Defective wiring.	Check continuity. Repair wiring.
	Defective trim switch.	Check continuity. Replace defective switch.
	Defective trim motor.	Remove and bench test. Replace defective motor.
TRIM MOTOR OPERATING - TRIM TAB FAILS TO MOVE.	Defective clutch solenoid.	Check continuity. Replace solenoid.
	Improperly adjusted clutch tension.	Check and adjust spanner nuts for proper tension.
	Disconnected or broken cable.	Operate manual trim wheel. Connect or replace cable.
	Defective actuator.	Check actuator operation. Replace actuator.

9-19. REMOVAL AND INSTALLATION. (Refer to figure 9-6.)

a. Remove aft baggage compartment wall.

NOTE

Position a support stand under tail tie-down ring to prevent the tailcone from dropping while working inside.

b. Remove cover (29) below drive assembly (6).
c. Remove cover (28) with voltage regulator attached and carefully disconnect wiring at connectors.
d. Remove sprocket guard (Index 5, figure 9-3) from trim tab actuator (3).
e. Remove mounting bolts from drive assembly and tab actuator and remove from aircraft.
f. Reverse preceding steps for reinstallation. Check system rigging in accordance with paragraph 9-23.

9-20. CLUTCH ADJUSTMENT. (Refer to figure 9-6.)

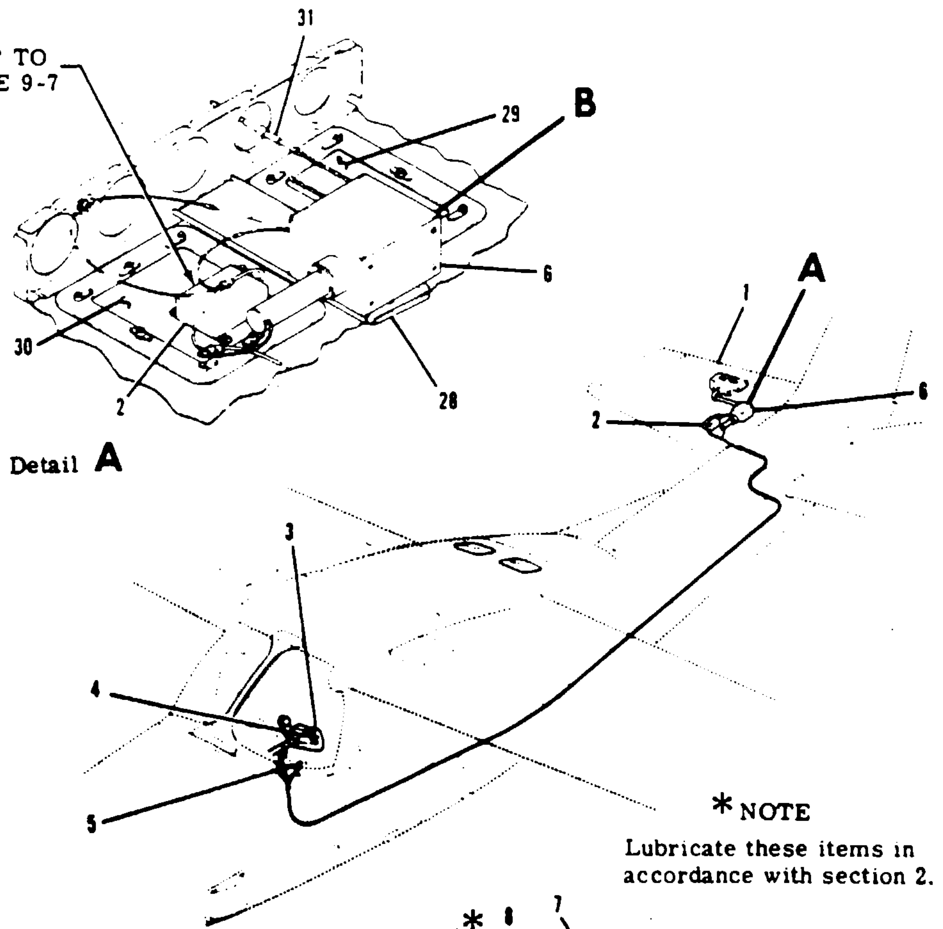
a. Remove access covers (29) & (30) below actuator.
b. Remove safety wire and relieve cable tension at turnbuckle (31).
c. Disconnect electric motor by unplugging the "quick-disconnect" connectors leading to the motor assembly.
d. Remove mounting bolts from drive assembly (6). It is necessary to remove from stabilizer to make the necessary adjustments to clutch.

NOTE

Step "c" isolates the motor assembly from the remainder of the electric trim system so it cannot be engaged during clutch adjustment.

e. Remove screws securing covers (17) and (18)

1. Trim Tab
2. Voltage Regulator
3. Trim Switch
4. Disengage Switch
5. Circuit Breaker
6. Drive Assembly
7. Washer
8. Shaft
9. Sprocket
10. Chain Assembly
11. Washer Assembly
12. Spring Washer
13. Washer
14. Nut
15. Shaft Assembly
16. Clutch
17. Cover Assembly
18. Rub Strip
19. Sprocket
20. Bushing
21. Chain
22. Gear Motor
23. Mounting Plate
24. Sprocket
25. Pin
26. Housing Assembly
27. Cover
28. Mounting Plate Assembly
29. Cover
30. Cover
31. Turnbuckle



* NOTE
Lubricate these items in accordance with section 2.

● SAFETY WIRE THESE ITEMS

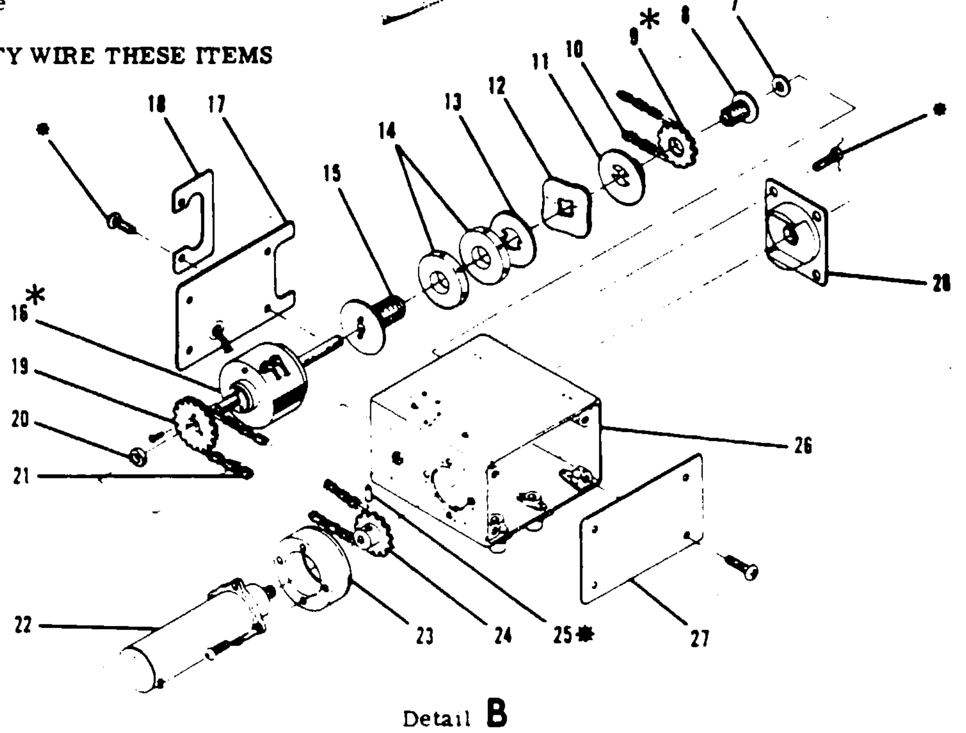


Figure 9-6 Electric Elevator Trim Assist Installation

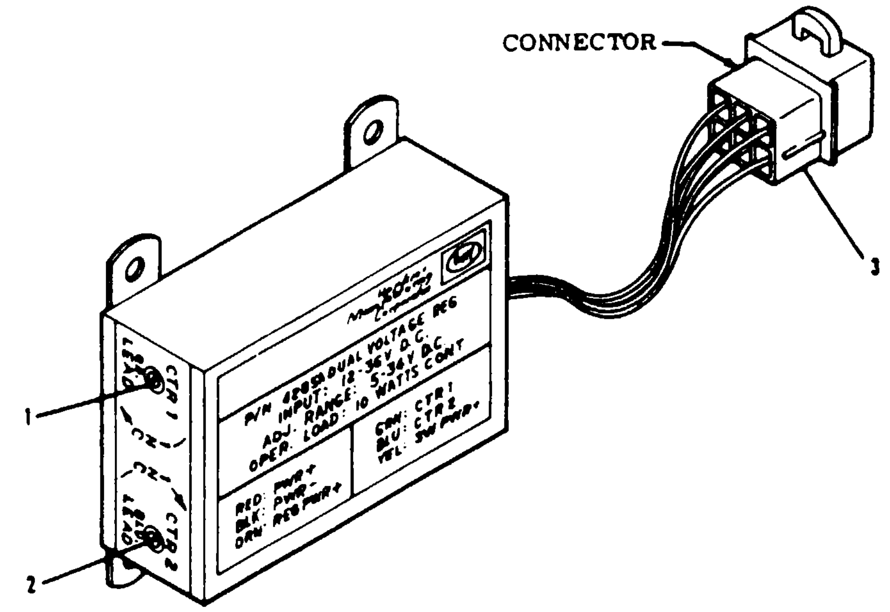


Figure 9-7. Dual Voltage Regulator

to housing (26) and slide the cover down over electrical wiring far enough to expose the clutch assembly.

f. Ensure the electric trim circuit breaker on the left side panel is pushed in and place master switch in the ON position.

g. Operate control wheel-mounted trim switch (3) UP or DOWN to energize the solenoid clutch (16).

h. Attach the spring scale to chain and pull scale slowly until slippage is noted.

i. Repeat Steps "g" and "h" several times to break the initial friction of the clutch.

j. Repeat Step "h" very slowly, carefully watching the indicator on the spring scale. Slippage should occur between 38.6 to 42.5 lbs.

k. If tension is not within tolerance, loosen OUTSIDE spanner nut (14) which acts as a lock. Tighten INSIDE spanner nut to increase clutch tension and loosen nut to decrease clutch tension.

l. When clutch slippage torque is within tolerance (step "j"), then tighten outside spanner nut against inside nut.

m. Connect electrical wiring to motor assembly which was removed in step "c", re-rig trim system in accordance with paragraphs 9-15 and 9-24 and reinstall all items removed for access.

9-21. VOLTAGE REGULATOR ADJUSTMENT. (Refer to figure 9-6.)

a. Remove access cover (30).

b. Connect an external power source of 27.5 volts dc continuous to the aircraft electrical system, or if an external power supply is not available, run the aircraft engine at approximately 1000 RPM to maintain the normal operating aircraft voltage.

c. Disconnect the electrical power leads to the motor by unplugging the connectors installed in the RED and BLACK wire leading to the motor assembly.

CAUTION

Insure CTR adjustments (Index 1 and 2, Figure 9-7) are both turned fully CCW to limit initial voltage to motor and voltmeter.

d. Using 18 ga. jumper wires or equivalent, connect one lead of a dc voltmeter capable of measuring the aircraft voltage to either the RED or BLACK wire leading to the motor and the other voltmeter lead to a good aircraft ground.

e. Operate the electric trim switch to the NOSE UP and NOSE DOWN positions and check voltage present at the RED and BLACK wires.

f. Adjust CTR 1 and CTR 2 adjustment screws on the voltage regulator counterclockwise (CCW), then slowly turn adjustment screws clockwise (CW) until a 11 volt output is obtained for both (RED and BLACK) lead.

g. Check to see if full "NOSE UP" to full "NOSE DOWN" and full "NOSE DOWN" to full "NOSE UP" is 39±1 seconds.

h. Remove voltmeter and reconnect the motor assembly power leads. Be sure to connect RED to RED and BLACK to BLACK when reconnecting leads.

i. Check trim system for proper operation and reinstall all items removed for access.

CAUTION

The trim motor should be allowed to cool

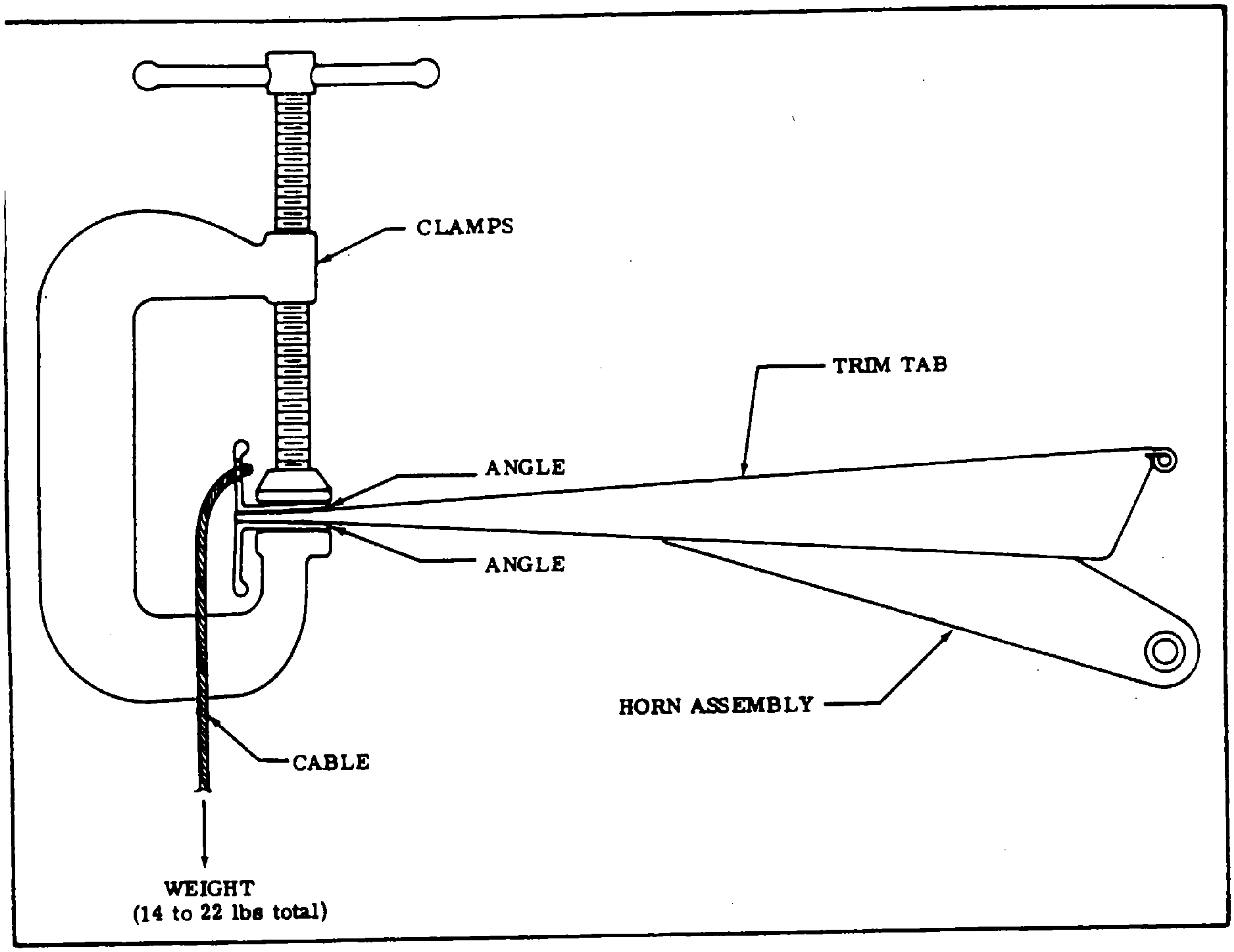


Figure 9-8. Trim Tab Simulated Air Load Test

between voltage regulator adjustments approximately 5 minutes if several actuations of the motor becomes necessary during adjustment.

9-22. TRIM TAB SIMULATED AIR LOAD TEST. (Refer to figure 9-8.)

NOTE

The manual elevator trim control system must be properly rigged, the aircraft electrical operating voltage must be normal, the electric trim assist clutch must be properly adjusted and the elevator must be in neutral position prior to completing the following steps.

a. Attach two angles approximately 18 inches in length to the trailing edge of the trim tab with clamps as illustrated to prevent bending of tab trailing edge.
b. Attach a cable directly aft of the trim tab horn assembly.
c. Attach 14 pounds minimum to 22 pounds maximum of weight (including the angles, clamps and cable) to the cable and operate the trim switch to place the tab in the UP position. The clutch MUST lift 15 pounds weight to the FULL UP position but must slip at 18 pounds.

NOTE

If the electric trim clutch slips prior to lifting the required weight to the full up position, DO NOT READJUST CLUTCH, refer to step "d" or step 5 to locate and remove the reason for excessive friction in the elevator trim control system.

d. Check the trim tab hinge and linkage for binding, check the trim system cables and chains for proper tension, check system pulleys and actuator for binding.
e. After the trim system has been thoroughly checked and excessive friction removed, repeat step "c", or step 3.

9-23. RIGGING - ELECTRIC TRIM ASSIST. (Refer to figure 9-6.)

a. The standard manual elevator trim control system MUST be rigged in accordance with paragraph 9-15 prior to rigging the electric trim assist.

b. Move elevator trim tab to full "NOSE UP" position.

c. Remove access cover (29) located in underside of right stabilizer.

d. Locate turnbuckle (31) terminal point 0.75 inch from drive assembly housing and adjust until chain deflection between sprockets is approximately 0.25 inch.

e. Resafety turnbuckle and reinstall all items removed for access.

SHOP NOTES:

SECTION 10

RUDDER CONTROL SYSTEM

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10-1. RUDDER CONTROL SYSTEM. (Refer to figure 10-1.)

10-2. DESCRIPTION. Rudder control is maintained through use of conventional rudder pedals which also control nose wheel steering. The system is comprised of the rudder pedals installation, cables and pulleys, all of which link the pedals to the rudder and nose wheel steering.

10-3. TROUBLE SHOOTING.

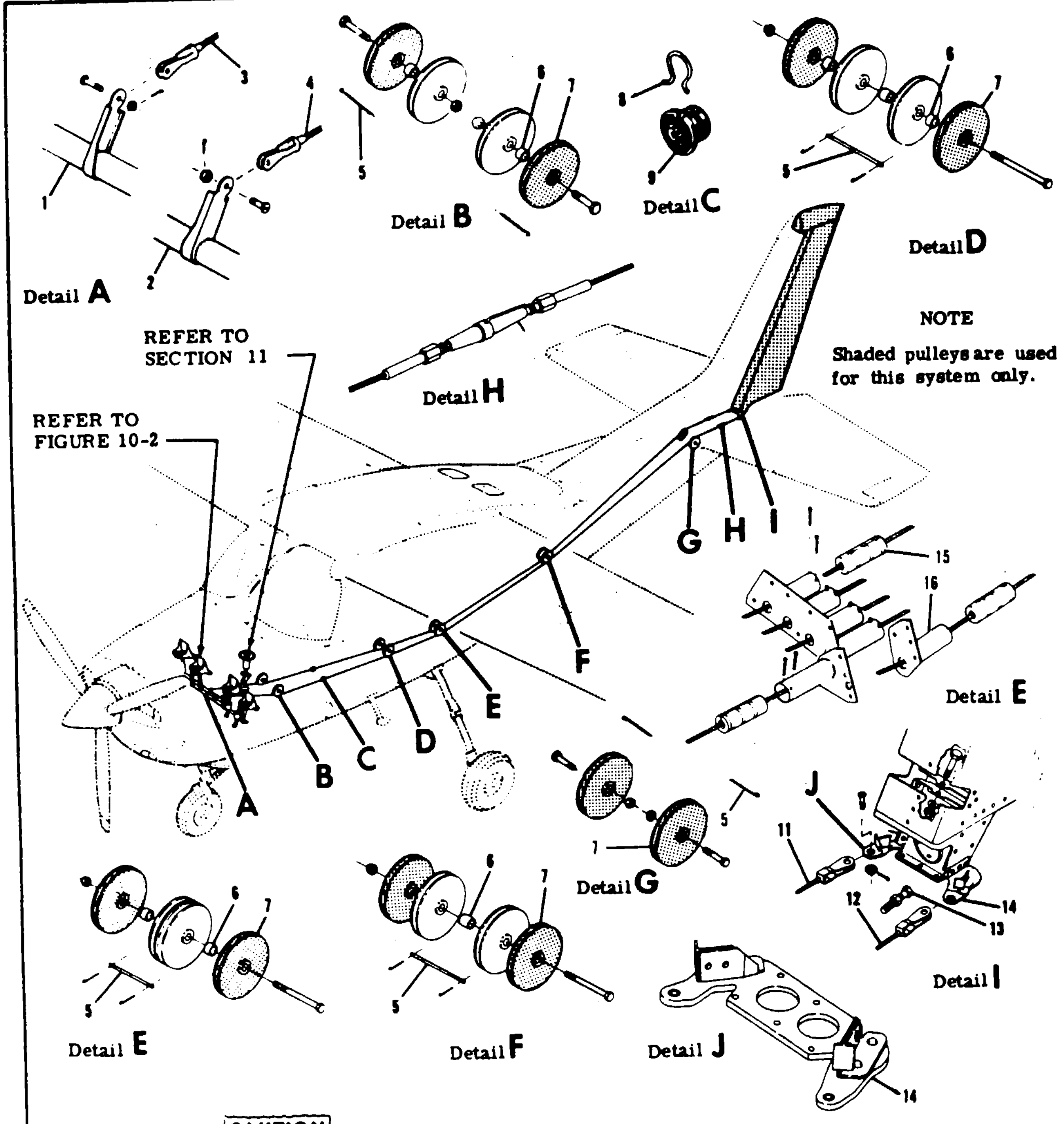
NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to re-rig system, refer to paragraph 10-11.

TROUBLE	PROBABLE CAUSE	REMEDY
RUDDER DOES NOT RESPOND TO PEDAL MOVEMENT.	Broken or disconnected cables.	Open access plates and check visually. Connect or replace cables.

10-3. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
BINDING OR JUMPY MOVEMENT OF RUDDER PEDALS.	Cables too tight.	Refer to figure 10-1 for cable tension. Rig system in accordance with paragraph 10-11.
	Cables not riding properly on pulleys.	Open access plates and check visually. Route cables correctly over pulleys.
	Binding, broken or defective pulleys or cable guards.	Open access plates and check visually. Replace defective pulleys and install guards properly.
	Pedal bars need lubrication.	Refer to Section 2.
	Defective rudder bar bearings.	If lubrication fails to eliminate binding. Replace bearing blocks.
	Defective rudder hinge bushings.	Check visually. Replace defective bushings.
	Clevis bolts too tight.	Check and readjust bolts to eliminate binding.
	Steering rods improperly adjusted.	Rig system in accordance with paragraph 10-11.
LOST MOTION BETWEEN RUDDER PEDALS AND RUDDER.	Insufficient cable tension.	Refer to figure 10-1 for cable tension. Rig system in accordance with paragraph 10-11.
INCORRECT RUDDER TRAVEL.	Incorrect rigging.	Rig in accordance with paragraph 10-11.



CAUTION

MAINTAIN SPECIFIED CONTROL CABLE TENSION

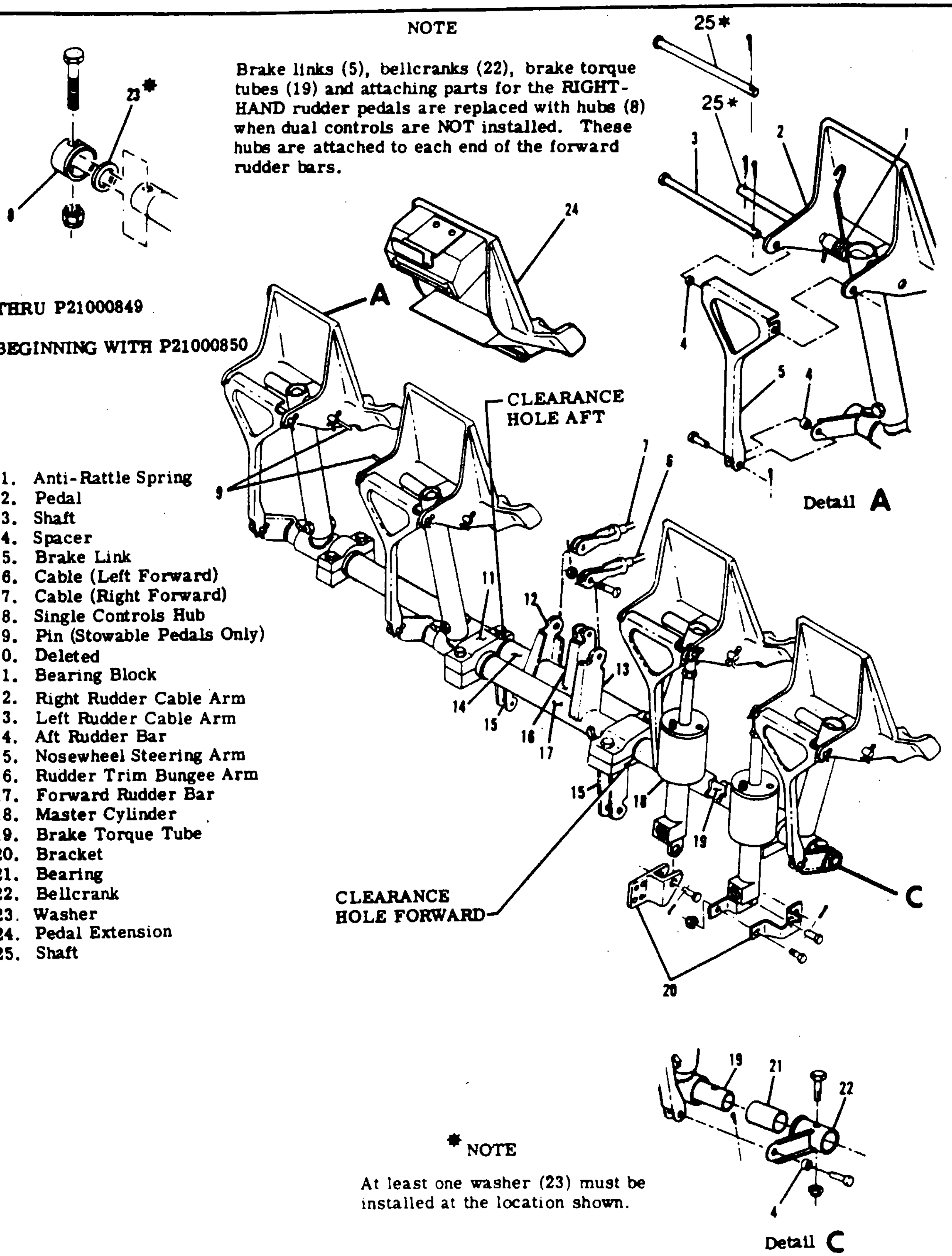
CABLE TENSION:
30 LBS ± 10 LBS (AT AVERAGE TEMPERATURE FOR THE AREA.)
REFER TO FIGURE 1-1 FOR TRAVEL.

1. Right Rudder Bar
2. Left Rudder Bar
3. Right Forward Cable
4. Left Forward Cable
5. Cable Guard
6. Spacer
7. Pulley
8. Clip
9. Fairlead
10. Turnbuckle
11. Right Rear Cable
12. Left Rear Cable
13. Stop Bolt
14. Bellcrank
15. Pressure Seal
16. Retainer

Figure 10-1. Rudder Control System

NOTE

Brake links (5), bellcranks (22), brake torque tubes (19) and attaching parts for the RIGHT-HAND rudder pedals are replaced with hubs (8) when dual controls are NOT installed. These hubs are attached to each end of the forward rudder bars.



* THRU P21000849

* BEGINNING WITH P21000850

1. Anti-Rattle Spring
2. Pedal
3. Shaft
4. Spacer
5. Brake Link
6. Cable (Left Forward)
7. Cable (Right Forward)
8. Single Controls Hub
9. Pin (Stowable Pedals Only)
10. Deleted
11. Bearing Block
12. Right Rudder Cable Arm
13. Left Rudder Cable Arm
14. Aft Rudder Bar
15. Nosewheel Steering Arm
16. Rudder Trim Bungee Arm
17. Forward Rudder Bar
18. Master Cylinder
19. Brake Torque Tube
20. Bracket
21. Bearing
22. Bellcrank
23. Washer
24. Pedal Extension
25. Shaft

* NOTE

At least one washer (23) must be installed at the location shown.

Figure 10-2. Rudder Pedal Installation

1. Steering Arm
2. Steering Bungee
3. Adjustable Rod End
4. Whiffletree (Steering Bellcrank)
5. Link Rod Assembly
6. Clamp
7. Boot
8. Boot Retainer
9. Right Rudder Bar Arm
10. Left Rudder Bar Arm

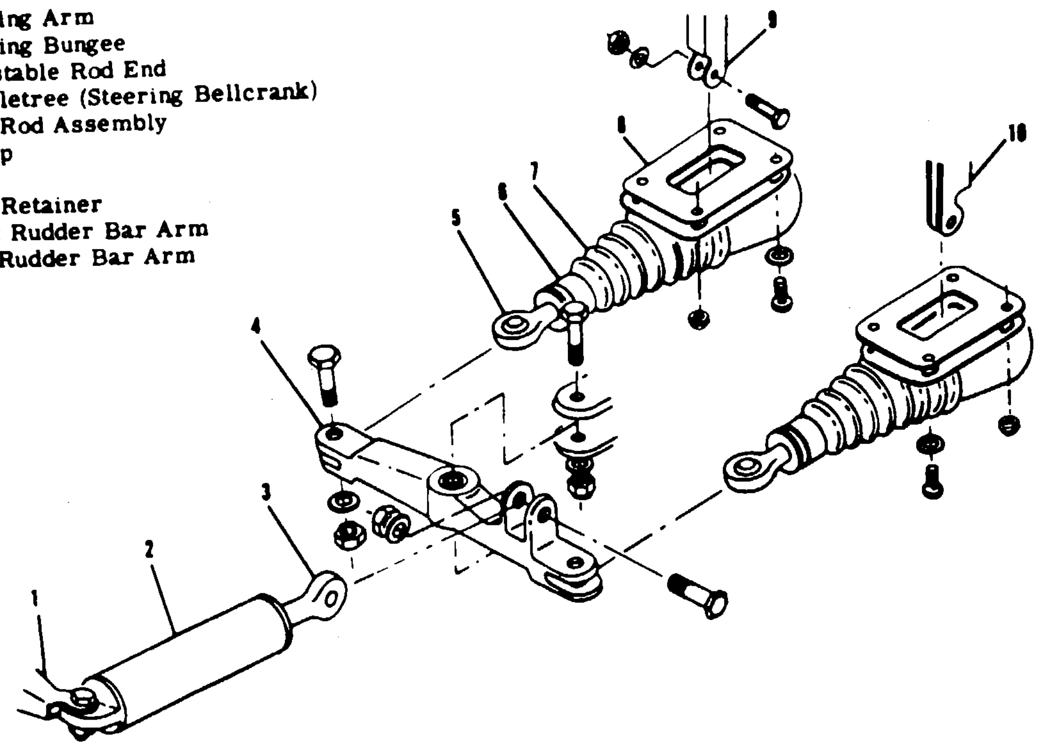


Figure 10-3. Nose Gear Steering Installation

10-4. RUDDER PEDAL ASSEMBLY.

10-5. REMOVAL AND INSTALLATION. (Refer to figure 10-2.)

a. Remove carpeting, shields and soundproofing from the rudder pedal and tunnel areas as necessary for access.

b. Disconnect brake master cylinders (18) and parking brake cables at pilot's rudder pedals.

c. Remove rudder pedals (2) and brake links (5).

d. Deleted

e. Remove fairing from either side of vertical fin, remove safety wire and relieve cable tension by loosening turnbuckles (index 10, figure 10-1).

f. Disconnect cables (6 and 7) from rudder bar arms (12 and 13).

g. Disconnect rudder trim bungee from rudder bar arm (16).

h. (Refer to figure 10-3.) Disconnect whiffletree link rod assemblies (5) at rudder bar arms (9 and 10).

i. (Refer to figure 10-2.) Remove bolts securing bearing blocks (11) and carefully work rudder bars out of tunnel area.

NOTE

The two inboard bearing blocks contain clearance holes for the rudder bars at one end and a bearing hole at the other. Tag these bearing blocks for reference on reinstallation.

j. Reverse the preceding steps for reinstallation. Lubricate rudder bar assemblies as outlined in Section 2. Rig system in accordance with paragraph 10-11, safety turnbuckles and reinstall all items removed for access.

10-6. RUDDER. (Refer to figure 10-4.)

10-7. REMOVAL AND INSTALLATION.

a. Remove stinger.

b. Disconnect tail navigation light wire.

c. Remove fairing from either side of vertical fin, remove turnbuckles (index 10, figure 10-1.)

d. Disconnect cables (4 and 6) from rudder bellcrank (3).

e. With rudder supported, remove all hinge bolts (2) and using care, lift rudder free of vertical fin.

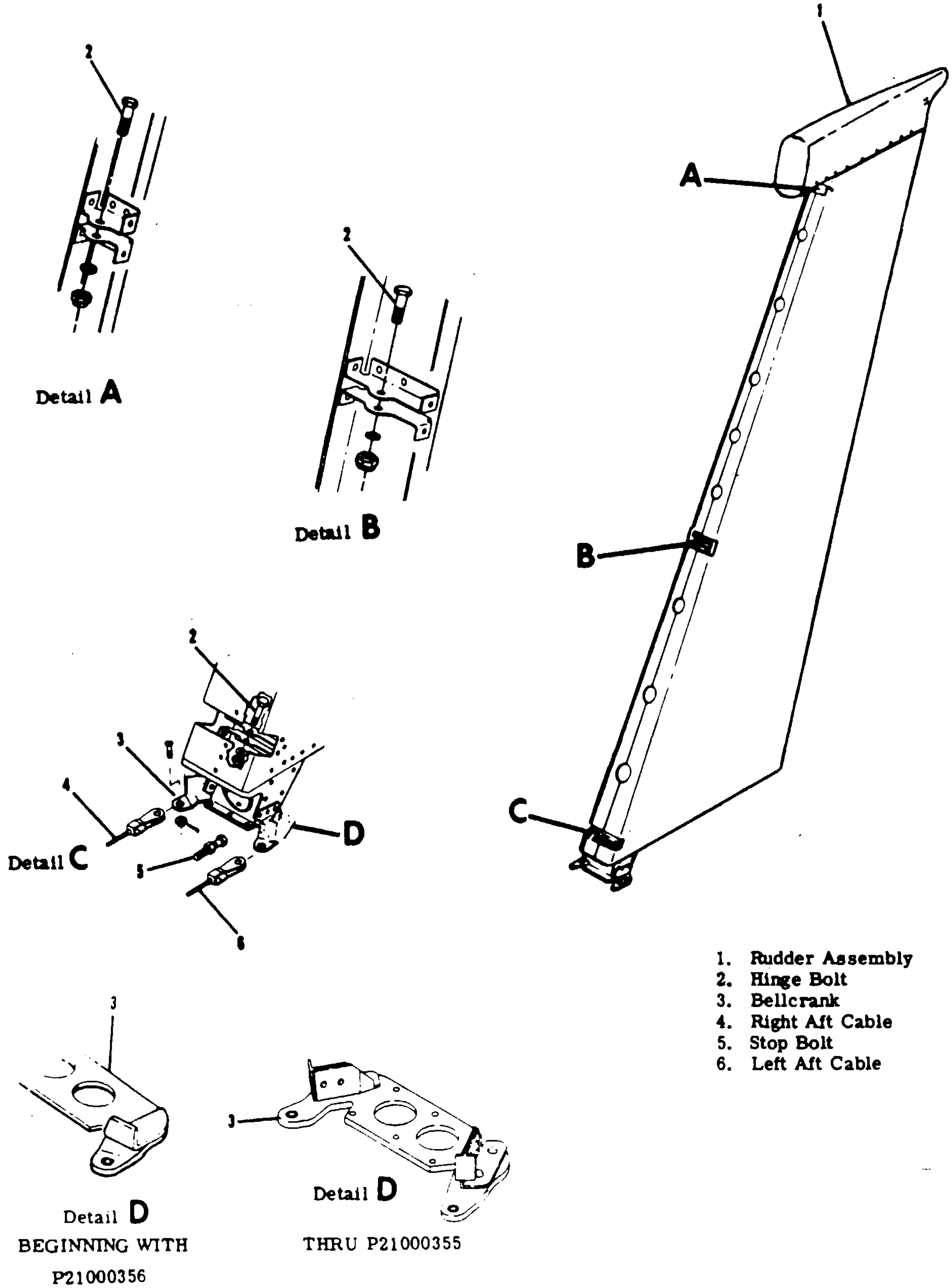
f. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 10-11, safety turnbuckles and reinstall all items removed for access.

10-8. REPAIR. Repair may be accomplished as outlined in Section 18.

10-9. CABLES AND PULLEYS. (Refer to figure 10-1.)

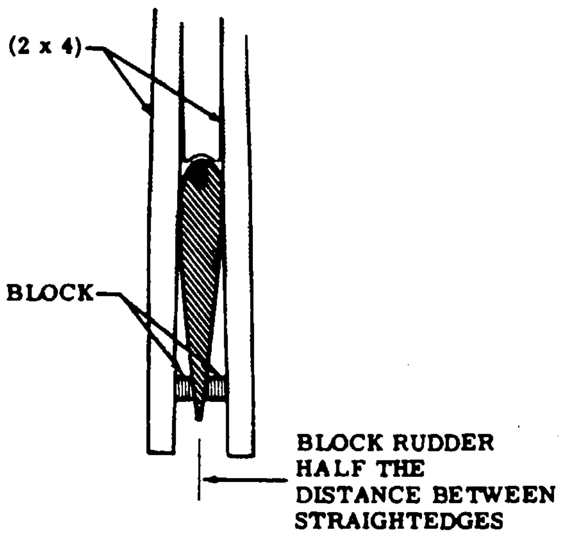
10-10. REMOVAL AND INSTALLATION.

a. Remove seats, upholstery and access plates as necessary.

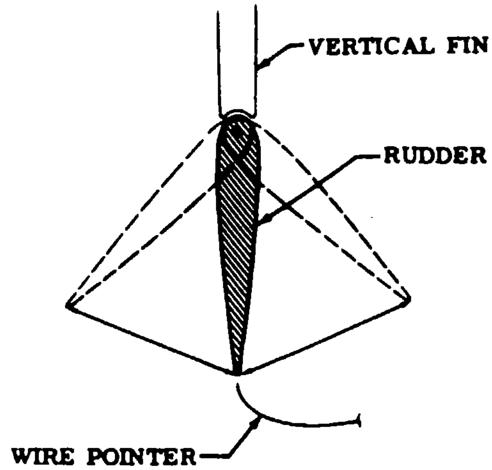


1. Rudder Assembly
2. Hinge Bolt
3. Bellcrank
4. Right Aft Cable
5. Stop Bolt
6. Left Aft Cable

Figure 10-4. Rudder Installation



ESTABLISHING NEUTRAL
POSITION OF RUDDER



MEASURING
RUDDER
TRAVEL

1. Establish neutral position of rudder by clamping straightedge (such as wooden 2 × 4) on each side of fin and rudder and blocking trailing edge of rudder half the distance between straightedges as shown.
2. Tape a length of soft wire to the stinger in such a manner that it can be bent to index at the lower corner of the rudder trailing edge.
3. Using soft lead pencil, mark rudder at point corresponding to soft wire indexing point (neutral).
4. Remove straightedges and blocks.
5. Hold rudder against right, then left, rudder stop. Measure distance from pointer to pencil mark on rudder in each direction of travel. Distance should be between 8.12" and 8.72".

Figure 10-5. Checking Rudder Travel

b. Remove safety wire, relieve cable tension and disconnect cables at turnbuckles (10).
c. Disconnect cables (3 and 4) at rudder bar arms.
d. Remove guards, pulleys, fairleads and pressure seals as required to work cables free of aircraft.

NOTE

To ease routing of cables, a length of wire may be attached to end of the cable before being withdrawn from aircraft. Leave wire in place, routed through structure; then attach cable being installed and pull the cable into position.

e. Reverse the preceding steps for reinstallation.
f. Reinstall guards, pulleys, fairleads and pressure seals; insure that cable is positioned in pulley grooves before installing cable guards.
g. Re-rig system in accordance with paragraph 10-11, safety turnbuckles and reinstall all items removed in step "a".

10-11. RIGGING.
a. Remove fairing from either side of vertical fin, remove safety wire and relieve cable tension at turnbuckles (index 10, figure 10-1).
b. Open landing gear doors. (Refer to Section 5.)
c. Tie down or weight tail to raise nosewheel free of ground.
d. Extend strut and ensure nose gear is centered against the external centering lug. (Neutral position.)
e. (Refer to figure 10-3.) Disconnect steering bungee adjustable rod end (3) from whiffletree (4).
f. Remove pedestal cover in accordance with Section 9.
g. Remove lower pedestal panel (index 14, figure 9-4).
h. Disconnect rudder trim bungee from rudder bar arm (index 16, figure 10-2).
i. Clamp rudder pedals in neutral position.
j. Adjust turnbuckles (index 10, figure 10-1) to streamline rudder with 30±10 lbs tension on cables.
k. Remove clamps from rudder pedals.
l. Adjust travel stop bolts (index 13, figure 10-1) to obtain degree of travel specified in figure 1-1. Figure 10-5 illustrates correct travel and one method of checking.
m. Adjust length of rod end (3) to align with whiffletree (4) and install bolt. DO NOT PRELOAD BUNGEE.
n. Connect rudder trim bungee and rig trim system as outlined in Section 11.
o. Operate rudder system, checking for ease of movement and full travel. Check cable tension with rudder in various positions. Cable tension should not be less than 20 pounds or more than 40 pounds in any position.
p. Check that all turnbuckles are safetied and reinstall all items removed for access.
q. Lower nosewheel to ground.

WARNING

Be sure rudder moves in the correct direction when operated by the rudder pedals.

SHOP NOTES:

SECTION 11

RUDDER TRIM CONTROL SYSTEM

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11-1. RUDDER TRIM CONTROL SYSTEM. (Refer to figure 11-1.)

11-2. DESCRIPTION. The rudder trim system is comprised of a trim control wheel and gear box assembly located in the upper control pedestal, which is connected by a chain assembly to a gimbal assembly in the lower pedestal. The gimbal assembly is attached to a stop bracket, which is attached to the rudder trim bungee. The bungee's push-rod assembly is attached to the right-hand rudder bar assembly. The rudder control system, rudder trim control system, and the nosewheel steering system are interconnected and adjustments to any one system will affect the others.

11-3. TROUBLE SHOOTING.

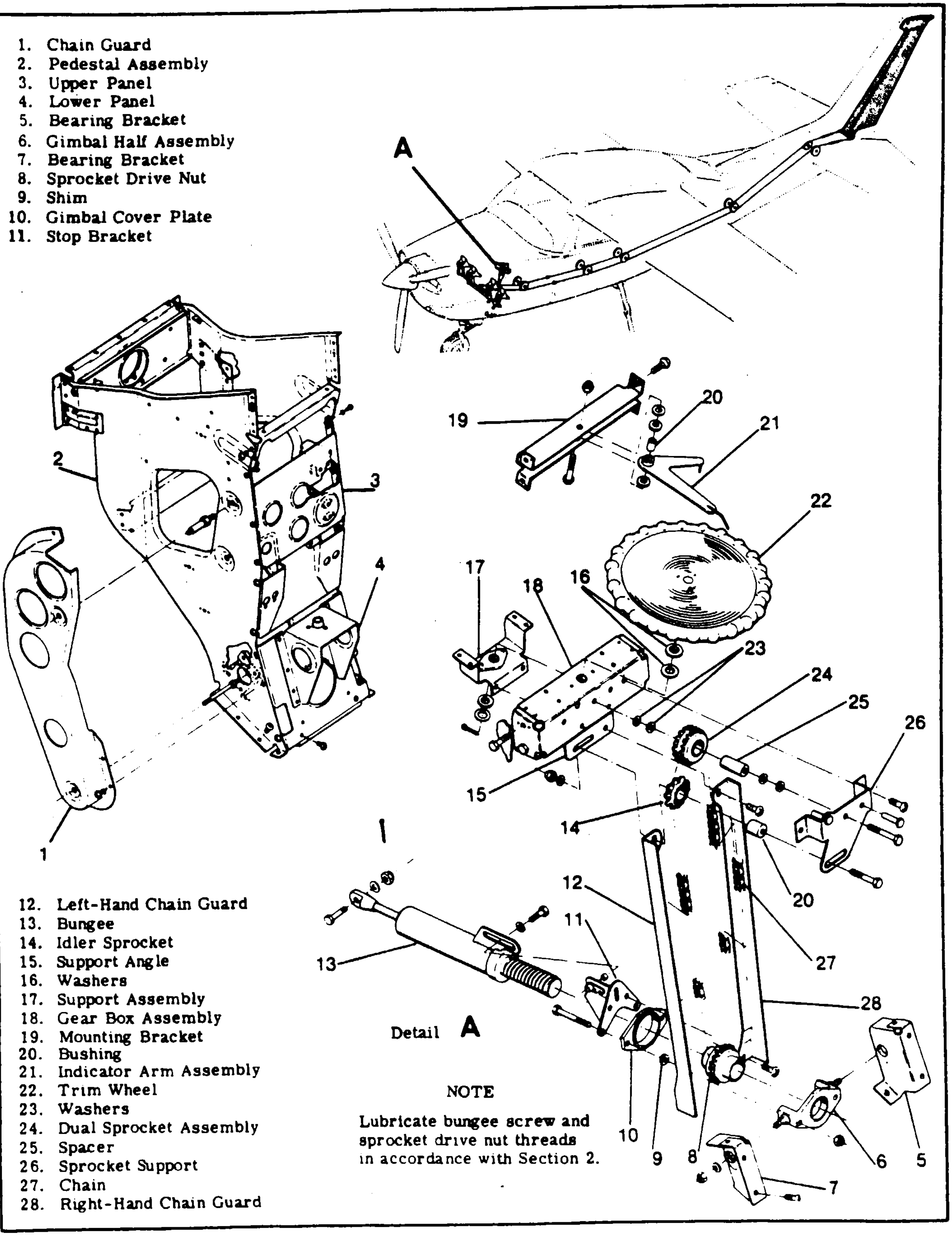
NOTES

This trouble shooting chart should be used in conjunction with the chart shown in Section 10.

Due to remedy procedures in the following chart, it may be necessary to re-rig the system. Refer to paragraph 11-5.

TROUBLE	PROBABLE CAUSE	REMEDY
FALSE READING ON TRIM POSITION INDICATOR.	Improper rigging.	Refer to note above.
	Worn, bent or disconnected linkage.	Check visually. Repair or replace parts as necessary.
HARD OR SLUGGISH OPERATION OF TRIM WHEEL.	Worn, bent or binding linkage.	Check visually. Repair or replace parts as necessary.
	Incorrect rudder cable tension.	Check and adjust rudder cable tension.
FULL TRIM TRAVEL NOT OBTAINED.	Rudder trim system improperly rigged.	Refer to note above.

1. Chain Guard
2. Pedestal Assembly
3. Upper Panel
4. Lower Panel
5. Bearing Bracket
6. Gimbal Half Assembly
7. Bearing Bracket
8. Sprocket Drive Nut
9. Shim
10. Gimbal Cover Plate
11. Stop Bracket



12. Left-Hand Chain Guard
13. Bungee
14. Idler Sprocket
15. Support Angle
16. Washers
17. Support Assembly
18. Gear Box Assembly
19. Mounting Bracket
20. Bushing
21. Indicator Arm Assembly
22. Trim Wheel
23. Washers
24. Dual Sprocket Assembly
25. Spacer
26. Sprocket Support
27. Chain
28. Right-Hand Chain Guard

NOTE

Lubricate bungee screw and sprocket drive nut threads in accordance with Section 2.

Figure 11-1. Rudder Trim Control System

11-4. REMOVAL AND INSTALLATION OF SYSTEM COMPONENTS. (Refer to figure 11-1.)

a. INDICATOR ASSEMBLY.

1. Remove pedestal cover in accordance with procedures outlined in Section 9.
2. Remove four screws attaching mounting bracket assembly (19) to pedestal assembly (2).
3. Remove indicator assembly as a unit.
4. Reverse preceding steps for installation.

b. WHEEL AND GEAR BOX ASSEMBLY.

1. Remove pedestal cover as outlined in Section 9.
2. Loosen chain (27) by loosening bolt securing idler sprocket (14) and sliding sprocket inboard in slot in support angle (15).
3. Remove upper panel (3) and disconnect chain (27) at connecting link.
4. Remove four bolts attaching gear box assembly (18) to pedestal assembly (2).
5. Remove bolts attaching idler sprocket (14) and chain guards (12) and (28).
6. Remove wheel and gear box assembly as a unit.

NOTE

If wheel and gear box assembly is disassembled, install washers (16) and (23) as required to nest sprockets and prevent end play.

7. Reverse preceding steps for installation.

c. CHAIN ASSEMBLY.

1. Remove pedestal cover as outlined in Section 9.
2. Remove upper panel (3).
3. Remove access cover directly below and aft of pedestal in floor.
4. Remove fuel selector shaft, then remove lower panel (4).
5. Loosen chain (27) by loosening bolt securing idler sprocket (14) and sliding sprocket inboard in slot in support angle (15).
6. Disconnect chain at connecting link.
7. Remove bolt attaching bungee (13) to stop bracket (11).
8. Pull gimball assembly (items 5, 6, 7, 8, 9, 10 and 11) aft away from bungee (13).
9. Remove chain (27) from sprocket drive nut (8).
10. Reverse preceding steps for installation.

d. GIMBAL ASSEMBLY.

1. Remove pedestal cover as outlined in Section 9.
2. Remove access cover directly below and aft of pedestal in floor.
3. Remove fuel selector shaft, then remove lower panel (4).
4. Loosen chain (27) by loosening bolt securing idler sprocket (14) and sliding sprocket inboard in slot in support angle (15).
5. Disconnect chain at connecting link.
6. Remove bolt attaching bungee (13) to stop bracket (11).
7. Pull gimbal assembly (items 5, 6, 7, 8, 9, 10 and 11) aft; remove from aircraft.

NOTE

If gimbal assembly is to be disassembled, upon reassembly, shims (9) should be installed between gimbal half assembly (6) and cover plate assembly (10) to maintain .002 to .004-inch end play on sprocket.

8. Reverse preceding steps for installation.

e. BUNGEE ASSEMBLY.

1. Remove pedestal cover as outlined in Section 9.
2. Remove upper panel (3).
3. Remove access cover directly below and aft of pedestal in floor.
4. Remove fuel selector shaft, then remove lower panel (4).
5. Loosen chain (27) by loosening bolt securing idler sprocket (14) and sliding sprocket inboard in slot in support angle (15).
6. Disconnect chain at connecting link.
7. Remove bolts attaching idler sprocket (14) and chain guards (12) and (28) to support angle (15).
8. Remove bolts attaching chain guard to stop bracket (11); remove chain guards.
9. Remove bolt attaching bungee (13) to stop bracket (11).
10. Pull gimbal assembly (items 5, 6, 7, 8, 9, 10 and 11) aft; remove from aircraft.
11. Disconnect bungee push-rod assembly from right-hand rudder bar assembly.
12. Using care, remove bungee from tunnel area, aft, through pedestal.
13. Reverse preceding steps for installation.

NOTE

Upon installation, lubricate bungee screw and sprocket drive nut threads per Section 2.

11-5. RIGGING RUDDER TRIM SYSTEM. (Refer to Figure 11-1.)

NOTE

Rudder control system and nose wheel steering system must be correctly rigged prior to rigging the rudder trim system.

a. Remove pedestal cover as outlined in Section 9.
b. Remove upper pedestal panel.
c. Remove access cover directly below and aft of pedestal in floor.
d. Remove fuel selector shaft, then remove lower pedestal panel.
e. Loosen chain by loosening bolt securing idler sprocket, and sliding sprocket inboard in slot in support angle; disconnect chain.
f. Remove bolt attaching bungee to stop bracket; unscrew gimbal assembly from actuator drive screw.
g. Disconnect bungee push-pull rod from right-hand rudder bar assembly.
h. Tie down or weight tail to raise nose wheel free of ground.
i. Ensure rudder pedals and rudder are in neutral position.

j. Attach bungee push-pull rod to right-hand rudder bar assembly.
k. Install lower panel assembly and bearing brackets.
l. Screw gimbal assembly onto bungee drive screw until studs on gimbal half assembly align with holes in bearing brackets and nutplate on stop bracket aligns with center of slot in bungee stop arm.
m. Install and tighten bolts, washers and nuts.
n. String chain over idler sprocket and sprocket in wheel and gear box assembly; connect chain at connecting link.

NOTE

Indicator assembly should be installed with rudder pedals in neutral position. If indicator does not line up with centerline of aircraft, bend indicator left or right as required.

o. Tighten chain by moving idler sprocket outboard in slot in support angle.
p. Install full selector shaft.
q. Install upper panel.
r. Install floor access covers and pedestal cover.
s. Remove blocking from rudder and pedals.
t. Lower aircraft.

WARNING

Be sure rudder moves in correct direction when operated by the trim control wheel.

SHOP NOTES:

SECTION 12

ENGINE

WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand nor allow anyone else to stand within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

NOTE

For additional information covering turbocharger and component maintenance, overhaul and trouble shooting refer to the Manufacturer's Overhaul Manual.

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12-1. ENGINE COWLING.

12-2. DESCRIPTION. The engine cowling is divided into four major removable segments. The left upper cowling segment has two access doors, one at the upper front provides access to the oil filler neck and one at the left aft side provides access to the oil dipstick and fuel strainer drain control lever (thru P21000760). The right and left nosecaps are fastened to the lower engine nacelle and to each other with screws. The right and left upper cowl segments are secured with quick-release fasteners and either segment may be removed individually. The forward opening in the lower left engine nacelle provides ram air to the cabin heating system and contains a port on the aft end for venting the cabin heating system. The opening in the lower right nacelle, which may be removed by removing screws, supplies ram air to the turbocharger.

12-3. REMOVAL AND INSTALLATION.

a. Release the quick-release fasteners attaching the cowling to the fuselage and at the parting surfaces of the left and right segments.

b. Remove screws securing the left and right nosecap together and to the lower engine nacelle, and remove caps.

c. Reverse the preceding steps for reinstallation. Ensure the baffle seals are turned in the correct direction to confine and direct air flow around the engine. The vertically installed seals mustfold forward and the side seals must fold upwards.

12-4. CLEANING AND INSPECTION. Wipe the inner surfaces of the cowling segments with a clean cloth saturated with cleaning solvent (Stoddard or equivalent). If the inside surface of the cowling is coated heavily with oil or dirt, allow solvent to soak until foreign material can be removed. Wash painted surfaces of the cowling with a solution of mild soap and water and rinse thoroughly. After washing, a coat of wax may be applied to the painted surfaces to prolong paint life. After cleaning, inspect cowling for dents, cracks, loose rivets and spot welds. Repair all defects to prevent spread of damage.

12-5. REPAIR. If cowling skins are extensively damaged, new complete sections of the cowling should be installed. Standard insert-type patches may be used for repair if repair parts are formed to fit contour of cowling. Small cracks may be stop-drilled and small dents straightened if they are reinforced on the inner surface with a doubler of the same material as the cowling skin. Damaged reinforcement angles should be replaced with new parts. Due to their small size, new reinforcement angles are easier to install than to repair the damaged part.

12-6. COWL FLAPS.

12-7. DESCRIPTION. Cowl flaps are provided to aid in controlling engine temperature. Two cowl flaps, operated by a single control in the cabin, are located in the lower aft engine compartment. The engine exhaust tailpipe extends through a cutout, forward of the right-hand cowl flap.

12-8. REMOVAL AND INSTALLATION. (Refer to figure 12-1.)

a. Place control lever (2) in the OPEN position.

b. Disconnect control clevises (13) from shock-mounts (14).

c. Remove safety wire securing hinge pins (9) to cowl flaps, pull pins from hinges and remove flaps.

d. Reverse the preceding steps for reinstallation. Rig cowl flaps, if necessary, in accordance with paragraph 12-9.

12-9. RIGGING. (Refer to figure 12-1.)

a. Disconnect control clevises (13) from shock-mounts (14).

b. Check to make sure that the flexible controls reach their internal stops in each direction. Mark controls so that full travel can be readily checked and maintained during the remaining rigging procedures.

c. Place control lever (2) in the CLOSED position. If the control lever cannot be placed in the closed position, loosen clamp (5) at upper end of controls and slip housings in clamp or adjust controls at upper clevis (4) to position control lever in bottom hole of position bracket (3).

d. THRU 1979 MODELS: With the control lever in the CLOSED position, set cowl flap OPEN .56 inch, measured at outboard trailing edge of cowl flap. BEGINNING WITH 1980 MODELS: Set cowl flap OPEN 1.55 inch measured at outboard trailing edge of cowl flap and 90° to cowl skin. BEGINNING WITH 1982 MODELS: With the control lever in the CLOSED position, set cowl flap flush to cowl skin.

NOTE

If lower control clevis (13) cannot be adjusted to attain desired setting, and still maintain sufficient thread engagement, loosen lower control housing clamp (8) and slide housing in clamp as necessary. Be sure threads are visible in clevis inspection holes.

e. Repeat preceding step for opposite cowl flap.

f. Check that all clamps and jam nuts are tight.

12-10. ENGINE.

12-11. DESCRIPTION. An air-cooled, horizontally-opposed, direct-drive, fuel-injected, six-cylinder, turbocharged, Continental TSIO-520 series engine, driving a constant-speed propeller, is used to power the aircraft. The cylinders, numbered from rear to front, are staggered to permit a separate throw on the crankshaft for each connecting rod. The right rear cylinder is number 1 and cylinders on the right side are identified by odd numbers 1, 3 and 5. The left rear cylinder is number 2 and the cylinders on the left side are identified as 2, 4 and 6. Refer to paragraph 12-12 for engine data. For repair and overhaul of the engine, accessories and propeller, refer to the appropriate publications issued by their manufacturer's. These publications are available from the Cessna Service Parts Center.

12-12. ENGINE DATA.

Aircraft Series	P21000001 thru P21000690 NOT MODIFIED by SK 210-98
Model (Continental)	TSIO-520-P
BHP Maximum for Take-Off	310
(5 Minutes) at RPM	2700
BHP Maximum Except Take-Off	285
RPM (Maximum Continuous)	2600
Limiting Manifold Pressure (Sea Level)	37.5 Inches Hg
Number of Cylinders	6-Horizontally Opposed
Displacement	520 Cubic Inches
Bore	5.25 Inches
Stroke	4.00 Inches
Compression Ratio	7.5:1
Magnetos	Slick Model No. 662
Right Magneto	Fires 20° ±1° BTC Upper Right and Lower Left
Left Magneto	Fires 20° ±1° BTC Upper Left and Lower Right
Firing Order	1-6-3-2-5-4
Spark Plugs	18mm (Refer to Continental Service Bulletin M77-10 for factory approved spark plugs and required gap)
Torque	330 ±30 Lb-In.
Fuel Metering Systems	Continental Fuel Injection
Unmetered Fuel Pressure	5.5 to 6.5 PSI at 600 RPM 35.0 to 39.0 PSI at 2700 RPM
Nozzle Pressure	3.5 to 4.0 PSI at 600 RPM 19.5 to 21.0 PSI at 2700 RPM
Oil Sump Capacity	10 U.S. Quarts
With Filter Element Change	11 U.S. Quarts
Tachometer	Mechanical Drive
Oil Pressure (PSI)	
Minimum Idling	10
Normal	30 to 60
Maximum (Cold Oil Starting)	100
Connection Location	Between No. 2 and No. 4 Cylinders
Oil Temperature	
Normal Operating	Within Green Arc
Maximum Permissible	Red Line (240°F)
Probe Location	Below Oil Cooler
Cylinder Head Temperature	Red Line (460°F) Max.
Probe Location	Lower Side No. 2 Cylinder Head
Economy Mixture Indicator (EGT)	
Probe Location	Exhaust Collector R. H. Side
Approximate Dry Weight With Accessories (Excluding Turbocharger System)	461 Lb. (Weight is approximate and will vary with optional accessories installed.)

12-12. ENGINE DATA.

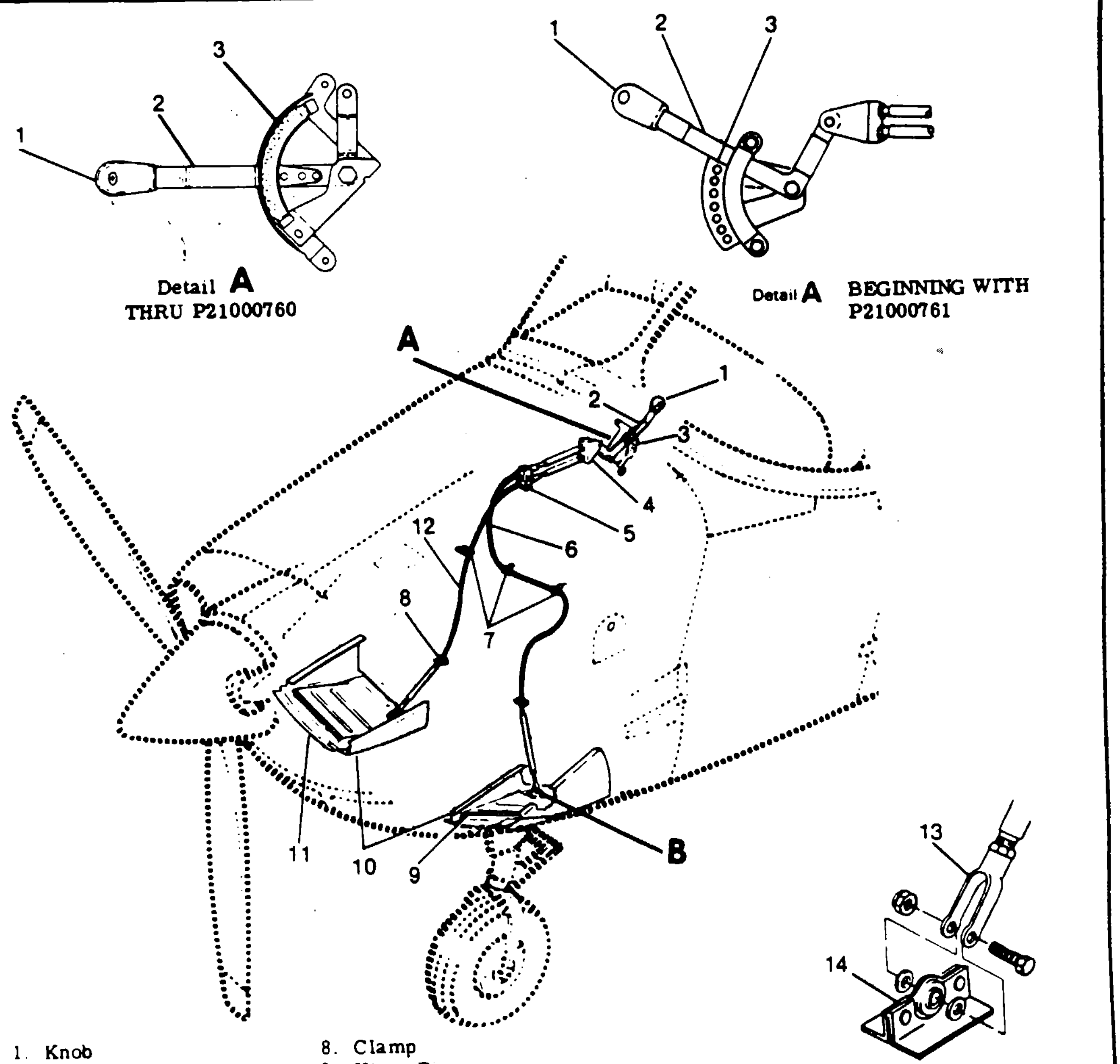
Aircraft Series	P21000001 thru P21000690 WHEN MODIFIED by SK210-98 P210000760 and ON
Model (Continental)	TSIO-520-P
BHP Maximum for Take-Off	310
(5 Minutes) at RPM	2700
BHP Maximum Except Take-Off	285
RPM (Maximum Continuous)	2600
Limiting Manifold Pressure (Sea Level)	36.5 Inches Hg
Number of Cylinders	6-Horizontally Opposed
Displacement	520 Cubic Inches
Bore	5.25 Inches
Stroke	4.00 Inches
Compression Ratio	7.5:1
Magnetos	Slick Model No. 662
Right Magneto	Fires 22° +0° -1° BTC Upper Right and Lower Left
Left Magneto	Fires 22° +0° -1° BTC Upper Left and Lower Right
Firing Order	1-6-3-2-5-4
Spark Plugs	18mm (Refer to Continental Service Bulletin M77-10 for factory approved spark plugs and required gap)
Torque	330 Lb-In, +30 or -30 Lb-In.
Fuel Metering System	Continental Fuel Injected
Unmetered Fuel Pressure	5.5 to 6.5 PSI at 600 RPM 33.0 to 37.0 PSI at 2700 RPM
Nozzle Pressure	3.5 to 4.0 PSI at 600 RPM 18.6 to 19.5 PSI at 2700 RPM
Oil Sump Capacity	10 U.S. Quarts
With Filter Wlement Change	11 U.S. Quarts
Tachometer	Mechanical Drive
Oil Pressure (PSI)	
Minimum Idling	10
Normal	30 to 60
Maximum (Cold Oil Starting)	100
Connection Location	Between No. 2 and No. 4 Cylinders
Oil Temperature	
Normal Operating	Within Green Arc
Maximum Permissible	Red Line (240°F)
Probe Location	Below Oil Cooler
Cylinder Head Temperature	Red Line (460°F) Max.
Probe Location	Lower Side No. 5 Cylinder Head
Economy Mixture Indicator (EGT)	
Probe Location	Exhaust Collector R. H. Side
Approximate Dry Weight With Accessories (Excluding Turbocharger System)	461 Lb. (Weight is approximate and will vary with optional accessories installed.)

12-12. ENGINE DATA.

Aircraft Series.	P21000761 and ON
Model (Continental)	TSIO-520-AF
BHP Maximum for Take-Off	310
(5 Minutes) at RPM	2700
BHP Maximum Except Take-Off	285
RPM (Maximum Continuous)	2600
Limiting Manifold Pressure (Sea Level)	35.5 Inches Hg.
Number of Cylinders	6-Horizontally Opposed
Displacement	520 Cubic Inches
Bore	5.25 Inches
Stroke	4.00 Inches
Compression Ratio	7.5:1
Magnetos	Slick Model No. 662 (thru 1982 Models) Slick Model No. 6220 (Beginning with 1983 Models)
Right Magneto	Fires 22° ±1° BTC Upper Right and Lower Left.
Left Magneto	Fires 22° ±1° BTC Upper Left and Lower Right.
Firing Order	1-6-3-2-5-4
Spark Plugs	18mm (Refer to Continental Service Bulletin M77-10 for factory approved spark plugs and required gap)
Torque	330 ±30 Lb-In.
Fuel Metering System	Continental Fuel Injection
Unmetered Fuel Pressure	5.5 to 6.5 PSI at 600 RPM 32.0 to 36.0 PSI at 2700 RPM (thru 1982 Models) 31.0 to 35.0 PSI at 2600 RPM (Beginning with 1983 Models)
Nozzle Pressure	3.5 to 4.0 PSI at 600 RPM 19.5 PSI at 2700 RPM
Oil Sump Capacity	10 U.S. Quarts
With Filter Element Change	11 U.S. Quarts
Tachometer	Mechanical Drive
Oil Pressure (PSI)	
Minimum Idling	10
Normal	30 to 60
Maximum (Cold Oil Starting)	100
Connection Location	Between No. 2 and No. 4 Cylinders
Oil Temperature	
Normal Operating	Within Green Arc
Maximum Permissible	Red Line (240°F)
Probe Location	In front of No. 5 Cylinder Base
Cylinder Head Temperature	Red Line (460°F) Max.
Probe Location	Lower Side No. 4 Cylinder Head
Turbine Inlet Temperature	
Probe Location	Exhaust Stack at Turbine Inlet
Approximate Dry Weight With Accessories (Excluding Turbocharger System)	461 Lb. (Weight is approximate and will vary with optional accessories installed.)

12-13. TIME BETWEEN OVERHAUL (TBO). Teledyne Continental Motors recommends engine overhaul at 1400 hours operating time for the TSIO-520-P series engines (THRU P21000760). BEGINNING with the TSIO-520-AF (P21000761 and ON) the engine overhaul time is 1600 hours. Refer to Continental Aircraft Engine Service Bulletin M81-22, and to any superseding bulletins, revisions or supplements thereto, for further recommendations. At the time of overhaul, engine accessories should be overhauled. Refer to Section 14 for propeller and governor overhaul periods.

12-14. OVERSPEED LIMITATIONS. The engine must not be operated above specified maximum continuous RPM. However, should inadvertant overspeed occur, refer to Continental Aircraft Engine Service Bulletin M75-16, and to any superseding bulletins, revisions or supplements thereto, for further recommendations.



1. Knob
2. Control Lever
3. Position Bracket
4. Clevis
5. Clamp
6. Left Cowl Flap Control
7. Clamp
8. Clamp
9. Hinge Pin
10. Cowl Flap
11. Hinge Half
12. Right Cowl Flap Control
13. Clevis
14. Shock Mount

Figure 12-1. Cowl Flaps Installation

2-15. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE FAILS TO START.	Engine flooded or improper use of starting procedure.	Use proper starting procedure. Refer to Pilot's Operating Handbook.
	Defective aircraft fuel system.	Refer to Section 13.
	Fuel tanks empty.	Service fuel tanks.
	Spark plugs fouled or defective.	Remove, clean, inspect and regap. Use new gaskets. Check cables to presistently fouled plugs. Replace if defective.
	Magneto impulse coupling failure.	Repair or install new coupling.
	Defective magneto switch or grounded magneto leads.	Repair or replace switch and leads.
	Defective ignition system.	Refer to paragraph 12-83.
	Induction air leakage.	Correct cause of air leakage.
	Clogged fuel screen in fuel control unit or defective unit.	Remove and clean. Replace defective unit.
	Clogged fuel screen in fuel manifold valve or defective valve.	Remove and clean screen. Replace defective valve.
	Clogged fuel injection lines or discharge nozzles.	Remove and clean lines and nozzles. Replace defective units.
	Defective auxiliary fuel pump.	Refer to Section 13.
	Engine-driven fuel pump not permitting fuel from auxiliary pump to bypass.	Install new engine-driven fuel pump.
	Vaporized fuel in system. (Most likely to occur in hot weather with a hot engine.)	Refer to Pilot's Operating Handbook.
ENGINE STARTS BUT DIES, OR WILL NOT IDLE PROPERLY.	Propeller control in high pitch (low RPM) position.	Use low pitch (high RPM) position for all ground operations.
	Improper idle speed or idle mixture adjustment.	Refer to paragraph 12-50.
	Defective aircraft fuel system.	Refer to Section 13.
	Spark plugs fouled or defective.	Remove, clean, inspect and regap. Use new gaskets. Check cables to persistently fouled plugs. Replace if defective.
	Water in fuel system.	Drain fuel tank sumps, lines and fuel strainer.
	Defective ignition system.	Refer to paragraph 12-83.

12-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE STARTS BUT DIES, OR WILL NOT IDLE PROPERLY (CONT).	Induction air leakage.	Correct cause of air leakage.
	Clogged fuel screen in fuel control unit or defective unit.	Remove and clean. Replace defective unit.
	Clogged fuel screen in fuel manifold valve or defective valve.	Remove and clean. Replace defective valve.
	Restricted fuel injection lines or discharge nozzles.	Remove, clean lines and nozzles. Replace defective units.
	Defective engine-driven fuel pump.	Install and calibrate new pump.
	Vaporized fuel in system. (Most likely to occur in hot weather with a hot engine.)	Refer to Pilot's Operating Handbook.
	Manual engine primer leaking.	Disconnect primer outlet line. If fuel leaks through primer, repair or replace primer.
	Obstructed air intake.	Remove obstruction; service air filter, if necessary.
	Discharge nozzle air vent manifolding restricted or defective.	Check for bent lines or loose connections. Tighten loose connections. Remove restrictions and replace defective components.
	Defective engine.	Check compression and listen for unusual engine noises. Check oil filter for excessive metal. Repair engine as required.
ENGINE HAS POOR ACCELERATION, RUNS ROUGHLY AT SPEEDS ABOVE IDLE OR LACKS POWER.	Idle mixture too lean.	Refer to paragraph 12-50.
	Propeller control in high pitch (low RPM) position.	Use low pitch (high RPM) position for all ground operations.
	Incorrect fuel-air mixture, worn control linkage or restricted air filter.	Replace worn elements of control linkage. Service air filter.
	Defective ignition system.	Refer to paragraph 12-83.
	Malfunctioning turbocharger.	Check operation, listen for unusual noise. Check operation of wastegate valve and for exhaust system defects. Tighten loose connections.
	Improper fuel-air mixture.	Check intake manifold connections for leaks. Tighten loose connections. Check fuel controls and linkage for setting and adjustment.

12-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE HAS POOR ACCELERATION, RUNS ROUGHLY AT SPEEDS ABOVE IDLE OR LACKS POWER (CONT).	Spark plugs fouled or defective.	Remove, clean, inspect and regap. Use new gaskets. Check cables to persistently fouled plugs. Replace if defective.
	Fuel pump pressure improperly adjusted.	Refer to paragraph 12-65.
	Restriction in fuel injection system.	Clean out restriction. Replace defective items.
	Propeller out of balance.	Check and balance propeller.
	Defective engine.	Check compression, check oil filter for excessive metal. Listen for unusual noises. Repair engine as required.
	Exhaust system leakage.	Refer to paragraph 12-105.
	Turbocharger wheels rubbing.	Replace turbocharger.
	Improperly adjusted or defective waste-gate controller.	Refer to paragraph 12-115.
	Leak in turbocharger discharge pressure system.	Correct cause of leaks. Repair or replace damaged parts.
	Manifold pressure overshoot. (Most likely to occur when engine is accelerated too rapidly.)	Move throttle about two-thirds open. Let engine accelerate and peak. Move throttle to full open.
	Engine oil viscosity too high for ambient air.	Refer to Section 2 for proper grade of oil.
POOR IDLE CUT-OFF.	Mixture control linkage improperly rigged.	Refer to paragraph 12-90.
	Defective or dirty fuel manifold valve.	Remove and clean manifold valve.
	Fuel contamination.	Drain all fuel and flush out fuel system. Clean all screens, fuel strainers, fuel manifold valves, nozzles and fuel lines.
	Defective mixture control valve in fuel pump.	Replace fuel pump.
ENGINE LACKS POWER, REDUCTION IN MAXIMUM MANIFOLD PRESSURE OR CRITICAL ALTITUDE.	Incorrectly adjusted throttle control, "sticky" linkage or dirty air filter.	Check movement of linkage by moving control through range of travel. Make proper adjustments and replace worn components. Service air filter.

12-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE LACKS POWER, REDUCTION IN MAXIMUM MANIFOLD PRESSURE OR CRITICAL ALTITUDE (CONT).	Defective ignition system.	Inspect spark plugs for fouled electrodes, heavy carbon deposits, erosion of electrodes, improperly adjusted electrode gaps and cracked porcelains. Test plugs for regular firing under pressure. Replace damaged or misfiring plugs.
	Improperly adjusted waste-gate valve.	Refer to paragraph 12-117.
	Loose or damaged exhaust system.	Inspect entire exhaust system to turbocharger for cracks and leaking connections. Tighten connections and replace damaged parts.
	Loose or damaged manifolding.	Inspect entire manifolding system for possible leakage at connections. Replace damaged components, tighten all connections and clamps.
	Fuel discharge nozzle defective.	Inspect fuel discharge nozzle vent manifolding for leaking connections. Tighten and repair as required. Check for restricted nozzles and lines and clean and replace as necessary.
	Malfunctioning turbocharger.	Check for unusual noise in turbocharger. If malfunction is suspected, remove exhaust and/or air inlet connections and check rotor assembly, for possible rubbing in housing, damaged rotor blades or defective bearings. Replace turbocharger if damage is noted.
BLACK SMOKE EXHAUST.	Turbo coking, oil forced through seal of turbine housing.	Clean or change turbocharger.
HIGH CYLINDER HEAD TEMPERATURE.	Defective cylinder head temperature indicating system.	Refer to Section 16.
	Improper use of cowl flaps.	Refer to Pilot's Operating Handbook.
	Engine baffles loose, bent or missing.	Install baffles properly. Repair or replace if defective.
	Dirt accumulated on cylinder cooling fins.	Clean thoroughly.
	Incorrect grade of fuel.	Drain and refill with proper fuel.

12-15. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
HIGH CYLINDER HEAD TEMPERATURE (CONT).	Incorrect ignition timing.	Refer to paragraph 12-82.
	Improper use of mixture control.	Refer to Pilot's Operating Handbook.
	Defective engine.	Repair as required.
HIGH OR LOW OIL TEMPERATURE OR PRESSURE.		Refer to paragraph 12-33.

NOTE

Refer to paragraph 12-112 for trouble shooting of controller and waste-gate actuator.

12-16. STATIC RUN-UP PROCEDURES. In a case of suspected low engine power, a static run-up should be conducted as follows:

a. Run-up engine, using take-off power and mixture settings, with the aircraft facing 90° right and then left to the wind direction.

b. Record the RPM obtained in each run-up position.

NOTE

Daily changes in atmospheric pressure, temperature and humidity will have a slight effect on static run-up.

c. Average the results of the RPM obtained. The minimum acceptable RPM is 2650. The average should fall between 2650 and 2700 RPM.

d. If the average results of the RPM obtained are lower than stated above, the following recommended checks may be performed to determine a possible deficiency.

1. Check governor control for proper rigging. It should be determined that the governor control arm travels to the high RPM stop on the governor and that the high RPM stop screw is adjusted properly. (Refer to Section 14 for procedures).

NOTE

If verification of governor operation is necessary the governor may be removed from the engine and a flat plate installed over the engine pad. Run-up engine to determine that governor was adjusted properly.

2. Check operation of alternate air door spring or magnetic lock to make sure door will remain closed in normal operation.

3. Check magneto timing, spark plugs and ignition harness for settings and conditions.

4. Check fuel injection nozzles for restriction and check for correct unmetered fuel flow.

5. Check condition of induction air filter. Clean if required.

6. Perform an engine compression check (Refer to engine Manufacturer's Manual).

12-17. REMOVAL. If an engine is to be placed in storage or returned to the manufacturer for overhaul, proper preparatory steps should be taken for corrosion prevention prior to beginning the removal procedure. Refer to Section 2 for storage preparation. The following engine removal procedure is based upon the engine being removed from the aircraft as a complete unit with the turbocharger and accessories installed.

NOTE

Tag each item when disconnected to aid in identifying wires, hoses, lines and control linkages when engine is reinstalled. Likewise, shop notes made during removal will often clarify reinstallation. Protect openings, exposed as a result of removing or disconnecting units, against entry of foreign material by installing covers or sealing with tape.

a. Place all cabin switches in the OFF position.

b. Place fuel selector or fuel ON-OFF valve in the OFF position.

c. Remove engine cowling in accordance with paragraph 12-3.

d. Disconnect battery cables and insulate terminals as a safety precaution. Remove battery and battery box for additional clearance, if desired.

e. Drain fuel strainer and lines.

NOTE

During the following procedures, remove any clamps or lacings which secure controls, wires, hoses or lines to the engine, engine nacelle or attached brackets, so they will not interfere with engine removal. Some of the items listed can be disconnected at more than one place. It may be desirable to disconnect some of these items at other than the places indicated. The reason for engine removal should be the governing factor in deciding at which point to disconnect them. Omit any of the items which are not present on a particular engine installation.

f. Drain the engine oil sump and oil cooler.
g. Disconnect magneto primary lead wires at magnetos.

WARNING

The magnetos are in a SWITCH ON condition when the switch wires are disconnected. Ground the magneto points or remove the high tension wires from the magnetos or spark plugs to prevent accidental firing.

h. Remove the spinner and propeller in accordance with Section 14. Cover exposed end of crankshaft flange and propeller flange to prevent entry of foreign material.
i. Disconnect throttle, mixture and propeller controls from their respective units. Remove clamps attaching controls to engine and pull controls aft clear of engine. Use care to avoid bending controls too sharply. Note EXACT position, size and number of attaching washers and spacers for reference on reinstallation.
j. Disconnect wires and cables as follows:
    1. Disconnect tachometer drive shaft at adapter.

CAUTION

When disconnecting starter cable do not permit starter terminal bolt to rotate. Rotation of the bolt could break the conductor between bolt and field coils causing the starter to be inoperative.

    2. Disconnect starter electrical cable at starter.
    3. Disconnect cylinder head temperature wire at probe.
    4. Disconnect oil temperature wire at probe below oil cooler.
    5. Disconnect electrical wires and wire shielding ground at alternator.
    6. Disconnect exhaust gas temperatures or turbine inlet temperature wires at quick-disconnects.
    7. Disconnect electrical wires at throttle microswitches.
    8. Remove all clamps and lacings attaching wires or cables to engine and pull wires and cables aft to clear engine.
k. Disconnect lines and hoses as follows:
    1. Disconnect vacuum hose at vacuum pump and remove oil separator vent line.

WARNING

Residual fuel and oil draining from disconnected lines and hoses constitutes a fire hazard. Use caution to prevent accumulation of such fuel and oil when lines or hoses are disconnected.

    2. Disconnect fuel supply and vapor return hoses at fuel pump. Disconnect and remove fuel pump drain line.
    3. Disconnect manifold pressure line at intake manifold.
    4. Disconnect the fuel-flow gage line at firewall.
    5. Disconnect the oil pressure line at the engine.
    6. Disconnect and remove the right and left manifold drain lines and the balance tube drain line.
    7. Disconnect air and oil lines at the waste-gate controller, located on the firewall.
    8. Disconnect the air vent line to fuel-flow gage, at firewall.
    9. Disconnect engine primer lines at right and left intake manifolds.
    10. Disconnect the oil drain line from oil deflector under external oil filter.
l. Disconnect flexible ducting from heater shroud and cabin valve.
m. Carefully check the engine again to ensure ALL hoses, lines, wires, cables, clamps and lacings are disconnected or removed which would interfere with the engine removal. Ensure all wires, cables and engine controls have been pulled aft to clear the engine.

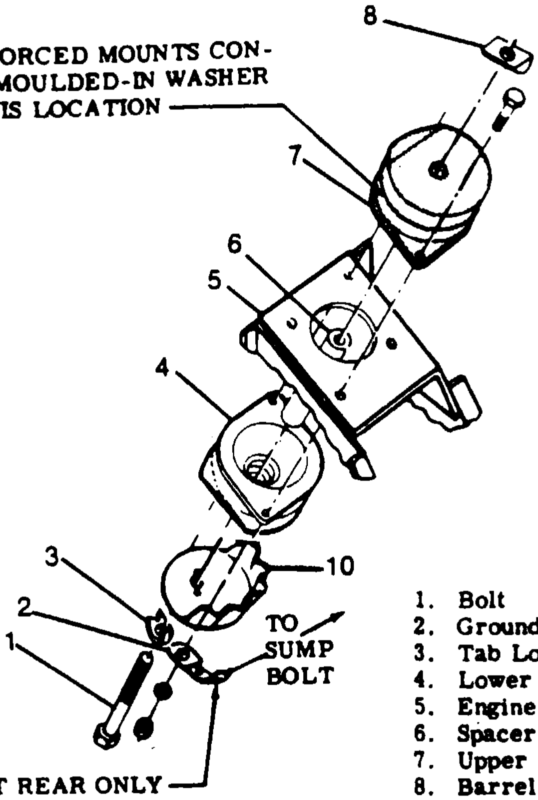
CAUTION

Place a suitable stand under tail tie-down ring before removing engine. The loss of engine weight will cause the aircraft to be tail heavy.

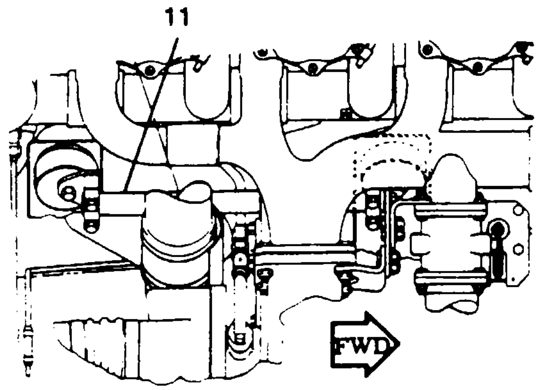
n. Attach a hoist to the lifting lug at the top center of the engine crankcase. Lift engine just enough to relieve the weight from the engine mounts.
o. Remove mount bolts, ground strap and heat shields.
p. Slowly hoist engine out of nacelle and clear of aircraft checking for any items which would interfere with the engine removal. Balance the engine by hand and carefully guide the disconnected parts out as the engine is removed.
q. Remove engine shock-mounts.

NOTE

If shock-mounts will be re-used, mark each one so it will be reinstalled in exactly the same position. If new shock-mounts will be installed, position them as illustrated in figure 12-2.

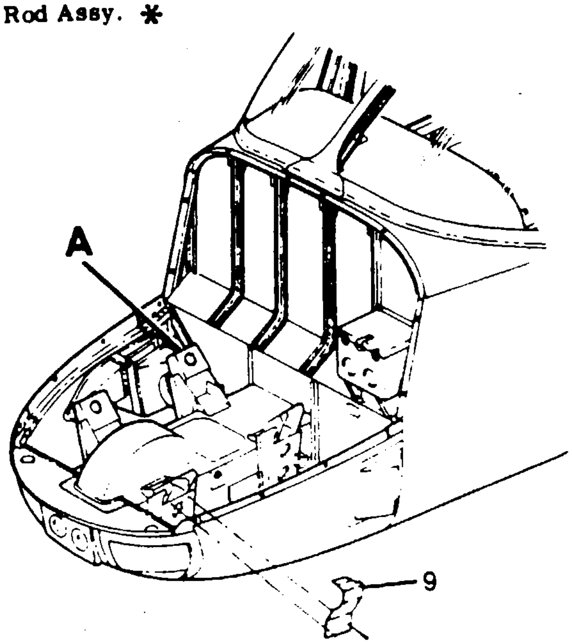


Detail **A**



1. Bolt
2. Ground Strap
3. Tab Lockwasher
4. Lower Mount
5. Engine Mount Support
6. Spacer
7. Upper Mount
8. Barrel Nut
9. Heat Shield
10. Deflector *
11. Rod Assy. *

* Installed on R.H. Engine Mounts only.



NOTES

It is important that the correct engine mounts be installed in the correct positions. Install left, forward, lower mount with beveled edges at the front and at the top. In addition, be sure that the two reinforced mounts are used at the upper, forward positions.

To determine which two of the eight mounts are the reinforced ones, use fingernail to feel whether moulded-in washer is present.

If shock-mounts will be re-used, mark each one so it will be reinstalled in exactly the same position. If new shock-mounts will be installed, position them as noted above.

Torque bolts (1) to 300 +50 -00 lb-in.

Figure 12-2. Engine Mount Installation

12-18. CLEANING. Clean engine in accordance with instructions in Section 2.

12-19. ACCESSORIES REMOVAL. Removal of engine accessories for overhaul or for engine replacement involves stripping the engine of parts, accessories and components to reduce it to the bare engine. During the removal process, removed items should be examined carefully and defective parts should be tagged for repair or replacement with new components.

NOTE

Items easily confused with similar items should be tagged to provide a means of identification when being installed on a new engine. All openings exposed by the removal of an item should be closed by installing a suitable cover or cap over the opening. This will prevent entry of foreign material. If suitable covers are not available, tape may be used to cover the openings.

12-20. INSPECTION. For specific items to be inspected, refer to the engine manufacturer's manual.

a. Visually inspect the engine for loose nuts, bolts, cracks and fin damage.
b. Inspect baffles, baffle seals and brackets for cracks, deterioration and breakage.
c. Inspect all hoses for internal swelling, chafing through protective plys, cuts, breaks, stiffness, damaged threads and loose connections. Excessive heat on hoses will cause them to become brittle and easily broken. Hoses and lines are most likely to crack or break near the end fittings and support points.
d. Inspect for color bleaching of the end fitting or severe discoloration of the hoses.

NOTE

Avoid excessive flexing and sharp bends when examining hoses for stiffness.

e. Refer to Section 2 for replacement intervals for flexible fluid carrying hoses in the engine compartment.
f. For major engine repairs, refer to the engine manufacturer's overhaul and repair manual.

12-21. BUILD-UP. Engine build-up consists of installation of parts, accessories and components to the basic engine to build up an engine unit ready for installation on the aircraft. All safety wire, lockwashers, nuts, gaskets and rubber connections should be new parts.

12-22. INSTALLATION. Before installing the engine on the aircraft, install any items which were removed from the engine or aircraft after the engine was removed.

NOTE

Remove all protective covers, plugs, caps and identification tags as each item is connected or installed. Omit any items not present on a particular engine installation.

a. Hoist the engine to a point just above the nacelle.
b. Install engine shock-mounts and ground strap as illustrated in figure 12-2.
c. Carefully lower engine slowly into place on the engine mounts. Route controls, lines, hoses and wires in place as the engine is positioned on the engine mounts.

NOTE

Be sure engine shock-mounts, spacers and washers are in place as the engine is lowered into position.

d. Attach ground strap under engine sump bolt and install engine mount bolts. Torque bolts to 300+50-00 lb-in. Bend tab washers to form lock for mount bolts. Install heat shields.
e. Remove support stand placed under tail tie-down fitting and remove hoist.

NOTE

If the exhaust system was loosened or removed, refer to paragraph 12-105.

f. Connect flexible ducting on heater shroud and cabin valve.
g. Route propeller governor control along left side of engine and secure with clamps.

NOTE

Throughout the aircraft fuel system, from the fuel bays to the engine-driven fuel pump, use NS-40 (RAS-4) (Snap-On Tools Corp., Kenosha, Wisconsin), MIL-T-5544 (Thread Compound, Antiseize, Graphite Petrolatum), USP Petrolatum or engine oil as a thread lubricant or to seal a leaking connection. Apply sparingly to male threads only, omitting the first two threads, exercising extreme caution to avoid "stringing" sealer across the end of the fitting. Always ensure that a compound, the residue from a previously used compound, or any other foreign material cannot enter the system. Throughout the fuel injection system, from the engine-driven fuel pump through the discharge nozzles, use only a fuel-soluble lubricant, such as engine oil, on fitting threads. Do not use any other form of thread compound on the injection system.

h. Connect lines and hoses as follows:
   1. Install and connect the left and right manifold drain lines and the balance tube drain line.

2. Connect the oil pressure line at its fitting.
3. Connect the fuel-flow gage line at firewall.
4. Connect the fuel supply and the vapor return lines at the fuel pump. Connect and install fuel pump drain line.
5. Connect manifold pressure line at intake manifold.
6. Connect vacuum line at the vacuum pump, and install oil separator vent line.
7. Connect air and oil lines at waste-gate controller on firewall.
8. Connect air vent line to fuel-flow gage line at firewall.
9. Connect engine primer lines at right and left intake manifolds.
10. Connect oil drain line to oil deflector under external oil filter.
11. Install all clamps securing lines and hoses to engine or structure.

i. Connect wires and cables as follows:
1. Connect oil temperature wire at probe below oil cooler.
2. Connect tachometer drive to adapter and torque to 100 lb-in.

WARNING

When connecting starter cable, do not permit starter terminal bolt to rotate. Rotation of the bolt could break conductor between terminal and field coils causing starter to be inoperative.

3. Connect starter electrical lead.
4. Connect cylinder head temperature wire at probe.
5. Connect electrical wires and wire shielding ground to alternator.
6. Connect electrical wiring to throttle switches.
7. Connect exhaust gas temperature or turbine inlet temperature wires at quick-disconnects.
8. Install clamps that attach wires or cables, to engine or structure.

j. Connect engine controls and install block clamps.
k. Rig engine controls in accordance with paragraphs 12-89, 12-90, 12-91 and 12-92.
l. Install propeller and spinner in accordance with instructions outlined in Section 14.
m. Complete a magneto switch ground-out and continuity check, then connect primary lead wires to the magnetos. Remove the temporary ground or connect spark plug leads, whichever procedure was used during removal.

WARNING

Be sure magneto switch is in OFF position when connecting switch wires to magnetos.

n. Clean and install induction air filter in accordance with Section 2.
o. Service engine with proper grade and quantity of engine oil. Refer to Section 2 if engine is new, newly overhauled or has been in storage.
p. Check all switches are in the OFF position and connect battery cables.
q. Inspect engine installation for security, correct routing of controls, lines, hoses and electrical wiring, proper safetying and tightness of all components.

NOTE

When installing a new or newly overhauled engine, and prior to starting the engine, disconnect the oil inlet line at the controller and the oil outlet line at the controller. Connect these oil lines to a full-flow oil filter, allowing oil to bypass the controller. With filter connected, operate engine approximately 15 minutes to filter out any foreign particles from the oil. This is done to prevent foreign material from entering the controller.

r. Install engine cowling in accordance with paragraph 12-3.
s. Perform an engine run-up and make final adjustments on the engine controls.

12-23. FLEXIBLE FLUID HOSES.

12-24. PRESSURE TEST. Refer to Section 2 for pressure test intervals. Perform pressure test as follows:
a. Place mixture control in the idle cut-off position.
b. Operate the auxiliary fuel pump in the high position.
c. Examine the exterior of hoses for evidence of leakage or wetness.
d. Hoses found leaking should be replaced.
e. After pressure testing fuel hoses, allow sufficient time for excess fuel to drain overboard from the engine manifold before attempting an engine start.
f. Refer to paragraph 12-20 for detailed inspection procedures for flexible hoses.

12-25. REPLACEMENT.
a. Hoses should not be twisted on installation. Pressure applied to a twisted hose may cause failure or loosening of the nut.
b. Provide as large a bend radius as possible.
c. Hoses should have a minimum of one-half inch clearance from other lines, ducts, hoses or surrounding objects or be butterfly clamped to them.
d. Rubber hoses will take a permanent set during extended use in service. Straightening a hose with a bend having a permanent set will result in hose cracking. Care should be taken during removal so that hose is not bent excessively, and during reinstallation to assure hose is returned to its original position.
e. Refer to AC 43.13, Chapter 10, for additional installation procedures for flexible fluid hose assemblies.

12-26. ENGINE BAFFLES.

12-27. DESCRIPTION. The sheet metal baffles installed on the engine direct the flow of air around the cylinders and other engine components to provide optimum cooling. These baffles incorporate rubber-asbestos composition seals at points of contact with the engine cowling and other engine components to help confine and direct the airflow to the desired area. It is very important to engine cooling that the baffles and seals are in good condition and installed correctly.

The vertical seals must fold forward and the side seals must fold upwards. Removal and installation of the various baffle segments is possible with the cowling removed. Be sure that any new baffles seal properly. On non-airconditioned aircraft P21000386 thru P21000590 the backbone baffle assembly is removed. The baffle mounting bolts must be torqued to 180 - 210 inch lbs. Beginning with P21000761 the backbone seal is not incorporated.

12-28. CLEANING AND INSPECTION. The engine baffles should be cleaned with a suitable solvent to remove oil and dirt.

NOTE

The rubber-asbestos seals are oil and grease resistant but should not be soaked in solvent for long periods.

Inspect baffles for cracks in the metal and for loose and/or torn seals. Repair or replace any defective parts.

12-29. REMOVAL AND INSTALLATION. Removal and installation of the various baffle segments is possible with the cowling removed. Be sure that any replaced baffles and seals are installed correctly and that they seal to direct the airflow in the correct direction. Various lines, hoses, wires and controls installed. Other repairs may be made as long as strength and cooling requirements are met. Replace sealing strips if they do not seal properly. are routed through some baffles. Make sure that these parts are reinstalled correctly after installation of baffles.

12-30. REPAIR. Repair of an individual segment of engine baffle is generally impractical, since, due to the small size and formed shape of the part, replacement is usually more economical. However, small cracks may be stop-drilled and a reinforcing doubler

12-31. ENGINE OIL SYSTEM.

12-32. DESCRIPTION. The engine lubrication system is a full - pressure, wet - sump type. Refer to applicable engine manufacturer's overhaul manual for specific details and descriptions.

SHOP NOTES:

Figure 12-3 deleted

12-33. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
NO OIL PRESSURE.	No oil in sump.	Check with dipstick. Fill sump with proper grade and quantity of oil. Refer to Section 2.
	Oil pressure line broken, disconnected or pinched.	Inspect pressure lines. Replace or connect lines as required.
	Oil pump defective.	Remove and inspect. Examine engine. Metal particles from damaged pump may have entered engine oil passages.
	Defective oil pressure gage.	Check with a known good gage. If second reading is normal, replace gage.
	Oil congealed in gage line.	Disconnect line at engine and gage; flush with kerosene. Pre-fill with kerosene and install.
	Relief valve defective.	Remove and check for dirty or defective parts. Clean and install; replace valve if defective.
LOW OIL PRESSURE.	Low oil supply.	Check with dipstick. Fill sump with proper grade and quantity of oil. Refer to Section 2.
	Low viscosity oil.	Drain sump and refill with proper grade and quantity of oil.
	Oil pressure relief valve spring weak or broken.	Remove and inspect spring. Replace weak or broken spring.
	Defective oil pump.	Check oil temperature and oil level. If temperature is higher than normal and oil level is correct, internal failure is evident. Remove and inspect. Examine engine. Metal particles from damaged pump may have entered oil passages.
	Secondary result of high oil temperature.	Observe oil temperature gage for high indication. Determine and correct reason for high oil temperature.
	Dirty oil screens.	Remove and clean oil screens.

12-33. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
HIGH OIL PRESSURE.	High viscosity oil.	Drain sump and refill with proper grade and quantity of oil.
	Relief valve defective.	Remove and check for dirty or defective parts. Clean and install; replace valve if defective.
	Defective oil pressure gage.	Check with a known good gage. If second reading is normal, replace gage.
LOW OIL TEMPERATURE.	Defective oil temperature gage or temperature bulb.	Check with a known good gage. If second reading is normal, replace gage. If reading is similar, the temperature bulb is defective.
	Oil cooler thermostatic bypass valve defective or stuck.	Remove valve and check for proper operation. Replace valve if defective.
HIGH OIL TEMPERATURE.	Oil cooler air passages clogged.	Inspect cooler core. Clean air passages.
	Oil cooler oil passages clogged.	Attempt to drain cooler. Inspect for sediment. Remove cooler and flush thoroughly.
	Thermostatic bypass valve damaged or held open by solid matter.	Feel front of cooler core with hand. If core is cold, oil is bypassing cooler. Remove and clean valve and seat. If still inoperative, replace.
	Low oil supply.	Check with dipstick. Fill sump with proper grade and quantity of oil. Refer to Section 2.
	Oil viscosity too high.	Drain sump and refill with proper grade and quantity of oil.
	Prolonged high speed operation on the ground.	Hold ground running above 1500 RPM to a minimum.
	Defective oil temperature gage.	Check with a known good gage. If second reading is normal. Replace gage.
	Defective oil temperature bulb.	Check for correct oil pressure, oil level and cylinder head temperature. If they are correct, check oil temperature gage for being defective; if similar reading is observed, bulb is defective. Replace bulb.

12-33. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
HIGH OIL TEMPERATURE (Cont.)	Secondary effect of low oil pressure.	Observe oil pressure gage for low indication. Determine and correct reason for low oil pressure.
	Oil congealed in cooler.	This condition can occur only in extremely cold temperatures. If congealing is suspected, use an external heater or a heated hangar to warm the congealed oil.
OIL LEAK AT FRONT OF ENGINE.	Damaged crankshaft seal.	Replace.
OIL LEAK AT PUSH ROD HOUSING.	Damaged push rod housing oil seal.	Replace.

12-34. FULL-FLOW OIL FILTER.

12-35. DESCRIPTION. An external oil filter is installed on the engine. Beginning with the 1980 models, a spin-on filter is used, previous models used a replacement filter element and filter can. The filter adapter incorporates a bypass valve. The 1980 models have the bypass valve in the spin-on oil filters.

12-36. REMOVAL AND INSTALLATION (Filter Element) (See figure 12-4).

NOTE

Filter element replacement kits and spin-on filters are available from the Cessna Service Parts Center.

a. Remove engine cowling in accordance with paragraph 12-3.
b. Remove both safety wires from filter can and unscrew hollow stud (1) to detach filter assembly from adapter (11) as a unit. Remove filter assembly from aircraft and discard gasket (9). Oil will drain from filter as assembly is removed from adapter.
c. Press downward on hollow stud (1) to remove from filter element (5) and can (4). Discard metal gasket (2) on stud (1).
d. Lift lid (7) off filter can (4) and discard lower gasket (6).
e. Pull filter element (5) out of filter can (4).

NOTE

Before discarding removed filter element (5), remove the outer perforated paper cover; using a sharp knife, cut through the folds of the filter element at both ends. Then, carefully unfold the pleated element and examine the material trapped in the element for evidence of internal engine damage, such as chips or particles from bearings. In new or newly overhauled engines, some small particles or metallic shavings might be found, these are generally of no consequence and should not be confused with particles produced by impacting, abrasion or pressure. Evidence of internal damage found in the oil filter element justifies further examination to determine the cause.

f. Wash lid (7), hollow stud (1) and filter can (4) in solvent and dry with compressed air.

NOTES

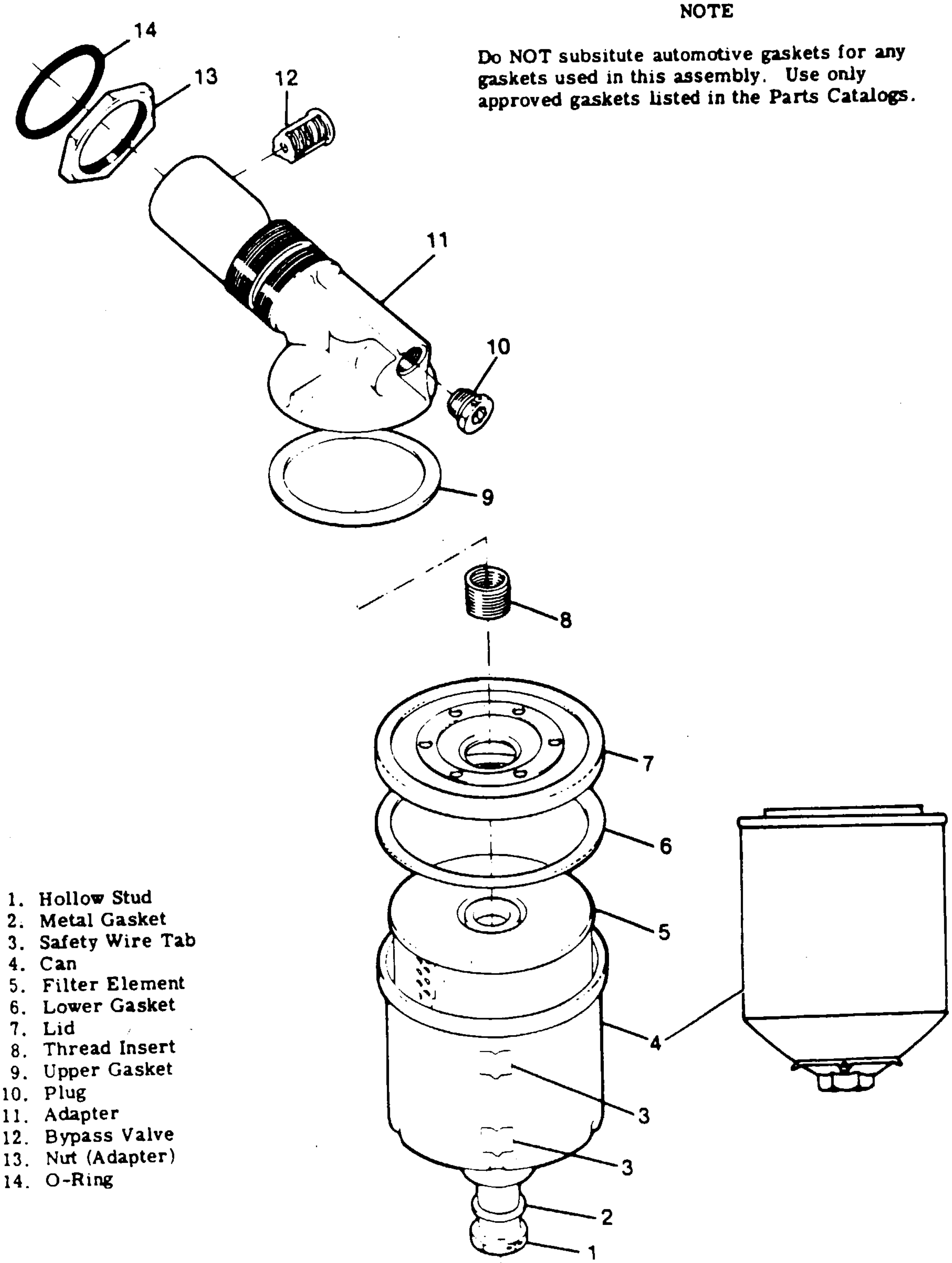
When installing a new filter element (5), it is important that all gaskets are clean, lubricated and positioned properly, and that the correct amount of torque is applied to the hollow stud (1). If the stud is under-torqued, oil leakage will occur. If the stud is over-torqued, the filter can might possibly be deformed, again causing oil leakage.

Lubricate all rubber gromments in the new filter element, lid gaskets and metal gasket with clean engine oil or general purpose grease before installation. Dry gaskets may cause false torque readings, again resulting in oil leaks.

Before assembly, place a straight edge across the bottom of the filter can. Check for distortion or out-of-flat condition greater than 0.010 inch. Install a new filter can if either of these conditions exist.

NOTE

Do NOT subsitute automotive gaskets for any gaskets used in this assembly. Use only approved gaskets listed in the Parts Catalogs.



1. Hollow Stud
2. Metal Gasket
3. Safety Wire Tab
4. Can
5. Filter Element
6. Lower Gasket
7. Lid
8. Thread Insert
9. Upper Gasket
10. Plug
11. Adapter
12. Bypass Valve
13. Nut (Adapter)
14. O-Ring

Figure 12-4. Full-Flow Oil Filter

After installing a new gasket on the lid, turn lid over. If gasket falls off, try a different gasket and repeat test. If this gasket falls off, install a new lid.

g. Inspect the adapter gasket seat for gouges, deep scratches, wrench marks and mutilation. If any of these conditions are found, install a new adapter.

h. Place a new filter element (5) in can (4) and insert the hollow stud (1) with a new metal gasket (2) in place, through the filter can and element.

i. Position a new gasket (6) inside flange of lid (7) and place lid in position on filter can.

j. With a new gasket (9) on face of lid, install filter can assembly on adapter (11). While holding filter can to prevent turning, tighten hollow stud (1) and torque to 20-25 lb-ft (240-300 lb-in), using a torque wrench.

k. Install all parts removed for access and service the engine with the proper grade and quantity of engine oil. One additional quart of oil is required each time the filter element is changed.

l. Start engine and check for proper oil pressure. Check for oil leakage after warming up the engine.

m. Again check for oil leakage after engine has been run at high power setting.

n. Check to make sure filter can has not been making contact with any adjacent parts due to engine torque.

o. While engine is still warm, recheck torque on hollow stud (1) then safety stud to lower tab (3) on filter can and safety adapter (11) to upper tab on filter can.

12-36A. REMOVAL AND INSTALLATION (Spin-On Filter) (See figure 12-4).

a. Remove engine cowling in accordance with paragraph 12-3.

b. Remove safety wire from spin-on filter.

c. Unscrew spin-on filter from adapter.

NOTE

Before discarding filter, cut the filter can open, remove the filter element and cut through the filter at both ends. Then, carefully unfold the pleated element and examine the material trapped in the element for evidence of internal engine damage, such as chips or particles from bearings. In new or newly overhauled engines, some small particles or metallic shavings might be found, these are generally of no consequence and should not be confused with particles produced by impacting, abrasion or pressure. Evidence of internal damage found in the oil filter element justifies further examination to determin the cause.

d. Before installing the new spin-on filter the gasket should be lightly lubricated with engine oil or Dow Corning Compound (DC-4).

e. Torque oil filter to 18-20 ft-lbs and safety.

f. Start engine and check for proper oil pressure. Check for oil leakage after warming up the engine.

g. Again check for oil leakage after engine has been run at high power setting (preferably a flight around the field).

h. Check to make sure the filter can has not been making contact with any adjacent parts due to engine torque.

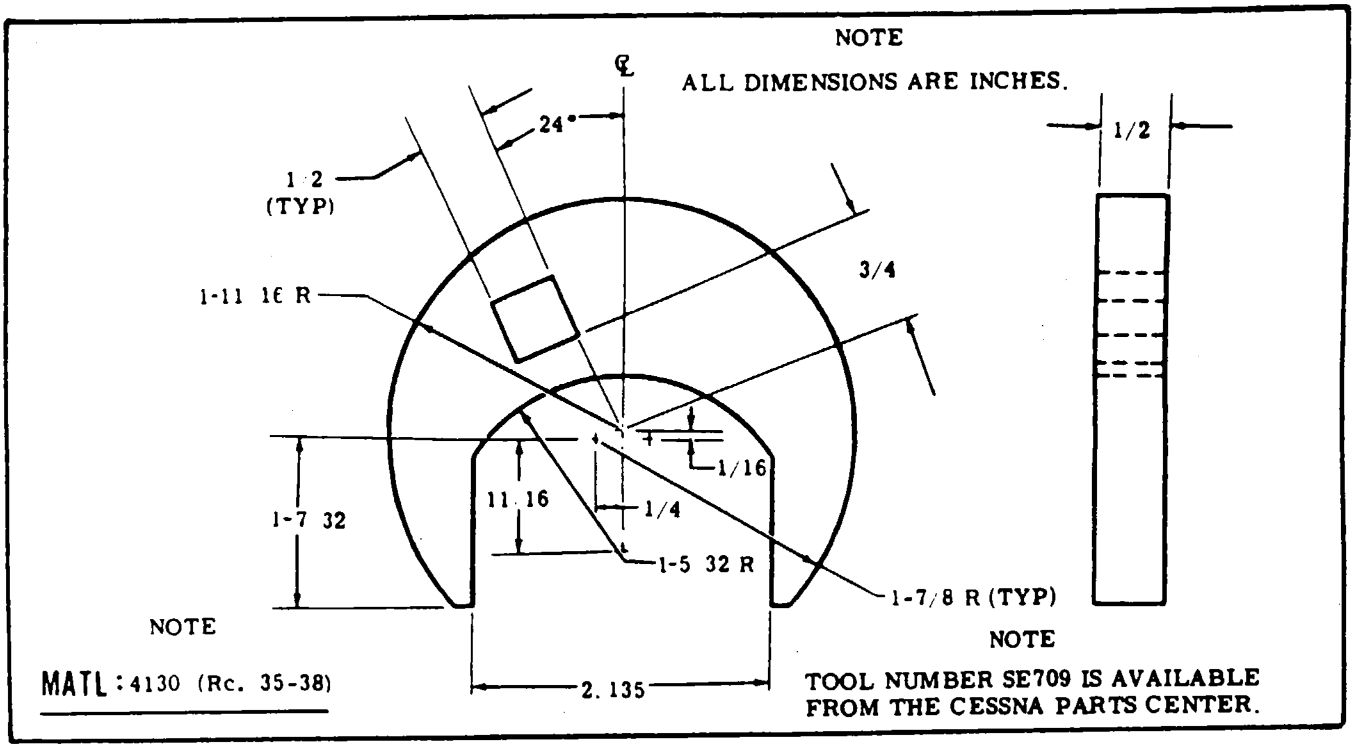


Figure 12-5. Oil Filter Adapter Wrench Fabrication

12-37. FILTER ADAPTER.

12-38. REMOVAL. (Refer to figure 12-4.)

a. Remove filter assembly in accordance with paragraph 12-36.

NOTE

A special wrench adapter for adapter nut (14) (Part No. SE-709) is available from the Cessna Service Parts Center, or one may be fabricated as shown in figure 12-5. Remove any engine accessory that interferes with removal of the adapter.

b. Note angular position of adapter (11), then remove safety wire and loosen adapter nut (14).

c. Unscrew adapter and remove from engine. Discard adapter O-ring (15).

12-39. DISASSEMBLY, INSPECTION AND REASSEMBLY. Figure 12-4 shows the relative position of the internal parts of the filter adapter and may be used as a guide during installation of parts. The bypass valve is to be installed as a complete unit, with the valve being staked three places. The heli-coil type insert (8) in the adapter may be replaced, although special tools are required. Follow instructions of the tool manufacturer for their use. Inspect threads on adapter and in engine for damage. Clean adapter in solvent and dry with compressed air. Ascertain that all passages in the adapter are open and free of foreign material. Also, check that bypass valve is seated properly.

12-40. INSTALLATION.

a. Assemble adapter nut (14) and new O-ring (15) on adapter (11) in sequence illustrated in figure 12-4.

b. Lubricate O-ring on adapter with clean engine oil. Tighten adapter nut until O-ring is centered in its groove on the adapter.

c. Apply anti-seize compound sparingly to the adapter threads, then simultaneously screw adapter and adapter nut into engine until O-ring seats against engine boss without turning adapter nut (14). Rotate adapter to approximate angular position noted during removal. Do not tighten adapter nut at this time.

d. Temporarily install filter assembly on adapter, and position so adequate clearance with adjacent parts is attained. Maintaining this position of the adapter, tighten adapter nut to 50-60 lb-ft (600-720 lb-in.) and safety. Use a torque wrench, extension and adapter as necessary when tightening adapter nut.

e. Using new gaskets, install filter assembly as outlined in paragraph 12-36. Be sure to service the engine oil system.

12-41. OIL COOLER.

12-42. DESCRIPTION. Thru the 1979 Models the aircraft is equipped woth a non-congealing oil cooler. Beginning with the 1980 Models a remote oil cooler is used. Ram air passes through the oil cooler and is discharged into the engine compartment.

12-43. ENGINE FUEL SYSTEM. Refer to figure 12-6.

12-44. DESCRIPTION. The fuel injection system is a low pressure system of injecting fuel into the intake port of each cylinder. It is a multi-nozzle continuous flow type which controls fuel flow to match engine airflow. Any change in throttle position, engine speed, or a combination of both, causes changes in fuel flow in the correct relation to engine airflow. A manual mixture control and a fuel flow indicator are provided for leaning. The fuel flow indicator is calibrated in pounds per hour. The continuous-flow system uses a typical rotary vane fuel pump. There are no running parts in this system except for the engine driven fuel pump. The four major components of the system are:the fuel injection pump, fuel-air control unit, fuel manifold valve and fuel discharge nozzles. The fuel injection pump incorporates an adjustable aneroid sensing unit which is pressurized from the discharge side of the turbocharger compressor. Turbocharger discharge air pressure is also used to vent the fuel discharge nozzles and the vent port of the fuel flow gage.

NOTE

Throughout the aircraft fuel system, from the fuel bays to the engine-driven fuel pump, use NS-40 (RAS-4, Snap-On Tools Corp., Kenosha, Wisconsin), MIL-T-5544 (Thread Compound, Antiseize, Graphite-Petrolatum) or equivalent, as a thread lubricant or to seal a leaking connection. Apply sparingly to male fittings only, omitting the first two threads. Always ensure that a compound, the residue from a previously used compound or any other foreign material cannot enter the system. Throughout the fuel injection system, from the engine-driven fuel pump through the discharge nozzles, use only a fuel soluble lubricant, such as engine lubricating oil, on the fitting threads. Do not use any other form of thread compound on the injection system fittings.

12-45. FUEL-AIR CONTROL UNIT.

12-46. DESCRIPTION. This unit occupies the position ordinarily used for a carburetor, at the intake manifold inlet. The function of this unit is to control engine air intake and to set the metered fuel pressure for proper fuel-air ratio. There are three control elements in this unit, one for air and two for fuel. One of the fuel control elements is for fuel mixture and the other is for fuel metering. Fuel enters the control unit through a strainer and passes to the metering valve. The position of the metering valve controls this fuel passed to the manifold valve and nozzles. A linkage connecting the metering valve to the air throttle proportions airflow to fuel flow. The position of the mixture valve determines the amount of fuel returned to the fuel pump. The fuel control portion of the fuel-air control unit is enclosed in a shroud and is blast-air cooled to help prevent vapor lock.

12-47. REMOVAL.

a. Place all cabin switches and fuel selector or fuel ON-OFF valve in the OFF position.

b. Remove cowling in accordance with paragraph 12-3.

c. Loosen clamp and disconnect flexible duct from elbow at top of air throttle.

d. Tag and disconnect electrical wires from electric fuel pump microswitch.

e. Disconnect throttle and mixture control rod ends at fuel-air control unit.

NOTE

Cap or plug all disconnected hoses, lines and fittings.

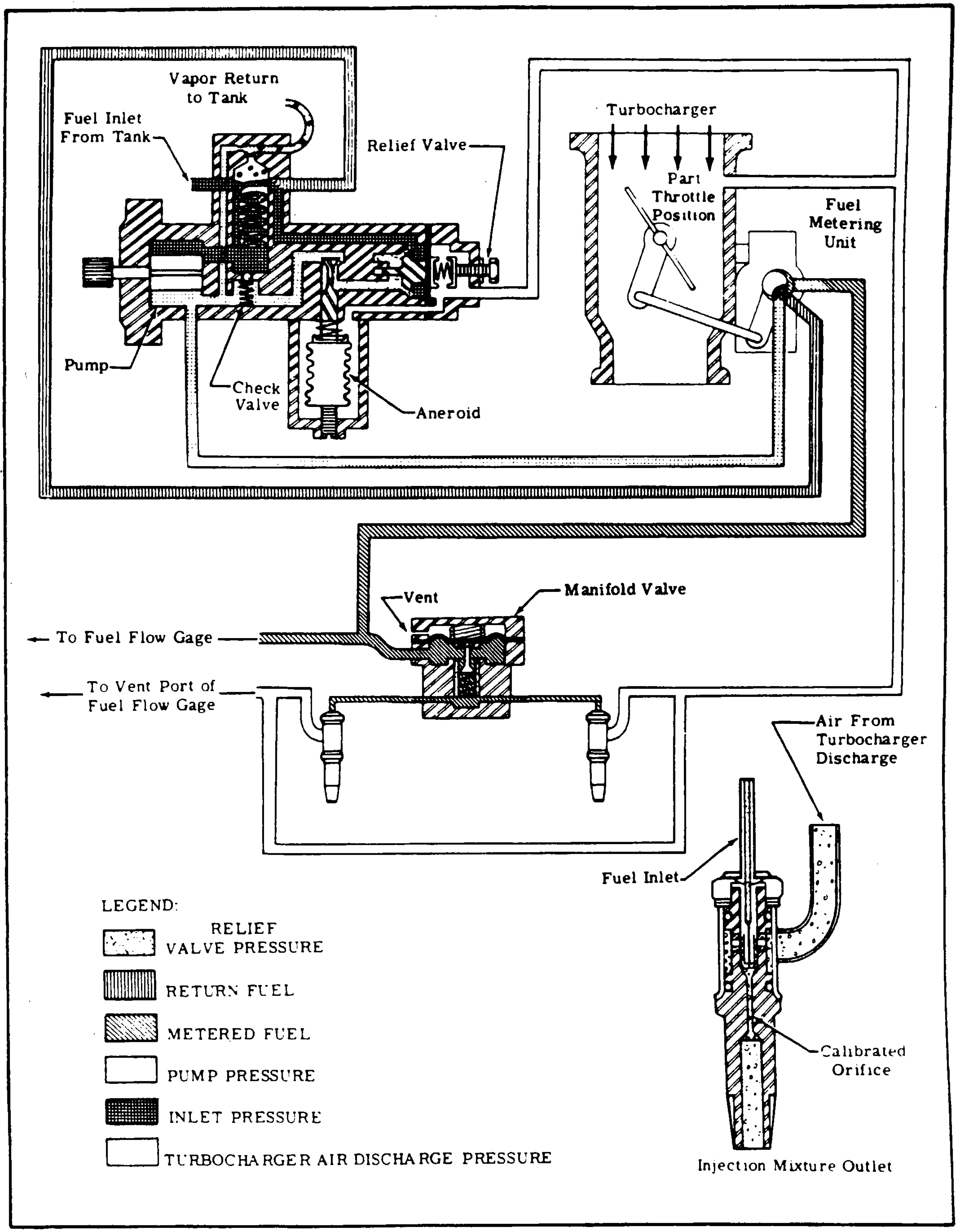


Figure 12-6. Fuel System Schematic

f. Disconnect cooling air blast tube from fuel control valve shroud.
g. Disconnect and tag all fuel lines at the fuel control valve.
h. Remove nuts and washers securing triangular brace to fuel-air control unit and engine, at lower end of control unit. Remove brace.
i. Remove bolt attaching fuel-air control unit to brace at top of control unit.
j. Loosen hose clamps which secure fuel-air control unit to right and left intake manifold assemblies and slip hoses from fuel-air control unit.
k. Remove fuel-air control unit.

12-48. CLEANING AND INSPECTION.
a. Check control connections, levers and linkage for security, safetying and for lost motion due to wear.
b. Remove the fuel screen assembly and clean in solvent (Stoddard or equivalent). Reinstall and safety.
c. Check the air control body for cracks and control unit for overall condition.

12-49. INSTALLATION.
a. Place control unit in position at rear of engine.
b. Install bolt attaching control unit to brace at top of unit. Ascertain that shock-mount is in place and in good condition.
c. Install triangular brace at lower end of control unit.
d. Install hoses and clamps which secure control unit to right and left intake manifold assemblies. Tighten hose clamps.
e. Connect fuel lines to unit and connect air blast tube at fuel control shroud.
f. Connect throttle and mixture control rod ends to control unit.
g. Connect electrical wiring to throttle-operated microswitch. Check switch rigging in accordance with Section 13.
h. Install induction air duct to elbow at top of control unit.
i. Inspect installation and install cowling.

12-50. ADJUSTMENTS. (Refer to figure 12-7.) The idle speed adjustment is a conventional spring-loaded screw located in the air throttle lever. The idle mixture adjustment is the locknut at the metering valve end of the linkage. Tightening the nut to shorten the linkage provides a richer mixture. A leaner mixture is obtained by backing off the nut to lengthen the linkage. Idle speed and mixture adjustment should be accomplished after the engine has been warmed up. Since idle rpm may be affected by idle mixture adjustment, it may be necessary to readjust idle rpm after setting the idle mixture correctly.
a. Set the throttle stop screw to obtain 600 ± 25 rpm, with throttle control pulled full out against idle stop.

NOTE

Engine idle speed may vary among different engines. An engine should idle smoothly, without excessive vibration and the idle speed should be high enough to maintain idling oil pressure and to preclude any possibility of engine stoppage in flight when the throttle is closed.

b. Advance throttle to increase engine speed to 1000 rpm.
c. Pull mixture control knob slowly and steadily toward the idle cut-off position, observing tachometer, then return control full IN (RICH) position before engine stops.
d. Adjust mixture adjusting nut to obtain a slight and momentary gain of 25 to 50 rpm at 1000 rpm engine speed as mixture control is moved from full IN (RICH) toward idle cut-off position. Return control to full IN (RICH) to prevent engine stoppage.
e. If mixture is set too LEAN, engine speed will drop immediately, thus requiring a richer mixture. Tighten adjusting nut (clockwise) for a richer mixture.
f. If mixture is set too RICH, engine speed will increase above 50 rpm, thus requiring a leaner mixture. Back off adjusting nut (counterclockwise) for a leaner mixture.

NOTE

After each adjustment to the idle mixture, run engine up to approximately 2000 rpm to clear engine of excess fuel to obtain a correct idle speed.

12-51. FUEL MANIFOLD VALVE (FUEL DISTRIBUTOR).

12-52. DESCRIPTION. Metered fuel flows to the fuel manifold valve, which provides a central point for distributing fuel to the individual cylinders. An internal diaphragm, operated by fuel pressure, raises or lowers a plunger to open and close the individual cylinder supply ports simultaneously. A needle valve in the plunger ensures that the plunger fully opens the outlet ports before fuel flow starts and closes the ports simultaneously for positive engine shut-down. A fine-mesh screen is included in the fuel manifold valve.

NOTE

The fuel manifold valves are supplied in two flow ranges. When replacing a valve assembly, be sure the replacement valve has the same suffix letter as the one stamped on the cover of the valve removed.

12-53. REMOVAL.

NOTE

Cap all disconnected lines, hoses and fittings.

a. Disconnect all fuel and fuel injection lines at the fuel manifold.
b. Remove bolts which secure fuel manifold and remove manifold.

12-54. CLEANING.
a. Remove manifold valve from engine in accordance with paragraph 12-53 and remove safety wire from cover attaching screws.

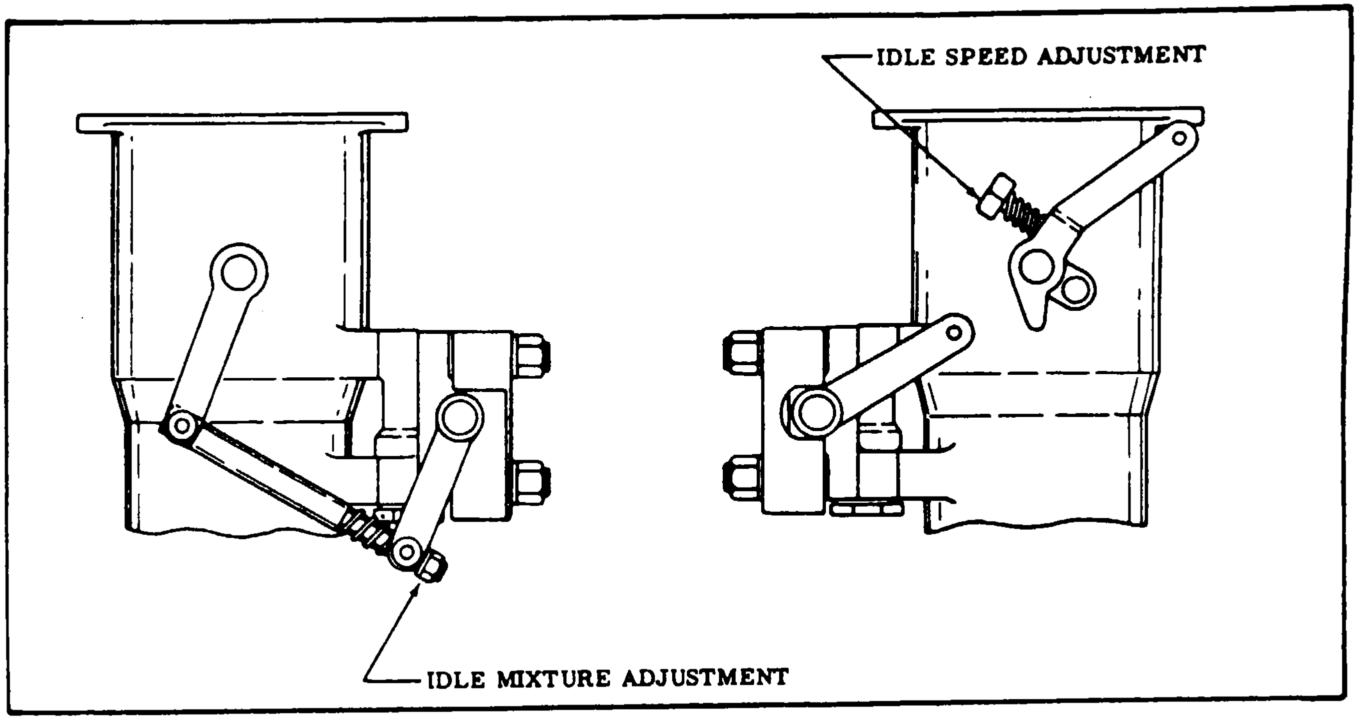


Figure 12-7. Idle Speed and Idle Mixture Adjustment

b. Hold the top cover down against internal spring until all four cover attaching screws have been removed, then gently lift off the cover. Use care not to damage the spring-loaded diaphragm below cover.
c. Remove the upper spring and lift the diaphragm assembly straight up.

NOTE

If the valve attached to the diaphragm is stuck in the bore of the body, grasp the center nut, rotate and lift at the same time to work gently out of the body.

CAUTION

Do not attempt to remove needle or spring from inside plunger valve. Removal of these items will disturb the calibration of the valve.

d. Using clean gasoline, flush out the chamber below the screen.
e. Flush above the screen and inside the center bore making sure that outlet passages are open. Use only a gentle stream of compressed air to remove dust and dirt and to dry.

CAUTION

The filter screen is a tight fit in the body and may be damaged if removal is attempted. It should be removed only if a new screen is to be installed.

f. Clean diaphragm, valve and top cover in the same manner. Be sure the vent hole in the top cover is open and clean.
g. Carefully replace diaphragm and valve. Check that valve works freely in body bore.
h. Position diaphragm so that horizontal hole in plunger valve is 90 degrees from the fuel inlet port in the valve body.
i. Place upper spring in position on diaphragm.
j. Place cover in position so that vent hole in cover is 90 degrees from inlet port in valve body. Install cover attaching screws and tighten to 20±1 lb-in. Install safety wire on cover screws.
k. Install fuel manifold valve assembly on engine in accordance with paragraph 12-55 and reconnect all lines and hoses to valve.
l. Inspect installation and install cowling.

12-55. INSTALLATION.
a. Secure the fuel manifold to the crankcase with the two crankcase bolts.
b. Connect the fuel lines and the six fuel injection lines. Inspect completed installation and install cowling.

12-56. FUEL DISCHARGE NOZZLES.

12-57. DESCRIPTION. From the fuel manifold valve, individual, identical size and length fuel lines carry metered fuel to the fuel discharge nozzles located in the cylinder heads. The outlet of each nozzle is directed into the intake port of each cylinder. An air bleed and nozzle pressurization arrangement is incorporated in each nozzle to aid in vaporization of the fuel. The nozzles are calibrated in several ranges. All nozzles furnished for one engine are of the same calibrated range and are identified by a number and suffix letter stamped on the flat portion of the nozzle body. When replacing a fuel discharge nozzle, be sure that it is of the same calibrated range as the rest of the nozzles in that engine. When a complete set of nozzles is being replaced, the number must be the same as the one removed but the suffix letter may be different, as long as they are the same for all nozzles being installed in a particular engine.

12-58. REMOVAL.

a. Remove engine cowling in accordance with paragraph 12-3.

NOTE

Plug or cap all disconnected lines and fittings.

b. Disconnect nozzle pressurization line at nozzles and disconnect pressurization line at "tee" fitting so that pressurization line may be moved away from discharge nozzles.
c. Disconnect fuel injection line at fuel discharge nozzle.
d. Using care to prevent damage or loss of washers and O-rings, lift sleeve assembly from fuel discharge nozzle.
e. Using a standard 1/2-inch deep socket, remove fuel discharge nozzle from cylinder.

12-59. CLEANING AND INSPECTION. To clean nozzles, immerse in clean solvent and use compressed air to dry them. When cleaning, direct air through the nozzle in the direction opposite of normal fuel flow. Do not remove the nozzle shield or distort it in any way. Do not use a wire or other metal object to clean the orifice or metering jet. After cleaning, check the shield height from the hex portion of the nozzle. The bottom of the shield should be approximately 1/16 inch above the hex portion of the nozzle.

12-60. INSTALLATION.

a. Using a standard 1/2-inch deep socket, install nozzle body in cylinder and tighten to a torque value of 60-80 lb-in.
b. Install O-rings, sleeve assembly and washers.
c. Align sleeve assembly and connect pressurization line to nozzles. Connect pressurization line to "tee" fitting.
d. Install O-ring and washer at top of discharge nozzle and connect fuel injection line to nozzle.
e. Inspect installation for crimped lines and loose fittings.
f. Inspect nozzle pressurization vent system for leakage. A tight system is required, since turbocharger discharge pressure is applied to various other components of the injection system.
g. Install cowling.

12-61. FUEL INJECTION PUMP.

12-62. DESCRIPTION. The fuel pump is a positive displacement, rotating vane type. It has a splined shaft for connection to the accessory drive section of the engine. Fuel enters the pump at the swirl well of the pump vapor separator. Here, vapor is separated by a swirling motion so that only liquid fuel is fed to the pump. The vapor is drawn from the top center of the swirl well by a small pressure jet of fuel and is fed into the vapor return line where it is returned to the fuel tank. Since the pump is engine-driven, changes in engine speed affect total pump flow proportionally. A check valve allows the auxiliary fuel pump pressure to bypass the engine-driven pump for starting, or in the event of engine-driven fuel pump failure in flight. The pump supplies more fuel than is required by the engine; therefore, a relief valve is provided to maintain a constant fuel pump pressure. The engine-driven fuel pump is equipped with an aneroid. The aneroid and relief valve are pressurized from the discharge side of the turbocharger compressor to maintain a proper fuel/air ratio at altitude. The aneroid is adjustable for fuel pump outlet pressure at full throttle and the relief valve is adjustable for fuel pump outlet pressure at idle.

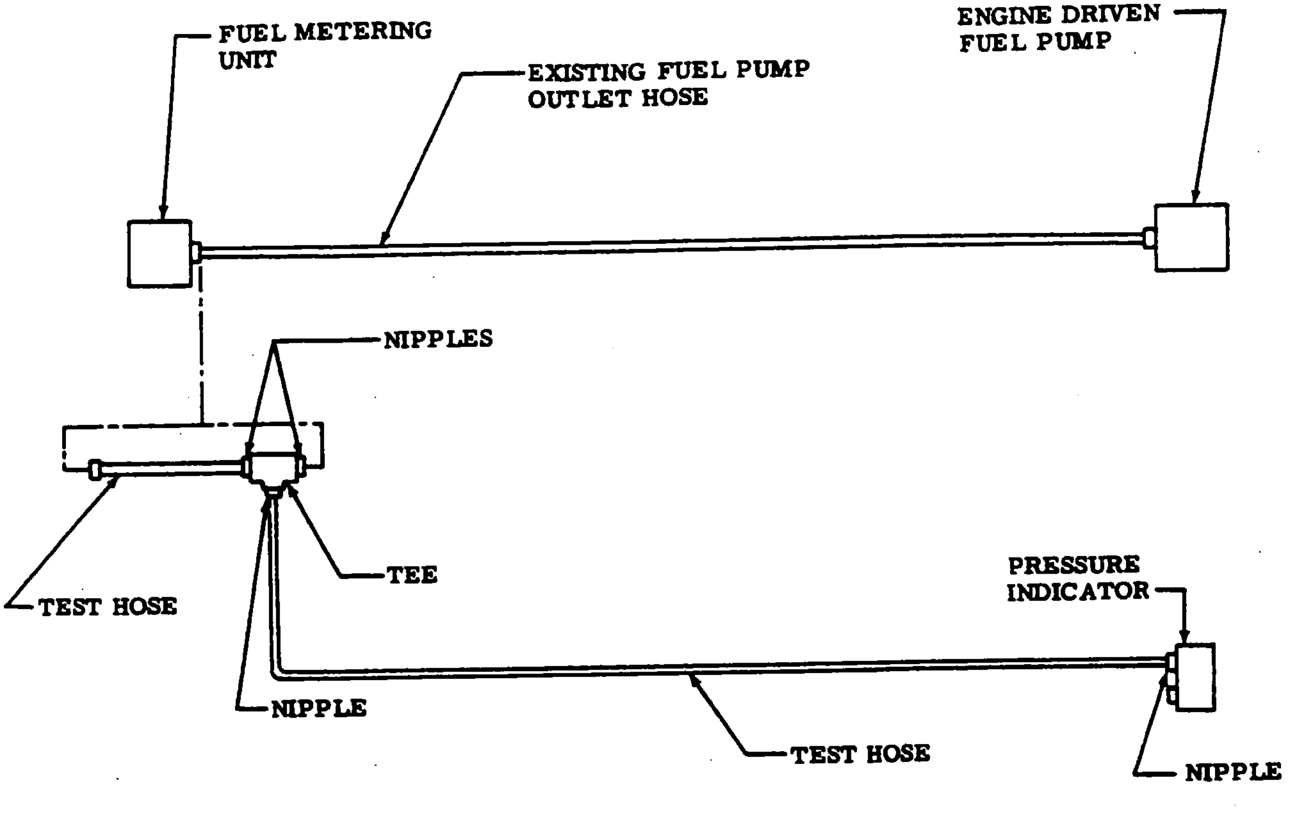
12-63. REMOVAL.

a. Place fuel selector valve handle in OFF position.
b. Remove engine cowling in accordance with paragraph 12-3.
c. Remove alternator and left rear intake elbow.
d. Hoist engine far enough to remove weight from engine mount and remove left rear engine mount leg, shock-mount and alternator bracket.
e. Remove flexible duct and shroud, removing fuel lines and fittings as necessary. Tag each fitting and line for identification and cap or seal to prevent entry of foreign material. Flanges of shroud may be straightened to facilitate removal and installation, but must be re-formed after installation. Note angular position of fittings before removal.
f. Remove nuts and washers attaching fuel pump to engine and pull pump aft to remove. Remove thin gasket.
g. Place temporary cover on pump mounting pad.

12-64. INSTALLATION.

a. Install and align any fittings removed after pump removal.
b. Using new thin gasket, install pump with aneroid chamber down.
c. Install cooling shroud and remainder of fittings, bending flanges of shroud to their original positions and aligning fittings as noted during removal.
d. Connect all fuel lines and shroud flexible duct.
e. Install alternator bracket, shock-mount and engine mount leg. Remove hoist, then adjust alternator drive belt tension. Refer to Section 17.
f. Install intake elbow.
g. Start engine and perform an operational check, adjusting fuel pump if required.
h. Install cowling.

12-65. ADJUSTMENT. (thru 1982 Models.) Adjustments of the fuel injection pump requires special



NOTE

WHEN ADJUSTING UNMETERED FUEL PRESSURE, TEST EQUIPMENT MAY BE "TEED" INTO THE ENGINE-DRIVEN FUEL PUMP OUTLET HOSE AT THE FUEL PUMP OR AT THE FUEL METERING UNIT.

Figure 12-8. Fuel Injection Pump Adjustment Test Harness

SHOP NOTES:

equipment and procedures. Adjustment to the pump aneroid applies only to the full throttle setting. Adjustment of the idle position is obtained through the relief valve. To adjust the pump to the pressures specified in paragraph 12-12, proceed as follows:

a. Remove engine cowling in accordance with paragraph 12-3.
b. Disconnect existing engine-driven fuel pump pressure hose at fuel metering unit and connect the test gage hose and fittings into fuel injection system as shown in figure 12-8. Test gage MUST be vented to atmosphere.

NOTE

Cessna Service Kit No. SK320-2K provides a test gage, line, and fittings for connecting the test gage into the system to perform accurate calibration of the engine driven fuel pump.

c. The test gage MUST be held as near to the level of the engine driven fuel pump as possible. Bleed air from test gage line prior to taking readings.

NOTE

The test gage should be checked for accuracy at least every 90 days or anytime an error is suspected. The tachometer accuracy should also be determined prior to making any adjustments to the pump.

d. Start engine and warm-up thoroughly. Set mixture control to full rich position and propeller control full forward (low pitch, high rpm).
e. Adjust engine idle speed to 600 rpm +25 to -25 rpm and check test gage for 5.5 to 6.5 PSI. Refer to figure 12-7 for idle mixture adjustment.

NOTE

DO NOT adjust idle mixture until idle pump pressure is obtained.

WARNING

DO NOT make fuel pump pressure adjustments while engine is operating.

f. If the pump pressure is not 5.5 to 6.5 PSI, stop engine and turn the pump relief valve adjustment, on the centerline of the fuel pump clockwise (CW) to increase pressure and counterclockwise (CCW) to decrease pressure.
h. Maintaining idle pump pressure and idle RPM, obtain correct idle mixture in accordance with paragraph 12-50.
i. Completion of the preceding steps have provided
1. Correct idle pump pressure.
2. Correct fuel flow.
3. Correct fuel metering cam to throttle plate orientation.

j. Advance to full throttle and maximum rated engine speed (propeller control full forward) with the mixture control in the full rich position and verify that maximum limit manifold pressure is indicated, Refer to paragraph 12-12. If manifold pressure is incorrect or static RPM is not at least 2650 RPM, refer to paragraph 12-16.
k. Check fuel flow gage for 186 PPH, +2 or -2 PPH. if fuel flow is incorrect, stop engine and adjust flow. This is accomplished by loosening the locknut and turning the adjusting screw located at the rear of the aneroid counterclockwise (CCW) to increase flow or clockwise (CW) to decrease flow, When fuel flow is correct, verify the unmetered pressure is within the limits specified in paragraph 12-12.

NOTE

If at static run-up, rated RPM (2700) cannot be achieved at full throttle, adjust pump flow slightly below limits (-1 PPH for each 10 RPM low). Verify that correct pressures are obtained when rated RPM is achieved during takeoff roll.

l. After correct pressures are obtained, tighten locknut.
m. Remove test equipment, run engine to check for leaks and install cowling..

12-65A. ADJUSTMENT. (Beginning with 1993 Models.) Adjustment of the fuel injection pump requires special equipment and procedures. Adjustment to the aneroid applies only to the full throttle setting. Adjustment of the idle position is obtained through the relief valve. To adjust the pump to the pressures specified in paragraph 12-12, proceed as follows:
a. Remove engine cowling in accordance with paragraph 12-3.
b. Disconnect the existing engine-driven fuel pump pressure hose at the fuel metering unit or fuel limiter unit and connect the test gage pressure hose and fittings into the fuel injection system as shown in figure 12A-3. Gage MUST be vented to atmosphere.

NOTE

Cessna Service Kit No. SK320-2K provides a test gage, line and fittings for connecting the test gage into the system to perform accurate calibration of the engine-driven fuel pump.

c. The test gage MUST be held as near to the level of the engine driven fuel pump as possible. Bleed air from test gage line prior to taking readings.

NOTE

The test gage should be checked for accuracy at least every 90 days or anytime an error is suspected. The tachometer accuracy should also be determined prior to making any adjustments to the pump.

d. Disconnect line from the return (center) port of fuel flow limiter, plug line and cap port.

CAUTION

Do not plug side port (inlet) of pressure limiter or limiter may be damaged during adjustment.

e. Start engine and warm-up thoroughly. Set mixture control to full rich position and propeller control full forward (low pitch, high rpm).
f. Adjust engine idle speed to 600 rpm, +25 or -25 rpm and check test gage for 5.5 to 6.5 PSI. Refer to figure 12-7 for idle mixture adjustment.

NOTE

Do not adjust idle mixture until idle pump pressure is obtained.

DO NOT make fuel pump pressure adjustments while engine is operating.

g. If the pump pressure is not 5.5 to 6.5 PSI, stop engine and turn the pump relief valve adjustment, on the centerline of the pump, clockwise (CW) to increase pressure and counterclockwise (CCW) to decrease pressure.
h. Maintaining idle pump pressure and idle RPM, obtain correct idle mixture in accordance with paragraph 12-50.
i. Completion of the preceding steps have provided:
1. Correct idle pump pressure.
2. Correct fuel flow.
3. Correct fuel metering cam to throttle plate orientation.

j. Advance to full throttle and maximum rated engine speed (propeller control full forward) with the mixture control in the full rich position and verify that maximum limit manifold pressure is indicated, Refer to paragraph 12-12. If manifold pressure is incorrect or static RPM is not at least 2650 RPM, refer to paragraph 12-16.
k. Retard the propeller control to obtain 2600 RPM, +25 or -25 RPM stabilized.
l. Check airplanes fuel flow gage for 186 PPH to 190 PPH. If fuel flow is correct, stop engine and adjust flow by loosening locknut and turning the adjusting screw, located at the aneroid, counterclockwise (CCW) to increase flow or clockwise (CW) to decrease flow. When flow is correct, verify the unmetered pressure is within the limits specified in paragraph 12-12.
m. After correct pressures are obtained, shut down engine and tighten locknut on fuel pump adjustment screw.
n. Remove cap/plug and, reconnect line to return (center) port of fuel flow limiter.
o. Start engine and advance to full throttle with mixture control full rich and the propeller control full forward. Check the airplanes fuel flow gage for 186PPH, +2 or -2 PPH. If flow is correct, shut down the engine and adjust fuel flow setscrew on fuel flow limiter clockwise (CW) to increase, counterclockwise (CCW) to decrease to obtain proper fuel flow.
p. Remove test equipment, run engine, check for leaks and install cowling.

12-66. INDUCTION AIR SYSTEM.

12-67. DESCRIPTION. Ram air to the engine enters an induction air duct thru a port in lower right cowl. The air is filtered through a dry filter, located in the induction airbox. From the filter, the air passes through a flexible duct to the inlet of the turbocharger compressor. The pressurized air is then routed through a duct to the fuel-air control unit mounted behind the engine and is then supplied to the cylinders through the intake manifold piping. The fuel-air control unit is connected to the cylinder intake manifold by elbows, hoses, and clamps. The intake manifold is attached to each cylinder by four bolts through a welded flange, which is sealed by a gasket. A balance tube passes around the front side of the engine to complete the manifold assembly. An alternate air door, mounted in the duct between the filter and the turbocharger compressor, is held closed by a spring. If the induction air filter should become clogged, suction from the turbocharger compressor will open the door permitting the compressor to draw ambient air through the louvered opening immediately aft of the main induction air scoop. The alternate air door should be checked periodically for freedom of operation and complete closing. The induction air filter should be removed and cleaned at each 50-hour inspection, more often when operating under dusty conditions, refer to Section 2.

12-68. AIR BOX. (Refer to figure 12-9.)

12-69. REMOVAL AND INSTALLATION.
a. Remove left hand upper cowl by releasing the quick-release fasteners attaching cowling to the fuselage and at the parting surfaces of the left and right segments.
b. Loosen clamp holding flex duct to turbocharger compressor, and disconnect flex duct.
c. Disconnect control rod from cowl flap.
d. Remove screws securing lower left cowl to fuselage and lower engine nacelle.
e. Remove lower left cowl and air box will come off as it is attached to the cowl.
f. Reverse the proceeding steps for installation.

12-70. CLEANING AND INSPECTION. Clean metal parts of the induction airbox with Stoddard solvent or equivalent. Inspect for cracks, dents, loose rivets, etc. Minor cracks may be stop-drilled. In case of continued or severe cracking, replace airbox. Inspect alternate spring-loaded door for freedom of operation and complete closing.

12-71. INDUCTION AIR FILTER. (Refer to figure 12-9.)

12-72. DESCRIPTION. An induction air filter, located in the center of the airbox removes dust particles from the ram air entering the engine.

12-73. REMOVAL AND INSTALLATION.
a. Remove right half of engine cowling in accordance with paragraph 12-3.
b. Remove the two nuts securing the filter retainer in place.
c. Remove filter retainer and remove filter.
d. Reverse the preceding steps for reinstallation.

12-74. CLEANING AND INSPECTION. Clean and inspect filter in accordance with Section 2.

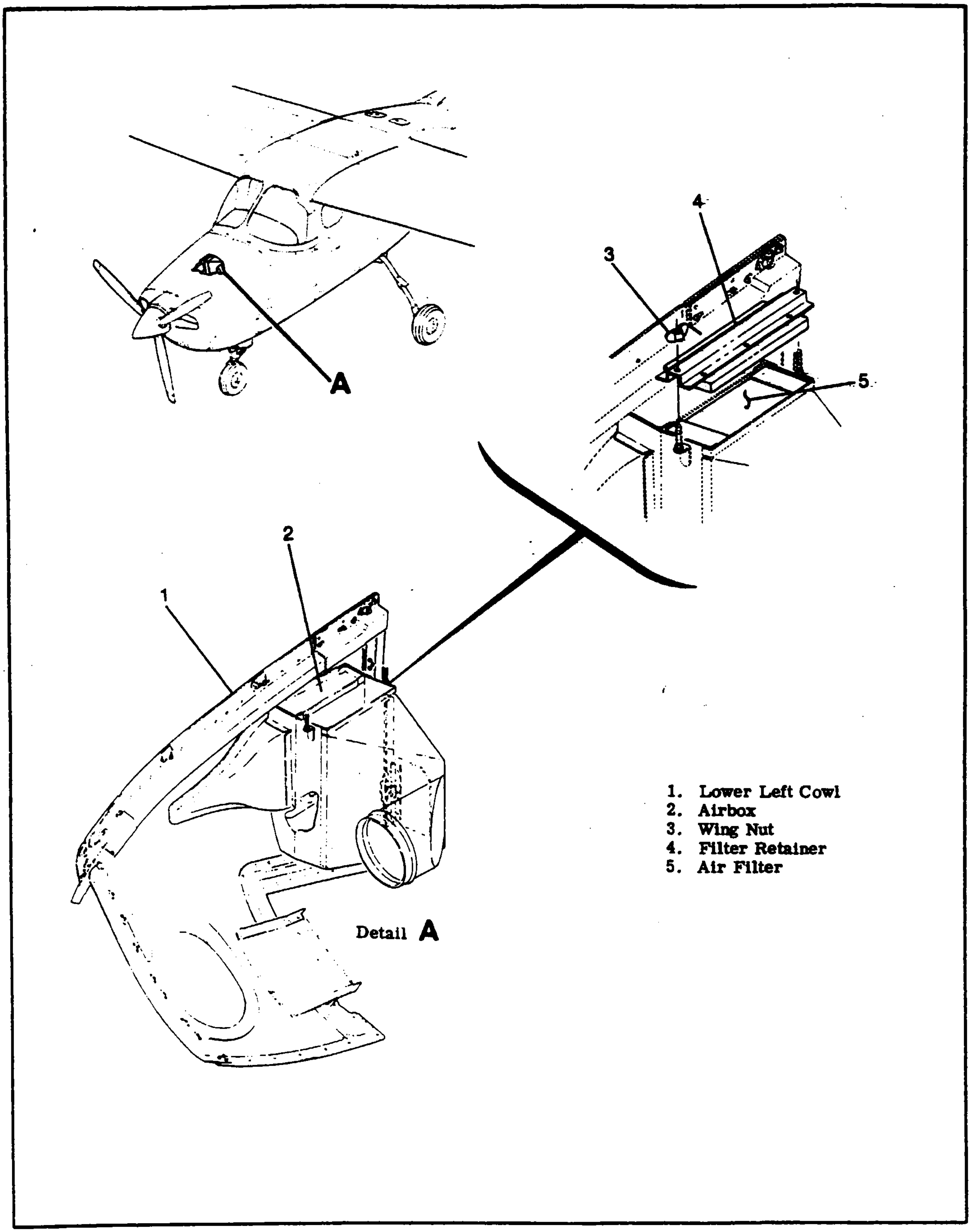


Figure 12-9. Airbox Installation

12-75. IGNITION SYSTEM. (Refer to Figure 12-10.)

12-76. DESCRIPTION. The ignition system is comprised of two magnetos, two spark plugs in each cylinder, an ignition wiring harness, an ignition switch mounted on the instrument panel and required wiring between the ignition switch and magnetos.

12-77. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE FAILS TO START.	Defective ignition switch.	Check switch continuity. Replace if defective.
	Spark plugs defective, improperly gapped or fouled by moisture or deposits.	Clean, regap and test plugs. Replace if defective.
	Defective ignition harness.	If no defects are found by a visual inspection, check with a harness tester. Replace defective parts.
	Magneto "P" lead grounded.	Check continuity. "P" lead should not be grounded in the ON position, but should be grounded in OFF position. Repair or replace "P" lead.
	Failure of impulse coupling.	Impulse coupling pawls should engage at cranking speeds. Listen for loud clicks as impulse couplings operate. Remove magnetos and determine cause. Replace defective magneto.
	Defective magneto.	Refer to paragraph 12-83.
	Broken drive gear.	Remove magneto and check magneto and engine gears. Replace defective parts. Make sure no pieces of damaged parts remain in engine or engine disassembly will be required.
ENGINE WILL NOT IDLE OR RUN PROPERLY.	Spark plugs defective, improperly gapped or fouled by moisture or deposits.	Clean, regap and test plugs. Replace if defective.
	Defective ignition harness.	If no defects are found by a visual inspection, check with a harness tester. Replace defective parts.
	Defective magneto.	Refer to paragraph 12-83.
	Impulse coupling pawls remain engaged.	Listen for loud clicks as impulse coupling operates. Remove magneto and determine cause. Replace defective magneto.
	Spark plugs loose.	Check and install properly.

Figure 12-10 deleted

12-78. MAGNETOS.

12-79. DESCRIPTION. The magnetos contain a conventional two-pole rotating magnet (rotor), mounted in ball bearings. Driven by the engine through an impulse coupling at one end, the rotor shaft operates the breaker points at the other end of the shaft. The nylon rotor gear drives a nylon distributor gear which transfers high tension current from the wedge-mounted coil to the proper outlet in the distributor block. A coaxial capacitor is mounted in the distributor block housing to serve as the condenser as well as a radio noise suppressor. Both nylon gears are provided with timing marks for clockwise or counterclockwise rotation. The distributor gear and distributor block have timing marks, visible through the air vent holes, for timing to the engine. A timing hole is provided in the bottom of the magneto adjacent to the magneto flange. A timing pin or 6-penny nail can be inserted through this timing hole into the mating hole in the rotor shaft to lock the magneto approximately in the proper firing position. The breaker assembly is accessible only after removing the screws fastening the magneto halves together and disconnecting the capacitor slip terminal. Do not separate magneto halves while it is installed on the engine.

12-79A. PRESSURIZED MAGNETOS (Beginning with 1983 Models). Pressurized air is taken from the throttle body adaptor assembly and directed by a hose, through a filter, to a tee and then to each magneto. The filter material is enclosed in a transparent case, with a flow arrow imprinted on it. The filter should be replaced when the filtering material is dirty.

12-80. REMOVAL.

a. Remove engine cowling in accordance with paragraph 12-3.

b. Tag for identification and remove high tension wires from the magneto being removed.

WARNING

The magneto is in a SWITCH ON condition when the switch wire is disconnected. Remove the high tension wires from magneto or disconnect spark plug leads from the spark plugs to prevent accidental firing.

c. Disconnect switch wire from condenser terminal at magneto. Tag wire for identification so it may be installed correctly.

d. Rotate propeller in direction of normal rotation until No. 1 cylinder is coming up on its compression stroke.

NOTE

To facilitate the installation of a replacement magneto, it is good practice to position the crankshaft at the advanced firing angle for No. 1 cylinder during step "d." Any standard timing device or method can be used, or if the magneto being removed is correctly timed to the engine, the crankshaft can be rotated to a position at which the breaker points will be just opening to fire No. 1 cylinder.

e. Remove magneto retainer clamps, nuts and washers and pull magneto from crankcase mounting pad.

NOTE

As the magneto is removed from its mounting, be sure that the drive coupling rubber bushing and retainer do not become dislodged from the gear hub and fall into the engine.

12-81. INTERNAL TIMING.

a. Whenever the gear on the rotor shaft or the cam (which also serves as the key for the gear) has been removed, be sure that the gear and cam are installed so the timing mark on the gear aligns with the "O" etched on the rotor shaft.

b. When replacing breaker assembly or adjusting contact breaker points, place a timing pin (or 0.093 inch 6-penny nail) through the timing hole in the bottom of the magneto next to the flange and into the mating hole in the rotor shaft. Adjusting contact breaker points so they are just starting to open in this position will give the correct point setting. Temporarily assemble the magneto halves and capacitor slip terminal and use a timing light to check that the timing marks, visibly through the ventilation plug holes are approximately aligned.

NOTE

The side of the magneto with the manufacturer's insignia has a red timing mark and the side opposite to the insignia has a black timing mark viewed through the vent plug holes. The distributor gear also has a red timing mark and a black timing mark. These marks are used for reference only when installing magneto on the engine. Do not place red and black lines together on the same side.

c. Whenever the large distributor gear and rotor gear have been disengaged, they must be engaged with their timing marks aligned for correct rotation.

Align the timing mark on the rotor gear with the "RH" on the distributor gear. Care must be taken to keep these two gears meshed in this position until the magneto halves are assembled.

12-82. INSTALLATION AND TIMING TO ENGINE. The magneto MUST be installed with its timing marks correctly aligned, with the number one cylinder on its compression stroke and with number one piston at its advanced firing position. Refer to paragraph 12-12 for the advanced firing position of number one piston.

WARNING

The magneto is grounded through the ignition switch, therefore, any time the switch (primary) wire is disconnected from the magneto, the magneto is in a switch ON or HOT condition. Before turning the propeller by hand, remove the high tension wires from the magneto or disconnect all spark plug leads to prevent accidental firing of the engine.

To locate the compression stroke of number one cylinder, remove the lower spark plugs from each cylinder except number one cylinder. Remove the top plug from number one cylinder. Place thumb of one hand over the number one cylinder spark plug hole and rotate the crankshaft in the direction of normal rotation until the compression stroke is indicated by positive pressure inside the cylinder lifting the thumb off the spark plug hole. After the compression stroke is obtained, locate number one piston at its advanced firing position. Locating the advanced firing position of number one cylinder may be obtained by use of a timing disc and pointer, Timrite, protractor and piston locating gage or external engine timing marks alignment.

NOTE

External engine timing marks are located on a bracket attached to the starter adapter, with a timing mark on the alternator drive pulley as the reference point.

In all cases, it must be definitely determined that the number one cylinder is at the correct firing position and on the compression stroke, when the crankshaft is turned in its normal direction of rotation. After the engine has been placed in the correct firing position, install and time the magneto to the engine in the following manner.

NOTE

Install the magneto drive coupling retainer and rubber bushings into the magneto drive gear hub slot. Insert the two rubber bushings into the retainer with the chamfered edges facing toward the front of the engine.

a. Turn the magneto shaft until the timing marks visible through the ventilation plug holes are aligned (red-to-red or black-to-black) and insert a timing pin (or 0.093 inch 6-penny nail) through the timing hole in the bottom of the magneto next to the flange and into the mating hole in the rotor shaft. This locks the magneto approximately in the firing position while installing on the engine.

NOTE

If the magneto drive gear was disengaged during magneto removal, hold the magneto in the horizontal position it will occupy when installed, make certain that the drive gear coupling slot is aligned with the magneto coupling lugs. If it is not aligned, pull the magneto drive gear out of mesh with its drive gear and rotate it to the aligned angle, then push it back into mesh. DO NOT WITHDRAW THE MAGNETO DRIVE GEAR FROM ITS OIL SEAL.

b. After magneto gasket is in place, position the magneto on the engine and secure, then remove the timing pin from the magneto. Be sure to remove this pin before turning the propeller.

c. Connect a timing light to the capacitor terminal at the front of the magneto and to a good ground.

d. Turn propeller back a few degrees (opposite of normal rotation) to close the contact points.

NOTE

Do not turn the propeller back far enough to engage the impulse coupling or the propeller will have to be turned in normal direction of rotation until the impulse coupling releases, then backed up to slightly before the firing position.

e. Slowly advance the propeller in the normal direction of rotation until the timing light indicates the contact points breaking. Magneto mounting clamps may be loosened so that the magneto may be shifted to break the points at the correct firing position.

f. Tighten magneto mounting nuts and recheck timing.

g. Repeat steps "a" through "f" for the other magneto.

h. After both magnetos have been timed, check synchronization of both magnetos. Magnetos must fire at the same time.

i. Remove timing devices from magneto and engine.

j. Connect spark plug leads to their correct magneto outlets.

NOTE

The No. 1 magneto outlet is the one closest to the ventilation plug on the side of the magneto having the manufacturer's insignia. The magneto fires at each successive outlet in clockwise direction. Connect No. 1 magneto outlet to No. 1 cylinder spark plug lead, No. 2 outlet to the next cylinder to fire, etc. Engine firing order is listed in paragraph 12-12.

k. Connect ignition switch (primary) leads to the capacitor terminals on the magnetos.
l. Inspect magneto installation and install engine cowling in accordance with paragraph 12-3.

12-83. MAINTENANCE. At the first 25-hour inspection and at each 100-hour inspection thereafter, the breaker compartment should be inspected. Magneto-to-engine timing should be checked at the first 25-hour inspection, first 50-hour inspection, first 100-hour inspection and thereafter at each 100-hour inspection. If timing is as specified in paragraph 12-12, internal timing need not be checked. If timing is out of tolerance, remove magneto and set internal timing, then install and time to the engine. In the event the magneto internal timing marks are off more than plus or minus five degrees when the breaker points open to fire number one cylinder, remove the magneto and check the magneto internal timing. Whenever the magneto halves are separated the breaker point assembly should always be checked. As long as internal timing and magneto-to-engine timing are within the preceding tolerances, it is recommended that the magneto be checked internally only at 500 hour intervals. It is normal for contact points to burn and the cam to wear a comparable amount so the magneto will remain in time within itself. This is accomplished by having a good area making contact on the surface between the points and the correct amount of spring pressure on the cam. The area on the points should be twenty-five percent of the area making contact. The spring pressure at the cam should be 10.5 to 12.5 ounces. When the contact points burn, the area becomes irregular, which is not detrimental to the operation of the points unless metal transfer is too great which will cause the engine to misfire. Figure 12-11 illustrates good and bad contact points. A small dent will appear on the nylon insulator between the cam follower and the breaker bar. This is normal and does not require replacement.

NOTE

If ignition trouble should develop, spark plugs and ignition wiring should be checked first. If the trouble definitely is associated with a magneto, use the following to help disclose the source of trouble without overhauling the magneto.

a. Moisture Check.
1. Remove magneto from engine and remove screws securing the magneto halves together, disconnect capacitor slip terminal and remove distributor. Inspect for moisture.
2. Check distributor gear finger and carbon brush for moisture.
3. Check breaker point assembly for moisture, especially on the surfaces of the breaker points.
4. If any moisture is evident in the preceding places, wipe with a soft, dry, clean, lint-free cloth.

b. Breaker Compartment Check.
1. Check all parts of the breaker point assembly for security.
2. Check breaker point surface for evidence of excessive wear, burning, deep pits and carbon deposits. Breaker points may be cleaned with a hard-finish paper. If breaker point assembly is defective, install a new assembly. Make no attempt to stone or dress the breaker points. Clean new breaker points with clean, unleaded gasoline and hard-finish paper before installing.
3. Check capacitor mounting bracket for cracks or looseness.
4. Check the carbon brush on the distributor gear for excessive wear. The brush must extend a minimum of 1/32 inch beyond the end of the gear shaft. The spring which the carbon brush contacts should be bent our approximately 20 degrees from vertical, since spring pressure on the brush holds the distributor gear shaft against the thrust bearing in the distributor block.
5. Oil the bearings at each end of the distributor gear shaft with a drop of SAE 20 oil. Wipe excess oil from parts.
6. Make sure internal timing is correct and reassemble magneto. Install and properly time magneto to engine.

12-84. MAGNETO CHECK. Advanced timing settings in some cases, is the result of the erroneous practice of bumping magnetos up in timing in order to reduce RPM drop on single ignition. NEVER ADVANCE TIMING BEYOND SPECIFICATIONS IN ORDER TO REDUCE RPM DROP. Too much importance is being attached to RPM drop on single ignition. RPM drop on single ignition is a natural characteristic of dual ignition design. The purpose of the following magneto check is to determine that all cylinders are firing. If all cylinders are not firing, the engine will run extremely rough and cause for investigation will be quite apparent. The amount of RPM drop is not necessarily significant and will be influenced by ambient air temperature, humidity, airport altitude, etc. In fact, absence of RPM drop should be cause for suspicion that the magneto timing has been bumped up and is set in advance of the setting specified. Magneto checks should be performed on a comparative basis between individual right and left magneto performance.

a. Start and run engine until the oil and cylinder head temperature is in the normal operating range.
b. Place the propeller control in the full low pitch (high RPM) position.
c. Advance engine speed to 1700 RPM.
d. Turn the ignition switch to the "R" position and note the RPM drop, then return the switch to the "BOTH" position to clear the opposite set of plugs.
e. Turn the switch to the "L" position and note the RPM drop, then return the switch to the "BOTH" position.
f. The RPM drop should not exceed 150 RPM on either magneto or show greater than 50 RPM differential between magnetos. A smooth RPM drop-off past normal is usually a sign of a too lean or too rich mixture. A sharp RPM drop-off past normal is usually a sign of a fouled plug, a defective harness lead or a magneto out of time. If there is doubt concerning operation of the ignition system, RPM checks at a leaner mixture setting or at higher engine speeds will usually confirm whether a deficiency exists.

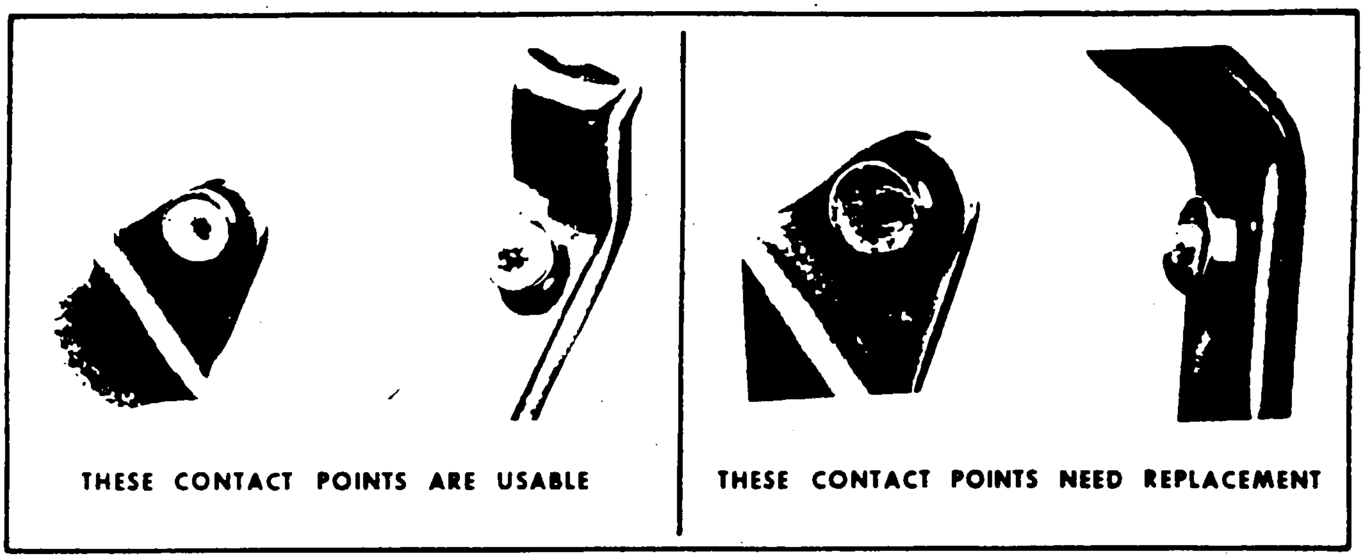


Figure 12-11. Magneto Contact Breaker Points

NOTE

An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system, a disconnected ground lead at magneto or possibly the magneto timing is set too far in advance.

12-85. SPARK PLUGS. Two spark plugs are installed in each cylinder and screw into helicoil type thread inserts. The spark plugs are shielded to prevent spark plug noise in the radios and have an internal resistor to provide longer terminal life. Spark plug service life will vary with operating conditions. A spark plug that is kept clean and properly gapped will give better and longer service than one that is allowed to collect lead deposits and is improperly gapped.

NOTE

Refer to Section 2 for inspection intervals. Remove, clean, inspect and regap all spark plugs at these intervals. At this time, install lower spark plugs in upper portion of cylinders and install upper spark plugs in lower portion of cylinders. Since deterioration of lower spark plugs is usually more rapid than that of the upper spark plugs, rotating helps prolong spark plug life.

12-86. ENGINE CONTROLS. (Refer to figure 12-12.)

12-87. DESCRIPTION. The throttle, mixture and propeller controls are of the push-pull type. The propeller and mixture controls are equipped to lock in any position desired. To move the control, the spring-loaded button, located in the end of the control knob, must be depressed. When the button is released, the control is locked. The propeller and mixture controls also have a vernier adjustment. Turning the control knob in either direction will change the control setting. The vernier is primarily for precision control setting. The throttle control has neither a locking button nor a vernier adjustment, but contains a knurled friction knob which is rotated for more or less friction as desired. The friction knob prevents vibration induced "creeping" of the control. A "Palnut" type locknut is installed in back of the existing locknut at the engine end of the throttle, mixture and propeller controls.

12-88. RIGGING. When adjusting any engine control, it is important to check that the control slides smoothly throughout its full travel, that it locks securely if equipped with a locking device and the arm or lever which it operates moves through its full arc of travel.

CAUTION

Some engine controls have a small retaining ring brazed (or attached with epoxy resin) in a groove .97 inch from the threaded end of the control. The purpose of these retaining ring is to prevent inadvertent withdrawal and possible damage to the knob end of the controls while jam nuts and rod ends are removed.

- Whenever engine controls are being disconnected, pay particular attention to the EXACT position, size and number of attaching washers and spacers. Be sure to install attaching parts as noted when connecting controls.

12-89. THROTTLE CONTROL.

a. Push throttle control full in, then pull control out approximately 1/8 inch for cushion.

b. Check that throttle control arm is against the mechanical stop. If necessary, loosen locknut and screw rod end IN or OUT as necessary to align with attachment hole while throttle arm is against the mechanical stop.

c. Pull control full out and check that throttle arm contacts the idle stop.
d. The throttle arm must contact the stops in each direction and the control should have approximately 1/8 inch cushion when pushed full in.

NOTE

Refer to the inspection chart in Section 2 for inspection, lubrication and/or replacement interval.

12-90. MIXTURE CONTROL.
a. Push mixture control full in, then pull control out approximately 1/8 inch for cushion.
b. Check that mixture control arm is in full rich position (against stop). If necessary, loosen locknut and screw rod end IN or OUT as necessary to align with attachment hole while mixture arm is against the mechanical stop.
c. Pull control full out and check that mixture arm contacts the idle cut-off stop.
d. The mixture arm must contact the stops in each direction and the control should have approximately 1/8 inch cushion when pushed full in.

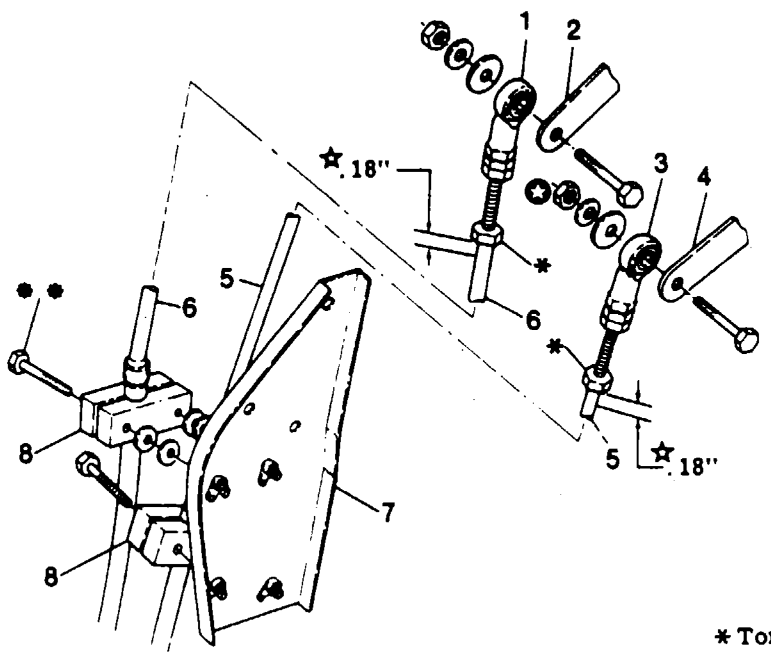
NOTE

Refer to the inspection chart in Section 2 for inspection, lubrication and /or replacement interval.

12-91. PROPELLER CONTROL. Refer to Section 14.

12-92. RIGGING THROTTLE-OPERATED MICRO-SWITCH. Refer to Section 13.

12-93. AUXILIARY ELECTRIC FUEL PUMP. FLOW ADJUSTMENT. Refer to Section 13.



* Torque to 15 ± 2 lb-in.

☆ When torqueing nut hold control in this .18 " area only.

* * Torque to 20-25 lb-in.

✪ Install AN356-1032 lock nut behind AN315-3R nuts.

1. Rod End (Throttle Control)
2. Throttle Control Arm
3. Rod End (Mixture Control)
4. Mixture Control Arm
5. Mixture Control
6. Throttle Control
7. Bracket (Typical)
8. Clamp

Safety wire bracket-to-engine mounting bolts to each other.

Figure 12-12. Engine Controls

12-94. LANDING GEAR WARNING HORN. Refer to Section 5.

12-95. STARTING SYSTEM.

12-96. DESCRIPTION. The automatically-engaged starting system employs an electrical starter motor mounted to a 90-degree adapter. A solenoid is activated by the ignition switch on the instrument panel. When the solenoid is activated, its contacts close and electrical current energizes the motor. Initial rotation of the motor engages the starter through an overrunning clutch in the starter adapter, which incorporates worm reduction gears. The starter motor is located just aft of the right rear cylinder.

CAUTION

Never operate the starter motor more than 12 seconds at a time. Allow starter motor to cool between cranking periods to avoid overheating. Longer cranking periods without cooling time will shorten the life of the starter motor.

12-97. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
STARTER WILL NOT OPERATE.	Defective master switch or circuit.	Check continuity. Install new switch or wires.
	Defective starter switch or switch circuit.	Check continuity. Install new switch or wires.
	Defective starter motor.	Check electrical power to motor. Repair or replace starter motor.
STARTER MOTOR RUNS, BUT DOES NOT TURN CRANKSHAFT.	Defective overrunning clutch or drive.	Check visually. Install new starter adapter.
	Starter motor shaft broken.	Check visually. Install new starter motor.
STARTER MOTOR DRAGS.	Low battery.	Check battery. Charge or install new battery.
	Starter switch or relay contacts burned or dirty.	Install serviceable unit.
	Defective starter motor power cable.	Check visually. Install new cable.
	Loose or dirty connections.	Remove, clean and tighten all terminal connections.
	Defective starter motor.	Check starter motor brushes, brush spring tension, thrown solder on brush cover. Repair or install new starter motor.
	Dirty or worn commutator.	Check visually. Clean and turn commutator.
STARTER EXCESSIVELY NOISY.	Worn starter pinion.	Remove and inspect. Replace starter drive.
	Worn or broken teeth on crankshaft gears.	Check visually. Replace crankshaft gear.

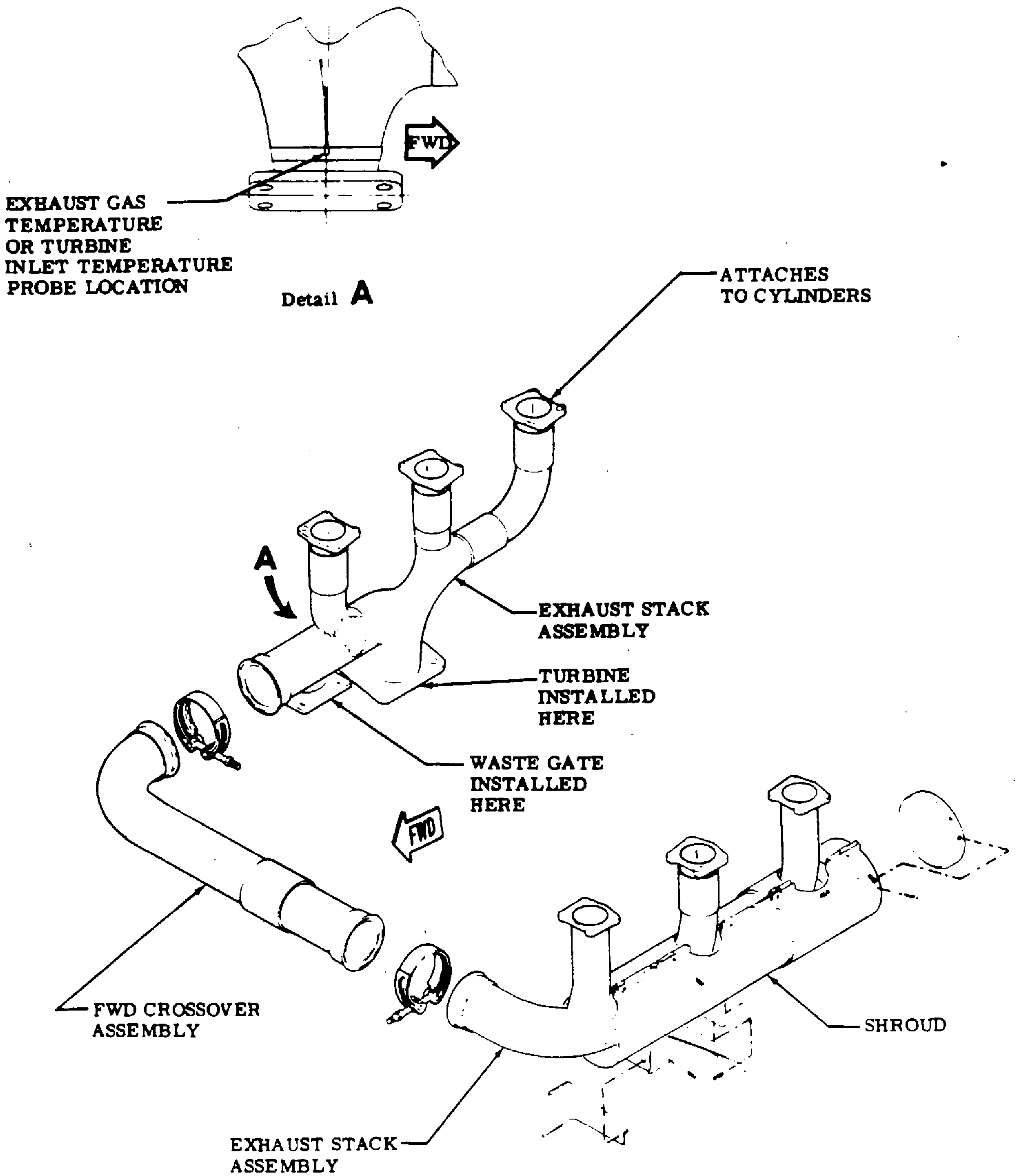


Figure 12-13. Exhaust System

12-98. PRIMARY MAINTENANCE. The starting circuit should be inspected at regular intervals, the frequency of which should be determined by the amount of service and conditions under which the equipment is operated. Inspect the battery and wiring. Check battery for fully charged condition, proper electrolyte level with approved water and terminals for cleanliness. Inspect wiring to be sure that all connections are clean and tight and that the wiring insulation is sound. Check that the brushes slide freely in their holders and make full contact on the commutator. When brushes are worn to one-half of their original length, install new brushes (compare brushes with new brushes). Check the commutator for uneven wear, excessive glazing or evidence of excessive arcing. If the commutator is only slightly dirty, glazed or discolored, it may be cleaned with a strip of No. 00 or No. 000 sandpaper. If the commutator is rough or worn, it should be turned in a lathe and the mica undercut. Inspect the armature shaft for rough bearing surfaces. New brushes should be properly seated when installing by wrapping a strip of No. 00 sandpaper around the commutator (with sanding side out) 1-1/4 to 1-1/2 times maximum. Drop brushes on sandpaper covered commutator and turn armature slowly in the direction of normal rotation. Clean sanding dust from motor after sanding operations.

12-99. STARTER MOTOR.

12-100. REMOVAL AND INSTALLATION.

a. Remove engine cowling in accordance with paragraph 12-3.

CAUTION

When disconnecting starter electrical cable, do not permit terminal bolt to rotate. Rotation of the bolt could break the conductor between bolt and field coils causing the starter to be inoperative.

b. Disconnect battery cables and insulate as a safety precaution.

c. Disconnect electrical cable at starter motor.

d. Remove nuts and washers securing motor to starter adapter and remove motor. Refer to engine manufacturer's overhaul manual for adapter removal.

e. Reverse the preceding steps for reinstallation. Install a new O-ring seal on motor, then install motor. Be sure motor drive engages with the adapter drive when installing.

12-101. EXHAUST SYSTEM. Refer to figure 12-13.

12-102. DESCRIPTION. The exhaust system is constructed of either 321 stainless steel (thru 1982 Models) or Inconel 601 stainless steel (beginning with 1983 Models). The exhaust system consists of two exhaust stack assemblies, one for the left and one for the right bank of cylinders. These exhaust stack assemblies are joined together to route the exhaust from all cylinders through the waste-gate or turbine. The three risers on the left bank of cylinders are joined together into a common pipe to form the left stack assembly. The risers on the cylinders are connected to a common pipe to form the right stack assembly. The right stack assembly connects to the left stack assembly at the front of the engine. Mounting pads for the waste-gate and turbine are provided on the right stack assembly. From the exhaust port of the turbine, a tailpipe routes the exhaust overboard through the lower fuselage. The exhaust port of the waste-gate is routed into the tailpipe so the exhaust gas can be expelled from the system when not needed at the turbine. The waste-gate is actuated by the waste-gate actuator which, in turn, is controlled by the waste-gate controller. Also, sleeving is installed on the fuel hose from the engine-driven pump to the fuel metering body and on the hose from the auxiliary fuel pump to the engine-driven pump. This is to prevent excessive heat on these fuel hoses as they route close to the exhaust stack.

12-103. REMOVAL.

a. Remove engine cowling and right and left nose caps in accordance with paragraph 12-3.

b. Loosen clamp and disconnect flexiable duct at aft end of cabin heater shroud on left exhaust stack.

c. Remove two screws securing shroud to support brackets.

d. Remove clamp attaching forward crossover assembly to left exhaust stack assembly.

e. Remove four nuts and washers attaching exhaust pipe to each cylinder and remove left exhaust stack assembly.

f. Remove bolts attaching waste-gate to right exhaust stack assembly.

g. Remove bolts and nuts attaching turbocharger to right exhaust assembly.

h. Remove EGT probe from exhaust collection.

i. Remove clamp attaching forward crossover assembly to right exhaust stack assembly.

j. Remove four nuts and washers attaching exhaust pipe to each cylinder and remove right exhaust stack assembly.

12-104. INSTALLATION.

NOTE

It is important that the complete exhaust system, including the turbocharger and waste-gate, be installed without pre-loading any section of the exhaust stack assembly.

Before reassembly of the slip joints, clean the mating surfaces with crocus cloth. The mating surfaces should then be lubricated with Fel-Pro, C5A or ON-OFF.

a. Use new gaskets between exhaust stacks and engine cylinders, at each end of waste-gate and between turbocharger and exhaust stack.

b. Loosen turbocharger supporting hardware as required to position the right exhaust stack assembly on cylinders.

c. Install washers and nuts securing exhaust stack assembly to cylinder, torque nuts evenly to 100-110 lb-in.

d. Position turbocharger and install bolts and nuts attaching turbocharger to right exhaust stack (figure 12-15). Tighten bolts securely.

e. Install bolts and nuts attaching waste-gate to right exhaust stack assembly and tighten securely.
f. Install forward crossover assembly on right exhaust stack assembly.
g. Install EGT probe in exhaust collector.
h. Position left exhaust stack assembly and secure with washers and nuts, torque evenly 100-110 lb-in.
i. Connect forward crossover assembly to left exhaust stack assembly with clamp.
j. Install two screws securing cabin heater shroud to support brackets.
k. Connect flexiable duct to aft end of cabin heater shroud and tighten clamp.
l. Be sure all parts are secure and safetied as required, then perform step "b" of paragraph 12-105 to check for air leaks.
m. Reinstall any parts removed for access, then install nose caps and cowling.

12-105. INSPECTION. Since exhaust systems of this type are subject to burning, cracking and general deterioration from alternate thermal stresses and vibrations, inspection is important and should be accomplished every 50 hours of operation. Also, a thorough inspection of the engine exhaust system should be made to detect cracks causing leaks which could result in loss of optimum turbocharger efficiency and engine power. To inspect the engine exhaust system proceed as follows:
a. Remove engine cowling as required and remove heater shroud so that ALL surfaces of the exhaust assemblies can be visually inspected.

WARNING

Never use highly flammable solvents on engine exhaust systems. Never use a wire brush or abrasives to clean exhaust systems or mark on the system with lead pencils.

NOTE

Especially check the areas adjacent to welds and slip joints. Look for gas deposits in surrounding areas, indicating that exhaust gases are escaping through a crack or hole or around the slip joints.

b. After visual inspection, an air pressure test should be made on the exhaust system as follows:
1. Attach the pressure side of an industrial vacuum cleaner to the tailpipe opening, using a rubber plug to effect a seal as required.

NOTE

The inside of the vacuum cleaner hose should be free of any contamination that might be blown into the engine exhaust system.

2. With vacuum cleaner operating, all joints in the exhaust system and the heat exchanger area may be checked manually by feel, or by using a soap and water solution and watching for bubbles. The exhaust manifold in the heat exchanger area must be free of air leaks. In other areas, forming of bubbles is acceptable; however, if bubbles are blown away system is not acceptable. Also, some bubbles will appear at the joint of the turbocharger turbine and compressor bearing housing.
c. Where a surface is not accessible for a visual inspection, or for a more positive test, the following procedure is recommended.
1. Remove exhaust stack assemblies.
2. Use rubber expansion plugs to seal openings.
3. Using a manometer or gage, apply approximately 1-1/2 psi (3 inches of mercury) air pressure while each stack assembly is submerged in water. Any leaks will appear as bubbles and can be readily detected.
d. It is recommended that any components of the exhaust system found defective be replaced before the next flight.
e. After installation of exhaust system components, recheck by performing the air pressure test to make sure that system is acceptable.

12-106. TURBOCHARGER.

NOTE

For additional information covering turbocharger and component maintenance, overhaul and trouble shooting refer to the Manufacturer's Overhaul Manual.

12-107. DESCRIPTION. The turbocharger is an exhaust gas-driven compressor, or air pump, which provides high velocity air to the engine intake manifold. The turbocharger is composed of a turbine wheel, compressor wheel, turbine housing and compressor housing. The turbine, compressor wheel and interconnecting drive shaft comprise one complete assembly and are the only moving parts in the turbocharger. Turbocharger bearings are lubricated with filtered oil supplied from the engine oil system. Engine exhaust gas enters the turbine housing to drive the turbine wheel. The turbine wheel, in turn, drives the compressor wheel, producing a high velocity of air entering the engine induction intake manifold. Exhaust gas is then dumped overboard through the exhaust outlet of the turbine housing and exhaust tailpipe. Air is drawn into the compressor through the induction air filter and is forced out of the compressor housing through a tangential outlet to the intake manifold. The degree of turbocharging is varied by means of a waste-gate valve, which varies the amount of exhaust gas allowed to bypass the turbine.

12-108. REMOVAL, REPLACEMENT AND INSTALLATION. Refer to figure 12-15. The following procedures should be used in conjunction with the Manufacturers Overhaul Manual.
a. Remove right-hand upper and lower cowling.

CAUTION

Plug or tape all open lines and fittings, to, from, or on the turbocharger.

b. Loosen the tailpipe clamp. Remove the tailpipe (7) from the turbine housing (13) and the wastegate assembly.
c. Disconnect line assemblies (2) and (19) from adapters (15) and (17).
d. Loosen clamps and remove air inlet and outlet ducts from the turbocharger compressor (11).
e. Remove four bolts (14) attaching turbocharger to exhaust collector (5).
f. Remove bolts (4), (6) and (20) securing the turbocharger support brackets and remove the turbocharger.
g. Remove oil inlet (17) and outlet (15) adapters from turbocharger, discard both gaskets, retain the bolts and washers.
h. Loosen turbine housing bolts (12, a, b, c and d).
i. Remove bolts (12, a, b and c) and remove support (8).

NOTE

With turbocharger removed check exhaust collector flange for flatness. Flange is to be flat within .005 ", resurface the exhaust collector flange as required.

j. On the new turbocharger, loosen turbine housing bolts (12, a, b, c and d) and remove bolts (12, a, b and c).

CAUTION

Clamp plates (9) must be installed between turbocharger and support (8). Lock plates (10) must be installed between support (8) and bolt heads (12).

k. Install support (8).
l. Snug bolts (12, a, b, c and d).

NOTE

DO NOT LOOSEN bolts (12, e and f) so support may be adjusted as required.

DO NOT bend up lock tabs.

m. Remove tape from adapters (15 and 17) and install with new gaskets and retained bolts and washers. Torque bolts to 180-190 pound-inches and safety.
n. Insert bolts (4) thru bracket (3) and support (8).
o. Tighten bolts (12, a, b, c and d) so bracket (8) will not slip, this will maintain alignment for bolts (4).
p. Remove bolts (4) and remove turbocharger.
q. Torque turbine housing bolts (12, a, b, c, d, e, and f) to 220-250 pound-inches and bend up lock tabs.
r. Reinstall turbocharger and insert bolts (4), install exhaust collector (5) on turbine housing (13), insert bolts (14) and (6) thru turbocharger support. Install washers and nuts, tighten.
s. Connect hose assemblies (2) and (19).
t. Install inlet and outlet ducts and secure with clamps.
u. When installing discharge duct (1) loosen compressor housing V-band clamp enough to allow for proper fit. Secure clamp and torque nut to 40-60 pound-inches.

NOTE

Be sure all clamps are installed with bolts on the outboard side for easier access.

v. Install tailpipe (7) and secure with existing clamp to turbine housing (13), torque nut to 40-60 pound-inches. A slip joint is used to attach the tailpipe to the wastegate assembly.

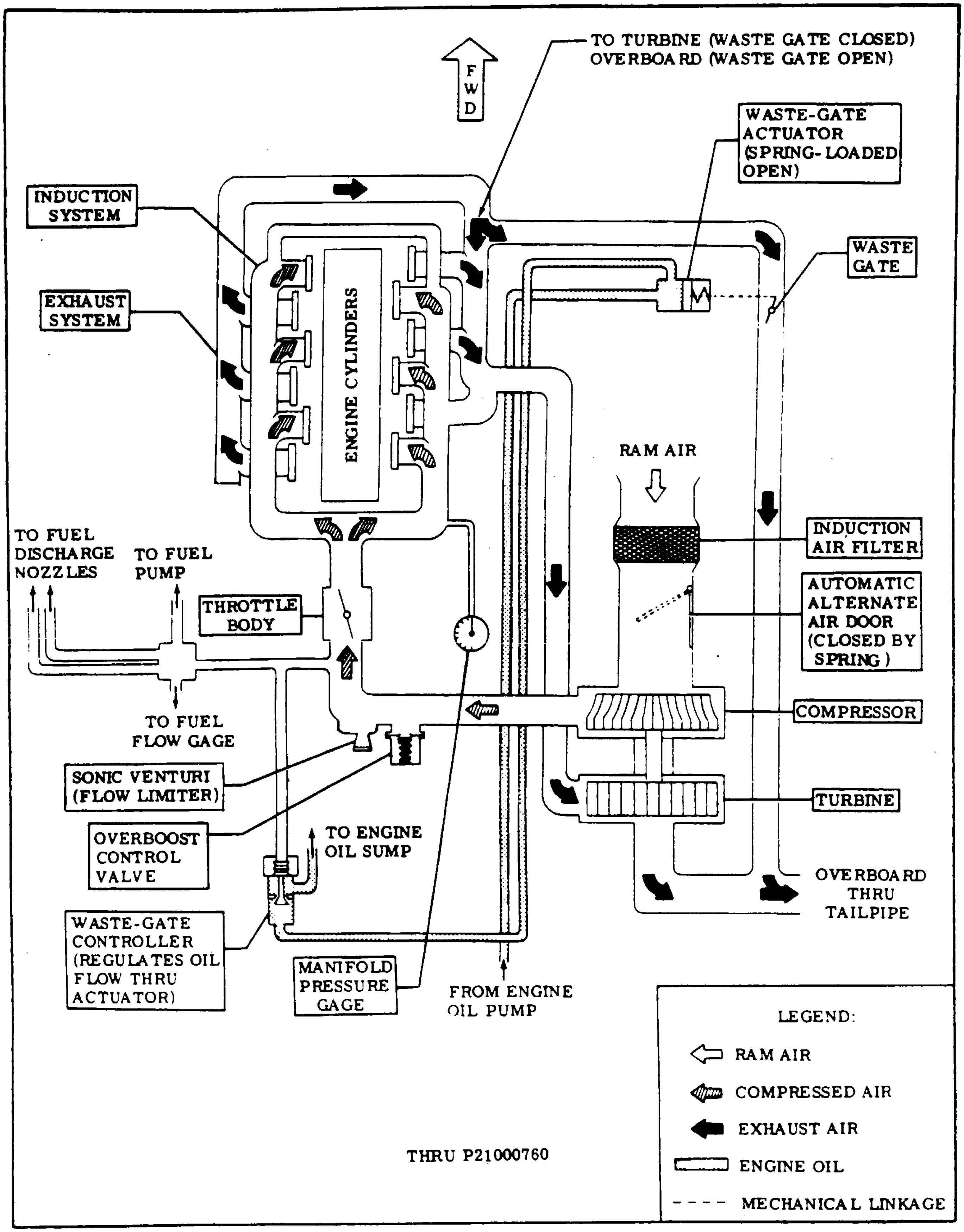


Figure 12-14. Turbocharger System Schematic (Sheet 1 of 2)

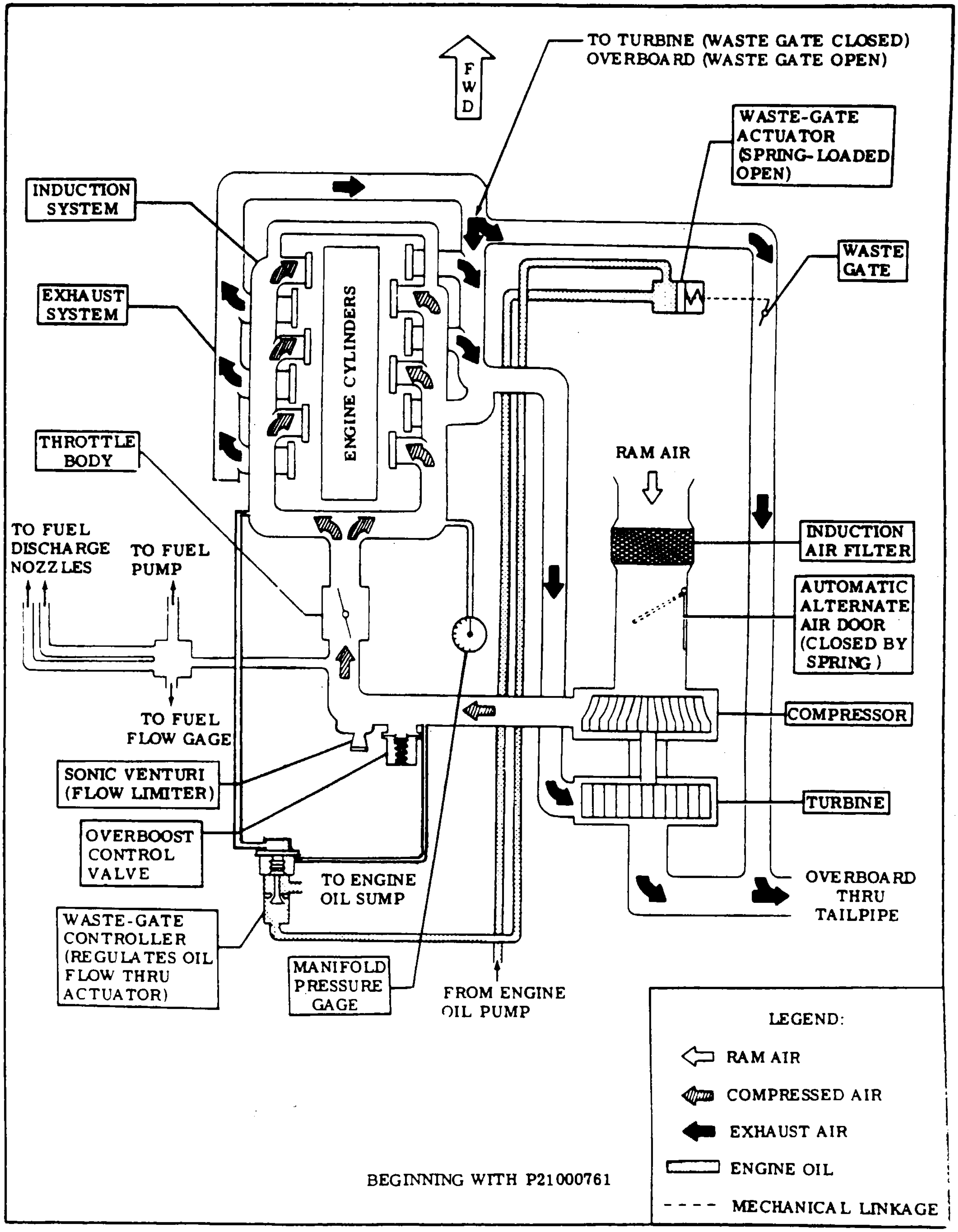


Figure 12-14. Turbocharger System Schematic (Sheet 2 of 2)

12-109. CONTROLLER AND WASTE-GATE ACTUATOR. (THRU P21000760).

12-110. FUNCTIONS. The waste-gate actuator and controller uses engine oil for power supply. The turbocharger is controlled by the waste-gate, waste-gate actuator, the absolute pressure and overboost control valve. The waste-gate bypasses engine exhaust gas around the turbocharger turbine inlet. The waste-gate actuator, which is physically connected to the waste-gate by mechanical linkage, controls the position of the waste-gate butterfly valve. The absolute pressure controller controls the maximum turbocharger compressor discharge pressure, the overboost control valve prevents an excessive pressure increase from the turbocharger compressor.

12-110A. SLOPED CONTROLLER AND WASTE-GATE ACTUATOR. (P21000761 and ON).

12-110B. FUNCTIONS. (P21000761 and ON). The turbocharger is controlled by the wastegate assembly and sloped controller. The wastegate assembly consists of a hydraulic actuator and a valve mechanically linked. The wastegate controls the flow of engine exhaust gas so that varying proportions will pass through or bypass the turbocharger. A pressure relief valve limits the maximum pressure from the turbocharger compressor in the manifold.

The sloped controller acts to control the turbocharger discharge pressure at a desired setpoint by controlling the position of the butterfly valve in the wastegate. The setpoint is not fixed, but varies in proportion to the difference between the compressor discharge (deck) and manifold pressures. The pressure difference varies according to changes in the throttle setting. For example; when the throttle is closed, manifold pressure decreases increasing the difference between manifold and deck pressure. The difference in pressure actuates a poppet valve in the controller to allow an increased flow of oil through the controller and consequently reduces the pressure in the waste-gate actuator. The decrease in oil pressure causes the spring loaded butterfly valve to open, more exhaust gas to bypass the turbocharger, with a subsequent decrease in compressor outlet pressure.

A sloped controller is not dependent on manifold pressure reaching a specific value before opening the wastegate, but. will react to open or close the wastegate whenever manifold pressure plus (the difference between manifold and deck pressure times a constant) deviates from a fixed preset value. This gives the benefits of reduced setpoints at low throttle settings and during high altitude operation. The sloped controller is designed to be approximately three times as sensitive to manifold pressure as deck pressure, so small changes in manifold pressure will result in rapid corrections of deck pressure because of action of the wastegate valve.

12-111. OPERATION. The waste-gate actuator is spring-loaded to position the waste-gate to the normally open position when there is not adequate oil pressure in the waste-gate actuator power cylinder during engine shut down. When the engine is started, oil pressure is fed into the waste-gate actuator power cylinder through the capillary tube. This automatically fills the waste-gate actuator power cylinder and lines leading to the controllers, blocking the flow of oil by normally closed metering and/or poppet valves. As oil pressure builds up in the waste-gate actuator power cylinder, it overcomes the force of the waste-gate open spring, closing the waste-gate. When the waste-gate begins to close, the exhaust gases are routed through the turbocharger turbine. As the engine increases its power and speed, the increase of temperature and pressure of the exhaust gases causes the turbocharger to rotate faster, raising the turbocharger compressor outlet pressure. As the compressor outlet pressure rises, the aneroid bellows and the absolute pressure controller sense the increase in pressure. When at high engine speed and load and the proper absolute pressure is reached, the force on the aneroid bellows opens the normally closed metering valve. When the oil pressure in the waste-gate actuator power cylinder is lowered sufficiently, the waste-gate actuator open spring forces the mechanical linkage to open the waste-gate. A portion of the exhaust gases then bypasses the turbocharger turbine, thus preventing further increase of turbocharger speed and holding the compressor discharge absolute pressure to the desired valve. Conversely, at engine idle, the turbocharger runs slowly with low compressor pressure output; therefore, the low pressure applied to aneroid bellows is not sufficient to affect the unseating of the normally closed metering valve. Consequently, engine oil pressure keeps the waste-gate closed. The overboost control valve acts as a pressure relief valve and will open to prevent an excessive pressure increase to the throttle body. Above 17,000 feet at full throttle the turbocharger is capable of maintaining 35.5 inches Hg. It is therefore necessary to reduce manifold pressure with the throttle to follow the manifold pressure versus altitude schedule.

