SECTION 9
SUPPLEMENTS
(Optional Systems Description & Operating Procedures)

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INTRODUCTION

This section consists of a series of supplements, each covering a single optional system which may be installed in the airplane. Each supplement contains a brief description, and when applicable, operating limitations, emergency and normal procedures, and performance. As listed in the Table of Contents, the supplements are classified under the headings of General and Avionics, and have been provided with reference numbers. Also the supplements are arranged alphabetically and numerically to make it easier to locate a particular supplement. Other routinely installed items of optional equipment, whose function and operational procedures do not require detailed instructions, are discussed in Section 7.

Limitations contained in the following supplements are FAA approved. Observance of these operating limitations is required by Federal Aviation Regulations.

SUPPLEMENT

ELECTRIC ELEVATOR TRIM SYSTEM

SECTION 1
GENERAL

The electric elevator trim system provides a simple method of relieving pitch control pressures without interrupting other control operations to adjust the manual elevator trim wheel. The system is controlled by a slide-type trim switch on the top of the left control wheel grip, a disengage switch on the left side of the control wheel pad and a "pull-off" type circuit breaker on the left sidewall circuit breaker panel. Pushing the trim switch to the forward position, labeled DN, moves the elevator trim tab in the "nose down" direction; conversely, pulling the switch aft to the UP position moves the tab in the "nose up" direction. When the switch is released, it automatically returns to the center off position, and elevator trim tab motion stops. The disengage switch, labeled ELEC TRIM DISENGAGE, disables the system when placed in the DISENGAGE position. The elevator trim circuit breaker, labeled TRIM PULL-OFF, is provided as a secondary control of all electrical power to the system and can be pulled to the off position in case of a system malfunction.

A servo unit (which includes a motor and chain-driven, solenoid-operated clutch) actuates the trim tab to the selected position. When the clutch is not energized (trim switch off) the electric portion of the trim system freewheels so that manual operation is not affected. The electric trim system can be overridden at any time by manually rotating the elevator trim wheel, thus overriding the servo that drives the trim tab.

SECTION 2
LIMITATIONS

The following limitation applies to the electric elevator trim system:

1. The maximum altitude loss during an electric elevator trim malfunction may be as much as 250 feet.

SECTION 3
EMERGENCY PROCEDURES

1. Elevator Trim Disengage Switch -- DISENGAGE.
2. Elevator Trim Circuit Breaker -- PULL-OFF for the remainder of the flight.
3. Manual Trim -- AS REQUIRED.

SECTION 4
NORMAL PROCEDURES

To operate the electric elevator trim system, proceed as follows:

1. Master Switch -- ON.
2. Elevator Trim Circuit Breaker -- PUSH-TO-RESET, if off.
3. Elevator Trim Disengage Switch -- ON.
4. Trim Switch -- ACTUATE as desired.
5. Elevator Trim Position Indicator -- CHECK.

NOTE

To check the operation of the disengage switch, actuate the elevator trim switch with the disengage switch in the DISENGAGE position. Observe that the manual trim wheel and indicator do not rotate when the elevator trim switch is activated.

SECTION 5
PERFORMANCE

There is no change to the airplane performance when this trim system is installed.

SUPPLEMENT

GROUND SERVICE PLUG RECEPTACLE

SECTION 1
GENERAL

The ground service plug receptacle permits the use of an external power source for cold weather starting and during lengthy maintenance work on electrical and avionics equipment. The receptacle is located behind the engine oil dipstick access door on the left side of the upper cowl.

NOTE

If no avionics equipment is to be used or worked on, the avionics power switch should be turned off. If maintenance is required on the avionics equipment, it is advisable to utilize a battery cart external power source to prevent damage to the avionics equipment by transient voltage. Do not crank or start the engine with the avionics power switch turned on.

A special fused circuit is included with the ground service plug receptacle which will close the battery contactor when external power is applied with the master switch turned on. This circuit is intended as a servicing aid when battery power is too low to close the contactor, and should not be used to avoid performing proper maintenance procedures on a low battery.

NOTE

Use of the ground service plug receptacle for starting an airplane with a "dead" battery or charging a "dead" battery in the airplane is not recommended. The battery should be removed from the airplane and serviced in accordance with Service Manual procedures. Failure to observe this precaution could result in loss of electrical power during flight.

SECTION 2
LIMITATIONS

The following information must be presented in the form of a placard located on the inside of the engine oil dipstick access door:

> CAUTION 24 VOLTS D.C.
> This aircraft is equipped with alternator and a negative ground system.
> OBSERVE PROPER POLARITY
> Reverse polarity will damage electrical components.