CAUTION

This turbocharged engine installation is equipped with a controller system which automatically controls the engine within prescribed manifold pressure limits. Although these automatic controller systems are very reliable and eliminate the need for manual control through constant throttle manipulation, they are not infallible. For instance, such things as rapid throttle manipulation (especially with cold oil), momentary waste-gate sticking, air in the oil system of the controller, etc. can cause overboosting.

Consequently, it is still necessary that the pilot observe and be prepared to control the manifold pressure, particularly during take-off and power changes in flight.

The slight overboosting of manifold pressure beyond established maximums, which is occasionally experienced during initial take-off roll or during a change to full throttle operation in flight, is not considered detrimental to the engine as long as it is momentary. Momentary overboost is generally in the area of 2 to 4 inches and can usually be controlled by slower throttle movement. No corrective action is required where momentary overboosting corrects itself and is followed by normal engine operation. However, if overboosting of this nature persists, or if the amount of overboost goes as high as 6 inches, the controller and overboost control should be checked for necessary adjustment or replacement of the malfunctioning component.

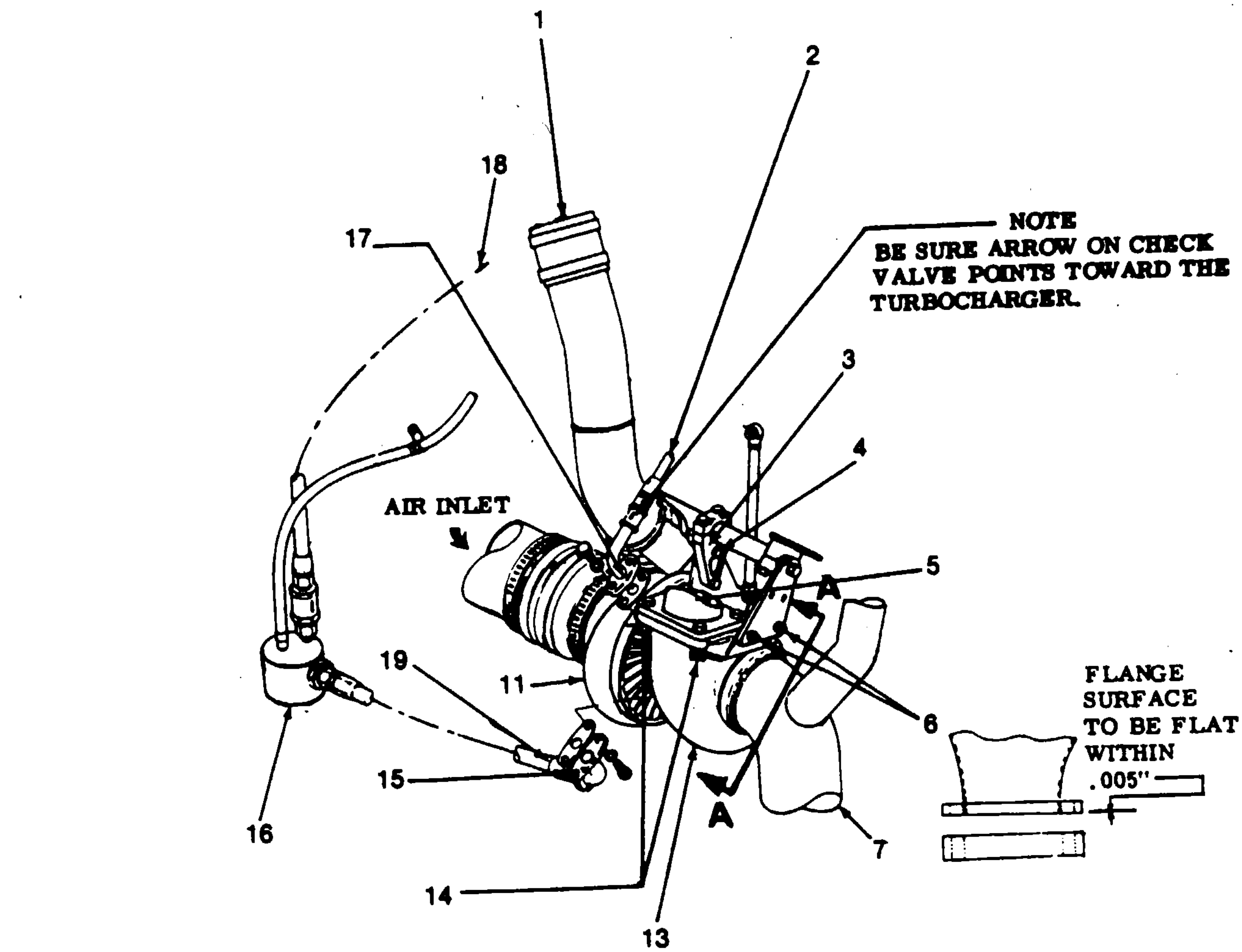
OVERBOOST EXCEEDING 6 INCHES beyond established maximums, is excessive and can result in engine damage. It is recommended that overboosting of this nature be reported to your Cessna Dealer, who will be glad to determine what, if any, corrective action needs to be taken.

12-112. TROUBLE SHOOTING.

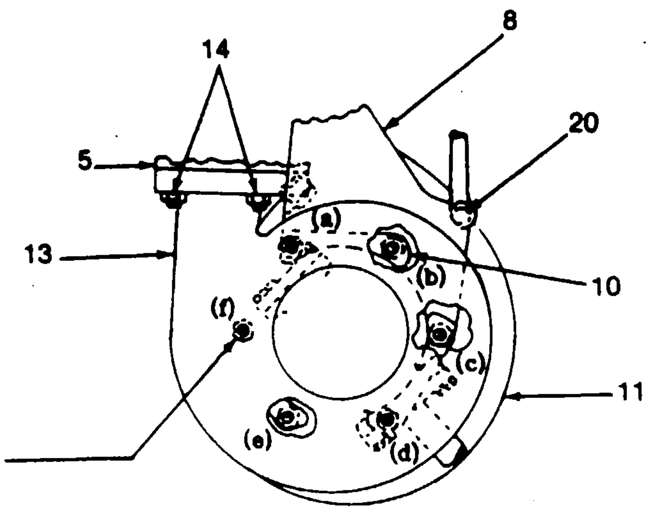
TROUBLE	PROBABLE CAUSE	REMEDY
UNABLE TO GET RATED POWER BECAUSE MANIFOLD PRESSURE IS LOW.	Controller not getting enough oil pressure to close the waste-gate.	Check oil pump outlet pressure, oil filter and external lines for obstructions. Clean lines and replace if defective. Replace oil filter.
	Controller out of adjustment or defective.	Refer to paragraph 12-115. Replace controller if defective.
	Defective actuator.	Refer to paragraph 12-117. Replace actuator if defective.
	Leak in exhaust system.	Check for cracks and other obvious defects. Replace defective components. Tighten clamps and connections.
	Leak in intake system.	Check for cracks and loose connections. Replace defective components. Tighten all clamps and connections.
ENGINE SURGES OR SMOKES.	Defective controller.	Refer to paragraph 12-115. Replace if not adjustable.
	Waste-gate actuator linkage binding.	Refer to paragraph 12-117.
	Waste-gate actuator leaking oil.	Replace actuator.
TURBOCHARGER NOISY WITH PLENTY OF POWER.	Turbocharger overspeeding from defective or improperly adjusted controller.	Refer to paragraph 12-115. Replace if defective.
	Waste-gate sticking closed.	Correct cause of sticking. Refer to paragraph 12-115. Replace defective parts.
	Controller drain line (oil return to engine sump) obstructed.	Clean line. Replace if defective.
ENGINE POWER INCREASES SLOWLY OR SEVERE MANIFOLD PRESSURE FLUCTUATIONS WHEN THROTTLE ADVANCED RAPIDLY.	Overboost control valve out of adjustment or defective.	Replace if defective.
	Waste-gate operation is sluggish.	Refer to paragraph 12-117. Replace if defective. Correct cause of sluggish operation.
ENGINE POWER INCREASES RAPIDLY AND MANIFOLD PRESSURE OVERBOOSTS WHEN THROTTLE ADVANCED RAPIDLY.	Overboost control valve out of adjustment or defective.	Replace if defective.
	Waste-gate operation is sluggish.	Refer to paragraph 12-117. Replace if defective. Correct cause of sluggish operation.

12-112. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
FUEL PRESSURE DECREASES DURING CLIMB, WHILE MANIFOLD PRESSURE REMAINS CONSTANT.	Compressor discharge pressure line to fuel pump aneroid restricted.	Check and clean out restrictions.
	Leaking or otherwise defective engine-driven fuel pump aneroid.	Replace engine-driven fuel pump.
MANIFOLD PRESSURE DECREASES DURING CLIMB AT ALTITUDES BELOW NORMAL PART THROTTLE CRITICAL ALTITUDE, OR POOR TURBOCHARGER PERFORMANCE INDICATED BY CRUISE RPM FOR CLOSED WASTE-GATE. (Refer to paragraph 12-112.)	Leak in intake system.	Check for cracks and other obvious defects. Tighten all hose clamps and fittings. Replace defective components.
	Leak in exhaust system.	Check for cracks and other obvious defects. Tighten all clamps and fittings. Replace defective components.
	Leak in compressor discharge pressure line to controller.	Check for cracks and other obvious defects. Tighten all clamps and fittings. Replace defective components.
	Controller seal leaking.	Replace controller.
	Waste-gate actuator leaking oil.	Replace actuator.
	Waste-gate butterfly - closed gap is excessive.	Refer to paragraph 12-117.
	Intake air filter obstructed.	Service air filter. Refer to Section 2 for servicing instructions.
FUEL FLOW DOES NOT DECREASE AS MANIFOLD PRESSURE DECREASES AT PART-THROTTLE CRITICAL ALTITUDE.	Defective engine-driven fuel pump aneroid mechanism.	Replace engine-driven fuel pump.
	Obstruction or leak in compressor discharge pressure line to engine-driven fuel pump.	Check for leaks or obstruction. Clean out lines and tighten all connections.
FUEL FLOW INDICATOR DOES NOT REGISTER CHANGE IN POWER SETTINGS AT HIGH ALTITUDES.	Moisture freezing in indicator line.	Disconnect lines, thaw ice and clean out lines.
SUDDEN POWER DECREASE ACCOMPANIED BY LOUD NOISE OF RUSHING AIR.	Intake system air leak from hose becoming detached.	Check hose condition. Install hose and hose clamp securely.
MANIFOLD PRESSURE GAGE INDICATION WILL NOT REMAIN STEADY AT CONSTANT POWER SETTINGS.	Defective controller.	Replace controller.
	Waste-gate operation is sluggish.	Refer to paragraph 12-117. Replace if defective. Correct cause of sluggish operation.

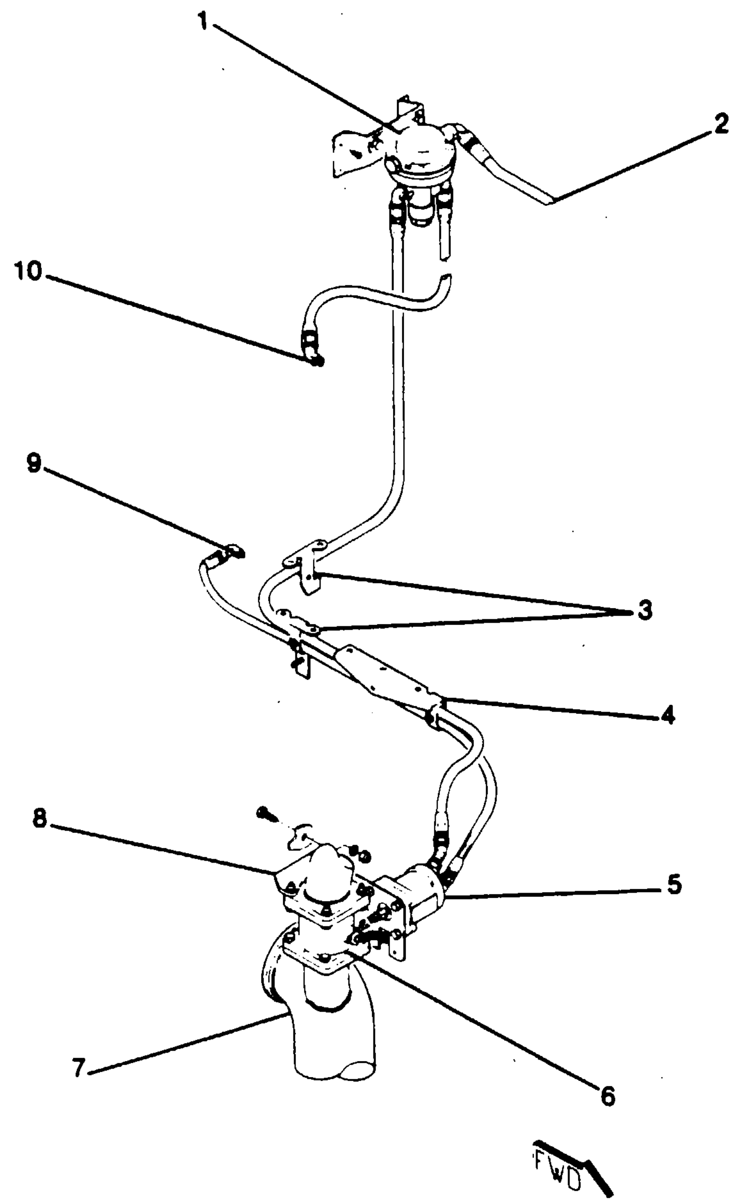


1. Turbocharger Discharge Duct
2. Line Assembly (inlet)
3. Bracket
4. Bolt
5. Exhaust Collector
6. Bolt
7. Tailpipe
8. Support
9. Clamp Plate
10. Lockplate
11. Compressor
12. Turbine Housing bolts
13. Turbine Housing
14. Bolt
15. Adapter, Oil (outlet)
16. Oil Reservoir
17. Adapter, Oil (inlet)
18. Hose Assembly (Check valve to scavenge pump)
19. Line Assembly (outlet)
20. Bolt



VIEW A-A

Figure 12-15. Turbocharger Installation



1. Controller
2. Line (To Fuel Injection Air Pressure System) (Upper Deck)
3. Support Assembly
4. Bracket Assembly
5. Wastegate Actuator
6. Wastegate
7. Tailpipe
8. Support
9. Line (From Engine Oil Pump)
10. Line (Return to Engine Sump)

Figure 12-16. Controller and Waste-Gate Installation

P21000001 THRU P21000690 NOT MODIFIED BY SK210-98

12-113. CONTROLLER AND TURBOCHARGER OPERATIONAL FLIGHT CHECK. The following procedure details the method of checking the operation of the absolute controller overboost control valve, and a performance check of the turbocharger.

1 TAKE-OFF-ABSOLUTE CONTROLLER CHECK.
a. Cowl Flaps - Open.
b. Airspeed - 110-120 KIAS.
c. Oil Temperature - Middle of green arc.
d. Engine Speed - 2700 ± 25 RPM.
e. Fuel Flow 186 to 195 LBS/HR (Full Rich Mixture and Oil Temperature in middle of green arc).
f. Full Throttle M. P. - Absolute controller should maintain 37.5±.5 in. Hg (Stabilized).

Climb 2000 feet after take-off to be sure manifold pressure has stabilized. It is normal on the first take-off of the day for full throttle manifold pressure to decrease 1/2 to 1.0 inch of mercury within one minute after the initial application of full power. Refer to Paragraph 12-115 for absolute controller adjustment.

2 CLIMB - ABSOLUTE CONTROLLER AND TURBOCHARGER PERFORMANCE CHECK.
a. Cowl Flaps - Open.
b. Airspeed - 110-120 KIAS.
c. Engine Speed - 2500 RPM.
d. Fuel Flow - Adjust mixture for 125.0 LBS/HR.
e. Part-Throttle M. P. - 32.0 in. Hg.
f. Climb to 17,000 feet - Check part-throttle critical altitude during climb.

This part-throttle critical altitude is where manifold pressure starts decreasing during the climb at a rate of approximately 1.0 inch of mercury per 1000 feet. After noting this altitude and the outside air temperature the desired manifold pressure should be maintained by advancing the throttle during the remainder of the climb.

Once the climb power setting is established after take-off, the controller should maintain a steady manifold pressure up to the part-throttle critical altitude indicated in the following chart. If part-throttle critical altitude has not been reached by 17,000 feet, discontinue check and proceed to cruise check.

Outside Air Temperature	Part-Throttle Critical Altitude (80% Power)
Standard or Colder	Above 21,000 feet
20°F Above Standard	16,000 to 22,000 feet
40°F Above Standard	10,000 to 16,000 feet

Part-Throttle critical altitudes lower than those listed indicate the turbocharger system is not operating properly (refer to the trouble shooting chart in paragraph 12-112). Critical altitudes above those listed indicate turbocharger performance better than normal. Also check that fuel flow decreases as manifold pressure decreases at critical altitude. Refer to the trouble shooting chart if fuel flow does not decrease.

3 CRUISE - TURBOCHARGER PERFORMANCE CHECK.
a. Cowl Flaps - Closed.
b. Airspeed - Level flight.
c. Pressure Altitude - 17,000 feet.
d. Engine Speed - 2700 RPM (5 minute limit).
e. Part-Throttle M. P. - 32.0 in. Hg.
f. Fuel Flow - Lean to 135 LBS/HR.
g. Propeller Control -
(1) Slowly decrease RPM until manifold pressure starts to drop, indicating waste gate is closed.

NOTE

If the waste gate closes at engine speeds lower than shown on the chart in figure 12-17, the turbocharger performance is normal. If the waste gate closes at engine speeds higher than shown in figure 12-17, refer to the trouble shooting chart in paragraph 12-112.

(2) Note outside air temperature and RPM as manifold pressure starts to drop, which should be in accordance with the chart in figure 12-17.
(3) After noting temperature and RPM, increase engine speed 50 RPM to stabilize manifold pressure, with the waste gate modulating exhaust flow to control compressor output.

P21000001 THRU P21000690 NOT MODIFIED BY SK210-98

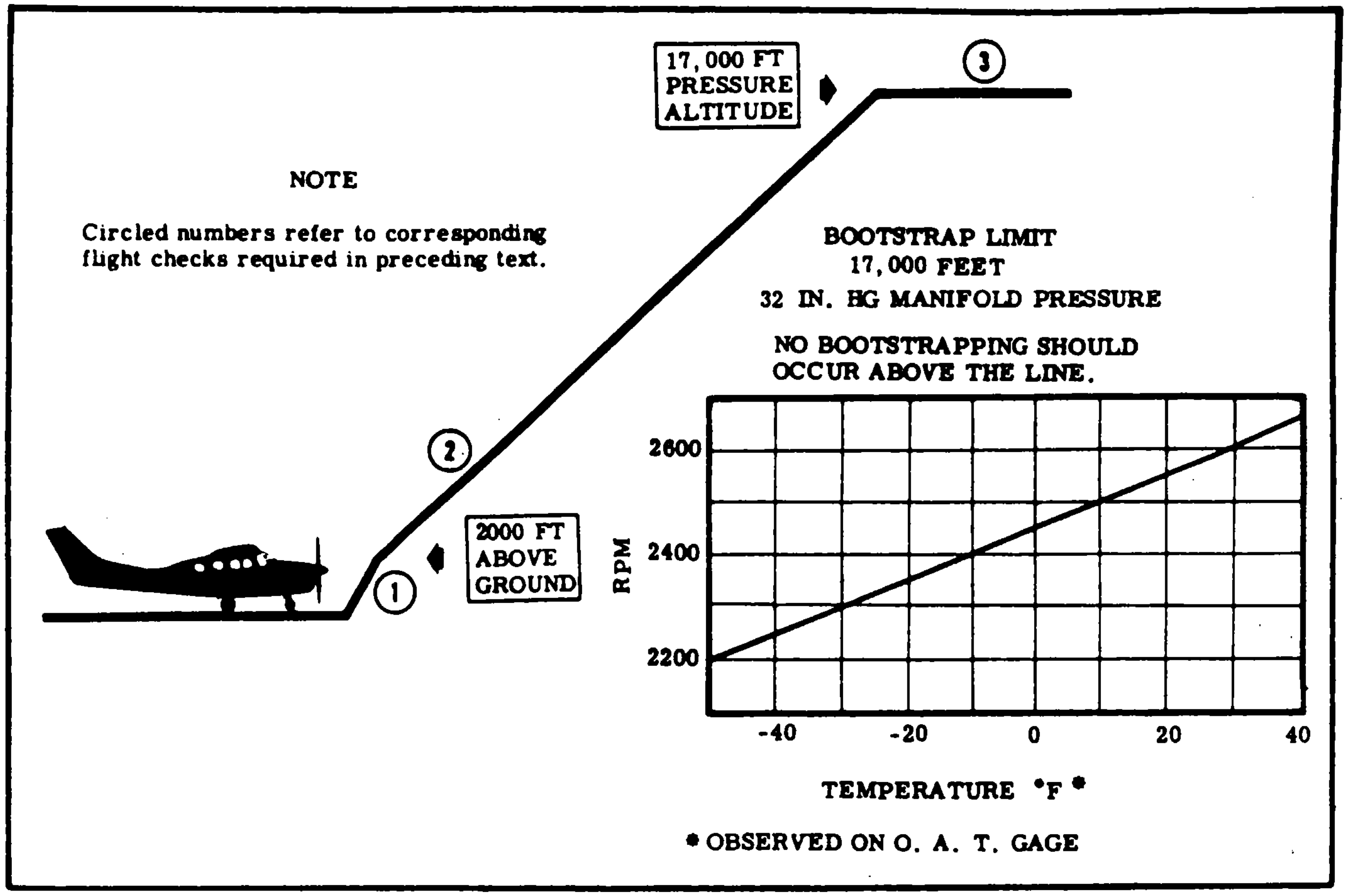


Figure 12-17. Operational Flight Check

P21000001 THRU P21000690 WHEN MODIFIED BY SK210-98 AND P21000691 THRU P21000760

12-113. CONTROLLER AND TURBOCHARGER OPERATIONAL FLIGHT CHECK. The following procedure details the method of checking the operation of the absolute controller overboost control valve, and a performance check of the turbocharger.

1 TAKE-OFF-ABSOLUTE CONTROLLER CHECK.

a. Cowl Flaps - Open.
b. Airspeed - 110-120 KIAS.
c. Oil Temperature - Middle of green arc.
d. Engine Speed - 2700 ± 25 RPM.
e. Fuel Flow 180 to 186 LBS/HR (Full Rich Mixture and Oil Temperature in middle of green arc)
f. Full Throttle M. P. - Absolute controller should maintain 36.5 ±.5 in. Hg (stabilized).

Climb 2000 feet after take-off to be sure manifold pressure has stabilized. It is normal on the first take-off of the day for full throttle manifold pressure to decrease 1/2 to 1.0 inch of mercury within one minute after the initial application of full power. Refer to paragraph 12-115 for absolute controller adjustment.

2 CLIMB - ABSOLUTE CONTROLLER AND TURBOCHARGER PERFORMANCE CHECK.

a. Cowl Flaps - Open.
b. Airspeed - 110-120 KIAS.
c. Engine Speed - 2500 RPM.
d. Fuel Flow - Adjust mixture for 125.0 LBS/HR
e. Part-Throttle M. P. - 31.0 in. Hg.
f. Climb to 12,000 feet - Check part-throttle critical altitude during climb.

This part-throttle critical altitude is where manifold pressure starts decreasing during the climb at a rate of approximately 1.0 inch of mercury per 1000 feet. After noting this altitude and the outside air temperature the desired manifold pressure should be maintained by advancing the throttle during the remainder of the climb.

Once the climb power setting is established after take-off, the controller should maintain a steady manifold pressure up to the part-throttle critical altitude indicated in the following chart. If part-throttle critical altitude has not been reached by 12,000 feet, discontinue check and proceed to cruise check.

Outside Air Temperature	Part-Throttle Critical Altitude (80% Power)
20°F Below Standard	11,500 feet
Standard Temperature	9000 feet
20°F Above Standard	6500 feet
40°F Above Standard	4000 feet

Part-throttle critical altitudes lower than those listed indicate the turbocharger system is not operating properly (refer to the trouble shooting chart in paragraph 12-112). Critical altitudes above those listed indicate turbocharger performance better than normal. Also check that fuel flow decreases as manifold pressure decreases at critical altitude. Refer to the trouble shooting chart if fuel flow does not decrease.

3 CRUISE - TURBOCHARGER PERFORMANCE CHECK.

a. Cowl Flaps - Closed.
b. Airspeed - Level flight.
c. Pressure Altitude - 10,000 feet.
d. Engine Speed - 2700 RPM (5 minute limit).
e. Part-Throttle M. P. - 31.0 in. Hg.
f. Fuel Flow - Lean to 135 LBS/HR.
g. Propeller Control -
   (1) Slowly decrease RPM until manifold pressure starts to drop, indicating waste gate is closed.

NOTE

If the waste gate closes at engine speeds lower than shown on the chart in figure 12-17A, the turbocharger performance is normal. If the waste gate closes at engine speeds higher than shown in figure 12-17A, refer to the trouble shooting chart in paragraph 12-112.

   (2) Note outside air temperature and RPM as manifold pressure starts to drop, which should be in accordance with the chart in figure 12-17A.
   (3) After noting temperature and RPM, increase engine speed 50 RPM to stabilize manifold pressure, with the waste gate modulating exhaust flow to control compressor output.

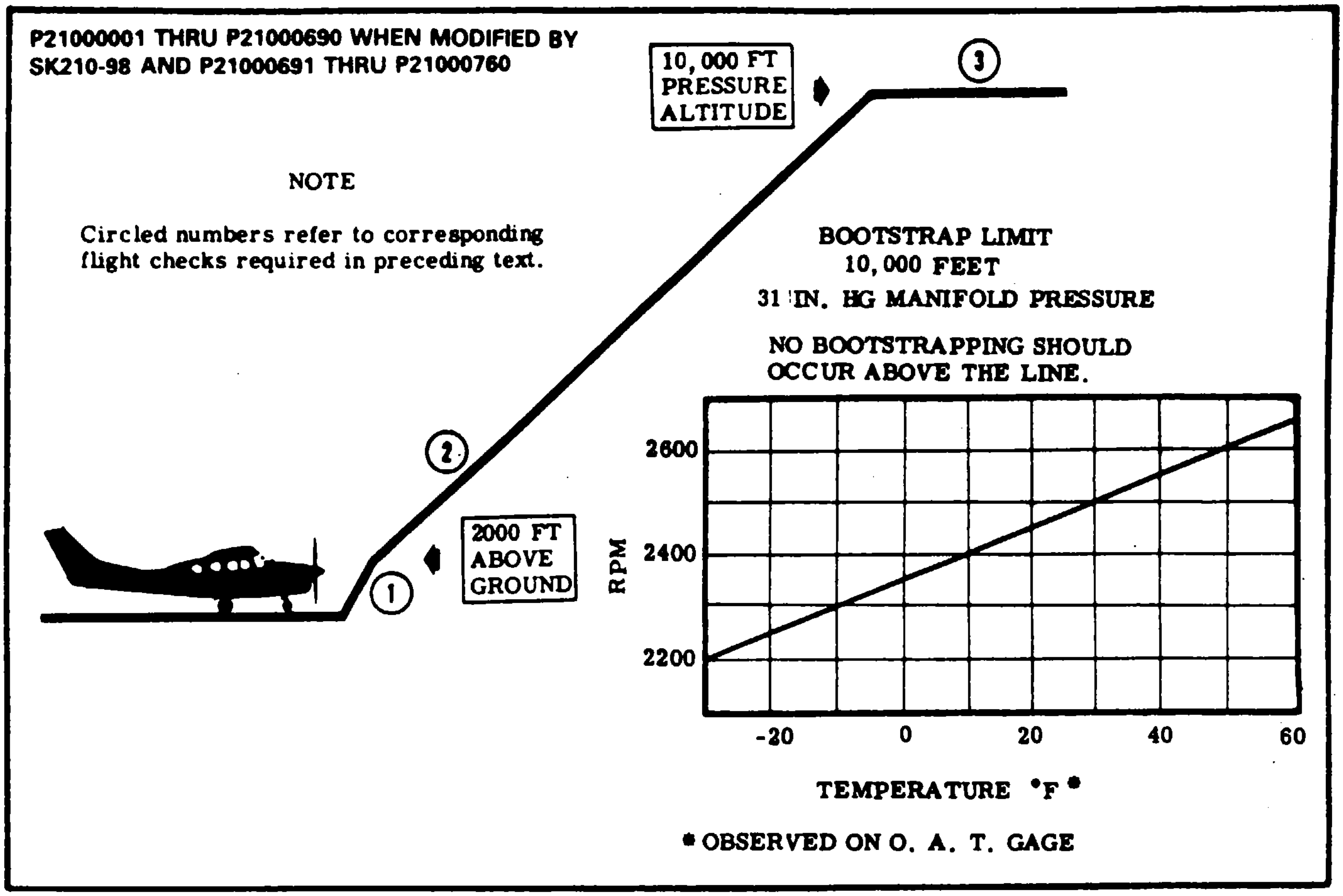


Figure 12-17A. Operational Flight Check

BEGINNING WITH P21000761

12-113. CONTROLLER, FUEL FLOW AND TURBOCHARGER OPERATIONAL FLIGHT CHECK. The following procedure details the method of checking the operation of the sloped controller, overboost valve and a performance check of the turbocharger.

(1) TAKE-OFF - SLOPED CONTROLLER CHECK.
a. Cowl Flaps - Open.
b. Airspeed - 110-120 KIAS.
c. Oil Temperature - Middle of green arc.
d. Engine Speed - 2700 ±25 RPM.
e. Fuel Flow (Full Rich Mixture) 180 to 186 LBS/HR. (186 ±2 LBS/HR with flow limiter installed).
f. Full Throttle M. P. - Sloped controller should maintain 35.5.

Climb 2000 feet after take-off to be sure manifold pressure has stabilized. It is normal on the first take-off of the day for full throttle manifold pressure to decrease 1/2 to 1.0 in. Hg within one minute after the initial application of full power.

(2) MAXIMUM CONTINUOUS POWER CLIMB, FULL RICH FUEL FLOW CHECKS. (Conduct immediately after Item 1 check).
a. Cowl Flaps - Open.
b. Airspeed - 110-120 KIAS.
c. Engine Speed - 2600 RPM.
d. Part-Throttle M. P. - 34.5 in. HG.
e. Fuel Flow (Full Rich Mixture) - 168 LBS/HR (MINIMUM).

NOTE

If the take-off fuel flow in Check 1 was less than 182 LBS/HR or the OAT is warmer than standard, use of the auxiliary fuel pump (yellow side) may be required to obtain 168 LBS/HR.

(2) NORMAL CLIMB - SLOPED CONTROLLER AND TURBOCHARGER PERFORMANCE CHECK.
a. Cowl Flaps - Open.
b. Airspeed - 110-120 KIAS.
c. Engine Speed - 2500 RPM.
d. Fuel Flow - Adjust mixture for 125 LBS/HR.
e. Part-Throttle M. P. - 30.0 in. Hg.
f. Climb to 17,000 feet - Check part-throttle critical altitude during climb.

This part-throttle critical altitude is where manifold pressure starts decreasing during the climb at a rate of approximately 1.0 in. Hg. per 1000 feet. After noting this altitude and the outside air temperature the desired manifold pressure should be maintained by advancing the throttle during the remainder of the climb.

Once the normal climb power setting is established after take-off, the controller should maintain a steady manifold pressure or no more than a 0.5 in. Hg. M. P. rise up to the part-throttle critical altitude indicated on the following chart. If part-throttle critical altitude has not been reached by 17,000 feet, discontinue check and proceed to cruise check

Outside Air Temperature	Part-Throttle Critical Altitude (80% Power)
20°F Below Standard	20,500 feet
Standard Temperature	18,000 feet
20°F Above Standard	15,500 feet
40°F Above Standard	13,000 feet

Part-throttle critical altitudes lower than those listed indicate the turbocharger system is not operating properly (refer to trouble shooting chart in paragraph 12-112). Critical altitudes above those listed indicate turbocharger performance better than normal. Also check that fuel flow decreases as manifold pressure decreases at critical altitude. Refer to trouble shooting chart if fuel flow does not decrease.

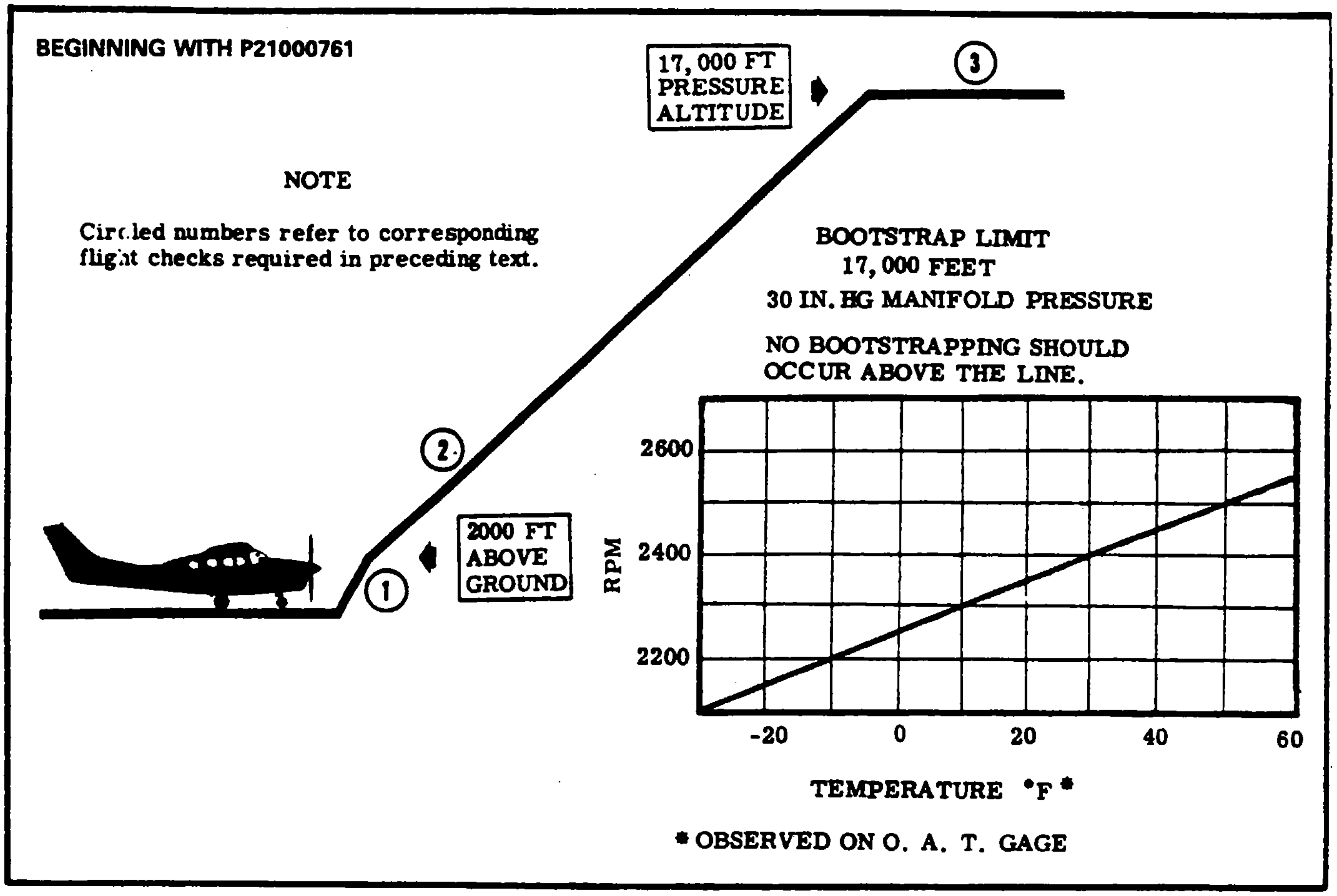


Figure 12-17B. Operational Flight Check

3 CRUISE-SLOPED CONTROLLER AND TURBOCHARGER PERFORMANCE CHECK.

a. Cowl Flaps - Closed.
b. Airspeed - Level Flight.
c. Pressure Altitude - 17,000 Feet.
d. Engine Speed - 2700 RPM (5 minute limit).
e. Part-Throttle M. P. - 30 in. Hg.
f. Fuel Flow - Lean to 135 LBS/HR.
g. Propeller Control -
   (1) Slowly decrease RPM until manifold pressure starts to drop, indicating wastegate is closed.

NOTE

If the wastegate closes at engine speeds lower than shown on the chart in figure 12-17B, the turbocharger performance is normal. If the wastegate closes at engine speeds higher than shown in figure 12-17B, refer to the trouble shooting chart in paragraph 12-112.

   (2) Note outside air temperature and RPM as manifold pressure starts to drop, which should be in accordance with the chart in figure 12-17B.
   (3) After noting temperature and RPM, increase engine speed 50 RPM to stabilize manifold pressure, with the wastegate modulating exhaust flow to control compressor output.

12-114. REMOVAL AND INSTALLATION OF TURBOCHARGER CONTROLLER.

a. Disconnect and tag oil lines from controller and plug or cap open lines and fittings.

b. Disconnect compressor outlet pressure sensing line from controller and plug or cap open line and fitting.

c. Remove two bolts attaching controller to mounting bracket on firewall.

d. Remove controller from aircraft, being careful not to drop controller unit.

e. Installation of the controller may be accomplished by reversing the preceding steps. Resafety bolts attaching controller to bracket.

12-115. ABSOLUTE CONTROLLER ADJUSTMENTS. (Refer to figure 12-18.) (THRU P21000760).

a. With engine oil temperature at middle of green arc, slowly open throttle and note maximum manifold pressure obtainable. Refer to paragraph 12-12.

b. Cut safety wire and remove plug from bottom of absolute controller (the vertical unit).

c. Using a flat-bladed screwdriver, rotate metering valve seat clockwise to increase manifold pressure and counterclockwise to decrease manifold pressure. Lightly tap the unit after each adjustment to seat internal parts.

NOTE

When adjusting metering valve, rotate in very small increments as this is an extremely sensitive adjustment. Approximately 13 degrees rotation will change the manifold pressure reading about one inch Hg.

d. Install and safety plug in absolute unit, then operate engine as in step "a". to ascertain that adjustment has not caused radical change in manifold pressure.

NOTE

When making adjustment on the ground, the hotter the engine gets, the lower the manifold pressure will be.

e. After each adjustment, the aircraft must be flight tested to check results.

f. Repeat this procedure until desired results are obtained.

12-116. REMOVAL AND INSTALLATION OF WASTEGATE AND ACTUATOR.

a. Disconnect and tag oil lines from actuator and plug or cap open lines and fittings.

b. Remove bolts, washers, and nuts attaching wastegate and actuator assembly to tailpipe.

c. Loosen clamp attaching tailpipe to turbine exhaust outlet and work tailpipe from turbine.

d. Remove bolts, washers, and nuts attaching the assembly to the exhaust manifold.

e. Remove the assembly from aircraft, being careful not to drop the unit.

f. Installation may be accomplished by reversing the preceding steps.

NOTE

When installing the assembly, be sure the gaskets at inlet and outlet of valve are installed and are in good condition. Replace gaskets if damaged.

12-117. ADJUSTMENT OF WASTEGATE ACTUATOR. (Refer to figure 12-18.)

a. This procedure may be accomplished with the wastegate either installed or removed from the aircraft.

b. Plug actuator outlet port and apply a 50 psig to 60 psig air pressure to the inlet port of the actuator.

c. If wastegate movement is sluggish apply either, Kano Aero Kroil (Kano Laboratories, 1000 S. Tompson Lane, Nashville, Tennessee 37211) or Mouse Milk Penetrating Oil (Worldwide Aircraft Filter Corporation, 1685 Abram Court, San Leandro, California 94577) to both EXTERNAL ends of the wastegate shaft. Actuate until smooth operation is obtained. Remove residue.

d. Check for 0.00 inch gap between butterfly and wastegate body as shown in figure 12-19.

e. If adjustment is required, remove pin from actuator shaft.

f. Hold clevis end and turn shaft clockwise to increase gap or counterclockwise to decrease gap of butterfly. Install pin through clevis and shaft, securing pin with washer and cotter pin.

g. After adjusting closed position and with zero pressure in cylinder, check butterfly for a clearance of 1.100 inch, +.000 or -.125 inch in the full open position as shown in figure 12-19.

h. If adjustment is required, loosen locknut and turn stop screw clockwise to decrease or counterclockwise to increase clearance of butterfly.

i. Recheck butterfly in the closed position to ascertain that gap tolerance has been maintained.

NOTE

To assure correct spring loads, actuate butterfly with air pressure. Actuator shaft and butterfly should move freely. Actuator shaft should start to move at 15 psig, +2 or -2 psig and fully extend at 35 psig, +2 or -2 psig. Two to four psi hysteresis is normal, due to friction of O-ring against cylinder wall.

j. Remove air pressure line and plug from actuator.

12-118. EXTREME WEATHER MAINTENANCE.

12-119. COLD WEATHER. Cold weather starting will be made easier by the installation of an engine primer system and a ground service receptacle. The primer system is manually operated from the cabin. Fuel is supplied by a line from the fuel strainer to the plunger. Operating the primer forces fuel to the engine. With an external power receptacle installed an external power source may be connected to assist in clod weather or low battery starting. The following may also be used to assist engine starting in extremely cold weather. After the last flight of the day, drain

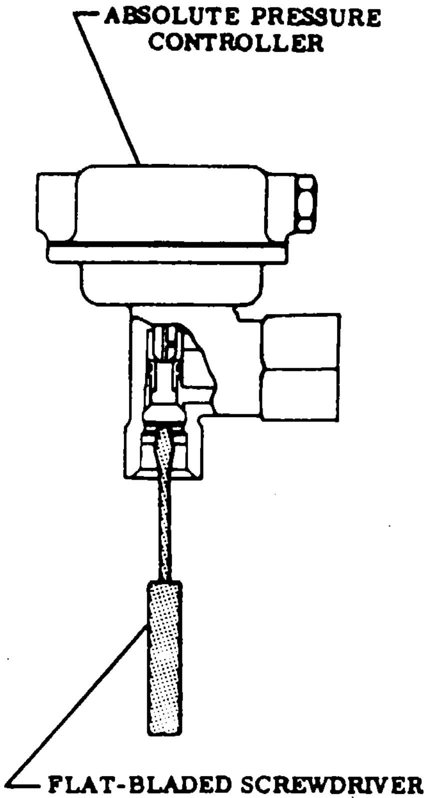


Figure 12-18. Controller Adjustment

the engine oil into a clean container so the oil can be preheated. Cover the engine to prevent ice or snow from collecting inside the cowling. When preparing the aircraft for flight or engine run-up after these conditions have been followed, preheat the drained engine oil.

WARNING

Do not heat the oil above 121°C (250°F). A flash fire may result. Before pulling the propeller through, ascertain that the magneto switch is in the OFF position to prevent accidental firing of the engine.

After preheating the engine oil, gasoline may be mixed with the heated oil in a ratio of 1 part gasoline to 12 parts engine oil before pouring into the engine oil sump. If the free air temperature is below minus 29°C (-20°F), the engine compartment should be preheated by a ground heater. Pre-heating the engine compartment is accomplished by inducing heated air up through the cowl flap openings; thus heating both the oil and the cylinders. After the engine compartment has been preheated, inspect all engine drain and vent lines for presence of ice. After this procedure has been complied with, pull propeller through several revolutions by hand before attenpting to start the engine.

CAUTION

Due to the desludging effect of the diluted oil, engine operation should be observed closely during the initial warm-up of the engine. Engines that have considerable amount of operational hours accumulated since their last dilution period may be seriously affected by the dilution process. This will be caused by the diluted oil dislodging sludge and carbon deposits within the engine. This residue will collect in the oil sump and possibly clog the screened inlet to the oil sump. Small deposits may actually enter the oil sump and be trapped by the main oil filter screen. Partial or complete loss of engine lubrication may result from either condition. If these conditions are anticipated after oil dilution, the engine should be run for several minutes at normal operating temperatures and then stopped and inspected for evidence of sludge and carbon deposits in the oil sump and oil filter screen. Future occurrence of this condition can be prevented by diluting the oil prior to each engine oil change. This will also prevent the accumulation of the sludge and carbon deposits.

Refer to Average Ambient Temperature (°F) Oil Grade chart in Section 2, for the correct grade of engine oil for the ambient temperature.

12-120. HOT WEATHER. Refer to Pilot's Operating Handbook.

12-121. SEACOAST AND HUMID AREAS. In salt water areas special care should be taken to keep the engine, accessories and airframe clean to prevent oxidation. In humid areas, fuel and oil should be checked frequently and drained of condensation to prevent corrosion.

12-122. DUSTY AREAS. Dust induced into the intake system of the engine is probably the greatest single cause of early engine wear. When operating in high dust conditions, service the induction air filters daily as outlined in Section 2. Also change engine oil and lubricate airframe items more often than specified.

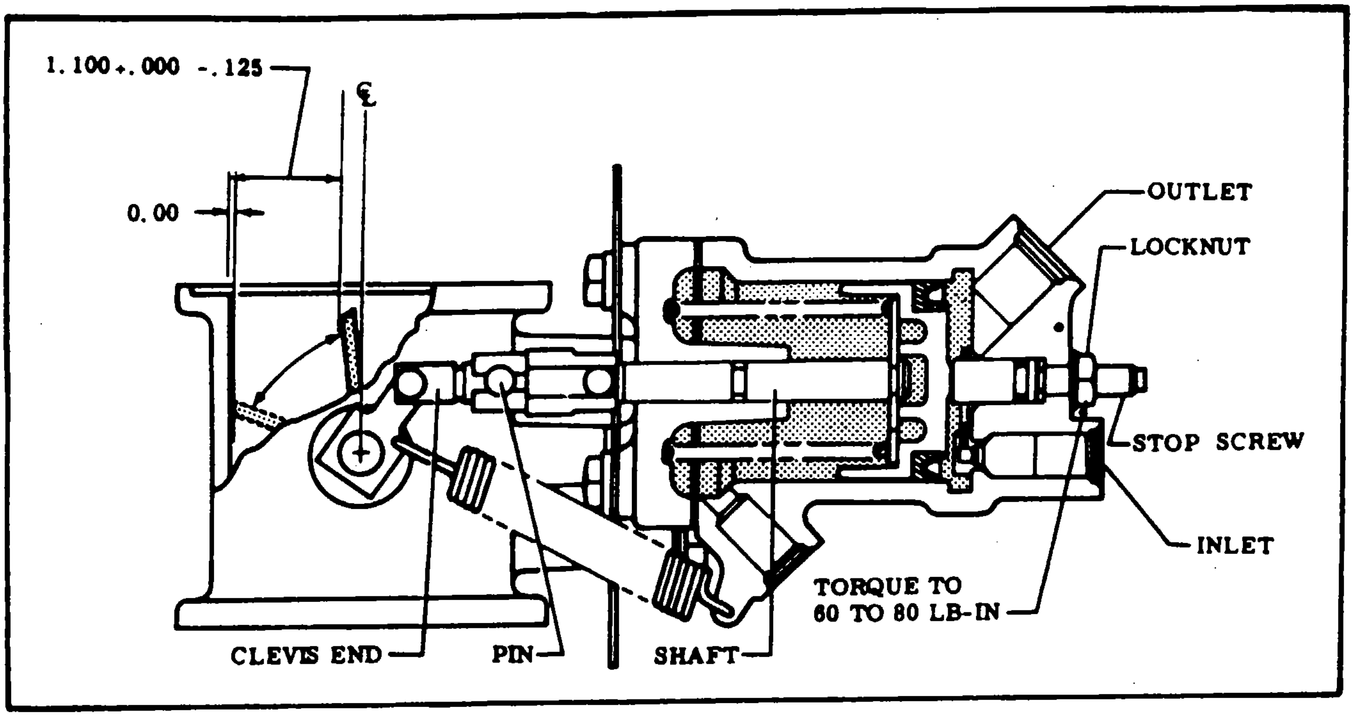


Figure 12-19. Waste-Gate Adjustment

SECTION 13

FUEL SYSTEM

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13-1. FUEL SYSTEM. The fuel system as defined by this manual includes all components up to and including the fuel line connecting to the engine driven pump inlet. Engine mounted components are covered in Section 12-

13-2. DESCRIPTION. (THRU P21000760). The fuel system is essentially a gravity flow system from the bay outlets to the selector valve and a pump augmented system from the selector valve to the engine. The fuel system is comprised of fuel bays in each wing, reservoirs, selector valve, auxiliary fuel pump, fuel strainer, engine driven fuel pump and associated plumbing. The fuel bay outlets are located at the inboard end of the bays with lines routed down the front and rear doorposts, under the floorboards and to the reservoirs. The forward line also serves as a vapor return line. Fuel bypasses the auxiliary fuel pump, when not in use through an integral bypass valve. Each bay is vented overboard through a check valve in each wing tip. Beginning with P21000390 and earlier aircraft modified by SK210-93 the following changes have been made: The fuel lines from the firewall to the strainer and the strainer to the tunnel fitting will be changed from aluminum to stainless steel with insulating sleeving. The fuel hose from the fuel pump to the check valve, and from the check valve to the firewall, and fuel pump to tunnel fitting will be changed from non-sleeved hose to fire sleeved hose. The check valve is also fire sleeved.

13-3. PRECAUTIONS. Because fuels are volatile, certain safety precautions should be observed when performing maintenance on the system, or some related systems. The most common precautions are listed below, however, good judgment and common sense should also be used during such maintenance actions.

a. Make sure aircraft is GROUNDED to a proper grounding stake before fueling, defueling, purging, or performing other maintenance on fuel system.

b. Residual fuel draining from disconnected lines also constitute a fire hazard. Allowing this drainage to accumulate increases the hazard accordingly, therefore drip pans should be used.

c. Damage to the fuel system can occur from foreign material in system, or unprotected lines and fittings when disconnected. Caps or covers should always be used.

NOTE

Use NS-40 (RAS-4) (Snap-On Tools, Corp., Kenosha, Wisconsin), MIL-T-5544 (Thread Compound, Antiseize, Graphite Petrolatum), USP Petrolatum, or engine oil as thread lubricant or seal through the complete system. Apply sparingly to male fittings omitting first threads to prevent stringing across fitting. Do not use any other form of thread compound on the injector system.

SHOP NOTES:

13-4. TROUBLE SHOOTING.

This table to be used in conjunction with trouble shooting chart in Section 12.

TROUBLE	PROBABLE CAUSE	REMEDY
NO FUEL QUANTITY INDICATION.	Fuel bays empty.	Service with proper fuel.
	Open or defective circuit breaker.	Reset, or replace if defective.
	Open circuit due to wiring or connections.	Tighten connections or replace defective wiring.
	Defective indicator, transmitter.	Refer to Section 16.
NO FUEL FLOW TO ENGINE DRIVEN PUMP.	Fuel selector or fuel ON-OFF valve turned off.	Turn ON.
	Fuel strainer plugged.	Clean strainer.
	Fuel bay outlet screen plugged.	**CAUTION** Drain bay. Remove and clean screens, and flush bay.
	Defective fuel selector valve.	**CAUTION** Drain bays. Repair or replace selector valve.
	Fuel line plugged.	**CAUTION** Drain bay. Remove, repair, and reinstall line.
NO FUEL FLOW WHEN ELECTRIC PUMP OPERATED.	Defective fuel pump switch.	Replace defective switch.
	Open circuit due to broken wiring or loose connections.	Repair circuit or tighten connections.
	Defective electric fuel pump.	Replace pump.
	Defective bypass or relief valve in engine driven pump.	Remove and replace engine driven fuel pump.
FUEL STARVATION AFTER STARTING.	Plugged fuel bay vent.	Refer to paragraph 13-19.
	Water in fuel.	Drain fuel bay sumps, lines, and strainer.
	Malfunction of engine driven fuel pump or injection system.	Refer to Section 12.
FLUCTUATING FUEL PRESSURE INDICATION.	Obstructed filters or screens.	Remove, check, and clean, proceding from most accessable to least.
	Manifold valve defective.	Replace defective valve.
	Fuel flow indicator defective.	Replace defective indicator.

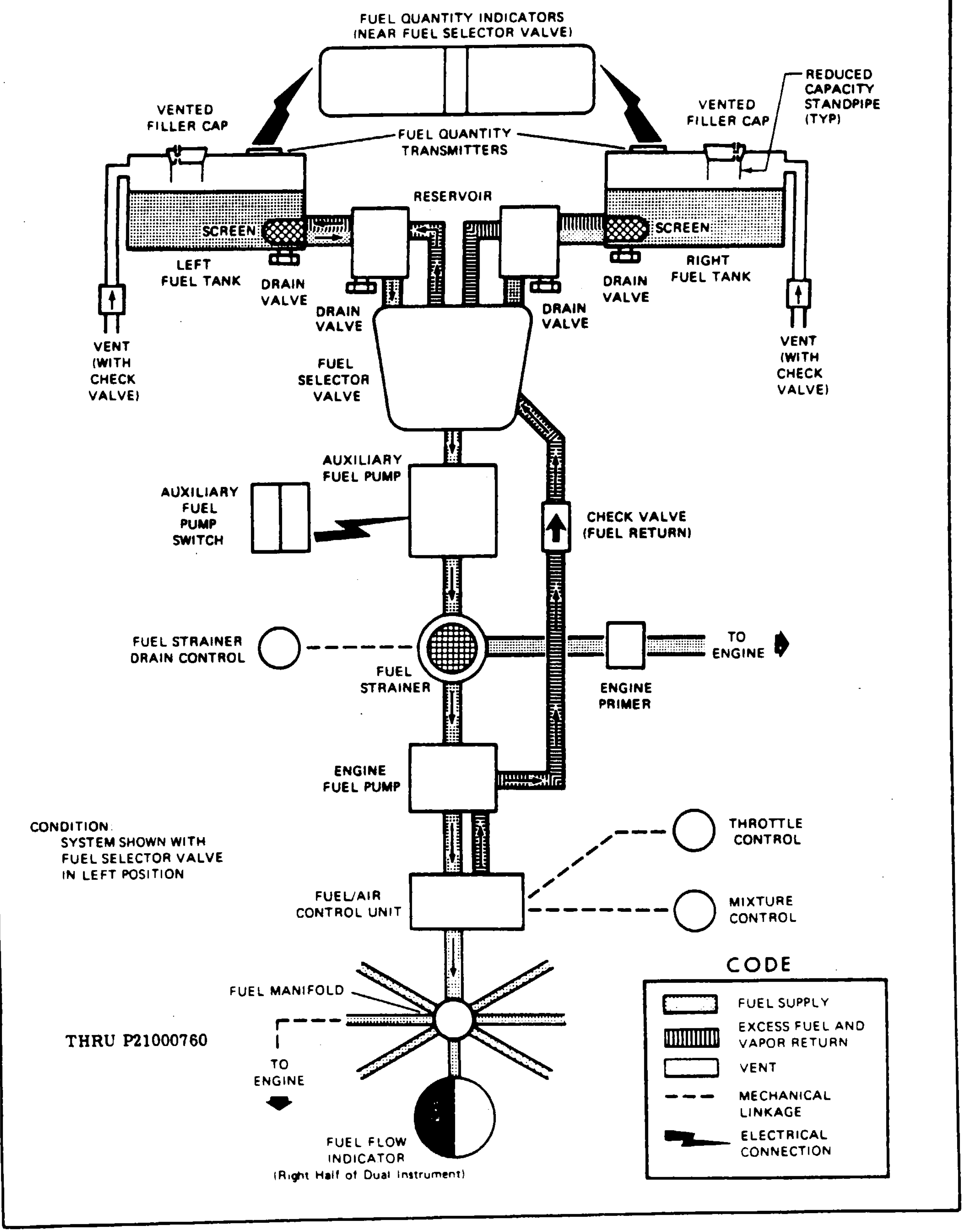
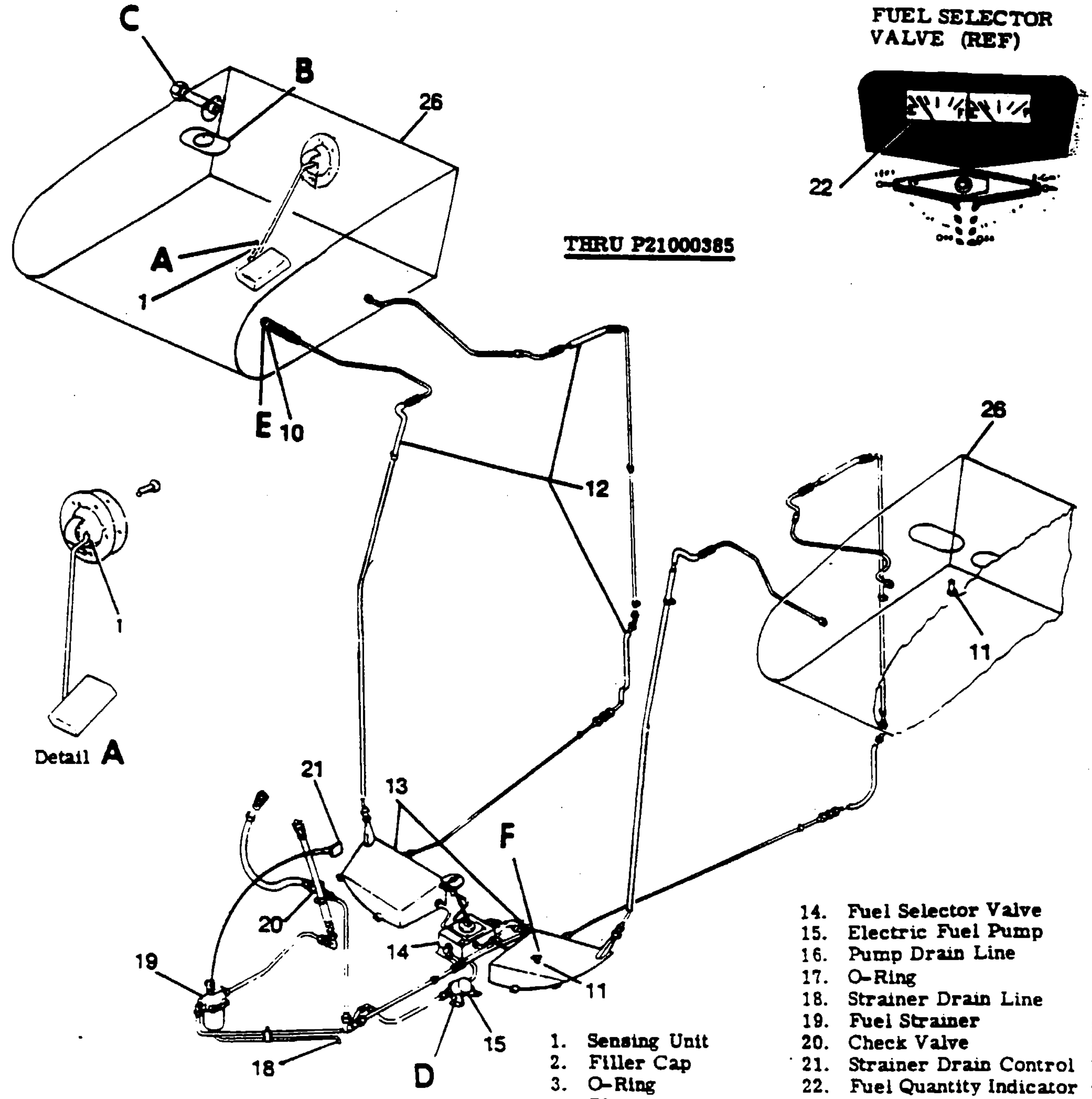


Figure 13-1. Fuel System Schematic



14. Fuel Selector Valve
15. Electric Fuel Pump
16. Pump Drain Line
17. O-Ring
18. Strainer Drain Line
19. Fuel Strainer
20. Check Valve
21. Strainer Drain Control
22. Fuel Quantity Indicator
23. Deleted
24. Fuel Outlet Fitting
25. Packing
26. Fuel Sampler Cup
27. Insulator
28. Bracket
29. Fuel Pump
30. Controller
31. Bracket
32. Spacer

1. Sensing Unit
2. Filler Cap
3. O-Ring
4. Plate
5. Adaptor
6. Indicator
7. Fuel Vent Fitting
8. Union
9. Vent Line
10. Finger Strainer
11. Drain Valve
12. Sleeving (typical)
13. Reservoir Tank

See sheet 2 for beginning serial P21000390 and those aircraft modified by SK210-93.

Figure 13-2. Fuel System (Sheet 1 of 4)

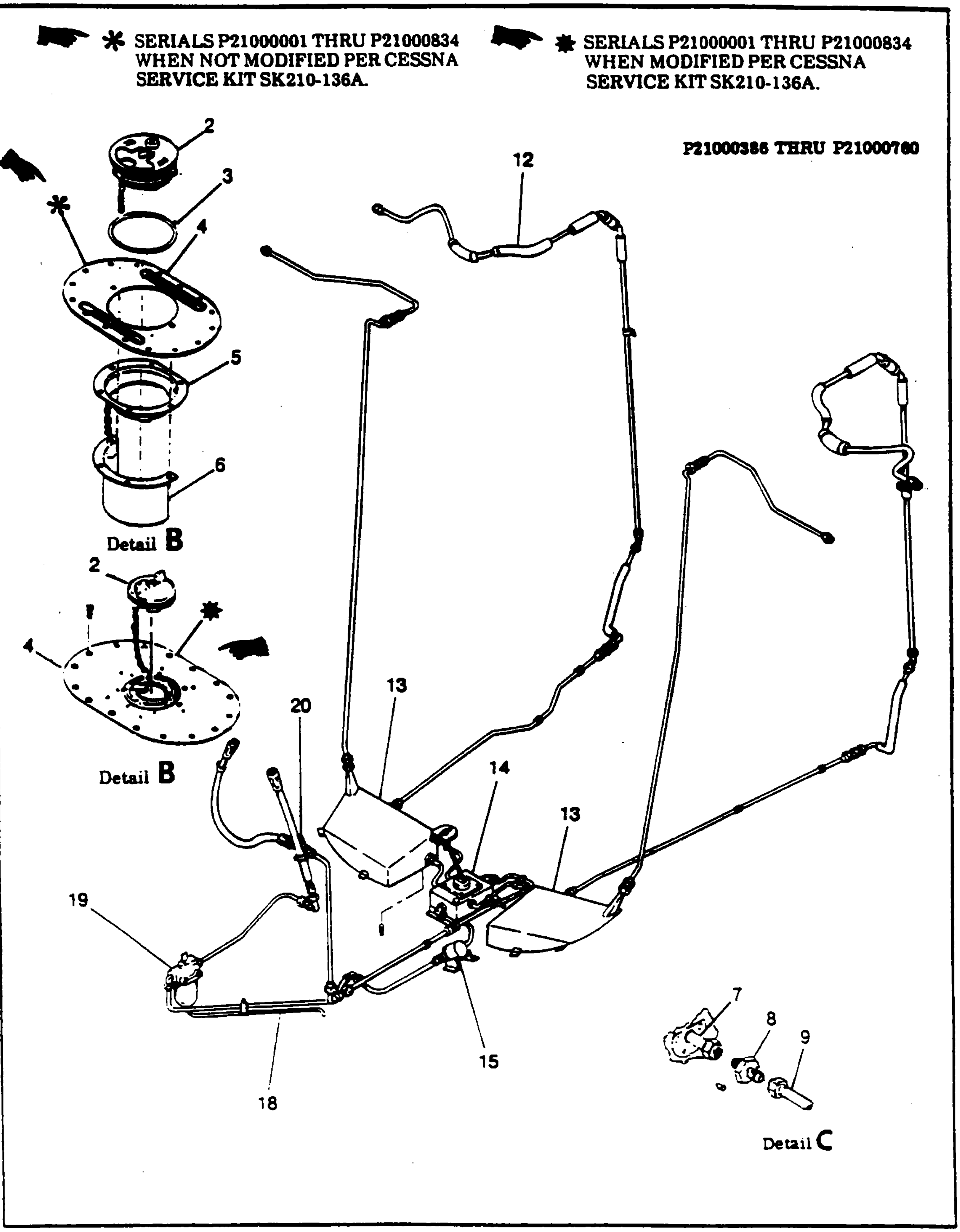


Figure 13-2. Fuel System (Sheet 2 of 4)

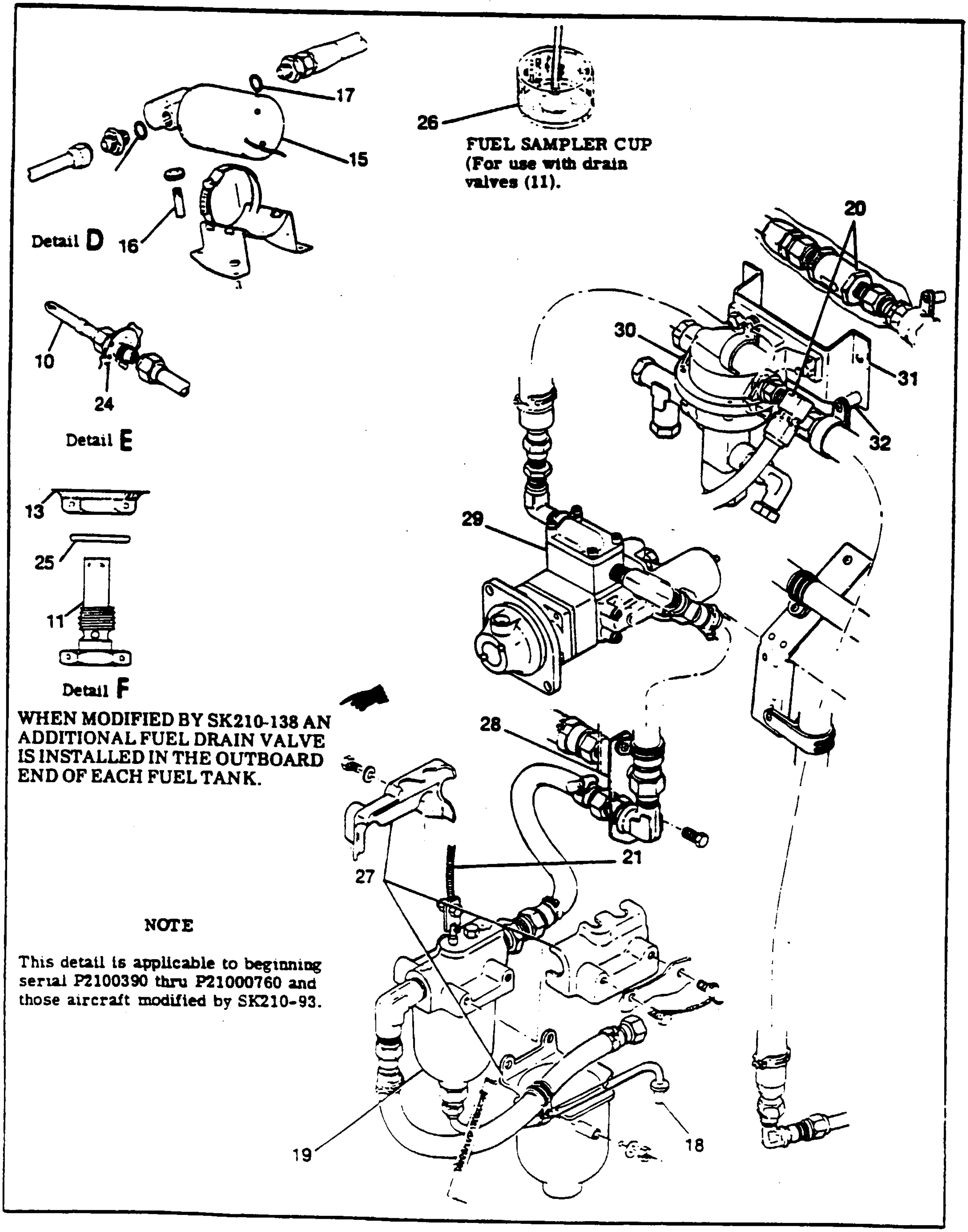
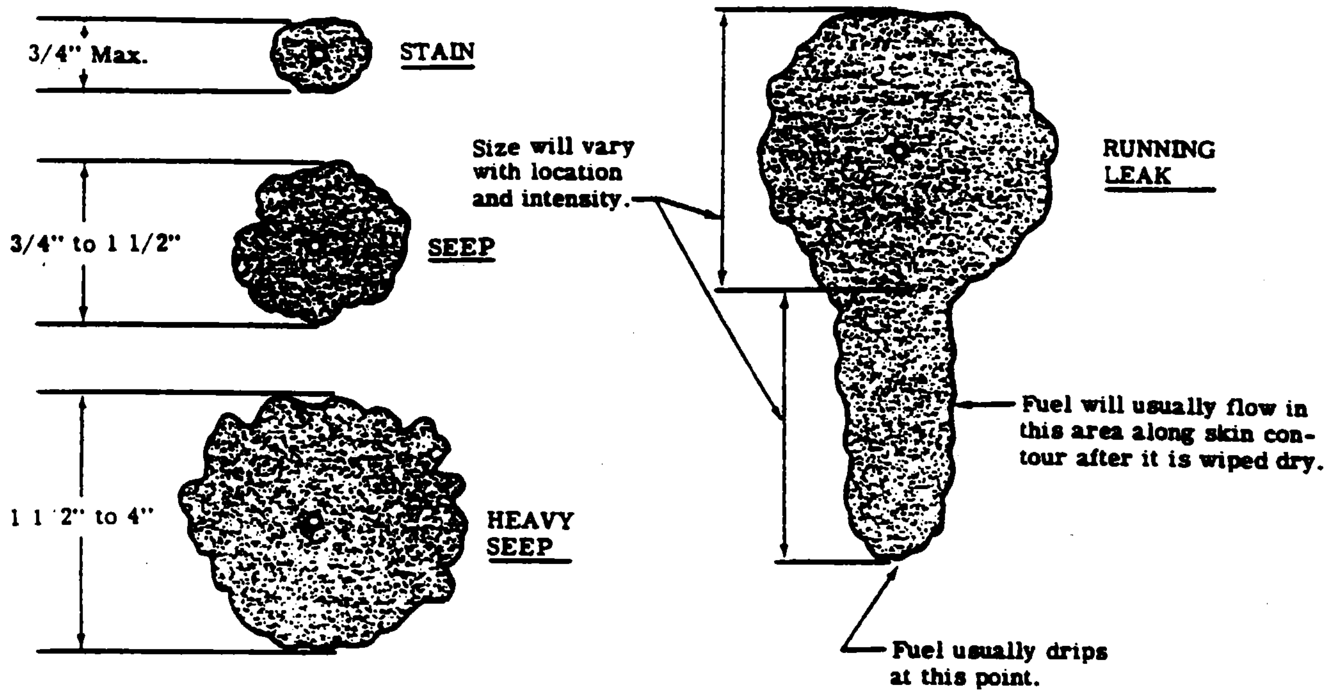


Figure 13-2. Fuel System (Sheet 3 of 4)



WARNING

REFER TO PARAGRAPH 13-9 FOR FUEL BAY PURGING WHICH SHOULD BE ACCOMPLISHED BEFORE REPAIRING FUEL BAYS.

Figure 13-3. Classification of Fuel Leaks.

13-5. FUEL BAYS. Fuel bays are those integral portions of the wet wing aircraft that form fuel cells.

13-6. DESCRIPTION. Aircraft with cantilever wings have an inboard section of each wing forward of the main spar sealed to form an integral fuel bay area. The bay consists of a front and rear fuel spar, inboard, outboard, and intermediate ribs and stringers. A standpipe at the bay filter acts as a visual aid, when loading fuel, to indicate quantity of fuel on board. For a reduced load, fill to bottom edge of filler collar.

13-7. FUEL BAY LEAKS.

13-8. CLASSIFICATION OF FUEL LEAKS. Fuel leaks which do not constitute a flight hazard are stains, seeps, and heavy seeps NOT in an enclosed area. However, they should be repaired when the aircraft is grounded for other maintenance. Fuel leaks which constitute a flight hazard are running leaks in any area, seeps, heavy seeps or stains in an enclosed area, such as the wing leading edge, the sections of wing inboard and outboard of the fuel bay and the area between the rear fuel spar and the main spar. These leaks must be repaired before that bay is used for another flight. The wet or stained spot on the wing in the area of the bay is an indication of the intensity of the leak. Fuel leak classifications are shown in figure 13-3.

NOTE

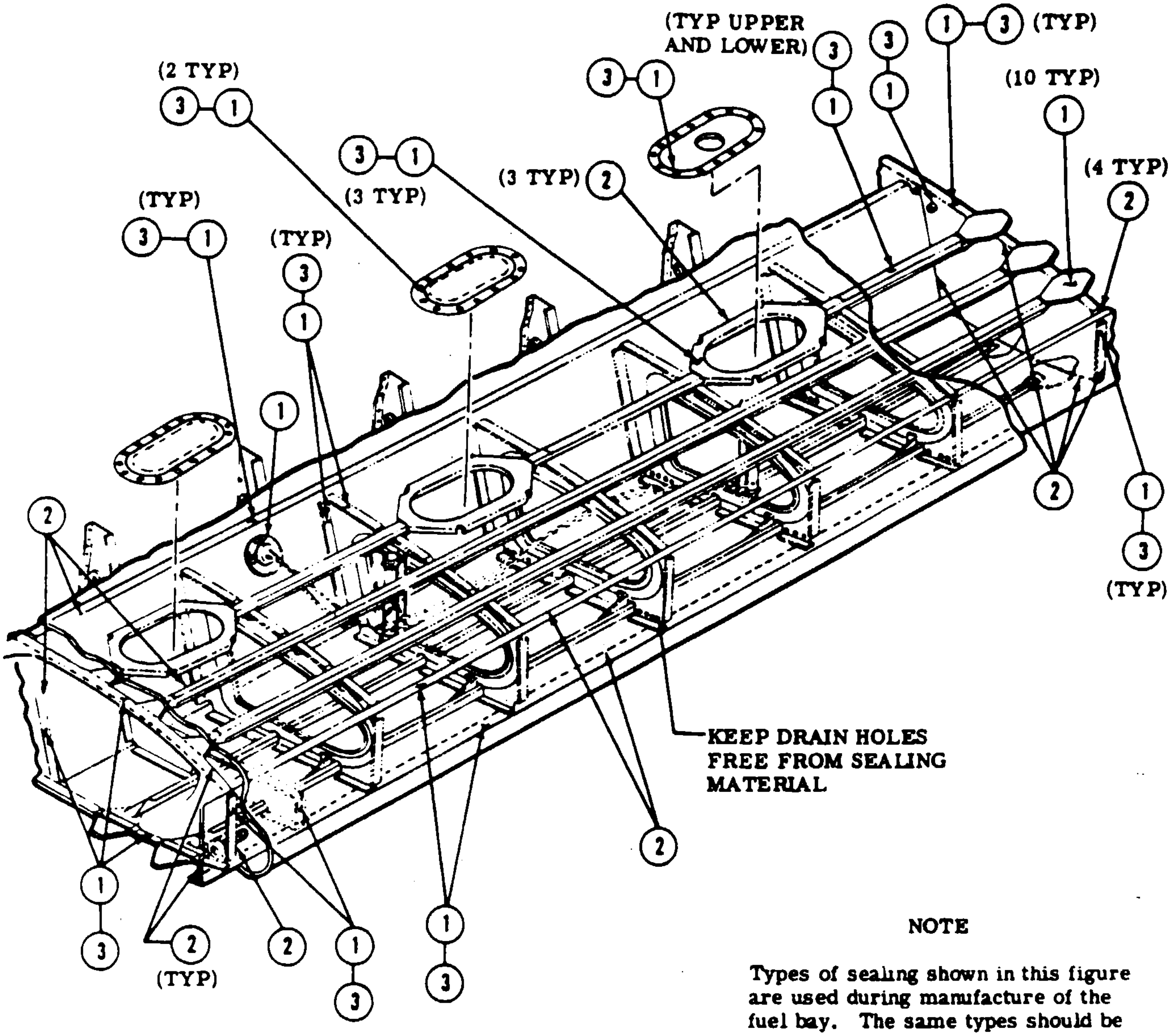
Stains and seeps that are not considered a flight hazard must be inspected after each flight to ensure that they have not grown in intensity to the point of causing a flight hazard.

Should a flight hazard leak occur in an area where there are no adequate repair facilities, then the affected bay should be drained, the leak temporarily repaired, and the aircraft flown immediately to an adequate repair facility by using the opposite fuel supply.

13-9. FUEL BAY PURGING.

WARNING

Purge fuel bays with an inert gas prior to repairing fuel leaks, to preclude the possibility of explosions.



NOTE

Types of sealing shown in this figure are used during manufacture of the fuel bay. The same types should be used when making a structural repair to the fuel bay area and when reinstalling the access doors or the fuel quantity sending unit.

CODE

(1) FAYING SURFACE SEAL

(2) FILLET SEAL

(3) RIVET AND FASTENER SEAL

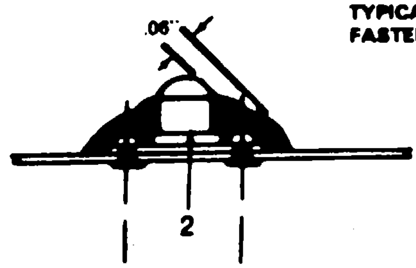
Figure 13-4. Fuel Bay Sealing (Sheet 1 of 2)

NOTE

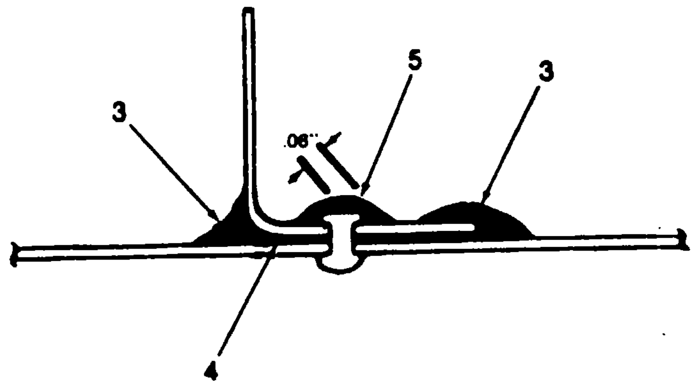
Refer to paragraph 13-12.

TYPICAL
INSPECTION PLATE

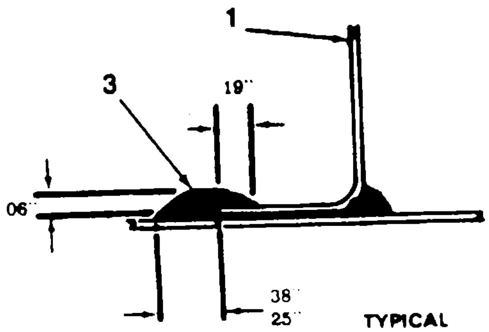
1. Fuel Side
2. Nutplate
3. Fillet Seal
4. Faying
5. Rivet and Fastener Seal



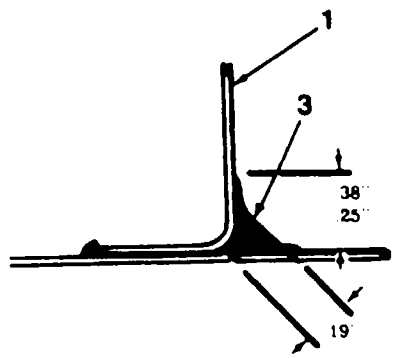
TYPICAL
FASTENER



TYPICAL
RIB SECTION



TYPICAL
FUEL BAY
SPAR



TYPICAL
END SECTION

Figure 13-4. Fuel Bay Sealing (Sheet 2 of 2)

The following procedure may be used to purge the bay with argon or carbon dioxide.

a. Ground the aircraft to a suitable ground stake.
b. Set fuel selector or fuel ON-OFF valve handle in OFF position.
c. Drain all fuel from bay being repaired. (Observe the precautions in paragraph 13-3.)
d. Remove access doors and insert hose to each end of bay simultaneously.
e. Allow inert gas to flow into bay for several minutes (time dependent upon hose size, rate of flow, etc.) to remove all fuel vapors.

Since argon and carbon dioxide are heavier than air, these gases will remain in the bay during the repair. The repair shall be made using non-sparking tools (air motors, plastic scrapers, etc.)

NOTE

Portable vapor detectors are available to determine presence of explosive mixtures and are calibrated for leaded fuel. These detectors can be used to determine when it is safe to make repairs.

13-10. FUEL BAY SEALANT. Two type sealants are used in integral fuel bay construction. A pliable type for access doors, and the rigid type for sealing ribs and spars to the skin. Service Kit SK210-56C, available through Cessna Service Parts Centers, contains these sealants with the proper ratio of accelerators for each.

WARNING

Keep sealants away from heat and flame. Use only in a well ventilated area. Avoid skin and eye contact. WEAR EYE SHIELDS. In case of eye contact, flush generously with clean water, and secure prompt medical attention.

13-11. MIXING SEALANT. Mix sealant according to service kit instructions.

13-12. SEALING. (Refer to Section 18 for repair procedures).

CAUTION

Protect drains and fuel outlet screens when applying sealants to fuel bays.

Any repair that breaks the fuel bay seal will necessitate resealing of that area of the bay. Repair parts that need sealing must be installed and riveted during the sealing operation. All joints within the boundary of the bay, but which do not provide a direct fuel path out of the bay, such as stringers and rib flanges within the bay, must be fay surface sealed only. Joints which provide a direct fuel path out of the bay area, such as fuel spar flanges and inboard and outboard rib flanges, must be fay surface sealed and fillet sealed on the fuel side. Fay surface sealing is applying sealant to one mating part before assembly. Enough sealant must be applied so it will squeeze out completely around the joint when the parts are riveted or fastened together. The fillet seal is applied after the joint is fay surface sealed and riveted or fastened together. Fillet sealing is applying sealant to the edge of all riveted joints, joggles, bend reliefs, voids, rivets or fasteners through the boundary of the bay and any place that could produce a fuel leak. The fay sealant need not be cured before the fillet seal is applied, but the squeezed out sealant, to which the fillet sealant is applied, must be free of dirt and contamination. Fillets laid on intersecting joints shall be joined together to produce a continuous fillet. Filler sealant must be pressed into the joint, working out all entrapped air. The best method of applying sealant is with an extrusion gun. Then work the sealant into the joint with a small paddle, being careful to eliminate all air bubbles.

NOTE

During structural repair, parts must be predrilled, countersunk or dimpled and cleaned before being sealed and positioned for final installation.

a. Remove all existing sealant from area to be sealed, leaving a taper on the remaining sealant. The taper will allow a scarf bond and a continuous seal when the new sealant is applied.

NOTE

The best method for removing sealant is with a chisel tool made of hard fiber. Remaining sealant is then removed with aluminum wool. Neither steelwool nor sandpaper can be used.

b. Vacuum thoroughly to remove all chips, filings, and other foreign material from bay areas.
c. All surfaces and areas to be sealed shall be thoroughly cleaned by wiping with a clean cloth dampened with Methyl Ethyl Ketone (MEK), acetone or similar solvent, and dried with a clean cloth prior to solvent evaporation. Always pour the solvent on the cloth. Never use contaminated solvent. The cloth shall not be so saturated that dripping occurs.

13-13. SEALING FUEL LEAKS. First determine the source of the fuel leak. Fuel can flow along a seam or structure of the wing for several inches, making the leak source difficult to find. A stained area is an indication of the leak source. Fuel leaks can be found by testing the complete bay as described in paragraph 13-15. Another method of detecting the source of a fuel leak is to remove access doors and blow with an air nozzle from the inside of the bay in the area of the leak while soap bubble solution is applied to the outside of the bay. After the leak source has been found, proceed as follows:

a. Remove existing sealant in the area of the leak.
b. Clean the area and apply a fillet seal. Press sealant into leaking area with a small paddle, working out all air bubbles.
c. If leakage occurs around a rivet or bolt, restrike the rivet or loosen bolt, retorque, and reseal around nutplate.

d. Apply fay surface door sealant to access doors, fuel quantity transmitters, etc., if removed, and install.

e. Test fuel bay for leakage as outlined in paragraph 13-15.

13-14. CURING TIME. Service Kit SK210-56 contains SP654706B2 Access Door Sealant Kit and SP654890B2 Fuel Bay Sealant Kit. Normal curing time for each seal is 24 hours. These values are based on a standard condition of 77°F (25°C) and 50% relative humidity. Curing time may be accelerated as shown in the following chart.

NOTE

Temperature shall not exceed 160°F (71°C). Bay must be vented to relieve pressure during accelerated curing.

ACCELERATED CURING TIME

°F of Sealant	Time in Hours
160	3
140	4
130	5 1/2
120	7

Service Kit SK210-101 contains PR1321B 1/2 Access Cover Sealant Kit and PR1422B 1/2 Fuel Bay Sealant Kit. Normal curing time for PR1321B 1/2 seal based on a standard condition of 75°F (23.9°C) and 50% relative humidity is 18 hours. Normal curing time for PR1422B 1/2 seal based on a standard condition of 75°F (23.93C) and 50% relative humidity is 45 hours. Curing time may be accelerated by applying heat up to 120°F on the PR1321B 1/2, and by applying heat up to 130°F on the PR1422B 1/2. Refer to Accelerated Curing Time Chart above.

13-15. TESTING INTEGRAL FUEL BAY.

a. Remove vent line from vent fitting and cap fitting.

b. Disconnect fuel lines from bay.

c. To one of the bay fittings, attach a water manometer capable of measuring twenty inches of water.

d. To the other bay fitting, connect a well regulated supply of air (1/2 PSI MAXIMUM, or 13.8 INCHES of water). Nitrogen may be used where the bay might be exposed to temperature changes while testing.

e. Make sure filler cap is installed and sealed.

CAUTION

Do not attempt to apply pressure to the bay without a good regulator and a positive shut-off in the supply line. Do not inflate the fuel bay to more than 1/2 psi or damage may occur.

f. Apply pressure slowly until 1/2 PSI is obtained.

g. Apply soap solution as required.

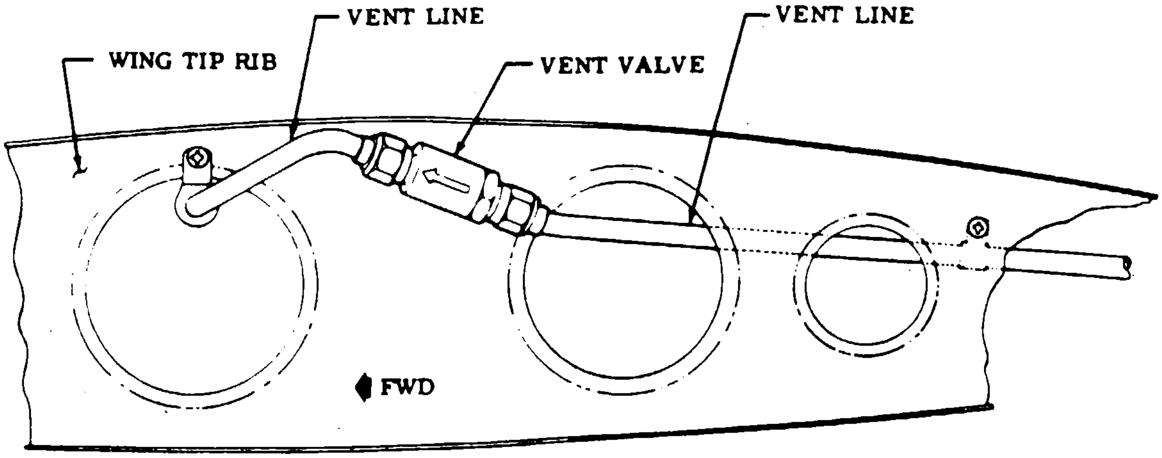
h. Allow 15 to 30 minutes for pressure to stabilize.

i. If bay holds for 15 minutes, without pressure loss, bay is acceptable.

j. Reseal and retest if any leaks are found.

13-16. FUEL VENTS.

13-17. DESCRIPTION. The fuel bay vent line extends from each fuel bay to the wing tip. This vent line contains a check valve to prevent fuel drainage through the vent line, but still allow the positive pressure



NOTE

Hinge for vent valve must be at top and vent valve installed with arrow in direction shown.

Figure 13-5. Fuel Bay Vents

from expanding fuel to escape from the bays. Check all fittings and clamps for tightness and vent line for clearance to prevent chafing against inner wing structure. The fuel vent line at the trailing edge of the wing tip should be checked daily for evidence of foreign matter.

13-18. REMOVAL AND INSTALLATION.
a. Remove wing tip and access covers on underside of wing as necessary for access.
b. Disconnect vent line at fuel bay and disconnect clamps attaching vent line to wing structure.
c. Disconnect vent line from the check valve at wing tip.
d. Remove vent line by carefully pulling it from the outboard end of the wing.
e. Reverse the preceding steps for installation.

CAUTION

The vent line check valve must be installed as shown in figure 13-5.

13-19. CHECKING. Field experience has demonstrated that the vents can become plugged, causing possible fuel starvation of the engine. Also, the bleed hole in the vent valve assembly could possibly become plugged, allowing pressure from expanding fuel to pressurize the bay areas. The following procedure may be used to check the vent and bleed hole in the vent valve assembly.

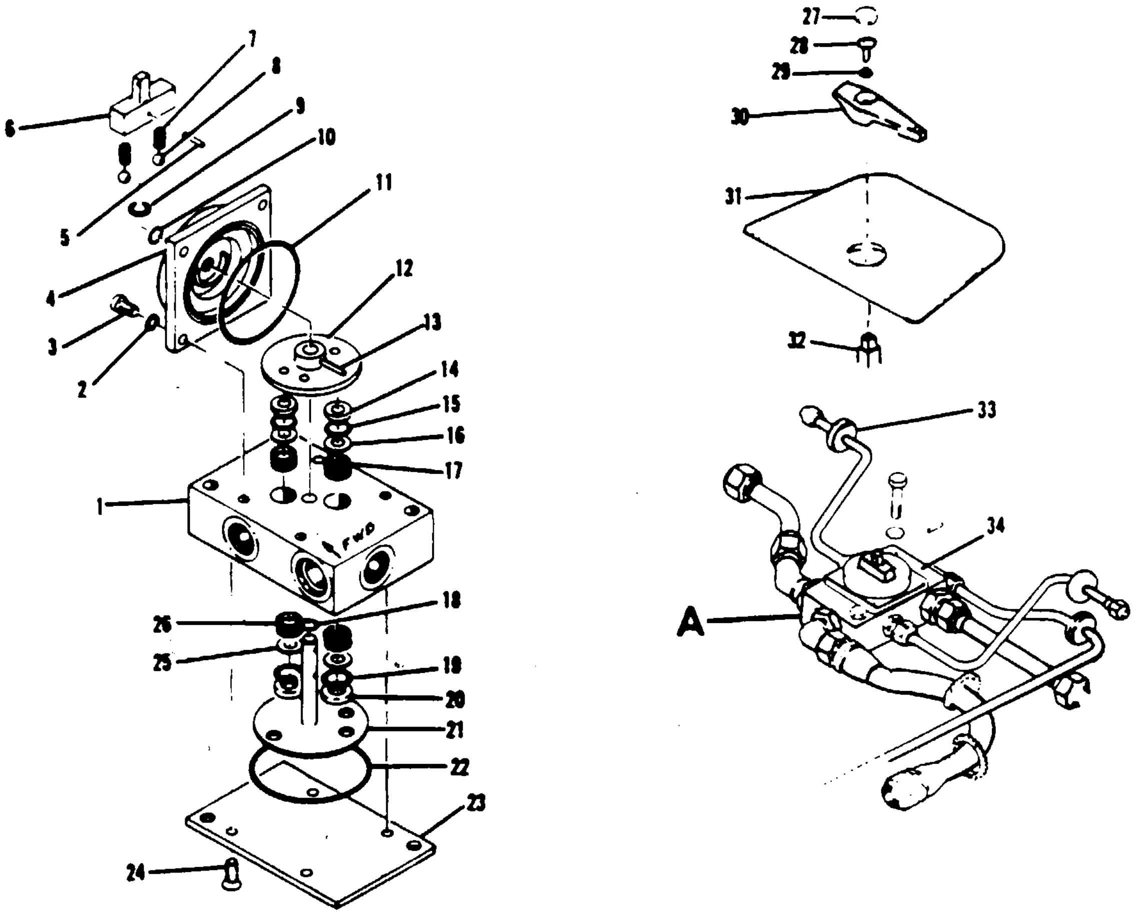
a. Cover .040 drilled holes approximately 6 inches from end of vent lines at trailing edges of wing tips.
b. Attach a rubber tube to the end of the vent line at the trailing edge of one wing tip.
c. Turn off fuel selector or fuel ON-OFF valve and check that both fuel filler caps are securely installed.
d. Blow into tube to slightly pressurize the fuel bay. If air can be blown into bay, the vent line is open.
e. After the fuel bay is slightly pressurized, insert end of rubber tube into a container of water and watch for a continuous stream of bubbles, which indicates the bleed hole in valve assembly is open and relieving pressure.
f. Repeat this procedure for fuel vent at opposite wing tip.

NOTE

A plugged vent or bleed hole can cause fuel starvation, or pressurization of fuel bay. It is a must to correct any plugged or restricted vent before returning aircraft to service.

CAUTION

Be sure to uncover drilled holes in vent lines at wing tips after completion of check.



Detail A

THRU P21000760

1. Valve Body
2. Lockwasher
3. Screw
4. Cover
5. Roll Pin
6. Yoke
7. Spring
8. Ball
9. Brass Washer
10. O-Ring
11. O-Ring
12. Rotor
13. Roll Pin
14. Seal
15. O-Ring
16. Washer
17. Spring
18. O-Ring
19. O-Ring
20. Seal
21. Rotor
22. O-Ring
23. Sump Plate
24. Screw
25. Washer
26. Spring
27. Cap
28. Screw
29. Washer
30. Handle
31. Placard
32. Selector Shaft
33. Grommet
34. Selector Valve

Figure 13-6. Fuel Selector Valve Assembly

13-20. FUEL QUANTITY INDICATING SYSTEM.

13-21. DESCRIPTION. The system is comprised of one float type transmitter in each fuel bay, two quantity indicators located in the fuel selector valve panel, and associated wiring. The gages are magnetic type, and the float transmitters are variable resistance type. Refer to Section 16 for operation, calibration, removal, and installation procedures.

13-22. REMOVAL AND INSTALLATION OF SYSTEM COMPONENTS. Refer to Section 16 for procedures.

13-23. DESCRIPTION. There are two reservoirs installed in the lower fuselage, one on each side of the aircraft, immediately outboard of the selector valve. Each reservoir has four line connections: two from the fuel bay, one to the selector valve, and one from the selector valve used for vapor return. A drain valve is installed in the bottom of each reservoir for draining impurities from the fuel system.

13-25. REMOVAL AND INSTALLATION.

a. Place selector valve in "OFF" position.
b. Drain all fuel from wing bay, reservoir and lines for the reservoir being removed. (Observe precautions in paragraph 13-3.)
c. Remove front seat, carpeting and plates as necessary to gain access to reservoir.
d. Disconnect and cap or plug all fuel lines at reservoir.
e. Remove screws securing tank mounting legs to fuselage structure.
f. Lift reservoir out.
g. Reverse the preceding steps for installation. Prior to reinstalling equipment removed for access, service fuel bays and check for leaks.

13-26. FUEL SELECTOR VALVE. (THRU P21000760).

13-27. DESCRIPTION. A three position fuel selector valve is located in the lower fuselage between the pilot and copilot positions. The positions on the placard are labeled OFF, LEFT ON, and RIGHT ON. Valve repair consists of replacement of seals, springs, balls, and other detail parts. Figure 13-6 illustrates the proper relationship of parts and may be used as a guide during disassembly and assembly.

13-28. REMOVAL AND INSTALLATION.

a. Drain all fuel from wing bays, reservoirs, strainer, and lines. (Observe precautions in paragraph 13-3.)
b. Remove selector valve handle.
c. Remove pedestal cover.
d. Remove access plates in floorboard and fuselage skin in area of selector valve.
e. Disconnect and cap or plug all fuel lines at valve.
f. Disconnect square shaft from valve by removing attached roll pin.
g. Remove bolts or screws attaching valve to support bracket and remove valve.

13-29. REPAIR. (Refer to figure 13-6.) The fuel selector valve may be repaired by disassembling, replacing defective parts, and reassembling as follows:

a. Mark sump plates, body, and cover to ensure correct reassembly, then remove sump plate mount screws (24), sump plate (23), and O-ring (22).
b. Drive out roll pin (5) securing yoke (6) to rotor shaft (21). Carefully remove yoke, retaining detent balls (8) and springs (7) as they become free.
c. Remove brass washer (9).
d. Remove cover screws (3) and cover (4).
e. Polish rotor Shaft (21) with fine emery cloth to remove burrs or roughness. Lubricate shaft with petrolatum, and remove cover (4) from shaft (21).
f. Partially remove roll pin (13), remove rotor (12), two teflon seals (14), O-rings (15), washers (16), and springs (17). Inspect carefully for defects.
g. Clean and lubricate rotor shaft (21) as in step "e." above, and remove from body (1). Remove two teflon seals (20), O-rings (19), washers (25), and springs (26).
h. Remove and inspect O-rings from body (1) and cover (4).
i. Replace all O-rings, lap or replace teflon seals and lubricate O-rings before installation.

CAUTION

Parts must be installed as illustrated in figure 13-6, to ensure proper valve operation.

NOTE

Mark shaft position relative to valve position to aid reinstallation.

j. Install O-ring (18) (18) in body rotor shaft hole. Install O-rings (19), teflon seals (20), springs (26), and washers (25), then slide rotor shaft into hole. Position rotor inexact relative position as shown in figure 13-6, and install O-ring (22) and sump plate (23).
k. Install two 3/16 inch pins approximately 1 inch long in body ports to hold valve mechanism alignment, slide springs (17), washers (16), O-rings (15), and teflon seals (14) over pins. Slide rotor (12) over shaft, with pins protruding thru valve ports. Remove 3/16 inch pins, and adjust rotor on shaft to align roll pin (13) with hole and insert when aligned. Allow roll pin to protrude as shown in figure 13-6.

CAUTION

After repair is complete a pressure check must be accomplished to ensure that no external leakage exists at 50 psi fuel pressure, and no more leakage than 0.5 cc per minute at 50 psi at any internal port. These tests may be made with air pressure after internal parts have been wetted with solvent.

NOTE

The roll pin (13) also serves as a limit stop for valve positioning, it is essential that pin be properly installed.

l. Install O-ring (10) in cover (4), lubricate rotor shaft (21) with petrolatum, install larger O-ring (11) in cover (4), and slide into place.

CAUTION

Be sure cover (4) is installed in relative position illustrated. A lug on the cover serves as a stop detent, and will not allow proper valve operation, if not installed correctly.

m. Install brass washer (9), and yoke (6). Note the position of small hole in the square portion of the yoke. If this is reversed, the linkage will not attach properly.

13-30. AUXILIARY FUEL PUMP.

13-31. DESCRIPTION. An electric auxiliary fuel pump is located forward of the reservoir. It is connected in line with the engine driven pump, therefore, all fuel must flow through the auxiliary pump internal bypass valve. A fuel drain safety feature that prevents accumulation of fuel in the auxiliary pump motor in case of leakage is incorporated. The auxiliary fuel pump is used for engine starting, and in place of the engine driven pump if it should fail in flight.

13-32. REMOVAL AND INSTALLATION.

a. Turn fuel selector or fuel ON-OFF valve OFF.
b. Drain fuel from pump, lines, and strainer.
c. Be certain that master and pump switches are OFF.
d. Remove pilots seat, carpeting, and plates at left side of pedestal as necessary for access to pump.
e. Disconnect, and cap or plug all fuel lines and electrical connections at pump. (Observe safety precautions in paragraph 13-3).
f. Loosen two securing clamps and lift pump out.
g. Reverse the preceding steps for installation. Prior to reinstalling equipment removed for access, place selector or fuel ON-OFF valve ON, and check for leaks and proper pump operation.

13-33. AUXILIARY FUEL PUMP CIRCUIT. The auxiliary fuel pump switch is a yellow and red split-rocker type. A yellow, right half is labeled START, and has an upper ON position, which is used for normal starting and minor vapor purging during taxi. The other half, red left side, is labeled EMERG with a HI upper position, and is used in the event of engine driven pump failure during takeoff or high power operation. The HI position may also be used for extreme vapor purging. With the right, yellow, half in the ON position, the pump operates at one of two speeds, depending on throttle setting. With the throttle open, the pump runs high speed/capacity, and with the throttle closed, the pump operates at a low-flow speed. This prevents an unusually rich mixture during let down, landing, or taxiing. Maximum fuel flow is produced when the left half of the switch is held in spring loaded HI position. Also in the HI position an interlock automatically turns the right side of the switch ON, however, when released, the right side will stay ON, until manually turned OFF. When the engine-driven fuel pump is functioning and the auxiliary fuel pump is placed ON, a fuel to air ratio considerably richer than "best-power" is produced unless the mixture is leaned. If both the master and auxiliary fuel switches are placed ON, and the engine stopped, manifold flooding and eventually oil dilution will occur. A throttle shaft-operated microswitch adds resistance to the high fuel flow circuit to slow down the pump when the throttle is retarded, to prevent an excessively rich mixture.

13-34. RIGGING THROTTLE MICROSWITCHES. (Refer to figure 13-7.) These aircraft are equipped with a throttle-operated microswitch, which slows the electric fuel pump when the throttle is retarded and the auxiliary fuel pump is ON. The auxiliary pump should slow in speed/capacity as the throttle passes the point when engine rpm and fuel mixture produce 23 in-hg manifold pressure.

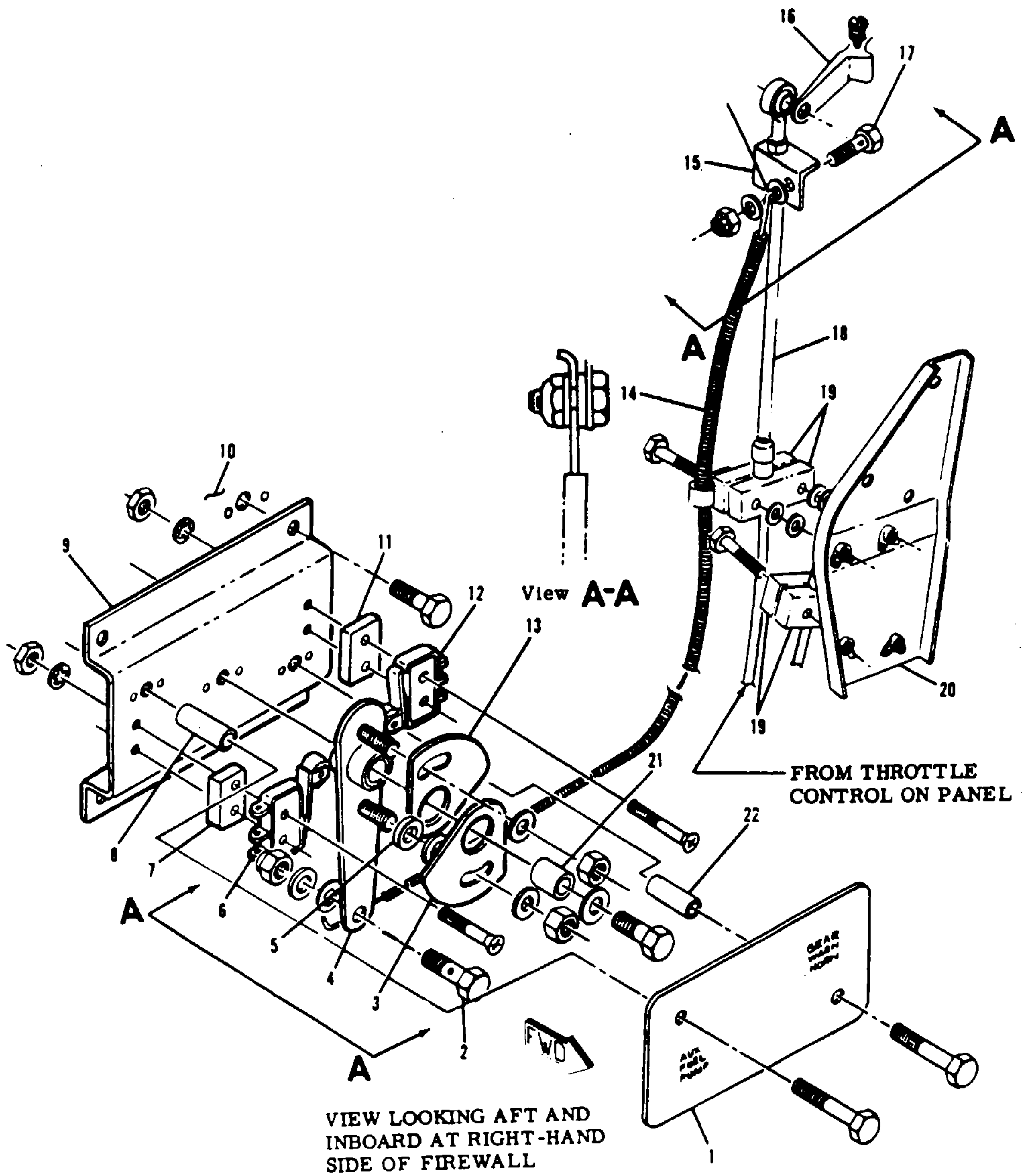
NOTE

These settings must be established during ground run-up only, because they do not apply during flight.

a. Start engine and set throttle so manifold pressure is 23 in-hg.
b. Mark this position on throttle shaft, and stop engine.
c. Adjust microswitch to activate at this throttle setting, so more resistance is placed in the circuit, to slow pump speed.
d. With the mixture control in IDLE CUT-OFF, the aux fuel pump switch ON, and master switch ON, listen for the pump speed to change as the throttle is retarded to previously marked position, (23 in-hg manifold pressure) with the engine stopped.

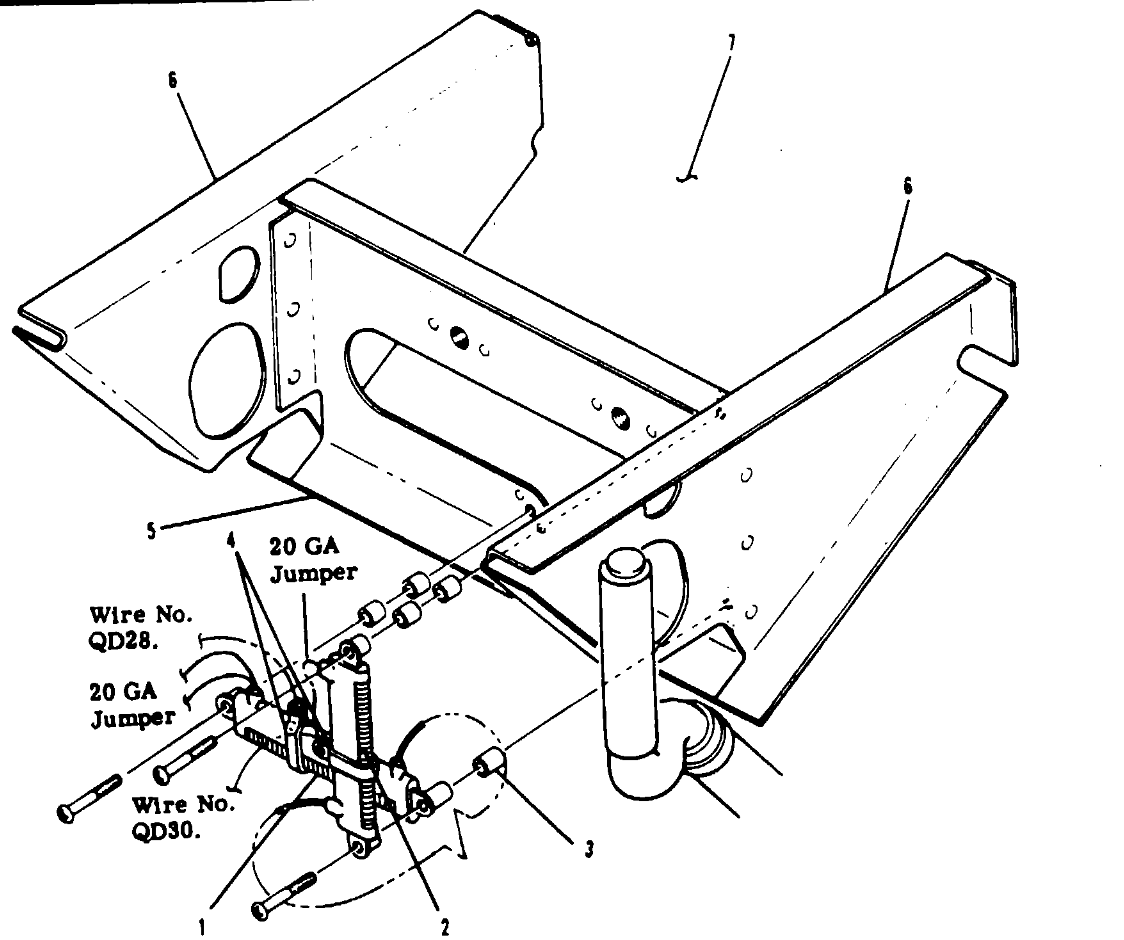
CAUTION

Prolonged fuel pump operation with engine stopped will cause manifold flooding.



1. Cover
2. Clamp Bolt
3. Fuel Pump Switch Cam
4. Arm Assembly
5. Thick Washer
6. Fuel Pump Switch
7. Spacer
8. Spacer
9. Mounting Bracket
10. Lower RH Firewall
11. Spacer
12. Gear Warning Switch
13. Gear Warning Cam
14. Throttle Control (Secondary)
15. Cable Clamp Mount
16. Throttle Lever
17. Clamp Bolt
18. Cabin Throttle Control
19. Clamp Half
20. Clamp Assembly
21. Bushing
22. Spacer

Figure 13-7. Throttle-Operated Microswitches



1. High-Boost Resistor (#1)
2. Low-Boost Resistor (#2)
3. Spacer (Typical)
4. Adjustable Slide
5. Bracket Assembly
6. Battery Box Support
7. Firewall

Figure 13-8. Auxiliary Fuel Pump Resistors

13-35. AUXILIARY PUMP FLOW RATE ADJUSTMENT. (Refer to figure 13-8).

NOTE

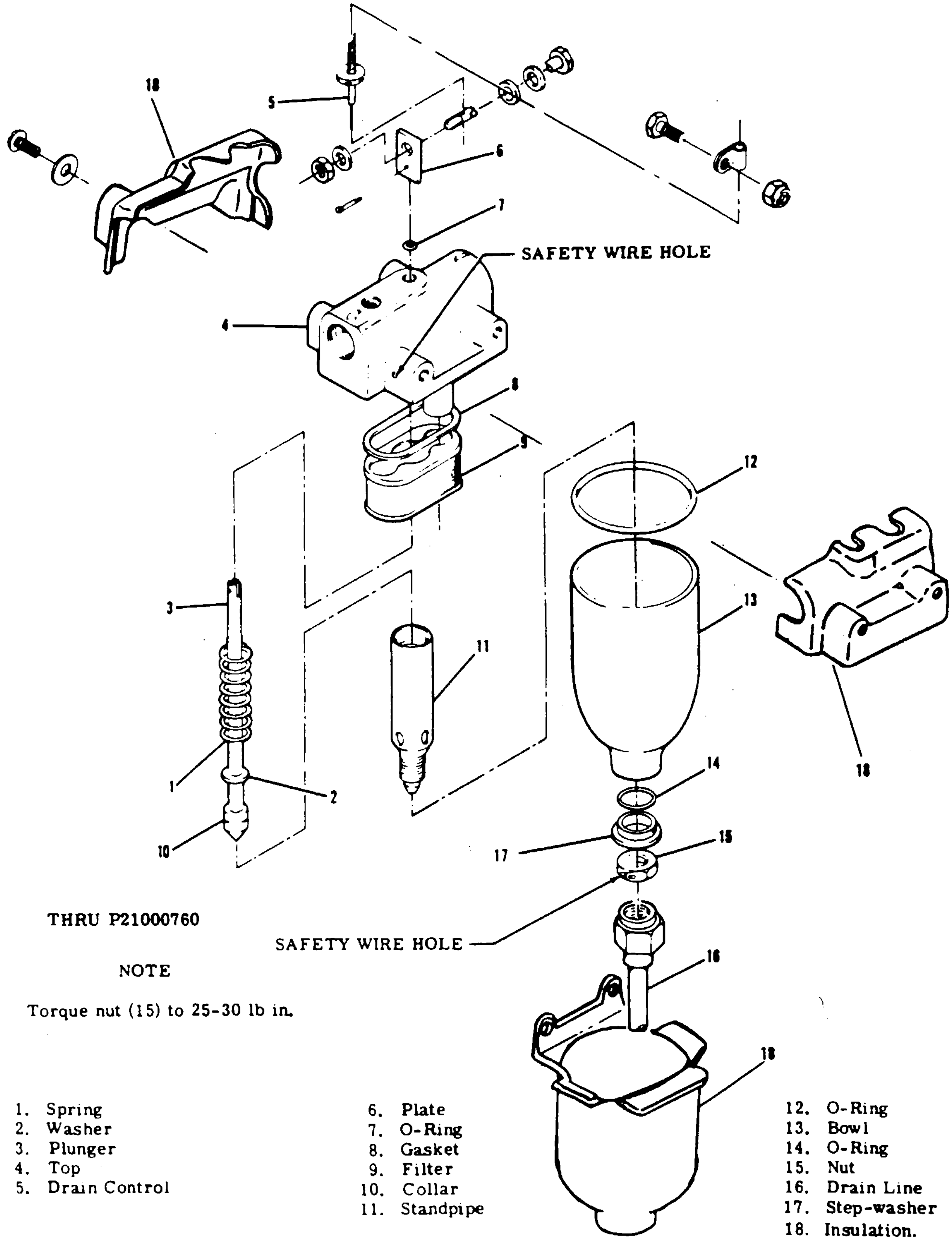
These tests are to be conducted with the engine stopped and external power supplied to the aircraft bus.

NOTE

When replacing the auxiliary fuel pump resistors, adjust to 3.5 ohm value prior to installation.

a. Apply an external power supply of 27.75 VDC ± 25V to the aircraft bus.
b. Set mixture control at "FULL RICH".
c. Turn both master and auxiliary fuel switches "ON".
d. Advance throttle to full open.
e. Check metered fuel pressure/flow on aircraft gage, should show 88-96 pounds/hour (14.7 - 16.0 gallons/hr).
f. Adjust number one (1) resistor if required.
g. Retard throttle slowly from the full OPEN position until speed of fuel pump can be heard to change speed due to microswitch activation.
h. Wait momentarily for fuel flow/pressure gage to respond.
i. Metered fuel pressure/flow should read on the low end red line or approximately one red line width above.
j. Adjust number two (2) resistor if required.

13-36. MAXIMUM HIGH BOOST CHECK. To verify high position function, momentarily depress spring-loaded red rocker switch to HI, and verify a noticeable increase in indicated fuel flow on fuel pressure/flow gage.



THRU P21000760

NOTE

Torque nut (15) to 25-30 lb in.

1. Spring
2. Washer
3. Plunger
4. Top
5. Drain Control
6. Plate
7. O-Ring
8. Gasket
9. Filter
10. Collar
11. Standpipe
12. O-Ring
13. Bowl
14. O-Ring
15. Nut
16. Drain Line
17. Step-washer
18. Insulation.

Figure 13-9. Fuel Strainer

13-37. FUEL STRAINER. (THRU P21000760).

13-38. DESCRIPTION. The fuel strainer is located in the nose wheel well, and is readily accessible with the nose gear doors open. The strainer is equipped with a quick-drain valve, which provides a means of draining impurities from the fuel system. The quick-drain control is located adjacent to the oil dipstick.

NOTE

The fuel strainer can be disassembled without removing from aircraft.

Beginning with P21000390 thru P21000760 and those aircraft modified by SK210-93 the fuel strainer is insulated. The insulation material consists of a split top and a bowl covering. This insulation material must be removed prior to disassembly and reinstalled upon reassembly of the fuel strainer.

13-39. DISASSEMBLY AND ASSEMBLY. (Refer to figure 13-9).

a. Place fuel selector valve in OFF position.
b. Open landing gear doors.
c. Drain fuel from strainer with quick-drain control. (Observe safety precautions in paragraph 13-3).
d. Disconnect strainer drain tube and remove safety wire, nut, and washer at bottom of filter bowl, and remove bowl.
e. Carefully unscrew standpipe and remove.
f. Remove filter screen and gasket. Wash filter screen and bowl in solvent (Federal Specification P-S-661 or equivalent), and dry with compressed air.
g. Using a new gasket between filter screen and top assembly, install screen and standpipe.
h. Using all new O-rings, install bowl. Note that step-washer at bottom of bowl is installed so that step seats against O-ring. Connect strainer drain tube.
i. Place selector valve ON, close strainer drain, check for leaks, and proper operation.
j. Safety wire bottom nut to top assembly. Wire must have right hand wrap, and at lease 45°.

13-40. REMOVAL AND INSTALLATION. (Observe safety precautions in paragraph 13-3.)

a. Place fuel selector valve in OFF position.
b. Open landing gear doors.
c. Drain fuel from strainer and lines with quick-drain control.
d. Disconnect and cap or plug all fuel lines at strainer.
e. Loosen clamp and clamp bolt attaching quick-drain control.
f. Disconnect primer line. (If installed).
g. Remove attaching bolts, and remove strainer.
h. Reverse preceding steps for installation. Place fuel selector valve to ON position, check for leaks, and proper operation of quick-drain valve.

13-41. FUEL SYSTEM.

BEGINNING WITH P21000761

13-42. DESCRIPTION. The fuel system is essentially a gravity-flow system from the bay outlets to the selector valve and a pump augmented system from the selector valve to the engine. The fuel system is comprised of wing bays, a selector valve, fuel strainer, and associated plumbing. Fuel bag outlets are located at the inboard end of the bags. A single fuel supply line is routed down the rear doorposts to the fuel selector valve. A fuel supply line, interconnected with a vent line, and a separate drain line are routed down the front doorposts. A combination drain, and vent line is routed down the left, forward, doorpost, from the vent crossover line to the reservoir. The fuel bays are vented by a crossover vent line, wing tip vents, and vented fuel caps.

The upper segment of the three position (LEFT ON, BOTH ON, RIGHT ON) fuel selector valve handles fuel from the bays. The lower segment handles vapor, along with returned and excess fuel from the engine-driven fuel pump.

The reservoir accepts fuel from the selector valve, bay drain and vent lines. The fuel flows from the reservoir through a by-pass in the auxiliary fuel pump (when the pump is not in operation) to the fuel ON-OFF valve.

The fuel ON-OFF valve provides a means of stopping fuel flow to the STRAINER and the engine driven fuel pump. The fuel ON-OFF control is mounted on the left side of the pedestal.

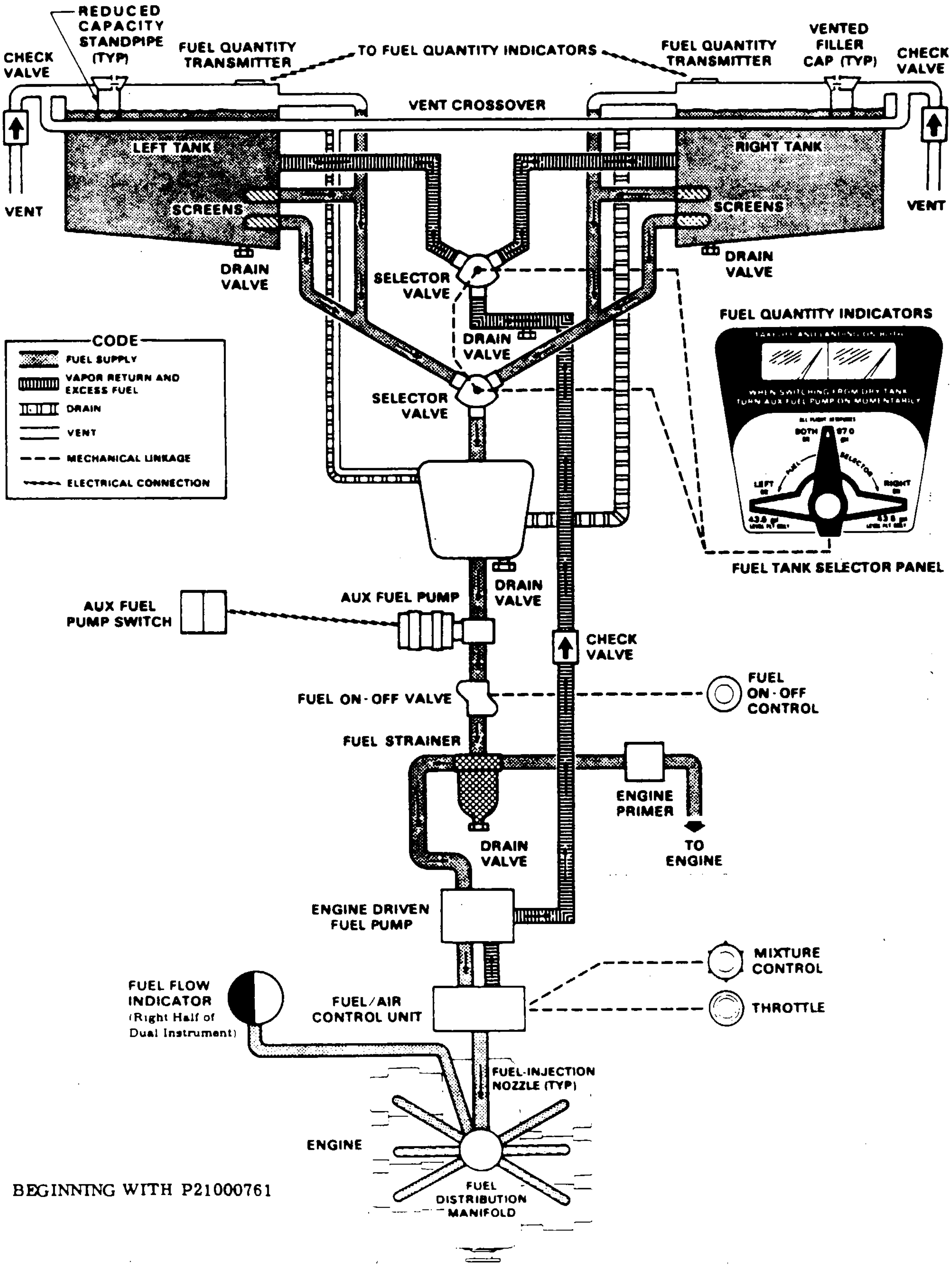
The fuel STRAINER, mounted on the firewall incorporates a remote drain valve. This valve, is mounted on the lower, left, engine cowling. The drain valve is activated by the fuel sampler cup.

13-43. FUEL SELECTOR VALVE. (See figure 13-12).

13-44. DESCRIPTION. A three position, six port fuel selector valve is located beneath the floorboard. A shaft links the fuel selector valve to a handle mounted on the pedestal structure. The positions of the handle are labeled "BOTH ON, LEFT ON, RIGHT ON". Valve repair is limited to replacement of component parts only. Figure illustrates the proper relationship of parts and may be used as a guide during disassembly and assembly.

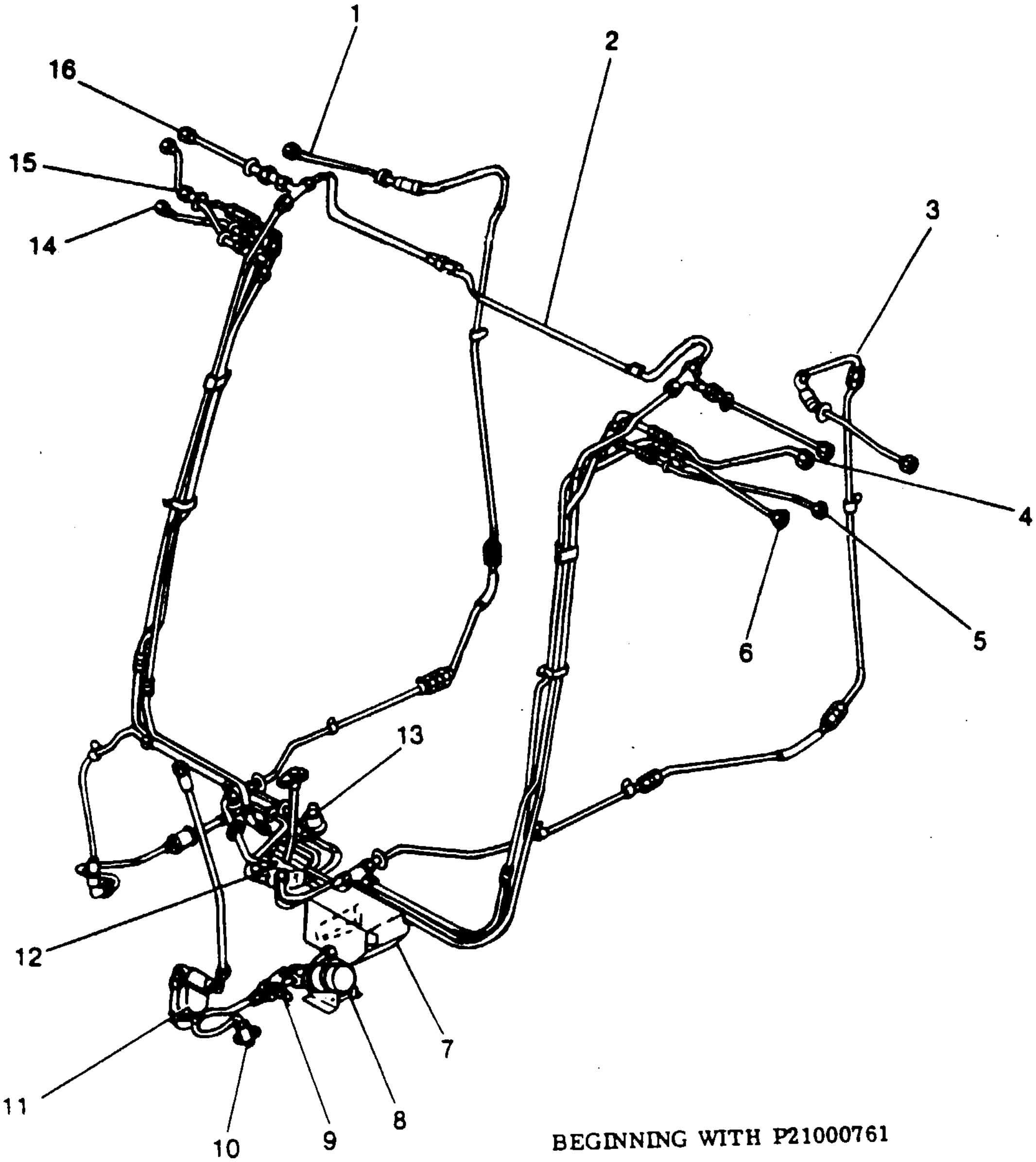
13-45. REMOVAL AND INSTALLATION.

a. Drain all fuel from wing bays, reservoir, strainer and lines. (Observe precautions in paragraph 13-3.)
b. Remove selector valve handle.
c. Remove pedestal cover.
d. Remove center access plate.
e. Tag, and then disconnect or plug all six lines at valve.
f. Remove screws attaching elevator cable bracket to valve.



BEGINNING WITH P21000761

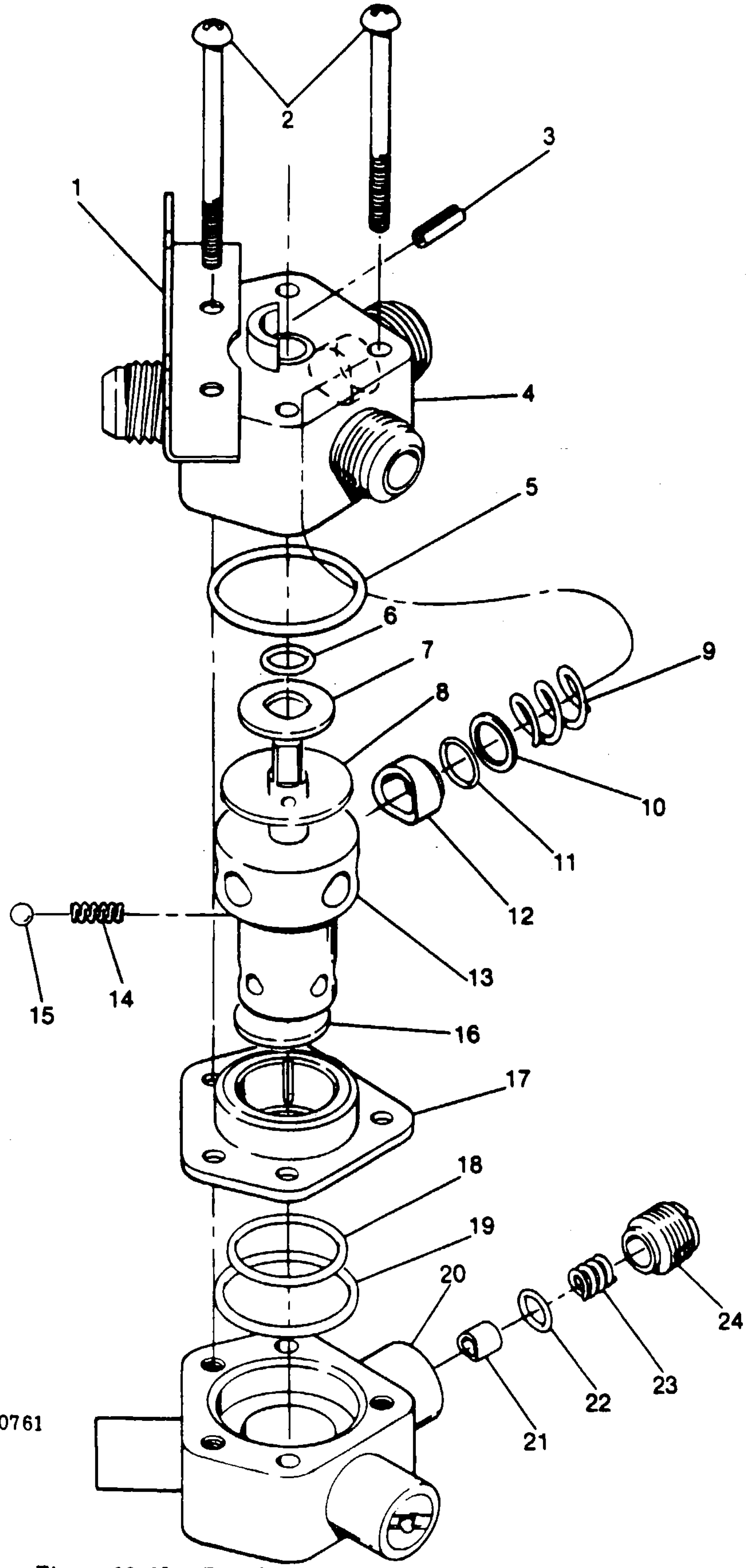
Figure 13-10. Fuel System Schematic



1. Right-Hand Fuel Line
2. Crossvent Line
3. Left-Hand Fuel Line
4. Vent Line
5. Fuel Line
6. Drain Line
7. Reservoir
8. Auxiliary Fuel Pump
9. ON-OFF Valve
10. Strainer Drain Valve
11. Fuel Strainer
12. Fuel Selector Valve
13. Vent Line Drain Valve
14. Drain Line
15. Fuel Line
16. Vent Line

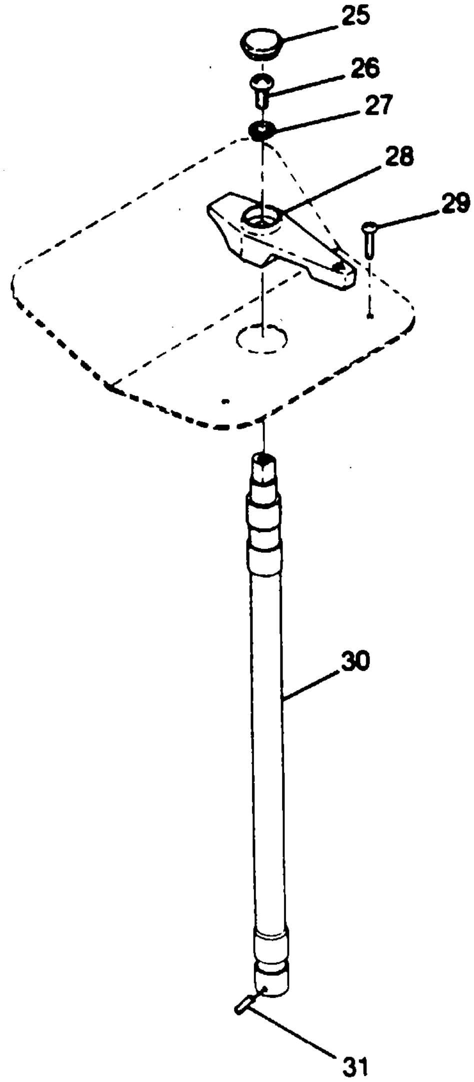
Figure 13-11. Fuel System

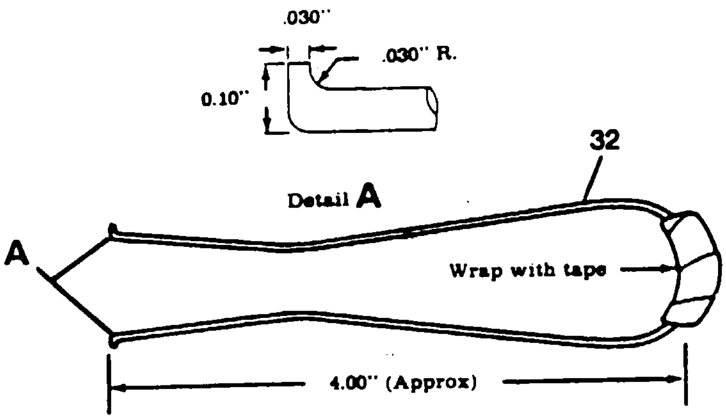
1. Elevator Cable Bracket
2. Screws
3. Stop Pin
4. Upper Body
5. Packing
6. Packing
7. Washer, 1358-11
8. Washer, 1358-12
9. Spring
10. Washer
11. Packing
12. Seal
13. Rotor
14. Spring
15. Ball
16. Washer, 1358-10 or -11
17. Detent Insert
18. Packing
19. Packing
20. Lower Body
21. Seal
22. Packing
23. Spring
24. Spring Retainer
25. Plug
26. Screw
27. Washer
28. Handle
29. Screw
30. Shaft
31. Pin
32. Spring Compressor



BEGINNING WITH P21000761

Figure 13-12. Fuel Selector Valve (Sheet 1 of 2)





Fabricate spring compressor (31) from 1/16 inch diameter #1 OXWELD AC welding rod or equivalent according to dimensions shown.

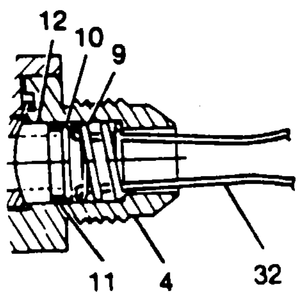


Figure 13-12. Fuel Selector Valve (Sheet 2 of 2)

g. Remove nuts, washers, and bolts attaching valve to its bracket.
h. Remove valve.
i. Reverse preceding steps for installation. Prior to reinstalling equipment removed for access, secure fuel bays and check all lines and fittings for leaks in all selector valve positions.

13-46. DISASSEMBLY, REPAIR AND REASSEMBLY.
a. Remove pin (31) and shaft (30).
b. Remove spring retainer (24) spring (23) packing (22) and seal (21) from each part of the lower body (20).
c. Remove screw (2) holding upper body (4) and lower body (20) together.
d. Remove lower body (20) with a twisting motion. Remove and tag washer(s) (16).
e. Cover upper body (4) and detent insert (17) with a clean shop cloth.

NOTE

The shop cloth will contain ball (15) and spring (14) when detent insert (17) is removed.

f. Carefully pry detent insert (17) from upper body (4).
g. Remove ball (15) and spring (14) from shop cloth.
h. Remove stop pin (3) from rotor (13).
i. Cover upper body (4) completely with a clean shop cloth.

NOTE

The shop cloth will contain seals (12), packings (11), washers (10) and springs (9) when the rotor is removed.

j. Push the rotor (13) out of the upper body (4).
k. Remove the rotor (13), seals (12), packings (11), washers (10), and springs (9) from the shop cloth.
l. Check detent holes in detent insert (17) for excessive wear.
m. Replace all seals and packings.
n. Insert rotor (13), in upper body (4), place detent insert (17), over rotor (13), place washer (16) in lower body (20), place lower body (20), over rotor (13) insert three screws (2) and torque to 30 lbs-in. Check end play between rotor and valve bodies.
If end play is:
(1) .008 or greater, add S-1358-11 and/or S-1358-12 washers to decrease end play to .001 to .007.
(2) .007 to .004 add (1) S-1358-12 washer.
(3) .003 or less, disassemble valve and reassemble with different parts, recheck end play.
o. When end play is within tolerance disassemble, retain washers.

NOTE

Reassembly of the selector valve is facilitated by mounting upper body (4) in a bench vise or equivalent bench support making certain upper body (4) is protected from damage. Fabrication of spring compressors (32) three required is necessary.

p. Place upper body (4) upside down in bench vise or support.
q. Replace packing (6). Lubricate spring (14) with petrolatum and insert in rotor (13).
r. Insert spring (9) and compress with spring compressor (32) then insert washer (10), packing (11) and seal (12). The concave portion of the seal must fit the convex surface of the rotor (13). Complete this for each port.
s. While holding the three springs (9) with the spring compressors (32), place washers (7) and/or (8) on the shaft end of rotor (13) and insert rotor (13) into the upper body (4). The seals (12) must fit flush against the rotor (13). Release the spring compressors (32).
t. Remove the upper body (4) from bench vise or support.
u. Insert stop pin (3) into rotor shaft.
v. Place detent insert (17) on rotor (13) with slots for ball (15) towqrd upper body (4).
w. Place ball (15) on spring (14) align one of the slots, with the ball (15) and depress the ball (15). While pushing the detent insert (17) toward the upper body (4) as the ball (15) enters the slot the detent insert (17) may be pushed on to rotor (13) until it is flush with the upper body (4). Rotate the detent insert (17) until all four of its bolt holes align with four of the holes on the upper body (4).
x. Roll packing (18) over end of rotor (13) and push into cutout between rotor (13) and detent insert (17). Packing (18) must not protrude beyond lip of detent insert (17). Care must be exercised to avoid damage to packing.
y. Place packing (19) in groove on outer edge of detent insert (17).
z. Place lower body (20) over rotor (13). The five bolt holes in the lower body (20) must align with the five bolt holes in the upper body (4).

13-47. LEAK TEST
a. With valve assembled remove stop pin (3).
b. Set valve in a closed position.
c. Apply 6-10 psi Stoddard solvent to each port separately.
d. Maximum internal leakage 10 drops per minute. No external leakage allowed.

13-48. ALTERNATE METHOD.
a. With valve assembled remove stop pin (3).
b. Set valve in a closed position.
c. Apply 6-10 psi air to each port while valve is submerged in water.
d. Maximum internal leakage equivalent to 10 drops per minute Stoddard solvent. No external leakage allowed.
Add two drops of Locktite 242 to end of each spring retainer (24) after pressure test.

13-49. FUEL RESERVOIR. (See figure 13-13).

13-50. DESCRIPTION. There is one reservoir installed in the lower fuselage, on the pilot's side outboard of the fuel selector valve. The reservoir has four fuel line connections; one from the fuel selector valve, one from the lower right hand crossover drain line, one from the left hand crossover drain line and one to the engine by way of the auxiliary fuel pump, ON-OFF valve and fuel strainer. A drain valve is installed in the bottom of the reservoir for draining.

13-51. REMOVAL AND INSTALLATION.

a. Drain all fuel from wing bays, reservoir, strainer and lines. Observe precautions in paragraph 13-3).

b. Remove carpeting and access plate.

c. Disconnect and cap or plug all fuel lines at the reservoir.

d. Remove screws securing mounting legs to fuselage.

e. Lift reservoir out.

f. Reverse the preceding steps for installation. Prior to replacing the access plate, secure fuel bays and check all connections for leaks.

NOTE

The clearance between the elevator cables and the drain line is .37 inch minimum and .50 maximum.

Lower Right Hand Crossover Drain Line
From Fuel Selector Valve
Left Hand Crossvent Drain Line
To Engine

13-52. FUEL ON-OFF VALVE. (See figure 13-14).

13-53. DESCRIPTION. The fuel ON-OFF valve is a two position valve located just forward of the auxiliary fuel pump under the pilot's floorboard. The valve control knob is located on the left lower area of the pedestal. Valve repair consists of replacement of component parts.

13-54. REMOVAL AND INSTALLATION.

a. Drain all fuel from wing bays, reservoir, strainer and lines. (Observe precautions in paragraph 13-3).

b. Remove carpeting and access plate.

c. Remove control cable from clamp on valve and control wire from valve arm.

d. Disconnect and cap or plug both the inlet and outlet fuel lines.

e. Remove bolts from bracket and remove valve.

f. Reverse the preceding steps for installation. Prior to replacing the access plate, service the fuel bays and check all connections for leaks. The valve must also be checked for positive on and off position.

NOTE

When installing the valve make certain the arrow on the valve points with the direction of normal fuel flow. (Toward the engine).

13-55. DISASSEMBLY, REPAIR AND REASSEMBLY.

a. Remove screws (13) securing cover (14) to valve body (19); carefully remove cover.

b. Remove ball (15) and spring (16) from rotor (17).

c. Slowly withdraw rotor (17) from valve body (19).

NOTE

Removal of rotor (17) from valve body (19) will allow seal (23), packing (22) washer (21), and spring (20) to pop free.

d. Remove seal (23), packing (22), washer (21), and spring (20) from valve body (19).

e. Remove packing (18) from valve body (19).

NOTE

Reassembly of valve is facilitated by mounting in a bench vise or equivalent bench support, making sure valve body (19) is protected from damage. Fabrication of a spring compressor is recommended before reassembly. Replace packings (21) and (18) whenever rotor (17) is removed from valve body.

f. Ensure all component parts are clean, then coat sparingly with lightweight oil.

g. Install new packing (18) into recess at top of valve body (19).

h. Insert spring (20) into valve body (19).

i. With spring compressor, compress spring (20).

j. Install washer (21), new packing (22), and seal (23) into port.

k. Holding spring (20) compressed, carefully insert rotor (17) into valve body (19), release spring compressor, and visually inspect assembly for proper seating of seal (23) to rotor.

l. Lubricate spring (16) and ball (15) with Petrolatum.

m. Insert spring (16) into rotor (17).

n. Place ball (15) on top of spring (16).

o. Position cover (14) on valve body and turn rotor (17) as required to index one of detents in cover.

p. Secure cover (14) to valve body (19) with screws (13).

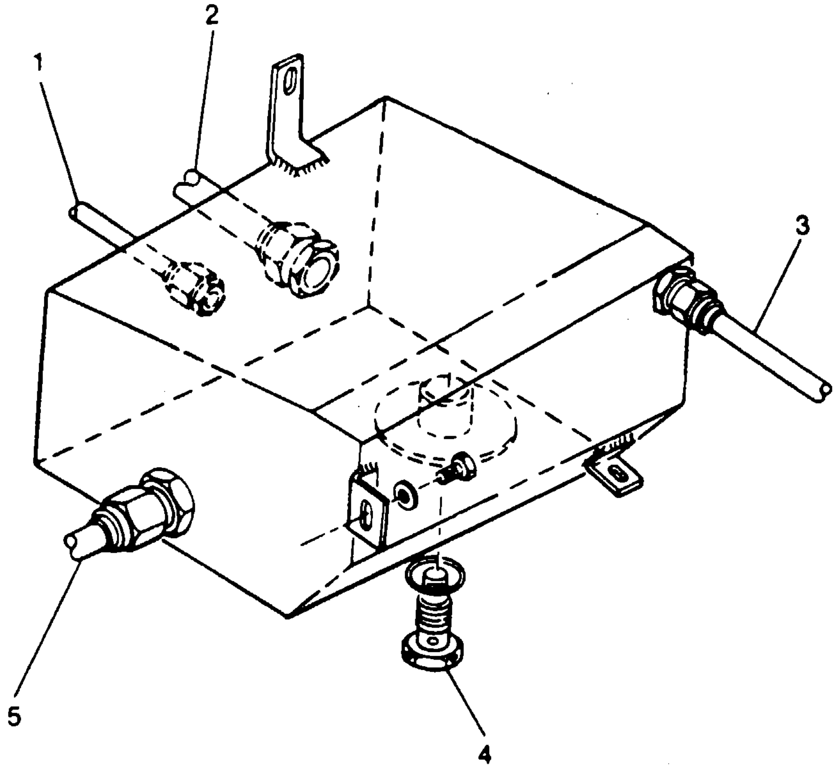
q. Test rotation of rotor (17) for ease of operation and positive detent engagement.

13-56. FUEL STRAINER. (See figure 13-15).

13-57. DESCRIPTION. The fuel strainer is located on the left forward side of the firewall. It is accessible through the left cowl flap opening or from above by removing the upper engine cowling. The fuel strainer incorporates a quick drain valve. The valve protrudes from the lower left side of the engine cowling.

NOTE

The fuel strainer can be disassembled, cleaned and reassembled without removing the assembly from the aircraft.

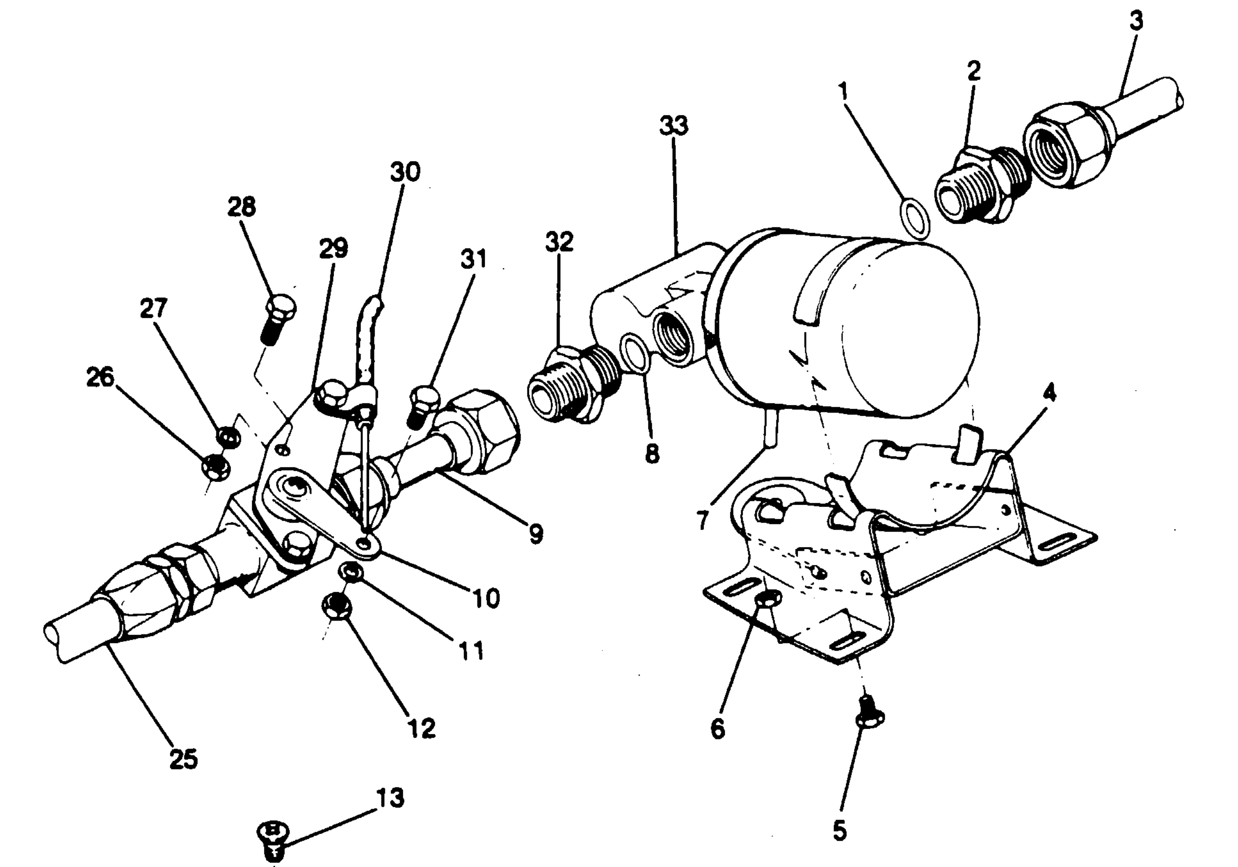


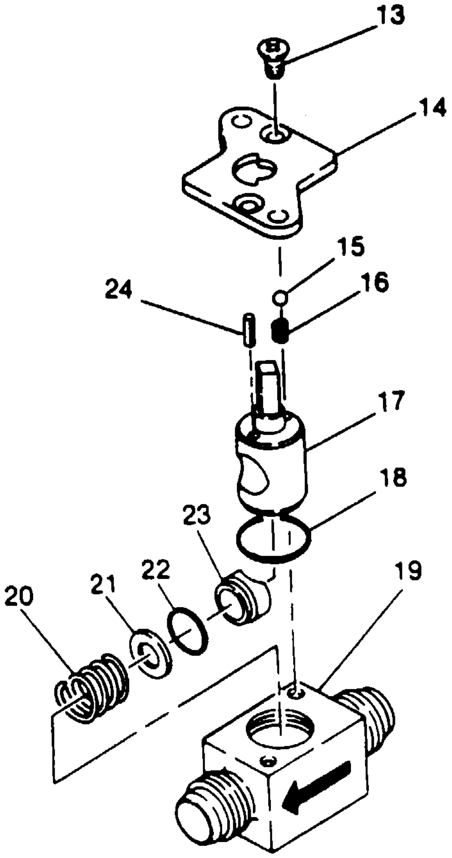
BEGINNING WITH P21000761

1. Lower Right-Hand Crossover Drain Line
2. From Fuel Selector Valve
3. Drain Line Left-Hand Crossvent Line
4. Drain Valve
5. To Engine

Torque Drain Valve (4) 15-35 lbs-in.

Figure 13-13. Fuel Reservoir

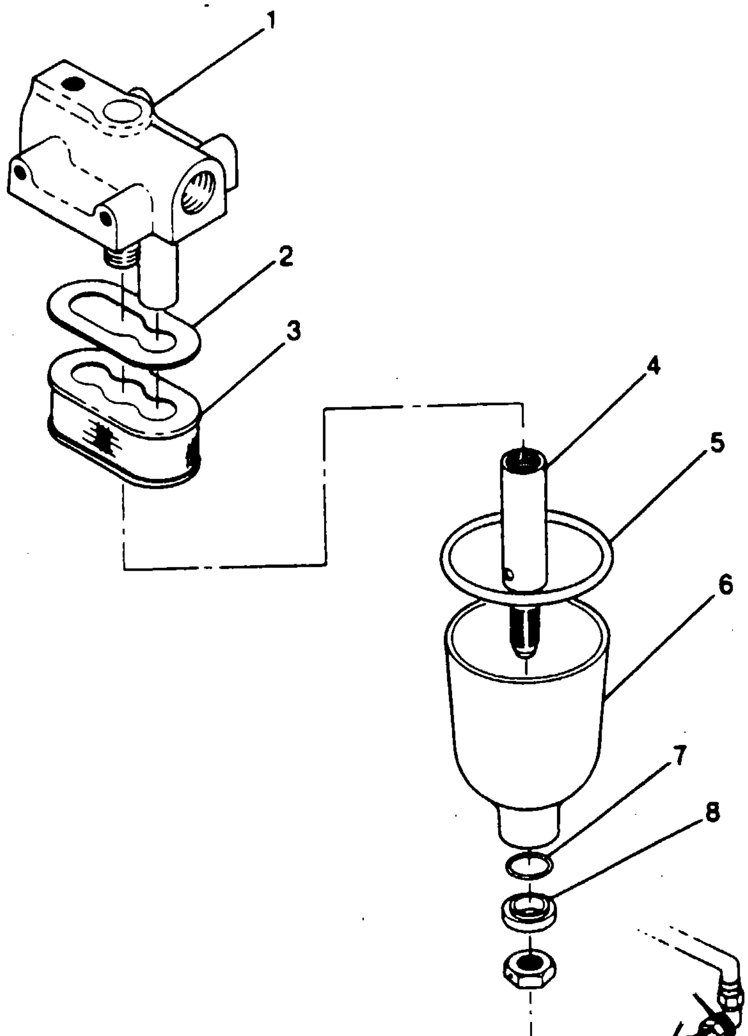


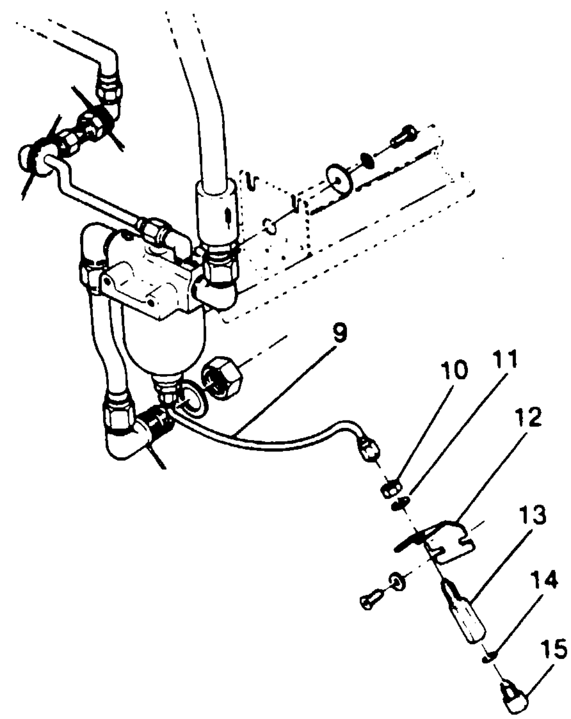


BEGINNING WITH P21000761

1. Packing
2. Fitting
3. Line Assembly
4. Fuel Pump Bracket
5. Screw
6. Nut
7. Fuel Pump Vent Line
8. Packing
9. Line Assembly
10. ON-OFF Control Arm
11. Washer
12. Nut
13. Screw
14. Cover
15. Bell
16. Spring
17. Rotor
18. Packing
19. Valve Body
20. Spring
21. Washer
22. Packing
23. Seal
24. Stop Pin
25. Hose Assembly
26. Nut
27. Washer
28. Bolt
29. ON-OFF Valve Bracket
30. ON-OFF Control Cable
31. Cable Clamp
32. Fitting
33. Auxiliary Fuel Pump

Figure 13-14. Auxiliary Fuel Pump and ON-OFF Valve.





BEGINNING WITH P21000761

1. Top
2. Gasket
3. Filter Screen
4. Standpipe
5. O-Ring
6. Bowl
7. O-Ring
8. Step Washer
9. Nut
10. Drain Line
11. Nut
12. Washer
13. Bracket
14. Fitting
15. O-Ring
16. Drain Valve
17. Washer
18. Screw

Figure 13-15. Fuel Strainer.

13-58. DISASSEMBLY REASSEMBLY.

a. Place ON-OFF fuel control in OFF position
d. Drain fuel from strainer and lines with drain valve (16).
c. Disconnect strainer drain line (10) from strainer bowl (6) and drain valve (16).
d. Remove nut (9), step washer (8) and O-ring (7) at bottom of bowl (6) and remove bowl (6) remove O-ring (5).
e. Carefully unscrew Standpipe (4) and remove.
f. Remove filter screen (3) and gasket (2). Wash filter screen and bowl in solvent (p-S-661) and dry with compressed air.
g. Using a new gasket (2) install filter screen (3) and standpipe (4). Tighten standpipe finger tight.
h. Using new O-rings (5) and (7) install bowl (6). The step washer (8) must be installed so that the step seats against the O-ring (7), connect drain line (10).
i. Place ON-OFF fuel control in ON position.
j. Check for fuel leaks.
k. Check drain valve (16) for operation.

13-59. VENTED FUEL FILLER CAPS.

13-60. DESCRIPTION. The filler cap assemblies may be constructed of either metal or red plastic. Both cap assemblies incorporate a vent safety valve that provides vacuum and positive pressure relief for their respective fuel tanks. It is important that both type caps to be cleaned on as required basis, if proper filler cap sealing is to be maintained.

13-61. METAL "FLUSH-TYPE" FILLER CAPS. Except for minor differences in construction and weight, metal fuel filler caps perform the same function as red plastic fuel filler caps. The caps are interchangeable and will fit the same adapter assembly.

13-62. INSPECTION.

NOTE

If fuel collects in the handle well it could indicate stem O-ring leakage. Fuel collecting around perimeter of cap could indicate cap O-ring or check valve leakage.

a. Remove fuel cap from adapter (7), remove safety chain (9) from cap and cover or plug fuel opening to keep out foreign matter.
b. Remove nut (10) and, observing position of lock plate (6) in relation to stem (14) disassemble cap.
c. Note resiliency of O-rings (3 & 13) and condition of grooves. If the O-rings (3 & 13) have deteriorated they must be replaced.

13-63. CLEANING.
a. Using a cotton swab and Stoddard solvent or equivalent, gently lift edges of rubber umbrella (5) and clean stainless steel seat and umbrella removing all contaminates. Using a second swab wipe seat and umbrella thoroughly, removing all cotton fibers. Repeat until swabs show no discoloration.
b. If O-ring grooves appear contaminated, clean with Stoddard solvent or equivalent and cotton swabs.
c. Ascertain that all vent holes in check valve are unobstructed.
d. Clean cap body and lock plate, check for defects.
e. If the umbrella continues to leak or is deteriorated it must be replaced.
f. To remove umbrella, lubricate the umbrella stem with (MIL-H-5606) hydraulic fluid to prevent tearing the stem.
g. To replace the umbrella, lubricate the umbrella stem with (MIL-H-5606) hydraulic fluid and use a small blunt tool to insert the retaining knob on the umbrella stem into the check valve body to prevent damaging the stem.

13-64. REASSEMBLY.
a. Place split washer (16) in cap well correctly.
b. With handle (1) and O-ring installed on stem (14), insert stem (14) through split washer (16) on cap body (2).
c. Place spring (15) on stem (14).
d. Position cap handle (1) to full "OPEN" position.
e. Place lock plate (6) on threaded end of stem (14) and align all three lugs (12) with three guide bosses on the cap body (2).
f. Check that square hole in bottom of lock plate (6) is aligned with square surface on threaded end of stem (14).

NOTE

It is possible to install the lock plate (6) 180° out of the desired position, if the alignment procedures in steps "d" and "f" are not followed. If the cap will not fit when assembled, remove the lock plate (6) and reassemble after rotating it 180°.

g. Compress the lock plate (6) and fuel cap body (2) and secure with washer (11) and nut (10).
h. Connect fuel cap assembly to safety chain (9) and reinstall in tank.

13-65. RED PLASTIC "FLUSH-TYPE" FILLER CAPS. A red plastic "Flush-Type" vented filler cap may be used. Extra care is required when reinstalling plastic filler caps in the fuel filler adapter assembly. An improperly installed filler cap could cause a loss of fuel from the tanks during flight.

13-66. INSPECTION.

NOTE

If fuel collects in the handle well it could indicate stem O-ring leakage. Fuel collecting around perimeter of cap could indicate cap outer seal or check valve leakage.

a. Remove fuel cap from adapter (8), remove safety chain (10) from cap and cover or plug fuel opening to keep out foreign matter.

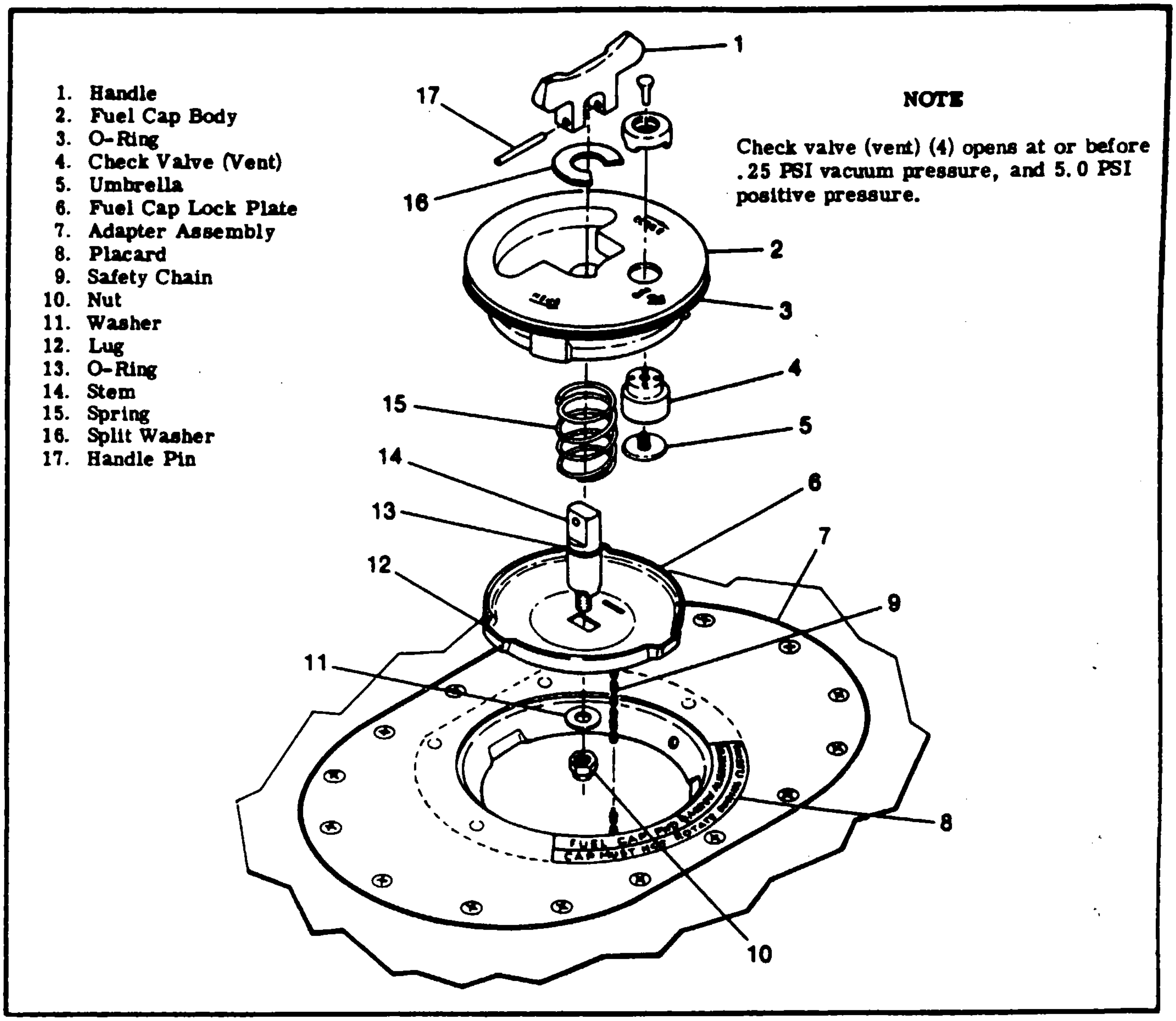


Figure 13-16. Fuel Filler Cap (Metal) (Sheet 1 of 2).

b. Rotate cap handle (1) to the "OPEN" position, compress cap body (2) and lock plate (6) to expose the .125 inch diameter handle pin (17).

c. Using a small wire push out the handle pin (17).

d. Note resilience of O-ring (13) and outer seal (3) and condition of grooves. If the O-ring (13) or the outer seal (3) have deteriorated they must be replaced.

e. Note condition of tabs on lock plate (6) for signs of abnormal wear, if such wear is evident replace the complete cap assembly.

13-67. CLEANING.

a. Using a cottom swab and Stoddard solvent or equivalent, gently lift edges of rubber umbrella (5) and clean stainless steel seat and umbrella removing all contaminates. Using a second swab wipe seat and umbrella thoroughly, removing all cottom fibers. Repeat until swabs show no discoloration.

b. If O-ring or outer seal grooves appear contaminated, clean with Stoddard solvent or equivalent and cotton swabs.

c. Ascertain that all vent holes in check valve are unobstructed.

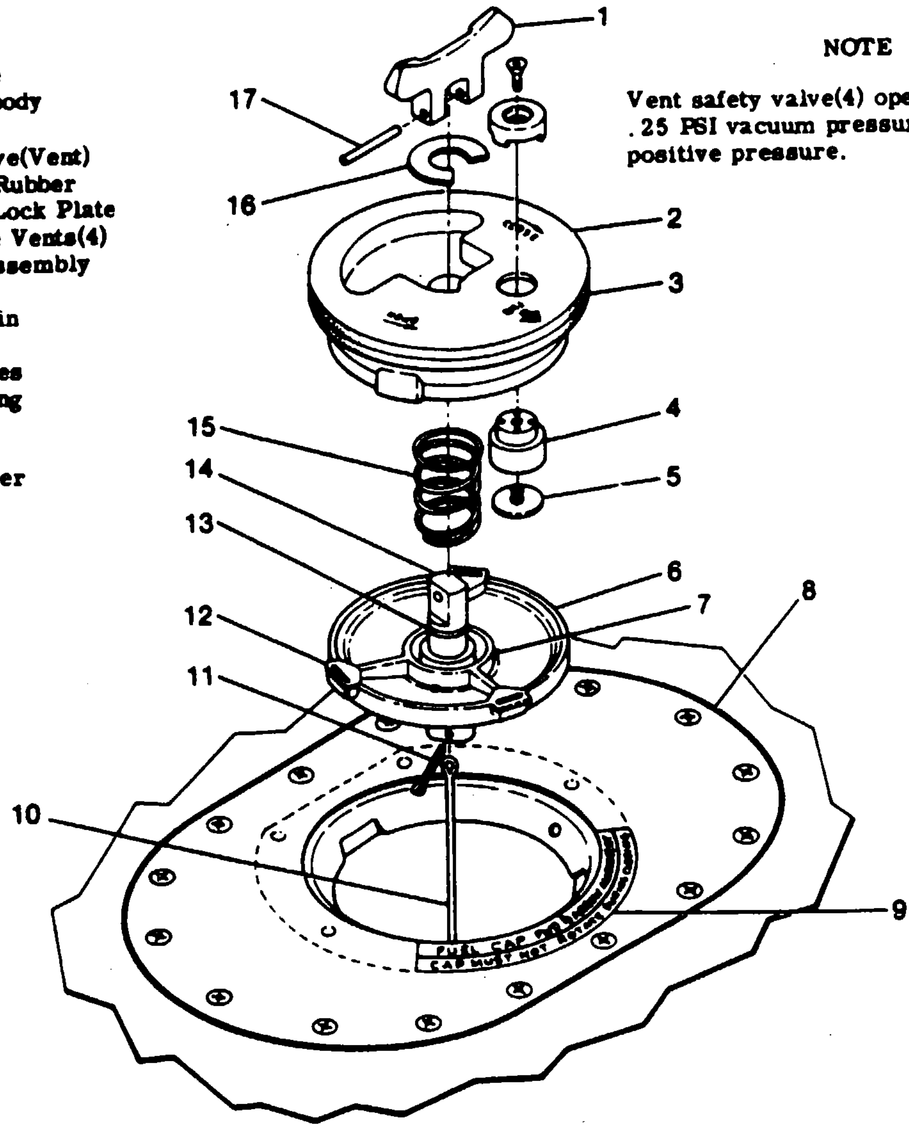
d. Clean cap body and lock plate, check for defects

e. If the umbrella continues to leak or is deteriorated it must be replaced.

f. To remove umbrella, lubricate the umbrella stem with (MIL-H-5606) hydraulic fluid to prevent tearing the stem.

g. To replace umbrella, lubricate the umbrella stem with (MIL-H-5606) hydraulic fluid and use a small blunt tool to insert the retaining knob on the umbrella stem into the check valve body to prevent damaging the stem.

1. Cap handle
2. Fuel Cap body
3. Outer Seal
4. Check Valve(Vent)
5. Umbrella Rubber
6. Fuel Cap Lock Plate
7. Lock Plate Vents(4)
8. Adapter Assembly
9. Placard
10. Safety Chain
11. Cotter Key
12. Metal Plates
13. Stem O-Ring
14. Stem
15. Spring
16. Split Washer
17. Handle Pin



NOTE

Vent safety valve(4) opens at or before .25 PSI vacuum pressure, and 5.0 PSI positive pressure.

Figure 13-16. Fuel Filler Cap (Red Plastic) (Sheet 2 of 2)

13-68. REASSEMBLY.

NOTE

If fuel was observed leaking around the cap periphery prior to disassembly and the leakage was not due to a bad O-ring or outer seal an additional split washer (16) may be added for a total of two, prior to reassemblying cap. To make sure that these washers are not installed upside down, check to see that edges of the split parallel the respective sides of the cap well. The addition of a washer under the cap handle will increase the effort required to uncap the fuel tank.

a. Install spring (15) on stem (14).
b. Install fuel cap body (2) on stem (14).
c. Check that three metal plates (12) on top rim of lock plate (6) are aligned with three guide bosses on fuel cap body (2).

CAUTION

It is possible to install the handle pin in the pin hole 180° out of the desired position, if the alignment procedure in step "c" is not followed. If the handle (1) is not installed properly the FWD arrow on the cap will not align with the arrow on the placard (9) when the cap is reinstalled.

d. Compress cap body (2) and lock plate (6), install split washer(s) (16) as required.
e. Install cap handle (1) on stem (14) so that the handle (1) will be in the open position.
f. Insert handle pin (17) through handle (1) and stem (14).
g. Connect fuel cap assembly to safety chain (10) and reinstall fuel cap. Make certain that the arrow on the fuel cap body (2) and the arrow on the placard (9) align.

13-69. LEAK TESTING METAL OR RED PLASTIC FILLER CAPS. The following procedure may be used to detect fuel filler cap leakage.
a. Service the aircraft with approved fuel, filling each fuel bay.
b. Place the fuel selector in the OFF position.
c. Plug one of the fuel bay vent lines (where it protrudes beneath the wind) with a small rubber plug or tape.
d. Connect a rubber hose to the other vent. Then tee into this hose a pressure measuring device, such as a water manometer, manifold pressure gage or airspeed indicator.
e. Blow into the open end of the hose. The pressure must not exceed .7 psi which equals 20 inches of water on a water manometer, or 1.43 inches Hg on a manifold pressure gage, or 174 kts on an airspeed indicator.

WARNING

Do not inhale fuel vapor while blowing into the rubber hose.

f. It may take several applications of pressure to bring the bay to the desired pressure.

WARNING

Do not apply regulated or unregulated air pressure from an air compressor to the fuel vent. Over inflation and major structural damage will occur if more than .7 psi is applied.

g. Pinch or close the rubber hose to sustain pressure in the fuel bay.
h. Apply a soap solution to the fuel filler caps and inspect for leakage around the rubber seal to filler neck junction, the fuel cap vent, and the fuel cap handle stem. Load the cap sideways in all directions by pressing on the fuel cap vent housing by hand.

NOTE

No leakage is permissible. If leaks are present, replace the cap with a new unit or repair in accordance with Cessna Service Information Letter SE80-59, Supplement #1 dated, June 23, 1980.

CAUTION

Care must be exercised in removing the fuel filler caps until the system has been depressurized.

i. After replacement of either fuel filler cap, repeat the inspection.
j. Remove the rubber hose, unplug or remove the tape from the other fuel vent, and place the fuel selector in the desired position.

13-70. PRIMING SYSTEM.

13-71. DESCRIPTION. The priming system is comprised of a plunger-type manually-operated primer, which draws fuel from the strainer and forces it through a tee fitting to the aft end of each intake manifold. Injecting the fuel into each manifold primes both banks of cylinders.

13-72. REMOVAL AND INSTALLATION.
a. With selector or fuel ON-OFF valve in OFF position, drain fuel from strainer and lines.
b. Disconnect and cap or plug all fuel lines at primer. (Observe precautions in paragraph 13-3.)
c. Unscrew knurled nut and remove plunger from pump body.
d. Remove pump body from instrument panel.

NOTE

Visually inspect primer lines for crushed, kinked or broken condition. Insure proper clamping to prevent fatigue due to vibration and chafing.

e. Reverse the preceding steps for installation. With selector or fuel ON-OFF valve in ON position, check for leaks and proper pumping action.

SECTION 14

PROPELLER AND GOVERNOR

WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

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14-1. PROPELLER

14-2. DESCRIPTION. These aircraft are equipped with an all-metal, constant-speed, three-blade, single-action, governor-regulated propeller. A single acting propeller uses oil pressure to effect a change of pitch in one direction only, relying on spring tension and blade moment to effect a change in the opposite direction. Engine lubricating oil is boosted by this propeller governor, and supplied in the exact regulated amount to maintain preselected engine load through blade pitch. A balanced condition between the governor flyweights and speeder spring will result in a no-change blade pitch action. However, either a decrease or increase in engine RPM will be sensed by the governor fly weights, and in turn will appropriately move the pilot valve to change blade pitch so the balance is once more attained. If the throttle is opened more or if aircraft speed is increased, the engine RPM will start to increase, the governor flyweights sense this change, and position the pilot valve so oil pressure is increased on the forward side of the propeller piston. This increased pressure moves the piston rearward, causing an increase in blade pitch and a corresponding decrease in engine RPM, thus maintaining a constant engine speed through a varying propeller load. Conversely if the throttle is closed somewhat or if aircraft speed decreases, the engine RPM will begin to decrease, again the governer senses this change, and effects a reduction in oil pressure on the forward side of the propeller piston which allows the piston return spring and the twisting moment of the propeller blades to decrease the blade pitch, which increases the engine RPM to previously selected speed.

14-3. REPAIR. Metal propeller repair first involves evaluating the damage and determining whether the repair will be a major or minor one. Federal Aviation Regulations, Part 43 (FAR 43), and Federal Aviation Agency, Advisory Circular No. 43.13 (FAA AC No. 43.13), define major and minor repairs, alterations and who may accomplish them. When making repairs or alterations to a propeller FAR 43, FAA AC No. 43.13 and the propeller manufacturer's instructions must be observed.

14-4. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
FAILURE TO CHANGE PITCH.	Governor control disconnected or broken.	Check visually. Connect or replace control.
	Governor not correct for propeller. (Sensing wrong.)	Check that correct governor is installed. Replace governor.
	Defective governor.	Refer to paragraph 14-9.
	Defective pitch changing mechanism inside propeller or excessive propeller blade friction.	Propeller repair or replacement is required.
FAILURE TO CHANGE PITCH FULLY.	Improper rigging of governor control.	Check that governor control arm and control have full travel. Rig control and arm as required.
	Defective governor.	Refer to paragraph 14-9.
SLUGGISH RESPONSE TO PROPELLER CONTROL.	Excessive friction in pitch changing mechanism inside propeller or excessive blade friction.	Propeller repair or replacement is required.
STATIC RPM TOO HIGH OR TOO LOW.	Improper propeller governor adjustments.	Perform static RPM check Refer to section 12 and 12A for procedures.
ENGINE SPEED WILL NOT STABILIZE.	Sludge in governor.	Refer to paragraph 14-9.
	Air trapped in propeller actuating cylinder.	Trapped air should be purged by exercising the propeller several times prior to take-off after propeller has been reinstalled or has been idle for an extended period.
	Excessive friction in pitch changing mechanism inside propeller or excessive blade friction.	Propeller repair or replacement is required.
	Defective governor.	Refer to paragraph 14-9.
OIL LEAKAGE AT PROPELLER MOUNTING FLANGE.	Damaged O-ring and seal between engine crankshaft flange and propeller.	Check visually. Remove propeller and install O-ring seal.
	Foreign material between engine crankshaft flange and propeller mating surfaces or mounting nuts not tight.	Remove propeller and clean mating surfaces; install new O-ring and tighten mounting nuts evenly to torque value in paragraph 14-6, "e".
OIL LEAKAGE AT ANY OTHER PLACE.	Defective seals, gaskets, threads, etc., or incorrect assembly.	Propeller repair or replacement is required.

14-5. REMOVAL (Refer to figure 14-1).

a. Remove spinner attaching screws (2), and remove spinner (1), spinner support (3), and spacers (4). Retain spacers (4).

b. Remove cowling as required for access to propeller mount nuts.

c. Loosen all mounting nuts (9) approximately 1/4" and pull propeller (15) forward until stopped by nuts.

WARNING

Be certain the magneto is GROUNDED before rotating propeller or engine.

NOTE

If optional propeller anti-ice system is installed, the slip ring is held in place by the propeller assembly. During removal, the nine (9) slip ring wires should be disconnected at the spinner bulkhead to facilitate propeller assembly removal without slip ring attached. Caution should be used in slip ring removal from crank shaft, so brushes aren't damaged, nor slip ring scratched. See Section 15.

NOTE

As the propeller (15) is separated from the engine crank shaft, flange, oil will drain from the propeller and engine cavities.

d. Remove all propeller mount nuts (9) and pull propeller forward off the crankshaft (12).

e. If desired the spinner bulkhead (11) can be removed by removing bolts (19) and nuts attaching spinner bulkhead to propeller.

14-6. INSTALLATION.

a. If the spinner bulkhead (11) was removed, position bulkhead so the propeller blades will emerge from the spinner (1) with ample clearance and install spinner bulkhead attaching with bolts (19) and nuts.

CAUTION

Use care when installing the propeller over crankshaft, because metal scrapings can become wedged between the crankshaft flange and propeller causing damage or oil leakage. When installing a new spinner bulkhead, trim the inside diameter as necessary.

NOTE

If aircraft is configured with optional anti-ice system, slip ring assembly must be installed with or prior to propeller assembly. In either instance, take care not to install brushes in a manner to cause damage to them, and properly connect wiring at spinner bulkhead. See Section 15.

b. Clean propeller hub cavity, crankshaft, and propeller mating surface.

c. Lubricate lightly, new O-ring (13) and crankshaft pilot with clean engine oil, and install the O-ring in the propeller hub.

d. Align propeller dowel pins with holes in crankshaft flange; push propeller carefully over crankshaft until mating surfaces are approximately 1/4 inch apart.

e. Install propeller attaching washers and nuts (9) and move propeller as far aft on pilot as possible, tighten nuts, and torque to 660 - 780 lb-in.

f. Install any spacers (4) used between spinner support and propeller cylinder, and install spinner support and spinners. The spacers are used as required to cause a snug fit between the spinner (1) and the spinner support (3).

14-7. TIME BETWEEN OVERHAUL (TBO). Propeller overhaul shall coincide with engine overhaul, but shall not exceed limits specified in McCauley Bulletin 137 and all revisions and supplements thereto. Refer to Section 12 for engine overhaul periods.

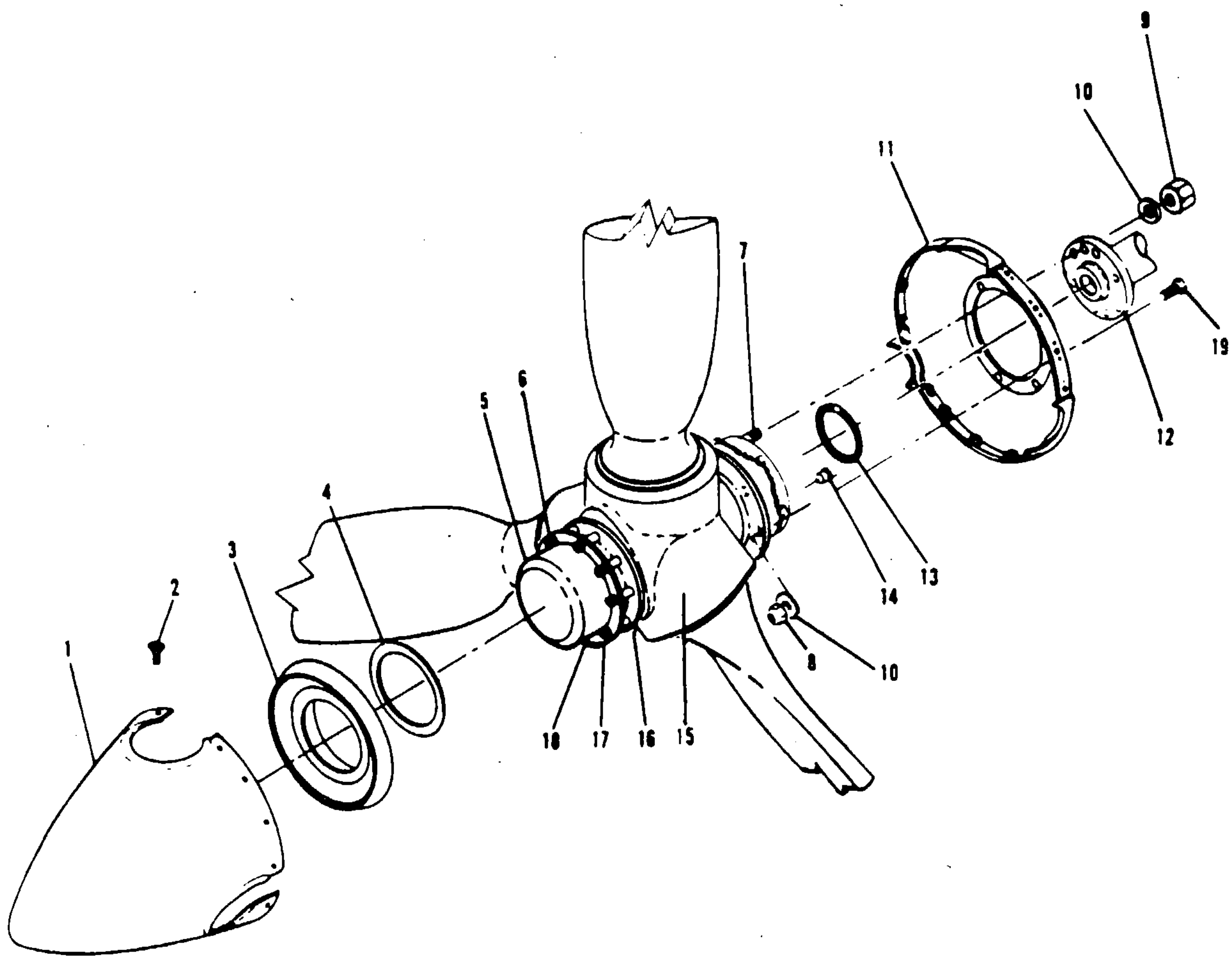
14-8. GOVERNOR.

14-9. DESCRIPTION. The propeller governor is a single-acting, centifugal type, which boosts oil pressure from the engine, and directs it to the propeller where the oil is used to increase blade pitch. Oil pressure in a single acting governor is used to effect a change in blade pitch in one direction only. The opposing pitch change action results from spring tenison working with the blade twisting moment when oil pressure is reduced. Oil pressure is boosted from engine oil to governor operating pressure by the governor oil pump. A pilot valve, speeder spring, and flyweights act correctly to direct oil flow to maintain constant engine load by changing propeller blade pitch.

NOTE

Outward physical appearance of specific governors is the same, but internal parts determine whether it uses oil pressure to increase or decrease blade pitch. The propellers used on these aircraft require governors which "sense" in a certain manner. "Sensing" is determined by the type pilot valve installed in the governor, therefore, it is important to ascertain that the gov-governor is correct for the propeller being used.

14-10. TROUBLE SHOOTING. When applying the insolation process, using a governor known to be in good condition will save time. If the "good" governor eliminates the trouble, the original governor was bad. If the trouble remains after installing a "good" governor, then the propeller is probably where the fault lies. Removal, replacement, rigging, high-speed stop adjustment, desludging, and gasket replacement are not major, and can be



1. Propeller Spinner
2. Screw
3. Spinner Support
4. Spacer
5. Cylinder
6. Screw
7. Stud
8. Nut
9. Nut
10. Washer
11. Spinner Bulkhead
12. Engine Crankshaft
13. O Ring
14. Dowel Pin
15. Propeller
16. Tube
17. Safety Wire
18. Ring
19. Bolt

Three Blade Threadless
Extended Hub

Figure 14-1. Propeller Installation

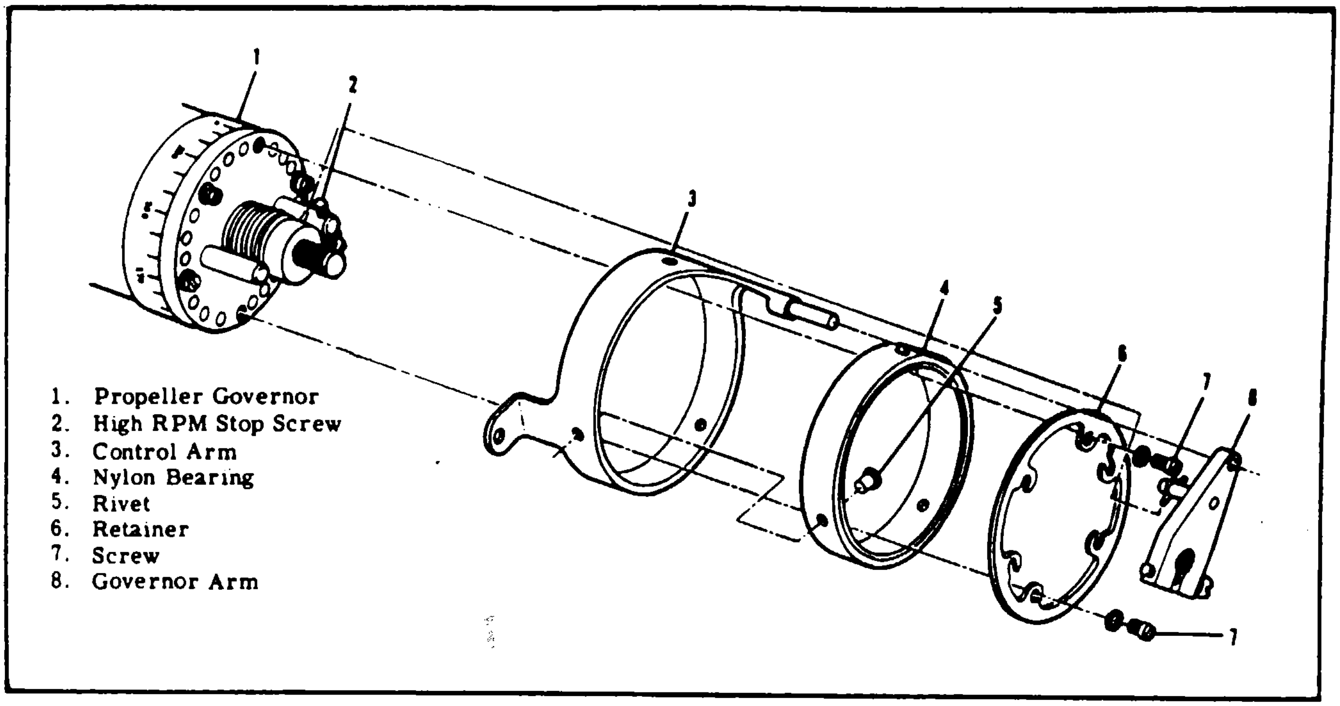


Figure 14-2. Governor Control Arm and Bearing Assembly

accomplished in the field. Repairs to propellers governors are classified as major by Federal Aviation Regulation, which also stipulates who may make the required repair actions.

14-11. REMOVAL

a. Remove cowling, nose cap and engine baffles as required for access to governor.
b. Disconnect governor control from governor.

NOTE

Note EXACT position of all washers so that washers may be installed in the same position on reinstallation.

c. Disconnect intake manifold balance tube at front of engine and move as required for clearance.
d. Remove nuts and washers securing governor to engine and pull governor from mounting studs.
e. Remove gasket from between governor and engine mounting pad.

14-12. CONTROL ARM AND BEARING ASSEMBLY.
Refer to figure 14-2.

14-13. REMOVAL
a. Using a scribe, make aligning index marks on governor arm (8) and end of governor serrated shaft.

NOTE

The governor arm (8) must be aligned on the governor shaft in the same serration or the governor speed will be changed approximately 200 rpm, for each serration misaligned.

b. Remove safety wire from governor arm screw and from screws attaching governor head to governor.
c. Remove the two screws (7) that pass through the non-notched holes in the retainer (6).
d. Loosen, but do not remove, the four remaining screws so that retainer (6) may be rotated.
e. Loosen screw in governor arm (8) so that arm may be slipped toward end of serrated shaft.
f. Slip governor arm toward end of serrated shaft and work retainer (6) and control arm (8) from governor (1).

NOTE

If governor arm (8) becomes disengaged from serrated shaft, align index marks and install arm on serrated shaft. The control arm spring has approximately 1-1/2 turns preload.

g. Reverse the preceding steps for reinstallation.

14-14. INSTALLATION.
a. Wipe governor and engine mounting pad clean.
b. Install a new gasket on the mounting studs. Install gasket with raised surface of the gasket screen toward the governor.

WARNING

Be certain that magneto is GROUNDED before turning propeller.

c. Position governor on mounting studs, aligning governor drive splines with splines in the engine and install mounting nuts ~~and washers~~. Do not force spline engagement. Rotate engine crankshaft slightly and splines will engage smoothly when properly aligned.

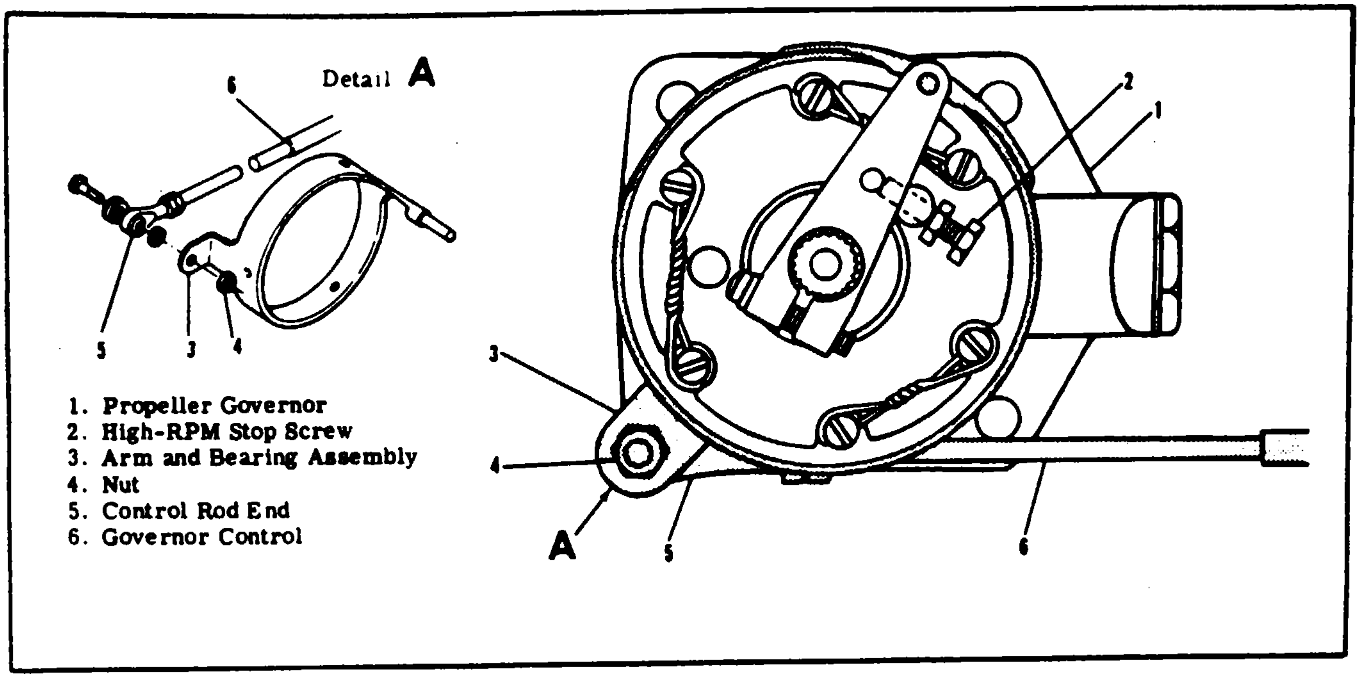


Figure 14-3. Governor and Control Adjustments

d. Connect governor control to governor, and rig as instructed in paragraph 14-16.
e. Connect intake manifold balance tube, if removed. Insure all clamps are tight.
f. Reinstall all items removed for access.

14-15. HIGH-RPM STOP ADJUSTMENT. See figure 14-3.
a. Remove engine cowling, and left hand section of nose cap.
b. Remove safety wire and loosen the high-speed stop screw locknut.
c. Turn the stop screw IN to decrease maximu rpm and OUT to increase maximum rpm. One full turn of the stop screw causes a change of approximately 25 rpm.
d. Tighten stop screw locknut, safety wire stop screw and make propeller control linkage adjustment as necessary to maintain full travel.
e. Install cabin heater inlet air duct or plug button and install cowling.
f. Test operate propeller and governor.

NOTE

It is possible for either the propeller low pitch (high-rpm) stop or the governor high-rpm stop to be the high-rpm limiting factor. It is desirable for the governor stop to limit the high-rpm at the maximum rated rpm for a particular aircraft. Due to climatic conditions, field elevation, low-pitch blade angle and other considerations, an engine may not reach rated rpm on the ground. It may be necessary to readjust the governor stop after test flying to obtain maximum rated rpm when airborne.

14-16. RIGGING PROPELLER GOVERNOR CONTROL.
a. Disconnect control end (5) from governor (1).
b. Place propeller control in cabin, full forward, then pull it back approximately 1/8 inch and lock in this position. This will allow "cushion" to assure full contact with governor high-rpm stop screw.
c. Place governor arm against high-rpm stop screw.
d. Loosen jam nuts and adjust control rod end until attaching holes align while governor arm is against high-rpm stop screw. Be sure to maintain sufficient thread engagement of the control and rod end. If necessary, shift control in the clamps to achieve this.
e. Attach rod end to the governor. Be sure all washers are installed correctly.
f. Operate the control to see that the governor arm bottoms out against the low pitch stop and bottoms out against the high pitch stop on the governor before reaching the end of control cable travel.

14-17. TIME BETWEEN OVERHAUL. (TBO) Propeller governor overhaul shall coincide with engine overhaul. Refer to section 12 for engine time between overhaul (TBO) intervals.

NOTE

The result of rigging is full travel of the governor arm (bottomed out against both high and low pitch stops) with some cushion at each end of control travel.

SECTION 15

UTILITY SYSTEMS

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15-1. UTILITY SYTEMS.

15-2. HEATING AND VENTILATING SYSTEM.

15-3. DESCRIPTION. The P210 aircraft utilizes an integrated series of ducts and valves to supply fresh air ventilation, heated or pressurized air to the cabin.

15-4. CABIN HEAT. A full control range of heated cabin air is available when using the cabin heat control. The control, CABIN HEAT, PULL ON, is mechanically connected to a valve, admitting ram air to a pressurization heat exchanger. The valve allows ram air at outside temperature or heated air from a shroud, surrounding the exhaust manifold, to pass through the heat exchanger. Since the heat exchanger governs the temperature of bleed air fed to the cabin, the setting of the cabin heat control will determine the cabin air temperature. With the cabin heat control pushed fully-in, the air entering the cabin will not be heated. However, pulling the control fully-out results in maximum system heating of incoming cabin air. Cabin heat can be selected with the pressurization system operating to pressurize the cabin or with the cabin unpressurized. To obtain heated air flow, ensure the pressurized air dump valve control is pushed fully-in; then select the desired cabin air temperature by pulling out the cabin heat control as required.

15-4A. OPERATION. (Thru 1978 Models,) (See figure 15-1, sheet 1 of 5.) Air for pressurization and/or heating is supplied by bleed air from the compressor section of the turbocharger. Pressurized air enters the system through a venturi (detail "A") and is routed through a heat exchanger (detail "B"). The pressurized air in the heat exchanger is cooled by outside air, which enters an air scoop (detail "C") and is forced thru the heat exchanger then dumped through an exit scoop (detail "D"). The pressurized air in the heat exchanger can be heated by pulling the "CABIN HEAT" control out. This operates a valve (detail "E") which restricts the flow of outside air through the heat exchanger and allows hot air from a shroud surrounding the left hand exhaust system (detail "F") to flow through the heat exchanger, heating the pressurized air. The amount of heating depends on the position of the cabin heat control, full out giving maximum heating. The pressurized air is then ducted to the diverter chamber (detail "G") where it enters through a dump valve (mounted on the chamber) which is operated by the "CABIN PRESSURE" control. When the cabin pressure control is full out, pressurized air is dumped into the engine compartment where it exits through the cowl flaps. The diverter chamber contains a valve which is operated by the "OVERHEAD/FLOOR-DEFROST" control. When the flow diverter control is pushed full in, pressurized air is directed into a duct (detail "H") which leads to the top of the firewall, along the windshield center post and into the overhead consoles (detail "I") where it enters the cabin through the outlet ports. A check valve (detail "J"), located at each wing root, prevents the pressurized air from escaping through the wing air scoops (detail "K"). Additionally, a cam lock device, located at the cabin heat valve (detail "L") prevents cabin heat from being applied while pressurized air flows through the overhead system. Only cool air is allowed to flow through the overhead system. When the diverter control is pulled full out, the pressurized air (hot or cold) flows into the firewall duct and enters the cabin through the floor vents (detail "M"). When the "DEFROST" control is pulled full out, flow through the right hand floor vent is blocked by a valve (detail "N") and the pressurized air is directed through the defrost valve (detail "O") and enters the cabin through the defrost vents (detail "P"). When pressurized air is not used (cabin pressure control pulled out), outside ram air enters through the wing scoops (detail "K") and check valves (detail "J"), then flows into the overhead consoles (detail "T"). If the Overhead/ Floor-Defrost control is not fully in or fully out, it is possible for the fresh air to leak past the diverter valve and flow through the floor vents or defroster vents. A check valve located in the diverter chamber (detail "G") prevents the air from escaping through the dump valve. All air entering the cabin is exhausted through the safety valve (detail "R") which is held open by a solenoid during unpressurized operation.

15-4B. VENTILATING SYSTEM OPERATION. (Beginning with 1979 Models.) (Refer to figure 15-1, sheet 2 of 5.) Ventilating airflow in the cabin, while in unpressurized flight, is available from any of three sources, simultaneously or individually: bleed air from the engine turbocharger compressor, ram air from an airscoop in each wing leading edge, or outside air from the openable window in the cabin entry door. When the aircraft is on the ground, taxiing or parked, the cabin emergency exit door can be opened to provide an additional ventilating air source.

CAUTION

The aircraft is not approved for flight with the emergency exit door open.

NOTE

Distribution of pressurization source air entering the cabin is controlled by the cabin air selector control. Ram air from the wing airscoops is directed to and controlled by the individual outlets. A two-speed cabin ventilator fan is located above the headliner to circulate cabin air through the overhead outlets during ground operations or pressurized flight and also, to augment the ram air flow when in unpressurized flight.

Distribution of ventilating airflow, obtained from the ram air from the wing airscoops, is provided by the overhead outlet system. Maximum cabin ventilation during unpressurized flight is obtained by turning the pressurization switch off, opening the individual overhead outlets, turning the ventilation fan on HI, pushing the dump valve control handle full-in ar^ djusting the cabin air selector control to obtain desired airflow distribution from the forward or floor outlets. In hot weather, use of only the ram air from the wing airscoops (dump valve pulled out) will provide the coolest cabin temperatures.

Whenever bleed air is being used for cabin ventilation (dump valve control pushed full-in) with the cabin unpressurized (pressurization switch OFF), and the aircraft altitude is higher than set on the cabin altitude selector, any loss of electrical power, such as turning off the master switch, will cause the cabin to pressurize. This occurs because the safety/dump valve required electrical power to be held open. An electrical power loss for any reason allows the valve to close, causing the cabin to pressurize. Therefore, if the master switch must be turned off in flight, it is recommended that first, the dump valve control be pulled full-out or the cabin altitude selector be adjusted to a value greater than the aircraft altitude. Under these circumstances, if ventilating air to the cabin is desired, ram air from the wing airscoops to the overhead outlets should be used.

15-4C. WINDSHIELD DEFROSTING OR DEFOGGING. (Beginning with 1979 Models.) (Refer to figure 15-1, sheet 2 of 5.) The aircraft incorporates provisions for windshield defrosting or defogging. Components include a valve, ducting, windshield outlets and a separate defroster control, labeled DEFROST, PULL-ON. The defroster control is located directly above the cabin heat control, and is mechanically connected to the defroster valve. This valve is located in the duct leading to the right side floor level outlet in the cabin. When the defrost control is pulled out, the valve opens to admit bleed air to a series of fixed outlets at the base of the windshield. The volume of airflow supplied to the windshield is, therefore, controlled by the setting of the defrost control. However, the temperature of the air reaching the windshield will be the same as that supplied to the floor level outlets, and this temperature is dependent on the setting of the cabin heat control. To obtain heated airflow to the windshield for defrosting, the cabin heat control must be pulled to the on position.

15-5. TROUBLE SHOOTING. Most of the operational troubles in the heating and ventilation systems are caused by sticking or binding air valves and their controls, or damaged air ducting. In most cases, valves or controls can be freed by proper lubrication. Damaged or broken parts should be repaired or replaced. When checking controls, be sure valves respond freely to control movement, that they move in the correct direction, and that they move through their full range of travel and seal properly. Check that hoses are properly secured and replace hoses that are burned, frayed or crushed.

15-6. REMOVAL AND INSTALLATION OF COMPONETS.

a. Figure 15-1 can be used as a guide for removal and installation of system components.

15-7. CABIN PRESSURIZATION.

15-8. (Deleted.)

15-9. (Deleted.)

15-9A. OPERATION. When the pressurized mode is selected, the bleed air from the aircraft engine turbocharger compressor is ducted through a sonic venturi (flow limiter) to a heat exchanger. At the heat exchanger, the bleed air is either heated or cooled, depending on the position of the cabin heat control on the instrument panel. If cool, pressurized air is desired (cabin heat control pushed full-in), ram air from an airscoop on the lower left side of the engine cowling is directed through the heat exchanger, cooling the bleed air. If heated air is desired, the cabin heat control is pulled out. This action closes the heat exchanger to cool ram air flow, and instead, allows heated air, passing through a shroud over the engine left exhaust manifold, to pass through the heat exchanger. Bleed air, is heated by this air as it flows through the heat exchanger. From the heat exchanger, the bleed air is ducted to a dump valve chamber on the engine side of the firewall. This chamber houses the pressurization system dump valve and the cabin pressure check valve. In order for pressurized bleed air to enter the cabin from the dump valve chamber, the dump valve control handle on the left side of the instrument panel must be pushed fully-in, closing the valve. Otherwise, with the dump valve handle pulled out (dump valve open), bleed air will dump from the chamber to the inside of the engine compartment, flowing overboard through the cowl flaps. The other component of the dump valve chamber, the cabin pressure check valve, closes to prevent a sudden loss in cabin pressure, such as when the dump valve is opened, or the engine fails to provide sufficient pressurized air flow. A cabin air selector valve chamber is located on the cabin side of the dump valve chamber. The air selector valve allows selection of either a pair of forward outlets or a pair of floor level fixed outlets, or both systems, depending upon the position of the air selector control, located on the lower right side of the instrument panel. Cabin pressure is controlled by two dual-purpose valves on the aft cabin bulkhead. One valve functions as an outflow valve, and begins to regulate air flow from the cabin as the aircraft climbs through the altitude selected for pressurization to begin. The outflow valve will continue to regulate air flow until maximum cabin differential pressure is reached, at which point, the valve will maintain this pressure differential. The other valve is a safety dump valve that contains an electric solenoid which, when the pressurization switch is placed in the OFF position, activates and opens the valve, dumping cabin pressure overboard. Both valves have as an integral part, differential pressure valves. The one in the outflow valve prevents cabin differential pressure from exceeding 3.35 PSI. In the event this valve fails, another one, incorporated into the safety/dump valve, will actuate and prevent the cabin differential pressure from exceeding 3.50 PSI. Anytime the cabin is not pressurized, outside air from the wing leading edge intakes may be vented into the cabin through the overhead outlets. When the cabin is pressurized, the flow of outside air is stopped by two pressure check valves, located in the wing roots.

15-9B. PRESSURIZATION CONTROLS AND INDICATORS. (See figure 15-1, sheet 5.)

15-9C. CABIN ALTITUDE SELECTOR. A cabin altitude selector, labeled ALT SEL, is mounted on the lower left side of the instrument panel. This control is used in selecting the altitude at which pressurization will begin and be maintained by controlling the outflow valve. The selector control knob has an outer scale marked SL, indicating sea level, and additional positions marked 1 through 10, indicating thousands of feet. An inner scale is included on this knob, which reflects the cabin altitude in relation to the cabin altitude selected on the outer scale at maximum cabin pressure differential.

15-9D. CABIN PRESSURIZATION SWITCH. A detent-equipped switch, adjacent to the cabin altitude selector, turns the pressurization system on or off, depending on its position. The detent requires that the switch be pulled out before repositioning, thus preventing inadvertent actuation. The two-position switch is labeled PRESSURE, and is ON in the up position, and OFF in the down position. When the switch is placed in the ON position, electrical power to a solenoid in the Safety/dump valve is removed and the valve will close to permit pressurization. In the OFF position, electrical power is applied to the safety/dump valve solenoid, and the valve will open to prevent pressurization. Loss of electrical power, for any reason, will cause the safety/dump valve to close.

15-9E. DUMP VALVE CONTROL HANDLE. A T-handle, labeled CABIN PRESSURE, PULL TO DUMP, is located on the lower left side of the instrument panel, adjacent to the master switch. This handle is mechanically connected to the dump valve, located in the dump valve chamber, on the engine side of the firewall. When the handle is pulled, the dump valve opens and allows pressurization air to flow overboard. With the handle pushed in, pressurized air flows to the cabin through the selector valve.

15-9F. CABIN AIR SELECTOR CONTROL. A push-pull type control labeled FWD AIR/PUSH, FLOOR DEFROST/PULL, permits incoming pressurized air to be directed to the two forward air outlets or to the two floor level outlets. With the cabin air selector control pushed fully in, pressurized air passes to the forward outlets. With the control pulled fully out, all airflow is diverted to the floor level outlets. A push-button type lock on the cabin air selector control allows positioning the control to any intermediate setting between full in and full out, which results in pressurized airflow to both pairs of outlets.

15-9G. CABIN RATE-OF-CLIMB INDICATOR. A cabin rate-of-climb indicator is located on the left side of the instrument panel above the dump valve control handle. The instrument is vented directly to the cabin and senses changes in pressure within the cabin to show cabin rate-of-climb or descent.

15-9H. CABIN ALTITUDE/DIFFERENTIAL PRESSURE INDICATOR. This instrument located adjacent to the cabin rate-of-climb indicator, shows both cabin altitude and differential pressure. It has two dials and two pointers. The outside dial indicates cabin altitude, and the inside dial indicates the pressure differential between cabin pressure and atmospheric pressure. The instrument is vented to the aircraft cabin and the static air source.

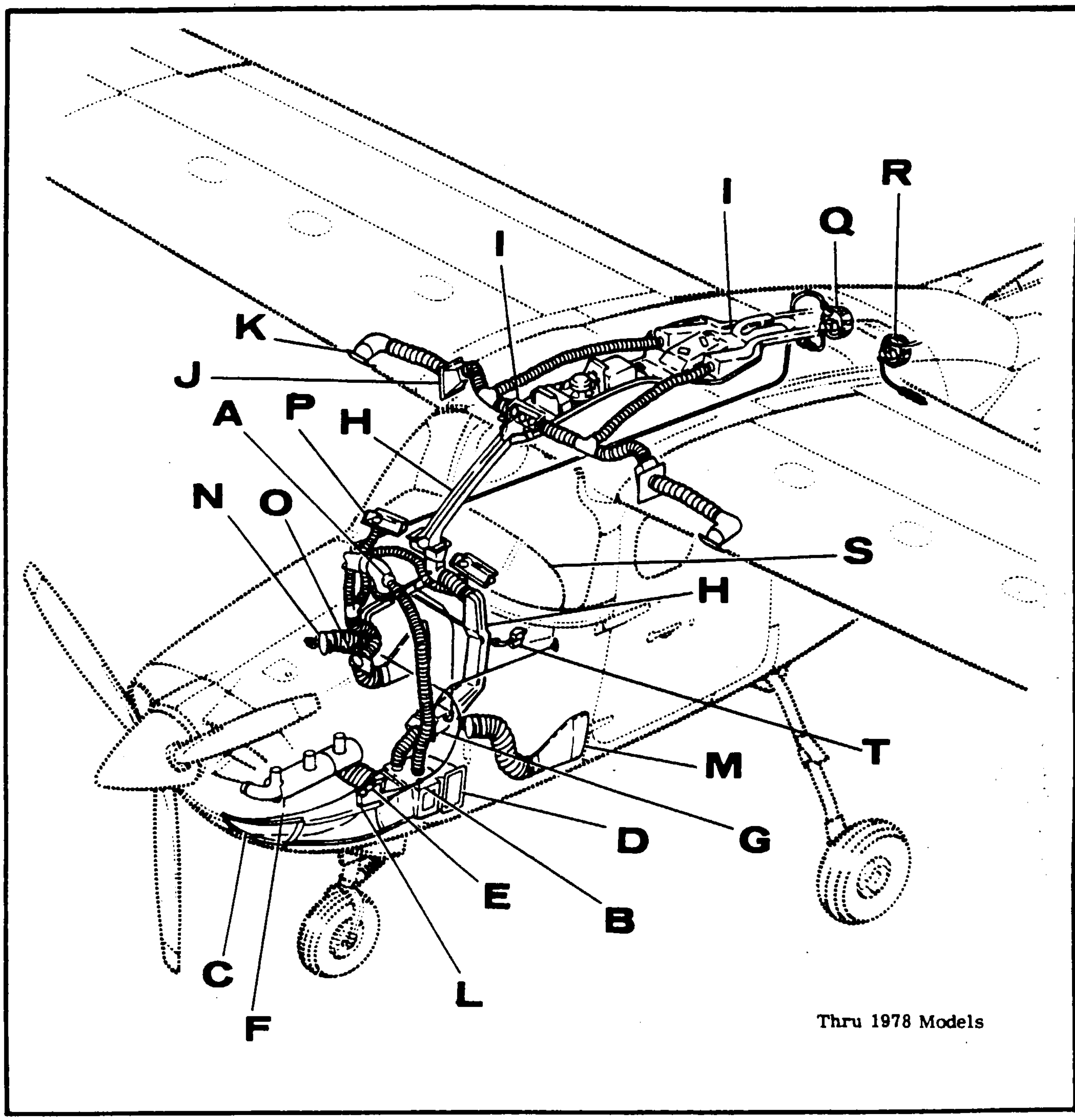
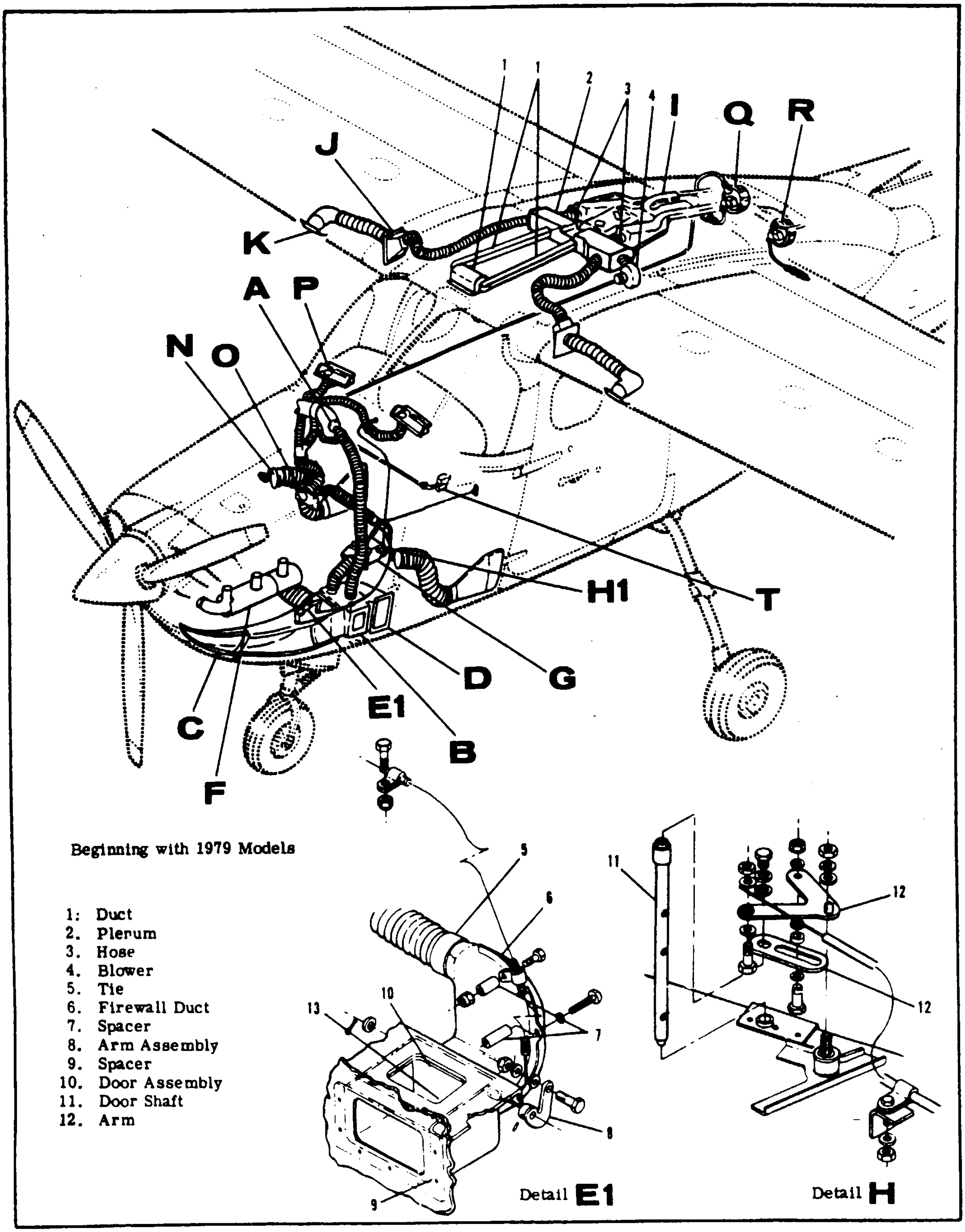


Figure 15-1. Heating, Ventilating and Pressurization System (Sheet 1 of 5)

15-9I. CABIN ALTITUDE WARNING LIGHT. Anytime the cabin altitude exceeds 12,400±100 feet, a barometric switch closes and illuminates a red press-to-test warning light labeled CABIN ALTITUDE. The light, located on the upper left corner of the instrument panel, indicates that cabin altitude is too high and corrective action must be taken. Oxygen should be employed, if available. If oxygen is not available, the aircraft should be flown to a lower altitude. When the aircraft descends to a cabin altitude of approximately 11,700 feet, the baromatric switch opens and the warning light turns off.

15-9J. PRESSURIZATION SYSTEM OPERATION. Refer to the Pilot's Operating Handbook for a complete pressurization system operation description.

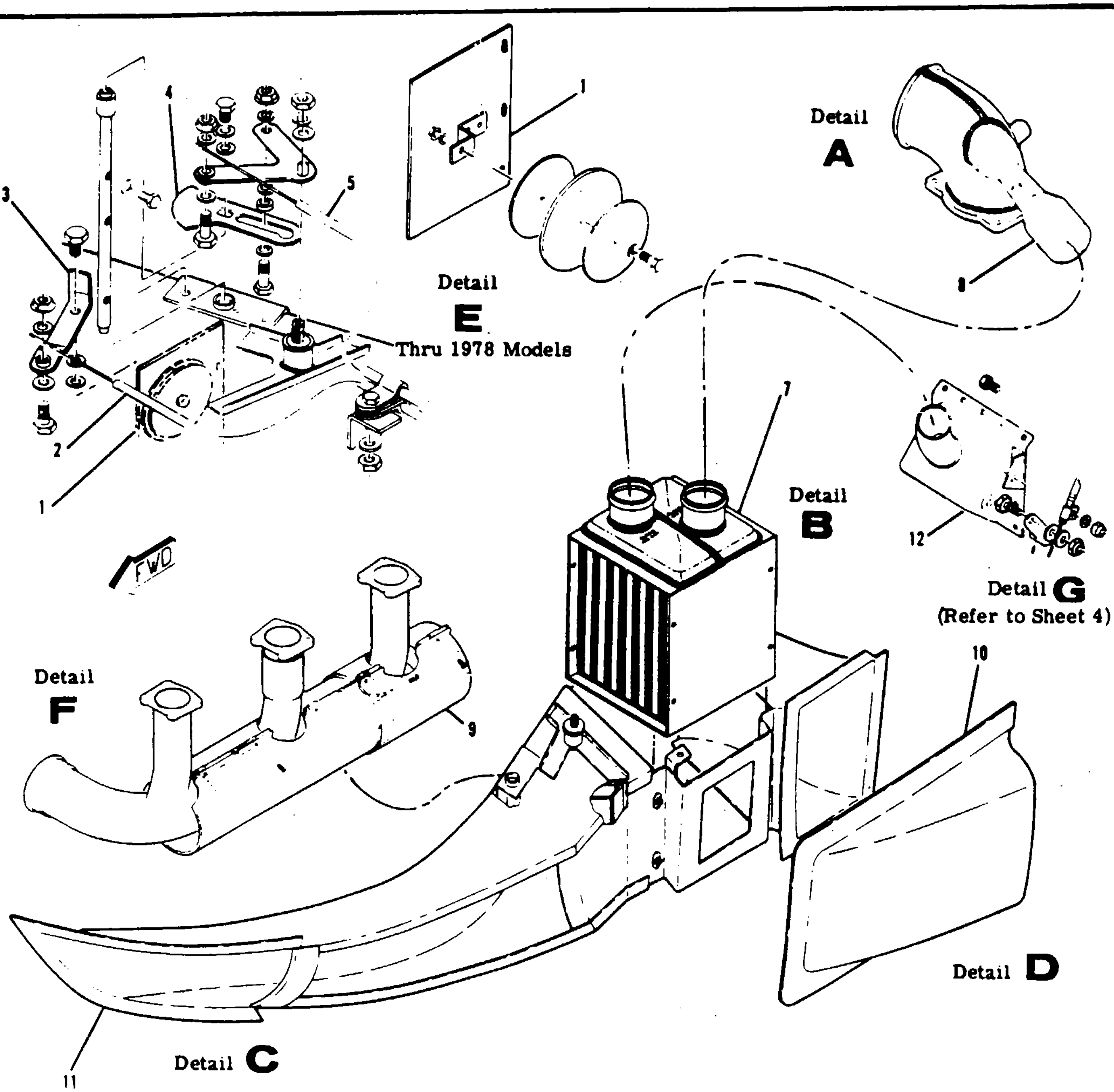
15-10. EMERGENCY OPERATION. In the event of contamination or the pressurized air from oil, smoke or exhaust fumes in the pressurized air system, it is possible to dump the pressurized air overboard by pulling the dump control full aft. A check valve, located on the cabin side of the firewall, will close, preventing rapid loss of cabin pressure. Cabin altitude will then rise to aircraft altitude.



Beginning with 1979 Models

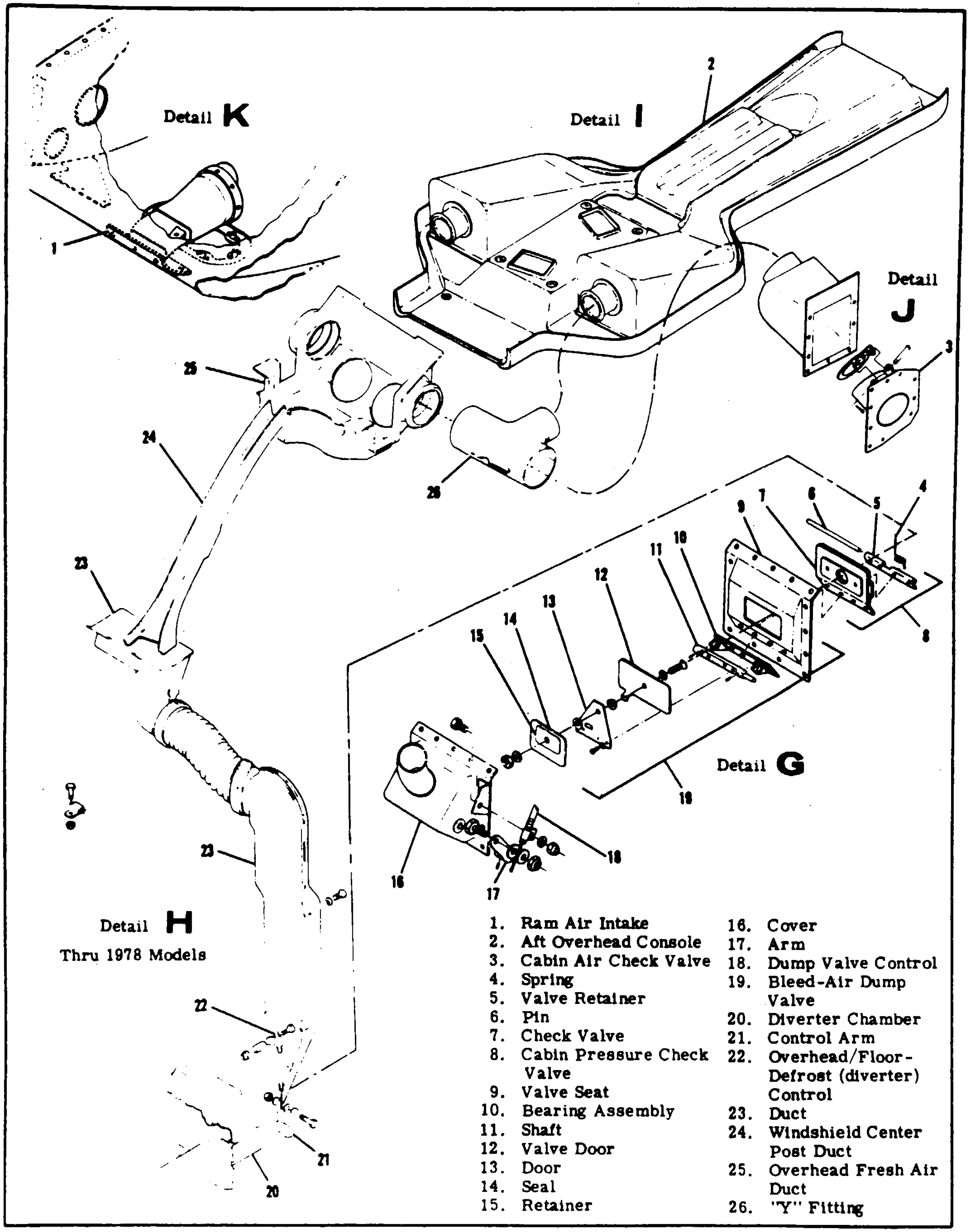
1. Duct
2. Plenum
3. Hose
4. Blower
5. Tie
6. Firewall Duct
7. Spacer
8. Arm Assembly
9. Spacer
10. Door Assembly
11. Door Shaft
12. Arm

Figure 15-1. Heating, Ventilating and Pressurization System (Sheet 2 of 5)



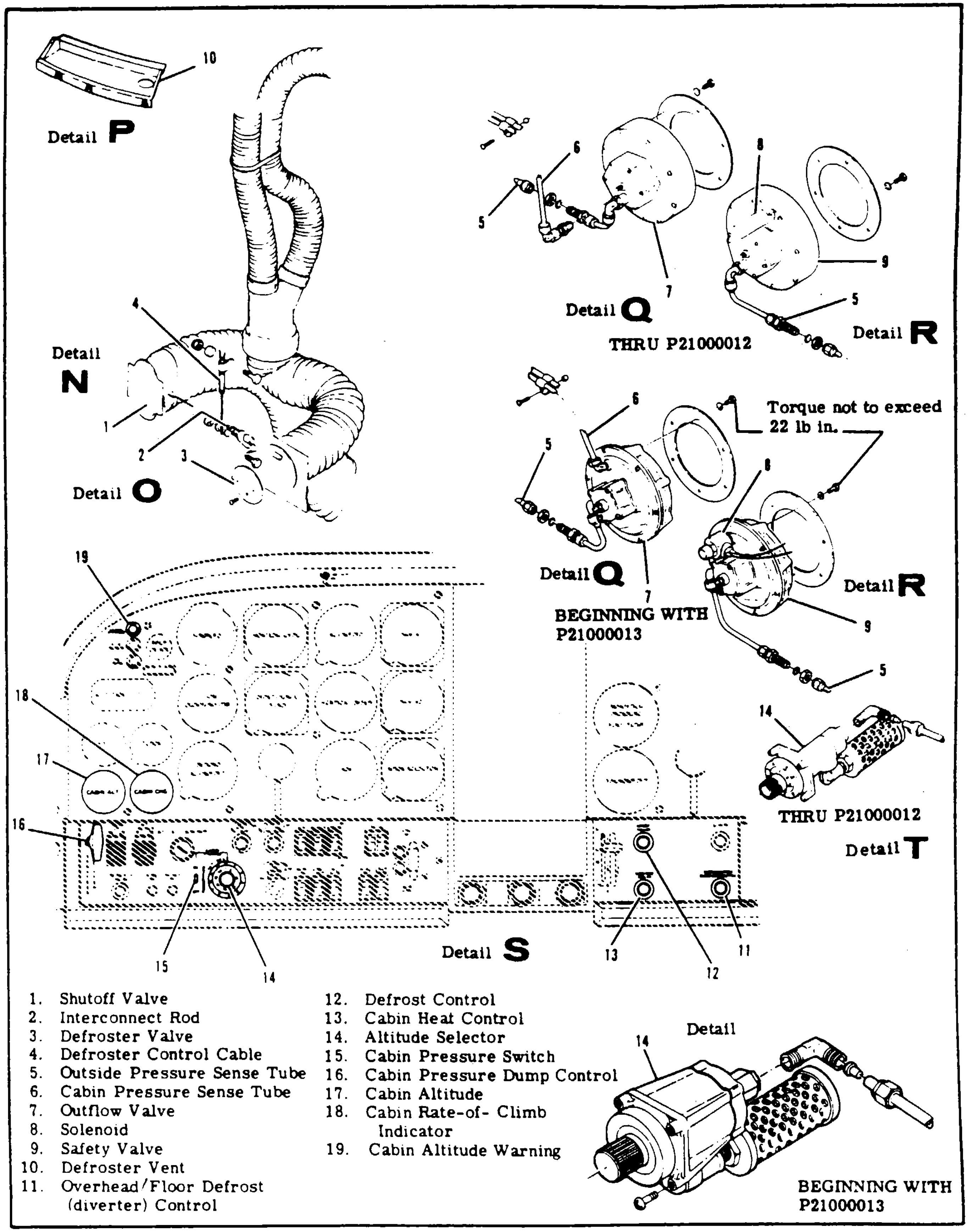
1. Cabin Heat Valve
2. Interconnect Cable
3. Cam Lock
4. Cam
5. Cabin Heat Control Cable
6. (Deleted)
7. Heat Exchanger
8. Flow Limiter
9. Heater Shroud
10. Exit Scoop
11. Intake Scoop
12. Dump Valve

Figure 15-1. Heating, Ventilating and Pressurization System (Sheet 3 of 5)



1.	Ram Air Intake	16.	Cover
2.	Aft Overhead Console	17.	Arm
3.	Cabin Air Check Valve	18.	Dump Valve Control
4.	Spring	19.	Bleed-Air Dump Valve
5.	Valve Retainer	20.	Diverter Chamber
6.	Pin	21.	Control Arm
7.	Check Valve	22.	Overhead/Floor-Defrost (diverter) Control
8.	Cabin Pressure Check Valve	23.	Duct
9.	Valve Seat	24.	Windshield Center Post Duct
10.	Bearing Assembly	25.	Overhead Fresh Air Duct
11.	Shaft	26.	"Y" Fitting
12.	Valve Door		
13.	Door		
14.	Seal		
15.	Retainer		

Figure 15-1. Heating, Ventilating and Pressurization System (Sheet 4 of 5)



1. Shutoff Valve
2. Interconnect Rod
3. Defroster Valve
4. Defroster Control Cable
5. Outside Pressure Sense Tube
6. Cabin Pressure Sense Tube
7. Outflow Valve
8. Solenoid
9. Safety Valve
10. Defroster Vent
11. Overhead/Floor Defrost (diverter) Control
12. Defrost Control
13. Cabin Heat Control
14. Altitude Selector
15. Cabin Pressure Switch
16. Cabin Pressure Dump Control
17. Cabin Altitude
18. Cabin Rate-of- Climb Indicator
19. Cabin Altitude Warning

Figure 15-1. Heating, Ventilating and Pressurization System (Sheet 5 of 5)

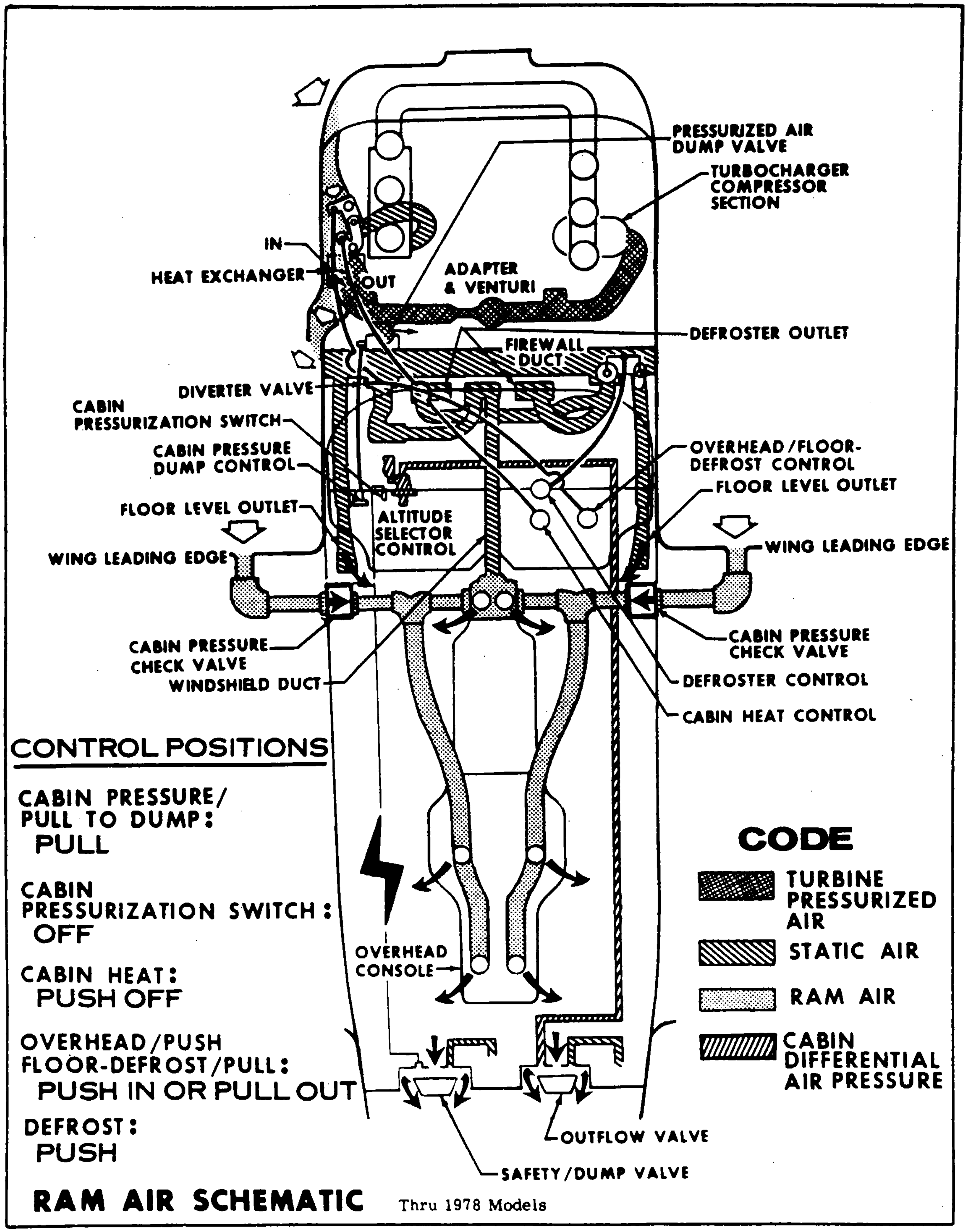


Figure 15-2. Cabin Air Flow Schematic (Sheet 1 of 6)

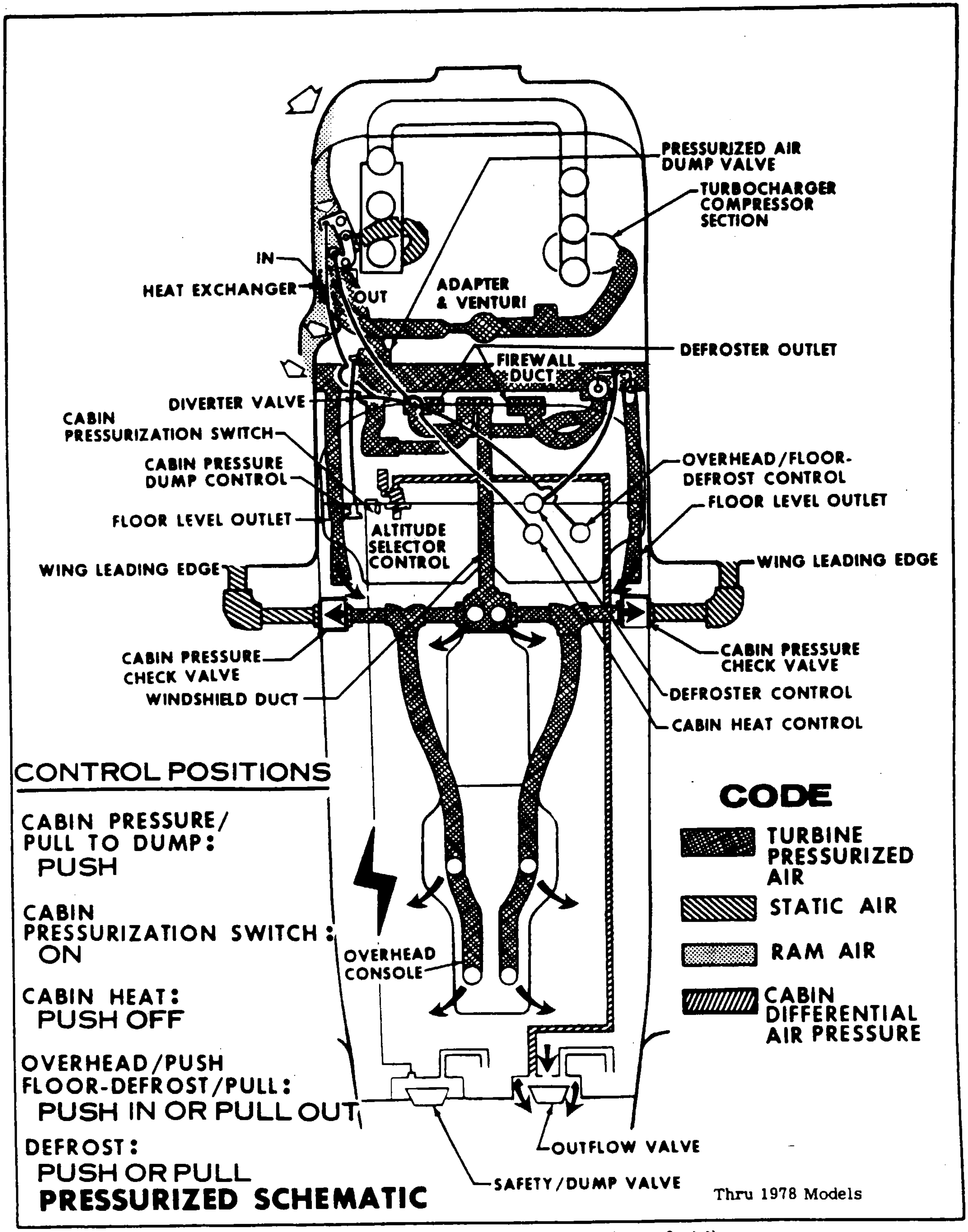


Figure 15-2. Cabin Air Flow Schematic (Sheet 2 of 6)

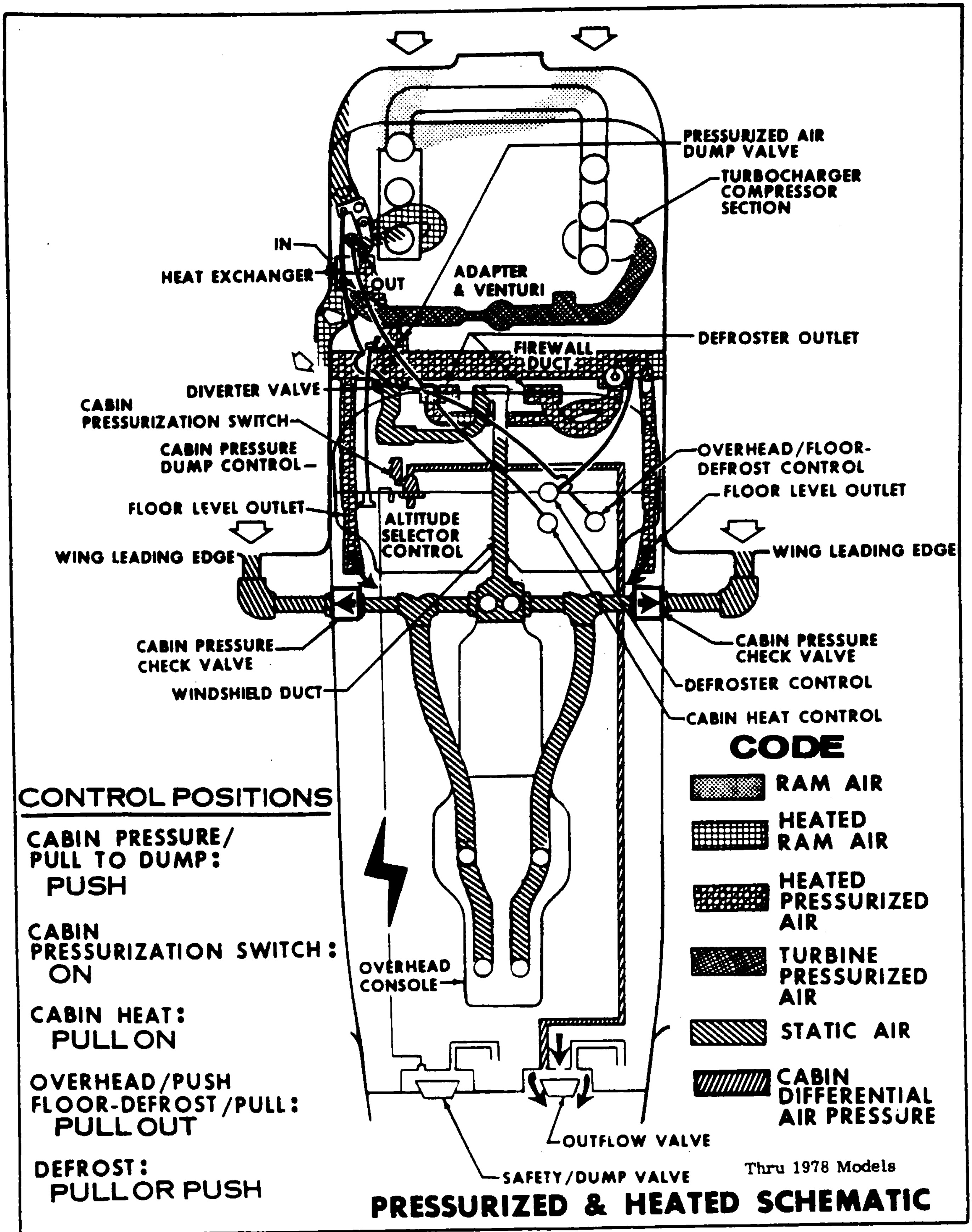


Figure 15-2. Cabin Air Flow Schematic (Sheet 3 of 6)

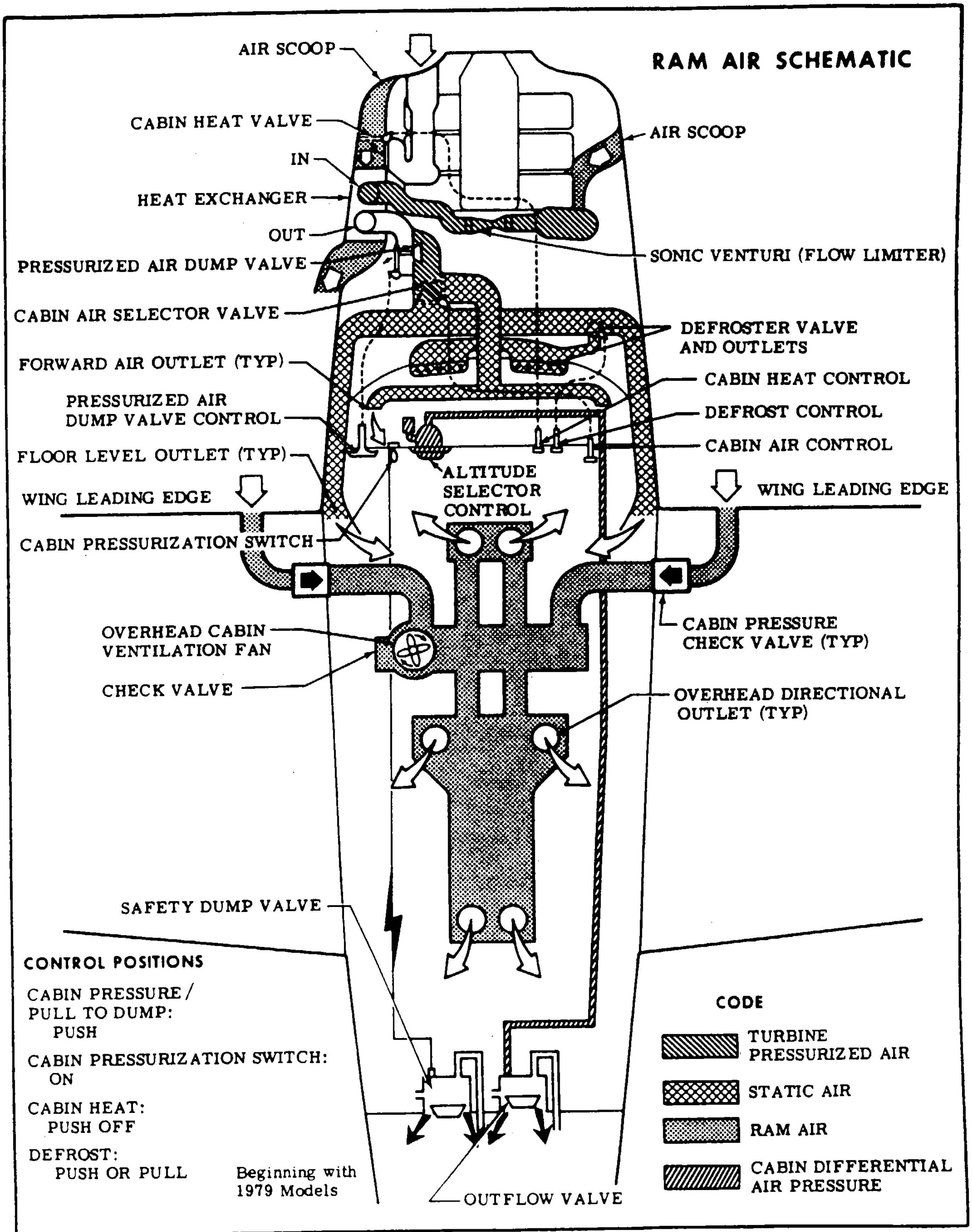


Figure 15-2. Cabin Air Flow Schematic (Sheet 4 of 6)

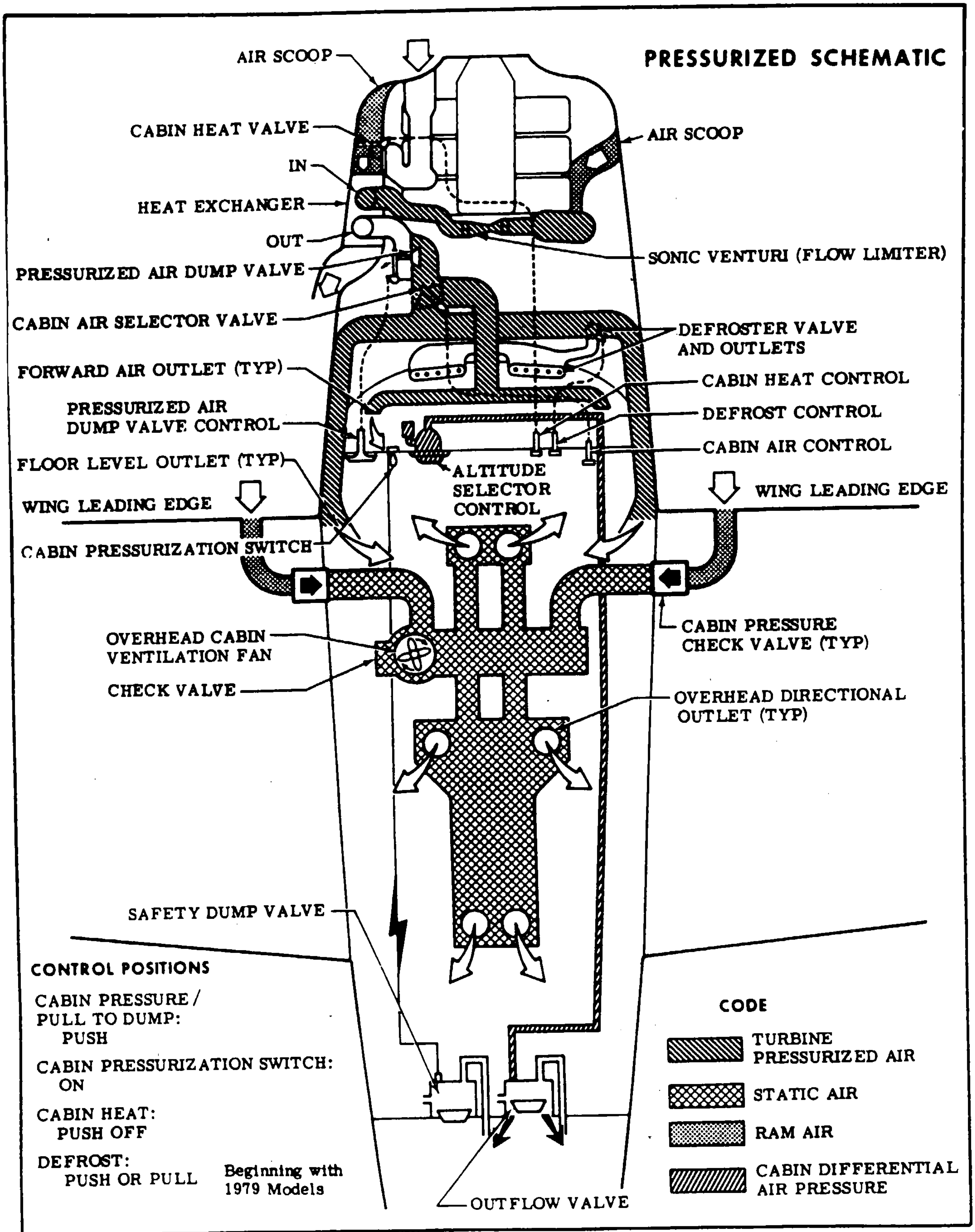


Figure 15-2. Cabin Air Flow Schematic (Sheet 5 of 6)

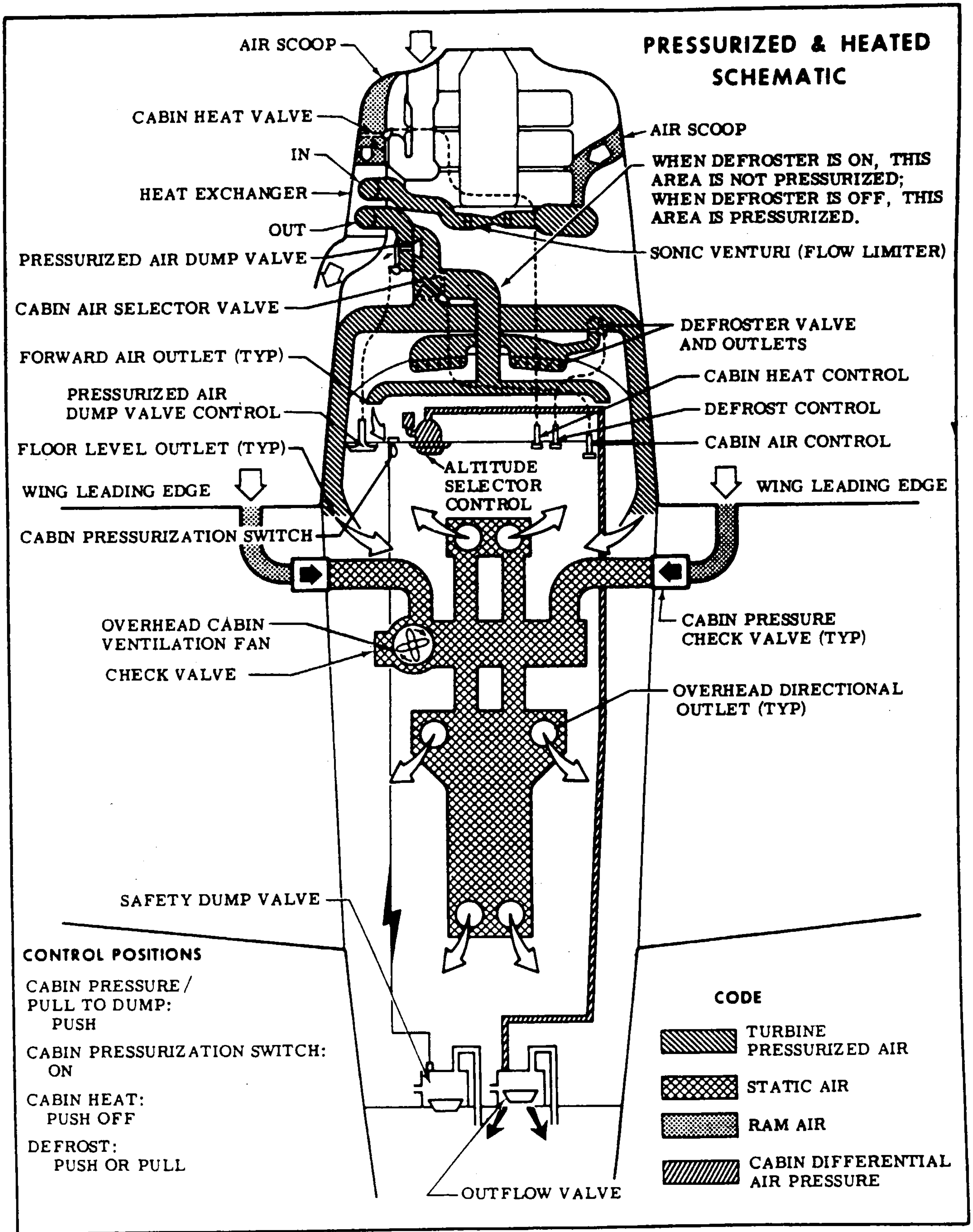


Figure 15-2. Cabin Air Flow Schematic (Sheet 6 of 6)

15-11. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
CABIN DOES NOT PRESSURIZE. (Turbocharger operating within limits outlined in Section 12 of this manual)	Safety valve will not close.	Check position of pressurization switch; should be ON.
		Check vent screen; if dirty, clean.
		Check circuitry to valve solenoid.
	Outflow valve will not control.	Check setting of cabin altitude controller.
		Check screen on altitude controller, if obstructed, clean.
	Insufficient air supply.	Check position of pressurized air dump controls; "Push in" for pressurization. Check venturi, ducting, connections, valving and rigging for leaks; repair.
CABIN PRESSURE WILL NOT GO TO MAXIMUM DIFFERENTIAL. (Turbocharger operating within limits outlined in Section 12 of this manual.)	Insufficient air supply.	Check position of pressurized air dump controls; "Push in" for pressurization. Check venturi, ducting, connections, valving and rigging for leaks; repair.
	Excessive cabin leakage.	Locate leakage areas and repair as required.
	Outflow valve not regulating properly.	Replace valve.
	Cabin differential gage not indicating properly.	Replace gage.
	Fresh air check valve not sealing.	Inspect valves. Clean or repair as required.
CABIN PRESSURE EXCEEDS MAXIMUM DIFFERENTIAL.	Outflow valve not regulating properly.	Replace valve.
	Cabin differential gage not indicating properly.	Replace gage.
	Safety valve not regulating properly.	If more than 3.5 psi, replace valve.
CABIN PRESSURE GOES TO MAXIMUM DIFFERENTIAL INDEPENDENT OF AIRCRAFT ALTITUDE.	Outflow valve controlling immediately.	Control line plumbing leaking or ruptured.
		Leak in casting of outflow valve; replace.

TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
CABIN ALTITUDE OVER-SHOOTS ALTITUDE ON SELECTOR.	Poppet valve is sticking in closed position.	Replace selector.
CABIN PRESSURE FLUCTUATION ON FULL DIFFERENTIAL.	Safety Valve Discrepant	Replace Safety Valve.

If volume of shop air is adequate and aircraft can be pressurized on the ground, then cabin leak down rate can be checked as follows:

a. Connect shop air to hose (2) between heat exchanger and firewall.

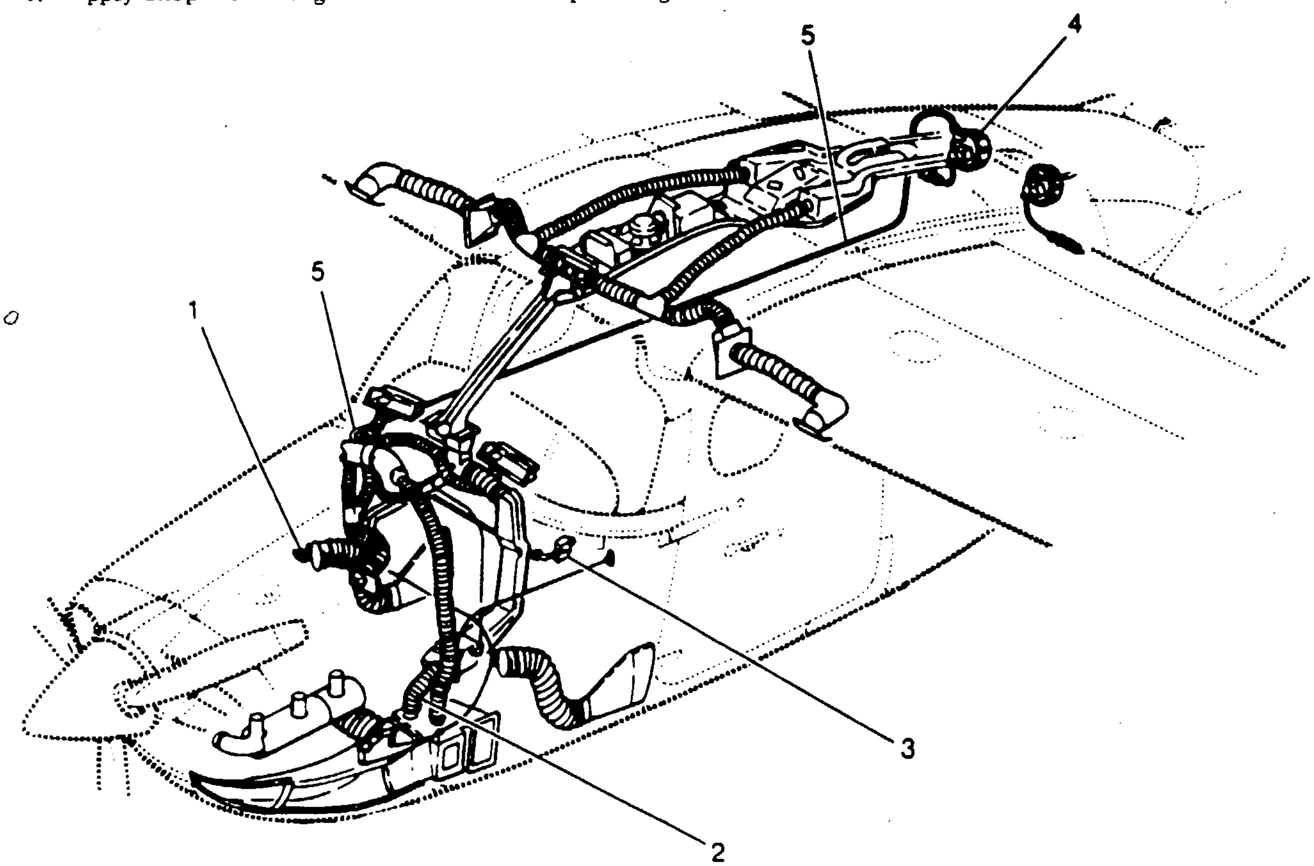
b. Connect a mercury manometer to the small connection (1) located on the right hand side of the firewall.

c. Disconnect hose (5) between cabin altitude controller (3) and outflow valve (4).

d. Turn master switch on and turn cabin pressure switch on.

e. Close cabin windows and door and lock from outside with key.

f. Apply shop air through a control valve to permit gradual flow.



TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
g. Increase cabin pressure to 6.5" of mercury and turn off air control valve. h. Start timing when manometer descends through 6" of mercury. i. Note time manometer reaches 4" of mercury. j. Leak down rate is acceptable, if time noted between steps "h" and "i" is no less than 10 seconds. P210 CABIN PRESSURE LEAK CHECK POINTS 1. Cabin door seal 2. Emergency door seal 3. Landing gear bulkhead (forward channel) 4. Downlock actuator boot (Check for leaks with gear retracted) 5. Nose gear steering boot 6. Base of hat section channels on aft pressure bulkhead (at floorboard) 7. Hat section stringers running through aft pressure bulkhead outboard of overhead windows (plug inside of stringer) 8. Seals around carry-thru spar 9. Fresh air check valves in wing roots 10. Water drain check valves 11. Tunnel area under pedestal up to firewall 12. Torward firewall (wire bundle and engine control holes) 13. Forward firewall upper outboard corners 14. Seals on floorboard covers (aft of landing gear bulkhead)		
CABIN ALTITUDE INCREASES WITH REDUCED POWER.	Faulty turbocharger controller.	Troubleshoot turbocharger per Section 12 of this manual.
CABIN DEPRESSURIZES SUDDENLY OR INTER-MITTENTLY.	Switch inadvertently turned to OFF.	Place switch ON; check switch. wiring or solenoid valve in safety valve for operation and security.
CABIN PRESSURIZATION AIR NOT COOLING	Obstruction in heat exchanger ram air duct.	Remove obstruction.

15-12. REMOVAL AND INSTALLATION OF COMPONENTS. (Refer to figure 15-1.)

a. Remove and install safety valve and/or outflow valve as follows:

1. Peel cover from forward side of pressure bulkhead and disconnect wires and tubes from valve.
2. Working through aft baggage compartment, cut safety wire from attaching bolts; remove bolts.
3. Remove valves from pressure bulkhead.

NOTE

Use all new gaskets when installing safety valve or outflow valve.

4. To install valve, have an assistant hold valve in place from inside cabin while bolts are being started.
5. Snug bolts down evenly and torque bolts (alternating from side-to-side and top-to-bottom) to value specified in figure 15-1.
6. Install new safety wire through bolts and reconnect wires and tubes to valve(s).
7. Replace bulkhead cover.

b. Figure 15-1 may be used as a guide while removing and installing remaining components.

15-13. DE-ICE AND ANTI-ICE SYSTEMS

15-13A. WING AND HORIZONTAL STABILIZER ONE CYCLE DE-ICE SYSTEM. (Thru P210000119.) (See figure 15-3.)

15-14. DESCRIPTION. The de-ice system consists of an engine-driven vacuum pump, a timer, an annunciator light to monitor system operation, controls pneumatic de-ice boots installed on the leading edges of the wings and horizontal stabilizer and the necessary hardware to complete the system.

CAUTION

Always allow sufficient ice build-up for efficient ice removal before actuating the de-ice system. If de-ice system is actuated continuously, or before ice has reached sufficient thickness, the ice will build up over the boots instead of cracking off.

15-15. SYSTEM OPERATION. The boots expand and contract, using pressure or vacuum supplied by the engine-driven vacuum pump. Normally, vacuum is applied to the boots to hold them against the leading edge surfaces. When a de-ice cycle is initiated, the vacuum is removed, and pressure is applied to "blow up" the boots. The resulting change in the contour of the boot will break the ice accumulated on the leading edges. The ice will then be removed by normal inflight air forces. Controls for the de-ice system consist of a timer switch, spring-loaded to the off position, located on the left switch and control panel, a pressure indicator light on the upper left side of the instrument panel, and a 5-amp circuit breaker switch on the left sidewall circuit breaker panel. When the timer switch, labeled DE-ICE PRESS is pushed to the ON (upper) position and released, the timer will initiate one de-ice cycle. Each time a cycle is required, the switch must be pushed to the ON position and released. The pressure indicator light, labeled DE-ICE PRESSURE should come on within 3 seconds after the cycle is initiated, and stay on for 2 to 3 seconds if the system is operating properly.

15-16. REMOVAL AND INSTALLATION OF DE-ICE SYSTEM. For removal and installation of de-ice system components, refer to figures 15-3, 15-4 and 15-4A. Refer to figures 15-4 and 15-4A for ice detector light.

15-17. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
DE-ICE BOOTS DO NOT INFLATE OR INFLATE SLOWLY.	Loose or faulty wiring.	Repair or replace wiring.
	Loose or damaged hose.	Tighten or replace hose.
	Loose or missing gasket.	Tighten fitting and/or replace gasket.
	Shuttle valve malfunction.	Replace shuttle valve.
	Pressure relief valve set too low.	Reset or replace valve.
	Pressure relief valve malfunction.	Replace pressure relief valve.
	Defective timer.	Replace timer.
DE-ICE BOOTS DO NOT DEFLATE OR DEFLATE SLOWLY.	Pressure relief valve malfunction.	Replace pressure relief valve.
	Shuttle valve malfunction.	Replace shuttle valve.
	Defective timer.	Replace timer.

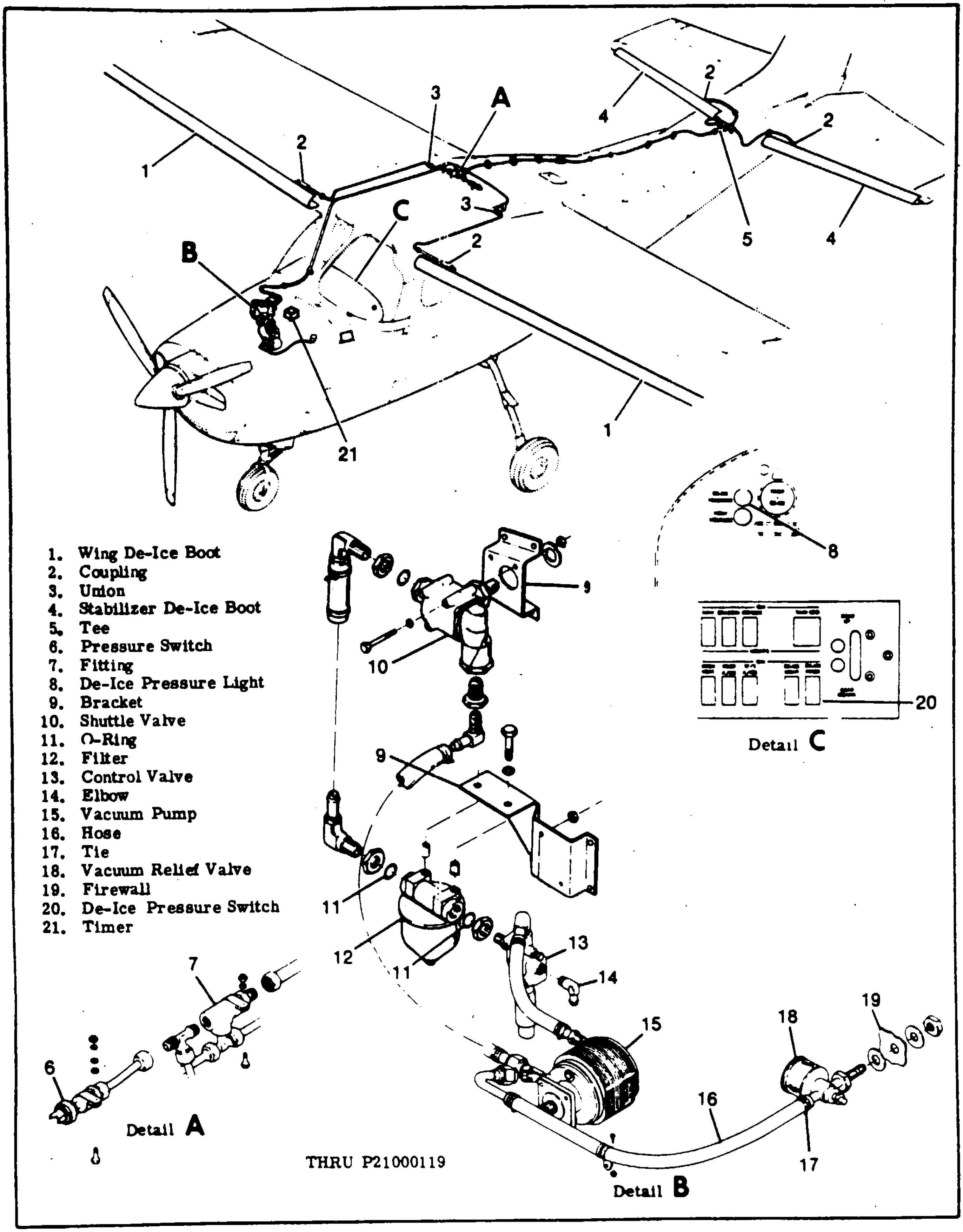


Figure 15-3. Wing and Horizontal Stabilizer One-Cycle De-ice System

15-18. DE-ICE SYSTEM FUNCTIONAL CHECK. (See figure 15-3.)

a. Electrical Check:

1. Check that WING DE-ICE circuit breaker is closed.

2. Actuate DE-ICE PRESS switch (20) to ON position, release and check that it returns to the off position.

3. Turn master switch on.

4. Check press-to-test function of DE-ICE PRESSURE light to check bulb and circuit. Make sure dimming lens on indicator light is open.

5. Activate DE-ICE PRESS switch on and check DE-ICE PRESSURE light.

6. If light fails to illuminate, recheck circuit breaker; if closed, check for short in electrical system.

7. Turn master switch off.

b. Air Pressure Test:

NOTE

This test can be performed in the engine compartment.

1. Disconnect pressure hose (16) from vacuum relief valve (18).

2. Disconnect discharge elbow (14) from control valve (13) and plug control valve port with AN933-4 plug.

3. Connect a source of clean, regulated, dry compressed air equipped with an inline hand-operated valve and pressure gage to pressure hose (16).

4. Apply 18-20 psi and trap the pressure in the system with the inline valve. Observe the system for leakage. Maximum allowable leakage is 2 psi per minute. If excess leakage is noted use a soap and water solution to locate leaks. Tighten connections as required.

5. To check pressure switch (6), turn master switch on while system is pressurized. Check that DE-ICE PRESSURE light (8) illuminates.

6. Remove test equipment and reconnect pressure hose (16) to vacuum relief valve (18).

7. Remove AN933-4 plug from control valve port (13) and replace with elbow (14).

NOTE

Refer to test kit #343 for air pressure testing and trouble shooting of the de-ice system. This kit is available from the Cessna Supply Division.

c. Vacuum Relief Valve Adjustment.

1. Adjust vacuum relief valve as outlined in Section 16 of this manual.

2. With vacuum relief valve adjusted and engine operating at 2400 rpm, place WING DE-ICE switch to ON position and observe de-ice system operation. System is functioning satisfactorily if the WING DE-ICE indicator light illuminates within 4.0 seconds after turning WING DE-ICE switch on.

d. Timer Cycle Check:

1. The timer cycle can be checked with the engine operating at 2100 rpm. Place WING DE-ICE switch to ON position and note time elapsed when WING DE-ICE indicator light goes out. This should be 6 seconds. Indicator light will not come on for 3 or 4 seconds after the switch is activated and will remain on until the DE-ICE control valve is deactivated by the automatic timer and control switch.

2. If it appears that the timer is defective, refer to figure 15-4D in this Manual for schematic and timer chart.

SHOP NOTES:

15-19. ADHESION TEST.

a. Using excess material trimmed from ends of any wing or empennage de-ice boot, prepare one test specimen for each de-ice boot installed.

b. This specimen should be one-inch wide and four or more inches long.

c. Cement specimen to installation surface adjacent to installed de-ice boot, following the identical procedure used for boot installation.

d. Leave one-inch of the strip uncemented to attach a clamp.

e. Four hours or more after de-ice boot installation, attach a spring scale to uncemented end of each strip and measure force required to remove the strip at a rate of one-inch per minute. The pull shall be applied 180° to the surface. (Strip doubled back on itself).

f. A minimum of five pounds tension (pull) shall be required to remove test strip.

NOTE

If less than five pounds is required acceptability of the de-ice boot adhesion shall be based on carefully lifting one corner of the de-ice boot in question sufficiently to attach a spring clamp and attaching a spring scale to this clamp. Pull with force 180° to the surface, and in such a direction that the de-ice boot tends to be removed on the diagonal. If a force of five pounds per inch of width can be exerted under these conditions, the installation shall be considered satisfactory. Width increases as corner peels back.

g. Re-cement corner following installation procedure.

CAUTION

Failure to achieve five pounds adhesion per inch of width requires reinstallation of the de-ice boot.

NOTE

Possible reasons for failure are: dirty surfaces, cement not mixed thoroughly. Corrosion of metal skin may occur if good adhesion is not attained, especially around rivet heads and metal skin splices. If these adhesion requirements are met, the aircraft may be flown immediately. Do not inflate de-ice boots within 48 hours of installation.

15-20. CLEANING DE-ICE BOOTS.

CAUTION

Use only the following instructions when cleaning de-ice/anti-ice boots. Disregard instructions which recommend petroleum base liquids (MEK, non-leaded gasoline, etc.) which can harm the boot material.

a. Clean boots with mild soap and water, then rinse thoroughly with clean water.

NOTE

Isopropyl alcohol can be used to remove grime which cannot be removed using soap. If isopropyl alcohol is used for cleaning, wash area with mild soap and water, then rinse thoroughly with clean water.

15-20A. CLEANING SYSTEM AND COMPONENTS. Follow procedures as outlined in paragraph 16-28C and paragraph 16-28D of this manual.

15-21. DE-ICE AND ANTI-ICE BOOT PROTECTIVE PRODUCTS. Two rubber treatment products, Age Master #1, and Icex are approved for use on de-ice boots and anti-ice boots of Cessna aircraft. Age

Master #1 protects the rubber against deterioration from ozone, sunlight weathering, oxidation and pollution. Icex helps retard ice adhesion and keeps the boots looking new longer; both products are produced and recommended by B. F. Goodrich. Age Master #1 (part #74-451-127) and Icex (part # ICEX) are available from the Cessna Supply Division.

a. Mask surrounding areas before applying Age Master #1 to clean, dry boot surfaces. Apply with a cheesecloth swab. DO NOT SPRAY this product; a rubbing or brushing action is required for the protective agent to penetrate the rubber surfaces. Apply three or more coats allowing a 5 to 10 minute drying period between applications. However, the total amount applied should not exceed 0.3 to 0.4 ounce per square foot of boot surface.

b. Mask surrounding areas before applying a light coat of Icex with a cheesecloth swab to clean, dry boot surfaces. A heavy coat of Icex will result in a sticky surface which collects dust and dirt. One quart of Icex will cover approximately 500 square feet. If boots have been treated with Age Master #1, allow it to dry for a minimum of 24 hours before applying the Icex. Apply Icex Spanwise in a single continuous back and forth motion.

CAUTION

Protect adjacent areas, clothing, and wear plastic or rubber gloves during application. Age Master stains clothing and Icex contains silicone which makes paint touch-up nearly impossible. Waterless hand cleaner is beneficial for cleaning hands, equipment and clothing.

Age Master #1 and Icex coatings last approximately 150 hours on wing and stabilizer boots and 15 hours on propeller boots.

15-22. APPROVED REPAIRS. (Cold Patch for Scuff or Surface Damage.)

NOTE

Surface coatings and surface refurbishing kits will not repair leaks. Use repair kit materials.

NOTE

When repairing de-ice boots and replacement layers are being installed, exercise care to prevent trapping air beneath the replacement layers. If air blisters appear after material is applied, they may be removed with a hypodermic needle. Should air blisters appear after boots have been installed for a length of time, it is permissible to cut a slit in the de-ice boot, apply adhesive and repair in accordance with the following cold patch repair procedures. An alternate method of repair is to peel the de-ice boot back using Toluol and reapply using 1300L cement.

a. Select a patch of ample size to cover damaged area.
b. Clean area to be repaired with a cloth slightly dampened with cleaner.
c. Buff area around damage with steel wool so that area is moderately but completely roughened
d. Wipe buffed area clean with a cloth slightly dampened with cleaner to remove all loose particles.
e. Apply one even,thorough coat of 1300L cement to the patch and to the corresponding damaged area of the de-ice boot. Allow cement to set until it becomes tacky.
f. Apply patch to the de-ice boot with an edge or the center adhering first, then work remainder of patch down, being careful to avoid trapping air pockets.
g. Roll patch thoroughly with a stitcher roller, and allow to set for ten or fifteen minutes.
h. Wipe patch and surrounding area from center of patch outward with a cloth slightly dampened with MEK.
i. Apply one light coat of A-56-B conductive cement (B. F. Goodrich part number 74-451-11) to restore conductivity.

NOTE

Satisfactory adhesion should be obtained in four hours; however, if the patch is allowed to cure for a minimum of twenty minutes, the de-ice boots may be inflated to check the repair.

15-22A. APPROVED REPAIRS. (Damage to Tube Area.)

NOTE

This type of damage consists of cuts, tears or ruptures to the inflatable tube area, and a fabric-reinforced patch must be used.

a. Select a patch of ample size to extend at least 5/8-inch beyond the damaged area.

NOTE

If the correct size patch cannot be obtained, one may be cut to the size desired from a larger patch. If this is done, the edges should be beveled by cutting with the shears at an angle. These patches are manufactured so they will stretch in one direction only. Be sure to cut the patch selected so that the stretch is in the width wise direction of the inflatable tube.

b. Clean the area to be repaired with a cloth slightly dampened with cleaner.
c. Buff the area around damage with steel wool so that area is moderately but completely roughened.
d. Wipe buffed area clean with a cloth slightly dampened with cleaner to remove all loose particles.
e. Apply one even, thorough coat of 1300L cement to the patch and to the corresponding damaged area of the de-ice boot. Allow cement to set until it becomes tacky.
f. Apply patch to de-ice boot with the stretch in the width-wise direction of the inflatable tubes, sticking edge of patch in place first, and working remainder down with a very slight pulling action so the rupture is closed. Use care not to trap air between patch and de-ice boot.
g. Roll patch thoroughly with a stitcher roller and allow to set for ten or fiteeen minutes.
h. Wipe patch and surrounding area, from the center of patch outward with a cloth slightly dampened with cleaner.
i. Apply one light coat of A-56-B conductive cement (B. F. Goodrich part number 74-451-11) to restore conductivity.

NOTE

Satisfactory adhesion of patch to de-ice boot should be reached in four hours; however, if patch is allowed to cure for a minimum of twenty minutes, de-ice boots may be inflated to check the repair.

15-22B. APPROVED REPAIRS. (Damage to Fillet Area.)

NOTE

This damage includes any tears or cuts to the tapered area aft of the inflatable tubes.

a. Trim damaged area square and remove excess material. Cut must be sharp and clean to permit a good butt joint of the inlay.
b. Cut inlay from tapered fillet B. F. Goodrich part number 74-451-21) to match cut out area.
c. Using Toluol, loosen edges of de-ice boot around area approximately one and one-half inches from all edges.
d. Clean area to be repaired with a cloth slightly dampened with cleaner.
e. Lift back edges of cutout and apply one coat of 1300L cement to underneath side of loosened portion of de-ice boot.
f. Apply one coat of 1300L cement to wing skin underneath loosened edges of de-ice boot and extending one and one-half inches beyond edges of de-ice boot into cutout area.
g. Apply second coat of 1300L cement to underneath side of de-ice boot as outlined in step (e).
h. Apply one coat of 1300L cement to one side of a two-inch wide neoprene-coated fabric tape (B. F. Goodrich part number 74-451-22), allow to dry and trim to size.
i. Reactivate cemented surfaces with Toluol and apply reinforcing tape to wing skin, exercising care to center tape under all edges of cutout.

j. Roll down tape on wing skin with stitcher roller to assure good adhesion, being careful to avoid creating air pockets.
k. Apply one coat of 1300L cement to top surface of tape and allow to dry approximately five to ten minutes.
l. Reactivate cemented surfaces with toluol. Working toward cutout, roll down edges of loosened de-ice boot, being careful to avoid creating air pockets. Edges should overlap on tape approximately one inch.
m. Roughen back surface of inlay repair material, previously cut to size, clean with cleaner and apply one coat of 1300L cement.
n. Apply one coat of 1300L cement to wing skin inside of cutout area and allow to dry.
o. Apply second coat of 1300L cement to back side of inlay material and allow to dry.
p. Reactivate cemented surfaces with Toluol and carefully insert inlay material with feathered edge aft. Working from wing leading edge aft, roll down inlay material carefully to avoid trapping air.
q. Roughen area on outer surface of de-ice boot and inlay with steel wool, one and one-half inches on each side of splice. Clean with cleaner and apply one coat of 1300L cement to this area.
r. Apply one coat of 1300L cement to one side of two-inch wide neoprene-coated fabric tape, trim to size and center tape over splice on all three sides.
s. Roll down tape on de-ice boot with stitcher roller to assure good adhesion, being careful to avoid creating air pockets.
t. Apply one light coat of A-56-B conductive cement (B. F. Goodrich part number 74-451-11) to restore conductivity.

15-22C. APPROVED REPAIRS. (Damaged Veneer, loose from De-ice Boot.)
a. Peel and trim loose veneer to the point where adhesion of veneer to de-ice boot is good.
b. Roughen area in which veneer is removed, with steel wool, rubbing parallel to cut edge of veneer ply to prevent loosening it.
c. Taper edges of veneer down to tan rubber ply by rubbing parallel to edges with steel wool and MEK.
d. Cut a piece of veneer material (B. F. Goodrich part number 74-451-23) to cover damaged area and extend at least one-inch beyond, in all directions.
e. Mask off an area one-half inch larger in length and width than size of veneer patch.
f. Apply one coat of 1300L cement to damaged area, and one coat to veneer ply. Allow cement to set until it becomes tacky.
g. Roll veneer ply to de-ice boot with a two-inch rubber roller, applying a slight tension on veneer ply when applying, to prevent trapping air.
h. Wipe patch and surrounding area from center of patch outward with a cloth slightly dampened with cleaner.
i. Apply one light coat of A-56-B conductive cement (B. F. Goodrich part number 74-451-11) to restore conductivity.

NOTE

B. F. Goodrich Repair Kit No. 74-451-C for repairing de-ice boots is available from the Cessna Supply Division.

15-23. MATERIALS REQUIRED FOR INSTALLATION OF DE-ICE BOOTS.
1. No. EC-1300L (EC-1403) Cement, Minnesota Mining & Manufacturing Company.
2. Methyl-Isobutyl Ketone (MIBK).
3. Cleaning Solvent - Toluol.
4. Cleaning Solvent - Hexane.
5. Clean, lint-free cleaning cloths.
6. Four yards clean, heavy canvas duck fabric 48 inches wide.
7. Several empty tin cans.
8. Three-inch paint brushes.
9. Two-inch rubber hand rollers.
10. 1/4-inch metal hand stitcher roller, B. F. Goodrich Company (Part Number 3306-10).
11. Carpenters' chalk line.
12. One-inch masking tape.
13. Steel measuring tape.
14. Sharp knives.
15. Fine sharpening stone.
16. No. EC-539 Sealing Compound, Minnesota Mining & Manufacturing Company.
17. No. A-56-B Cement, B. F. Goodrich Company (Part Number 3306-15).
18. GACO-700-A Coating, Gates Engineering Co., Wilmington, Delaware 19899.

15-24. REPLACEMENT OF DE-ICE BOOTS. To remove or loosen installed de-ice boots, use toluol or toluene to soften the "cement" line. Apply a minimum amount of this solvent to the cement line as tension is applied to peel back the boot. Removal should be slow enough to allow the solvent to undercut the cement so that parts will not be damaged. To install a wing de-icer boot, proceed as follows:
a. Clean the metal surfaces and the bottom side of the de-icer thoroughly with Methyl Ethyl Ketone or Methyl Isobutal Ketone. This shall be done by wiping the surfaces with a clean, lint-free rag soaked with the solvent and then wiping dry with a clean, dry, lint-free rag before the solvent has time to dry.
b. Place one inch masking tape on wing to mask off boot area allowing 1/2 inch margin. Take care to mask accurately so that clean-up time will be reduced.
c. Stir EC-1300L cement thoroughly before using. Brush one even, light coat onto leading edge and to rough side of boot, brushing well into rubber. Allow cement to air dry until cement does not transfer to fingers when touched. Then apply a second coat to each of the surfaces and allow to dry. Apply a vacuum to the boots when they are installed to help smooth out wrinkles.

d. Place a straight line along the leading edge line and a corresponding line on the inside of the de-icer boot if it does not have a centerline. Securely attach hoses to de-icer connections. Position centerline of boot with leading edge line, using a clean, lint-free cloth, heavily moistened with toluol, reactivate surface of cement on wing and the boot in small, spanwise areas approximately 6-inches wide. Avoid excessive rubbing of cement, which would remove it from the surface of the wing. Utilize enough help to hold boot steady during installation, and caution them against handling cemented surfaces. Roll boot firmly against leading edge, being careful not to trap any air between boot and leading edge surface. Always roll parallel to the inflatable tubes. Should the boot attach "off course", pull it up immediately with a quick motion, and reposition properly. Avoid twisting or sharp bending of boot. Finally, roll the entire surface of the boot parallel to tubes, applying pressure. Use the metal stitcher roller between tubes and around connections. Should an air pocket be encountered, carefully insert a hypodermic needle and allow air to escape. Do not puncture the inflatable tubes at any time. Fill any gaps between adjoining boots with GACO N-700-A Neoprene coating (Gates Engineering Co., Wilmington, Delaware 19899). Apply a coat of the Neoprene coating along trailing edge of boot to the surface of the skin to form a neat, straight fillet.

e. Remove masking tape and clean surfaces with toluol.

15-25. WING AND HORIZONTAL STABILIZER THREE-CYCLE DE-ICE SYSTEM. (Beginning with P21000120.) (See figure 15-4.)

15-25A. DESCRIPTION. The system consists of pneumatically-operated boots, an engine-driven pneumatic pump, an annunciator light to monitor system operation, system controls and the hardware necessary to complete the system.

15-25B. SYSTEM OPERATION. The boots expand and contract, using pressure or vacuum from the engine-driven vacuum pump. Normally, vacuum is applied to all boots to hold them against the leading edge surfaces. When a de-icing cycle is initiated, the vacuum is removed and a pressure is applied to "blow up," the boots. Ice on the boots will then be removed by normal in-flight air forces. Controls for the system consist of a spring-loaded on-off rocker switch on the left switch and control panel, a pressure indicator light on the upper left side of the instrument panel, and a 5-amp "pull-off" type circuit breaker on the left sidewall circuit breaker panel. The two-position de-icing switch, labeled DE-ICE PRESS, is spring-loaded to the normal off (lower) position. When pushed to the ON (upper) position and released, it will activate one de-icing cycle. Each time a cycle is desired, the switch must be pushed to the ON position and released. If necessary, the system can be stopped at any point in the cycle (deflating the boots) by pulling out the circuit breaker labeled WING, DE-ICE. During a normal de-icing cycle, the boots will inflate according to the following sequence: first, the horizontal stabilizer boots will inflate for approximately six seconds, then the inboard boots inflate for the next six seconds, followed by the outboard wing boots for another six seconds. The total time required for one cycle is approximately 18 seconds. The pressure indicator light, labeled DE-ICE PRESSURE, should illuminate when the horizontal stabilizer boots reach proper operating pressure. At lower altitudes, it should come on within one to two seconds after the cycle is initiated and remain on for approximately 17 seconds if the system is operating properly. At higher altitudes, the light will come on initially within three seconds and will go off for one to three seconds during sequencing. The system may be recycled six seconds after the light goes out. The absence of illumination during any one of the three sequences of a cycle indicates insufficient pressure for proper boot inflation and effective de-icing ability. An ice detector light is also installed to facilitate detection of wing ice at night or during reduced visibility. The ice detector light system consists of a light installed on the left side of the cowl deck forward of the windshield which is positioned to illuminate the leading edge of the wing, and a rocker-type switch, labeled DE-ICE LIGHT, located on the left switch and control panel.

15-25C. FLIGHT INTO KNOWN ICING EQUIPMENT AND SYSTEMS. (Beginning with serial P21000225.) (See figure 15-4A.)

15-25D. DESCRIPTION. A flight into known icing equipment package may be installed on the airplane. For operations in known icing conditions as defined by the FAA, the following Cessna (drawing number 1200254) and FAA approved equipment must be installed and operational:

1. Wing horizontal stabilizer and vertical fin leading edge pneumatic de-ice boots.
2. Propeller anti-ice boots.
3. Windshield anti-ice panel.
4. Heated pitot tube (high capacity).
5. Heated stall warning transducer (high capacity).
6. Ice detector light.
7. 95-amp alternators. (Thru 1982 models).
8. Dual 60-amp alternators. (Beginning with 1983 models).
9. Control surface static dischargers.
10. High capacity vacuum pump (thru 1981 models).
11. Dual vacuum pumps. (Beginning with 1982 models).

Service information on this equipment when installed on known icing certified aircraft is contained in the following paragraphs.

15-25E. WING, HORIZONTAL STABILIZER AND VERTICAL FIN DE-ICE SYSTEM. (Beginning with serials P21000225.) (See figure 15-4A.)

NOTE

A few aircraft which are not certified for flight into known icing conditions may have this system installed.

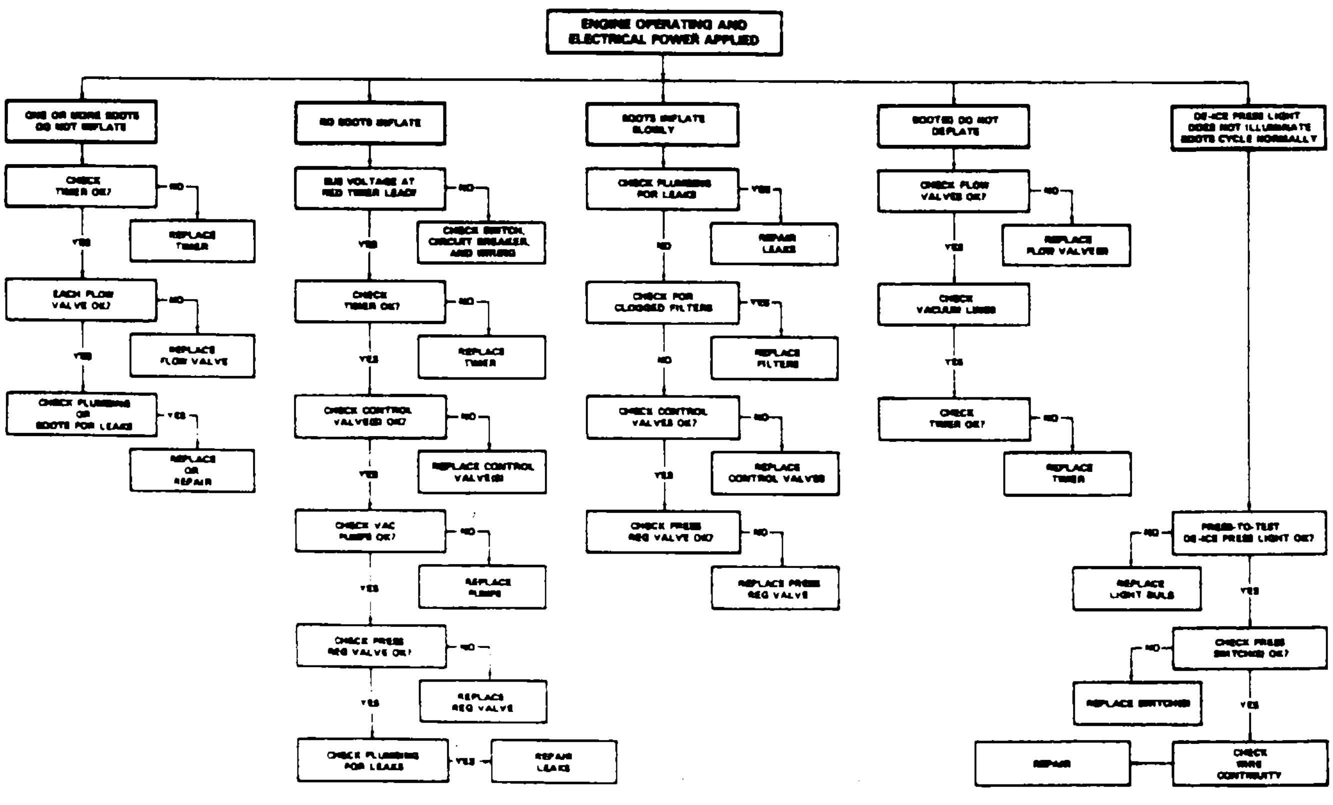
15-25F. DESCRIPTION. The system consists of an engine-driven vacuum pump, pressure control valve, vacuum relief valve, flow control valves, pressure switch, timer and a boot mounted on the leading edge of each wing, on the leading edge of each horizontal stabilizer, and a boot mounted on the leading edge of the vertical fin. The standard vacuum pump is replaced with a larger capacity vacuum pump. The aircraft vacuum system components also serve the de-ice vacuum system, and the vacuum relief valve adjustment should be maintained in accordance with procedures outlined in the applicable paragraph in Section 16 of this manual. If the vacuum relief valve is set too low, suction to the gyros will drop momentarily during the boot inflation cycle. This suction variation can be corrected with proper vacuum relief valve adjustment. An ice detector light is incorporated in the left side of the cowl deck below the windshield to aid in checking for ice formation during night operation.

15-25G. WING, HORIZONTAL STABILIZER AND VERTICAL FIN DE-ICE SYSTEM. (Beginning with P21000761.) (See figure 15-4A.)

15-25H. DESCRIPTION. The system consists of two engine-driven vacuum pumps, two pressure control valves, two vacuum relief valves, flow control valves, pressure switch, timer and a boot mounted on the leading edge of each wing, on the leading edge of each horizontal stabilizer and on the leading edge of the vertical fin. The dual vacuum pumps are utilized by the aircraft vacuum system, and the relief valve adjustment should be maintained in accordance with the procedures outlined in the applicable paragraph in Section 16 of this manual. A vacuum gage, located on the left side of the instrument panel is equipped with two plungers labeled L, R and source. In case of a vacuum pump failure, a red band will become visible on the plunger corresponding to the failed pump.

15-25I. SYSTEM OPERATION. The boots expand and contract, utilizing pressure or vacuum from the engine-driven vacuum pumps. Normally, vacuum holds all the boots against the leading edge surfaces. When a de-icing cycle is initiated, the vacuum is removed and pressure is applied to expand the boots, thus cracking the ice which is removed by the inflight air moving over the leading edges and surfaces of the wings and stabilizers. Controls for the de-ice system consist of a two-position rocker-type de-ice switch located on the left switch panel, a pressure indicator light on the upper left side of the instrument panel, and a 5-amp circuit breaker on the left sidewall circuit breaker panel. The de-ice switch, labeled DE-ICE PRESS, is spring-loaded to the off position. When the switch is pushed to the ON (upper) position and released, it will activate one de-ice cycle. The system may be stopped at any point in the cycle (boots deflated) by pulling the WING DE-ICE circuit breaker to the off position. The boots inflate in the following sequence: Horizontal and vertical stabilizer boots inflate for approximately 6 seconds, inboard wing boots, 6 seconds and outboard wing boots, 6 seconds. The total

15-25J. TROUBLE SHOOTING.



time required for one de-ice cycle is approximately 18 seconds. The pressure indicator light, labeled DE-ICE PRESSURE, should light when the tail section boots inflate. When ground-checking the system, it should light within one to two seconds after the cycle is initiated, and remain on for approximately 17 seconds. The system may be recycled within six seconds after the light goes off. An ice detector light is also included in the system, refer to paragraph 15-25B for its location and operating instructions.

15-25K. REMOVAL / INSTALLATION OF DE-ICE SYSTEM. Refer to figures 15-4 and 15-4A.

15-25L. KNOWN ICING DE-ICE SYSTEM FUNCTIONAL CHECK. (See figures 15-4B, 15-4C, and 15-6A.)

a. Electrical Controls Check: (See figure 15-6A.)

1. Check wing de-ice circuit breaker (25) closed.
2. Check de-ice pressure switch (31) off (spring-loaded to off position).
3. Turn master switch (33) on.
4. Press de-ice pressure light (9) to check light circuit and bulb. Make sure dimming shutter is open.
5. Turn master switch (33) off.

b. Vacuum Relief Valve(s) Adjustment.

1. Refer to Section 16 of this manual for vacuum relief valve(s) adjustment.

c. Preflight System Check: (See figure 15-6A.)

1. With vacuum relief valve(s) adjusted and engine running from 2200 to 2500 rpm, check both buttons on the suction gage are retracted out of sight and vacuum is normal.
2. Place de-ice pressure switch (31) on, and release.
3. Check that de-ice pressure light (9) comes on within one second, remains on for 18 seconds, then shuts off.
4. Check boots for inflation during 18 second cycle as follows: first six seconds tail section boots, then inboard wing boots for next six seconds, finally the outboard wing boots inflate for six seconds completing one cycle.
5. The absence of or slow illumination of the de-ice pressure light during any one of the three sequences of a cycle indicates insufficient pressure for proper system operation.

d. Timer Check:

1. Refer to paragraph 15-25AA and paragraph 15-25AB for timer checks.

e. Air pressure Check (See figure 15-4C):

NOTE

This check may be performed in the engine compartment.

1. Disconnect both pressure hoses (8) from pressure control valves (3).
2. Connect a source of clean regulated dry air pressure (21 ±1 psig) fitted with a hand-operated valve or check valve and an in-line air pressure gauge to right pump pressure hose (8).

NOTE

A test kit (#343) for testing vacuum and pneumatic de-ice systems is available from Airborne, 711 Taylor Street, Elyria, Ohio 44035, or the Cessna Supply Division. This kit contains the necessary equipment and supplemental instructions to perform this check.

3. Disconnect left and right vacuum inlet hoses from left and right vacuum pumps (1).
4. Disconnect electrical leads from pressure control valves (3).

CAUTION

Do not attempt air pressure check with de-ice timer module connected into the circuit.

5. Connect a vacuum source (5.6 in. Hg minimum) to right pump vacuum hose.
6. Connect a switched 28 VDC electrical source to right pressure control valve.
7. Insert pressure probe equipped with vacuum/pressure gage into the rubber hose connecting tail boots with tail boot flow valve.
8. Turn on pressure and vacuum sources. Verify that pressure flow is being vented overboard at right pressure control valve and no flow is present either in or out of disconnected hoses at left vacuum pump. Pressure gage on probe should read 4.5-4.6 in. Hg vacuum.
9. Switch on electrical power to right pressure control valve and actuate tail boot flow control manually.

NOTE

Flow valves can be actuated mechanically by depressing the solenoid plunger inward using the fingers. This procedure eliminates the necessity of disconnecting and reconnecting electrical leads.

10. Overboard flow at pressure control valve should stop and pressure air should inflate tail boots. Pressure gage should show 18 ±.5 psi with audible venting of pressure air from pressure regulator valve (7) evident. Recheck for absence of airflow out of left pressure control valve.
11. With pressure control valve energized turn off pressure source using hand-operated valve. Pressure leak-down as shown by probe pressure gage should be 2 psi per minute or less. Use soap and water solution to locate leaks, turn off power to left pressure control valve, repair leaks and restest until leak-down rate is within tolerance.
12. Insert pressure probe into hose connecting outboard wing boots with outboard boot flow control valve and repeat steps 8 thru 11 noting leaks.
13. Insert pressure probe into hose connecting inboard wing boots with inboard boot flow control valve and repeat steps 8 thru 11 noting leaks.
14. Disconnect pressure and vacuum sources from right vacuum pump hoses and connect to left pump hoses.
15. Turn on pressure and vacuum sources. Verify that pressure flow is being vented overboard at left pressure control valve and no flow is present either in or out of disconnected hoses at right pump. Probe pressure gauge should read 4.5-5.6 in. Hg

vacuum.

16. Switch on electrical power to left pressure control valve. Overboard flow at pressure control valve should stop. Check for no airflow from right pressure control valve and audible venting of pressure air from pressure regulator valve (7) evident.

17. With probe air pressure gauge inserted into hose connecting any flow valve with its associated de-ice boot, actuate flow valve manually, and recheck probe air pressure gauge reads 18 ±. 5 psi.

18. Disconnect test equipment and reconnect pressure and vacuum lines to vacuum pumps.

19. Reconnect wiring to pressure control valves.

15-25M. ADHESION TEST. Follow procedures outlined in paragraph 15-19.

15-25N. CLEANING. Follow procedures outlined in paragraph 15-20.

15-25P. CLEANING SYSTEM AND COMPONENTS. Follow procedures outlined in paragraph 16-28C and paragraph 16-28D of this manual.

15-25Q. DE-ICE AND ANTI-ICE BOOT PROTECTIVE PRODUCTS. Follow procedures outlined in paragraph 15-21.

15-25R. APPROVED REPAIRS. (Cold Patch). Follow procedures outlined in paragraph 15-22.

15-25S. APPROVED REPAIRS. (Damage to Tube Area). Follow procedures outlined in Paragraph 15-22A.

15-25T. APPROVED REPAIRS. (Damage to Fillet Area). Follow procedures outlined in paragraph 15-22B.

15-25U. APPROVED REPAIRS. (Damage Veneer). Follow procedures outlined in paragraph 15-22C.

15-25V. MATERIALS REQUIRED FOR INSTALLATION OF DE-ICE BOOTS. Follow procedures outlined in paragraph 15-23.

15-25W. REPLACEMENT OF DE-ICE BOOTS. Follow the procedures outlined in paragraph 15-24 of this Manual.

15-25X. TIMER. (See figures 15-4D and 15-4E.)

15-25Y. DESCRIPTION. The timer is located on the glove box and controls the length of time, in seconds, that the de-ice boots are inflated during a de-icing cycle.

15-25AA. FUNCTIONAL TEST OF TIMER. (See figure 15-4D.) THRU P21000811.

a. Connect timer as shown in the wiring schematic.

b. Set voltage at 28 VDC, control switch to MOM-ON position and release to none position.

c. Record the time each light is on.

d. The recorded times shall match those shown in the timing chart ±10% at 28 VDC.

NOTE

Do not check voltage levels without a load attached, readings may be erroneous.

e. Timer output shall complete the cycle then shut off all outputs.

NOTE

Reactivation of the control switch during a cycle will not interrupt that cycle or cause the unit to reset until the existing cycle is completed.

15-25AB. FUNCTIONAL TEST OF TIMER. (See figure 15-4E.) BEGINNING WITH P21000812.

a. Connect timer as shown in the wiring schematic.

b. Set voltage at 28 VDC, control switch to MOM-ON position and release to none position.

c. Record the time each light is on.

d. The recorded times shall match those shown in the timing chart ±10% at 28 VDC.

e. The timer output shall complete the cycle and then shut off all outputs.

NOTE

Reactivation of the control switch during a cycle will not interrupt that cycle or cause the unit to reset until the existing cycle is completed.

f. Vary the voltage from 22-31 VDC and repeat step e. Timer must continue to operate at these voltages within the time frame shown in the chart.

NOTE

Do not check voltage levels without a load attached, since readings may be erroneous.

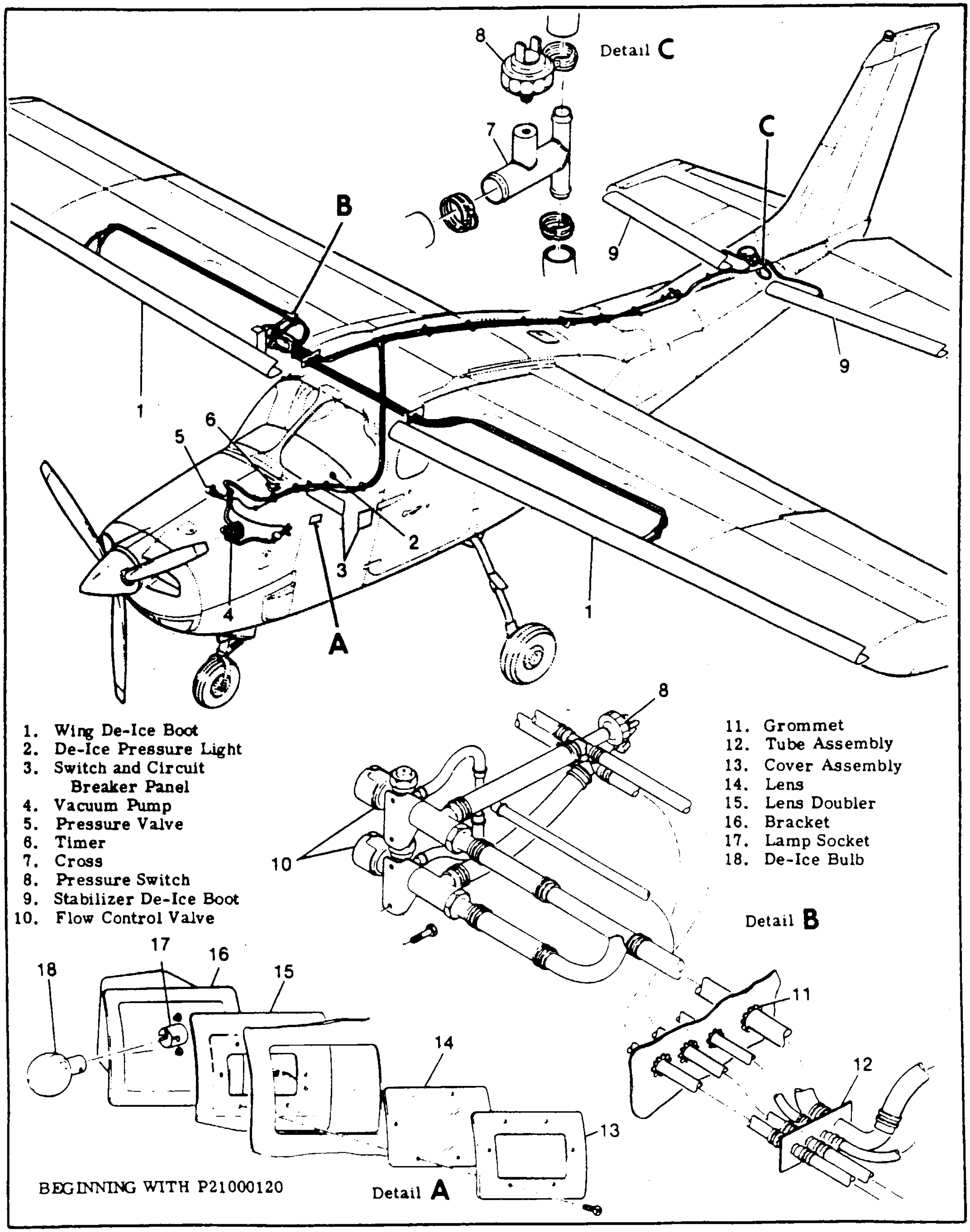
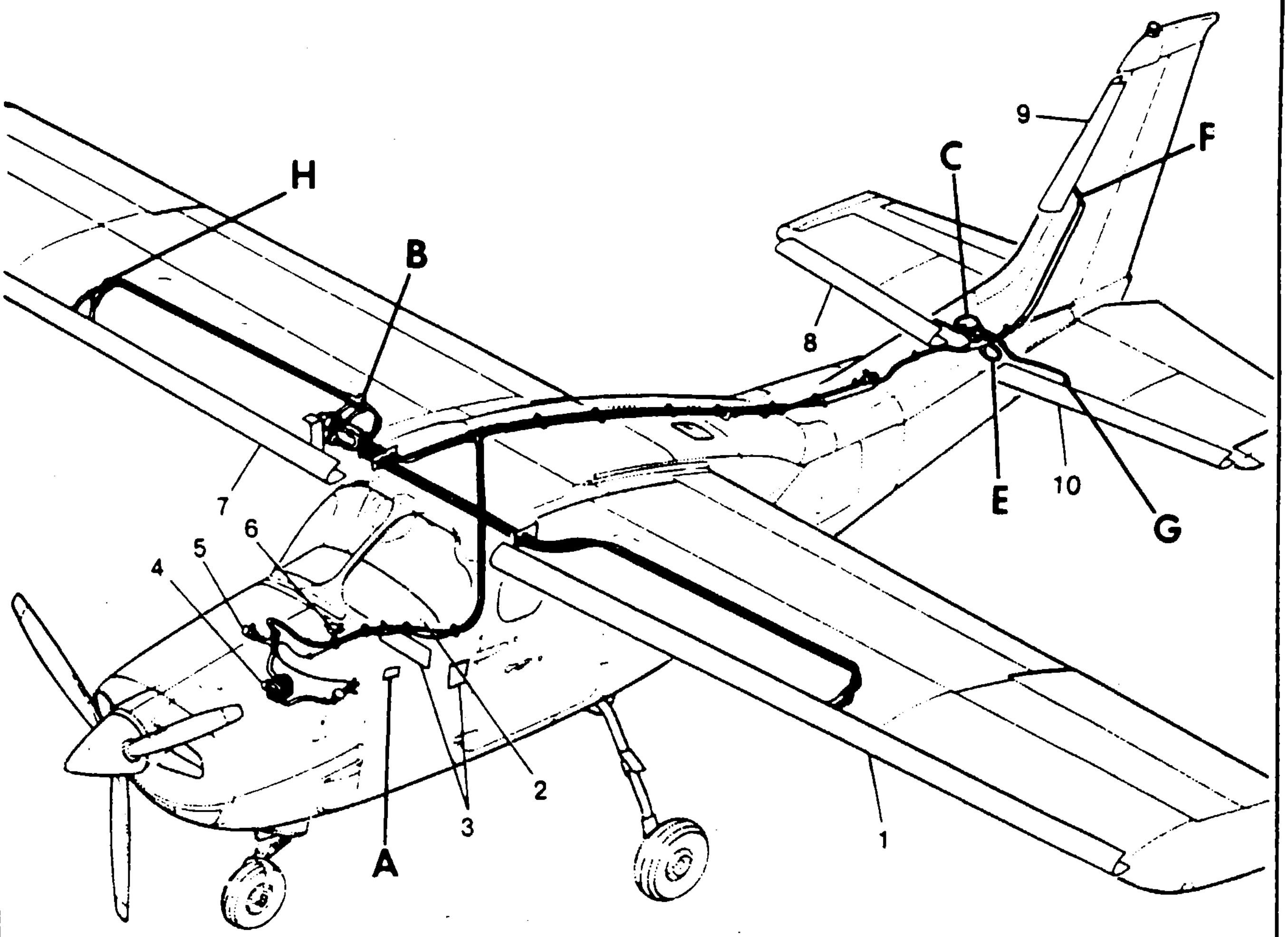


Figure 15-4. Wing and Horizontal Stabilizer Three-Cycle De-ice System



1. LH Wing De-Ice Boot
2. De-Ice Pressure Light
3. Switch & Circuit Breaker Panel
4. Vacuum Pump
5. Pressure Valve
6. Timer
7. RH Wing De-Ice Boot
8. RH Stabilizer De-Ice Boot
9. Vertical Fin De-Ice Boot
10. LH Stabilizer De-Ice Boot
11. De-Ice Bulb
12. Lamp Socket
13. Bracket
14. Lens Doubler
15. Lens
16. Lens Cover
17. Flow Control Valve
18. Pressure Switch
19. Grommet
20. Tube Assembly
21. Cross Assembly
22. Nut
23. Screw
24. Bracket
25. Clamp
26. Hose
27. Tube
28. Clamp

SERIAL P21000120
THRU P21000760

Figure 15-4A. Wing, Horizontal Stabilizer and Vertical Fin De-Icing System (Sheet 1 of 5)

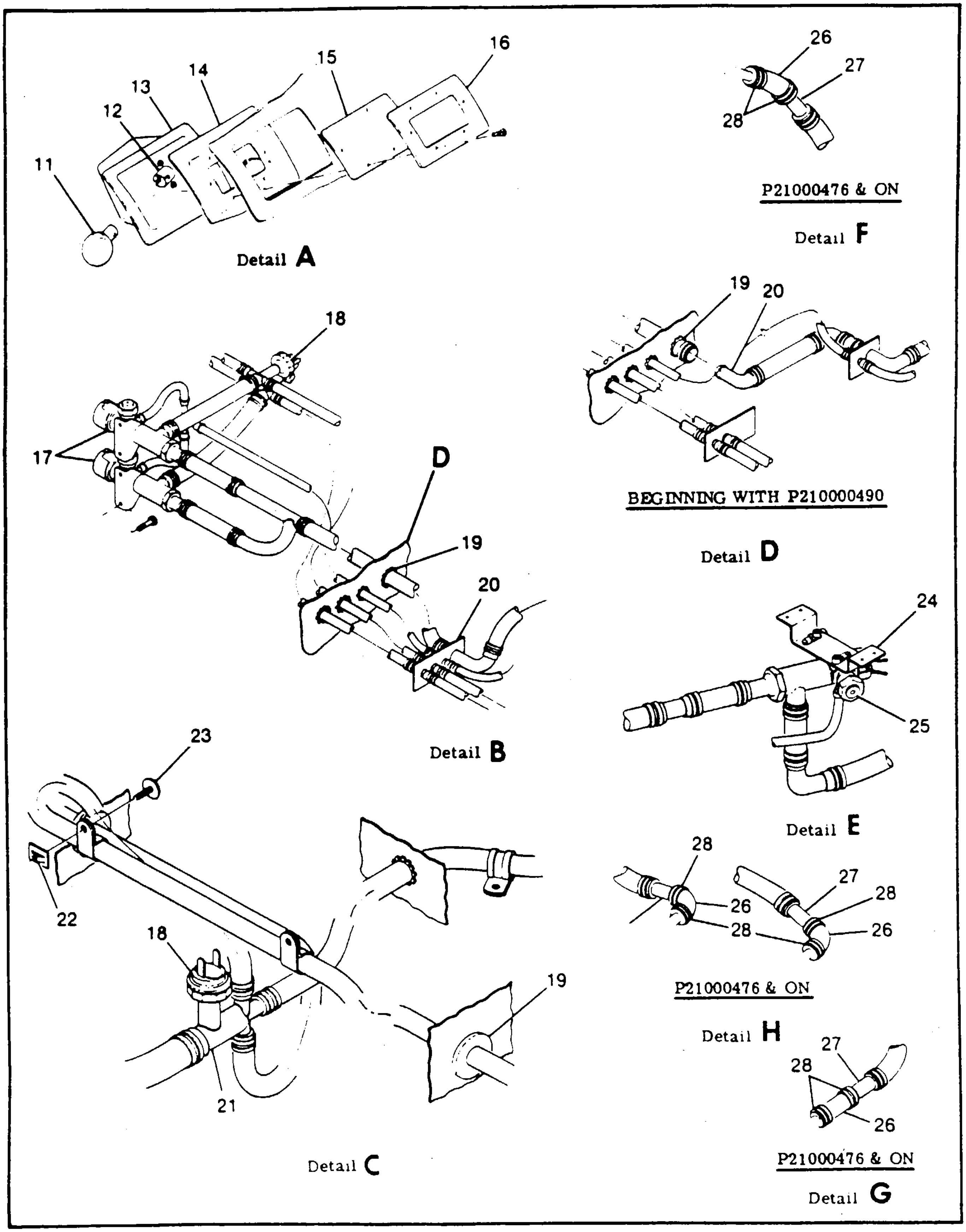
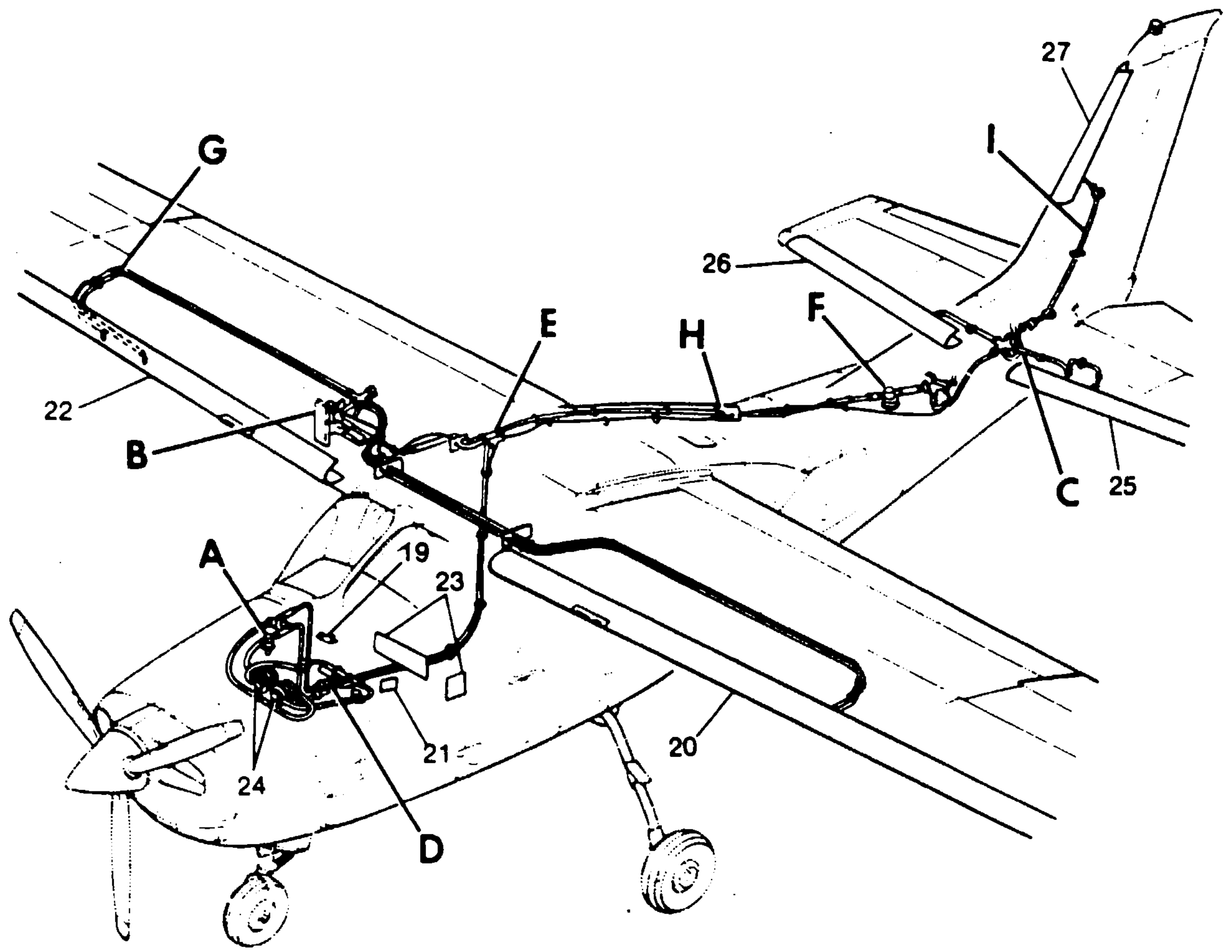


Figure 15-4A. Wing, Horizontal Stabilizer and Vertical Fin De-Icing System (Sheet 2 of 5)



1. Pressure Control Valve
2. Hose Clamp
3. Grommet
4. De-Ice Check Valve
5. Bracket
6. De-Ice Flow Valve
7. Pressure Switch
8. Caplug
9. Pressure Regulator Valve
10. Bracket
11. Bracket, Clamp
12. Tube Clamp
13. Ratchet Clamp
14. De-Ice Clamp
15. Hose
16. De-Ice Flow Valve
17. Bolt
18. Screw
19. Timer
20. LH Wing De-Ice Boot
21. Ice Detector Light
22. RH Wing De-Ice Boot
23. Switch and Circuit Breaker Panels
24. Vacuum Pumps
25. LH Stabilizer De-Ice Boot
26. RH Stabilizer De-Ice Boot
27. Vertical Fin De-Ice Boot

SERIAL P21000761 & ON

■ REQUIRED WITH PARTIAL DE-ICING SYSTEM

Figure 15-4A. Wing, Horizontal Stabilizer and Vertical Fin De-Icing System (Sheet 3 of 5)

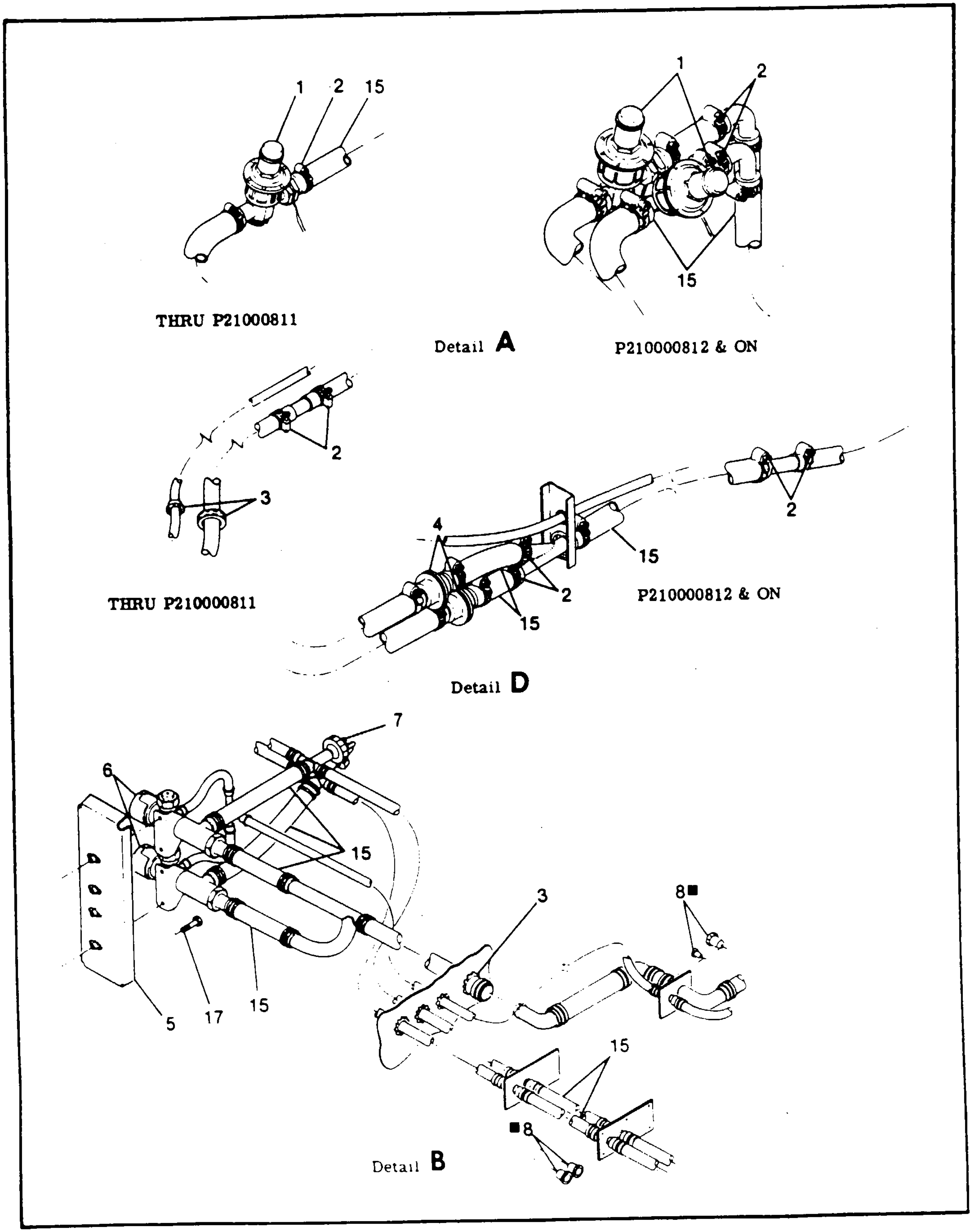


Figure 15-4A. Wing, Horizontal Stabilizer and Vertical Fin De-Icing System (Sheet 4 of 5)

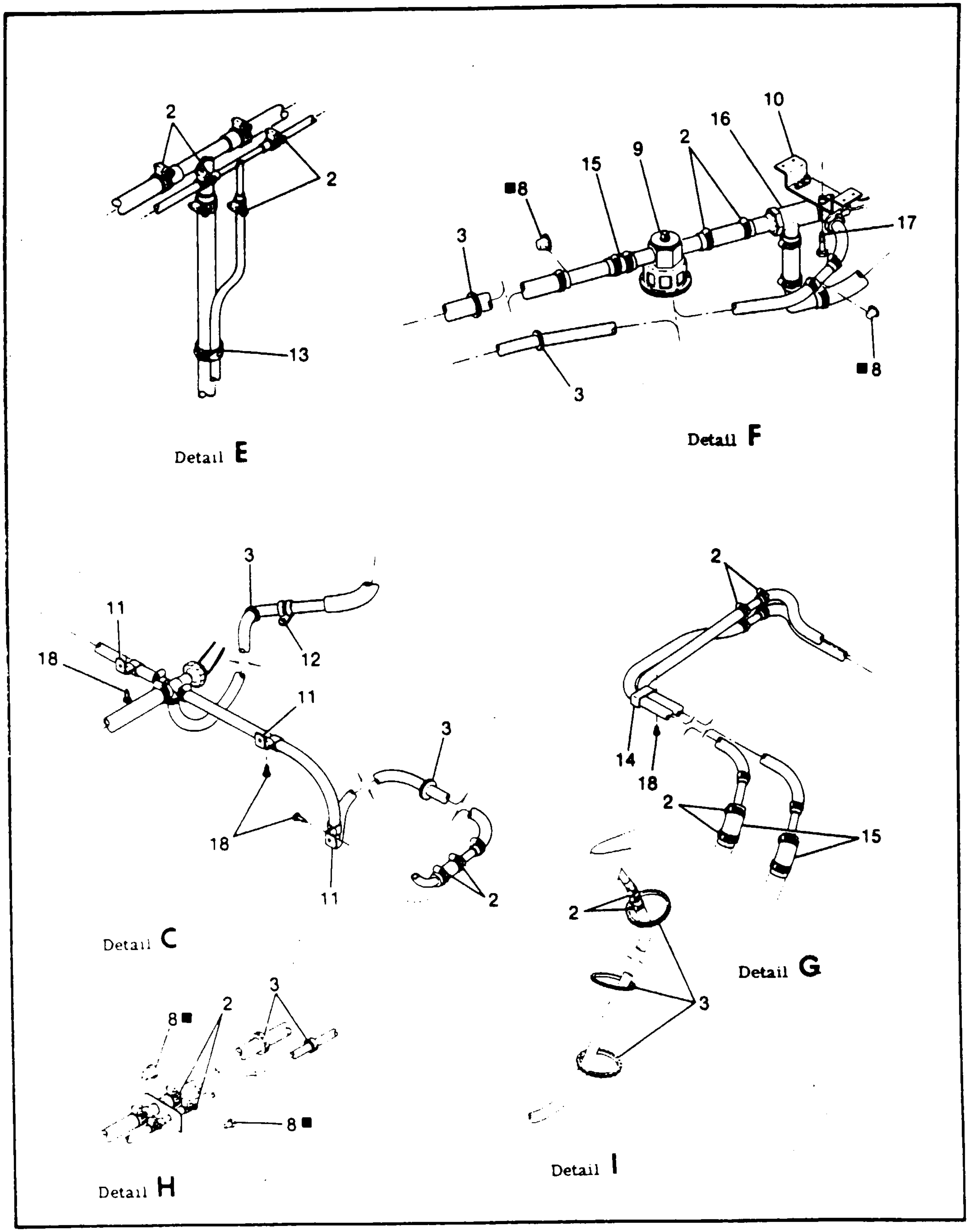


Figure 15-4A. Wing, Horizontal Stabilizer and Vertical Fin De-Icing System (Sheet 5 of 5)

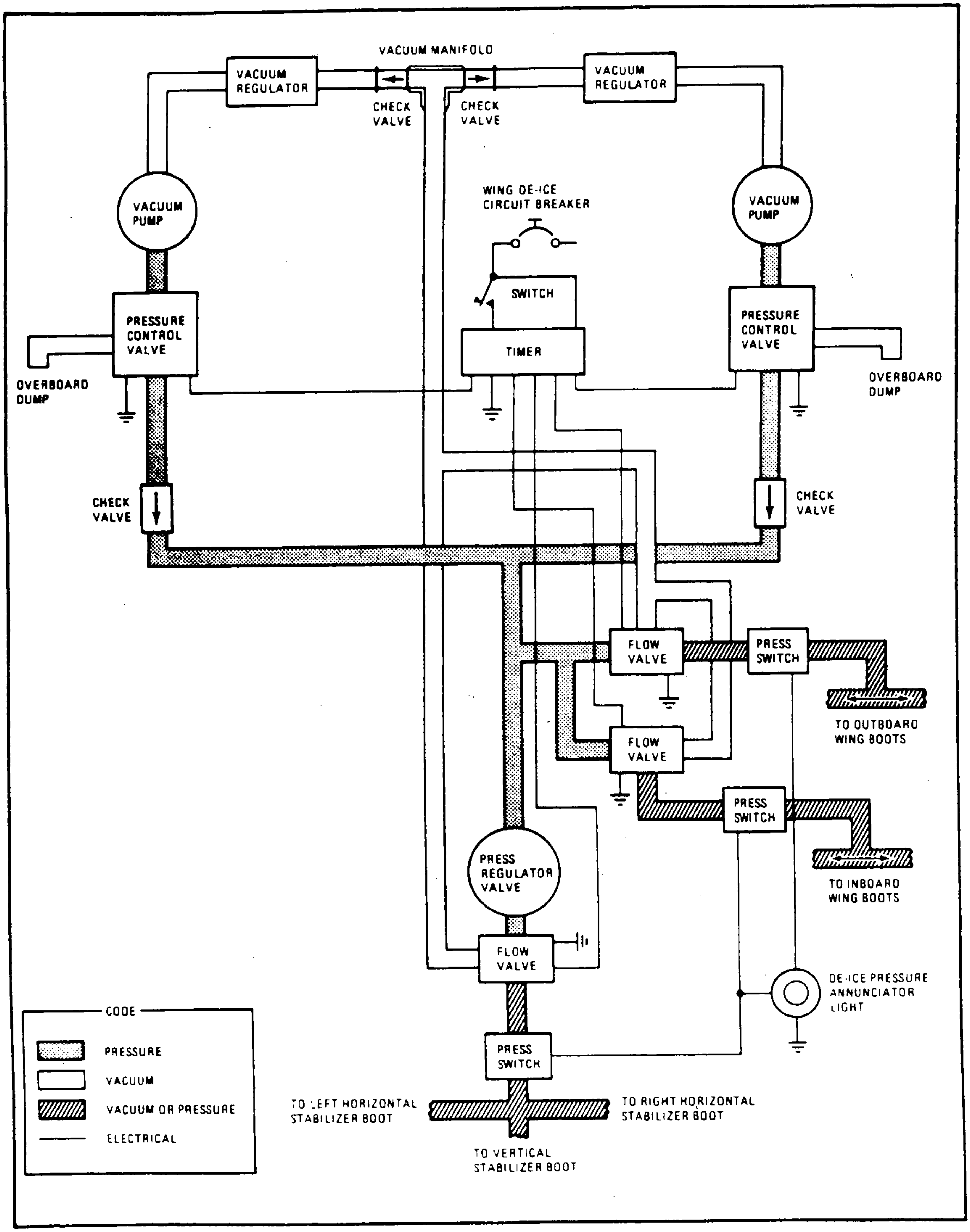


Figure 15-4B. Surface De-Ice System Components Schematic.

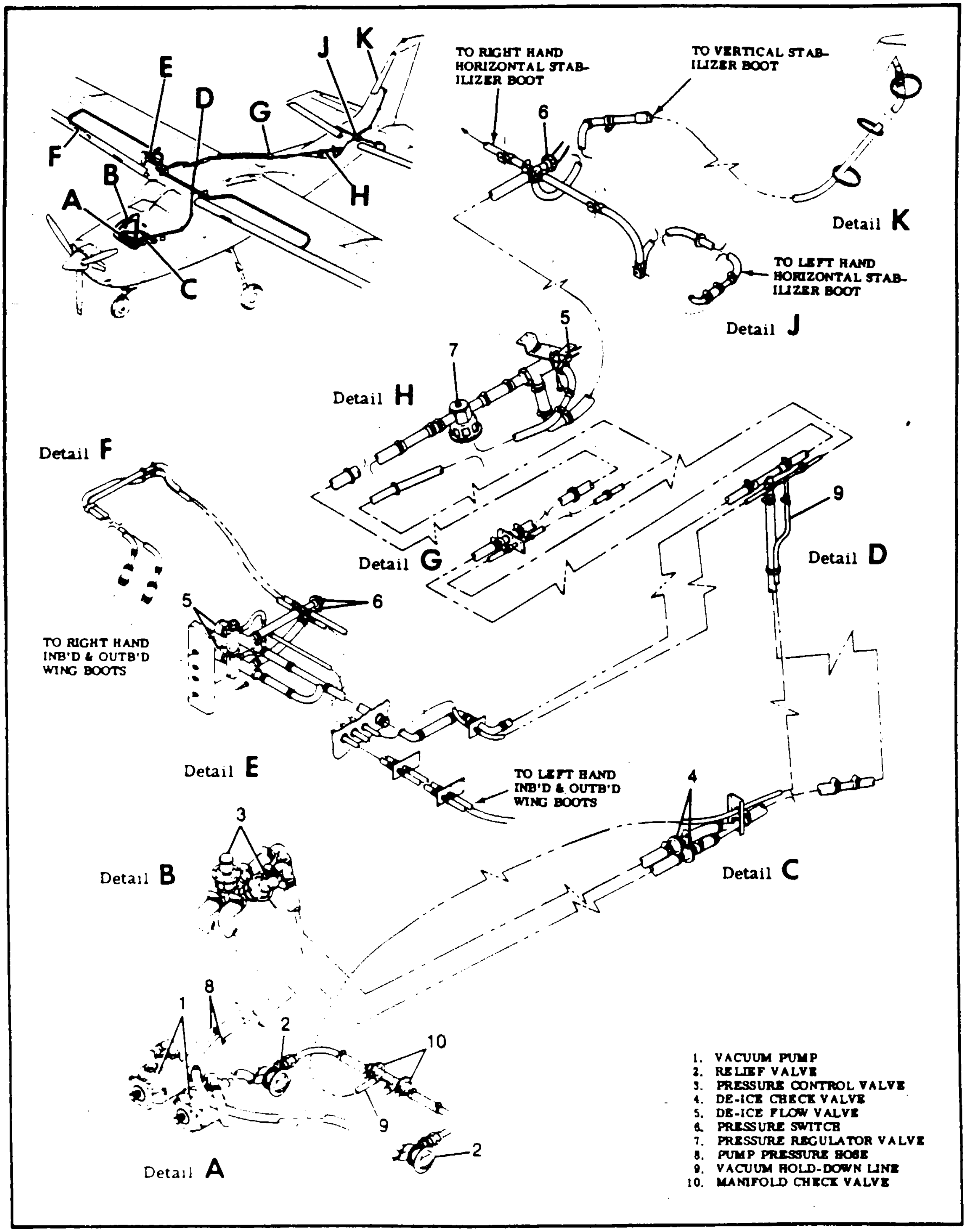
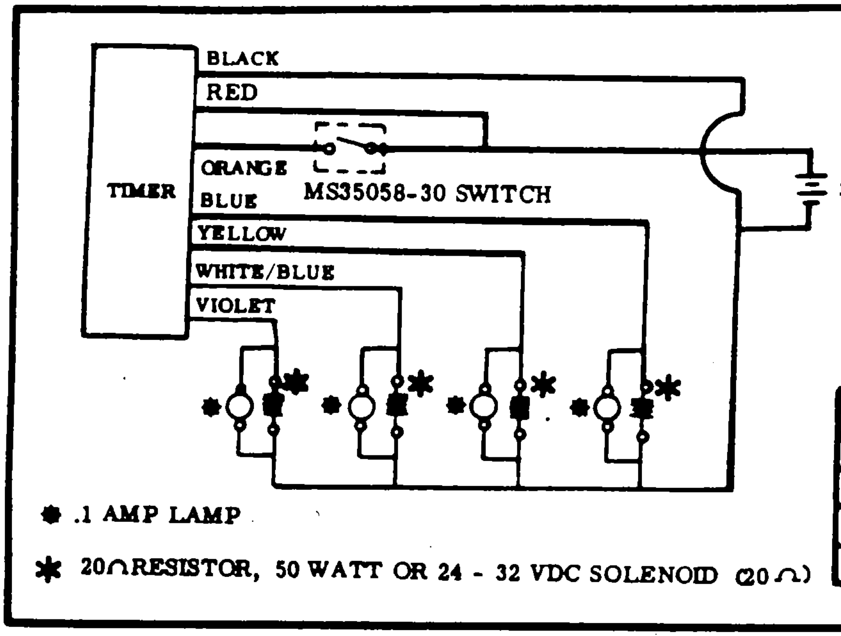


Figure 15-4C. Surface De-Ice System Components.



THRU SERIAL P21000811

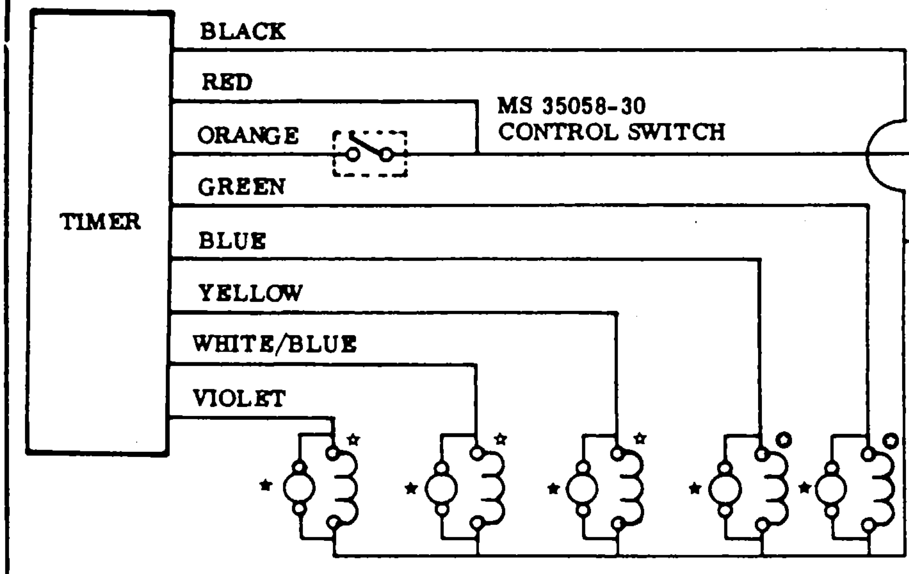
NOTE

Black wire is the ground wire.

TIMING CHART

WIRE COLOR CODE	TIME ON (SECONDS)
BLUE	18 SECONDS
YELLOW	6 SEC.
WHITE/BLUE	6 SEC.
VIOLET	6 SEC.

Figure 15-4D. Wing, Horizontal Stabilizer and Vertical Fin De-Ice System Timer.



SERIAL P21000812 AND ON

NOTE

Black wire is the ground wire.

TIMING CHART

WIRE COLOR	TIME ON (SECONDS)
BLUE	18 SECONDS
YELLOW	6 SEC.
WHITE/BLUE	6 SEC.
VIOLET	6 SEC.
GREEN	18 SECONDS

★ .1 AMP LAMP, 28 VDC
☆ 20 OHM RESISTOR, 50 WATT OR 24-32 VDC SOLENOID (20 OHM)
O 65 OHM RESISTOR, 10 WATT OR 24-32 VDC SOLENOID (65 OHM)

Figure 15-4E. Wing, Horizontal Stabilizer and Vertical Fin De-Ice System Timer.

15-26. PROPELLER ANTI-ICE SYSTEM. The electrothermal system includes an inboard and an outboard heating element on each propeller blade, a brush block and a slip ring assembly to distribute electrical energy to the heating elements, an ammeter to monitor system operation, a switch and a circuit breaker. The anti-ice system heats the areas of the propeller blades where ice generally accumulates. The heat, centrifugal force of the rotating blades, and the air blast combine to remove the ice build-up. When the switch is turned on, the timer cycles current to the outboard elements for 20 ± 1 seconds, and to the inboard elements for 20 ± 1 seconds, thus completing one cycle. Heating may begin at any phase in the cycle, depending upon timer position when the switch was previously turned off. Ground checkout of the system may be performed without the engine running. The propeller must be removed before the system components, except the brush block, can be installed or removed.

15-28. REMOVAL. (See figure 15-5.)

WARNING

Be certain magneto is grounded before turning propeller.

a. Remove spinner attaching screws (22) and remove spinner (12), spinner support (20) and spacers (21). Retain spacers (21).
b. Remove engine cowling as required for access to propeller mounting nuts (24) and washers (23).
c. Loosen all propeller mounting nuts (24) approximately 1/4-inch and pull propeller forward until stopped by mounting nuts (24).

NOTE

As propeller is separated from engine crankshaft flange, oil will drain from propeller and engine cavities.

15-27. TROUBLE SHOOTING - PROPELLER ANTI-ICE SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
ELEMENTS DO NOT HEAT.	Circuit breaker out or defective.	Reset circuit breaker. If it pops out again, determine cause and correct. Replace defective parts.
	Defective wiring.	Repair or replace wiring.
	Defective switch.	Replace switch.
	Defective timer.	Replace timer.
	Defective brush-to-slip ring connection.	Check alignment. Replace defective parts.
SOME ELEMENTS DO NOT HEAT.	Incorrect wiring.	Correct wiring.
	Defective wiring.	Repair or replace wiring.
	Defective timer.	Replace timer.
	Defective brush-to-slip ring connection.	Check alignment. Replace defective parts.
	Defective element.	Replace element.
CYCLING SEQUENCE NOT CORRECT OR NO CYCLING.	Crossed connections.	Correct wiring.
	Defective timer.	Replace timer.
RAPID BRUSH WEAR, FREQUENT BREAKAGE, SCREECHING OR CHATTERING.	Brush block or slip ring out of alignment.	Align properly.

CAUTION

Use caution when removing propeller. Removing propeller without the de-ice slip ring requires disconnecting nine wires at the spinner bulkhead, since the slip ring is mounted to the bulkhead. Wires should be identified according to wiring diagrams to facilitate reassembly. During removal, installation or other maintenance, use care to prevent damaging slip ring and brushes.

d. Remove safety wire and loosen clamps (13).
e. Remove nuts, washers, de-ice lead wires slip ring lead wires from screws in aft spinner bulkhead (7). Tag lead wires to facilitate reinstallation.
f. Remove all propeller mounting nuts (24) and washers (23) and pull propeller forward to remove from engine crankshaft (25).
g. Remove slip ring (6).

15-29. INSTALLATION. (See figure 15-5.)
a. Install slip ring (6) and aft spinner bulkhead (7).
b. Install de-ice boot lead wires and slip ring lead wires, screws, washers and nuts in aft spinner bulkhead (7).
c. Install propeller and install washers (23) and propeller mounting nuts (24).
d. Secure aft spinner bulkhead (7) to propeller with screws.
e. Tighten propeller mounting nuts to a torque of 55 to 60 lb. ft.
f. Tighten clamps (13) with clamp screw housings 180° apart to maintain balance. Safety wire clamp screw housings to clamps as shown in view B-B.
g. Install spacer (21) and spinner support (20) in spinner (12) and install spinner on propeller.

15-30. SLIP RING ALIGNMENT CHECK. After installation, slip ring must be checked for run-out.

NOTE

Excessive slip ring run-out will result in severe arcing between slip ring and brushes, and cause rapid brush wear. If allowed to continue, this condition will result in rapid deterioration of slip ring and brush contact surfaces, and lead to the eventual failure of the propeller de-icing system.

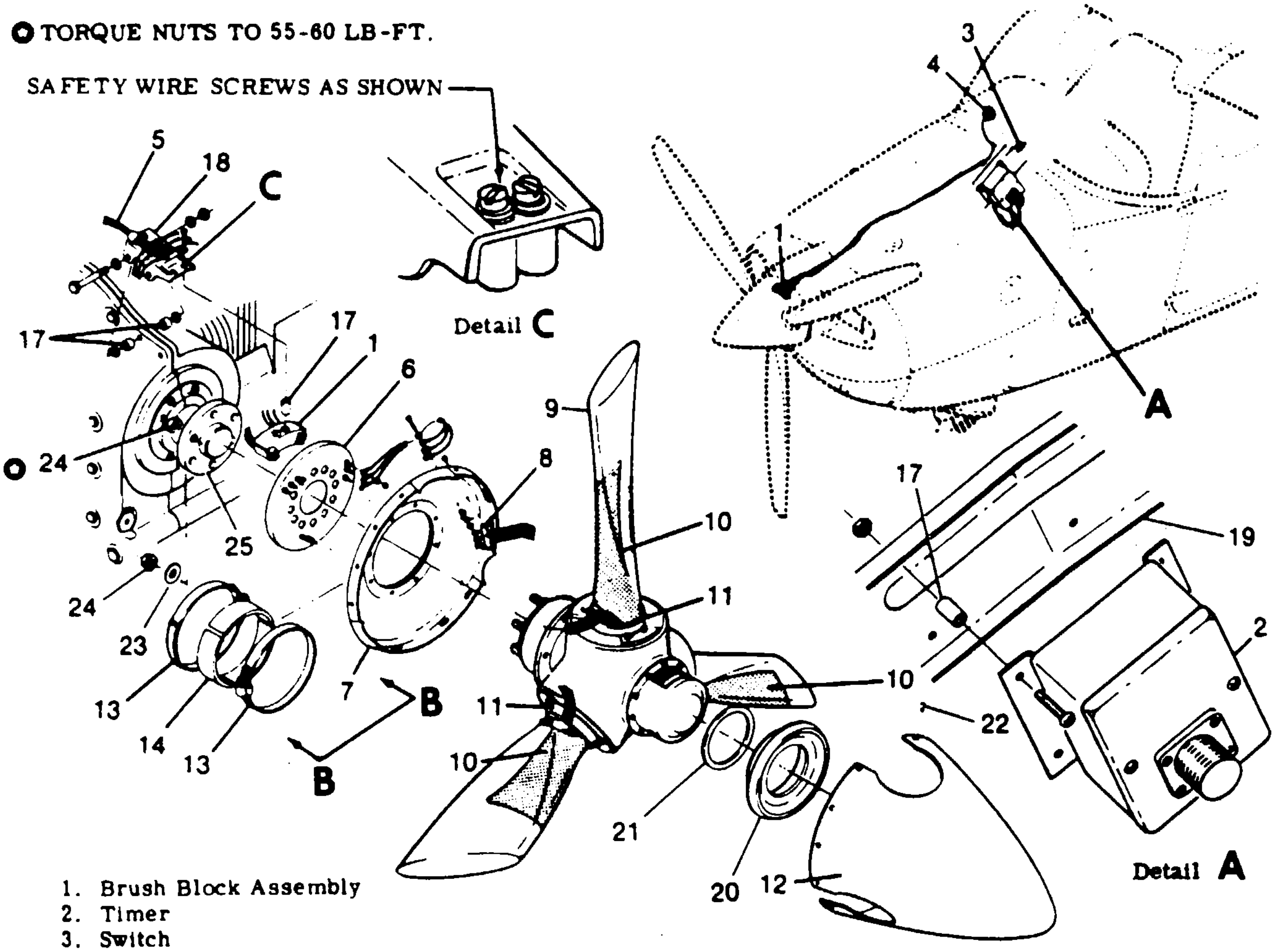
a. Securely attach a dial indicator gage to the engine and place the pointer on the slip ring.
b. Rotate the propeller slowly by hand, noting the deviation of the slip ring from a true plane as indicated on the gage.
c. Check that the total run-out does not exceed 0.010 inch (±0.005 inch), and that the total is not exceeded within any four inches of slip ring rotation.

NOTE

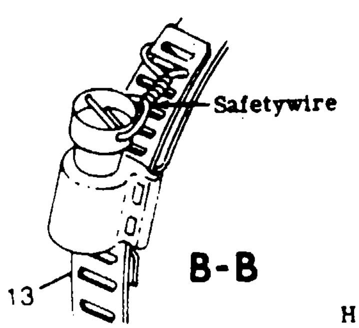
Care must be taken to exert a uniform push or pull on the propeller to avoid a considerable error in the readings caused by loose fitting thrust bearings.

d. If slip ring run-out is within the limits specified, no corrective action is required. If the run-out is not within limits specified, the slip ring will have to be removed and returned to the claims department of the Cessna Supply Division, and a new part ordered.

15-31. TIMER TEST.
a. Remove connector plug of wire harness from timer and jump power input socket of wire harness to timer input pins. (Refer to chart following this step for pin identification.)



1. Brush Block Assembly
2. Timer
3. Switch
4. Ammeter
5. Cable
6. Slip Ring
7. Spinner Bulkhead
8. Clip Assembly
9. Prop
10. Boot
11. Restrainer Strap
12. Spinner
13. Clamp
14. Rubber Spacer
15. Cup
16. Deleted
17. Spacer
18. Mounting Bracket
19. Support
20. Spinner Support
21. Spacer
22. Spinner Attaching Screws
23. Washer
24. Propeller Mounting Nuts
25. Engine Crankshaft



Hose clamp (13) screw housings to be installed 180° apart to maintain balance. Length of brushes from the slip ring to the brush block housing to be .063 ± .015 "

Apply ice-repellant (MI-903) (Glidden Mfg. Co.) to leading edge surfaces, landing light covers and windshield to retard ice build-up.

Figure 15-5. Propeller De-Ice System (Sheet 1 of 2)

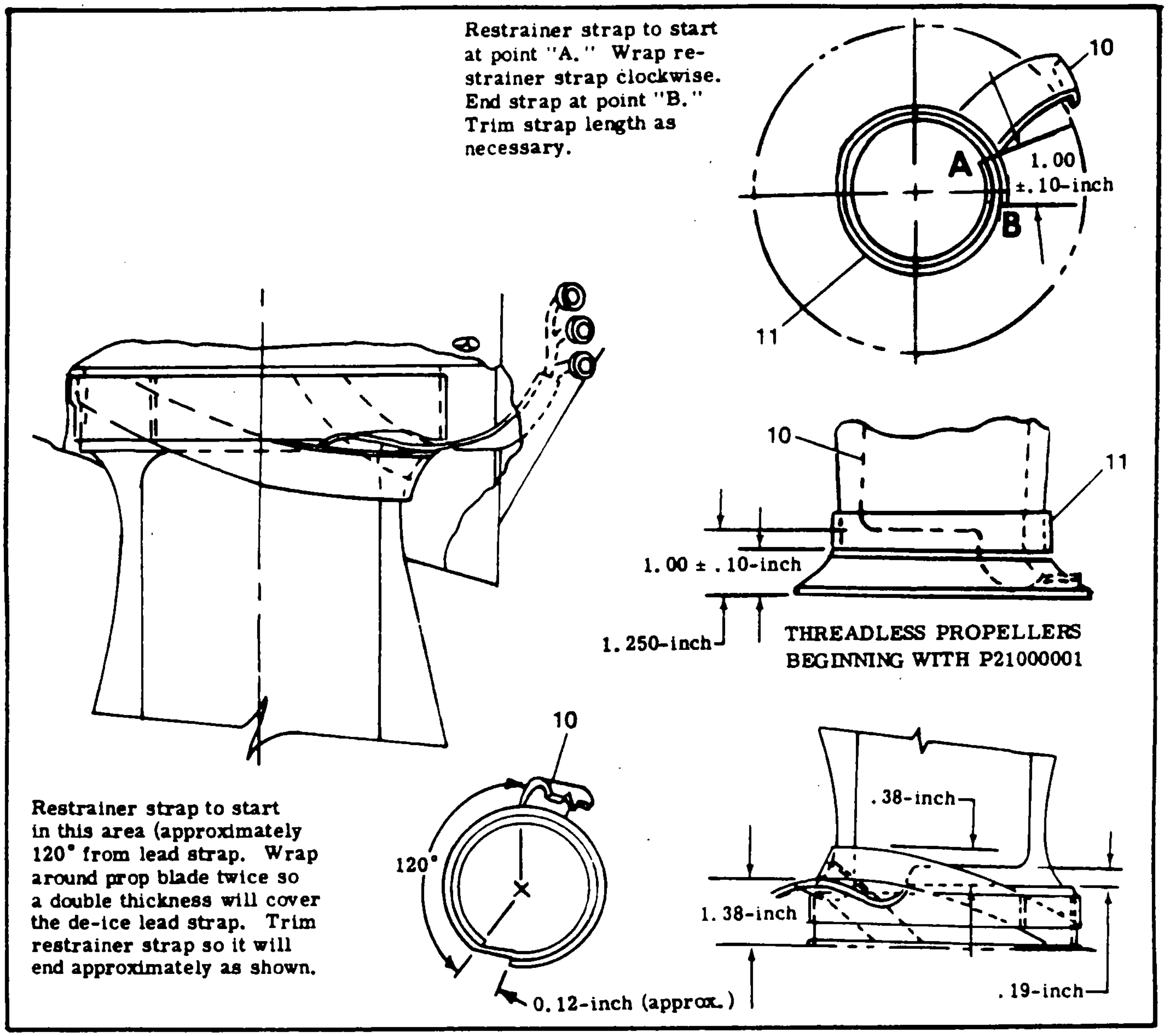


Figure 15-5. Propeller De-Ice System (Sheet 2 of 2)

Timer P/N	Power Input Pin & Socket	Ground Pin	Output Sequence, Time, Voltage	Time Repeat Cycle Time (sec)
C165020-0101	B (28VDC) (24-32)	G (28VDC)	C, D 20 seconds each	40

b. Jump timer ground pin to ground.

c. Turn on De-Icing System.

d. Check timer operation per the chart preceding step "b." (Use a voltmeter.)

e. Check volts to ground in each case. If engine is not running, and auxiliary power is not used, voltage will be battery voltage and cycle time may be slightly longer than indicated.

f. Hold voltmeter probe on the pin until the voltage drops to 0. Move the probe to the next pin in the sequence shown in the chart. Check voltage at each pin in sequence. When correctness of the cycling sequence is established, turn propeller De-Icing switch off at the beginning of one of the on-time periods, and record the letter of the pin at which the voltage supply is present.

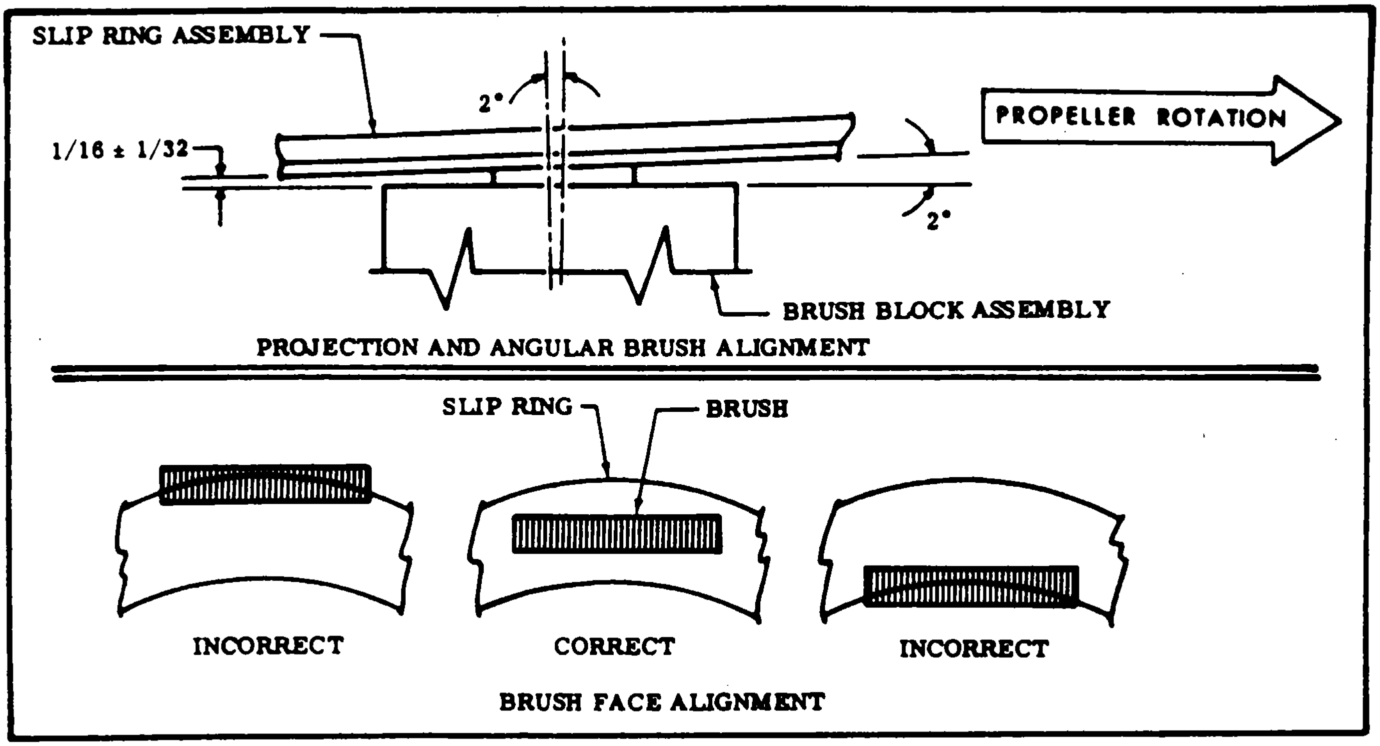


Figure 15-6. Brush Face Alignment and Projection and Angular Brush Alignment

NOTE

Timers do not home to pin "C" when turned off.

15-32. INSTALLATION AND ALIGNMENT OF BRUSH BLOCK ASSEMBLY. (See figure 15-6.)

NOTE

Installation of the brush block should be deferred, when possible, until after the slip ring, propeller, and related components are installed. However, the brush block assembly may be replaced without removing the propeller. To avoid breakage when installing the brush block assembly, keep brushes retracted in brush block until slip ring and propeller assemblies have been installed.

CAUTION

Make sure that slip ring run-out has been corrected before attempting to align brushes on slip ring.

a. In order to get smooth, efficient and quiet transfer of electric power from the brushes to the slip ring, brush alignment must be checked and adjusted, if necessary to meet the following requirements.

1. Projection must be such that the distance between the brush block and the slip ring is .06" ± .03".

2. The brushes must be lined up with the slip ring so that the entire face of each brush is in contact with the slip ring throughout the full 360° of slip ring rotation.

3. The brushes must contact the slip ring at an angle of approximately 2° from perpendicular to the slip ring surface, measured toward the direction of rotation of the slip ring.

b. Brush projection can normally be adjusted by loosening hardware attaching the brush block and holding the brushes in the desired location while re-tightening the hardware. Slotted holes are provided.

c. One method for face alignment is described in step "b". Another is to use shims between brush block and bracket. Laminated metal shims are generally provided. Layers of metal .003" are used to make up shims which are approximately 0.20" thick overall. Shims may be fabricated locally.

d. Loosen mounting bolts and twist block while tightening to attain proper angular adjustment.

CAUTION

Use care not to disturb other adjustments when adjusting angular alignment.

15-33. HEATED WINDSHIELD PANEL-FIXED. (See figure 15-6C.

15-34. DESCRIPTION. An optional heated panel is provided to prevent ice formation on the windshield. The system consists of an electrically heated panel attached to the windshield, a controller and a relay mounted on the glove box. The system is controlled by a rocker type switch on the pilot's switch panel. A circuit breaker on the circuit breaker panel protects the system.

15-35. REMOVAL AND INSTALLATION. (See figure 15-6C.)

a. Panel Removal.

1. Ensure aircraft electrical power is "OFF".
2. Disconnect housing plug and cap, located forward of instrument panel on the left hand side.
3. Remove screws securing cover and gasket to deck skin, then pull housing plug up through skin.
4. Remove screws from retainers at top and bottom of heated panel.
5. Remove heated panel, retainers and shims at top and bottom of panel.
6. Remove any sealer that may have parted sticking to the windshield. A sharpened (Wood) spatula may be used, exercising care.

CAUTION

Do Not use any tool, abrasive or cleaner which may damage the windshield.

b. Panel Installation.

1. Apply a strip of masking tape on the LH windshield, from top to bottom, with outboard edge of tape located 6.60 inches to the left and parallel with the windshield centerline, as viewed looking forward.
2. Apply a strip of masking tape at the bottom of heated panel location with edge running parallel with, and .55 inch below the center of the three open fastener locations. However, this dimension may vary as lower edge of heated panel may be trimmed to match aircraft contours. A minimum of .35 inch edge margin must be maintained.
3. Locate heated panel with lower end and inboard side against edge of masking tape. Using a hole finder, locate and mark the four hole locations at the lower end of the panel.
4. Drill four .172 holes on the lower end of the panel where marked.
5. Place lower spacer in position and temporarily secure the lower end of heated panel with four screws.
6. Press the heated panel to the windshield contour working up from the bottom so that panel seal is compressed against windshield, firmly tape heated panel to windshield.

NOTE

The inner and outer lip of the heated panel seal should be in positive contact with the surface of the windshield over the full periphery of the panel. It is permissible to vary thickness of the spacers to facilitate proper sealing.

7. Using a hole finder, mark the center hole location at the upper end of panel.

CAUTION

Protect aircraft structure. Slip a thin metal shield between heated panel and windshield retainer to guard against drill bit thrust when penetrating heated panel.

8. Drill a (.172) hole located .10 inch down from the mark on the heated panel.
9. Remove drilling shield.
10. Use a pointed aligning tool (ice pick) through hole in heated panel and open hole in windshield retainer, pull panel up to align holes.

NOTE

Take precaution to prevent damage to windshield and/or doubler nutplates when tightening heated panel on windshield.

11. Using a hole finder, mark the remaining holes at the upper end of the panel.
12. Place the drilling shield between heated panel ana windshield retainer and drill (.172) holes at the marked locations.
13. Place the upper spacer in position between heated panel and windshield and temporarily secure using four screws.
14. Check the temporary installation to ensure that heated panel is in proper relation to the windshield. Check to see if panel seal is in contact with windshield.
15. Remove the masking tape applied to windshield for locating heated panel. Apply new strips of masking tape on each side of the panel with edge aligned with and against outer lip of seal to facilitate final installation. Also apply strips of tape to upper and lower edge of heated panel.
16. Remove heated panel and deburr all parts.
17. Remove protective cover from the heated panel. Do not remove masking tape aligning guides. Clean thoroughly with a soft cloth or sponge. Wash with a mild soap and water, a 50/50 solution of isopropanol and water, or alighatic naptha types. Do not use any abrasive materials, strong acid or base, methanol or methyl-ethyl-ketone. After cleaning, rinse thoroughly and dry.
18. After cleaning, plastic surfaces may be polished by applying a thin coat of hard polishing wax. Rub lightly with a soft cloth using a circular motion.

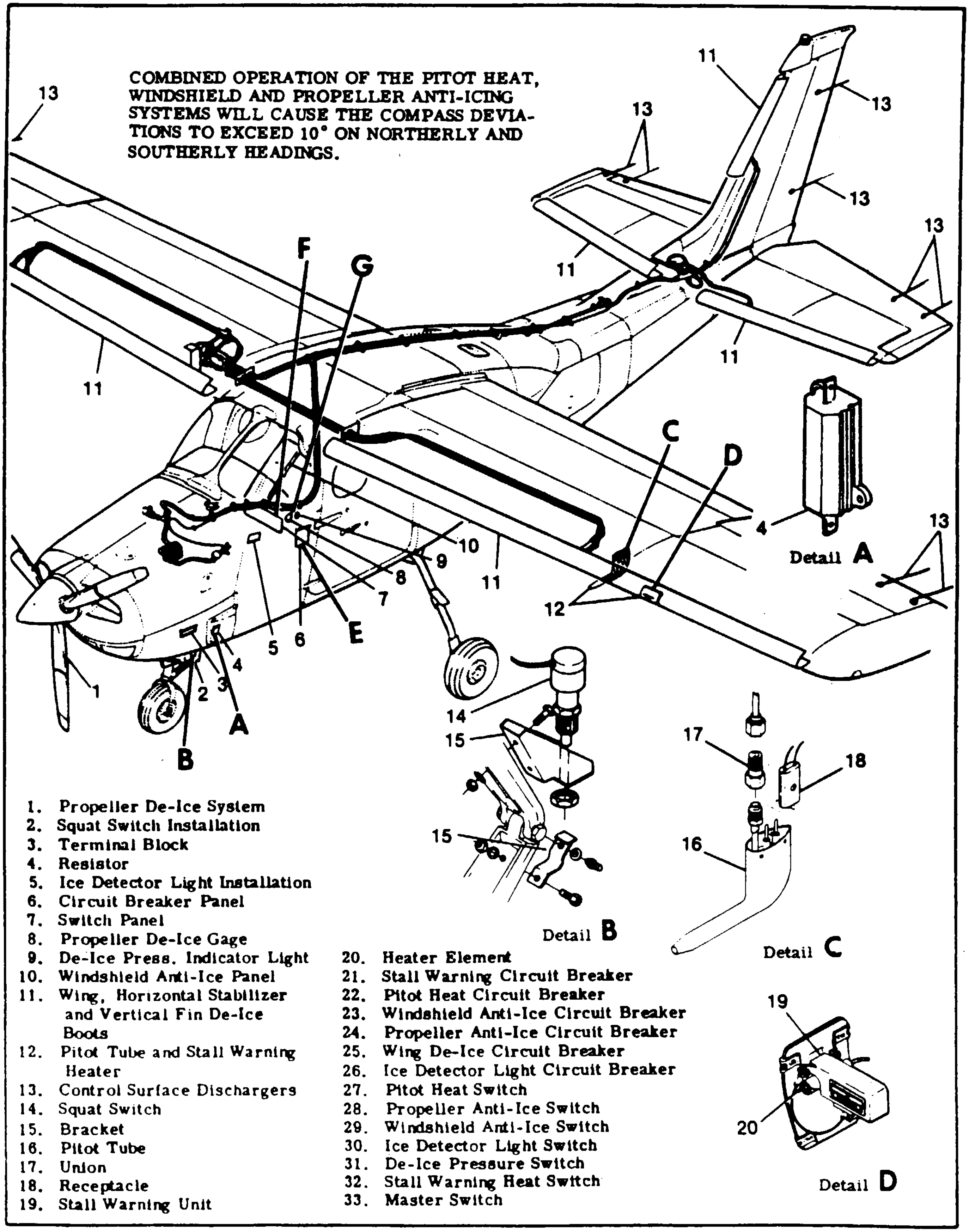
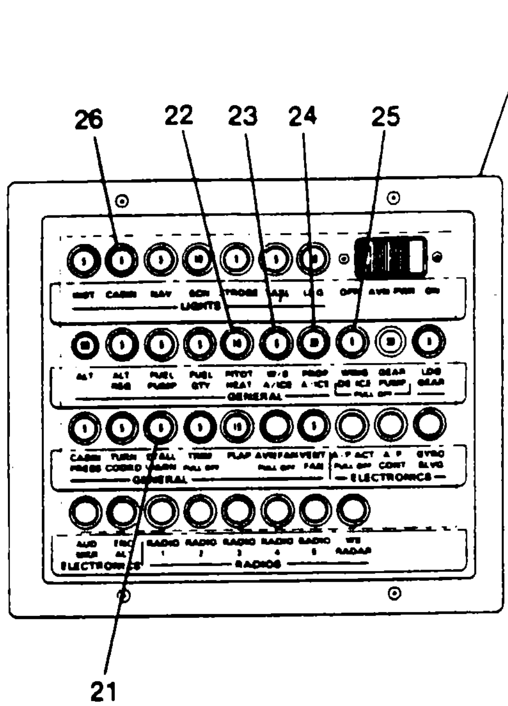
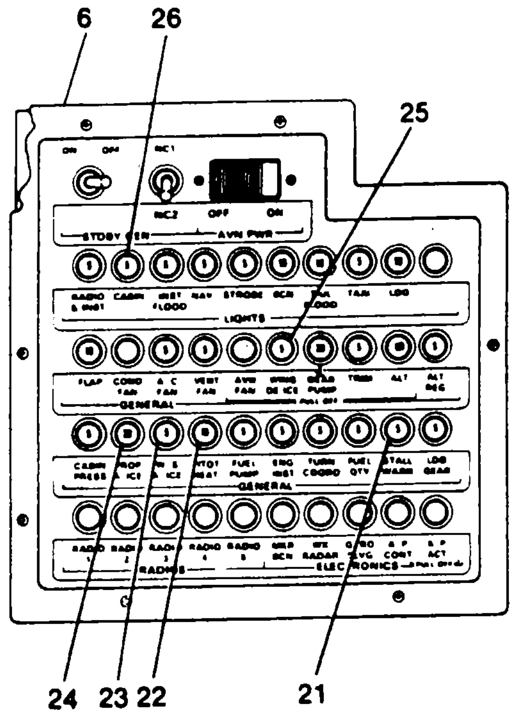


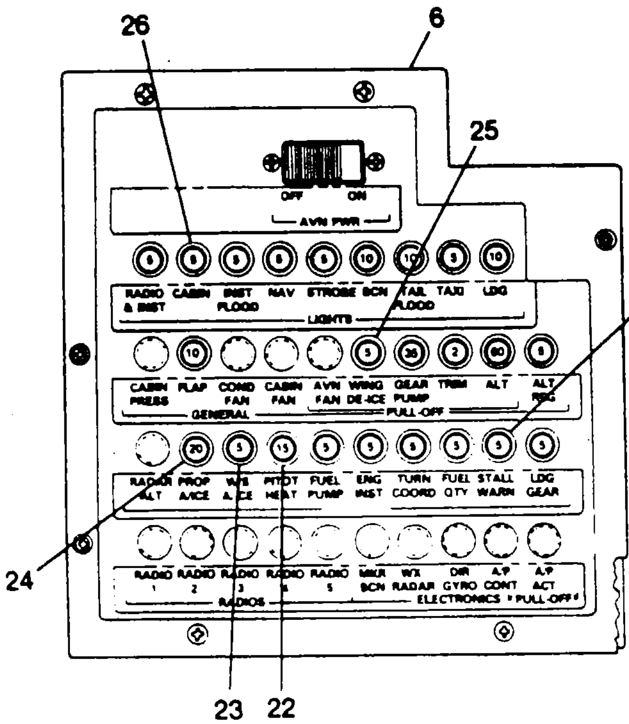
Figure 15-6A. Known Icing Equipment (Sheet 1 of 4)



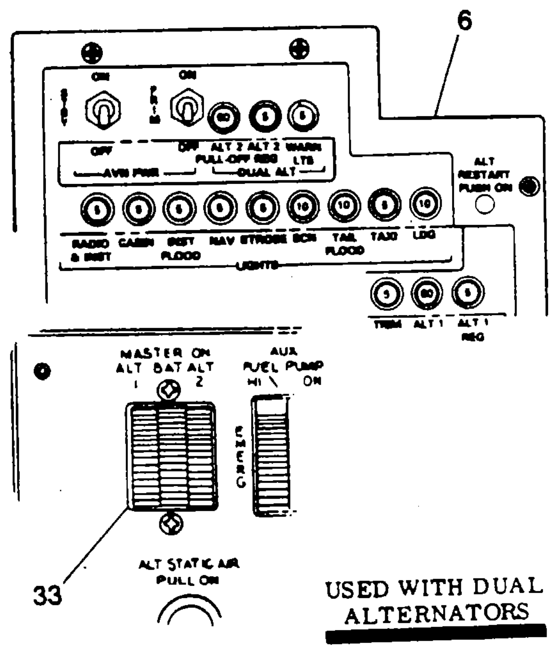
THRU P21000385



P21000386 THRU P21000760



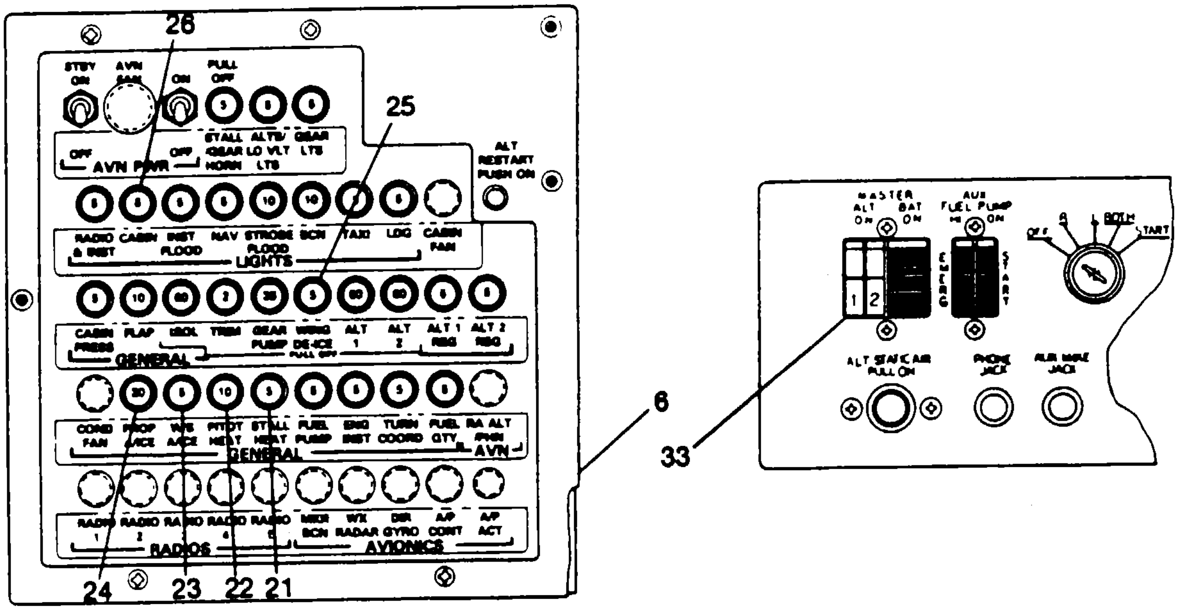
P21000761 THRU P21000811



P21000761 THRU P21000811

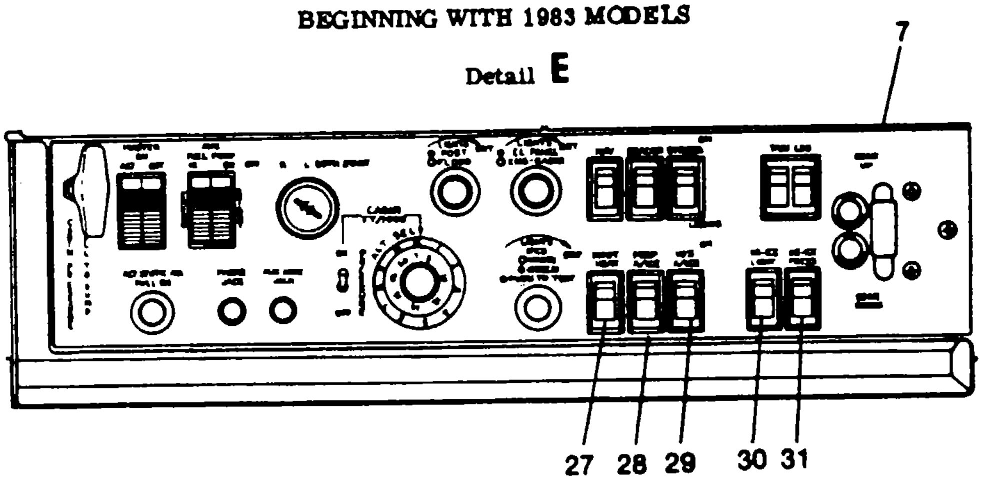
Detail E

Figure 15-6A. Known Icing Equipment (Sheet 2 of 4)

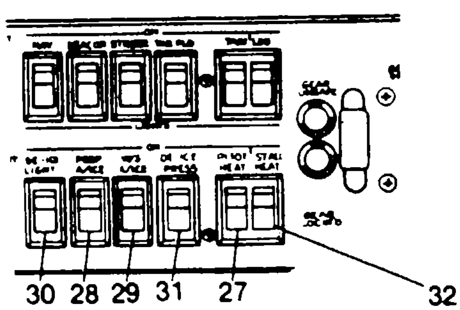


BEGINNING WITH 1983 MODELS

Detail **E**



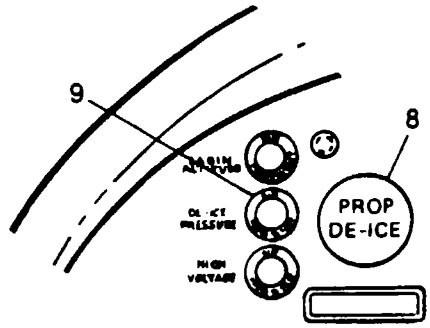
THRU P21000811



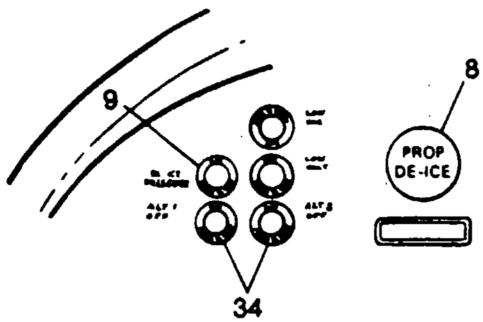
BEGINNING WITH 1983 MODELS

Detail **F**

Figure 15-6A. Known Icing Equipment (Sheet 3 of 4)



THRU P21000811

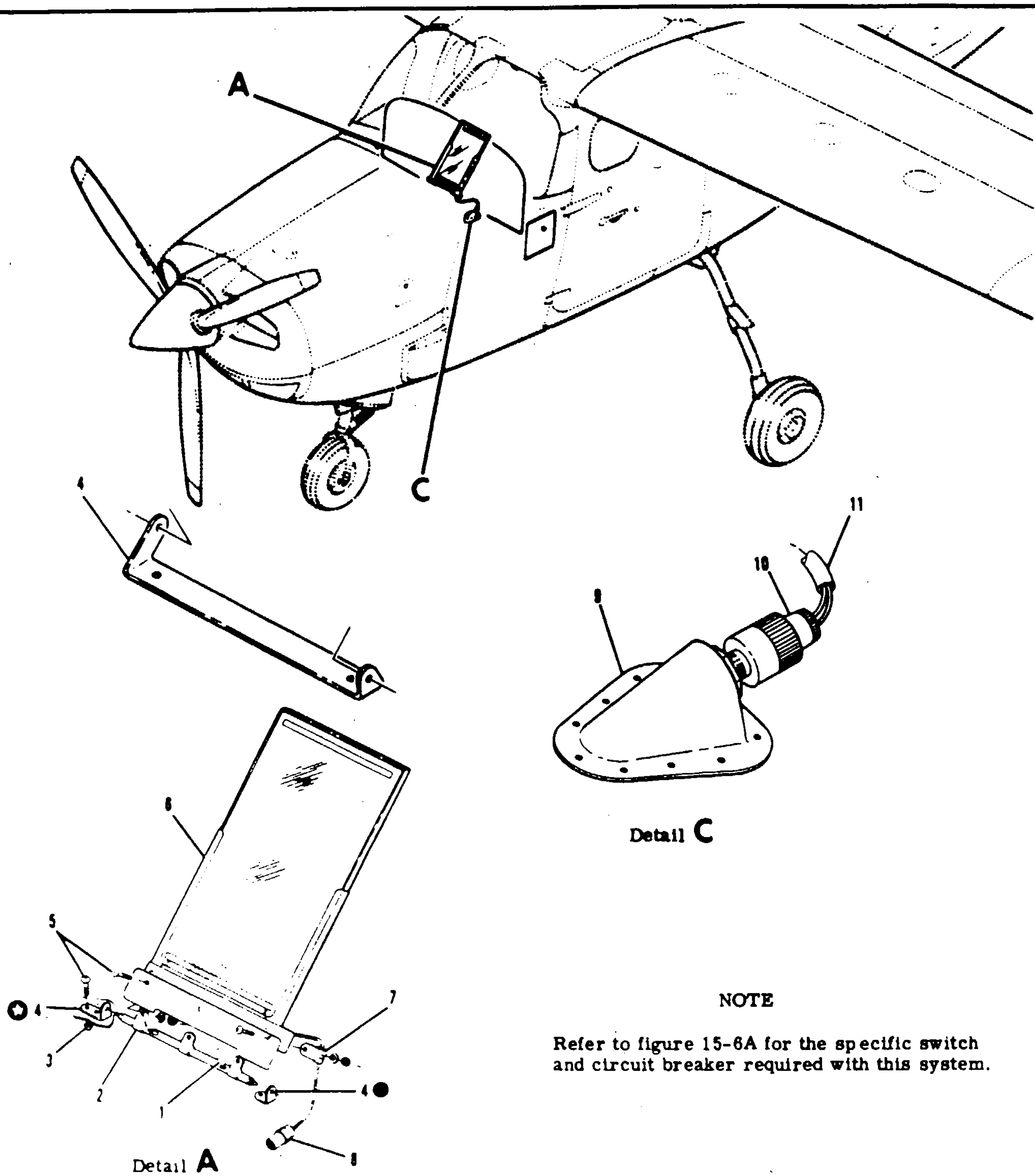


BEGINNING WITH 1983 MODELS

Detail G

34. Alt Off Light - Used With Dual Alternators

Figure 15-6A. Known Icing Equipment (Sheet 4 of 4)



NOTE

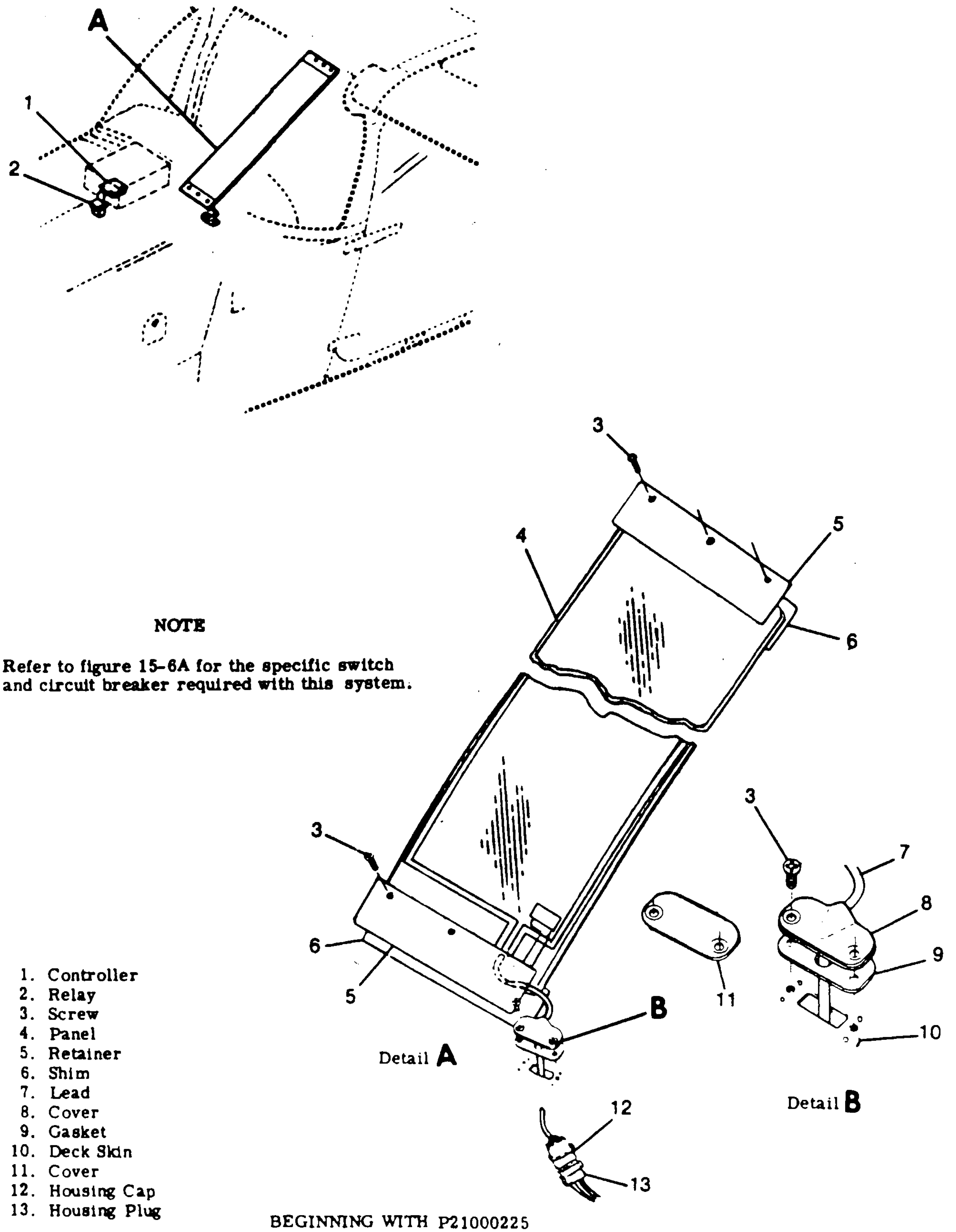
Refer to figure 15-6A for the specific switch and circuit breaker required with this system.

1. Release Assembly
2. Stop Assembly
3. Nut
4. Bracket
5. Screw
6. Panel Assembly
7. Clamp
8. Connector
9. Housing Assembly
10. Connector
11. Anti-Ice Panel Lead

✪ THRU P21000242

● BEGINNING WITH P21000243

Figure 15-6B. Windshield Anti-Ice Panel Installation (Removable)



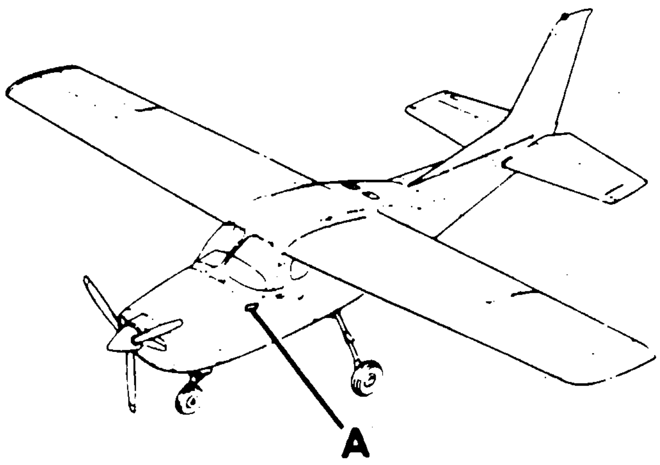
NOTE

Refer to figure 15-6A for the specific switch and circuit breaker required with this system.

1. Controller
2. Relay
3. Screw
4. Panel
5. Retainer
6. Shim
7. Lead
8. Cover
9. Gasket
10. Deck Skin
11. Cover
12. Housing Cap
13. Housing Plug

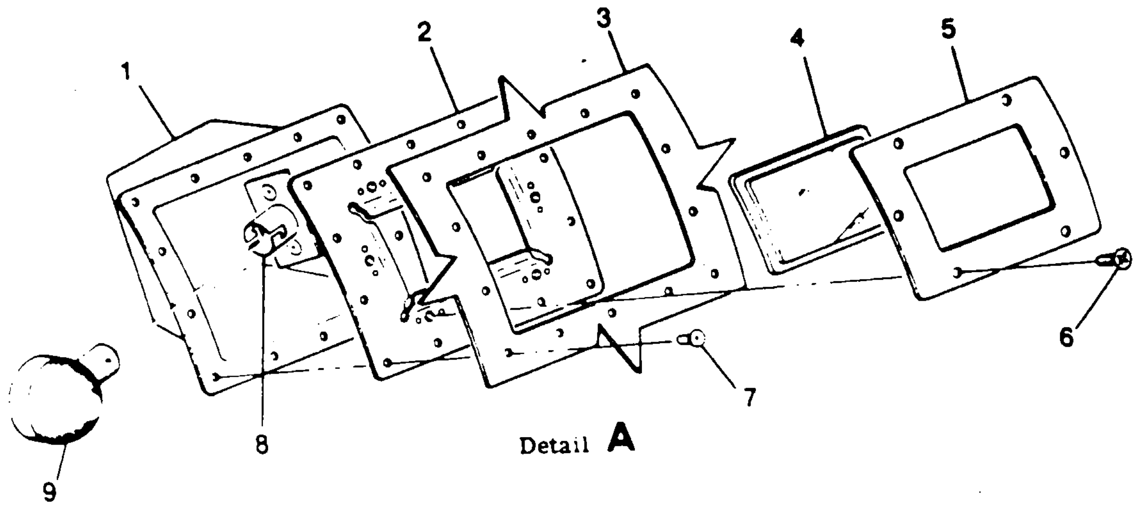
BEGINNING WITH P21000225

Figure 15-6C. Windshield Anti-Ice Panel Installation (Fixed)



NOTE

Refer to figure 15-6A for the specific switch and circuit breaker required with this system



Detail A

1. Bracket Assembly
2. Doubler Assembly
3. Skin-Cowl Deck
4. Lens
5. Cover
6. Screw
7. Rivet
8. Socket
9. Lamp

Figure 15-6D. Ice Detector Light Installation

19. Apply a bead of RTV108 sealer to the groove of heated panel.

NOTE

Do not allow the RTV108 sealer to be pressed out of the seal upon installation. If this happens, remove the heated panel, wipe the sealer off the windshield and the seal on the heated panel with isopropyl alcohol. Reapply RTV108 sealer in grooves, correcting the amount of bead, and reinstall the heated panel.

20. Install heated panel on windshield exercising care to prevent smearing of sealer.
21. Ensure proper location of spacers at upper and lower ends of heated panel. (see note after step 5).
22. Apply RTV-108 sealer to screws.
23. Install screws at top and bottom of heated panel.
24. Route heated panel electrical leads through the deck skin and gaskets then connect.
25. Install cover and apply a strip of tape around opening to keep sealer off of deck skin. Apply RTV 108 sealer, putting wire bundle in cover.

NOTE

Allow 24 hours for full cure of RTV108 sealer.

26. Remove all tape around heated panel and lead cover.
27. Operational check the heated panel as follows:
a. Turn windshield de-ice switch momentarily ON, check ammeter for discharge.

15-36. TRAPPED MOISTURE. To eliminate moisture trapped between the heated windshield panel and the windshield, proceed as follows:
a. Fabricate two probes from .125 diameter tube approximately three inches long. Cut one end of tubes off at approximately a 30° or less angle. File to a sharp edge.
b. Insert one tube through the upper outboard corner of the heated panel and the other through the lower inboard corner. Move lower tube to the outboard corner as required to release all trapped water. Insert tubes through the rubber seal.
c. Connect upper tube to a source of low pressure dry air, or bottled nitrogen. Flow air between the heated panel and windshield until all visible moisture is gone. Activate heated panel for short periods to accelerate removal of moisture.
d. Apply soap and water mixture to edges of the heated panel. Restrict exit air, note and mark leakage from under panel. (Do not over pressure use no more than 2.0 psi.)
e. Clean windshield and edge of heated panel with mild soap and water, a 50/50 solution of isopropl alcohol and water. Wipe dry and apply masking tape along leak area approximately .06 from seal. Lift edge of seal and insert RTV. Fill gap at upper and lower ends of heated panel between panel seal and the windshield retainer with RTV if leak is in this area. Remove tubes from windshield; fill holes with RTV and remove masking tape. Use clear RTV-108 sealer only.

15-37. ICE DETECTOR LIGHT. (See figure 15-6D.)

15-38. DESCRIPTION. An optional ice detector light may be installed on the left hand side of the fuselage, forward of the cabin door. The ice detector light will illuminate the leading edge of the left wing so the pilot can visually detect ice formation on the wing. A push-button switch, located below the master switch, controls the ice detector light.

15-39. 95-AMP ALTERNATOR INSTALLATION. THRU P21000811. (See Section 17 of this manual.)

15-40. DUAL ALTERNATOR SYSTEM. BEGINNING WITH P21000812. (See Section 17 of this manual.)

15-41. DUAL VACUUM SYSTEM. BEGINNING WITH P21000761. (See Section 17 of this manual.)

15-42. CONTROL SURFACE DISCHARGERS.

15-43. DESCRIPTION. Static dischargers are installed on the trailing edge surfaces of the ailerons, elevators and rudder. The static dischargers release any static electrical charge that builds up on the aircraft during flight. The release of static electricity is accomplished at a lower potential than builds up and with less "noise interference" with airborne navigational systems. Static dischargers should be inspected periodically for loss of wire tips, frayed sheathing, cracks to mounting brackets and weather erosion.

15-44. RESISTANCE CHECK. Static dischargers lose their effectiveness with age, therefore, they should be checked periodically (annually or more often), by means of a high-resistance "Megger" test. This may be accomplished by using a Megger insulation tester. This tester may be purchased from The James J. Biddle Co. Plymouth Meeting, Pa. 19462. The Megger insulation tester measures the resistance, in megohms, that is connected between its terminals. First, verify that the static discharger is adequately grounded to the aircraft. Using an ohmmeter, check the resistance from the static discharger base to a good aircraft ground. Resistance greater than .50 ohm indicates a poor ground. Second, with the static discharger mounted on the aircraft, and the "earth" terminal of the Megger connected to the base of the discharger, measure the resistance to the tip of the discharger using the 500 volt scale on the Megger. Measurements of less than 1 megohm or greater than 100 megohms is cause for replacement of the discharger.

NOTE

Do not bend the static discharger during this test. Dischargers may have a higher resistance if bent.

15-45. PITOT TUBE AND STALL WARNING.

15-46. DESCRIPTION. A special pitot tube with a larger inlet and higher capacity heating element and a higher capacity heated stall warning transducer are installed in the left wing to assure proper airspeed indications and stall warning in the event icing conditions are encountered. These systems are designed to prevent ice formation rather than remove it after it forms. Both systems are controlled by a rocker switch labeled, PITOT HEAT, on the left switch and control panel. Beginning with 1983 models, the systems are controlled by separate rocker switches labeled, PITOT HEAT and STALL HEAT. The pitot tube heater is protected by a 10-amp circuit breaker labeled, PITOT HEAT. The stall warning heater is protected by a 5-amp circuit breaker labeled, STALL HEAT. When the aircraft is on the ground, a resistor is introduced into the the stall warning heater circuit by the nose wheel squat switch in order to prevent overheating. In addition, thinner static port buttons are used with the special pitot tube in order to maintain the standard airspeed calibrations.

15-47. REMOVAL AND INSTALLATION. (See Section 17 of this manual.)

15-48. HEATED WINDSHIELD PANEL (REMOVABLE.) (See figure 15-6B.)

15-49. DESCRIPTION. The panel is constructed of two sheets of plate glass covering a layer of vinyl. Imbedded in the vinyl is a fine resistance wire which provides the heat for windshield de-icing. The lower edge of the panel is mounted on the deck skin just forward of the windshield. The upper end of the panel is supported by a rubber bumper which holds the panel off the windshield. The lower mounting bracket is hinged for easy cleaning between the panel and windshield. The hinge pins are spring loaded so the panel may be easily removed. Power to the windshield panel is provided through a plug located in a housing assembly just left of the lower support bracket. A drain tube is provided for the housing assembly also a plug button, painted the same color as the deck skin, to plug the connector hole when the anti-ice assembly is removed. A circuit breaker switch located on the instrument panel is a off-on switch and a circuit breaker to protect the system.

15-50. REMOVAL AND INSTALLATION. (See figure 15-6B.) Use the figure as a guide for removal and installation of components.

15-51. OXYGEN SYSTEM.

15-52. DESCRIPTION. The solid-state emergency oxygen system consists of oxygen generators and masks located in the overhead console. One generator is provided for the pilot, co-pilot and 3rd seat passenger and a second generator is provided for the 4th, 5th and 6th seat passengers. The generators contain solid chemicals, which when activated, provide an oxygen supply for approximately 15 minutes from each oxygen generator. A lanyard is provided in each stowage compartment to activate the chemical process in the generator. After the chemical reaction has been initiated, the flow of oxygen will continue until the generator is entirely expended. Once expended, they must be replaced. Amber lights are located in the overhead console to indicate that oxygen is being supplied by the generator or has been expended. Flow indicators are provided in the lines. A green color indicates an adequate supply of oxygen. A red color indicates an inadequate or no oxygen flow. Disposable partial rebreathing type masks are provided.

15-53. OPERATION.

a. Open mask compartment (located in overhead console) and remove mask from bag being careful not to destroy the printed instructions on bag.
b. Put on mask following instructions on bag.
c. Adjust metallic nose strap for snug fit.
d. Pull lanyard.
e. Check flow indicator for green indication.
f. Reduce cabin altitude to 10,000 feet or lower before the 15-minute oxygen supply is depleted. (Refer to Pilot-s Operating Handbook.)

WARNING

For safety reasons, no smoking should be allowed in aircraft while oxygen is being used.

15-54. SYSTEM OPERATIONAL STATUS CHECK. Determine operational condition of oxygen system as follows:

a. Turn master switch on.
b. Observe oxygen warning lights. Amber lights indicate that oxygen has been depleted and, therefore, requires a new generator.

CAUTION

Oxygen system checkout should be performed prior to each flight since the oxygen generators may have been expended on the previous flight.

15-55. REMOVAL OF OXYGEN GENERATORS AND MASKS. (See figure 15-7.)

a. Open mask compartment and remove bag and mask from tube. Remove placard from lanyard; save placard.
b. Remove screws holding overhead console in place and remove consoles. (This will require disconnecting two ram air hoses from forward end of aft console. (Refer to figure 15-1.)
c. Note routing of mask tubes then remove tubes from clamps along routing and pull away from ports on oxygen generator.
d. Working through zipper opening in head liner, remove screws attaching bottom plate to generator mounting bracket. Remove bottom plate and spread sides of mounting bracket to free generator mounting pins. Remove generator.

15-56. INSTALLATION OF OXYGEN GENERATORS AND MASKS.

CAUTION

Do not remove safety cap from generator until after installation is complete.

a. Working through zipper opening in headliner, spread sides of generator mounting bracket and install generator. Insure that mounting pins on side of generator engage pin holes in bracket then install bottom plate on mounting bracket.

b. Cut pin off of old lanyard and tape ends of new lanyard to old one. Pull new lanyard through routing tube by pulling on the placard end of the old one. Remove old lanyard and discard.

c. Set spring-loaded ignitor firing mechanism to loaded position and connect indicator light mechanism. (Refer to figure 15-7 and paragraph 15-34.)

CAUTION

Do not remove safety cap from generator ignitor until after installation is complete.

d. Cut off lower corner of mask bag and pull tube out of bag. (Do not remove cap from end of tube.)

e. Have an assistant hold the overhead console directly below it's source location and route mask tubes through hole in upper left hand corner of mask compartment and through clamps along original routing.

f. Remove caps from end of mask tubes and install tubes on generator: tighten all clamps.

g. Push lanyard through hole in forward end of mask compartment and attach placard with square knot.

h. Reconnect ram air hoses to ports on overhead console. (Aft console only.)

i. Remove safety cap from generator ignitor.

j. Install overhead console on aircraft.

k. Push mask tubes back into bag until bag hangs approximately 12 inches below mask compartment. Tape bag to tube at this point with clear or transparent type.

l. Install mask bags and lanyard in mask compartment and install cover on compartment. (Recheck square knot in lanyard before installing cover.)

m. Working through zipper opening in headliner, recheck to see that mask tubes are firmly in place on generator.

n. Close zipper opening.

15-57. OXYGEN SYSTEM INDICATOR LIGHT SWITCH ADJUSTMENT. (See figure 15-7.)
When lanyard (2) is pulled, pin (3) will be drawn out of bracket on oxygen generator (4), disconnecting spring (1). This action releases spring (14) which will snap back and contact actuator of switch (10). When springs (14) and (1) are connected and hooked over pin (3), switch (10) actuator should be adjusted to clear (below) spring (14). Switch (10) should be adjusted in slotted holes in bracket (8), with screws (11).

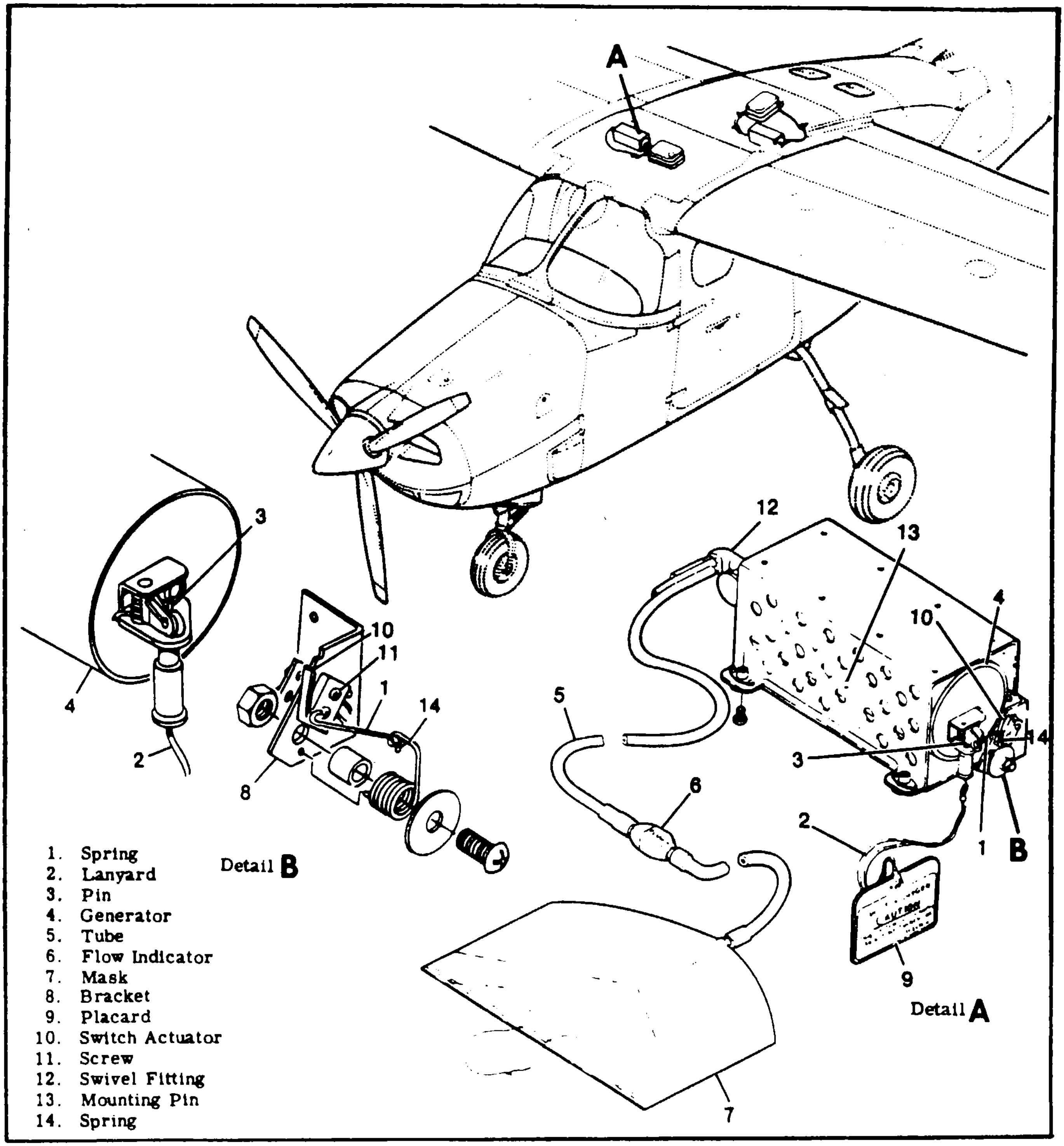


Figure 15-7. Emergency Oxygen System.