SECTION 3
EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when the ground service plug receptacle is installed.

SECTION 4
NORMAL PROCEDURES

Just before connecting an external power source (generator type or battery cart), the avionics power switch should be turned off, and the master switch turned on.

WARNING

When turning on the master switch, using an external power source, 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.

The ground service plug receptacle circuit incorporates a polarity reversal protection. Power from the external power source will flow only if the ground service plug is correctly connected to the airplane. If the plug is accidentally connected backwards, no power will flow to the electrical system, thereby preventing any damage to electrical equipment.

The following check should be made after engine start and removal of the external power source, if there is any question as to the condition of the battery.

1. Master Switch -- OFF.
2. Taxi and Landing Light Switches -- ON.
3. Engine RPM -- REDUCE to IDLE.
4. Master Switch -- ON (with taxi and landing lights turned on).
5. Engine RPM -- INCREASE to approximately 1500 RPM.
6. Ammeter and Low-Voltage Warning Light -- CHECK.

NOTE

If the ammeter does not show a charge or the low-voltage warning light does not go out, the battery should be removed from the airplane and properly serviced prior to flight.

SECTION 5
PERFORMANCE

There is no change to the airplane performance when the ground service plug receptacle is installed.

SUPPLEMENT

KNOWN ICING EQUIPMENT

SECTION 1
GENERAL

The flight into known icing equipment package allows flight penetration of icing conditions as defined by the FAA. The package includes extended coverage pneumatic de-icing boots on the wings and horizontal and vertical stabilizer leading edges, electrically-heated propeller blade anti-ice boots, a permanently installed electric windshield anti-ice panel, a high power heated pitot tube, a high power heated stall warning transducer, a high capacity (95-amp) alternator or dual 60-amp alternators, dual vacuum pumps, an ice detector light, and control surface-mounted static discharger wicks. The package is designed to provide adequate in-flight protection during the normally encountered extremes of icing conditions produced by moisture laden clouds. It will not necessarily provide total protection under abnormally severe conditions such as those which exist in areas of freezing rain or extremely widespread areas of heavy cloud moisture content. During all operations, the pilot must exercise good judgment and be prepared to alter his flight if conditions exceed the capacity of the ice protection equipment or if any component of this equipment fails.

The in-flight ice protection equipment was not designed to remove ice, snow, or frost accumulations on a parked airplane sufficiently enough to ensure a safe takeoff or subsequent flight. Other means (such as a heated hangar or approved de-icing solutions) should be employed to ensure that all wing, tail, control, propeller, windshield and static port surfaces are free of ice, snow, and frost accumulations, and that there are no internal accumulations of ice or debris in the control surfaces, engine intakes and pitot-static system ports prior to takeoff.

WING AND STABILIZER DE-ICE BOOTS

The pneumatic de-ice boot system installed on the leading edges of the wings and horizontal and vertical stabilizers is designed to remove ice after accumulation in flight rather than prevent ice formation. The system consists of the pneumatically-operated boots, engine-driven dual vacuum pumps, an annunciator light to monitor system operation, system controls, and the hardware necessary to complete the installation. In operation, the boots expand and contract, using pressure or vacuum from the

engine-driven vacuum pump.

NOTE

Although the airplane is equipped with a dual vacuum system, the wing and stabilizer de-ice boots are operated by the right vacuum pump only.

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. The resulting change in contour will break the ice accumulation on the leading edges. Ice on the boots will then be removed by normal in-flight air forces.

Controls for the de-icing system consist of a two-position rocker-type de-icing 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 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 the circuit breaker, labeled WING, DE-ICE PULL-OFF, to the off position.

During a normal de-icing cycle, the boots will inflate according to the following sequence: first the tail section (horizontal and vertical stabilizer) boots inflate for approximately six seconds, then the inboard wing 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 tail section 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 system operation, and icing conditions should be avoided.

PROPELLER ANTI-ICE BOOTS

The propeller anti-ice system provides a measure of protection for the propeller blade surfaces if icing conditions are encountered. The system is operated by a rocker-type switch, labeled PROP A/ICE, on the left switch

and control panel. When the switch is placed in the ON position, current flows to an anti-ice timer which cycles electric power every 20 seconds between the inboard and outboard set of heating elements in the anti-icing boots located on the propeller blades. Operation of the anti-ice system can be checked by monitoring a propeller anti-ice ammeter near the upper left corner of the instrument panel. The system is protected by a 20-amp "push-to-reset" type circuit breaker, labeled PROP A/ICE, located on the left sidewall circuit breaker panel.