SECTION 16

INSTRUMENTS AND INSTRUMENT SYSTEMS

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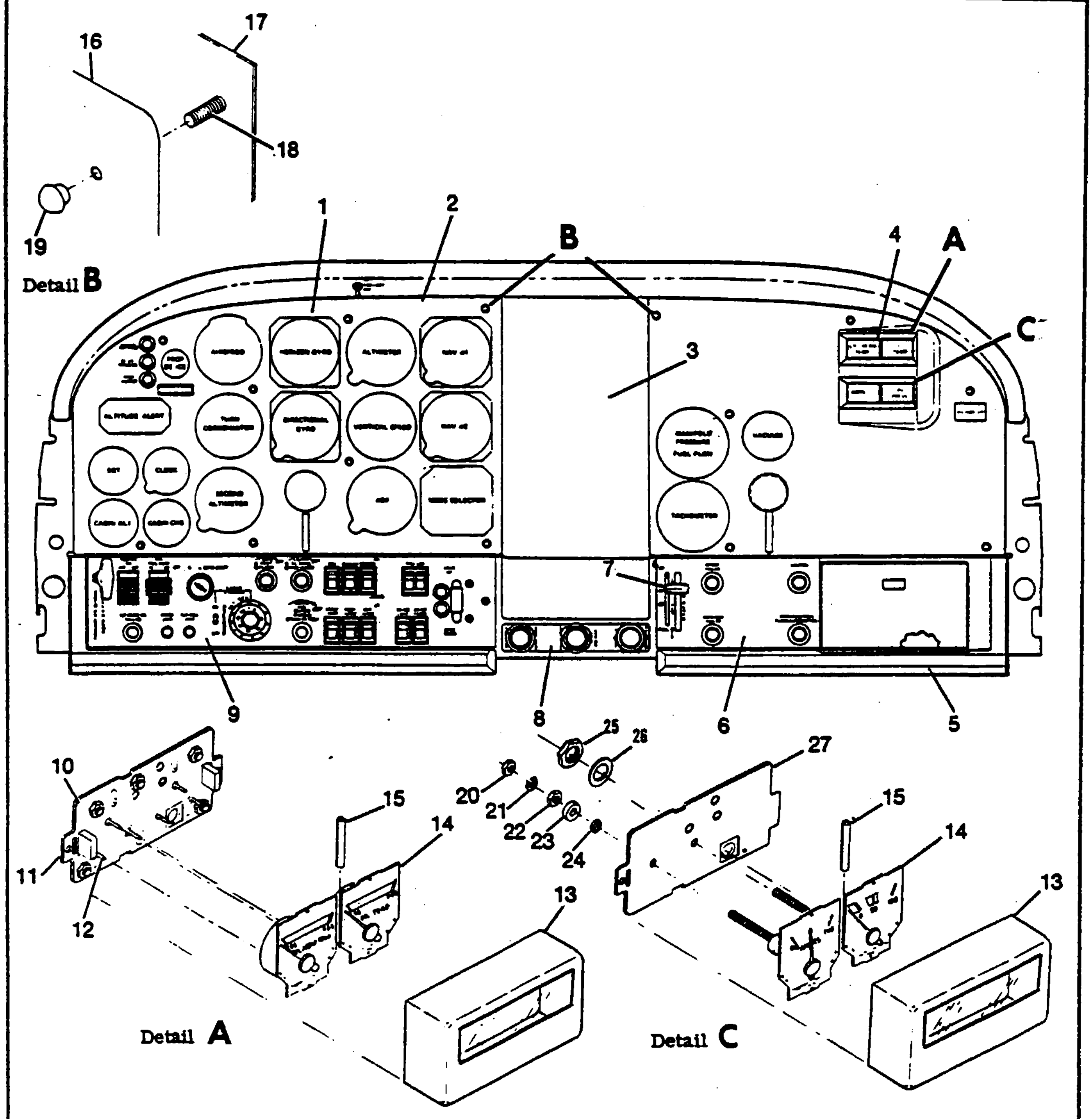
Fuel Computer/Digital Clock	2I22/16-26
Description	2I22/16-26
Fuel Computer Operation	2I22/16-26
Digital Clock Operation	2I23/16-27
Trouble Shooting	2J1/16-29
Transducer Removal and Replacement	2J1/16-29

16-1. INSTRUMENTS AND INSTRUMENT SYSTEMS.

16-2. GENERAL. This section describes typical instrument installations and their respective operating systems. Emphasis is placed on trouble shooting and corrective measures only. It does not deal with specific instrument repairs since this usually requires special equipment and data and should be handled by instrument specialists. Federal Aviation Regulations require malfunctioning instruments be sent to an approved instrument overhaul and repair station or returned to manufacturer for servicing. Our concern here is with preventive maintenance



1. Flight Instruments
2. Removable Flight Instrument Panel
3. Radio Panel
4. Instrument Cluster
5. Protection Pad
6. Heating and Ventilating Controls
7. Wing Flap Controls
8. Engine Controls
9. Ignition and Switch Panel
10. Gage Circuit Board
11. Mounting Screw Location
12. Gage Mounting Pin
13. Gage Cover
14. Replaceable Gage
15. Gage Divider Support
16. Decorative Cover
17. Removable Panel
18. Stud
19. Threaded Button
20. Nut
21. Lockwasher
22. Retainer Nut
23. Plastic Washer
24. Rubber Washer
25. Nut-Oil Fitting Retainer
26. Washer
27. Backplate

Figure 16-1. Instrument Panel (Typical)

ment systems and correction of system faults which result in instrument malfunctions. The descriptive material, maintenance and trouble-shooting information in this section is intended to help the mechanic determine malfunctions and correct them, up to the defective instrument itself, at which point an instrument technician should be called in. Some instruments, such as fuel quantity and oil pressure gages, are so simple and inexpensive, repairs usually will be more costly than a new instrument. On the other hand, aneroid and gyro instruments usually are well worth repairing. The words "replace instrument" in the text, therefore, should be taken only in the sense of physical replacement in the aircraft. Whether replacement is to be with a new instrument, an exchange one, or the original instrument is to be repaired must be decided on basis of individual circumstances.

16-3. INSTRUMENT PANEL. (Refer to figure 16-1).

16-4. DESCRIPTION. The instrument panel consists of a left and right removable instrument panel, a stationary radio panel and a lower switch and controls panel. The left hand removable panel contains the flight instruments. The right hand removable panel contains the engine cluster instruments and other related instruments with additional space for radio equipment. The center stationary panel is a compartmented panel for acceptance of radio equipment. The lower stationary panel contains the aircraft systems switches and controls.

16-5. REMOVAL AND INSTALLATION.

a. Left Removable Instrument Panel.

1. Unscrew threaded buttons holding decorative cover and remove instrument knobs as necessary.
2. Pull decorative cover back and disconnect post light wiring, if installed, and remove decorative cover.
3. Tag and disconnect wiring and plumbing connections from instruments and panel.
4. Remove the screws through face of panel and screws from bottom support angle of panel.
5. Remove screws through panel and column support bearing and bearing doubler.
6. Panel may be moved aft to the control wheel for access behind panel. If panel is to be removed completely remove the control wheel per section 6.
7. To install panel reverse the steps of procedure.

b. Right Removable Instrument Panel.

1. Removal and Installation of right panel is similiar to left panel. Radio equipment, if installed, must be removed.

16-6. INSTRUMENTS. (Refer to figure 16-1).

16-7. REMOVAL. Most instruments are secured to the panel with screws inserted through the face of the panel, under the decorative cover. To remove an instrument, remove the decorative cover, disconnect wiring or plumbing from instrument, remove mounting screws through panel face and remove instrument from forward side of panel. Two instrument clusters are installed in the right removable instrument panel. Each cluster unit contains two instruments, which are individually replaceable. A cluster may be removed by removing decorative cover, removing two mounting screws and disconnecting wiring or plumbing, remove cluster unit from face of panel. Refer to figure 16-1 for replacement of individual gage. In all cases, when an instrument is removed, disconnected plumbing or wires should be protected. Cap open lines and cover pressure connections on instrument to prevent damage to threads and entrance of foreign matter. Wire terminals should be insulated or tied up to prevent accidental grounding or short-circuiting.

16-8. INSTALLATION. Generally, installation procedure is the reverse of removal procedure. Ensure mounting screw nuts are tightened firmly, but do not over-tighten, particularly on instruments having plastic cases. The same rule applies to connecting plumbing and wiring.

NOTE

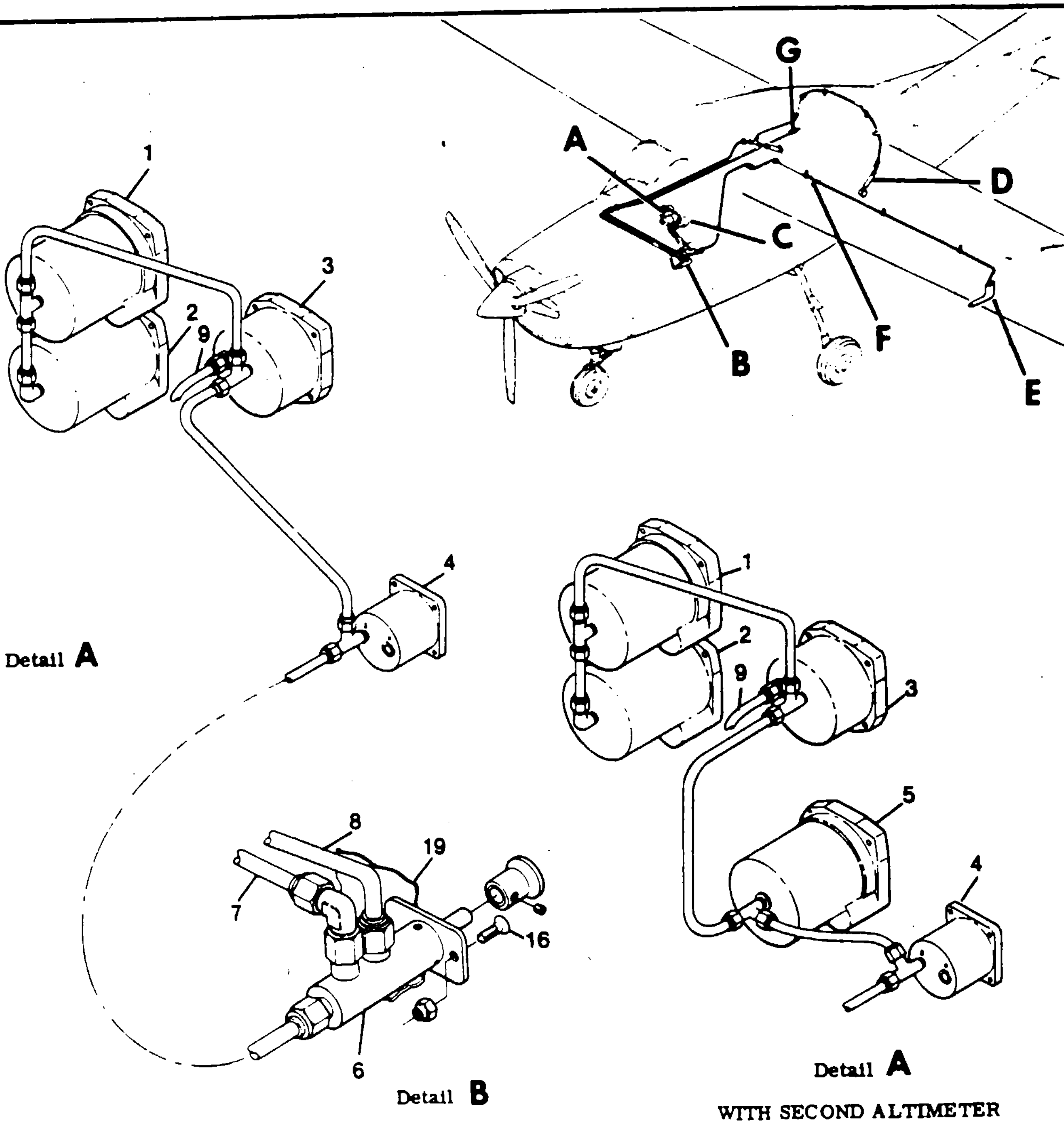
All instruments (gages and indicators), requiring a thread seal or lubricant, shall be installed using teflon tape on male fittings only. This tape is available through the Cessna Service Parts Center.

When replacing an electrical gage in an instrument cluster assembly, avoid bending pointer or dial plate. Distortion of dial or back plate could change the calibration of gages.

16-9. PITOT AND STATIC SYSTEM. (Refer to figure 16-2).

16-10. DESCRIPTION. The pitot system conveys ram air pressure to the airspeed indicator. A pitot tube heater and stall warning heater may be installed. The heating elements are controlled by a switch on the pilots lower instrument panel and powered by the electrical system. The static system vents vertical speed indicator, altitude and airspeed indicators to atmospheric pressure through plastic tubing connected to the static ports. A static line sump is installed at each source button to collect condensation in the static system. The alternate static pressure valve, located on pilots lower switch panel, allows an alternate source of static pressure that is connected aft of the pressure bulkhead in the baggage compartment. The alternate static source is to be used only in emergency situations, when the normal system is inoperative or malfunctioning. When alternate static valve is used instrument readings may vary from normal readings due to static air source being inside of the fuselage of the aircraft. Refer to The Pilot's Operating Handbook for flight operation using alternate static source pressure.

16-11. MAINTENANCE. Proper maintenance of the pitot and static system is essential for proper operation of altimeter, vertical speed and airspeed indicators. Leaks, moisture and obstructions in the pitot system will result in false airspeed indications, while



1. Altimeter
2. Vertical Airspeed Indicator
3. Airspeed Indicator
4. Cabin Altimeter
5. Second Altimeter
6. Alternate Static Source Valve
7. Line (Alternate Air Source)
8. Line (To Static Port Sump)
9. Line (Pitot Pressure Source)
10. Static Line Sump
11. Static Port
12. Pitot Mast
13. Heated Pitot Element
14. Mount Support
15. Decorative Cover
16. Mounting Screw
17. Retainer
18. True Airspeed Ring
19. Panel
20. Shim Spacer
21. Tee Fitting
22. Piccolo Tube Assembly

Figure 16-2. Pitot Static System (Sheet 1 of 2)

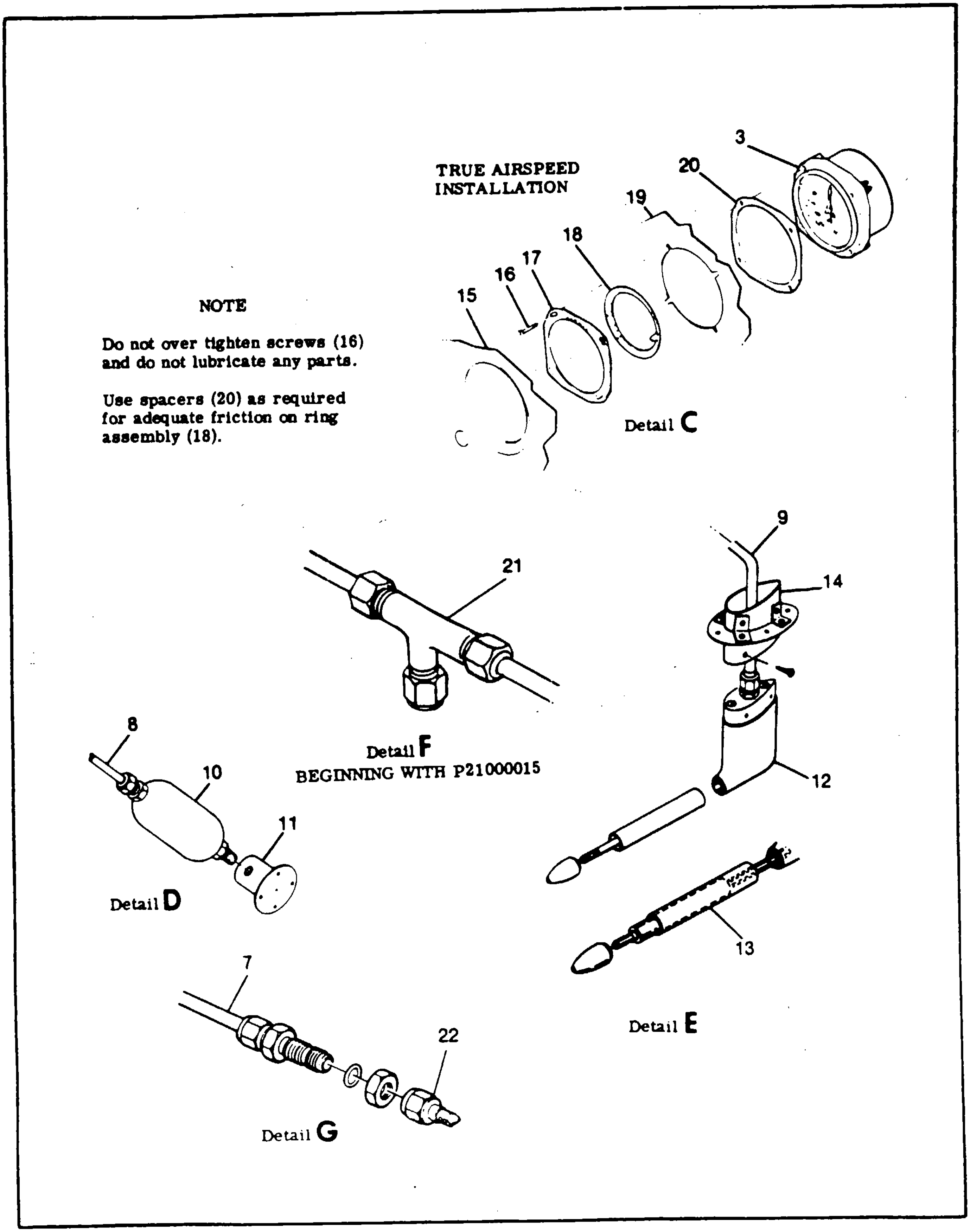


Figure 16-2. Pitot Static System (Sheet 2 of 2)

static system malfunctions will affect the readings of all three instruments. Under instrument flight conditions, these instrument errors could be hazardous. Cleanliness and security are the principal rules for system maintenance. The pitot tube and static ports MUST be kept clean and unobstructed.

16-12. STATIC PRESSURE SYSTEM INSPECTION AND LEAKAGE TEST. The following procedure outlines inspection and testing of the static pressure system, assuming the altimeter has been tested and inspected in accordance with current Federal Aviation Regulations.

a. Ensure that the static system is free from entrapped moisture and restrictions.

b. Ensure that no alterations or deformations of the airframe surface have been made which would affect the relationship between air pressure in the static pressure system and true ambient static air pressure for any flight configuration.

c. Seal one static source port with pressure sensitive tape. This seal must be air tight.

d. Assure that the alternate static source valve is in the closed, normal position.

e. Attach a source of suction to the remaining static pressure source opening. Figure 16-3 shows one method of obtaining suction.

f. Slowly apply suction until the altimeter indicates 8,000-foot increase in altitude.

CAUTION

When applying or releasing suction, do not exceed the range of vertical speed indicator or airspeed indicator.

g. Cut off the suction source to maintain a "closed" system for one minute. Leakage shall not exceed 100 feet of altitude loss as indicated on the altimeter.

h. If leakage rate is within tolerance, slowly release the suction source and remove the tape from static port.

NOTE

If leakage rate exceeds the maximum allowable, first tighten all connections, then repeat leakage test. If leakage rate still exceeds the maximum allowable, use the following procedure.

i. Disconnect the static pressure lines from airspeed indicator and vertical speed indicator. Use suitable fittings to connect the lines together so the altimeter is the only instrument still connected into the static pressure system.

j. Repeat the leakage test to check whether the static pressure system or the bypassed instruments are the cause of leakage. If the instruments are at fault, they must be repaired by an "appropriately rated repair station" or replaced. If the static pressure system is at fault, use the following procedure to locate leakage.

k. Attach a source of positive pressure to the static source opening. Figure 16-3 shows one method of obtaining positive pressure.

CAUTION

Do not apply positive pressure with the airspeed indicator or vertical speed indicator connected to the static pressure system.

l. Slowly apply positive pressure until the altimeter indicates a 500 foot decrease in altitude and maintain this altimeter indication while checking for leaks.

m. Tighten leaking connections. Repair or replace parts found defective.

n. Reconnect the airspeed and vertical speed indicators into the static pressure system and repeat leakage test per steps "c" through "h".

16-13. PITOT SYSTEM INSPECTION AND LEAKAGE TEST. Thru P21000014 to check the pitot system for leaks, place a piece of tape over the small hole in the lower aft end of pitot tube. Fasten a piece of rubber or plastic tubing over pitot tube, close opposite end of tubing and slowly roll up tube until airspeed indicator registers in cruise range. Secure tube and after a few minutes recheck airspeed indicator. Any leakage will have reduced the pressure in the system, resulting a lower airspeed indication. Slowly unrool tubing before removing it so pressure is reduced gradually. Other wise the instrument may be damaged. If test reveals a leak in the system, check all connections for tightness.

16-13A. PITOT SYSTEM INSPECTION AND LEAKAGE TEST. Beginning with P21000015 check the system as follows:

a. Seal pitot openings with pressure sensitive tape. This seal must be air tight.

b. Connect a source of pressure, (Figure 16-2 shows one method of obtaining positive pressure) to the tee fitting in the pitot line located in the wing leading edge inboard of the wing strut.

c. Apply pressure until the airspeed indicator registers in the cruse range.

CAUTION

Do not exceed airspeed limits as damage could occur to the airspeed indicator.

d. Close pressure source to maintain a closed system.

e. After a few minutes recheck airspeed indicator for pressure loss.

f. If a loss in pressure has occurred, check all connections for tightness and recheck system.

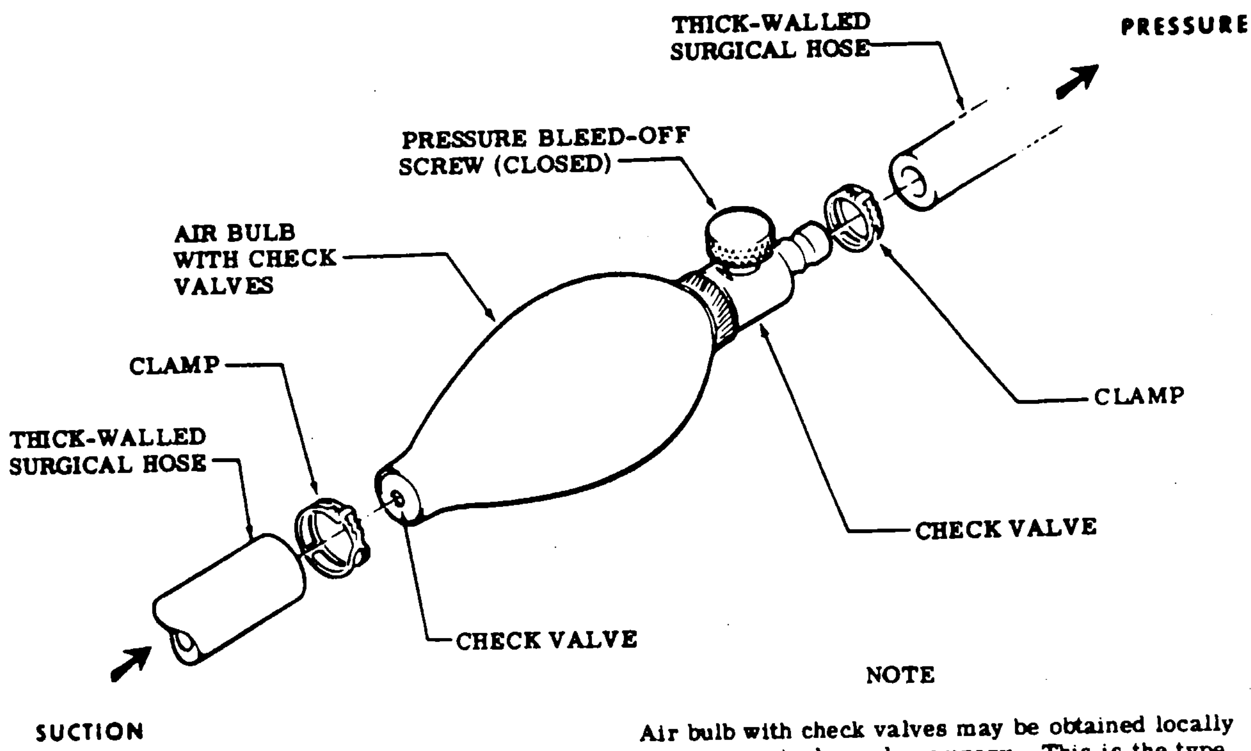
g. After system check is complete, remove pressure source, reinstall cap on tee fitting and remove tape from pitot openings.

16-14. BLOWING OUT LINES. Although the pitot system is designed to drain down to the pitot tube opening, condensation may collect at other points in the system and produce a partial obstruction. To clear the line, disconnect it at the airspeed indicator.

CAUTION

Never blow through pitot or static lines toward instruments. Insure that (avionics) altitude sensor line is disconnected from static lines before blowing out lines, otherwise damage to the sensor may occur.

Using low pressure air, blow from the indicator end of line toward the pitot tube. Like the pitot lines, static pressure lines must be kept clear and connections tight. Static source sumps collect moisture and keeps system clear. However, when necessary, disconnect static line at first instrument to which it is connected, then blow the line clear with low pressure air. Open the alternate static source valve and blow line clear. Check all static pressure line connections for tightness. If hose or hose connections are used, check them for general condition and clamps for security. Replace



NOTE

Air bulb with check valves may be obtained locally from a surgical supply company. This is the type used in measuring blood pressure.

TO APPLY SUCTION:

1. Squeeze air bulb to expel as much air as possible.
2. Hold suction hose firmly against static pressure source opening.
3. Slowly release air bulb to obtain desired suction, then pinch hose shut tightly to trap suction in system.
4. After leak test, release suction slowly by intermittently allowing a small amount of air to enter static system. To do this, tilt end of suction hose away from opening, then immediately tilt it back against opening. Wait until vertical speed indicator approaches zero, then repeat. Continue to admit this small amount of air intermittently until all suction is released, then remove test equipment.

TO APPLY PRESSURE:

CAUTION

Do not apply positive pressure with airspeed indicator or vertical speed indicator connected into static system.

1. Hold pressure hose firmly against static pressure source opening.
2. Slowly squeeze air bulb to apply desired pressure to static system. Desired pressure may be maintained by repeatedly squeezing bulb to replace any air escaping through leaks.
3. Release pressure by slowly opening pressure bleed-off screw, then remove test equipment.

Figure 16-3. Static System Test Equipment hose which have cracked, hardened or show other signs of deterioration.

16-15. REMOVAL AND INSTALLATION OF COMPONENTS. (See figure 16-2). To remove the pitot mast, remove the four mounting screws on the side of connector (14) and pull mast out of connector far enough to disconnect pitot line (9). Electrical connections to the heater assembly (if installed) may be disconnected through the wing access opening just inboard of mast. Pitot and static lines are removed in the usual manner, after removing wing access plates, lower wing fairing strip and upholstery as required. Installation of tubing will be simpler if a guide wire is drawn in as tubing is removed from wing and door post. Disconnect fittings at wing root and remove wing tubing through lower wing fairing opening and draw body portion down through door post.

When replacing components to pitot and static pressure systems, tighten connections firmly, but avoid over-tightening and distorting fittings. If twisting of plastic tubing is encountered when tightening fittings, VV-P-236 (UPS Petrolatum), may be applied sparingly between tubing and fittings.

16-16. TROUBLE SHOOTING--PITOT-STATIC SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
LOW OR SLUGGISH AIRSPEED INDICATION. Normal altimeter and vertical speed.	Pitot tube deformed, leak or obstruction in pitot line.	Straighten tube, repair or replace damaged line.
INCORRECT OR SLUGGISH RESPONSE. All three instruments.	Leaks or obstruction in static line.	Repair or replace line.
	Alternate static source valve open.	Close for normal operation.

16-17. TRUE AIRSPEED INDICATOR. A true airspeed indicator may be installed. This indicator, equipped with a conversion ring, may be rotated until pressure altitude is aligned with outside air temperature, then airspeed indicated on the instrument is read as true airspeed on the adjustable ring. Refer to figure 16-2 for removal and installation. Upon installation, before tightening mounting screws (16), calibrate the instrument as follows: Rotate ring (18) until 105 knots on adjustable ring aligns with 105 knots on indicator. Holding this setting, move retainer (17) until 60°F aligns with zero pressure altitude, then tighten mounting screws (16) and replace decorative cover (15).

16-18. TROUBLE SHOOTING.

NOTE

Refer to paragraph 16-14 before blowing out pitot or static lines.

TROUBLE	PROBABLE CAUSE	REMEDY
HAND FAILS TO RESPOND.	Pitot pressure connection not properly connected to pressure line from pitot tube.	Repair or replace damaged line, tighten connections.
	Pitot or static lines clogged.	Blow out lines.
INCORRECT INDICATION OR HAND OSCILLATES.	Leak in pitot or static lines.	Repair or replace damaged lines, tighten connections.
	Defective mechanism.	Replace instrument.
	Leaking diaphragm.	Replace instrument.
	Alternate static source valve open.	Close for normal operation.

16-18. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
HAND VIBRATES.	Excessive vibration caused by loose mounting screws.	Tighten mounting screws.
	Excessive tubing vibration.	Tighten clamps and connections, replace tubing with flexible hose.

16-19. TROUBLE SHOOTING -- ALTIMETER.

NOTE

Refer to paragraph 16-14 before blowing out pitot or static lines.

TROUBLE	PROBABLE CAUSE	REMEDY
INSTRUMENT FAILS TO OPERATE.	Static line plugged.	Blow out lines.
	Defective mechanism.	Replace instrument.
INCORRECT INDICATION.	Hands not carefully set.	Reset hands with knob.
	Leaking diaphragm.	Replace instrument.
	Pointers out of calibration.	Replace instrument.
HAND OSCILLATES.	Static pressure irregular.	Blow out lines, tighten connections.
	Leak in airspeed or vertical speed indicator installations.	Blow out lines, tighten connections.

16-20. TROUBLE SHOOTING--VERTICAL SPEED INDICATOR.

NOTE

Refer to paragraph 16-14 before blowing out pitot or static lines.

TROUBLE	PROBABLE CAUSE	REMEDY
INSTRUMENT FAILS TO OPERATE.	Static line plugged.	Blow out lines.
	Static line broken.	Repair or replace damaged line, tighten connections.
INCORRECT INDICATION.	Partially plugged static line.	Blow out lines.
	Ruptured diaphragm.	Replace instrument.
	Pointer off zero.	Reset pointer to zero.

16-20. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
POINTER OSCILLATES.	Partially plugged static line.	Blow out lines.
	Leak in static line.	Repair or replace damaged lines, tighten connections.
	Leak in instrument case.	Replace instrument.

16-21. TROUBLE SHOOTING--PITOT TUBE HEATER.

NOTE

Refer to paragraph 16-14 before blowing out pitot or static lines.

TROUBLE	PROBABLE CAUSE	REMEDY
TUBE DOES NOT HEAT OR CLEAR ICE.	Switch turned "OFF."	Turn switch "ON."
	Popped circuit breaker.	Reset breaker.
	Break in wiring.	Repair wiring.
	Heating element burned out.	Replace element.

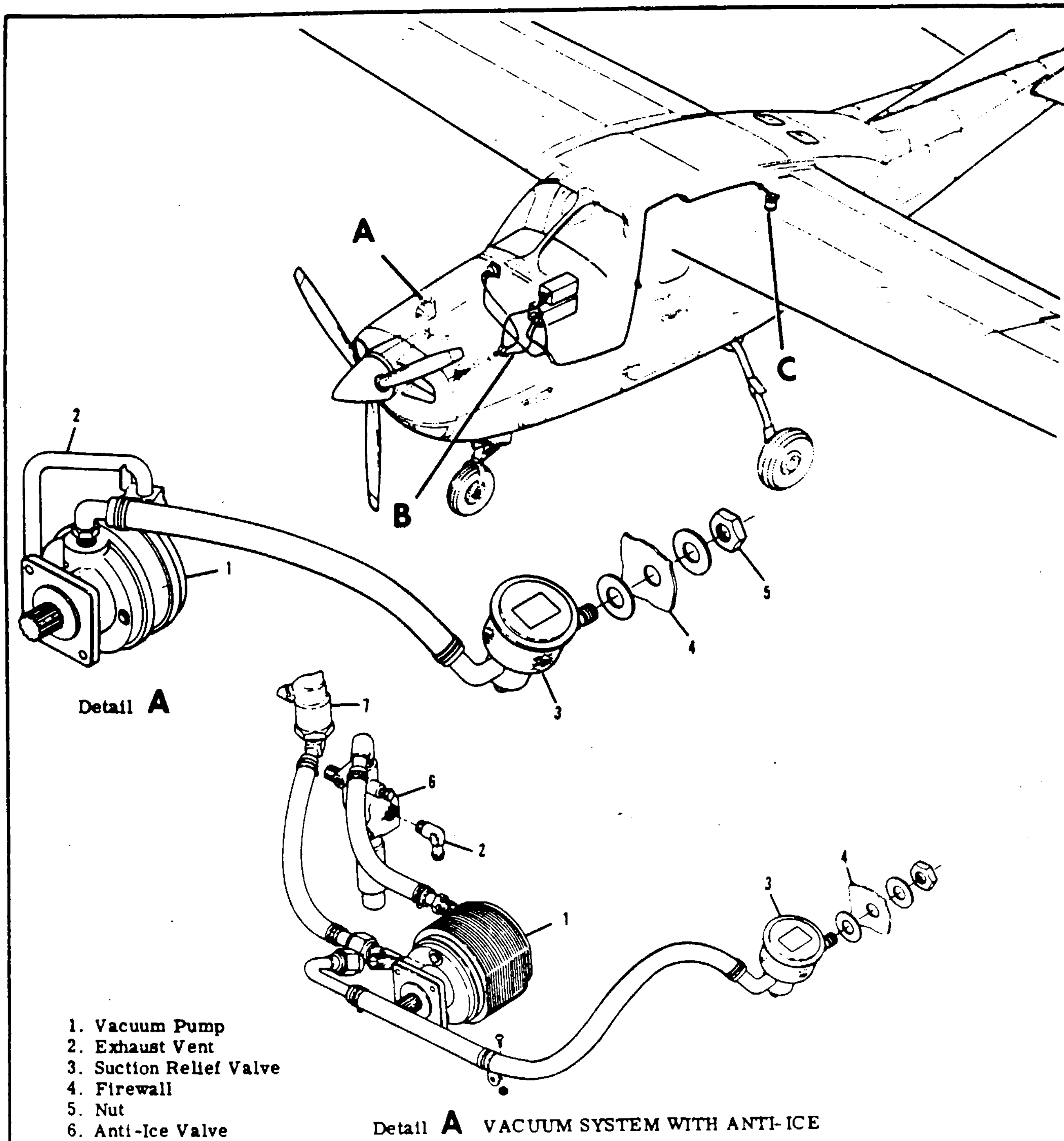
16-22. VACUUM SYSTEM. (See figure 16-4.)

16-23. DESCRIPTION. A dry vacuum system is installed on the aircraft. The system utilizes a sealed bearing engine-driven vacuum pump. A discharge tube is connected to the pump to expell air from the pump overboard. A suction relief valve is used to control system vacuum and is connected between the pump inlet and the instruments. A central air filtering system is utilized. The reading of the suction gage indicates net difference in suction before and after air passes through a gyro. This differential pressure will gradually decrease as the central air filter becomes dirty, causing a lower reading on the suction gage. Effective P21000589 barb type fittings are used in the vacuum system to eliminate the use of hose clamps.

BEGINNING WITH P21000761 a dual pump system is available. The system plumbing and installation is illustrated in figure 16-4 sheets 2 of 3 and 3 of 3. With this system dual vacuum relief valves are utilized. Both are mounted at Station 3.85, and right or left buttock lines 8.35.

16-24. TROUBLE SHOOTING -- VACUUM SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
HIGH SUCTION GAGE READINGS. (Gyros function normally.)	Relief valve screen clogged, relief valve malfunction.	Clean screen, reset valve. Replace gage.
LOW SUCTION GAGE READINGS.	Leaks or restriction between instruments and relief valve, relief valve out of adjustment, defective pump.	Repair or replace lines, adjust or replace relief valve, repair or replace pump.
	Central air filter dirty.	Clean or replace filter.



1. Vacuum Pump
2. Exhaust Vent
3. Suction Relief Valve
4. Firewall
5. Nut
6. Anti-Ice Valve
7. Anti-Ice Vacuum
8. Suction Gage
9. Horizon Gyro
10. Directional Gyro
11. Suction Lines Connector
12. Vent Lines Connector
13. Central Filter
14. Mounting Bracket
15. Filter Retainer

Figure 16-4. Vacuum System (Sheet 1 of 3)

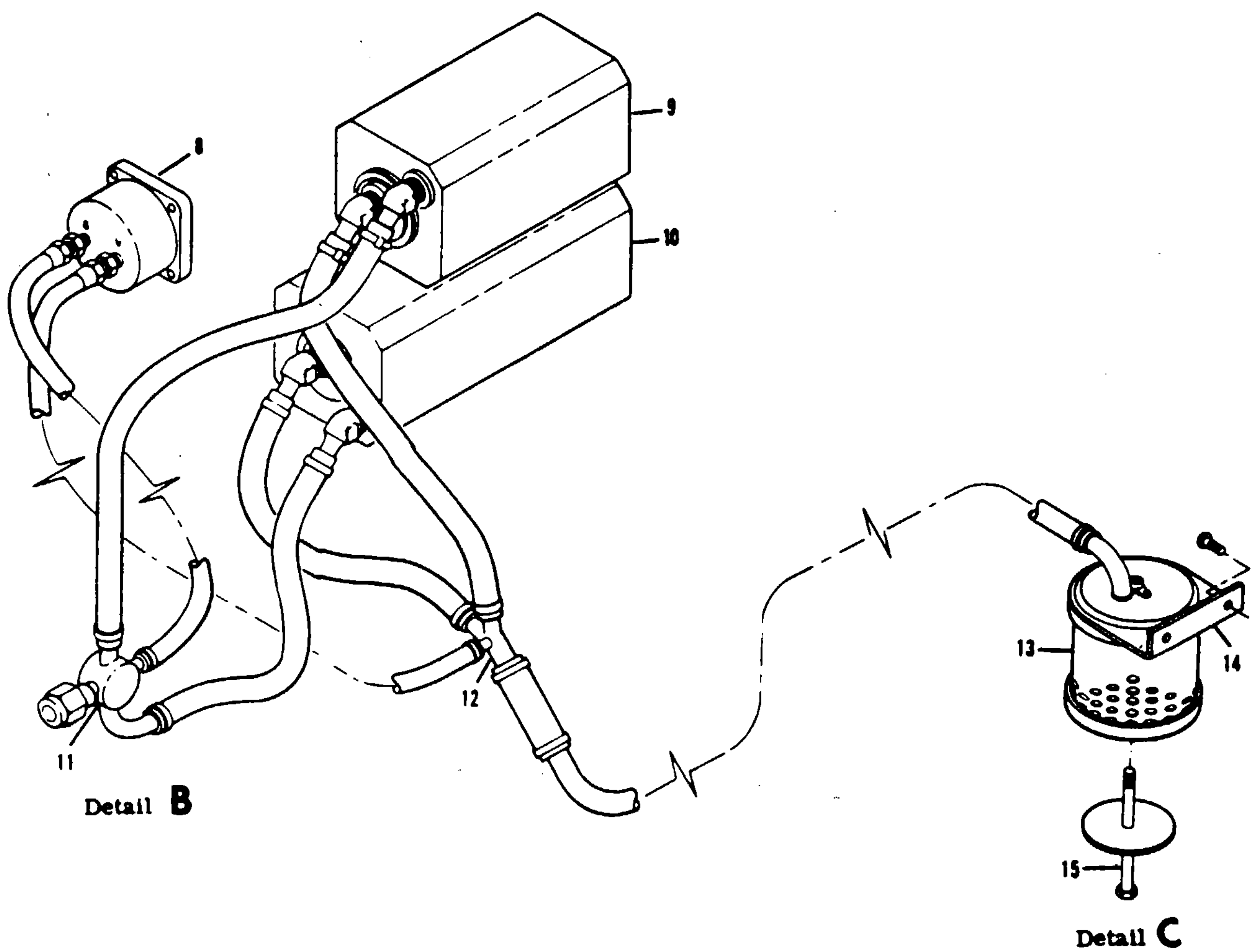
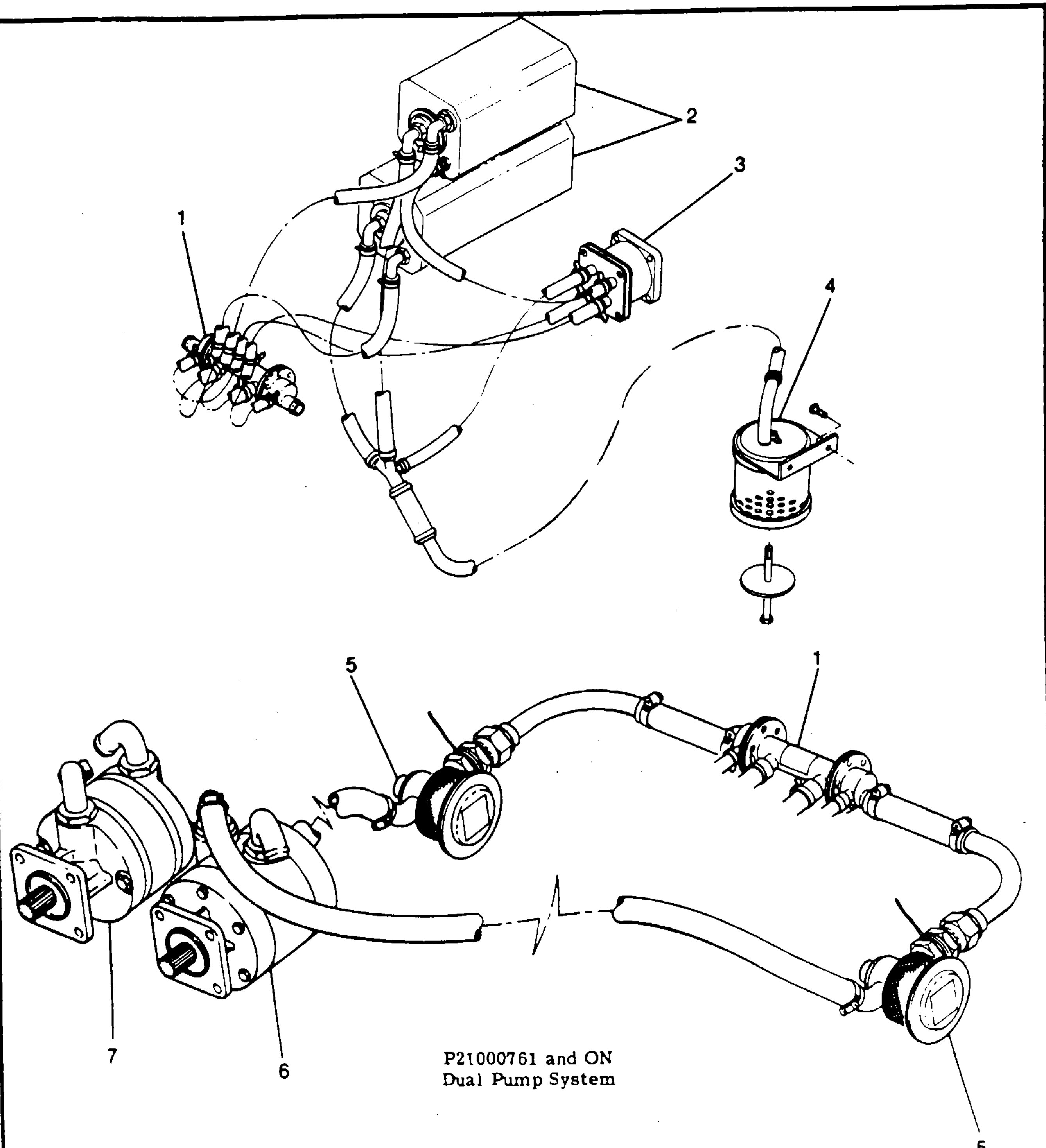


Figure 16-4. Vacuum System (Sheet 2 of 3)



1. Check Valve Manifold
2. Gyros
3. Vacuum Gage
4. Central Air Filter
5. Relief Valve
6. Left - Hand Vacuum Pump
7. Right - Hand Vacuum Pump

Figure 16-4. Vacuum System (Sheet 3 of 3)

16-24. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
SUCTION GAGE FLUCTUATES.	Defective gage or sticking relief valve.	Replace gage. Clean sticking valve with Stoddard solvent. Blow dry and test. If valve sticks after cleaning, replace it.

16-25. TROUBLE SHOOTING -- GYROS.

TROUBLE	PROBABLE CAUSE	REMEDY
HORIZON BAR FAILS TO RESPOND.	Central air filter dirty.	Clean or replace filter.
	Suction relief valve improperly adjusted.	Adjust or replace relief valve.
	Faulty suction gage.	Replace suction gage.
	Vacuum pump failure.	Replace pump.
	Vacuum line kinked or leaking.	Repair or replace damaged lines, tighten connections.
HORIZON BAR DOES NOT SETTLE.	Defective mechanism.	Replace instrument.
	Insufficient vacuum.	Adjust or replace relief valve.
	Excessive vibration.	Check that gyro mounting screws are secure.
HORIZON BAR OSCILLATES OR VIBRATES EXCESSIVELY.	Central air filter dirty.	Clean or replace filter.
	Suction relief valve improperly adjusted.	Adjust or replace relief valve.
	Faulty suction gage.	Replace suction gage.
	Defective mechanism.	Replace instrument.
	Excessive vibration.	Check that gyro mounting screws are secure.
EXCESSIVE DRIFT IN EITHER DIRECTION.	Central air filter dirty.	Clean or replace filter.
	Low vacuum, relief valve improperly adjusted.	Adjust or replace relief valve.
	Faulty suction gage.	Replace suction gage.
	Vacuum pump failure.	Replace pump.
	Vacuum line kinked or leaking.	Repair or replace damaged lines, tighten connections.

16-25. TROUBLE SHOOTING GYRO'S (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
DIAL SPINS IN ONE DIRECTION CONTINUOUSLY.	Operating limits have been exceeded.	Replace instrument.
	Defective mechanism.	Replace instrument.

16-26. TROUBLE SHOOTING -- VACUUM PUMP

TROUBLE	PROBABLE CAUSE	REMEDY
OIL IN DISCHARGE.	Damaged pump drive seal.	Replace gasket.
HIGH SUCTION.	Suction relief valve screen clogged.	Clean or replace screen.
LOW SUCTION.	Relief valve leaking.	Replace relief valve.
	Vacuum pump failure.	Replace vacuum pump.

16-28. MAINTENANCE PRACTICES.

NOTE

When replacing a vacuum system component, ensure all connections are made correctly to avoid damage to gyro system. When a component is removed, cap off and identify all open lines, hoses, and fittings to prevent dirt from entering system, and to ensure proper reinstallation. Upon component replacement, check all hoses carefully to be sure they are clean and free of debris, oil, solvent, collapsed inner liners, and external damage. Replace old, hard, cracked, or brittle hoses, particularly on pump inlet, to avoid possible pump damage. On vacuum pump, where hose clearance is tight, making it difficult to reinstall hoses, apply a light film of petrolatum to the fitting. Install hoses by pushing them straight on, and do not wiggle hoses from side to side as this could cause particles to be cut from inside of hose, allowing particles to enter system.

CAUTION

Do not use teflon tape, pipe dope, or thread lubricants of any type on fitting threads, and avoid over-tightening of connections. All filters in the vacuum system must be replaced when installing a new pump. Failure to do so will void pump warranty. DO NOT CONNECT A PUMP BACKWARDS. Since the manifold check valves provide no pressure relief, the pump will be destroyed within a matter of seconds after starting the engine.

16-28A. REMOVAL OF VACUUM PUMP.

a. Remove upper engine cowling in accordance with procedures in Sections 12 or 12A.

b. Disconnect, cap off and identify hose on inlet side of vacuum pump.

c. Identify and disconnect hose on outlet side of vacuum pump.

d. Remove nuts, lockwashers, and flat washers securing vacuum pump to engine.

e. Remove vacuum pump from mounting studs on engine.

f. Remove elbow from pump and retain if it is reusable.

NOTE

Discard any twisted fittings or nuts with rounded corners.

16-28B. MOUNTING PAD INSPECTION.

a. Check condition of the AND 20000 pad seal. If the seal shows any signs of oil leakage, replace the seal Replace seal if there is any doubt as to its serviceability.

16-28C. INSTALLATION OF VACUUM PUMP.

a. Before installing a new vacuum pump, purge all of the lines in the system to remove carbon particles or other pump components that may have been deposited in the lines by the previous pump.

CAUTION

The pump housing should never be placed directly in a vise, since clamping across the center housing will cause an internal failure of the carbon rotor. Protect pump mounting flange with soft metal or wood. NEVER install a vacuum pump that has been dropped.

b. Consult the applicable Parts Catalog, the pump vendor's application list, or the PMA label on the pump box to verify that the pump is the correct model for the engine and/or system.

c. Position the vacuum pump in a jaw-protected vise, with drive coupling downward.

NOTE

Do not use teflon tape, pipe dope, or thread lubricants of any type, and avoid over-tightening of connections.

d. Install elbow in pump; hand-tighten only.

NOTE

Use only a box wrench to tighten fittings to desired position. Do not make more than one and one half (1-1/2) turns beyond hand-tighten position.

NOTE

Before installing vacuum pump on engine, ensure that mating surfaces are clean and free of any old gasket material.

e. Position new mounting pad gasket on mounting studs on engine.

f. Position vacuum pump on mounting studs.

g. Secure pump to engine with flat washers, new lockwashers, and nuts.

CAUTION

Always replace all lockwashers with new ones when installing a new vacuum pump. Tighten all four mounting nuts (4) to 50 to 70 pound-inches.

h. Connect hose to inlet side of vacuum pump.

i. Install upper engine cowling in accordance with procedures in Sections 12 or 12A.

16-28D. CLEANING. In general, low pressure, dry compressed air should be used in cleaning vacuum system components.

CAUTION

Never apply compressed air to lines or components installed in aircraft. The excessive pressures will damage gyros. If an obstructed line is to be blown out, disconnect at both ends and blow from instrument panel out.

16-29. VACUUM RELIEF VALVE ADJUSTMENT. A suction gage reading of 5.3 inches Hg is desirable for the gyro instruments. However a range of 4.6 to 5.4 inches Hg is acceptable.

Single Pump Adjustment. Remove central air filter, run the engine to 2200 RPM, adjust relief valve to 5.3 ± .1 inches Hg.

Dual Pump Adjustment. Remove central air filter, run engine to 2200 RPM, adjust relief valves to lower end of green arc (4.6 inches Hg) with individual pump only on the line. Combined reading (both pumps on line) is not to exceed 5.4 inches Hg at 2200 RPM.

16-29A. LOW-VACUUM WARNING LIGHT. (See figure 16-4, sheet 1 of 3.) A red low-vacuum warning light is installed on the instrument panel. This light is used in conjunction with the single pump system only. The light is controlled by a vacuum switch which is teed into the line between the suction gage and the directional gyro. The switch contacts are normally closed. The light may be checked by turning ON the master switch. With the engine running the light should illuminate when the vacuum drops below 3±.5 inches Hg.

CAUTION

Do not exceed maximum engine temperature.

Be sure the filter element is clean before installing. If reading drops noticeably, install a new filter element.

16-30. ENGINE INDICATORS.

16-31. TACHOMETER.

16-32. DESCRIPTION. The tachometer is a mechanical indicator driven at half crankshaft speed by a flexible shaft. Most tachometer difficulties will be found in the drive-shaft. To function properly, the shaft housing must be free of kinks, dents and sharp bends. There should be no bend on a radius shorter than six inches and no bend within three inches of either terminal. If a tachometer is noisy or the pointer oscillates, check the cable housing for kinks, sharp bends and damage. Disconnect cable at tachometer and pull it out of housing. Check cable for worn spots, breaks and kinks.

NOTE

Before replacing a tachometer cable in the housing, coat the lower two thirds with AC Type ST-640 speedometer cable grease or Lubriplate No. 110. Insert the cable in housing as far as possible, then slowly rotate cable to make sure it is seated in the engine fitting. Insert cable in tachometer, making sure it is seated in drive shaft, then reconnect housing and torque to 50 pound-inches (at instrument).

16-33. MANIFOLD PRESSURE/FUEL FLOW INDICATOR.

16-34. DESCRIPTION. The manifold pressure and fuel flow indicators are in one instrument case, however, each instrument operates independently. The manifold pressure gage is a barometric instrument which indicates absolute pressure in the intake manifold in inches of mercury. The fuel flow indicator is a pressure instrument calibrated in pounds per hour, indicating approximate pounds of fuel metered per hour to the engine. Pressure for operating the indicator is obtained through a hose from the fuel manifold valve. The fuel flow indicator is vented to atmospheric pressure on standard engine installations and to turbocharger outlet pressure on turbocharged engine installations.

16-35. TROUBLE SHOOTING--MANIFOLD PRESSURE INDICATOR.

TROUBLE	PROBABLE CAUSE	REMEDY
EXCESSIVE ERROR AT EXISTING BAROMETRIC PRESSURE.	Pointer shifted.	Replace instrument.
	Leak in vacuum bellows.	Replace instrument.
	Loose pointer.	Replace instrument.
	Leak in pressure line.	Repair or replace damaged line, tighten connections.
	Condensate or fuel in line.	Blow out line.
JERKY MOVEMENT OF POINTER.	Excessive internal friction.	Replace instrument.
	Rocket shaft screws tight.	Replace instrument.
	Link springs too tight.	Replace instrument.
	Dirty pivot bearings.	Replace instrument.
	Defective mechanism.	Replace instrument.
	Leak in pressure line.	Repair or replace damaged line, tighten connections.
SLUGGISH OPERATION OF POINTER.	Foreign matter in line.	Blow out line.
	Damping needle dirty.	Replace instrument.
	Leak in pressure line.	Repair or replace damaged line, tighten connections.
EXCESSIVE POINTER VIBRATION.	Tight rocker pivot bearings.	Replace instrument.
IMPROPER CALIBRATION.	Faulty mechanism.	Replace instrument.
NO POINTER MOVEMENT.	Faulty mechanism.	Replace instrument.
	Broken pressure line.	Repair or replace damaged line.

16-36. TROUBLE SHOOTING--FUEL FLOW INDICATOR.

TROUBLE	PROBABLE CAUSE	REMEDY
DOES NOT REGISTER.	Pressure line clogged.	Blow out line.
	Pressure line broken.	Repair or replace damaged line.
	Fractured bellows or damaged mechanism.	Replace instrument.
	Clogged snubber orifice.	Replace instrument.
	Pointer loose on staff.	Replace instrument.
POINTER FAILS TO RETURN TO ZERO.	Foreign matter in line.	Blow out line.
	Clogged snubber orifice.	Replace instrument.
	Damaged bellows or mechanism.	Replace instrument.
INCORRECT OR ERRATIC READING.	Damaged or dirty mechanism.	Replace instrument.
	Pointer bent, rubbing on dial or glass.	Replace instrument.
	Leak or partial obstruction in pressure or vent line.	Blow out dirty line, repair or tighten loose connections.

16-37. CYLINDER HEAD TEMPERATURE GAGE.

16-38. DESCRIPTION. The temperature sending unit regulates electrical power through the cylinder head temperature gage. The gage and sending unit require little or no maintenance other than cleaning, making sure lead is properly supported and all connections are clean, tight and properly insulated. Rochester and Stewart Warner gages are connected the same but the Rochester gage does not have a calibration pot, and cannot be adjusted. Refer to Table 2 on page 16-20B when trouble shooting the cylinder head temperature gage.

NOTE

For Stewart Warner gages a Cylinder Head Temperature Gage Cailbration Unit, (SK182-43) is available and may be ordered through the Cessna Service Parts Center. Rochester gages cannot be recalibrated.

NOTE

Torque used to tighten wire lead nut not to exceed 4 inch-pounds.

16-39. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE INOPERATIVE.	No current to circuit.	Repair electrical circuit.
	Defective gage or sender.	Repair or replace defective items.
GAGE FLUCTUATES RAPIDLY.	Loose or broken wire permitting alternate make and break of gage circuit.	Repair or replace defective wire.
GAGE READS TOO HIGH ON SCALE.	High voltage.	Check voltage supply.
	Gage off calibration.	Replace gage or sender. Check ground connection.

16-39. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE READS TOO LOW ON SCALE.	Low voltage.	Check voltage supply and "D" terminal.
	Gage off calibration.	Replace defective items.
	Defective gage or sender.	Replace defective items.
GAGE READS OFF SCALE AT HIGH END.	Defective gage or sender.	Replace defective items.
OBVIOUSLY INCORRECT READING.	Defective gage or sender.	Replace defective items.
	Incorrect calibration.	Replace defective items.
GAGE READS FULL SCALE WITH ENGINE COOL OR COLD. (P21000535 & ON)	Wire between sender and gage grounded.	Repair or replace wire as required.
	Defective gage or sender.	Replace defective items.
GAGE READS ZERO WHEN ENGINE IS HOT. (P21000535 & ON)	Wire between gage and sender is open or disconnected.	Repair or replace wire as required.
	Defective gage or sender.	Replace defective items.

16-40. OIL PRESSURE GAGE.

16-41. DESCRIPTION. The Bourdon tube-type oil pressure gage is a direct-reading instrument, operated by a pressure pickup line connected to the engine main oil gallery. The oil pressure line from the instrument to the engine should be filled with kerosene, especially during cold weather operation, to attain an immediate oil indication.

16-42. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE DOES NOT REGISTER.	Pressure line clogged.	Clean line.
	Pressure line broken.	Repair or replace damaged line.
	Fractured Bourdon tube.	Replace instrument.
	Gage pointer loose on staff.	Replace instrument.
	Damaged gage movement.	Replace instrument.
GAGE POINTER FAILS TO RETURN TO ZERO.	Foreign matter in line.	Clean line.
	Foreign matter in Bourdon tube.	Replace instrument.
	Bourdon tube stretched.	Replace instrument.
GAGE DOES NOT REGISTER PROPERLY.	Faulty mechanism.	Replace instrument.

16-42. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE HAS ERRATIC OPERATION	Worn or broken movement.	Replace instrument.
	Foreign matter in Bourdon tube.	Replace instrument.
	Dirty or corroded movement.	Replace instrument.
	Pointer bent and rubbing on dial, dial screw or glass.	Replace instrument.
	Leak in pressure line.	Repair or replace damaged line.

16-43. OIL TEMPERATURE GAGE.

16-44. DESCRIPTION. The oil temperature gage is an electrically operated indicator, located in a two instrument cluster in the right instrument panel. The sending unit is located in the engine oil passage. The gage and sending unit require little or no maintenance other than cleaning, making sure leads are properly supported and all connections are clean, and tight and properly insulated. Refer to Table 1 on page 16-20A when trouble shooting the oil temperature gage.

16-45. REMOVAL AND INSTALLATION. (Refer to Figure 16-1.)

a. Remove decorative cover.
b. Remove (2) screws, nuts, and spacers and remove cluster from the instrument panel.
c. Remove cluster cover and remove rubber divider from between the gages.
d. Remove gage by sliding off guide pins of circuit board.
e. Install by reversing the preceding steps.

16-46. FUEL QUANTITY INDICATING SYSTEM.

16-47. FUEL QUANTITY INDICATORS.

16-48. DESCRIPTION. A two gage fuel quantity indicator cluster, is located adjacent to the fuel selector control handle, on the lower pedestal. These electromagnetic type indicators, graduated in pounds/gallons, are used in conjunction with float operated variable-resistance transmitters.

16-49. REMOVAL AND INSTALLATION. (Refer to Figure 16-5.)

a. Remove nut from fuel selector control handle and remove handle.
b. Remove screws in cover plate and lift cover and gage cluster out of pedestal.
c. Remove wiring, tag and protect.
d. Remove two mounting screws and remove fuel quantity cluster from pedestal cover.
e. Remove cluster cover and remove rubber divider from between gage faces.
f. Remove gage by sliding off of guide pins of circuit board.
g. Install by reversing the preceding steps.

16-50. FUEL QUANTITY TRANSMITTERS.

16-51. DESCRIPTION. A float operated variable-resistance transmitter is located in each fuel tank. The full position of float produces a minimum resistance through transmitter, permitting maximum current flow through the fuel quantity indicator and maximum pointer deflection. As fuel level is lowered, resistance in transmitter is increased, producing a decreasing current flow through fuel quantity indicator and a smaller pointer deflection.

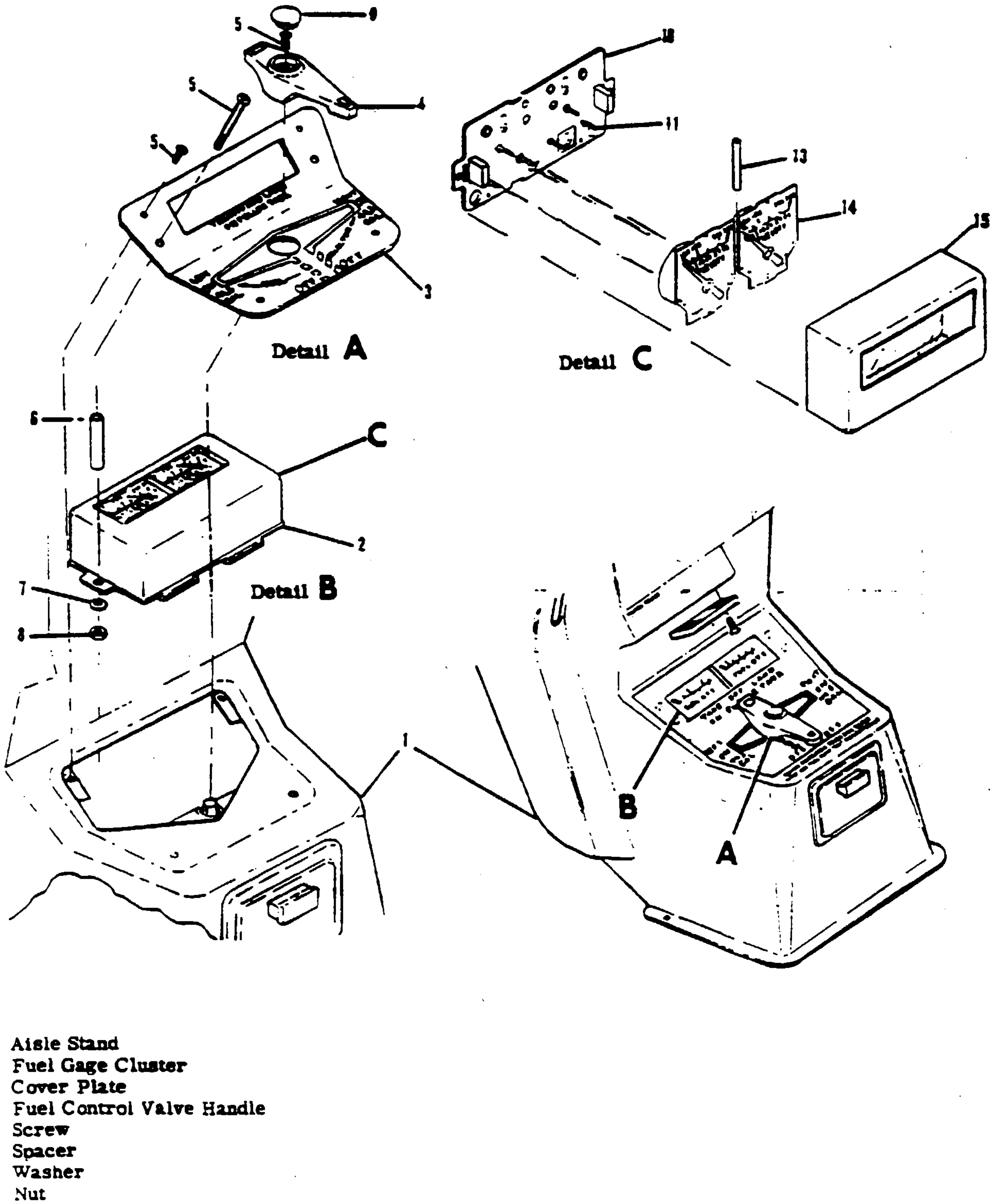
16-52. REMOVAL AND INSTALLATION.

a. Remove access plates on the underside of wing forward of the flap bellcrank.
b. Drain enough fuel from bay to lower fuel level below transmitter. (Observe precautions in paragraph 13-3.)
c. Disconnect electrical lead and ground strap from transmitter.
d. Remove safety wire from transmitter attaching bolts, remove bolts and carefully remove transmitter from fuel spar, DO NOT BEND FLOAT ARM.
e. To install transmitter, reverse preceding steps, using a new gasket around opening in fuel bay and new sealing washers.

NOTE

Ensure that transmitter is grounded per figure 16-7.

f. Service fuel bay. Check for leaks and correct fuel quantity indication.



1. Aisle Stand
2. Fuel Gage Cluster
3. Cover Plate
4. Fuel Control Valve Handle
5. Screw
6. Spacer
7. Washer
8. Nut
9. Decorative Button
10. Gage Circuit Board
11. Gage Mounting Pin
12. Gage Divider Support
13. Replacable Gage
14. Gage Cover

Figure 16-5. Fuel Gage Installation

16-53. TRANSMITTER ADJUSTMENT
(Refer to page 16-20A).

1. Fuel Transmitter
2. Safety Wire
3. Aft Fuel Spar
4. Ground Strap
5. Upper Wing Skin

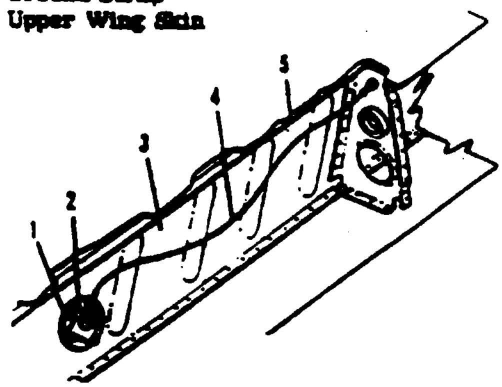


Figure 16-6. Fuel Transmitter Installation

16-54. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
FAILURE TO INDICATE.	No power to indicator or transmitter. (Pointer stays below E.)	Check fuse and inspect for open circuit. Replace fuse, repair or replace defective wire.
	Grounded wire. (Pointer stays above F.)	Check for partial ground between transmitter and gage. Repair or replace defective wire.
	Low voltage.	Check voltage at indicator. Correct voltage.
	Defective indicator.	Substitute known-good indicator. Replace indicator.
OFF CALIBRATION.	Defective indicator.	Substitute known-good indicator. Replace indicator.
	Defective transmitter.	Substitute known-good transmitter. Recalibrate or replace.
	Low or high voltage.	Check voltage at indicator. Correct voltage.
STICKY OR SLUGGISH INDICATOR OPERATION.	Defective indicator.	Substitute known-good indicator. Replace indicator.
	Low voltage.	Check voltage at indicator. Correct voltage.

16-53. TRANSMITTER ADJUSTMENT.

WARNING

Using the following fuel transmitter calibration procedure on components other than the originally installed (Stewart Warner) components will result in a faulty fuel quantity reading.

16-53A. STEWART WARNER GAGE TRANSMITTER CALIBRATION. Chances of transmitter calibration changing in normal service is remote; however, it is possible that float arm or float arm stops may become bent if transmitter is removed from cell. Transmitter calibration is obtained by adjusting float travel. Float travel is limited by float arm stops.

WARNING

Use extreme caution while working with electrical components of the fuel system. The possibility of electrical sparks around an "empty" fuel cell creates a hazardous situation.

Before installing transmitter, attach electrical wires and place master switch in "ON" position. Allow float arm to rest against lower float arm stop and read indicator. The pointer should be on E (empty) position. Adjust the float arm against lower stop so pointer indicator is on E. Raise float until arm is against upper stop and adjust upper stop to permit indicator pointer to be on F (full). Install transmitter in accordance with paragraph 15-52.

16-53B. ROCHESTER GAGE TRANSMITTER. Do not attempt to adjust float arm or stop. No adjustment is allowed.

Table 1

NOTE

Select the oil temperature sending unit part number that is used in your aircraft from the left column and the temperature from the column headings. Read the ohms value under the appropriate temperature column.

Part Number	Type	72°F	120°F	165°F	220°F	250°F
S1630-1	Oil Temp				46.4	
S1630-3	Oil Temp		620.0			52.4
S1630-4	Oil Temp		620.0			52.4
S1630-5	Oil Temp			192.0		
S2335-1	Oil Temp	990.0				34.0

Table 2

NOTE

Select the cylinder head temperature sending unit part number that is used in your aircraft from the left column and the temperature from the column headings. Read the ohms value under the appropriate temperature column.

Part Number	Type	200°F	220°F	450°F	475°F
S1372-1	CHT		310.0	34.8	
S1372-2	CHT		310.0	34.8	
S1372-3	CHT			113.0	
S1372-4	CHT			113.0	
S2334-3	CHT	745.0			38.0
S2334-4	CHT	745.0			38.0

16-53C. FUEL QUANTITY INDICATING SYSTEM OPERATIONAL TEST

WARNING: REMOVE ALL IGNITION SOURCES FROM THE AIRPLANE AND VAPOR HAZARD AREA. SOME TYPICAL EXAMPLES OF IGNITION SOURCES ARE STATIC ELECTRICITY, ELECTRICALLY POWERED EQUIPMENT (TOOLS OR ELECTRONIC TEST EQUIPMENT - BOTH INSTALLED ON THE AIRPLANE AND GROUND SUPPORT EQUIPMENT), SMOKING AND SPARKS FROM METAL TOOLS.

WARNING: OBSERVE ALL STANDARD FUEL SYSTEM FIRE AND SAFETY PRACTICES.

1. Disconnect all electrical power from the airplane. Attach maintenance warning tags to the battery connector and external power receptacle stating:

   DO NOT CONNECT ELECTRICAL POWER, MAINTENANCE IN PROGRESS.

2. Electrically ground the airplane.

3. Level the airplane and drain all fuel from wing fuel tanks.

4. Gain access to each fuel transmitter float arm and actuate the arm through the transmitter's full range of travel.

   A. Ensure the transmitter float arm moves freely and consistently through this range of travel. Replace any transmitter that does not move freely or consistently.

   WARNING: USE EXTREME CAUTION WHILE WORKING WITH ELECTRICAL COMPONENTS OF THE FUEL SYSTEM. THE POSSIBILITY OF ELECTRICAL SPARKS AROUND AN "EMPTY" FUEL CELL CREATES A HAZARDOUS SITUATION.

   B. While the transmitter float arm is being actuated, apply airplane battery electrical power as required to ensure that the fuel quantity indicator follows the movement of the transmitter float arm. If this does not occur, troubleshoot, repair and/or replace components as required until the results are achieved as stated.

   NOTE: Stewart Warner fuel quantity indicating systems can be adjusted. Refer to Paragraph 16-53A for instructions to calibrate a Stewart Warner fuel indicating system. Rochester fuel quantity indicating system components are not adjustable, only component replacement or standard electrical wiring system maintenance practices are permitted.

5. With the fuel selector valve in the "OFF" position, add unusable fuel to each fuel tank.

6. Apply electrical power as required to verify the fuel quantity indicator indicates "EMPTY".

   A. If "EMPTY" is not indicated, adjust, troubleshoot, repair and/or replace fuel indicating components as required until the "EMPTY" indication is achieved.

   NOTE: Stewart Warner fuel quantity indicating systems can be adjusted. Refer to Paragraph 16-53A for instructions to calibrate a Stewart Warner fuel indicating system. Rochester fuel quantity indicating system components are not adjustable, only component replacement or standard electrical wiring system maintenance practices are permitted.

7. Fill tanks to capacity, apply electrical power as required and verify fuel quantity indicator indicates "FULL".

   A. If "FULL" is not indicated, adjust, troubleshoot, repair and/or replace fuel indicating components as required until the "FULL" indication is achieved.

      NOTE: Stewart Warner fuel quantity indicating systems can be adjusted. Refer to Paragraph 16-53A for instructions to calibrate a Stewart Warner fuel indicating system.
      Rochester fuel quantity indicating system components are not adjustable, only component replacement or standard electrical wiring system maintenance practices are permitted.

8. Install any items and/or equipment removed to accomplish this procedure, remove maintenance warning tags and connect the airplane battery.

16-54. TROUBLE SHOOTING (CONT).

TROUBLE	PROBABLE CAUSE	REMEDY
ERRATIC READINGS.	Loose or broken wiring on indicator or transmitter.	Inspect circuit wiring. Repair or replace defective wire.
	Defective indicator or transmitter.	Substitute known-good component. Replace indicator or transmitter.
	Defective master switch.	Replace switch.

16-55. HOURMETER.

16-56. DESCRIPTION. The hourmeter is an electrically operated instrument, actuated by a pressure switch in the oil pressure gage line. Electrical power is supplied through a one-amp fuse from the electrical clock circuit, and therefore will operate independent of the master switch. A diode incorporated into the meter prevents interruption of avionics operation. This type hourmeter is identified by a white + above the positive terminal.

NOTE

When installing the hourmeter, the positive (red) wire must be connected to the white + terminal. Connecting wires incorrectly will damage the meter.

16-57. ECONOMY MIXTURE INDICATOR.

16-58. DESCRIPTION. The economy mixture indicator is an exhaust gas temperature (EGT) sensing device which is used to aid the pilot in selecting the most desirable fuel-air mixture for cruising flight at up to 80% power. Exhaust gas temperature (EGT) varies with ratio of fuel-to-air mixture entering the engine cylinders. Refer to the Pilot's Operating Handbook for operating procedures.

16-59. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE INOPERATIVE	Defective gage, probe or circuit.	Repair or replace defective part.
INCORRECT READING.	Indicator needs calibrating.	Calibrate indicator in accordance with paragraph 16-60.
FLUCTUATING READING.	Loose, frayed or broken lead, permitting alternate make and break of circuit.	Tighten connections and repair or replace defective leads.

16-60. CALIBRATION. A potentiometer adjustment screw is provided behind the plastic cap at the back of the instrument for calibration. This adjustment screw is used to position the pointer over the reference increment line (4/5 of scale) at peak EGT. Establish 75% power in level flight, then carefully lean the mixture to peak EGT. After the pointer has peaked, using the adjustment screw, position pointer over reference increment line (4/5 of scale).

NOTE

This setting will provide relative temperature indications for normal cruise power settings within range of instrument.

Turning the screw clockwise increases the meter reading and counterclockwise decreases the meter reading. There is a stop in each direction and damage can occur if too much torque is applied against stops. Approximately 600°F total adjustment is provided. The adjustable yellow pointer on the face of the instrument is a reference pointer only.

16-61. REMOVAL AND INSTALLATION. Removal of the indicator is accomplished by removing the mounting screws and disconnecting the leads. Tag leads to facilitate installation. The thermocouple probe is secured to the exhaust stack with a clamp. When installing probe, tighten clamp to 45 pound-inches and safety as required.

16-62. MAGNETIC COMPASS. (See figure 16-7.)

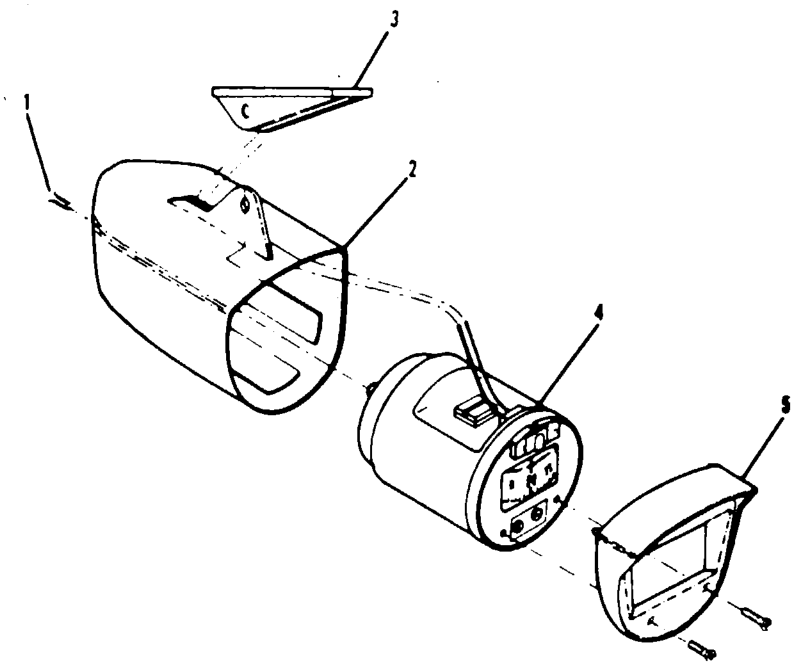


Figure 16-7. Magnetic Compass

16-63. DESCRIPTION. The magnetic compass is liquid-filled, with expansion provisions to compensate for temperature changes. It is equipped with compensating magnets adjustable from the front of the case. The compass is internally lighted, controlled by the instrument lights rheostat switch. No maintenance is required on the compass except an occasional check on a compass rose and replacement of the lamp. Access to the compass lamp and the compensating magnets is provided by removing the compass case cover bezel.

16-64. STALL WARNING HORN AND TRANSMITTER.

16-65. DESCRIPTION. The stall warning horn is contained in the dual warning unit mounted on the right hand wing root rib. It is electrically operated and controlled by a stall warning transmitter mounted on the leading edge of the left wing. For further information on the warning horn and transmitter, refer to Section 17.

16-66. TURN COORDINATOR.

16-67. DESCRIPTION. The turn coordinator is an electrically operated, gyroscopic, roll-turn rate indicator. Its gyro simultaneously senses rate of motion roll and yaw axis which is projected on a single indicator. The gyro is a non-tumbling type requiring no caging mechanism and incorporates an ac brushless spin motor with a solid state inverter.

16-68. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
INDICATOR DOES NOT RETURN TO CENTER.	Friction caused by contamination in the indicator dampening.	Replace instrument.
	Friction in gimbal assembly.	Replace instrument.
DOES NOT INDICATE A STANDARD RATE TURN (TOO SLOW).	Low voltage.	Correct voltage.
	Inverter frequency changed.	Replace instrument.
NOISY MOTOR.	Faulty bearings.	Replace instrument.

16-68. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ROTOR DOES NOT START.	Faulty electrical connection.	Correct voltage or replace faulty wire.
	Inverter malfunctioning.	Replace instrument.
	Motor shorted.	Replace instrument.
	Bearings frozen.	Replace instrument.
IN COLD TEMPERATURES, HAND FAILS TO RESPOND OR IS SLUGGISH.	Oil in indicator becomes too thick.	Replace instrument.
	Insufficient bearing end play.	Replace instrument.
	Low voltage.	Correct voltage.

16-69. TURN-AND-SLIP INDICATOR.

16-70. DESCRIPTION. The turn-and-slip indicator isoperated by the aircraft electrical system and operates ONLY when the master switch is on. Its circuit is protected by an automatically-resetting circuit breaker.

16-71. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
INDICATOR POINTER FAILS TO RESPOND.	Automatic resetting circuit breaker defective.	Replace circuit breaker.
	Master switch "OFF" or switch defective.	Replace defective switch.
	Broken or grounded lead to indicator.	Repair or replace defective wiring.
	Indicator not grounded.	Repair or replace defective wire.
	Defective mechanism.	Replace instrument.
HAND SLUGGISH IN RE-TURNING TO ZERO.	Defective mechanism.	Replace instrument.
	Low voltage.	Correct voltage.
POINTER DOES NOT INDI-CATE PROPER TURN.	Defective mechanism.	Replace instrument.
HAND DOES NOT SIT ON ZERO.	Gimbal and rotor out of balance.	Replace instrument.
	Hand incorrectly sits on rod.	Replace instrument.
	Sensitivity spring adjustment pulls hand off zero.	Replace instrument.

16-71. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
IN COLD TEMPERATURES, HAND FAILS TO RESPOND OR IS SLUGGISH.	Oil in indicator becomes too thick.	Replace instrument.
	Insufficient bearing end play.	Replace instrument.
	Low voltage.	Correct voltage.
NOISY GYRO.	High voltage.	Correct voltage.
	Loose or defective rotor bearings.	Replace instrument.

16-72. CABIN PRESSURIZATION INSTRUMENTS.

16-73. CABIN ALTITUDE RATE OF CHANGE.

16-74. DESCRIPTION. The cabin altitude rate of change instrument is mounted in the lower left side of the instrument panel. The instrument tells the rate in feet per minute at which the cabin altitude is changing. It is calibrated in 100 fpm increment to 1000 feet and 1000 fpm increments from 1000 feet to 6000 feet. The instrument is vented to cabin pressure at the back of the instrument.

16-75. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
POINTER FAILS TO RESPOND.	Defective instrument.	Replace instrument.
	Hole in vent plug obstructed.	Remove plug and clean out obstruction.

16-76. CABIN ALTITUDE AND DIFFERENTIAL PRESSURE INSTRUMENT.

16-77. DESCRIPTION. The cabin altitude and differential pressure instrument is mounted on the lower lift side of the pilot's instrument panel. Instrument is vented to cabin pressure and to static pressure through plastic tubing connected to the static line. It is a dual purpose instrument which indicates cabin altitude to 35,000 feet and differential cabin pressure in psi between cabin and atmosphere. The differential pressure has a red line at 3.35 psi.

16-78. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
ERRONEOUS INDICATIONS.	Defective instrument.	Replace instrument.
	Hole in vent plug obstructed.	Remove plug and clean out obstruction.
	Static line obstructed.	Blow out line.

16-79. ELECTRIC CLOCK.

16-80. DESCRIPTION. The electric clock is connected to the battery through a one-ampere fuse mounted adjacent to the battery box. The electrical circuit is separate from the aircraft electrical system and will operate when the master switch is "OFF." Beginning with P21000151 the aircraft may be equipped with a digital clock. Refer to the Pilots Operating Handbook for operating instructions.

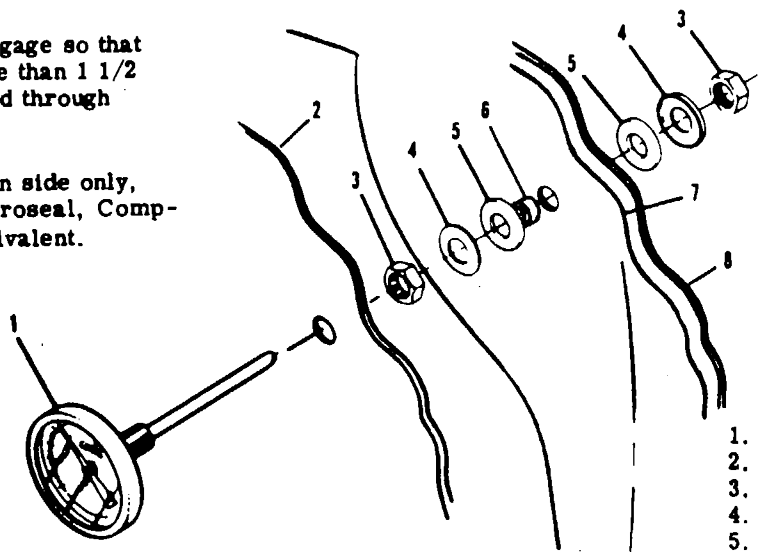
16-81. OUTSIDE AIR TEMPERATURE GAGE, MECHANICAL.

16-82. DESCRIPTION. The aircraft is equipped with a mechanical outside air temperature gage. The gage is mounted through the right windshield at upper outboard corner. Refer to figure 16-8 for removal and installation information.

NOTE

On installation positiongage so that when tightened not more than 1 1/2 to 2 threads are exposed through external nut.

Seal over jam nut, cabin side only, with Pro-Seal, Coast Proseal, Compton, California, or equivalent.



1. Outside Airtemp Gage
2. Royalite Trim
3. Nut
4. Washer
5. Rubber Washer
6. Spacer Sleeve
7. Windshield
8. Windshield Retainer

Figure 16-8. Outside Air Temperature Gage

16-83. TURBINE INLET TEMPERATURE GAGE.

16-84. DESCRIPTION. The standard turbine inlet temperature gage indicates exhaust gas temperature at the turbocharger inlet. This is accomplished by means of a thermocouple installed in the exhaust stack at the turbine inlet. The gage is supplied electrical power from the CABIN LTS circuit breaker.

If the gage fails to indicate the fault will be either the thermocouple, wiring, gage or CABIN LTS circuit breaker. The gage must have electrical power to function.

16-85. REMOVAL AND INSTALLATION. Removal of the gage is accomplished by removing the decorative cover and the four screws that secure the gage to the panel. Carefully remove the gage from the panel, tag and remove the leads. Installation is a reversal of the preceeding procedure.

16-86. TURBINE INLET/SIX-POSITION EXHAUST GAS TEMPERATURE INDICATOR.

16-87. DESCRIPTION. A combination turbine inlet temperature (TIT)/ six-position exhaust gas temperature (EGT) indicator. The system is supplied electrical power from the CABIN LTS circuit breaker. The system consists of a panel-mounted dual indicator incorporating a selector switch, thermocouple probes (one for each cylinder and one at the turbine inlet) and a wiring harness connecting the probes to the indicator

The exhaust gas temperature (EGT) portion of the system is indicated by the left scale of the indicator and is graduated in 25° F increments. Individual cylinder exhaust gas temperatures are selectable according to selector switch position number as aligned with the white index dot on the indicator face. Each selector switch number corresponds to an engine cylinder number. The EGT needle adjustment potentiometer is located on the face of the instrument below the TIT scale.

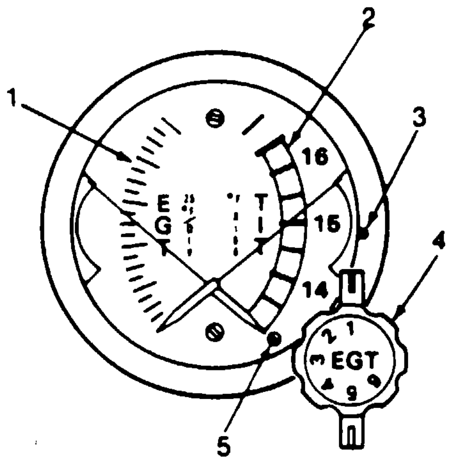


Figure 16-9. Turbine Inlet/ Six-Position Exhaust Gas Temperature Indicator

The turbine inlet temperature (TIT) portion of the system (right scale of the indicator) indicates the absolute temperature in degrees F of the exhaust gases entering the turbine. This temperature indication is not affected by EGT selector switch position.

If either or both segments fail to indicate the fault will be either. The CABIN LTS circuit breaker, a thermocouple, wiring or the gage.

16-88. REMOVAL AND INSTALLATION. Removal of the indicator is accomplished by removing the decorative cover and the three screws that secure the indicator to the panel. Carefully remove the indicator from the panel, tag and remove the leads. Installation is a reversal of the preceeding procedure.

16-89. FUEL COMPUTER/DIGITAL CLOCK.

16-90. DESCRIPTION. The Astro Tech FT-2 is a dual function instrument providing a complete fuel management system and a multi-purpose time keeping device in a single instrument with each function sharing a common display panel. The instrument may be used as a replacement for the digital or electric clock, and may be mounted in the same location on the instrument panel.

The fuel computer portion of the instrument displays the following selections; fuel flow as measured by an engine mounted transducer, total fuel used, current fuel remaining and time remaining based on fuel remaining at the current flow rate. Fuel quantities are displayed in pounds with a gallon display available by utilizing a push button located below and to the right of the display. When time remaining at the currect flow rate reaches 45 minutes or less, the display will be blanked from one-tenth to three-tenths of a second per second in all of the selections.

The digital clock portion of the instrument displays the following selections; current time of day in either local (LCL) or Greenwich Mean Time (GMT) in hours and minutes, cummulative flight time in minutes and seconds (first hour) and hours and minutes (up to 100 hours) whenever fuel flow is greater than 25 to 30 pounds per hour (PPH) and elapsed time in minutes and seconds (first hour) and hours and minutes (up to 100 hours).

Fuel selections and time selections are made by utilizing a rotary-type selector switch common to both functions. Two pushbuttons, located below the display, are used to program the fuel computer digital clock.

16-91. FUEL COMPUTER OPERATION. The fuel computer contains five selections. They are selected by rotating the selector switch to the positions labeled ADD, FLOW, LB USD, LB REM, and TIME REM. These selections, when used in proper sequence with the programming buttons, will correctly program the computer.

The fuel quantity added during servicing of the airplane must be entered in the computer so that the LB REM position accurately represents the correct amount of usable fuel on board for each flight. The fuel quantity added is entered in the computer as follows:

To enter fill-up:

a. Rotate the selector switch to the ADD position.
b. Press left and right programming buttons together until display panel reads FULL.
c. Rotate the selector switch to LB REM position to display the usable fuel quantity in pounds on board.

NOTE

The usable fuel quantity for each airplane is programmed into the instrument at the factory. A battery disconnect or other power interruption will not alter this quantity.

To enter less than fill-up:

a. Rotate the selector switch to the ADD position.

b. Press right programming button, labeled GAL, until the right digit represents the correct units of gallons of fuel added.

c. Press left programming button, labeled RST, until the left two digits represent the correct tens and hundreds of gallons of fuel added.

d. Rotate the selector switch to LB REM position to display the correct usable fuel quantity in pounds on board.

If an error has been made, resulting in an incorrect display of LB REM, the correct amount may be entered as follows:

a. Leave the selector switch in the ADD position.

b. Enter the corrected fuel quantity in gallons.

c. Rotate the selector switch to FLOW, then press and hold the left programming button.

d. While holding the left button pressed, slowly rotate the selector switch to the LB REM position. The set-in amount in gallons, multiplied by six, will now appear as LB REM.

When the selector switch is placed in the FLOW position, the display indicates the current fuel flow rate in pounds per hour (PPH). Press the GAL programming button to display the flow rate in gallons per hour (GPH).

Placing the selector switch in the LB USD position displays the current fuel quantity used (in pounds) since the last addition of fuel to the airplane. Press the GAL programming button to display the fuel used in gallons.

NOTE

Any entry of additional fuel to LB REM will reset the LB USD to zero.

The LB REM position displays the current total remaining fuel (in pounds) on board the airplane, based on the takeoff amount minus the fuel used as computed using fuel flow rates. Press the GAL programming button to display the remaining fuel in gallons.

NOTE

When the display is changed from pounds to gallons in the FLOW, LB USD, and LB REM positions, the gallons shown are computed on the ratio of 6 pounds per gallon and no volumetric correction for temperature change is made. Therefore maximum accuracy may be obtained by referring to the gallons functions.

The TIME REM position displays the flight time remaining in hours and minutes as computed using the current fuel flow rate and fuel remaining amounts. Since this displayed value is dependent upon flow rate, a reduction in engine power will show an increase in time remaining.

NOTE

With the selector switch in the TIME REM position, power settings of less than 25 to 30 PPH flow rate will cause the word OFF to be displayed.

If it is desired to test the display, rotate the selector switch to TIME REM position, then press the right programming button. This will cause all 8's to be shown, thereby testing each segment of each digit.

Any power interruption that might alter a memory value or activation of the reset switch will erase a line of dashes to be displayed in all selector switch positions. Pressing the right programming button will clear the dashes from the display and show the current selector switch position. All memory values will be erased and must be re-entered. However, the usable fuel quantity will not be altered, since it is permanently entered in the instrument.

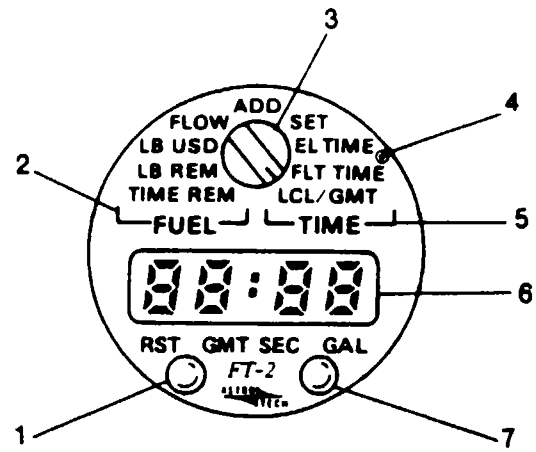
NOTE

If an abnormally low voltage condition should occur, such as during a cold weather engine start or if power is interrupted during programming sequences, such as the reset sequence, it is possible for the instrument to enter a "locked up" condition in which the display will not change with selector switch selection. Should this occur, it will be necessary to clear the condition by pressing the reset switch with a pencil or similar small diameter tool. The reset switch is in a small diameter hole located between the words "EL TIME" and "FLT TIME" near the outer periphery of the instrument face. The instrument should now operate normally, but will have to be reprogrammed.

16-92. DIGITAL CLOCK OPERATION. The digital clock contains four selections. They are selected by rotating the selector switch to the positions labeled SET, EL TIME, FLT TIME, and LCL/GMT. These selections, when used in proper sequence with the programming buttons, will correctly program the digital clock.

NOTE

Some models may have an unmarked detent position between the ADD and SET positions. This position performs the same function as the SET position.



1. Programming Button
2. Fuel Computer Selections
3. Selector Switch
4. Reset Switch
5. Digital Clock Selections
6. Display Panel
7. Programming Button

Figure 16-9. Fuel Computer/Digital Clock.

The digital clock may be set to the local (LCL) and Greenwich Mean Time (GMT) as follows:

a. Rotate the selector switch to the SET position.
b. Press the left programming button until local hours advance to the correct value.
c. Press both programming buttons together until Greenwich Mean Time hours advance to the correct value.
d. Press right programming button until minutes advance to correct value. This action sets and holds seconds to zero.
e. Rotate selector switch from SET to start seconds from zero hold.

To display the local time-of-day in hours and minutes, rotate the selector switch to LCL/GMT. If a minutes and seconds display is desired, press the right programming button, labeled SEC. If Greenwich Mean Time in hours and minutes is desired, press the left programming button, labeled GMT.

NOTE

Local or Greenwich Mean Time hours may be changed without resetting the minutes and seconds.

To display accumulated flight time, rotate the selector switch to FLT TIME. After the first hour, if a minutes and seconds display is desired in place of the hours and minutes display, press the right (SEC) programming button. Flight time may be reset to zero by pressing the left (RST) programming button.

NOTE

Accumulated flight time may be zeroed only when the instrument is not counting (whenever fuel flow is less than 25-30 PPH) to prevent accidently zeroing flight time in the air.

Elapsed time (since pressing the RST button) is displayed by rotating the selector switch to the EL TIME position. After the first hour, if a minutes and seconds display is desired in place of the hours and minutes display, press the right (SEC) programming button. Elapsed time may be reset to zero by pressing the left (RST) programming button.

16-75. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
FUEL COMPUTER FUNCTION INOPERATIVE	Faulty wiring from transducer to instrument.	Repair or replace wiring.
	Faulty transducer	Replace transducer
NO DISPLAY	Faulty wiring or open fuse.	Repair or replace wiring. Replace fuse.
DISPLAY WILL NOT CHANGE WITH SELECTOR SWITCH SELECTION	Low voltage or power interruption.	Correct low voltage condition. Connect power supply.
		Depress reset switch to reset instrument.

16-93. TRANSDUCER REMOVAL AND REPLACEMENT (See figire 16-10.)

CAUTION

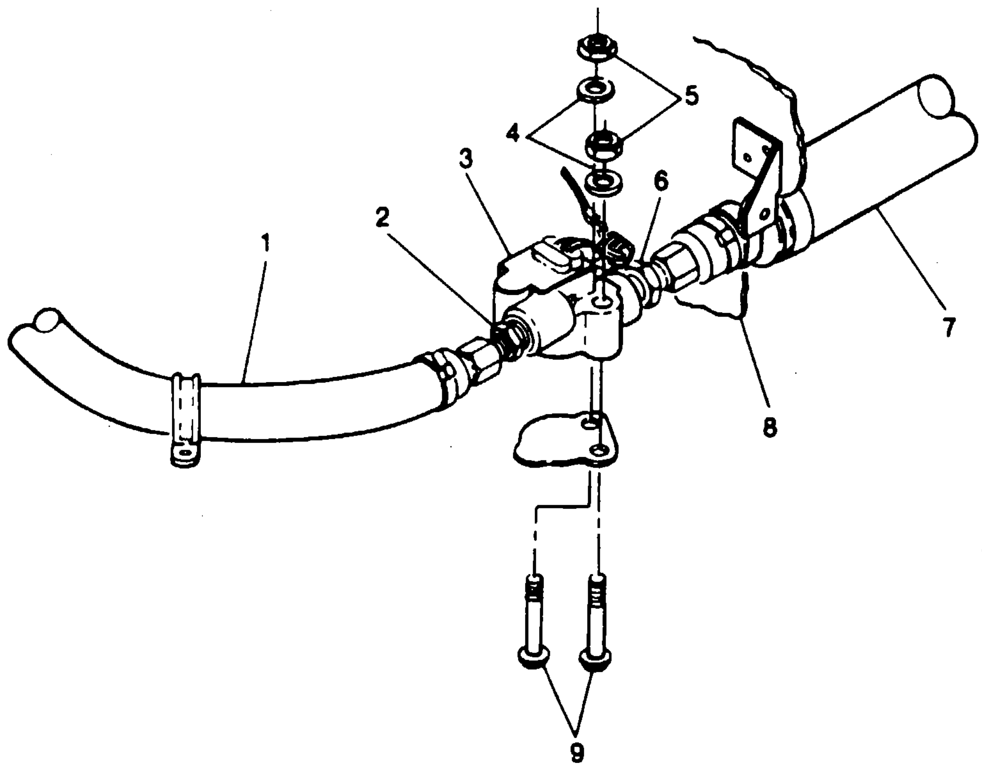
When performing any maintenance on the fuel system, the precautions in Section 13 must be observed.

a. Place the fuel selector in the OFF position.
c. Remove the fuse from the clock fuse holder mounted on the battery contactor bracket.
d. Disconnect the electrical connector, connecting the transducer to the instrument.
e. Disconnect and cap both fuel lines (1 and 7).
f. Remove nuts (5), washers (4), bolts (9) and remove transducer (3).
g. Reverse these steps for reinstallation.

NOTE

When replacing the inlet and outlet pipe fittings they are to be turned 3 times past hand tight or torqued to 25-30 lbs-ft whichever occurs first.

The transducer must be mounted horizontally with the electrical leads on top.



1. Line to Flow Divider
2. Adapter
3. Transducer
4. Washers
5. Nuts
6. Adapter
7. Line to Throttle Body Metering Unit
8. Vertical Baffle
9. Bolts

Figure 16-10. Fuel Computer Transducer.

SECTION 17

ELECTRICAL SYSTEMS

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17-1. ELECTRICAL SYSTEMS.

17-2. GENERAL. This section contains service information necessary to maintain the Aircraft Electrical Power Supply System, Battery and External Power Supply System, Alternator Power System, Aircraft Lighting System, Pitot Heater, Stall Warning, Cigar Lighter, and Electrical Load Analysis.

17-3. ELECTRICAL POWER SUPPLY SYSTEM.

17-4. DESCRIPTION. Energy for the aircraft is supplied by a 28- volt, direct-current, single wire, negative ground electrical system. A 24-volt battery supplies power for starting and furnishes a reserve in event of alternator failure. An alternator is the normal source of power during flight and maintains a battery charge controlled by a voltage regulator. An external power source receptacle may be installed to supplement the battery alternator system for starting and ground operation.

17-5. SPLIT BUS BAR.

17-6. DESCRIPTION. Electrical power is supplied through two bus bars located on the left hand cabin side forward of the cabin door. One bus bar supplies power to the electrical equipment. The other bus bar powers the electronic equipment. This bus bar is connected to the electrical bus through an avionics master switch installed on the electronics bus.

17-7. REMOVAL AND INSTALLATION. (Refer to figure 17-1.)

17-8. MASTER SWITCH.

17-9. DESCRIPTION. The operation of the battery and alternator systems is controlled by a master switch. The switch is an interlocking split rocker with the battery mode on the right-hand side and the alternator mode on the left-hand side. This arrangement allows the battery to be on the line without the alternator, however, operation of the alternator without the battery on the line is not possible. The switch is labeled "BAT" and "ALT" below the switch and is located on the left-hand side of the switch panel.

17-10. AMMETER.

17-11. DESCRIPTION. The ammeter is connected between the battery and the aircraft bus. The meter indicates the amount of current flowing either to or from the battery. With a low battery and the engine operating at cruise speed the ammeter will show the full alternator output when all electrical equipment is off. When the battery is fully charged and cruise RPM is maintained with all electrical equipment off, the ammeter will show a minimum charging rate.

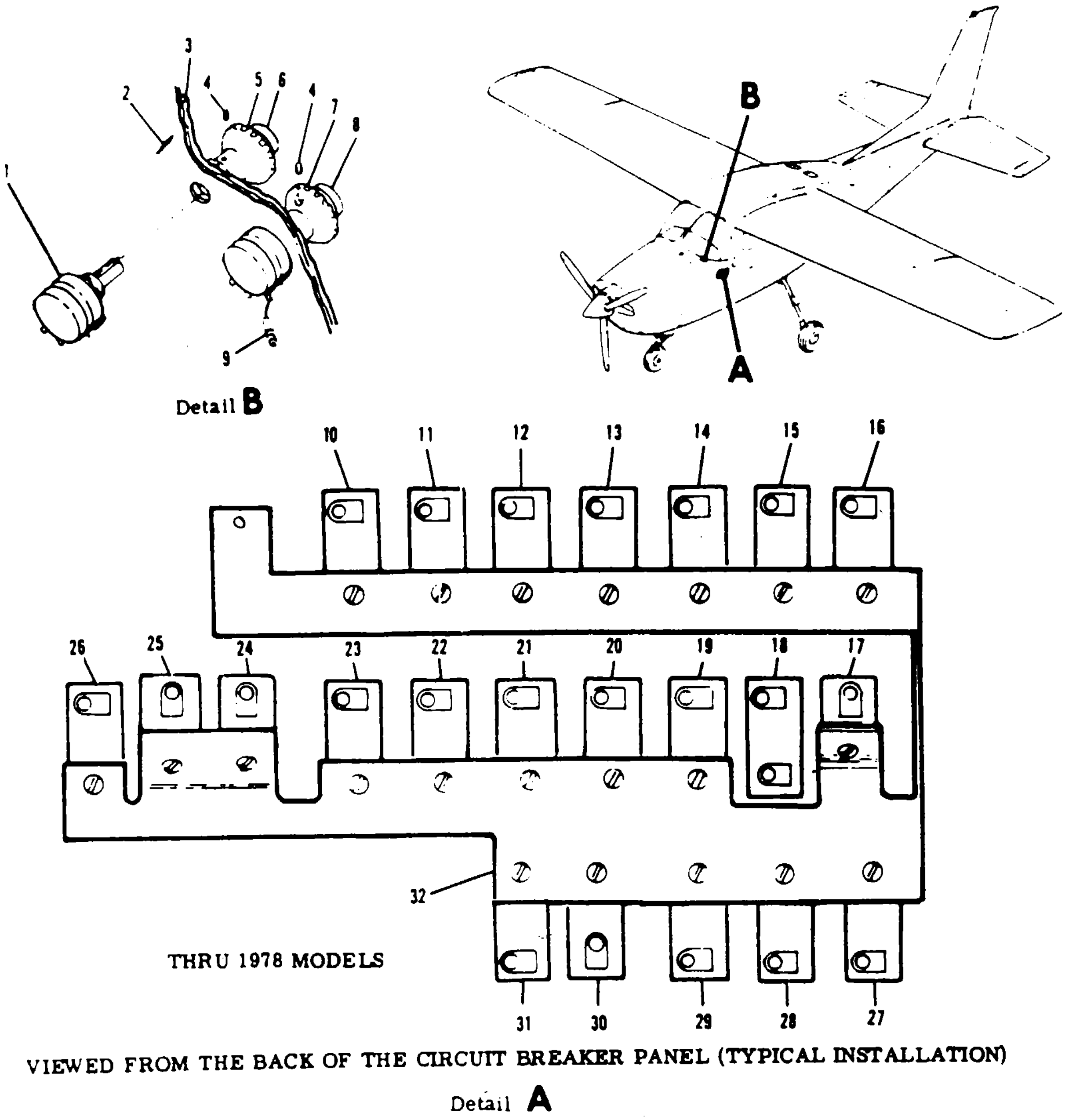
17-12. BATTERY POWER SYSTEM.

17-13. BATTERY.

17-14. DESCRIPTION. A 24-volt battery with an approximate 12.75 ampere-hour capacity on the standard battery and 15.5 ampere-hour capacity on the optional battery is utilized. The battery is mounted on the forward left side of the firewall and is equipped with non-spill type filler caps.

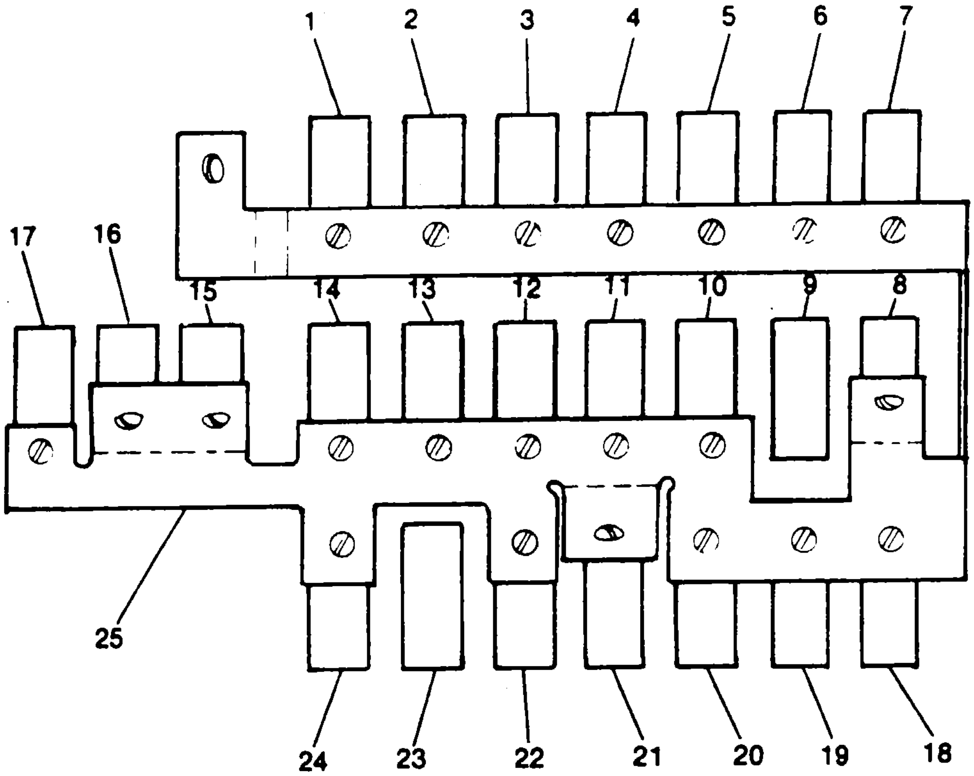
17-15. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
BATTERY WILL NOT SUPPLY POWER TO BUS OR IS INCAPABLE OF CRANKING ENGINE	Battery discharged.	1. Measure voltage at "BAT" terminal of battery contactor with master switch and a suitable load such as a taxi light turned on. Normal battery will indicate 23 volts. If voltage is low proceed to step 2. If voltage is normal proceed to step 3.
	Battery faulty.	2. Check fluid level in cells and charge at 28 volts for approximately 30 minutes or until battery voltage rises to 28 volts. If tester indicates a good battery, the malfunction may be assumed to be a discharged battery. If tester indicates a faulty battery, replace the battery.
	Faulty contactor or wiring. between contactor and master switch.	3. Measure voltage at master switch terminal (smallest) on contactor with master switch closed. Normal indication is zero volts. If voltage reads zero, proceed to step 4. If a voltage reading is obtained, check wiring between contactor and master switch. Also check master switch.
	Open coil on contactor.	4. Check continuity between "BAT" terminal and master switch terminal of contactor. Normal indication is 50-70 ohms. If ohmmeter indicates an open coil, replace contactor. If ohmmeter indicates a good coil, proceed to step 5.
	Faulty contactor contacts.	5. Check voltage on "BUS" side of contactor with master switch closed. Meter normally indicates battery voltage. If voltage is zero or intermittent, replace contactor. If voltage is normal, proceed to step 6.
	Faulty wiring between contactor and bus.	6. Inspect wiring between contactor and bus. Repair or replace wiring.



1. Rheostat
2. Instur ment Panel
3. E L Panel
4. Set Screw
5. Engine and Radio Light Control
6. E L Panel Light Control
7. Flood Light Control
8. Post Light Control
9. Resistor
10. Landing Light Circuit Breaker
11. Taxi Light Circuit Breaker
12. Strobe Light Circuit Breaker
13. Flashing Beacon Circuit Breaker
14. Navigation Light Circuit Breaker
15. Cabin Light Circuit Breaker
16. Instrument Light Circuit Breaker
17. Alternator Circuit Breaker
18. Alternator Regulator Circuit Breaker
19. Fuel Pump Circuit Breaker
20. Fuel Quanity Circuit Breaker
21. Pitot Heat Circuit Breaker
22. Windshield Anti-Ice Circuit Breaker
23. Prop Anti-Ice Circuit Breaker
24. Wing De-Ice Circuit Breaker
25. Gear Pump Circuit Breaker
26. Landing Gear Circuit Breaker
27. Cabin Pressure Circuit Breaker
28. Turn Coordinator Circuit Breaker
29. Stall Warning Circuit Breaker
30. Electric Trim Circuit Breaker
31. Flap Circuit Breaker
32. Bus Bar

Figure 17-1. Bus Bar and Circuit Breaker Installation (Sheet 1 of 4)



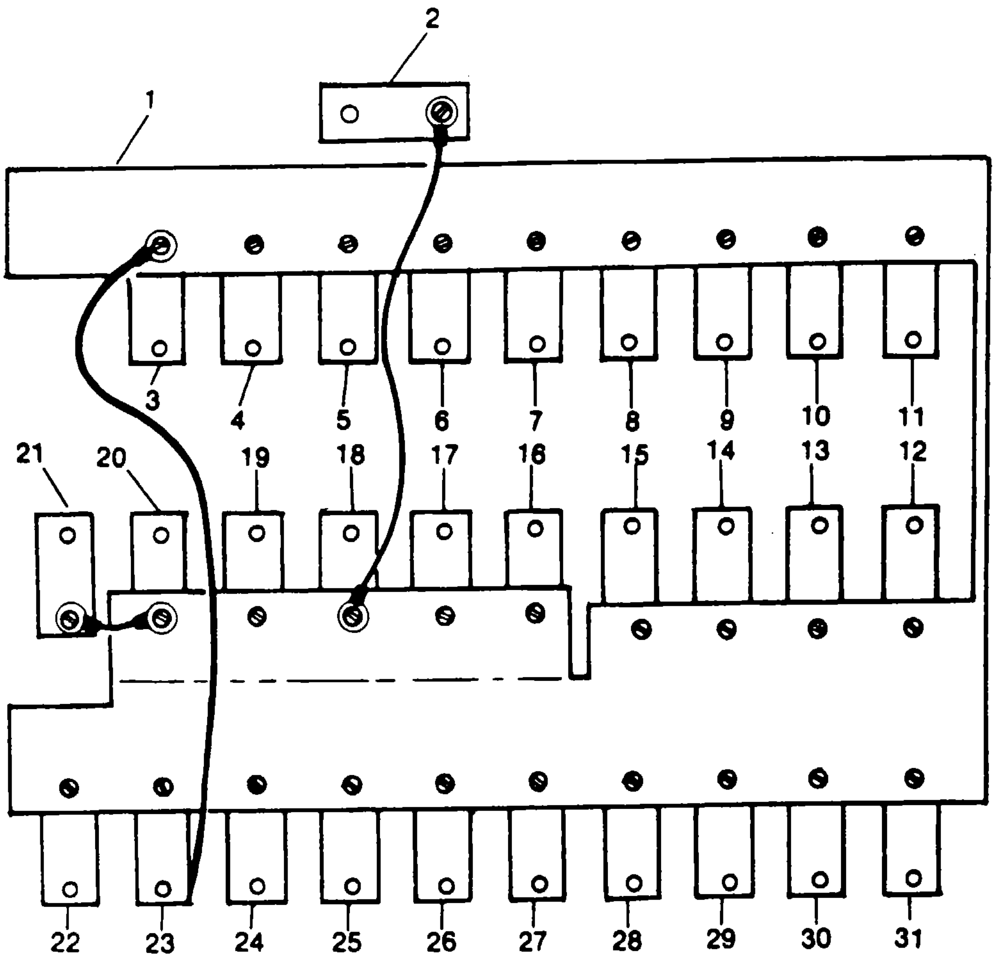
1979 MODELS

VIEWED FROM THE BACK OF THE CIRCUIT BREAKER PANEL (TYPICAL INSTALLATION)

Detail A

1. Landing Light Circuit Breaker
2. Taxi Light Circuit Breaker
3. Strobe Light Circuit Breaker
4. Flashing Beacon Circuit Breaker
5. Navigation Light Circuit Breaker
6. Cabin Light Circuit Breaker
7. Instrument Light Circuit Breaker
8. Alternator Circuit Breaker
9. Alternator Regulator Circuit Breaker
10. Fuel Pump Circuit Breaker
11. Fuel Quantity Circuit Breaker
12. Ptiot Heat Circuit Breaker
13. Windshield Anti-Ice Circuit Breaker
14. Prop Anti-Ice Circuit Breaker
15. Wing De-Ice Circuit Breaker
16. Gear Pump Circuit Breaker
17. Landing Gear Circuit Breaker
18. Cabin Pressure Circuit Breaker
19. Turn Coordinator Circuit Breaker
20. Stall Warning Circuit Breaker
21. Electric Trim Circuit Breaker
22. Flap Circuit Breaker
23. Avionics Fan Circuit Breaker
24. Vent Fan Circuit Breaker
25. Bus Bar

Figure 17-1. Bus Bar and Circuit Breaker Installation (Sheet 2 of 4)



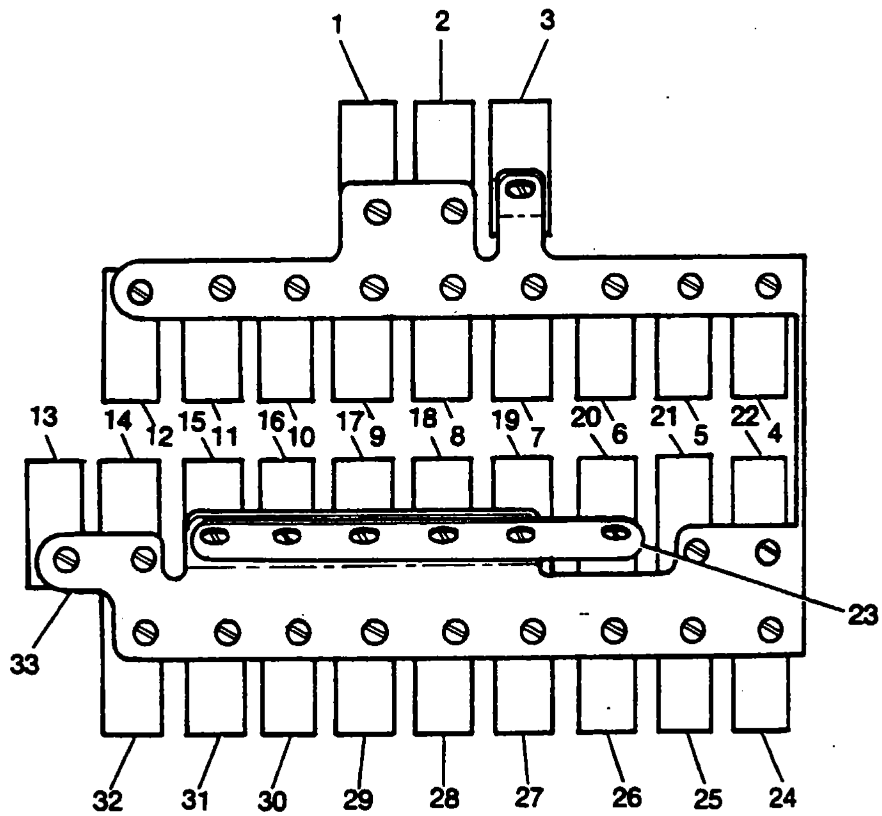
1980 THRU 1982 MODELS

VIEWED FROM THE BACK OF THE CIRCUIT BREAKER PANEL (TYPICAL INSTALLATION)

Detail A

1. Bus Bar
2. Avionics Master Switch
3. Landing Gear Circuit Breaker
4. Taxi Light Circuit Breaker
5. Tail Floodlight Circuit Breaker
6. Beacon Circuit Breaker
7. Strobe Light Circuit Breaker
8. Navigation Light Circuit Breaker
9. Instrument Light Circuit Breaker
10. Cabin Light Circuit Breaker
11. Radio & Instrument Light Circuit Breaker
12. Flap Circuit Breaker (Thru 1981 Models)
    Cabin Pressure Circuit Breaker (Beginning With 1982 Models)
13. Air Condition Circuit Breaker (Thru 1981 Models)
    Flap Circuit Breaker (Beginning With 1982 Models)
14. A C Fan Circuit Breaker
15. Vent Fan Circuit Breaker
16. Avionics Fan Circuit Breaker
17. Wing De-ice Circuit Breaker
18. Gear Pump Circuit Breaker
19. Electric Trim Circuit Breaker
20. Alternator Circuit Breaker
21. Alternator Regulator Circuit Breaker
22. Landing Gear Circuit Breaker
23. Stall Warning Circuit Breaker
24. Fuel Quantity Circuit Breaker
25. Turn Coordinator Circuit Breaker
26. Engine Instrument Circuit Breaker
27. Fuel Pump Circuit Breaker
28. Pitot Heat Circuit Breaker
29. Windshield Anti-ice Circuit Breaker
30. Prop Anti-ice Circuit Breaker
31. Cabin Pressure Circuit Breaker (Thru 1981 Models)
    Radar Alt Circuit Breaker (Beginning With 1982 Models)

Figure 17-1. Bus Bar and Circuit Breaker Installation (Sheet 3 of 4)



BEGINNING WITH 1983 MODELS

VIEWED FROM THE BACK OF THE CIRCUIT BREAKER PANEL (TYPICAL INSTALLATION)

Detail A

1. Gear Lights Circuit Breaker
2. Alternator Low Voltage Circuit Breaker
3. Stall & Gear Horn Circuit Breaker
4. Radio & Instrument Circuit Breaker
5. Cabin Lights Circuit Breaker
6. Instrument Flood Lights Circuit Breaker
7. Navigation Lights Circuit Breaker
8. Strobe/Flood Lights Circuit Breaker
9. Flashing Beacon Light Circuit Breaker
10. Taxi Light Circuit Breaker
11. Landing Light Circuit Breaker
12. Cabin Fan Circuit Breaker
13. Alternator 2 Regulator Circuit Breaker
14. Alternator 1 Regulator Circuit Breaker
15. Alternator 2 Circuit Breaker
16. Alternator 1 Circuit Breaker
17. Wing De-Ice Circuit Breaker
18. Gear Pump Circuit Breaker
19. Trim Circuit Breaker
20. Isolation Circuit Breaker
21. Flap Circuit Breaker
22. Cabin Pressure Circuit Breaker
23. Bus Bar
24. Air Condition Fan Circuit Breaker
25. Prop Anti-Ice Circuit Breaker
26. Windshield Anti-Ice Circuit Breaker
27. Pitot Heat Circuit Breaker
28. Stall Heat Circuit Breaker
29. Fuel Pump Circuit Breaker
30. Engine Instrument Circuit Breaker
31. Turn Coordinator Circuit Breaker
32. Fuel Quantity Circuit Breaker
33. Bus Bar

Figure 17-1. Bus Bar and Circuit Breaker Installation (Sheet 4 of 4)

17-16. REMOVAL AND INSTALLATION OF THE BATTERY. (Refer to figure 17-2.)

a. To gain access to the battery, remove the upper left half of the cowling.

b. Remove the battery box lid and disconnect the battery ground cable.

CAUTION

Always remove the ground cable first and connect it last to prevent accidentally shorting the battery to the airframe with tools.

c. Disconnect the positive cable from the battery and remove the battery from the aircraft.

d. To install a battery, reverse this procedure.

17-17. CLEANING THE BATTERY. For maximum efficiency, the battery and connections should be kept clean at all times.

a. Remove the battery and connections in accordance with the preceding paragraph.

b. Tighten battery cell filler caps to prevent the cleaning solution from entering the cells.

c. Wipe the battery cable ends, battery terminals, and the entire surface of the battery with a clean cloth moistened with a solution of bicarbonate of soda (baking soda) and water.

d. Rinse with clean water, wipe off excess water and allow battery to dry.

e. Brighten cable ends and battery terminals with emery cloth or a wire brush.

f. Install the battery according to the preceding paragraph.

g. Coat the battery terminals with petroleum jelly or an ignition spray product to reduce corrosion.

17-18. ADDING ELECTROLYTE OR WATER TO THE BATTERY.

NOTE

Remove battery from aircraft prior to adding electrolyte.

A battery being charged and discharged with use will decompose the water from the electrolyte by electrolysis. When the water is decomposed, hydrogen and oxygen gases are formed which escape into the atmosphere through the battery vent system. The acid in the solution chemically combines with the plates of the battery during discharge or is suspended in the electrolyte solution during charge. Unless the electrolyte has been spilled from a battery, acid should not be added to the solution. The water, however will decompose into gases and should be replaced regularly. Add distilled water as necessary to maintain the electrolyte level above the horizontal baffle plate, and just below the split ring on the filler neck inside the battery. When activating a new dry charged battery, care must be taken to ensure proper strength of electrolyte is used. Specific gravity of the electrolyte must be 1.285 +0 .005 or -0.005 when measured at 80°F +5 or -5°F. When electrolyte level falls below normal with use, add only distilled water to maintain the proper level. The battery electrolyte contains approximately 25% sulphuric acid by volume. Any change in this volume will hamper the proper operation of the battery.

CAUTION

Do not add any type of battery rejuvenator to the electrolyte. When acid has been spilled from a battery, the acid balance may be adjusted by following instructions published by the Association of American Battery Manufacturers.

17-19. TESTING THE BATTERY. The specific gravity check method of testing the battery is preferred when the condition of the battery is in a questionable state of charge. However, when the aircraft has been operated for a period of time with an alternator output voltage which is known to be correct, the question of battery capability may be answered more correctly with a load type tester. If testing the battery is deemed necessary, specific gravity should be checked first and compared with the following chart.

BATTERY HYDROMETER READINGS

1.280 Specific Gravity	100% Charged
1.250 Specific Gravity	75% Charged
1.220 Specific Gravity	50% Charged
1.190 Specific Gravity	25% Charged
1.160 Specific Gravity	Practically Dead

NOTE

All readings shown are for and electrolyte temperature of 80° Fahrenheit. For higher temperatures the readings will be slightly lower. For cooler temperatures the readings will be slightly higher. Some hydrometers will have a built-in temperature compensation chart and a thermometer. If this type tester is used, disregard this chart.

If specific gravity reading indicates that the battery is not fully charged, the battery should be charged on 12-volt systems at 14-volts, or on 24-volt systems at 28-volts for approximately 30 minutes, or until battery voltage rises to 14-volts on 12-volt systems or 28-volts on 24-volt systems. After charging, a load tester will give more meaningful results. A special-gravity check can be used after charging but the check cannot spot cells which short under load, broken connectors between plates of a cell, etc..

17-20. CHARGING THE BATTERY. When the battery is to be charged, the level of electrolyte should be checked and adjusted by adding distilled water to cover the tops of the internal battery plates. The battery cables and connections should be clean.

WARNING

When a battery is charging, hydrogen and oxygen gases are generated. Accumulation of these gases can create a hazardous explosive condition. Always keep sparks and open flame away from the battery. Allow unrestricted ventilation of the battery area during charging.

The main points of consideration during a battery charge are excessive battery temperature and violent gassing. Under a reasonable rate of charge, the battery temperature should not rise over 125° F nor should gassing be so violent that acid is blown from the vents.

17-21. BATTERY BOX.

17-22. DESCRIPTION. The battery is completely enclosed in a box which is painted with acid proof paint. The box has a vent tube which protrudes through the bottom of the aircraft allowing battery gases and spilled electrolyte to escape. The battery box is riveted to the left forward side of the firewall.

17-23. REMOVAL AND INSTALLATION. (Refer to figure 17-2). The battery box is riveted to the firewall. The rivets must be drilled out to remove the box. When a battery box is installed and riveted into place, all rivets and scratches inside the box should be painted with acid-proof lacquer, Part No. CES1054-381, available from the Cessna Service Parts Center.

17-24. MAINTENANCE. The battery box should be inspected and cleaned periodically. The box and cover should be cleaned with a strong solution of bicarbonate of soda (baking soda) and water. Hard deposits may be removed with a wire brush. When all corrosive deposits have been removed from the box, flush it thoroughly with clean water.

WARNING

Do not allow acid deposits to come in contact with skin or clothing. Serious acid burns may result unless the affected area is washed immediately with soap and water. Clothing will be ruined upon contact with battery acid.

Inspect the cleaned box and cover for physical damage and for areas lacking proper acid proofing. A badly damaged or corroded box should be replaced. If the box or lid require acid proofing, paint the area with acid-proof black lacquer, Part No. CES1054-381, available from the Cessna Service Parts Center.

17-25. BATTERY CONTACTOR.

17-26. DESCRIPTION. The battery contactor is bolted to the firewall below the battery box. The contactor is a solenoid plunger type, which is actuated by turning the master switch on. When the master switch is off, the battery is disconnected from the electrical system. A silicon diode is used to eliminate spiking of the transistorized radio equipment. The cathode (+) terminal of the diode connects to the battery terminal of the battery contactor. The anode (-) terminal of the diode connects to the same terminal of the diode connects to the same terminal on the contactor as the master switch wire. This places the diode directly across the contactor solenoid coil so that inductive spikes originating in the coil are clipped when the master switch is opened. (Refer to figure 17-2).

17-27. REMOVAL AND INSTALLATION. (Refer to figure 17-2.)

a. Open battery box and disconnect ground cable from negative battery terminal. Pull cable clear of battery box.

b. Beginning with 1981 Models, cut sta-straps and remove cover from contactor.

c. Remove nuts and washers securing cables to the contactor.

d. Remove the bolt, washer and nut securing each side of the contactor. Then remove contactor.

e. To install, reverse this procedure using new sta-straps on the cover.

17-28. BATTERY CONTACTOR CLOSING CIRCUIT. (Refer to figure 17-3). This circuit consists of a 5-amp fuse, a resistor and a diode mounted on the ground service receptacle bracket. This serves to shunt a small charge around the battery contactor so that ground power may be used to close the contactor when the battery is too dead to energize the contactor by itself.

17-29. GROUND SERVICE RECEPTACLE.

17-30. DESCRIPTION. A ground service receptacle is installed to permit the use of external power for cold weather starting or when performing lengthy electrical maintenance. A reverse polarity protection system is utilized whereby ground power must pass through an external power contactor to be connected to the bus. A silicon junction diode is connected in series with the coil on the external power contactor so that if the ground power source is inadvertently connected with a reversed polarity, the external power contactor will not close. This feature protects the diodes in the alternator, and other semiconductor devices used in the aircraft, from possible reverse polarity damage.

NOTE

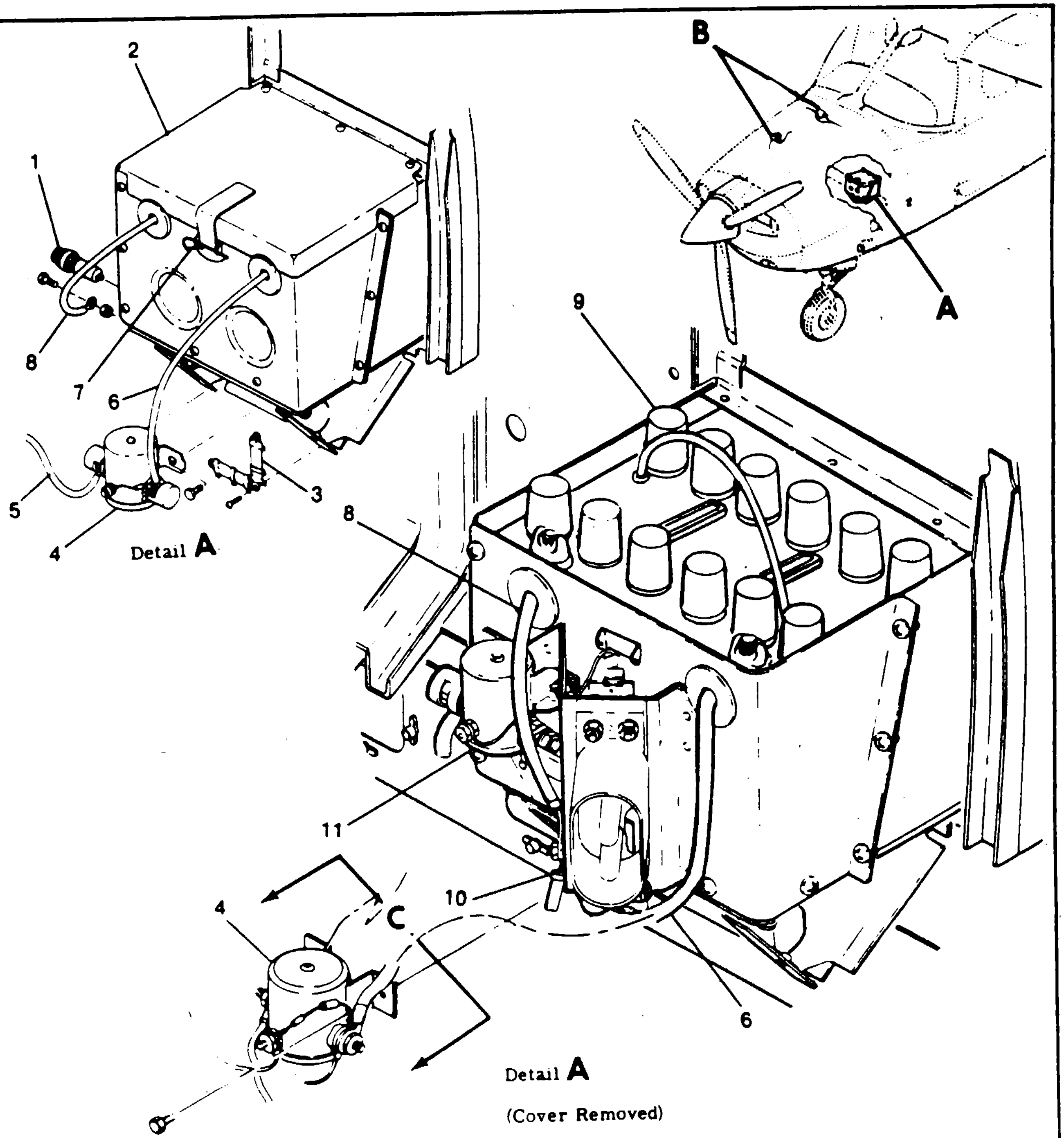
Maintenance of the electronic installations cannot be performed when using external power. Application of external power opens the relay supplying voltage to the electronics bus. For lengthy ground testing of electronic systems, connect a well regulated and filtered power supply directly to the battery side of the battery contactor. Adjust the supply for 28 volts and close the master switch.

NOTE

When using ground power to start the aircraft, close the master switch before removing the ground power plug. This will ensure closure of the battery contactor and excitation of the alternator field

CAUTION

Failure to observe polarity when connecting an external power source directly to the battery or directly to the battery side of the battery contactor, will damage the diodes in the alternator and other semiconductor devices in the aircraft.



1. Fuse
2. Battery Box
3. Resistor
4. Battery Contactor
5. Cable (to Starter Contactor)
6. Positive Cable
7. Clip
8. Ground Cable
9. Battery
10. Ground Service Receptacle
11. Ground Service Contactor
12. Cable (to Ground Service Contactor)
13. Cable (to Starter Contactor)
14. Diode
15. Wire (to Fuse)
16. Wire (to Master Switch)
17. Nylon Cover
18. Sta-strap
19. Cable (to Starter)
20. Starter Contactor
21. Wire (to Ammeter)
22. Cable (to Battery Contactor)
23. Wire (to Starter Switch)
24. Ground Wire
25. Starter Contactor Cover

Figure 17-2. Battery and Electrical Equipment Installation (Sheet 1 of 4)

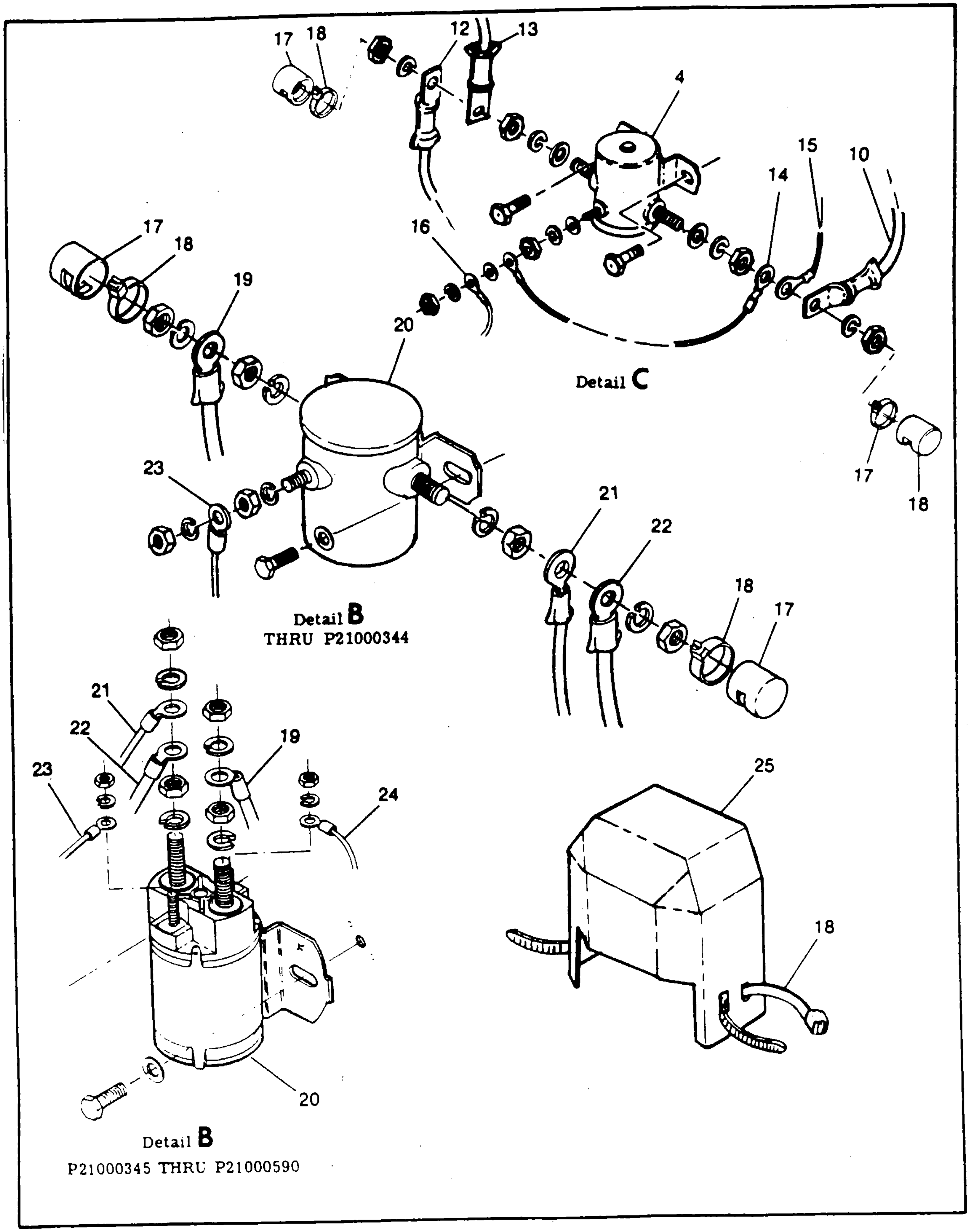
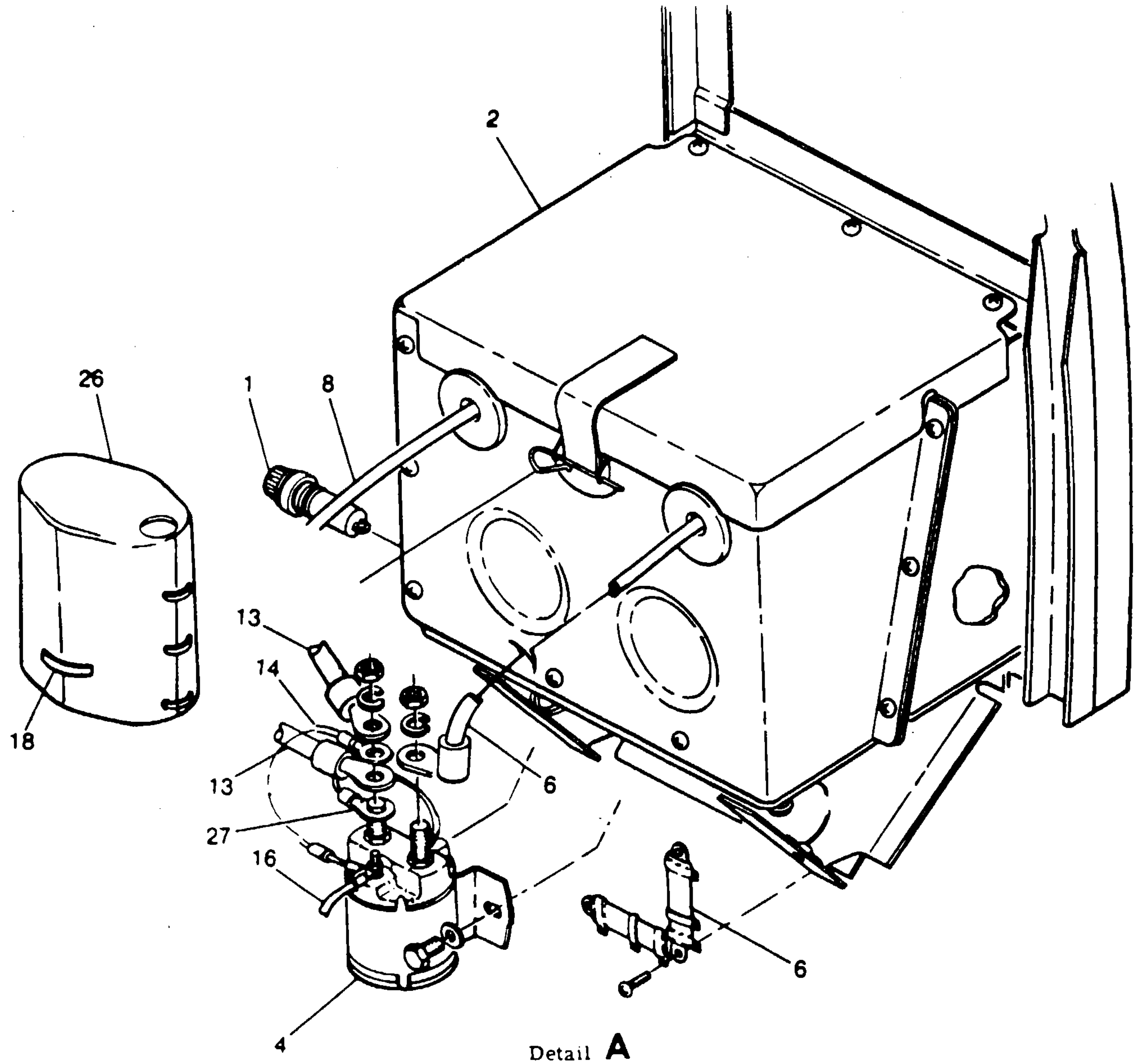


Figure 17-2. Battery and Electrical Equipment Installation (Sheet 2 of 4)

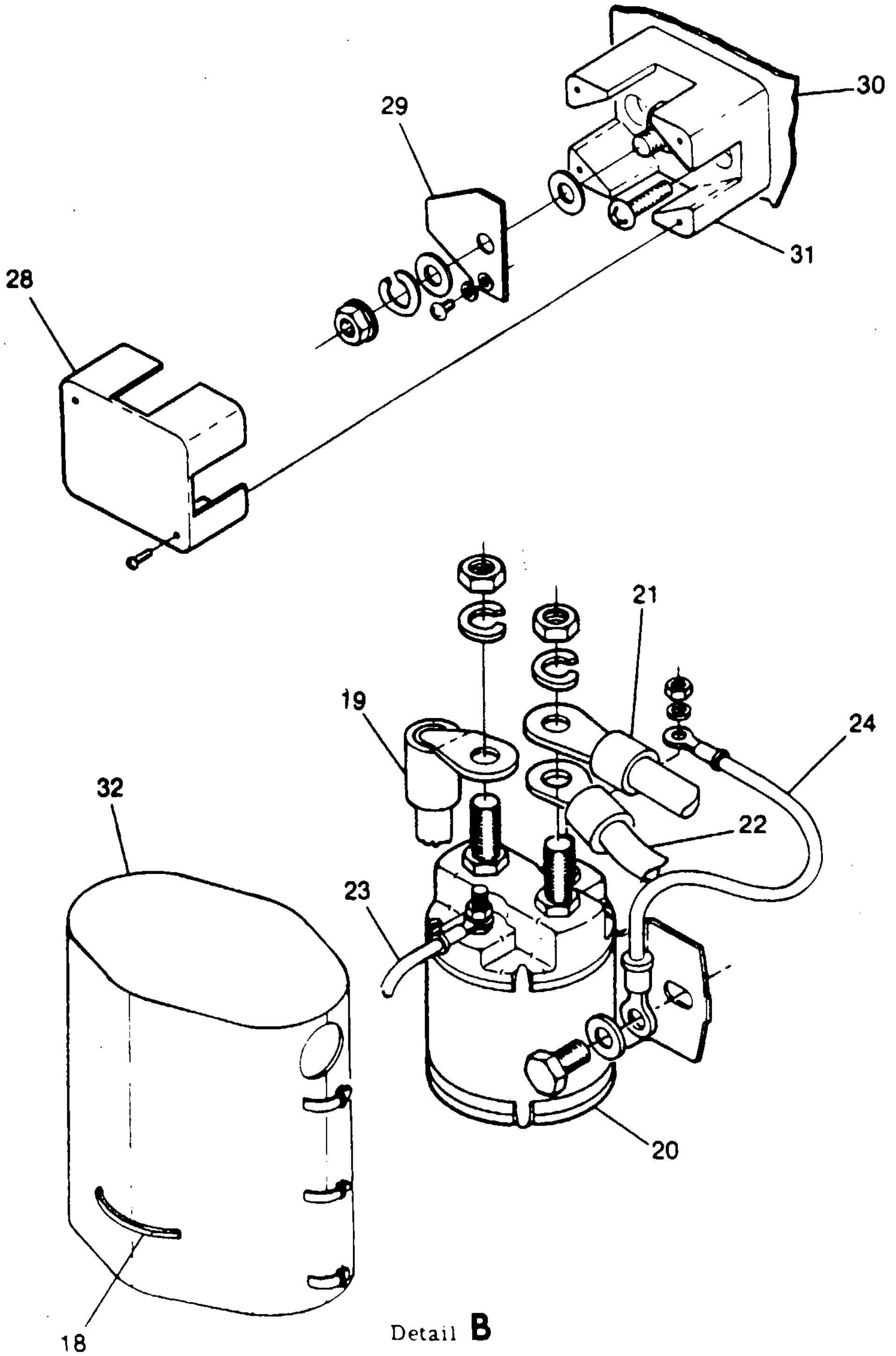


Detail **A**

BEGINNING WITH 1981 MODELS

26. Cover (Battery Contactor)
27. Jumper Wire
28. Cover (Terminal Block)
29. P C Board
30. Firewall
31. Terminal Block
32. Cover (Starter Contactor)

Figure 17-2. Battery and Electrical Equipment Installation (Sheet 3 of 4)



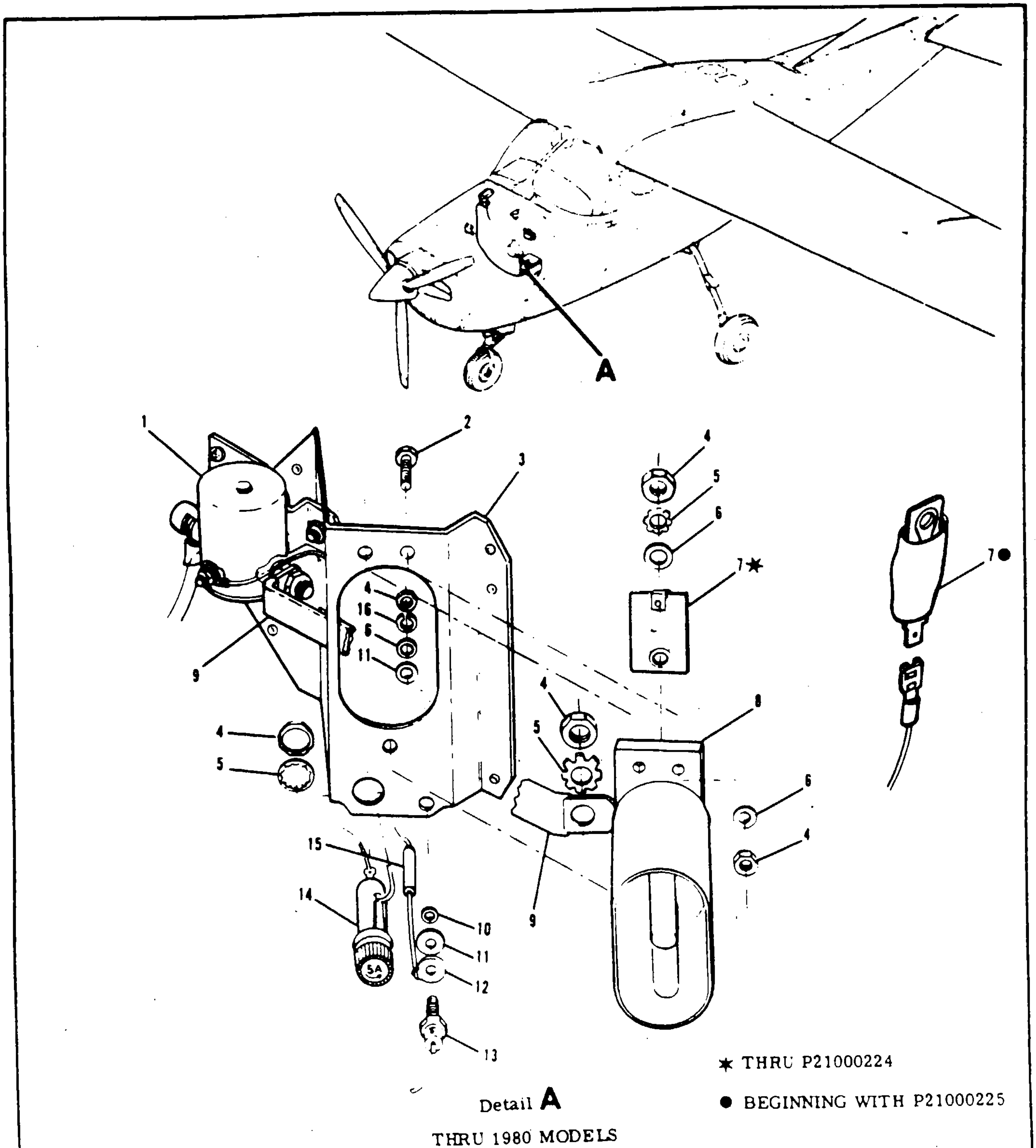
Detail **B**

BEGINNING WITH P21000591

Figure 17-2. Battery and Electrical Equipment Installation (Sheet 4 of 4)

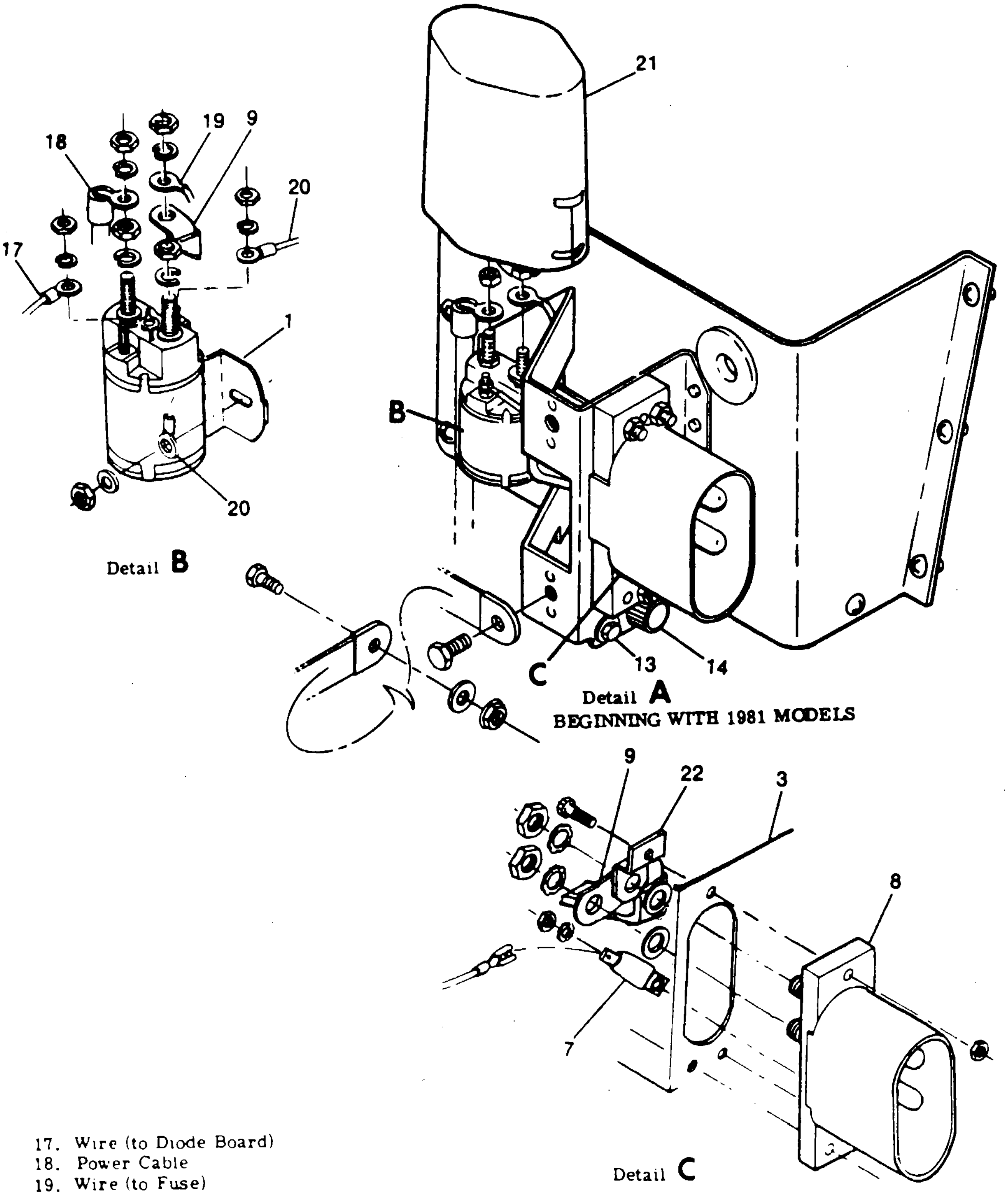
17-31. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
GROUND POWER WILL NOT CRANK ENGINE.	Ground service connector wired incorrectly.	1. Check for voltage at all three terminals of external power contactor with ground power connected and master switch off. If voltage is present on input and coil terminals but not on the output terminal, proceed to step 4. If voltage is present on the input terminal but not on the coil terminal, proceed to step 2. If voltage is present on all three terminals, check wiring between contactor and bus.
		2. Check for voltage at small terminal of ground service receptacle. If voltage is not present, check ground service plug wiring. If voltage is present, proceed to step 3.
	Open or mis-wired diode on ground service diode board assembly.	3. Check polarity and continuity of diode on diode board at rear of ground service receptacle. If diode is open or improperly wired, replace diode board assembly.
	Faulty external power contactor.	4. Check resistance from small (coil) terminal of external power contactor to ground (master switch off and ground power unplugged). Normal indication is 50-70 ohms If resistance indicates an open coil, replace contactor. If resistance is normal, proceed to step 5.
	Faulty contacts in external power contactor.	5. With master switch off and ground power applied, check for voltage drop between two large terminals of external power (turn on taxi light for a load). Normal indication is zero volts. If voltage is intermittently present or present all the time, replace contactor.



1. Contactor
2. Bolt
3. Bracket
4. Nut
5. Star Washer
6. Washer
7. Diode Board
8. Receptacle
9. Bus Bar
10. Spacer
11. Mica Washer
12. Solder Terminal
13. Diode
14. Fuse Holder
15. Resistor
16. Lock Washer

Figure 17-3. Ground Service Receptacle Installation (Sheet 1 of 2)



17. Wire (to Diode Board)
18. Power Cable
19. Wire (to Fuse)
20. Ground Wire
21. Cover (Ground Service Contactor)
22. Ground Strap

Figure 17-3. Ground Service Receptacle Installation (Sheet 2 of 2)

17-32. REMOVAL AND INSTALLATION. (Refer to figure 17-3.)

a. Openthe battery box and disconnect the ground cable from the negative terminal of the battery and pull the cable free of the box.

b. Remove the nuts, washers, ground strap, bus bar and diode board from the studs of the receptacle and remove battery cable

c. Remove the screws and nuts holding the receptacle, ground strap will then be free from bracket.

d. To install a ground service receptacle, reverse this procedure.

17-33. ALTERNATOR POWER SYSTEM.

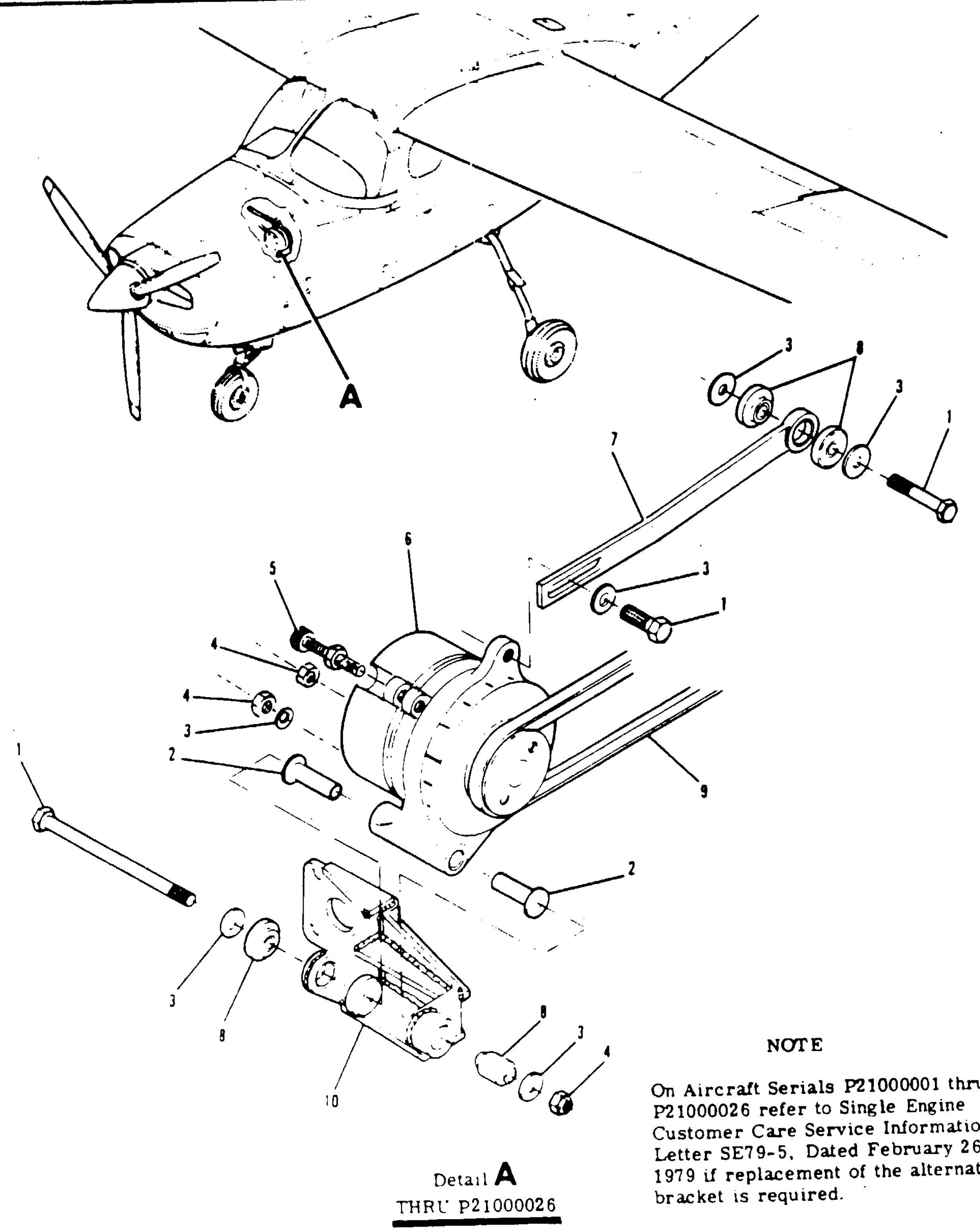
17-34. DESCRIPTION. The alternator system consists of an engine driven alternator, a voltage regulator and a circuit breaker located on the instrument panel. The system is controlled by the left hand portion of the split rocker, master switch labeled ALT. An over-voltage sensor switch and red warning light, labeled HIGH VOLTAGE are incorporated to protect the system. The aircraft battery supplies the source of power for excitation of the alternator.

17-35. ALTERNATOR.

17-36. DESCRIPTION. The 60-ampere alternator used on the aircraft is three-phase, delta connected with integral silicon diode rectifiers. The alternator is rated at 28-volts at 60-amperes continuous output. A optional 28-volt, 95 ampere alternator may be installed.

17-37. ALTERNATOR REVERSE VOLTAGE DAMAGE. The alternator is very susceptible to reverse polarity damage due to the very low resistance of the output windings and the low resistance of the silicon diodes in the output. If a high current source, such as a battery or heavy duty ground power cart is attached to the aircraft with the polarity inadvertently reversed, the current through the alternator will flow almost without limit and the alternator will be immediately damaged.

SHOP NOTES:

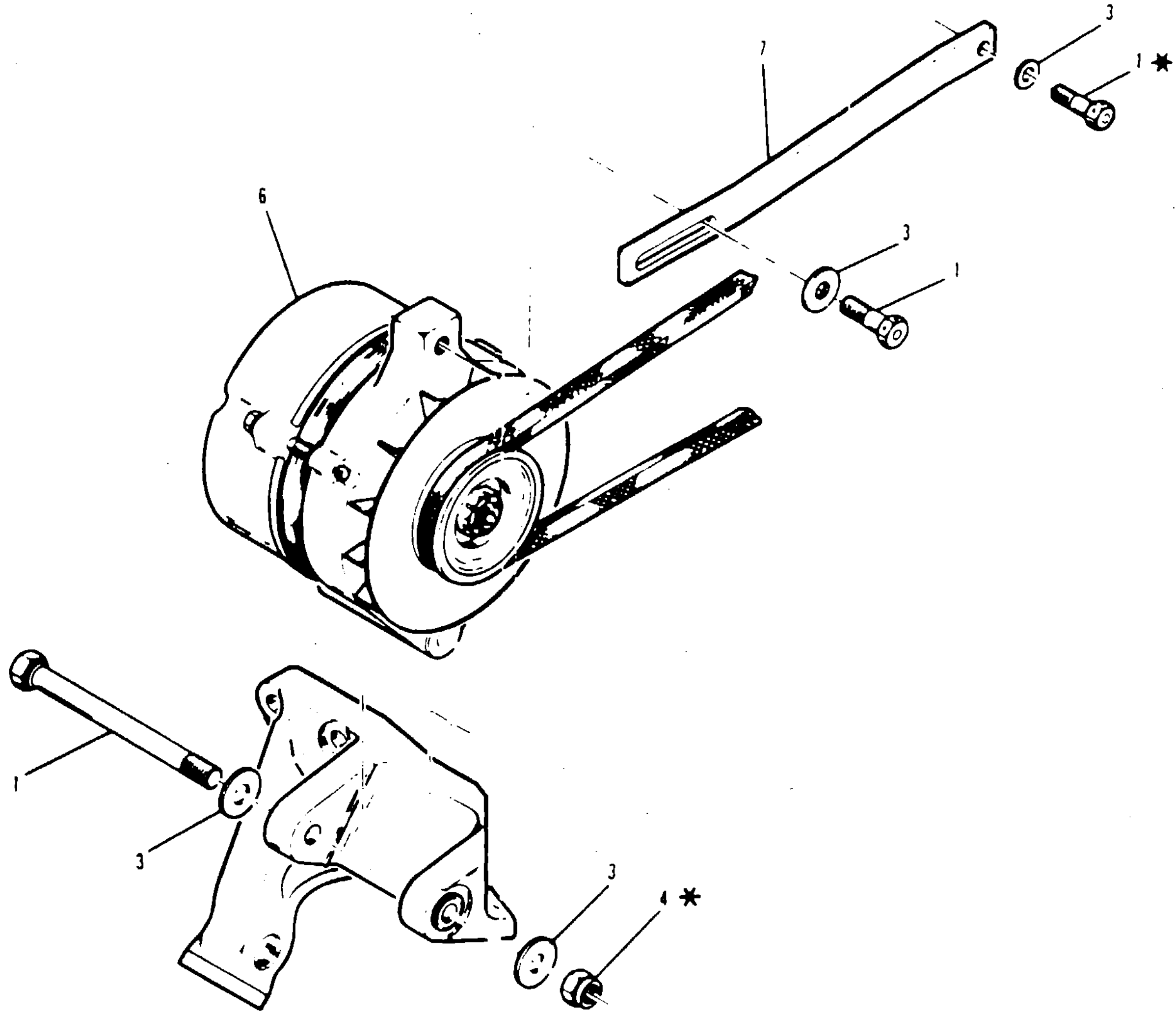


NOTE

On Aircraft Serials P21000001 thru P21000026 refer to Single Engine Customer Care Service Information Letter SE79-5, Dated February 26, 1979 if replacement of the alternator bracket is required.

1. Bolt
2. Bushing (Metal)
3. Washer
4. Nut
5. Screw
6. Alternator
7. Adjustment Bracket
8. Bushing (Rubber)
9. Belt
10. Support Bracket

Figure 17-4. Alternator Installation (Sheet 1 of 3)

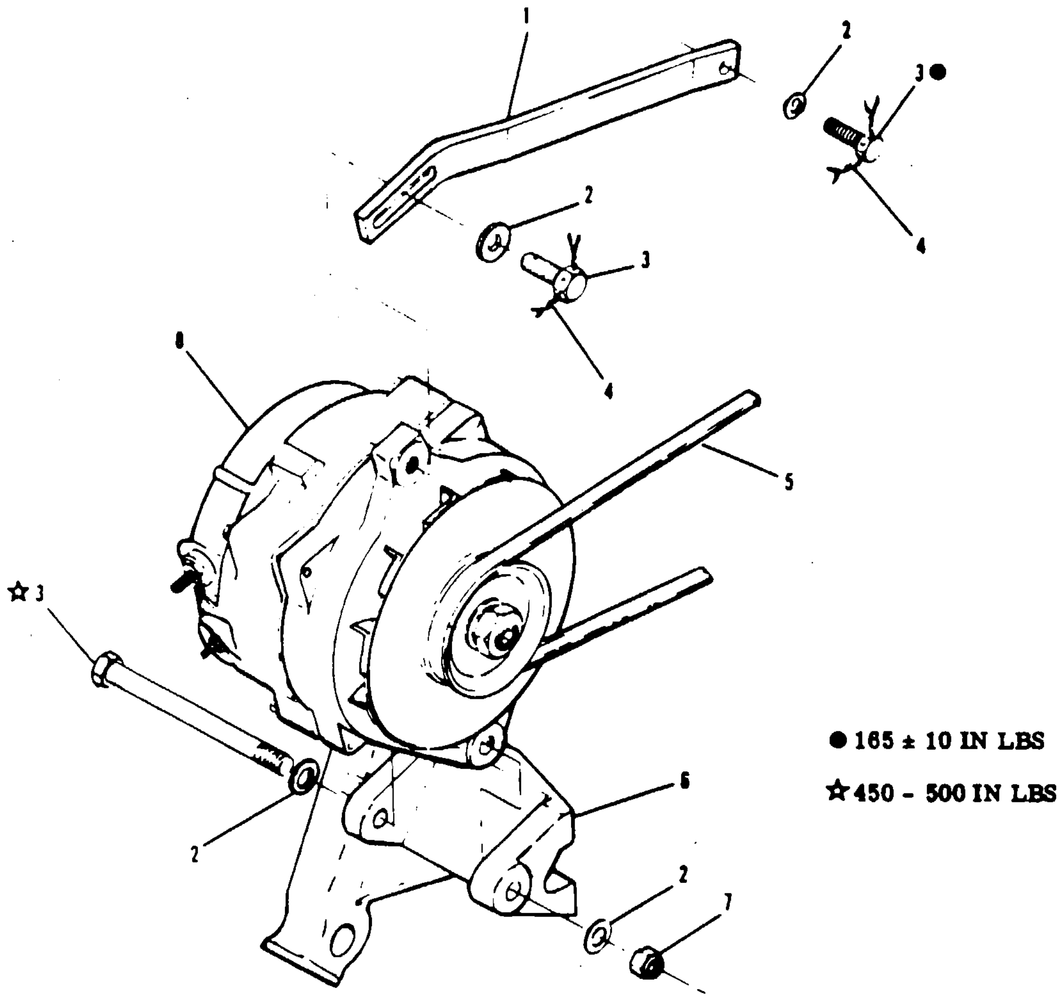


✱ TORQUE TO 165 ± 10 IN LBS.

✱ TORQUE TO 450 - 500 IN LBS.

BEGINNING WITH P21000027

Figure 17-4. Alternator Installation (Sheet 2 of 3)



NON-SHOCKMOUNTED

95 AMP ALTERNATOR

1. Arm-Adjusting
2. Washer
3. Bolt
4. Safety Wire
5. Drive Belt
6. Support
7. Nut
8. Alternator

Figure 17-4. Alternator Installation (Sheet 3 of 3)

17-38. TROUBLE SHOOTING THE ALTERNATOR SYSTEM (THRU 1978 MODELS).

a. ENGINE NOT RUNNING.

TROUBLE	PROBABLE CAUSE	REMEDY
AMMETER INDICATES HEAVY DISCHARGE OR ALTERNATOR CIRCUIT BREAKER OPENS. (Battery Switch ON, Alternator Switch OFF, all other electrical switches OFF.)	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator to alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in at least one direction, repair or replace alternator.
ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON.	Short in Over-Voltage sensor.	Disconnect Over-Voltage Sensor plug and recheck. If circuit breaker stays in replace Over-Voltage Sensor.
	Short in alternator voltage regulator.	Disconnect regulator plug and recheck. If circuit breaker stays in, replace regulator.
	Short in alternator field.	Disconnect "F" terminal wire and recheck. If circuit breaker stays in, replace alternator.

b. ENGINE RUNNING.

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON, OVER-VOLTAGE LIGHT DOES NOT COME ON.	Defective circuit breaker.	Replace circuit breaker.
ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON, OVER-VOLTAGE LIGHT DOES NOT COME ON	Shorted field in alternator	Check resistance from "F" terminal of alternator to alternator case. if resistance is less than 5 ohms repair replace.

CAUTION

This malfunction frequently causes a shorted regulator which will result in an over-voltage condition when system is again operated

17-38. TROUBLE SHOOTING THE ALTERNATOR SYSTEM (THRU 1978 MODELS) (Cont.)
b. ENGINE RUNNING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR MAKES ABNORMAL WHINING NOISE.	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator to alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in at least one direction, repair or replace alternator.
OVER-VOLTAGE LIGHT DOES NOT GO OUT WHEN ALTERNATOR AND BATTERY SWITCHES ARE TURNED ON.	Shorted regulator.	Replace regulator.
	Defective over-voltage sensor.	Replace sensor.
AFTER ENGINE START WITH ALL ELECTRICAL EQUIPMENT TURNED OFF CHARGE RATE DOES NOT TAPER OFF IN 1-3 MINUTES	Regulator faulty or high resistance in field circuit.	With engine not running turn off all electrical loads and turn on battery and alternator switches. Measure bus voltage to ground, then measure voltage from terminal of alternator to ground. If there is more than 2 volts difference check field circuit wiring shown on alternator system wiring diagram in Section 19. Clean all contacts. Replace components until there is less than 2 volts difference between bus voltage and field voltage.
NOTE Also refer to battery power system trouble shooting chart.		
ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED	Alternator output voltage insufficient.	1. Connect voltmeter between D.C. Bus and ground. Turn off all electrical loads. Turn on Battery Switch, start engine and adjust for 1500 RPM. Voltage should read approximately 24 volts Turn on alternator switch, voltage should read between 27.4 and 28.0 volts. Ammeter should indicate a heavy charge rate which should taper off in 1-3 minutes. If charge rate tapers off very

17-38. TROUBLE SHOOTING THE ALTERNATOR SYSTEM (THRU 1978 MODELS) (Cont.)

b. **ENGINE RUNNING** (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED. (Cont.)	Alternator output voltage insufficient (cont).	quickly and voltage is normal, check battery for malfunction. If ammeter shows a low charge rate or any discharge rate, and voltage does not rise when alternator switch is turned on proceed to Step 2.
		2. Stop engine, turn off all switches Connect voltmeter between "F" terminal of alternator and ground. Do NOT start engine. Turn on battery switch and alternator switch. Battery voltage should be present at "F" terminal, less 1 volt drop thru regulator, if not refer to Step 3.
		3. Starting at "F" terminal of alternator trace circuit to voltage regulator, at "B" terminal of regulator trace circuit to over-voltage sensor, to master switch, to Bus Bar. Replace component which does not have voltage present at output. Refer to alternator system wiring diagram in Section 19.
	Alternator field winding open.	1. If voltage is present turn off alternator and battery switches. Check resistance from "F" terminal of alternator to alternator case, turning alternator shaft during measurement. Normal indication is 12-20 ohms. If resistance is high or low, repair or replace alternator. If ok refer to Step 2.
		2. Check resistance from case of alternator to airframe ground. Normal indication is very low resistance. If reading indicates no, or poor continuity, repair or replace alternator ground wiring.

17-38A. TROUBLE SHOOTING THE ALTERNATOR SYSTEM (BEGINNING WITH 1979 MODELS).

a. ENGINE NOT RUNNING.

TROUBLE	PROBABLE CAUSE	REMEDY
AMMETER INDICATES HEAVY DISCHARGE OR ALTERNATOR CIRCUIT BREAKER OPENS. (Battery Switch ON, Alternator Switch OFF, all other electrical switches OFF.)	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator to alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in at least one direction, repair or replace alternator.
ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON	Short in alternator control unit.	Disconnect Over-Voltage Sensor plug and recheck. If circuit breaker stays in, replace Over-Voltage Sensor.
		Disconnect alternator control unit plug and recheck. If circuit breaker stays in, replace alternator control unit.
	Short in alternator field.	Disconnect "F" terminal wire and recheck. If circuit breaker stays in, replace alternator.
b. ENGINE RUNNING.		
ALTERNATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON. LOW-VOLTAGE LIGHT DOES NOT COME ON.	Defective circuit breaker.	Replace circuit breaker.
ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON. LOW-VOLTAGE LIGHT MAY OR MAY NOT COME ON.	Shorted field in alternator.	Check resistance from "F" terminal of alternator to alternator case, if resistance is less than 5 ohms repair/replace.

CAUTION

This malfunction may cause a shorted alternator control unit, which will result in an over-voltage condition when system is again operated.

17-38A. TROUBLE SHOOTING THE ALTERNATOR SYSTEM (BEGINNING WITH 1979 MODELS) (Cont.)
b. ENGINE RUNNING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR MAKES ABNORMAL WHINING NOISE.	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator to alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in one direction, repair or replace alternator.
LOW-VOLTAGE LIGHT DOES NOT GO OUT WHEN ALTERNATOR AND BATTERY SWITCHES ARE TURNED ON.	Shorted alternator control unit.	Replace alternator control unit.
	Defective low-voltage sensor.	Replace alternator control unit.
AFTER ENGINE START WITH ALL ELECTRICAL EQUIPMENT TURNED OFF CHARGE RATE DOES NOT TAPER OFF IN 1-3 MINUTES	Alternator control unit faulty or high resistance in field circuit	With engine not running turn off all electrical loads and turn on battery and alternator switches. Measure bus voltage to ground, then measure voltage from terminal of alternator to ground. If there is more than 2 volts difference check field circuit wiring shown in alternator system wiring diagram in Section 19. Clean all contacts. Replace components until there is less than 2 volts difference between bus voltage and field voltage.
NOTE Also refer to battery power system trouble shooting chart.		
ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED.	Alternator output voltage insufficient.	1. Connect voltmeter between D.C. Bus and ground. Turn off all electrical loads. Turn on Battery Switch, start engine and adjust for 1500 RPM, voltage should read approximately 24 volts. Turn on alternator switch, voltage should read between 28.4 and 28.9 volts. Ammeter should indicate a heavy charge rate which should taper off in 1-3 minutes. If charge rate tapers off very quickly and voltage is normal, check battery for malfunction. If ammeter shows a low charge rate or any discharge rate, and voltage does not rise when alternator switch is turned on proceed to Step 2.

17-38A. TROUBLE SHOOTING THE ALTERNATOR SYSTEM (BEGINNING WITH 1979 MODELS) (Cont.)
b. **ENGINE RUNNING** (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED. (Cont.)	Alternator output voltage insufficient (cont.)	2. Stop engine, turn off all switches. Connect voltmeter between "F" terminal of alternator and ground. Do NOT start engine. Turn on battery switch and alternator switch. Battery voltage should be present at "F" terminal, less 1 volt drop thru regulator, if not refer to Step 3.
		3. Starting at "F" terminal of alternator, trace circuit to alternator control unit at Pin 1 (Blue Wire). Trace circuit from Pin 3 (Red Wire) to master switch, to Bus Bar. Trace circuit from alternator control unit Pin 2 (Orange Wire) to alternator "BAT" terminal. Check connections and replace component which does not have voltage present at output. Refer to alternator system wiring diagram in Section 19
	Alternator field winding open.	1. If voltage is present turn off alternator and battery switches. Check resistance from "F" terminal of alternator to alternator case, turning alternator shaft during measurement. Normal indication is 12-20 ohms. If resistance is high or low, repair or replace alternator. If OK refer to Step 2.
	Alternator output voltage insufficient.	2. Check resistance from case of alternator to airframe ground. Normal indication is very low resistance. If reading indicates no, or poor continuity, repair or replace alternator ground wiring.

17-39. REMOVAL AND INSTALLATION. (Refer to figure 17-4)

a. Make sure that master switch remains in the off position or disconnect negative lead from battery.
b. Disconnect the wiring from the alternator.
c. Remove the safety wire from the upper adjusting bolt and remove the bolt from the alternator.
d. Remove the nut and washer from the lower mounting bolt.
e. Remove the alternator drive belt and lower mounting bolt to remove the alternator.
f. To replace alternator, reverse this procedure.
g. Adjust belt tension to obtain 3/8" deflection at the center of the belt when applying 12 pounds of pressure to the belt. After the belt is adjusted and the the bolt is safety wired, tighten the bottom bolt to 100-140 lb.-in. torque on the 60 ampere alternator and 450-500 lb.-in. torque on the 95 amperee alternator to remove any play between the alternator mounting foot and the U-shaped support assembly.

CAUTION

On new aircraft or whenever a new belt is installed, belt tension should be checked within 10 to 25 hours of operation.

NOTE

When tightening the alternator belt, apply pry bar pressure only to the end of the alternator nearest to the belt pulley.

17-40. ALTERNATOR VOLTAGE REGULATOR.

17-41. DESCRIPTION. A transistorized voltage regulator is installed on the aircraft. The regulator is adjustable, but adjustment on the aircraft is not recommended. A bench adjustment procedure is outlined in the Cessna Alternator Charging Systems Service/Parts Manual. A Cessna Alternator Charging System Test Box Assembly (P/N 9870000-1) is available through the Cessna Service/Parts Center for use in isolating failures in the 28-volt transistorized voltage regulator (C611002-0105) and the 28-volt Alternator.

17-42. REMOVAL AND INSTALLATION. (Refer to figure 17-5).

a. Ensure that the master switch is off.
b. Remove upper cowl to gain access to the regulator.
c. Remove the connector plug from the regulator.
d. Remove the three bolts holding the regulator on the firewall.
e. To reinstall the regulator, reverse the preceding steps.

17-42A. ALTERNATOR CONTROL UNIT. (BEGINNING WITH 1979 MODELS.)

17-42B. DESCRIPTION. The alternator control unit is a solid state voltage regulator with an over-voltage sensor and a low-voltage sensor incorporated in the unit. The control unit is not adjustable and is a remove and replace item. A Cessna Alternator Charging System Test Box Assembly **(P/N 9870005-1)** available through the Cessna Service/Parts Center for use in isolating failures in the 28-volt alternator control units (C611005-0101 and C611005-0102) and the 28-volt alternator.

NOTE

On 1979 thru 1982 models if the alternator low voltage light comes on when a COM radio transmitter is keyed, refer to Cessna Single Engine Customer Care Service Information Letter SE82-17 Dated April 30, 1982.

17-42C. REMOVAL AND INSTALLATION. (Refer to figure 17-5.)

a. Remove upper half of engine cowl.
b. Place master switch in the "OFF" position.
c. Disconnect negative lead from the battery.
d. Disconnect housing plug from the alternator control unit.
e. Remove screws securing the control unit to the firewall.
f. To install control unit reverse the preceding steps. Be sure the connections for grounding are clean and bright before assembly. Otherwise faulty voltage regulation and/or excessive radio noise may result.

17-43. OVER-VOLTAGE SENSOR AND WARNING LIGHT.

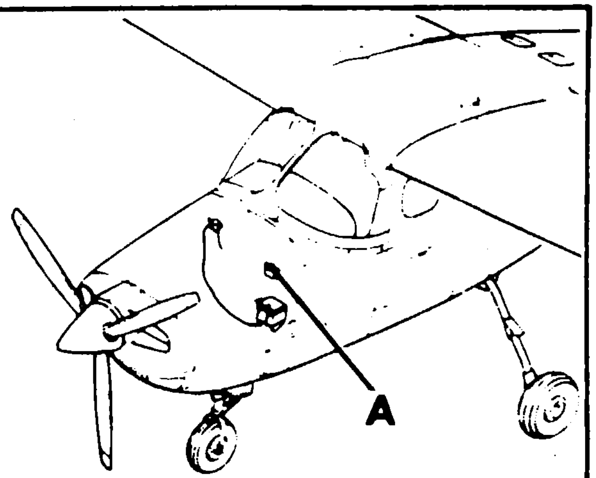
17-44. DESCRIPTION. The over-voltage system consists of a over-voltage sensor switch and a red warning light labeled, HIGH VOLTAGE, on the instrument panel. When an over-voltage tripoff occurs the over-voltage sensor turns off the alternator system and the red warning light comes on. The ammeter will show a discharge. Turn off the alternator portion of the master switch to recycle the over-voltage sensor. If the over-voltage condition was transient, the normal action is necessary. If the over-voltage tripoff recurs, then a generating system malfunction has occurred such that the electrical accessories must be operated from the aircraft battery only. Conservation of electrical energy must be practiced until the flight can be terminated. The over-voltage red warning light filament may be tested at any time by turning off the alternator portion of the master switch and leaving the battery portion turned on. This test does not induce an over-voltage condition on the electrical system. Beginning with 1979 Models the over-voltage sensor is contained within the alternator control unit. The unit also contains a low-voltage sensor. A red warning light labeled "LOW VOLTAGE" is installed on the instrument panel. When an over-voltage condition occurs the over-voltage sensor turns off the alternator and the voltage in the system drops. When system voltage drops below 24.8 volts the low-voltage sensor turns on the low-voltage light indicating a drain on the battery and the ammeter will show a discharge. Turn off both sections of the master switch to recycle the over-voltage sensor. If the over-voltage condition was transient, the normal alternator charging will resume and no further action is necessary. If the over-voltage tripoff recurs, then a generating system malfunction has occurred such that the electrical accessories must be operated from the aircraft battery only. Conservation of electrical energy must be practiced until the flight can be terminated. The over-voltage light filament may be tested at any time by turning off the "Alternator" portion of the master switch and leaving the battery portion on. This test does not induce an over-voltage condition on the electrical system.

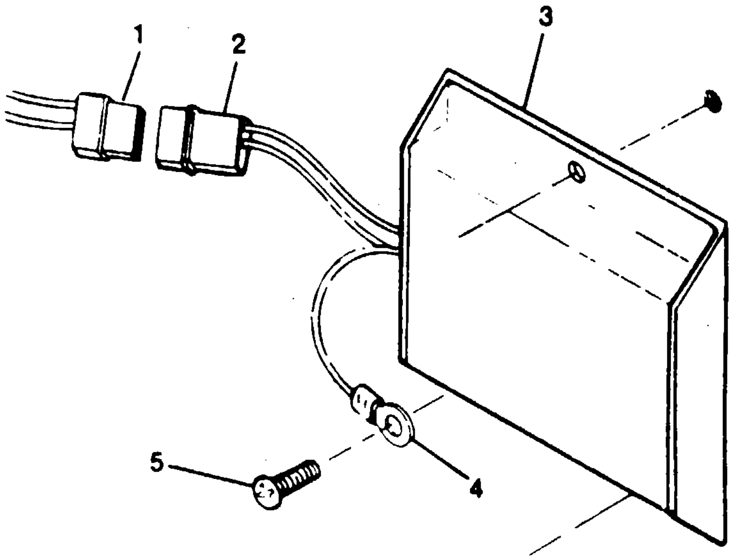
17-45. REMOVAL AND INSTALLATION (Refer to figure 17-6.)

a. Turn master switch (BATT side) to OFF position.
b. Disconnect plug.
c. Remove mounting screws and remove relay.
d. To install reverse the procedure.

17-46. RIGGING THROTTLE-OPERATED MICRO-SWITCH. Refer to Section 13.

17-47. AUXILIARY FUEL PUMP FLOW RATE ADJUSTMENT. Refer to Section 13.



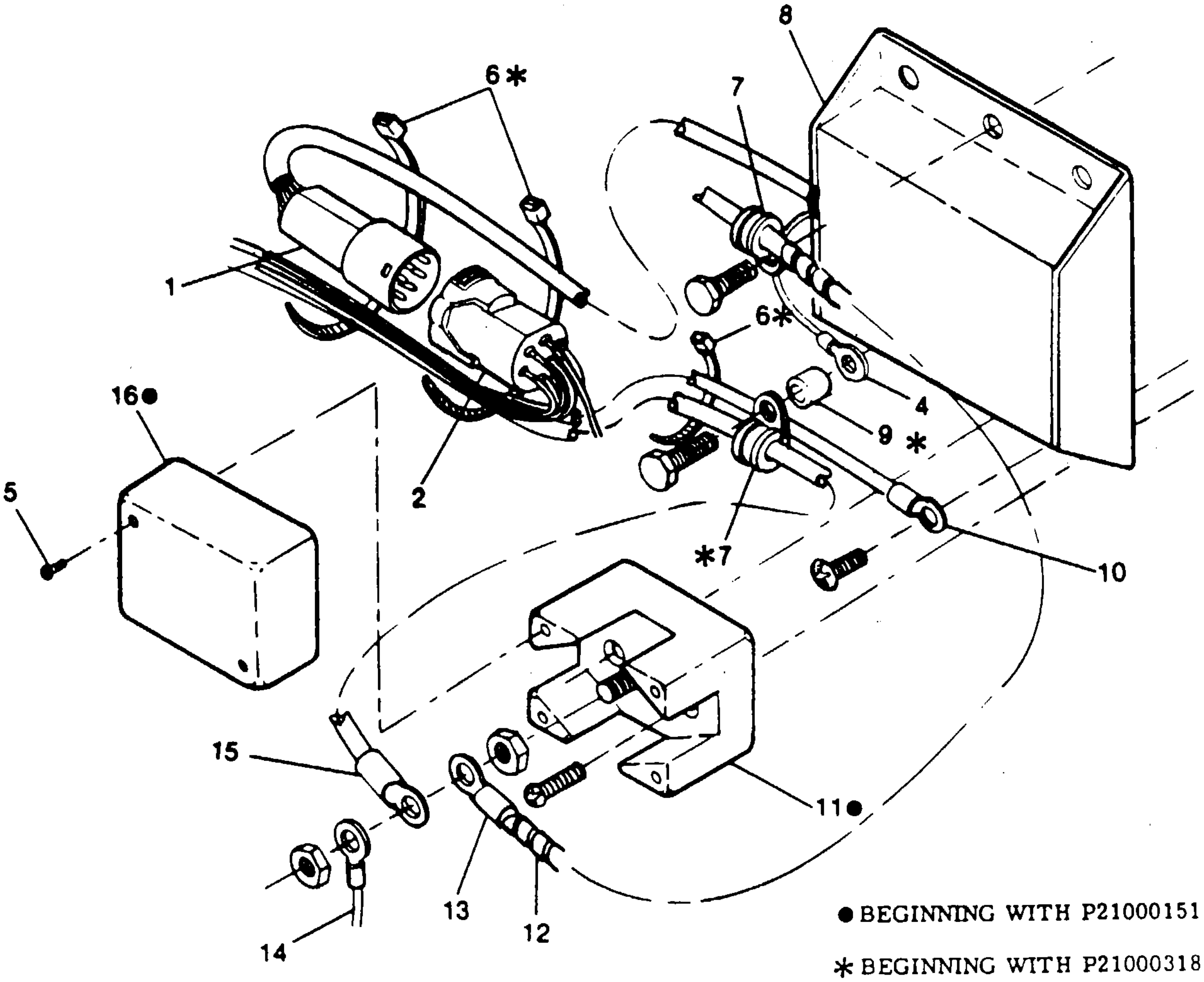


Detail **A**

THRU 1978 MODELS

1. Housing - Plug
2. Housing - Cap
3. Voltage Regulator
4. Ground Wire
5. Screw
6. Sta-strap
7. Clamp
8. Alternator Control Unit
9. Spacer
10. Wire (to Alternator Ground)
11. Terminal Block
12. Spiral Wrap
13. Wire (to Circuit Breaker)
14. Wire (to Alternator Control Unit)
15. Wire (to Alternator)
16. Cover

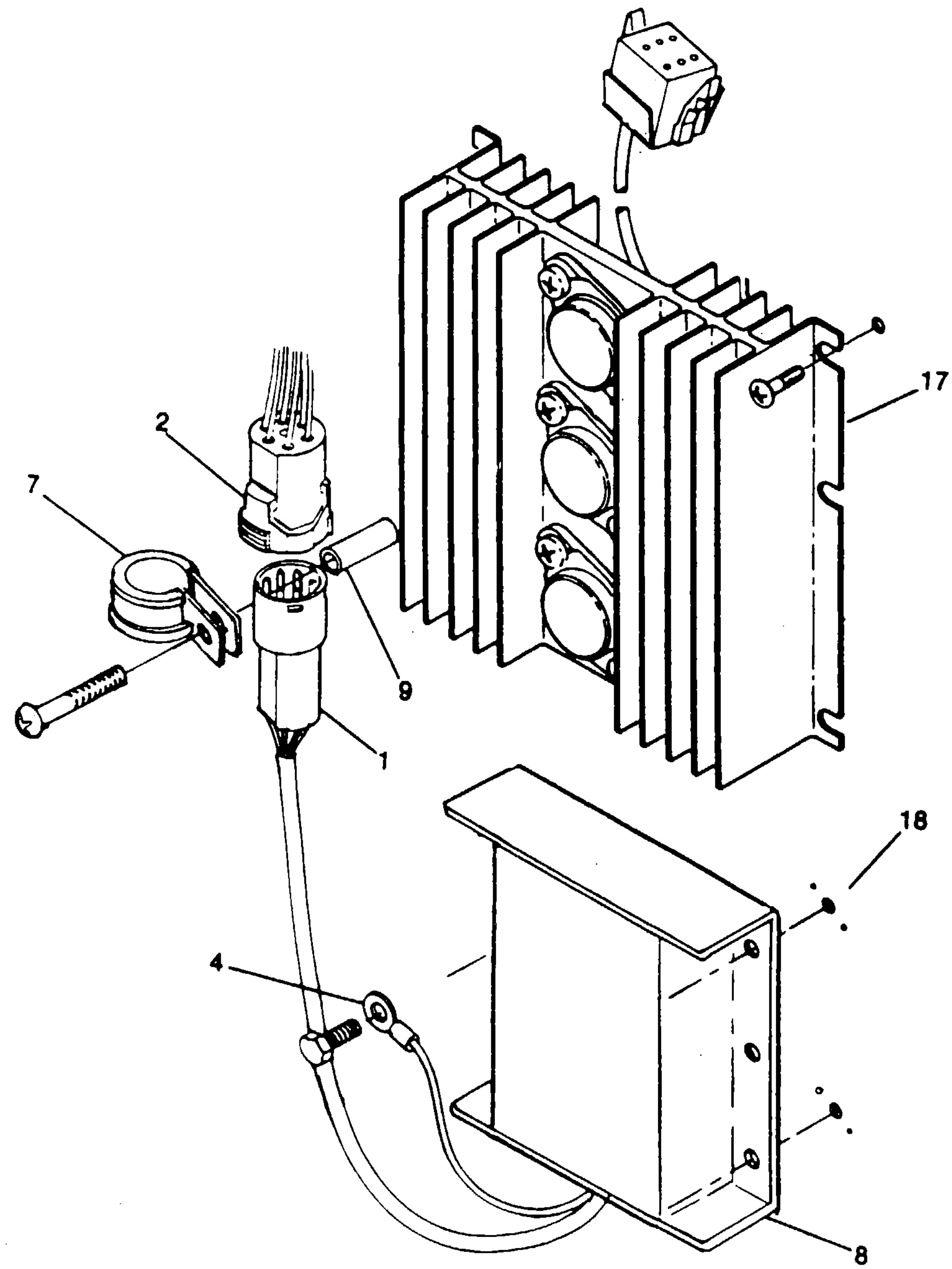
Figure 17-5. Voltage Regulator/Alternator Control Unit Installation (Sheet 1 of 3)



1979 THRU 1980 MODELS

Detail A

Figure 17-5. Voltage Regulator/Alternator Control Unit Installation (Sheet 2 of 3)

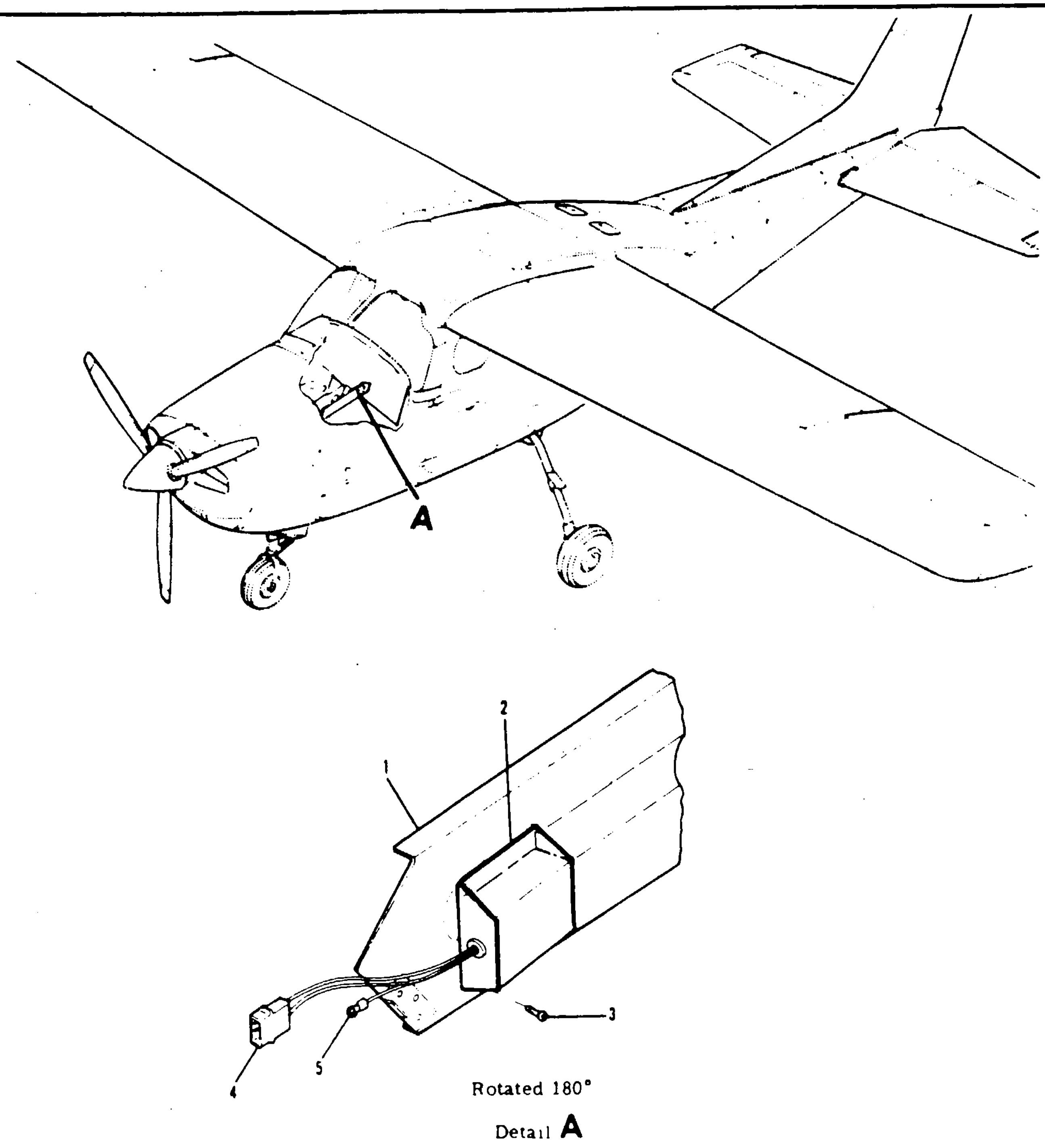


Detail **A**

BEGINNING WITH 1981 MODELS

17. Heat Sink
18. Battery Box (Aft Side)

Figure 17-5. Voltage Regulator, Alternator Control Unit Installation (Sheet 3 of 3)



1. Support
2. Sensor
3. Screw
4. Housing - Cap
5. Ground Wire

Figure 17-6. Over-Voltage Sensor Installation

17-47A. STANDBY GENERATOR SYSTEM.

17-47B. DESCRIPTION. The standby generator system may be installed on the aircraft beginning with 1980 models. The system provides a 24 volt DC, 7-amp capacity of standby power for the following essential electrical and avionic equipment in the event event the main electrical system cannot be used; gear warning, stall warning, fuel quantity, turn coordinator, engine oil and cylinder head temp, also circuit breaker (radio 3) and (radio 1 or 2). The system consists of a standby generator, mounted on the engine accessory case, a voltage regulator, mounted on the upper right hand portion of the firewall, a two-position toggle OFF-ON switch and a two-position toggle radio selector switch (labeled NC1/NC2) installed on the circuit breaker panel. For trouble shooting and adjustments refer to the Standby Generator Charging Systems Manual, D5021-13, dated 15 September 1979.

17-47C. REMOVAL AND INSTALLATION. Refer to figure 17-6A.

17-47D. DUAL ALTERNATOR SYSTEM.

17-47E. DESCRIPTION. The dual alternator system consists of two belt-driven, 28 volt, 60 amp alternators, two alternator control units, two shunt and fuse assemblies, two line contactors, two alternator switches, two circuit breakers, a volt ammeter, a three light indicating system and a alternator restart system.

17-47F. ALTERNATORS.

17-47G. DESCRIPTION. The alternators are belt-driven, 28 volt, 60 amp, three-phase, Delta connected stator windings with integral silicon diode rectifiers and a stator tap.

NOTE

Alternators are equal in function & capability, and normally operate under equal loads. Each may operate independently, but should not be thought of or operated as, a primary and secondary (or standby) system.

17-47H. REMOVAL AND INSTALLATION. (See figure 17-6B.)

17-47I. ALTERNATOR CONTROL UNITS.

17-47J. DESCRIPTION. The alternator control units are solid state voltage regulators with low voltage sensing internal paralleling circuitry in the alternator control units controls load sharing between the alternators.

17-47K. REMOVAL AND INSTALLATION. (See figure 17-6B.)

17-47L. ALTERNATOR CONTACTORS AND SHUNTS

17-47M. DESCRIPTION. Each alternator is equipped with a contactor and shunt. The shunt directs power through two fuses to the alternator control unit remote sensing and current sensing circuits. The shunt is also connected through fuses to the volt-ammeter selector switch which enables the pilot to monitor the electrical system operation.

17-47N. REMOVAL AND INSTALLATION. (See figure 17-6B.)

17-47O. VOLT-AMMETER.

17-47P. DESCRIPTION. The volt-ammeter is mounted on the left side of the instrument panel. A selector switch is provided for the pilot to monitor the electrical system operation. The selector switch allows the pilot to monitor the current supplied by each alternator, the battery charge or discharge current, or the system voltage.

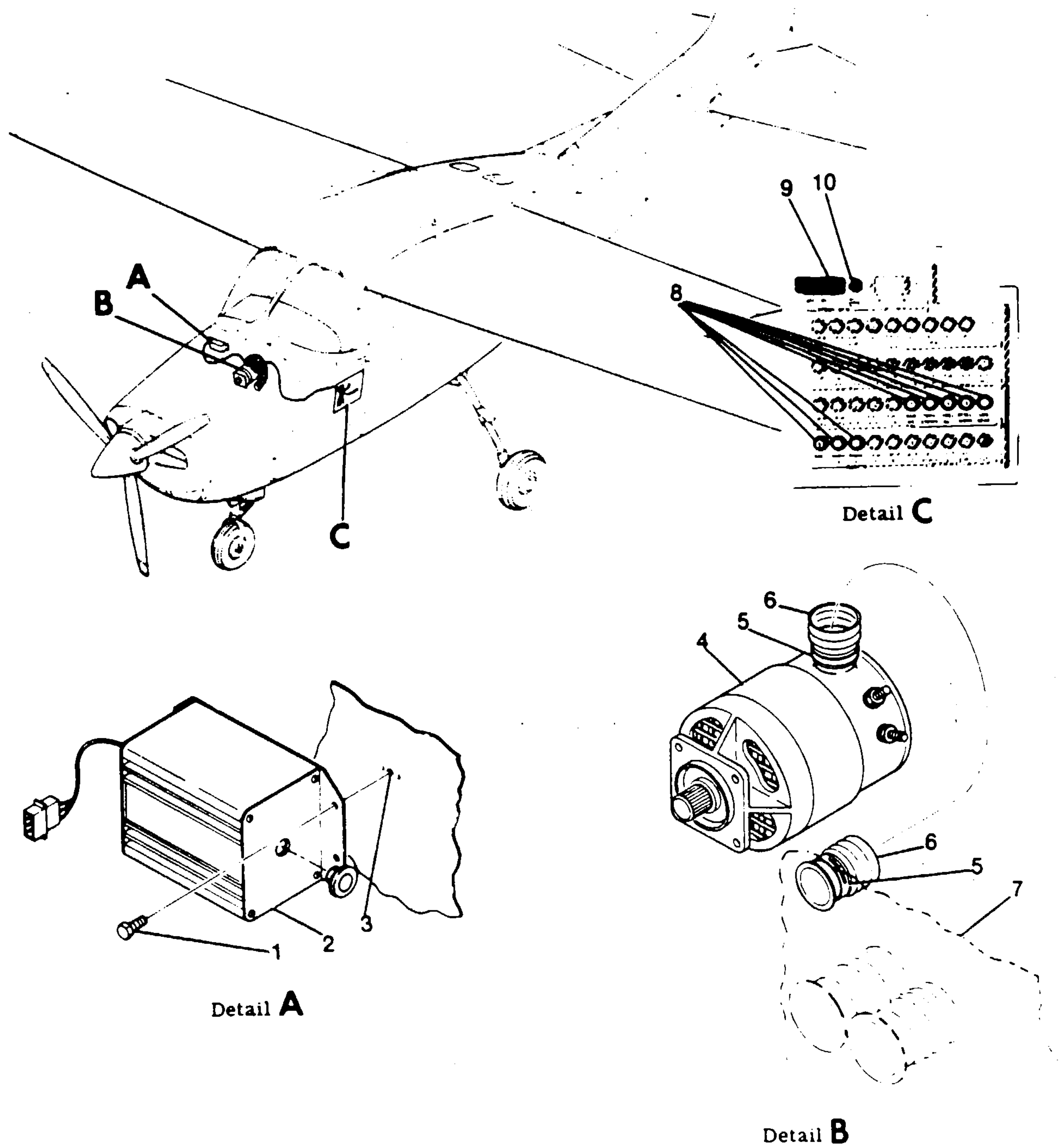
17-47Q. ALTERNATOR RESTART SYSTEM. The alternator restart system consists of a battery pack and a switch. When the restart switch, on the circuit breaker panel is actuated, power is directed from the battery pack through the restart switch to the alternator switch. With the alternator switch closed power is directed to the alternator control unit then to the alternator field for excitation of the alternator.

NOTE

Batteries should be changed at yearly intervals or sooner if function test shows need. Correct polarity must be observed when installing batteries. No. 814 Ray-O-Vac or No. MN1400 Mallory or equivalent to No. E-93 Everready Batteries are recommended.

WARNING

Do not rely on contact between battery holder (81) and plate (82) to maintain spring contact on batteries. If required, end plates of the battery holder may be reformed inward slightly to increase contact pressure on batteries. Check continuity of battery pack before installation with battery pack suspended from plate and with curvature of plate reversed as in normal installation.



1. Bolt
2. Voltage Regulator
3. Rivnut
4. Generator
5. Clamp
6. Cooling Hose
7. Engine Baffle
8. Circuit Breakers
9. OFF-ON Switch
10. NC 1/NC 2 Switch

Figure 17-6A. Standby Generator System Installation.

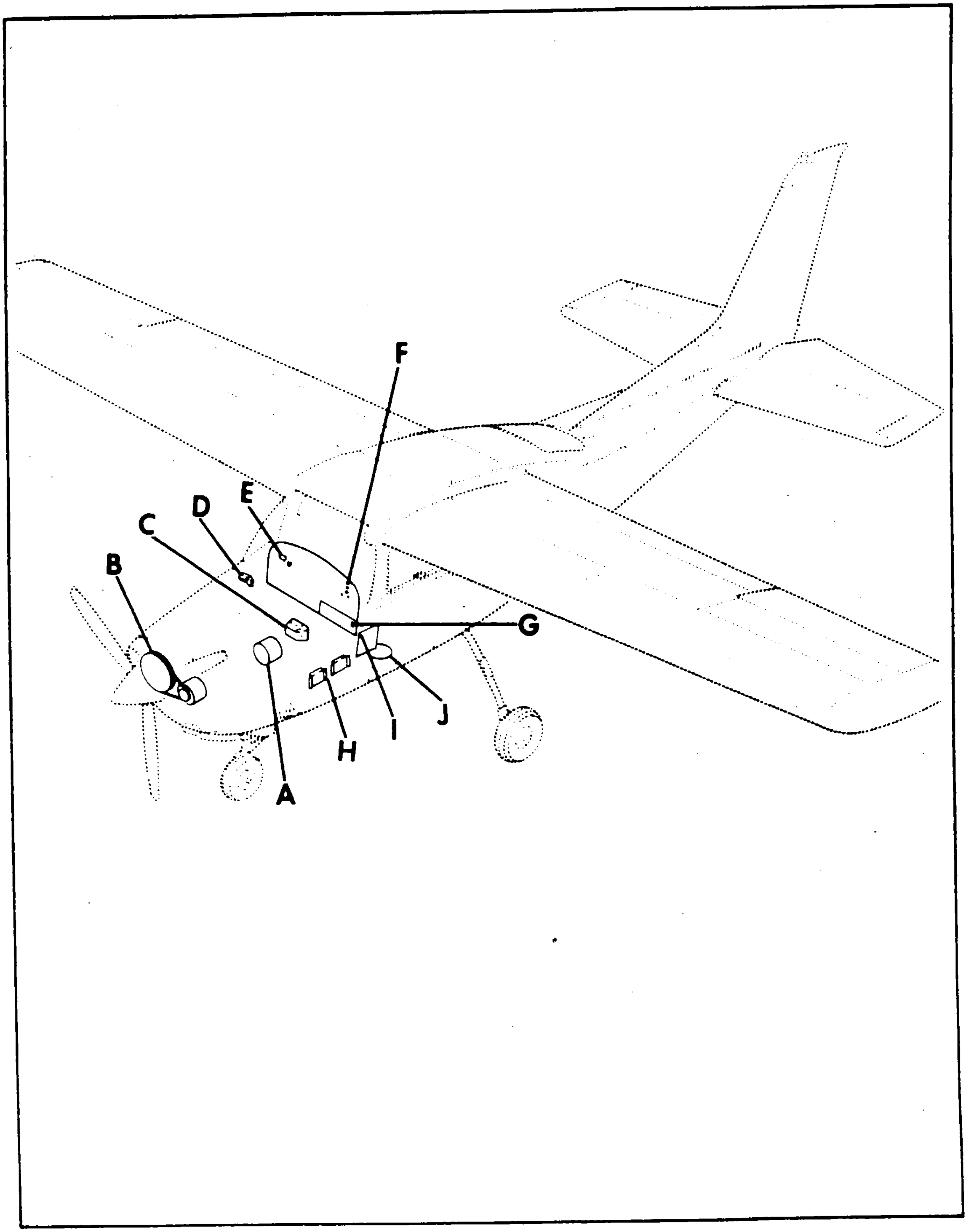
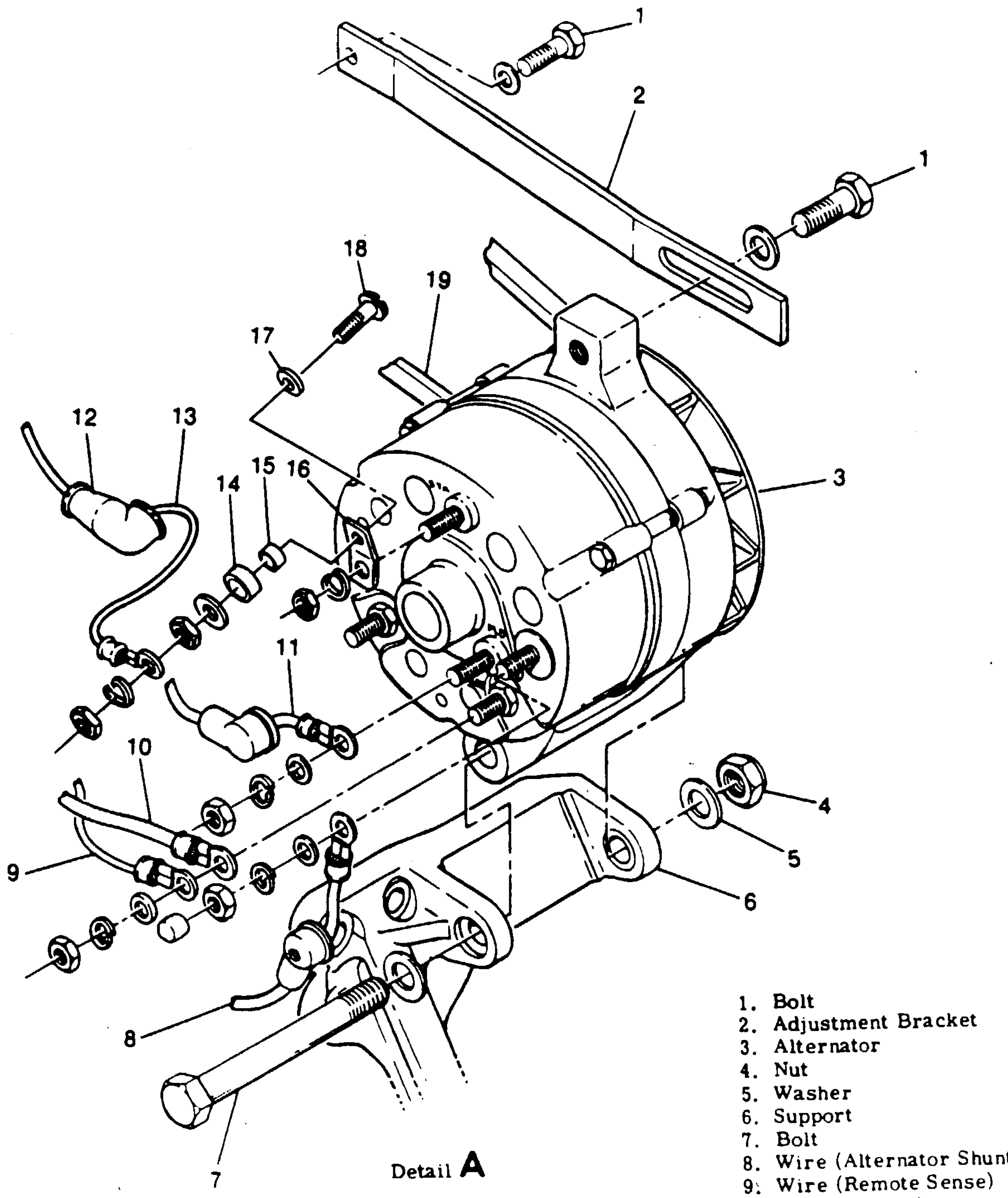
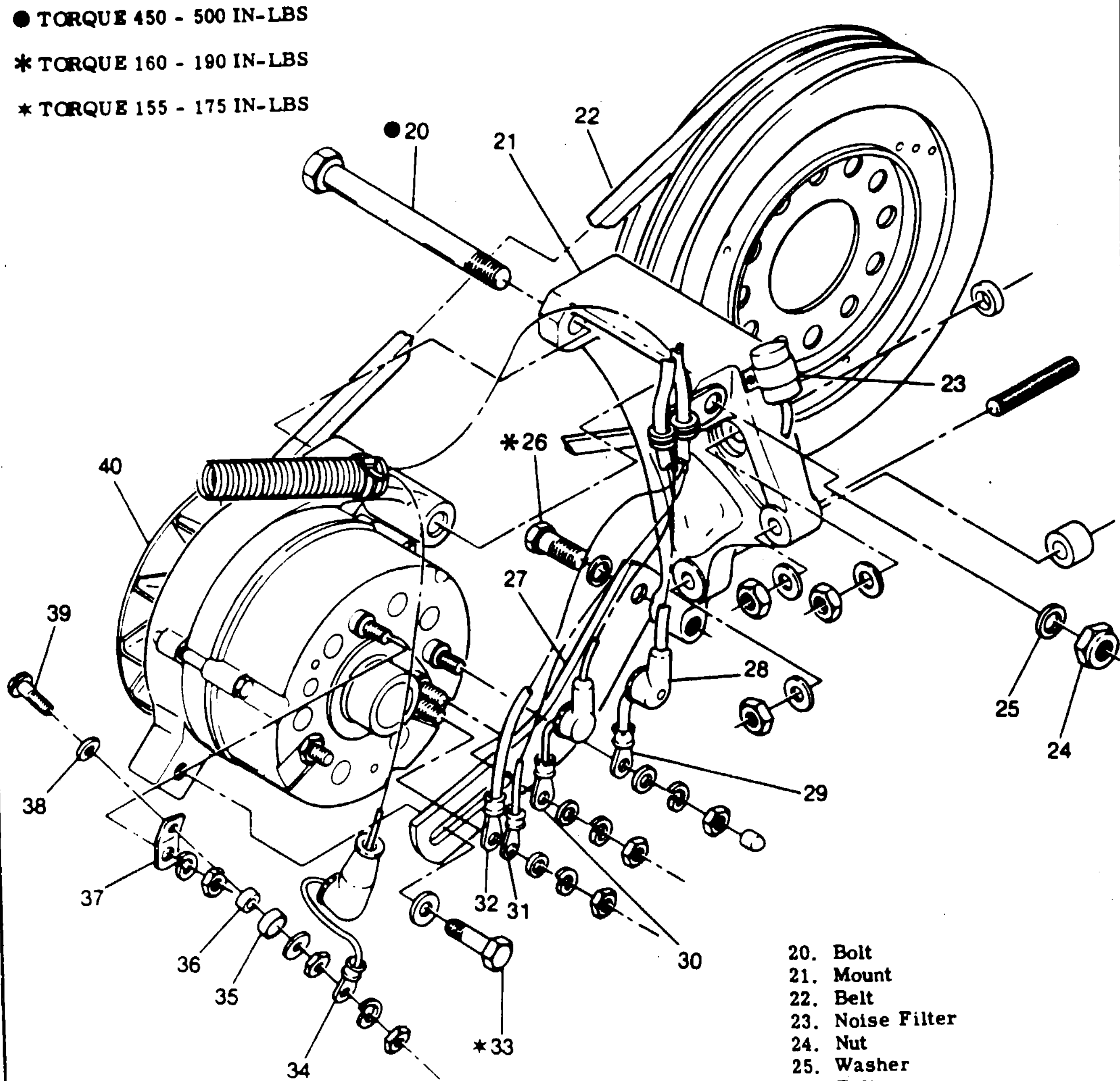


Figure 17-6B. Dual Alternator System Installation (Sheet 1 of 8)



1. Bolt
2. Adjustment Bracket
3. Alternator
4. Nut
5. Washer
6. Support
7. Bolt
8. Wire (Alternator Shunt)
9. Wire (Remote Sense)
10. Wire (Ground)
11. Wire (Field)
12. Nipple
13. Wire (Alt OFF Sense)
14. Resistor
15. Insulator
16. Resistor
17. Washer
18. Screw
19. Belt

Figure 17-6B. Dual Alternator System Installation (Sheet 2 of 8)

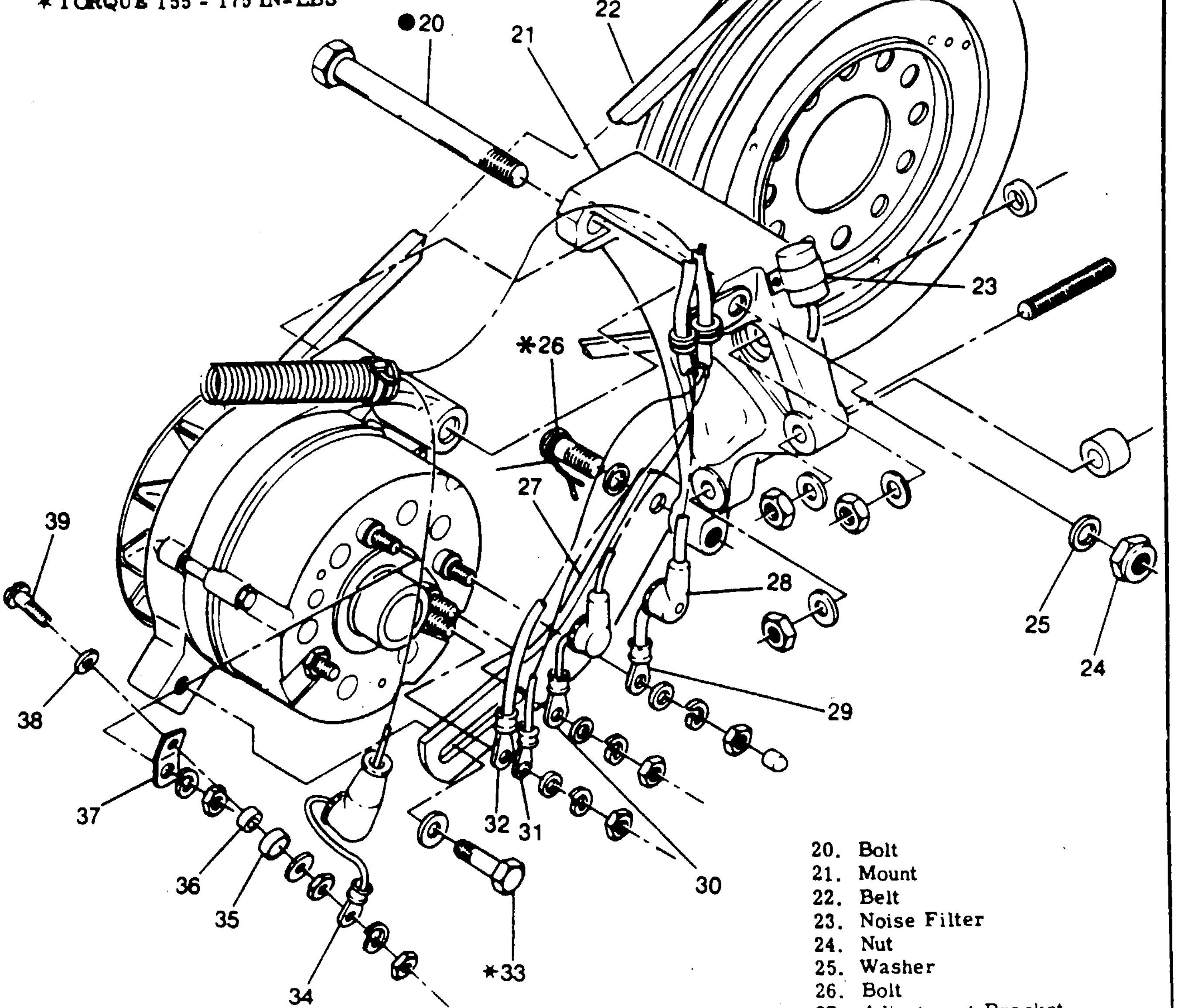


20. Bolt
21. Mount
22. Belt
23. Noise Filter
24. Nut
25. Washer
26. Bolt
27. Adjustment Bracket
28. Nipple
29. Wire (Alternator Shunt)
30. Wire (Field)
31. Wire (Remote Sense)
32. Wire (Ground)
33. Bolt
34. Wire (Alt OFF Sense)
35. Resistor
36. Insulator
37. Resistor
38. Washer
39. Screw
40. Alternator

Detail **B**

THRU P21000769

Figure 17-6B. Dual Alternator System Installation (Sheet 3 of 8)

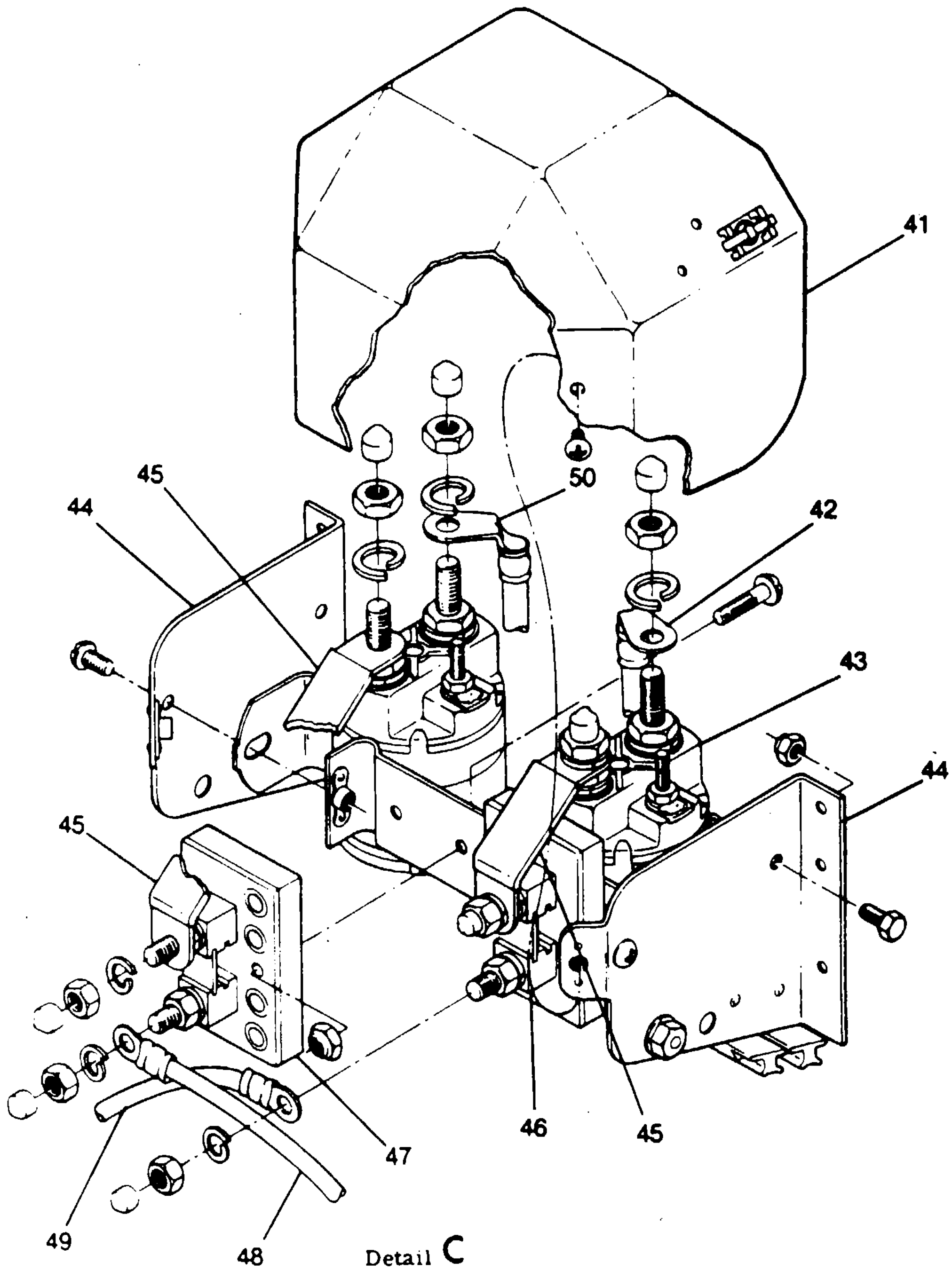


20. Bolt
21. Mount
22. Belt
23. Noise Filter
24. Nut
25. Washer
26. Bolt
27. Adjustment Bracket
28. Nipple
29. Wire (Alternator Shunt)
30. Wire (Field)
31. Wire (Remote Sense)
32. Wire (Ground)
33. Bolt
34. Wire (Alt OFF Sense)
35. Resistor
36. Insulator
37. Resistor
38. Washer
39. Screw
40. Safety Wire

Detail B

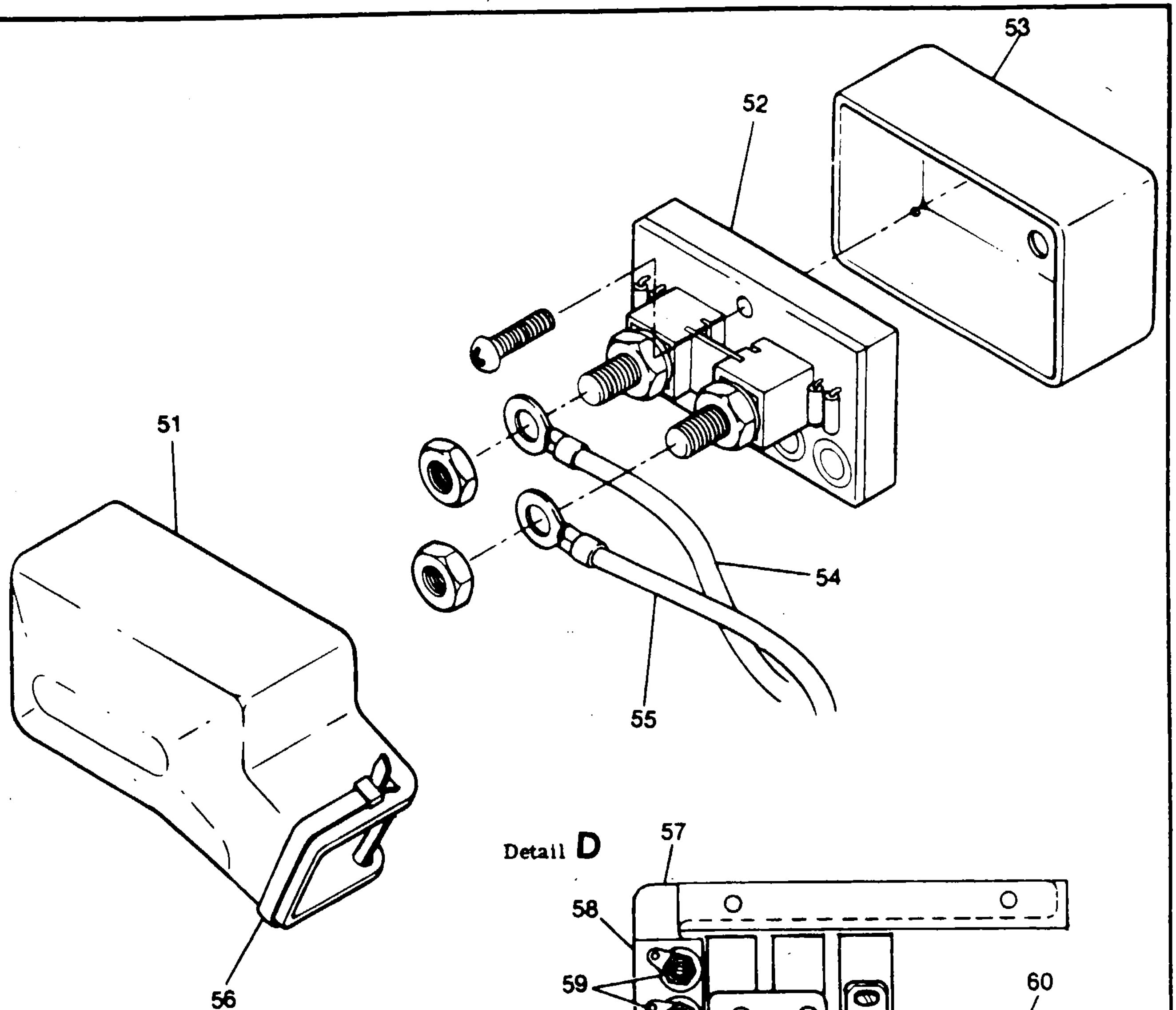
BEGINNING WITH P21000770

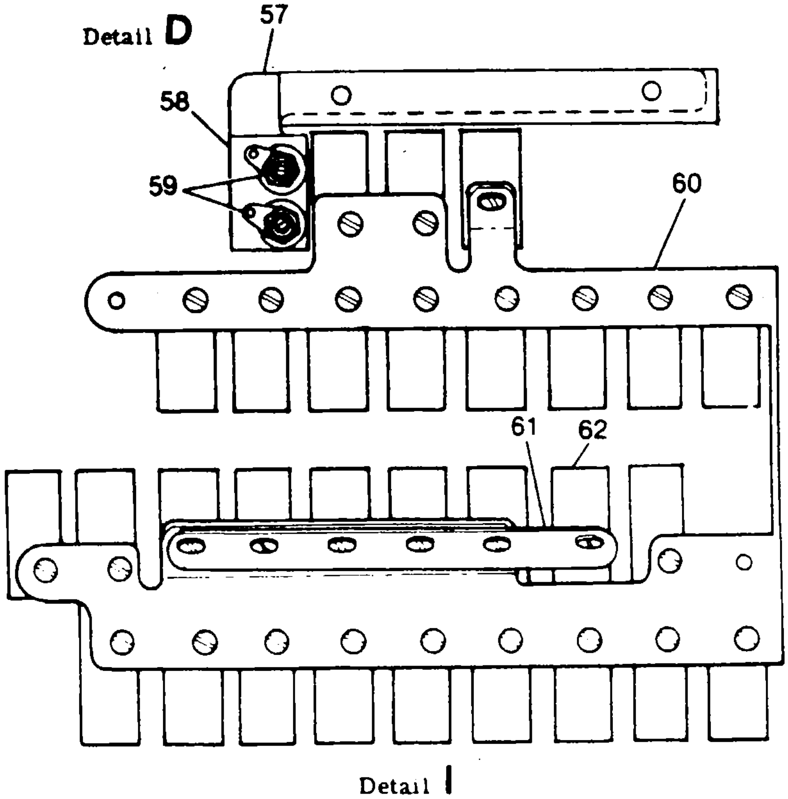
Figure 17-6B. Dual Alternator System Installation (Sheet 4 of 8)



41. Cover
42. Wire (Circuit Breaker)
43. Contactor (Alternator No. 2)
44. Bracket
45. Bus Bar
46. Shunt (Alternator No. 2)
47. Shunt (Alternator No. 1)
48. Wire (to Alternator No. 1)
49. Wire (to Alternator No. 2)
50. Wire (Circuit Breaker)

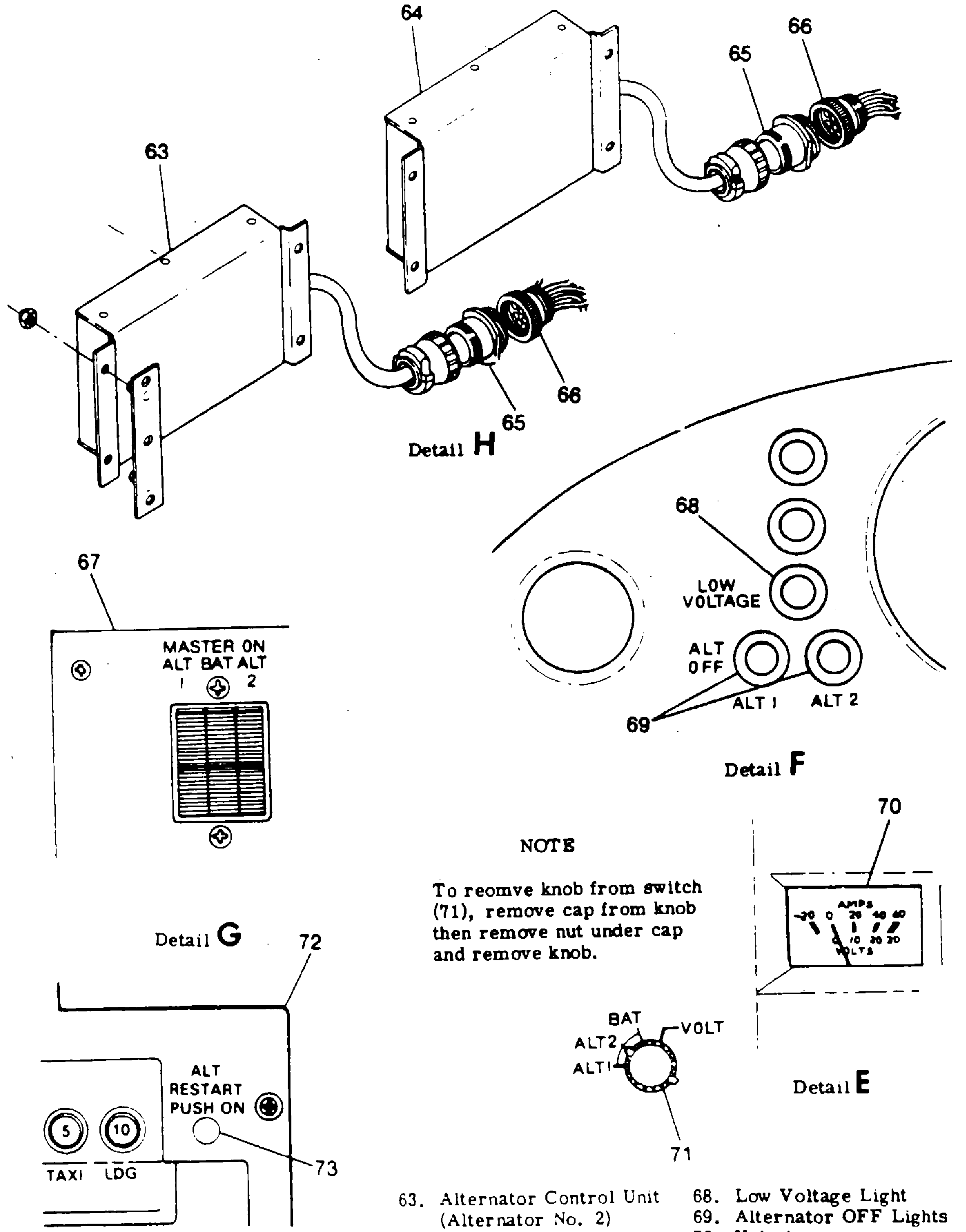
Figure 17-6B. Dual Alternator System Installation (Sheet 5 of 8)





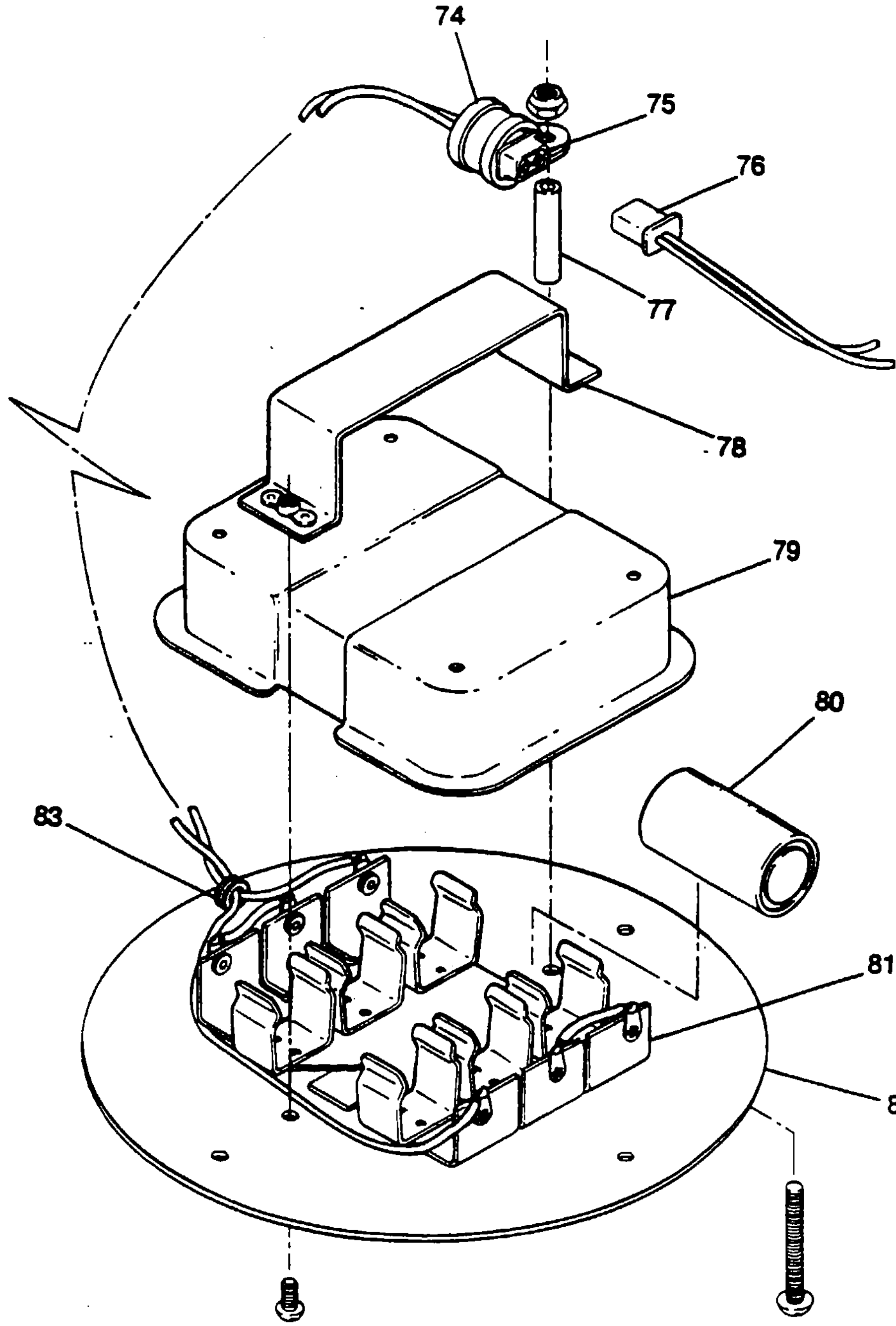
51. Cover
52. Shunt (Battery)
53. Sleeve
54. Wire (to Main Bus)
55. Wire (to Battery Contactor)
56. Tie
57. Strap
58. Insulator
59. Diodes
60. Bus Bar
61. Bus Bar (Dual Alternator only)
62. Isolation Circuit Breaker

Figure 17-6B. Dual Alternator System Installation (Sheet 6 of 8)



63. Alternator Control Unit (Alternator No. 2)
64. Alternator Control Unit (Alternator No. 1)
65. Housing Plug
66. Housing Cap
67. Switch Panel
68. Low Voltage Light
69. Alternator OFF Lights
70. Volt Ammeter
71. Selector Switch
72. Circuit Breaker Panel
73. Alternator Restart Switch

Figure 17-6B. Dual Alternator System Installation (Sheet 7 of 8)



Detail J

74. Housing Cap
75. Clamp
76. Housing Plug
77. Spacer
78. Bracket
79. Cover
80. Battery
81. Battery Holder
82. Plate
83. Grommet

Figure 17-6B. Dual Alternator System Installation (Sheet 8 of 8)

17-48. AIRCRAFT LIGHTING SYSTEM.

17-49. DESCRIPTION. The aircraft lighting system consists of landing and taxi lights, navigation ·hts, flashing beacon light, anti-collision strobe ·ts, interior and instrument panel flood lights, e..ctroluminescent panel lighting, instrument post lighting, pedestal lights, oxygen lights, courtesy lights, de-ice light, control wheel map light, baggage compartment light, compass and radio dial ·hts.

17-50. SWITCHES.

17-51. DESCRIPTION. The instrument panel switches used are snap-in type rocker switches. These switches have a design feature which permits them to snap into the panel from the panel side and can subsequently be removed for easy maintenance. These switches also feature spade type slip-on terminals.

;2. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
LANDING AND TAXI LIGHTS OUT.	Short circuit in wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is OK, proceed to step 3.
	Defective wiring.	2. Test each circuit separately until short is located. Repair or replace wiring.
	Defective switch.	3. Check voltage at lights with master and landing and taxi light switches ON. Should read battery voltage. Replace switch.
LANDING OR TAXI LIGHT OUT.	Lamp burned out.	1. Test lamp with ohmmeter or new lamp. Replace lamp.
	Open circuit in wiring.	2. Test wiring for continuity. Repair or replace wiring.
FLASHING BEACON DOES NOT LIGHT.	Short circuit in wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is OK, proceed to step 3.
	Defective wiring.	2. Test circuit until short is located. Repair or replace wiring.
	Lamp burned out.	3. Test lamp with ohmmeter or a new lamp. Replace lamp. If lamp is good, proceed to step 4.
	Open circuit in wiring.	4. Test circuit from lamp to flasher for continuity. If no continuity is present, repair or replace wiring. If continuity is present, proceed to step 5.
	Defective switch.	5. Check voltage at flasher with master and beacon switch on. Should read battery voltage. Replace switch. If voltage is present, proceed to step 6.
	Defective flasher.	6. Install new flasher.
FLASHING BEACON CONSTANTLY LIT.	Defective flasher.	1. Install new flasher.

17-52. TROUBLE SHOOTING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
ALL NAV LIGHTS OUT.	Short circuit in wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is OK, proceed to step 3.
	Defective wiring.	2. Isolate and test each nav light circuit until short is located. Repair or replace wiring.
	Defective switch.	3. Check voltage at nav light with master and nav light switches on. Should read battery voltage. Replace switch.
ONE NAV LIGHT OUT.	Lamp burned out.	1. Inspect lamp. Replace lamp.
	Open circuit in wiring.	2. Test wiring for continuity. Repair or replace wiring.
WARNING The anti-collision system is a high voltage device. Do not remove or touch tube assembly while in operation. Wait at least 5 minutes after turning off power before starting work.		
BOTH ANTI-COLLISION STROBE LIGHTS WILL NOT LIGHT.	Open circuit breaker.	1. Check, if open reset. If circuit breaker continues to open proceed to step 2.
		2. Disconnect red wire between aircraft power supply (battery/external power) and strobe power supplies, one at a time. If circuit breaker opens on one strobe power supply, replace strobe power supply. If circuit breaker opens on both strobe power supplies proceed to step 3. If circuit breaker does not open proceed to step 4.
		3. Check aircraft wiring. Repair or replace as necessary.
		4. Inspect strobe power supply ground wire for contact with wing structure.

17-52. TROUBLE SHOOTING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
CAUTION Extreme care should be taken when exchanging flash tube. The tube is fragile and can easily be cracked in a place where it will not be obvious visually. Make sure the tube is seated properly on the base of the nav light assembly and is centered in the dome. NOTE When checking defective power supply and flash tube, units from opposite wing may be used. Be sure power leads are protected properly when unit is removed to prevent short circuit.		
ONE ANTI-COLLISION STROBE LIGHT WILL	Defective Strobe Power Supply, or flash tube.	1. Connect voltmeter to red lead between aircraft power supply (battery/external power) and strobe power supply, connecting negative lead to wing structure. Check for 12/24 volts. If OK proceed to step 2. If not, check aircraft power supply (battery/external power).
		2. Replace flash tube with known good flash tube. If system still does not work, replace strobe power supply.
DOME LIGHT TROUBLE.	Short circuit in wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is OK, proceed to step 3.
	Defective wiring.	2. Test circuit until short is located. Repair or replace wiring.
		3. Test for open circuit. Repair or replace wiring. If no short or open circuit is found, proceed to step 4.
	Lamp burned out.	4. Test lamp with ohmmeter or new lamp. Replace lamp.
	Defective switch.	5. Check for voltage at dome light with master and dome light switch on. Should read battery voltage. Replace switch.

17-52. TROUBLE SHOOTING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
ELECTROLUMINESCENT PANELS WILL NOT LIGHT.	Short circuit in wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is OK, proceed to step 3.
	Defective wiring.	2. Test circuit until short is located. Repair or replace wiring. 3. Test for open circuit. Repair or replace wiring. If no open or short circuit is found, proceed to step 4.
	Defective resistor.	4. Check resistor for continuity. (Located in line between rheostat and inverta-pak.) Replace resistor.
	Defective rheostat.	5. Check input voltage at inverta-pak with master switch on. Voltmeter should give a smoothly varied reading over the entire control range of the rheostat. If no voltage is present or voltage has a sudden drop before rheostat has been turned full counterclockwise, replace rheostat.
	Defective inverta-pak.	6. Check output voltage at inverta-pak with ac voltmeter. Should read about 125 volts ac with rheostat set for full bright. Replace inverta-pak.
INSTRUMENT LIGHTS WILL NOT LIGHT.	Short circuit wiring.	1. Inspect circuit breaker. If circuit breaker is open, proceed to step 2. If circuit breaker is OK, proceed to step 3.
	Defective wiring.	2. Test circuit until short is located. Repair or replace wiring. 3. Test for open circuit. Repair or replace wiring. If no short or open circuit is found, proceed to step 4.
	Faulty section in dimming potentiometer.	4. Lights will work when control is placed in brighter position. Replace potentiometer.
	Faulty light dimming transistor.	5. Test both transistors with new transistor. Replace faulty transistor.
	Faulty selector switch.	6. Inspect. Replace switch.

17-52. TROUBLE SHOOTING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
INSTRUMENT LIGHTS WILL NOT DIM.	Open resistor or wiring in minimum intensity end of potentiometer.	1. Test for continuity. Replace resistor or repair wiring.
	Shorted transistor.	2. Test transistor by substitution. Replace defective transistor.
CONTROL WHEEL MAP LIGHT WILL NOT LIGHT.	Nav light switch turned off.	1. Nav light switch has to be ON before map light will light.
	Short circuit in wiring.	2. Check lamp fuse on terminal board located on back of stationary panel with ohmmeter. If fuse is open, proceed to step 3. If fuse is OK, proceed to step 4.
	Defective wiring.	3. Test circuit until short is located. Repair or replace wiring. 4. Test for open circuit. Repair or replace wiring. If a short or open circuit is not found, proceed to step 5.
	Defective map light assembly.	5. Check voltage at map light assembly with master and nav switches on. If battery voltage is present, replace map light assembly.

17-53. LANDING AND TAXI LIGHTS.

17-54. DESCRIPTION. The landing and taxi lights are mounted in the lower nose cap. Both lamps are used for landing and only the left hand for taxi. The lamps are controlled by two rocker switches with a diode assembly installed across the switches which enables the landing light switch to turn on both the landing and taxi lamps. The taxi light switch will turn on only the taxi lamp.

17-55. REMOVAL AND INSTALLATION. (Refer to figure 17-7.)

a. Thru 1979 Models.
1. Remove screws (8) securing cover (1) to nose cap.
2. Pull light assembly forward from nose cap and disconnect lamp electrical leads.
3. Remove screws (9) from lamp assembly and remove lamp assembly.
4. Remove screws (2) from plate (3) and disassemble lamp assembly.
5. Install new lamp and reassemble.

b. Beginning with 1980 Models.
1. Remove screws (10) and remove cover (11).
2. Remove screws (12) and note position of washers (15) and or spacers (17) for installation.
3. Remove screws (20) then remoce retainer (16) and Gasket (18).
4. Pull lamp (4) from cover (19) and disconnect electrical leads.
5. Install new lamp and reassemble making sure washers (15) and or spacers (17) are in the proper position.

17-56. NAVIGATION LIGHTS.

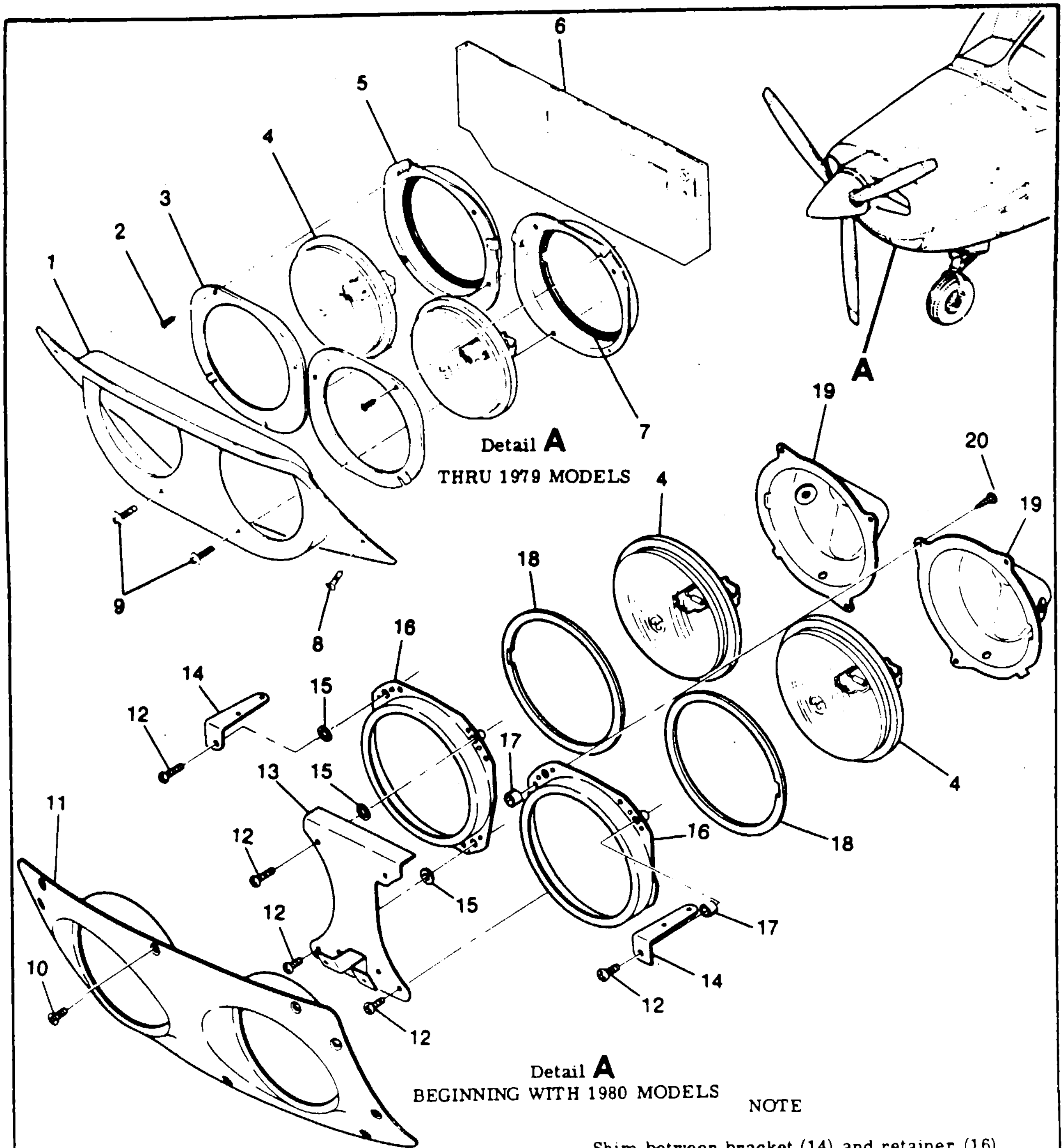
17-57. DESCRIPTION. The navigation lights are located on each wing tip and the stinger. Operation of the lights is controlled by a single two position switch. A plastic light detector on each wing tip allows the pilot to determine if the lamps are working properly during flight.

17-58. REMOVAL AND INSTALLATION. Refer to figure 17-8 for removal and installation of navigation light components.

17-59. ANTI-COLLISION STROBE LIGHTS.

17-60. DESCRIPTION. A white strobe light may be installed on each wing tip with the navigation light. These lights are vibration resistant and operate on the principle of a capacitor discharge into a zenon tube, producing an extremely high intensity flash. Each strobe light has its own power supply mounted on the wing tip ribs.

17-61. TROUBLE SHOOTING. Refer to paragraph 17-52 for trouble shooting of the anti-collision strobe lights.

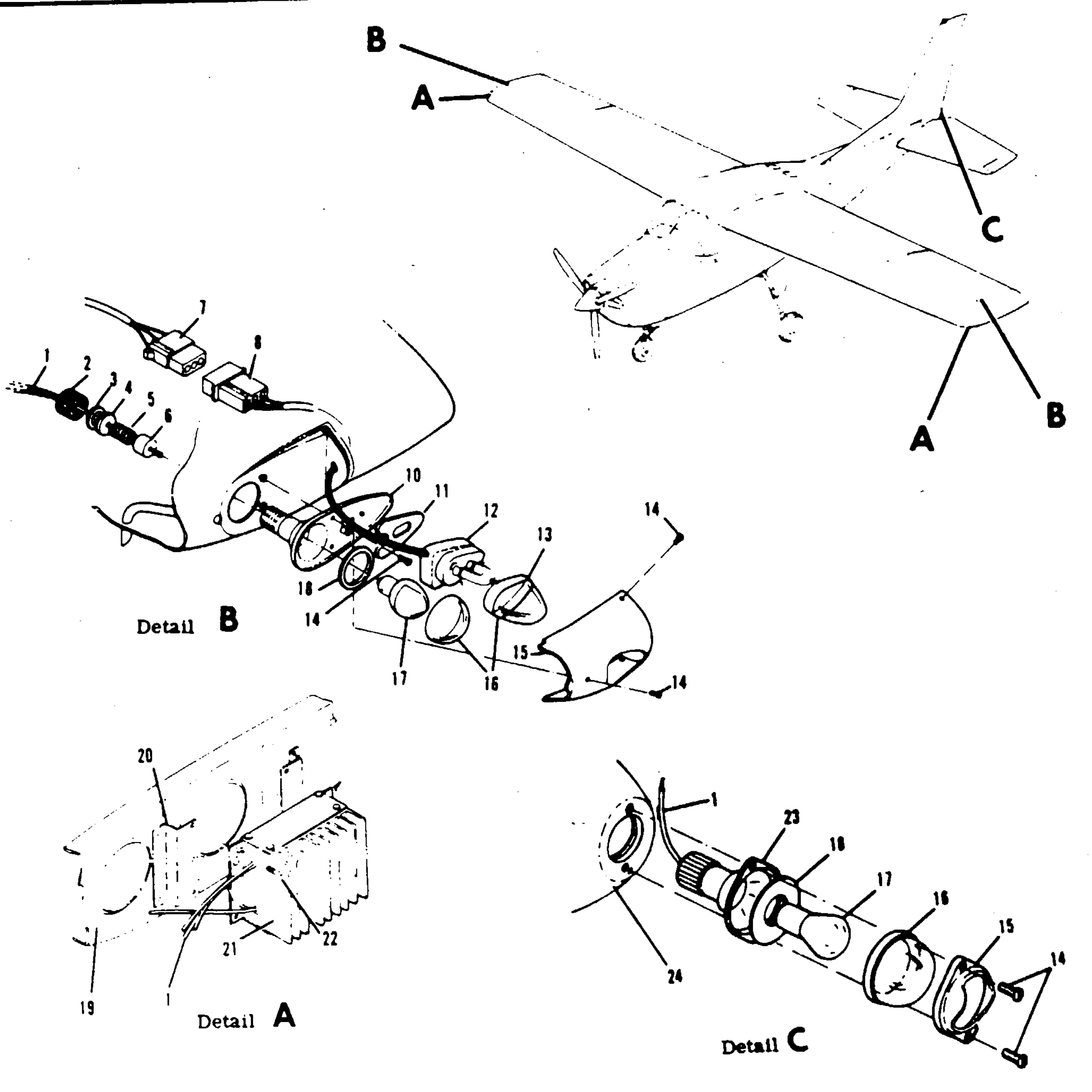


NOTE

Shim between bracket (14) and retainer (16) with a equal number of AN960-10L washers (15) at all six locations as required so bottom of retainer (16) is 0.00 to 0.30 aft of cover (11).

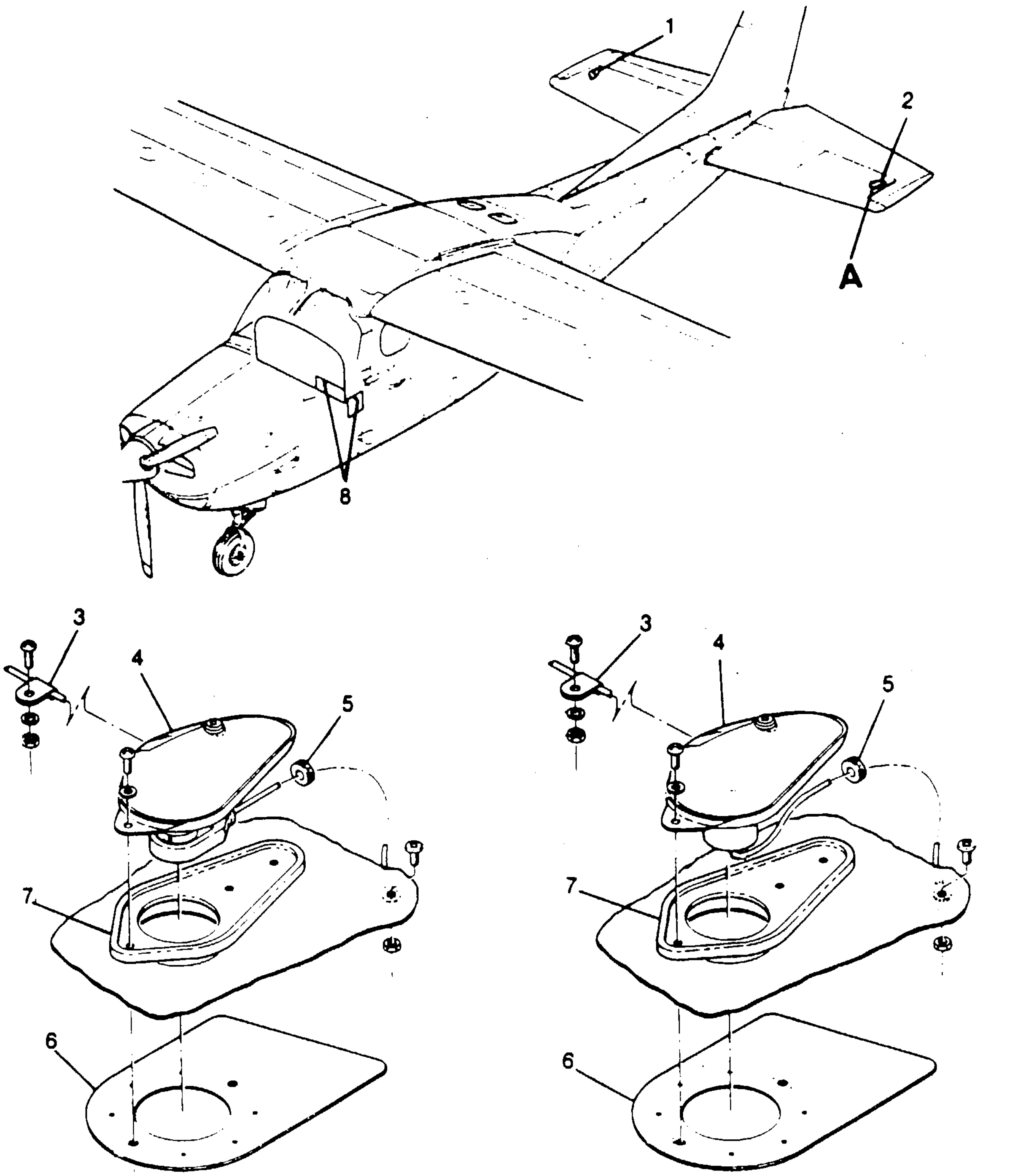
1. Cover
2. Screw
3. Plate
4. Lamp
5. Bracket
6. Shield
7. Gasket
8. Screw
9. Screw
10. Screw
11. Cover
12. Screw
13. Bracket Assembly
14. Bracket
15. Washer
16. Retainer
17. Spacer
18. Gasket
19. Cover Assembly
20. Screw

Figure 17-7. Landing and Taxi Light Installation



1. Electrical Leads
2. Cap
3. Washer
4. Insulated Washer
5. Spring
6. Insulator
7. Housing - Plug
8. Housing - Cap
9. Wing Tip
10. Socket
11. Spacer
12. Flash Tube
13. Gasket
14. Screw
15. Lens Retainer
16. Lens
17. Bulb
18. Seal
19. Wing Tip Rib
20. Bracket
21. Power Supply
22. Screw
23. Socket - Tial
24. Stinger

Figure 17-8. Navigation, Flood and Anti-Collision Strobe Lights Installation (Sheet 1 of 2)

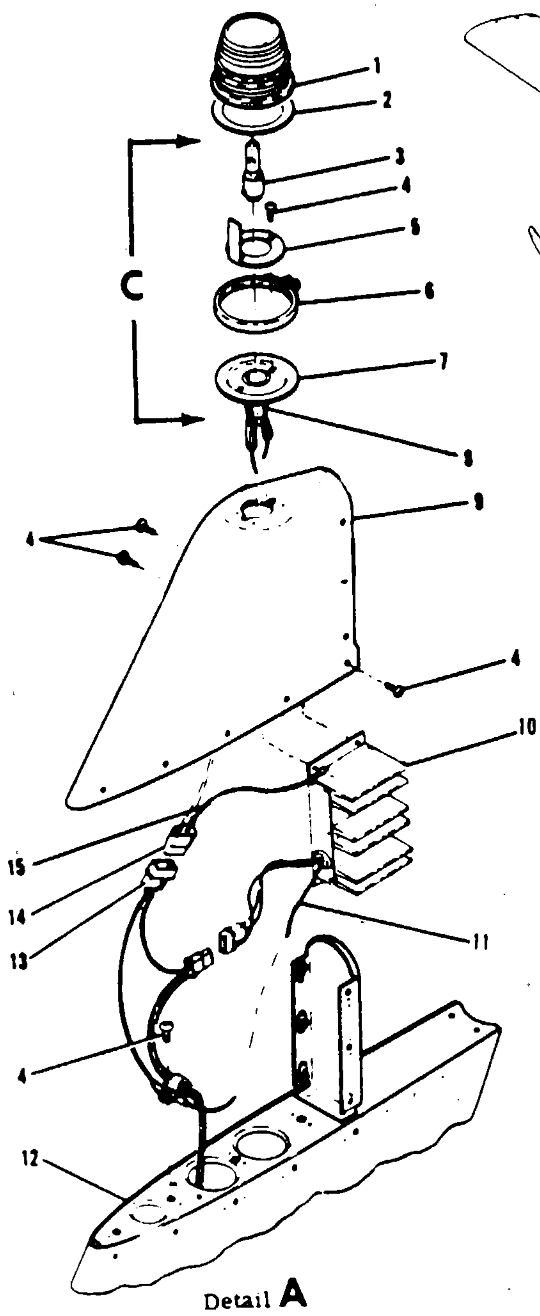


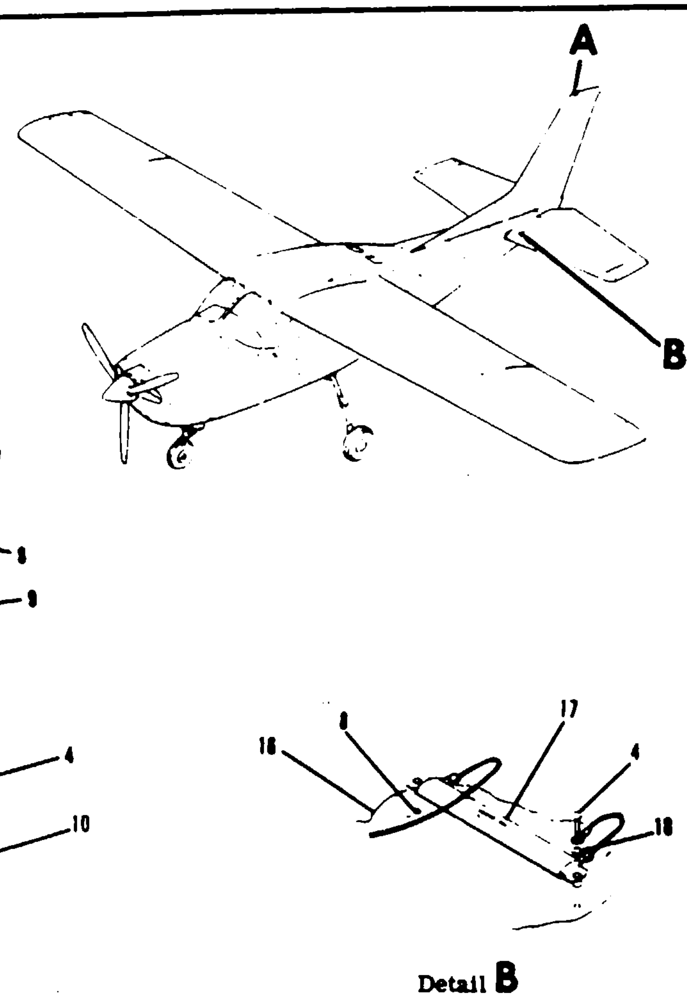
Detail **A**
THRU P21000605

Detail **A**
BEGINNING WITH P21000606

1. R H Light Assembly
2. L H Light Assembly
3. Clamp
4. Lens
5. Grommet
6. Doubler
7. Gasket
8. Switch & Circuit Breaker

Figure 17-8. Navigation, Flood and Anti-Collision Strobe Lights Installation (Sheet 2 of 2)





CAUTION

When inserting lamp into socket always use a handkerchief or a tissue to prevent getting fingerprints on the lamp.

NOTE

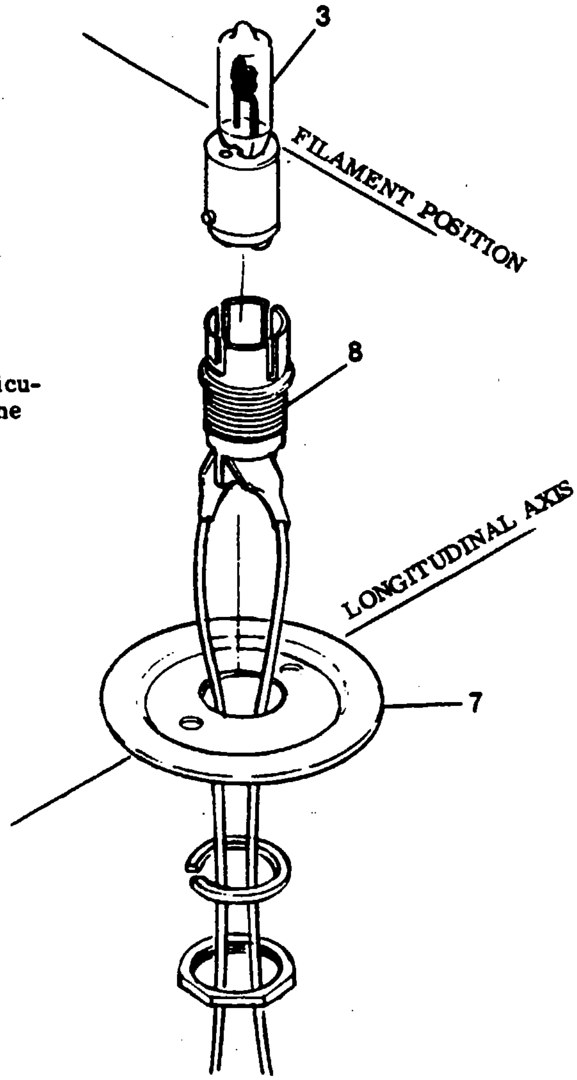
Fingerprints on lamp may shorten the life of the lamp.

1. Dome
2. Gasket
3. Lamp
4. Screw
5. Baffle
6. Clamp Assembly
7. Mounting Plate
8. Socket
9. Tip Assembly - Fin
10. Flasher Assembly
11. Ground Wire
12. Fin Assembly
13. Housing - Cap
14. Housing - Plug
15. Ground Wire
16. Stabilizer Skin - Upper
17. Resistor
18. Washer

Figure 17-9. Flashing Beacon Installation (Sheet 1 of 2)

NOTE

When installing lamp be sure socket assembly is installed in mounting plate so lamp may be installed with filament perpendicular to the longitudunal axis of the aircraft.



Detail C

Figure 17-9. Flashing Beacon Installation (Sheet 2 of 2)

17-62. REMOVAL AND INSTALLATION. Refer to figure 17-8 for removal and installation of strobe light components.

a. Remove wing tip disconnecting navigation and strobe light wires.
b. Disconnect power supply wires.
c. Remove the four mounting screws and remove power supply.
d. To reinstall reverse the preceding steps.

17-62A. VERTICAL TAIL FLOOD LIGHTS.

17-62B. DESCRIPTION. A flood light assembly is mounted on each end of the stabilizer, on the upper side. These lights are used to illuminate the vertical tail. A switch on the switch panel controls the lights, and a circuit breaker on the breaker panel protects the circuit.

17-62C. REMOVAL AND INSTALLATION. Refer to figure 17-8. for removal and installation.

17-63. FLASHING BEACON.

17-64. DESCRIPTION. The flashing beacon light is attached to the vertical fin tip. The flashing beacon has a iodine-vapor lamp electrically switched by a solid-state flasher assembly. The flasher assembly is mounted inside the fin tip. The switching frequency of the flasher assembly operates at approximately 45 flashes per minute. A resistor is installed and connected to the unused flasher lead to eliminate a pulsing effect on the cabin lighting and ammeter.

17-65. REMOVAL AND INSTALLATION. Refer to figure 17-9 for removal and installation of flashing beacon components.

17-66. INSTRUMENT LIGHTING.

17-67. DESCRIPTION. The instrument panel lighting consists of two separate sections. The lower two-thrids of the panel is illuminated by two lights mounted in the overhead console. The lighting for the upper one-third of the panel is provided by four lights mounted in the under side of the instrument glare shield. The intensity of the lighting is controled by the instrument light dimming rheostat, located on the switch panel.

17-68. REMOVAL AND INSTALLATION. Refer to figure 17-10 for removal and installation of instrument brow lights.

17-69. REMOVAL AND INSTALLATION OF OVER-HEAD CONSOLE INSTRUMENT PANEL LIGHTS.

a. Unscrew cabin flood light lens and remove.
b. Loosen set screw and remove cabin flood light control knob.
c. Unscrew two air outlets at forward end of console.
d. Remove screws from the over-head console cover and remove cover.
e. Twist lamp for removal from socket assembly.
f. For installation, reverse the preceding steps.

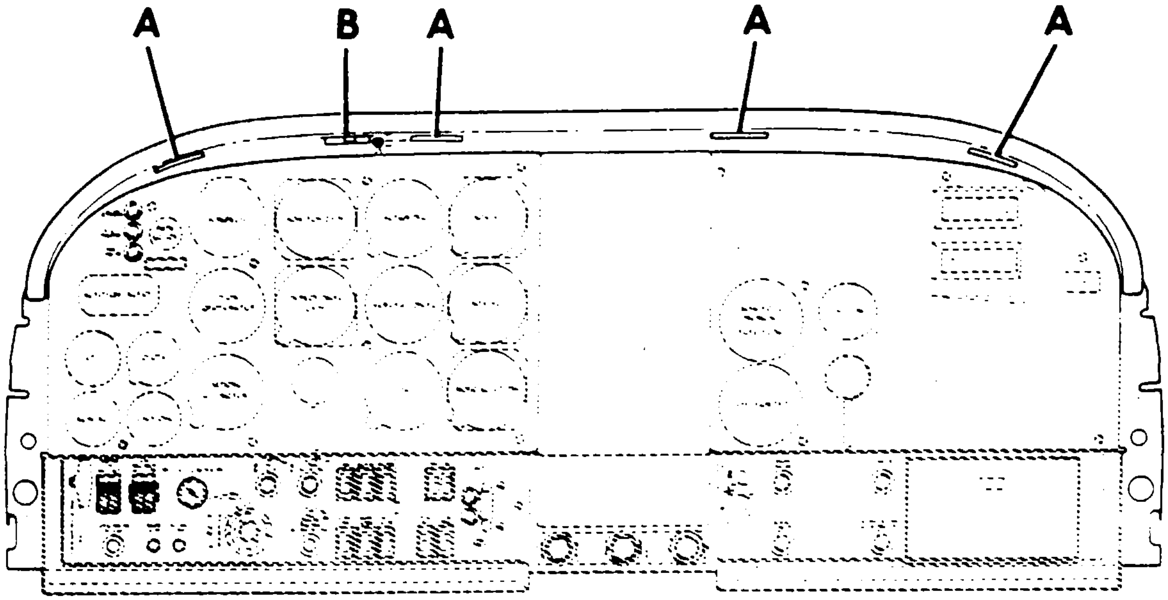
17-70. FLOOD LIGHT.

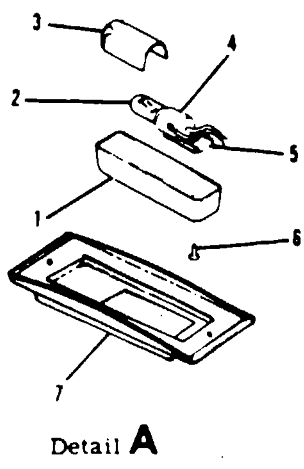
17-71. DESCRIPTION. A cabin flood light is mounted on the over-head console. The lamp is controlled by a rheostat switch mounted adjacent to the light. For removal refer to figure 17-11.

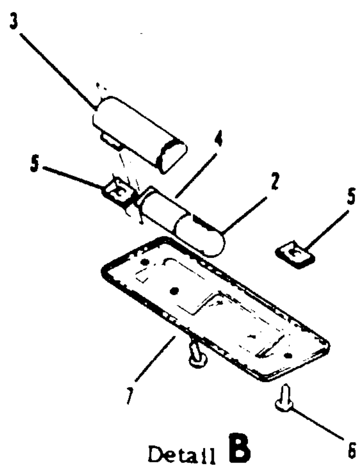
17-72. ELECTROLUMINESCENT PANEL LIGHTING.

17-73. DESCRIPTION. The electroluminescent lighting consists of two "EL" panels; the switch panel and the comfort control panel. The ac voltage required to drive the "EL" panels is supplied by a small inverta-pack (power supply) located behind the instrument panel on the lower left side. The intensity of the "EL" panel lighting is controlled by a rheostat located on the lower left side of the instrument panel. These "EL" panels have an expected life of over 16,000 hours and no replacement should be necessary during the life of the aircraft.

17-74. TRANSISTORIZED LIGHT DIMMING.

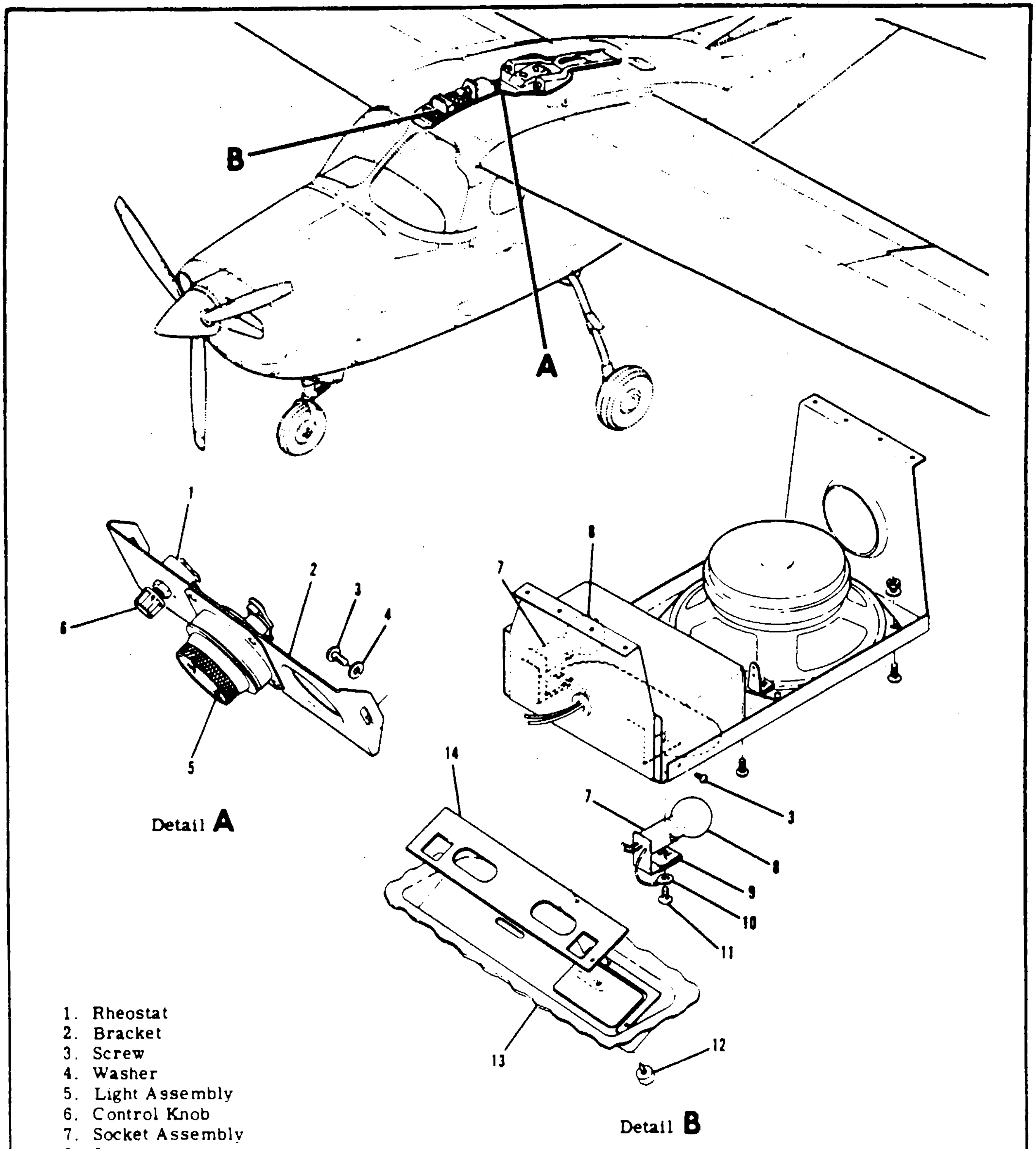






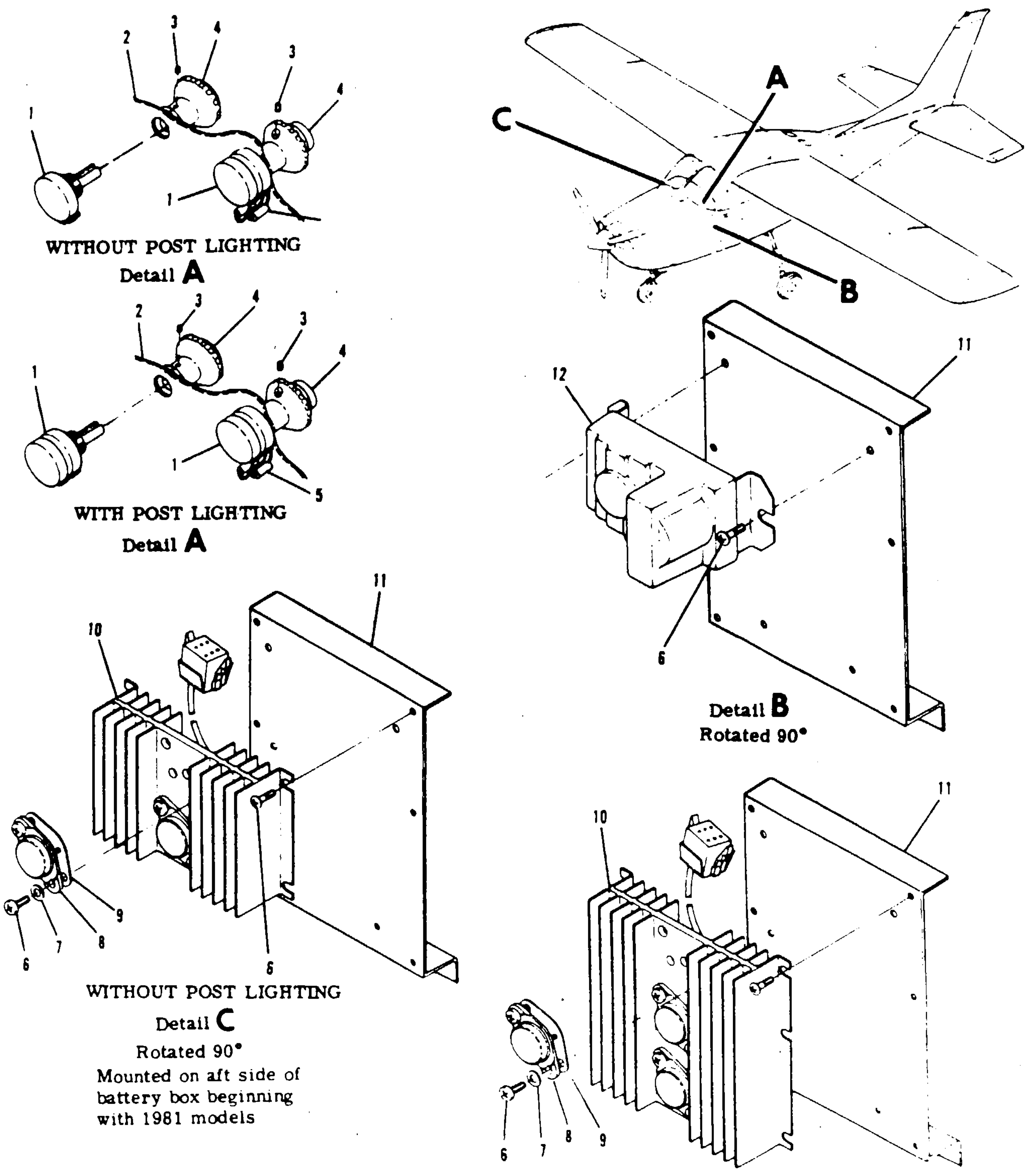
1. Housing
2. Lamp
3. Reflector
4. Lamp Socket
5. Tinnerman Nut
6. Tinnerman Screw
7. Housing - Cover

Figure 17-10. Instrument Panel Glare Shield Light Installation



1. Rheostat
2. Bracket
3. Screw
4. Washer
5. Light Assembly
6. Control Knob
7. Socket Assembly
8. Lamp
9. Tinnerman Nut
10. Ground Wire
11. Tinnerman Screw
12. Adjustment Knob
13. Overhead Console
14. Plate

Figure 17-11. Lighting - Overhead Console



WITHOUT POST LIGHTING
Detail A

WITH POST LIGHTING
Detail A

Detail B
Rotated 90°

WITHOUT POST LIGHTING
Detail C
Rotated 90°
Mounted on aft side of battery box beginning with 1981 models

1. Rheostat
2. Panel
3. Set Screw
4. Control Knob
5. Resistor
6. Screw
7. Washer
8. Transistor
9. Insulator
10. Heat Sink
11. Bracket
12. Inverter

WITH POST LIGHTING
Detail C
Rotated 90°
Mounted on aft side of battery box beginning with 1981 models

Figure 17-12. Transistorized Light Dimming and Electroluminescent Inverter Installation

17-75. DESCRIPTION. The light dimming circuit consists of a two/three-circuit transistorized dimming assembly. System is controlled by two controls on the lower left hand side of the panel. The right hand control is a dual rheostat with a concentric knob ar arrangement. A three-circuit transistorized dimming assembly is installed with post lighting. The controls go from three to four. The center portion of the left control, controls the post lights, the outer portion controls flood lights, the center portion of the right hand control, controls E L panel lighting and the outer portion controls engine and radio lighting.

17-76. REMOVAL AND INSTALLATION. For removal and installation of transistorized dimming, refer to figure 17-12.

17-77. PEDESTAL LIGHTS.

17-78. DESCRIPTION. The pedestal lights consist of three post type lights mounted on the pedestal to illuminate the fuel selector handle, rudder and elevator trim controls. The pedestal lights are controlled by the instrument light rheostat.

17-79. REMOVAL AND INSTALLATION. For removal and installation of pedestal lamps, slide the cap and lens assembly from the base. Slide the lamp from the socket and replace.

17-80. INSTRUMENT POST LIGHTING.

17-81. DESCRIPTION. Individual post lighting may be installed as optional equipment to provide for non-glare instrument lighting. The post light consists of a cap and a clear lamp assembly with a tinted lens. The intensity of the instrument post lights is controlled by the instrument light dimming rheostat located on the switch panel.

17-82. REMOVAL AND INSTALLATION. For removal and replacement of the instrument post lamps, slide the cap and the lens assembly from the base. Slide the lamp from the socket and replace.

17-83. OXYGEN LIGHT.

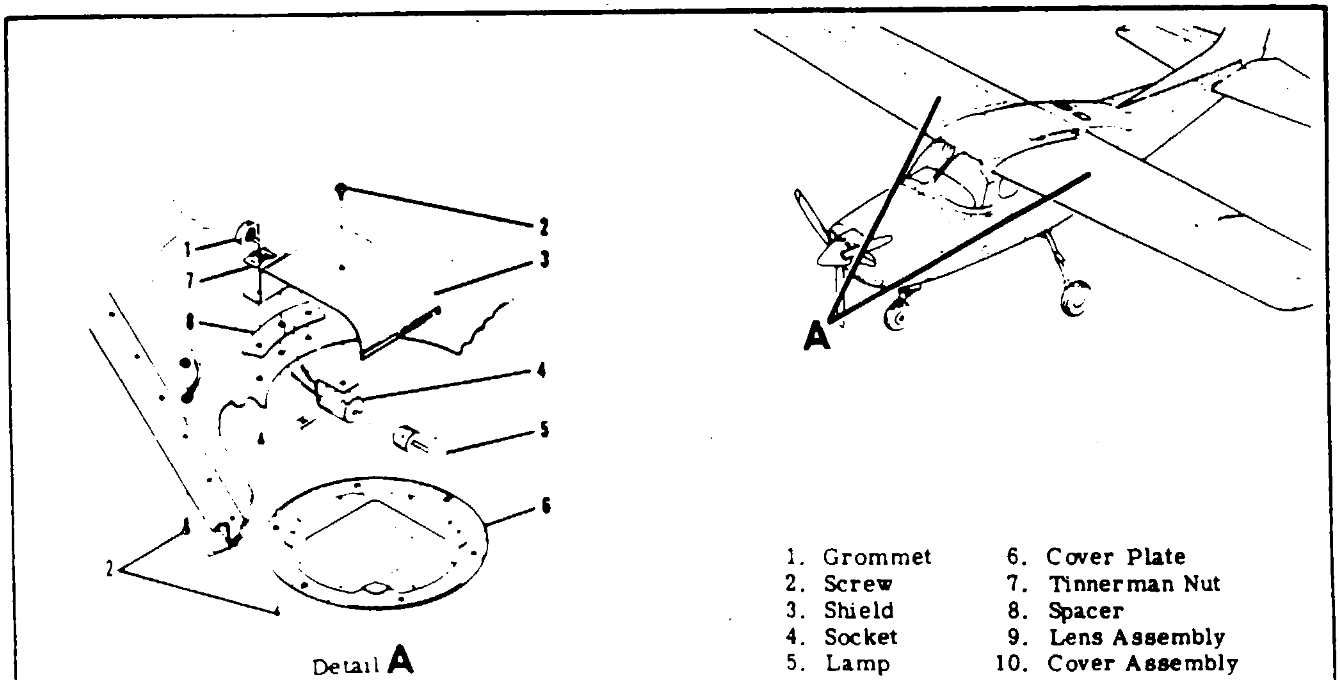
17-84. DESCRIPTION. The oxygen light consists of a indicator light installed aft of the oxygen access door on the overhead console. The light will illuminate when oxygen is in use.

17-85. REMOVAL AND INSTALLATION. For removal of lamp, unscrew lens assembly and pull lamp from assembly. Insert new lamp reinstall lens assembly.

17-86. COURTESY LIGHTS.

17-87. DESCRIPTION. The lights consist of one light located on the underside of each wing to provide ground lighting around the cabin area. The courtesy lights have clear lens and are controlled by a single slide switch labeled "Utility Lights," located on the left rear door post.

17-88. REMOVAL AND INSTALLATION. Refer to figure 17-13 for removal and installation of courtesy lights.



1. Grommet
2. Screw
3. Shield
4. Socket
5. Lamp
6. Cover Plate
7. Tinnerman Nut
8. Spacer
9. Lens Assembly
10. Cover Assembly

Figure 17-13. Courtesy Light Installation

17-89. BAGGAGE COMPARTMENT LIGHT.

17-90. DESCRIPTION. The baggage compartment is illuminated by a lamp mounted in the top of the baggage compartment. The light is controlled by the "Utility Lights" switch located on the left door post.

17-91. REMOVAL AND INSTALLATION. (Refer to figure 17-16.)

a. Ensure that the master switch is "OFF".
b. To gain access to the baggage compartment lamp, remove the screws attaching the retainer and lens to the reflector assembly.
c. Twist the lamp from the socket.
d. To replace the bulb, reverse this procedure.

17-92. INTERIOR LIGHTING

17-93. DESCRIPTION. Interior lighting consists of a dome light installed in the overhead console aft of rear wing spar. A slide switch located forward of the light controls the lamp.

17-94. REMOVAL AND INSTALLATION.

a. Snap lens out of cover.
b. Remove lamp and replace with new lamp.
c. Reinstall lens.

17-95. CONTROL WHEEL MAP LIGHT.

17-96. DESCRIPTION. The control wheel mwp light is internally mounted in the control wheel. A rheostat on the lower left hand side of the wheel controls the light.

17-97. REMOVAL AND INSTALLATION. (Refer to figure 17-14.) To remove lamp, push upward on the lamp and turn. The lamp and reflector are replaced as a unit.

17-98. COMPASS AND RADIO DIAL LIGHTS.

17-99. DESCRIPTION. The compass and radio dial lights are contained within the individual units. The light intensity is controlled by the instrument light dimming rheostat mounted on the lower left side of the instrument panel.

17-100. Deleted.

17-101. Deleted.

17-102. Deleted.

17-103. STALL WARNING UNIT.

17-104. DESCRIPTION. A solid state warning unit is installed on the right hand wing root rib thru P21000-489, and on the cabin top skin at sta. 50.40 beginning with P21000490. The warning siginal is transmitted through the radio speaker in the overhead console.

17-105. REMOVAL AND INSTALLATION. Refer to figure 17-17 for removal and installation.

17-106. STALL WARNING SWITCH.

17-107. DESCRIPTION. The stall warning switch is installed in the leading edge of the left wing and is actuated by airflow over the surface of the wing. The switch will close as a stall condition is approached, actuating the stall warning horn. The horn should sound at approximately five to ten miles per hour above the actual stall speed. Initial installation of the switch should be with the lip of the warning switch approximately one sixteenth of an inch below the center line of the wing skin cutout. Test fly the aircraft to determine if the horn sounds at the desired speed. If the horn sounds too soon, move the unit down slightly; if too late, move the unit up slightly.

17-108. REMOVAL AND INSTALLATION. Refer to figure 17-17 for removal and installation.

17-109. PITOT AND STALL WARNING HEATERS.

17-110. DESCRIPTION. Electrical heater units are incorporated in some pitot tubes and stall warning switch units. The heaters offset the possibility of ice formation on the pitot tube and stall warning actuator switch. The heaters are integrally mounted in the pitot tube and stall warning actuator switch. Both heaters are controlled by the pitot heat switch.

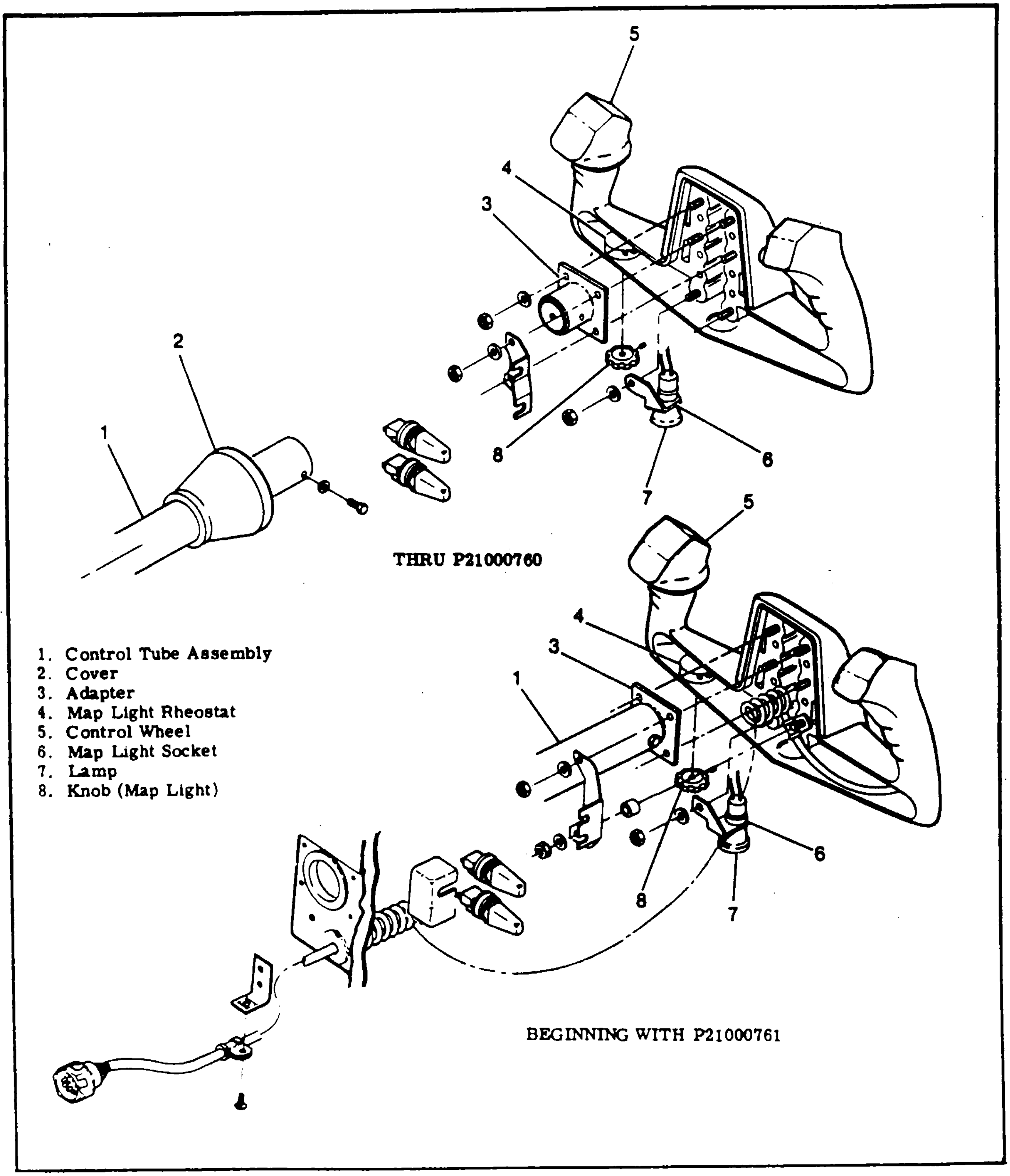
17-111. REMOVAL AND INSTALLATION. Refer to figures 17-17 and 17-18 for removal and installation.

17-112. LANDING GEAR INDICATOR LIGHTS.

17-113. DESCRIPTION. The position of the landing gear is indicated by two press-to-test lamp assemblies mounted on the right side of the switch panel. The green light is on when all the wheels are down and locked; the amber is on when all the wheels are up and locked. If any wheel assumes an intermediate position of neither up and locked or down and locked, both lights will be dark. The hood of each light is removable for bulb replacement, and has a dimming shutter.

17-114. REMOVAL AND INSTALLATION.

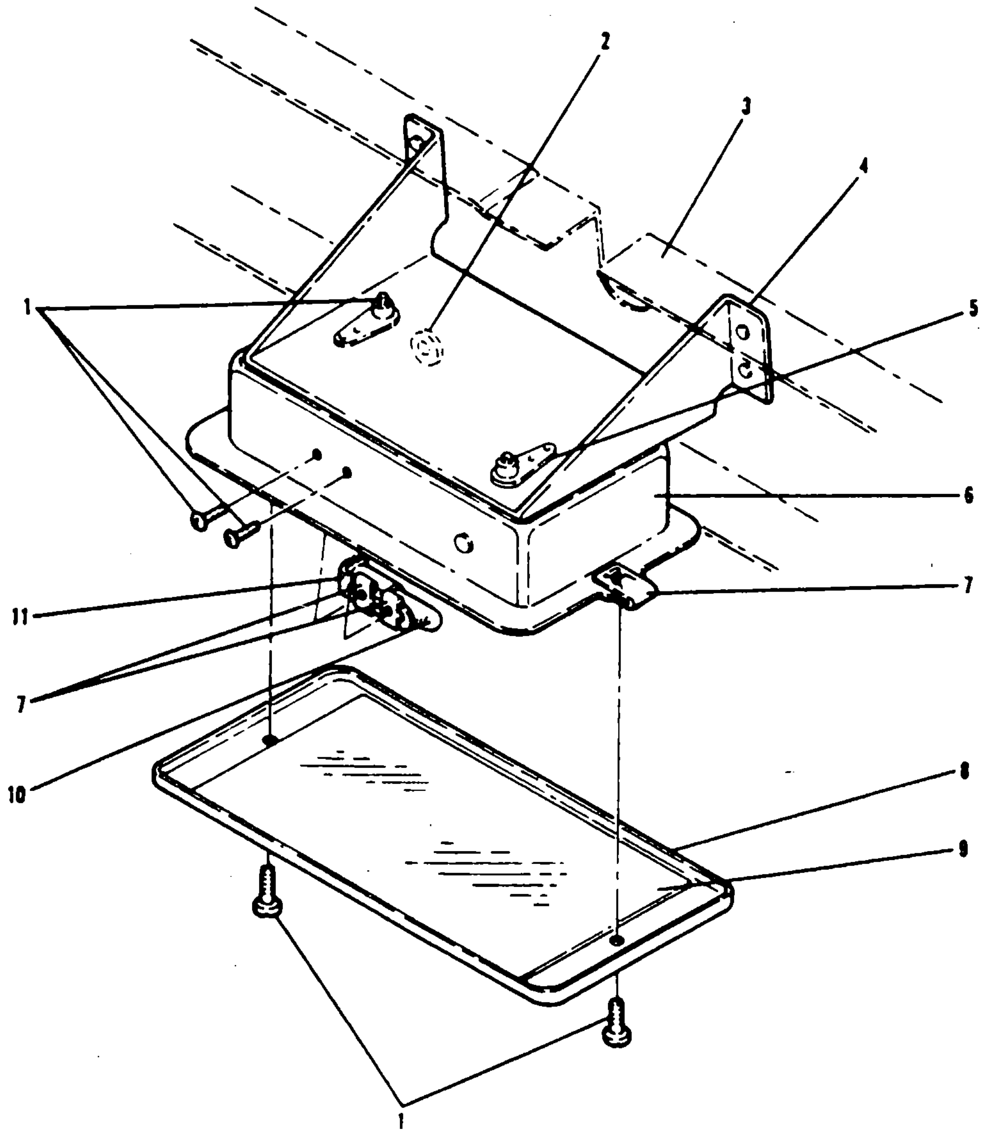
a. Remove the hood on either light by unscrewing counterclockwise. The lamp bulb is in the hood and may be replaced by pulling it out and inserting a new lamp.
b. To remove the lamp socket assembly, remove the nut from the assembly on the front side of the panel.
c. Tag and unsolder the wires from the socket assembly.
d. To replace a lamp socket assembly, reverse the above procedure.



1. Control Tube Assembly
2. Cover
3. Adapter
4. Map Light Rheostat
5. Control Wheel
6. Map Light Socket
7. Lamp
8. Knob (Map Light)

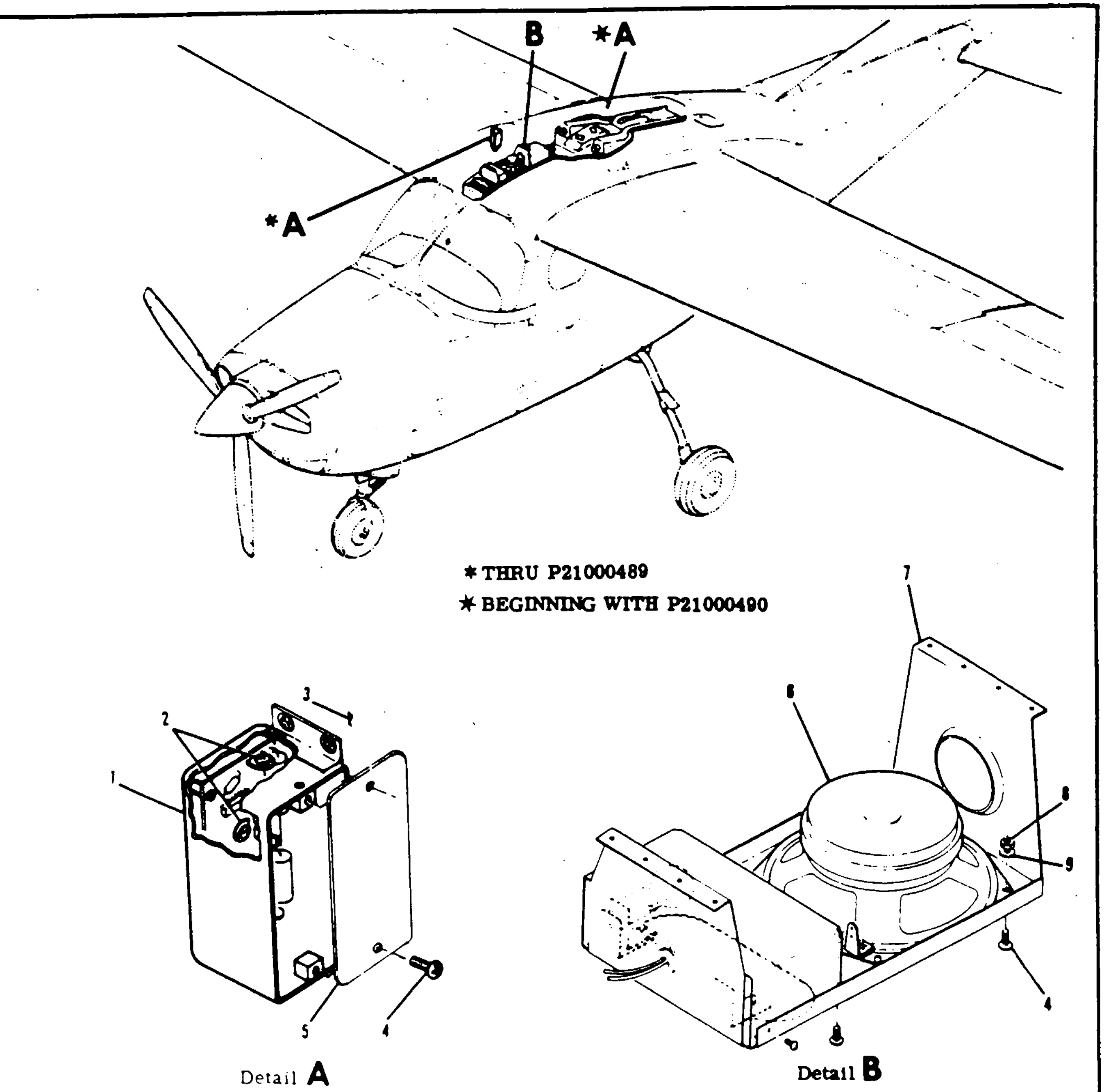
Figure 17-14. Control Wheel Map Light Installation

Figure 17-15. Deleted



1. Screw
2. Grommet
3. Sta. 138 Bulkhead
4. Bracket
5. Nutplate
6. Reflector
7. Nut
8. Retainer
9. Lens
10. Lamp
11. Socket

Figure 17-16. Baggage Compartment Light Installation



1. Dual Warning Unit
2. Adjustment Pots
3. RH Wing Root Rib
4. Screw
5. Cover
6. Speaker
7. Bracket
8. Nut
9. Washer

Figure 17-17. Stall Warning Unit

17-115. LANDING GEAR WARNING HORN.
Refer to Section 5.

17-116. CIGAR LIGHTER. (THRU P21000761)

17-117. DESCRIPTION. A special circuit breaker is contained in a small cylinder screwed directly on the back of the cigar lighter socket. The circuit breaker is a bi-metallic type and is resettable. To reset a breaker, make sure that the master switch is off, then insert a small diameter pin (end of a paper clip works) into the hole in the phenolic back plate of the breaker and apply pressure. A small click will be heard when the breaker resets.

CAUTION

Make sure the master switch is "OFF" before inserting probe into the circuit breaker on cigar lighter to reset.

17-118. REMOVAL AND INSTALLATION. (Refer to figure 17-20).
a. Ensure that the master switch is "OFF."
b. Remove cigar lighter element.
c. Disconnect wire on back of lighter.
d. Remove shell that screws on socket back of panel.
e. The socket will then be free for removal.
f. To install a cigar lighter, reverse this procedure.

17-119. Deleted.

17-120. Deleted.

17-121. Deleted.

17-122. Deleted.

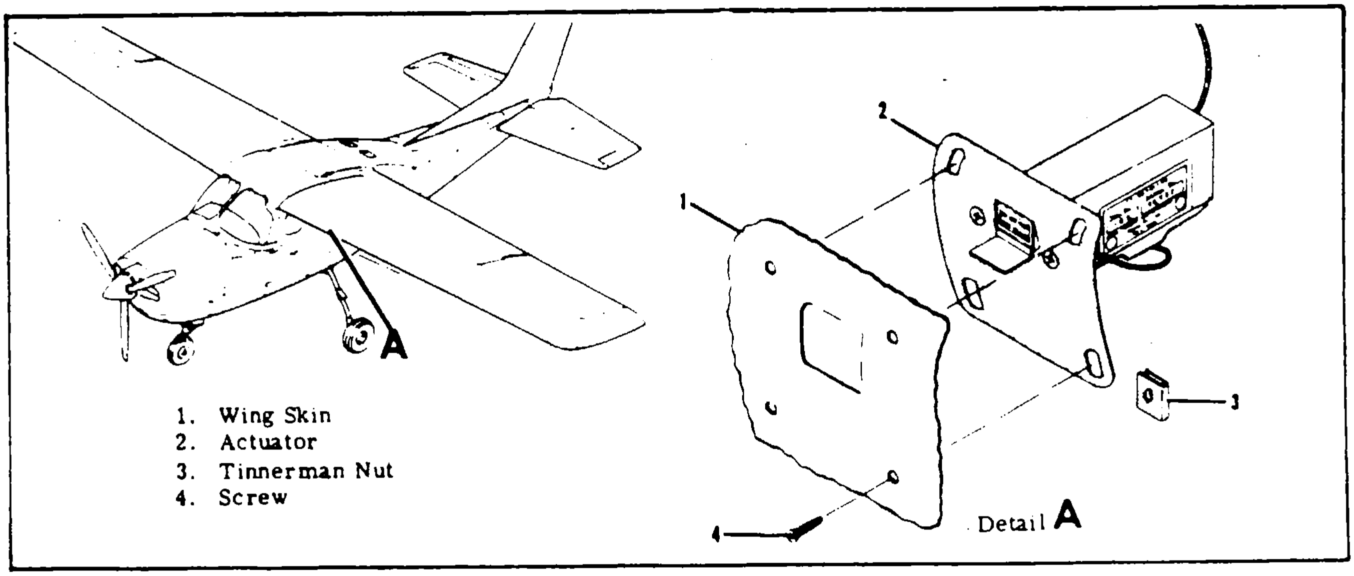


Figure 17-18. Stall Warning Switch.

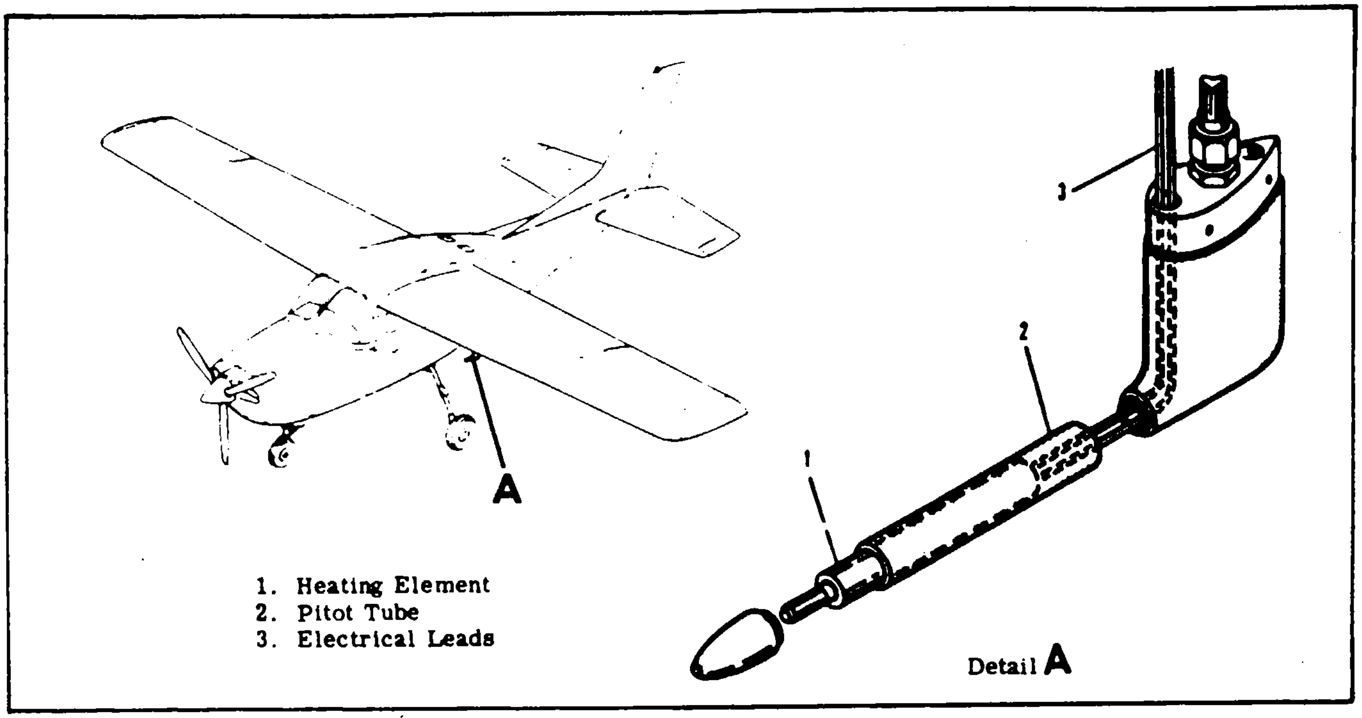


Figure 17-19. Pitot Heater

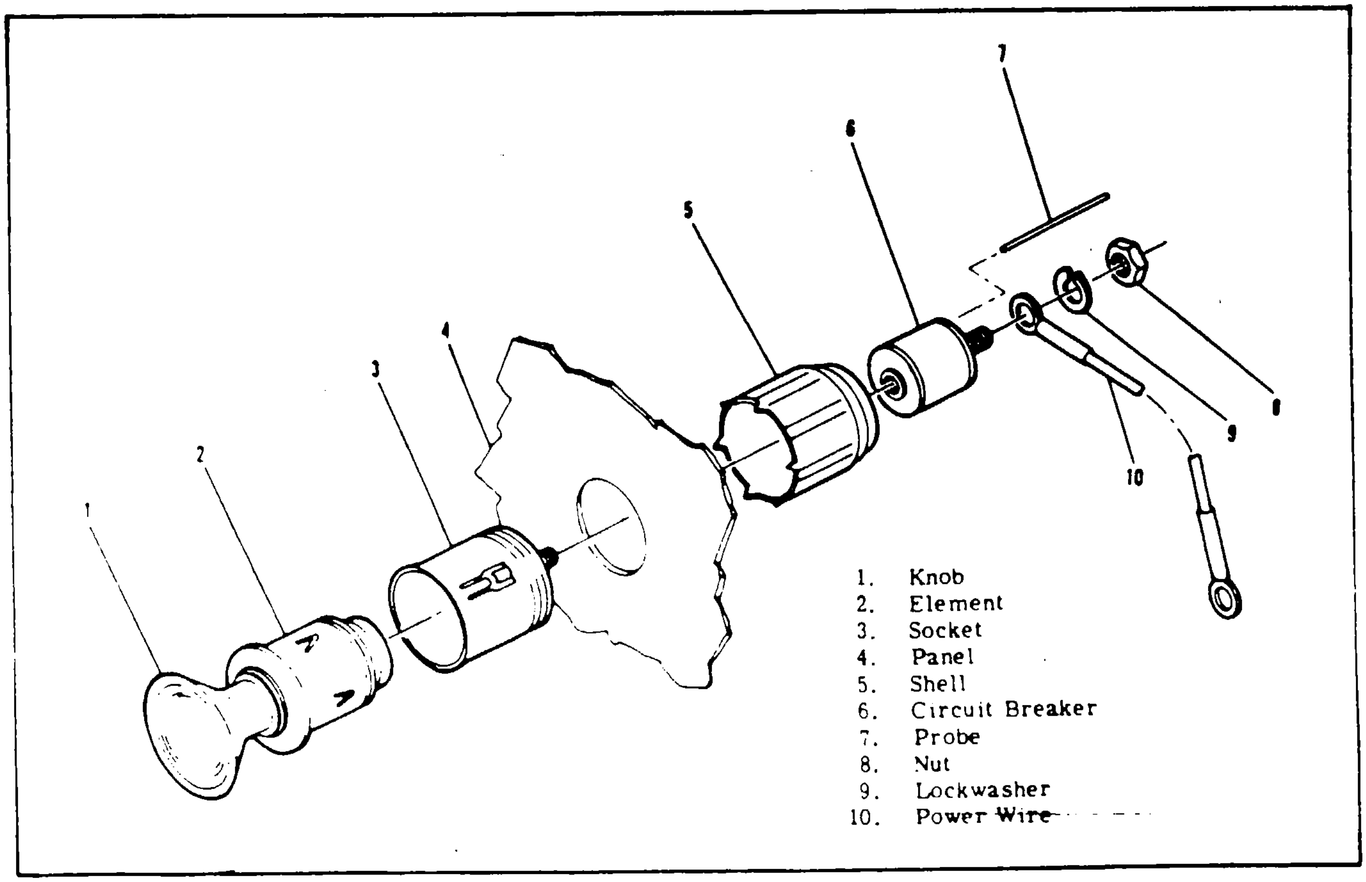


Figure 17-20. Cigar Lighter Installation

17-123. EMERGENCY LOCATOR TRANSMITTER.

17-124. DESCRIPTION. The ELT is a self-contained, solid state unit, having its own power supply with an externally mounted antenna. The unit is mounted in the tailcone, aft of the baggage curtain on the right hand side. The transmitters are designed to provide a broadcast tone that is audio modulated in a swept manner over the range of 1600 to 300 Hz in a distinct, easily recognizable distress signal for reception by search and rescue personnel and others monitoring the emergency frequencies. The ELT exhibits line of sight transmission characteristics which correspond approximately to 100 miles at a search altitude of 10,000 feet. The C589511-0103 transmitter, and the C589511-0104 transmitter on aircraft with Canadian registry, are used thru P21000150. The C589511-0117 transmitter, and the C589511-0113 transmitter on aircraft with Canadian registry, are used on P210 00151 thru P21000811. Beginning with P21000812 the C589512-0103 transmitter is used on all aircraft.

The C589511-0104 transmits on 121.5 MHz at 25 mw rated power output for 100 continuous hours in the temperature range of -40°F (-40°C to + 55°C). The C589511-0113 transmits on 121.5 MHz at 25 mw rated power output for continuous hours in the temperature range of -4°F to +131°F (-20°C to + 55°C). The C589511-0103 transmits on 121.5 and 243.0 MHz simultaneously at 75 mw rated power output for 48 continuous hours in the temperature range of -40°F to + 131°F (-40°C to + 55°C). The C589511-0117 and C589512-0103 transmits on 121.5 and 343.0 MHz at 75 mw rated power output for 48 continuous hours in the temperature range of -4°F to + 131°F (-20°C to + 55°C).

Power is supplied to the transmitter by a battery-pack. The C589511-0104 and C589511-0103 ELT's equipped with a lithium battery-pack must be modified by SK185-20 as outlined in Avionics Service Letter AV78-31, dated 20 November 1981, to incorporate alkaline battery-packs. The C589511-0114 alkaline battery-packs have the service life of the battery-pack stamped on the battery-pack, on the end of the transmitter below the switch and on top of the transmitter. The C589512-0107 alkaline battery-packs have the replacement date and date of installation on the top of the transmitter.

17-125. OPERATION. A three position switch on the forward end of the unit controls operation. Placing the switch in the ON position will energize the unit to start transmitting emergency signals. In the OFF position, the unit is inoperative. Placing the switch in the ARM position will set the unit to start transmitting emergency signals only after the unit has received a 5g (tolerances are +2g and -0g) impact force, for a duration of 11-16 milliseconds.

CAUTION

Do not leave the emergency locator transmitter in the ON position longer than 5 seconds or you may activate downed aircraft procedures by C. A. P., D. O. T. or F. A. A. personnel.

17-126. CHECKOUT INTERVAL.

100 HOURS.

a. Turn aircraft master switch ON.
b. Turn aircraft transceiver ON and set frequency on receiver to 121.5 MHz.
c. Remove the ELT's antenna cable from the ELT unit.
d. Place the ELT's function selector switch in the ON position for 5 seconds or less. Immediately replace the ELT function selector switch in the ARM position after testing ELT.
e. Test should be conducted only within the time period made up of the first five minutes after any hour.

CAUTION

Tests with the antenna connected should be approved and confirmed by the nearest control tower.

NOTE

Without its antenna connected, the ELT will produce sufficient signal to reach your receiver, yet it will not disturb other communications or damage output circuitry.

NOTE

After accumulated test or operation time equals 1 hour, battery-pack replacement is required.

f. Check calendar date for replacement of battery-pack. This date is supplied on a sticker attached to the outside of the ELT case and to each battery.

17-127. REMOVAL AND INSTALLATION OF TRANSMITTER. (Refer to figure 17-22.)

a. Remove baggage curtain to gain access to the transmitter and antenna.
b. Disconnect co-axial cable from end of transmitter.
c. Remove the two #10 screws from the baseplate of the ELT and remove ELT.
d. To reinstall transmitter, reverse preceding steps.

CAUTION

Ensure that the direction of flight arrows (placarded on the transmitter) are pointing towards the nose of the aircraft.

17-128. REMOVAL AND INSTALLATION OF ANTENNA (See figure 17-22).

a. Disconnect co-axial cable from base of antenna.

b. Remove the nut and lockwasher attaching the antenna base to the fuselage and the antenna will be free for removal.

c. To reinstall the antenna, reverse the preceding steps.

CAUTION

The C589511-0111 and C589511-0119 co-axial cable must be installed as indicated on the cable sleeve. Cable end marked "TO ANT" must be connected to the ELT antenna, and the end marked "TO ELT" must be connected to the C589511-0113/-0117 and C589511-0103/-0104 transmitters.

NOTE

Upon reinstallation of antenna, cement rubber boot (14) using RTV 102, General Electric Co. or equivalent, to antenna whip only; do not apply adhesive to fuselage skin or damage to paint may result.

17-129. REMOVAL AND INSTALLATION OF BATTERY PACK (See figure 17-23).

NOTE

Transmitters equipped with the C589511-0105 or C589511-0106 battery-packs can be replaced with a C589511-0114 after modification by SK185-20 has been completed.

CAUTION

Lithium battery-pack must be replaced with alkaline battery-packs per SK185-20.

a. After the transmitter has been removed from aircraft in accordance with para. 17-127, place the transmitter switch in the OFF position.

b. Remove the four screws attaching the cover to the case and then remove the cover to gain access to the battery-pack.

c. Disconnect the battery-pack electrical connector and remove battery-pack.

d. Place new battery-pack in the transmitter with four batteries as shown in the case in figure 17-23.

e. Connect the electrical connector as shown in figure 17-23.

NOTE

Before installing the C589511-0105 pack, check to ensure that its voltage is 7.5 volts or greater.

f. Replace the transmitter baseplate on the unit and pressing the baseplate and unit together attach baseplate with four nylok patch screws.

g. Stamp the new replacement date on the outside of the ELT. The date should be noted on the switching nameplate on the side of the unit as well as on the instruction nameplate on top of the unit.

WARNING

The battery-pack has pressurized contents. Do not recharge, short circuit or dispose of in fire.

CAUTION

Be sure to enter the new battery-pack expiration date in the aircraft records. It is also recommended this date be placed in your ELT Owner's Manual for quick reference.

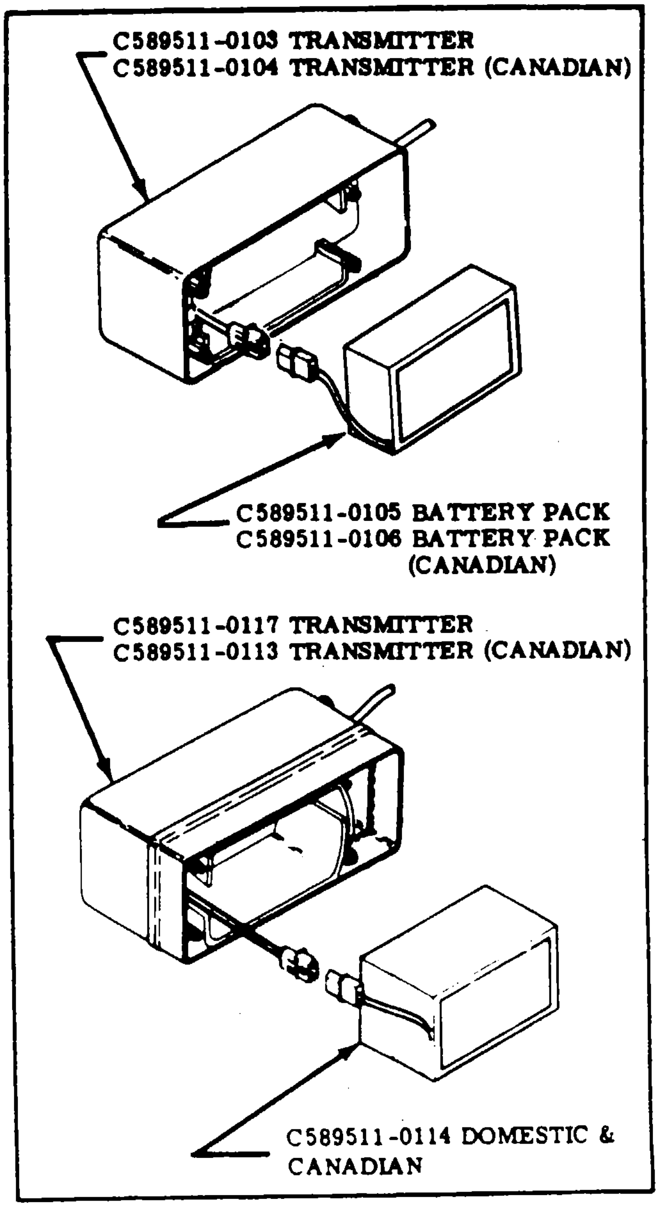
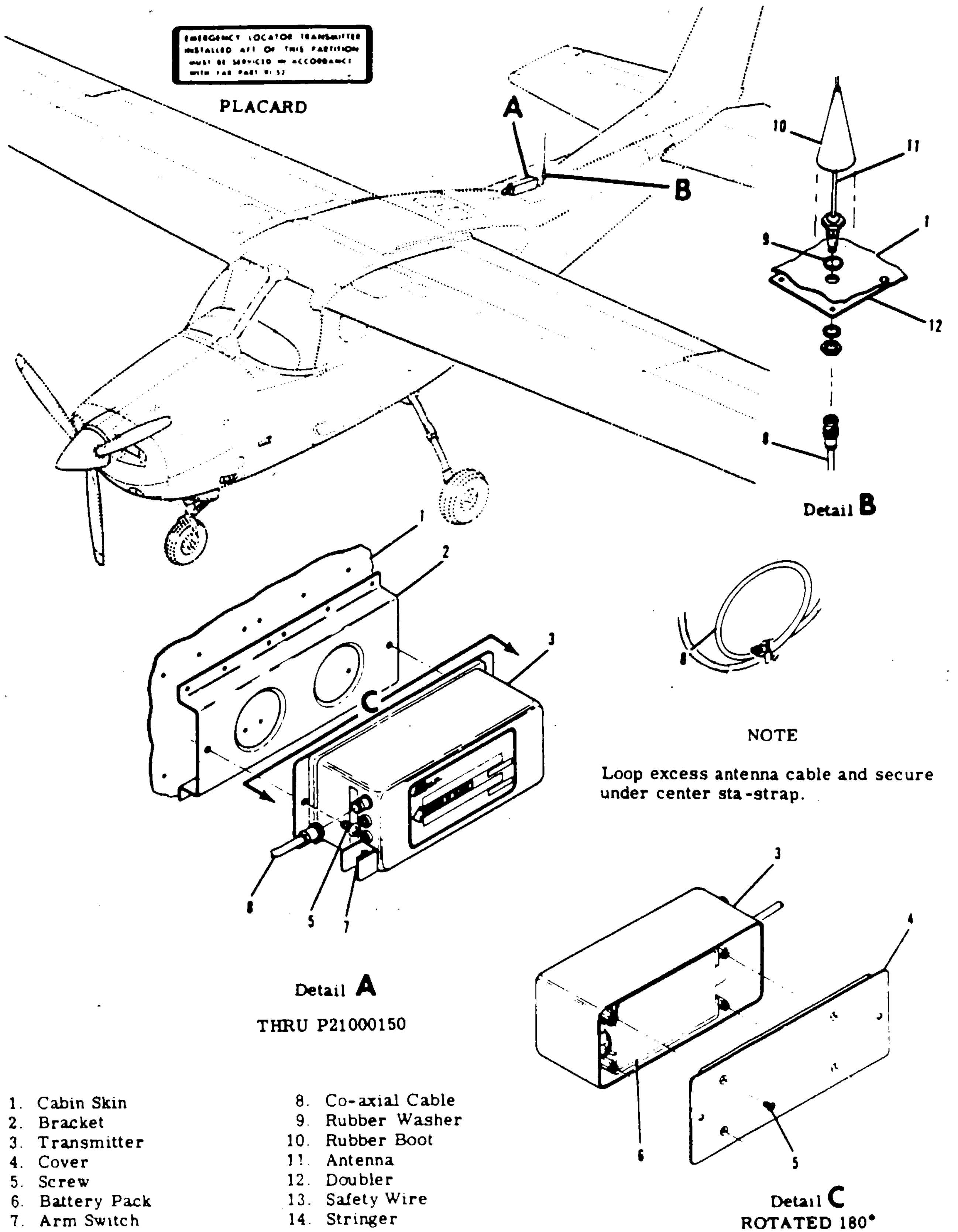


Figure 17-23. Battery Pack Installation.



1. Cabin Skin
2. Bracket
3. Transmitter
4. Cover
5. Screw
6. Battery Pack
7. Arm Switch
8. Co-axial Cable
9. Rubber Washer
10. Rubber Boot
11. Antenna
12. Doubler
13. Safety Wire
14. Stringer

Figure 17-22. Emergency Locator Transmitter Installation (Sheet 1 of 3)

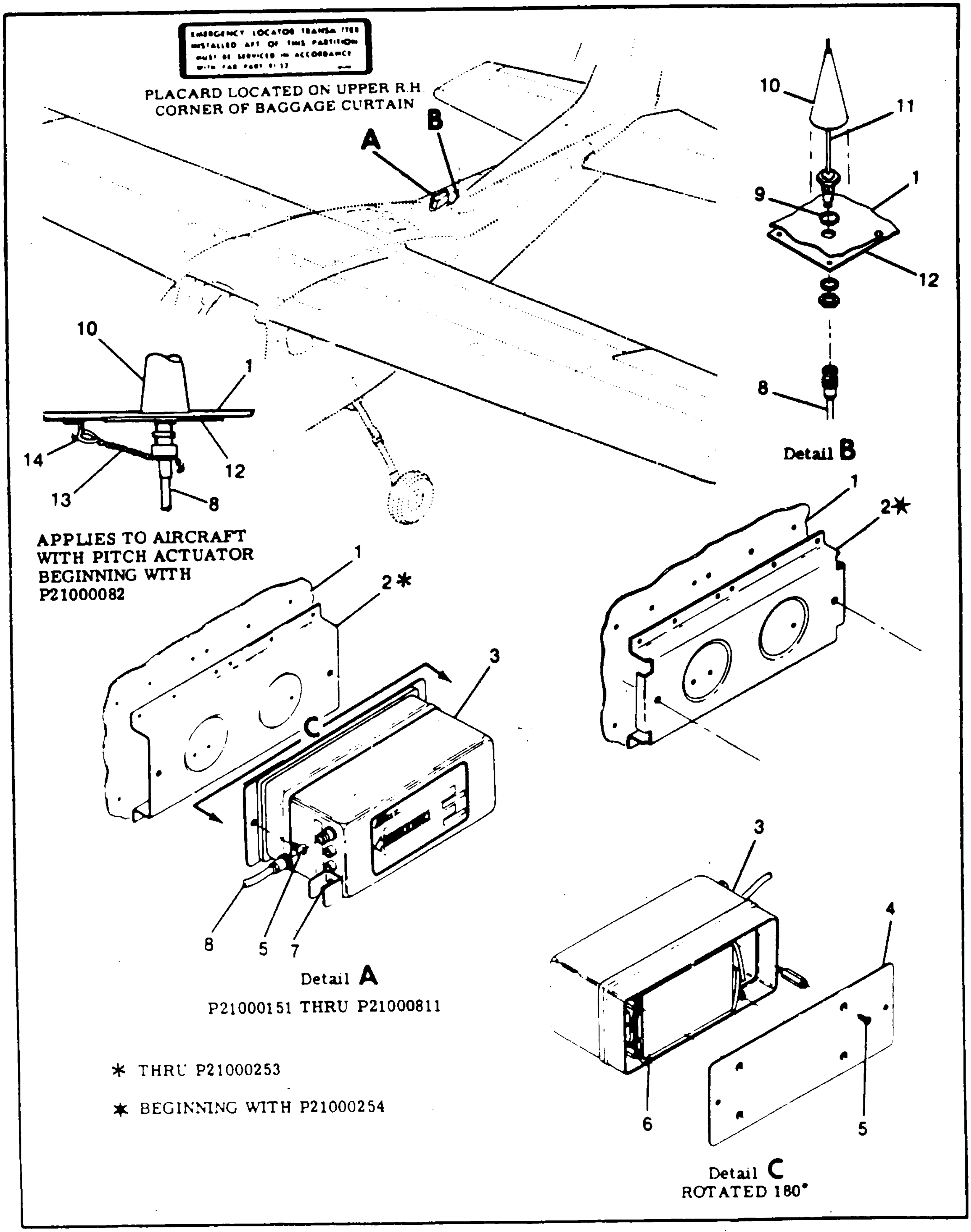


Figure 17-22. Emergency Locator Transmitter Installation (Sheet 2 of 3)

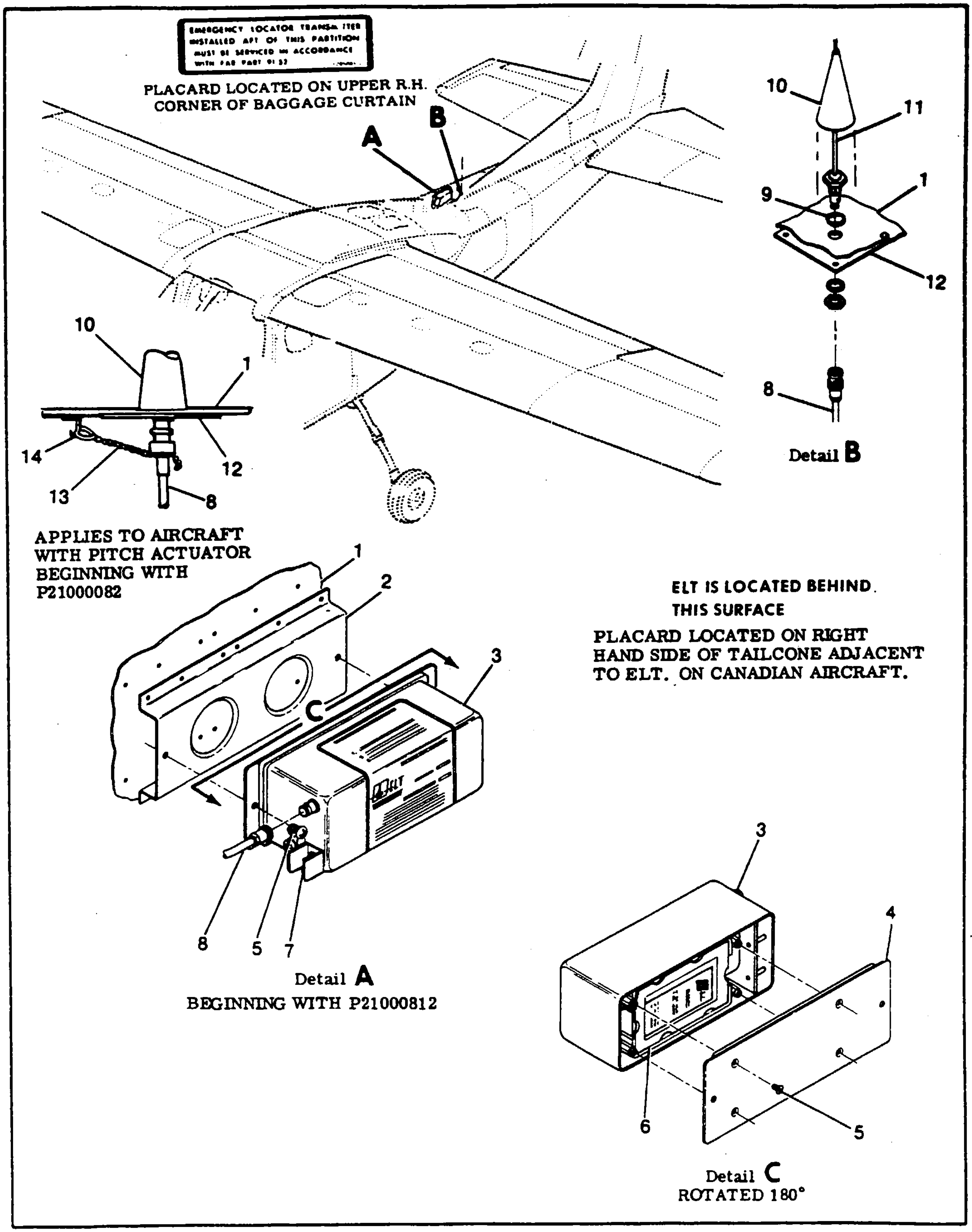


Figure 17-22. Emergency Locator Transmitter Installation (Sheet 3 of 3)

17-129A. G SWITCH OPERATIONAL CHECK.

a. Remove emergency locator beacon transmitter from aircraft in accordance with paragraph 17-127.

b. While holding transmitter in one hand, sharply strike the end of the case in the direction of activation, indicated on the case of the transmitter.

1. Verify that the G switch has been actuated.

c. Reset the G switch.

d. Reinstall transmitter in aircraft in accordance with paragraph 17-127.

17-130. TROUBLE SHOOTING. Should your Emergency Locator Transmitter fail the 100 Hours performance checks, it is possible to a limited degree to isolate the fault to a particular area of the equipment. In performing the following trouble shooting procedures to test peak effective radiated power, you will be able to determine if battery replacement is necessary, or if your unit should be returned to your dealer for repair.

TROUBLE	PROBABLE CAUSE	REMEDY
*POWER LOW	Low battery voltage.	1. Set toggle switch to OFF. 2. Remove plastic plug from the remote jack and by means of a Switchcraft #750 jackplug, connect a Simpson 260 model voltmeter and measure voltage. If battery-pack voltage is 11.2 volts or less, the battery-pack is below specifications.
	Faulty transmitter.	3. If the battery-pack voltage meets the specifications in step 2., the battery-pack is OK. If the battery is OK, check the transmitter as follows: a. Remove the voltmeter. b. By means of a Switchcraft 750 jackplug and 3 inch maximum long leads, connect a Simpson Model 1223 ammeter to the jack. c. Set the toggle switch to ON and observe the ammeter current drain. If the current-drain is in the 85-100 ma range, the transmitter or the coaxial cable is faulty.
	Faulty coaxial antenna cable	4. Check coaxial antenna cable for high resistance joints. If this is found to be the case, the cable should be replaced.

*This test should be carried out with the coaxial cable provided with your unit.

ELECTRICAL LOAD ANALYSIS CHART

STANDARD EQUIPMENT (RUNNING LOAD)	AMPS 1978	1979	1980	1981	1982	1983
Battery Contactor	0.5	0.5	0.5	0.5	0.5	0.33
Clock	†	†	†	†	†	†
Engine Instruments	0.2	0.2	0.2	0.2	0.2	.10
Flashing Beacon	6.0	6.0	6.0	6.0	6.0	7.00
Instrument Lights	2.2	2.2	2.2	2.2	2.2	2.2
EL Panel	0.7	0.7	0.7	0.7	0.7	0.3
Gear Position Lamp & Solenoid Valves	0.8	0.8	0.8			
Position Lights	2.5	2.5	2.5	2.5	2.5	2.79
★Turn Coordinator	0.3	0.3	0.3	0.2	0.2	0.30
★Turn & Bank Indicator (Optional)	0.2	0.2	0.2	0.2	0.2	0.24
Pressurization System	0.9	0.9	0.9	0.9	0.9	0.90
Lamp - Gear Up or Gear On						.04
Alternator Control Unit						2.00
OPTIONAL EQUIPMENT (RUNNING LOAD)						
Heated Pitot and Stall Warning Heaters	5.8	5.8	5.8	5.8	5.8	5.8
Windshield Anti-Ice	4.4	4.4	4.4	4.4	4.4	4.4
Wing De-Ice	1.6	1.6	1.6	1.6	1.6	3.0
Propeller Anti-Ice	18.0 ●	18.0 ●	18.0 ●	18.0 ●	18.0 ●	18.0 ●
Strobe Lights	3.0	3.0	3.0	3.0	3.0	2.0
Post Lights	0.8	0.8	0.8	0.8	0.8	0.8
Cessna 200A Navomatic (Type AF-295B)	2.5	2.5	2.5			
Cessna 300 ADF (Type R-546E)	1.0	1.0	1.0	1.0	1.0	1.0
Cessna 300 Transponder (Type RT-359A)	2.0	2.0	2.0	2.0	2.0	2.0
Cessna 300 Nav/Com (RT-385A)	1.0☆	1.0☆	1.0☆	1.0☆	1.0☆	1.0☆
Cessna 400 RNAV (RN-478A)	0.5	0.5	0.5	0.5	0.5	0.5
Cessna 400 ADF (Type R-446A)	1.6	1.6	1.6	1.6	1.6	1.6
Cessna 400 Nav/Com (RT-485A - RT-485B)	1.6☆	1.6☆	1.6☆	1.0☆	1.0☆	1.6☆
Cessna 400 Transponder (RT-459A)	2.0	2.0	2.0	2.0	2.0	2.0
Cessna 400 DME (Type RT-476A)	2.5	2.5	2.5	2.5	2.5	
Cessna 400 Encoding Altimeter (EA-401A)	0.1	0.1	0.1	0.1	0.1	0.1
Cessna 400 Marker Beacon (Type R-402A - R-402B)	0.1	0.1	0.1	0.1	0.1	0.1
Sunair SSB Transceiver (Type ASB-125)	2.5☆	2.5☆	2.5☆	2.5☆	2.5☆	2.5☆
Pantronics PT-10A HF Transceiver	1.0☆	1.0☆	1.0☆			
Altitude Alert/Select (AA-801A)	0.6	0.6	0.6	0.6	0.6	0.6
Cessna 400 Nav-O-Matic (Type AF-420A)	1.2	1.2	1.2			
With Slaved Directional Gyro System	1.4	1.4	1.4			
Cessna 400B IFCS (Type IF-550A) (Includes HSI & Course Datum)	6.0	6.0	6.0	6.0	6.0	6.0
Cessna 400B Nav-O-Matic (Type AF-550A) (Includes Unslaved DG GS-502A)	5.0	5.0	5.0	5.0	5.0	5.0
With Slaved Directional Gyro System (CS-504A)	5.2	5.2	5.2	5.2	5.2	
With Slaved D.G. & Course Datum (CS-504A)	5.4	5.4	5.4	5.4	5.4	5.4
With Unslaved HSI (IG-832C)	5.8	5.8	5.8	5.8	5.8	5.3
With Slaved HSI System (CS-832A)						5.8
With Slaved HSI & Course Datum (CS-832A)	6.0	6.0	6.0	6.0	6.0	6.0
RDR-160 Weather Radar	3.5	3.5	3.5	3.5	3.5	3.5
Cessna 400 Glideslope (Type R-443B)	0.5	0.5	0.5	0.5	0.5	0.5
Stereo Avionics West (EC-100)			1.0			1.0
Avionics Cooling Fan				1.0	1.0	1.0
Fan-Overhead Ventilation				6.0	6.0	
DME 190				1.2		
DME 451				1.2	1.2	
ANS-351 RNAV				.70	.70	

ELECTRICAL LOAD ANALYSIS CHART

STANDARD EQUIPMENT (RUNNING LOAD CONT.)	AMPS 1978	1979	1980	1981	1982	1983
Cessna 400 DME (RT-477A)						1.50
Cessna 400 RNAV (RN-479A)						1.00
Interphone System				†	†	†
Bonzer Radar Altimeter					0.5	0.5
High Altitude Encoder (Blind)					0.1	0.1
400 RMI						0.4
Wing De-Ice, Prop De-Ice Windshield, Heated Pitot and Stall Warning (Certified for Flight In Known Icing)				46.2	46.2	40.65
ITEMS NOT CONSIDERED AS PART OF RUNNING LOAD						
Cessna 300 Nav/Com (RT-385A)	2.3✪	2.3✪	2.3✪	2.3✪	2.3✪	2.3✪
Cessna 400 Nav/Com (RT-485A - RT-485B)	4.0✪	4.0✪	4.0✪	2.3✪	2.3✪	2.3✪
ASB-125 SSB HF Transceiver	7.5✪	7.5✪	7.5✪	7.5✪	7.5✪	7.5✪
PT-10A Transceiver	9.0✪	9.0✪	9.0✪			
Auxiliary Fuel Pump	3.0	3.0	3.0	3.0	3.0	
Cigarette Lighter	7.0	7.0	7.0	7.0		
Flap Motor	10.0 □	10.0 □	10.0 □	8.5 □	8.5 □	1.8 □
Landing Lights (Each)	3.6 □	3.6 □	3.6 □	3.6 □	3.6 □	3.60 □
Stall Warning Horn	.28	.28	.28	.28		.40
Wing Courtesy Light & Cabin Lights	1.2	1.2	1.2			1.50
Ice Detector Light	1.5	1.5	1.5	1.5	1.5	1.50
Electrohydraulic Power Pack				17.5	17.5	14.0
Electric Elevator Trim	0.7	0.7	0.7	0.7	0.7	.50
Map Light (Glare Shield or Control Wheel)		0.1	0.1	0.1	0.1	.10
Foster RNAV 511		1.0	1.0	1.0		
Recognition Lights			5.35	5.3	5.3	3.60
Air Conditioning				22.8	22.8	22.8

*Only one or the other may be used at one time
†Negligible
•In flight running load
✪Transmit
☆Receive
□Minimum to Maximum

SECTION 18

STRUCTURAL REPAIR

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18-1. STRUCTURAL REPAIR.

18-2. REPAIR CRITERIA. Although this section outlines repair permissible on structure of the aircraft, the decision of whether to repair or replace a major unit of structure will be influenced by such factors as time and labor available and by a comparison of labor costs with the price of replacement assemblies. Past experience indicates that replacement, in many cases, is less costly than major repair. Certainly, when the aircraft must be restored to its airworthy condition in a limited length of time, replacement is preferable. Restoration of a damaged aircraft to its original design strength, shape and alignment involves careful evaluation of the damage, followed by exacting workmanship in performing the repairs. This section suggests the extent of structural repair practicable on the aircraft and supplements Federal Aviation Regulation, Part 43. Consult the factory when in doubt about a repair not specifically mentioned here.

18-3. EQUIPMENT AND TOOLS.

18-4. SUPPORT STANDS. Padded, reinforced sawhorse or tripod type support stands, sturdy enough to support any assembly placed upon them, must be used to store a removed wing or tailcone. Plans for local fabrication of support stands are contained in figure 18-1. The fuselage assembly, from the tailcone to the firewall, must NOT be supported from the underside, since the skin bulkheads are not designed for this purpose. Adapt support stands to fasten to the wing-attach points or landing gear attach-points when supporting a fuselage.

18-5. FUSELAGE REPAIR JIGS. Whenever a repair is to be made which could affect structural alignment, suitable jigs must be used to assure correct alignment of major attach points, such as fuselage, firewall, wing and landing gear. These fuselage repair jigs are obtainable from the factory.

18-6. WING JIGS. These jigs serve as a holding fixture during extensive repair of a damaged wing, and locates the root rib, leading edge and tip rib of the wing. These jigs are also obtainable from the factory.

18-7. REPAIR MATERIALS. Thickness of a material on which a repair is to be made can easily be determined by measuring with a micrometer. In general, material used in Cessna aircraft covered in this manual is made from 2024 aluminum alloy, heat treated to a -T3, -T4, or -T42 condition. If the type of material cannot readily be determined, 2024-T3 may be used in making repairs, since the strength of -T3 is greater than -T4 or -T42 (-T4 and -T42 may be used interchangeably, but they may not be substituted for -T3. When necessary to form a part with a smaller bend radius than the standard cold bending radius for 2024-T4, use 2024-0 and heat treat to 2024-T42 after forming. The repair material used in making a repair must equal the gauge of the material being repaired unless otherwise noted. It is often practical to cut repair pieces from service parts listed in the Parts Catalog. A few components (empennage tips, for example) are fabricated from thermo-formed plastic or glass fiber constructed material.

18-8. WING TWIST AND STABILIZER ANGLE-OF-INCIDENCE. Wing twist (washout) and stabilizer angle of incidence are shown below. Stabilizers do not have twist. The cantilever wing has a uniform twist from the root rib to the tip rib. Refer to figure 18-3 for wing twist measurement.

WING	
Twist (Washout)	3°
STABILIZER	
Angle-of-incidence	-3° ± 15'

18-9. WING.

18-10. DESCRIPTION. The wing is sheet-metal constructed, with a single main spar, two fuel spars, formed ribs and stringers. The front fuel spar also serves as an auxiliary spar and is the forward wing attaching point. An inboard section forward of the main spar is sealed to form an integral fuel bay area. The main spar consists of milled spar caps and attaching fittings joined by a web section. The aft fuel spar is a formed channel. The front fuel spar is a built-up assembly consisting of a formed channel, doubler, attach strap and support angle. Stressed skin, riveted to the ribs, spars and stringers, completes the wing structure. Access openings (hand holes with removable cover plates) are located in the underside of the wing between the wing root and tip section. These openings afford access to the flap and aileron bellcranks, flap drive pulleys, flap actuator in left wing, flap and aileron control cable disconnect points, fuel adapter plate, air scoop connectors and electrical wiring.

18-11. WING SKIN.

18-12. NEGLIGIBLE DAMAGE. Any smooth dents in the wing skin that are free from cracks, abrasions and sharp corners, which are not stress wrinkles and do not interfere with any internal structure or mechanism, may be considered as negligible damage in any area of the wing. Outboard of wing station 40.00 in areas of low stress intensity, cracks, deep scratches or sharp dents, which after trimming or stop drilling can be enclosed by a two-inch circle, can be considered negligible if the damaged area is at least one diameter of the enclosing circle away from all existing rivet lines and material edges. The area on the lower surface of the wing between the two stringers adjacent to the main spar is not considered low stress intensity. Stop drilling is considered a temporary repair and a permanent repair should be made as soon as practicable.

18-13. REPAIRABLE DAMAGE. Repairs must not be made to the upper or lower wing skin inboard of station 40.00 without factory approval. However, an entire skin may be replaced without factory approval. Refer to Section 1 for wing station locations. Figure 18-16 outlines typical repairs to be employed in patching skin. Before installing a patch, trim the damaged area to form a rectangular pattern, leaving at least a one-half inch radius at each corner and deburr. The sides of the hole should lie span-wise or chord-wise. A circular patch may also be used. If the patch is in an area where flush rivets are used, make a flush patch type of repair; if in an area where flush rivets are not used, make an overlapping type of repair. Where optimum appearance and airflow are desired, the flush patch may be used. Careful workmanship will eliminate gaps at butt-joints; however, an epoxy type filler may be used at such joints.

18-14. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If a skin is badly damaged, repair must be made by replacing an entire skin panel, from one structural member to the next. Repair seams must be made to lie along existing structural members and each seam must be made exactly the same in regard to rivet size, spacing and pattern as the manufactured seams at the edges of the original sheet. If the manufactured seams are different, the stronger must be copied. If the repair ends at a structural member where no seam is used, enough repair panel must be used to allow an extra row of staggered rivets, with sufficient edge margin, to be installed.

18-15. WING STRINGERS.

18-16. NEGLIGIBLE DAMAGE. Refer to paragraph 18-12.

18-17. REPAIRABLE DAMAGE. Figure 18-12 outlines a typical wing stringer repair. Two such repairs may be used to splice a new section of stringer material in position, without the filler material.

18-18. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If a stringer is so badly damaged that more than one section must be spliced, replacement is recommended.

18-19. WING RIBS.

18-20. NEGLIGIBLE DAMAGE. Refer to paragraph 18-12.

18-21. REPAIRABLE DAMAGE. Figure 18-12 illustrates typical wing rib repairs.

18-22. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Any wing rib damaged extensively should be replaced. However, due to the necessity of disassembling so much of the wing in order to replace a rib, especially in the fuel bay area which involves sealing, wing ribs should be repaired if practicable.

18-23. WING SPAR.

18-24. NEGLIGIBLE DAMAGE. Due to the stresses which the wing spar encounters, very little damage can be considered negligible. Smooth dents, light scratches and abrasions may be considered negligible.

18-25. REPAIRABLE DAMAGE. All cracks, stress wrinkles, deep scratches and sharp dents must be repaired. However, repairs must not be made to the main wing spar inboard of wing station 155.00 without factory approval. Refer to Section 1 for wing station locations. Figure 18-15 outlines a typical main wing spar repair.

18-26. DAMAGE NECESSITATING REPLACEMENT OF PARTS. An entire wing spar may be replaced without factory approval.

18-27. WING FUEL BAY SPARS AND RIBS.

18-28. NEGLIGIBLE DAMAGE. Any smooth dents in the fuel spars that are free from cracks, abrasions and sharp corners, which are not stress wrinkles and do not interfere with any internal structure or mechanism, may be considered as negligible damage in any area of the spar.

18-29. REPAIRABLE DAMAGE. The type of repair outlined in figure 18-15 also applies to fuel bay spars outboard of wing station 124.0. Inboard of station 124.0, factory approval of proposed repairs is required. Refer to Section 13 for sealing procedures when working in fuel bay areas.

18-30. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Due to the amount of fuel bay sealant which must be removed from fuel bay components to facilitate repair, individual parts are not available to replace fuel bay spars or ribs. The entire fuel bay area must be replaced as a unit.

18-31. AILERONS.

18-32. NEGLIGIBLE DAMAGE. Refer to paragraph 18-12.

18-33. REPAIRABLE DAMAGE. The repair shown in figure 18-18 may be used to repair damage to aileron leading edge skins. The flush type skin patches shown in figure 18-11 may be used to repair damage to the remaining skins. Following repair, the aileron must be balanced. Refer to paragraph 18-35 and figure 18-2 for balancing the aileron.

18-34. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If the damage would require a repair which could not be made between adjacent ribs, complete skin panels must be replaced. Ribs and spars may be repaired, but replacement is generally preferable. Where extensive damage has occurred, replacement of the aileron assembly is recommended. After repair or replacement, balance aileron in accordance with paragraph 18-35 and figure 18-2.

18-35. AILERON BALANCING. Following repair, replacement or painting, the aileron must be balanced. Complete instructions for fabricating balancing fixtures and mandrels and their use are given in figure 18-2.

18-36. WING FLAPS.

18-37. NEGLIGIBLE DAMAGE. Refer to paragraph 18-12.

18-38. REPAIRABLE DAMAGE. Flap repairs should be similar to aileron repairs discussed in paragraph 18-33. A flap leading edge repair is shown in figure 18-18.

18-39. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Flap repairs which require replacement of parts should be similar to aileron repairs discussed in paragraph 18-34. Since the flap is not considered a movable control surface, no balancing is required.

18-40. WING LEADING EDGE.

18-41. NEGLIGIBLE DAMAGE. Refer to paragraph 18-12.

18-42. REPAIRABLE DAMAGE. A typical leading edge skin repair is shown in figure 18-18. Also, wing skin repairs, outlined in paragraph 18-13, may be used to repair leading edge skins, although the flush-type patches should be used. Extra access holes, described in paragraph 18-10, must not be installed in the wing without factory approval. Where extreme damage has occured, replace complete skin panels.

18-43. DAMAGE NECESSITATING REPLACEMENT OF PARTS. An entire leading edge skin may be replaced without factory approval.

18-44. ELEVATORS AND RUDDER.

18-45. NEGLIGIBLE DAMAGE. Refer to paragraph 18-12. The exception to negligible damage on the elevator surfaces is the front spar, where a crack appearing in the web at the hinge fittings or in the structure which supports the overhanging balance weight is not considered negligible. Cracks in the overhanging tip rib, in the area at the front spar intersection with the web of the rib, also cannot be considered negligible.

18-46. REPAIRABLE DAMAGE. Skin patches illustrated in figure 18-16 may be used to repair skin damage. Following repair, the elevators and rudder must be balanced. Refer to paragraph 18-48 and figure 18-2 for balancing the elevators and rudder. If damage would require a repair which could not be made between adjacent ribs, see the following paragraph.

18-47. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If the damaged area would require a repair which could not be made between adjacent ribs, complete skin panels must be replaced. Ribs and spars may be repaired, but replacement is generally preferable. Where extensive damage has occured, replacement of the entire assembly is recommended. After repair and/or replacement, balance elevators and rudder in accordance with paragraph 18-48 and figure 18-2.

18-48. ELEVATOR AND RUDDER BALANCING. Following repair, replacement or painting, the elevators and rudder must be balanced. Complete instructions for fabricating balancing fixtures and mandrels and their use are given in figure 18-2.

18-49. FIN AND STABILIZER.

18-50. NEGLIGIBLE DAMAGE. Refer to paragraph 18-12.

18-51. REPAIRABLE DAMAGE. Skin patches illustrated in figure 18-7, may be used to repair skin damage. Access to the dorsal area of the fin may be gained by removing the horizontal closing rib at the bottom of the fin. Access to the internal fin structure is best gained by removing skin attaching rivets on one side of the rear spar and ribs, and springing back the skin. Access to the stabilizer structure may be gained by removing skin attaching rivets on one side of the rear spar and ribs, and springing back the skin. If the damaged area would require a repair which could not be made between adjacent ribs, or a repair would be located in an area with compound curves, see the following paragraph.

18-52. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If the damaged area would require a repair which could not be made between adjacent ribs, or the repair would be located in an area with compound curves, complete skin panels must be replaced. Ribs and spars may be repaired, but replacement is generally preferable. Where damage is extensive, replacement of the entire assembly is recommended.

18-52A. BONDED DOORS.

18-52B. REPAIRABLE DAMAGE. Bonded doors may be repaired by the same methods used for riveted structure. Rivets are a satisfactory substitute for bonded seams on these assemblies. The strength of the bonded seams in doors may be replaced by a single 3/32, 2117-AD rivet per running inch of bond seam. The standard repair procedures outlined in AC43.13-1 are also applicable to bonded doors.

18-53. FUSELAGE.

CAUTION

Repairs must not be made to the main wing spar carry-thru section of the cantilever wing without factory approval.

18-54. DESCRIPTION. The fuselage is of semi-monocoque construction consisting of formed bulkheads, longitudinal stringers, reinforcing channels and skin platings.

18-55. NEGLIGIBLE DAMAGE. Refer to paragraph 18-12. Mild corrosion appearing upon alclad surfaces does not necessarily indicate incipient failure of the base metal. However, corrosion of all types must be carefully considered and approved remedial action taken. Small cans appear in the skin structure of all metal aircraft. It is strongly recommended, however, that wrinkles which appear to have originated from other sources, or which do not follow the general appearance of the remainder of the skin panels, be thoroughly investigated. Except in the landing gear bulkhead area, wrinkles occuring over stringers which disappear when the rivet pattern is removed may be considered negligible. However, the stringer rivet holes may not align perfectly with the skin holes because of a permanent "set" in the stringer. If this is apparent, replacement of the stringer will usually restore the original strength characteristics of the area.

NOTE

Wrinkles occuring in the skin of the main landing gear bulkhead areas must not be considered negligible. The skin panel must be opened sufficiently to permit a thorough examination of the lower portion of the landing gear bulkhead and its tie-in structure.

Wrinkles occuring on open areas which disappear when the rivets at the edge of the sheet are removed, or a wrinkle which is hand removable, may often be repaired by the addition of a 1/2 x 1/2 x .060 inch 2024-T4 extruded angle, riveted over the wrinkle and extended to within 1/16 to 1/8 inch of the nearest structural members. Rivet pattern must be identical to the existing manufactured seam at the edge of the sheet.

18-56. REPAIRABLE DAMAGE. Fuselage skin repairs may be accomplished in the same manner as wing skin repairs outlined in paragraph 18-13. Stringers, formed skin flanges, bulkhead channels and similar parts may be repaired as shown in figures 18-13 or 18-15.

18-57. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Fuselage skin major repairs may be accomplished in the same manner as wing skin repairs outlined in paragraph 18-14. Damaged fittings must be replaced.

18-58. BULKHEADS.

18-59. LANDING GEAR BULKHEADS. Since these bulkheads are highly stressed members irregularly formed to provide clearance for control lines, actuators, fuel lines, etc., patch type repairs will be, for the most part, impractical. Minor damage consisting of small nicks or scratches may be repaired by dressing out the damaged area, or by replacement of rivets. Any other such damage must be repaired by replacing the landing gear support assembly as an aligned unit.

18-60. REPAIR AFTER HARD LANDING. Buckled skin or floorboards and loose or sheared rivets in the area of the main gear support will give evidence of damage to the structure from an extremely hard landing. When such evidence is present, the entire support structure must be carefully examined and all support forgings must be checked for cracks, using a dye penetrant and proper magnification. Bulkheads in the area of possible damage must be checked for alignment and a straightedge must be used to determine deformation of the bulkhead webs. Damaged support structure, buckled floorboards and skins and damaged or questionable forgings must be replaced.

18-61. FIREWALL DAMAGE. Firewalls may be repaired by removing the damaged material and splicing in a new section. The new portion must be lapped over the old material, sealed with Pro-Seal #700 (Coast Pro-Seal Co., Chemical Division, 2235 Beverly Blvd., Los Angeles, California) compound, or equivalent and secured with MS16535 (steel) or MS-20613 (corrosion-resistant steel) rivets. The heater valve assembly is attached with MS16535 and MS-20613 rivets. Firewall plates, firewall doublers, and nutplates are attached to the firewall with MS-20470 (aluminum) rivets. Damaged or deformed angles and stiffeners may be repaired as shown in figure 18-15, or they may may be replaced. A severely damaged firewall must be replaced as a unit.

18-62. FASTENERS. Fasteners used in the aircraft are generally solid aluminum rivets, blind rivets, and steel-threaded fasteners. Usage of each is primarily a function of the loads to be carried, accessibility, and frequency of removal. Rivets used in aircraft construction are usually fabricated from aluminum alloys. In special cases, monel, corrosion-resistant steel and mild steel, copper, and iron rivets are used.

18-63. RIVETS. Standard solid-shank MS rivets are those generally used in aircraft construction. They are fabricated in the following head types: roundhead, flathead, countersunk head, and brazier head. Flathead rivets are generally used in the aircraft interior where head clearance is required. MS20426 countersunk head rivets are used on the exterior surfaces of the aircraft to minimize turbulent airflow. MS20470 brazier head rivets are used on the exterior surfaces of the aircraft where strength requirements necessitate a stronger rivet head than that of the countersunk head rivet. Both the brazier head and the countersunk head rivets are used on the exterior of the aircraft where head clearance is required. Hi-shear rivets are special, patented rivets having a hi-shear strength equivalent to that of standard AN bolts. They are used in special cases in locations where hi-shear loads are present, such as in spars, wings, and in heavy bulkhead ribs. This rivet consists of a cadmium-plated pin of alloy steel. Some have a collar of aluminum alloy. Some of these rivets can be reaily identified by the presence of the attached collar in place of the formed head on standard rivets. Blind rivets are used, where strength requirements permit, where one side of the structure is inaccessible, making it impossible or impractical to drive standard solid-shank rivets.

18-64. REPLACEMENT OF HI-SHEAR RIVETS. Replacement of hi-shear rivets with close-tolerance bolts or other commercial fasteners of equivalent strength properties is permissible. Holes must not be elongated, and the hi-shear substitute must be a smooth, push-fit. Field replacement of main landing gear forgings on bulkheads may be accomplished by using the following fasteners.

a. NAS464P-* bolt, MS21042-* nut and AN960-* washer in place of Hi-shear rivets for forgings with machined flat surfaces around attachment holes.

b. NAS464P-* bolt, ESNA2935-* mating base washer and ESNA RM52LH2935-* self-aligning nut for forgings (with draft angle of up to a maximum of 8°) without machined flat surfaces around attachment holes.

*Dash numbers to be determined according to the size of the holes and the grip lengths required. Bolt grip length should be chosen so that no threads remain in the bearing area.

18-65. SUBSTITUTION OF RIVETS.

a. Solid-shank rivets (MS20426AD and MS20470AD). When placing rivets in installations which require raised head rivets, it is desirable to use rivets identical to the type of rivet removed. Countersunk-head rivets (MS20426) are to be replaced by rivets of the same type and degree of countersink. When rivet holes become enlarged, deformed, or otherwise damaged, use the next larger size rivet as a replacement. Replacement shall not be made with rivets of lower strength material.

b. Hi-shear Rivets. When hi-shear rivets are not available, replacement of sizes 3/16-inch or greater rivets shall be made with bolts of equal or greater strength than the rivet being replaced, and with self-locking nuts of the same diameter.

c. The following pages contain approved solid-sha and hi-shear rivet substitutions.

Replace	In thickness (or thicker)	With
MS20470AD3	.025	NAS1398B4, NAS1398D4
	.020	NAS1738B4, NAS1738D4, NAS1768D4, CR3213-4, CR3243-4
MS20470AD4	.050	NAS1398B4, NAS1398D4
	.040	NAS1398B5, NAS1398D5, NAS1738B4, NAS1738E4, NAS1768D4, CR3213-4
	.032	NAS1738B5, NAS1738E5, NAS1768D5, CR3213-5, CR3243-4
	.025	CR3243-5
MS20470AD5	.063	NAS1398B5, NAS1398D5
	.050	NAS1398B6, NAS1398D6, NAS1398B5, NAS1738E5, CR3213-5
	.040	NAS1738B6, NAS1738E6, NAS1768D5, CR3213-6, CR3243-5
	.032	CR3243-6
MS20470AD6	.080	NAS1398B6
	.071	NAS1398D6
	.063	NAS1738B6, NAS1738D6, NAS1768D6, CR3213-6
	.050	CR3243-6

Replace	In thickness (or thicker)	With
MS20426AD3	.063	NAS1399B4, NAS1399D4
(Countersunk)	.040	NAS1769D4, CR3212-4
(See Note 1)	.025	NAS1769B4, NAS1739E4, CR3242-4
MS20426AD3	.063	NAS1399B4, NAS1399D4
(Dimpled)	.050	CR3212-4
	.040	NAS1739B4, NAS1739D4, NAS1769D4, CR3242-4
MS20426AD4	.080	NAS1399B4, NAS1399D4
(Countersunk)	.063	NAS1739B4, NAS1739D4, CR3212-4
	.050	NAS1769D4
	.040	CR3242-4
(See Note 1)	.050	CR3212-5
	.040	NAS1739B5, NAS1739D5, NAS1769D4
	.032	CR3242-5
MS20426AD4 (Dimpled)	.063	NAS1739B4, NAS1739D4
	.090	NAS1399B5, NAS1399E5
	.071	CR3212-5
	.063	NAS1739B5, NAS1399D5, NAS1769D5
	.050	CR3242-5
MS20426AD5	.090	NAS1399B5, NAS1399D5
(Countersunk)	.080	CR3212-5
	.071	NAS1739B5, NAS1739E5
	.063	NAS1769D5
	.050	CR3242-5
(See Note 1)	.063	NAS1739B6, NAS1739D6, NAS1769D6, CR3212-6
	.040	CR3242-6
	.032	AN509-10 Screw with MS20365 Nut
MS20426AD5 (Dimpled)	.071	NAS1739B5, NAS1739D5
	.090	NAS1739B6, NAS1739D6, CR3212-6
	.080	NAS1769D6
	.071	CR3242-6
	.032	AN509-10 Screw with MS20365 Nut
MS20426AD6	.090	NAS1739B6, NAS1739D6, CR3212-6
(Countersunk)	.071	NAS1769D6
	.063	CR3242-6
	.032	AN509-10 Screw with MS20365 Nut
MS20426AD6	.090	NAS1739B6, NAS1739D6
(Dimpled)	.032	AN509-10 Screw with MS20365 Nut

NOTE 1: Rework required. Countersink oversize to accommodate oversize rivet.

REPLACE Fastener	REPLACE Collar	DIAMETER	WITH Fastener	WITH Collar
● NAS178	NAS179	(See Note 1)	● NAS1054	NAS179, NAS528
		(See Note 1)	● NAS14XX	NAS1080C, NAS1080E, NAS1080G
		(See Note 1)	● NAS529	NAS524A
		(See Notes 1 and 2)	★ NAS1446	NAS1080C, NAS1080A6
		(See Note 1)	★ NAS7034	NAS1080K
		(See Note 1)	□ NAS464	AN364, MS20364, MS21042
			□ NAS1103	
			□ NAS1303	
			□ NAS6203	
			□ AN173	AN305, MS20305, MS21044, MS21045
● NAS1054	NAS179, NAS528		● NAS14XX	NAS1080C, NAS1080E
			● NAS529	NAS524A
		(See Note 2)	★ NAS1446	NAS1080C, NAS1080A6
			★ NAS7034	NAS1080K
			□ NAS464	AN364, MS20304, MS21042
			□ NAS1103	
			□ NAS1305	
			□ NAS6203	
● NAS14XX	NAS1080C NAS1080E NAS1080G		● NAS529	NAS524A
			★ NAS1446	NAS1080C, NAS1080A6
			★ NAS7034	NAS1080K
			□ NAS464	AN364, MS20364, MS21042
			□ NAS1103	
			□ NAS1303	
			□ NAS6203	
● NAS529	NAS524A	(See Note 3)	□ NAS1446	NAS1080C, NAS1080A6

NOTE 1: See appropriate tables for nominal diameters available.

NOTE 2: Available in oversize for repair of elongated holes. Ream holes to provide a .001 inch interference fit.

NOTE 3: NAS1446 oversize only permitted as a replacement for NAS529.

● Steel shank fastener designed for drive-on collars.

★ Steel shank fastener designed for squeeze-on collars. Installation requires sufficient space for the tool and extended shank of the fastener.

□ Threaded fastener.

18-66. BAFFLES. Baffles ordinarily require replacement if damaged or cracked. However, small plate reinforcements riveted to the baffle will often prove satisfactory both to the strength and cooling requirements of the unit.

18-67. ENGINE COWLING.

18-68. REPAIR OF COWLING SKINS. If extensively damaged, complete sections of cowling must be re-

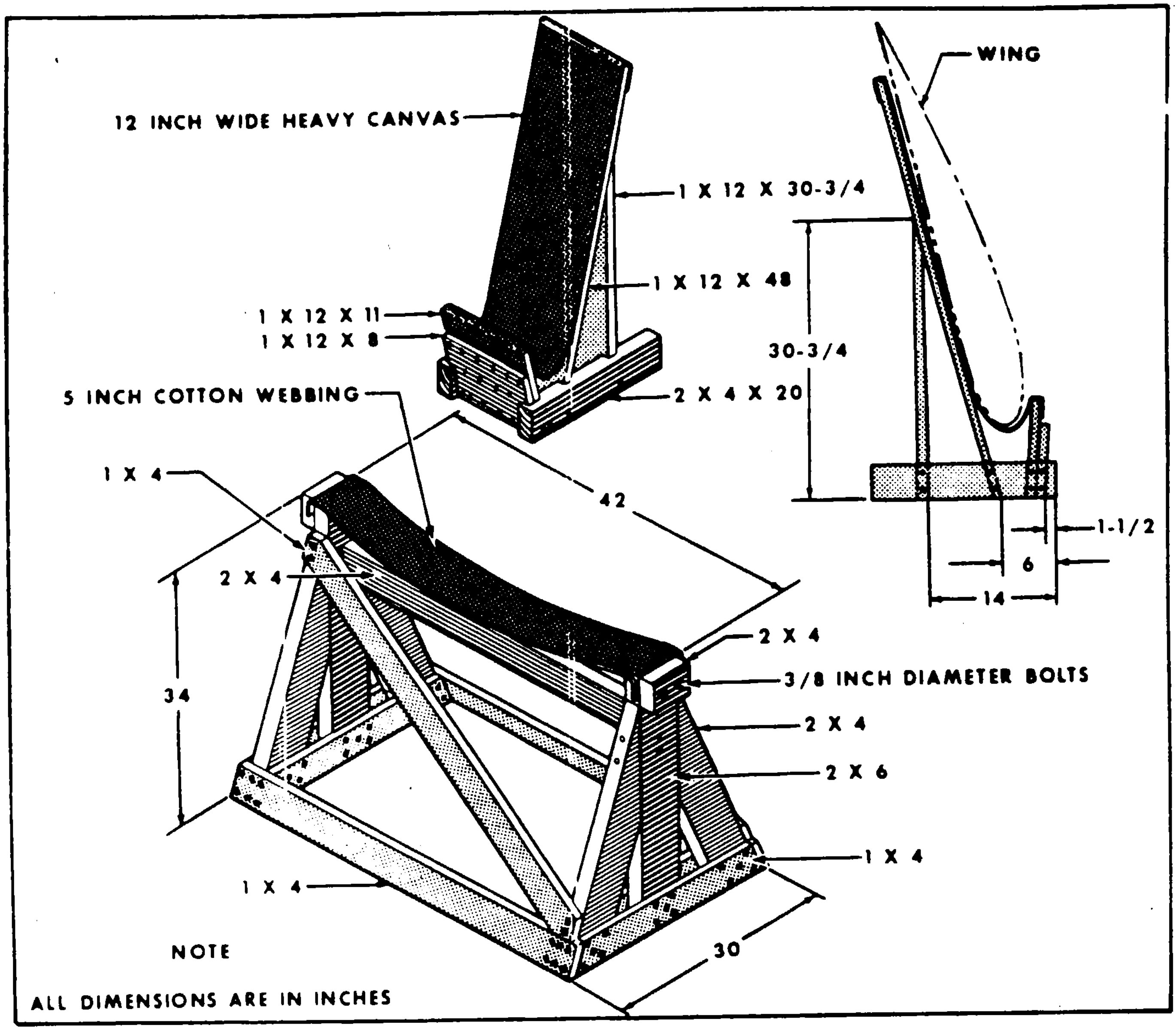


Figure 18-1. Wing and Fuselage Support Stands

placed. Standard insert-type patches, however, may be used if repair parts are formed to fit. Small cracks may be stop-drilled and dents straightened if they are reinforced on the inner side with a doubler of the same material. Bonded cowling may be repaired by the same methods used for riveted structure. Rivets are a satisfactory substitute for bonded seams on these assemblies. The strength of the bonded seams in cowling may be replaced by a single 3/32, 2117-AD rivet per running inch of bond seam. The standard repair procedures outlined in AC43.13-1 are also applicable to cowling.

18-69. REPAIR OF REINFORCEMENT ANGLES. Cowl reinforcement angles, if damaged, must be replaced. Due to their small size they are easier to replace than to repair.

18-70. REPAIR OF GLASS-FIBER CONSTRUCTED COMPONENTS. Glass-fiber constructed components on the aircraft may be repaired as stipulated in instructions furnished in SK182-12. Observe the resin manufacturer's recommendations concerning mixing and application of the resin. Epoxy resins are preferable for making repairs, since epoxy compounds are usually more stable and predictable than polyester and give better adhesion.

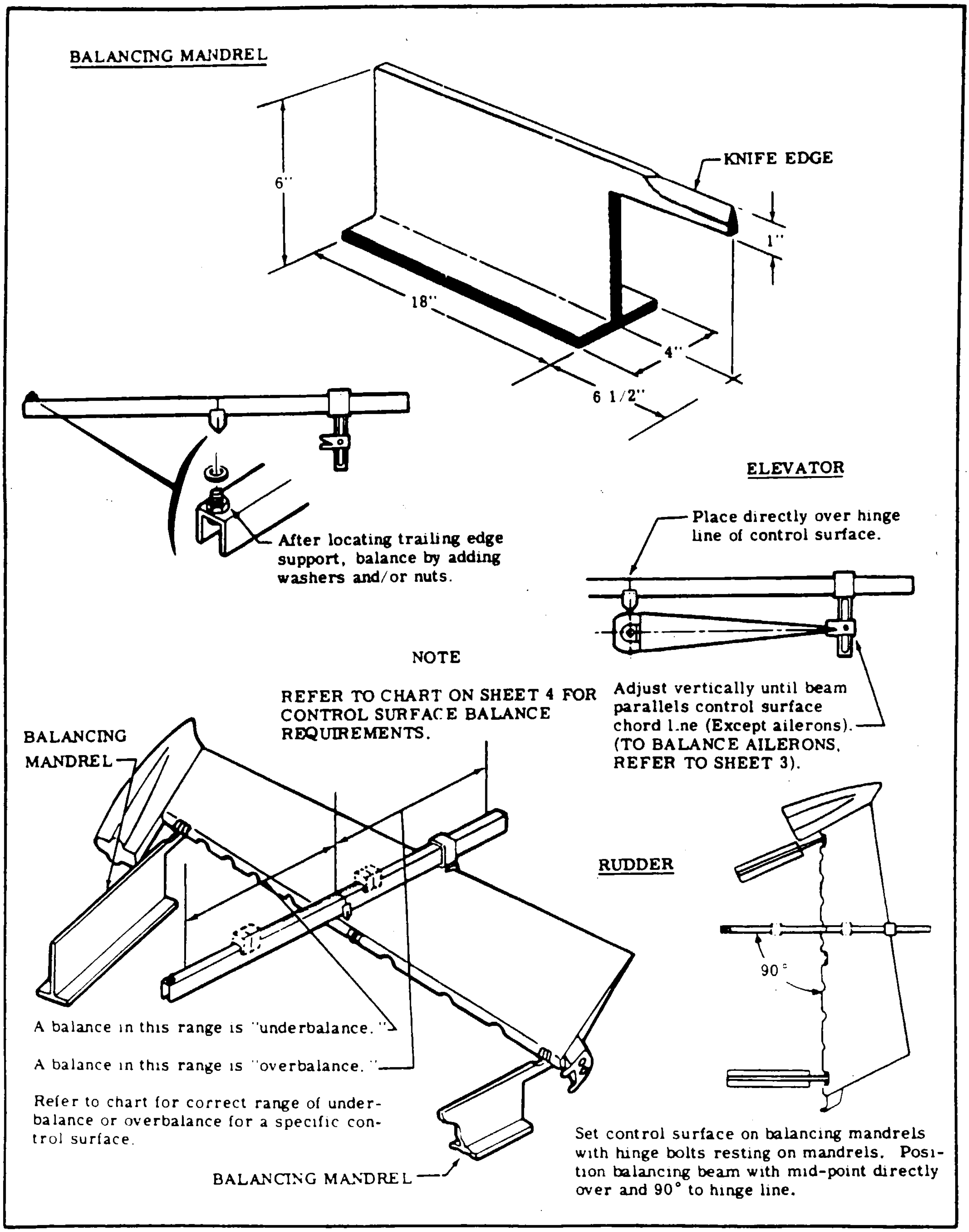
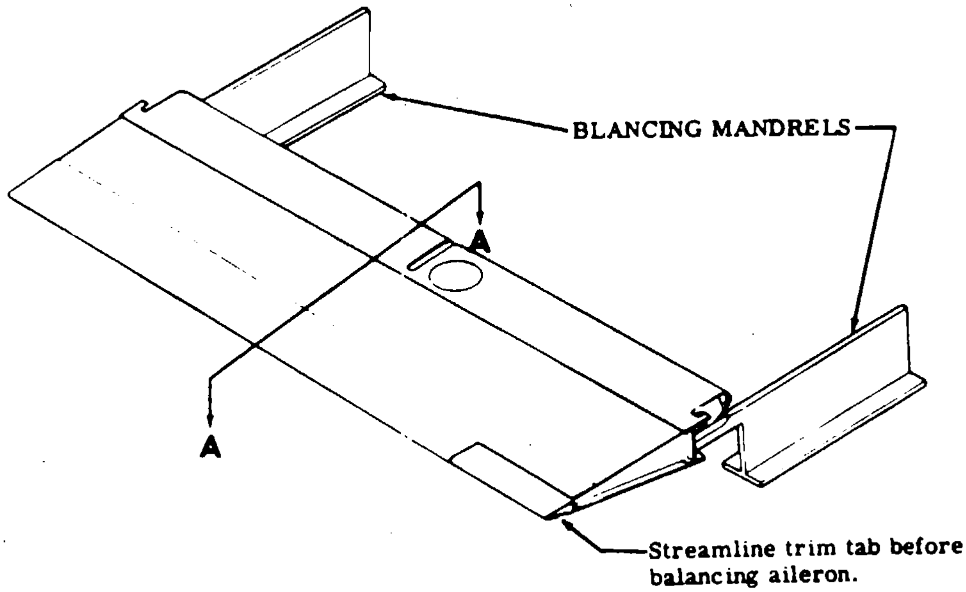
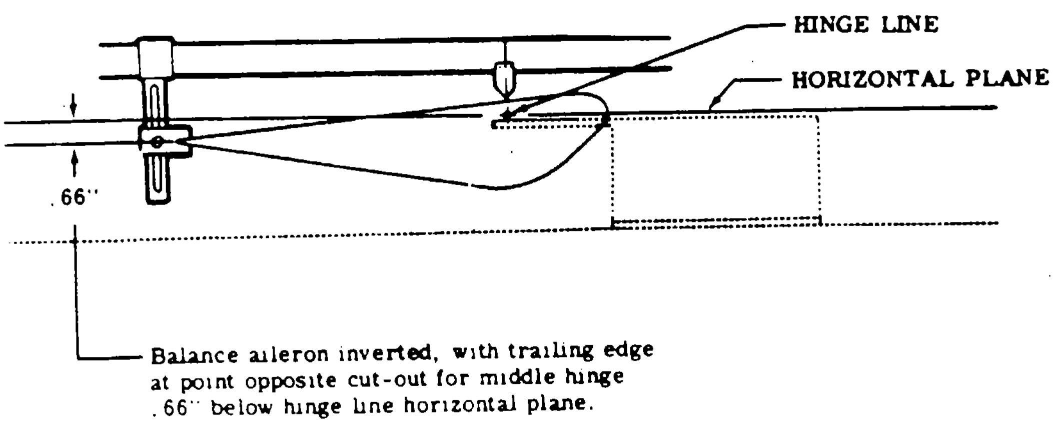


Figure 18-2. Control Surface Balancing (Sheet 1 of 4).

AILERONS



DETAIL A-A



Refer to chart for correct range of underbalance.

Figure 18-2. Control Surface Balancing (Sheet 2 of 4).

GENERAL NOTES

1. Balance control surfaces in a draft-free area.

2. Place hinge bolts through control surface hinges and position on knife edge balancing mandrels.

3. Make sure all control surfaces are in their approved flight configuration: painted (if applicable), trim tabs installed, all foreign matter removed from inside of control surface, elevator trim tab push-pull rod installed and all tips installed.

4. Place balancing mandrels on a table or other suitable flat surface.

5. Adjust trailing edge support to fit control surface being balanced while center of balancing beam is directly over hinge line. Remove balancing beam and balance the beam itself by adding washers or nuts as required at end opposite the trailing edge support.

6. When positioning balancing beam on control surface, avoid rivets to provide a smooth surface for the beam and keep the beam 90° to the hinge line of the control surface.

7. Paint is a considerable weight factor. In order to keep balance weight to a minimum, it is recommended that existing paint be removed before adding paint to a control surface. Increase in balance weight will also be limited by the amount of space available and clearance with adjacent parts. Good workmanship and standard repair practices should not result in unreasonable balance weight.

8. The approximate amount of weight needed may be determined by taping loose weight at the balance weight area.

9. Lighten balance weight by drilling off part of weight.

10. Make balance weight heavier by fusing bar stock solder to weight after removal from control surface. The ailerons should have balance weight increased by ordering additional weight and gang channel, listed in applicable Parts Catalog and installing next to existing inboard weight the minimum length necessary for correct balance, except that a length which contains at least two attaching screws must be used. If necessary, lighten new weight or existing weights for correct balance.

BALANCING BEAM

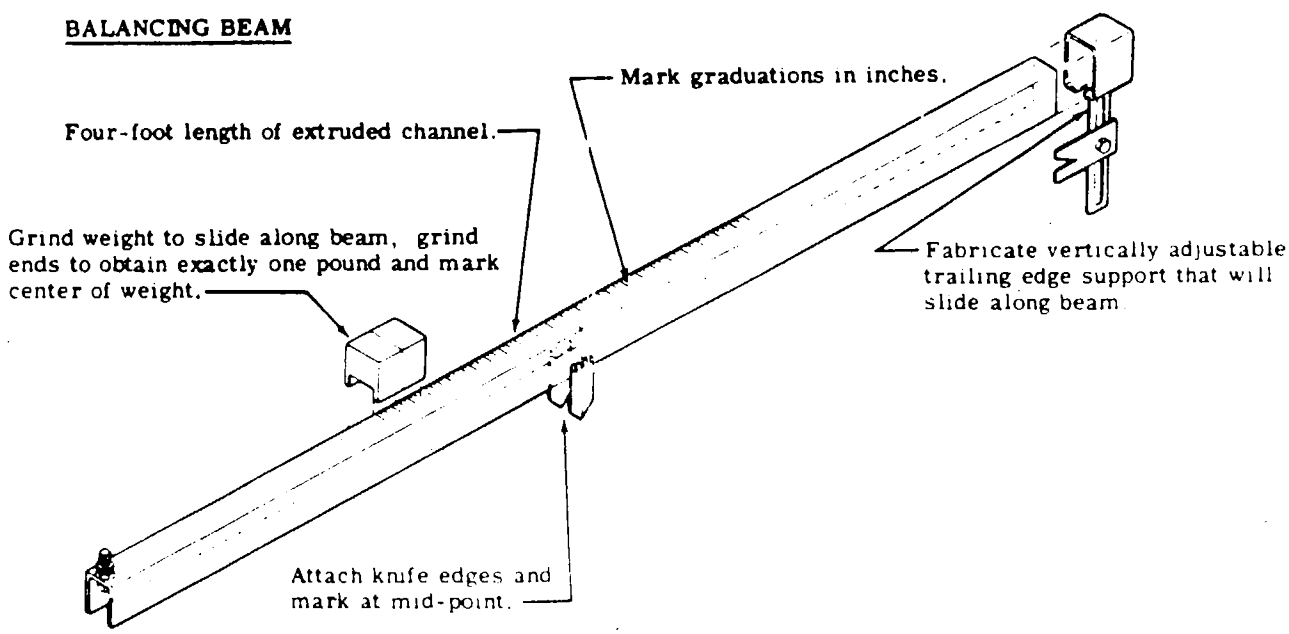


Figure 18-2. Control Surface Balancing (Sheet 3 of 4).

CONTROL SURFACE BALANCE REQUIREMENTS

NOTE

- Balance limits for control surfaces are expressed for "Approved Flight" configuration. "Approved Flight" configuration is that condition of the control surface as prepared for flight of the airplane whether it be painted or unpainted.
- "Approved Flight" limits must never be exceeded when the surface is in its final configuration for flight.

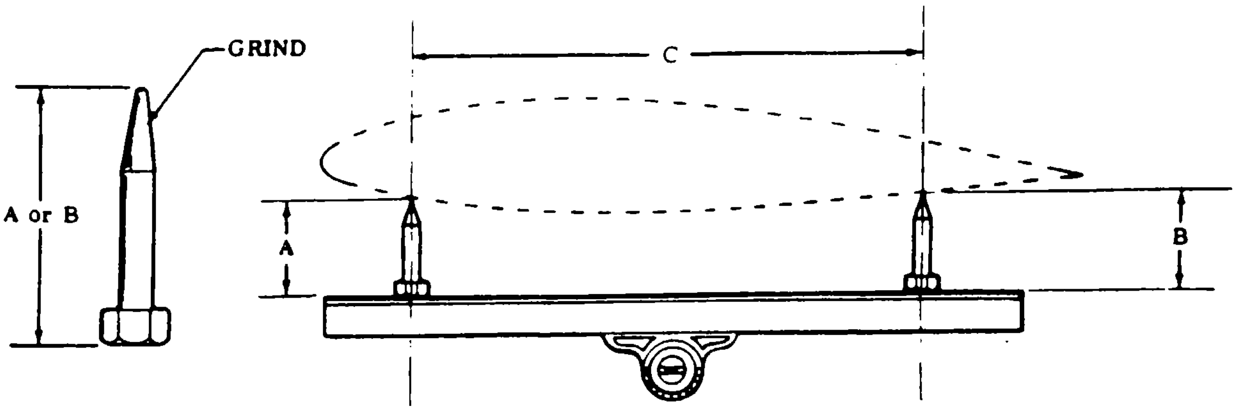
DEFINITIONS:

UNDERBALANCE is defined as the condition that exists when the control surface is trailing edge heavy, and is symbolized by a plus (+).

OVERBALANCE is defined as the condition that exists when the control surface is leading edge heavy, and is symbolized by a minus (-).

CONTROL SURFACE	APPROVED FLIGHT CONFIGURATION BALANCE LIMITS (Inch-Pounds)
AILERON	+4.25 to +11.16
RUDDER	-2.85 to -1.50
RIGHT ELEVATOR	0.0 to -12.1
LEFT ELEVATOR	0.0 to -12.1

Figure 18-2. Control Surface Balancing (Sheet 4 of 4).



A	B	C	WING STATION
2.00 .75	2.00 2.00	40.50 25.50	26.50 205.00

ALL WING TWIST OCCURS BETWEEN STA. 26.50 AND STA. 205.00.

CHECKING WING TWIST

If damage has occured to a wing, it is advisable to check the twist. The following method can be used with a minimum of equipment, which includes a straightedge (42" minimum length of angle or equivalent), three modified bolts and a protractor head with level.

1. Check chart for applicable dimension for bolt length (A or B).
2. Grind bolt shanks to a rounded point as illustrated, checking length periodically.
3. Tape two bolts to straightedge according to dimension C.
4. Locate inboard wing station to be checked and make a pencil mark approximately one-half inch aft of first lateral row of rivets, aft of wing leading edge.
5. Holding straightedge parallel to wing station (staying as clear as possible from "cans"), place bolt on pencil mark and set protractor head against lower edge of straightedge.
6. Set bubble in level to center and lock protractor to hold this reading.
7. Omitting step 6, repeat procedure for outboard wing station, using dimensions specified in chart. Check to see that protractor bubble is still centered.
8. Proper twist is present in wing if protractor readings are the same (parallel). Forward or aft bolt may be lowered from wing .10 inch maximum to attain parallelism.

Figure 18-3. Checking Wing Twist.

18-71. CLEANING MATERIALS AND EQUIPMENT.

a. Aliphatic Naphtha (TT-N-95) Type II.
b. Mozels Cleaning Solvent #18, Mozel Chemical Company.
c. Methyl-ethyl Ketone (MEK) cleaning solvent.
d. Clean rags.
e. Stiff bristle brushes (other than nylon).
f. Sealant gun (Pyle #950 or equivalent). Pyle Industries Inc., Southfield, Michigan.
g. Polyethylene nozzles for sealant gun.
h. Polyethylene cartridges for sealant gun.
i. Rubber gloves.

18-72. CLEANING PROCEDURES.

a. Clean the surface immediately prior to the application of the sealing compound to insure the surface is free of dirt, grease and chips.
b. Metal cleaning should be done with a clean, soft lintless rag moistened with Methyl-ethyl Ketone (MEK). The solvent should always be poured on the cloth to refrain from contamination of the solvent. The solvent should never be poured or sprayed on the structure due to possibility of running between layers of structure and creeping out again after cleaning, bringing contamination to surface to which the sealant is to be applied.
c. Immediately dry the area thus cleaned with a dry, clean, lintless rag before the solvent has evaporated from the surface.
d. If primer is removed during cleaning, it should be touched up after all sealing operations are complete.
e. Always clean an area wider than the width of the finally applied sealant.
f. Cleaned areas should be handled with care to prevent surface contamination.

18-73. APPLICATION SEQUENCE. In order to accomplish an adequate seal in an efficient manner, the following sealant operations shall be accomplished in the following order:

a. Faying surface sealing as required on assembly.
b. Fill holes and slots as required.
c. Fill joggles and confined holes by injection as required.
d. Fillet seal seams and joints as required.
e. Seal fasteners as required.
f. Faying surface sealing of close-out panels as required.

18-74. MIXING TWO PART SEALANTS.

a. The base compound should be matched with the appropriate batch numbered accelerator.
b. The two components must be weighed in proportions as marked on the container within a tolerance of ±2%.
c. If the entire preweighed kit is to be used, it is not necessary to weigh out the accelerator and base compound. Simply mix entire amount of the preweighed compounds in accordance with instructions outlined.
d. The two components should be mixed thoroughly so that the complete mixture is of uniform color.

NOTE

Care should be exercised to preclude the trapping of air in the sealing compound during the mixing procedure.

e. Mixed compound has a limited work life, so only enough should be mixed to satisfy the immediate requirement.

18-75. APPLICATION OF SEALING PROCEDURES.

18-76. FAYING SURFACE SEALING.

a. Using sealant Type I, apply to one surface with a brush, spatula or roller. Spread evenly to approximately 1/32 inch thick over the entire faying surface. The application should be accomplished with the sealing compound flowed on with minimum stroking to to prevent formation of bubbles.

b. Avoid using excess amounts of sealing compound.
c. When the surfaces are fastened together, any extruded sealant should be faired out with a fairing tool, leaving a smooth fillet along the joint.
d. All permanent fasteners must be installed within the work life of the sealant. Sealant extruded through hole by rivet must be wiped from end of rivet before bucking. If permanent fasteners cannot be installed, use temporary fasteners and clamps as necessary to hold the parts firmly together until the sealant has cured. Remove individual temporary fasteners and replace immediately with permanent fasteners. Fresh sealant must be applied to the fasteners.

NOTE

Any pressure testing required should not be done before the sealing compound has completely cured.

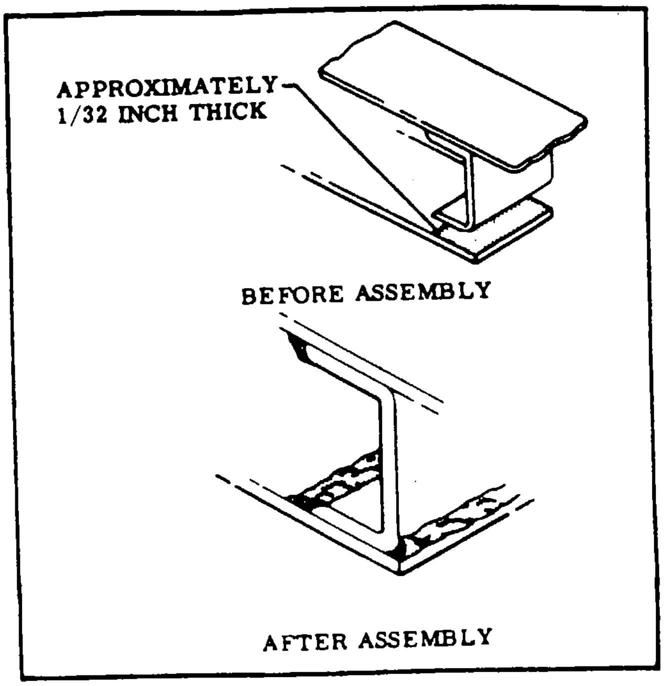


Figure 18-4 Fay Surface Sealing

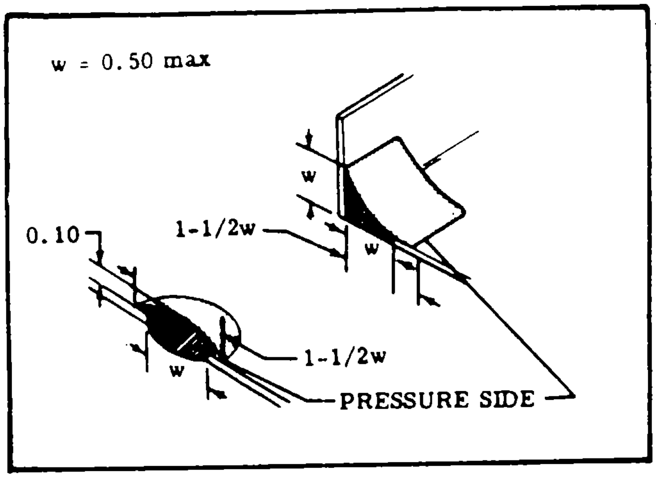


Figure 18-5. Hole Filling

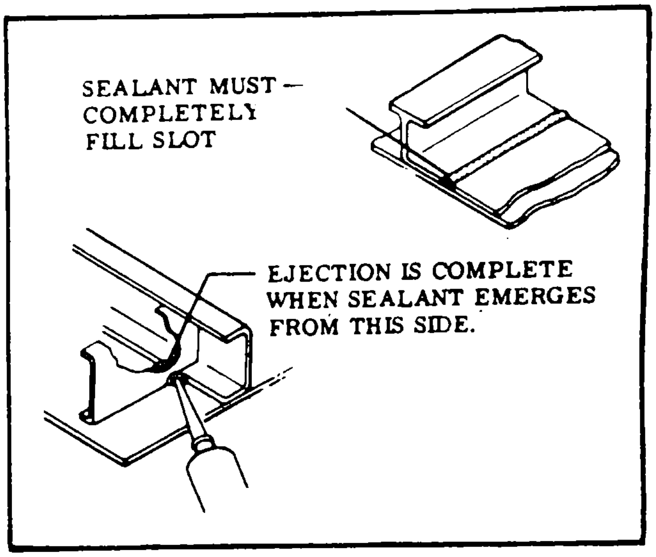


Figure 18-6. Injection Sealing

18-77. INJECTION SEALING.

a. An injection seal may be applied to provide continuity of seals where fillet seals are interrupted by holes, joggles, or structure. Force Type I sealant into one end of the cavity or injection hole, if provided, with a sealing fun until the sealing compound emerges from a prescribed opening for seal continuity.

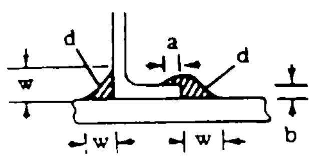
b. When a seal is made at the bottom of a slot, the sealant should be applied to fill and have a continuous contact with the bottom and sides of the slot.

18-78. FILLET SEALING.

a. Fillet sealing should be done with Type I sealant, using a sealing gun for application. The nozzle tip should be pointed into the seam and maintained nearly perpendicular to the line of travel. A bead of sealant will be forced ahead of the nozzle tip.

b. Fillets may be worked into the surface with fairing tools or gun tip.

c. Fillet shapes and dimensions should conform to dimensions given in figure 18-7 as near as possible.



d = 0.08 minimum
w = 0.12 to 0.025
t = 0.02 to 0.010 except
t = 0 when b = 0.15 or more
a = 0.04 to 0.15 except
a = 0 when b = 0.15 or more

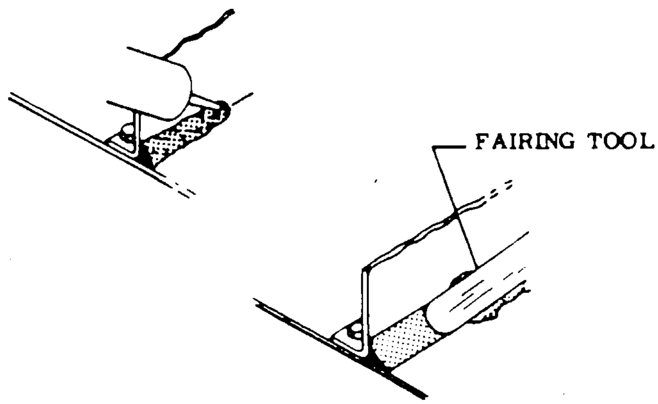


Figure 18-7 Fillet Sealing

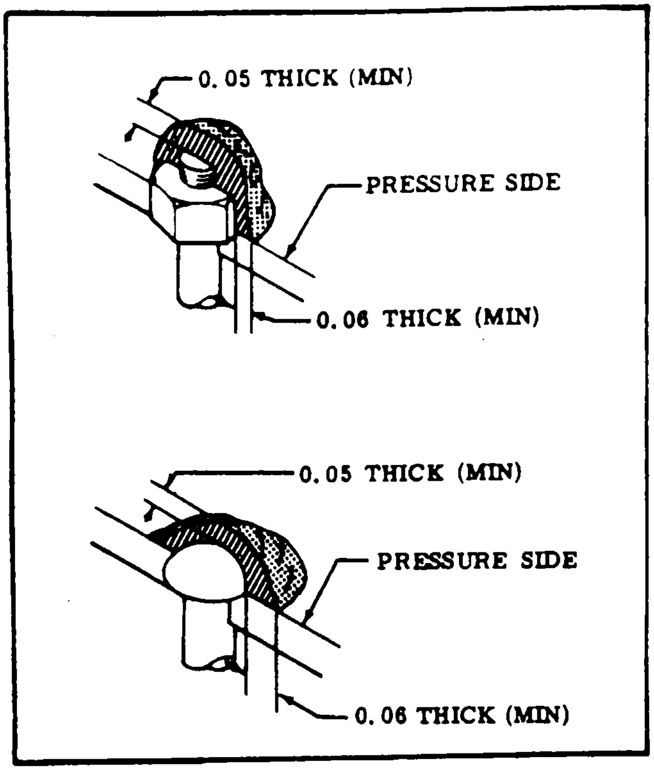


Figure 18-8. Fastener Sealing

18-79. FASTENER SEALING.

a. Fasteners installed through a faying surface within the work life of the sealant need no further sealing.

b. Fasteners installed through a faying plane where no faying surface sealant is used would be sealed by one of the following methods:

1. Apply Type I sealer to the fastener or hole on installation.
2. Brush the fastener with sealant after installation.

18-80. WINDOW SEALING.

a. Apply masking tape to window and outside mating skin or fairing. If window is already masked, or otherwise protected, peel off the protective coating in areas to be in contact with the sealant.

b. Clean both surfaces thoroughly. Acrylic materials should be cleaned with Aliphatic Naphtha (TT-N-95, Type II) and a clean lint-free cloth.

NOTE

Do not use ketone or any cleaner that may cause crazing of the acrylic type glass.

CAUTION

Windows are of acrylic materials and must be sealed with Type II sealant, which uses a NONCRAZING accelerator.

c. Apply sealant to surfaces as required, consistent with the type of sealing.

d. Assemble mating surfaces allowing the sealant to extrude out the edge of the skin or fairing. Complete assembly using the appropriate fasteners and dabbing sealant into the dimpled or countersunk hole.

e. Fair extruded sealant over the edge of the masking tape.

f. After sealant is cured, remove masking tape.

18-81. ELECTRICAL SEALING. When the wire bundles are continuous and pass through a pressurized bulkhead, they should be sealed in accordance with one of the following alternate methods using the S45 nylon seal fitting.

a. Injection Method.

1. Clean the metal area where the seal fitting will seat. Clean the wires and seal fittings with Mozel solvent #18.
2. Pass the wire bundle through the bulkhead cutout and secure, leaving approximately two inches of slack.

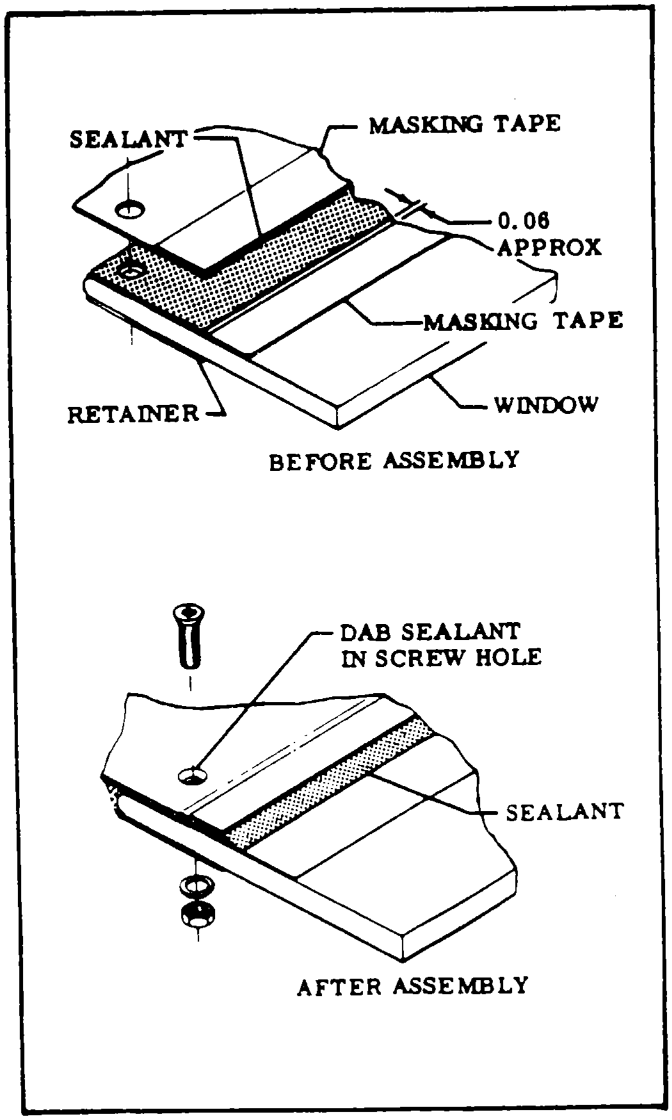


Figure 18-9. Window Sealing

3. Bundle ties must not be placed within six inches of the seal assembly to facilitate penetration of sealant around individual wires.

4. Place the seal halves around the wire bundle on the pressure side and position in bulkhead cutout.

5. Wrap several turns of masking tape around the seal assembly ends and the wire bundle to center the bundle and retain the sealant when applied.

6. Secure the seal assembly to the bulkhead with the required fasteners

7. Puncture the tape over the injection hole in the fitting.

8. Injection sealant should be 93-004 Aerospace Sealant and should be used toward the beginning of its work life (freshly mixed) to obtain a good flow throughout the fitting and between wires leaving no voids.

9. Inject sealant using a sealant gun at a pressure of approximately 100 psi until the sealant, without visible evidence of entrapped air, emerges from both notches in the outer periphery of the seal assembly mounting flanges.

10. Remove excess sealant which extrudes from the seal assembly mounting flanges.

11. Remove the masking tape after the sealant has cured.

b. Pre-Pack Method.

1. Accomplish steps 1 through 4 of injection method.

2. Place seal fitting halves around the wire bundle on the pressure side of the bulkhead.

3. Wrap several turns of masking tape around the seal assembly on the far end only to center the bundle and retain the sealant when applied.

4. Hold the seal assembly in a vertical position with the open end up and inject sealant in around the wires. Remove and reinject the nozzle at several locations within and around the bundle to fill all the voids between the wires and around the wires and the seal assembly.

5. Wrap the open end of the seal assembly with masking tape to center the bundle and retain the sealant.

6. Lay a heavy bead of sealant within the flange of the fitting so that when placed against the bulkhead, some would be extruded between the fitting and bulkhead.

7. Position fitting in the cutout and secure with the required fasteners.

8. Remove any excessive sealant which extrudes from the seal assembly mounting flanges.

18-82. ADDING WIRES TO WIRE BUNDLE. Additional wires, approximately 18 inches in length have been added to the wire bundles at the firewalls, wing roots, etc., where additional wiring may be necessary.