WINDSHIELD ANTI-ICE PANEL

An electrically-heated panel is permanently installed on the pilot's side of the windshield to assure a clear view for landing during icing conditions. The system is designed to prevent ice formation rather than remove it once formed. Components of the system include a heating element and temperature sensor within the windshield panel, a 15-amp "push-to-reset" type circuit breaker, labeled W/S A/ICE, on the left sidewall circuit breaker panel and a rocker-type switch, labeled W/S A/ICE, on the left switch and control panel.

During operation, the windshield heat will cycle on and off as required to maintain the proper heater element temperature. Operation can be verified by feeling the inside of the windshield and noting the relatively warmer surface behind the panel as compared to elsewhere on the windshield. In addition, slight changes to the panel light transmissibility, compass deviation, and airplane ammeter readings will provide an indication as the element cycles on and off.

PITOT TUBE AND STALL WARNING HEATER

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 once formed. Electrical components of these systems include a rocker-type switch, labeled PITOT HEAT, on the left switch and control panel and a 15-amp push-to-reset type circuit breaker, labeled PITOT HEAT, on the left sidewall circuit breaker panel. When the airplane is on the ground, a resistor is introduced into the stall warning heater circuit by the nose wheel squat switch in order to prevent overheating.

ICE DETECTOR LIGHT

An ice detector light is flush-mounted on the left side of the cowl deck to facilitate the detection of wing ice at night or during reduced visibility by lighting the leading edge of the wing. Components of the system include

the ice detector light, a two-position rocker-type switch, labeled DE-ICE LIGHT, on the left switch and control panel and a 5-amp push-to-reset type circuit breaker, labeled CABIN LIGHTS, on the left sidewall circuit breaker panel. The rocker switch is spring-loaded to the off (lower) position and must be held in the ON (upper) position to keep the ice detector light illuminating.

SECTION 2
LIMITATIONS

This airplane is approved for flight into icing conditions as defined by the FAA, provided the following Cessna (drawing number 1200254) and FAA approved equipment is installed and is operational:

1. Wing leading edge boots.
2. Horizontal stabilizer leading edge boots.
3. Vertical stabilizer leading edge boots.
4. Propeller anti-ice boots.
5. Windshield anti-ice panel.
6. Heated pitot tube (high capacity).
7. Heated stall warning transducer (high capacity).
8. Ice detector light.
9. 95-amp alternator, or dual 60-amp alternators.
10. Control surface static dischargers.
11. Dual vacuum pumps.

If the pilot's windshield is covered with ice, do not leave the windshield anti-ice switch on for more than one minute. Prolonged operation may cause an overheat condition which can result in warpage and distortion of the panel and possible damage to the windshield.

The following placards must be installed when a known icing equipment package is installed:

1. In full view of the pilot in place of the similar type placard shown in Section 2 of the basic handbook:

> The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the Normal Category. Other operating limitations which must be complied with when operating this airplane in this category are contained in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
>
> No acrobatic maneuvers, including spins, approved.
> This airplane is approved for flight into icing conditions if the proper optional equipment is installed and operational.
> Landing with cabin pressurized is prohibited.
>
> This airplane is certified for the following flight operations as of date of original airworthiness certificate:
>
> DAY—NIGHT—VFR—IFR

2. On the windshield centerpost above the magnetic compass:

> OPERATION OF ICE PROTECTION EQUIPMENT (WINDSHIELD, PROPELLER, AND PITOT HEAT) MAY CAUSE A DEVIATION OF MORE THAN 10 DEGREES.

SECTION 3
EMERGENCY PROCEDURES

PROPELLER ANTI-ICE SYSTEM MALFUNCTION

If uneven de-icing of propeller blades is indicated by excessive vibration:

1. Propeller -- EXERCISE to MAX RPM.
2. Propeller Anti-Ice Ammeter -- CHECK for proper operation by periodic fluctuations within the green arc.
3. If reading is below the green arc indicating that the propeller blades may not be de-iced uniformly:
   a. Propeller Anti-Ice Switch -- OFF.

WARNING

When uneven anti-icing of the propeller blades is indicated, it is imperative that the anti-ice system be turned OFF. Uneven anti-icing of the blades can result in propeller unbalance and engine failure.

4. Icing Conditions -- DIVERT to non-icing conditions with assistance of ATC.

CAUTION

If after leaving icing conditions, roughness or vibration develops or persists that is not traceable to icing or another cause, reduce engine RPM to smoothest condition and plan a landing at the nearest airport to check the security of the anti-cie boots as a possible cause.