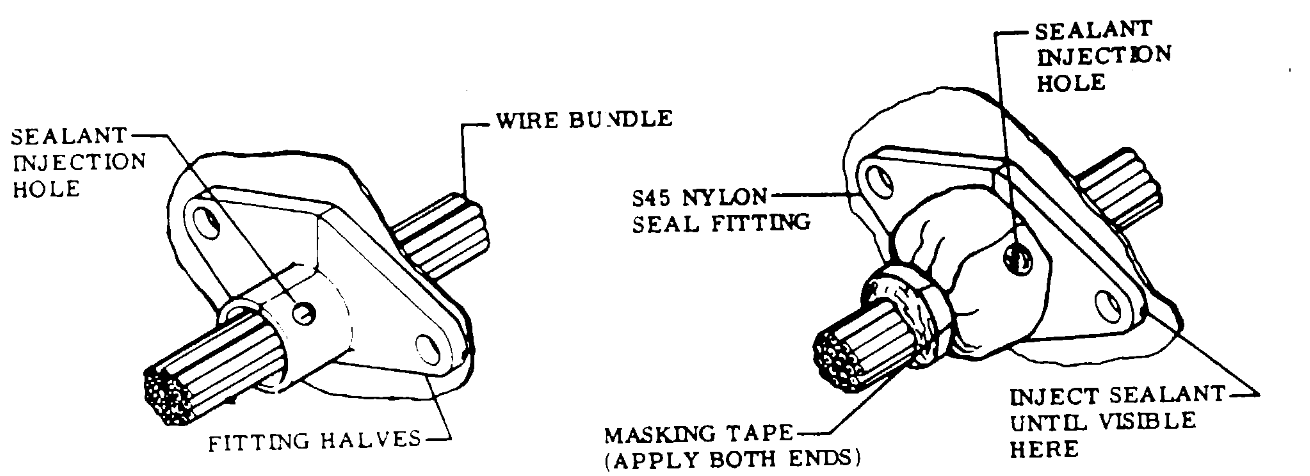


Figure 18-10. Electrical Sealing

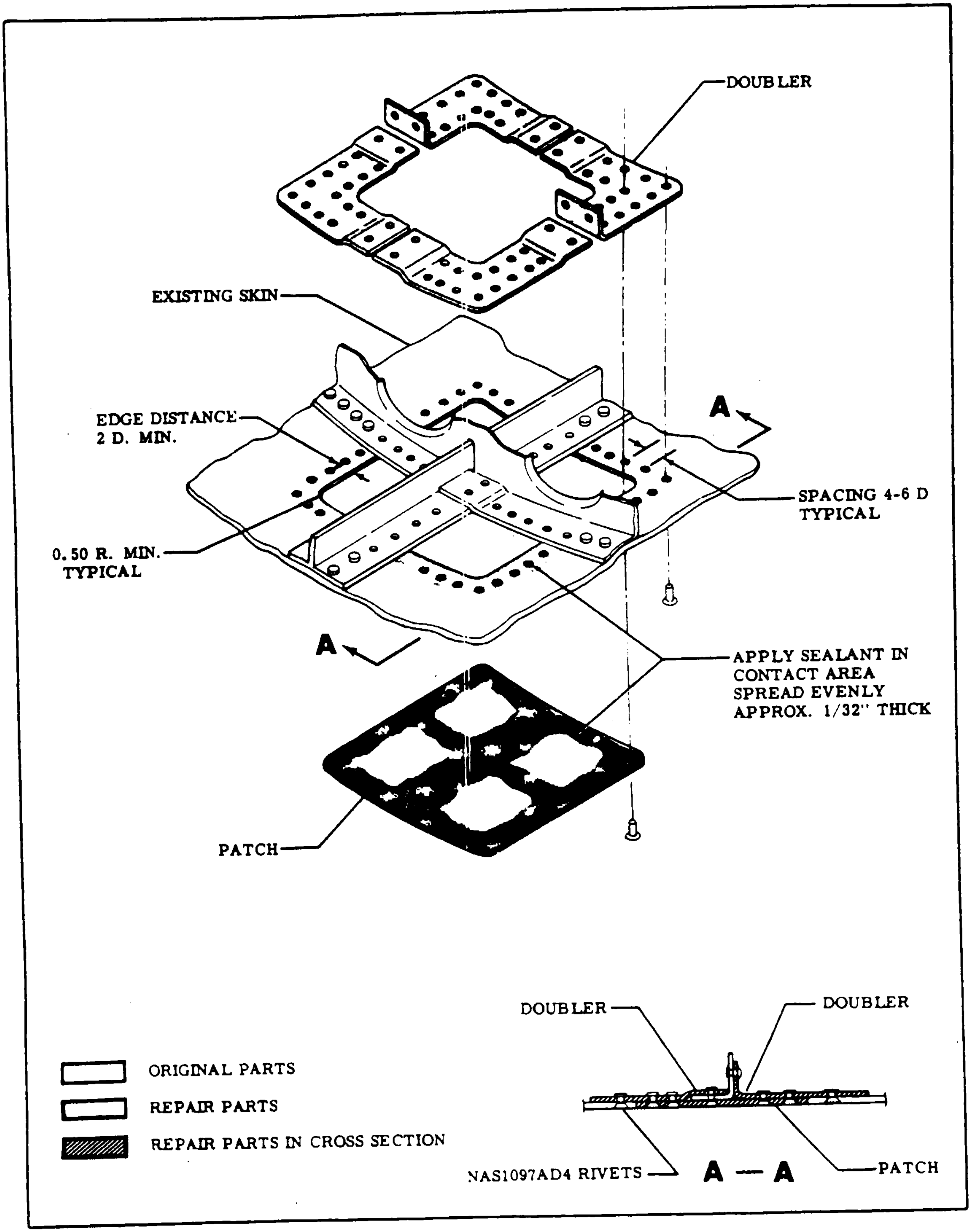


Figure 18-11. Over Structure Repair of Pressure Cabin

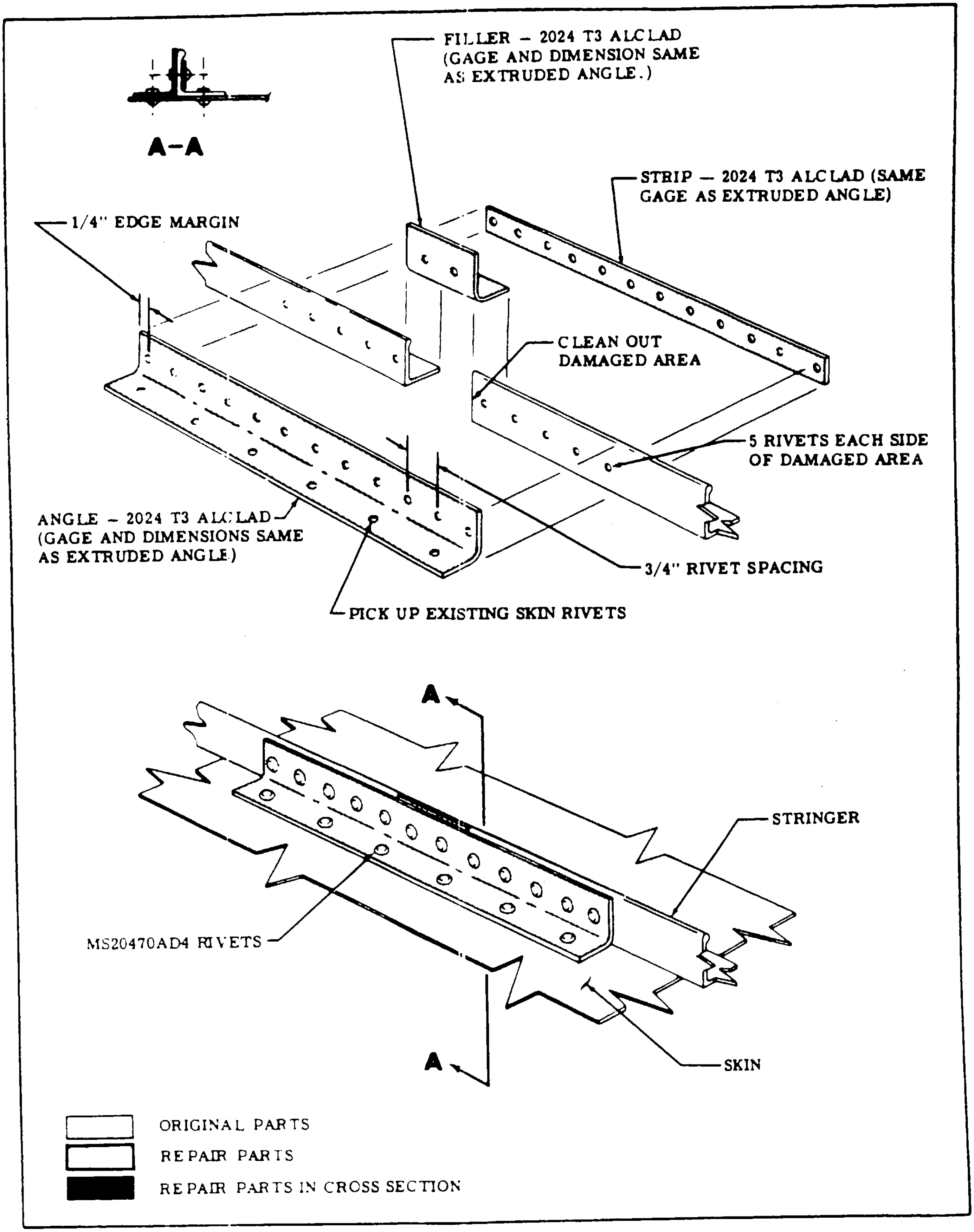


Figure 18-12. Typical Stringer Repair

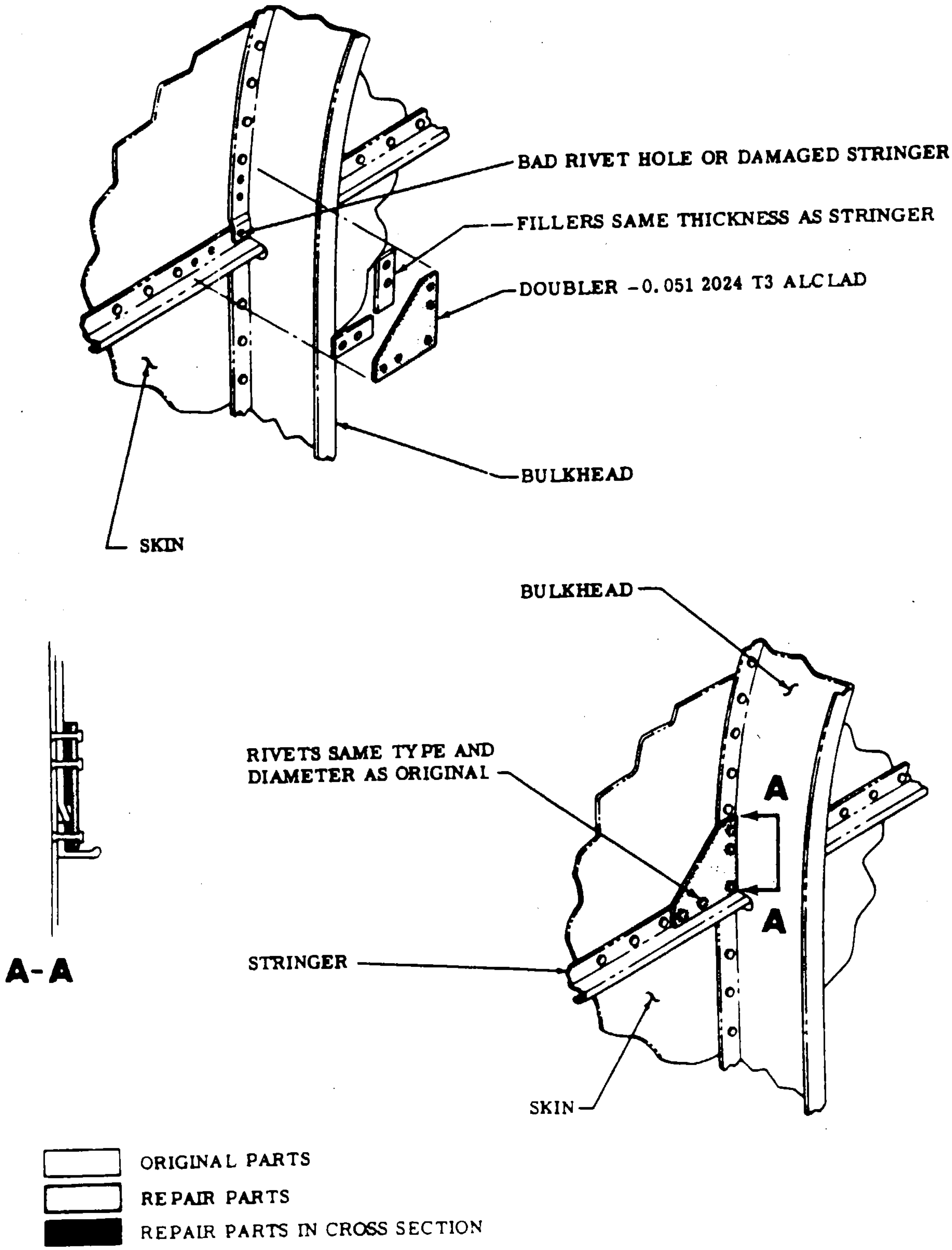


Figure 18-13. Typical Stringer to Bulkhead Repair

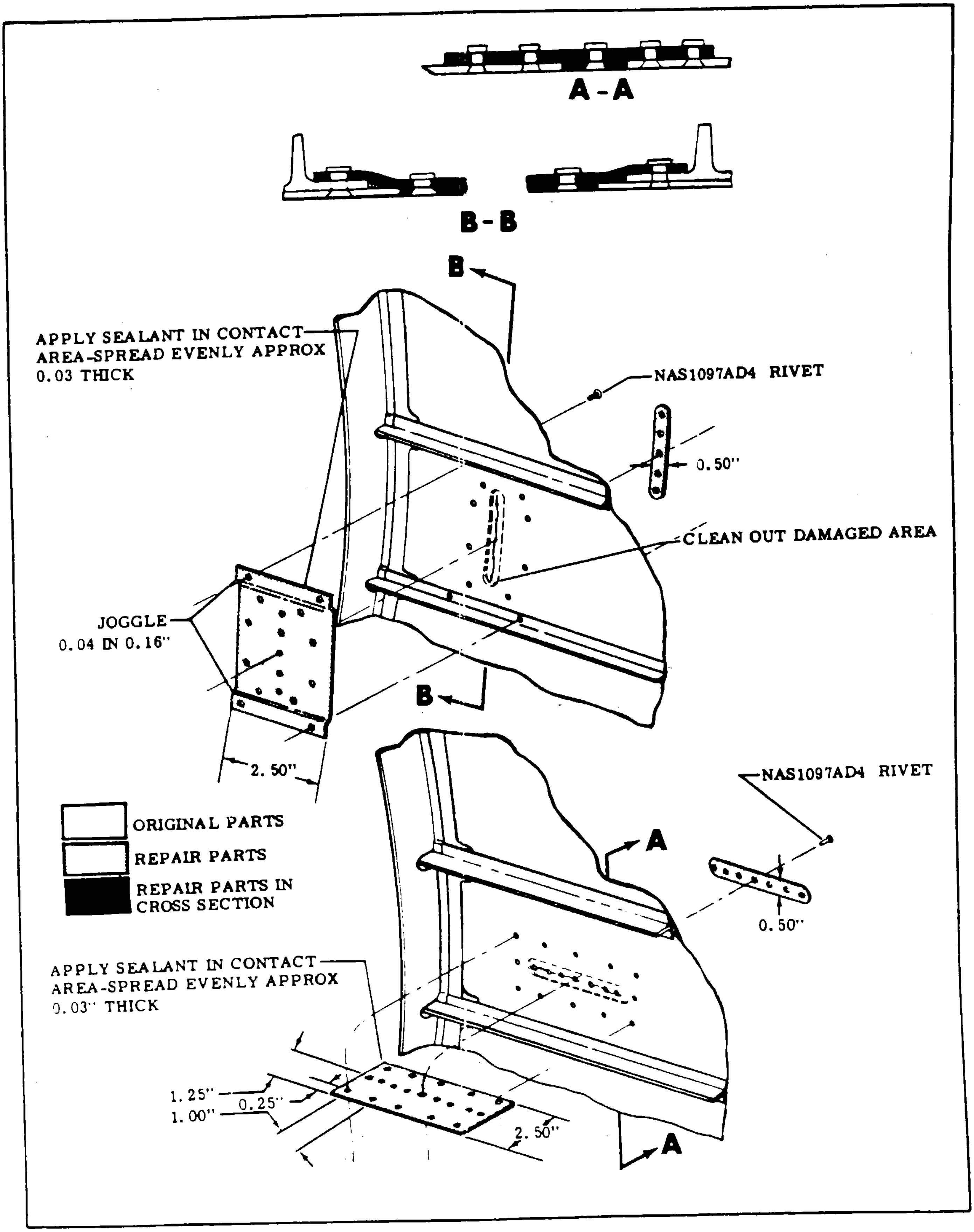


Figure 18-14. Typical Cabin Skin Crack Repair

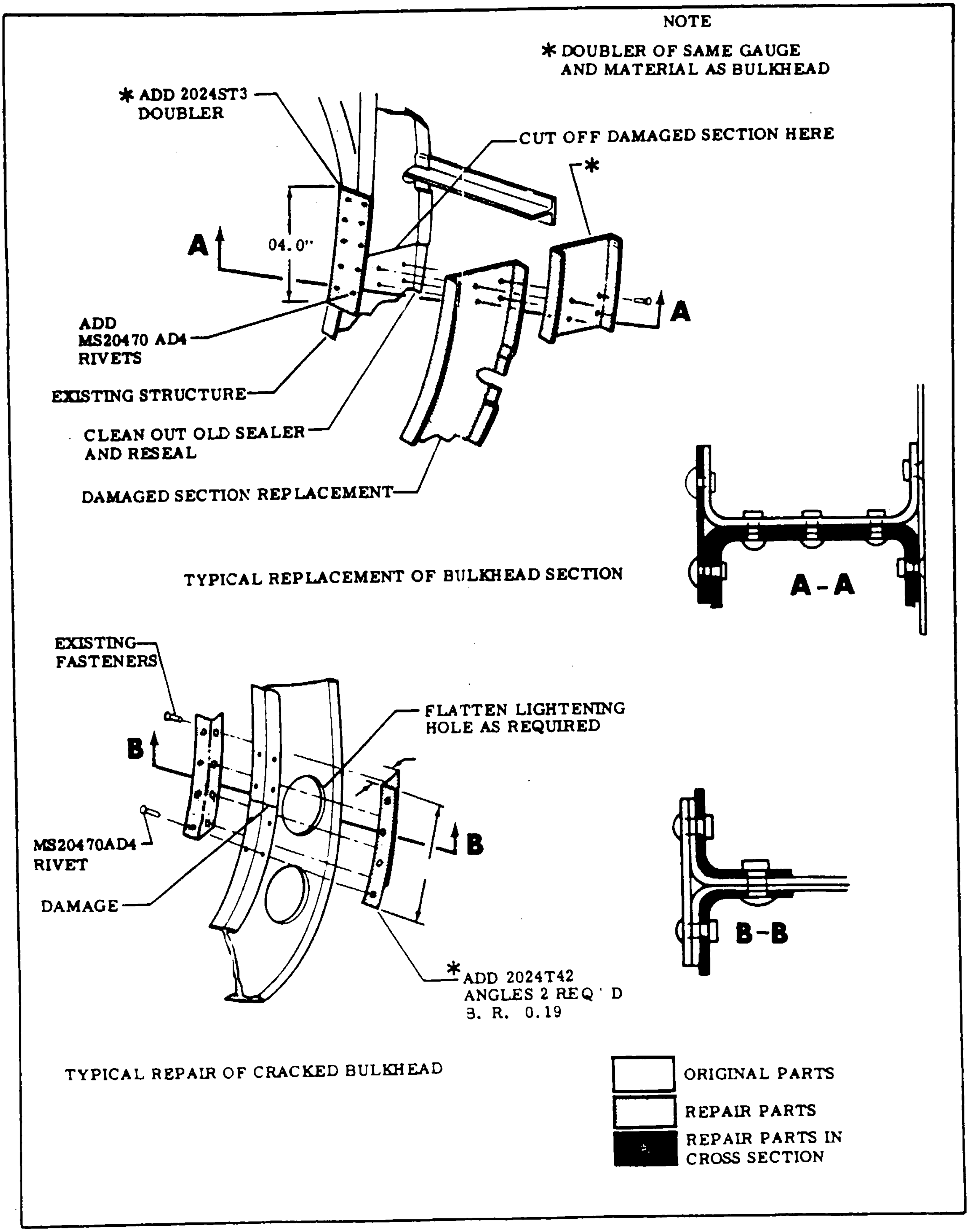
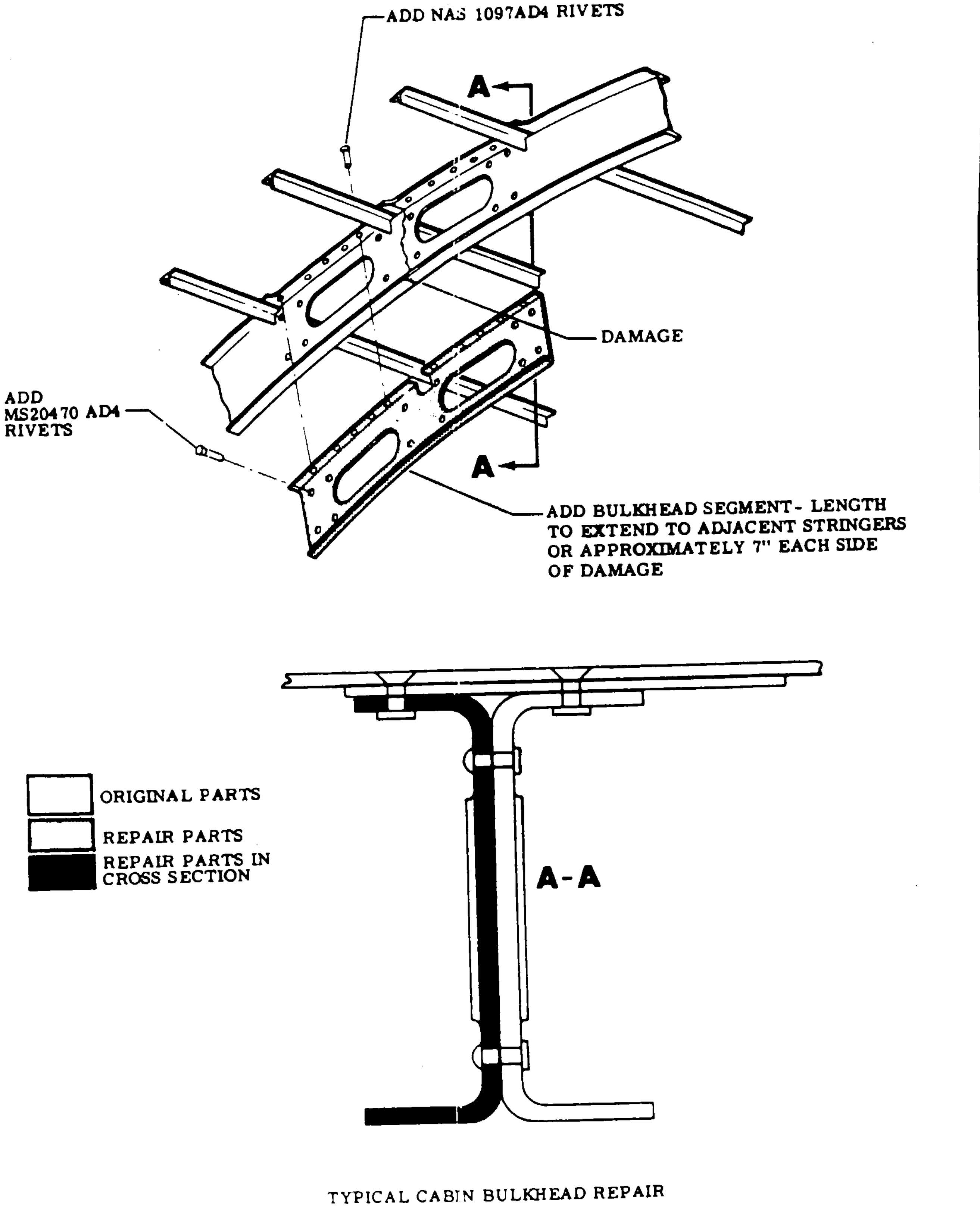


Figure 18-15. Typical Cabin Bulkhead Repair (Sheet 1 of 2)



TYPICAL CABIN BULKHEAD REPAIR

Figure 18-15. Typical Cabin Bulkhead Repair (Sheet 2 of 2)

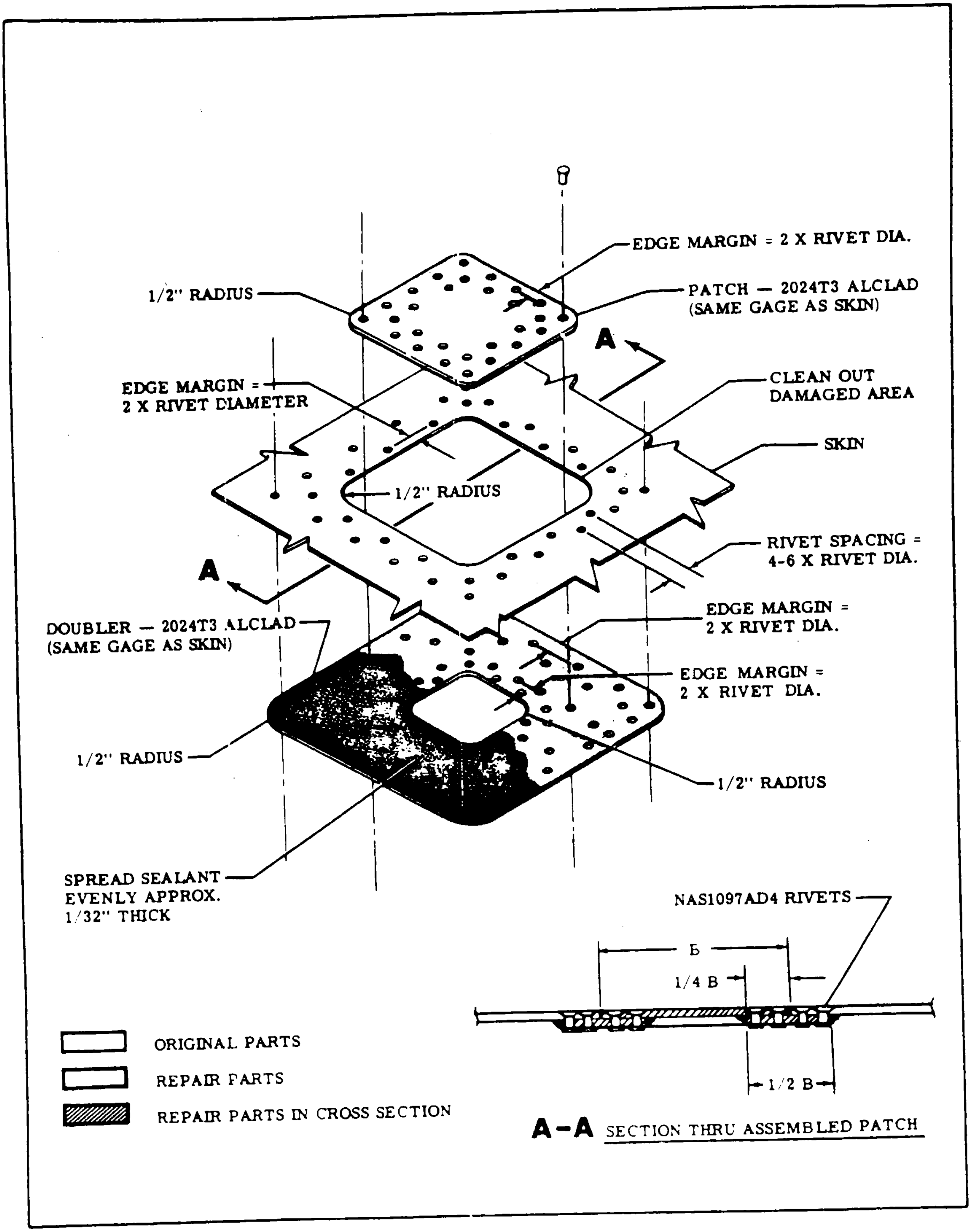


Figure 18-16. Typical Insert Patch in Pressure Cabin

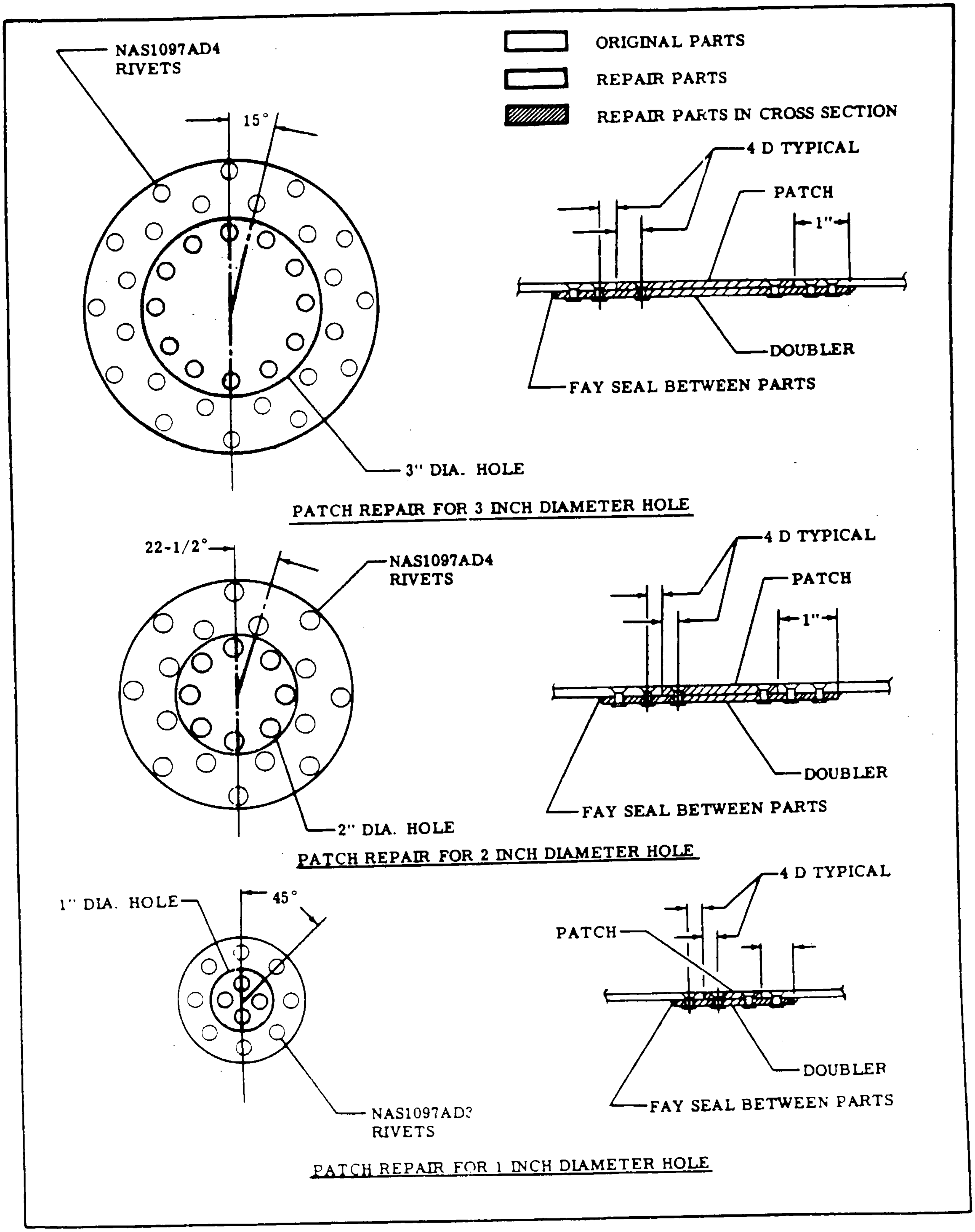


Figure 18-17. Typical Circular Hole Skin Repair in Pressure Cabin

1 Use rivet pattern at wing station 25.25 for repair from wing station 25.25 to wing station 96.00. Use rivet pattern at wing station 110.00 for lap splice patterns from wing station 110.00 to 189.00. See figure 1-2 for wing stations.

2 Use rivet spacing similar to the pattern at wing station 110.00 at leading edge ribs between lap splices.

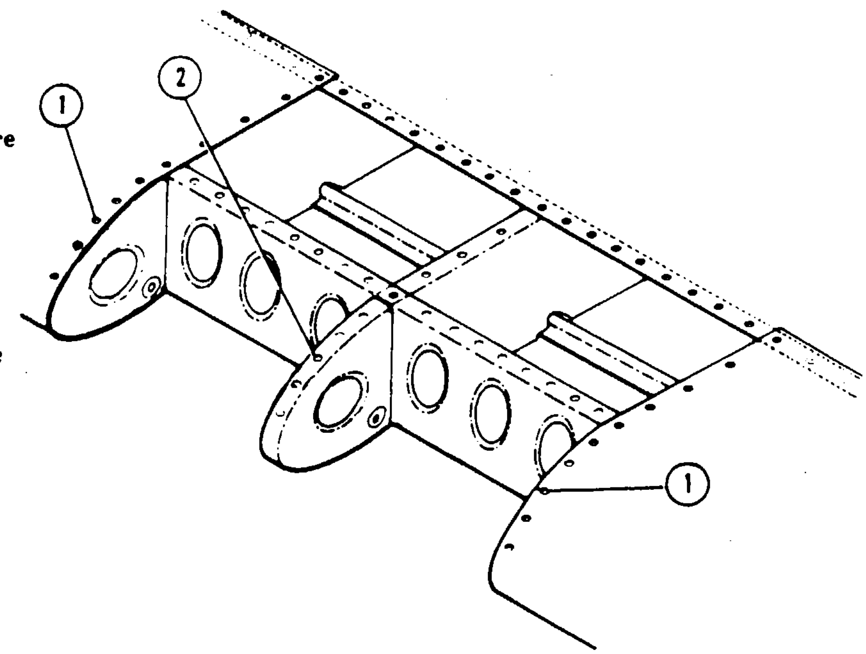
Select numbers of flush rivets to be used at each wing station leading edge rib from table.

RIBS AND STRINGERS:

Blind rivets may be substituted for solid rivets in proportionally increased numbers in accordance with the table.

SPARS:

Blind rivets may be installed in wing spars only in those locations where blind rivets were used during original manufacture, ie fuel bay area of front spars on aircraft with integral fuel bays.



NUMBER OF FLUSH RIVETS IN DIMPLED SKIN REQUIRED IN REPLACEMENT LEADING EDGE SKIN		
WING STATION RIB	SOLID MS20426-4	BLIND CR2248-4
124	18	22
136	15	18
155	11	13
172	10	12
189	10	12

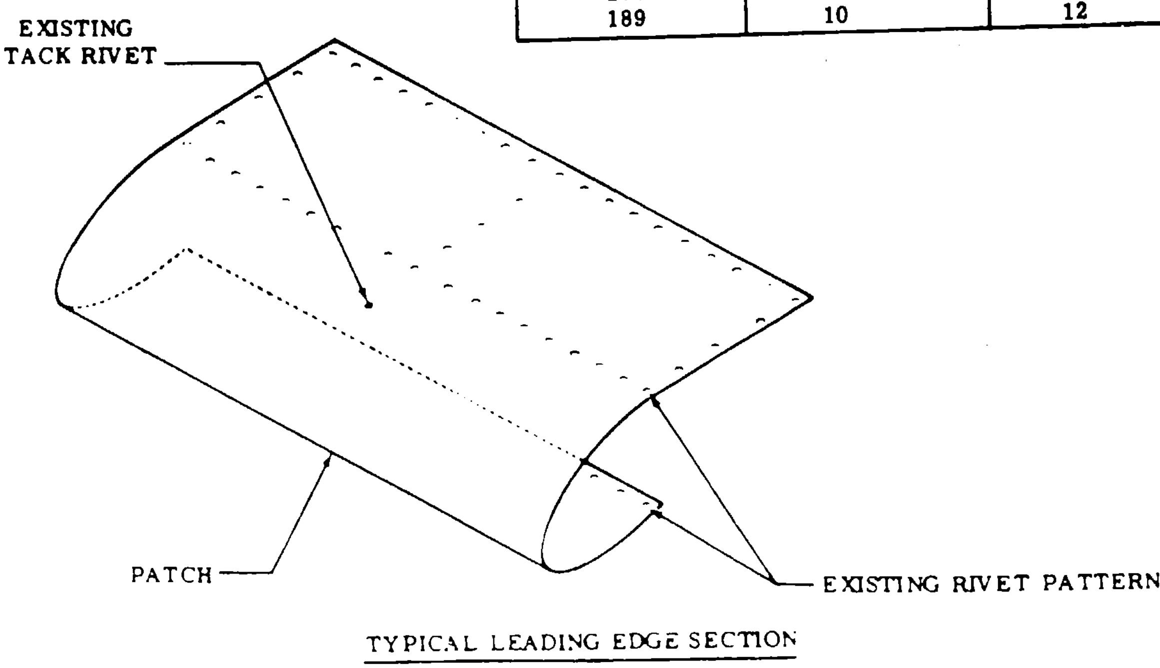


Figure 18-18. Bonded Leading Edge Repair

SECTION 19

PAINT

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NOTE

This section contains a listing of standard factory materials, and shows the area of their application. To determine the paint number and color, refer to the aircraft trim plate and Parts Catalog. In all cases, determine the type of paint, because some types are not compatible with others. Materials can be obtained from the Cessna Supply Division.

19-1. MATERIALS LISTING.

IMRON MODIFIED URETHANE

MATERIAL	NO/TYPE	AREA OF APPLICATION
PAINT	IMRON ENAMEL	Used as corrosion proof topcoat
	IMRON 192S Activator	Catalyst for Imron Enamel
PRIMER	WASH PRIMER P60G2	Used to prime aircraft for Imron Enamel
REDUCER, THINNER	IMRON Y8485S Reducer	Used to thin Imron Enamel
	Catalyst Reducer R7K44	Used to reduce P60G2

SUPPORT MATERIALS

MATERIAL	NO/TYPE	AREA OF APPLICATION
STRIPPER	Strypeeze Stripper	Used to strip primer overspray
CLEANER	Form Tech AC	Used to clean aircraft exterior and to remove grease, bug stains, etc.
	Klad Polish	Used to clean aluminum finish
	808 Polishing Compound	Used to rub out overspray
SOLVENT	(MEK) Methyl Ethyl Ketone	Used to tack aircraft prior to topcoat
CLOTH	HEX Wiping Cloth	Used with solvent to clean aircraft exterior
FILLER	White Streak	Used to fill small dents
MASKING	Class A Solvent Proof Paper	Used to mask areas not to be painted
	Tape Y218	Used for masking small areas
	Tape Y231	Used for masking small areas

NOTE

Do not paint pitot tube, gas caps, or aileron gap seals. Also do not paint antenna covers which were not painted at the factory.

19-2. FACILITY. Painting facilities must include the ability to maintain environmental control; temperature at 65°F., and a positive pressure inside to preclude the possibility of foreign material damage. All paint equipment must be clean, and accurate measuring containers available for mixing protective coatings. Modified Urethane has a pot life of four to eight hours, depending on ambient temperature and relative humidity. Use of approved respirators while painting is a must, for personal safety. All solvent containers should be grounded to prevent static build-up. Catalyst materials are toxic, therefore, breathing fumes or allowing contact with skin can cause serious irritation. Material stock should be rotated to allow use of older materials first, because its useful life is limited. All supplies should be stored in an area where temperature is higher than 50°F., but lower than 90°F. Storage at 90°F is allowable for no more than sixty days providing it is returned to room temperature for mixing and use.

Modified urethane paint requires a minimum of seven days to cure under normal conditions, if humidity and temperature is lower, curing time will be extended a maximum of 14 days. During the curing period, indiscriminate use of masking tape, abrasive polishes, or cleaners can cause damage to finish. Desirable curing temperature for modified urethane is 60°F. for a resulting satisfactory finish.

19-3. APPLICATION.

19-4. CLEAN UP.

a. Inspect airplane for any surface defects, such as dents or unsatisfactory previous repairs, and correct according to Paragraph 19-11.

b. Wipe excess sealer from around windows and skin laps, using Form Tech AC. Mask windows, ABS parts and other areas not to be primed, with 3M tape and Class A Solvent-Proof Paper. Care must be exercised to avoid cuts, scratches or gouges by metal objects to all plexiglass surfaces, because cuts and scratches may contribute to crazing and failure of plexiglass windows.

c. Methyl Ethyl Ketone (MEK) solvent should be used for final cleaning of airplanes prior to painting. The wiping cloths shall be contaminant and lint free HEX. Saturate cloth in the solvent and wring out so it does not drip. Wipe the airplane surface with the solvent saturated cloth in one hand, and immediately dry with a clean cloth in the other hand. It is important to wipe dry solvent before it evaporates.

NOTE

Do not use MEK on plexiglass as crazing will result.

When an airplane has paint or zinc chromate overspray on the exterior, stripper may be used to remove the overspray. The stripped may be applied by brush and will require a few minutes to soften the overspray. Heavy coatings may require more than one application of the stripper. Use extreme care to prevent stripper from running into faying surfaces on corrosion proofed airplanes. After removal of the overspray, clean the airplane with Methyl Ethyl Ketone (MEK) solvent in the prescribed manner.

NOTE

It is imperative that clean solvent be used in cleaning airplanes. Dispose of contaminated solvent immediately. Fresh solvent should be used on each airplane.

WARNING

Use explosion proof containers for storing wash solvents and other flammable materials.

19-5. PREPRIMING.

a. Corrosion proofed and standard aircraft will receive Sherwin Williams Primer P60G2, DuPont Imron Enamel for over all color, and for stripes.

b. Mix 1 part P60G2 primer with 1 1/2 parts R7K44 catalyst reducer, by volume. Mix in stainless steel or lined containers only. After mixing allow primer to set for 30 minutes before spraying. Pot life of the mixed primer is six (6) hours, all mixed materials should be discarded if not used within that time limit. Pot pressure during spraying should be approximately 10 ± 1 psi. Air pressure should be 40 to 50 psi at the gun. Blow loose contaminant off the airplane with clean, dry air. Check all tapes to make sure they adhere properly. Cover the flap tracks, nose gear strut tube, wheels, and shimmy dampener rod ends. ABS parts and other preprimed parts do not receive wash primer.

WARNING

AIRCRAFT SHOULD BE GROUNDED PRIOR TO PAINTING TO PREVENT STATIC ELECTRICITY BUILD-UP AND DISCHARGE.

19-6. PRIMING.

a. Apply primer in one wet even coat. Dry film thickness to be .0003 to .0005 inches. Do not topcoat until sufficiently cured. When scratching with firm pressure of the fingernail does not penetrate the coating, the primer is cured. Primer should be topcoated within four hours after application.

19-7. PREPAINTING.

a. On standard aircraft mix the required amount of Imron with Imron 192S Activator in a 3 to 1 ratio by volume. Mix thoroughly, and begin spraying immediately, because there is no induction time requirement. Imron can be thinned to spraying viscosity with Y8485S Imron Reducer. Viscosity should be checked and adjusted after four hours if necessary.

b. When applying modified urethane finishes, the painter should wear an approved respirator, which has a dust filter and organic vapor cartridge, or an air supplied respirator. All modified urethane finishes contain some isocyanate, which may cause irritation to the respiratory tract or an allergic reaction.

Individuals may become sensitized to isocyanates.

c. The pot life of the mixture is approximately 6-8 hours at 75°F. Pot pressure should be approximately 12 psi during application. Air pressure at the gun should be 40 to 50 psi.

c. Scuff sand the primer only where runs or dirt particles are evident. Minor roughness or grit may be removed by rubbing the surface with brown Kraft paper which has been thoroughly wrinkled. Unmask ABS and other preprimed parts and check tapes. Clean surface with a jet of low pressure-dry air.

19-8. PAINTING OVERALL.

a. Complete painting of the plane should be done with 2 or 3 wet, even coats. Dry coats will not reflow, and will leave a grainy appearance.

b. Allow 5 minute period for the finish to flash off before moving aircraft to the oven.

c. Move to the force dry oven and dry for approximately 1 1/2 hours at 120°F to 140°F.

d. Dry film thickness of the overall color should be between 1.3 and 2.0 mils, over 5.0 mils requires Control Surface Balance Check. (Refer to Sect 18).

19-9. MASKING FOR STRIPES.

a. Remove airplane from the oven. Allow airplane to cool to room temperature before masking.

b. Mask stripe area using 3M Tape Y231 or 3M Tape Y218 and Class A solvent proof paper. Double tape all skin laps to prevent blow by.

c. Airplanes which will have a stripe only configuration shall be masked, cleaned, and primed, in stripe area only.

d. If the base coat is not over 72 hours old, the stripe area does not require sanding. If sanding is necessary because of age or to remove surface defects, use #400 or #600 sand paper. Course paper will leave sand marks which will decrease gloss and depth of gloss of the finish. The use of power sanders should be held to a minimum, if used, exercise care to preclude sanding through the white base coat. Wipe surface to be striped with a tack cloth and check all tapes.

e. Stripe colors on Imron base coat will be Imron Enamel. Mix as out lined in paragraph 19-6.

f. Painting of the stripe should be done with 2 or 3 wet-even coats. Dry coats will not reflow, and will leave a grainy appearance. Stripes may be force dried or air dried. Film thickness of a stripe is approximately 1.0 mil.

g. Do not remove masking tape and paper until the paint has dried to a "dry to touch" condition. Care should be exercised in removal of the masking to prevent damage to the finish.

h. Modified urethane finishes are sensitive to moisture, therefore, should be stored out of rain until cured.

19-10. TOUCH UP.

When necessary to touch up or refinish an area, the defect should be sanded with #400 and followed by #600 sand paper. Avoid, if possible, sanding through the primer. If the primer is penetrated over an area 1/2 inch square or larger, repriming is necessary. Avoid spraying primer on the adjacent paint as much as possible. Since urethane finishes cannot be "spotted in" repairs should be in sections extending to skin laps or stripe lines.

a. Dry overspray and rough areas may be compounded out with DuPont #808 rubbing compound.

b. Grease, bug stains, etc. may be removed from painted surfaces with Form Tech AC. Klad Polish may be used on bare aluminum to remove stains, oxides, etc.

c. Rework areas, where paint or primer removal is required, may be stripped with Strypeeze Paint Removal. All traces of stripper must be removed before refinishing.

19-11. REPAIR OF DENTS.

a. To repair dents use White Streak Filler or equivalent. Mix White Streak in the correct proportion as recommended by the manufacturer.

b. Do not apply White Streak Filler over paint. All paint shall be removed in the repair area and the aluminum surface sanded lightly to increase adhesion. Apply the White Streak to a level slightly above the surrounding skin. After drying for 10 - 15 minutes, sand the filler flush with the skin surface, using care to feather the edges.

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NOTE

Effectivity of diagrams are designated as follows: Eff thru (SRxxxx) denotes effectivity to the serial number prior to the (SRxxxx) serial. Ser (SRxxxx) & on denotes effectivity for the (SRxxxx) serial and on. Diagrams and/or portions of, may be individually serialized and not designated by a (SRxxxx) number.

Heated Pitot & Heated Stall Warning System-Known Icing (OPT) 3G12/20-108
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CIRCUIT FUNCTION AND SPECIFIC CIRCUIT CODE LETTERS

A - Armament
B - Photographic
C - Control Surface
- CA - Automatic Pilot
- CC - Wing Flaps
- CD - Elevator Trim

D - Instrument (Other Than Flight or Engine Instrument)
- DA - Ammeter
- DB - Flap Position Indicator
- DC - Clock
- DD - Voltmeter
- DE - Outside Air Temperature
- DF - Flight Hour Meter

E - Engine Instrument
- EA - Carburetor Air Temperature
- EB - Fuel Quantity Gage and Transmitter
- EC - Cylinder Head Temperature
- ED - Oil Pressure
- EE - Oil Temperature
- EF - Fuel Pressure
- EG - Tachometer
- EH - Torque Indicator
- EJ - Instrument Cluster

F - Flight Instrument
- FA - Bank and Turn
- FB - Pitot Static Tube Heater and Stall Warning Heater
- FC - Stall Warning
- FD - Speed Control System
- FE - Indicator Lights

G - Landing Gear
- GA - Actuator
- GB - Retraction
- GC - Warning Device (Horn)
- GD - Light Switches
- GE - Indicator Lights

H - Heating, Ventilating and De-Icing
- HA - Anti-icing
- HB - Cabin Heater
- HC - Cigar Lighter
- HD - De-ice
- HE - Air Conditioners
- HF - Cabin Ventilation

J - Ignition
- JA - Magneto

K - Engine Control
- KA - Starter Control
- KB - Propeller Synchronizer

L - Lighting
- LA - Cabin
- LB - Instrument
- LC - Landing
- LD - Navigation
- LE - Taxi
- LF - Rotating Beacon
- LG - Radio
- LH - De-ice
- LJ - Fuel Selector
- LK - Tail Floodlight

M - Miscellaneous
- MA - Cowl Flaps
- MB - Electrically Operated Seats
- MC - Smoke Generator
- MD - Spray Equipment
- ME - Cabin Pressurization Equipment
- MF - Chem O_2 - Indicator

P - D. C. Power
- PA - Battery Circuit
- PB - Generator Circuits
- PC - External Power Source

Q - Fuel and Oil
- QA - Auxiliary Fuel Pump
- QB - Oil Dilution
- QC - Engine Primer
- QD - Main Fuel Pumps
- QE - Fuel Valves

R - Radio (Navigation and Communication)
- RA - Instrument Landing
- RB - Command
- RC - Radio Direction Finding
- RD - VHF
- RE - Homing
- RF - Marker Beacon
- RG - Navigation
- RH - High Frequency
- RJ - Interphone
- RK - UHF
- RL - Low Frequency
- RM - Frequency Modulation
- RP - Audio System and Audio Amplifier
- RR - Distance Measuring Equipment (DME)
- RS - Airborne Public Address System

S - Radar
U - Miscellaneous Electronic
- UA - Identification - Friend or Foe

W - Warning and Emergency
- WA - Flare Release
- WB - Chip Detector
- WC - Fire Detection System

X - A.C. Power

FUNCTION CIRCUITS	GAUGE	BASE COLOR (or solid)	STRIPE COLOR
A + Power	16	Red	None
	18	Red	Black
		Red	White
	20	Red	Green
	22	Red	Yellow
Ground	16	Black	None
	18	Black	White
Mike Ground	22	Black	None
Radio Lights Dim	18	Yellow	None
Mike Audio	22	Tan	None
		Tan (Shielded)	None
Mike Key	22	White	Black
Radio Speaker	20	Green	None
Headphones	22	Blue	None
Dev - ●	22	Gray	Red
Dev - ●	22	Gray	Green

● "Dev -" and "Dev -" circuits are for use in Nav-o-matic 300 autopilots and any associated omni indicator circuit to which it connects.

NOTE

All other color coded wires are for general use in multi-conductor radio and autopilot harness assemblies.

CROSS REFERENCE LISTING OF SERIAL REQUEST NUMBERS LISTED ON DIAGRAMS VS. AIRCRAFT SERIAL NUMBERS.

SR NO.	AIRCRAFT SERIAL NO.	SR NO.	AIRCRAFT SERIAL NO.
*SR6755	21059503	*SR7639	21060316
*SR7038	21059720	*SR7650	21060540
*SR7126	21059853	*SR7677	21060319
*SR7320	21059864	*SR7724	21060130
*SR7381	21060090	*SR7913	21061040
*SR7473	21059882	*SR7922	21060356
*SR7486	21059852	*SR7997	21060526, T21060544

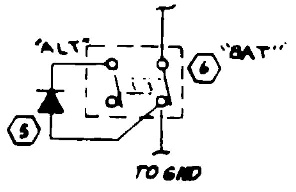
CROSS REFERENCE LISTING OF SERIAL REQUEST NUMBERS LISTED ON DIAGRAMS VS. AIRCRAFT SERIAL NUMBERS (CONT).

SR.	AIRCRAFT SERIAL NO.
*SR8082	21060612
*SR8143	21061574
*SR8153	21060719
*SR8259	21061041
*SR8297	21061103
*SR8394	21061315
*SR8426	21061296
*SR8464	21062274
SR8465	P21000001 thru P210000150
*SR8482	21061230
*SR8499	21061574
*SR8552	21061617
*SR8633	21061984
*SR8656	21061627
*SR8784	21062954
SR8785	P21000151
SR8861	*21062274, P21000001
SR8863	*21062274 thru 21062953 P21000001 thru P21000150
SR8938	*21062250
SR8970	*21062250, P21000001
SR9014	*21062727, P21000041
SR9080	*21062699, P21000031
SR9114	*21063641
SR9115	P21000386
SR9140	*21062828, P21000085
SR9142	*21062717, P21000065

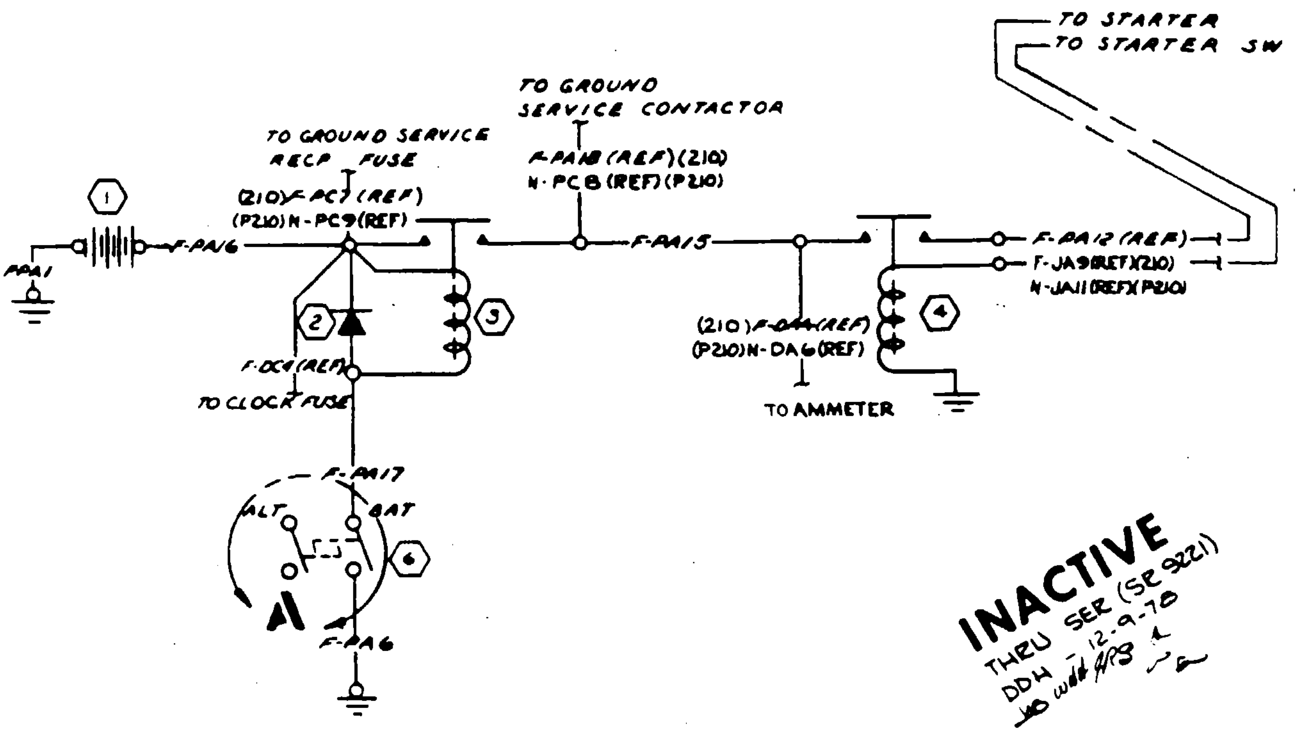
SR NO.	AIRCRAFT SERIAL NO.
SR9169	*21062739, P21000065
SR9187	*21062955, P21000151
SR9195	*21062942, P21000122
SR9221	*21063477, P21000345
SR9310	*T21063641, P21000386
SR9361	P21000151
SR9384	*21062955
SR9427	*21062969, P21000120
SR9429	*21063299, P21000257
SR9465	*21063369, P21000279
SR9556	*21063953, *T21067300 & P21000405
SR9583	*21063547, P21000344
SR9634	*21064136
SR9635	P21000591
SR9711	*21064064, P21000535
SR9742	*21064083, P21000553
SR9785	*21064136, P21000591
SR9953	*21064536
SR9954	P21000761
SR10056	*21064536, P21000761
*SR10061	21064198
* SR10101	21064773
SR10102	P21000812
SR10122	*21064536, P21000761
SR10148	*21064198, P21000692
SR10250	*21064559, P21000771
SR10254	* 21064602, P21000785
SR10396	*21064773, P21000812

*Not Applicable to P210

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	JLO 5-3-73	
B	BY REV: ADD DETAIL "A" & SER; 226A WAS 186A/PA6 & PA17 (SR6755)(REF)(SR8143)	GDS 5-6-76	
C	BY REV: C614001-0101 WAS 0870060-1; ADD WIRES JA11(REF), PC8(REF), PC9(REF) & DA6(REF) (SR8860)(SR8465)	GDS 6-6-77	
D	BY REV: C614001-0105 WAS C614001-0101 (SR9149)	RLY 5-25-78	



DETAIL A
THRU SER (SR6755)
(21059502)



INACTIVE
THRU SER (SE 9221)
DDH 12-9-78

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
F-PA17	22		50	S-1367-1-10	S-1493-1	
F-PA16	2		15	S-1367-7-13	S-1367-7-13	
F-PA15	2		44	S-1367-7-13	S-1606-1	
F-PA6	22		6	S-1493-1	S-1367-1-8	
F-PA1	2		14	S-1367-7-12	S-1367-7-13	

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
6	S-1994-1-1	MASTER SWITCH
5	0770719-2	DIODE ASSY
4	S-1577-1	STARTER CONTACTOR
3	S-1580-1	BAT CONTACTOR
2	0770728-1	DIODE ASSY
1	C614001-0105	BATTERY ASSY

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD. NO

SUPERSEDES 12210-1073
SUPERSEDED BY 1270709 P 4.12

CONTRACT NO

	NAME	DATE
DESIGN	V R SIPES	1-28-71
GROUP		2-26-71
DRAWN	V R SIPES	2-18-71
CHECK	L K WHITE	2-24-71
STRESS		
PROJ		2-28-71
APPD		
OTHER		

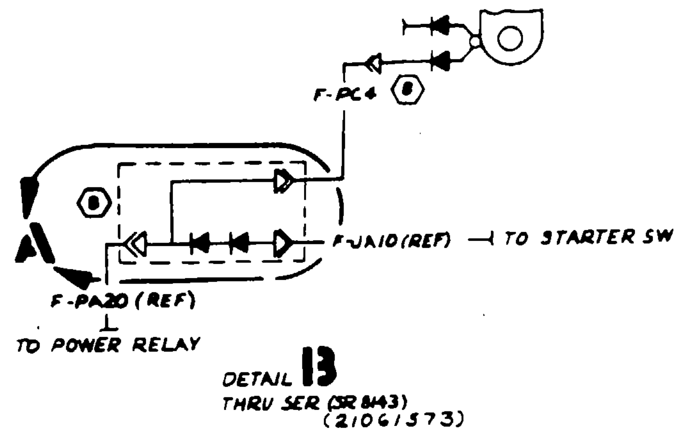
Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — BATTERY CIRCUIT

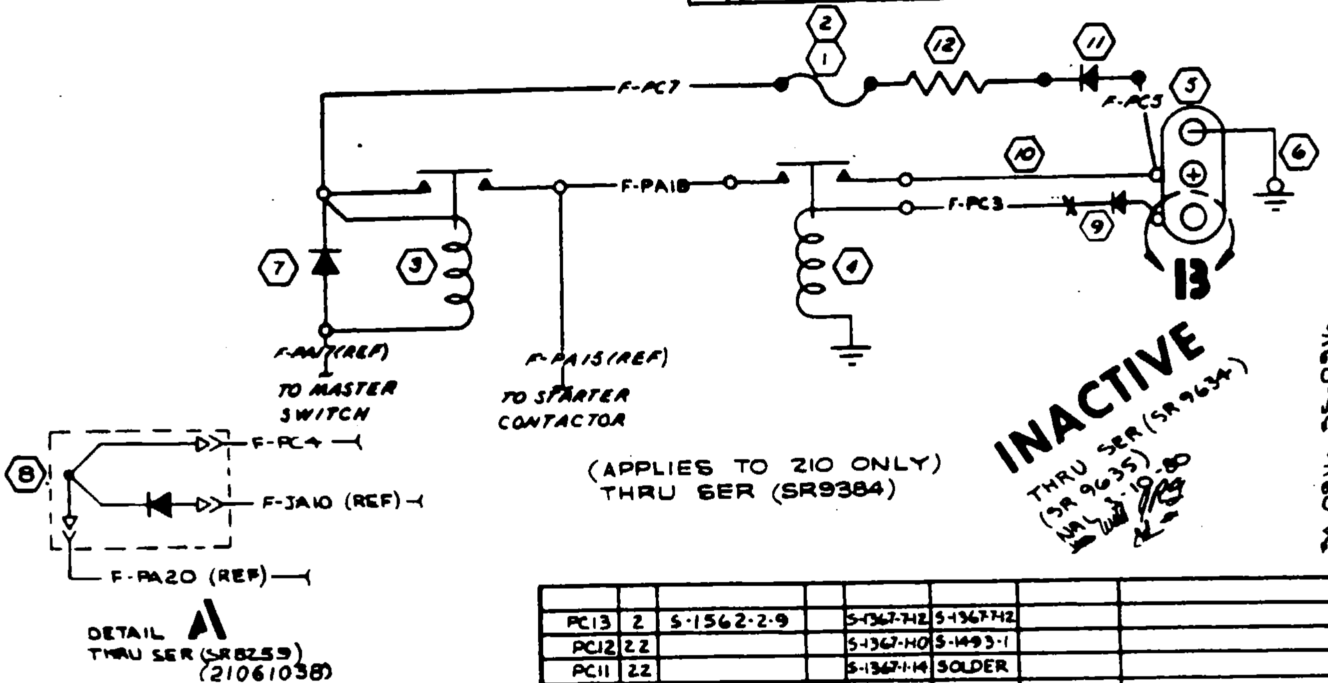
SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

SCALE NONE | 210 | PAGE 4.1

(SR6755) II



LET	DESCRIPTION	DATE	APPD
	REVISION		
A	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	JLO 5-3-73	
B	BY REV: S-1367-6-13/PA18 WAS S-1367-7-13/PA18; S-1367-6-14/PA18 WAS S-1367-7-13/PA18 ADD WIRE LENGTH/ F-PA18 (NOW SHOP PRACTICE)	J&F 11-8-73	
C	BY REV: ADD DETAIL "A" & SER & SECOND DIODE (SR8255)	RS 6-11-75	
D	BY REV: ADD DETAIL "B" & SER; 22GA WAS 18GA F-PC3, F-PC5 & F-PC7, MS3506-1 WAS AN2552-3A ADD IN-2070; S-1370-2 WAS S-1493-1 (SR8143)	GDS 5-12-76	
E	BY REV: ADD P 4.2.1 PC8 THRU PC13, S-1637(-1&-2), 2170009 (SR8465)	GDS 6-6-77	JAB
F	BY REV: SER OUT 210/P 4.2; ADD 210/P4.2.1 & SER; PC11 WAS TO MS3506-1 (SR9384) (NOW SHOP PRACT)	DLP 7-13-78	JAB



(APPLIES TO 210 ONLY)
THRU SER (SR9384)

INACTIVE
THRU SER (SR9634)
(SR 9635) 10-80

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PC13	2	S-1562-2-9		S-1367-7-12	S-1367-7-12		
PC12	22			S-1367-H0	S-1493-1		
PC11	22			S-1367-1-14	SOLDER		
PC10	22			S-1636-1	SOLDER		
PC9	22			S-1367-H3	S-1635-1		
PC8	4	S-1562-4-9		S-1367-6-13	S-1367-6-14		
F-PC7	22		20	SOLDER	S-1367-1-5	THRU	SER (SR9384)
F-PC5	22		5	S-1367-1-4	SOLDER		(SR9384)
F-PC4	18		65	S-1493-1	S-1493-1		(SR8143)
F-PC3	22		5	S-1367-1-10	S-1370-2		(SR9384)
F-PA18	4		15	S-1367-6-15	S-1367-6-14	THRU	SER (SR9384)

WIRE TABLE

	PART NO.	DESCRIPTION	VENDOR
15	2170009	BUS BAR ASSY	
14	S-1637-2	HOUSING	
13	S-1637-1	HOUSING	
12	X26263	RESISTOR .75Ω	(94310)
11	20H3P	DIODE	(81970)
10	1270653-1	BUS BAR	
9	1N-2070	DIODE	
8	1570043	DIODE ASSY	
7	0770728	DIODE ASSY	
6	0312155	GROUND STRAP	
5	MS 3506-1	RECEPTACLE	
4	S-1577-1	CONTACTOR	
3	S-1580-1	BAT CONTACTOR	
2	S-1090-2	FUSEHOLDER	
1	S-1091-5	FUSE	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO.
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES 1221O-1073
SUPERSEDED BY 1270709 P 4.15

CONTRACT NO

	NAME	DATE
DESIGN	VR SIPES	1-28-71
GROUP	H Wise	2-26-71
DRAWN	VR SIPES	2-18-71
CHECK	L.K WHITE	2-24-71
STRESS		
PROJ		
APPD		
OTHER		

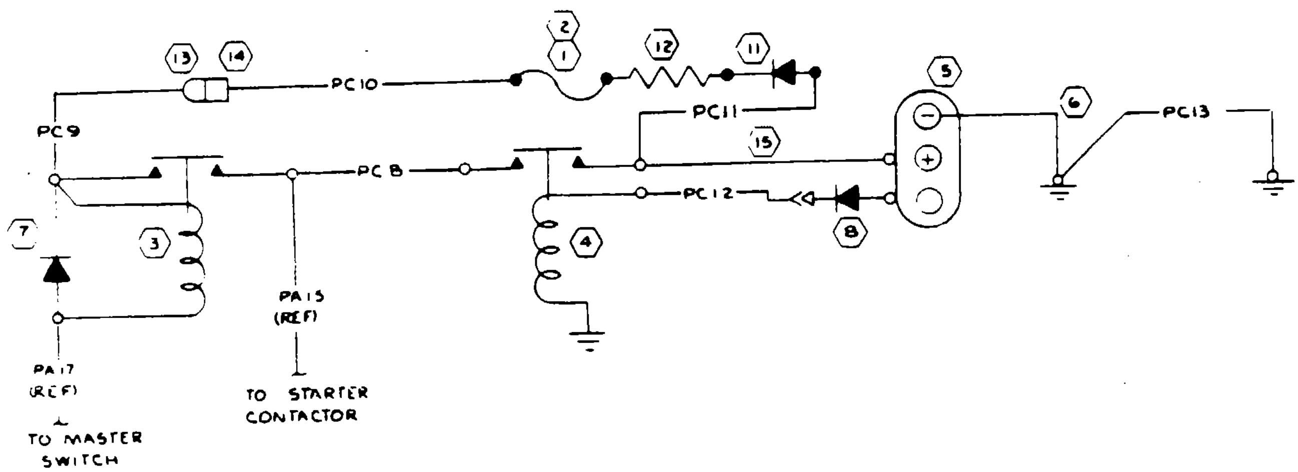
Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — GROUND SERVICE RECEPTACLE (OPT)

SIZE C | CODE IDENT NO 71379 | DWG NO 1270709
SCALE NONE | 210 P210 | PAGE 4.2
(SR 6755) II (21059508)

34-09-13-09

REVISION			
LET	DESCRIPTION	DATE	APPD
F	SEE PG 4.2 FOR REVISION		



(APPLIES TO P210)
SER (SR8465) & ON
(APPLIES TO 210)
SER (SR9384) & ON

INACTIVE
THRU SER (SR9634) (SR 9635)
NRL 3-10-80

CONTRACT NO		
	NAME	DATE
DESIGN	SPENCER	6-5-77
GROUP		6-25-77
DRAWN	SCHIFFELBEIN	6-6-77
CHECK	BOHLESKE	6-7-77
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION, 5800 E PAWNEE, WICHITA KANSAS

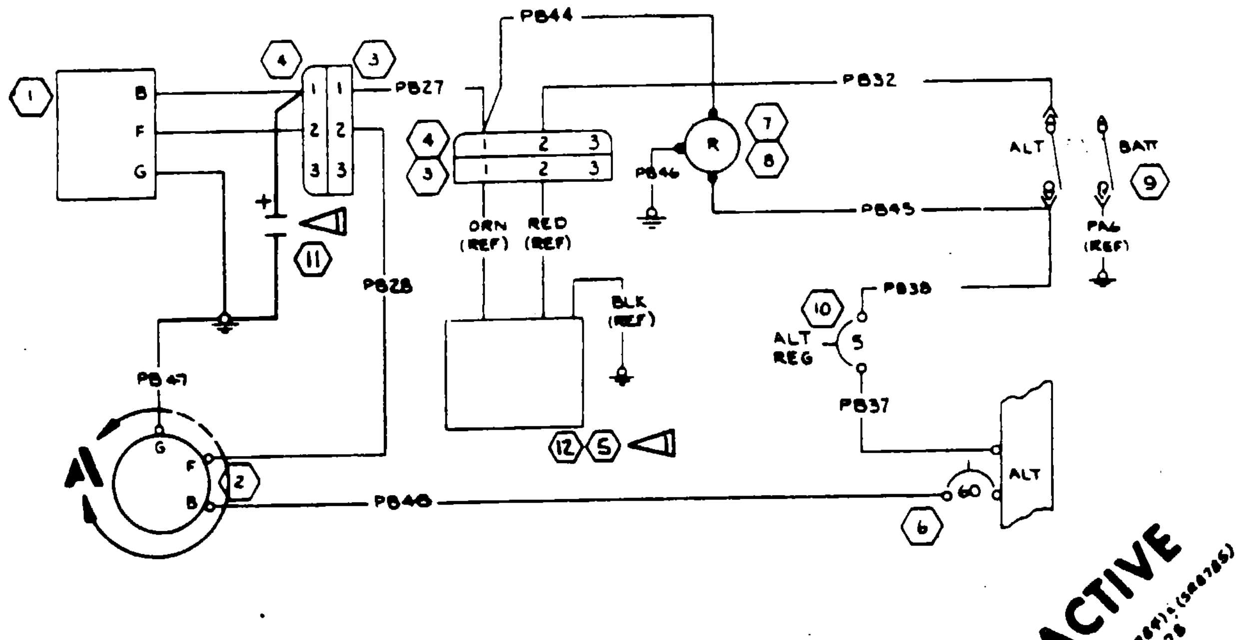
TITLE: WIRING DIAGRAM — GROUND SERVICE RECEPTACLE (OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709
SCALE NONE	P210 (SR8465)	PAGE 4.2.1

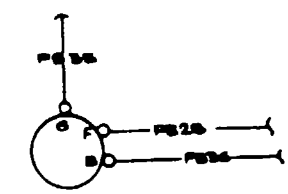
NOTE:

1. THIS CAPACITOR IS TO BE ADDED ONLY WHEN REQD TO PREVENT OVERVOLT SENSOR TRIPOUT DURING GEAR CYCLING & IS TO BE INSTALLED ONLY WITH THE C593003-0101 OVERVOLT SENSOR

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV. ADDED DETAIL A. SER IN PB47 & PB48 SER OUT PB35 & PB36 (SR9014) INACTIVATE DWG	G.D.M. 12-18-77	
B	BY REV. ADDED NOTE 1, TVA 1315 CAPACITOR, & C593003-0103 OVERVOLT SENSOR; C611004-0102 WAS C611002-0105 & C611004-0101 (ALT) (SR9140) (SR9169)	TPS 4-12-78	



INACTIVE THRU SER (SR8784) & (SR8785) 2-28-78 CES JAD



DETAIL A
THRU SER (SR9014)

12	C593003-0103	OVERVOLT SENSOR (ALT)	
11	TVA 1315	CAPACITOR	1
10	S-1560-5L	CIRCUIT BREAKER	
9	S-1994-1-1	MASTER SWITCH	
8	MS25041-2	INDICATOR LIGHT	
7	MS25237-327	LAMP	
6	S-1707-60	CIRCUIT BREAKER	
5	C593003-0101	OVERVOLT UNIT	1
4	S-1638-2	HOUSING-CAP	
3	S-1638-1	HOUSING-PLUG	
2	C611503-0102	ALTERNATOR	
1	C611004-0102	VOLTAGE REGULATOR	
ITEM NO.	PART NO.	DESCRIPTION	

EQUIPMENT TABLE

PB48	8	S1562-8-9		S1943-2	S1367-4-8		(SR9014) & ON & ALL SPARES
PB47	8	S1562-8-9		S1943-3	S1367-4-12		(SR9014) & ON & ALL SPARES
PB46	22			SOLDER	S-1367-1-8		
PB32	22		26	S-1635-1	S-1493-1		
PB45	22			SOLDER	S-1493-1		
PB38	22			S-1367-1-6	S1493-1		
PB37	22			S-1367-1-10	S-1367-1-6		
PB36	8	S-1562-8-9		S-1367-4-12	S-1367-4-10		
PB28	22		23	S-1636-1	S-1367-1-10		
PB35	8	S-1562-8-9	24	S-1943-2	S-1367-4-6		
PB44	22			SOLDER	SEE PB27		
PB27	22		64	S1636-1	S1635-2		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

CONTRACT NO:

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

	NAME	DATE
DESIGN	SPENCER	4-25-77
GROUP	D.H. Hardin	4-26-77
DRAWN	GL RYAN	4-21-77
CHECK	J Youel	4-22-77
STRESS		
PROJ	PLH & DRCK	4-26-77
APPD		
OTHER		

TITLE WIRING DIAGRAM — ALTERNATOR SYSTEM

SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709

SCALE: NONE | 210 | PAGE: 4.6

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: PG 4.5

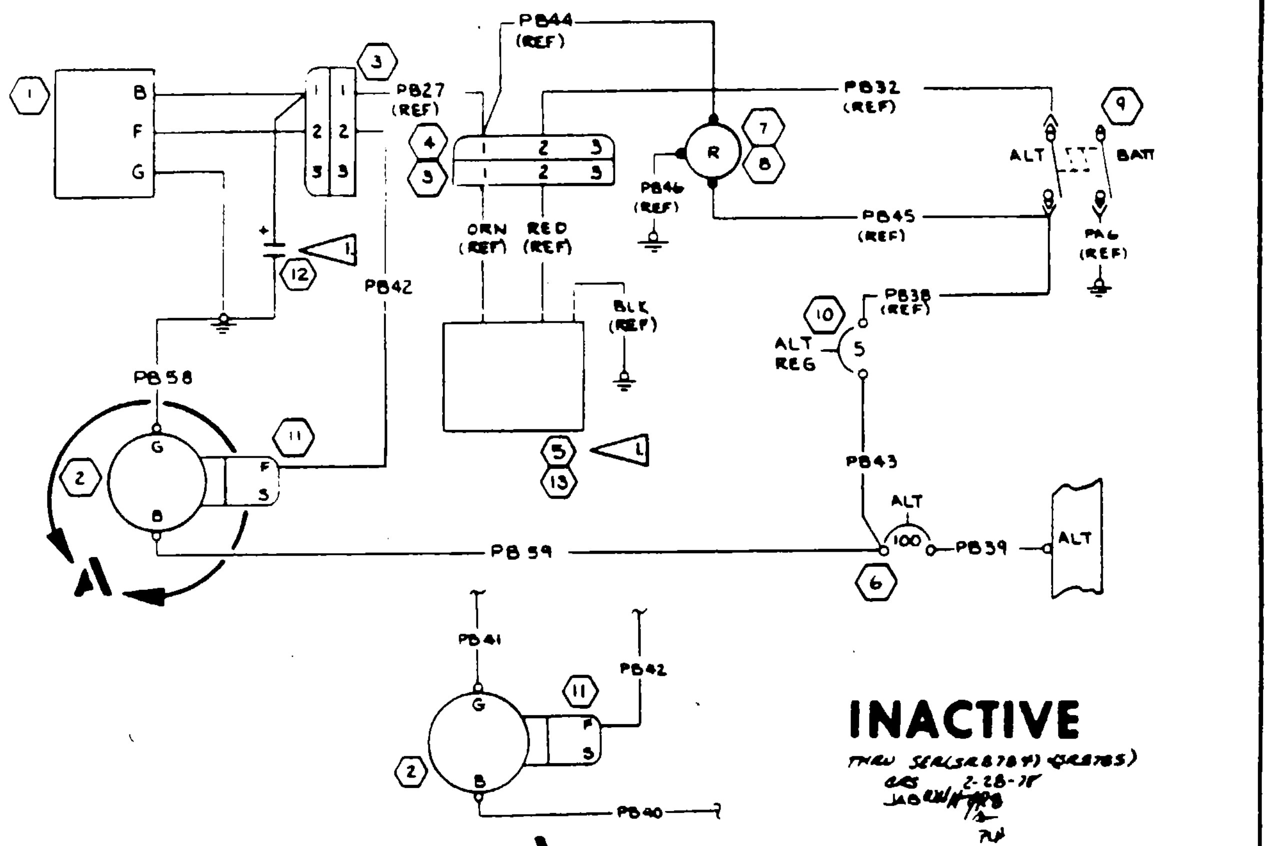
SUPERSEDED BY: PG 4.5

(SR8464)

NOTE:

1. THIS CAPACITOR IS TO BE ADDED ONLY WHEN REQD TO PREVENT OVERVOLT SENSOR TRIP-OUT DURING GEAR CYCLING & IS TO BE INSTALLED ONLY WITH THE C593003-0101 OVERVOLT SENSOR.

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: 18 GA WAS 22 GA/PB42; 42281-2 WAS S-1493-1 /PB42(SR8464)(SR8464)	TMS 6-21-77	JAB
B	BY REV: S2326-1 WAS 45-2-5-N2 (SR8464)(SR8466)	JJB 8-29-77	JAB
C	BY REV: ADD DETAIL "A", TVA1315 CAPACITOR, C593003-0103 OV SENSOR & NOTE 1; SER IN PB58 & PB59; SER OUT PB40 & PB41; C611004-0102 WAS C611002-0105 & C611004-0101(ALT)(SR 9140)(SR 9142)(SR 9142)	TFS 4-8-78	JAB



INACTIVE

THRU SER(SR8784)(SR8785)

DETAIL A
THRU SER (SR 9142)

13	C593003-0103	OVERVOLT SENSOR (ALT)	
12	TVA-315	CAPACITOR	1
11	D20B-M489-KA	CONNECTOR	
10	S-1360-5L	CIRCUIT BREAKER	
9	S-1994	MASTER SWITCH	
8	MS25041-2	INDICATOR LIGHT	
7	MS25237-327	LAMP	
6	S-2326-1	CIRCUIT BREAKER	
5	C593003-0101	OVERVOLT UNIT	1
4	S-1638-2	HOUSING - CAP	
3	S-1638-1	HOUSING - PLUG	
2	C611505-0101	ALTERNATOR	
1	C611004-0102	VOLTAGE REGULATOR	
ITEM NO	PART NO	DESCRIPTION	

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PB59	4	S-1562-4-9		S-1367-6-12	S-2402-2		(SR 9142)(ON & ALL SPARES
PB58	4	S-1562-4-9		S-1367-6-12	S-2402-1		(SR 9142)(ON & ALL SPARES
PB43	22			S-1367-1-6	S-1367-1-12		
PB42	18			S-1656-1	42281-2		
PB41	4	S-1562-4-9		S-1367-6-12	S-1367-6-12		THRU SER (SR 9142)
PB40	4	S-1562-4-9		S-1367-6-12	S-1367-6-12		THRU SER (SR 9142)
PB39	4	S-1562-4-9		S-1367-6-12	S-1367-6-10		

WIRE TABLE

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	4-25-77
GROUP		4-26-77
DRAWN	G.L. RYAN	4-21-77
CHECK	J. YOUEL	4-22-77
STRESS		
PROJ	PLHRODRICK	4-25-77
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — ALTERNATOR SYSTEM — 95 AMP (OPT)

SIZE C | CODE IDENT NO. 71379 | DWG NO 1270709

SCALE: NONE | 210 P210 | PAGE: 4.7

(SR8464)

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES:

SUPERSEDED BY
1270709 PG 4.10

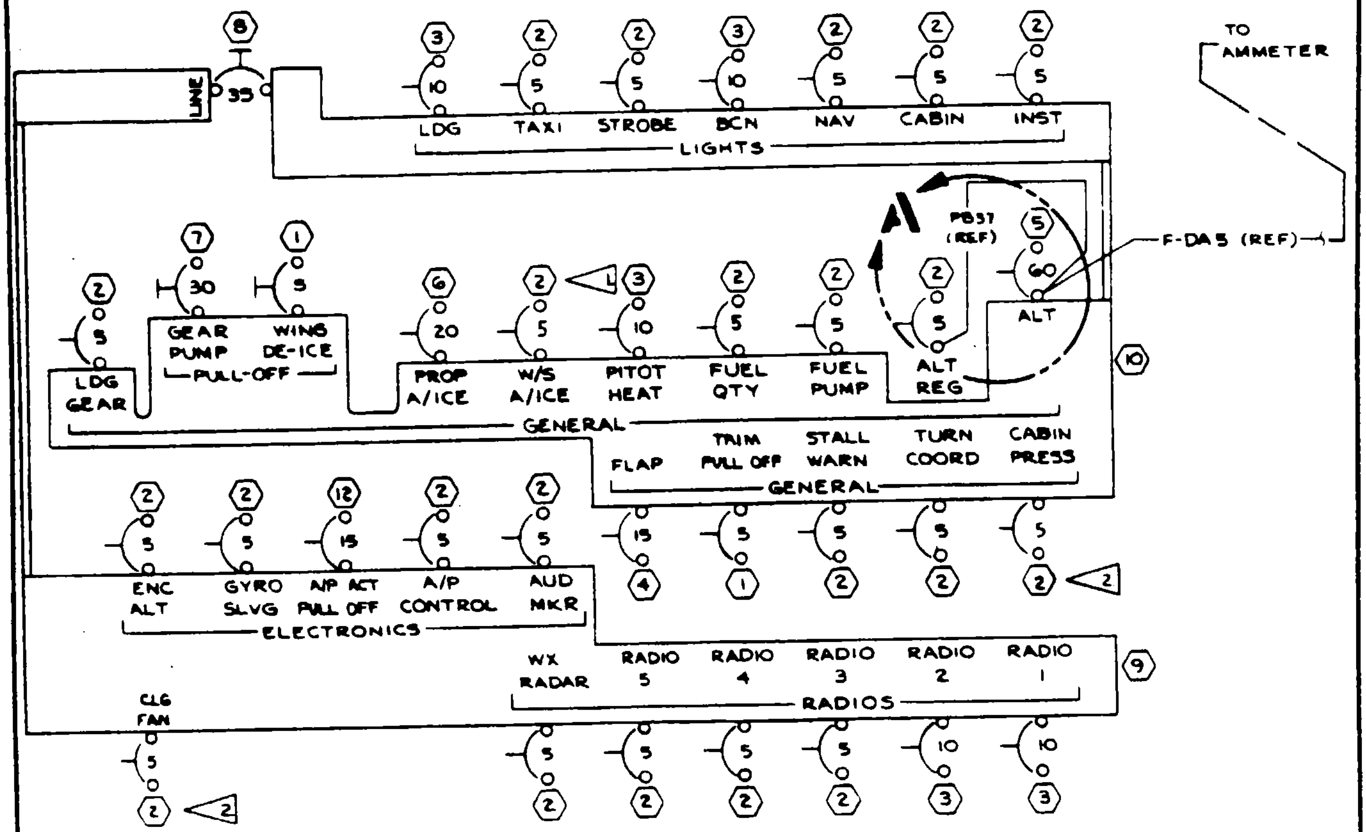
NOTES:

1. S-1360-15L CKT BKR REQD WITH KNOWN ICING W/S A/ICE SYSTEM
2. APPLIES TO P210 ONLY

INACTIVE

THRU SER (SR9361)
MLS 8-10-78

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV. ADD CLG FAN CKT BKR & NOTE 1&2, S1360-5L WAS S1360-10L/W/S A/ICE, S-2326-1 WAS 45-2-5-N2; ADD CABIN PRESS CKT BKR; S-1232-5 WAS S-1360-5L /TRIM PULL OFF; S-1232-15 WAS S-1360-15L /A/P ACT-PULL OFF (SR8464) (SR8465)	GDS 6-6-77	
B	BY REV: INACTIVATE DWG KNOWN ICING WAS SIERRACIN (NOTE 1) (SR9361)	MLS 8-10-78	



12	S-1232-15	CIRCUIT BKR	
11	S-2326-1	CIRCUIT BKR	
10	2113158-1	BUS BAR	
9	2113043-1	BUS BAR	
8	S-2281-1	SWITCH	
7	S-1232-30	CIRCUIT BKR	
6	S-1360-20L	CIRCUIT BKR	
5	S-1707-60	CIRCUIT BKR	
4	S-1360-15L	CIRCUIT BKR	
3	S-1360-10L	CIRCUIT BKR	
2	S-1360-5L	CIRCUIT BKR	
1	S-1232-5	CIRCUIT BKR	
ITEM NO.	PART NO.	DESCRIPTION	

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS

WIRE TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 1270709 P. 4.5

SUPERSEDED BY: 1270709 P. 4.11

CONTRACT NO:

	NAME	DATE
DESIGN		
GROUP		4-14-77
DRAWN	R.E. GOWIN	4-28-77
CHECK	J. TOWEL	4-28-77
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

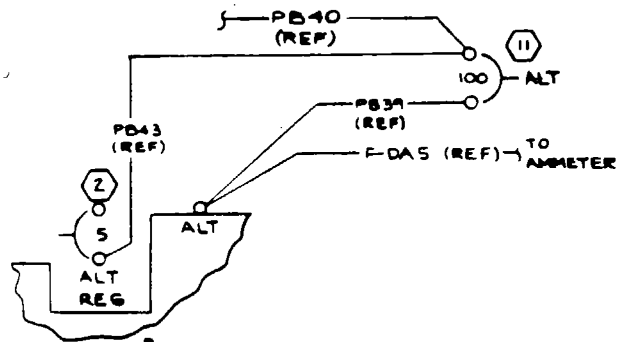
TITLE: WIRING DIAGRAM — CIRCUIT BREAKERS

SIZE	CODE IDENT NO.	DWG NO
C	71379	1270709

SCALE NONE 210 P210 PAGE: 4.8

(SR 8464)

Circuit Breakers (Sheet 1 of 2)



DETAIL A
FOR USE WITH 95 AMP ALT SYSTEM (OPT)

INACTIVE

THRU SER (5R9361)
MLS 8-10-78

CONTRACT NO:			Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS
	NAME	DATE	TITLE: WIRING DIAGRAM — CIRCUIT BREAKERS
DESIGN			
GROUP		4-14-77	
DRAWN	R.E. GOWIN	4-28-77	
CHECK	J. YOUEL	4-28-77	
STRESS			
PROJ		5-2-77	SIZE: C; CODE IDENT. NO. 71379; DWG NO 1270709
APPD			
OTHER			SCALE: NONE; 210 P210; PAGE: 4.8

(SR 8464)

Circuit Breakers (Sheet 2 of 2)

REVISIONS

LTR	DESCRIPTION	DATE	APPD
A	BY REV: SER OUT PB47 SER IN PB64 SER (SR9429), ADD DETAIL "A"	HHG 9-14-78	[illegible]
B	BY REV: ADD DETAIL "B" & "C", PB 67 [illegible] S1232-60 (SR9114)(SR9115)	HHG 2-8-79	[illegible]
C	BY REV: 20GA WAS 22GA/PB49, PB50 PB55; 16GA WAS 22GA/PB51; S-2099-8 WAS S-2099-6, S-1367-2-10 WAS S-1367-1-10 (NOW SHOP PRACTICE) YEL(PB49) WAS PB49, RED(PB55) WAS PB55 ORN(PB52) WAS PB52, BLU(PB51) WAS PB51 (USE EXISTING STOCK)	RLK HHG 9-5-79	[illegible]
	ADD DETAIL "A", PB80 WIRE & SER (SR9572)	NTL	PCP

NOTES:

1 PART OF BASIC AVIONICS KIT

INACTIVE: THRU SER (SR9634)(SR9635) & (SR9785) 3-24-80 SEB BY [illegible]

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PB80	8	S-1562-8-9		S-2484-1	S-1943-2	SER (SR9572) ON (ALL SPARES	
PB67	8	S-1562-8-9		S-1943-2	S-1367-4-8	SER (SR9114)(SR9115) ON	
PB64	8	S-1562-8-9		S-1943-3	S-1943-2	SER (SR9429) THRU (SR9572)	
PB46	22			SOLDER	S-1367-1-8		
PB54	8	S-1562-8-9		S-1943-2	S-1943-2		
PB53	8	S-1562-8-9		S-1943-2	S-1367-4-8	THRU SER	(SR9114)(SR9115).
ORN(PB52)	20	-20-3		S-2099-6	S-1367-1-12		
BLU(PB51)	16	-16-6		S-2099-8	S-1367-2-10		
PB50	20			S-2099-6	S-1367-1-10		
YEL(PB49)	20	-20-4		SOLDER	S-2099-6		
PB56	22			S-1367-1-6	SOLDER		
RED(PB55)	20	-20-2		S-2099-6	S-1493-1		
PB38	22			S-1367-1-6	S-1493-1		
PB37	22			S-1367-1-10	S-1367-1-6		
PB47	8	S-1562-8-9		S-1367-4-12	S-1943-3	OBSOLETE	THRU SER (SR9429)

WIRE TABLE

	PART NO.	DESCRIPTION	
13	S-1232-60	CIRCUIT BREAKER	
12	C611005-0102	ALT CONTROL UNIT (ALTERNATE)	
11	0570314	TERMINAL BOARD	
10	S-1707-60	CIRCUIT BREAKER	
9	S-1360-5L	CIRCUIT BREAKER	
8	MS25041-2	INDICATOR LIGHT	
7	MS25237-327	LAMP	
6	S-1994-1-1	MASTER SWITCH	
5	S-1915-1	CAPACITOR	1
4	C611503-0102	ALTERNATOR ASSY	
3	S-2373-2	CONNECTOR	
2	S-2373-1	CONNECTOR	
1	C611005-0101	ALT CONTROL UNIT	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 1270709 P. 4.6

SUPERSEDED BY: 1270709 P. 4.15

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	3-2-78
GROUP	[illegible]	3-6-78
DRAWN	SHAVER	2-28-78
CHECK	BORLESKE	3-1-78
STRESS		
PROJ	[illegible]	3-8-78
APPD	[illegible]	
OTHER	/	

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

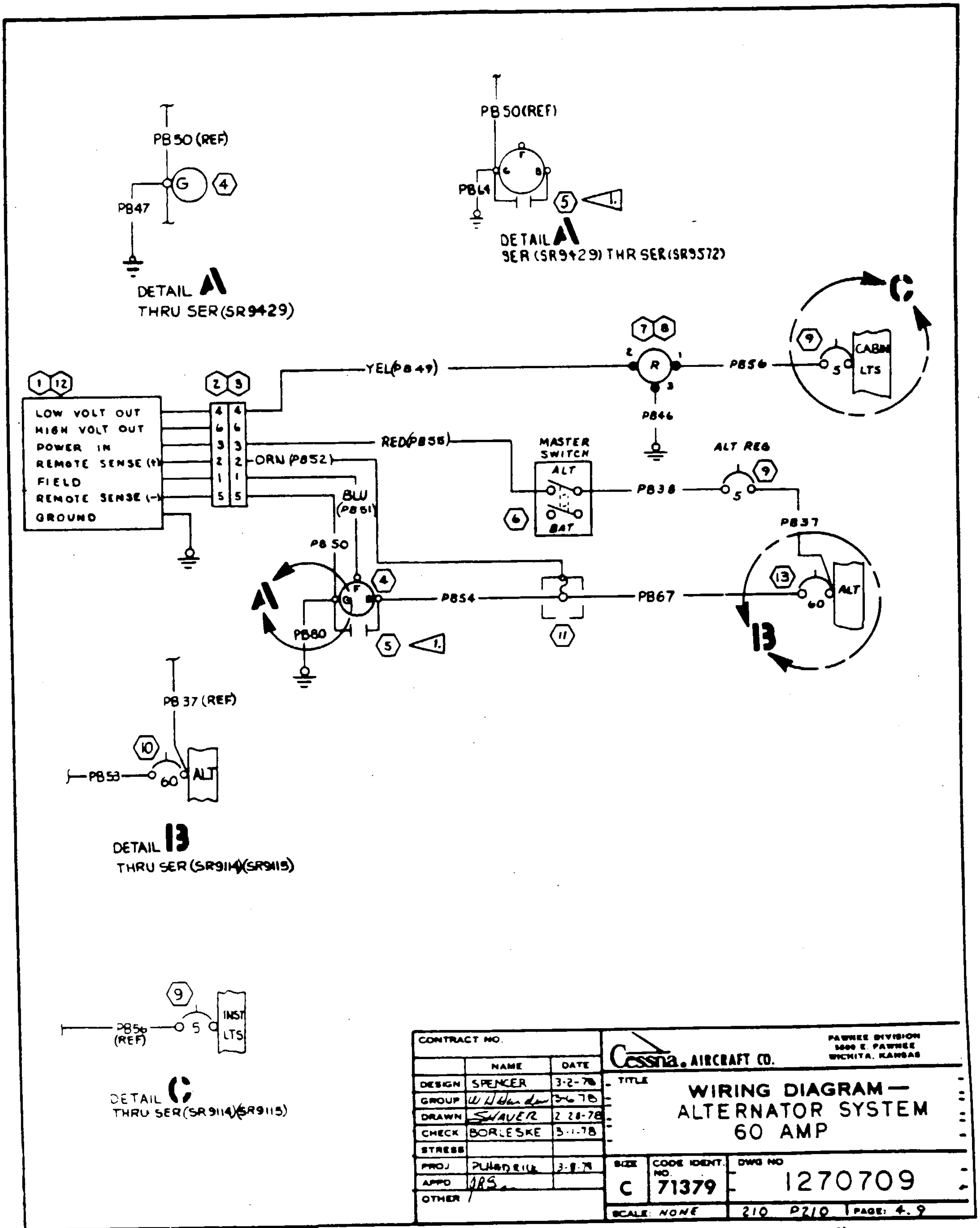
TITLE WIRING DIAGRAM — ALTERNATOR SYSTEM 60 AMP

SIZE	CODE IDENT. NO	DWG NO
C	71379	1270709

SCALE: NONE | 210 P210 | PAGE: 4.9

Alternator System, 60 Amp (Sheet 1 of 2)

(SR8784)(SR8785)



(SR8784)(SR8785)

Alternator System, 60 Amp (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
J	BY REV: ADD BLK(PB147)(REF) & S-2527-14-2 (SR10101)(SR10102) (S-2576-2 WAS -1)/PB87 (REWORK IN WORK & FINISHED PARTS)	MKT TMS 12-21-81	[illegible]
K	BY REV DELETE S-2527-14-2 & BLK (PB147)(REF.) INACT DWG (SR10101)(SR10102)	MKT 1-27-82	JAB [illegible]

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: PB58 WAS PB41, S-2402-1 WAS S-1367-6-10/PB88, S-2402-2 WAS S-1367-6-12 / PB56 (SR 9142)	TPS 4-8-78	JAB [illegible]
B	BY REV: PB56(REF) WAS PB48(REF), PB55(REF) WAS PB97 (REF) 20GA WAS 18 GA/PB57, S-2376-1 WAS 42281-2, PB61 WAS PB56, PB60 WAS PB55 (NOW SHOP PRACTICE) (SR8784)(SR8785)	CMK 8-14-78	JAB [illegible]
C	BY REV: SER OUT PB58, PB60, PB61 SER IN PB62, PB63, PB65; ADD DETAIL "A" (SR 9429)	HHG 9-14-78	JAB [illegible]
D	BY REV: ADD DETAIL "B", "C", PB66 & SER (SR 9114)(SR9115)	HHG 2-8-79	JAB [illegible]
E	BY REV: 18 GA WAS 20GA/PB57 S-2099-8 WAS S-2099-6 (NOW SHOP PRACTICE) ADD DETAIL "D" (SR9607) YEL(PB49)(REF) WAS PB49(REF), RED(PB55)(REF) WAS PB55(REF), ORN(PB52)(REF) WAS PB52(REF), BLU(PB57) WAS PB57 (USE EXISTING STOCK)	RLK HHG 9-5-79	JAB [illegible]
F	BY REV: SER OUT PB43 & ADD PB37 (REF) (SR9607)	RAO 1-2-80	JAB [illegible]
G	BY REV: ADD DETAIL "E" 0570315 WAS 0570314 (SR 9634) (SR9635)	NRL 3-10-80	JAB [illegible]
H	BY REV: ADD PB91, NOTE 2 & NOTE 3 MER 210E0927 (SR 10061)	LPB 11-19-80	JAB [illegible]

NOTES:

1. PART OF BASIC AVIONICS KIT
2. PB63 WIRE USED ON P210 ONLY AFTER SER (SR10061)
3. PB91 WIRE USED ON 210 & T210 SER (SR10061) & ON

INACTIVE
THRU SER(SR10101)(SR10102)
MKT 1-29-82
JAB [illegible]

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PB91	4	S-1562-4-9		S-2402-2	S-2402-2	SER(SR10061)	ON & ALL SPARES
BLU(PB87)	18	-18-6		S-2099-8	S-2376-2	SER(SR9634)	(SR9635) & ON
PB66	4	S-1562-4-9		S-1367-6-12	S-1367-6-10	SER(SR9114)	(SR9115) & ON
PB65	4	S-1562-4-9		S-2402-2	S-2402-1	SER(SR9429)	& ON/ALL SPARES
PB63	4	S-1562-4-9		S-2402-2	S-2402-2	SER(SR9429)	& ON/ALL SPARES
PB62	4	S-1562-4-9		S-2402-2	S-1367-6-12	SER(SR9429)	& ON/ALL SPARES
BLU(PB57)	18	-18-6		S-2099-8	S-2376-1	THRU SER	(SR9634)(SR9635)
PB61	4	S-1562-4-9		S-1367-6-12	S-2402-2	OBSOLETE	THRU SER (SR9429)
PB60	4	S-1562-4-9		S-1367-6-12	S-1367-6-12	OBSOLETE	THRU SER (SR9429)
PB43	22			S-1367-1-6	S-1367-1-12		THRU SER (SR9607)
PB58	4	S-1562-4-9		S-1367-6-12	S-2402-1	OBSOLETE	THRU SER (SR9429)
PB39	4	S-1562-4-9		S-1367-6-12	S-1367-6-10	THRU SER	(SR9114)(SR9115)

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
13	C611005-0102	ALT CONTROL UNIT (ALTERNATE)	
12	0570315	TERMINAL BOARD	
11	S-2326-1	CIRCUIT BREAKER	
10	S-1360-56	CIRCUIT BREAKER	
9	S-1994-1-1	MASTER SWITCH	
8	MS25041-2	INDICATOR LIGHT	
7	MS25237-327	LAMP	
6	S-1915-1	CAPACITOR	1
5	D208-14489-KA	CONNECTOR	
4	C611505-0101	ALTERNATOR ASSY	
3	S-2373-2	CONNECTOR	
2	S-2373-1	CONNECTOR	
1	C611005-0101	ALT CONTROL UNIT	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 1270709 P 4.7
SUPERSEDED BY: 1270709 P4 22

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	3-2-78
GROUP	[illegible]	3-6-78
DRAWN	SHAVER	2-28-78
CHECK	BORLESKE	3-1-78
STRESS		
PROJ	[illegible]	3-8-78
APPD	[illegible]	
OTHER		

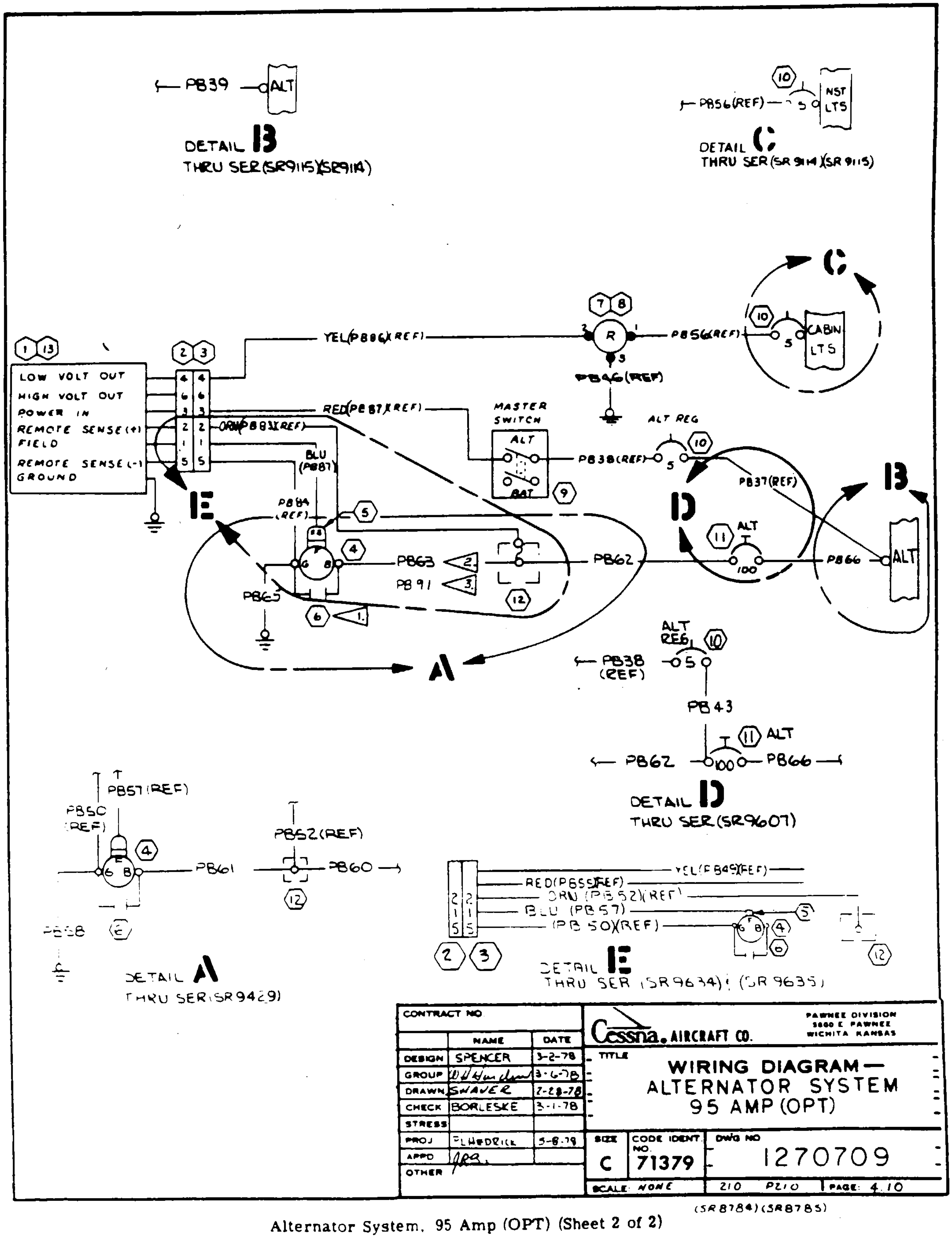
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE: WIRING DIAGRAM — ALTERNATOR SYSTEM 95 AMP (OPT)

SIZE: C | CODE IDENT NO: 71379 | DWG NO: 1270709
SCALE: NONE | 210 P210 | PAGE: 4.10

(SR8784)(SR8785)

Alternator System, 95 Amp (OPT) (Sheet 1 of 2)

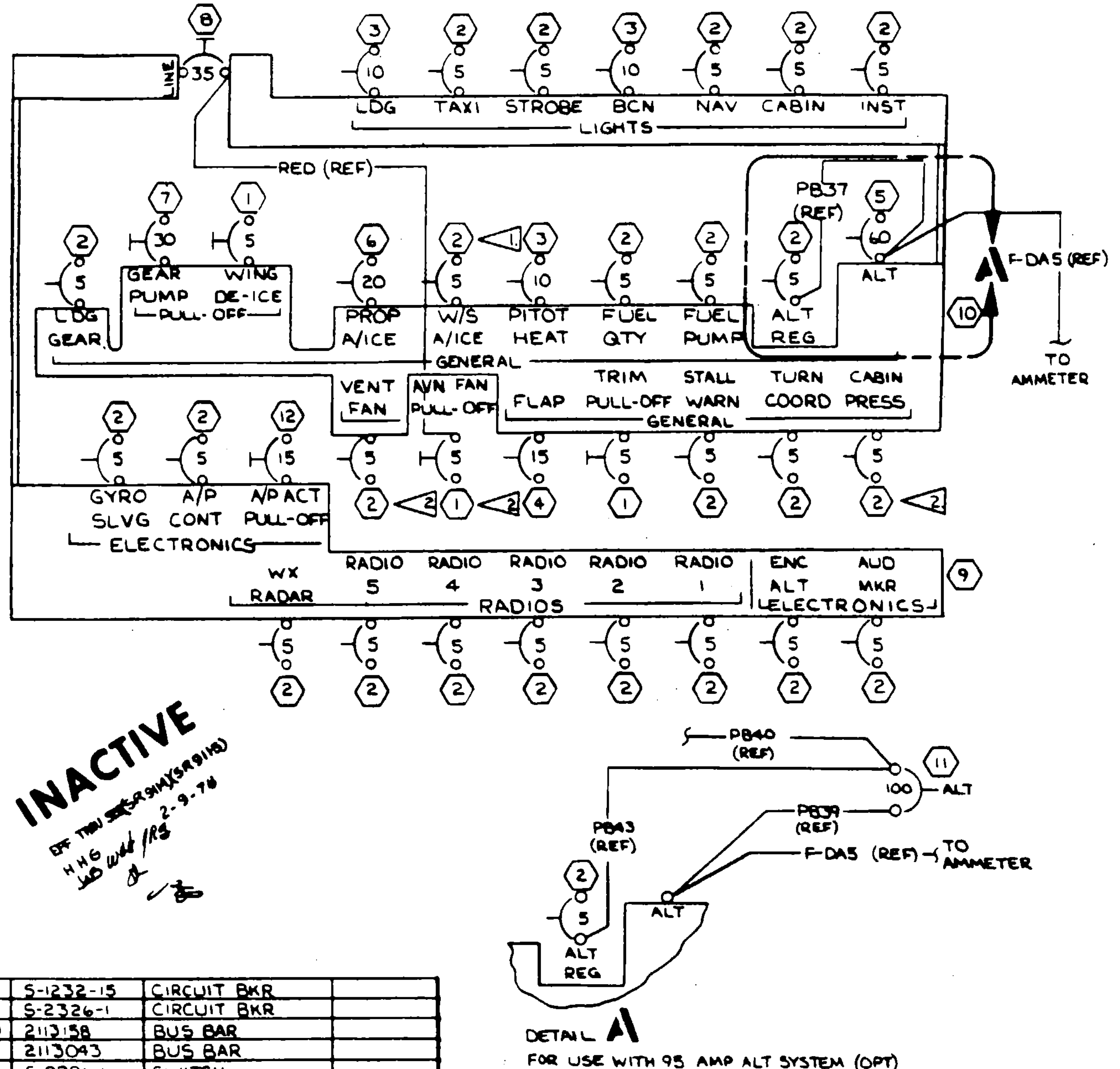


Alternator System, 95 Amp (OPT) (Sheet 2 of 2)

NOTES:

1. S-1360-15L CKT BKR REQD WITH KNOWN KING W/S A/ICE SYSTEM
2. APPLIES TO P210 ONLY

REVISION			
LET	DESCRIPTION	DATE	APPD



12	S-1232-15	CIRCUIT BKR	
11	S-2326-1	CIRCUIT BKR	
10	2113158	BUS BAR	
9	2113043	BUS BAR	
8	S-2281-1	SWITCH	
7	S-1232-30	CIRCUIT BKR	
6	S-1360-20L	CIRCUIT BKR	
5	S-1707-60	CIRCUIT BKR	
4	S-1360-15L	CIRCUIT BKR	
3	S-1360-10L	CIRCUIT BKR	
2	S-1360-5L	CIRCUIT BKR	
	S-1232-5	CIRCUIT BKR	
ITEM NO.	PART NO.	DESCRIPTION	
	EQUIPMENT TABLE		

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 1270709 P. 4 8

SUPERSEDED BY: PAGE 4.13.0 & 4.13.1

WIRE TABLE

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	8-23-78
GROUP	[illegible]	8-25-78
DRAWN	SHEFFIELD	8-10-78
CHECK	CORLESKE	8-4-78
STRESS		
PROJ	[illegible]	8-25-78
APPD	JRS	
OTHER		

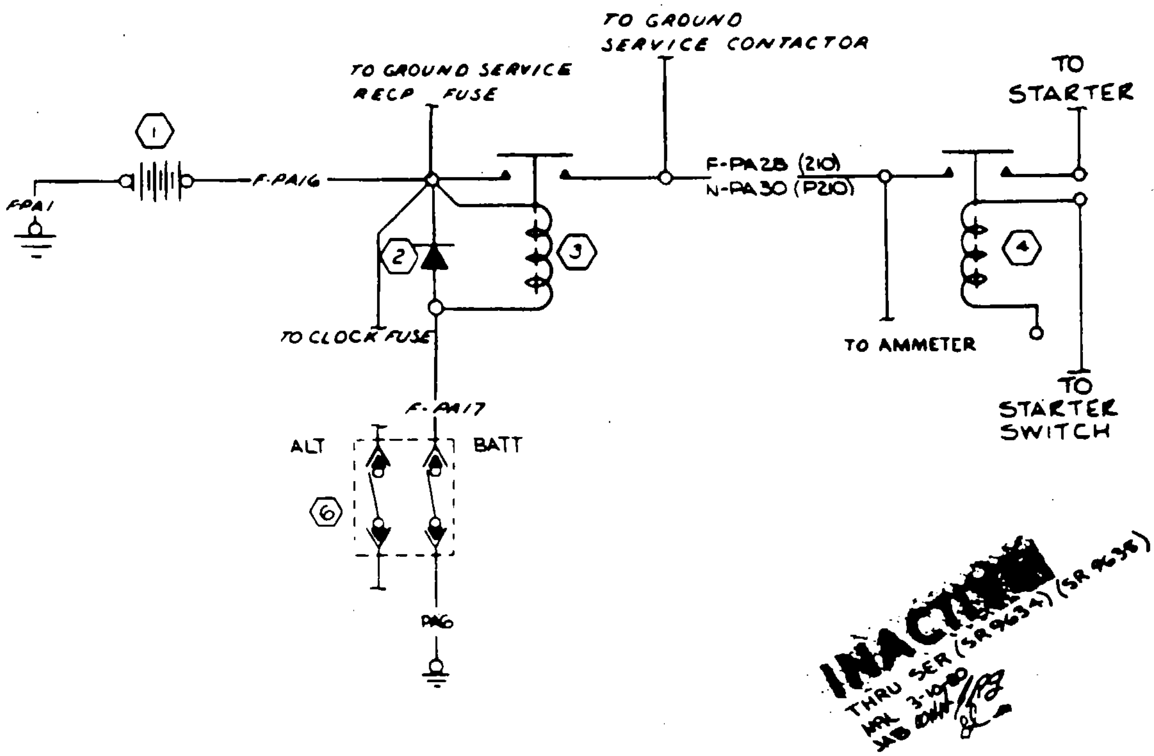
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — CIRCUIT BREAKERS

SIZE	CODE IDENT NO.	DWG NO
C	71379	1270709

SCALE: NONE (SR9361) PAGE: 4 11

REVISION			
LET	DESCRIPTION	DATE	APPD



N-PA30	2	S-1562-2-9		S-2447-2	S-2447-2		
F-PA28	2	S-1562-2-9		S-2447-2	S-2447-2		
F-PA17	22			S-1367-1-10	S-1493-1		
F-PA16	2	S-1562-2-9		S-1367-2-13	S-1367-2-15		
F-PA6	22			S-1493-1	S-1367-1-8		
F-PA1	2	S-1562-2-9		S-1367-2-12	S-1367-2-13		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	
6	S-1994-1-1	MASTER SWITCH	
4	S-2443-1	STARTER CONTACTOR	
3	S-1580-1	BAT CONTACTOR	
2	0770728	DIODE ASSY	
1	C6400-0105	BATTERY ASSY	

EQUIPMENT TABLE

CES 1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES 1270109 P 4.1

SUPERSEDED BY 1270709 PG 4.16

CONTRACT NO

	NAME	DATE
DESIGN	WHITSON	12-14-78
GROUP		12-4-78
DRAWN	HAUN	12-9-78
CHECK	BORLESKE	12-12-78
STRESS		
PROJ		12-20-78
APPD		
OTHER		

Cessna. AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV 5800 E PAWNEE WICHITA KANSAS

TITLE WIRING DIAGRAM — BATTERY CIRCUIT

SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

SCALE NONE | SR 9221 | PAGE 4.12

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL "D" (SR9607)	RLY 9-26-79	JRS
B	BY REV: PB37 (REF) WAS PB43 (REF) / DETAIL A (SR9607)	RAO 1-2-80	JRS
C	BY REV: ADD S1232-35 & DETAIL "E" (SR10122)	GW 2-13-81	JRS
D	BY REV: ADD DETAIL F & DETAIL G, PB THRU PB WIRES ADD NOTE 4 ADD PG 4.13.2. SER OUT DETAILS B,C (SR9953)(SR9954)	WMH 5-21-81	
E	BY REV: ADD S-1232-2 & DETAIL "H" (SR9953)(SR9954)	GLS 7-6-81	JRS
F	BY REV: ADD DETAIL "J" & "K" (SR10101) (SR10102)	MKT 1-27-82	
G	BY REV: DELETE DETAILS J & K; INACT DWG (SR10101)(SR10102)	MKT 4-28-82	JRS

NOTES:

1. APPLIES TO P210 ONLY
2. S-1360-15L CKT BKR REQD WITH KNOWN ICING W/S A/ICE SYSTEM
3. S-1360-15L CKT BKR REQD WITH KNOWN ICING PITOT HEAT SYSTEM
4. APPLIES TO P210 ONLY THRU SER (SR9954)

INACTIVE
THRU SER (SR10101)(SR10102)
MKT 4-28-82
Rey (WMH JRS)

02-00916

17	S-1232-2	CIRCUIT BREAKER
16	2170029	BUS BAR
15	MS25306-222	SWITCH
14	S-1232-35	CIRCUIT BREAKER
13	0713854	BUS BAR
12	S-2326-1	CIRCUIT BREAKER
11	1270742	BUS BAR
10	1270741	BUS BAR
9	S-1232-15	CIRCUIT BREAKER
8	S-2281-1	SWITCH
7	S-1360-20L	CIRCUIT BREAKER
6	S-1232-60	
5	S-1232-30	
4	S-1232-5	
3	S-1360-15L	
2	S-1360-10L	
1	S-1360-5L	CIRCUIT BREAKER
	PART NO	DESCRIPTION

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PB96	10	S-1562-10-9		S-1367-3-6	S-1367-3-8		
PB95	10			S-1367-3-8	S-1367-3-6		
PB94	10			S-1367-3-6	S-1367-3-8		
PB93	10			S-1367-3-8	S-1367-3-6		
PB69	10	S-1562-10-9		S-1367-3-8	S-1367-3-8		
PB68	10	S-1562-10-9		S-1367-3-8	S-1367-3-8		

WIRE TABLE

CONTRACT NO:

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

	NAME	DATE
DESIGN	SPENCER	2-14-79
GROUP		2-2-79
DRAWN	H GHAZARIAN	2-9-79
CHECK	BORLESKE	2-12-79
STRESS		
PROJ		2-5-79
APPD	JRS	
OTHER		

TITLE WIRING DIAGRAM — CIRCUIT BREAKERS

SIZE C | CODE IDENT. NO. 71379 | DWG NO 1270709

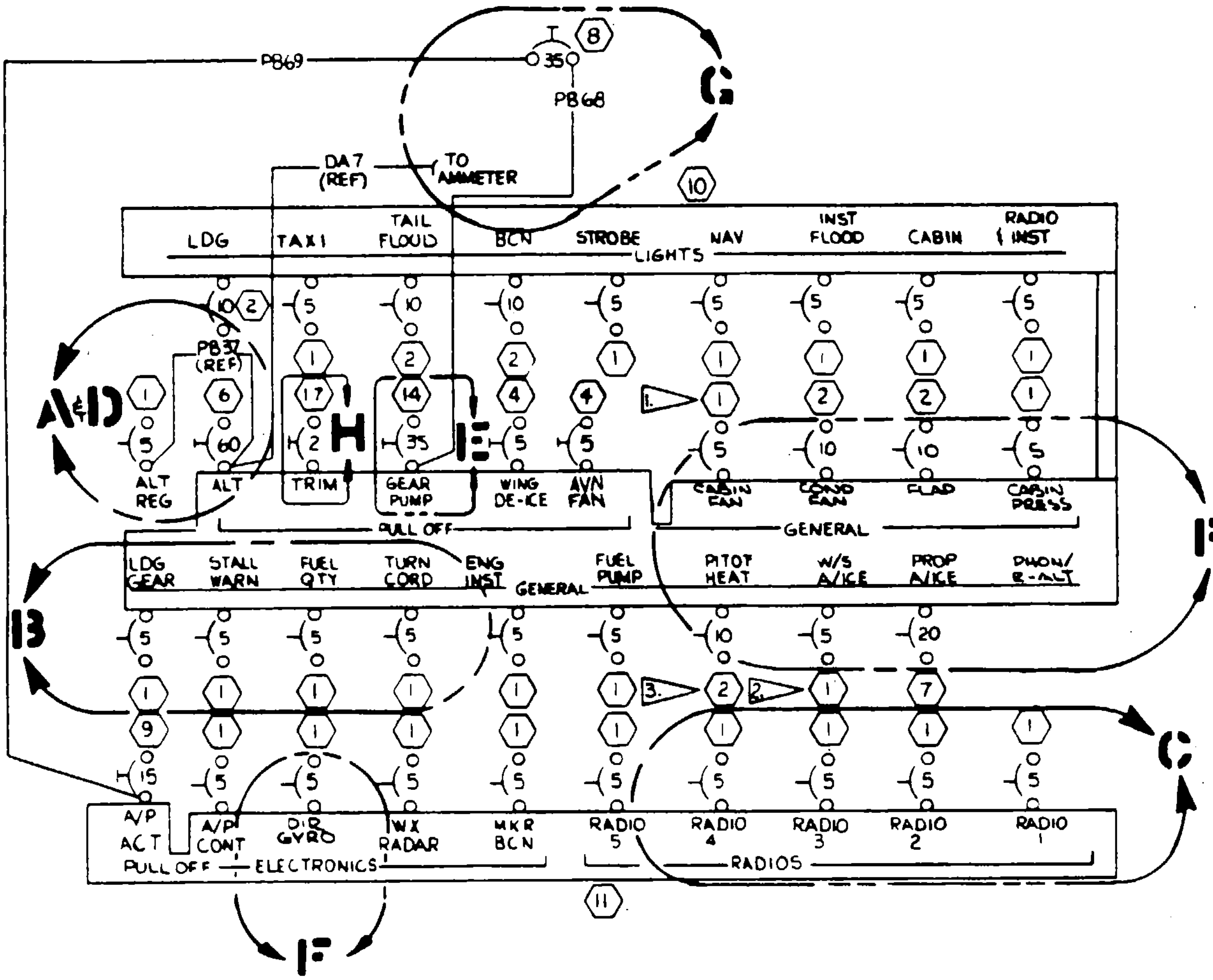
SCALE: NONE | (SR9114)(SR9115) | PAGE: 4.13.0

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: P 4.11

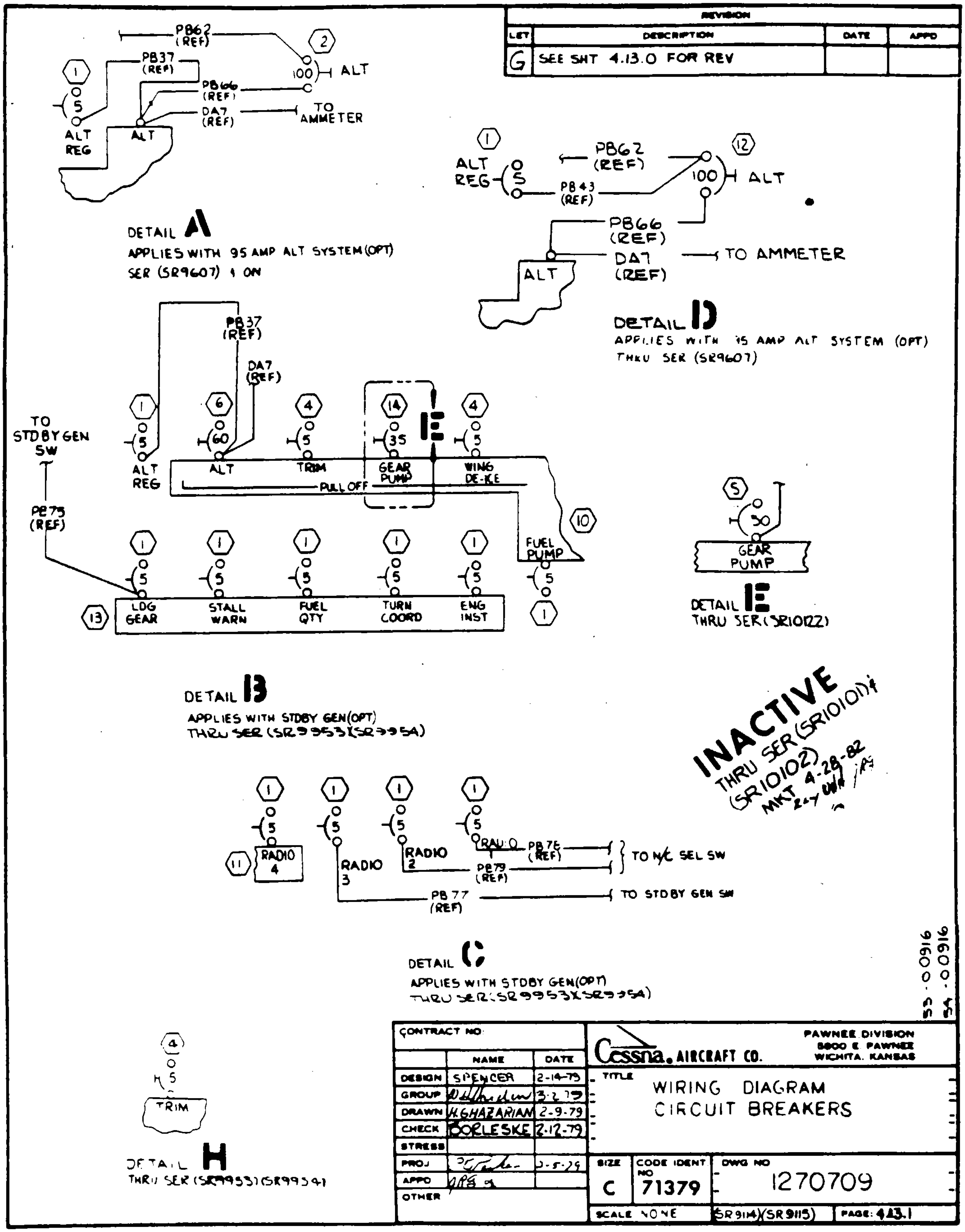
SUPERSEDED BY: P 4.13.3

Circuit Breakers (Sheet 1 of 2)

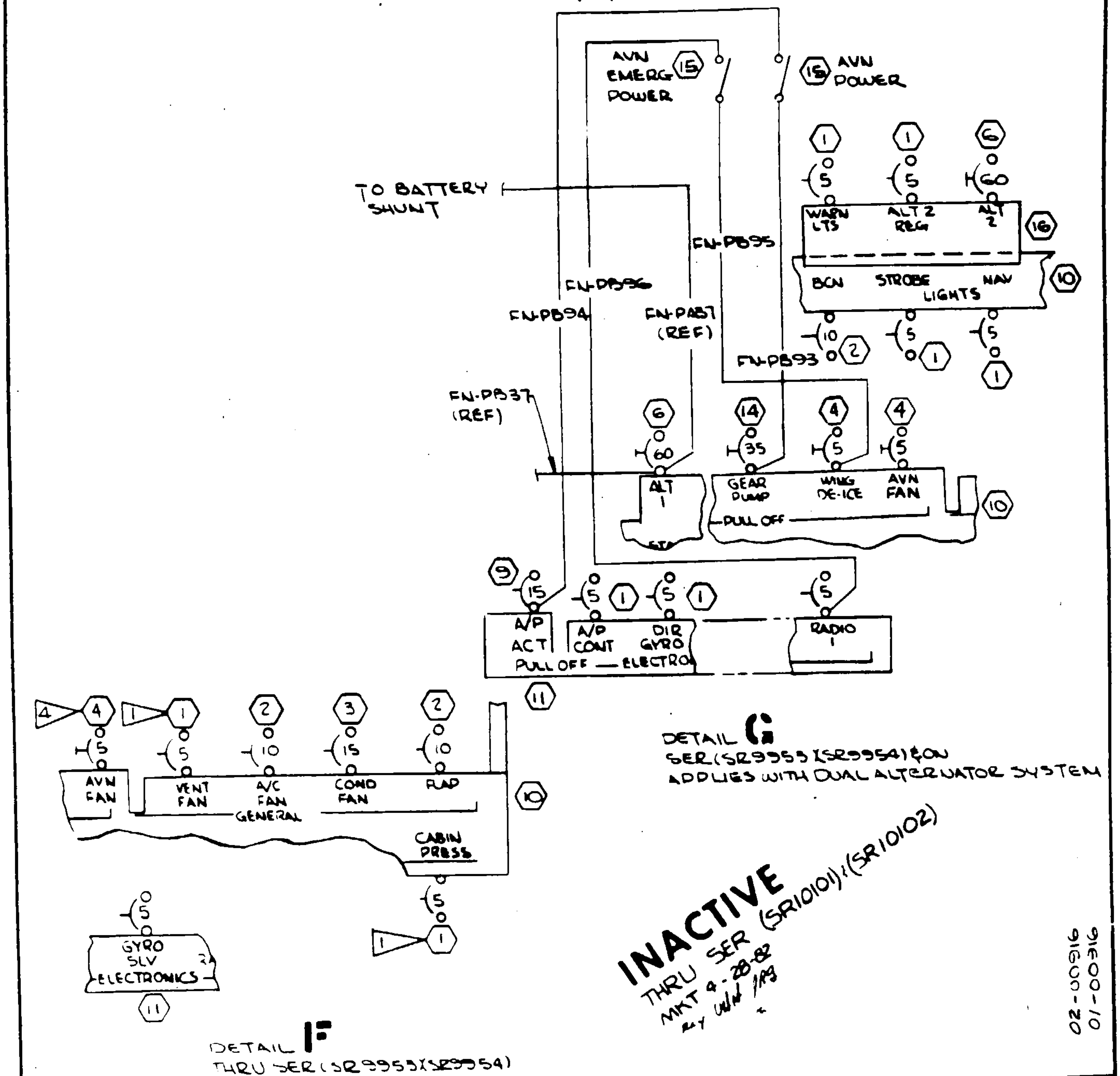


CONTRACT NO:			Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS
	NAME	DATE	TITLE WIRING DIAGRAM — CIRCUIT BREAKERS
DESIGN	SPENCER	2-19-79	
GROUP	[signature]	3-2-79	
DRAWN	H GHAZARIAN	2-9-79	
CHECK	BORLESKE	2-12-79	
STRESS			SIZE C · CODE IDENT NO. 71379 · DWG NO 1270709
PROJ	[signature]	3-5-79	
APPD	[signature]		
OTHER			SCALE: NONE · (SR 9114)(SR 9115) · PAGE: 4.13.0

Circuit Breakers (Sheet 2 of 2)


REVISION
LET
DESCRIPTION
DATE
APPD
G
SEE SHT 4.13.0 FOR REV
PB62 (REF)
PB37 (REF)
PB66 (REF)
DA7 (REF)
TO AMMETER
100
ALT
5
ALT REG
DETAIL A
APPLIES WITH 95 AMP ALT SYSTEM (OPT)
SER (SR9607) & ON
PB43 (REF)
TO AMMETER
DETAIL D
APPLIES WITH 95 AMP ALT SYSTEM (OPT)
THRU SER (SR9607)
TO STDBY GEN SW
PB75 (REF)
60
35
TRIM
GEAR PUMP
WING DE-ICE
PULL OFF
FUEL PUMP
LDG GEAR
STALL WARN
FUEL QTY
TURN COORD
ENG INST
30
DETAIL E
THRU SER (SR10122)
DETAIL B
APPLIES WITH STDBY GEN (OPT)
THRU SER (SR9953)(SR9954)
INACTIVE
THRU SER (SR10101) & (SR10102)
MKT 4-28-82
RADIO 4
RADIO 3
RADIO 2
RADIO
PB76 (REF)
PB79 (REF)
PB77 (REF)
TO N/C SEL SW
TO STDBY GEN SW
DETAIL C
APPLIES WITH STDBY GEN (OPT)
THRU SER (SR9953)(SR9954)
DETAIL H
THRU SER (SR9953)(SR9954)
CONTRACT NO
NAME
DATE
DESIGN SPENCER 2-14-79
GROUP 3-2-79
DRAWN H.GHAZARIAN 2-9-79
CHECK BORLESKE 2-12-79
STRESS
PROJ 3-5-79
APPD
OTHER
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS
TITLE
WIRING DIAGRAM
CIRCUIT BREAKERS
SIZE C
CODE IDENT NO 71379
DWG NO 1270709
SCALE NONE
(SR9114)(SR9115)
PAGE: 4.13.1
53-00916
54-00916

REVISION			
LET	DESCRIPTION	DATE	APPD
G	SEE P 4.13.0 FOR REVISION		



CONTRACT NO		
	NAME	DATE
DESIGN		
GROUP		3-24-81
DRAWN	HARDEN	3-24-81
CHECK	BORLESKE	3-24-81
STRESS		
PROJ		
APPD	DRS	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

TITLE WIRING DIAGRAM CIRCUIT BREAKERS

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709
SCALE NONE	SR9953 SR9954	PAGE 4.13.2

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD RED 7 (REF), 0570442, 2470003, 87149-7 (SR9114) (SR9115)	GLS 9-7-79	
B	BY REV: ADD DETAIL A SER (Z1065853) SER (P21000437)	GLS 11-21-79	

INACTIVE
THUR (SR9793)
MKM 7-16-80

14-0946
15-0946

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PB 79	12			S-1367-3-6	S-1367-3-6		
PB 78	12			S-1367-3-6	S-1367-3-6		
PB 77	12			S-1367-3-6	S-1367-3-6		
PB 76	12			S-1367-3-6	S-1367-3-8		
PB 75	16			S-1367-2-6	S-1367-2-6		
PB 74	16			S-1367-2-6	S-1367-2-8		
PB 73	16			S-1367-2-12	S-1367-2-6		
BLK(PB72	20	-20-0		S-1367-1-8	S-1636-1		
PB 71	20			S-1367-1-10	S-1636-1		
PB 70	20			S-1367-1-12	S-1636-1		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
16	0570442	AUD CONT PNL	
15	2470003	AUD CONT PNL	
14	87149-7	CONNECTOR	
13	S-2281-1	SWITCH	
12	S-1232-30	CKT BKR	
11	S-1232-15	CKT BKR	
10	S-1638-2	CONNECTOR	
9	S-1638-1	CONNECTOR	
8	S-1360-5L	CKT BKR	
7	0713854	BUS BAR	
6	1270742	BUS BAR	
5	1270741	BUS BAR	
4	S-382-3	SWITCH	
3	7664K5	SWITCH	
2	C611006-0101	VOLTAGE REGULATOR	
1	C611507-0101	GENERATOR	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES:

SUPERSEDED BY: 1270709 P4.18

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	2-14-79
GROUP		3-2-79
DRAWN	H.GHAZARIAN	2-9-79
CHECK	CORLESKE	2-12-79
STRESS		
PROJ		3-5-79
APPD		
OTHER		

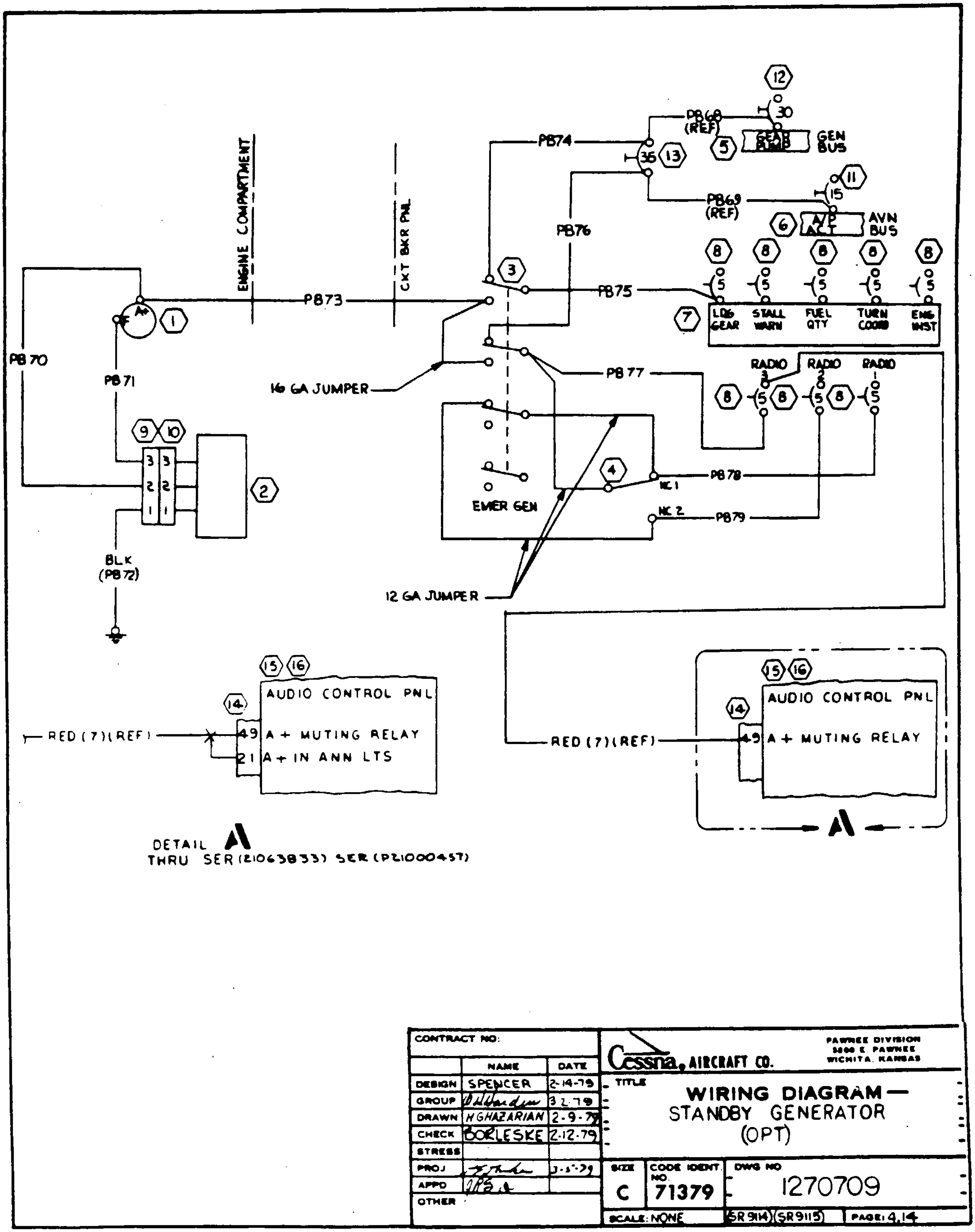
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — STANDBY GENERATOR (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709

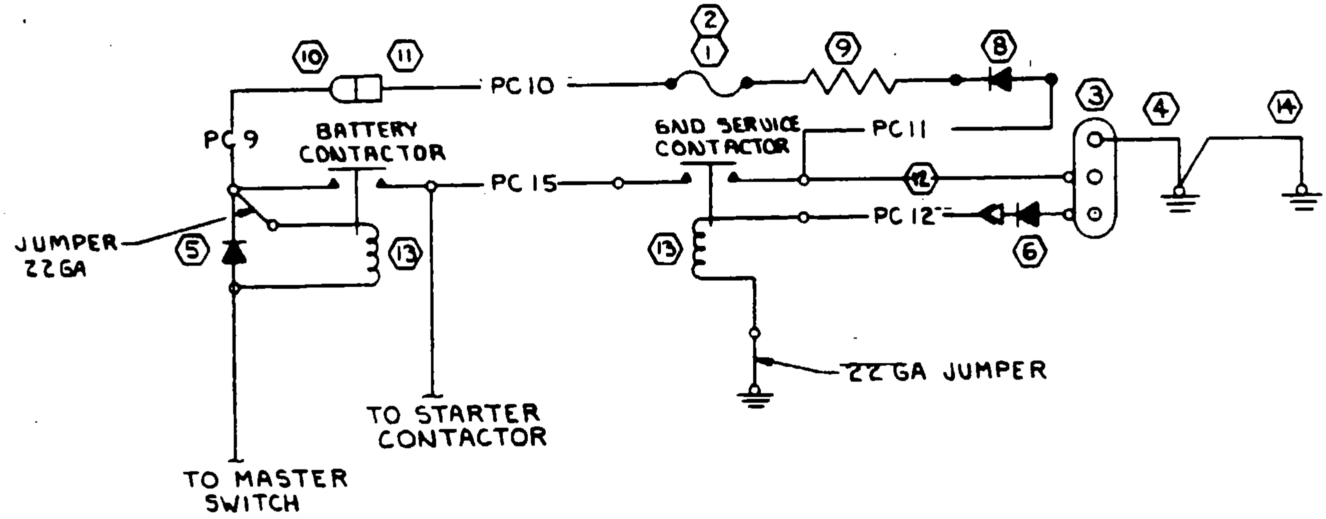
SCALE: NONE (SR9114)(SR9115) PAGE: 4.14

Standby Generator (Sheet 1 of 2)



Standby Generator (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD



35-0916
34-0916

ITEM NO.	PART NO.	DESCRIPTION
14	0412007	GND SERV GND
13	S-2475-1	CONTACTOR
12	1270744	BUS BAR ASSY
11	S-1637-2	HOUSING
10	S-1637-1	HOUSING
9	X26263	RESISTOR .75Ω
8	20H3P	DIODE
7		
6	1570043	DIODE ASSY
5	0770728	DIODE ASSY
4	0312155	GROUND STRAP
3	MS 3506-1	RECEPTACLE
2	S-1090-2	FUSEHOLDER
1	S-1091-5	FUSE

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
PC11	22			S-1367-1-14	SOLDER	
PC15	2	S-1562-2-9		S-2447-2	S-1368-2-8	
PC12	22			S-1367-1-10	S-1493-1	
PC10	22			S-1636-1	SOLDER	
PC9	22			S-1367-1-8	S-1635-1	

WIRE TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 1270709 P 4.2 4.21

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	TJADEN	1-22-80
GROUP	D. Hlland	3-4-80
DRAWN	LEUERENZ	3-10-80
CHECK	BORLESKE	3-11-80
STRESS		
PROJ	J. MOORE	3-27-80
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — GROUND SERVICE (OPT)

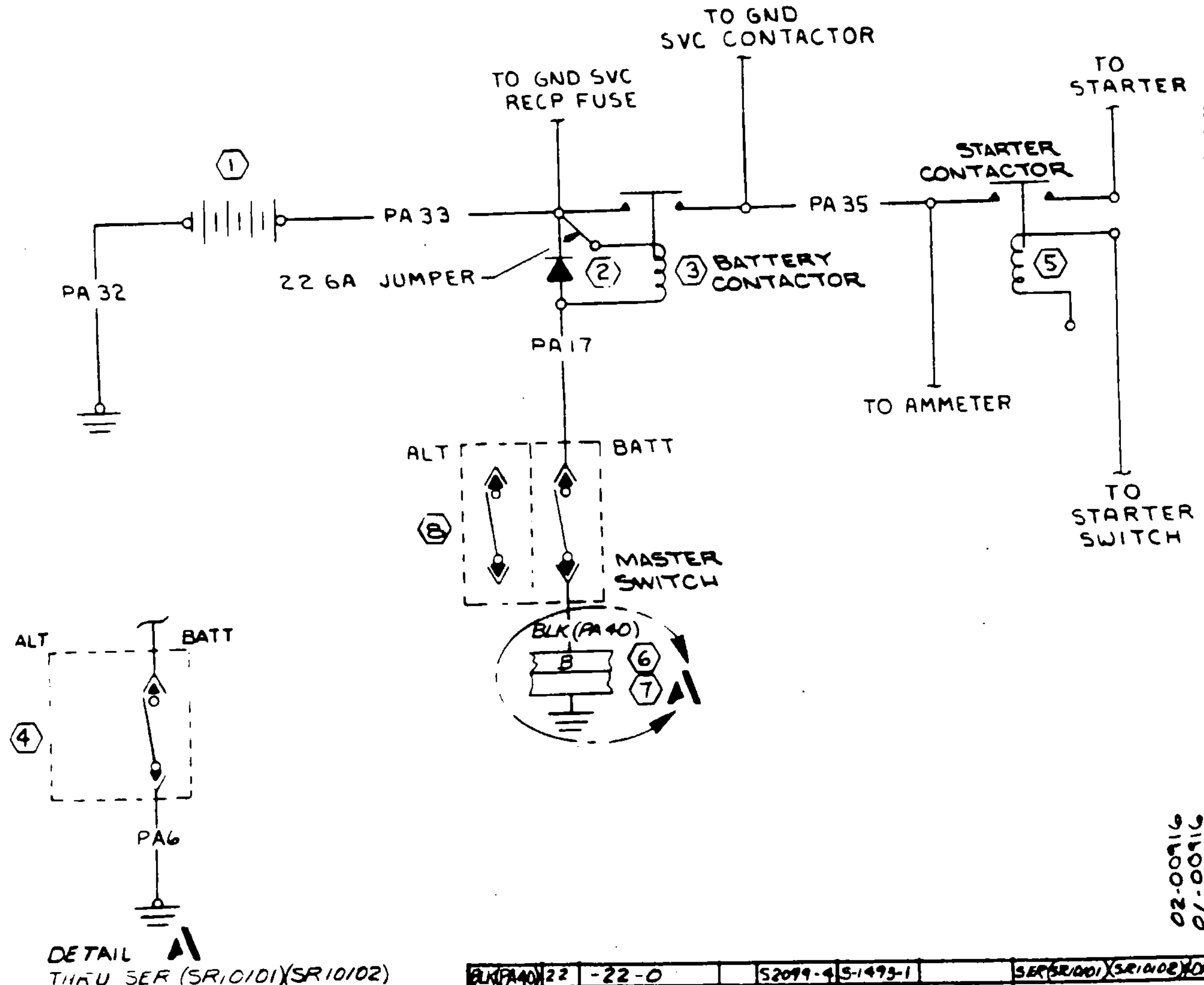
SIZE	CODE IDENT. NO	DWG NO
C	71379	1270709

SCALE NONE (SR 9634) (SR 9635) PAGE: 4.15

NOTES·

1. PLACE 35.00 IN. LENGTH OF S-292-14 SLEEVING OVER WIRE BEFORE INSTALLING WIRE TERMINATION.

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV ADD DETAIL "A" BLK (PA40) S-2527-1 (-2) (SR10101)(SR10102)	MKT 1-27-82	
B	BY REV: ADD S-2593-2 SWITCH (SR10101)(SR10102)	WHH 4-22-82	



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK(PA40)	22	-22-0		S2099-4	S-1493-1		SER (SR10101)(SR10102) & ON
PA35	2	S-1562-2-9	52.2	S-1367-7-13	S-1367-7-13	1	
PA32	2	S-1562-2-9	21.7	S-1367-7-12	S-1367-7-13		
PA33	2	S-1562-2-9	10.4	S-2447-2	S-1367-7-13		
PA17	22			S-1367-1-10	S-1493-1		
PA6	22			S-1493-1	S-1367-1-8		THRU SER (SR10101)(SR10102)

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
8	S2593-2	MASTER SWITCH	
7	S-2527-2	GND CONNECTOR	
6	S-2527-1	LH GND BLOCK	
5	S-2443-1	CONTACTOR	
4	S-1994-1-1	SWITCH	
3	S-2475-1	CONTACTOR	
2	0770728	DIODE ASSY	
1	C614001-0105	BATTERY ASSY	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 1270709 P412

SUPERSEDED BY:

CONTRACT NO:

Cessna AIRCRAFT CO. PAWNEE DIVISION 1800 E PAWNEE WICHITA KANSAS

	NAME	DATE
DESIGN	TJADEN	1-22-80
GROUP		3-5-80
DRAWN	LEUERENZ	3-10-80
CHECK	BORLESKE	3-11-80
STRESS		
PROJ		3-27-80
APPD		
OTHER		

TITLE: WIRING DIAGRAM — BATTERY CIRCUIT

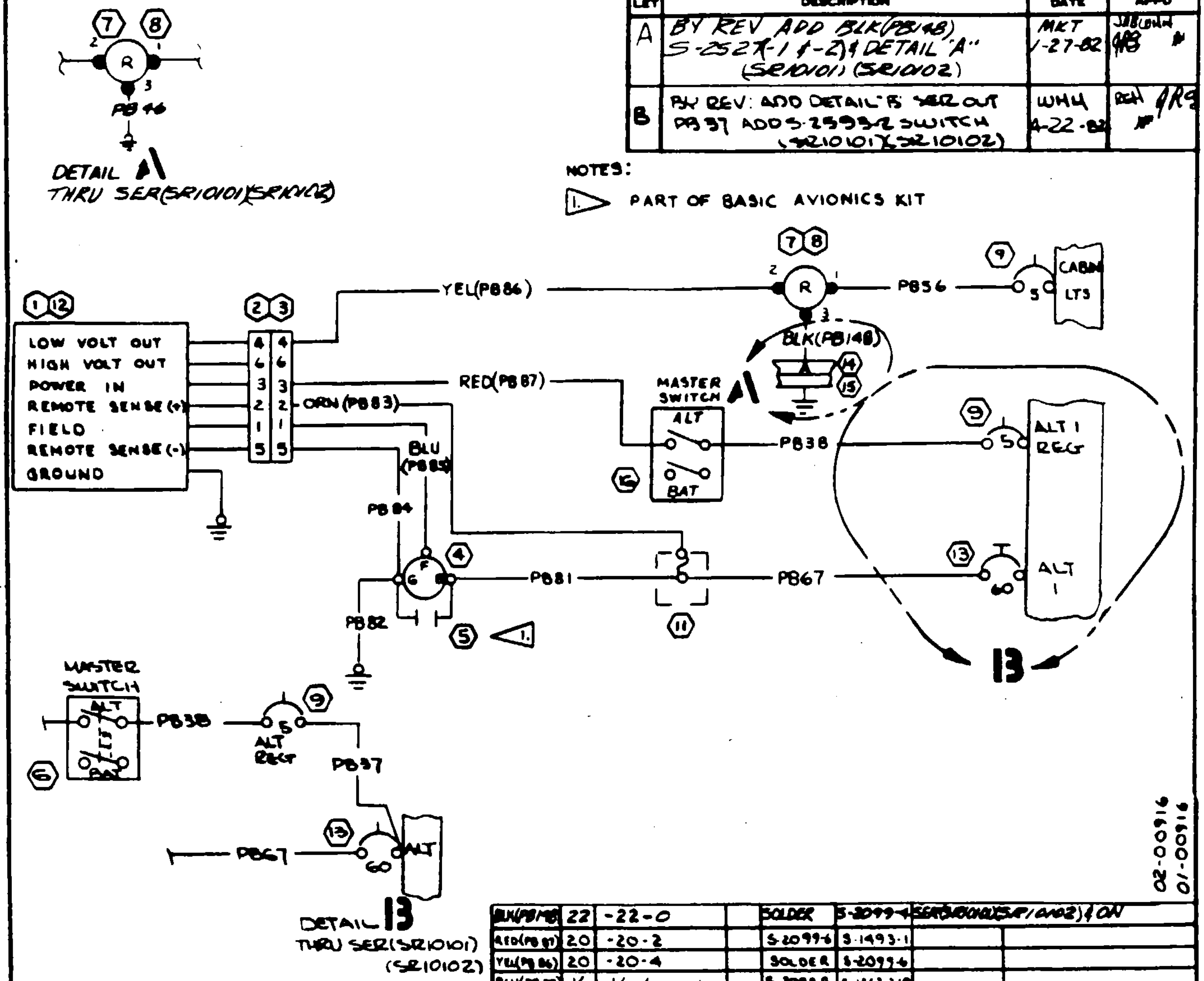
SIZE: C | CODE IDENT NO: 71379 | DWG NO: 1270709

SCALE: NONE (SR9634) (SR9635) PAGE: 4.16

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV ADD BLK(PB148) S-2527-1 & -2) & DETAIL "A" (SR10101) (SR10102)	MKT 1-27-82	
B	BY REV: ADD DETAIL "B" SER OUT PB37 ADD S-2593-2 SWITCH (SR10101)(SR10102)	WHH 4-22-82	

NOTES:

1. PART OF BASIC AVIONICS KIT



16	S-2593-2	MASTER SWITCH
15	S-2527-2	GND CONNECTOR
14	S-2527-1	LH GND BLOCK
13	S-1232-60	CIRCUIT BREAKER
12	C611005-0102	ALT CONTROL UNIT (ALTERNATE)
11	0570315	TERMINAL BOARD
10	S-1707-60	CIRCUIT BREAKER
9	S-1360-5L	CIRCUIT BREAKER
8	MS25041-2	INDICATOR LIGHT
7	MS25237-327	LAMP
6	S-1994-1-1	MASTER SWITCH
5	S-1915-1	CAPACITOR 1
4	C611503-0102	ALTERNATOR ASSY
3	S-2373-2	CONNECTOR
2	S-2373-1	CONNECTOR
1	C611003-0101	ALT CONTROL UNIT
ITEM NO.	PART NO.	DESCRIPTION

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS	
BLK(PB148)	22	-22-0		SOLDER	S-2099-4	(SR10101)(SR10102) & ON	
RED(PB87)	20	-20-2		S-2099-6	S-1493-1		
YEL(PB86)	20	-20-4		SOLDER	S-2099-6		
BLU(PB85)	16	-16-6		S-2099-8	S-1367-2-10		
PB84	20			S-2099-6	S-1367-1-10		
ORN(PB83)	20	20-3		S-2099-6	S-1367-1-4		
PB82	8	S-1562-8-9		S-1943-1	S-2484-1		
PB81	8	S-1562-8-9		S-1943-2	S-1943-1		
PB67	8	S-1562-8-9		S-1943-2	S-1367-4-8		
PB56	22			S-1367-1-6	SOLDER		
PB46	22			SOLDER	S-1367-1-8	THRU SER(SR10101)(SR10102)	
PB38	22			S-1367-1-6	S-1493-1		
PB37	22			S-1367-1-6	S-1367-1-6	THRU SER	(SR10101)(SR10102)

WIRE TABLE

CONTRACT NO:

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

	NAME	DATE
DESIGN	ABRAHAM	3-31-80
GROUP	D. Hautler	4-3-80
DRAWN	S BURRIS	3-31-80
CHECK	RE HAIR	3-31-80
STRESS		
PROJ		4-80
APPD		
OTHER		

TITLE **WIRING DIAGRAM — ALTERNATOR SYSTEM 60 AMP**

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CXXXXX=CESSNA STD. NO.

SUPERSEDES: 1270709 PG 4.9.C

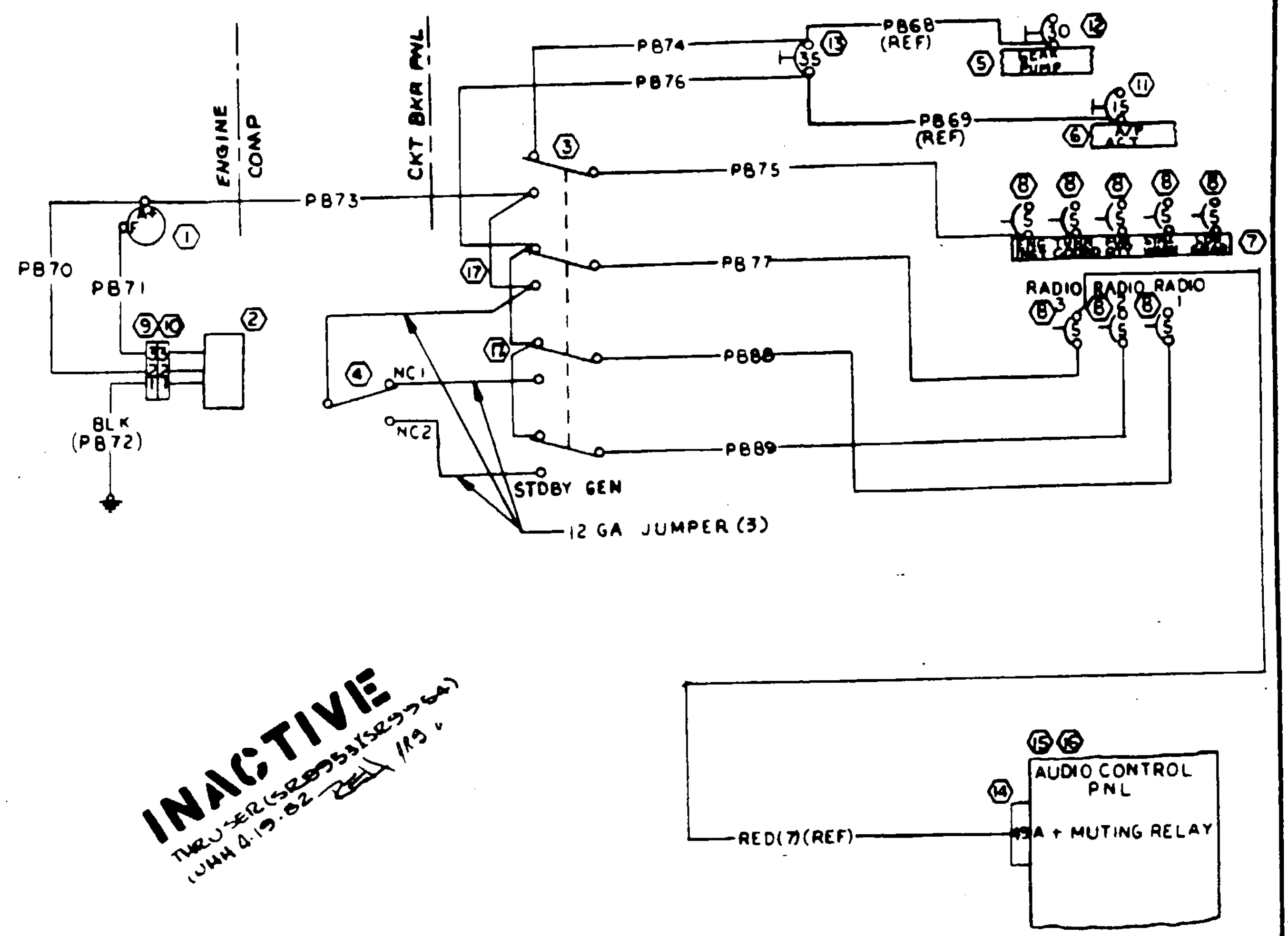
SUPERSEDED BY:

SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709

SCALE NONE (SR 9634)(SR 9635) PAGE: 4.17

(SR 9785)

REVISION			
LET	DESCRIPTION	DATE	APPD



INACTIVE
THRU SER(SR9953)(SR9964)
(JMH 4.19.82

18			
17	1270864	BUS BAR	
16	057C442	AUDIO CONT PNL	
15	2470003	AUDIO CONT PNL	
14	87149-7	CONNECTOR	
13	S-2281-1	SWITCH	
12	S-1232-30	CKT BKR	
11	S-1232-15	CKT BKR	
10	S-1678-[illegible]	CONNECTOR	
9	S-1638-1	CONNECTOR	
8	S-1360-5A	CKT BKR	
7	[illegible]	BUS BAR	
6	127[illegible]42	BUS BAR	
5	127[illegible]74[illegible]	BUS BAR	
4	S-382-[illegible]	SWITCH	
3	[illegible]	SWITCH	
2	[illegible]	VOLTAGE REGULATOR	
1	C61507-0[illegible]	GENERATOR	
ITEM NO	PART NO	DESCRIPTION	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA
STD. NO.

SUPERSEDES:

SUPERSEDED BY:
1270709 P4 /4

PB89	12			S1367-3-6	S1367-3-6			
PB88	12			S1367-3-6	S1367-3-6			
PB77	12			S1367-3-6	S1367-3-6			
PB76	12			S1367-3-6	S1367-3-6			
PB75	16			S1367-2-6	S1367-2-6			
PB74	16			S-1367-2-6	S1367-2-6			
PB73	16			S-1367-2-12	S-1367-2-6			
BLK(PB72)	20	-20-0		S-1367-1-8	S-1636-1			
PB7[illegible]	20			S-1367-1-10	S-1636-1			
PB70	20			S-1367-1-12	S-1636-1			
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS	

WIRE TABLE

CONTRACT NO.

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

	NAME	DATE
DESIGN	TJADEN	7-16-80
GROUP	[illegible]	7-28-80
DRAWN	TJADEN	7-16-80
CHECK	BORLESKE	7-16-80
STRESS		
PROJ	[illegible] Moore	7-28-80
APPD	JRS	
OTHER		

TITLE
WIRING DIAGRAM—
STANDBY GENERATOR
(OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709

SCALE: NONE (SR9793) PAGE: 4.18

REVISION			
LET	DESCRIPTION	DATE	APPD
C	BY REV: ADD S2527-2, S2527-1, PB143, PB148, PB149, PB150, PB155, PB156, PB157, S2593-2 ADD PAGE 4.19.2 SER OUT PB112, PB113, PB128, PB129, PB141, PB142, PB143 (SR10101)(SR10102)	MKT 1-27-82 RNJ	
D	BY REV: ADD DETAIL "C" (SR10101)(SR10102)	WHH 4-22-82	RSH

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: FN-DA15(REF) WAS FN-PB108 FN-DA14(REF) WAS FN-PB107 FN-DA12(REF) WAS FN-PB104 & FN-DA13(REF) WAS FN-PB105. DELETE FN-PB108, FN-PB104 FN-PB105 & FN-PB107 WIRES FROM WIRE TABLE. ON PB102 & PB103 WIRES SOLDER WAS S1493-1. ON PB112 & PB113 WIRES SOLDER WAS S1367-6, S1367-1-6 WAS S1493-1. ON PB128 & PB129 WIRES S1367-1-6 WAS S-1493-1. ADD 20 GA JUMPERS AT ALT. RESTART SW. ON PB145 WIRE SOLDER WAS S1367-6 & S1367-1-10 DELETE 2170024 FROM EQUIPMENT TABLE (SR9953)(SR9954)	WHH 4-8-81	RSH
B	BY REV: ADD NUMBERS ON TERMINALS/ MS25041-2 & MS25041-4. ADD MS25041-4; PB117/S1367-1-6 WAS S2099-4, PB135/S1367-1-6 WAS SOLDER (SR9953)(SR9954)	JPO 9-16-81 MKT 10-6-81	RSH

▷ TO AMMETER SEL SW

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PB124	20			S1367-1-12	S2099-4		
PB123	6			S1943-4	S1943-5		
PB122	20			S1367-1-8	S2099-4		
PB121	18			S1367-1-10	S2099-3		
PB120	20			S1367-1-10	S2099-4		
PB119	20			S1367-1-8	S2099-4		
PB118	18B			S1943-4	S2099-4		
PB117	20			S1367-1-6	S1367-1-6		
PB116	18			S1367-1-10	S2099-3		
PB115	20			S1367-1-8	S2099-4		
PB114	20			S1636-1	S1367-1-8		
PB113	20			SOLDER	S1367-1-6		THRU SER (SR10101)(SR10102)
PB112	20			SOLDER	S1367-1-6		THRU SER (SR10101)(SR10102)
PB111	20			SOLDER	S1636-1		
PB110	6			S2447-6	S1367-5-12		
PB109	6			S2447-6	S1367-5-12		
PB106	20			SOLDER	S1367-1-8		
PB103	20			S1367-1-6	SOLDER		
PB102	20			S1367-1-6	SOLDER		
PB101	18			S1367-1-10	S1367-1-10		
PB100	18			S1367-1-10	S1367-1-10		
PB98	6			S1367-5-8	S2447-6		
PB97	6			S2447-6	S1367-5-8		

02-00916
01-00916

WIRE TABLE

	PART NO.	DESCRIPTION	
21	S2593-2	SWITCH	
20	S2527-2	GND CONNECTOR	
19	S2527-1	LH GND BLOCK	
18	MS25041-4	LIGHT ASSY	
17	2101055	BATTERY ASSY	
16	MS25237-327	LAMP	
15	MS25041-2	LIGHT ASSY	
14	S2349-1	CONNECTOR	
13	C611007-0101	ALT CONTROL UNIT	
12	S1790-2-1	SWITCH	
11	C611503-0104	ALTERNATOR	
10	S2035-2	PLUG	
9	83-0057	RESISTOR	
8			
7	S1890-1	SWITCH	
6	20H3P	DIODE	
5	S2558-1	SHUNT	
4	2170027	BUS BAR	
3	S1360-5L	CKT BREAKER	
2	S1232-60	CKT BREAKER	
1	S2475-1	CONTACTOR	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-1XXXX-CESSNA SPEC. NO. S-1XXX OR CMXXXX-CESSNA STD. NO.

SUPERSEDES:

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN		
GROUP	W.A. Newbrough	3-24-81
DRAWN	ACKERSON	3-24-81
CHECK	BORLESKE	3-24-81
STRESS		
PROJ	J.H. MOCKLER	3-25-81
APPD		
OTHER		

Cessna. AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — DUAL ALTERNATOR

SIZE	CODE IDENT. NO	DWG NO
C	71379	1270709

SCALE - NONE (SR9953)(SR9954) PAGE: 4.19.0

Dual Alternator (Sheet 1 of 2)

BLK (PB157)	22	-22-0		SOLDER	S2099-4	SER (SR10101)	(SR10102) & ON
BLK (PB156)	22	-22-0		SOLDER	S2099-4	SER (SR10101)	(SR10102) & ON
BLK (PB155)	22	-22-0		SOLDER	S2099-4	SER (SR10101)	(SR10102) & ON
PB150	20			S1493-1	S2099-4	SER (SR10101)	(SR10102) & ON
PB149	20			S1493-1	S2099-4	SER (SR10101)	(SR10102) & ON
PB148	20			SOLDER	S1493-1	SER (SR10101)	(SR10102) & ON
PB147	20			SOLDER	S1493-1	SER (SR10101)	(SR10102) & ON
PB146	6			S1943-4	S1943-5		
PB145	20			SOLDER	SOLDER		
PB144	20			S1361-1-8	SOLDER		
PB143	22			SOLDER	S1367-1-8	THRU SER (SR10101)	(SR10102)
PB142	22			SOLDER	S1367-1-8	THRU SER (SR10101)	(SR10102)
PB141	22			SOLDER	S1367-1-8	THRU SER (SR10101)	(SR10102)
PB140	22			SOLDER	S2099-4		
PB139	22			SOLDER	SOLDER		
PB138	22			SOLDER	SOLDER		
PB137	22			S2099-4	SOLDER		
PB136	22			S2099-4	SOLDER		
PB135	22			S2099-4	S1367-1-6		
PB134	20			S2099-4	S1367-1-8		
PB133	20			S1367-1-8	S2099-4		
PB132	20			S2099-4	S2099-4		
PB131	20			S2099-4	S2099-4		
PB130	20			S2099-4	S2099-4		
PB129	20			S1367-1-6	S2099-4	THRU SER (SR10101)	(SR10102)
PB128	20			S1367-1-6	S2099-4	THRU SER (SR10101)	(SR10102)
PB127	18S			S1943-4	S2099-4		
PB126	20			S1367-1-8	S2099-4		
PB125	20			S1367-1-10	S2099-4		
CODE	GA	MATERIAL	LG	TERMINALS			SERIALS
WIRE TABLE							

CONTRACT NO:		
	NAME	DATE
DESIGN		
GROUP	[illegible]	3-24-81
DRAWN	ACKERSON	3-24-81
CHECK	BORLESKE	3-24-81
STRESS		
PROJ	[illegible]	[illegible]
APPD	[illegible]	
OTHER		

Cessna. AIRCRAFT CO.

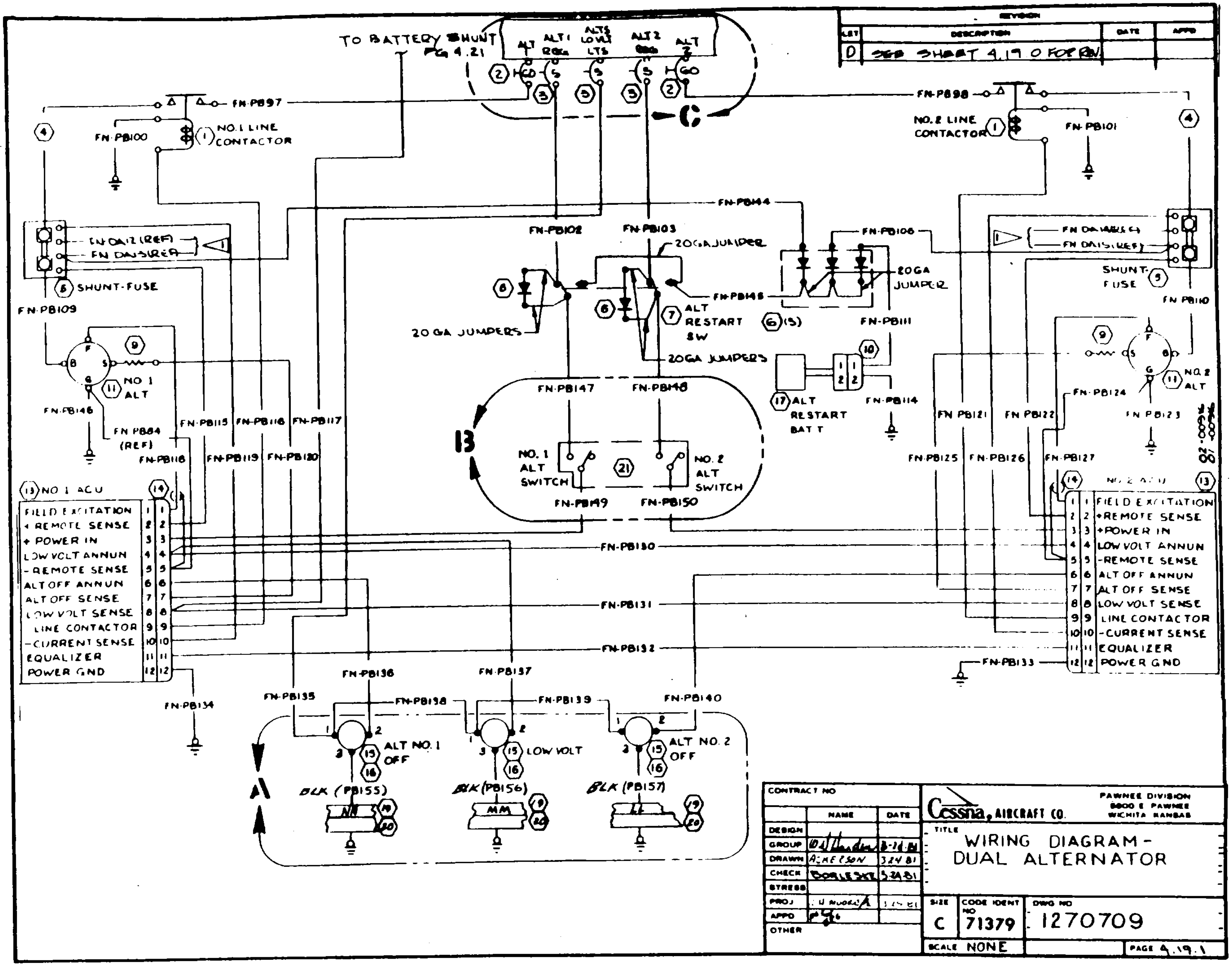
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — DUAL ALTERNATOR

SIZE C | CODE IDENT. NO. 71379 | DWG NO 1270709

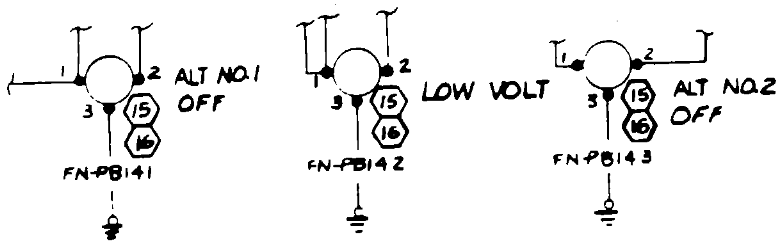
SCALE NONE (SR9953) (SR9964) PAGE: 4.19.0

Dual Alternator (Sheet 2 of 2)

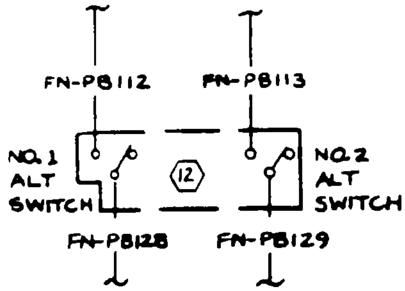


TO BATTERY SHUNT
ALT 1
ALT 1 REG
ALTS LO VLT LTS
ALT 2 REG
ALT 2
C
FN-PB97
FN-PB98
NO. 1 LINE CONTACTOR
NO. 2 LINE CONTACTOR
FN-PB100
FN-PB101
FN-PB144
FN-PB102
FN-PB103
20GA JUMPER
FN-PB106
20GA JUMPER
SHUNT-FUSE
FN-PB109
FN-PB110
20 GA JUMPERS
ALT RESTART SW
FN-PB145
FN-PB111
20GA JUMPERS
NO 1 ALT
NO. 2 ALT
FN-PB146
FN-PB84 (REF)
FN-PB115
FN-PB116
FN-PB117
FN-PB118
FN-PB119
FN-PB120
FN-PB147
FN-PB148
ALT RESTART BATT
FN-PB114
FN-PB121
FN-PB122
FN-PB123
FN-PB124
FN-PB125
FN-PB126
FN-PB127
B
NO. 1 ALT SWITCH
NO. 2 ALT SWITCH
FN-PB149
FN-PB150
NO 1 ACU
NO 2 ACU
FIELD EXCITATION
+REMOTE SENSE
+POWER IN
LOW VOLT ANNUN
-REMOTE SENSE
ALT OFF ANNUN
ALT OFF SENSE
LOW VOLT SENSE
LINE CONTACTOR
-CURRENT SENSE
EQUALIZER
POWER GND
FN-PB130
FN-PB131
FN-PB132
FN-PB133
FN-PB134
FN-PB135
FN-PB136
FN-PB137
FN-PB138
FN-PB139
FN-PB140
ALT NO. 1 OFF
LOW VOLT
ALT NO. 2 OFF
A
BLK (PB155)
BLK (PB156)
BLK (PB157)
NN
MM
LL
LET
DESCRIPTION
DATE
APPD
REVISION
D
SEE SHEET 4.19.0 FOR REV
CONTRACT NO
NAME
DATE
DESIGN
GROUP
DRAWN
CHECK
STRESS
PROJ
APPD
OTHER
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS
TITLE
WIRING DIAGRAM - DUAL ALTERNATOR
SIZE
C
CODE IDENT NO
71379
DWG NO
1270709
SCALE NONE
PAGE 4.19.1

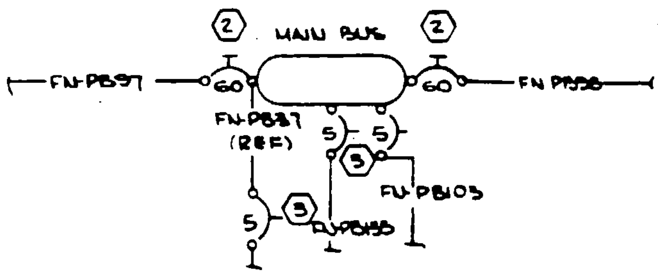
REVISION			
LET	DESCRIPTION	DATE	APPD
D	SEE PG 4.19.0 FOR REV.		



DETAIL A
THRU SER(SR 10101)(SR 10102)



DETAIL B
THRU SER (SR 10101)(SR10102)



DETAIL C
THRU SER(SR10101)(SR10102)

02-00916
01-00916

CONTRACT NO		
	NAME	DATE
DESIGN		
GROUP	[illegible]	3-26-82
DRAWN	M. THOMPSON	1-27-82
CHECK	BORLESKE	1-28-82
STRESS		
PROJ	J.H. MOORE	3-30-82
APPD	[illegible]	
OTHER		

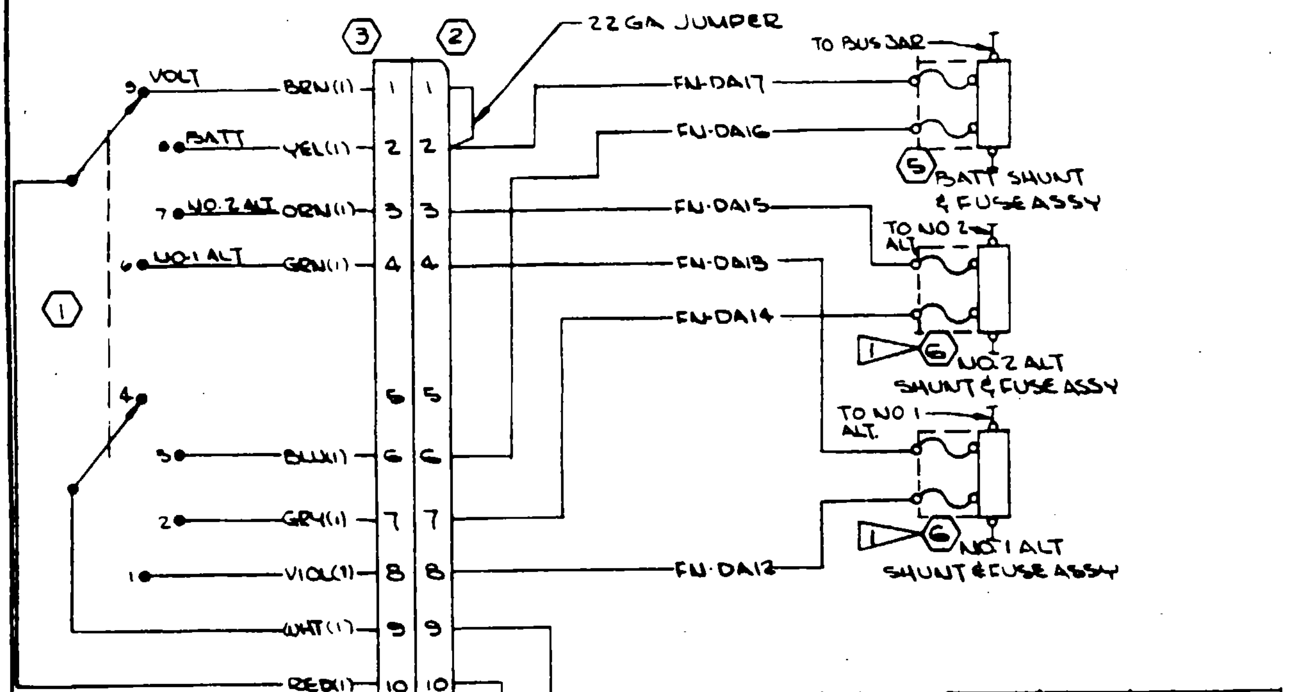
Cessna. AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

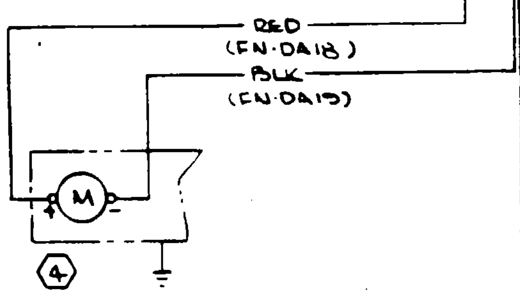
TITLE WIRING DIAGRAM
DUAL ALTERNATOR

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709
SCALE NONE	(SR10101)(SR10102)	PAGE 4.19.2

NOTES:
1. ALTERNATOR SHUNT & FUSE ASSY'S ARE PART OF 2170024 MODULE ASSY.

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: DELETE BLK(1), 2170030 FN-DD2 & FN-DD1, BRN(1), YEL(1), ORN(1) GRN(1) WAS 20GA (SR9953)(SR9954)	MKT 8-7-81	
B	6,7,8,9 WAS 1,2,3,4/SWITCH TERMINALS (SR10513) ADD S2558-2 SHUNT (NOW SHOP PRACTICE)	TMS 5-27-82 WWH 6-4-82	





54-00916
53-00916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
BRN(1)	22	-22-1		SOLDER	S1963-2	
YEL(1)		-22-4				
ORN(1)		-22-3				
GRN(1)	22	-22-5		SOLDER	S1963-2	
BLU(1)	22	-22-6		SOLDER	S1963-2	
GRY(1)		-22-8				
VIO(1)		-22-7				
WHT(1)		-22-9				
RED(1)		-22-2		SOLDER	S1963-2	
[illegible]		-22-0		S1963-1	S1367-1-10	
[illegible]		-22-2			S1367-1-10	
FN-DA17					S1367-1-8	
FN-DA16						
FN-DA15						
FN-DA14						
FN-DA13						
FN-DA12	22			S1963-1	S1367-1-8	

WIRE TABLE

FIND NO.	PART NO.	DESCRIPTION
6	S2558-1	SHUNT
5	S2558-2	SHUNT
4	C669563	INSTR. CLUSTER
3	S1961-2-0	HOUSING
2	S1961-1-0	HOUSING
1	2570044	SELECTOR SW ASSY

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES:

SUPERSEDED BY: PG. 4.22

CONTRACT NO:

	NAME	DATE
DESIGN		
GROUP	[illegible]	3-24-81
DRAWN	HARDEN	3-20-81
CHECK	BORLESKE	3-24-81
STRESS		
PROJ	[illegible]	[illegible]
APPD	[illegible]	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — VOLT-AMMETER (OPT)

SIZE: C | CODE IDENT NO. 71379 | DWG NO 1270709

SCALE: NONE (SR9953)(SR9954) PAGE: 4.20

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: FN-PA38 WAS FN-PA17(REF) FN-PA39 WAS FN-PA16(REF) (SR9953)(SR9954)	WHH 4-9-81	RSH
B	BY REV. S-2558-2 WAS S-2558-1. ADD FN-PB117 BATTERY-SHUNT (SR9953)(SR9954)	MKT 10-6-81	RSH JRS
C	BY REV: ADD DETAIL 'A' S2527-2, S2527-1, BLK(FN-PA41); SER OUT FN-PA39, FN-PA38, S1790-1; ADD S2593-2, FN-PA17 (SR10101)(SR10102)	MKT 1-27-82 RNJ	
D	BY REV: CHANGE PICTURE OF S-2593-2 MASTER SWITCH TO SHOW PROPER LOCATION OF ALT 1 & ALT 2. (SR10101)(SR10102)	WHH 4-22-82	JRS
E	BY REV: ADD DETAIL 'B' & 150 CIRCUIT BREAKER (SR10101)(SR10102)	WHH 5-26-82	RSH
F	BY REV: DA17(REF) WAS DA16(REF) DA16(REF) WAS DA17(REF); FUSE WAS RESISTOR TO CONNECTION 2 OF S-2558-2 (SR9953)(REF)(SR9954)(REF)	GLS 7-14-82	JRS

02-00916
01-00916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
FN-PA17	22			S1367-1-10	S-1493-1		SER (SR10101)(SR10102) & ON
BLK(FN-PA41)	22	-22-0		S1367-1-6	S2099-4		SER (SR10101)(SR10102) & ON
FN-PA39	22			S1367-1-6	S1367-1-8		THRU SER (SR10101)(SR10102)
FN-PA38	22			S1367-1-10	S1367-1-6		THRU SER (SR10101)(SR10102)
FN-PA37	6	S-1562-6-9		S1367-5-12	S1367-5-8		
FN-PA36	6	S-1562-6-9		S1367-5-13	S1367-5-12		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
10	S-2593-2	MASTER SWITCH
9	S2527-2	GND CONNECTOR
8	S2527-1	LH GND BLOCK
7	S-2558-2	SHUNT-BATTERY
6	S-1232-60	CIRCUIT BREAKER
5	S-2443-1	CONTACTOR
4	S1790-1	MASTER SWITCH
3	S2475-1	CONTACTOR
2	0770728	DIODE ASSY
1	C614001-0105	BATTERY ASSY

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES:

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN		
GROUP		3-26-81
DRAWN	HARDEN	3-24-81
CHECK	DORLESKE	3-29-81
STRESS		
PROJ		3-25-81
APPD		
OTHER		

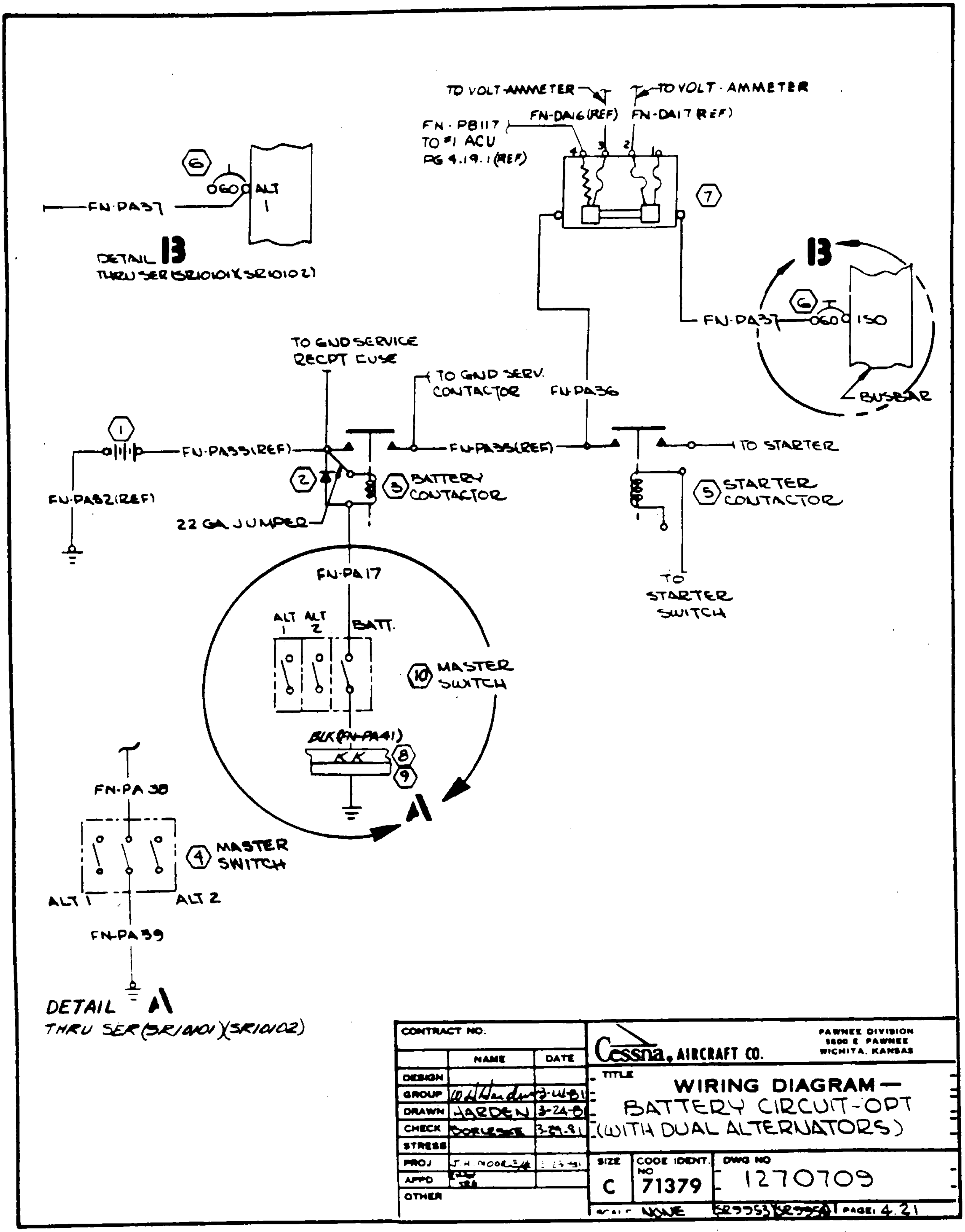
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — BATTERY CIRCUIT-OPT (WITH DUAL ALTERNATORS)

SIZE: C | CODE IDENT. NO. 71379 | DWG NO 1270709

SCALE: NONE | SR9953 SR9954 | PAGE: 4.21

Battery Circuit-OPT (With Dual Alternators) (Sheet 1 of 2)

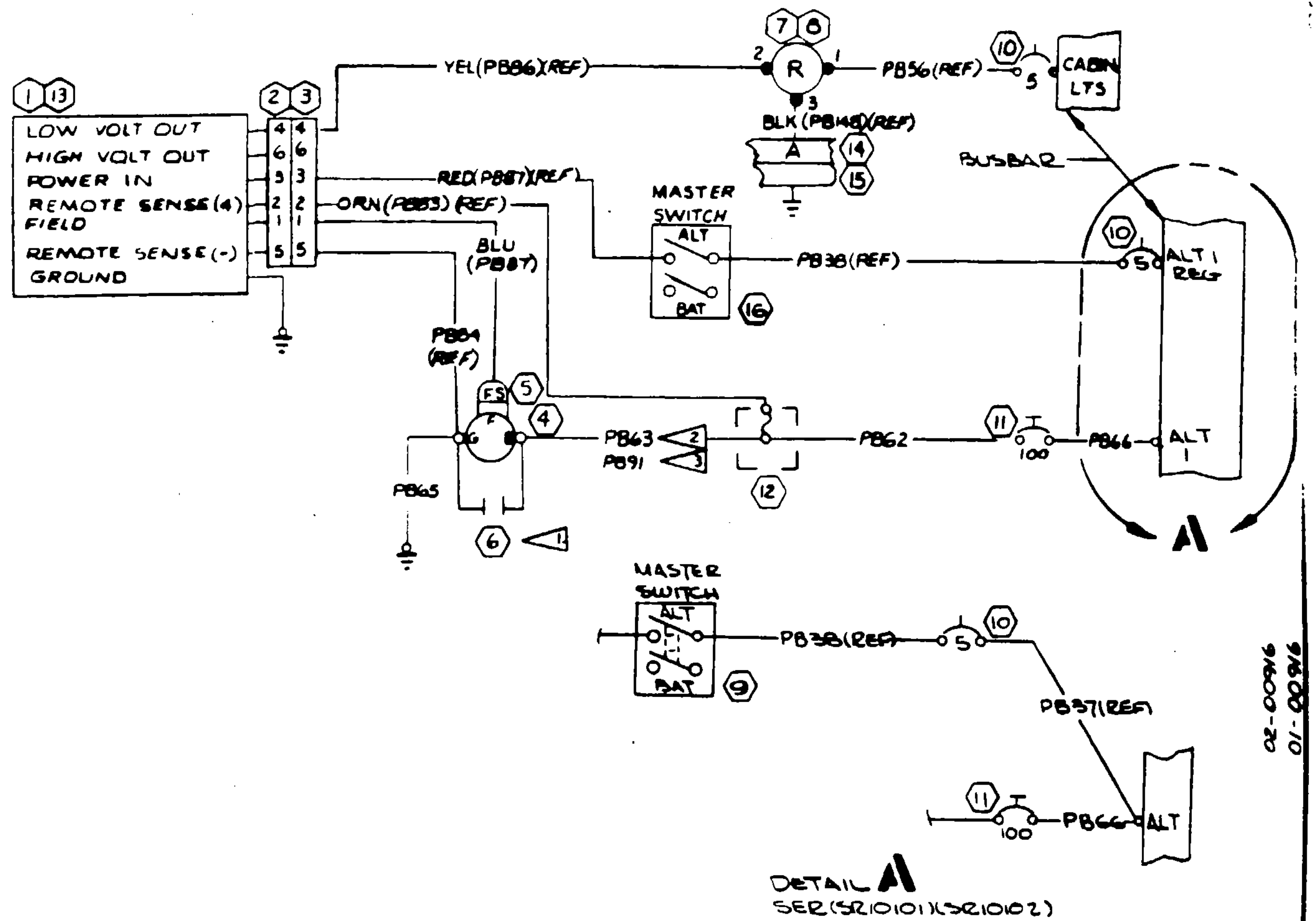


Battery Circuit-OPT (With Dual Alternators) (Sheet 2 of 2)

NOTES:

1. PARTS OF BASIC AVIONICS KIT
2. PB63 WIRE USED ON P210 ONLY AFTER SER (SR1004)
3. PB91 WIRE USED ON 210 & T210 SER (SR1004) & ON

REVISION			
LET	DESCRIPTION	DATE	APPD
A	PER REV: ADD DETAIL 'A' & S-2593-2 SWITCH (SR10101 & SR10102)	WHH 4-22-82	



16	S-2593-2	MASTER SWITCH
15	S-2527-2	GND CONNECTOR
14	S-2527-1	LH GND BLOCK
13	C611005	ALT CONTROL UNIT (ALTERNATE)
12	0570315	TERMINAL BOARD
11	S-2326-1	CIRCUIT BREAKER
10	S-1360-5L	CIRCUIT BREAKER
9	S-1999-1-1	MASTER SWITCH
8	MS25041-2	INDICATOR LIGHT
7	MS25237-327	LAMP
6	S-1915-1	CAPACITOR (1)
5	D208-4489-KA	CONNECTOR
4	C611505	ALTERNATOR ASSY
3	S-2373-2	CONNECTOR
2	S-2373-1	CONNECTOR
1	C611005	ALT CONTROL UNIT
ITEM NO	PART NO	DESCRIPTION

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
PB91	4	S-1562-4-9		S-2402-2	S-2402-2	(3)	
BLU(PB87)	18	-18-6		S-2099-8	S-2376-1		
PB66	4	S-1562-4-9		S-1367-6-12	S-1367-6-10		
PB65	4	S-1562-4-9		S-2402-2	S2402-1		
PB63	4	S-1562-4-9		S-2402-2	S2402-2	(2)	
PB62	4	S-1562-4-9		S-2402-2	S-1367-6-12		

WIRE TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES 1270709 P4.10

SUPERSEDED BY

CONTRACT NO.