WING AND STABILIZER DE-ICE SYSTEM MALFUNCTION

If the wing and stabilizer de-ice boots fail to inflate sufficiently during any or all of the three sequences of one cycle, verify that the RH vacuum pump is operating (RH button retracted), circuit breaker switch is pushed full in and the pressure indicator light is operative (press to test); then attempt another cycle. If the system is still deficient, avoid or divert from the existing icing conditions. If there are unshed ice accumulations along the wing and stabilizer leading edges during an approach and landing, follow the procedures listed under Inadvertent Icing Encounters in Section 3 of the basic handbook.

SECTION 4
NORMAL PROCEDURES

PREFLIGHT INSPECTION

1. De-Ice Boots -- CHECK for tears, abrasions and cleanliness.
2. Propeller Anti-Ice Boots -- CHECK condition of boots and wires.
3. Pitot Heat Switch -- ON for 30 seconds, then OFF (ensure pitot cover is removed).
4. Pitot Tube -- CLEAR and VERY WARM.
5. Stall Warning Transducer -- PERCEPTIBLY WARM.
6. Ice Detector Light Switch -- ON.

7. Ice Detector Light -- ILLUMINATED.
8. Wing, Tail, Control, Propeller, Windshield and Static Port Surfaces -- CHECK free of ice, snow and frost accumulations. Also, check that control surfaces, engine intakes and static ports contain no internal accumulations of ice or debris.

DURING ENGINE RUNUP

1. De-Icing Switch -- ON and release. Check inflation and deflation cycle of tail and wing boots.
2. Pressure Indicator Light -- CHECK ON within three seconds and OFF after 18 seconds.
3. Boots -- CHECK VISUALLY FOR COMPLETE DEFLATION to the vacuum hold-down condition.
4. Propeller Anti-Ice Switch -- ON.
5. Propeller Anti-Ice Ammeter -- CHECK in green arc range and for periodic cycling.

NOTE

To check the heating elements and anti-ice timer for one complete cycle, the system must be left on for approximately one minute. Ammeter readings must remain in the green arc except during momentary change when cycling.

6. Windshield Anti-Ice Switch -- ON and observe momentary flicker of airplane ammeter and/or slight change in compass indication.
7. Windshield Surface -- WARM to touch behind panel after 5 minutes.

CAUTION

Do not operate the windshield anti-ice system if the windshield is covered with ice. Refer to Section 2, Limitations.

8. Pitot Heat, Propeller Anti-Ice and Windshield Anti-Ice Switches -- AS REQUIRED for takeoff and climb out conditions.

CAUTION

Do not operate the pitot heat and propeller anti-ice heaters for prolonged periods on the ground.

IN FLIGHT

1. Before Visible Moisture Is Encountered Below Approximately 40°F (4°C):

a. Propeller Anti-Ice Switch -- ON.
b. Propeller Anti-Ice Ammeter -- MONITOR.

CAUTION

If the ammeter indicates unusually high or low amperage during the 20-second cycle of operation, a malfunction has occurred and it is imperative that the system be turned off. Uneven anti-icing may result, causing propeller unbalance and engine roughness.

c. Windshield Anti-Ice Switch -- ON.

NOTE

Under non-icing conditions (especially at night), turn the windshield anti-ice switch OFF to avoid a mild impairment (distortion) of vision through the panel that occurs when the heating elements in the panel are activated during the on cycle.

NOTE

For accurate magnetic compass readings, turn the pitot heat, propeller anti-ice and windshield anti-ice switch OFF momentarily.

d. Pitot Heat Switch -- ON.

NOTE

While using the anti-ice systems, monitor the airplane ammeter to ensure that the electrical system does not become overloaded. If the total electrical load is high, resulting in a discharge indication, limit the use of other electrical equipment so that the airplane ammeter maintains a slight charge.

2. During Icing Encounters:
   a. Ice Detector Light -- ON as required.
   b. Ice Build-Up -- MONITOR until approximately 1/4 to 1/2 inch thick on the leading edges.

NOTE

De-icing boots are intended for removal of ice after it has accumulated rather than prevent its formation. If ice

accumulation is slow, best results can be obtained by not using the de-ice system until approximatley 1/4 to 1/2 inch of ice has accumulated. Clear the accumulation with one or two cycles of operation. Do not repeat de-icing procedure until ice has again accumulated.

c. De-Icing Switch -- ON and release. The switch must be actuated after each complete boot cycle if additional cycles are required.

NOTE

Cycling the de-icing boots produces no adverse aerodynamic effects in any attitude within the allowable flight limitations. Continual cycling of the de-ice system, however, is not recommended as this may cause ice to form outside the contour of the inflated boots, preventing its removal. The de-ice system will operate effectively up to a maximum altitude of 22,000 feet; however, at or near this altitude, engine RPM must be a minimum of 2500 RPM.

d. Power -- INCREASE as required to maintain a safe airspeed or to climb out of icing conditions, if feasible.

NOTE

An accumulation of 1/2 inch of ice on the leading edges can cause a large (up to 500 FPM) loss in rate of climb, a cruise speed reduction of up to 30 KIAS, as well as a significant buffet and stall speed increase (up to 15 knots). Even after cycling the de-icing boots, the ice accumulation remaining on the unprotected areas of the airplane can cause large performance losses. With residual ice from the initial 1/2 inch accumulation, losses up to 300 FPM in climb, 15 KIAS in cruise, and a stall speed increase of 7 knots can result. With one inch of residual accumulation, these losses can double.

e. Airspeed -- MAINTAIN BETWEEN 90 KIAS AND 165 KIAS with 1/2 inch or more of ice accumulation.

NOTE

Prior to a landing approach, cycle the wing and stabilizer de-ice boots to shed any accumulated ice. Maintain extra airspeed on approach to compensate for the increased prestall buffet associated with ice on unprotected areas. Do

not cycle the boots during an approach or landing since boot inflation increases stall speeds by 3 knots, decreases stall warning by the same amount, and may cause or increase any rolling tendency during stall.

Refer to Section 8 of the basic handbook for care and maintenance of the wing and stabilizer de-ice and propeller anti-ice boots.

SECTION 5
PERFORMANCE

The following approximate performance changes from those shown in Section 5 of the basic handbook occur in clear air (no ice accumulation) as a result of the installation of the flight into known icing package:

Climb Rate: 30 FPM decrease.

Cruise Speed: 2 to 3 KIAS decrease.

As noted in Section 4 of this supplement, much greater changes in performance occur with ice accumulation. Make appropriate allowances for the possibility of these losses occuring when planning a flight into or through forecast reported icing conditions.

If dual 60-amp alternators are included in the Known Icing Equipment package, refer to the Dual Alternator System supplement for additional performance changes on hot days.

SUPPLEMENT

OXYGEN SYSTEM

SECTION 1
GENERAL

A six-place solid state oxygen system provides supplementary oxygen for emergency purposes. Two small oxygen generators are provided, one mounted just forward and one just aft of the main spar above the headliner. However, if the airplane is equipped with an air conditioner, both generators are mounted aft of the main spar. The generators contain solid chemicals which, when activated, provide supplementary oxygen for approximately 15 minutes from each generator. The oxygen masks are located in two separate compartments in the overhead console. A lanyard is provided in each mask stowage compartment to activate the chemical process in the generator. Once the chemical reaction has been initiated, the flow of oxygen will continue until the generator is entirely expended. When expended, they must be replaced.

NOTE

Flow rate decreases with time after activation. Therefore, flow rate will remain adequate (i.e., above or at the level specified by FAR 23.1443) for a particular altitude for only a limited time as shown in the following table:

Altitude (Feet)	Adequate Flow Rate Time (Minutes)
23,000	4.7
20,000	5.7
17,000	6.6
14,000	7.5
12,500	15

Amber lights are located adjacent to each compartment in the overhead console to indicate that oxygen is being supplied by the generator or has been expended. These lights, therefore, indicate the oxygen availability during the preflight inspection, provided the master switch is turned ON. An illuminated amber light during preflight indicates the need to replace the oxygen generator, if it is desired to have emergency oxygen available for the planned flight.

Disposable partial rebreathing type masks are provided which incorporate flow indicators in the lines to each mask. With no oxygen flow, a red indicator will be visible in the line. When flow of oxygen begins, the red indicator will disappear.

SECTION 2
LIMITATIONS

There is no change to the airplane limitations when oxygen equipment is installed. The following placards are displayed in oxygen equipped airplanes.

1. On each oxygen mask compartment door:

EMERGENCY OXYGEN PULL

OXYGEN LIGHT ON INDICATES CANNISTER IN USE OR EXPENDED

2. Attached to end of each oxygen generator actuator lanyard:

PULL FOR OXYGEN **CAUTION** THIS SYSTEM ONCE ACTIVATED CAN NOT BE TURNED OFF

SECTION 3
EMERGENCY PROCEDURES

In the event that the emergency oxygen system is needed, proceed as follows:

1. Mask Compartment(s) -- OPEN.
2. Mask -- SELECT. Adjust mask to face and adjust metallic nose strap for snug mask fit.
3. Lanyard(s) -- PULL to commence oxygen flow.
4. Flow Indicator(s) -- CHECK that red indicator disappears.
5. Cabin Altitude -- REDUCE to 12,500 feet or lower before the 15-minute oxygen supply is entirely depleted.