	NAME	DATE
DESIGN		
GROUP	W H Harden	3-26-82
DRAWN	M THOMPSON	2-2-82
CHECK	BORLESKE	2-2-82
STRESS		
PROJ	J H MOORE	3-26-82
APPD	JRG	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — ALTERNATOR SYSTEM 95 AMP (OPT)

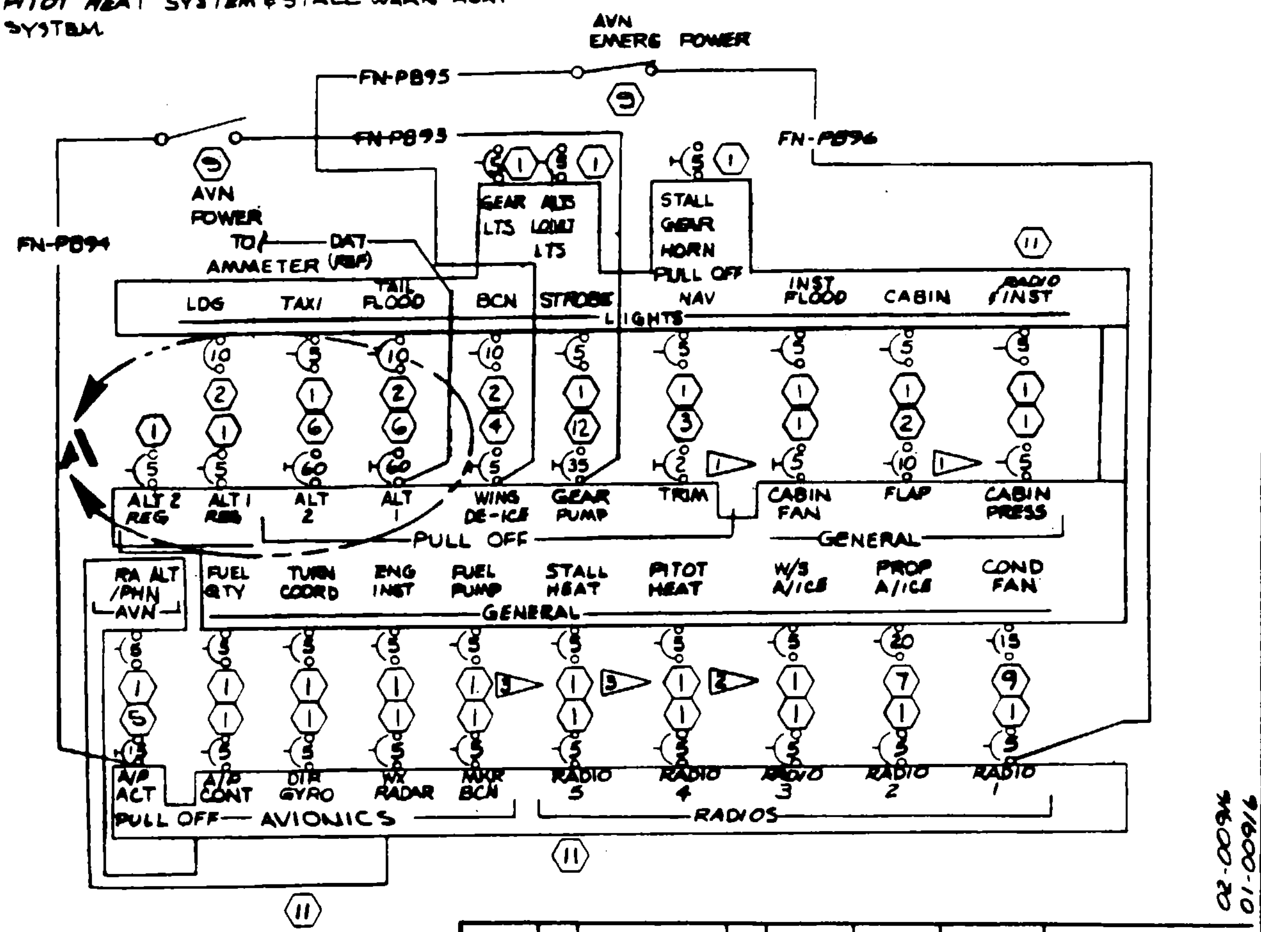
SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE (SR10101)(SR10102) PAGE: 4.22

NOTES:

1. APPLIES TO P210 ONLY
2. S-1360-15L CKT BKR REQD WITH KNOWN ICING W/S A/ICE SYSTEM
3. S-1360-10L CKT BKR REQD WITH KNOWN ICING PITOT HEAT SYSTEM & STALL WARN HEAT SYSTEM

REVISION			
LET	DESCRIPTION	DATE	APPD



ITEM NO	PART NO.	DESCRIPTION	
13	0713854	BUS BAR	
12	S-1232-35	CIRCUIT BREAKER	
11	2170035	BUS BAR	
9	MS25306-222	SWITCH	
8	S-2326-1	CIRCUIT BREAKER	
7	S-1360-20L		
6	S-1232-60		
5	S-1232-15		
4	S-1232-5		
3	S-1232-2		
2	S-1360-10L		
1	S-1360-5L	CIRCUIT BREAKER	

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
FN-PB96	10	S-1562-10-9		S-1367-36	S-1367-36	(OPT)	
FN-PB95	10			S-1367-38	S-1367-36	(OPT)	
FN-PB94	10			S-1367-36	S-1367-38	(OPT)	
FN-PB93	10	S-1562-10-9		S-1367-38	S-1367-36	(OPT)	

WIRE TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO
S-XXX OR CMXXXX=CESSNA STD. NO

SUPERSEDES 4130

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	HARDEN	4-29-82
GROUP	W H [illegible]	4-29-82
DRAWN	M. THOMPSON	4-28-82
CHECK	R. YOUNGERS	4-28-82
STRESS		
PROJ	J J MOORE	4-29-82
APPD	JRS	
OTHER		

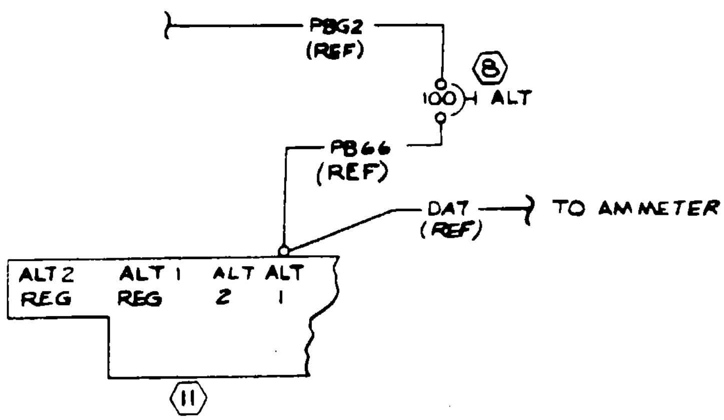
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA KANSAS

TITLE WIRING DIAGRAM — CIRCUIT BREAKERS

SIZE C CODE IDENT NO 71379 DWG NO 1270709

SCALE NONE (SR10101)(SR10102) PAGE: 4.23.0

REVISION			
LET	DESCRIPTION	DATE	APPD



DETAIL **A**
APPLIES WITH 95 AMP ALT SYSTEM (OPT)

CONTRACT NO		
	NAME	DATE
DESIGN	HARDEN	4-29-82
GROUP	W. Harden	4-29-82
DRAWN	M THOMPSON	4-28-82
CHECK	R. YOUNGERS	4-28-82
STRESS		
PROJ	[illegible]	[illegible]
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

TITLE: WIRING DIAGRAM — CIRCUIT BREAKERS

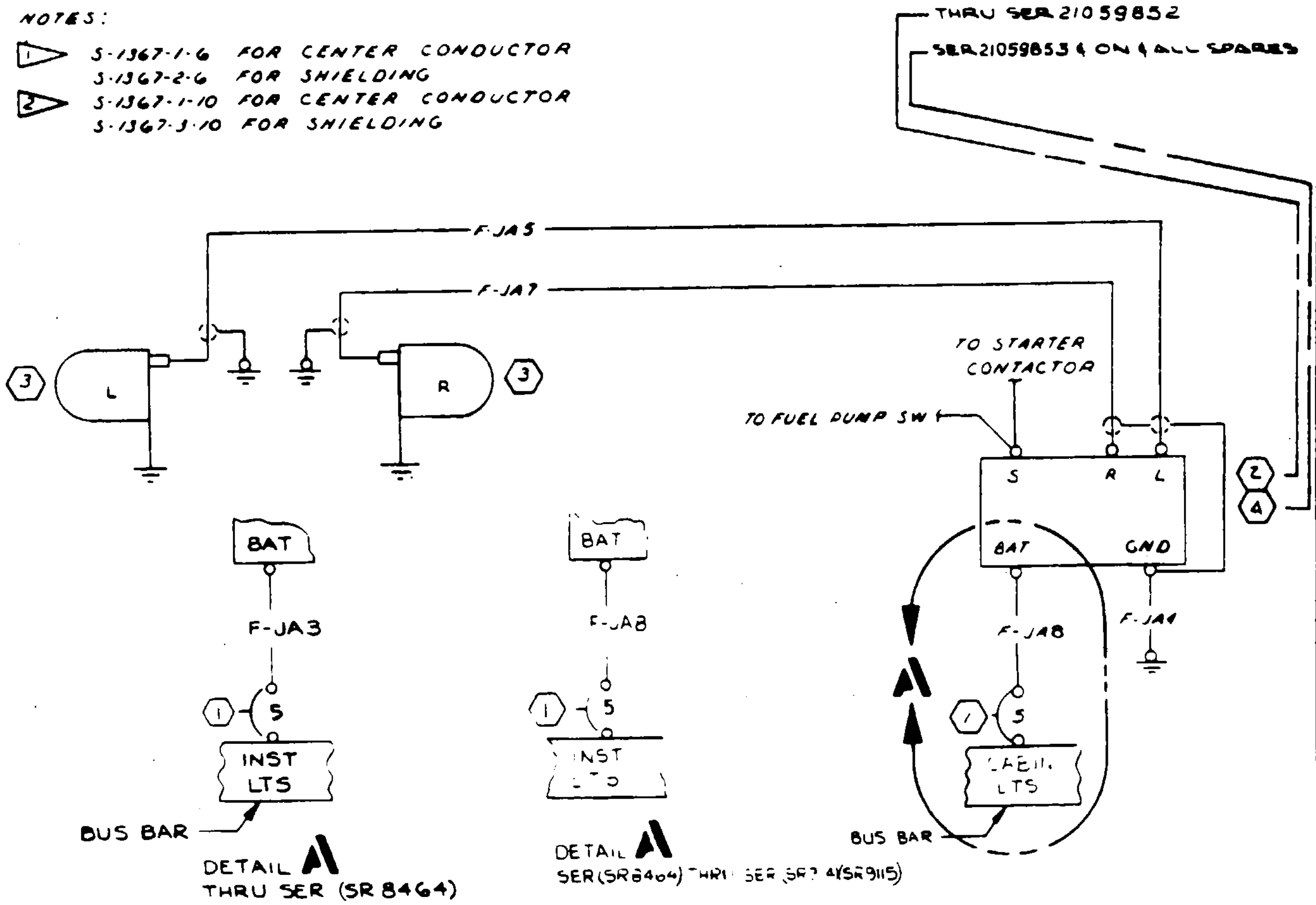
SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE | 5R1O1O1 | 5R1O1O2 | PAGE 4.23.1

LET	DESCRIPTION	DATE	APPD
E	BY REV: ADD DETAIL 'A' & SER (SR9114) (SR 9115)	HHG 2-12-79	
A	BY REV: SEE OUT C292501-0101; SER IN C292501-0105 (SR7126)	RLY 2-29-72	
B	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	JWO 5-3-73	
C	BY REV: S1360-5L WAS S1360-8L (SR8143)	GDS 5-12-76	
D	BY REV: ADD DETAIL 'A' & SER & F-JA8 (SR 8464)	REG 4-28-77	

NOTES:

1. S-1367-1-6 FOR CENTER CONDUCTOR; S-1367-2-6 FOR SHIELDING
2. S-1367-1-10 FOR CENTER CONDUCTOR; S-1367-3-10 FOR SHIELDING



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
F-JA8	20			S-1367-1-6	S-1367-1-6		SER (SR8464) & ON
F-JA7	18S		66	1	2		
F-JA5	18S		65	1	2		
F-JA4	20		7	S-1367-1-6	S-1367-1-6		
F-JA3	20		13	S-1367-1-6	S-1367-1-6		THRU SER (SR8464)

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	VENDOR
4	C292501-0105	IGNITION SWITCH	
3	SLICK #662	MAGNETO	(09035)
2	C292501-0101	SWITCH	
1	S-1360-5L	CIRCUIT BREAKER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES 12210-1073

SUPERSEDED BY

CONTRACT NO

	NAME	DATE
DESIGN	V R SIPES	1-28-71
GROUP		2-26-71
DRAWN	V R SIPES	2-18-71
CHECK	L K WHITE	2-24-71
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV 5800 E PAWNEE WICHITA KANSAS

TITLE WIRING DIAGRAM — MAGNETO SYSTEM

SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

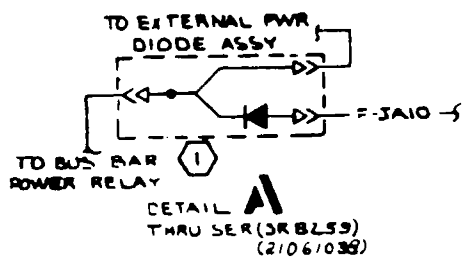
SCALE NONE | 210 | PAGE 5.1

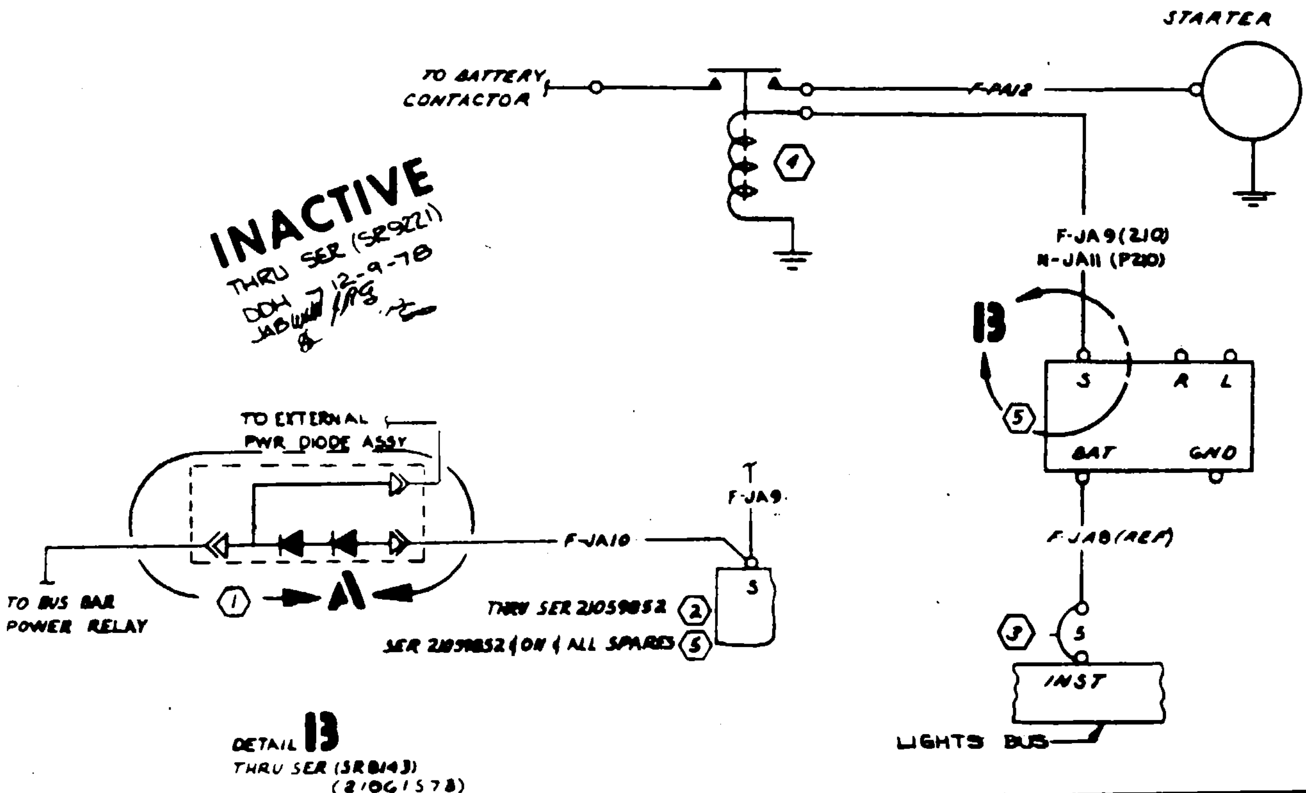
(SR 6755) IX
21059503

LET	DESCRIPTION	DATE	APPD.
G	BY REV: S-1367-1-10 WAS S-1493-1/JA11 (SR 9221)	PSM 1-19-79	
H	BY REV: S-1367-6-13 WAS S-1367-7-13/ PA12 (NOW SHOP PRACTICE)	HHG 8-1-79	

REVISION

LET	DESCRIPTION	DATE	APPD
A	BY REV: SEE OUT C292501-0101; SEE IN C292501-0105 (SR7126)	RLW 2-29-72	
B	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	JLO 6-3-73	
C	BY REV: ADD DETAIL "A" & SER & SECOND DIODE (SR8259)	RS 6-11-75	
D	BY REV: ADD DETAIL "B" (SER: 226A WAS 206A/F-JA9, S1360-5L WAS S1360-8L (SR8143)	GDS 5-12-76	
E	BY REV: F-JA8(REF) WAS F-JA3 (REF) (SR 8464)	REG 4-28-77	
F	BY REV: ADD WIRE JA11 (SR8465)	GDS 6-6-77	





WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
N-JA11	20			S-1367-1-6	S-1367-1-10		
F-PA12	4	S-1562-4-9		S-1367-6-13	S-1367-6-13		
F-JA10	20		7	S-1367-1-6	S-1493-1		THRU SER (SR8143)
F-JA9	22		75	S-1367-1-6	S-1367-1-10		

WIRE TABLE

ITEM NO.	PART NO	DESCRIPTION
6	C292501-0105	IGNITION SWITCH
4	S-1577-1	STARTER CONTACTOR
3	S-1360-5L	CIRCUIT BREAKER
2	C292501-0101	SWITCH
1	1370043	DIODE ASSY

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC NO S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES 1210-1073

SUPERSEDED BY 1270709 P 6.2

CONTRACT NO

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

	NAME	DATE
DESIGN	V R SIPES	1-28-71
GROUP	V Wise	2-25-71
DRAWN	V R SIPES	2-19-71
CHECK	L.E. WHITE	2-24-71
STRESS		
PROJ		
APPD		
OTHER		

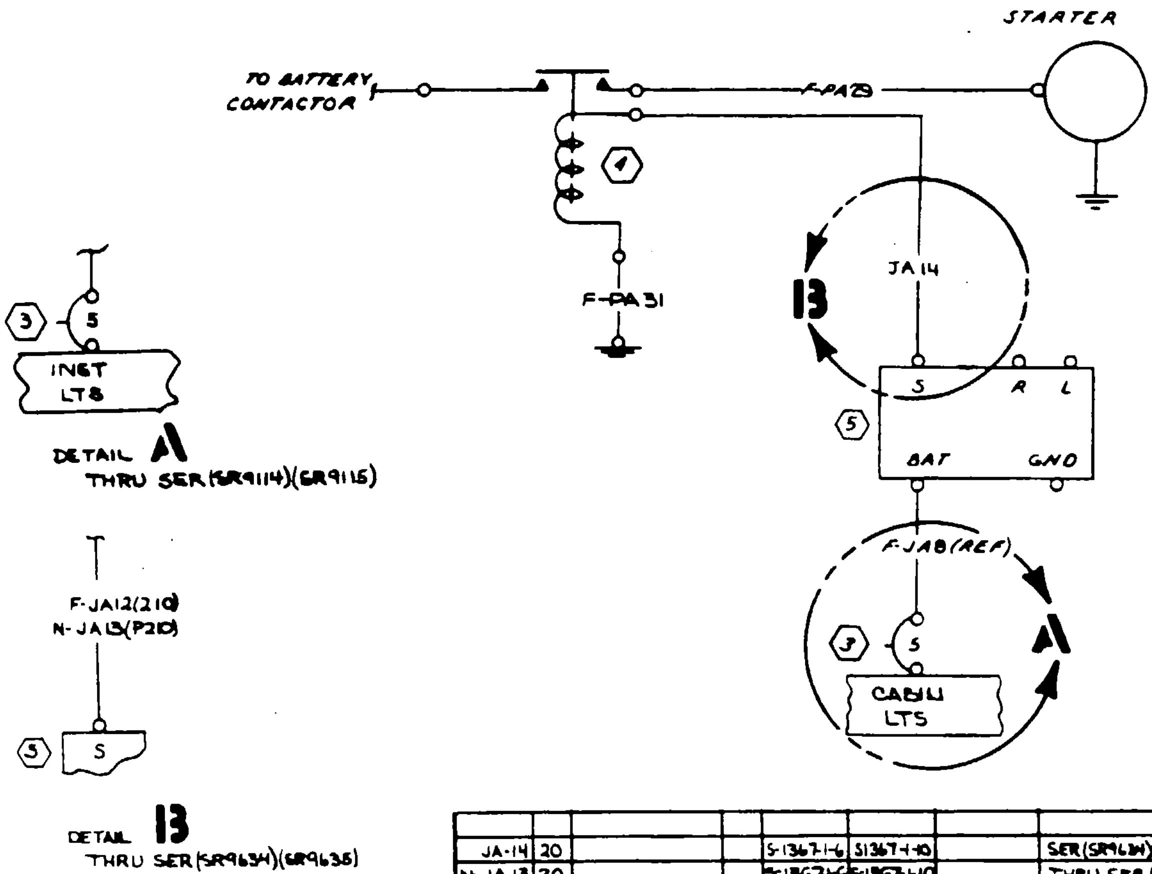
TITLE WIRING DIAGRAM — STARTER SYSTEM

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE 210 & P210 PAGE 6.1

(SR6755) II (21059503)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL A (SR9114)(SR9115)	DDH 12-9-78	
B	BY REV: ADD JA12 & JA13; DELETE JA9 & JA11 (SR9221)	PSM 1-19-79	
C	BY REV: S-1367-6-13 WAS S-1367-7-13/PA29 (NOW SHOP PRACTICE)	HHG 8-1-79	
D	BY REV: SER OUT JA12, JA13; ADD JA14, DETAIL B (MER P210 E0870) (SR9634)(SR9635)	DFS 7-11-80	



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
JA-14	20			S-1367-1-6	S1367-1-10		SER (SR9634)(SR9635) ON
N-JA13	20			S-1367-1-6	S-1367-1-10		THRU SER (SR9635)
F-JA12	20			S-1367-1-6	S-1367-1-10		THRU SER (SR9634)
F-PA31	22			S1367-HO	S1367-HO		
F-PA29	4	S1562-4-9		S-2447-4	S1367-6-13		

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION
S	C292501-0106	IGNITION SWITCH
4	S-2443-1	STARTER CONTACTOR
3	S-1360-5L	CIRCUIT BREAKER

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES 1270709 P 6.1
SUPERSEDED BY

CONTRACT NO

	NAME	DATE
DESIGN	WHITSON	12-14-78
GROUP	Williamson	12-15-78
DRAWN	HAUN	12-9-78
CHECK	BORLESKE	12-12-78
STRESS		
PROJ	Walker	12-26-78
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV
5800 E PAWNEE
WICHITA, KANSAS

TITLE WIRING DIAGRAM — STARTER SYSTEM

SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

SCALE NONE | SR9221 | PAGE: 6.2

REVISION (CON'T)			
LET	DESCRIPTION	DATE	APPD
L	BY REV: ADD DETAIL "C" & SER & F-QD33 (SR8464)	REG 4-28-77	

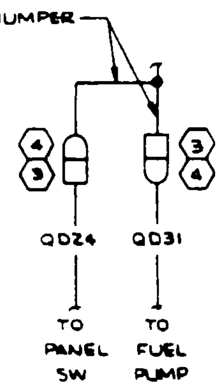
REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADDED NOTE 1	3-19-73	
B	BY REV: "F" PREFIX WAS "H", ADD F-GC21 (REF), F-GC13 (REF) & 1250706 (NOW SHOP PRACTICE)	DLO 6-20-73	
C	BY REV: S-1370-1/QD31 WAS SEE QD24, SOLDER/QD24 WAS S-1370-1 (MER E0034) (NOW SHOP PRACTICE)	DEF 2-8-74	
D	BY REV: S-1856-1 WAS 1250706-1 F-GC22 (REF) WAS F-GC13 (REF) (SR7981)	DLO 6-25-74	
E	BY REV: DELETE NOTE 1; ADD NOTE 2 & 3; ADD JUMPERS AT RESISTOR AMOR-20-10 (SR8082)	BLA 11-26-74	
F	BY REV: ADD S-1637-1 & -2 TO QD24 & QD31, ALL WIRE LENGTHS; S-1635-1/QD31 & S-1636-1/QD24 WERE SOLDER NOW SHOP PRACTICE MER E0408	TMS 2-28-75	
G	BY REV: REVISE NOTE 2 AND ADD DETAIL 'A' (SR8297)	GW 7-30-75	
H	BY REV 2LM-E WAS S-1856-1; ADD DETAIL B QD32 & SER MER 207E0436 (SR8115)(SR8426)	JMS 1-14-76	
J	BY REV 20GA WAS 18GA/F-QD23 THRU F-QD32 & JUMPER WIRES (SR8143)	GDS 5-6-76	
K	BY REV S-2035-1 WAS S-1637-1; S-2035-2 WAS S-1637-2 (NOW SHOP PRACTICE) MER E0523	PH 8-27-76	

NOTES:

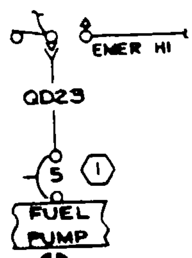
1. ~~PLACE YELLOW ROCKER SWITCH IN HIGH BOOST POSITION. ADJUST RESISTORS WITH ENGINE OFF & 27.5 VDC APPLIED TO BUS. OPEN TO FULL THROTTLE & ADJUST 1 OF RESISTOR TO PRODUCE 125 LBS/HR INDICATION ON FUEL FLOW METER. ADJUST 2ND RESISTOR WITH THROTTLE CLOSED TO PRODUCE 60 LBS/HR INDICATION ON FUEL FLOW METER. RESISTORS ARE IN SERIES WHEN THROTTLE IS CLOSED.~~

2. ADJUST AMOR-20-10 TO 3.5 ±.5 OHMS PRIOR TO INSTALLATION

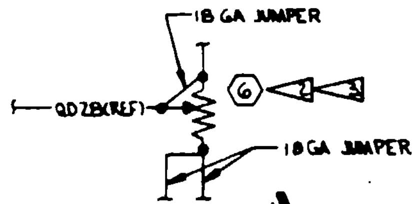
3. READJUST RESISTANCE AS REQUIRED AFTER INSTL TO COMPLY WITH FUEL FLOW REQUIREMENTS PER CES 1248



DETAIL B THRU SER (SR8426)



DETAIL C THRU SER (SR8464)



DETAIL A EFF THRU SER (SR8297)

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
F-QD33	20			S-1367-1-6	S-1493-1	SER (SR8464) & ON
F-QD32	20		60	S-1493-1	S-1635-1	SER (SR8426) & ON
F-QD31			54	S-1635-1	S-1370-1	
F-QD30			60	S-1635-1	SOLDER	
F-QD29			12	SOLDER	S-1636-1	
F-QD28			60	S-1635-1	SOLDER	
F-QD27			12	SOLDER	S-1636-1	
F-QD26			12	S-1635-1	SOLDER	
F-QD25			90	S-1493-1	S-1636-1	
F-QD24			60	S-1493-1	S-1636-1	THRU SER (SR8426)
F-QD23	20		17	S-1367-1-6	S-1493-1	THRU SER (SR8464)

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	
9	S-2035-2	HOUSING	
8	S-2035-1	HOUSING	
7	C291504-0201	PUMP	
6	AMOR20-10	RESISTOR	
5	2LM-E	SWITCH	
4	S-1637-1	HOUSING	
3	S-1637-2	HOUSING	
2	S-1846-3-2	SWITCH	
1	S-1360-5L	CKT BKR	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES P 7.1

SUPERSEDED BY

CONTRACT NO

	NAME	DATE
DESIGN	V.R.SIPES	11-10-72
GROUP	H. Wise	1-3-73
DRAWN	PAPE	12-28-72
CHECK	E.YOUNGEES	12-30-72
STRESS		
PROJ		1-3-73
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV 5800 E. PAWNEE WICHITA, KANSAS

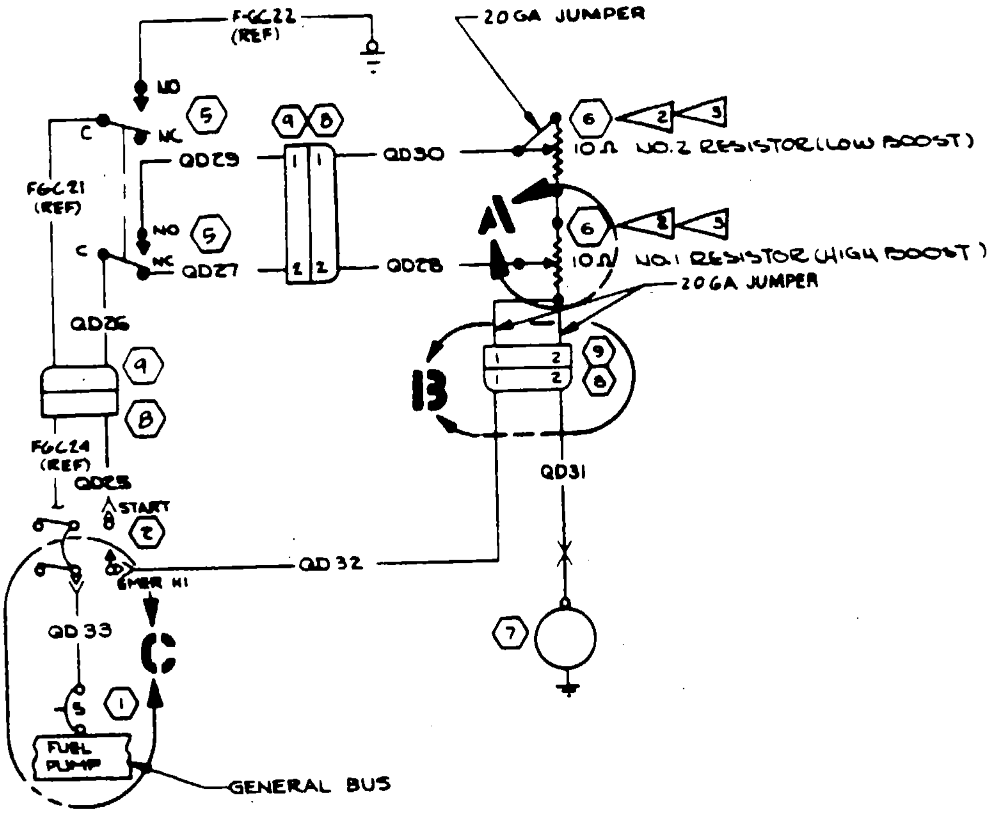
TITLE WIRING DIAGRAM — FUEL PUMP SYSTEM

SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

SCALE NONE | 210 | PAGE 7.1.1

Fuel Pump System (Sheet 1 of 2)

(SR7381) II (R/060090)

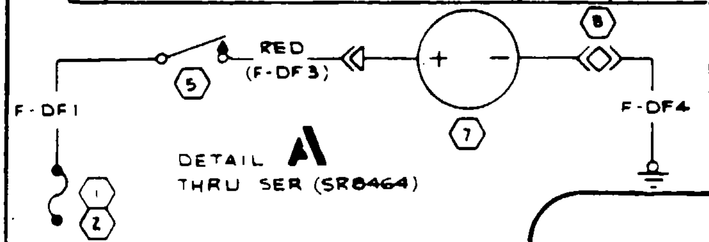


CONTRACT NO.			Cessna AIRCRAFT CO. — COMMERCIAL AIRCRAFT DIV, 5800 E. PAWNEE, WICHITA, KANSAS		
	NAME	DATE	TITLE		
DESIGN	VR SIPES	11-30-72	WIRING DIAGRAM — FUEL PUMP SYSTEM		
GROUP	H Wise	1-3-73			
DRAWN	PAPE	12-28-72			
CHECK	R. YOUNGERS	12-30-72			
STRESS			SIZE	CODE IDENT NO	DWG NO
PROJ	N McCarter	1-3-73	C	71379	1270709
APPD					
OTHER			SCALE NONE	210	PAGE 7.1.1

(5273B1) I (2106 0090)

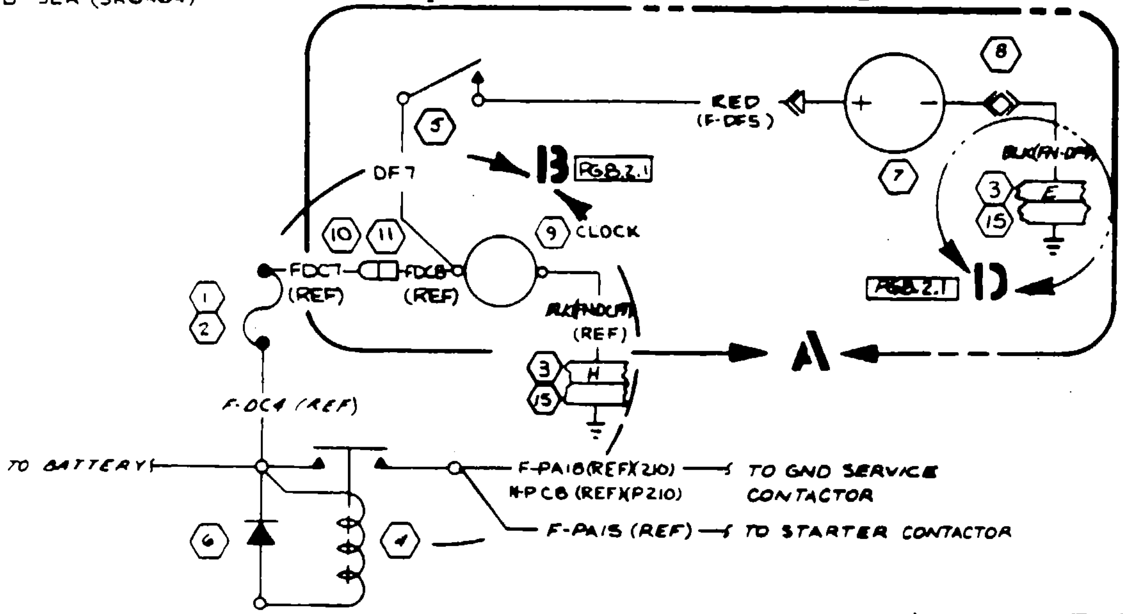
Fuel Pump System (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	DLO 5-5-75	
B	BY REV: C664502-0101 WAS C664501-0103 ADD S-2023-1 (SR 7913)(REF)	2-10-76 GDS	
C	BY REV: 22 GA WAS 20GA/F-DF1, F-DF3 F-DF4 (SR8143)	GDS 5-6-76	
D	BY REV: RED (F-DF5) WAS F-DF5 (SR8656)	PH 9-21-76	
E	BY REV: ADD RED(F-DF5), F-DF6, & DETAIL A & SER (SR8464)	GLR 4-18-77	
F	BY REV: ADD PCB(REF) (SR8465)	GDS 6-6-77	
G	BY REV ADD DF7 & SER SER OUT DF1 (SR8464)(REF)(SR8465)(REF)	DLP 12-9-77	
H	BY REV: C664503-0101 WAS C664502-0101; ADD DF8, NOTE 1, S1637-1,-2, C664511-0101, S1360-5L, DETAIL B & PG 8.2.1 (SR9080)(REF) (SR9187)	CMK 7-13-78	
J	BY REV: ADD DETAIL "C" & C664511-0102 (SR9583)	HHG 2-13-80	
K	BY REV: ADD DETAIL "D", S2527-2, S2527-1, BLK(FN-DF9), BLK(F-DC15)(REF) WAS BLK(F-DC11)(REF) BLK(F-DC15)(REF) WAS DC3(REF) (SR10101)(SR10102)	MKT 1-27-82	
L	BY REV: S1367-1-8/DF1, DF3, DF5, DF7, & DF8 WAS S1367-1-6 (NOW SHOP PRACTICE)(MER 152E0967)	GW 7-8-82	



NOTES:

1. REQD ONLY WHEN OPT DIGITAL CLOCK C664511 IS INSTALLED



EQUIPMENT TABLE

ITEM NO	PART NO	DESCRIPTION	
15	S2527-2	GND CONNECTOR	
14	C664511-0102	DIGITAL CLOCK	
13	S-1360-5L	CIRCUIT BREAKER	
12	C664511-0101	DIGITAL CLOCK	
11	S-1637-2	HOUSING	
10	S-1637-1	HOUSING	
9	C664508-0101	CLOCK	
8	S-2023-1	ADAPTOR	
7	C664503-0101	HOURMETER	
6	0770728-1	DIODE ASSY	
5	S-1711-1	OIL PRESS. SWITCH	
4	S-1580-1	BATTERY CONTACTOR	
3	S-2527-1	LH GND BLOCK	
2	S-1091-1	FUSE	
1	S-1090-22	FUSEHOLDER	

WIRE TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK(FN-DF9)	22	-22-0		S-1493-1	S2099-4		SER(SR10101)(SR10102) & ON
RED (DF8)	22	-22-2		S-1367-1-8	S-1636-2	1.	
F DF7	22			S1367-1-6	S1367-1-8		SER(SR8464)(SR8465) & ON
F-DF6	22			S1493-1	S1367-1-8	SER(SR8464)	THRU (SR10101)(SR10102)
RED (F-DF5)	22	-22-2		S1367-1-8	S1493-1		SER(SR8464) & ON
F-DF4	22		15	S-1493-1	S-1367-1-8		THRU SER (SR8464)
RED (F-DF3)	22	-22-2	30	S-1367-1-8	S-1493-1		THRU SER (SR8464)
F-DF1	22		80	SOLDER	S-1367-1-8		THRU SER (SR8464)

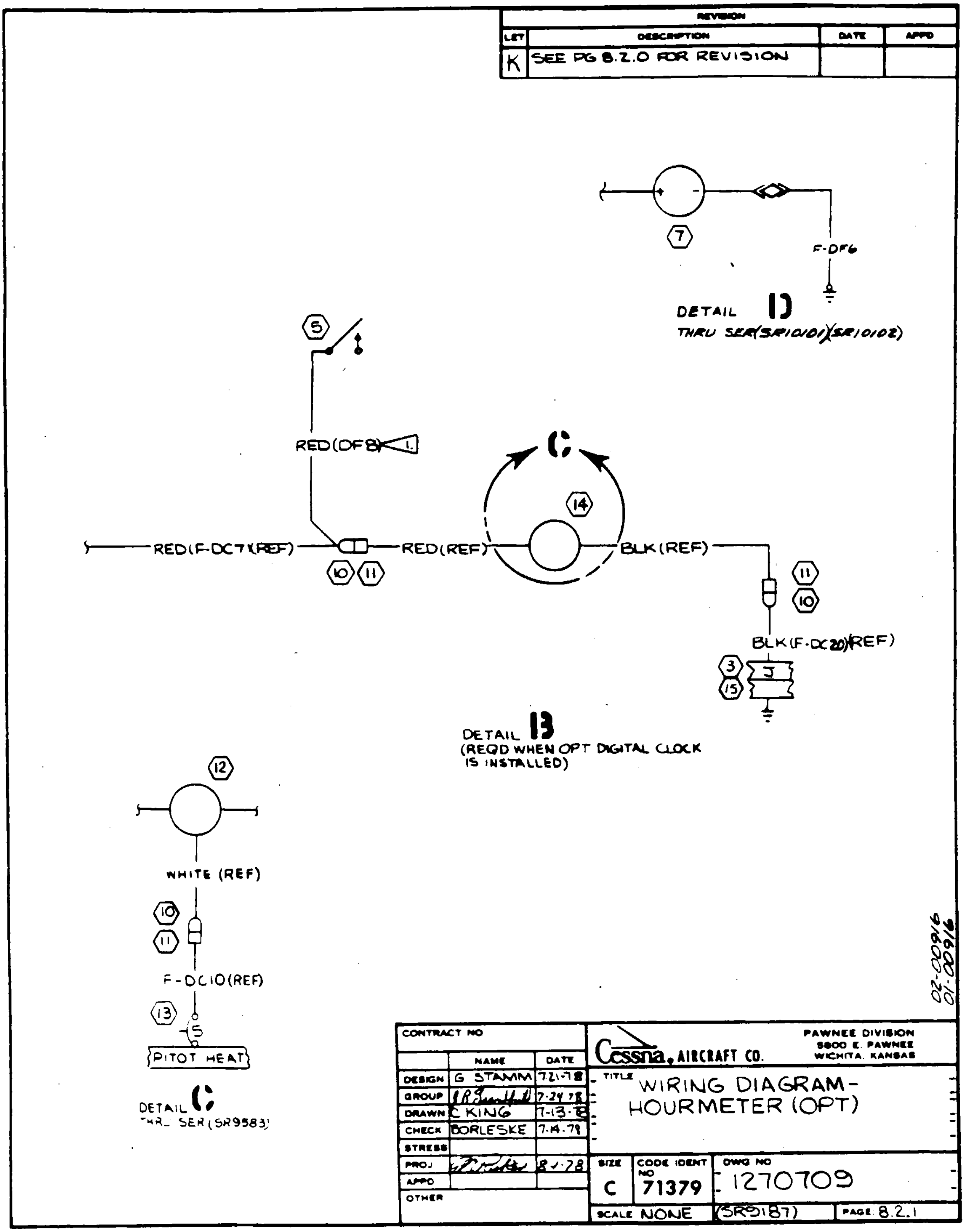
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC NO S-XXX OR CMXXXX=CESSNA STD NO	SUPERSEDES 2210-1073 SUPERSEDED BY

CONTRACT NO:		
	NAME	DATE
DESIGN	V R SIPES	1-28-71
GROUP	H. Wead	2-26-71
DRAWN	V R SIPES	2-18-71
CHECK	L.K. WHITE	2-24-71
STRESS		
PROJ	N. McCarter	2-27-71
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV
5800 E PAWNEE
WICHITA KANSAS

TITLE
WIRING DIAGRAM — HOURMETER (OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709
SCALE NONE	210 P210 (SR6755)	PAGE 8.2.0


REVISION
LET
DESCRIPTION
DATE
APPD
K
SEE PG 8.2.0 FOR REVISION
7
F-DF6
DETAIL D
THRU SER(SR10101)(SR10102)
5
RED(DF8)
1.
C
14
RED(F-DC7)(REF)
RED(REF)
BLK(REF)
10
11
BLK(F-DC20)(REF)
3
15
J
DETAIL B
(REQD WHEN OPT DIGITAL CLOCK IS INSTALLED)
12
WHITE (REF)
F-DC10(REF)
13
5
PITOT HEAT
DETAIL C
THRU SER(SR9583)
02-00916
01-00916
CONTRACT NO
NAME
DATE
DESIGN
G STAMM
7-21-78
GROUP
7-24-78
DRAWN
C KING
7-13-78
CHECK
BORLESKE
7-14-78
STRESS
PROJ
8-1-78
APPD
OTHER
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS
TITLE
WIRING DIAGRAM-
HOURMETER (OPT)
SIZE
C
CODE IDENT NO
71379
DWG NO
1270709
SCALE NONE
(SR9187)
PAGE 8.2.1

NOTES:

1. COVER S-1493-1 TERMINAL WITH S-1694 6-1-0 HEAT SHRINK TUBING. TERMINAL DESIGNATIONS (SR. SL. I) TO BE STAMPED ON TUBING WITH WHITE INK.

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV. ADD S-2349 (-1 & -2), S-2350 (-1 & -2), WIRES EB 22, EB 23, YEL (EB 24 & YEL (EB 25) (SR8465)	GDS 6-6-77	JAB
B	BY REV: S-2099-7 WAS 66331-5/YEL (EB24, EB25); S-2353-2 WAS 66332-5/EB22 & EB23 (SR8464)(SR8465)	JJB 8-29-77	JAB
C	BY REV: ADD BLACK (EB26). S-2376-1 WAS S-1493-1 (SR8464)(REF)(SR8465)(REF)	CRS DLP 11-30-77	JAB
D	BY REV: ADD DETAIL A & SER, EB27, EB28, 205841-1, & 205838-1 (SR9427)	CS 4-10-78	JAB
E	BY REV: ADD EB29 & EB30 (NOW SHOP PRACT)	TFS 8-16-78	JAB
F	BY REV: (SR9427) WAS (SR8862)/REV D; DETAIL "A", EB22, EB24, EB28 & EB27 (SR9427)	GDA 10-9-78	
G	BY REV: PG 8.3 WAS PG 8.4 (NOW SHOP PRACTICE) BY REV ADD PG 8.5: (EB31, EB32, EB33, EB34 & EB35, NOTE 1, & DETAILS B & C & SER (SR9742)	WAG 1-19-80	

INACTIVE
EFF THRU SER (SR10148)
GW 3581

WIRE TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
EB 35	20			S-1367-1-6	S-1493-1	1	SER (SR9742) & ON
EB 34	20			S-1493-1	S-1636-1	1	
EB 33	20			S-1493-1	S-1636-1	1	
EB 32	20			S-1493-1	S-2415-1	1	
EB 31	20			S-1493-1	S-2353-2	1	SER (SR9742) & ON
BLK (EB 30)	22			S-1367-1-8	S-1367-1-10		
BLK (EB 29)	22			S-1367-1-8	S-1367-1-10		
YEL (EB 27)	20	-22-4		S-1367-1-10	S-2391-1		SER (SR9427) & ON
EB28	20			S-1367-1-10	S-2415-1	SER (SR	9427) THRU SER (SR9742)
BLK (EB 26)	22	-22-0		S-1367-1-8	S-1367-1-6		
YEL (EB 25)	20	-20-4		S-2099-7	S-1367-1-10		
YEL (EB 24)	20	-20-4		S-2099-7	S-1367-1-10		THRU SER (SR9427)
EB 23	20			S-2376-1	S-2353-2		THRU SER (SR9742)
EB 22	20			S-2376-1	S-2353-2		THRU SER (SR9427)
YEL (EB21)	20	-20-4		S-1635-1	S-1367-1-10		
YEL (EB20)	20	-20-4		S-1635-1	S-1367-1-10		
EB19	20			S-2376-1	S-1636-1		THRU SER (SR9742)
EB18	20			S-2376-1	S-1636-1		THRU SER (SR9742)
EB17	22			S-1367-1-6	S-2376-1		THRU SER (SR9742)

EQUIPMENT TABLE

ITEM NO	PART NO.	DESCRIPTION	
3	205841-1	CONNECTOR	
2	205838-1	CONNECTOR	
1	S-2349-2	HOUSING	
10	S-2350-2	HOUSING	
9	S-2349-1	CONNECTOR	
8	S-2350-1	CONNECTOR	
7	1905124	CONNECTOR	
6	C668002-0102	XMTR	
5	C668002-0101	XMTR	
4	S-1641-6	HOUSING	
3	S-1640-6	HOUSING	
2	C669525-0101	INST CLUSTER	
1	S-1360-5L	CIRCUIT BREAKER	

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: PG 8.3

SUPERSEDED BY: PG 8.8.0 & 8.8.1

CONTRACT NO.:

	NAME	DATE
DESIGN	WHITSON	4-22-77
GROUP		4-21-77
DRAWN	G.L. RYAN	4-21-77
CHECK	J. YOUR	4-22-77
STRESS		
PROJ	PLHEDRICK	4-21-77
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

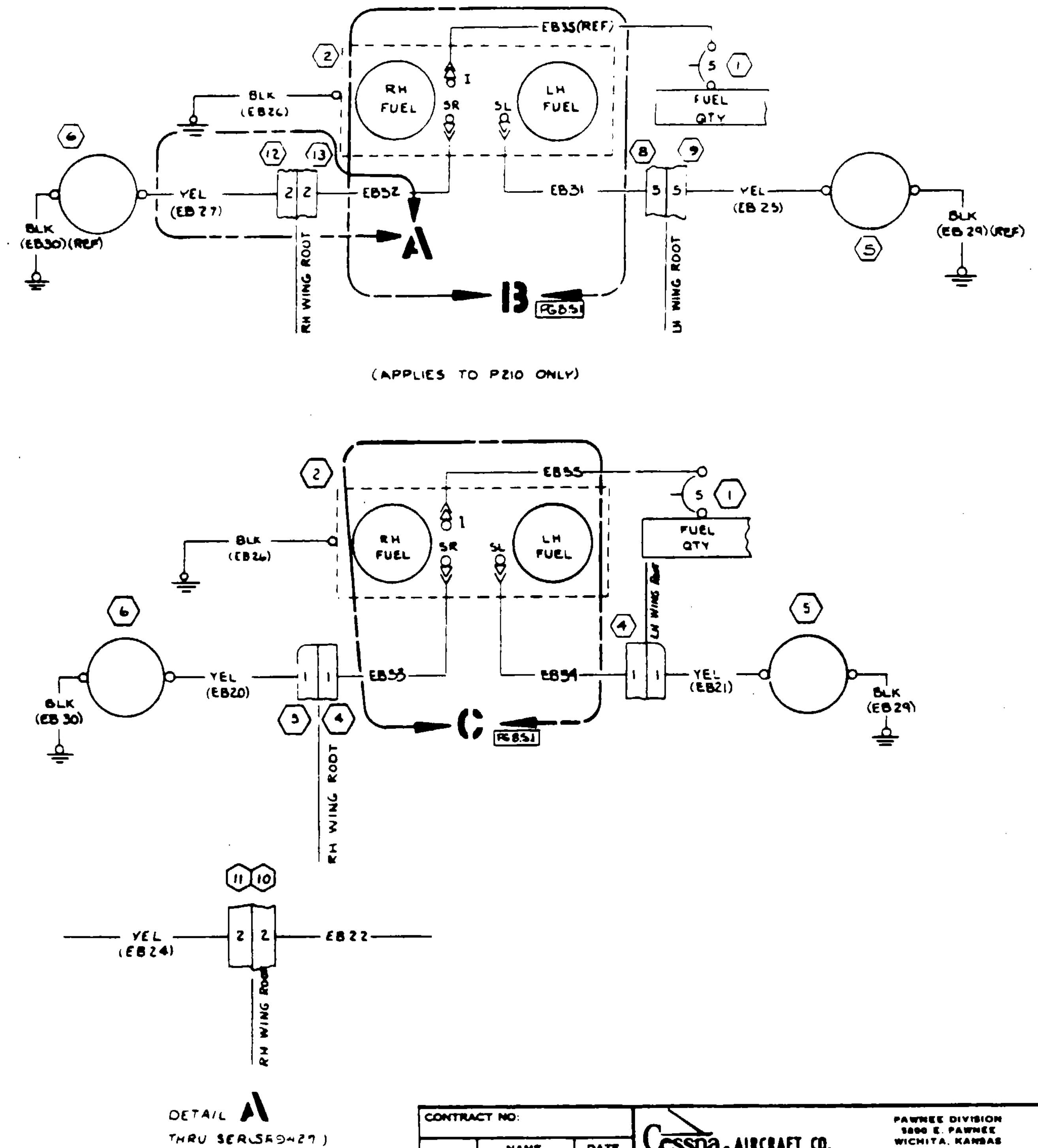
TITLE: WIRING DIAGRAM — FUEL GAUGES

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE: NONE — 2-0 P210 — PAGE: 8.5.0

(SR 8464)

Fuel Gauges (Sheet 1 of 2)



CONTRACT NO:		
	NAME	DATE
DESIGN	WHITSON	4-22-77
GROUP	D.L. Harder	4-24-77
DRAWN	G.L. RYAN	4-21-77
CHECK	J. Youel	4-22-77
STRESS		
PROJ	P.L. HEDRICK	4-26-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

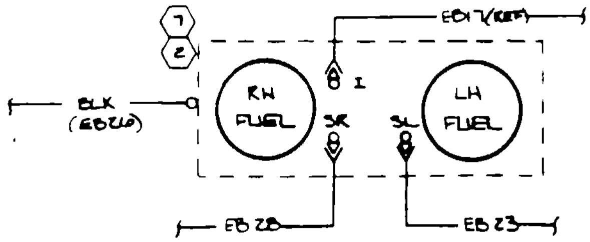
TITLE WIRING DIAGRAM — FUEL GAUGES

SIZE	CODE IDENT. NO	DWG NO
C	71379	1270709
SCALE: NONE	210 P210	PAGE: 8.5.C

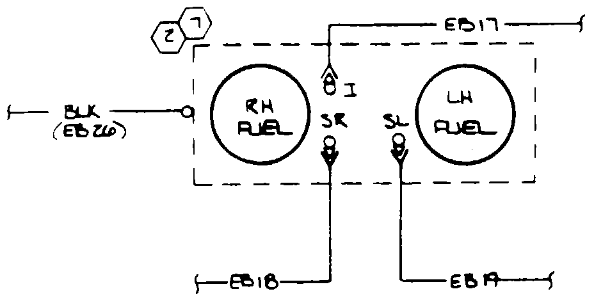
(S50464)

Fuel Gauges (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
G	SEE PAGE 8.5.0 FOR REVISIONS		



DETAIL B PG 8.5
THRU SER(SR 9742)



DETAIL C PG 8.5
THRU SER(SR 9742)

INACTIVE
EFF THRU SER(10148)
GW 3-5-81
JAB WHW

CONTRACT NO		
	NAME	DATE
DESIGN		
GROUP	W.H. Hunden	3-1-80
DRAWN	WE GOINGS	1-23-80
CHECK	MD RANDALL	1-25-80
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — FUEL GAUGES

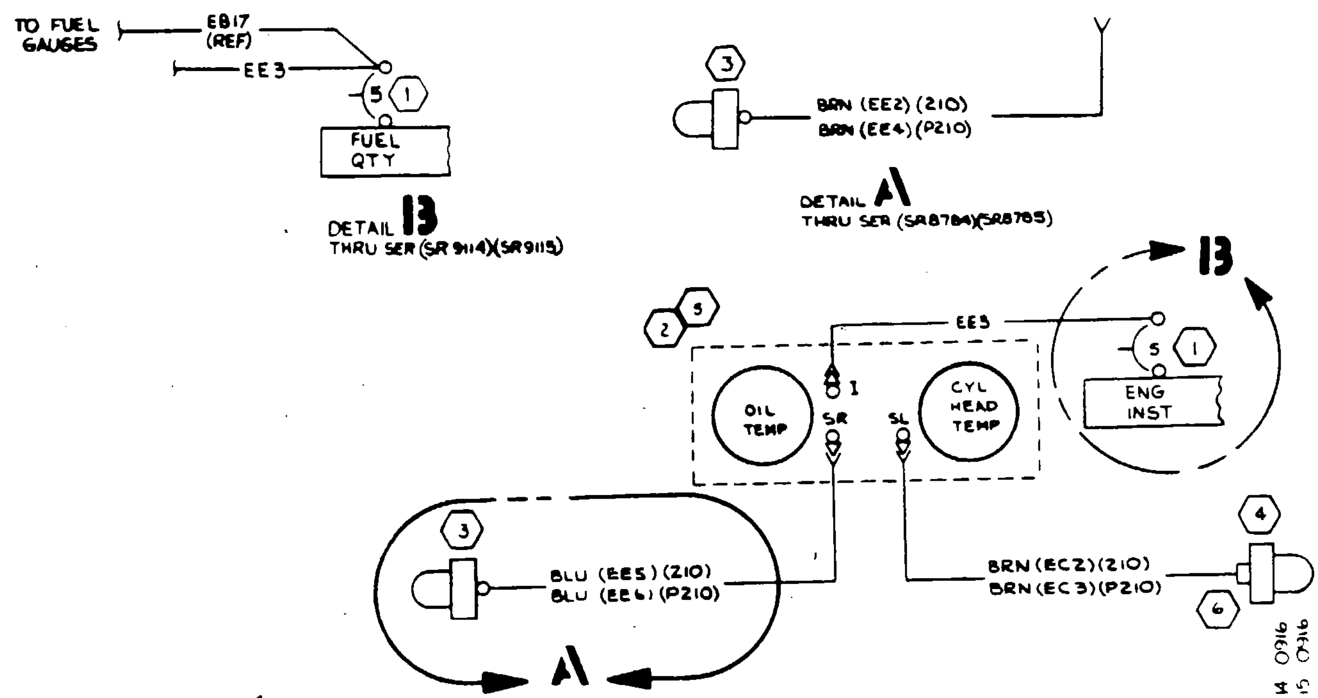
SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE 210/P210 PAGE 8.5.1

NOTES:

1. MATERIAL IS ALPHA 5857-7 OR BELDEN 83009-1
2. CRIMP S-1636-5 TERMINAL AROUND WIRE INSULATION. BEND .25 OF STRIPPED WIRE BACK OVER CRIMP & SOLDER PER CES1040. USE MOLEX HT-1921 CRIMPING TOOL ONLY
3. MATERIAL IS ALPHA 5857-4 (VENDOR CODE 92194) OR BELDEN 83009-6 (VENDOR CODE 70903)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV ADD EC3 & EE4/P210 (SR8465)	DLP 6-6-77	JAB
B	BY REV S-2376-1 WAS S-1493-1 (SR8464)(REF) (SR8465) (REF)	DLP 12-9-77	JAB
C	BY REV: ADD DETAIL A, SER, EE5, EE6, & NOTE 3 (SR8785)(SR8784)	MLS 8-10-78	JAB
D	BY REV: ADD DETAIL 'B' & SER (SR9114)(SR9115)	HHG 2-12-79	JAB
E	BY REV PG 8.1 WAS PG 8.4 NOW SHOP PRACTICE	SEB 7-29-80	JAB



INACTIVE
EFF THRU (SR9711)
SEB 11-7-79

BLU (EE5)	18	3		S-2376-1	S-1367-1-10		SER (SR8784) - ON
BLU (EE6)	18	3		S-2376-1	S-1367-1-10		SER (SR8785) - ON
BRN (EC3)	18	1		S-2376-1	S-1636-5	2	
BRN (EE4)	18	1		S-2376-1	S-1367-1-10		THRU SER (SR8785)
EE3	22			S-1367-1-6	S-2376-1		
BRN (EC2)	18	1		S-2376-1	S-1636-5	2	
BRN (EE2)	18	1		S-2376-1	S-1367-1-10		THRU SER (SR8784)
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
6	S-1637-4	HOUSING
5	2965164	CONNECTOR
4	S-1372-4	XMTR
3	S-1630-5	XMTR
2	C669526-0101	INST CLUSTER
1	S-1360-5L	CIRCUIT BREAKER

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: PG 8.1

SUPERSEDED BY: PG 8.7

CONTRACT NO.

	NAME	DATE
DESIGN	WHITSON	4-22-77
GROUP	W. Harder	4-21-77
DRAWN	G. L. RYAN	4-21-77
CHECK	J. Young	4-22-77
STRESS		
PROJ	PL HENDRICKS	4-26-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — OIL TEMP & CYL HEAD TEMP

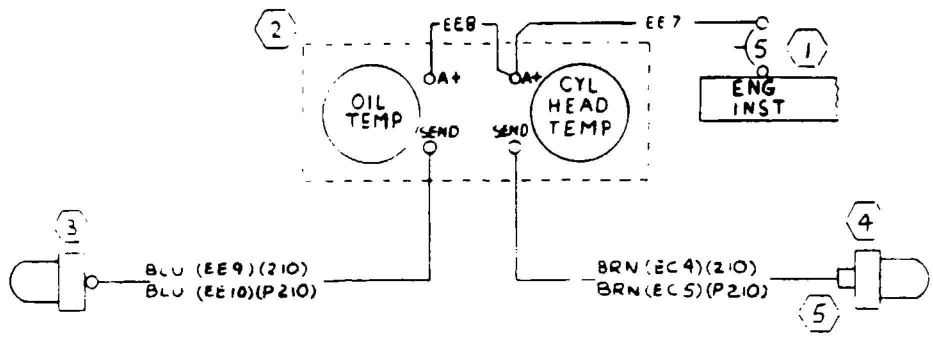
SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE: NONE | 210 P210 (SR8464) | PAGE: 8.6

REVISION			
LET	DESCRIPTION	DATE	APPD

NOTES

1. MATERIAL IS ALPHA 5857-7 OR BELDEN 85009-1
2. CRIMP S-1636-5 TERMINAL AROUND WIRE INSULATION BEND 25 OF STRIPPED WIRE BACK OVER CRIMP & SOLDER PER CES1040. USE MOLEX HT-1921 CRIMPING TOOL ONLY
3. MATERIAL IS ALPHA 5857-6 (VENDOR CODE 92194) OR BELDEN 83009-6 (VENDOR CODE 70903)



INACTIVE

BLU(EE9)	18	3		S-1367-1-10	S-1367-1-10		
BLU(EE10)	18	3		S-1367-1-10	S-1367-1-10		
EE8	22			S-1367-1-10	S-1367-1-10		
EE7	22			S-1367-1-6	S-1367-1-10		
BRN(EC5)	18	1		S-1367-1-10	S-1636-5	2	
BRN(EC4)	18	1		S-1367-1-10	S-1636-5	2	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
5	S-1637-4	HOUSING	
4	S-2334-4	XMTR	
3	S-2335-1	XMTR	
2	[illegible]-5614-0102	INST CLUSTER	
1	S-360-5L	CIRCUIT BREAKER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: PG 8.6

SUPERSEDED BY: PG 8.10

CONTRACT NO:

	NAME	DATE
DESIGN	J.H. TJADEN	11-8-79
GROUP	[illegible]	12-13-79
DRAWN	J.H. TJADEN	11-8-79
CHECK	BORLESKE	12-8-79
STRESS		
PROJ	[illegible]	[illegible]
APPD	[illegible]	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

TITLE: WIRING DIAGRAM — OIL TEMP & CYL HEAD TEMP

SIZE	CODE IDENT NO.	DWG NO
C	71379	1270709

SCALE NONE | 2.0 P210 | PAGE: 8.7

(SR9711)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV ADD DETAIL "A", BLK (EB42) ADD S2527-1/-2 (SR10101)(SR10102)	MKT 1-27-82	JAB

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK(EB42)	20	-20-0		S1367-1-6	S2099-4		SER(SR10101)(SR10102) ON
EB41	20			S1367-1-10	S1367-1-10		
EB40	20			S1367-1-10	S1636-1		
EB39	20			S1367-1-10	S1636-1		
EB38	20			S1367-1-10	S2415-1		
EB37	20			S1367-1-10	S2353-2		
EB36	20			S1367-1-6	S1367-1-10		
BLK(EB30)	22	-22-0		S1367-1-8	S1367-1-10		
BLK(EB29)	22	-22-0		S1367-1-8	S1367-1-10		
YEL(EB27)	20	-20-4		S2341-1	S1367-1-10		
BLK(EB26)	22	-22-0		S1367-1-8	S1367-1-8		THRU SER (SR10101)(SR10102)
YEL(EB25)	20	-20-4		S2099-7	S1367-1-10		
YEL(EB21)	20	-20-4		S1635-1	S1367-1-10		
YEL(EB20)	20	-20-4		S1635-1	S1367-1-10		

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	
12	S2527-2	GND CONNECTOR	
11	S2527-1	LH GND BLOCK	
10	S2349-1	CONNECTOR	
9	S2350-1	CONNECTOR	
8	205841-1	CONNECTOR	
7	205838-1	CONNECTOR	
6	C668050-0602	RH SENDING UNIT	
5	C668050-0601	LH SENDING UNIT	
4	S1641-6	CONNECTOR	
3	S1640-6	CONNECTOR	
2	C669562	INST CLUSTER	
	S1360-5L	CIRCUIT BREAKER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 270709 PGS 8.50 & 8.5.1

SUPERSEDED BY:

CONTRACT NO:

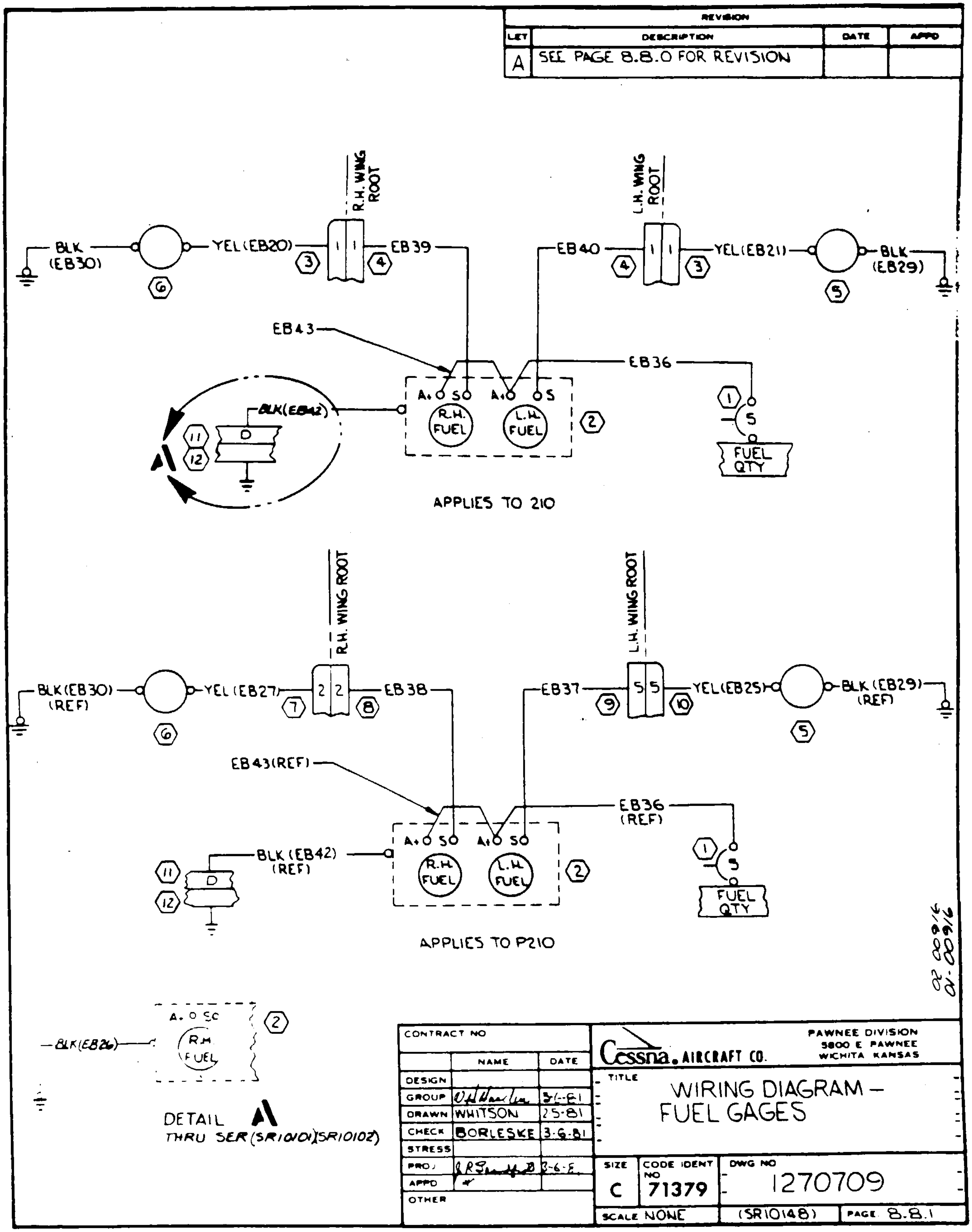
	NAME	DATE
DESIGN		
GROUP	[illegible]	3-6-81
DRAWN	WHITSON	2-5-81
CHECK	BORLESKE	3-6-81
STRESS		
PROJ	[illegible]	3-6-81
APPD	[illegible]	
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — FUEL GAGES

SIZE: C
CODE IDENT NO: 71379
DWG NO: 1270709

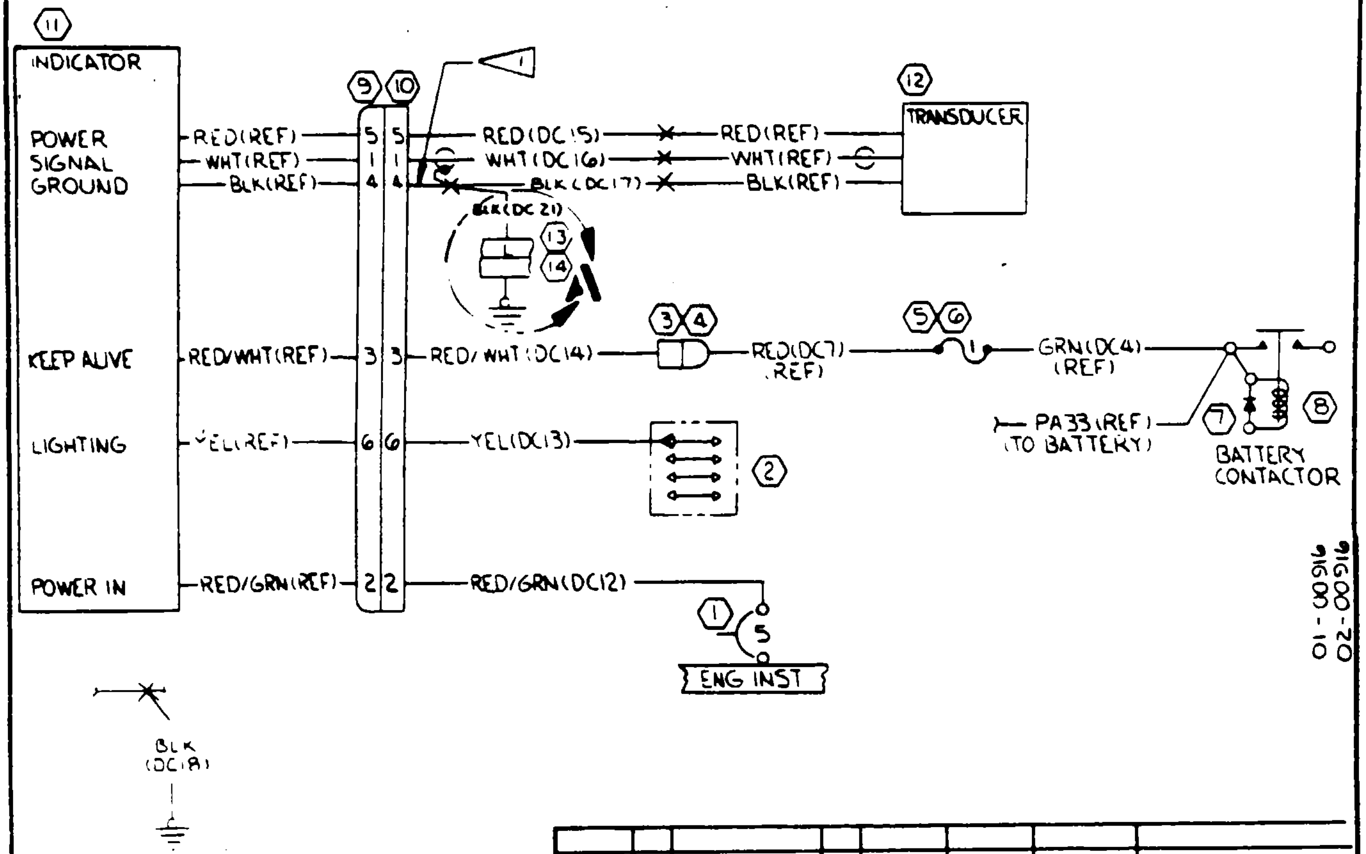
SCALE: NONE (SR10148) PAGE: 8.8.0


REVISION
LET
DESCRIPTION
DATE
APPD
A
SEE PAGE 8.8.0 FOR REVISION
R.H. WING ROOT
L.H. WING ROOT
BLK (EB30)
YEL (EB20)
EB39
EB40
YEL (EB21)
BLK (EB29)
EB43
EB36
BLK (EB42)
A+ S
R.H. FUEL
L.H. FUEL
FUEL QTY
D
APPLIES TO 210
BLK (EB30) (REF)
YEL (EB27)
EB38
EB37
YEL (EB25)
BLK (EB29) (REF)
EB43 (REF)
EB36 (REF)
BLK (EB42) (REF)
APPLIES TO P210
BLK (EB26)
DETAIL A
THRU SER (SR10101)(SR10102)
CONTRACT NO
NAME
DATE
DESIGN
GROUP
DRAWN WHITSON 2-5-81
CHECK BORLESKE 3-6-81
STRESS
PROJ
APPD
OTHER
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS
TITLE
WIRING DIAGRAM – FUEL GAGES
SIZE C
CODE IDENT NO 71379
DWG NO 1270709
SCALE NONE
(SR10148)
PAGE 8.8.1

NOTES:

1\. TERMINATE 22 GA JUMPER WITH S-1636-1

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD JUMPER WIRE & NOTE 1; S-1370-1 WAS S-1636-1 / BLK (DC17) (SR9953)(REF)(SR9954)(REF)(MER210E0977) ADD S-2527-1 & S-2527-2; SER IN BLK (DC21) SER OUT BLK (DC18) (SR10101)(SR10102)	GLS 1-27-82	



DETAIL A
THRU SER (SR10101)(SR10102)

91600-10
91600-20

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK (DC21)	22	-22-0		SEE BLK(17)	S2099-4		SER(SR10101)(SR10102) & ON
BLK (DC18)	22	-22-0		SEE BLK(17)	S1367-1-8		THRU SER(SR10101)(SR10102)
BLK (DC17)	22	-22-0		S1370-1	S1370-1		
WHT (DC16)	22S	S1461-22-9		S1636-1	S1370-1		
RED (DC15)	22	22-2		S1636-1	S1370-1		
RED/WHT (DC14)	22	-22-2-9		S1636-1	S1636-1		
YEL (DC13)	22	-22-4		S1636-1	S1829-1		
RED/GRN (DC12)	22	-22-2-5		S1367-1-6	S1636-1		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
14	S-2527-2	GND CONNECTOR
13	S-2527-1	LH GND BLOCK
12	C913001	FLOW TRANSDUCER
11	C662060	INDICATOR
10	S1641-6	HOUSING
9	S1640-6	HOUSING
8	S2475-1	BATT. CONTACTOR
7	0770728	DIODE ASSY
6	S1090-22	FUSE HOLDER
5	S1091-1	FUSE
4	S1637-1	HOUSING
3	S1637-2	HOUSING
2	34004-818	TERMINAL BLOCK
	S1360-5L	CIRCUIT BREAKER

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES.

SUPERSEDED BY.

CONTRACT NO:

	NAME	DATE
DESIGN		
GROUP	[illegible]	4-30-81
DRAWN	WHITSON	4-28-81
CHECK	ZEHAIR	4-28-81
STRESS		
PROJ	[illegible]	
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — FUEL TOTALIZER/CLOCK (OPT)

SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

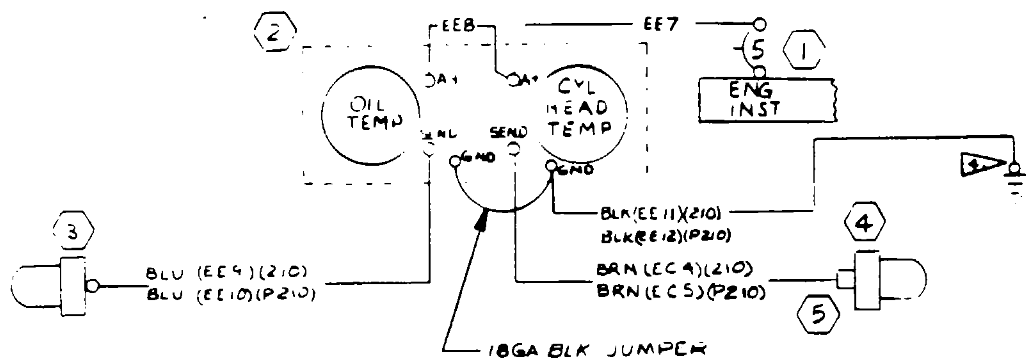
SCALE: NONE (SR9953)(SR9954) PAGE: 8.9

N/A 2101057

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD NOTE 6; BRN (EC6) WAS BRN (EC5) (SR9954)(REF)	GLS 11-12-81	
B	BY REV: DELETE NOTE 6; BRN (EC5) WAS BRN (EC6) (SR9954)(REF)	GLS 1-18-82	

NOTES:

1. MATERIAL IS ALPHA 5857-7 OR BELDEN 83009-1
2. CRIMP S-1636-5 TERMINAL AROUND WIRE INSULATION. BEND 25 OF STRIPPED WIRE BACK OVER CRIMP & SOLDER PER CES1040. USE MOLEX HT-1921 CRIMPING TOOL ONLY
3. MATERIAL IS ALPHA 5857-6 (VENDOR CODE 92194) OR BELDEN 83009-6 (VENDOR CODE 70903)
4. GROUND AT ENGINE ACCESSORY COVER
5. MATERIAL IS ALPHA 5857-2 (VENDOR CODE 92194) OR BELDEN 83009-10 (VENDOR CODE 70903)



5900916
5300916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK(EE12)	18	5		S-1367-1-8	S-1367-1-12		
BLK(EE11)	18	5		S-1367-1-8	S-1367-1-12		
BLU(EE9)	18	3		S-1367-1-10	S-1367-1-10		
BLU(EE10)	18	3		S-1367-1-10	S-1367-1-10		
EE8	22			S-1367-1-10	S-1367-1-10		
EE7	22			S-1367-1-6	S-1367-1-10		
BRN(EC5)	18	1		S-1367-1-10	S-1636-5	2	
BRN(EC4)	18	1		S-1367-1-10	S-1636-5	2	

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
5	S-1637-4	HOUSING
4	S-2334-4	XMTR
3	S-2335-1	XMTR
2	C669561-0102	INST CLUSTER
1	S-1360-5L	CIRCUIT BREAKER

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC NO S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES: PG 7

SUPERSEDED BY

CONTRACT NO.

	NAME	DATE
DESIGN		
GROUP	[illegible]	8-81
DRAWN	M THOMPSON	9-2-81
CHECK	[illegible]	9-4-81
STRESS		
PROJ		9-9-81
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

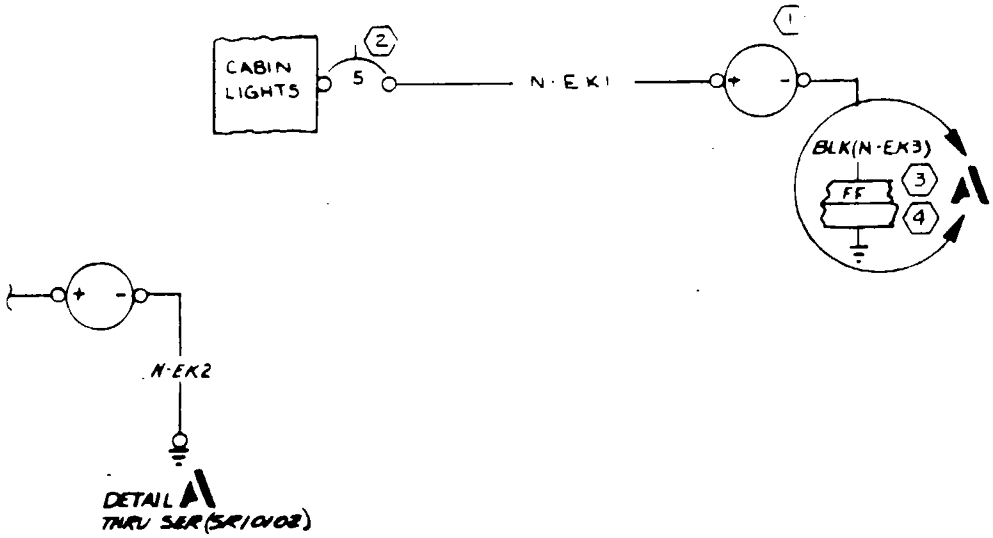
TITLE: WIRING DIAGRAM — OIL TEMP & CYL HEAD TEMP

SIZE: C | CODE IDENT NO: 71379 | DWG NO: 1270703

SCALE: NONE | 210 P210 | PAGE: 8 10

(SR9953)(SR9954)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL "A", BLK(N-EK5), S2527-2 ¢ -1; SER OUT N-EK2 (SR10102)	MKT 1-27-82	
B	BY REV. BLK(N-EK3) WAS BLK(N-EK5) (SR10102)	GLS 6-29-82	



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK(N-EK3)	22	-22-0		S-1367-1-8	S-2099-4		SER(SR10102) & ON
N-EK2	22			S-1367-1-8	S-1367-1-8		THRU SER(SR10102)
N-EK1	22			S-1367-1-6	S-1367-1-8		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
4	S2527-2	GND CONNECTOR	
3	S2527-1	LH GND BLOCK	
2	S-1360-5L	CIRCUIT BREAKER	
1	C668501	T.I.T. GAGE	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES:

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN		
GROUP		10-3-81
DRAWN	G. STAMM	10-9-81
CHECK	BORLESKE	10-9-81
STRESS		
PROJ		10-12-81
APPD		
OTHER		

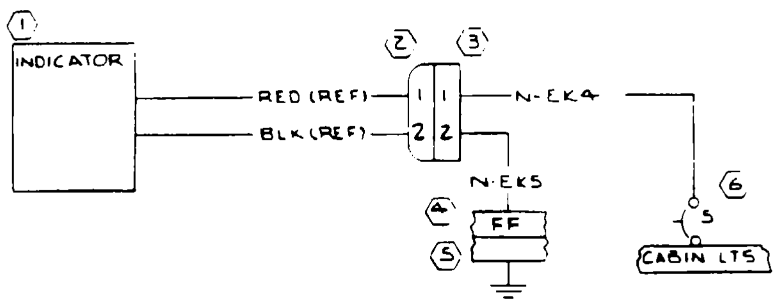
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA KANSAS

TITLE WIRING DIAGRAM — TURBINE INLET TEMP GAGE

SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

SCALE NONE | (SR9954) (REF) | PAGE: 8.11

REVISION			
LET	DESCRIPTION	DATE	APPD



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
N-EK5	22	-22-9		S-1636-1	S-2099-4		
BLK(REF)				X	S-1635-1		
RED(REF)				S-1635-1	X		
N-EK4	22	-22-9		S-1367-6	S-1636-1		

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	
6	S-360-5L	CIRCUIT BREAKER	
5	S-2527-2	GND CONNECTOR	
4	S-2527-1	LH GND BLOCK	
3	S-2035-2	CONNECTOR	
2	S-2035-1	CONNECTOR	
1	[illegible]68501	INDICATOR-EGT/[illegible]	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES

SUPERSEDED BY

CONTRACT NO.

	NAME	DATE
DESIGN		
GROUP	[illegible]	4-20-82
DRAWN	G STAMM	4-20-82
CHECK	E YOUNGERS	4-20-82
STRESS		
PROJ	[illegible]	[illegible]
APPD	[illegible]	
OTHER		

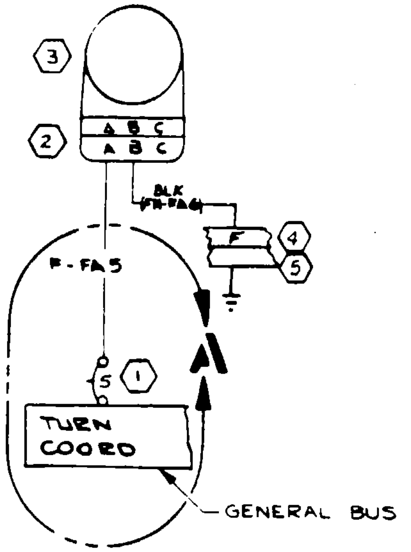
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

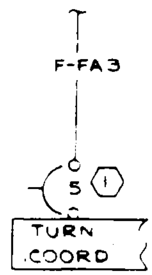
TITLE
WIRING DIAGRAM —
INDICATOR-EGT & TURBINE
INLET TEMP (OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	12707[illegible]

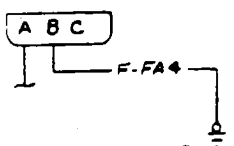
SCALE NONE (SR10102) PAGE: 8.12

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	5-3-73	
B	BY REV: 22 GA WAS 20/ FA3, FA4 (SR 8143)	GDS 5-6-76	
C	BY REV: ADD DETAIL A & SER & FA5 (SR 8464)	REG 4-28-77	
D	BY REV ADD DETAIL "B" S2527-1&-2 BLK(FN-FA6) SER CUT FA4 (SR10101)(SR10102)	MKT 1-27-82	





DETAIL A
THRU SER (SR 8464)



DETAIL B
THRU SER (SR10101)(SR10102)

02-00916
01-00916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
BLK(FN-FA6)	22	-22-0		SOLDER	S2099-4	SER (SR10101)(SR10102) & ON
FA5	22			S1367-1-8	SOLDER	SER (SR8464) & ON
FA4	22		20	SOLDER	S1367-1-8	THRU SER (SR10101)(SR10102)
FA3	22		16	S1367-1-8	SOLDER	THRU SER (SR 8464)

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION
5	S2527-2	GND CONNECTOR
4	S2527-1	GND BLOCK
3	C661003-0509	TURN COORDINATOR
2	MS3106A10SL3S	CONNECTOR
1	S-1360-5L	CIRCUIT BREAKER

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES 1210-1073
SUPERSEDED BY

CONTRACT NO

	NAME	DATE
DESIGN	V R SIPES	2-18-71
GROUP	H Ward	2-25-71
DRAWN	V R SIPES	2-18-71
CHECK	L K WHITE	2-24-71
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV 5800 E PAWNEE WICHITA KANSAS

TITLE WIRING DIAGRAM — TURN COORDINATOR

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

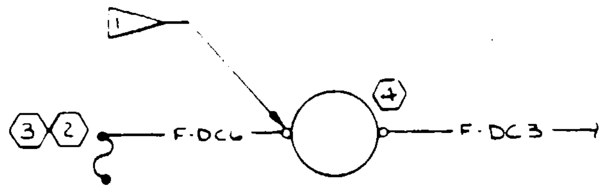
SCALE NONE | 210 | PAGE 9.2

(SR6755) IX (21059503)

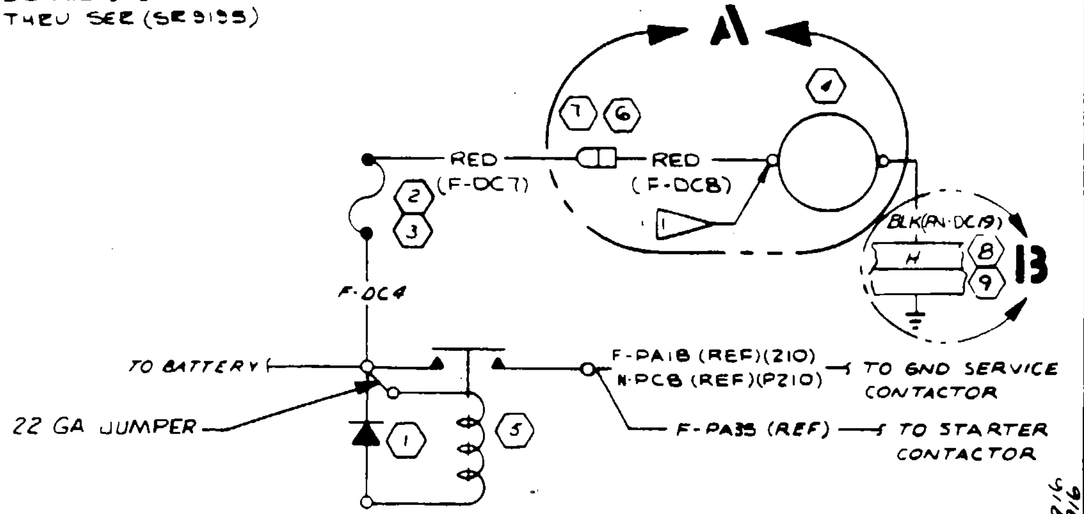
NOTES:

1. CAUTION: POWER WIRE MUST BE CONNECTED TO "BAT" TERMINAL OF CLOCK OTHERWISE INTERNAL DAMAGE TO UNIT WILL RESULT

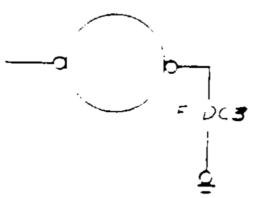
REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	JLO 5-3-73	
B	BY REV: 22 GA WAS 20/ F-DC3, F-DC4, F-DC5 (SR8143)	GDS 5-6-76	
C	BY REV ADD P210 (SR8465)	DLP 6-6-77	JAB
D	BY REV: ADD NOTE 1, RED(F-DC7), RED F-DC8, S-1637-1,-2 & DETAIL A; SER OUT F-DC6; C664508-0101-0102 WAS C664508-0101 (SR9195)	BGK CMK 7-13-78	JAB
E	BY REV: ADD DETAIL "B" BLK(FN-DC19), S2527(-1,-2); SER OUT F-DC3, F-PA35(REF) WAS F-PA15(REF), S-2475-1 WAS S-1580-1, (NOW SHOP PRACT)(SR10101)(SR10102)	MKT 1-27-82	



DETAIL A
THRU SER (SR9195)



02 0016
01-0016



DETAIL B
THRU SER SR10101(SR10102)

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
BLK (FN-DC19)	22	-22-0		S-1367-16	S2099-4	SER (SR10101)(SR10102) & ON
GRN F-DC8	22	-22-2		S-1636-1	S-1367-1-16	SER (SR9195) & ON
RED F-DC7	22	-22-2		SOLDER	S-1635-1	SER (SR9195) & ON
F-DC6	22		64	SOLDER	S-1367-16	THRU SER (SR9195)
BRN F-DC4	22	-22-5	6	SOLDER	S-1367-4-3	
F-DC3	22		8	S-1367-1-6	S-1367-1-8	THRU SER (SR10101)(SR10102)

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	
9	S-2527-2	GND CONNECTOR	
8	S-2527-1	LH GND BLOCK	
7	S-1637-1	HOUSING	
6	S-1637-2	HOUSING	
5	S-2475-1	BATTERY CONTACTOR	
4	C664508-0102	CLOCK	
3	S-1094-1	FUSE	
2	S-1090-22	FUSEHOLDER	
1	2770728	DIODE ASSY	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES 2210 1073

SUPERSEDED BY

CONTRACT NO

	NAME	DATE
DESIGN	VR SIPES	1-28-71
GROUP	H Wiel	2-26-71
DRAWN	VR SIPES	2-18-71
CHECK		
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV
5800 E PAWNEE
WICHITA KANSAS

TITLE
WIRING DIAGRAM — CLOCK

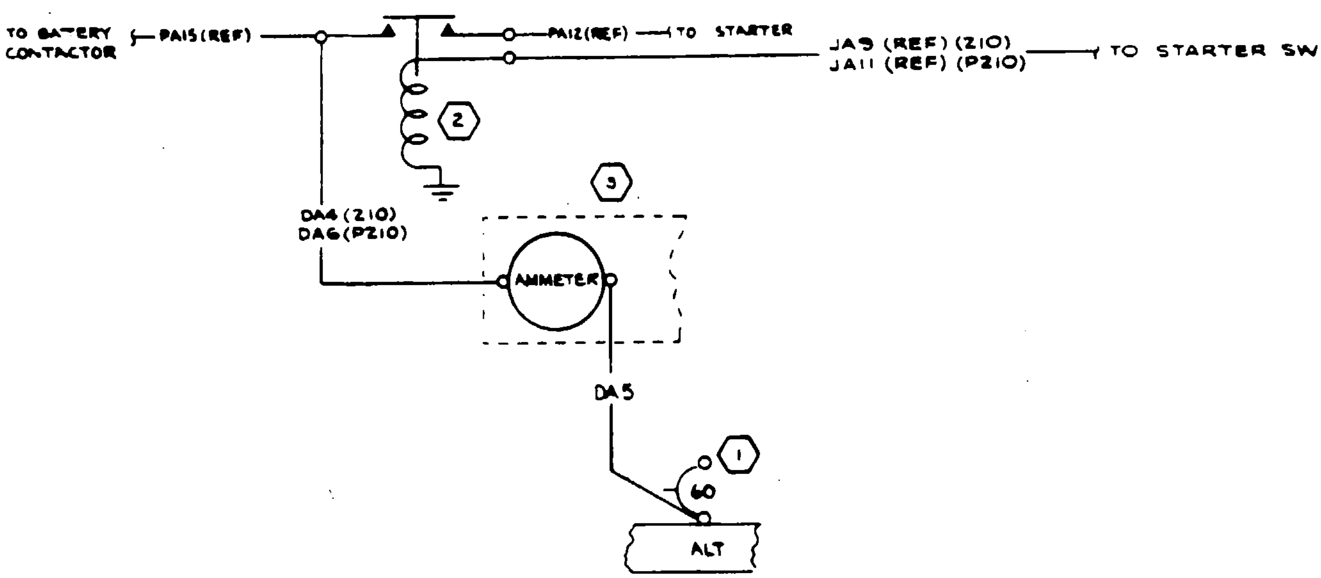
SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE | 210 P210 | PAGE 10.1

(SR6755) D

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV · ADD DA6 / P210 (SR8465)	DLP 6-6-77	JAB

INACTIVE
THRU SER (SR 9221)
DDH - 12-9-78



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
DA6	8	S-1562-8-9		S-1367-4-10	S-1367-4-13		
DA5	8	S-1562-8-9		S-1367-4-10	S-1367-4-10		
DA4	8	S-1562-8-9		S-1367-4-10	S-1367-4-13		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
3	C669527-0101	INST CLUSTER	
2	S-1577-1	STARTER CONTACTOR	
1	S-1707-60	CIRCUIT BREAKER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX-CESSNA SPEC. NO.
S-XXX OR CMXXXX-CESSNA
STD. NO.

SUPERSEDES: PG 10.2

SUPERSEDED BY: 1270709 P 10.5

CONTRACT NO.

	NAME	DATE
DESIGN	WHITSON	4-22-77
GROUP		4-26-77
DRAWN	G.L. RYAN	4-21-77
CHECK	J. YOUEL	4-22-77
STRESS		
PROJ	P.H. HENDRICK	4-26-77
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — AMMETER

SIZE: C
CODE IDENT. NO. 71379
DWG NO 1270709
SCALE: NONE
210 P210
PAGE: 10.3
(SR 8464)

LET	DESCRIPTION	DATE	APPD
D	BY REV ADD DETAIL B S2527(-2&-1), BLK(DC20; SER OUT BLK(DC11); S-2475-1 WAS S-1580-1 (NOW SHOP PRAC) (SR10101)(SR10102)	MKT 1-27-82	

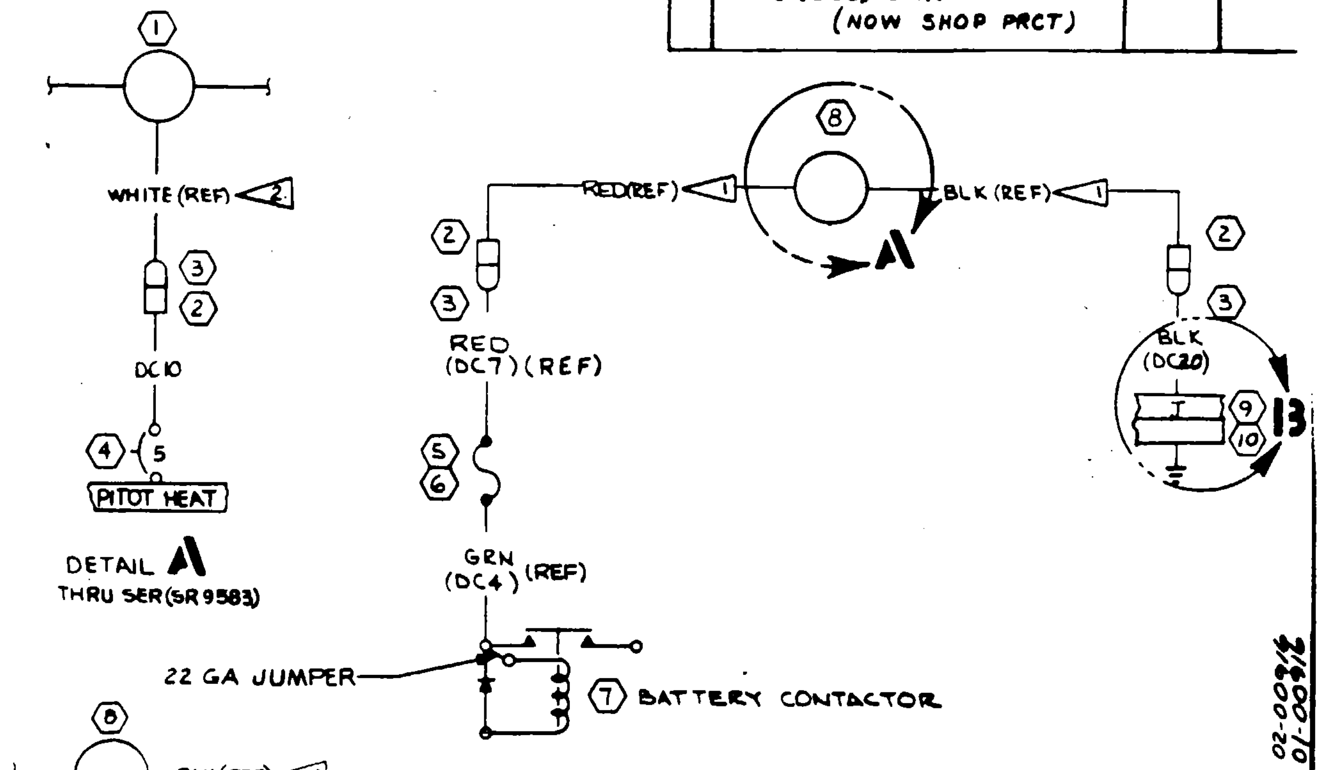
REVISION

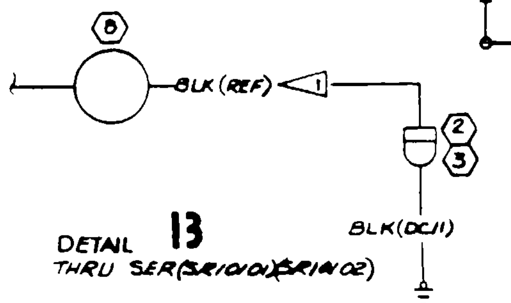
LET	DESCRIPTION	DATE	APPD
A	BY REV: WHITE (REF) WAS RED(REF) RED(REF) WAS BLU (REF), RED DC7 WAS BLU DC8; GRN (DC9) (REF) WAS GRN (DC9), DC11 WAS DC7 (SR9187)	CMK 7-13-78	JAB
B	BY REV: ADD DETAIL 'A' (C664511-0102 (SR9583)	HHG 2-15-80	
C	BY REV: (DC7) RED (REF) WAS (DC7) RED, (DC4) GRN WAS (DC9) GRN (NOW SHOP PRCT)	MKM 8-18-80	

NOTES:

1 INSTALL S-1636-1 ON VENDOR WIRE

2 INSTALL S-1635-1 ON VENDOR WIRE





WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
[illegible]	18	18-0		S1635-1	S2099-3		SER (SR10101) [illegible] & ON
DC10	18			S-1367-1-6	S-1636-1		THRU SER (SR9583)
BLK (REF)				1			
WHT (REF)				2			THRU SER (SR9583)
RED (REF)				1			
BLK (DC11)	18	-18-0		S-1635-1	S-1367-1-8		THRU SER (SR10101) [illegible]

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
10	S2527-2	GND CONNECTOR
9	S2527-1	LH GND BLOCK
8	C664511-0102	DIGITAL CLOCK
7	S-2475-1	CONTACTOR
6	S-1091-1	FUSE
5	S-1090-22	FUSEHOLDER
4	S-1360-5L	CIRCUIT BREAKER
3	S-1637-1	HOUSING
2	S-1637-2	HOUSING
1	C664511-0101	DIGITAL CLOCK

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES

SUPERSEDED BY

CONTRACT NO

	NAME	DATE
DESIGN	G STUMM	4-12-78
GROUP	[illegible]	4-12-78
DRAWN	R. YOUNGERS	4-11-78
CHECK	BORLESKE	4-11-78
STRESS		
PROJ	PULLINGER	4-14-78
APPD	[illegible]	
OTHER		

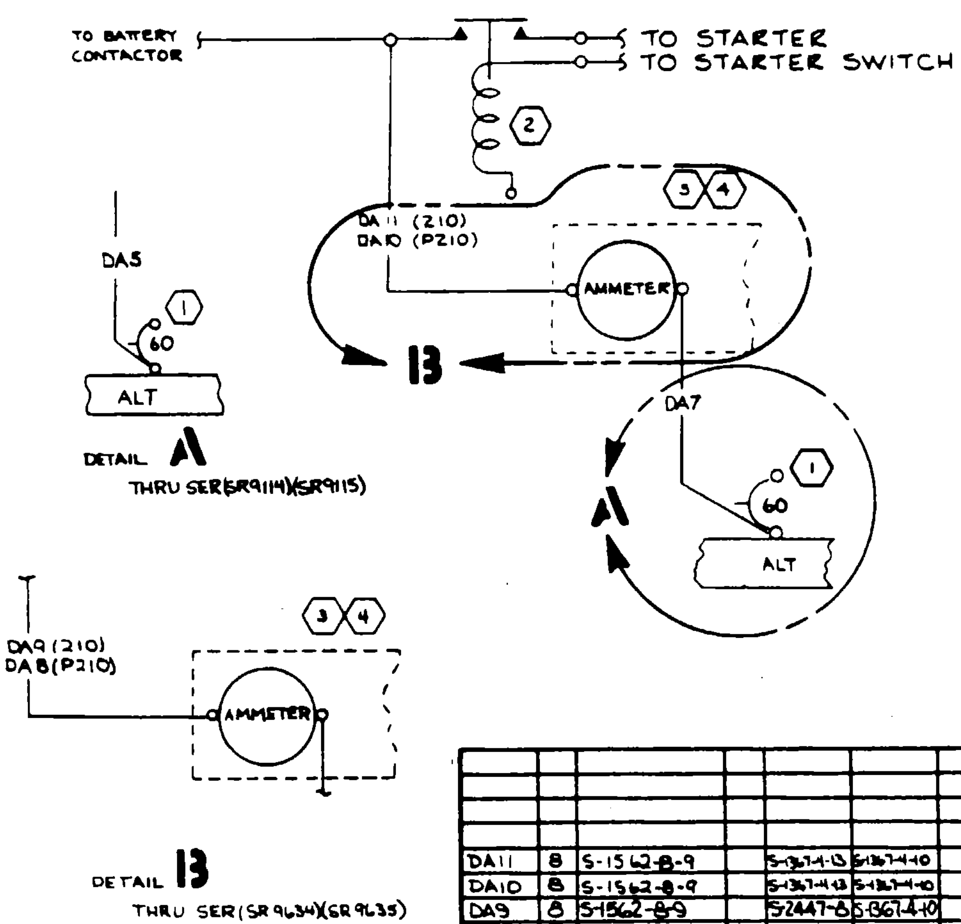
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

TITLE
WIRING DIAGRAM — DIGITAL CLOCK (OPT)

SIZE C | CODE IDENT. NO. 71379 | DWG NO 1270709

SCALE NONE | SR9187 | PAGE: 10.4

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL A & DA7; SER OUT DA5 (SR9114)(SR9115)	HHG 12-12-78	
B	BY REV: ADD C669560-0102 (SR 9711)	SEB 11-1-79	
C	BY REV: SER OUT DA8, DA9; SER IN DA10, DA11; ADD DETAIL B (MER P210E0870) (SR9634)(SR9635)	DRS 7-14-80	



15-0916
14-0916

DA11	8	S-1562-8-9		S-1367-4-13	S-1367-4-10		SER (SR9634) & ON
DA10	8	S-1562-8-9		S-1367-4-13	S-1367-4-10		SER (SR9635) & ON
DA9	8	S-1562-8-9		S-2447-8	S-1367-4-10		THRU SER (SR9634)
DA8	8	S-1562-8-9		S-2447-8	S-1367-4-10		THRU SER (SR9635)
DA7	8	S-1562-8-9		S-1367-4-10	S-1367-4-8		SER (SR9114)(SR9115) & ON
DA5	8	S-1562-8-9		S-1367-4-10	S-1367-4-10		THRU SER (SR9114)(SR9115)
WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

4	C669560-0102	INST CLUSTER	
3	C669527-0101	INST CLUSTER	
2	S-2443-1	STARTER CONTACTOR	
1	S-707-60	CIRCUIT BREAKER	
ITEM NO.	PART NO	DESCRIPTION	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES: 1270709 D 10.3

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	WHITSON	12-14-78
GROUP	D.H. Hunden	12-?-78
DRAWN	HAUN	12-9-78
CHECK	BORLESKE	12-12-78
STRESS		
PROJ		12-20-78
APPD	JRG	
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

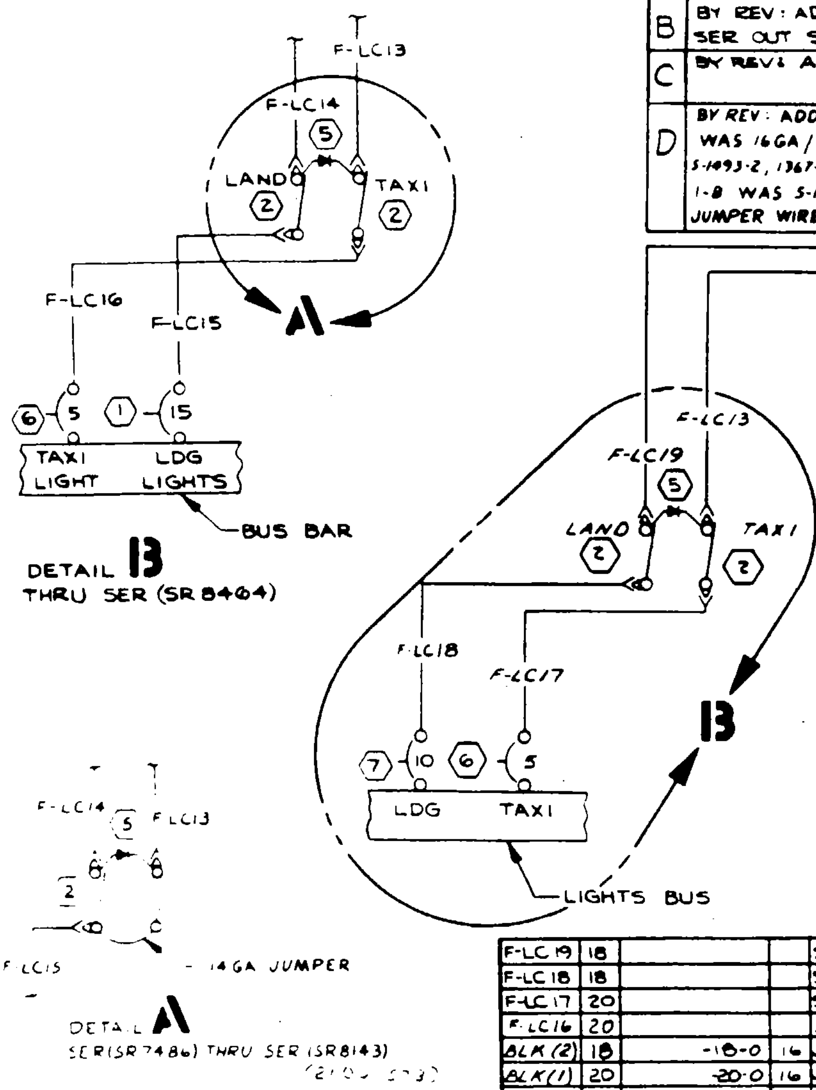
TITLE
WIRING DIAGRAM — AMMETER

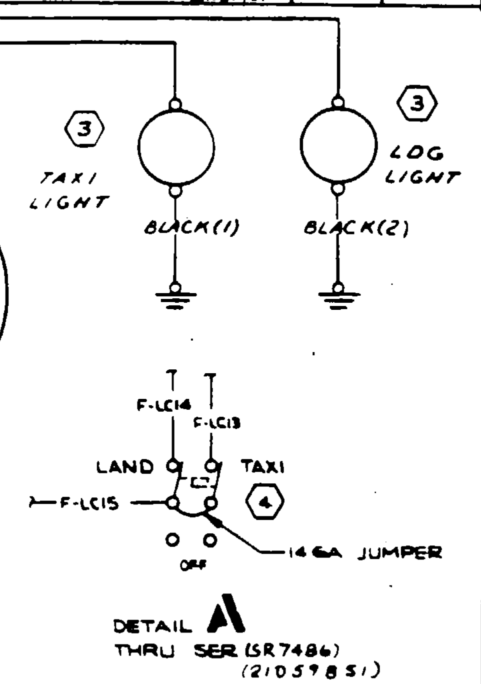
SIZE: C | CODE IDENT NO: 71379 | DWG NO: 1270709

SCALE: NONE | SE 9221 | PAGE: 10.5

REVISION (CON'T)			
LET	DESCRIPTION	DATE	APPD
E	BY REV ADD DETAIL "B" & SER, F-LC17, F-LC18 & F-LC19 (SR8464)	REG 4-28-77	
F	BY REV 18GA WAS 16GA / BLK(2), F-LC18 TO LDG WAS TAXI, F-LC17 TO TAXI WAS LDG (SR8464)(SR8465)	JJB 8-29-77	JAB

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: DELETE S-2094-1, GRAY, TAN, BLK(3) & BLK(4); 16GA WAS 18GA / F-LC 13 & F-LC14; 16GA WAS 14GA / F-LC15; S-1367-2-8 WAS S-1493-3 / F-LC13, F-LC14, BLK(1) & BLK(2) (SR6755)	RLY 9-2-71	
B	BY REV: ADD S-2160-1, 1270082-1 & SER; SER OUT S-1846-1-3. SER (SR7486)	DLP 1-9-73	
C	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	JLO 5-3-75	
D	BY REV: ADD F-LC16, S1360-5L; 20GA WAS 16GA / F-LC13, BLK(1); S-1493-1 WAS S-1493-2, 1367-1-8 WAS 1367-2-8 / LC13; S-1367-1-8 WAS S-1367-2-8 / BLK(1); SER OUT 14GA JUMPER WIRE (SR8143)	5-6-76	





F-LC19	18			S-1493-1	S-1367-1-8		SER (SR8464) & ON
F-LC18	18			S-1493-1	S-1367-1-6		SER (SR8464) & ON
F-LC17	20			S-1493-1	S-1367-1-6		SER (SR8464) & ON
F-LC16	20			S-1493-1	S-1367-1-6		SER (SR8143) THRU SER (SR8464)
BLK (2)	18	-18-0	16	S-1367-2-8	S-1367-2-8		
BLK (1)	20	-20-0	16	S-1367-1-8	S-1367-1-8		
F-LC15	16		6	S-1493-2	S-1367-2-6		THRU SER (SR8464)
F-LC14	16		175	S-1493-2	S-1367-2-8		THRU SER (SR8464)
F-LC13	20		175	S-1493-1	S-1367-1-8		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

7	S-1360-10L	CIRCUIT BREAKER
6	S-1360-5L	CIRCUIT BREAKER
5	1270082-1	DIODE ASSY
4	S-1846-1-3	SWITCH
3	GE 4591	LIGHT
2	S-2160-1	SWITCH
1	S-1360-15L	CIRCUIT BREAKER
	PART NO	DESCRIPTION

EQUIPMENT TABLE

CES-1000 IS APPLICABLE · VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC NO S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES 12210-1073

SUPERSEDED BY

CONTRACT NO

	NAME	DATE
DESIGN	V R SIPES	1-28-71
GROUP	H W...	2-26-71
DRAWN	V R SIPES	2-19-71
CHECK	L.K. WHITE	2-24-71
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV 5800 E PAWNEE WICHITA KANSAS

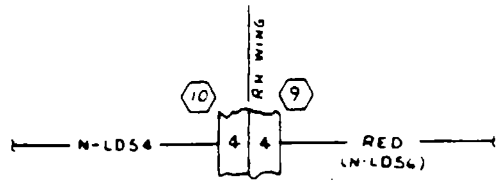
TITLE WIRING DIAGRAM — LANDING LIGHTS

SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

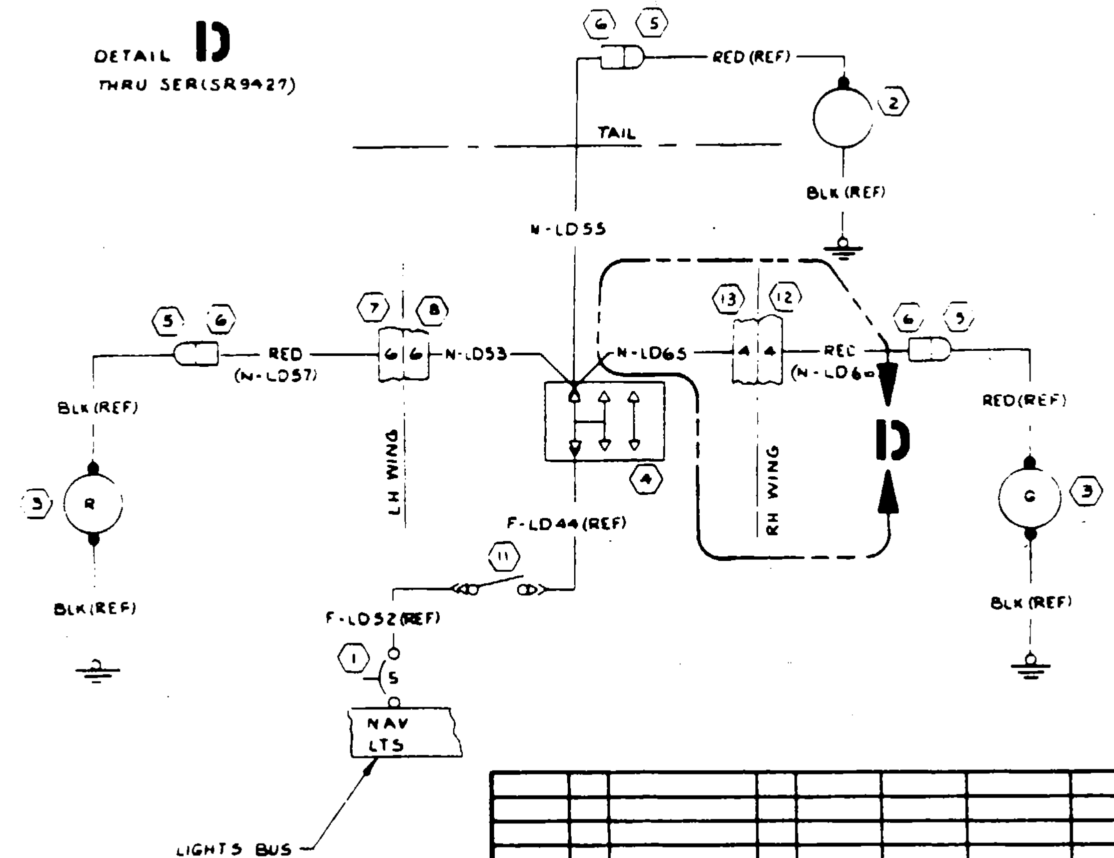
SCALE NONE | 210 P210 | PAGE 1/1

(SR6755) IX
21059502

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV S-2099-7 WAS 66331-5/RED (N-LD57) & RED(N-LD56); S-2353-2 WAS 66332-5/ N-LD54 & N-LD53 (SR8465)	JJB 8-29-77	JAB JRB
B	BY REV: ADD DETAIL D, & SER, ADD 205841-1 & 205838-1, LD65, LD66 20 GA WAS 22 GA/ LD56, LD57 & LD66 (SR9427)	CS 4-10-78	JAB JRB
C	BY REV: (SR9427) WAS (SR8863)/REV 'B'; DETAIL "D"; LD59, LD56, LD65 & LD66 (SR9427)	GDA 10-2-78	JRB



DETAIL **D**
THRU SER(SR9427)



RED (LD66)	20	-20-2		S-1636-1	S-2391-1		SER(SR9427) & ON
LD65	22			S-1829-1	S-2415-1		SER(SR9427) & ON
RED (N-LD57)	20	-20-2		S-1636-1	S-2099-7		
RED (N-LD56)	20	-20-2		S-1636-1	S-2099-7		THRU SER(SR9427)
N-LD55	20			S-1829-1	S-1636-1		
N-LD54	22			S-1829-1	S-2353-2		THRU SER(SR9427)
N-LD53	22			S-1829-1	S-2353-2		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
13	205841-1	CONNECTOR	
12	205838-1	CONNECTOR	
11	S2160-1	SWITCH	
10	S-2350-2	CONNECTOR	
9	S-2349-2	CONNECTOR	
8	S-2350-1	CONNECTOR	
7	S-2349-1	CONNECTOR	
6	S1637-2	HOUSING	
5	S1637-1	HOUSING	
4	34003-817	TERM BLOCK	
3	C622001-0202	LIGHT ASSY	
2	C622001-0102	LIGHT ASSY	
1	S1360-5L	CIRCUIT BREAKER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES:

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	6-20-77
GROUP		6-23-77
DRAWN	SCHIFFELBEIN	6-6-77
CHECK	BORLESKE	6-7-77
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

TITLE
WIRING DIAGRAM — NAVIGATION LIGHTS

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE | P210 | PAGE: 11 5 1

(SR8465)

REVISION			
LET	DESCRIPTION	DATE	APPD
J	BY REV ADD DETAIL "C" S2527-2 & -1, BLK (FN-LB163), SER OUT BLK (FN-LB88) (SR10101)(SR10102)	MKT 1-27-82	JAB JRS

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD WIRE LENGTHS & ORIENT TERM BOARD (NOW SHOP PRACTICE)	DLO 7-28-73	DLP
B	BY REV: ADD RH10-10, HF-10-10, S-1637-1, S-1637-2, F-LB111, F-LB108, F-LB109 & F-LB110 (SR7650)	MEM 5-17-74	DLO JRS
C	BY REV. 34003-55 WAS 34002-55; SER (SR 7913)	CJH 11-27-74	JCT JRS
D	BY REV. 34003-817 WAS 34003-55. INBOARD TERM BLOCK / DETAIL 'A' WAS OUTBOARD TERM BLOCK: ADD SER S TO LB8, LB9, LB10, LB11 (SR7650)(REF) (NOW SHOP PRACTICE) (SR7913)	GW 9-17-75	JRS
E	BY REV 22 GA WAS 18 GA / F-LB88, F-LB111 F-LB108 F-LB109, F-LB110; S-1636-1 WAS S-1636-2 (SR 8143)	GDS 5-6-76	JRS
F	BY REV. ADD F-LB140, DETAIL B', SER OUT F-LB108, F-LB109, F-LB110 & F-LB111, RH-10-10 HF-10-10, S-1637-1, S-1637-2 (SR8464)(SR8465)	JJB 8-29-77	JAB JRS
G	BY REV 1213319(5) WAS (4) (SR8464)(REF)(SR8465)(REF)	CLF 2-9-77	JAB JRS
H	BY REV: ADD RED LB145, BLK FLB 88 WAS F-LB88, MER 210E0667 (NOW SHOP PRACTICE)	HHG 2-21-79	JRS

02-00814

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK F-LB163	22	-22-0		S1370-1	S2099-4		SER (SR10101)(SR10102) & ON
RED F-LB145	22	-22-2		S1370-1	SEE LB140		
F-LB140	22			S-1829-1	S-1370-1		(SR8464) & ON
F-LB110	22			S-1370-1	S-1635-1		(SR7650) THRU (SR8464)
F-LB109	22		6	SOLDER	S-1635-1		(SR7650) THRU (SR8464)
F-LB108	22		6	S-1636-1	SOLDER		(SR7650) THRU (SR8464)
F-LB111	22			S-1636-1	S-1829-1		(SR7650) THRU (SR8464)
BLK F-LB88	22	-22-0	90	S-1370-1	S-1367-1-6		THRU SER (SR10101)(SR10102)
F-LB87	18		90	S-1370-1	S-1823-1		THRU SER 21065339

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	
9	S2527-2	GND CONNECTOR	
8	S2527-1	LH GND BLOCK	
7	34003-817	TERMINAL BLOCK	
6	S-1637-2	HOUSING-SOCKET	
5	S-1637-1	HOUSING	
4	HF-10-10	RESISTOR OHMITE	ALTERNATE
3	RH-10-10	RESISTOR DALE	
2	34002-55	TERMINAL BLOCK	
1	1213319	LIGHT ASSY	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES 1210-1073

SUPERSEDED BY

CONTRACT NO

	NAME	DATE
DESIGN	VR SIPES	1-28-71
GROUP		2-26-71
DRAWN	VR SIPES	2-18-71
CHECK		
STRESS		
PROJ		
APPD		
OTHER		

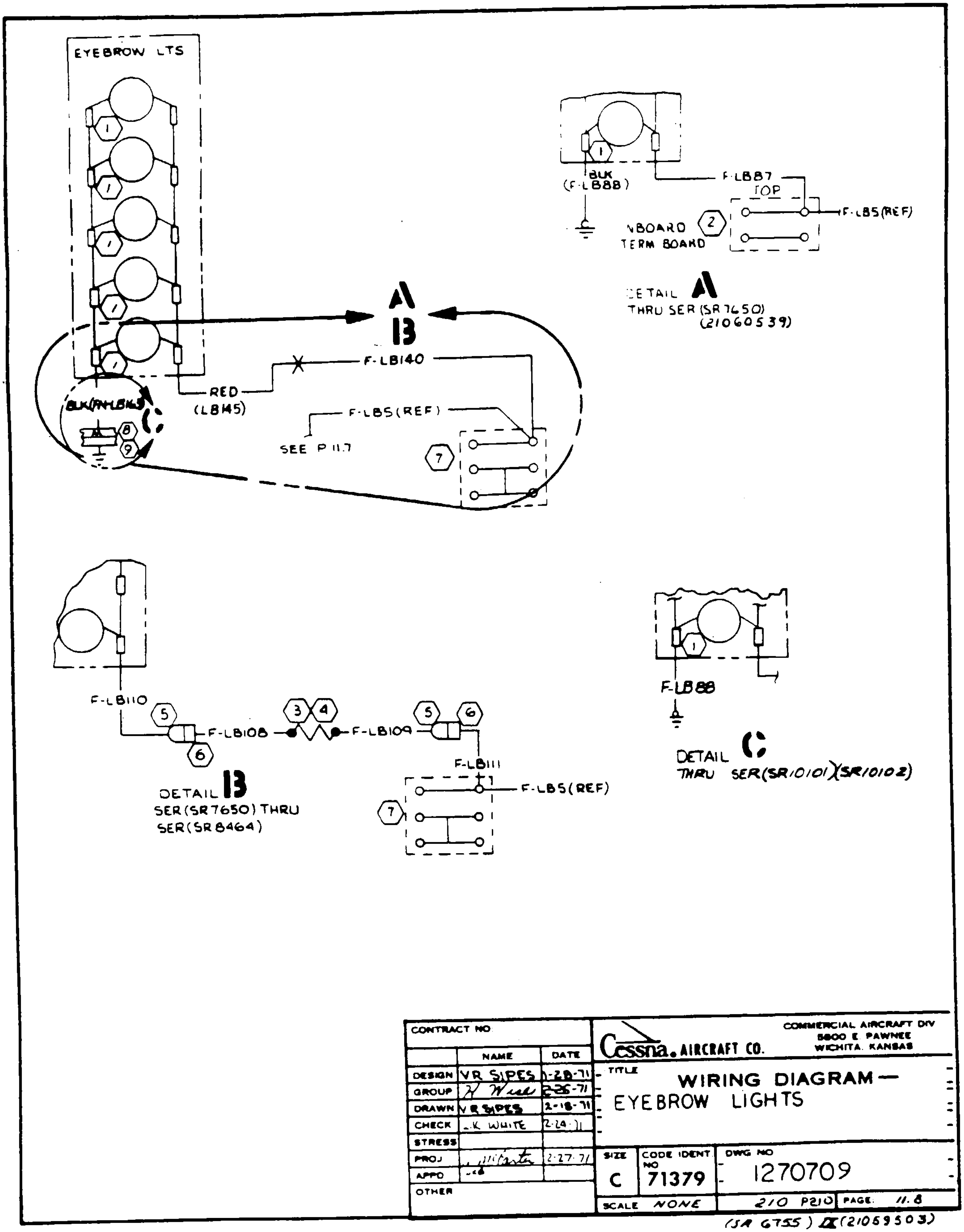
Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV
5800 E PAWNEE
WICHITA KANSAS

TITLE
WIRING DIAGRAM — EYEBROW LIGHTS

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709
SCALE NONE		210 P210 PAGE 11.8

(SR 6755) (21059503)

Eyebrow Lights (Sheet 1 of 2)



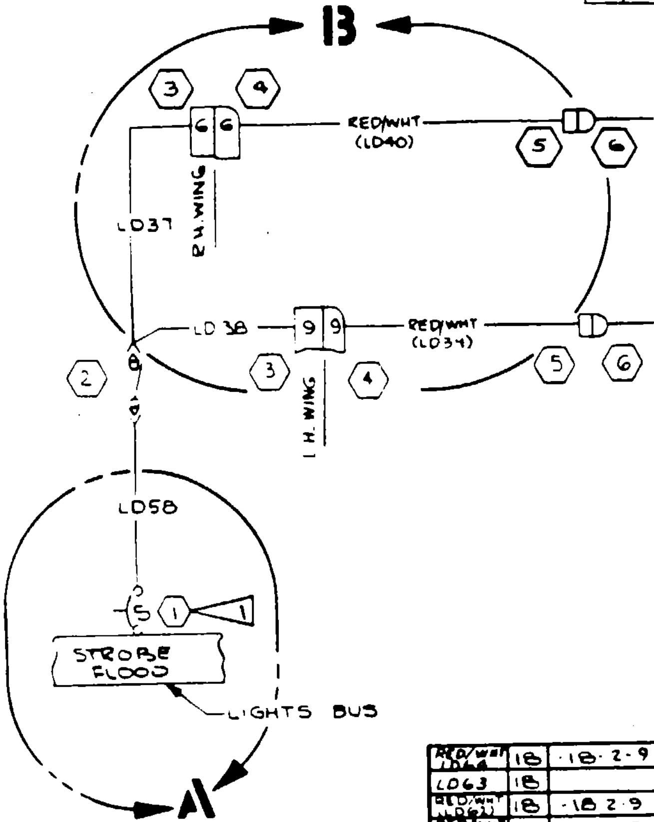
Eyebrow Lights (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
F	BY REV ADD DETAIL B ; LD53 WAS LD41 (SR8464)(SR8465)	DLP 6 6 77	JAB
G	BY REV RED/WHT LD62 & LD61 WAS LD45 & LD44. LD60 WAS LD43. LD59 WAS LD42. LD58 WAS LD53; S-2099-7 WAS 66331-5/ RED/WHT LD62 & LD61, S-2353-2 WAS 66332-5/ LD59 & LD60 (SR8464)(SR8465)	JJB 8-29-77	JAB JRG
K	REV CONT. ON P 11.12.1		

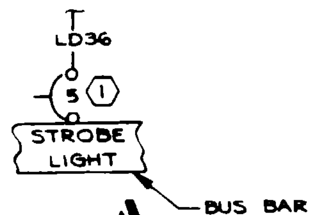
REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	DLO	
B	BY REV REACTIVATE DWG (SR7913)	GW 6-12-75	
C	BY REV: 22 GA WAS 18 GA/ LD36 THRU LD40 S-1635-1 WAS S-1635-2. S-1636-1 WAS S-1636-2 (SR8143)	GDS 5-6-76	JRG
D	BY REV: ADD (RED/WHT) TO LD39 & LD40 (NOW SHOP PRACTICE)	PH 8-25-76	JRG
E	BY REV: ADD DETAIL "A" & SER & LD41 (SR8464)	REG 4-28-77	

NOTES:

1. S-1360-5L CKT. BKR. REPLACED WITH S-1360-10L CKT. BKR. WHEN TAIL FLOODLIGHT IS INSTALLED.



See Sheet 2



DETAIL A
THRU SER (SR8464)

01 30416 02.00916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
RED/WHT (LD64)	18	-18-2-9		S-1636-1	S-2391-1		SER(SR9427) & ON
LD63	18			S-1493-1	S-2415-1		SER(SR9427) & ON
RED/WHT (LD62)	18	-18-2-9		S-2099-7	S-1636-1	STD	
RED/WHT (LD61)	20	-20-2-9		S-2099-7	S-1636-1	STD	THRU SER(SR9427)
LD60	18			S-1493-1	S-2353-2		
LD59	20			S-1493-1	S-2353-2		THRU SER(SR9427)
LD58	18			S-1367-1-6	S-1493-1		SER (SR8464) & ON
RED/WHT (LD40)	18	-18-2-9		S-1636-1	S-1635-1	STD	
RED/WHT (LD39)	18	-18-2-9		S-1636-1	S-1635-1	STD	
LD38	18		180	S-1635-1	S-1493-1		
LD37	18		200	S-1635-1	S-1493-1		
LD36	22		18	S-1367-1-6	S-1493-1		THRU SER (SR8464)

WIRE TABLE

	PART NO	DESCRIPTION	
15	S-1360-10L	CIRCUIT BREAKER	
14	205841-1	CONNECTOR	
3	205838-1	CONNECTOR	
[illegible]	S-2349-2	CONNECTOR	
	S-2350-2	CONNECTOR	
[illegible]	S-2349-1	CONNECTOR	
9	S-2350-1	CONNECTOR	
8	C622006-0107	LAMP ASSY	
7	C622008-0102	POWER SUPPLY	
6	S-1637-1	HOUSING	
5	S-1637-2	HOUSING	
4	S-1640-6	HOUSING	
3	S-1641-6	HOUSING	
2	S-2160-1	SWITCH	
	S-1360-5L	CIRCUIT BREAKER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES PG 11.11

SUPERSEDED BY

CONTRACT NO

	NAME	DATE
DESIGN	VR SIPES	3/29/72
GROUP		5-22-72
DRAWN	VR SIPES	5/22/72
CHECK		
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV
5800 E PAWNEE
WICHITA KANSAS

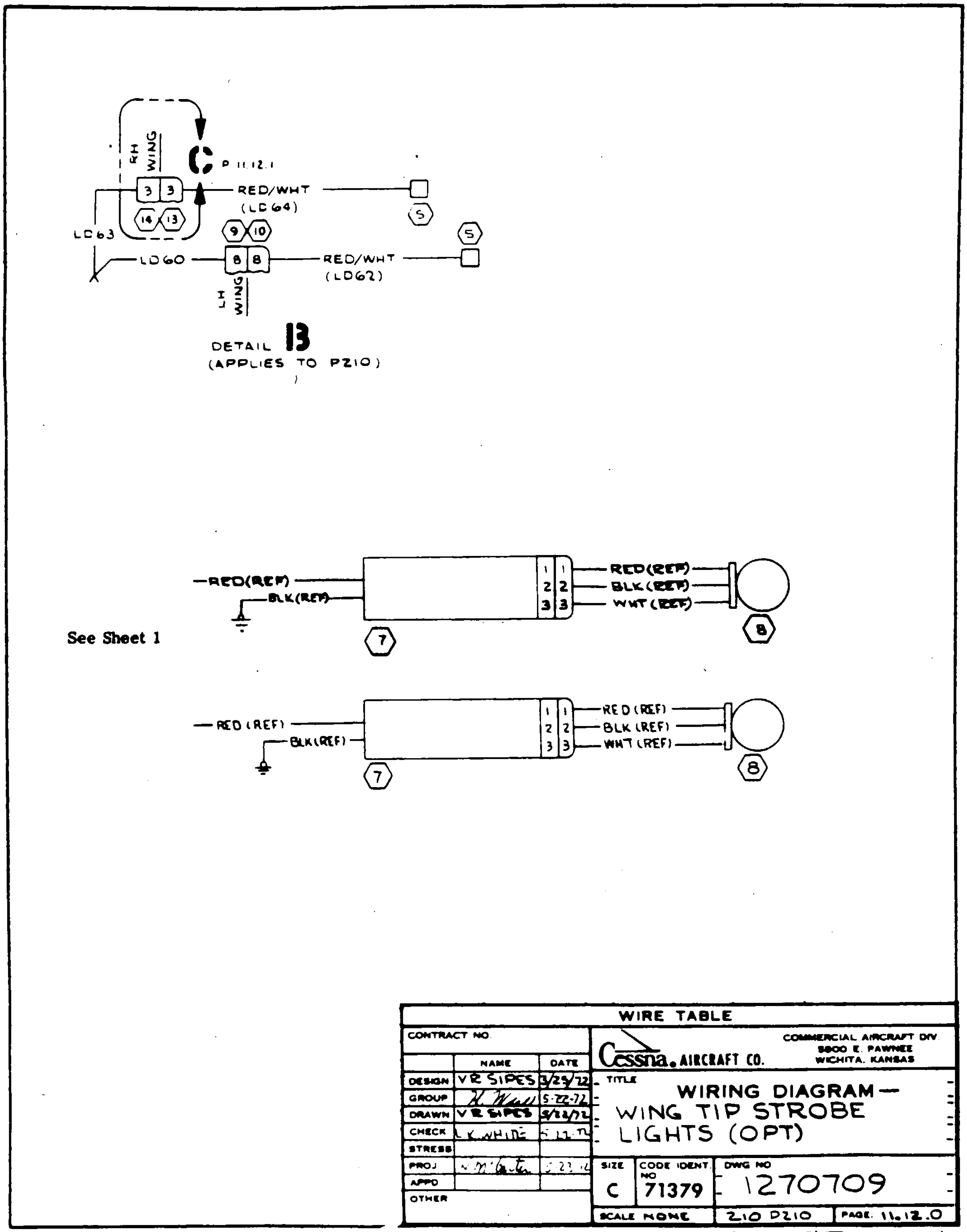
TITLE WIRING DIAGRAM — WING TIP STROBE LIGHTS (OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE | 210 P210 | PAGE 11.12.0

Wing Tip Strobe Lights (OPT) (Sheet 1 of 2)

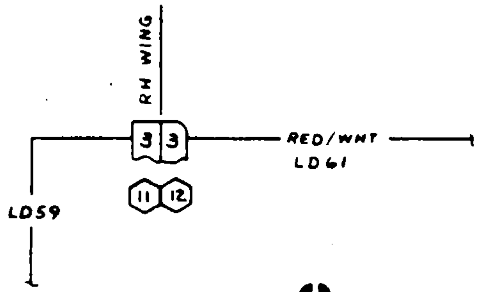
(SE 7038) IX (21059720)



Wing Tip Strobe Lights (OPT) (Sheet 2 of 2)

(SE 7038) IX (21059720)

REVISION			
LET	DESCRIPTION	DATE	APPD
H	BY REV: C622006-0107 WAS -0102 C622008-0102 WAS C622007-0103; ADD DETAIL C & SER, ADD 205838-1, 205841-1, LD63, LD64, P11.12.1 (SR9427)(SR8938)(REF) 20 GA WAS 22 GA/LD37 LD38, LD39, LD40, LD58 LD59, LD60, LD61, LD62, LD63, LD64	CS 4-10-78 DLP	APS
J	BY REV: (SR9427) WAS (SR8863)/REV H; DETAIL C; LD59, LD61, LD63 & LD64 (SR9427)	GDA 10-4-78	R3P APS
K	BY REV. ADD FLAG NOTE 1 ON BUS BAR "STROBE FLOOD" WAS "STROBE" WIRE TABLE 16 GA WAS 20 GA (SR10101)(SR10102)	WMH 5-26-82	REH



DETAIL C P 11.12.0
THRU SER(SR9427)

01-00916 02-00916

CONTRACT NO		
	NAME	DATE
DESIGN	SPENCER	4-17-78
GROUP		
DRAWN	C SHAVER	4-10-78
CHECK	RE HAIR	5-27-82
STRESS		
PROJ		
APPD	APS	
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

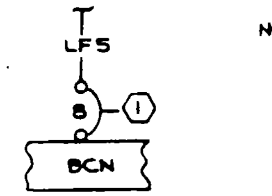
TITLE
WIRING DIAGRAM—
WING TIP STROBE
LIGHTS (OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709
SCALE NONE	(SR9427)	PAGE 11.12.1

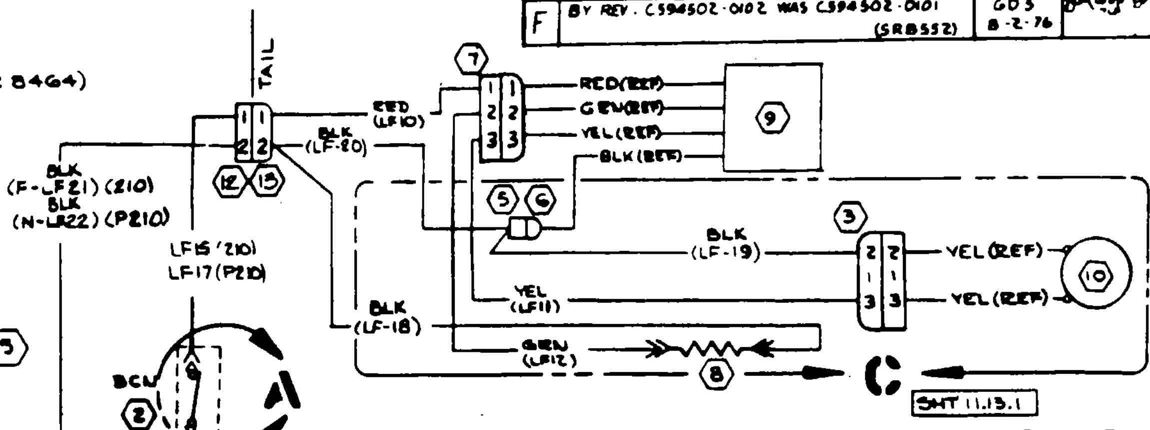
LET	DESCRIPTION	DATE	APPD
G	BY REV: ADD DETAIL "B" & SER, LF16 & S-1360-10L (SR8464)	REG 4-28-77	
H	BY REV: ADD WIRE LF17/P210 (SR8465)	GDS 6-6-77	JAB
J	BY REV: ADD PAGE 11.13.1, 16 GA JUMPER S-1640-6, S-1641-6 & FLAG NOTE 2; SER OUT LF13 & LF14; SER IN LF18, LF19, LF20 & LF21 (SR9310)	LWF 2-15-79	CMK
K	(CONTINUED ON PAGE 11.13.1)		

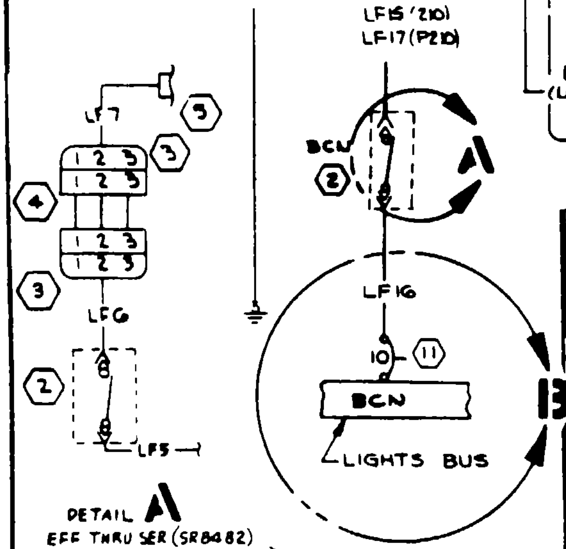
REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD RED, YEL, GRN, BLK & SER; SER OUT LF10, LF11, LF12, LF13 & LF14. ADD NOTE 1 (SR7478)	DLP 1-10-73	
B	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	DLO 5-3-73	
C	BY REV: ADD DETAIL 'A' & SER'S: SER OUT LF6 & LF7. SER IN LF15 (SR7913)	GW 9-17-75	DS
D	BY REV EFF OF DET 'A' WAS THRU (SR7913) (SR8482)	JCS 3-15-76	
E	BY REV: 18 GA WAS 16GA/LF5, BLK(LF14), BLK(LF13), GRN(LF12), YEL(LF11), RED(LF10), LF5; S-1367-1-8 WAS S-1367-2-8, S-1493-1 WAS S-1493-2 (SR8143)	TMS 5-21-76	
F	BY REV: C594502-0102 WAS C594502-0101 (SR8552)	GDS 8-2-76	

NOTES: SEE SHT 11.13.1



DETAIL B
THRU SER (SR 8464)





DETAIL A
EFF THRU SER (SR8482)
(21061229)

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK (LF22)	18	-18-0		S-1635-1	S-1367-1-8	3	SER (SR9310) & ON
BLK (LF21)	18	-18-0		S-1635-1	S-1367-1-8	3	SER (SR9310) & ON
BLK (LF20)	18	-18-0		JMPR LF18	JMPR LF19	3	SER (SR9310) & ON
BLK (LF19)	18	-18-0		S-1635-1	S-1636-3	3	SER (SR9310) & ON
BLK (LF18)	18	-18-0		S-1635-3	S-1493-1	3	SER (SR9310) & ON
LF 17	18			S-1493-1	S-1636-2	3	SER (SR8465) & ON
LF16	18			S-1367-2-6	S-1493-1		SER (SR 8464) & ON
LF 15	18			S-1493-1	S-1636-2	3	SER 21061230 & ON
BLK (LF14)	18	-18-0		S-1635-2	S-1367-1-8		SER 21059882 THRU (SR9310)
BLK (LF13)	18	-18-0		S-1493-1	S-1367-1-8		SER 21059882 THRU (SR9310)
GRN (LF12)	18	-18-5	75	S-1636-2	S-1493-1	3	SER 21059882 & ON
YEL (LF11)	18	-18-4	75	S-1636-2	S-1638-2	3	SER 21059882 & ON
RED (LF10)	18	-18-2	65	S-1635-2	S-1636-2	4	SER 21059882 & ON
LF14	16			S-1635-2	S-1367-2-6		THRU SER 21059881
LF13	16			S-1493-2	S-1367-2-6		THRU SER 21059881
LF12	16		75	S-1636-2	S-1493-2		THRU SER 21059881
LF 11	16		75	S-1636-2	S-1638-2		THRU SER 21059881
LF10	16		65	S-1635-2	S-1636-2		THRU SER 21059881
LF7	16		75	S-1638-2	S-1636-2		THRU SER 21061229
LF6	16		125	S-1493-2	S-1639-2		THRU SER 21061229
LF5	18		7	S-1367-2-6	S-1493-1		THRU SER (SR 8464)

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION
13	S-2035-1	HOUSING-PLUG
12	S-2035-2	HOUSING-CAP
11	S-1360-10L	CIRCUIT BREAKER
10	C621001-0102	LIGHT ASSY
9	C594502-0102	FLASHER ASSY
8	OR95-6	RESISTOR
7	S-1638-1	HOUSING-PLUG
6	S-1637-1	HOUSING-CAP
5	S-1637-2	HOUSING-PLUG
4	1270705	CABLE ASSY
3	S-1638-2	HOUSING-CAP
2	S-2160-1	SWITCH
1	S-1360-8L	CIRCUIT BREAKER

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC NO S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES: PG 11.3

SUPERSEDED BY

CONTRACT NO

	NAME	DATE
DESIGN	VR SIPES	3/25/72
GROUP	H. Wiee	5-22-72
DRAWN	VR SIPES	5-22-72
CHECK	WHITE	5-22-72
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV
5800 E PAWNEE
WICHITA KANSAS

TITLE: WIRING DIAGRAM — FLASHING BEACON LIGHT

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE | 210 P210 | PAGE 11.13.0

(SR7038) 21059720

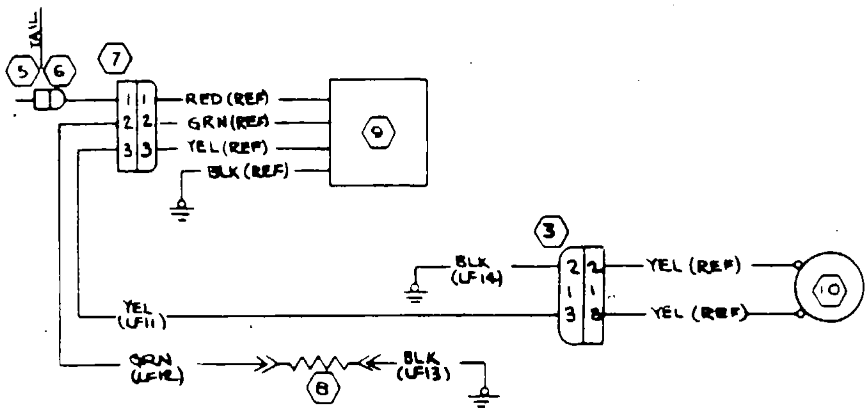
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
K	BY REV: DELETE NOTE 2. ADD NOTE 3, BLK N-LF22 WIRE. S-2035-2 WAS S-1640-6 & S-2035-1 WAS S-1641-6. BLK WIRES (LF 18), (LF 19), (LF20), & (LF21) WERE WHT WIRES. (SR9310)	MDR 7-31-79	

NOTES:

1. COLORED WIRES BEARING CES 1100 CODING IN PARENTHESIS SHALL NOT BE STAMPED. CES 1100 CODING ON THESE WIRES IS FOR PARTS LIST USE ONLY

2. ~~INTERTWINE (LF19) WITH (LF11), (LF18) WITH (LF12) & (LF20) WITH (LF10) FROM COMPONENTS TO S-1641-6 HOUSING PLUG & INTERTWINE (LF21) WITH (LF15)/210 & (LF17)/P210~~

3. INTERTWINE (LF19) WITH (LF11), (LF18) WITH (LF12) & (LF20) WITH (LF10) & INTERTWINE (LF21)/210 & (LF22)/P210 WITH (LF15)/210 & (LF17)/P210



DETAIL C SHT 11.13.0
THRU SER (SR 9310)

CONTRACT NO			Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV 5800 E PAWNEE WICHITA, KANSAS		
	NAME	DATE	TITLE WIRING DIAGRAM — FLASHING BEACON LIGHT		
DESIGN	L. WFINE	2-15-79			
GROUP					
DRAWN	L. WFINE	2-15-79			
CHECK	C KING	2-15-79			
STRESS					
PROJECT			SIZE C	CODE IDENT NO 71379	DWG NO 1270709
APPD			SCALE NONE	210 P210	PAGE 11.13.1

LET	DESCRIPTION	DATE	APPD
H	CONTINUED ON PAGE 11-17.1		

REVISION

LET	DESCRIPTION	DATE	APPD
A	BY REV: BLK(LB128) WAS BLK(REF) (SR8465) (SR8464)	GDS 6-20-77	JAB WWH
B	BY REV: F-LB71 TO 34004-818 WAS 270479-13, F-LB72 TO MS25231-1829 WAS 34004-818; RED/BLU (LA-116) WAS (LA-95). BLK(LA-117) WAS (LA-96); WHT(REF) WAS WHT/BLK (LB118); BLK(REF) WERE BLK(LB115), RED/BLU (LB116), RED(LB114); CHASSIS GND/MS25231-1825 WAS BLK(LB128) & BLK(LB117); ADD NOTE 1 (SR8464)(SR8465)	JJB 8-29-77	JAB WWH
C	BY REV: ADDED F-LB100, F-LB101, N-LB130, BLK(N-LB142), C660501-0102 COMPASS ASSY, & NOTE 2; ADD LB143, NOTE 3, S2413-1 & MS25231-1819 (SR9187)	TFS CMK 7-13-78	JAB
D	BY REV: DELETE NOTE 2, BLK(N-LB142) N-LB130, F-LB101, F-LB100, C660501-0102 COMPASS ASSY (SR8464)(REF)	LSS 8-10-78	JAB
E	BY REV: ADD RED(F-LA125), BLK(F-LA124), RED(F-LA116) WAS RED/BLU (LA116). ON F-LA90 WIRE: S-1370-1 WAS SOLDER; BLK(F-LA91) WAS LA91 & S-1370-1 WAS SOLDER (NOW SHOP PRACTICE) ADD A/C (OPT): RED(F-LA121), BLK(F-LA122) (SR9114)(SR9115)	MDR 4-6-79	CJF

14-0916
15-0916

NOTES:

1. TERMINATE VENDOR FURNISHED WIRE WITH S-1367-1-8
2. ~~S1493-1 TERMINAL REPLACES S/1829-1 WHEN OPT POST LIGHTS ARE INSTALLED~~
3. REQD ONLY WHEN OPT DIGITAL CLOCK C66A511 IS INSTALLED

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
FN-LB151	22			S-1367-1-8	S-1367-1-8		SER(SR9711) & ON
FN-LB152	22			S-1367-1-8	S-1829-1		SER(SR9711) & ON
FN-LB153	22			S-1829-1	S-1370-1	(OPT)	3
BLK (FN-LA122)	22	-22-0		SOLDER	SEE F-LA91	(OPT)	SER(SR9556) & ON
RED (FN-LA121)	22	-22-2		SOLDER	SEE F-LA90	(OPT)	
BLK (F-LA124)	22	-22-0		SOLDER	SEE F-LA91	(OPT)	
RED (F-LA125)	22	-22-2		SOLDER	SEE F-LA90	(OPT)	SER(SR9556) & ON
RED (FN-LB114)	22	-22-2		SEE LB112	S-1370-1		
RED (F-LA116)	22	-22-2		SOLDER	SOLDER	(OPT)	
BLK (F-LA117)	22	-22-0	25	SOLDER	SOLDER	(OPT)	
BLK (FN-LA91)	22	-22-0	10	S-1370-1	S-1367-1-8	(OPT)	
FN-LA90	22		190	S-1829-1	S-1370-1	(OPT)	
FN-LB112	22			S-1829-1	S-1370-2		
FN-LB72	22			SEE LB112	S-1829-1		THRU SER(SR10148)
FN-LB71	22			S-1829-1	SEE 1270479		THRU SER(SR9711)
FN-LB70	22			SEE 1270479	SEE 1270479		THRU SER(SR9711)

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	
13	C669562	INST. CLUSTER	
12	C669561-0102	INST CLUSTER	
11	C669560-0102	INST CLUSTER	
10	S-2413-1	SOCKET	3
9	MS25231-1819	LIGHT	3
8			
7	MS25231-1829	LAMP	
6	S-1899-7	LIGHT ASSY	
5	34004-818	TERMINAL BOARD	
4	C669525-0101	INST CLUSTER	
3	C669527-0101	INST CLUSTER	
2	C669526-0101	INST CLUSTER	
1	1270479-13	LIGHT ASSY	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: PG 11.2 & 11.2.1

SUPERSEDED BY:

CONTRACT NO:

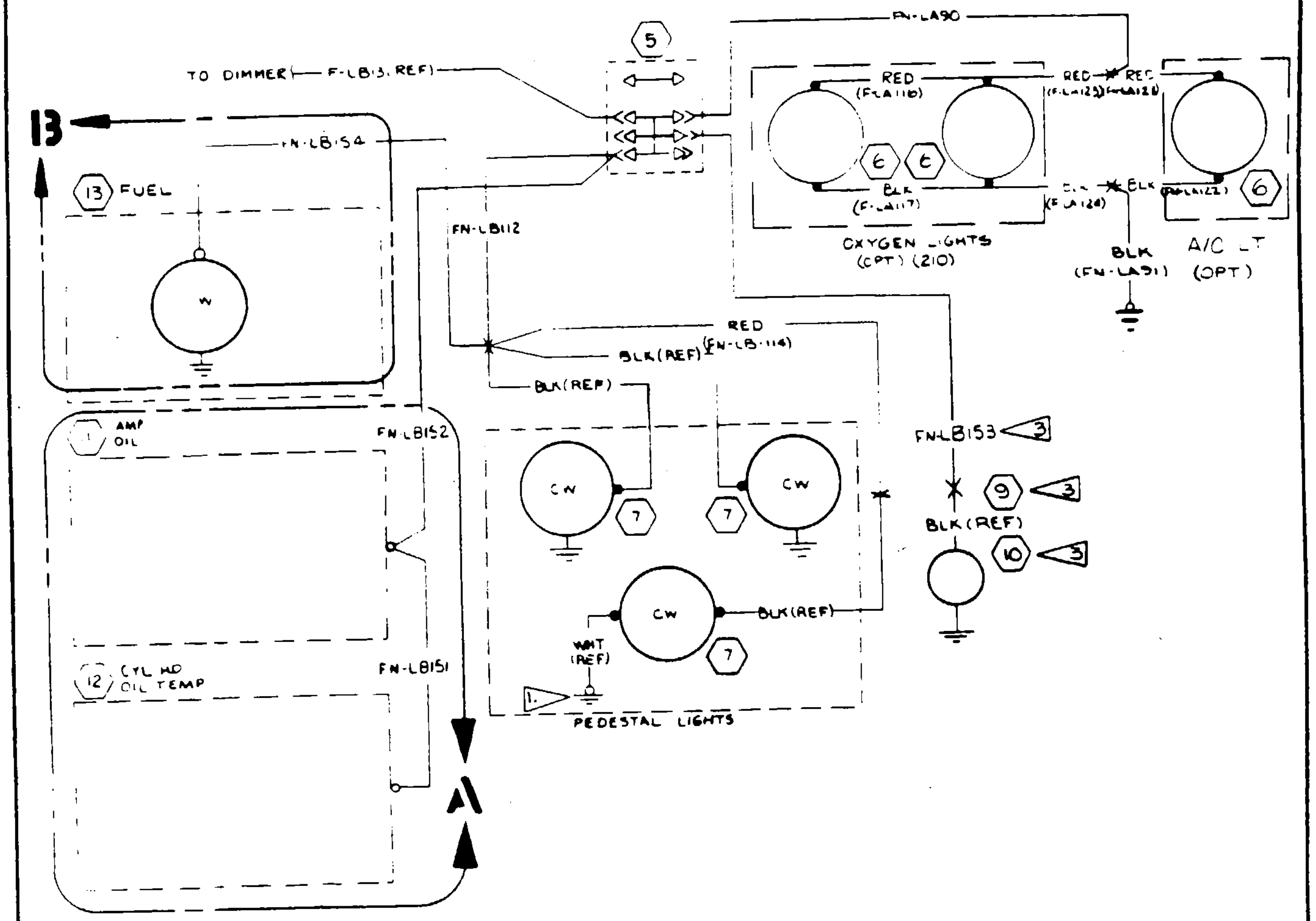
	NAME	DATE
DESIGN	WHITSON	4-22-77
GROUP	W. Harden	4-21-77
DRAWN	G.L. RYAN	4-21-77
CHECK	J. YOUEL	4-22-77
STRESS		
PROJ	D.L. HEDRICK	4-26-77
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — INSTRUMENT LIGHTS

SIZE: C
CODE IDENT NO: 71379
DWG NO: 1270709
SCALE: NONE
210 P210
PAGE: 11-17.C
(SR8464)

Instrument Lights (Sheet 1 of 2)



CONTRACT NO		
	NAME	DATE
DESIGN	WHITSON	4-22-77
GROUP	[illegible]	4-21-77
DRAWN	G.L. RYAN	4-21-77
CHECK	J YOUEL	4-22-77
STRESS		
PROJ	PLHBURICE	4-26-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

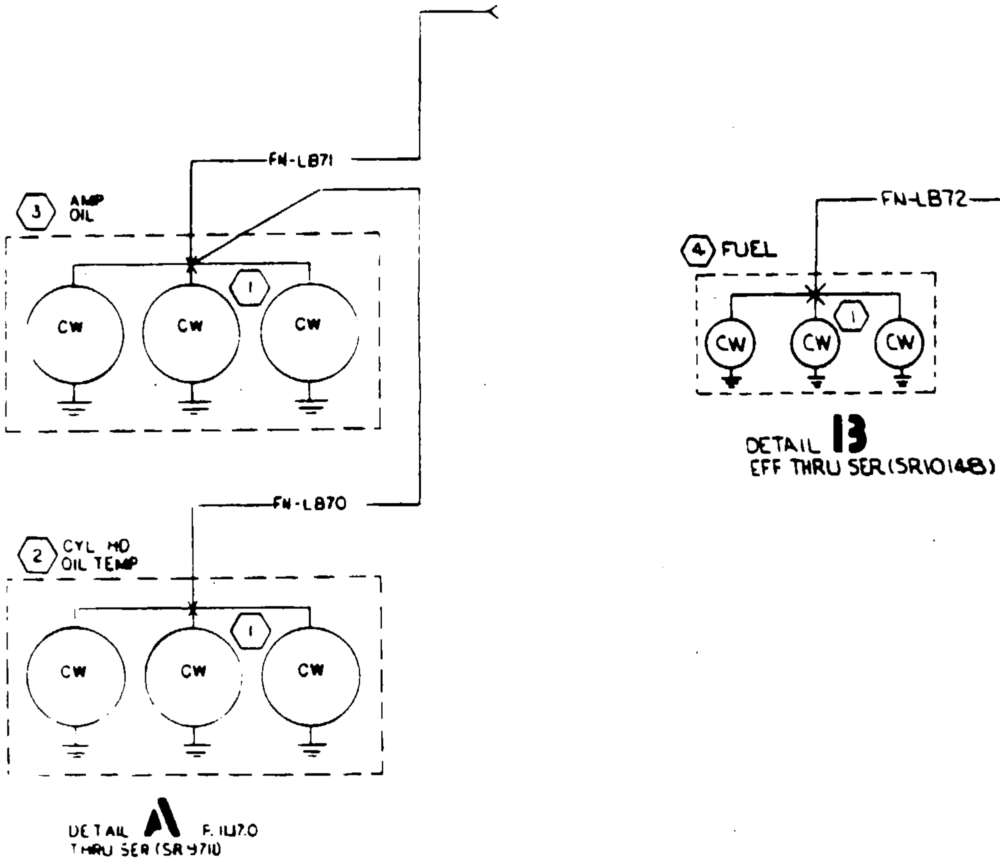
TITLE WIRING DIAGRAM — INSTRUMENT LIGHTS

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709
SCALE NONE		210 P210 PAGE: 11.17.C

(5KB464)

Instrument Lights (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
F	BY REV: FN-LB153 WAS LB143 (SR9187)(REF) ADD DETAIL A, C669560-0102 & C669561-0102 (SR9711) FN-LB70 WAS F-LB70, FN-LB71 WAS F-LB71 FN-LB72 WAS F-LB72, FN-LB112 WAS F-LB112, RED (FN-LB114) WAS RED(LB114) (NEW SHIP PRACTICE)	SA 11-21-79	
G	BY REV: ADD SER (SR9556) & ON TO LA123, LA124, LA121 & LA122 WIRES (SR9556)	WHH 1-28-80	
H	BY REV: ADD DETAIL 'B' & SERIALS (SR10148)	GW 3-5-81	



LB154	22			SEE LB112	S1367-1-8	SER(SR10014B) & ON
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS

WIRE TABLE

CONTRACT NO		
	NAME	DATE
DESIGN	ABRAHAM	12-11-79
GROUP		
DRAWN	ABRAHAM	11-21-79
CHECK	BORLESKE	12-8-79
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — INSTRUMENT LIGHTS

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709
SCALE NONE	210 P210	PAGE 11.17.1

(SR9711)

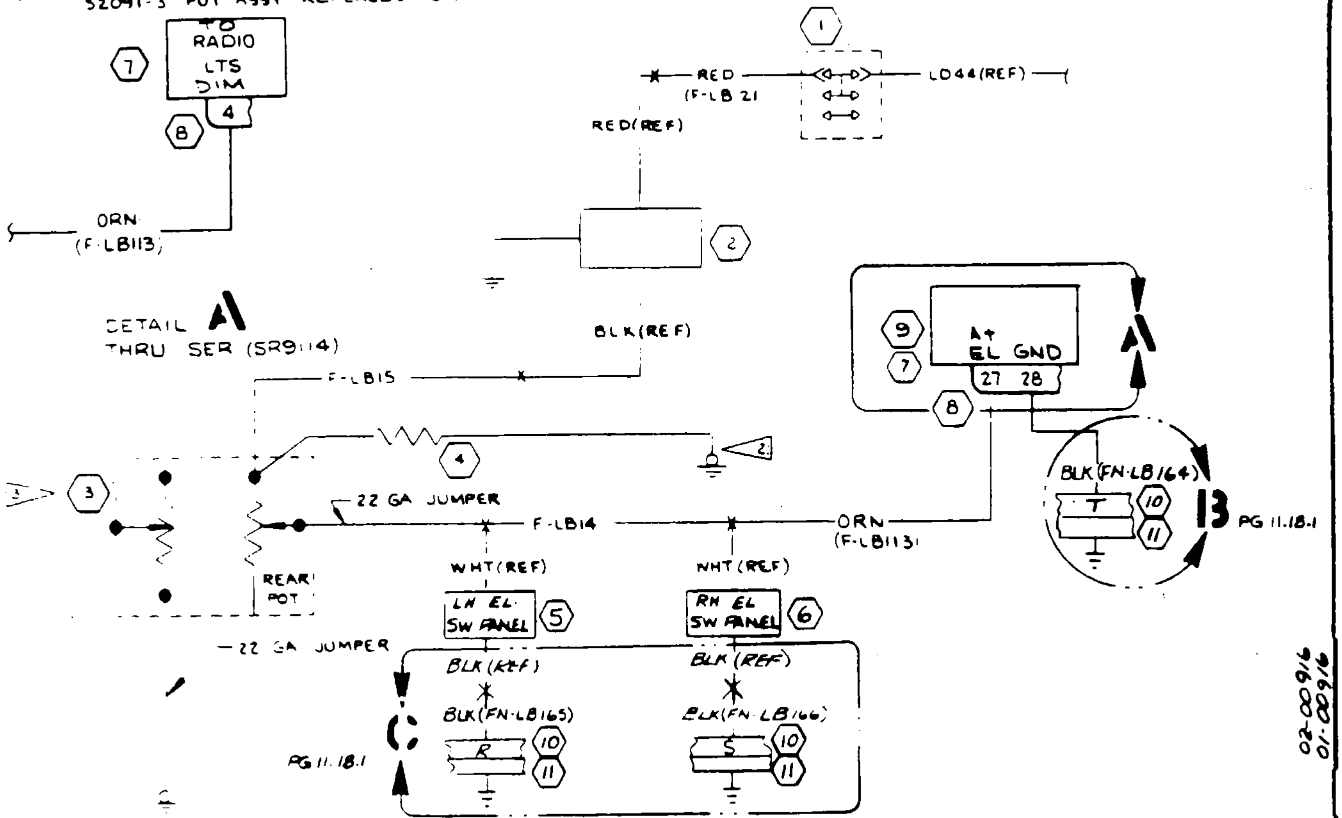
LET	DESCRIPTION		DATE	APPD
C	BY REV: ADD DETAIL "B" & "C" PG 11.18.1 BLK(FN-LB164), BLK(FN-LB165), BLK(FN-LB166), S2527-2 & (-1), SER OUT BLK(8) & BLK(1) (SR10101)(SR10102)	MKT	1-27-82	JAB ORN ARG

REVISION

LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL A LB144 & SER, 2470003 (SR9114)	DLP 2-20-79	
B	BY REV: BLK LB150 WAS BLK LB144 (SR9114)(SR9115)	HHG 5-21-79	JAB

NOTES

1. THESE WIRES VENDOR FURNISHED
2. RESISTOR WIRE IS TERMINATED WITH S1367-1-14 TERMINAL & INSTALLED ON BUSHING OF THE TANDEM POT ASSY
3. WHEN ELECTROLUMINESCENT PANELS ARE INSTALLED, S2091-3 POT ASSY REPLACES S1904-2 POT ASSY



BLK (FN-LB164)	22	-22-0		S1370-1	S2099-4		SER(SR10101)(SR10102) ON
BLK (FN-LB165)	22	-22-0		S1370-1	S2099-4		SER(SR10101)(SR10102) ON
BLK (FN-LB166)	22	-22-0		85969-6	S2099-4		SER(SR10101)(SR10102) ON
BLK(LB150)	22	22-0		85969-6	S-1367-1-8		SER(SR9114) THRU (SR10101)(SR10102)
ORN F-LB113	22	-22-3		S1370-1	85965-6		
BLK(2)	22	-22-0		S1367-1-8	1		THRU SER(SR10101)(SR10102)
BLK(1)	22	-22-0		S1367-1-8	1		THRU SER(SR10101)(SR10102)
F-LB14	22		62	S1370-1	SEE ORN		
F-LB15	22		65	S1370-1	SOLDER		
RED F-LB121	22	-22-2	65	S1829-1	S1370-1		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION
11	S2527-2	GND CONNECTOR
10	S2527-	LH GND BLOCK
9	2470003	AUDIO CONTROL PNL
8	87-49-1	CONNECTOR
7	2570442	AUDIO CONTROL PNL
6	[illegible]782	PANEL ASSY
5	2 3027	PANEL ASSY
4	VAL 5-6000	RESISTOR
3	S209[illegible]-3	POT ASSY
2	[illegible] 3CO[illegible]	POWER SUPPLY
	34CC3-B7	TERM BLOCK

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO.
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES: PG [illegible]

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	D L HARDY	4-26-77
GROUP	[illegible]	4-26-77
DRAWN	G L RYAN	4-21-77
CHECK	J YOUEL	4-22-77
STRESS		
PROJ	PLUHDRICK	4-26-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

TITLE: WIRING DIAGRAM — ELECTROLUMINESCENT PANEL (OPT)

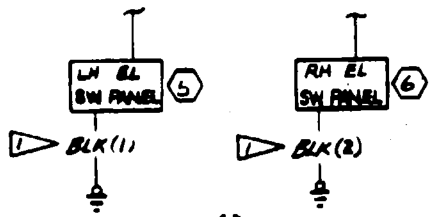
SIZE	CODE IDENT NO.	DWG NO
C	71379	1270709

SCALE: NONE 210 PAGE: 11.18 O

(SR8464)

REVISION			
LET	DESCRIPTION	DATE	APPD
C	SEE PAGE 11.18.0 FOR REVISION		

DETAIL B PG 11.18.0
THRU SER (SR10101)(SR10102)



DETAIL C PG 11.18.0
THRU SER(SR10101)(SR10102)

02-00916
01-00916

CONTRACT NO		
	NAME	DATE
DESIGN		
GROUP		
DRAWN	M THOMPSON	1-27-82
CHECK	BORLESKE	1-28-82
STRESS		
PROJ	L MOORE	[illegible]
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

TITLE
WIRING DIAGRAM
ELECTROLMINESCENT PANEL
(OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE PAGE 11.18.1

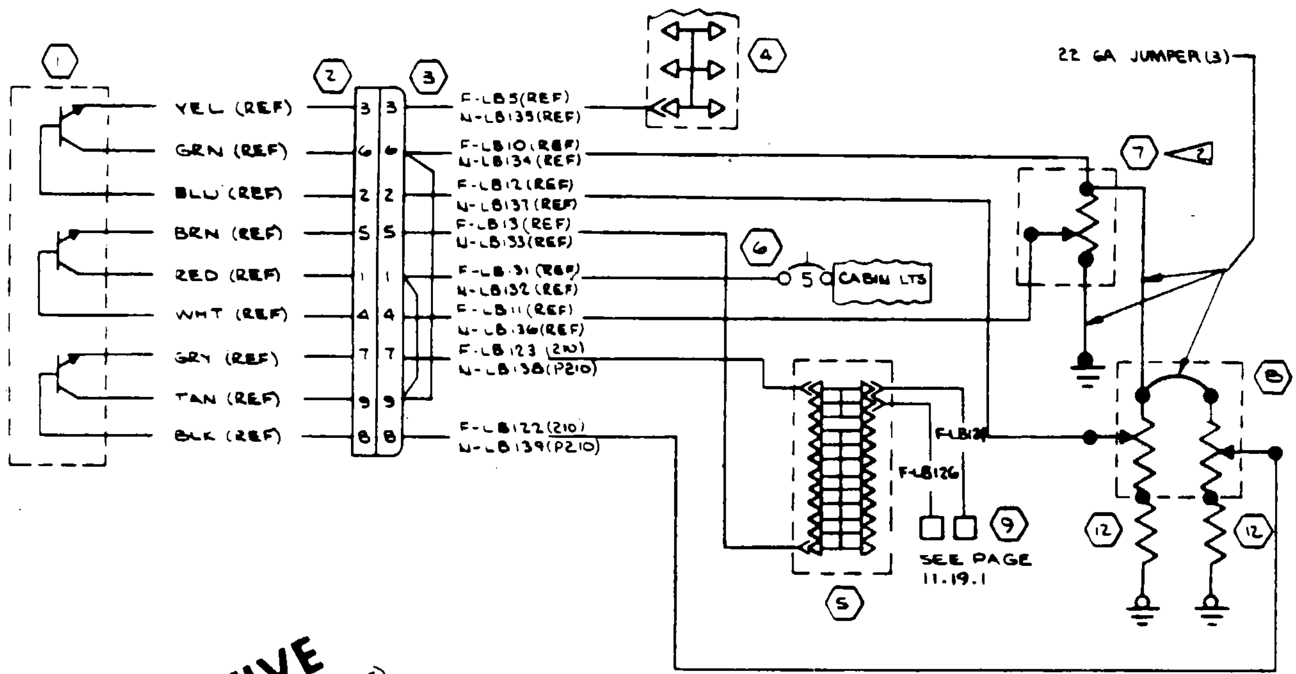
(SR10101)(SR10102)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD LB138 & LB139, U-LB135(REF), U-LB134(REF) U-LB137(REF) U-LB133(REF), U-LB132(REF), U-LB136(REF); F-LB131(REF) WAS F-LB1(REF), S-2091-7 WAS S-2091-3 (SR8464)(SR8465)	JJB 8-29-77	

NOTES:

WHEN POST LT OPTION IS INSTALLED S70501-1 DIMMING ASSY REPLACES S70166 & S-2091-7 POT ASSY REPLACES S-1904-2

2 THIS POT IS PART OF S-2091-7 DUAL POT ASSY WHEN OPTIONAL EL LIGHTING IS INSTALLED



INACTIVE
EFF THRU SER(SR9114)(SR9115)
2-12-79

LB139	22			S-1635-1	SOLDER		
LB138	22			S-1635-1	S-1829-1		
LB122	22			S-1635-1	SOLDER		
LB123	22			S-1635-1	S-1829-1		
LB124	22			S-1829-1	S-1636-1		
LB125	22			S-1636-1	S-1367-1-8		
LB126	22			S-1829-1	S-1636-1		
LB127	22			S-1636-1	S-1367-1-8		
BLK(2)	22	-22-0		SOLDER	SOLDER		
BLK(1) (LB119)	22	-22-0		SOLDER	S-1636-1		
RED(2)	22	-22-2		SOLDER	SOLDER		
RED(1) (LB120)	22	-22-2		SOLDER	S-1635-1		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

2	S-2000C201J	RESISTOR	
	S-3857	POST LT ASSY	
	S-1637-	HOUSING	
9	S-1637-2	HOUSING	
8	S-2091-7	POT ASSY	
	S-1904-2	POT ASSY	
6	S-1360-5L	CIRCUIT BREAKER	
5	34004-B16	TERMINAL BLOCK	
4	34005-B17	TERMINAL BLOCK	
3	S-1640-9	HOUSING	
2	S-164-9	HOUSING	
	S70501	DIMMER ASSY	
ITEM NO	PART NO	DESCRIPTION	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES
P-6

SUPERSEDED BY
P1.25

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	4-25-77
GROUP		4-26-77
DRAWN	R. YOUNGERS	4-18-77
CHECK	J YOUEL	4-18-77
STRESS		
PROJ	ELHEDRICK	4-26-77
APPD		
OTHER		

Cessna. AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

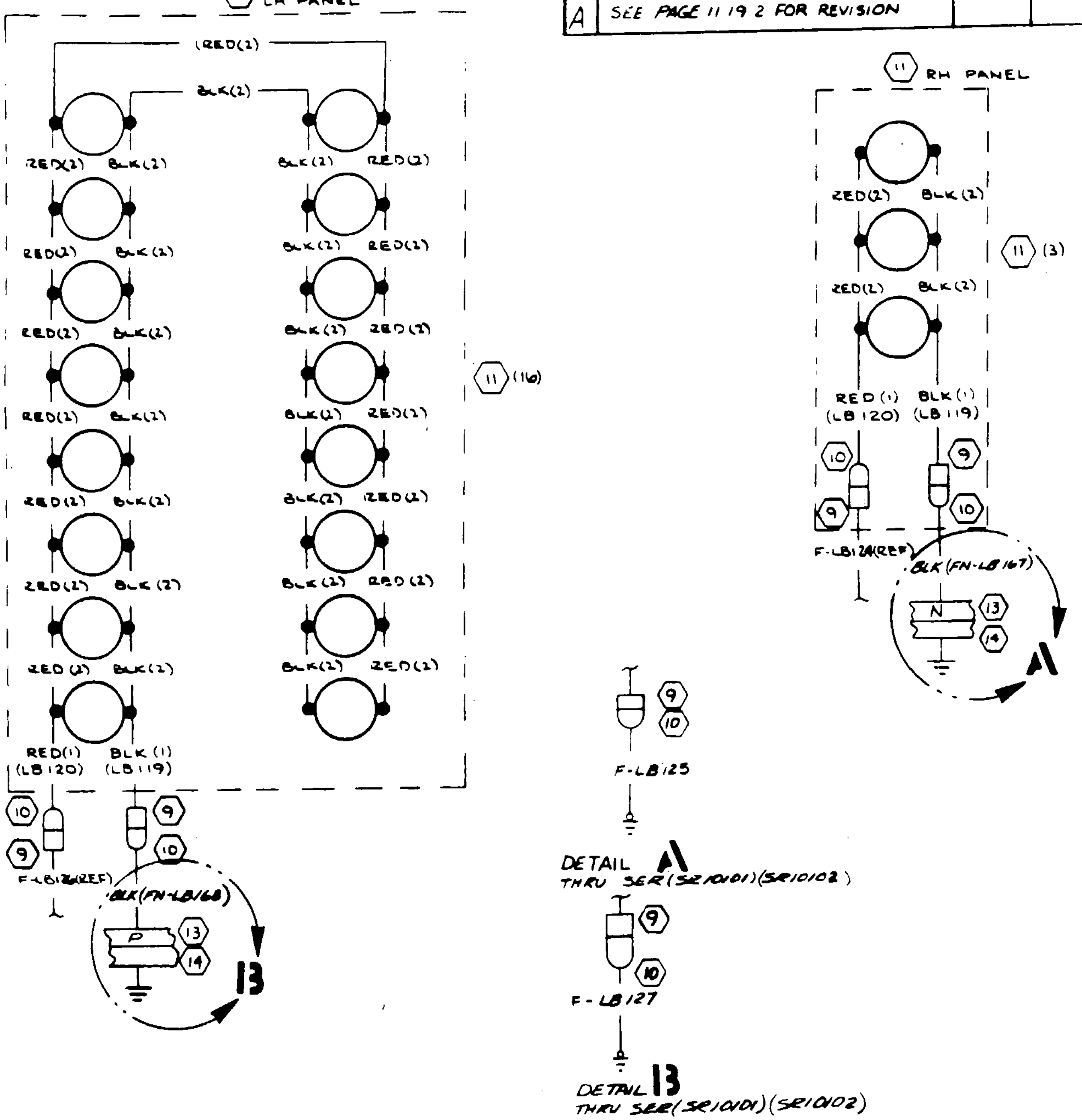
TITLE
WIRING DIAGRAM — POST LIGHTING (OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE (SR8464)(SR8465) PAGE 11.19.0

210 P210

REVISION			
LET	DESCRIPTION	DATE	APPD
A	SEE PAGE 11.19.2 FOR REVISION		



CONTRACT NO		
	NAME	DATE
DESIGN	SPENCER	4-25-77
GROUP		4-26-77
DRAWN	R. YOUNGERS	4-18-77
CHECK	J. YOUEL	4-19-77
STRESS		
PROJ	PLHEDRICK	4-26-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

TITLE WIRING DIAGRAM – POST LIGHTING (OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	2707C9

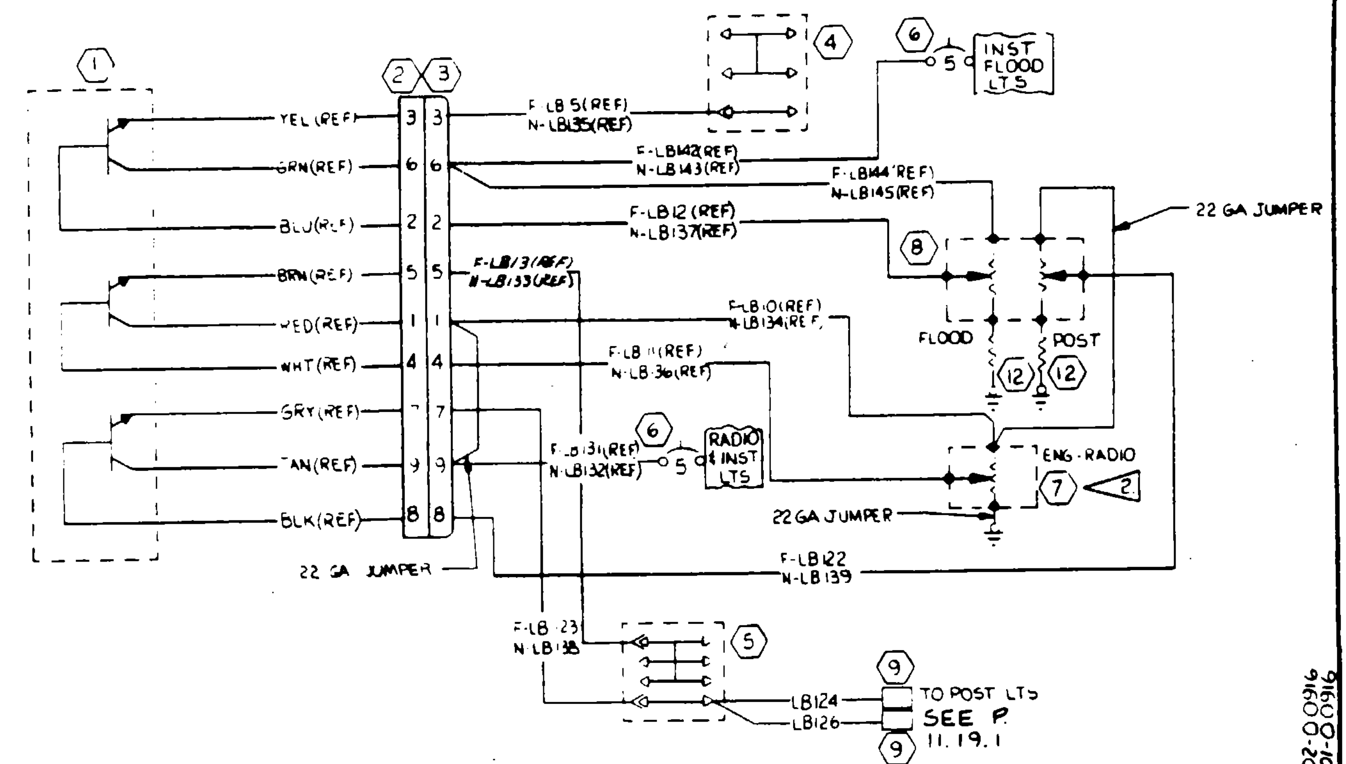
SCALE NONE (SR8464)(SR8465) PAGE 11.19.1

NOTES:

1. WHEN POST LT OPTION IS INSTALLED 1570301-1 DIMMING ASSY REPLACES 1570166 & S-2091-7 POT ASSY REPLACES S-1904-2

2. THIS POT IS PART OF S-2091-7 DUAL POT ASSY WHEN OPTIONAL EL LIGHTING IS INSTALLED

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV. ADD DETAIL "A" & "B", S2527(-1,-2) BLK(FN-LB167), BLK(FN-LB168), SER OUT LB125 & LB127 (SR10101)(SR10102)	MKT 1-27-82	JAB



FN-LB167	22	-22-0		S-1635-1	S2099-4		SER (SR10101)(SR10102) & ON
FN-LB168	22	-22-0		S-1635-1	S2099-4		SER (SR10101)(SR10102) & ON
LB133	22			S-1635-1	SOLDER		
LB138				S-1635-1	S-1829-1		
LB122				S-1635-1	SOLDER		
LB123				S-1635-1	S-1829-1		
LB125				S-1636-1	S-1367-1-8		THRU SER (SR10101)(SR10102)
LB127				S-1636-1	S-1367-1-8		THRU SER (SR10101)(SR10102)
BLK(2)		-22-0		SOLDER	SOLDER		
BLK(1)(LB122)		-22-0		SOLDER	S-1636-1		
RED(2)		-22-2		SOLDER	SOLDER		
RED(1)(LB120)		-22-2		SOLDER	S-1635-1		
LB126				S-1829-1	S-1636-1		
LB124	22			S-1829-1	S-1636-1		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

14	S2527-2	GND CONNECTOR	
13	S2527-1	LH GND BLOCK	
12	S-2000C20-3	RESISTOR	
11	513837	POST LT ASSY	
10	S-1637-1	HOUSING	
9	S-1637-2	HOUSING	
8	S-2091-7	POT ASSY	
7	S-1904-2	POT ASSY	
6	S-1360-5L	CIRCUIT BREAKER	
5	34004-818	TERMINAL BLOCK	
4	34003-817	TERMINAL BLOCK	
3	S-1640-9	HOUSING	
2	S-1624-9	HOUSING	
1	1570301	DIMMER ASSY	
ITEM NO	PART NO	DESCRIPTION	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES: PAGE 11.19.C
SUPERSEDED BY:

CONTRACT NO

	NAME	DATE
DESIGN	SPENCER	2-14-79
GROUP		3-5-79
DRAWN		2-12-79
CHECK	BORLESKE	2-13-79
STRESS		
PROJ		3-5-79
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

TITLE: WIRING DIAGRAM — POST LIGHTING (OPT)

SIZE: C | CODE IDENT NO: 71379 | DWG NO: 1270709

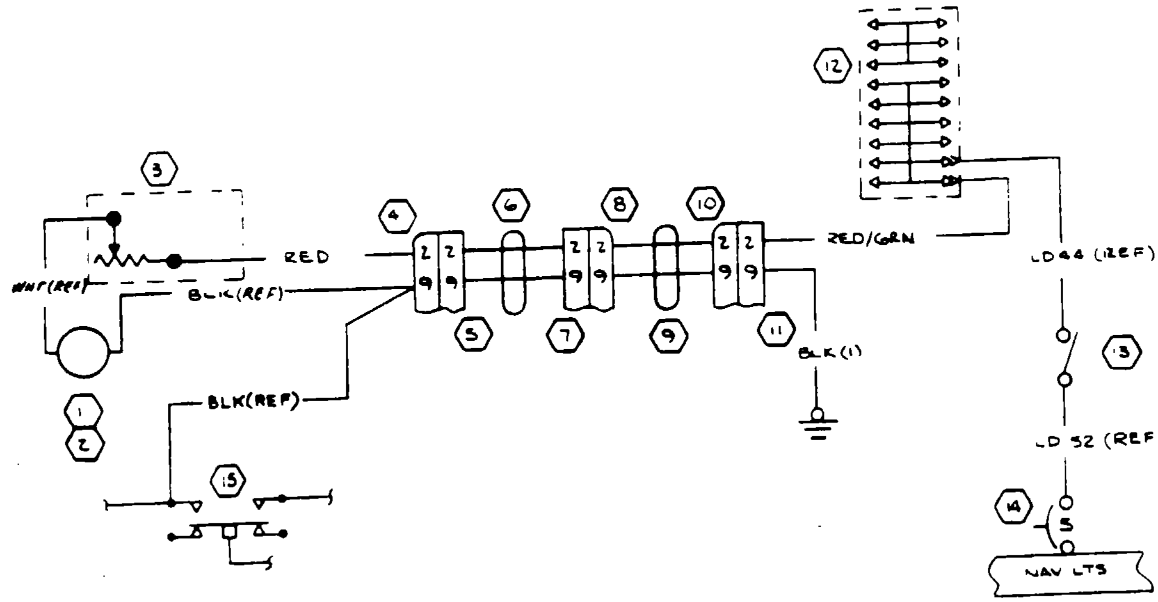
SCALE: NONE | (SR 9114)(SR9115) | PAGE: 11.19.2

02-00916
01-00916

NOTES:

FOR INTERCONNECTION WITH ELECTRIC ELEVATOR TRIM SEE PAGE 14 4 2

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: BLK(REF) WAS BLK ADD S-1985-1 WHT(REF) WAS RED(1) (SR8464)(REF)(SR8465)(REF)	CRS 11-21-77	



INACTIVE
EFF THRU SER (SR9453) (SR9454)
3/10/81
REHAU ENG JRC

65-0916
64-0916

BLK(1)	22	-22-0		S-1963-2	S-1367-1-8	
RED/GRN	22	-22-2-5		S-1963-2	S-1829-1	
RED	22	8569-2		SOLDER	SOLDER	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION
15	S-1985-1	MIKE SWITCH
14	S-1360-5L	CIRCUIT BREAKER
13	S-2160-1	SWITCH
12	34003-B17	TERMINAL BLOCK
11	S-1961-2-0	HOUSING
10	S-1961-1-0	HOUSING
9	570307	CABLE
8	570307	CONNECTOR ASSY
7	3421-0000	CONNECTOR SOCKET
6	270P46	CABLE
5	3473-300C	CONNECTOR SOCKET
4	1270842	CONNECTOR ASSY
3	8859A161-152A	RHEOSTAT
2	2428	LAMP
	4157-001	SOCKET

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES: P11.5

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	4-25-77
GROUP		4-26-77
DRAWN	R. YOUNGERS	4-18-77
CHECK	J. YOUNG	4-19-77
STRESS		
PROJ	D. HEDRICK	4-26-77
APPD		
OTHER		

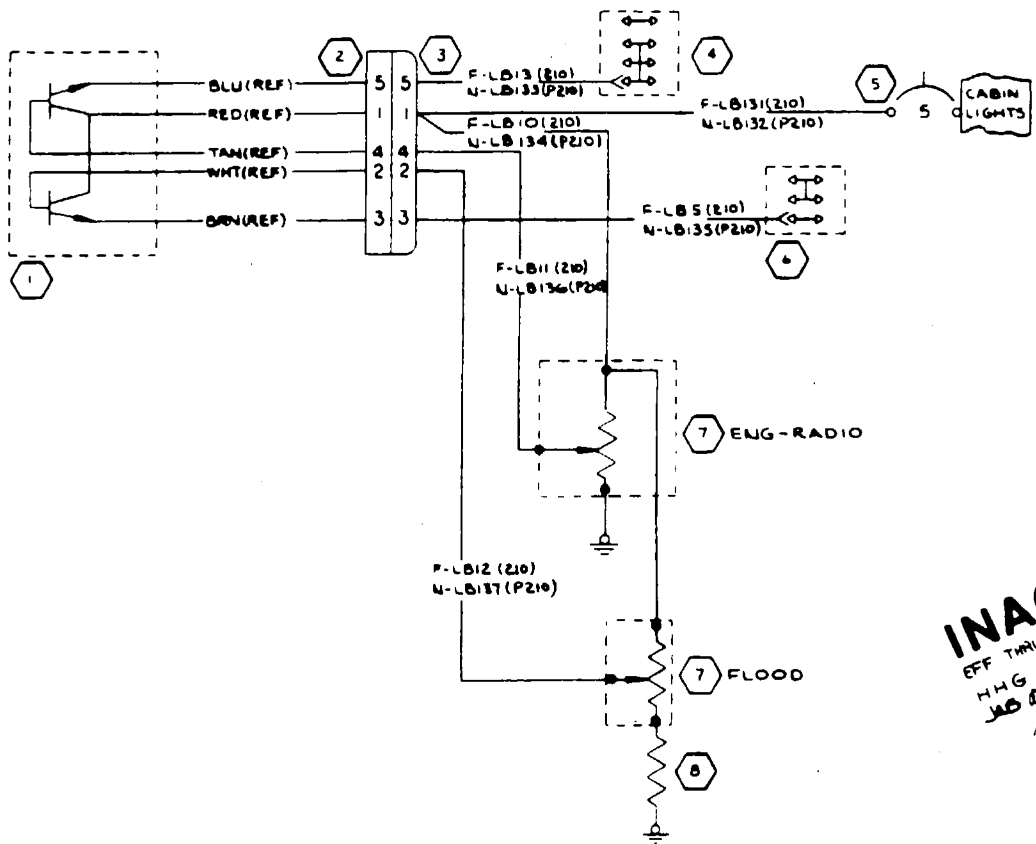
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — MAP LIGHT, CONTROL WHEEL

SIZE C CODE IDENT. NO. 71379 DWG NO 270709

SCALE NONE (SR8464)(SR8465) PAGE: 11 20

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD N-LB132, N-LB133, N-LB134, N-LB135, N-LB136, N-LB137; F-LB131 WAS F-LB1 (SR8464)(SR8465)	JJB 8-29-77	JAB



INACTIVE
EFF THRU SER (SR9114)(SR9115)
2-12-79
HHG

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
N-LB137	22			S-1635-1	SOLDER		
N-LB136	22			S-1635-1	SOLDER		
N-LB135	18			S-1829-1	S-1635-1		
N-LB134	22			SEE N-LB132	SOLDER		
N-LB133	18			S-1635-1	S-1829-1		
N-LB132	18			S-1635-3	S-1367-1-6		
F-LB5	18		65	S1829-1	S1635-1		
F-LB12	22		65	S-1635-1	SOLDER		
F-LB11	22		65	S-1635-1	SOLDER		
F-LB10	22		65	SEE F-LB131	SOLDER		
F-LB131	18		65	S1635-3	S1367-1-6		
F-LB13	8		72	S1635-1	S1829-1		

WIRE TABLE

	PART NO	DESCRIPTION	
8	S2200220W	RESISTOR	
7	S-904-2	POT ASSY	
6	14003 8	TERMINAL BLOCK	
5	S1360-5L	CIRCUIT BREAKER	
4	34004-8-8	TERMINAL BLOCK	
3	S1640-6	HOUSING-PIN	
2	S1641-6	HOUSING-SOCKET	
1	[illegible]	DIMMING ASSY	

EQUIPMENT TABLE

CES 1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES XXXX=CESSNA SPEC. NO
S-XXX OR CMXXXX=CESSNA STD. NO

SUPERSEDES: PG 11 1.0 E 11 1 1

SUPERSEDED BY:

CONTRACT NO.

	NAME	DATE
DESIGN	D.H. HALDEN	4-21-77
GROUP	[illegible]	4-25-77
DRAWN	G.L. RYAN	4-21-77
CHECK	J. YOUNG	4-22-77
STRESS		
PROJ	D.L. HEDRICK	4-26-77
APPD		
OTHER		

Cessna. AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

TITLE: WIRING DIAGRAM — FLOOD, ENGINE INSTR & RADIO DIAL LIGHTS

SIZE: C
CODE IDENT NO: 71379
DWG NO: 1270709

SCALE: NONE
210 P210 (SR8464) (SR8465)
PAGE 1 / 1 21

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-2099-7/GRN(LA103) WAS 66331-5, S-2353-2/LA101 WAS 66332-5 LA106 WAS TO CKT BKR; SEE LA105/LA106 WAS S-1367-1-6 (SR8465)	JJB 8-29-77	
B	BY REV. ADD BLK(LA119), S1637-1-2, S16364 WAS S1367-1-8/LA112 (MER P210 E0688)	BGL 10-25-78	
C	BY REV: ADD DETAIL A & PAGE 11.22.1 (SR9115)	HHG 2-2-79	

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK (LA119)	22	-22-0		S-1635-1	S1367-1-8		
BLK (LA112)	22	-22-0		SOLDER	S-1636-1		
LA111	22			S-1635-1	SOLDER		
LA110	22			S-1635-1	SOLDER		
LA109				SEE LA107	S-1636-1		
LA108				SEE LA107	S-1636-1		
LA107				S-1830-1	S-1370-2		
LA106				SEE LA105	S-1830-1		
LA105	22			S-1367-1-6	S-1370-2	OPT	
MF13	22			S-1635-1	S-1367-1-8	OPT	
GRN (LA103)	22			S-2099-7	S-1636-1		
MF12	22			SOLDER	S-1636-1	OPT	
LA101	22			SEE LA107	S-2353-2	OPT	
MF11	22			SEE LA105	SOLDER	OPT	
MF10	22			S-1635-1	S-1367-1-8	OPT	
BLK (MF9)		BELDEN 8529		SOLDER	S-1636-1		
RED (MF8)		BELDEN 8529		S-1635-1	SOLDER		
MF7				SOLDER	S-1636-1		
MF6				SEE LA105	SOLDER		
MF5				S-1635-1	S-1367-1-8		
BLK (MF4)		BELDEN 8529		SOLDER	S-1636-1		
RED (MF3)		BELDEN 8529		S-1635-1	SOLDER		
MF2				SOLDER	S-1636-1		
MF1	22			SEE LA105	SOLDER	OPT	

WIRE TABLE

	PART NO.	DESCRIPTION	
10	S-2349-1	CONNECTOR	
9	S-2350-1	CONNECTOR	
8	S-1884-2	LIGHT ASSY	
7	11SM42	SWITCH	
6	GE 313	LAMP	
5	S-1831-1	SWITCH	
4	S-1637-1	HOUSING	
3	S-1637-2	HOUSING	
2	S-1360-5L	CIRCUIT BREAKER	
1	1221103-2	LIGHT ASSY	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES:

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	6-20-77
GROUP		6-23-77
DRAWN	SCHIFFELBEIN	6-6-77
CHECK	BORLESKE	6-7-77
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

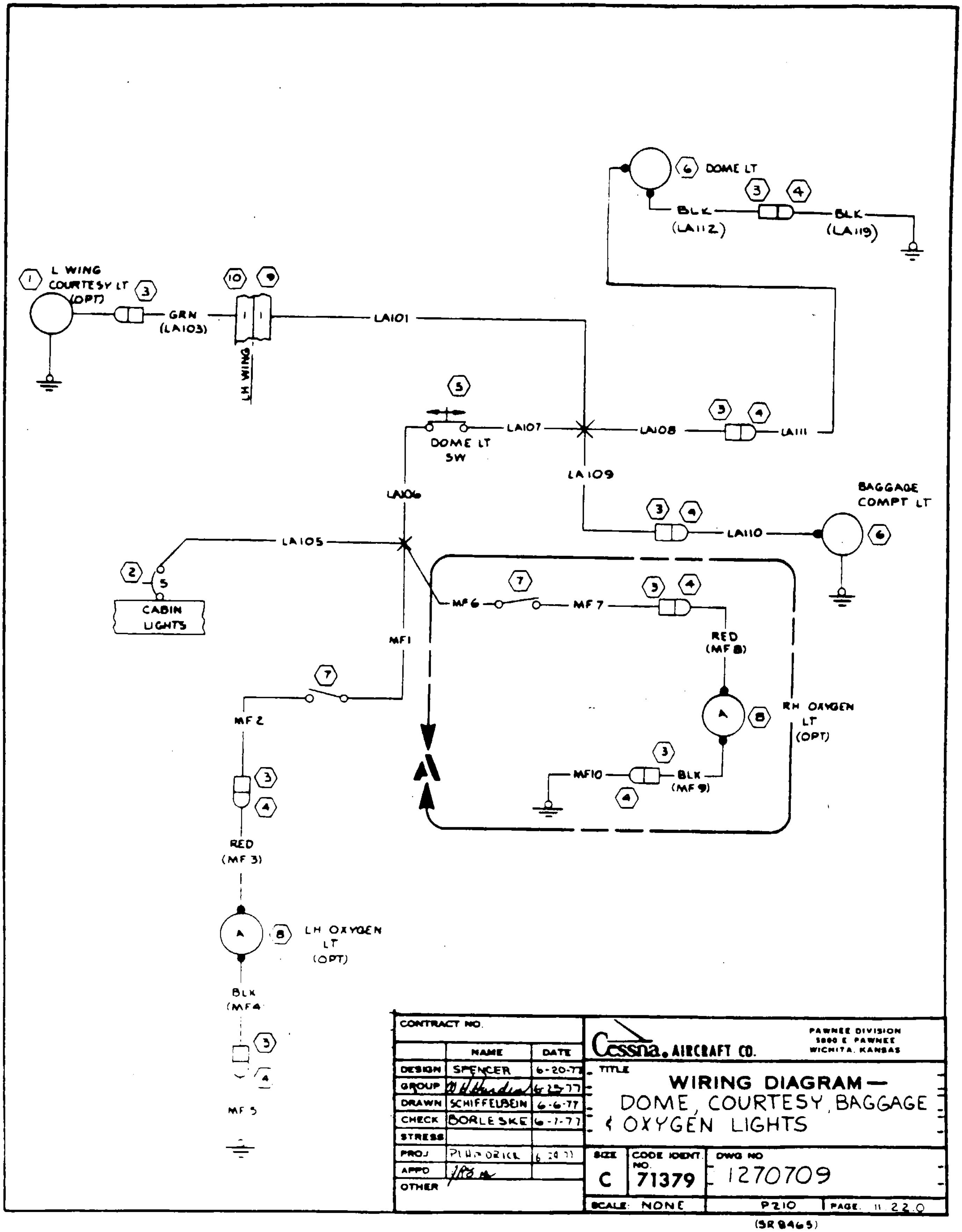
TITLE
WIRING DIAGRAM — DOME, COURTESY, BAGGAGE & OXYGEN LIGHTS

SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709

SCALE: NONE | P210 | PAGE: 11.22.0

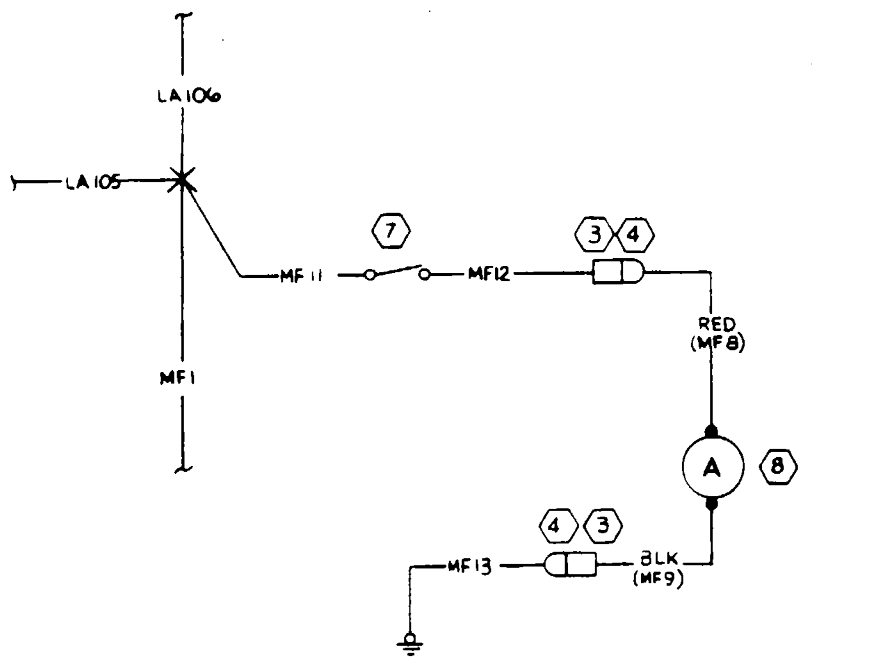
(SR8465)

Dome, Courtesy, Baggage & Oxygen Lights (Sheet 1 of 2)



Dome, Courtesy, Baggage & Oxygen Lights (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
C	SEE P11.22.0 FOR REV.		