NOTE

Descent should be started as soon as possible in order to assure that flow rate remains adequate throughout the descent. Refer to Section 3 in the basic handbook for emergency descent procedures.

SECTION 4
NORMAL PROCEDURES

Prior to each flight, turn on the master switch and check that the oxygen expended lights are not illuminated. If either of the lights are illuminated, the respective oxygen generator should be replaced. Also, check that the face masks and hoses are accessible and in good condition.

SECTION 5
PERFORMANCE

There is no change to the airplane performance when oxygen equipment is installed.

SUPPLEMENT

PROPELLER ANTI-ICE SYSTEM

SECTION 1
GENERAL

The propeller anti-ice system provides a measure of protection for the propeller blade surfaces if unexpected icing conditions are encountered. The system is operated by a rocker switch, labeled PROP A/ICE, on the left switch and control panel. When the switch is placed in the ON position, electric current flows to an anti-ice timer which cycles the current every 20 seconds between the inboard and outboard set of heating elements in the anti-ice boots located on the propeller blades. Operation of the anti-ice system can be checked by monitoring an ammeter, labeled PROP ANTI-ICE AMPS, near the upper left corner of the instrument panel. The system is protected by a 20-amp "push-to-reset" type circuit breaker, labeled PROP A/ICE, located on the left sidewall circuit breaker panel.

SECTION 2
LIMITATIONS

There is no change to the airplane limitations when the propeller anti-ice system is installed; intentional flight into known icing conditions is prohibited, regardless of installed ice protection equipment.

SECTION 3
EMERGENCY PROCEDURES

Flight into known icing conditions is prohibited. If unexpected icing conditions are encountered, the Inadvertent Icing Encounter checklist in Section 3 of the basic handbook should be followed. In addition the following procedure is recommended:

1. Master Switch -- ON.
2. Propeller Anti-Ice Switch -- ON.
3. Propeller Anti-Ice Ammeter -- CHECK in green arc range (14 to 18

amps) and ammeter pointer for periodic cycling (approximately every 20 seconds).

NOTE

To check the heating elements and anti-ice timer for one complete cycle, the system must be left on for approximately 1 minute. Ammeter readings must remain in the green arc except during momentary change.

NOTE

While using the anti-ice system, monitor the airplane ammeter to ensure that the electrical system does not become overloaded. If the total electrical load is high, resulting in a discharge indication, limit the use of other electrical equipment so that the airplane ammeter maintains a slight charge.

CAUTION

If the anti-ice ammeter indicates unusually high or low amperage (out of the green arc range limits) anytime during system operation, or if the ammeter pointer does not "flick" approximately every 20 seconds, a malfunction has occurred. It is imperative that the system be turned off, since uneven anti-icing may result, causing propeller unbalance and engine roughness. If, after leaving icing conditions, roughness or vibration develops or persists that is not traceable to icing or another cause, reduce engine RPM to smoothest condition and plan a landing at the nearest airport to check the security of the anti-ice boots as a possible cause.

4. Propeller Anti-Ice Switch -- OFF when anti-icing is no longer required.

SECTION 4
NORMAL PROCEDURES

There is no change to the airplane normal procedures when the propeller anti-ice system is installed.

Refer to Section 8 of the basic handbook for care and maintenance of the propeller anti-ice boots.

SECTION 5
PERFORMANCE

There is no change to the airplane performance when the propeller anti-ice system is installed.

SUPPLEMENT

STROBE LIGHT SYSTEM

SECTION 1
GENERAL

The high intensity strobe light system enhances anti-collision protection for the airplane. The system consists of two wing tip-mounted strobe lights (with integral power supplies), a two-position rocker switch labeled STROBE LIGHTS on the left switch and control panel, and a 5-amp "push-to-reset" type circuit breaker labeled STROBE LIGHTS, on the left sidewall circuit breaker panel.

SECTION 2
LIMITATIONS

Strobe lights must be turned off when taxiing in the vicinity of other airplanes, or during night flight through clouds, fog or haze.

SECTION 3
EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when strobe lights are installed.

SECTION 4
NORMAL PROCEDURES

To operate the strobe light system, proceed as follows:

1. Master Switch -- ON.
2. Strobe Light Switch -- ON.

SECTION 5
PERFORMANCE

The installation of strobe lights will result in a minor (less than 1 knot) reduction in cruise performance.

SUPPLEMENT

WINDSHIELD ANTI-ICE SYSTEM

SECTION 1
GENERAL

The windshield anti-ice system assures adequate visibility for a landing during flight conditions where ice may form on the windshield. A detachable electrically-heated glass panel, 11.0 inches high by 5.5 inches wide, mounts to the base of the windshield in front of the pilot. Quick disconnects are provided to facilitate ease of installation and removal. When not in use, a padded cover is provided for protection against scratches, breakage, and wiring damage, and the panel may be stowed in the seat pocket on the aft side of the pilot's or front passenger's seat back. Windshield anti-icing is controlled by a rocker-type switch, labeled W/S A/ICE, located on the left switch and control panel. The system is protected by a 5-ampere, "push-to-reset" type circuit breaker, labeled W/S A/ICE, located on the left sidewall circuit breaker panel.

The heated glass panel should be installed whenever icing conditions are a possibility on a proposed flight, especially if the freezing level is near or at the surface.

SECTION 2
LIMITATIONS

There is no change to the airplane limitations when the windshield anti-ice system is installed; intentional flight into known icing conditions is prohibited regardless of installed ice protection equipment. Prolonged operation of the system without the engine running should be avoided.

SECTION 3
EMERGENCY PROCEDURES

Flight into known icing conditions is prohibited. If unexpected icing conditions are encountered, the Inadvertent Icing Encounter checklist in Section 3 of the basic handbook should be followed. In addition, the

following procedure is recommended:

1. Windshield Anti-Ice Switch -- ON 5 to 10 minutes in advance of its need. The anti-ice system may become ineffective if a large accumulation of ice is allowed to form.

NOTE

For accurate magnetic compass readings, turn the pitot heat, propeller anti-ice and windshield anti-ice switches OFF momentarily.

2. Windshield Anti-Ice Switch -- OFF when the possibility of icing no longer exists.

SECTION 4
NORMAL PROCEDURES

The anti-ice system should be checked, **prior to engine start,** as follows:

1. Anti-Ice Panel -- INSTALL.
2. Master Switch -- ON.
3. Windshield Anti-Ice Switch -- ON for one minute.
4. Anti-Ice Panel -- CHECK FOR WARMTH (step outside the airplane to feel for warmth in the panel).
5. Windshield Anti-Ice and Master Switches -- OFF.

CAUTION

Inadvertent prolonged operation of the heated anti-icing panel without the engine running may cause damage to the panel and crazing of the windshield.

SECTION 5
PERFORMANCE

There is no change to the airplane performance when the windshield anti-ice system is installed.

SUPPLEMENT

WING AND STABILIZER DE-ICE SYSTEM

SECTION 1
GENERAL

Pneumatic de-icing boots, installed on the leading edges of the wings, and the horizontal stabilizer provide a measure of protection if unexpected icing conditions are encountered. The system is designed to remove ice after accumulation in flight, rather than prevent ice formation.

NOTE

> This system was not designed to remove ice, snow, or frost accumulations on a parked airplane sufficiently enough to ensure a safe takeoff or subsequent flight. Other means (such as a heated hangar or approved de-icing solutions) should be employed to ensure that all wing, tail, control, propeller, windshield and static port surfaces are free of ice, snow, and frost accumulations, and that there are no internal accumulations of ice or debris in the control surfaces, engine intakes and pitot-static system ports prior to takeoff.

The de-ice boot system consists of pneumatically operated boots, engine-driven dual vacuum pumps, an annunciator light to monitor system operation, system controls and the hardware necessary to complete the system. In operation, the boots expand and contract, using pressure or vacuum from the engine-driven vacuum pump.

NOTE

> Although the airplane is equipped with a dual vacuum system, the wing and stabilizer de-ice boots are operated by the right vacuum pump only.

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 de-icing system consist of a rocker-type de-icing 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 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 the circuit breaker labeled WING, DE-ICE PULL-OFF, to the off position.

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 wing 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 flush-mounted on the left side of the cowl deck to facilitate the detection of wing ice at night or during reduced visibility by lighting the leading edge of the wing. Components of the system include the ice detector light, a two-position rocker-type switch, labeled DE-ICE LIGHT, on the left switch and control panel and a 5-amp "push-to-reset" type circuit breaker, labeled CABIN LIGHTS, on the left sidewall circuit breaker panel. The rocker switch is spring-loaded to the off (lower) position and must be held in the ON (upper) position to keep the ice detector light illuminating.