DETAIL A
(APPLIES WHEN AIR CONDITIONING OPTION IS INSTALLED)

CONTRACT NO	NAME	DATE
DESIGN	SPENCER	2-5-79
GROUP	W H Hardin	2-10-79
DRAWN	HGHAZARIAN	2-2-79
CHECK	BORLESKE	2-2-79
STRESS		
PROJ		2-13-79
APPD		
OTHER		

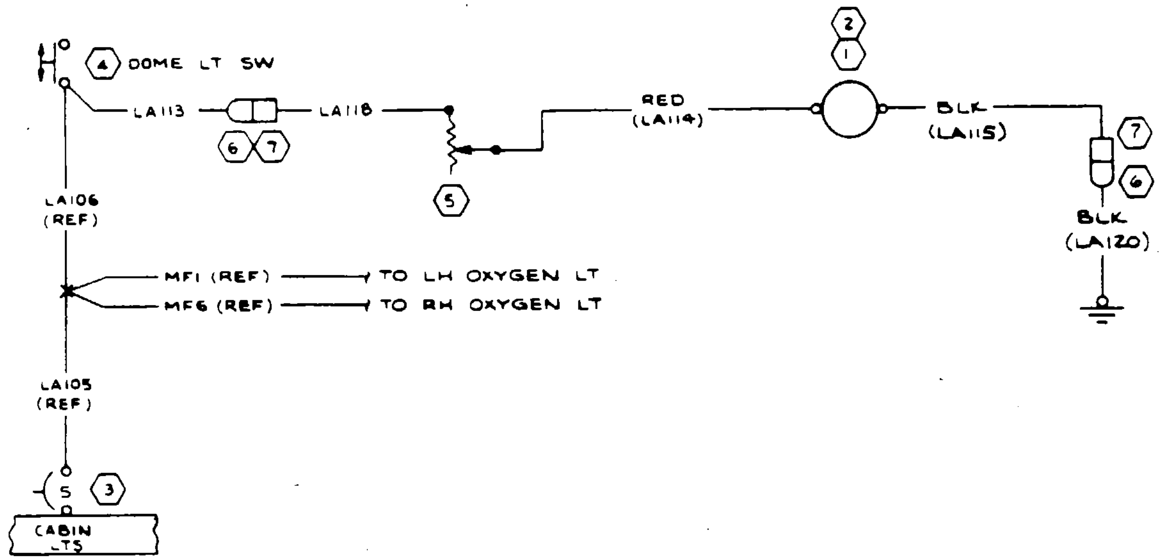
Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM
DOME, COURTESY, BAGGAGE & OXYGEN LIGHTS

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE (SR 9115) PAGE 11.22.1

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD LA118 S-1637-1 & S-1637-2, XR-6479 WAS R-12Y2 (SR8465) (REF)	DLP 12-9-77	JAB
B	BY REV: ADD BLK (LA120) S1637-1&2 S-1636-1 WAS S-1367-1-8/LA115 (MER P210 80 688)	BGL 10-25-78	JAB



BLK (LA120)	22	-22-0		S-1635-1	S-1367-1-6	
LA118	22			S-1636-1	SOLDER	
BLK (LA115)	22	-22-0		S-1367-1-6	S-1636-1	
RED (LA114)	22	-22-2		SOLDER	S-1367-1-6	
LA113	22			S-1830-1	S-1635-1	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	
7	S-1637-2	HOUSING	
6	S-1637-1	HOUSING	
5	XR6479	RHEOSTAT	175 Ω
4	S-1831-1	SWITCH	
3	S-1360-5L	CKT BKR	
2	GE-495	BULB	
1	2393	LIGHT ASSY	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES

SUPERSEDED BY

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	6-20-77
GROUP		6-23-77
DRAWN	PAPE	6-7-77
CHECK	BORLESKE	6-7-77
STRESS		
PROJ		6-21-77
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

TITLE
WIRING DIAGRAM — FLOOD LIGHT (OPTIONAL)

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE P210 PAGE: 11 23

(SR8465)

1▷ TERMINATE VENDOR FURNISHED WIRES WITH S-1685-1
2▷ TERMINATE VENDOR FURNISHED WIRES WITH S-1367-1-8
3▷ TERMINATE VENDOR FURNISHED WIRE W/S1636-1

0100015-00-0316

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD BLK TO(N-LB141) (SR8464)(REF)(SR8465)(REF)	LS6 8-10-78	JAB
B	BY REV: ADD BLK(LB88)(REF), WHT(REF) WAS BLK(REF), BLK(REF) WAS WHT(REF) LB103 WAS RED LB103, LB104 WAS RED LB104, S-1370-1 WAS S-1636-1 MER 210E0667	HHG 3-21-79	JRG
	BY REV: ADD 2315-1, GE1495, F-LB146, N-LB147, BLK(FN-LB148), DETAIL 'A'. (SR9114)(SR9115)	MDR 4-6-79	EJF
C	BY REV: ON DETAIL A SER(SR9556) & ON WAS SER(SR9114)(SR9115) & ON (SR9556)	WHH 1-28-81	JAB
D	BY REV: ADD DETAIL B. ADD-LB155 THRU-LB162 WIRES. ADD RED(1), RED(2) BLK(1) & BLK(2) WIRES. ADD POST LTS FOR TACH, TWO RADIO IND. & SECOND ALT. AS STANDARD (SR9953)(SR9954)	WHH 3-24-81	
G	SEE PAGE 11.24.1 FOR REVISION		

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK(2)	22	-22-0		SOLDER	SOLDER	SER(SR9953)(SR9954) & ON	
BLK(1)		-22-0		S-1636-1	SOLDER		
RED(2)		-22-2		SOLDER	SOLDER		
RED(1)		-22-2		S1636-1	SOLDER	SER(SR9953)(SR9954) & ON	
N-LB162				S-1635-1	S1367-1-8	SER(SR9554) THRU SER(SR10102)	
F-LB161				S-1635-1	S1367-1-8	SER(SR9553) THRU SER(SR10101)	
N-LB160				S-1829-1	S-1635-1	SER(SR9554) & ON	
F-LB159				S-1829-1	S-1635-1	SER(SR9553) & ON	
N-LB158				S1636-1	S1367-1-8	SER (SR9554) THRU SER (SR10102)	
F-LB157				S1636-1	S1367-1-8	SER (SR9553) THRU SER (SR10101)	
N-LB156				S-1829-1	S-1635-1	SER(SR9554) & ON	
F-LB155	22			S-1829-1	S-1635-1	SER(SR9553) & ON	
BLK FN-LB148	22	-22-0		S-1636-1	S-1367-1-8	(OPT)	SER(SR9556) & ON
N-LB147	22			S-1636-1	S-1829-1	(OPT)	SER(SR9556) & ON
F-LB146	22			S-1636-1	S-1829-1	(OPT)	SER(SR9556) & ON
BLK N-LB141	22	-22-0		S-1635-1	S-1367-1-8		THRU SER(SR10101)(SR10102)
N-LB130				S-1636-1	S-1829-1		
N-LB129				S-1636-2	S-1829-1		
LB105				S-1829-1	S-1635-1		
LB104				SOLDER	S-1636-1		
LB103				SOLDER	S-1370-1		
F-LB102				S-1636-2	S-1829-1		
F-LB101				S-1635-1	S-1367-1-8		THRU SER(SR10101)(SR10102)
F-LB100	22			S-1829-1	S-1636-1		

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION
18	S2527-2	GND CONNECTOR
17	S2527-1	LH GND BLOCK
16	2113026	COVER ASSY-RH
15	1513837	POST LT. ASSY
14	2113025	COVER ASSY LH
13	GE1495	BULB
12	2315-1	LIGHT ASSY
11	34004-818	TERMINAL BLOCK
10	1213319	LIGHT ASSY
9	S-1695-2	SWITCH
8	S-1637-2	HOUSING
7	S-1637-1	HOUSING
6	34003-817	TERMINAL BLOCK
5	S-2035-2	HOUSING - PLUG
4	S-2035-1	HOUSING - CAP
3	C660501	COMPASS ASSY
2	MS15584-16	MINIATURE LAMP
	05-3208	SOCKET

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: PAGE

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	12-1-77
GROUP	W. Hudson	3-17-78
DRAWN	G. MOTYKO	11-28-77
CHECK	BORLESKE	11-29-77
STRESS		
PROJ	PLHBDRICK	3-21-78
APPD	JRS	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

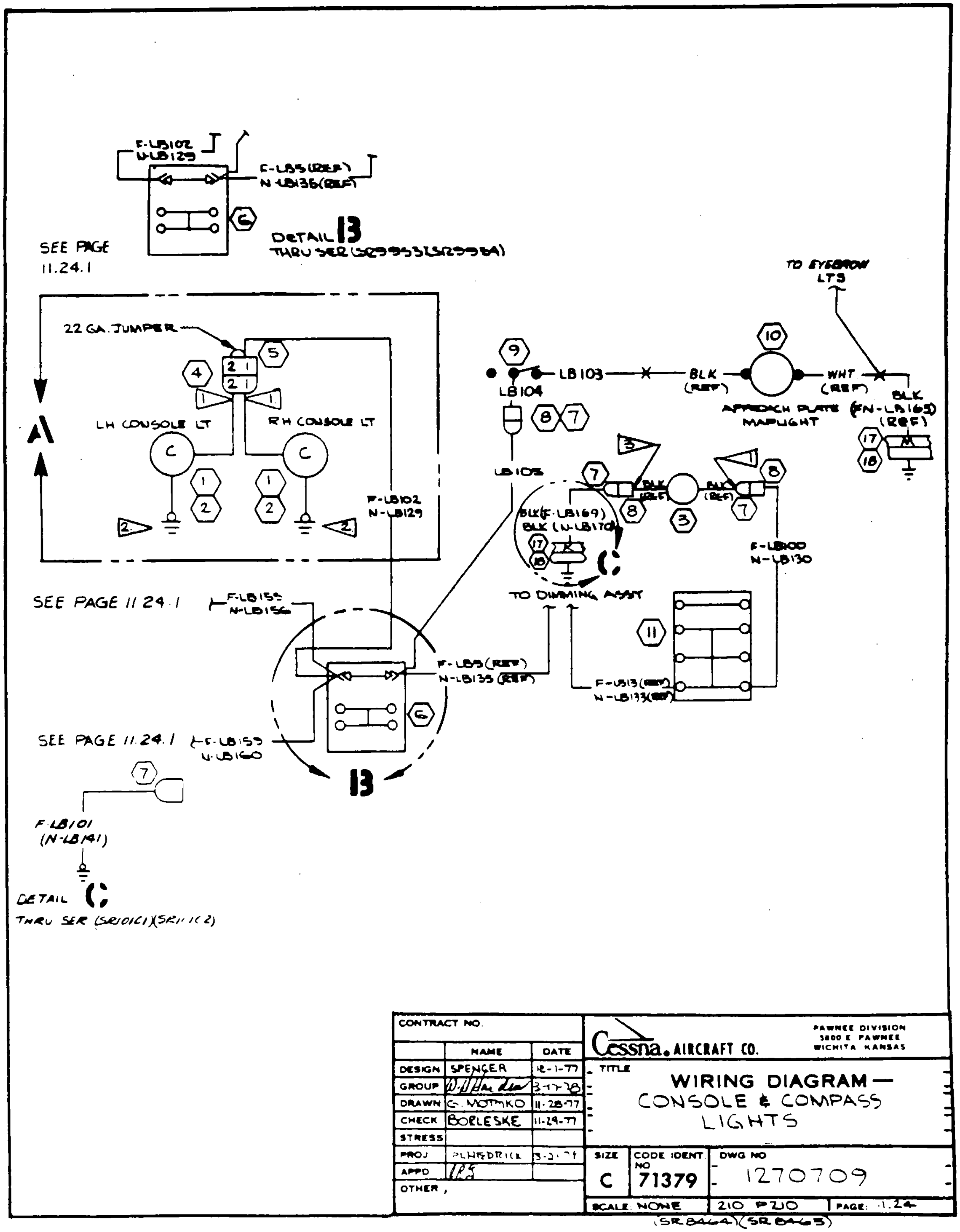
TITLE: WIRING DIAGRAM — CONSOLE & COMPASS LIGHTS

SIZE C | CODE IDENT. NO. 71379 | DWG NO 1270709

SCALE: NONE | 210 P210 | PAGE: 11.24.C

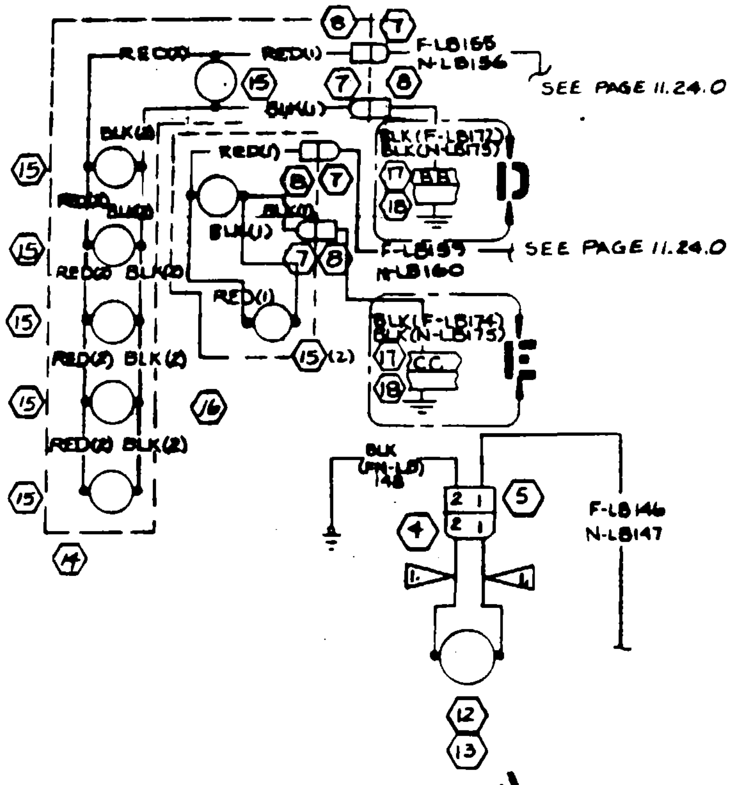
(SR8464)(SR8465)

Console & Compass Lights (Sheet 1 of 2)

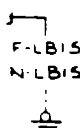


Console & Compass Lights (Sheet 2 of 2)

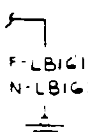
REVISION			
LTR	DESCRIPTION	DATE	APPD
E	BY REV: ADD 1513837(4) & PAGE 11.24.1 (SR9953)(SR9954)	MKT 8-18-81	
F	BY REV ADD DETAIL C, BLK(F-LB169), BLK(N-LB170), SER OUT BLK(N-LB141), F-LB101; ADD S2527(-1-2), C660501 WAS C660501-0102 (SR10101)(SR10102)	MKT 1-27-82	
G	BY REV: ADD DETAIL D & E (SR10101)(SR10102)	GLS 6-28-82	



DETAIL A
SER(SR9656)& ON
(APPLIES WITH OPTIONAL AIR CONDITIONING)



DETAIL D
THRU SER (SR10101)(SR10102)



DETAIL E
THRU SER (SR10101) (SR10102)

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
BLK (N-LB175)	22	-22-0		S-1636-1	S-2099-4	SER(SR10102) & ON
BLK (F-LB174)	22	-22-0		S-1636-1	S-2099-4	SER(SR10101) & ON
BLK (N-LB173)	22	-22-0		S-1636-1	S-2099-4	SER(SR10102) & ON
BLK (F-LB172)	22	-22-0		S-1636-1	S-2099-4	SER(SR10101) & ON
BLK (F-LB169)	22	-22-0		S-1635-1	S-2099-4	SER(SR10101) & ON
BLK (N-LB170)	22	-22-0		S-1635-1	S-2099-4	SER(SR10102) & ON

WIRE TABLE

CONTRACT NO:			Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS
	NAME	DATE	TITLE WIRING DIAGRAM — CONSOLE & COMPASS LIGHTS
DESIGN			
GROUP		8-24-81	
DRAWN	M.THOMPSON	8-18-81	
CHECK	BORLESKE	8-24-81	
STRESS			
PROJ		8-24-81	SIZE C · CODE IDENT NO 71379 · DWG NO 1270709
APPD			
OTHER			SCALE NONE · 210 P210 · PAGE 11.24

ITEM NO.	PART NO.	DESCRIPTION
	EQUIPMENT TABLE	

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES:

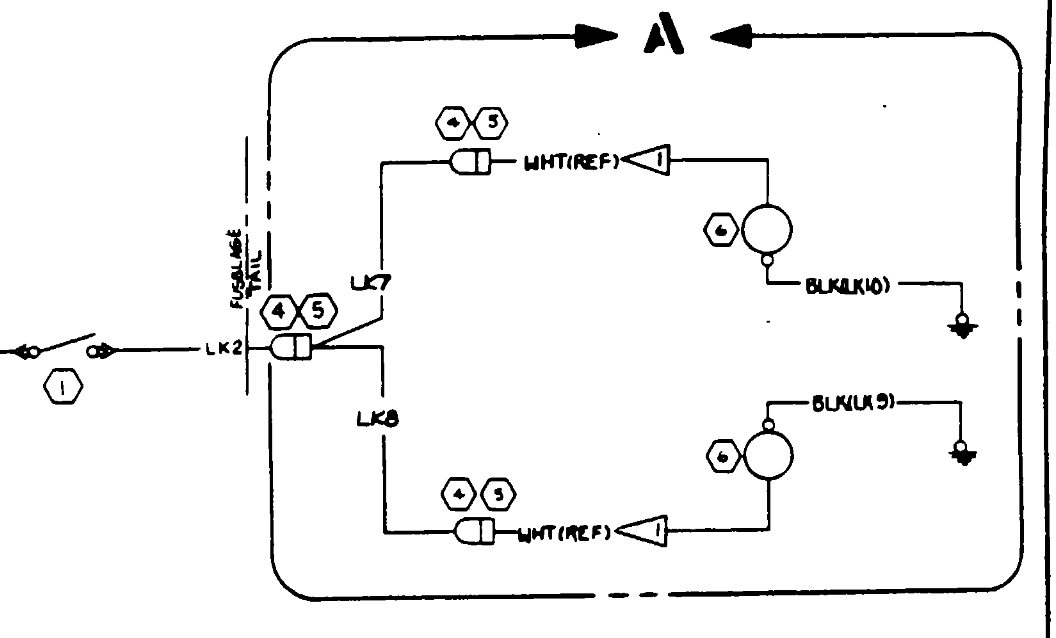
SUPERSEDED BY:

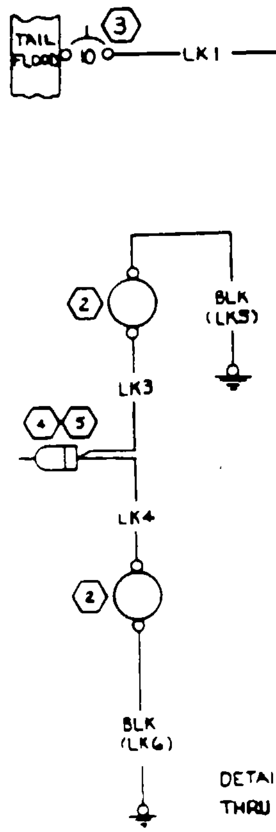
01 00916 02 00916

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD NOTE 1, DETAIL "A", LK7 & LK8 BLK(LK9) & BLK(LK10) (SR9884)	DOC 4-9-80	

NOTES:

1. INSTALL S-1636-1 ON VENDOR WIRE





DETAIL A
THRU SER(SR9884)

15-0916
14-0916

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS	
BLK(LK10)	18	-18-0		S-1367-1-4	S-1367-1-8		SER(SR9884)(ON (ALL SPARES)	
BLK(LK9)		-18-0		S-1367-1-4	S-1367-1-8			
LK8				S-1635-1	SEE LK7			
LK7				S-1635-1	S-1636-3		SER(SR9884)(ON (ALL SPARES)	
BLK(LK6)		-18-0		S-1367-1-6	S-1367-1-8		THRU SER(SR9884)	
BLK(LK5)		-18-0			S-1367-1-8			
LK4					SEE LK3			
LK3				S-1367-1-6	S-1636-3		THRU SER(SR9884)	
LK2				S-1493-1	S-1635-1			
LK1	18			S-1367-1-6	S-1493-1			

WIRE TABLE

6	00033092	LIGHT ASSY	
5	S-1637-2	HOUSING	
4	S-1637-1	HOUSING	
3	S-1360-10L	CKT BKR	
2	00033051	LIGHT ASSY	
1	S-2160-1	SWITCH	
	PART NO.	DESCRIPTION	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES:

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	2-14-79
GROUP		3-5-79
DRAWN	H. GHAZARIAN	2-9-79
CHECK	BOLESKE	2-12-79
STRESS		
PROJ		
APPD		
OTHER		

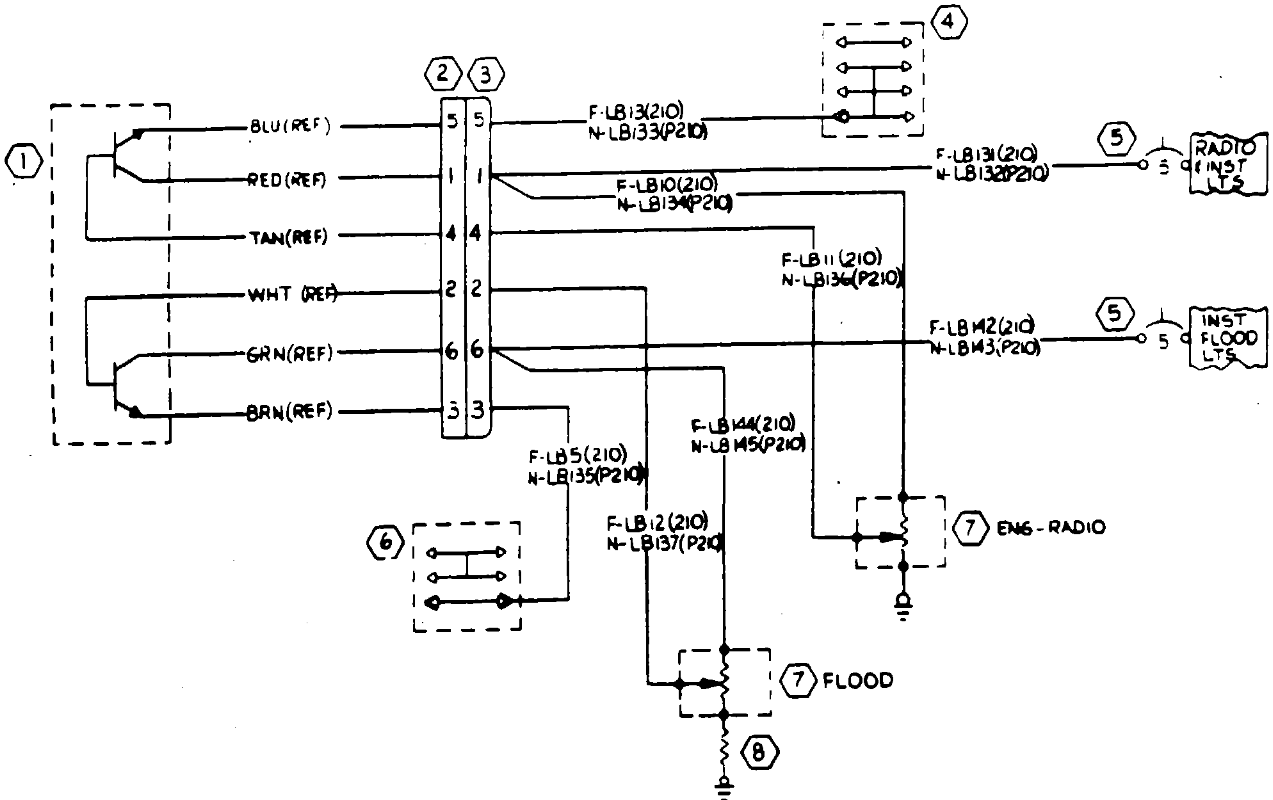
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — VERTICAL TAIL ILLUMINATION LIGHT (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709

SCALE: NONE (SR9114)(SR9115) PAGE: 11.25

REVISION			
LET	DESCRIPTION	DATE	APPD



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
N-LB137	22			S-1635-1	SOLDER	
F-LB12	22			S-1635-1	SOLDER	
N-LB135	18			S-1829-1	S-1635-1	
F-LB5	18			S-1829-1	S-1635-1	
N-LB136	22			S-1635-1	SOLDER	
F-LB11	22			S-1635-1	SOLDER	
N-LB134	22			SEE N-LB132	SOLDER	
F-LB10	22			SEE F-LB131	SOLDER	
N-LB132	18			S-1635-3	S-1367-1-6	
F-LB131	18			S-1635-3	S-1367-1-6	
N-LB133	18			S-1635-1	S-1829-1	
F-LB13	18			S-1635-1	S-1829-1	
N-LB145	22			SEE N-LB143	SOLDER	
F-LB144	22			SEE F-LB142	SOLDER	
N-LB143	18			S-1635-3	S-1367-1-6	
F-LB142	18			S-1635-3	S-1367-1-6	

WIRE TABLE

	PART NO.	DESCRIPTION	
8	S2000020W	RESISTOR	
7	S1904-2	POT ASSY	
6	34003-817	TERMINAL BLOCK	
5	S-1360-5L	CIRCUIT BREAKER	
4	34004-818	TERMINAL BLOCK	
3	S-1640-6	HOUSING-PIN	
2	S-1641-6	HOUSING-SOCKET	
1	1570166	DIMMING ASSY	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXX=CESSNA STD. NO.

SUPERSEDES: P 11.21

SUPERSEDED BY:

CONTRACT NO.

	NAME	DATE
DESIGN	SPENCER	2-14-79
GROUP		3-2-79
DRAWN	WGHAZARIAN	2-12-79
CHECK	BORLESKE	2-12-79
STRESS		
PROJ		3-1-79
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE

WIRING DIAGRAM—
FLOOD, ENGINE INST & RADIO LIGHTS

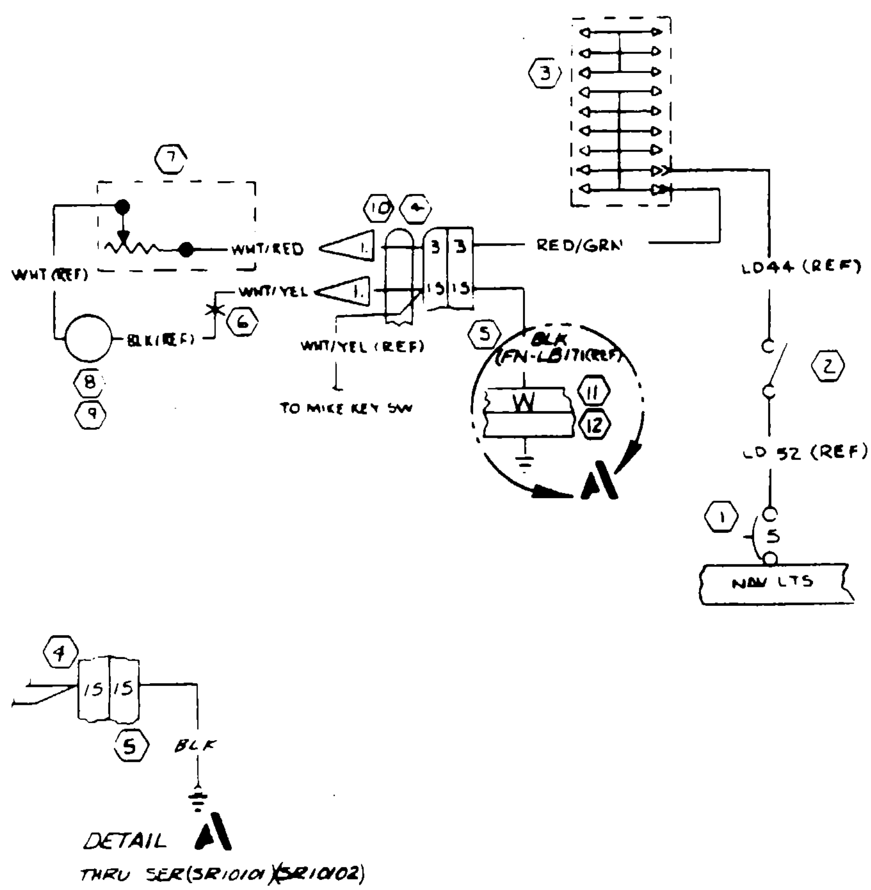
SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709

SCALE: NONE (SR 9114) (SR 9115) PAGE: 11.26

NOTES:

1. MATERIAL IS RCFS130B COIL CORD VENDOR CODE (096906)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV ADD DETAIL "A"; S2527-1-2 BLK (FN-LB171) SER OUT BLK (SR10101)(SR10102)	MKT 1-27-82	JAB ORS



01-00916 02-00916

BLK (FN-LB-71)	22	-22-0		S-1963-2	S2099-4		SER (SR10101)(SR10102) & ON
BLK	22	-22-0		S-1963-2	S-1367-1-8		THRU SER (SR10101)(SR10102)
WHT/YEL	24	1		S-1370-1	S-1963-3		
WHT/RED	24	1		S-1963-3	SOLDER		
RED/GRN	22	-22-2-5		S-1829-1	S-1963-2		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

12	S2527-2	GND CONNECTOR
11	S2527-1	LH GND BLOCK
10	2270030	CABLE ASSY
9	24RB	LAMP
8	4157-001	SOCKET
7	1859A161 152A	RHEOSTAT
6	S-1370-1	SPLICE
5	S-1962-2-C	HOUSING
4	S-1962-1-C	HOUSING
3	34003-817	TERMINAL BLOCK
2	S-2160-1	SWITCH
1	S-1360-5L	CIRCUIT BREAKER
ITEM NO	PART NO.	DESCRIPTION

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: P 120

SUPERSEDED BY:

CONTRACT NO.

	NAME	DATE
DESIGN	S. STAMM	3/10/81
GROUP	D. Handen	3-20-81
DRAWN	S. STAMM	3/10/81
CHECK	RE HAIR	3-1-81
STRESS		
PROJ	[illegible]	3-2-81
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA KANSAS

TITLE: WIRING DIAGRAM — MAP LIGHT, CONTROL WHEEL

SIZE: C | CODE IDENT NO: 71379 | DWG NO: 1270709

SCALE: NONE (SR9953)(SR9954) PAGE: 11.27

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD N-GD 36 & N-GD37; F-GD21 WAS GD-21 F-GD30 WAS GD30 (SR8464)(SR8465)	JJB 8-29-77	JAB [illegible]

NOTES:

1. INSTALL 1270717 DIODE ASSY WITH SYMBOL POINTING TOWARD POSITIVE TERMINAL ON MOTOR

INACTIVE
THRU SER (SR8784)(SR8785)
2-28-78
JAB [illegible]

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS			SERIALS
GD37	22			S-1367-1-6	S-1367-1-6		
GD36	22			S-1367-1-6	SOLDER		
GD35	22			S-1370-1	S-1370-1		
GD34	22			S-1367-1-6	S-1370-1		
GD33	22			S-1367-1-6	S-1370-1		
GD21	22			S-1367-1-6	S-1367-1-6		
GD17	22			S-1367-1-6	S-1367-1-6		
TAN (GPS)	22	-22-10		S-1635-1	S-1370-1		
GD4	12			S-1367-3-10	S-1367-3-8		
GD3	12			S-1367-3-10	S-1367-3-13		
GE4	22			SOLDER	SOLDER		
GE2	22			SOLDER	SOLDER		
GE1	22			SOLDER	S-1367-1-8		
GE8	12			S-1367-3-13	S-1367-3-13		
GE9	22			S-1367-1-8	SOLDER		
GE10				SOLDER	SOLDER		
GE11				SOLDER	SOLDER		
GD25				S-1367-1-8	S-1636-1		
GD26				S-1367-1-8	S-1367-1-6		
GD27				S-1367-1-6	S-1370-1		
GD28				S-1367-1-6	SOLDER		
GD29				S-1367-1-6	S-1367-1-10		
GD30				S-1367-1-6	SOLDER		
GD31				SOLDER	S-1636-1		
GD32	22			SEE GD27	S-1636-1		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
18	1280800	POWER PACK ASSY	
16	VM920M-3	LIGHT	
15	VM911M-4A	LIGHT	
14	1N2070	DIODE	
13	S-2313-1	SWITCH	
12	S-1638-2	HOUSING	
11	1280840	PRESSURE SW	
10	S-1638-3	HOUSING	
9	1280830	SOLENOID	
8	1270717	DIODE ASSY	
7	MS27212-3	TERMINAL BOARD	
6	MS27212-1-6	TERMINAL BOARD	
5	1280811	MOTOR	
4	S-1377-1	SWITCH	
3	1270034	SQUAT SW	
2	S-1232-30	CKT BKR	
1	S-1360-5L	CKT BKR	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: P 2.2.0

SUPERSEDED BY: 1270709 P 12.4.0 & 12.4.1

CONTRACT NO.

	NAME	DATE
DESIGN	SPENCER	6-20-77
GROUP	[illegible]	6-23-77
DRAWN	PAPE	6-6-77
CHECK	BORLESKE	6-7-77
STRESS		
PROJ	[illegible]	
APPD	[illegible]	
OTHER		

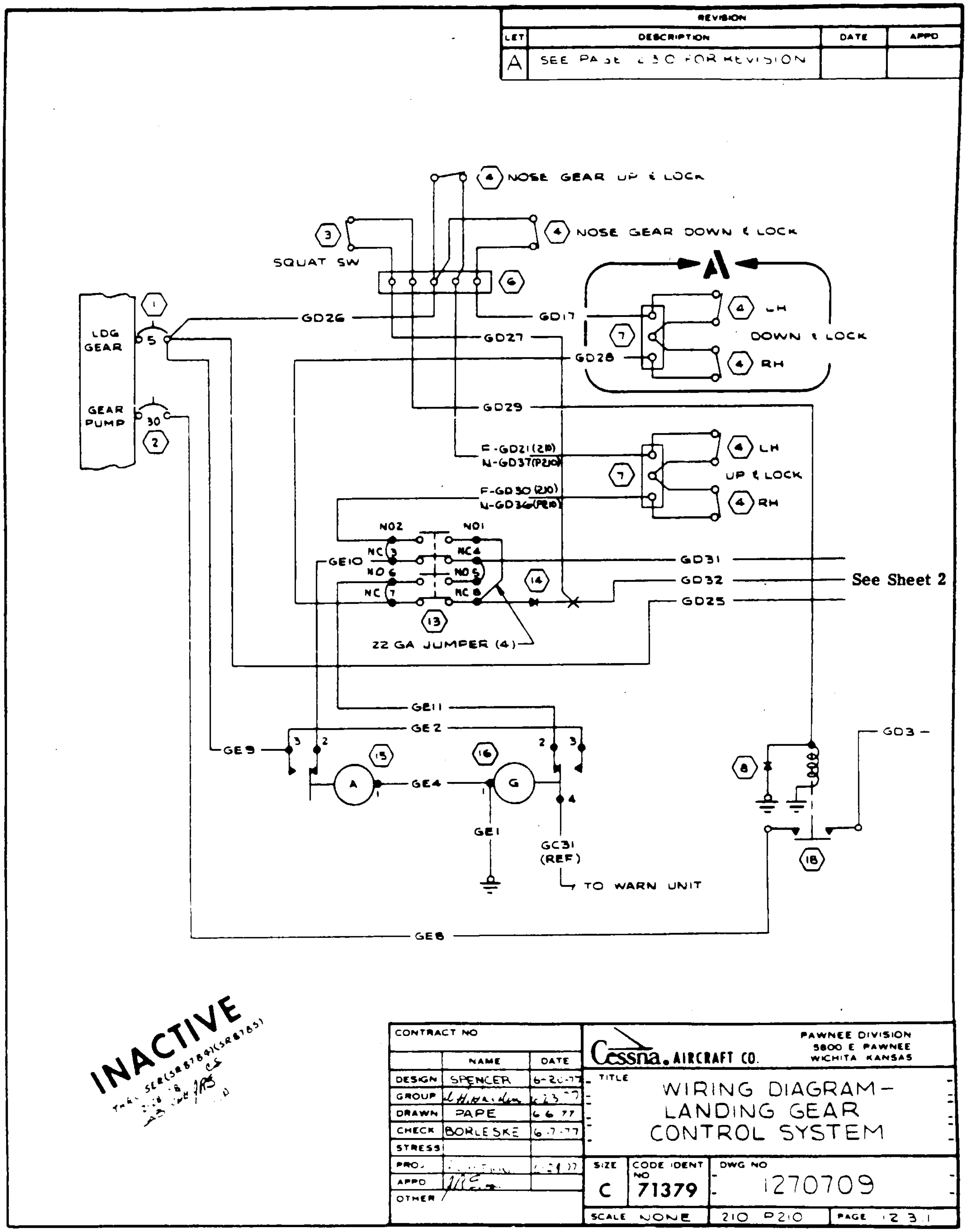
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

TITLE: WIRING DIAGRAM — LANDING GEAR CONTROL SYSTEM

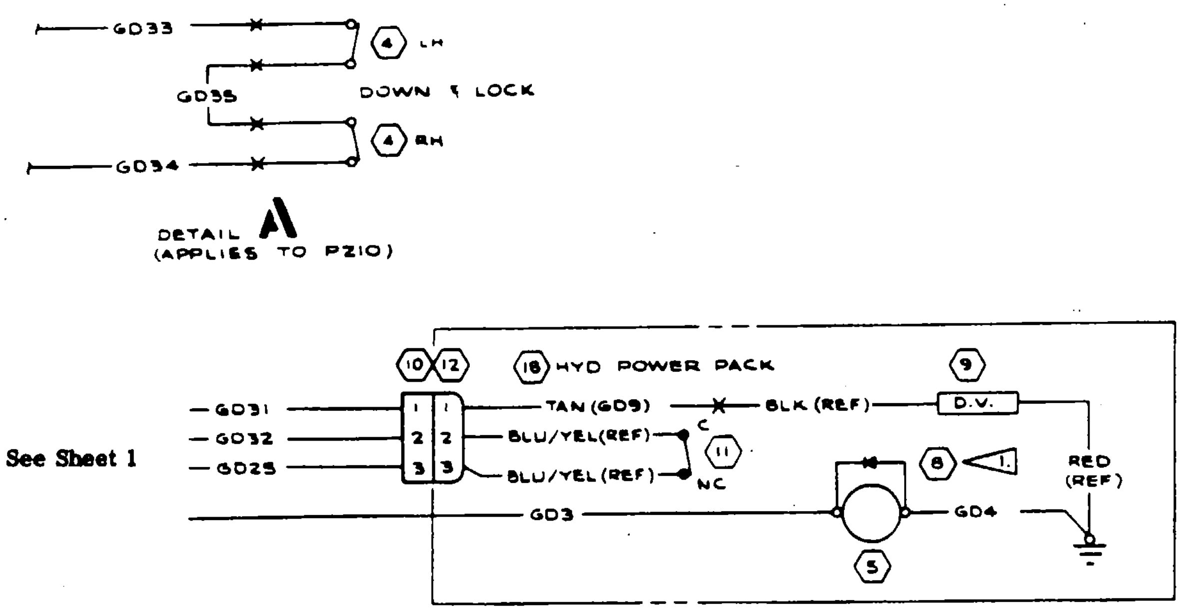
SIZE: C | CODE IDENT. NO: 71379 | DWG NO: 1270709

SCALE: NONE | 210 P210 | PAGE: 2.3.0

(SR8464, (SR8465)



Landing Gear Control System (Sheet 1 of 2)



INACTIVE
THRU SER(SR8784)(SR8785)
2-28-78

CONTRACT NO			Cessna AIRCRAFT CO. — PAWNEE DIVISION, 5800 E PAWNEE, WICHITA, KANSAS		
	NAME	DATE	TITLE		
DESIGN	SPENCER	6-20-77	WIRING DIAGRAM – LANDING GEAR CONTROL SYSTEM		
GROUP		6-23-77			
DRAWN	PAPE	6-6-77			
CHECK	BORLESKE	6-7-77			
STRESS					
PROJ			SIZE C	CODE IDENT NO 71379	DWG NO 1270709
APPD					
OTHER			SCALE NONE	210 P210	PAGE 12.3.1

Landing Gear Control System (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: 670034 WAS 1270717; S-1367-3-12 WAS S-1367-1-12/GA1 MER 210E0736 (NOW SHOP PRACTICE)	HHG 3-15-79	
B	BY REV: MS27212-1-7 WAS MS27212-1-6, 1270717 WAS 1670034 (SR8863)(REF)	MDR 6-22-79	
C	BY REV: ADD DETAIL "B", NOTE 5, GD49, GD50 & 9880710 (SR9738) S-1367-1-6 WAS S-1367-1-8/ GE9 & GD26 (NOW SHOP PRACT)	RAO 12-19-79	
D	BY REV: REACTIVATE DRAWING (SR9634)(REF)(SR9635)(REF) 9881141 WAS 9881128 (SR 9828)	DFS 9-25-80	
E	BY REV: ADD DETAIL "C" & S1232-35 (SR10122)	GW 2-13-81	
F	BY REV: ADD DETAIL "D" & GA3 (SR10254)	TMS 10-24-81	

NOTES:

1. SYSTEM SHOWN WITH LANDING GEAR DOWN & LOCKED ACFT ON GROUND & POWER OFF

2. PRESSURE SWITCH OPENS WHEN GEAR IS UP & HYDRAULIC PRESSURE BUILDS UP TO PROPER LEVEL

3. INSTALL 1270717 DIODE ASSY WITH MARKING BAND ON DIODE TO POSITIVE TERMINAL ON PUMP MOTOR

4. TERMINATE VENDOR FURNISHED WIRES WITH S-1636-1

5. USE S-1694-5-0.8 SHRINKABLE TUBING OVER S-1830-1 TERMINAL

INACTIVE THRU SER (SR10101)(SR10102) 1-27-82

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
GA3	10	S-1562-10-9		S-1367-3-12	S-1367-3-8		SER(SR10254) & ON
GA2	10	S-1562-10-9		S1367-3-13	S1367-3-12		SER(SR10122) & ON
GE10	10	S-1562-10-9		S1367-3-13	S1367-3-8		SER(SR10122) & ON
GD46	22			S-1367-1-6	S-1367-1-6		
GD45				S-1367-1-6	SOLDER		
GD44				S-1367-1-6	S-1367-1-6		
GD43				S-1367-1-6	S-1367-1-6		
GD42				SOLDER	S-1370-1		
GD41				S-1367-1-6	SOLDER		
GD40	22			S-1367-1-6	SOLDER		
GA1	12			S-1367-3-13	S-1367-3-12		THRU SER(SR10122)
BLU/YEL GD50	22	-22-6-4		S-1636-1	S-1830-1	5	SER (SR9738) & ON
BLU/YEL GD49	22	-22-6-4		S-1636-1	S-1830-1	5	SER (SR9738) & ON
GD48	22			S-1367-1-6	S-1367-1-6		
GD47	22			S-1367-1-6	S-1367-1-6		
GD39	22			S-1635-1	S-1367-1-6		
GD38				S-1367-1-6	S-1635-1		
GD35				S-1370-1	S-1370-1		
GD33				S-1367-1-6	S-1370-1		
GD29				S-1367-1-6	S-1367-1-10		
GD26				S-1367-1-6	S-1367-1-6		
GD17				S-1367-1-6	S-1367-1-6		
GE9	22			S-1367-1-6	SOLDER		
GE8	12			S-1367-3-13	S-1367-3-13		THRU SER(SR10122)
GE4	22			SOLDER	SOLDER		
GE2	22			SOLDER	SOLDER		
GE1	22			SOLDER	S-1367-1-8		THRU SER(SR10101)(SR10102)

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	
17	S1232-35	CIRCUIT BREAKER	
16	9880710	PRESSURE SWITCH	2
15	YZ-2RN7T	SWITCH	
14	9881141	MOTOR	
13	1270717	DIODE ASSY	
12	S-15[illegible]	POWER PACK CONT	
11	VM920M-3	LIGHT	
10	VM911M-4A	LIGHT	
9	MS27212-1-3	TERMINAL BOARD	
8	MS27212-1-7	TERMINAL BOARD	
7	S-13[illegible]	SWITCH	
6	1270034	SQUAT SWITCH	
5	9880700	PRESSURE SWITCH	2
4	S-1637-1	HOUSING	
3	S-1637-2	HOUSING	
2	S-1232-30	CIRCUIT BREAKER	
1	S-1360-5L	CIRCUIT BREAKER	

EQUIPMENT TABLE

CES 1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES 1270709 P123.0 & 123.1

SUPERSEDED BY 1270709 P126.0 P126.1

CONTRACT NO.

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

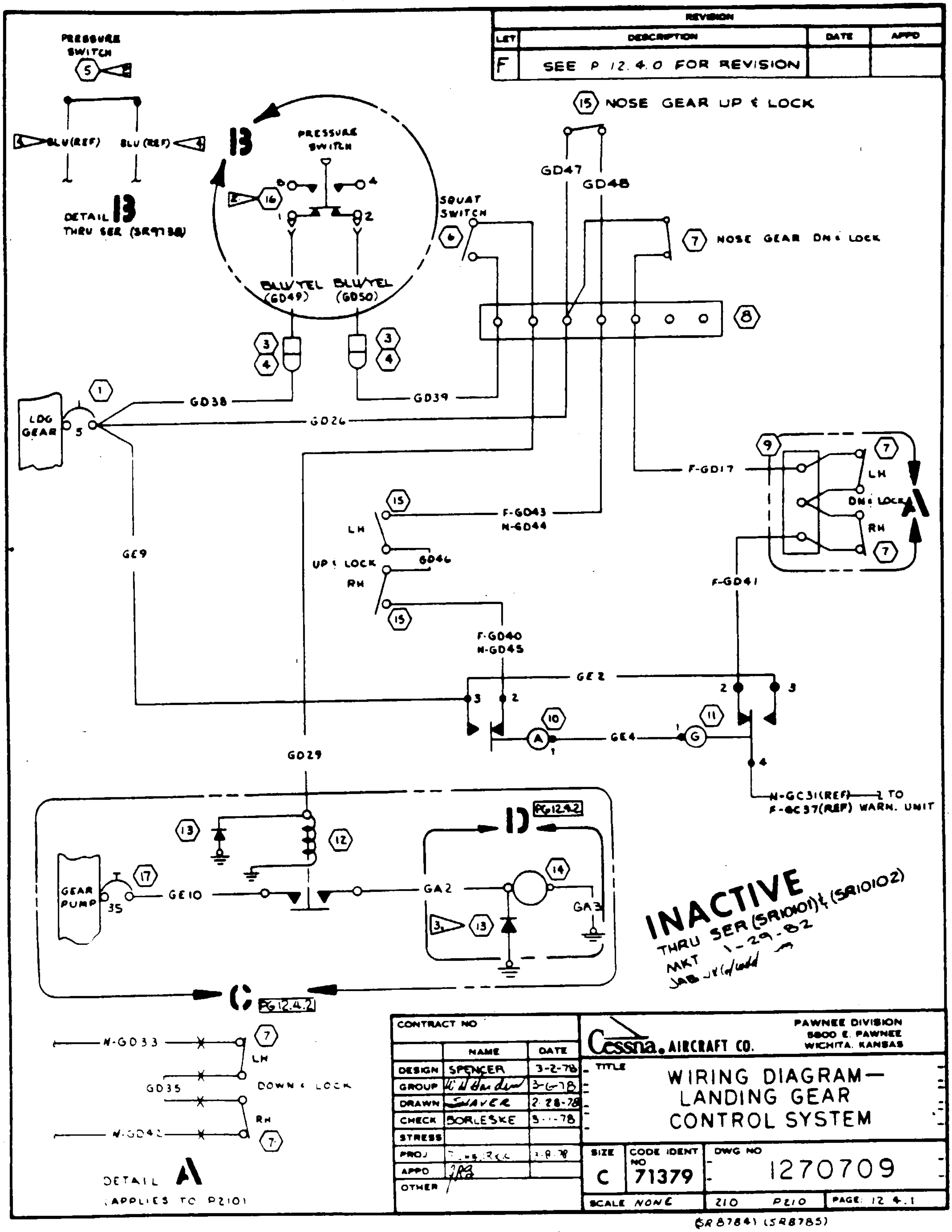
	NAME	DATE
DESIGN	SPENCER	3-2-78
GROUP	[illegible]	3-6-78
DRAWN	SHAYER	2-28-78
CHECK	BORESKE	3-1-78
STRESS		
PROJ	PUHEDRICK	3-8-78
APPD	[illegible]	
OTHER		

TITLE
WIRING DIAGRAM — LANDING GEAR CONTROL SYSTEM

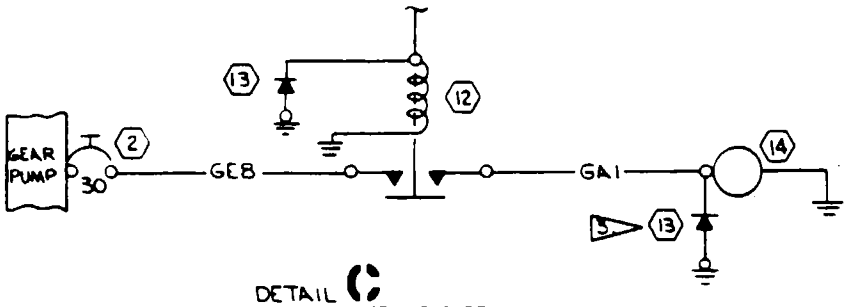
SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

SCALE NONE | 210 P210 | PAGE: 124.0

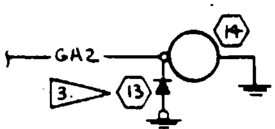
(SR8784)(SR8785)


REVISION
LET | DESCRIPTION | DATE | APPD
F | SEE P 12.4.0 FOR REVISION
PRESSURE SWITCH
BLU(REF)
BLU (REF)
DETAIL B
THRU SER (SR9738)
PRESSURE SWITCH
BLU/YEL (GD49)
BLU/YEL (GD50)
SQUAT SWITCH
NOSE GEAR UP & LOCK
GD47
GD48
NOSE GEAR DN & LOCK
LDG GEAR
GD38
GD26
GD39
GE9
F-GD17
LH
DN & LOCK
RH
F-GD43
N-GD44
LH
UP & LOCK
RH
GD46
F-GD41
F-GD40
N-GD45
GE2
GE4
GD29
N-GC31(REF) TO
F-GC37(REF) WARN. UNIT
PG 12.4.2
GEAR PUMP
35
GE10
GA2
GA3
INACTIVE
THRU SER (SR10101) & (SR10102)
MKT 1-29-82
PG 12.4.2
N-GD33
LH
GD35
DOWN & LOCK
RH
N-GD42
DETAIL A
(APPLIES TO P210)
CONTRACT NO
NAME | DATE
DESIGN | SPENCER | 3-2-78
DRAWN | SHAVER | 2-28-78
CHECK | BORLESKE | 3-·-78
STRESS
PROJ
APPD
OTHER
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS
TITLE
WIRING DIAGRAM—
LANDING GEAR
CONTROL SYSTEM
SIZE C
CODE IDENT NO 71379
DWG NO 1270709
SCALE NONE
210 P210
PAGE 12.4.1
(SR8784) (SR8785)

REVISION			
LET	DESCRIPTION	DATE	APPD
F	SEE PAGE 12.4.0 FOR REVISION		



DETAIL C
EFF THRU SER (SR10122)



DETAIL D
EFF THRU SER (SR10254)

INACTIVE
THRU SER (SR10101) & (SR10102)
MKT 1-29-82
JAB

02 00916
01-00916

CONTRACT NO			Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS
	NAME	DATE	TITLE WIRING DIAGRAM — LANDING GEAR CONTROL SYSTEM
DESIGN			
GROUP			
DRAWN	WHITSON	2 13 81	
CHECK	BORLEKE	2-17-81	
STRESS			SIZE C · CODE IDENT NO 71379 · DWG NO 1270709
PROJ			
APPD		3-3-81	
OTHER			SCALE NONE · (SR10122) · PAGE 12.4.2

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: GE13 WAS GE9, GD67 WAS GD26 & GD68 WAS GD38 (SR10101)(SR10102)	WHH 4-22-82	
B	BY REV: MS27212-1-8 WAS MS27212-1-7 OBSOLETE GD64 & GD65 WIRES REVISE DETAIL A. ON GD63 WIRE. S1367-1-6 WAS S1370-1. ADD NOTE 5. ADD N-GD69 WIRE. (SR10101)(SR10102)	GCS WHH 6-30-82	

NOTES:
1. SYSTEM SHOWN WITH LANDING GEAR DOWN & LOCKED, ACFT ON GROUND, & POWER OFF
2. PRESSURE SWITCH OPENS WHEN GEAR IS UP & HYDRAULIC PRESSURE BUILDS UP TO PROPER LEVEL
3. INSTALL 1270717 DIODE ASSY WITH MARKING BAND ON DIODE TO POSITIVE TERMINAL ON PUMP MOTOR
4. USE S-1694-5-0.8 SHRINKABLE TUBING OVER S-1830-1 TERMINAL
5. TERMINATE VENDOR FURNISHED WIRE WITH S-1367-1-6 TERMINAL.

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
N-GD69	22			S1367-1-6	S1367-1-6		
GD68	22			S1367-1-6	S1655-1		
GD67	22			S1367-1-6	S1367-1-6		
GE13	22			S1367-1-6	SOLDER		
GA3	10	S1562-10-9		S1367-3-8	S1367-3-8		
N-GD66	22			S-1367-1-6	SOLDER		
N-GD63	22			S1367-1-6	S-1367-1-6		
GA2	10	S-1562-10-9		S1367-3-8	S1367-3-8		
GE10	10	S-1562-10-9		S-1367-3-8	S1367-3-8		
N-GD44	22			S-1367-1-6	S-1367-1-6		
F-GD43				S-1367-1-6	S-1367-1-6		
N-GD42				SOLDER	S-1370-1		
F-GD41	22			S1367-1-6	SOLDER		
GD62	22			S1499-1	SOLDER		
F-GD61				S-1367-1-6	S-1367-1-6		
F-GD60				S-1367-1-6	S-1367-1-6		
F-GD59				S-1367-1-6	S-1367-1-6		
F-GD58				S-1367-1-6	S-1367-1-6		
F-GD57				SOLDER	S-1367-1-6		
GD56				S-1367-1-6	S-1367-1-6		
GD55				S-1367-1-6	SOLDER		
[illegible]	22	-22-6-4		S-1636-1	S-1830-1	4	
[illegible]		-22-6-4		S-1636-1	S-1830-1	4	
GD48				S-1367-1-6	S1367-1-6		
GD47	22			S-1367-1-6	S-1367-1-6		
GD39				S-1635-1	S-1367-1-6		
N-GD36				S-1370-1	S-1370-1		
N-GD35				S-1367-1-6	S-1370-1		
GD29				S-1367-1-6	S-1367-1-10		
F-GD17				S-1367-1-6	S-1367-1-6		
GE4				SOLDER	SOLDER		
GE2				SOLDER	SOLDER		
[illegible] (2)	22	-22-0		SOLDER	S-2099-4		

WIRE TABLE

02-00916
01-00916

ITEM NO.	PART NO.	DESCRIPTION	
19			
18	S2527-2	GND CONNECTOR	
17	S2527-1	LH GND BLOCK	
16	MS25041-2	LIGHT ASSY	
15	1570043	DIODE ASSY	
14	S-1232-35	CIRCUIT BREAKER	
13	9880710	PRESSURE SWITCH	2
12	S-1586-1	SWITCH-UP LOCK	
11	9881141	MOTOR	
10	1270717	DIODE ASSY	
9	S-1577-1	POWER PACK CONT	
8	VM920M-3	LIGHT	
7	MS27212-1-5	TERMINAL BOARD	
6	MS27212-1-8	TERMINAL BOARD	
5	S-1377-2	SWITCH	
4	1270034	SQUAT SWITCH	
3	S-1637-1	HOUSING	
2	S-1637-2	HOUSING	
1	S-1360-5L	CIRCUIT BREAKER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 1270709 P12.4.0 P12.3.1 P12.9.2

SUPERSEDED BY:

CONTRACT NO:

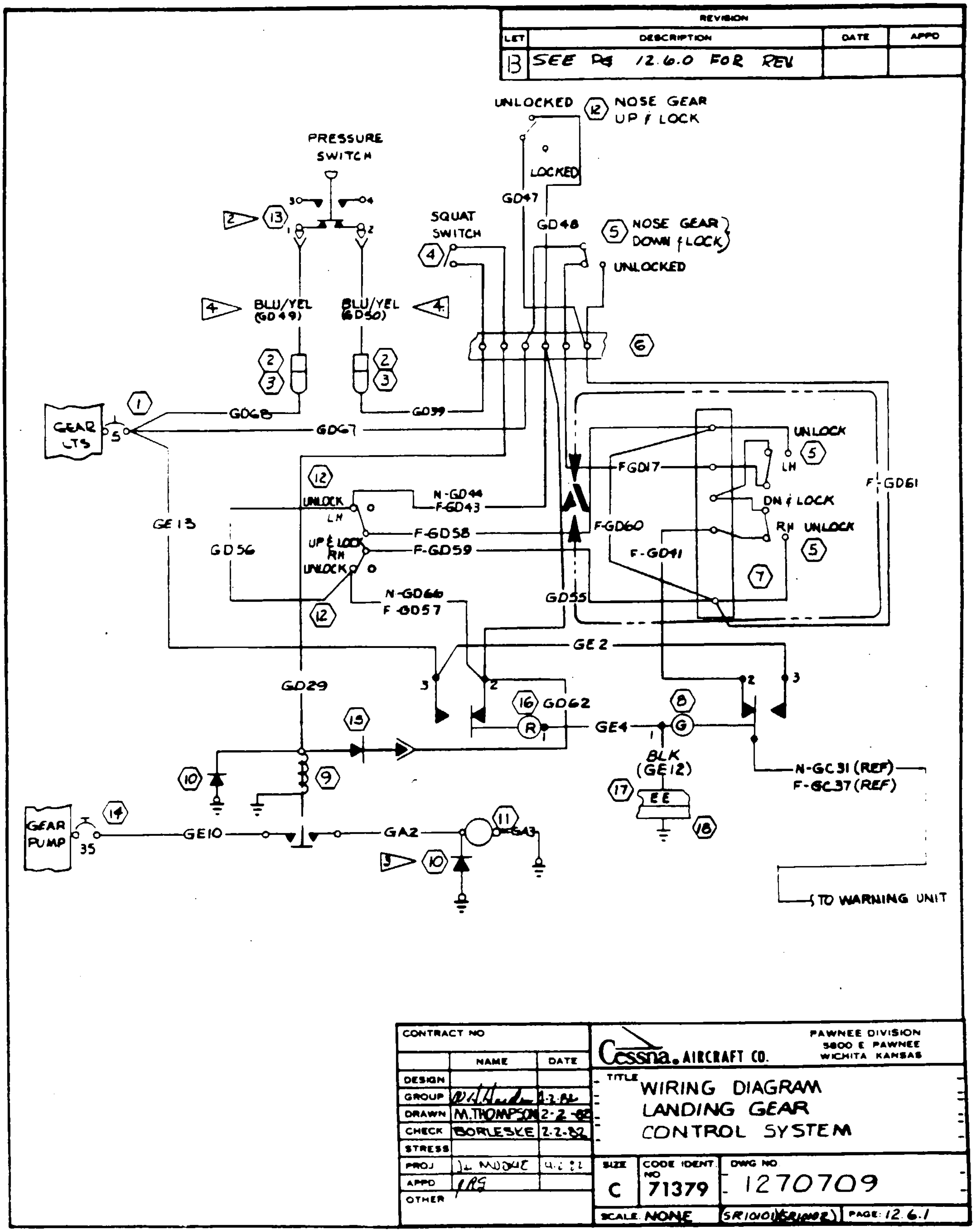
	NAME	DATE
DESIGN		
GROUP	[illegible]	2-2-82
DRAWN	M.THOMPSON	2-2-82
CHECK	BORLESKE	2-2-82
STRESS		
PROJ	J.H.MOORE	4-2-82
APPD	[illegible]/WHH	4-7-82
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

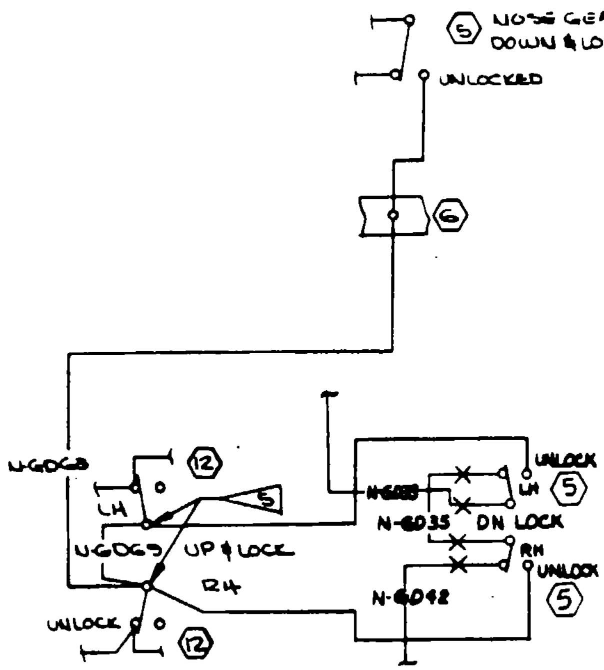
TITLE
WIRING DIAGRAM — LANDING GEAR CONTROL SYSTEM

SIZE C | CODE IDENT. NO. 71379 | DWG NO 1270709

SCALE NONE (SR10101)(SR10102) PAGE: 12.6.0



Landing Gear Control System (Sheet 1 of 2)



DETAIL A
(APPLIES TO P210 ONLY)

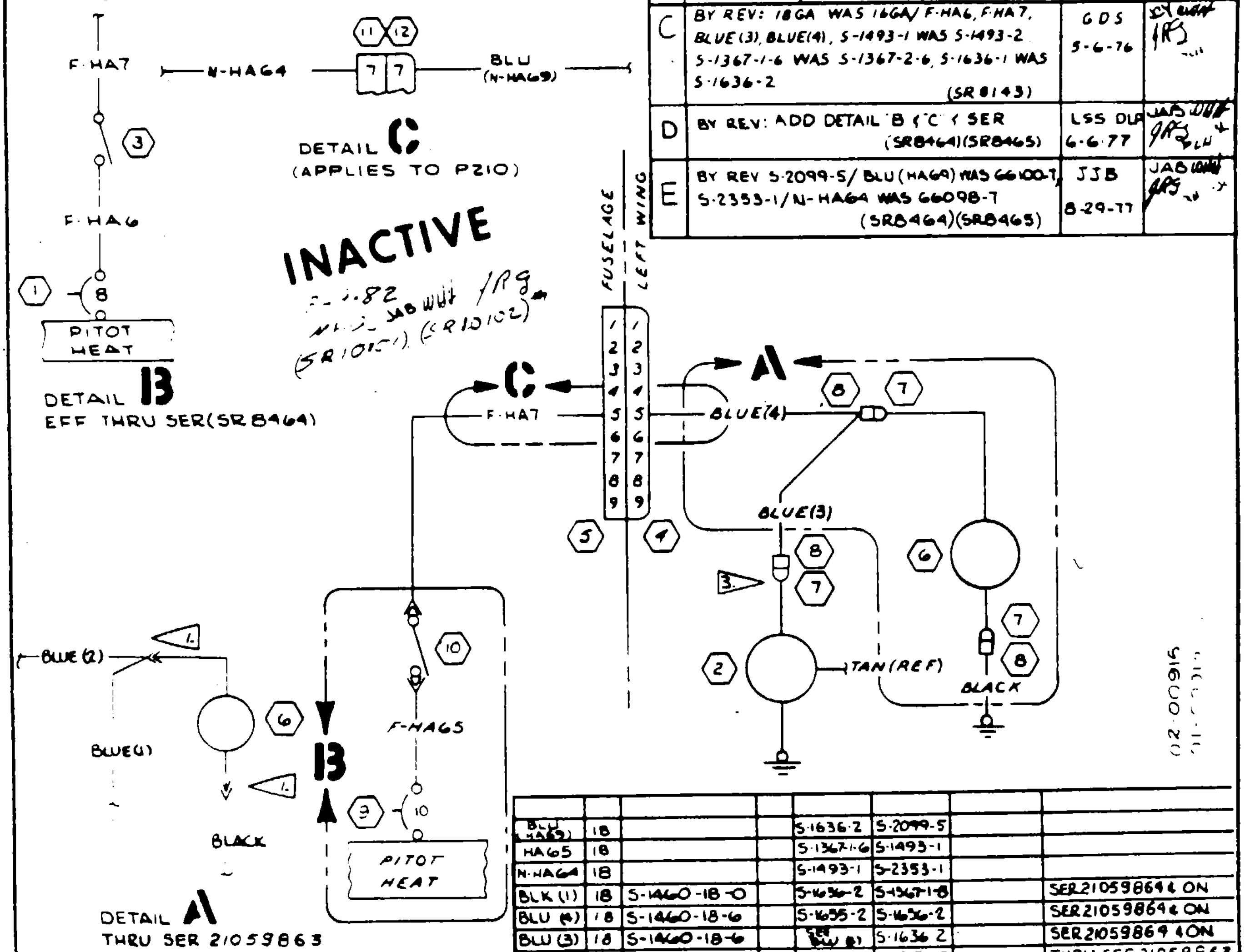
CONTRACT NO			Cessna. AIRCRAFT CO.	PAWNEE DIVISION 5800 E. PAWNEE WICHITA KANSAS
	NAME	DATE	TITLE	
DESIGN			WIRING DIAGRAM	
GROUP		2-2-82	LANDING GEAR	
DRAWN	M.THOMPSON	2-2-82	CONTROL SYSTEM	
CHECK	BORLESKE	2-2-82		
STRESS				
PROJ			SIZE C	CODE IDENT NO 71379 / DWG NO 1270709
APPD				
OTHER			SCALE NONE	PAGE 12.6.1

Landing Gear Control System (Sheet 2 of 2)

NOTES:

1. S-1369-3 TERMINAL ADDED TO VENDOR SUPPLIED WIRE
2. HEATER CIRCUIT SHOWN ONLY, FOR STALL WARNING CIRCUIT SEE PAGE 15.1
3. S-1637-1 HOUSING & S-1635-1 PIN ADDED TO VENDOR SUPPLIED WIRE.

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: SER OUT BLU(1), BLU(2) & BLK SER IN BLU(3), BLU(4) & BLK(1); ADD DETAIL A & SER (SR7320)	XY 11-6-72	
B	BY REV: ADD NOTE 3; S-1636-2 WAS S-1369-2 (BLU(3)); (NOW SHOP PRACTICE)	MEM 5-9-74	
C	BY REV: 18GA WAS 16GA/ F-HA6, F-HA7, BLUE(3), BLUE(4), S-1493-1 WAS S-1493-2 S-1367-1-6 WAS S-1367-2-6, S-1636-1 WAS S-1636-2 (SR8143)	GDS 5-6-76	
D	BY REV: ADD DETAIL B & C & SER (SR8464)(SR8465)	LSS 6-6-77	JAB
E	BY REV S-2099-5/ BLU (HA69) WAS 66100-7, S-2353-1/N-HA64 WAS 66098-7 (SR8464)(SR8465)	JJB 8-29-77	JAB



12	S-2349-1	CONNECTOR
11	S-2350-1	CONNECTOR
10	S-2160-1	SWITCH
9	S-[illegible]-1CL	CIRCUIT BREAKER
8	S-1637-2	HOUSING - PLUG
7	S-1637-1	HOUSING - CAP
6	C721105-18	PITOT TUBE, HEATED
5	S-1641-9	HOUSING - SOCKET
4	S-1640-9	HOUSING - PIN
3	S-845-2	SWITCH
2	221095-3	HEATED STALL DETECTOR
1	S-1360-8L	CIRCUIT BREAKER
	PART NO	DESCRIPTION

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLU (HA69)	18			S-1636-2	S-2099-5		
HA65	18			S-1367-1-6	S-1493-1		
N-HA64	18			S-1493-1	S-2353-1		
BLK (1)	18	S-1460-18-0		S-1636-2	S-1367-1-8		SER 21059864 & ON
BLU (4)	18	S-1460-18-6		S-1635-2	S-1636-2		SER 21059864 & ON
BLU (3)	18	S-1460-18-6		SEE BLU (4)	S-1636-2		SER 21059864 & ON
BLACK	18	S-1460-18-0		S-1369-1	S-1367-1-8		THRU SER 21059863
BLU(2)	16	S-1460-16-6		S-1635-2	S-1369-2		THRU SER 21059863
BLU(1)	16	S-1460-16-6		SEE BLU(2)	S-1369-2		THRU SER 21059863
F-HA7	18			S-1493-1	S-1636-1		
F-HA6	18			S-1367-1-6	S-1493-1		

WIRE TABLE

CONTRACT NO

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV 5800 E PAWNEE WICHITA KANSAS

	NAME	DATE
DESIGN	V R SIPES	1-28-71
GROUP		2-26-71
DRAWN	V R SIPES	2-18-71
CHECK	L K WHITE	2-24-71
STRESS		
PROJ		2-27-71
APPD		
OTHER		

TITLE WIRING DIAGRAM — HEATED PITOT TUBE & HEATED STALL WARNING SYSTEM

CES 1000 5 APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC NO S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES 2210-[illegible]

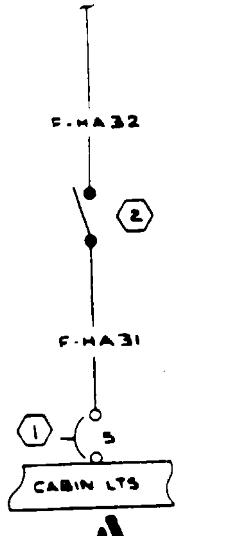
SUPERSEDED BY

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

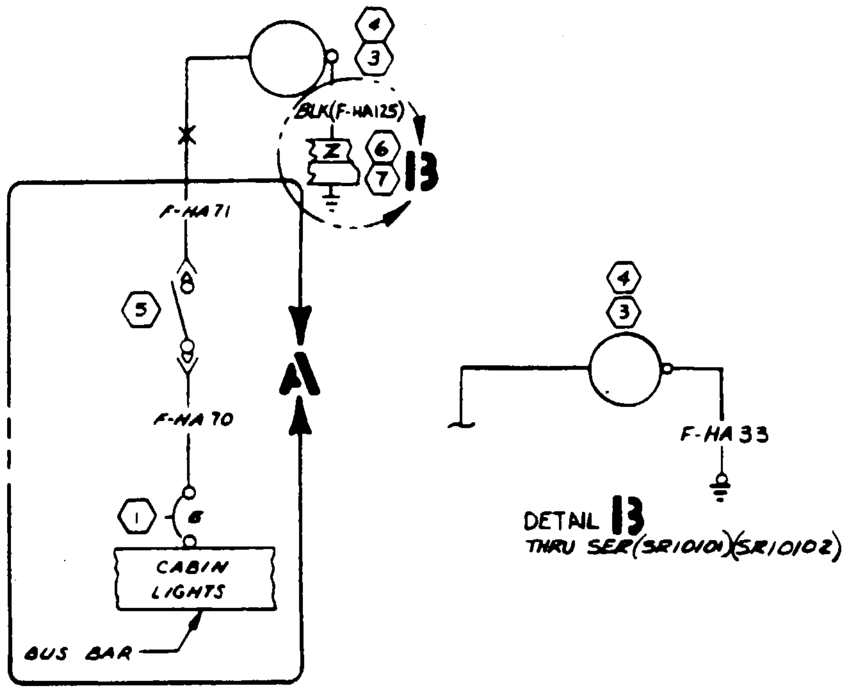
SCALE NONE 210 P210 PAGE 13 2

(SR6755) 21059503

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	JLO 5-3-73	
B	BY REV: 22 GA WAS 18 GA/ HA 31, HA32, HA 33 (SR8143)	GDS 5-6-76	
C	BY REV ADD DETAIL "A" & SER (8465) (SR8464)	LSS 6-6-77	JAB
D	BY REV: S-2160-3 WAS S-2160-1 (SR8464)(REF)(SR8465)(REF)	DLP 12-9-77	JAB
E	BY REV ADD DETAIL "B", S2527-2 (-1), BLK(F-NHA113); SEE OUT FN-HA33 (SR10101) (SR10102)	MKT 1-27-82	JAB
F	BY REV: BLK(FN-HA125) WAS BLK(FN-HA113) (SR10101) (SR10102)	RNJ 5-5-82	



DETAIL A
EFF THRU SER (SR8464)



DETAIL B
THRU SER(SR10101)(SR10102)

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
FN-HA125	22	-22-0		S1367-1-6	S2099-4		SER(SR10101)(SR10102) & ON
HA 71	22			S-1370-1	S-1493-1		SER (SR8464) & ON
HA 70	22			S-1367-1-6	S-1493-1		SER (SR8464) & ON
F-HA33	22		12	S-1367-1-6	S-1367-1-4		THRU SER(SR10101)(SR10102)
F-HA32	22		24	SOLDER	S-1370-1		THRU SER(SR8464)
F-HA31	22		18	S-1367-1-6	SOLDER		THRU SER(SR8464)

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION	VENDOR
7	S2527-2	GND CONNECTOR	
6	S2527-1	LH GND BLOCK	
5	S-2160-3	SWITCH	
4	MS25338-1019	LAMP	
3	#11-225	LAMPHOLDER	(95263)
2	S-1284-1	SWITCH	
1	S-1360-6L	CIRCUIT BREAKER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD. NO

SUPERSEDES R210-1073

SUPERSEDED BY

CONTRACT NO:

	NAME	DATE
DESIGN	V R SIPES	1-28-71
GROUP	V Wial	2-26-71
DRAWN	VR SIPES	2-19-71
CHECK	L C WHITE	2-24-71
STRESS		
PROJ	N. Wheaton	2-27-71
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV
5800 E. PAWNEE
WICHITA, KANSAS

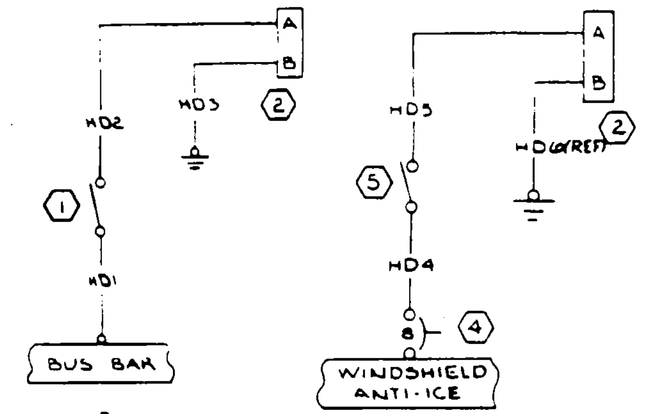
TITLE
WIRING DIAGRAM — LIGHT, ICE DETECTOR (OPT)

SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

SCALE NONE | 210 P210 | PAGE 13.5

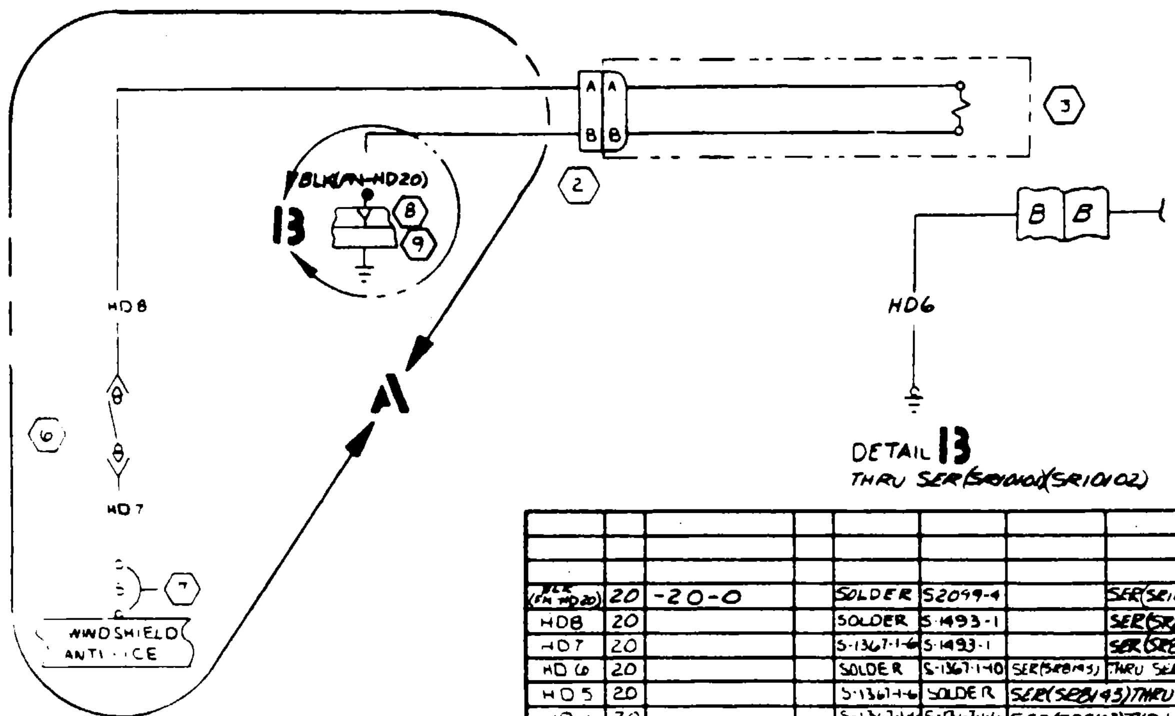
(SR6755) IX
21059503

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: SER OUT HD1, HD2, HD3 & 112-507-101 SER IN S-382-2 ADD HD4, HD5, HD6, S-1360-8L & S-382-2 (SR8143)	RS 4-1-76	
B	BY REV ADD DETAIL "A" & SER (SR8143) THRU SER (SR8464), HD7 & HD8 (SR8464) (SR8465)	LSS 6-6-77	JAB
C	BY REV: REACTIVATE DWG (SR8784)(SR8785)	CMK 7-6-78	JAB
D	BY REV: ADD DETAIL "B", S2527-2 & -1 BLK (FN-HD20) SER OUT HD-6 (SR10101) (SR10102)	MKT 1-27-82	JB



DETAIL A
THRU SER (SR8143)
(21061573)

DETAIL A
SER (SR8143) THRU SER (SR8464)



DETAIL B
THRU SER (SR10101)(SR10102)

01-00916 02-00916

BLK (FN-HD20)	20	-20-0		SOLDER	S2099-4		SER (SR10101)(SR10102) & ON
HD8	20			SOLDER	S-1493-1		SER (SR8464) & ON
HD7	20			S-1367-1-6	S-1493-1		SER (SR8464) & ON
HD6	20			SOLDER	S-1367-1-10	SER (SR8143)	THRU SER (SR10101) (SR10102)
HD5	20			S-1367-1-6	SOLDER	SER (SR8143) THRU SER (SR8464)	
HD4	20			S-1367-1-6	S-1367-1-6	SER (SR8143) THRU SER (SR8464)	
HD3	18			SOLDER	S-1367-1-10		THRU SER (SR8143)
HD2	18			S-1367-1-6	SOLDER		THRU SER (SR8143)
HD1	18			S-1367-1-6	S-1367-1-6		THRU SER (SR8143)
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

9	S2527-2	GND CONNECTOR	
8	S2527-1	2H GND BLOCK	
7	S-1360-5L	CIRCUIT BREAKER	
6	S-2160-1	SWITCH	
5	S-382-2	SWITCH	
4	S-1360-8L	CKT BREAKER	
3	S-3463	HEATER	
2	MPTC028-2S	RECEPTACLE	
1	S-1360-[illegible]	CIRCUIT BREAKER SW	
ITEM NO	PART NO	DESCRIPTION	

EQUIPMENT TABLE

CES 1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES

SUPERSEDED BY: PG. 13.12

CONTRACT NO

	NAME	DATE
DESIGN	[illegible]	[illegible]
GROUP	W Warden	12-12-74
DRAWN	J. HESSMAN	12-3-74
CHECK	J. YOUEL	12-10-74
STRESS		
PROJ	[illegible]	[illegible]
APPD	[illegible]	
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM —
WINDSHIELD ANTI-ICE SYSTEM
(OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	2270709
SCALE NONE	210 (SR 7913)	PAGE: 13.7

P210 (2106104C)

NOTES:

1. FOR COMPLETE INSTL (3) THREE EACH OF THESE WIRES ARE REQUIRED

2. THESE WIRES TO BE PER MIL-W-81044/12-18-9

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL "A", F-HA66, F-HA67, S-2160-1 & SER; C662503-0103 WAS C622503-0106 (SR8465)(SR8464)	LSS 6-6-77	JAS WHF JRG
B	BY REV: ADD F-HA79, ADD F-HA39, C662503-0103 & 22-310-20/DETAIL "B"; F-HA79 WAS F-HA39; SER OUT 1201080 (SR8464)(SR8465)	JJB 8-29-77	JAB WHF JRG
C	BY REV: S-1367-2-6 WAS S-1367-2-13/ HA41, HA42 & HA43 (NOW SHOP PRACTICE)	HHG 2-20-79	WHF JRG
D	BY REV: ADD RED(F-HA106), BLK (F-HA107), S-1637-1, & S-1637-2. RED(F-HA66) WAS HA66 & BLK (F-HA67) WAS HA67. S-1367-2-8 & S-1636-2 WAS SOLDER/HA66 & HA67 (MER 206E0770) 14 GA WAS 22 GA/HA66, HA67, HA107, HA106. (USE AS IS PARTS IN WORK, & FINISHED PARTS)	MDR 5-22-79	JAB WHF JRG RJS
E	BY REV: ADD DETAIL "B" (NOW SHOP PRACTICE)	RLY 8-7-80	WHF JRG

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK (F-HA107)	14	-14-0		SOLDER	S-1635-2		
RED (F-HA106)	14	-14-2		SOLDER	S-1635-2		
F-HA79	14			S-1367-2-4	SOLDER		
BLK (F-HA67)	14	-14-0		S-1367-2-8	S-1636-2		
RED (F-HA66)	14	-14-2		S-1367-2-8	S-1636-2		
F-HA73	14			S-1367-2-12	S-1493-2		
F-HA72	14			S-1367-2-10	S-1493-2		
F-HA36	18	2.		S-1367-1-6	S-1367-1-6		
F-HA35	18	2.		S-1367-1-6	S-1367-1-6		
F-HA34	18	2.		S-1367-1-6	S-1367-1-6		
F-HA43	14			S-1367-2-10	S-1367-2-6		
F-HA42	14		105	SOLDER	S-1367-2-6		
F-HA41	14		105	SOLDER	S-1367-2-6		
F-HA40	14		25	SOLDER	S-1367-2-8		
F-HA39	14		70	S-1367-2-12	SOLDER		
F-HA38	14		27	S-1367-2-10	S-1367-2-12		
F-HA37	14		32	S-1367-2-10	S-1367-2-10		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION
15	C40055	BRUSH BLOCK
14	C40057	BRACKET
13	S-1637-2	CONNECTOR
12	S-1637-1	CONNECTOR
11	S-2160-1	SWITCH
10	040106	SLIP RING ASSY
9	C40010	BRUSH BLOCK ASSY
8	C165020-0101	TIMER
7	MS3106A020-15S	PLUG
6	MS3057-12A	CLAMP
5	1201080	CABLE ASSY
4	22-370-20	SHUNT
3	C662503-0103	AMMETER
2	S-382-2	SWITCH
1	S-1360-20L	CKT BREAKER

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES: PG. 13.4

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN		
GROUP	JRS WHF	4-27-76
DRAWN	SWANSON	4-1-76
CHECK	YOUEL	4-7-76
STRESS		
PROJ	PUHRBEICK	4-28-76
APPD	JRS	
OTHER	/	

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

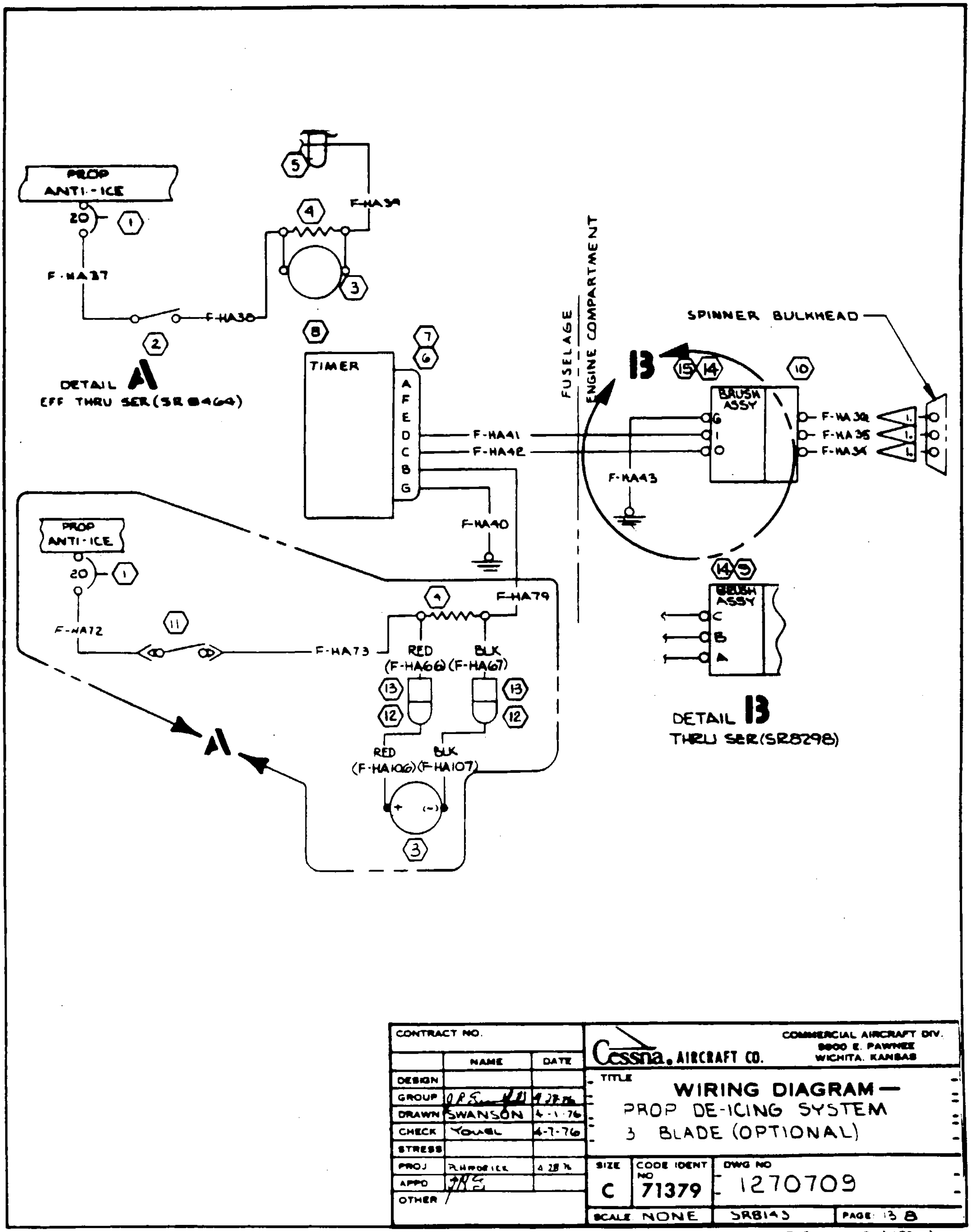
TITLE: WIRING DIAGRAM — PROP DE-ICING SYSTEM 3 BLADE (OPTIONAL)

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE: NONE | SR8143 | PAGE: 3.8

21061574 (210) (P210)

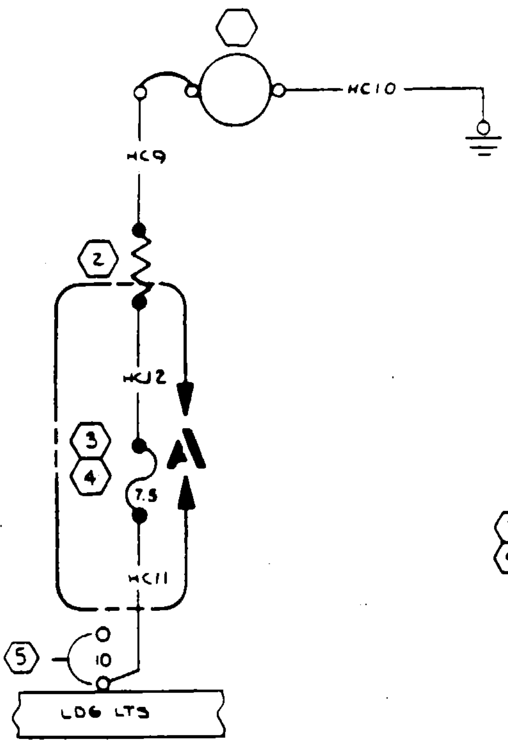
Prop De-Icing System 3 Blade (OPT)(Sheet 1 of 2)

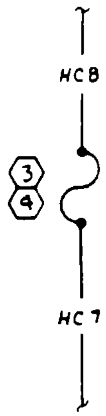


21061574 (210) (P210)

Prop De-Icing System 3 Blade (OPT) (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD HC10 (SR8464)(SR8465)	CRS 9-14-77	
B	BY REV: ADD DETAIL A & SER; SER OUT HC7 & HC8; SER IN HC11 & HC12 (SR8784)(REF)(SR8785)(REF)	CRS 10-9-79	





DETAIL A
THRU SER(SR8784)(SR8785)

INACTIVE
THRU SER(SR10056)
GW 1-12-81

HC12	18			SOLDER	SOLDER	SER(SR8784)(SR8785) & ON	
HC11	18		6 MAX	S-1367-1-6	SOLDER	SER(SR8784)(SR8785) & ON	
HC10	18			S-1493-1	S-1367-1-8		
HC9	18			SOLDER	S-1367-1-8		
HC8	18			SOLDER	SOLDER	THRU SER (SR8784)(SR8785)	
HC7	18			SOLDER	S-1367-1-6	THRU SER(SR8784)(SR8785)	
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

5	S-1360-10L	CIRCUIT BREAKER
4	S-2375-7.5	FUSE
3	S-2374-7.5	FUSEHOLDER
2	S-2041-50-1-6	RESISTOR
	0513052	CIGAR LTR ASSY
ITEM NO	PART NO.	DESCRIPTION

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: P13.1

SUPERSEDED BY:

CONTRACT NO.

	NAME	DATE
DESIGN	SPENCER	5-2-77
GROUP		5-2-77
DRAWN	R. YOUNGERS	4-28-77
CHECK	S YOUEL	4-28-77
STRESS		
PROJ		5-2-77
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — CIGAR LIGHTER

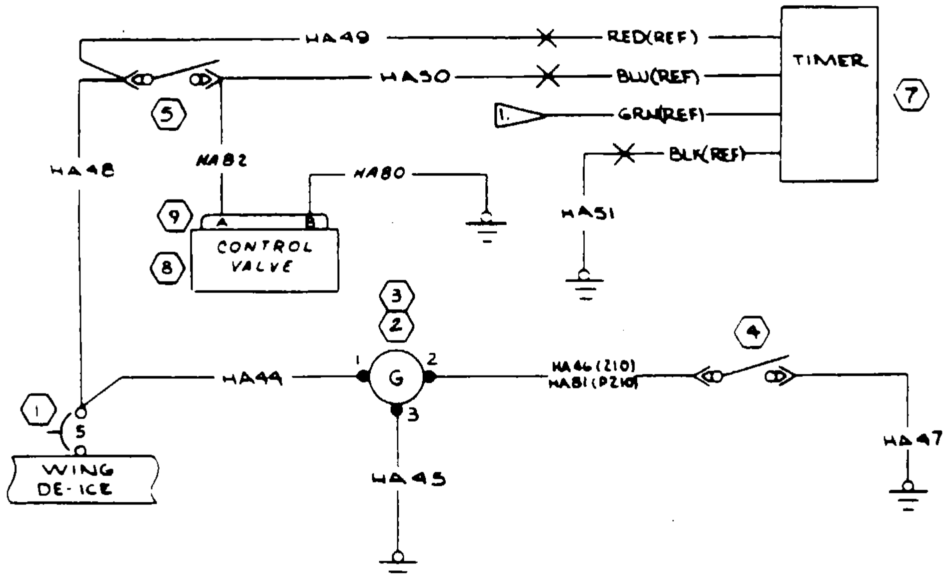
SIZE C | CODE IDENT NO. 71379 | DWG NO 1270709

SCALE: NONE | (SR8464)(SR8465) PAGE: 3.9

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD DETAIL "A" (SR9927)(SR8464)(SR8465)	CRS 9-14-77	
B	BY REV: DELETE DETAIL A, DELETE HA52, DELETE NOTE 2; DELETE 3D2346-01 DWG BECOMES INACTIVE	CRS 11-22-77	
C	BY REV: (SR9427) WAS (SR8863)/REV A & INACTIVATION SR (SR9427)	GDA 10-4-78	

NOTES

1. TERMINATE VENDOR FURNISHED WIRE WITH S-1557-2 CAP



INACTIVE

HA81	22			S-1493-1	SOLDER		
HA80	20			S-1367-1-8	SOLDER		
HA82				SEE HA50	SOLDER		
HA51				S-1367-1-8	S-1370-1		
HA50				S-1493-2	S-1370-1		
HA49				SEE HA48	S-1370-1		
HA48	20			S-1367-1-6	S-1493-2		
HA47	22			S-1493-1	S-1367-1-8		
HA46				S-1493-1	SOLDER		
HA45				SOLDER	S-1367-1-8		
HA44	22			S-1367-1-6	SOLDER		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

9	MS3106A-12S-3S	CONNECTOR	
8	3D1542-03	CONTROL VALVE	
7	3D2495-02	TIMER MODULE	
6			
5	S-2160-3	SWITCH	
4	1D194-	PRESSURE SWITCH	
3	MS25041-3	INDICATOR LIGHT	
2	MS25237-327	LAMP	
1	S-232-5	CIRCUIT BREAKER	
ITEM NO	PART NO.	DESCRIPTION	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC NO
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES

SUPERSEDED BY 1270709 P13130 + 3.13

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	6-20-77
GROUP		6-25-77
DRAWN	L. STORY	6-6-77
CHECK	BOKLESKE	6-7-77
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA KANSAS

TITLE WIRING DIAGRAM — WING & STABILIZER DE-ICING SYSTEM (OPT)

SIZE C | CODE IDENT NO. 71379 | DWG NO 1270709

SCALE NONE (SR8464)(SR8465) PAGE 3.10

NOTES.

1. HEATER CIRCUIT SHOWN ONLY. FOR STALL WARNING CIRCUIT SEE PAGE 15.5
2. TERMINATE VENDOR LEAD WITH S-1635-1
3. TERMINATE VENDOR LEAD WITH S-1367-1-6
4. S-1557-2 CAP UNUSED VENDOR LEADS FROM SWITCH
5. INTERTWINE HA108, HA109 & HA110 WITH HA53, HA54 HA55 & HA60 PER T210. INTERTWINE HA111 HA112 & HA110 WITH HA53, N-HA64 & NHA68 PER P210

01.00916.02.0001C

LET	REVISION DESCRIPTION	DATE	APPD
A	BY REV: S-2099-5 /ORN(U-HA74) WAS 66100-7, S-2353-1/N-HA68 WAS 66098-7 (SR8464)(SR8465)	JJB 8-29-77	JAB JRB
B	BY REV: 186-9 WAS S-1672-4 (NOW SHOP PRACTICE)	PSM 12-6-78	
C	BY REV: SEE OUT DETAIL A, DETAIL B; SER IN DETAIL A, HA100, HA101, HA102 HA103, HA104; ADD FLAGNOTE 5 & PG 13.11.2 (SR9310)	LWF 2-15-79	CMK
D	BY REV: MS27212-1-7 WAS MS27212-1-6. REWIRE SQUAT SWITCH & RESISTOR. S-1367-2-6 WAS SOLDER/HA55. S-1367-2-6 WAS S-1370-2/HA56. S-1367-2-6 WAS S-1370-2/HA57. S-1367-2-6 WAS SOLDER/HA58. S-1367-2-6 WAS SOLDER/HA68. S-1367-2-8 WAS SOLDER/HA103. REVISE PIN #'S/S-1640-9, S-1641-9 S-2349-1, S-2350-1 (SR8863)(AEF)	MDR 6-22-79	JRB
E	BY REV: HA-108 WAS HA-100, HA109 WAS HA-101, HA110 WAS HA-102, HA-111 WAS HA-103; HA112 WAS HA-104. (SR 9310)	MKM 8-1-80	JRB
F	BY REV: ADD DETAIL 'C' & SERIALS. ADD HA113 WIRE & STALL WARN HEAT SWITCH & CIRCUIT BREAKER (SR10556)	WHA 1-15-82	JRB
G	BY REV: MS27212-1-8 WAS MS27212-1-7/ITEM 12 (SR10101)(SR10102)	GLS 6/28/82	JRB

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
HA113	16			S-1367-2-6	S-1653-2		SER(SR10556) & ON
HA112	16			S-1636-2	S-2099-5	5	SER(SR9310) & ON
HA111	16			S-1367-2-6	S-2350-1	5	SER (SR9310) & ON
HA110	16			S-1635-2	SOLDER	5	SER (SR9310) & ON
HA109	16			S-1635-2	S-1636-2	5	SER (SR9310) & ON
HA108	16			S-1367-2-8	S-1636-2	5	SER(SR9310) & ON
N-HA68	16			S-1367-2-6	S-2353-1		
ORN (U-HA74)	16	-16-3		S-1636-2	S-2099-5		
BLK (HA67)	20	-20-0		S-1636-2	S-1367-1-8		
BLU (HA62)	16	-16-6		S-1635-2	S-1636-2		
BLK (HA61)	20	-20-0		SOLDER	S-1367-1-8		THRU SER(SR9310)
HA60	16			S-1635-2	SOLDER	5	
HA59				S-1635-2	S-1636-2	5	
HA58				S-1367-2-6	S-1636-2		
HA57				SOLDER	S-1367-2-6		
HA56				SOLDER	S-1367-2-6		
HA55				SEE HA54	S-1367-2-6		
HA54				S-1493-2	S-1636-2	5	
HA53	16			S-1367-2-6	S-1493-2	5	

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION
17	S-1360-10L	CIRCUIT BREAKER
16	S-2349-1	CONNECTOR
15	S-2350-1	CONNECTOR
14	S-1641-6	HOUSING - PIN
13	S-1640-6	HOUSING - PIN
12	MS27212-1-8	TERMINAL BOARD
11	1CH1-6	SQUAT SWITCH
10	S-2041-50-15	RESISTOR
9	186-9	HEATED STALL DETECTOR
8	AN5812-1	HEATED PITOT TUBE
7	AN3115-1	RECEPTACLE
6	S-1637-1	HOUSING - CAP
5	S-1637-2	HOUSING - PLUG
4	S-1640-9	HOUSING - PIN
3	S-1641-9	HOUSING - SOCKET
2	S-2160-1	SWITCH
	S-1360-15L	CIRCUIT BREAKER

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES.

SUPERSEDED BY.

CONTRACT NO:

Cessna. AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

	NAME	DATE
DESIGN	SPENCER	6-20-77
GROUP	W.H. Hardin	6-23-77
DRAWN	L STOREY	6-6-77
CHECK	BOK. ESKE	6-7-77
STRESS		
PROJ	P. HAVELKA	6-24-77
APPD	JRB	
OTHER		

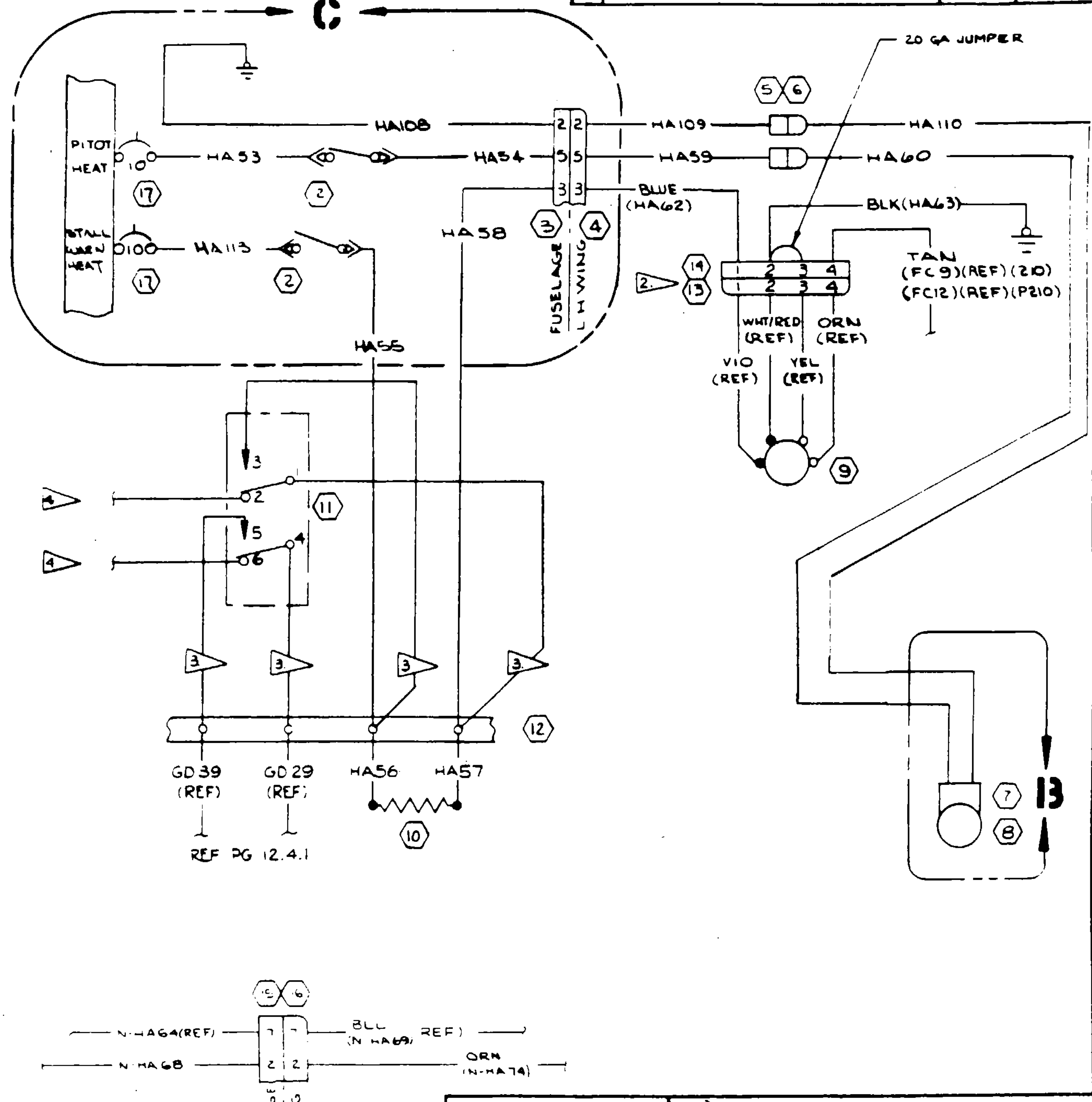
TITLE WIRING DIAGRAM — HEATED PITOT TUBE & HEATED STALL WARNING SYSTEM - KNOWN ICING (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709

SCALE: NONE | 210 P210 | PAGE: 13.11.0

(SR8863)

REVISION			
LET	DESCRIPTION	DATE	APPD
F	SEE PAGE 13.11.0		

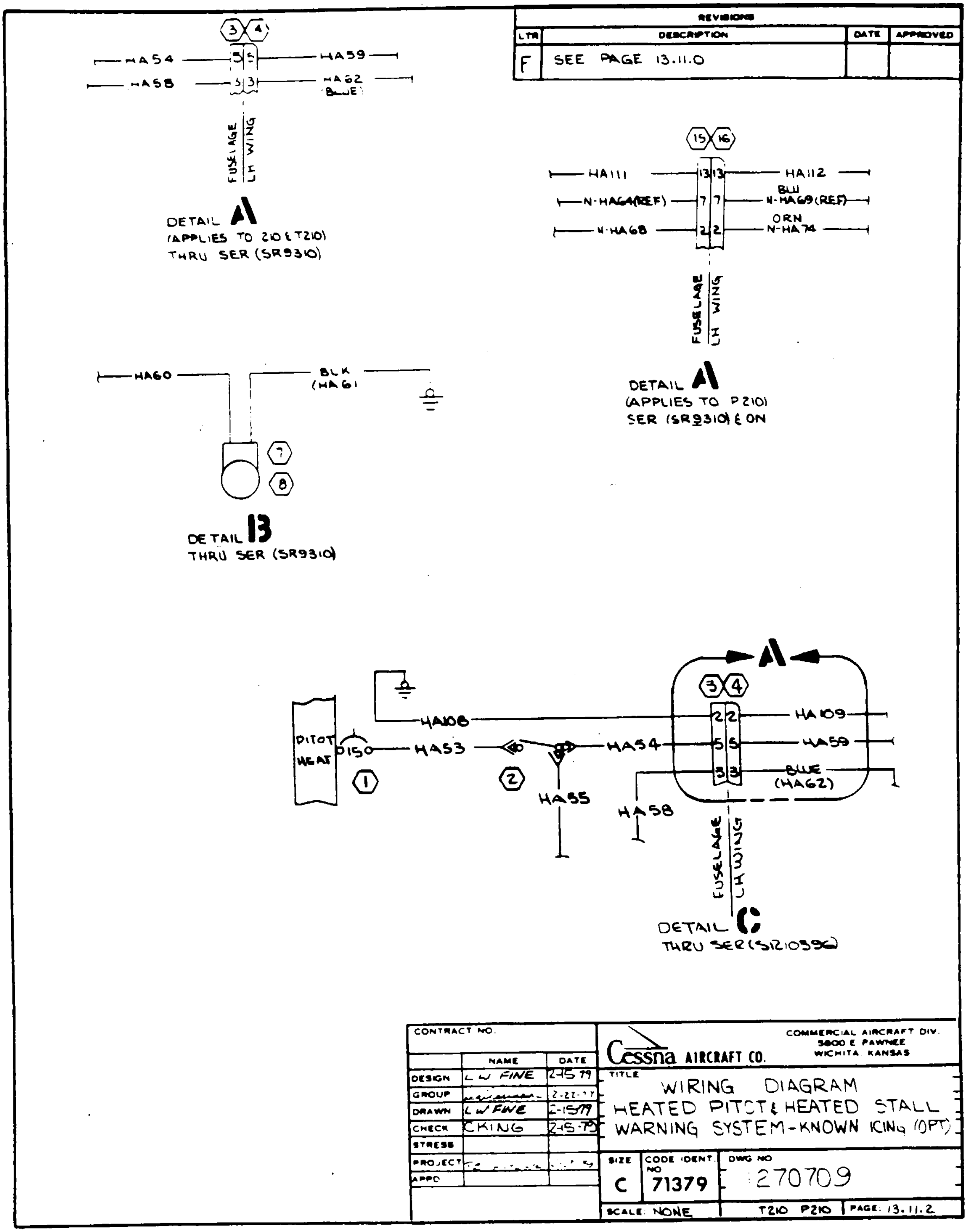


CONTRACT NO		
	NAME	DATE
DESIGN	SPENCER	6-20-77
GROUP	D. H. Harden	6-23-77
DRAWN	STOREY	6-6-77
CHECK	BORLESKE	6-7-77
STRESS		
PROJ	PLINEDRICK	6-24-77
APPD	JPS	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

TITLE WIRING DIAGRAM HEATED PITOT TUBE & HEATED STALL WARNING SYSTEM - KNOWN ICING (OPT)

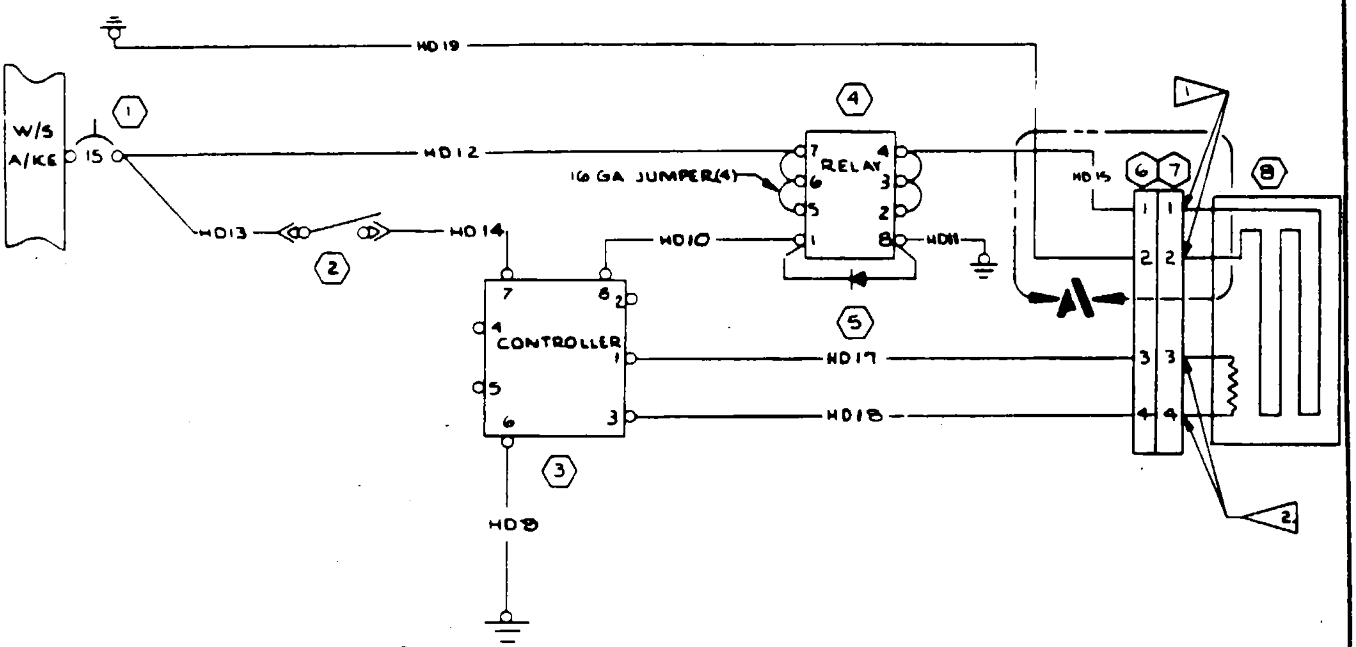
SIZE	CODE IDENT NO	DWG NO
C	71379	1270709
SCALE NONE	210 P210 (SR8863)	PAGE 13.11.1

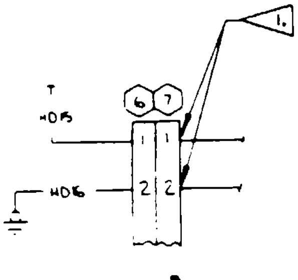

REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
F
SEE PAGE 13.11.0
HA54
HA59
HA58
HA62
BLUE
FUSELAGE
LH WING
DETAIL A
(APPLIES TO 210 & T210)
THRU SER (SR9310)
HA111
HA112
N-HA64(REF)
BLU
N-HA69(REF)
N-HA68
ORN
N-HA74
DETAIL A
(APPLIES TO P210)
SER (SR9310) & ON
HA60
BLK
(HA61)
DETAIL B
THRU SER (SR9310)
PITOT HEAT
HA108
HA53
HA54
HA109
HA59
BLUE
(HA62)
HA55
HA58
DETAIL C
THRU SER (SR10396)
CONTRACT NO.
NAME
DATE
DESIGN
L W FINE
2-15-79
GROUP
2-22-79
DRAWN
L W FINE
2-15-79
CHECK
C KING
2-15-79
STRESS
PROJECT
APPD
Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS
TITLE
WIRING DIAGRAM
HEATED PITOT & HEATED STALL
WARNING SYSTEM-KNOWN ICING (OPT)
SIZE
C
CODE IDENT. NO
71379
DWG NO
270709
SCALE: NONE
T210 P210
PAGE. 13.11.2

NOTES:

1. TERMINATE VENDOR FURNISHED WIRES WITH S-1635-2
2. TERMINATE VENDOR FURNISHED WIRES WITH S-1635-1
3. INTERTWINE HD19 WITH HD15 & HD12 FROM POINT OF ORIGIN TO TERMINATION POINT

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV & ADD S-1638-4, S-1638-5, NOTES 1 & 2, ADD HD15, HD16, HD17 & HD18; NP143501 WAS SK2567; IN TITLE BLOCK: KNOWN ICING WAS SIERRACIN (SR8863)	CRS 11-22-77	JAB
B	BY REV: ADD FLAGNOTE 3; SER OUT HD16; SER IN HD19 (SR8810)	LWF 2-15-79	CMK
C	BY REV: ADD DETAIL "B" & SER (SR 9808)	NRL 8-8-80	
D	BY REV: DELETE DETAIL "B" & THRU SER (SR 9808) "NOW ... OF ..."	DES 7-1-81	





DETAIL A
THRU SER (SR 9310)

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
HD19	16			S-1636-2	S-1367-2-8	3	SER (SR9310) & ON
HD18	22			S-1367-2-8	S-1636-1		
HD17	22			S-1367-2-8	S-1636-1		
HD16	16			S-1636-2	S-1367-2-10		THRU SER (SR9310)
HD15				S-1367-2-8	S-1636-2		
HD14				S-1493-2	S-1367-2-8		
HD13				S-1367-2-6	S-1493-2		
HD12				S-1367-2-6	S-1367-2-8		
HD11				S-1367-2-8	S-1367-2-10		
HD10				S-1367-2-8	S-1367-2-8		
HD9	16			S-1367-2-8	S-1367-2-8		

WIRE TABLE

ITEM NO	PART NO	DESCRIPTION
8	NP143501	PANEL
7	S-1638-4	HOUSING - CAP
6	S-1638-5	HOUSING - PLUG
5	1N-2070	DIODE
4	KRP3DH	RELAY
3	9910216	CONTROLLER
2	S-2160-1	SWITCH
1	S-1360-15L	CIRCUIT BREAKER

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES:

SUPERSEDED BY: DG 1316

CONTRACT NO.

	NAME	DATE
DESIGN	SPENCER	6-20-77
GROUP		6-23-77
DRAWN	L STOREY	6-6-77
CHECK	SOKLESKE	6-7-77
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — WINDSHIELD ANTI-ICE SYSTEM KNOWN ICING (OPT)

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE: NONE | 210 P210 | PAGE: 1312

(SR8863)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: S-1370-1 WAS SEE HA50/HA52 YEL (REF) WAS BLU/WHT (REF); VIO (REF) WAS BLU (REF); WHT/BLU (REF) WAS YEL (REF); MOVED 3D2346-01 FROM S-2160-3 TO 3D2600-03; 3D2366-01 WAS 3D2346-01; (SR9427) WAS (SR8863)/13.13.0 & 13.13.1; S-2415-1 WAS 1-66509-3, S-2341-1 WAS 1-66506-3 (NOW SHOP PRACTICE) (SR9427)	BGK 10-4-78 CS 7-7-78	RJP
B	BY REV: ADD DETAIL "A" S2527-2 (-1), BLK (FN-HA114), SER OUT HA45 (SR10101)(SR10102) BY REV ADD 2H48-22, DETAIL "B" & SOLENOID 2H48-22 PRESS CONT. VALVE (SR9954) (SR10356)	MKT 1-27-82 WHH 5-4-82	JAB JRS
C	BY REV: BLK (FN-HA126) WAS BLK (FN-HA114) (SR10101) (SR10102)	RNJ 5-5-82	

NOTES:

1. TERMINATE VENDOR FURNISHED WIRE WITH S-1367-1-8

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK (FN-HA126)	22	-22-0		SOLDER	S2099-4		(SR10101)(SR10102) ON
F-HA105	22			S-1493-1	S-1367-1-8		
N-HA104				S-1493-1	S-1367-1-8		
F-HA103				S-1493-2	S-1493-1		
N-HA102				SOLDER	S-2415-1		
F-HA101	22			SOLDER	S-1636-1		
N-HA100	20			S-1370-1	S-1367-1-8		
F-HA99					S-1367-1-8		
N-HA98					S-2341-1		
F-HA97					S-1685-1		
N-HA96					S-2341-1		
F-HA95					S-1635-1		
N-HA94					S-1370-1		
F-HA93					S-1370-1		
N-HA92					S-2415-1		
F-HA91					S-1636-1		
N-HA90					S-2415-1		
F-HA89	20			S-1370-1	S-1636-1		
N-HA88	20			S-1370-1	S-1367-1-8		
F-HA87	22			S-1493-1	S-1367-1-8		
N-HA86				S-1493-1	SOLDER		
F-HA85				SOLDER	S-1493-1		
N-HA84				S-2341-1	SEE N-HA102		
F-HA83	22			S-1635-1	SEE F-HA103		
HA52	20			S-1370-1	S-1370-1		
HA51				S-1367-1-8	S-1370-1		
HA50				S-1493-2	S-1370-1		
HA49				SEE HA48	S-1370-1		
HA48	20			S-1367-1-8	S-1493-2		
HA45	22			SOLDER	S-1367-1-8		THRU SER (SR10101)(SR10102)
HA44	22			S-1367-1-8	SOLDER		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
15	2H48-22	PRESSURE CONT. VALVE	
14	S2527-2	GND CONNECTOR	
13	S2527-1	LH GND BLOCK	
12	205838-1	CONNECTOR	P210
11	S-1640-9	CONNECTOR	210
10	S-1641-9	CONNECTOR	210
9	205841-1	CONNECTOR	P210
8	1D1194-1	PRESSURE SWITCH	
7	MS25041-3	INDICATOR LIGHT	
6	MS25237-327	LAMP	
5	3D2357-01	DE-ICE FLOW VALVE	
4	3D2366-01	PRESSURE CONT VALVE	
3	3D2600-03	TIME MODULE	
2	S-2160-3	SWITCH	
1	S-1232-5	CIRCUIT BREAKER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 1270709 P 13.10

SUPERSEDED BY:

CONTRACT NO:

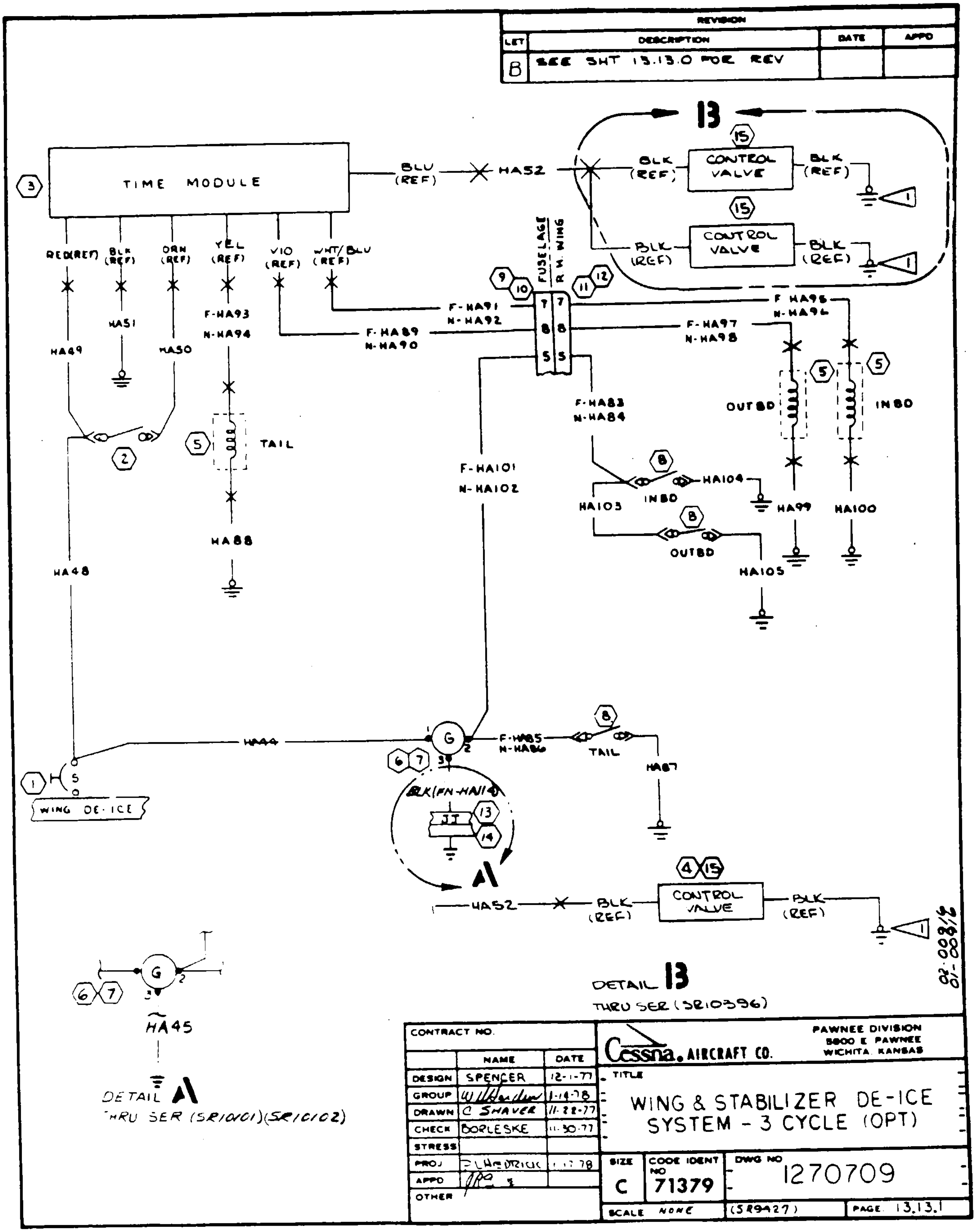
	NAME	DATE
DESIGN	SPENCER	12-1-77
GROUP	W. Vandiver	1-10-78
DRAWN	C SHAVER	11-22-77
CHECK	BORLESKE	11-30-77
STRESS		
PROJ	D HEDRICK	1-?-78
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA, KANSAS

TITLE: WIRING DIAGRAM — WING & STABILIZER DE-ICE SYSTEM - 3 CYCLE (OPT)

SIZE	CODE IDENT. NO	DWG NO
C	71379	1270709

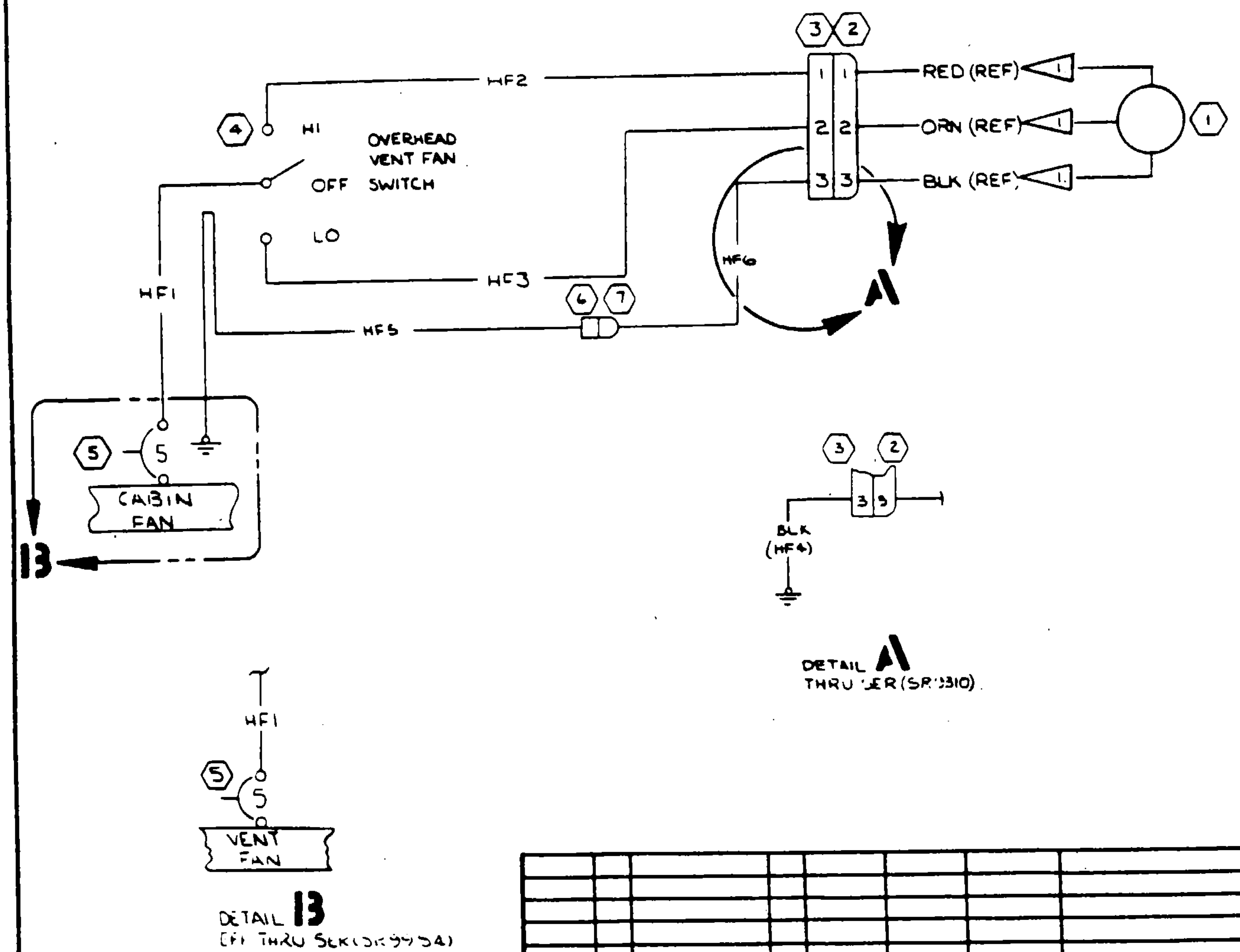
SCALE: NONE | (SR9427) | PAGE: 13.13.0


REVISION
LET
DESCRIPTION
DATE
APPD
B
SEE SHT 13.13.0 FOR REV
TIME MODULE
BLU (REF)
HA52
BLK (REF)
CONTROL VALVE
RED(REF)
BLK (REF)
ORN (REF)
YEL (REF)
VIO (REF)
WHT/BLU (REF)
HA51
HA49
HA50
F-HA93
N-HA94
F-HA91
N-HA92
F-HA89
N-HA90
FUSELAGE
R. H. WING
F-HA95
N-HA96
F-HA97
N-HA98
TAIL
OUTBD
INBD
F-HA83
N-HA84
F-HA101
N-HA102
HA104
HA103
HA99
HA100
HA105
HA88
HA48
HA44
F-HA85
N-HA86
HA87
BLK(FN-HA114)
JJ
WING DE-ICE
HA45
DETAIL A
THRU SER (SR10101)(SR10102)
DETAIL B
THRU SER (SR10396)
CONTRACT NO.
NAME
DATE
DESIGN SPENCER 12-1-77
GROUP 1-4-78
DRAWN C SHAVER 11-28-77
CHECK BORLESKE 11-30-77
STRESS
PROJ 1-78
APPD
OTHER
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS
TITLE
WING & STABILIZER DE-ICE SYSTEM - 3 CYCLE (OPT)
SIZE C
CODE IDENT NO 71379
DWG NO 1270709
SCALE NONE
(SR9427)
PAGE 13.13.1

NOTES

1. TERMINATE VENDOR LEADS WITH S-1635-1
2. INTERTWINE HF5 & HF6 WITH HF3 & HF1

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD FLAGNOTE 2: SER OUT HF4: SER IN HF5 & HF6 S1637-2 & S1637-1 (SR9310)	LWF 2-15-79	CMK
B	BY REV. ADD DETAIL 'B' (SR9954)	GW 4-30-81	



HF6	20			S-1635-1	S-1636-1	2 SER(SR9310) & ON
HF5	20			S-1636-1	S-1367-1-8	2 SER (SR 9310) & ON
HF1	20			S-1367-1-6	S-1367-1-6	
HF2	20			S-1367-1-6	S-1636-1	
HF3	20			S-1367-1-6	S-1636-1	
BLK (HF4)	20	-20-0		S-1636-1	S-1367-1-8	THRU SER(SR9310)
WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS		SERIALS

WIRE TABLE

7	S-1637-1	HOUSING - CAP
6	S-1637-2	HOUSING - PLUG
5	S-1360-5L	CIRCUIT BREAKER
4	S-382-1	SWITCH
3	S-1638-1	HOUSING
2	S-1638-2	HOUSING
1	C414005-0101	BLOWER ASSY
ITEM NO.	PART NO.	DESCRIPTION

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES:

SUPERSEDED BY:

CONTRACT NO.

	NAME	DATE
DESIGN	SPENCER	8-23-76
GROUP		8-25-76
DRAWN	SHEFFIELD	8-5-76
CHECK	BORLESKE	8-16-76
STRESS		
PROJ		8-25-76
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

TITLE WIRING DIAGRAM — CABIN VENTILATION BLOWER - P210

SIZE C | CODE IDENT NO. 71379 | DWG NO 1270709

SCALE: NONE | (SR9361) | PAGE: 13 14

NOTES:

1. REMOVE & DISCARD VENDOR FURNISHED TERMINALS. TERMINATE WITH S-1636-2 TERMINALS.
2. TERMINATE VENDOR FURNISHED WIRE WITH S-1635-2 TERMINAL
3. TERMINATE VENDOR FURNISHED WIRE WITH S-1636-1 TERMINAL
4. INTERTWINE HE21 WITH HE9/210, HE22 WITH HE20/P210, HE16 WITH HE2, HE3, HE4 & HE1/210, HE17 WITH HE2, HE3, HE4, & HE18/P210, HE15 WITH HE12, HE13, & HE14

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: TITLE BLOCK SERIALS WERE (SR9114) & (SR9115) (SR 9556)	HHG 8-9-79	JAB WHH
B	BY REV: HE 10 WAS CONN TO PIN 4/ S-1917-2 HE 6 & HE 19 WAS CONN TO PIN 1/S-2035-1, S-1493-1 WAS SEE HE 10 / F-HE 6 & N-HE 19 NOW SHOP PRACTICE (MER 210 E0 811) (SR 9556)	SEB 1-25-80	JAB WHH IRS
C	BY REV: ADD DETAIL 'A' (SK9954)	GW 6-30-81	IRS

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK N-HE22	16	-16-0		S-1636-2	S-1367-2-8		
BLK F-HE21	16	-16-0		S-1636-2	S-1367-2-8		
N-HE20	16			S-1493-2	S-1635-2		
N-HE19	18			S-1493-1	S-1493-1		
N-HE18				S-1367-1-6	S-1493-1		
BLK N-HE17		-18-0		SEE HE15	S-1367-1-8		
BLK F-HE16		-18-0		SEE HE15	S-1367-1-8		
BLK HE15		-18-0		S-1635-1	S-1635-1		
HE14				S-1635-1	SEE HE4		
HE13				S-1635-1	SEE HE3		
HE12				S-1635-1	SEE HE2		
HE11				S-1493-1	S-1367-1-8		
HE10	18			S-1635-1	S-1493-1		
F-HE9	16			S-1493-2	S-1635-2		
HE8	16			S-1367-2-6	S-1493-2		
HE7	18			S-1635-1	S-1635-1		
F-HE6				S-1493-1	S-1493-1		
HE5				S-1493-1	S-1493-1		
HE4				S-1635-1	S-1493-1		
HE3				S-1635-1	S-1493-1		
HE2				S-1635-1	S-1493-1		
F-HE1	18			S-1367-1-6	S-1493-1		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
5	S-1917-2	RELAY	
4	2882362	HIGH PRESSURE SW	
3	50508	COMPRESSOR	
2	S-2035-2	HOUSING	
1	S-2035-1	HOUSING	
[illegible]	2303-1	COOLING FAN	
[illegible]	S-1637-[illegible]	HOUSING	
[illegible]	[illegible]	HOUSING	
[illegible]	S-1360-[illegible]	CKT BKR	
[illegible]	S-1360-[illegible]	CKT BKR	
[illegible]	[illegible]47200	THERMOSTAT SW (ARA)	
[illegible]	0832590	SWITCH (ARA)	
[illegible]	S-[illegible]33-4	HOUSING	
[illegible]	S-[illegible]33-[illegible]	HOUSING	
1	[illegible]	BLOWER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES

SUPERSEDED BY.

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	3-2-79
GROUP	D.H. Hender	3-5-79
DRAWN	H. GHAZARIAN	2-12-79
CHECK	BORLESKE	2-14-79
STRESS		
PROJ	[illegible]	[illegible]
APPD	[illegible]	
OTHER		

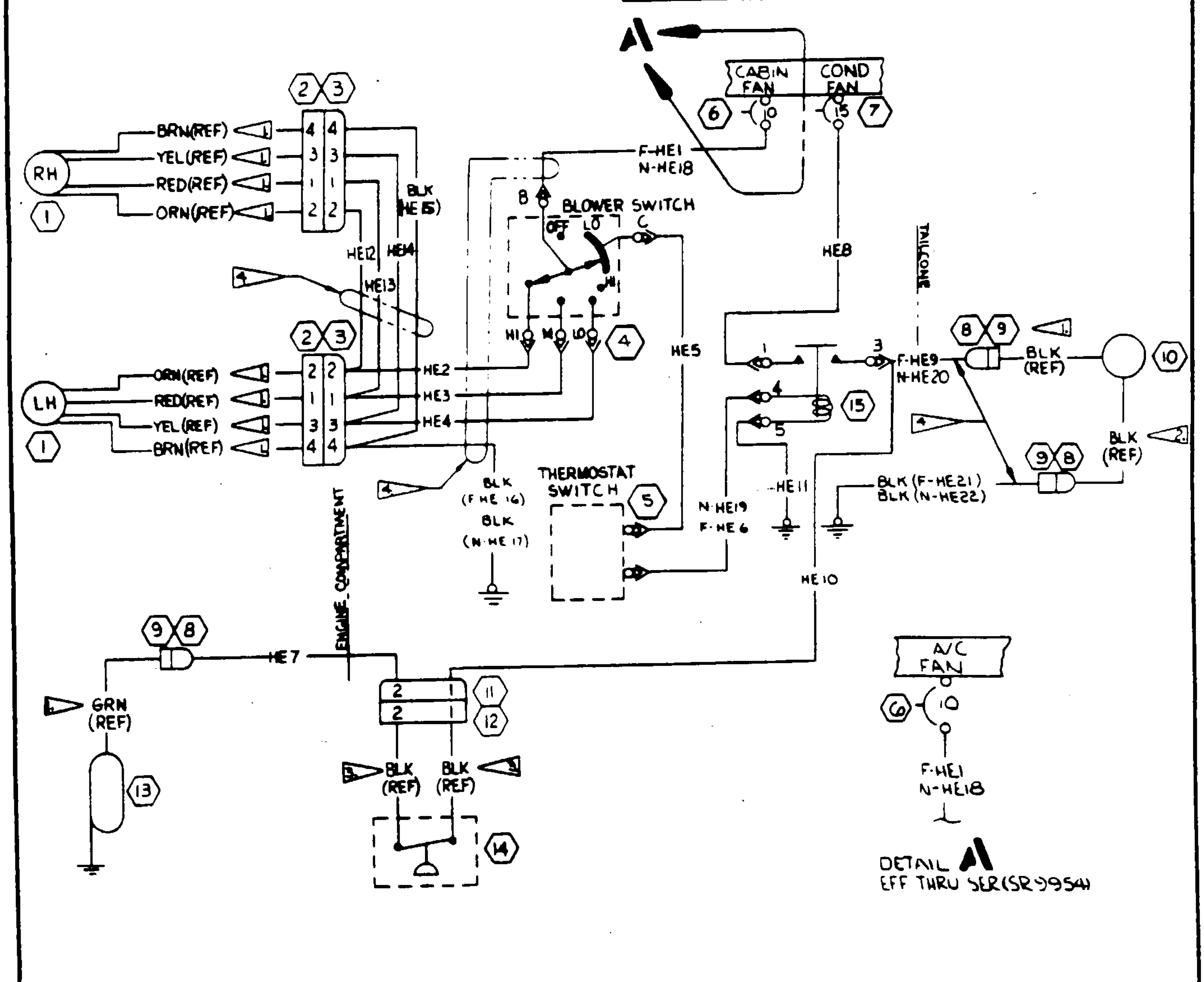
Cessna. AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — AIR CONDITIONER (OPT)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709

SCALE: NONE (SR 9556) PAGE: 13.15.C

REVISION			
LET	DESCRIPTION	DATE	APPD
C	SEE SHT 13.15.0 FOR REVISION		



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS	SERIALS

WIRE TABLE

CONTRACT NO.	NAME	DATE
DESIGN	SPENCER	3-2-79
GROUP	[illegible]	3-7-79
DRAWN	H GHAZARIAN	2-12-79
CHECK	BORLESKE	2-14-79
STRESS		
PROJ	[illegible]	
APPD	[illegible]	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

TITLE WIRING DIAGRAM — AIR CONDITIONER (OF T)

SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

SCALE: NONE | (SR 9556) | PAGE: 13.15.1

PART NO.	DESCRIPTION

EQUIPMENT TABLE

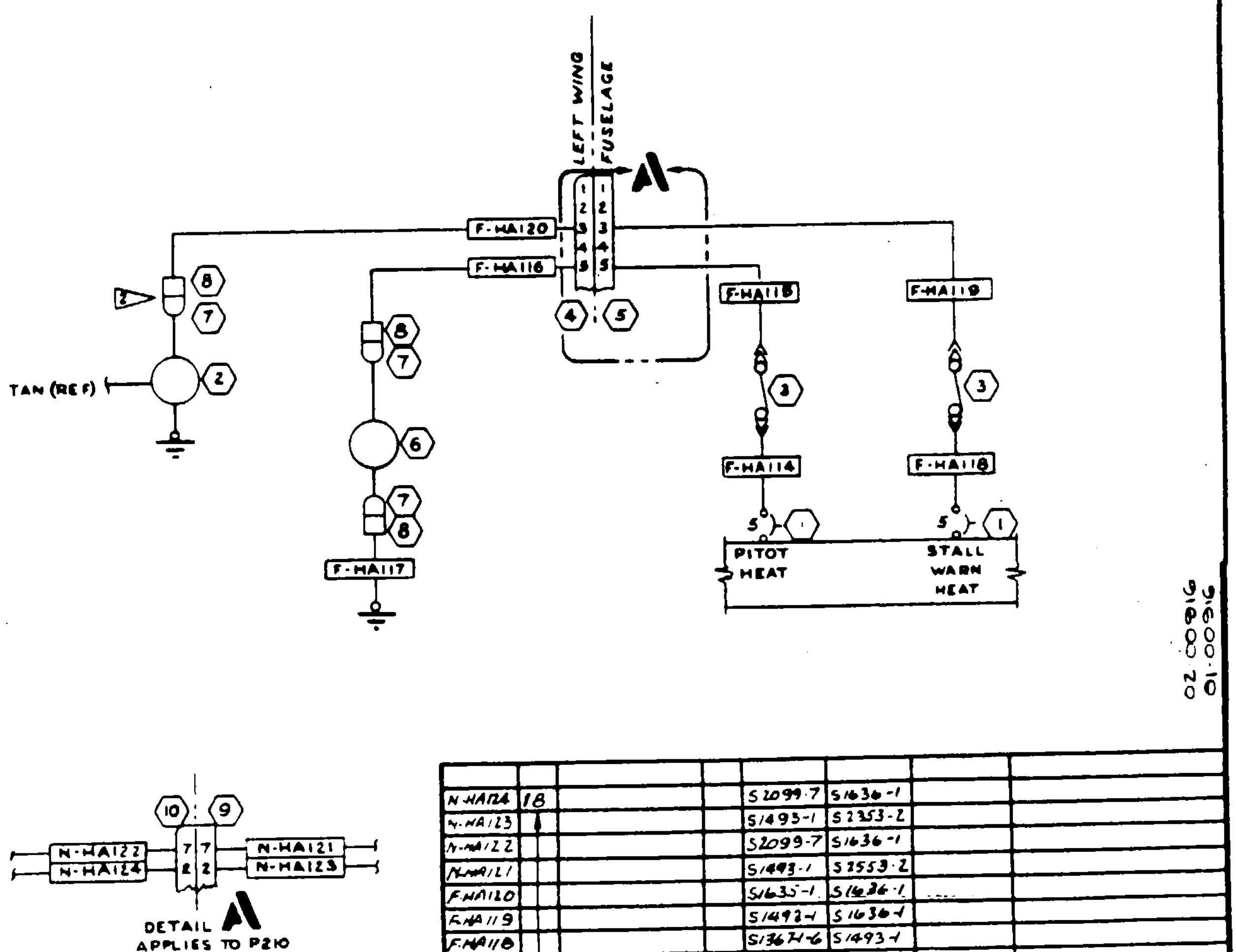
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD NO.

SUPERSEDES:

SUPERSEDED BY:

REVISION			
LET	DESCRIPTION	DATE	APP'D

NOTES:
1. ONLY HEATER CIRCUITS ARE SHOWN. FOR STALL WARNING CIRCUIT SEE PAGE 15.5
2. S1637-1 HOUSING & S1635-1 PIN ADDED TO VENDOR SUPPLIED WIRE.



N-HA124	18			S2099-7	S1636-1		
N-HA123				S1495-1	S2353-2		
N-HA122				S2099-7	S1636-1		
N-HA121				S1493-1	S2553-2		
F-HA120				S1635-1	S1636-1		
F-HA119				S1493-1	S1636-1		
F-HA118				S1367-6	S1493-1		
F-HA117				S1636-1	S1367-6		
F-HA116				S1635-1	S1636-1		
F-HA115				S1493-1	S1636-1		
F-HA114	18			S1367-16	S1493-1		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

10	S2349-1	CONNECTOR
9	S2350-1	CONNECTOR
8	S1637-2	HOUSING - PLUG
7	S1637-1	HOUSING - CAP
6	0721105	PITOT TUBE - HEATED
5	S1641-9	HOUSING - SOCKET
4	S1640-9	HOUSING - PIN
3	S2160-1	SWITCH
2	1221C95	HEATED STALL DETECTOR
1	S1360-5L	CIRCUIT BREAKER
ITEM NO.	PART NO.	DESCRIPTION

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES Pg 13.2

SUPERSEDED BY:

CONTRACT NO:

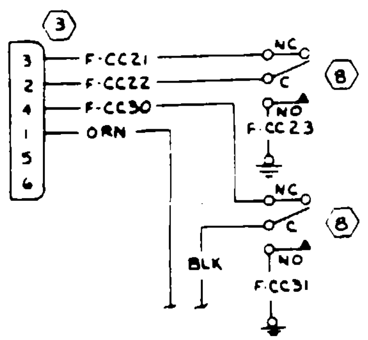
	NAME	DATE
DESIGN	HARDEN	2-5-82
GROUP	W. Harden	3-15-82
DRAWN	ACKERSON	2-9-82
CHECK	BORLESKE	3-12-82
STRESS		
PROJ	J.R. Smith	3-15-82
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

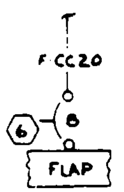
TITLE
WIRING DIAGRAM — HEATED PITOT TUBE & HEATED STALL WARNING SYSTEM

SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709

SCALE: NONE | SR10101 / SR10102 | PAGE: 13.16



DETAIL A
THRU SER 21060089



DETAIL B
THRU SER (SR8464)

INACTIVE
EFF THRU SER (SR9114)(SR9115)
2-9-79
WHG
JAB JRS

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD WIRE LENGTHS (NOW SHOP PRACTICE)	DLO 5-3-73	WIW
B	BY REV: ADD DETAIL "A" & SER (SR7381) IX	DLP 6-22-73	
C	BY REV: ADD COLOR TO CC34, CC35, CC36, CC37, CC38 & CC39 & REVISED WIRE LENGHTS (NOW SHOP PRACTICE)	RS 4-4-76	JRS
D	BY REV: ADD P141.1, DETAIL "B", WIRES CC40 THRU CC48, S-1360-15L, S-2349-1, S-2350-1, SER OUT CC20; SER IN CC49; MOTOR WIRE BLK(REF) WAS ORN(REF), RED(REF) WAS BLK(REF), PINS 6 WAS 3, 3 WAS 1, 4 WAS 2, 1 WAS 4, 2 WAS 6 PER S1640 & S1641, PINS 1 WAS 2 & 2 WAS 1 PER S1638, WIRES BLK(CC39) WAS RED (CC39), RED(1) WAS BLK(1) (SR8464) MER 498 (NOW SHOP PRACTICE) (SR8465)	GDS 6-6-77	JAB
E	BY REV S-2099-5 WAS 66100-7/ N-CC44, N-CC45, N-CC46, N-CC47; S-2353-1 WAS 66098-7/ N-CC40, N-CC41, N-CC42, N-CC43 (SR8464)(SR8465)	JJB 8-29-77	JAB JRS

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
F-CC49	16			S-1367-2-8	S-1367-2-4	SER (SR8464) & ON
N-CC48				S-1636-2	S-1493-2	
N-CC47				S-1636-2	S-2099-5	
N-CC46				S-1493-2	S-2099-5	
N-CC45				S-1493-2	S-2099-5	
N-CC44				S-1493-2	S-2099-5	
N-CC43				S-1367-2-4	S-2353-1	
N-CC42				S-1367-2-4	S-2353-1	
N-CC41				S-1367-2-4	S-2353-1	
N-CC40	16			S-1367-2-4	S-2353-1	SER (SR8464) & ON
RED(1)	16	-16-2	13	S-1493-2	S-1636-2	SER 21060090 & ON
VIOLET (CC38)	16	-16-7	19	S-1493-2	S-1367-2-8	
VIOLET (CC37)	16	-16-7	19	S-1493-2	S-1367-2-8	
GREEN (CC36)	16	-16-5	13	S-1635-2	S-1493-2	
ORANGE (CC35)	16	-16-3	13	S-1635-2	S-1493-2	
BLUE (CC34)	16	-16-6	13	S-1635-2	S-1493-2	SER 21060090 & ON
BLK (CC39)	16	-16-0	13	S-1635-2	S-1636-2	
BLK	16	-16-0	13	S-1367-2-4	S-1636-2	THRU SER 21060089
F-CC33	16		220	S-1367-2-4	S-1636-2	
F-CC32	16		220	S-1367-2-4	S-1636-2	
F-CC31	16		4	S-1367-2-4	S-1367-2-8	THRU SER 21060089
F-CC30	16		18	S-1635-2	S-1367-2-4	THRU SER 21060089
F-CC27	16		220	S-1367-2-4	S-1636-2	
F-CC26	16		220	S-1367-2-4	S-1636-2	
F-CC25	16		4	S-1367-2-4	S-1367-2-6	
F-CC24	16		10	S-1367-2-4	S-1367-2-8	
F-CC23	16		4	S-1367-2-4	S-1367-2-8	THRU SER 21060089
F-CC22	16		20	S-1635-2	S-1367-2-4	THRU SER 21060089
F-CC21	16		20	S-1635-2	S-1367-2-6	THRU SER 21060089
F-CC20	16		30	S-1367-2-8	S-1367-2-4	THRU SER (SR8464)

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION
11	S-2349-1	CONNECTOR
10	S-2350-1	CONNECTOR
9	S-1360-15	CIRCUIT BREAKER
8	S-1906-1	SWITCH
7	C301002-0202	FLAP MOTOR
6	S-1360-8L	CIRCUIT BREAKER
5	S-1906-2	SWITCH
4	S-1641-6	HOUSING-SOCKET
3	S-1640-6	HOUSING-PIN
2	S-1638-2	HOUSING-SOCKET
1	S-1638-1	HOUSING-PLUG

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC NO S-XXX OR CMXXXX=CESSNA STD NO

SUPERSEDES 1210-1073

SUPERSEDED BY 270709 PG 4.12

CONTRACT NO

	NAME	DATE
DESIGN	V R SIPES	3-5-71
GROUP	H Wise	3-5-71
DRAWN	V R SIPES	3-5-71
CHECK	L.K. WHITE	3-5-71
STRESS		
PROJ.		—
APPD		
OTHER		

Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV
5800 E PAWNEE
WICHITA, KANSAS

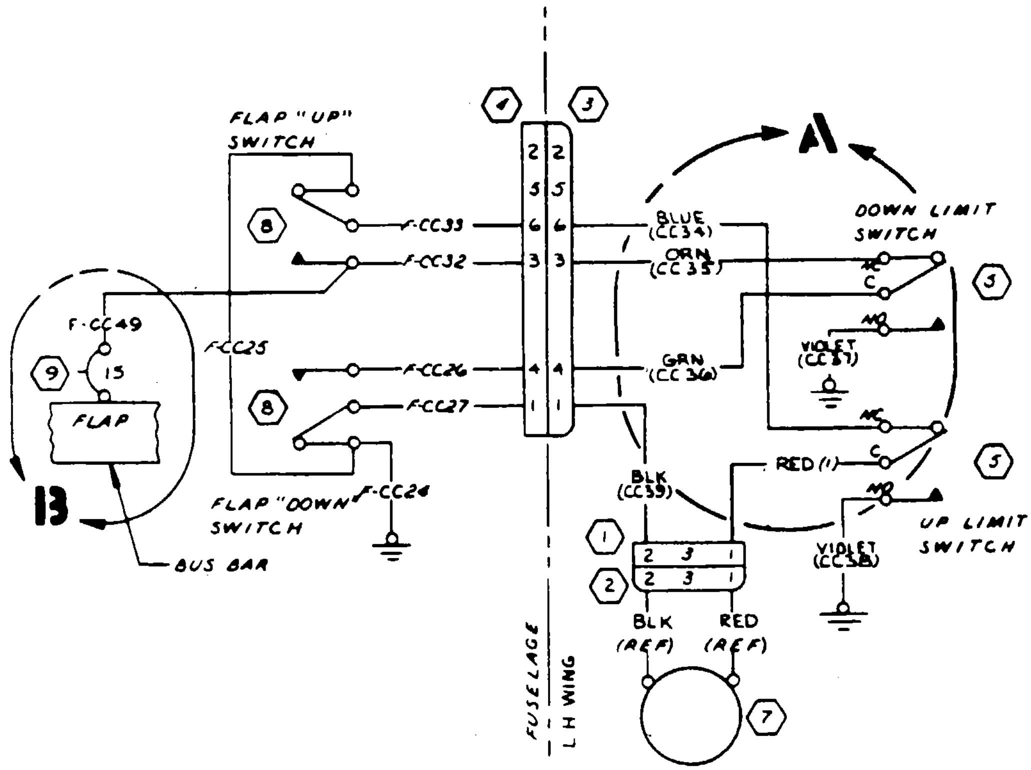
TITLE WIRING DIAGRAM — WING FLAPS

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709

SCALE NONE 210 P210 PAGE N.1.0

(SR6755) IX (21059503)

Wing Flaps (Sheet 1 of 2)



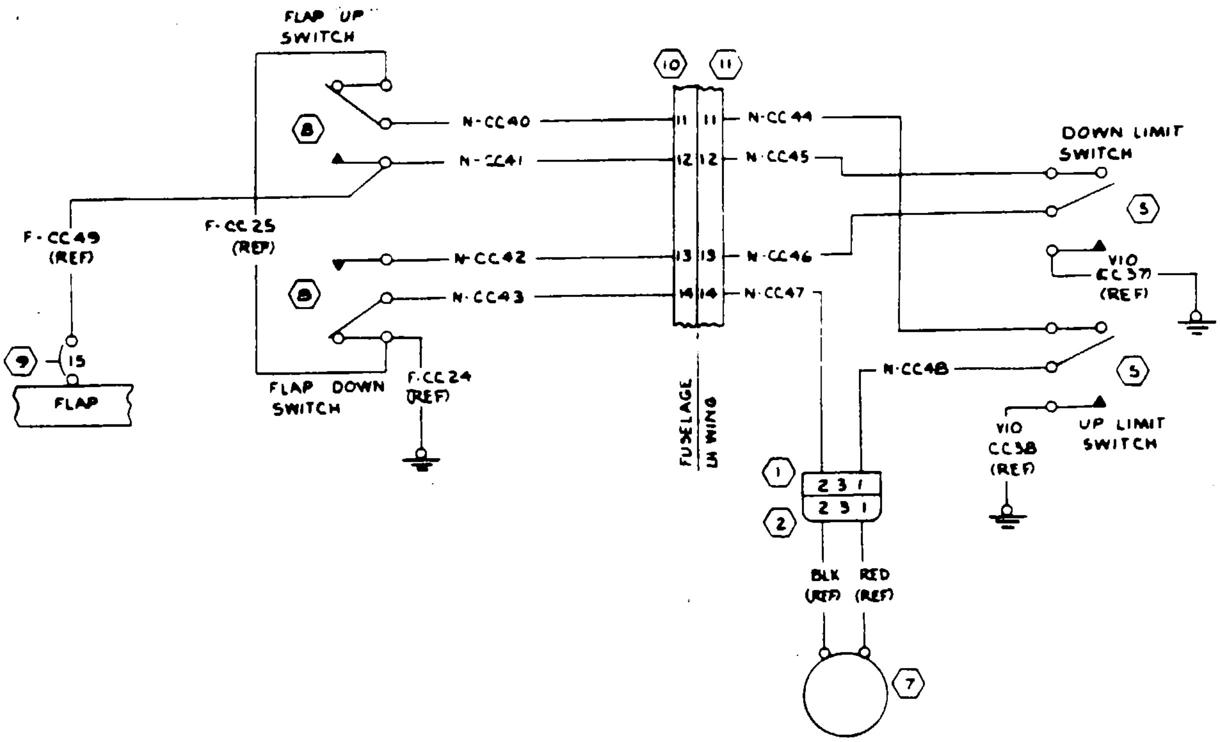
INACTIVE
EFF THRU SER (SR9114)(SR9115)
2-9-79
HHG
JAB

CONTRACT NO			Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV 5800 E. PAWNEE WICHITA, KANSAS		
	NAME	DATE	TITLE WIRING DIAGRAM — WING FLAPS		
DESIGN	V R SIPES	3-5-71			
GROUP	H Wue	3-5-71			
DRAWN	V R SIPES	3-5-71			
CHECK	L K. WHITE	3-5-71			
STRESS			SIZE	CODE IDENT NO	DWG NO
PROJ			C	71379	1270709
APPD			SCALE NONE	210 P210	PAGE: N.1.0
OTHER					

Wing Flaps (Sheet 2 of 2)

(SR6755) II (21059503)

REVISION			
LET	DESCRIPTION	DATE	APPD
D	SEE P 14.1 FOR REVISION		



(APPLIES TO P210 ONLY)

INACTIVE
EFF THRU SER (SR9115)
HHG 2-9-79

CONTRACT NO			Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS		
	NAME	DATE	TITLE WIRING DIAGRAM — WING FLAPS		
DESIGN	SPENCER	6-20-77			
GROUP	W.D. Harden	6-23-77			
DRAWN	SCHIFFELBEIN	6-6-77			
CHECK	BORLESKE	6-7-77			
STRESS			SIZE	CODE IDENT NO	DWG NO
PROJ	[illegible]	[illegible]	C	71379	1270709
APPD	[illegible]		SCALE NONE	P210	PAGE: 14.1.1
OTHER					

(SR8465)

NOTES:

1. C611003-0101 TRIM REGULATOR WITH MOD "A" OR LATER WILL BE REQD AT SER (SR9369) & ON & ALL SPARES. MOD DESIGNATION WILL BE A SUFFIX TO THE VENDOR PART NUMBER

2. ~~WHEN A374A FILTER IS INSTALLED, REMOVE S/1636 TERMINALS FROM WIRES & TERMINALS FROM MOTOR LEADS & SOLDER DIRECTLY TO FILTER AS SHOWN IN DETAIL A~~

3. MATERIAL IS RCFS1308 COIL CORD VENDOR CODE 096906

01-00916 02-00916

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV. ADD N-CD58, N-CD59, N-CD60 & N-CD61, S-1232-5 WAS S-1360-5L (SR8465)	DLP 6-6-77	JAS
B	BY REV: S-1963-2 WAS S-1636-1/F-CD55 F-CD56, F-CD57, N-CD59, N-CD60, N-CD61 (SR8464)(SR8465)	JJB 8-29-77	JAB
C	BY REV: ADD NOTE 1 (SR9369)	CMK 7-13-78	JAB
D	BY REV: ADD DETAIL A, NOTE 2 A374A FILTER, RED(F-CD62) & BLK(F-CD63) (SR9438)	HHG 10-25-78	JAB
E	BY REV: DELETE DETAIL "A", NOTE 2 A374A FILTER & (SR9438) (NOW SHOP PRACTICE) ADD NOTE 3, DETAIL A & B, EQUIPMENT ITEMS 19, 20, 21 & 22, RCFS1308 COIL CORD; SERIAL OUT WIRES RED (2), BRN(1) & ORN(1) (SR9953)(SR9954)	DTL 2-2-81 GLS 2-27-81	RBH DS
F	BY REV: WHT/BLK WAS WHT/YEL WIRE WHT/YEL WAS WHT/BLK IN DETAIL A (SR9953)(SR9954)	GLS 3/13/81	
G	BY REV. ADD S2527-2 & -1, BLK(AN-LB171) WAS BLK(REF (SR10101) (SR10102)	MKT 1-27-82	JAB

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
WHT/BLK	24	3		SOLDER	S-1963-3	SER (SR9953)(SR9954) & ON	
ORN						SER (SR9953)(SR9954) & ON	
WHT/ORN						SER (SR9953)(SR9954) & ON	
RED	24	3		SOLDER	S-1963-3	SER (SR9953)(SR9954) & ON	
BLK (F-CD63)	22	-22-0		SOLDER	S-1370-1		
N-CD61	20			S-1636-1	S-1963-2		
N-CD60	20			S-1636-1	S-1963-2		
N-CD59	20			S-1636-1	S-1963-2		
N-CD58	20			S-1636-1	S-1367-1-6		
BLK (1)	22	8568-10		SOLDER	SOLDER		
ORN (1)	22	8568-3		SOLDER	SOLDER		THRU SER (SR9953)(SR9954)
BRN (1)	22	8568-1		SOLDER	SOLDER		THRU SER (SR9953)(SR9954)
RED (2)	22	8568-2		SOLDER	SOLDER		THRU SER (SR9953)(SR9954)
RED (1)	22	8568-2		SOLDER	SOLDER		
RED (F-CD62)	22	-22-2		SOLDER	S-1635-1		
F-CD57	20			S-1636-1	S-1963-2		
F-CD56	20			S-1636-1	S-1963-2		
F-CD55	20			S-1636-1	S-1963-2		
F-CD54	20			S-1636-1	S-1367-1-6		
BLU (F-CD27)	20	-20-6		S-1635-1	S-1636-1		
GRN (F-CD26)	20	-20-5		S-1635-1	S-1636-1		
RED (F-CD24)	20	-20-2		S-1635-1	S-1636-1		
BLK (F-CD17)	20	-20-0	18	S-1367-1-8	S-1636-1		
F-CD16	20		18	S-1370-1	S-1367-1-8		
ORN (F-CD9)	20	-20-3	8	S-1635-1	S-1636-1		
BRN (F-CD8)	18	-18-5	8	S-1635-1	S-1636-1		
BLU (F-CD4)	20	-20-6	8	S-1635-1	S-1636-1		
YEL (F-CD3)	20	-20-4	137	S-1636-1	S-1636-1		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
24	S2527-2	GND CONNECTOR	
23	S2527-1	LH GND BLOCK	
22	2270030	CABLE ASSY	
21	S-1962-1-0	HOUSING	
20	S-1962-2-0	HOUSING	
19	S-1732-2	CIRCUIT BREAKER	
18	S-1985-1	SWITCH - MIKE KEY	
17	3473-3000	CONNECTOR SOCKET	
16	3421-0000	CONNECTOR SOCKET	
15	1570307	CONNECTOR ASSY	
14	S-1961-1-0	HOUSING	
13	S-1961-2-0	HOUSING	
12	S-1637-2	HOUSING	
11	S-1637-1	HOUSING	
10	C611003-0101	VOLTAGE REG	1
9	S-1640-6	HOUSING	
8	S-1641-6	HOUSING	
7	S-1232-5	CIRCUIT BREAKER	
6	1260243	MAP LIGHT INSTL	
5	S-2030-1	PITCH TRIM SW	
4	7101-P1	SWITCH	
3	1270844	CABLE	
2	1570307	CABLE ASSY	
1	1270842	CONNECTOR ASSY	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES P 14.4.1

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	4-25-77
GROUP		4-26-77
DRAWN	R.E. GOWIN	4-19-77
CHECK	J. YOUEL	4-19-77
STRESS		
PROJ		4-26-77
APPD		
OTHER		

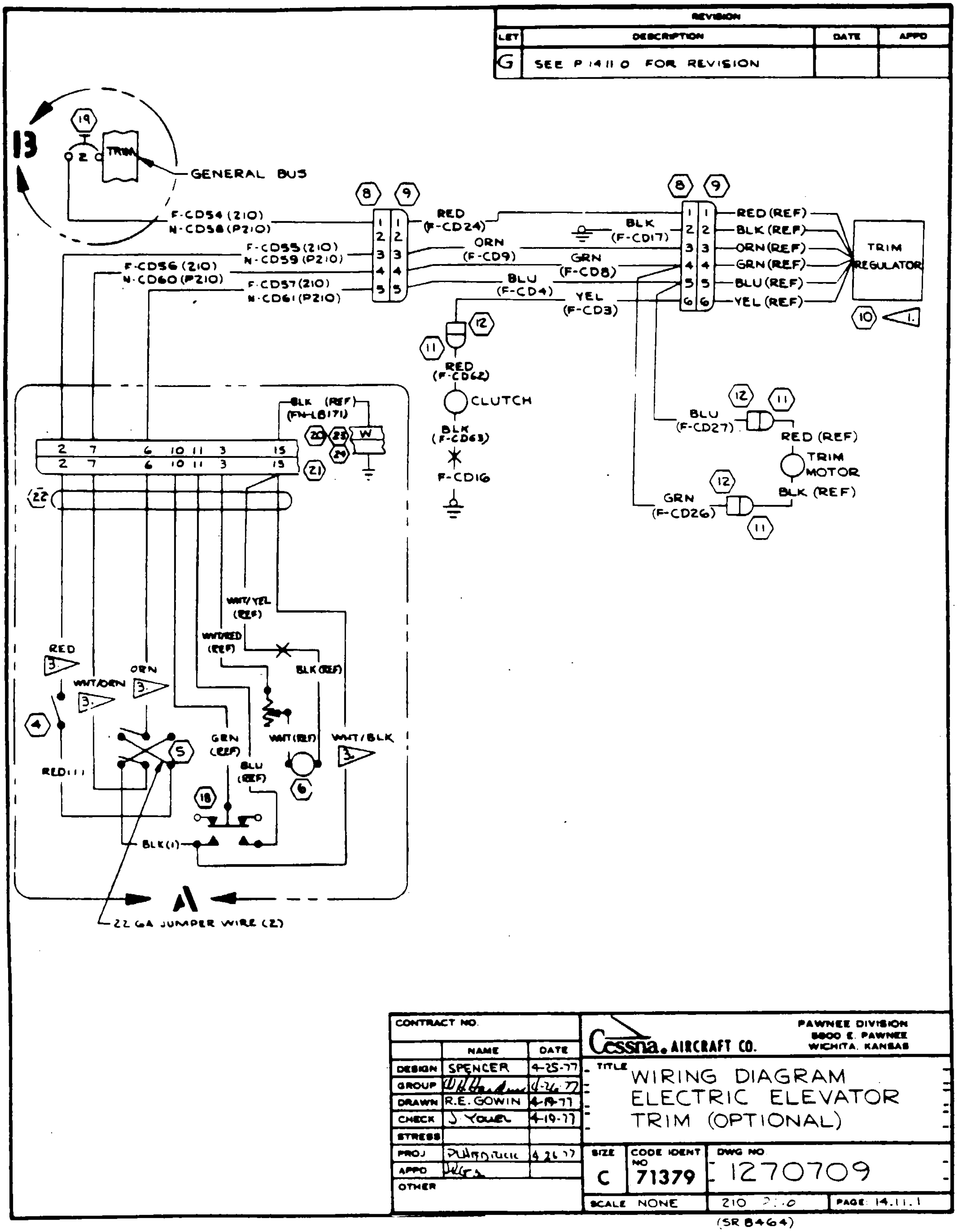
Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA, KANSAS

TITLE: WIRING DIAGRAM — ELECTRIC ELEVATOR TRIM (OPTIONAL)

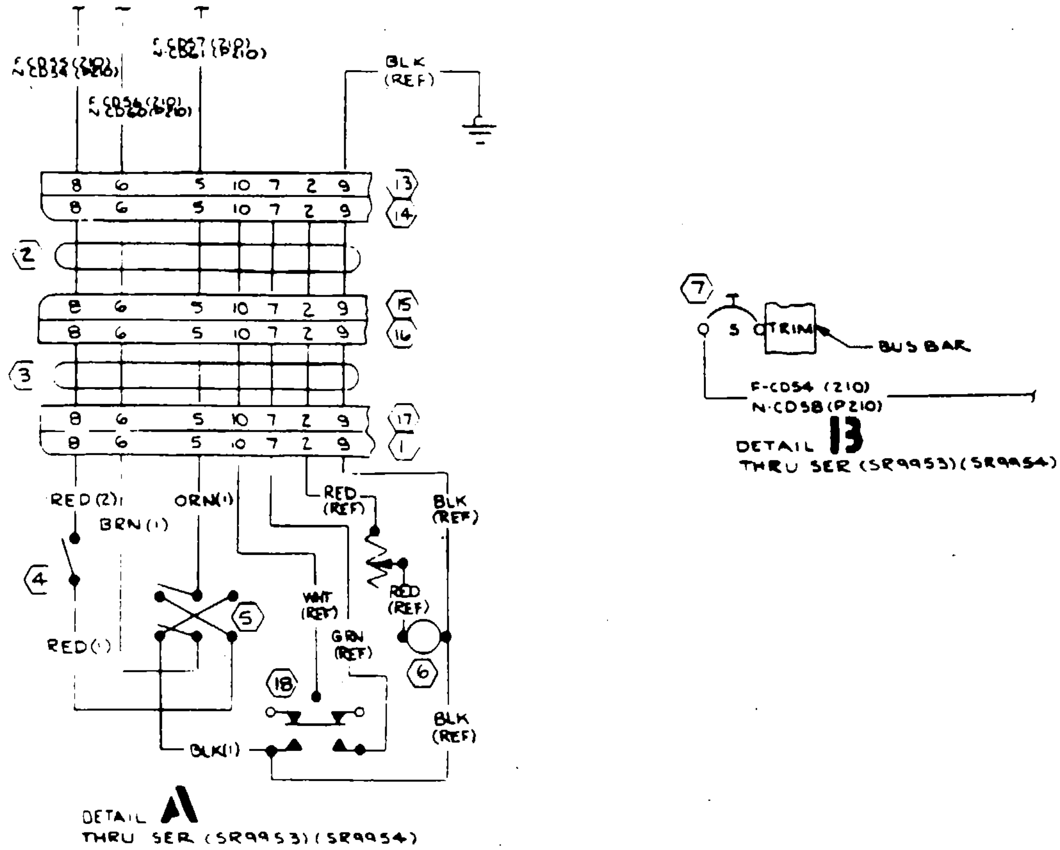
SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

SCALE NONE | 210 P210 | PAGE: 14.11.0

(SR8464)



Electric Elevator Trim (Optional) (Sheet 1 of 2)



CONTRACT NO.		
	NAME	DATE
DESIGN	SPENCER	4-25-77
GROUP	[illegible]	4-26-77
DRAWN	R.E. GOWIN	4-19-77
CHECK	J. YOUEL	4-19-77
STRESS		
PROJ	[illegible]	4-26-77
APPD	[illegible]	
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

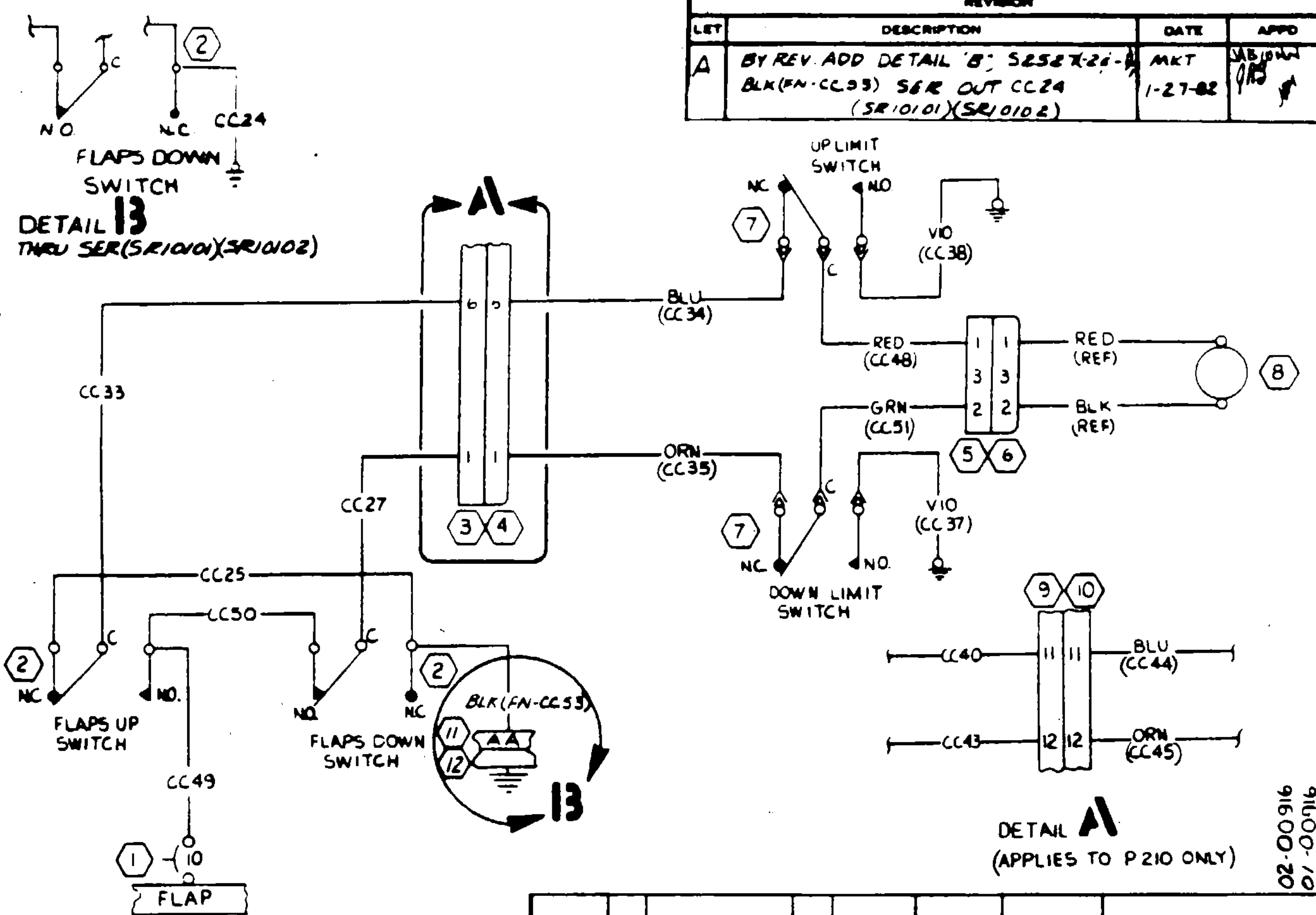
TITLE WIRING DIAGRAM ELECTRIC ELEVATOR TRIM (OPTIONAL)

SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709
SCALE NONE	210 P210	PAGE 14.11.1

(SR 8464)

Electric Elevator Trim (Optional) (Sheet 2 of 2)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV. ADD DETAIL 'B'; S2527-2(-1) BLK(FN-CC53) SER OUT CC24 (SR10101)(SR10102)	MKT 1-27-82	



WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
BLK (FN-CC53)	16	-16-0		S1367-2-4	S2099-3		SER(SR10101)(SR10102)(ON
ORN(CC45)	16	-16-3		S-1493-2	S-2099-5		
BLU(CC44)		-16-6		S-1493-2	S-2099-5		
CC43				S-1367-2-4	S-2353-1		
CC40				S-1367-2-4	S-2353-1		
CC50				S-1367-2-4	S-1367-2-4		
VIO(CC37)		-16-7		S-1493-2	S-1367-2-8		
VIO(CC38)		-16-7			S-1367-2-8		
GRN(CC51)		-16-5			S-1636-2		
RED(CC48)		-16-2		S-1493-2	S-1636-2		
ORN(CC35)		-16-3		S-1635-2	S-1493-2		
BLU(CC34)		-16-6		S-1635-2	S-1493-2		
CC49				S-1367-2-8	S-1367-2-4		
CC33				S-1367-2-4	S-1636-2		
CC27					S-1636-2		
CC25					S-1367-2-4		
CC24	16			S-1367-2-4	S-1367-2-8		THRU SER(SR10101)(SR10102)

WIRE TABLE

ITEM NO.	PART NO.	DESCRIPTION	
12	S2527-2	GND CONNECTOR	
11	S2527-1	LH GND BLOCK	
10	S-2349-1	CONNECTOR	
9	S-2350-1	CONNECTOR	
8	C301002-0202	FLAP MOTOR	
7	S-1906-2	SWITCH	
6	S-1638-2	HOUSING	
5	S-1638-1		
4	S-1640-6		
3	S-1641-6	HOUSING	
2	S-1906-1	SWITCH	
1	S-1360-10L	CIRCUIT BREAKER	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: 1270709 PGS 14.10 (14.11)

SUPERSEDED BY:

CONTRACT NO.:

	NAME	DATE
DESIGN	SPENCER	2-14-79
GROUP		3-2-79
DRAWN	H GHAZARIAN	2-9-79
CHECK	BORLESKE	2-12-79
STRESS		
PROJ		3-5-79
APPD		
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E. PAWNEE
WICHITA, KANSAS

TITLE: WIRING DIAGRAM — WING FLAPS

SIZE: C | CODE IDENT NO: 71379 | DWG NO: 1270709

SCALE: NONE | (SR9114)(SR9115) | PAGE: 14.12

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: 22 GA WAS 20GA/GC21 THRU GC25 BLUE (GC26), BLK (GC27), FC5, BLK (FC7) (SR 8143)	GDS 5-6-76	JRS
B	BY REV ADD S-2035-1 ; S-2035-2 ; S-1850-1 WAS S-1493-1, S-1636-1 WAS S-1635-1/GC24, S-1635-1 WAS S-1636-1/GC24 (NOW SHOP PRACTICE) REF EO 823	PH 8-16-76	JRS
C	BY REV: ADD DETAILS "A", "B", "C", "D" ; P 15.5.1, S-2349-1, S-2350-1, WIRES TAN(FC9), TAN(FC10), FC11, TAN(FC12), GC29, BLU(GC30), GC31 & GC32 ; SER OUT GC25 ; SER IN GC28 ; GE 9(REF) WAS GE6(REF), GE10(REF) WAS GE 5(REF), GE11(REF) WAS GE 3(REF) ADD S-1672-4 (SR 8464)(SR 8465)	LSS GDS 6-6-77	JAB JRS
D	BY REV: S-2099-5 WAS 66100-7/TAN(FC12), TAN(FC10); S-2353-2 WAS 66332-5/N-FC11 (SR8464)(SR8465)	JJB 8-29-77	JAB JRS
E	BY REV: 1270733 WAS 1270733-1 (NOW SHOP PRACTICE)	NTL 8-28-79	JAB JRS
F	BY REV: ADD DETAIL "E & F", WIRES BLU (GC 33), BLU (GC 34), BLK (GC 35) & S-2035-1, S-2035-2 (SR 9860)	SEB 7-31-80	JAB JRS
J	SEE PAGE 15.5.1 FOR REVISION		

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS
GC40	22			S-1367-1-8	S-1636-1	SER(SR10102) & ON	
GC39	22			S-1367-1-8	S-1636-1	SER(SR10101) & ON	
GC37	22			S-1635-1	SOLDER	SER(SR 9953) & ON	
FC13	18	-18-10		S-1636-1	S-2099-5	SER(SR9953) & ON	
GC38	22			S-1636-1	S-1636-1	SER(SR 9953) & ON	
GC36	22			S-1367-1-6	S-1636-1	SER(SR9953) THRU SER(SR10101)	
BLK (GC35)	22	-22-0		S-1637-1	SOLDER		SER (SR 9860) & ON
BLU GC34	22	-22-6		S-1636-1	SOLDER		SER (SR 9860) & ON
BLU GC33	22	-22-6		S-1635-1	S-1636-1		SER (SR 9860) & ON
TAN (FC12)	18	-18-10		S-1636-1	S-2099-5		
N-FC11	22			S-2353-2	S-1636-1		
TAN (FC10)	18	-18-10		S-1367-1-6	S-2099-5		
N-GC32	22			S-1636-1	S-1636-1		
N-GC31	22			S-1635-1	SOLDER		
BLU (GC30)	22	-22-6		S-1636-1	S-1830-1		THRU SER(SR 9860)
N-GC29	22			S-1367-1-6	S-1636-1	THRU SER(SR10102)	
F-GC28	22			S-1367-1-6	S-1636-1		THRU SER(SR9953)
TAN (FC9)	22	-22-10		S-1636-1	S-1635-1		
BLU GC26	22	-22-6		S-1636-1	S-1830-1		THRU SER(SR9860)
BLK FC7	22	-22-0		S-1367-1-6	S-1367-1-8		
BLK GC27	22	-22-0		S-1637-1-8	S-1850-1		THRU SER(SR9860)
TAN FC6	18	-18-10	145	S-1635-1	S-1367-1-6		
FC5	22			S-1636-1	S-1636-1		THRU SER (SR 9953)
GC25	22			S-1637-1-6	S-1636-1		THRU SER (SR8464)
GC24	22			S-1636-1	S-1636-1		THRU SER(SR7753)
GC23	22			S-1635-1	SOLDER		THRU SER(SR7753)
GC22	22			SOLDER	S-1367-1-10		
GC2	22			S-1636-1	SOLDER		

WIRE TABLE

ITEM NO	PART NO.	DESCRIPTION	
18	S2527-2	GND CONNECTOR	
17	S2527-1	LH GND BLOCK	
16	S-2349-1	PLUG	
15	S-2350-1	RECEPTACLE	
14	S-1672-4	STALL DETECTOR	
13	S-2035-2	HOUSING PIN	
12	S-2035-1	HOUSING PIN	
11	S1232-5	CIRCUIT BREAKER	
10	S-1672-1	STALL DETECTOR	
9	S-1641-9	HOUSING SOCKET	
8	S-1640-9	HOUSING - PIN	
7	IM920M-3	LIGHT ASSY	
6	S-1360-5L	CIRCUIT BREAKER	
5	S-1641-6	HOUSING - SOCKET	
4	S-1640-6	HOUSING - PLUG	
3			
2	S-1856-1	SWITCH	
	1270733	WARNING UNIT ASSY	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA
STD. NO.

SUPERSEDES:

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	V R SIPES	11-15-74
GROUP	JRS	11-18-74
DRAWN	G WHITSON	11-11-74
CHECK	J YOUEL	11-17-74
STRESS		
PROJ	WML/PLR	11-21-74
APPD		
OTHER		

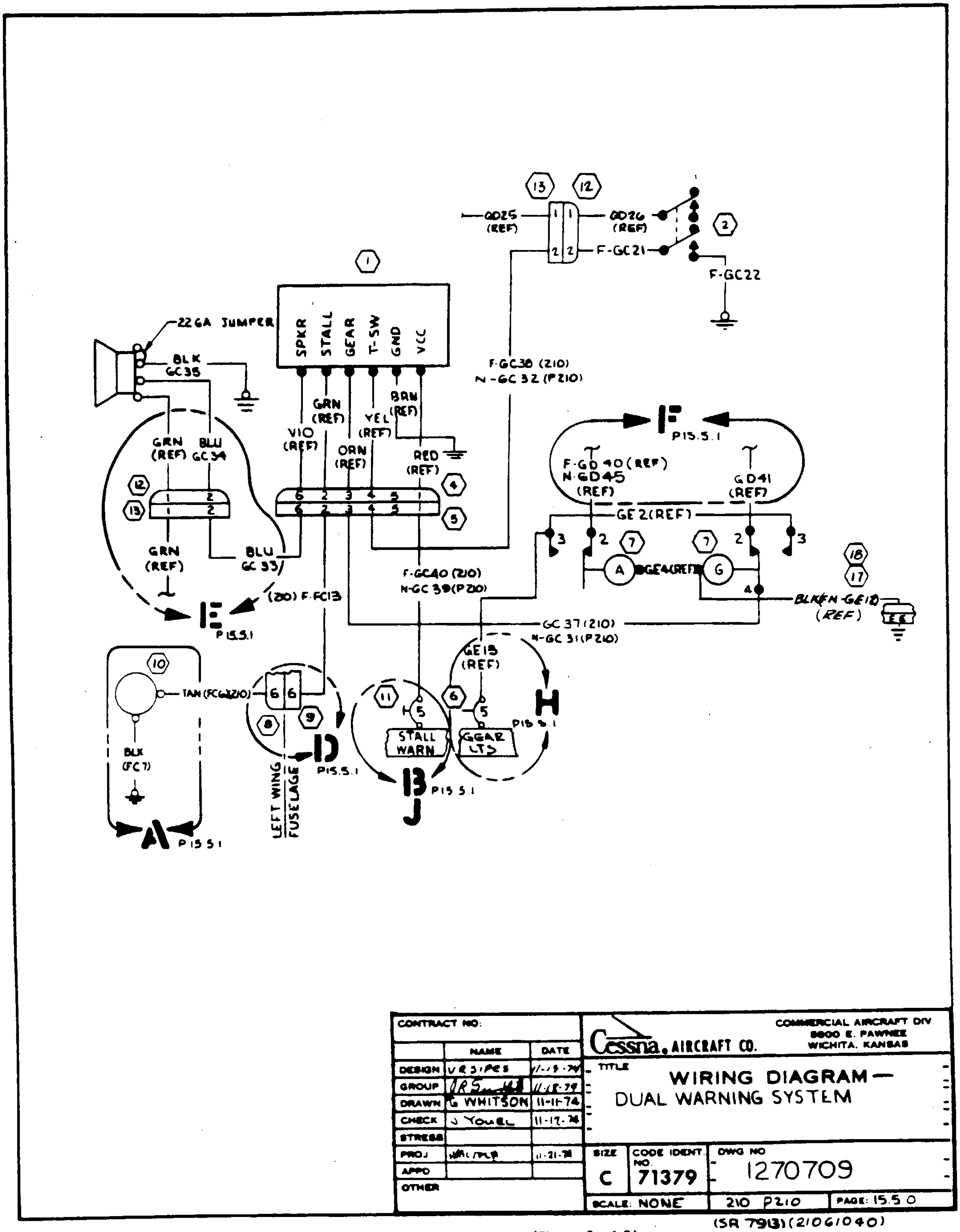
Cessna AIRCRAFT CO.
COMMERCIAL AIRCRAFT DIV.
5800 E. PAWNEE
WICHITA, KANSAS

TITLE
WIRING DIAGRAM — DUAL WARNING SYSTEM

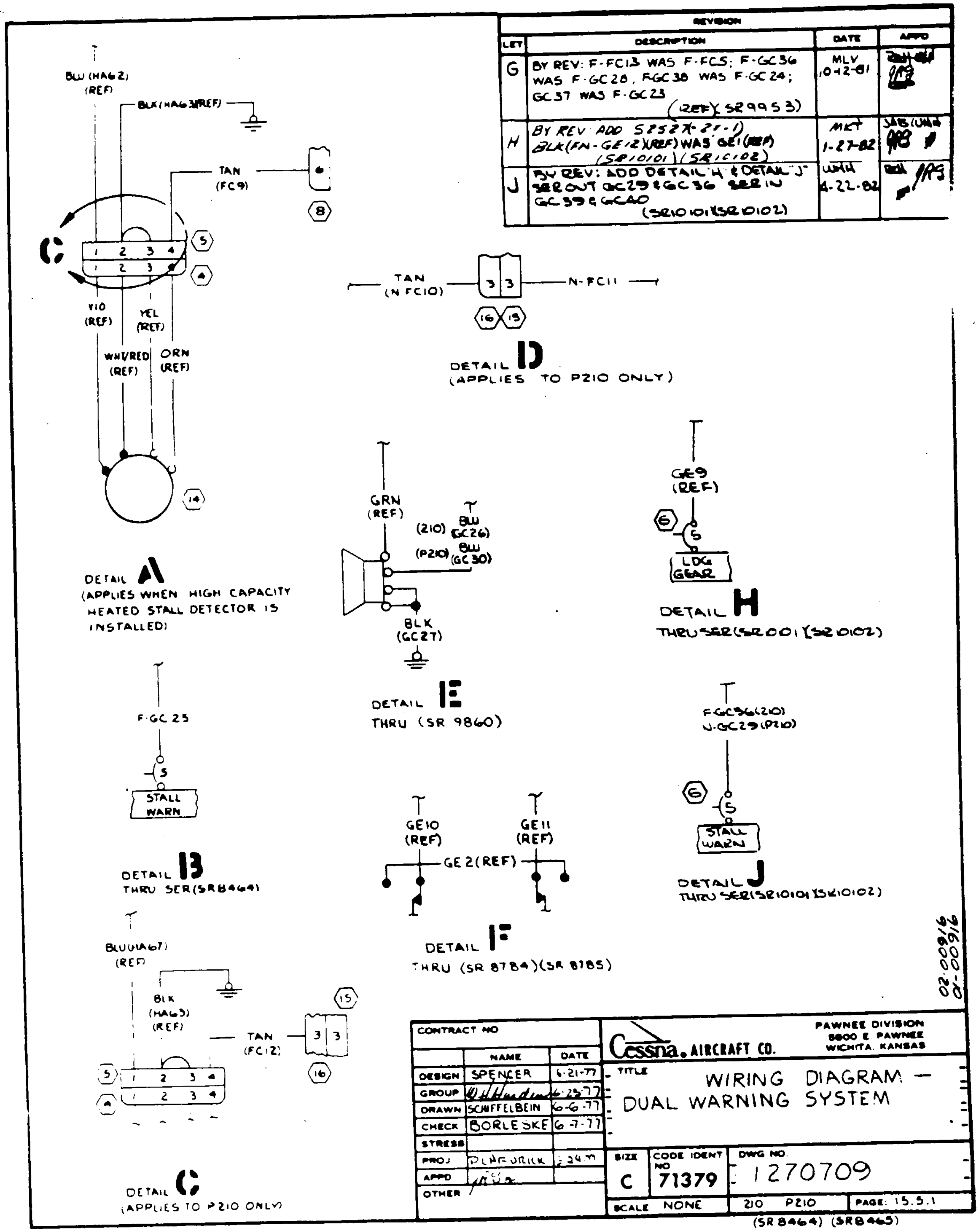
SIZE	CODE IDENT NO.	DWG NO	
C	71379	1270709	
SCALE: NONE		210 P210	PAGE: 15.5.0

(SR 7913)(2106/040)

Dual Warning System (Sheet 1 of 2)



Dual Warning System (Sheet 2 of 2)


REVISION
LET | DESCRIPTION | DATE | APPD
G | BY REV: F-FC13 WAS F-FC5; F-GC36 WAS F-GC28, F-GC38 WAS F-GC24; GC37 WAS F-GC23 (REF)(S29953) | MLV 10-12-81
H | BY REV ADD S2528-21-1 BLK(FN-GE12)(REF) WAS GE1(REF) (SR10101)(SR10102) | MKT 1-27-82
J | BY REV: ADD DETAIL H & DETAIL J SER OUT GC29 & GC36 SER IN GC39 & GC40 (SR10101)(SR10102) | 4-22-82
BLU (HA62) (REF)
BLK (HA63)(REF)
TAN (FC9)
VIO (REF)
YEL (REF)
WHT/RED (REF)
ORN (REF)
DETAIL A
(APPLIES WHEN HIGH CAPACITY HEATED STALL DETECTOR IS INSTALLED)
TAN (N FC10)
N-FC11
DETAIL D
(APPLIES TO P210 ONLY)
GRN (REF)
(210) BLU GC26)
(P210) BLU (GC30)
BLK (GC27)
DETAIL E
THRU (SR 9860)
GE9 (REF)
LDG GEAR
DETAIL H
THRU SER (SR001)(SR0102)
F-GC25
STALL WARN
DETAIL B
THRU SER (SR8464)
GE10 (REF)
GE11 (REF)
GE2 (REF)
DETAIL F
THRU (SR 8784)(SR 8785)
F-GC36 (210)
U-GC29 (P210)
STALL WARN
DETAIL J
THRU SER (SR10101)(SR10102)
BLU (HA67) (REF)
BLK (HA63) (REF)
TAN (FC12)
DETAIL C
(APPLIES TO P210 ONLY)
CONTRACT NO
DESIGN SPENCER 6-21-77
GROUP 6-25-77
DRAWN SCHIFFELBEIN 6-6-77
CHECK BORLESKE 6-7-77
STRESS
PROJ 6-24-77
APPD
OTHER
Cessna AIRCRAFT CO.
PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS
TITLE WIRING DIAGRAM — DUAL WARNING SYSTEM
SIZE C
CODE IDENT NO 71379
DWG NO. 1270709
SCALE NONE
210 P210
PAGE: 15.5.1
(SR8464) (SR8465)
02-0091
01-0091

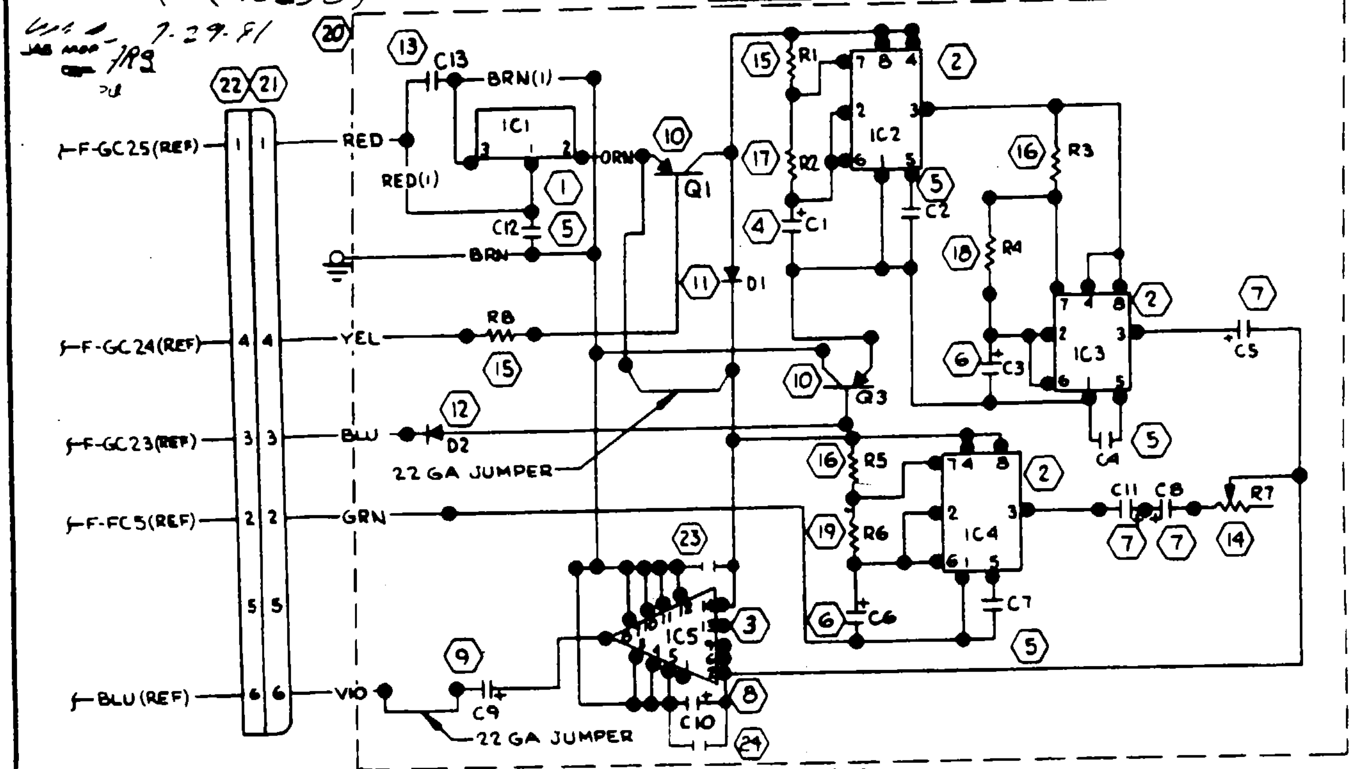
C	BY REV: 5000506605000007 WAS 6E62F405 (USE AS IS PARTS IN WORK & FINISHED PARTS)	RLY 1-28-80	JRG

REVISION

LET	DESCRIPTION	DATE	APPD
A	BY REV: ADD C315C103M5UICA CAPACITOR, & C321C104M5UICA CAPACITOR (SR9465)	NTL 2-16-79	JRG
B	BY REV: S-2493-12 WAS MC7812CP, S-2437-1 WAS MC1455P1 NOW SHOP PRACTICE	NTL 8-28-79	JRG

INACTIVE

THRU SER (SR 10250)
7-29-81 JRG



NOTES:

1. LM340-12 VENDOR CODE 27014 MAY BE SUBSTITUTED FOR S-2493-12
2. SG555CN VENDOR CODE 34333, LM555CN VENDOR CODE 27014, OR SN72555P VENDOR CODE 01295 MAY BE SUBSTITUTED FOR S-2437-1

ITEM NO.	PART NO.	DESCRIPTION	
24	C315C103M5UICA	CAPACITOR	
23	C321C104M5UICA	CAPACITOR	
22	S-1641-6	HOUSING-SOCKET	
21	S-1640-6	HOUSING-PIN	
20	1270730	PC BOARD	
19	S2000A122J	RESISTOR	
18	S2000A242J	RESISTOR	
17	S2000A393J	RESISTOR	
16	S2000A471J	RESISTOR	
15	S2000A102J	RESISTOR	
14	2322-410-03308	POT	
13	ET470X063A6	CAPACITOR	
12	1N2070	DIODE	
11	1N4001	DIODE	
10	2N4918	TRANSISTOR	
9	5000506605000007	CAPACITOR	
8	T310B225K035AS	CAPACITOR	
7	T330B104K035AS	CAPACITOR	
6	T330B564K035AS	CAPACITOR	
5	UK25-103	CAPACITOR	
4	T330C106K025AS	CAPACITOR	
3	LM 380 N	INTEGRATED CKT	
2	S-2437-1	INTEGRATED CKT	2
1	S-2493-12	INTEGRATED CKT	1

EQUIPMENT TABLE

WIRE CODE NO	GA	MATERIAL	LG	TERMINALS		SERIALS
ORN	22	BELDEN 8568		SOLDER	SOLDER	
RED(I)					SOLDER	
BRN(I)					SOLDER	
VIO					S-1635-1	
RED					S-1635-1	
BRN					S-1367-2-4	
YEL					S-1635-1	
BLU					S-1635-1	
GRN	22	BELDEN 8568		SOLDER	S-1635-1	

WIRE TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES: PAGE 5.4

SUPERSEDED BY: Pg 5.7.0 & 5.7.1

CONTRACT NO.

	NAME	DATE
DESIGN		
GROUP	W. Vanden	10-3-77
DRAWN	BLISS	9-16-77
CHECK	BORLESKE	9-13-77
STRESS		
PROJ		10-3-77
APPD	JRG	
OTHER		

Cessna AIRCRAFT CO. COMMERCIAL AIRCRAFT DIV. 5800 E. PAWNEE WICHITA, KANSAS

TITLE: WIRING DIAGRAM — SCHEMATIC DUAL WARNING UNIT

SIZE: C | CODE IDENT NO: 71379 | DWG NO: 1270709

SCALE: NONE | 210 & P210 | PAGE: 15.6

(SR8970)

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV: 2322-410-03306 WAS 2322-410-03308 ; ITEM 12 WAS IN2070 DIODE (SR10250)	8-6-81 JAB	JAB

29			
28	S2000A2R7J	RESISTOR	
27	S2000A103J	RESISTOR	
26	S2000A153J	RESISTOR	
25	2N3904	TRANSISTOR	
24	C315C103M5UICA	CAPACITOR	.01µf 50V
23	C321C104M5UICA	CAPACITOR	.1µf 50V
22			
21	S1640-6	HOUSING - PIN	
20	1270730	P.C. BOARD	
19	S2000A122J	RESISTOR	
18	S2000A242J		
17	S2000A393J		
16	S2000A471J		
15	S2000A102J	RESISTOR	
14	2322-410-03306	POT	
13	ET470X063A6	CAPACITOR	47µf 63V
12			
11	1N4001	DIODE	
10	2N4918	TRANSISTOR	
9	500D506G050DD7	CAPACITOR	50µf 50V
8	T310B225K035AS		2.2µf 35V
7	CK05BX104K		.10µf 35V
6	T330B564K035AS		.56µf 35V
5	UK25-103		.01µf 25V
4	T330C106K025AS	CAPACITOR	10µf 35V
3	LM380N	AUDIO AMP	
2	S2437-1	TIMER	
1	S2493-12	VOLTAGE REG	
ITEM NO	PART NO.	DESCRIPTION	

EQUIPMENT TABLE

ORN	22	BELDEN 8568		SOLDER	SOLDER		
RED(1)					SOLDER		
BRN(1)					SOLDER		
BRN					S-1367-24		
VIO					S-1635-1		
RED							
YEL							
BLU							
GRN	22	BELDEN 8568		SOLDER	S1635-1		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES 15.6

SUPERSEDED BY.

CONTRACT NO:

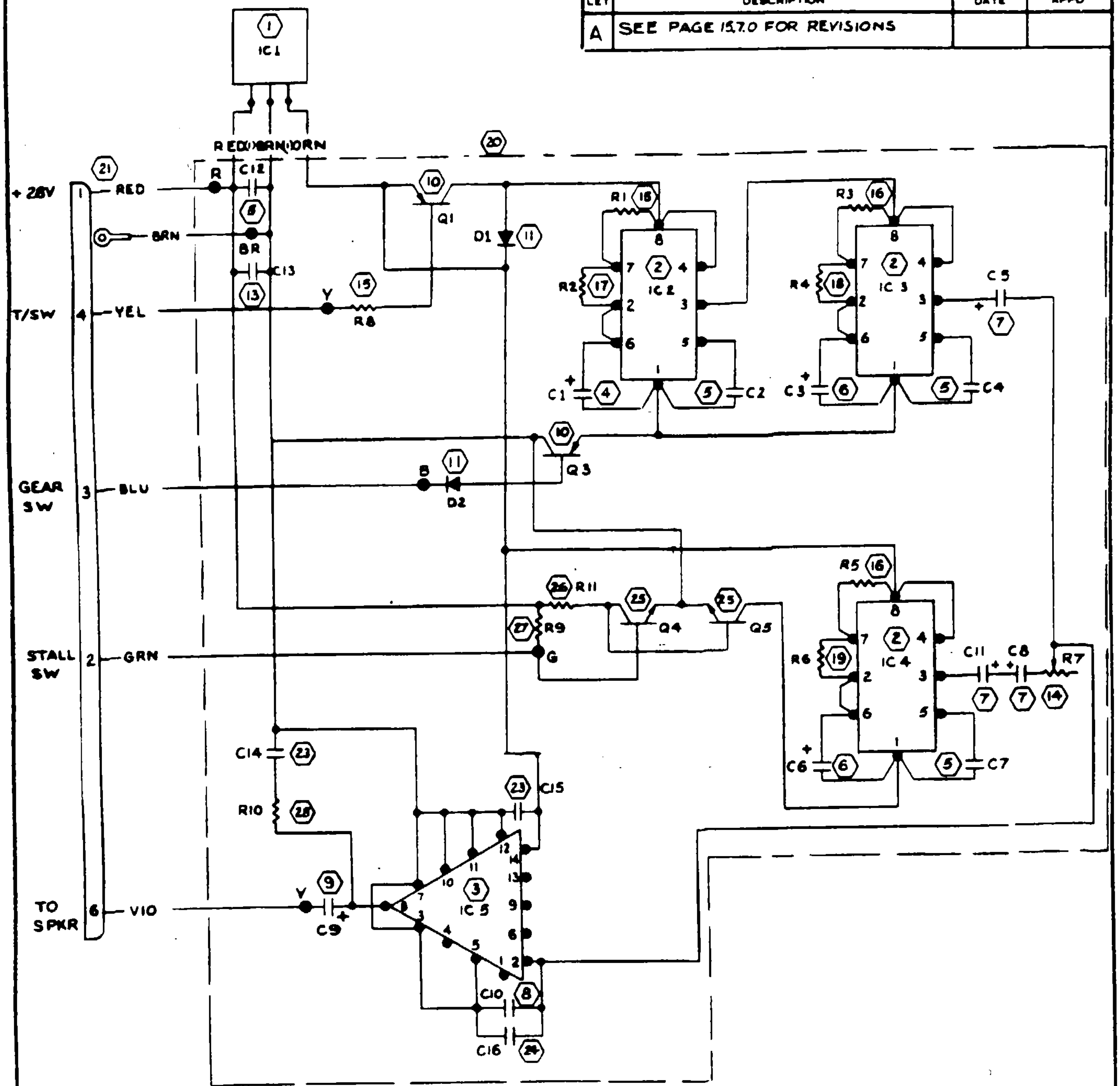
	NAME	DATE
DESIGN		
GROUP		
DRAWN		7-2-81
CHECK	BORLESKE	7-31-81
STRESS		
PROJ		7-31-81
APPD		
OTHER		

Cessna. AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

TITLE
WIRING DIAGRAM — DUAL WARNING UNIT

SIZE C
CODE IDENT NO 71379
DWG NO 1270709
SCALE (SR10250) PAGE: 15.7.0

REVISION			
LET	DESCRIPTION	DATE	APPD
A	SEE PAGE 15.7.0 FOR REVISIONS		



CONTRACT NO		
	NAME	DATE
DESIGN		
GROUP		
DRAWN	ACKER	7-2?-81
CHECK	BORLESKE	7-31-81
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E. PAWNEE WICHITA, KANSAS

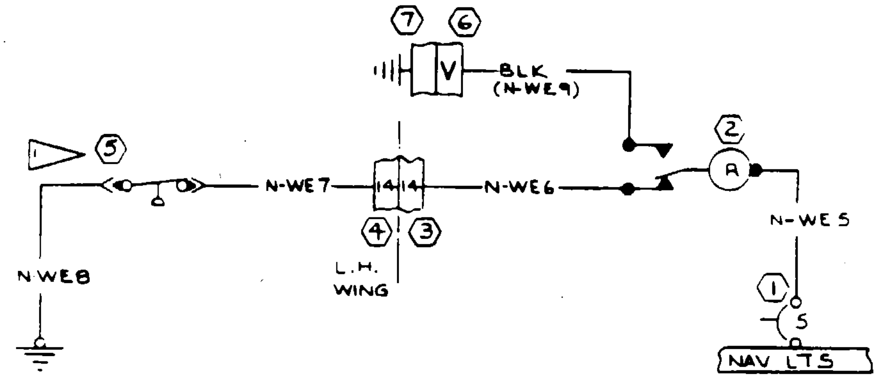
TITLE SCHEMATIC - DUAL WARNING UNIT

SIZE	CODE IDENT NO	DWG NO
C	71379	1270709
SCALE —	(SR10250)	PAGE 15.7.1

REVISION			
LET	DESCRIPTION	DATE	APPD

NOTES:

1. VACUUM SWITCH CONTACTS ARE NORMALLY CLOSED.



B-K (N-WE9)	22	-22-0		SOLDER	S-2094-4		
N-WE8				S-1443-1	S-1367-1-8		
N-WE7				S-2094-7	S-1493-1		
N-WE6				SOLDER	S-2353-2		
N-WE5	22			S-1367-1-6	SOLDER		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

7	S-2527-2	GND CONNECTOR	
6	S-2527-1	LH GND BLOCK	
5	S-23[illegible]-1	VACUUM SWITCH	
4	S-2344-1	CONNECTOR	
3	S-2350-1	CONNECTOR	
2	MS25041-2-327	LAMP ASSY	
1	S-1360-5L	CIRCUIT BREAKER	
ITEM NO	PART NO.	DESCRIPTION	

EQUIPMENT TABLE

CES-1000 IS APPLICABLE
VENDOR CODES PER S-1400
CES-XXXX=CESSNA SPEC. NO.
S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES.

SUPERSEDED BY

CONTRACT NO.

	NAME	DATE
DESIGN	G STAMM	3/15/82
GROUP	[illegible]	3-26-82
DRAWN	G STAMM	3/15/82
CHECK	R E HALL	3-15-82
STRESS		
PROJ	[illegible]	[illegible]
APPD	[illegible]	
OTHER		

Cessna AIRCRAFT CO.
PAWNEE DIVISION
5800 E PAWNEE
WICHITA KANSAS

TITLE
WIRING DIAGRAM — LOW VACUUM WARNING LIGHT (OPT)

SIZE C | CODE IDENT NO 71379 | DWG NO 1270709

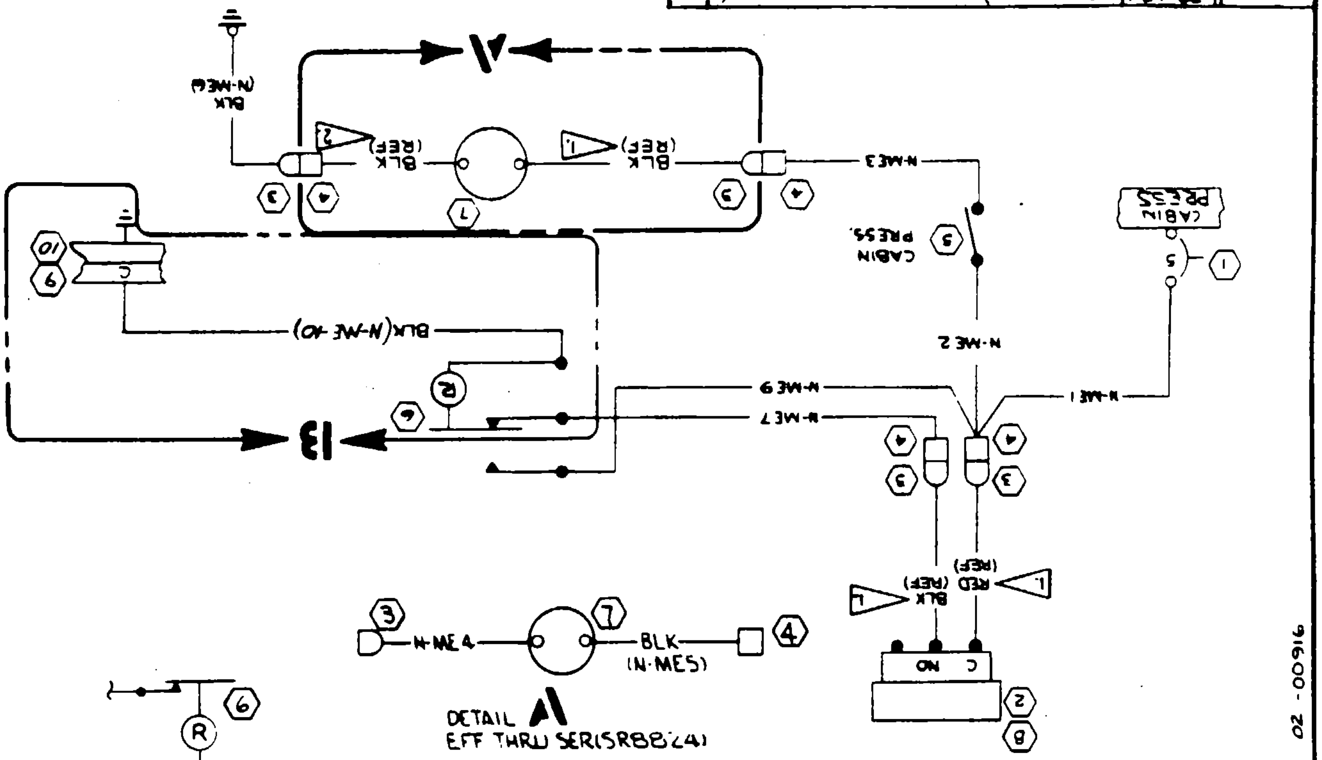
SCALE NONE | P210 | PAGE: 15.9

(SR10102)

NOTES:

1. TERMINATE VENDOR FURNISHED WIRE WITH S-1635-1
2. TERMINATE VENDOR FURNISHED WIRE WITH S-1636-1

REVISION			
LET	DESCRIPTION	DATE	APPD
A	BY REV ADD 05E10-1, NOTE 2 & DETAIL 'A' & SER DELETE 88000-4 (SR8824) (SR8465)	JJB 8-29-77	
B	BY REV: MS25041-6 WAS MS25041-4 (SR8465) (REF)	RLL 5-5-78	
C	BY REV ADD S-2203-4 "NOW SHOP PRACTICE"	AKT 3-20-79	
D	BY REV ADD BLK (N-ME-10), S-2527-1 & DETAIL "B" (SR10102)	MKT 1-27-82	



BLK (N-ME-10)	22			SOLDER	S-2099-4		SER(SR10102) & ON
N-ME9	22			SEE N-ME1	SOLDER		
BLK (N-ME8)	22	-22-0		SOLDER	S-1367-1-8		THRU SER (SR10102)
N-ME7	22			S-1636-1	SOLDER		
BLK (N-ME6)	20	-22-0		S-1635-1	S-1367-1-8		
BLK (N-ME5)	20	-22-0		S-1367-1-6	S-1636-1		THRU SER (SR8824)
N-ME4	20			S-1635-1	S-1367-1-6		THRU SER (SR8824)
N-ME3	20			SOLDER	S-1636-1		
N-ME2	20			SEE N-ME1	SOLDER		
N-ME1	20			S-1367-1-6	S-1636-2		
WIRE CODE NO	GA	MATERIAL	LG	TERMINALS			SERIALS

WIRE TABLE

10	S-2527-2	GND CONNECTOR
9	S-2527-1	LH GND BLOCK
8	S-2203-4	SWITCH BARO PRESSURE (ALT)
7	05E10-1	SAFETY VALVE
6	MS25041-6	IND-CABIN PRESS
5	MTL-106D	SWITCH-CABIN PRESS
4	S-1637-2	HOUSING - PLUG
3	S-1637-1	HOUSING - CAP
2	S-2203-3	SWITCH-BARO PRESSURE
	S-1360-5L	CIRCUIT BREAKER
ITEM NO	PART NO.	DESCRIPTION

EQUIPMENT TABLE

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX=CESSNA SPEC. NO. S-XXX OR CMXXXX=CESSNA STD. NO.

SUPERSEDES:

SUPERSEDED BY:

CONTRACT NO:

	NAME	DATE
DESIGN	SPENCER	6-21-77
GROUP		6-25-77
DRAWN	SCHIFFELBEIN	6-6-77
CHECK	BORLESKE	6-8-77
STRESS		
PROJ		
APPD		
OTHER		

Cessna AIRCRAFT CO. PAWNEE DIVISION 5800 E PAWNEE WICHITA KANSAS

TITLE WIRING DIAGRAM — CABIN PRESSURE DUMP VALVE & BAROMETRIC PRESSURE SWITCH

SIZE	CODE IDENT. NO.	DWG NO
C	71379	1270709

SCALE: NONE | P210 | PAGE: 1 of 2

(SR8465)