SECTION 2
LIMITATIONS

There is no change to the airplane limitations when the wing and stabilizer de-ice system is installed; intentional flight into known icing conditions is prohibited.

SECTION 3
EMERGENCY PROCEDURES

Flight into known icing conditions is prohibited. If unexpected icing conditions are encountered, the Inadvertent Icing Encounter checklists in Section 3 of the basic handbook should be followed. In addition, the following procedure is recommended.

1. Icing Condition -- LEAVE as soon as possible. Divert to non-icing conditions with assistance of ATC.

NOTE

Since wing and horizontal stabilizer de-icer boots alone do not provide adequate protection for the entire airplane, known icing conditions should be avoided. If icing is inadvertently encountered, close attention should be given to the pitot-static system, propeller, induction system and other components subject to icing.

2. Ice Detector Light -- ON as required.
3. Ice Build-up -- MONITOR until approximately 1/4 to 1/2 inch thick on the leading edges.

NOTE

De-icing boots are intended for removal of ice after it has accumulated rather than prevent its formation. If ice accumulation is slow, best results can be obtained by not using the de-ice system until approximately 1/4 to 1/2 inch of ice has accumulated. Clear the accumulation with one or two cycles of operation. Do not repeat de-icing procedure until ice has again accumulated.

4. De-Icing Switch -- ON and release. The switch must be actuated after each complete boot cycle if additional cycles are required.

NOTE

Cycling the de-icing boots produces no adverse aerodynamic effects in any attitude within the allowable flight limitations. Continual cycling of the de-ice system, however, is not recommended as this may cause ice to form outside the contour of the inflated boots, preventing its removal. The de-ice system will operate effectively up to a maximum altitude of 22,000 feet; however, at or near this altitude, engine RPM must be a minimum of 2500 RPM.

5. Power -- INCREASE as required to maintain a safe airspeed or, if feasible, to climb out of icing conditions.

NOTE

An accumulation of 1/2 inch of ice on the leading edges can cause a large (up to 500 FPM) loss in rate of climb, a cruise speed reduction of up to 30 KIAS, as well as a significant buffet and stall speed increase (up to 15 knots). Even after cycling the de-icing boots, the ice accumulation remaining on the unprotected areas of the airplane can cause large performance losses. With residual ice from the initial 1/2 inch accumulation, losses up to 300 FPM in climb, 15 KIAS in cruise, and a stall speed increase of 7 knots can result. With one inch of residual accumulation, these losses can double.

6. Airspeed -- MAINTAIN BETWEEN 90 KIAS AND 165 KIAS with 1/2 inch or more ice accumulation.

NOTE

Prior to a landing approach, cycle the wing and stabilizer de-ice boots to shed any accumulated ice. Maintain extra airspeed on approach to compensate for the increased prestall buffet associated with ice on unprotected areas. Do not cycle the boots during an approach or landing since boot inflation increases stall speeds by 3 knots, decreases stall warning by the same amount, and may cause or increase any rolling tendency during stall. If there are unshed ice accumulations along the wing and stabilizer leading edges during an approach and landing, follow the procedures listed under Inadvertent Icing Encounters in Section 3 of the basic handbook.

SECTION 4
NORMAL PROCEDURES

PREFLIGHT INSPECTION

Prior to flight, make an exterior inspection to check the de-icing boots for tears, abrasions, and cleanliness. Any damage must be repaired prior to flight.

DURING ENGINE RUNUP

The system should be checked through several cycles as follows:

1. De-Icing Switch -- ON and release. Check inflation and deflation cycle of all boots.

NOTE

If the wing and stabilizer de-ice boots fail to inflate sufficiently during any or all of the three sequences of one cycle, verify that the right vacuum pump is operating (red button is not visible), the circuit breaker is pushed full in and the pressure indicator light is operative (press to test); then attempt another cycle. If the system is still deficient, maintenance is required.

2. Pressure Indicator Light -- CHECK ON within three seconds and OFF after 18 seconds.
3. Boots -- CHECK VISUALLY FOR COMPLETE DEFLATION to the vacuum hold-down condition.

Refer to Section 8 of the basic handbook for care and maintenance of the wing and stabilizer de-ice boots.

SECTION 5
PERFORMANCE

The following approximate performance changes from those shown in Section 5 of the basic handbook occur as a result of the installation of the wing and stabilizer de-ice system:

Climb Rate: 30 FPM decrease.

Cruise Speed: 2 to 3 KTAS decrease.

SUPPLEMENT

EMERGENCY LOCATOR TRANSMITTER (ELT)

SECTION 1
GENERAL

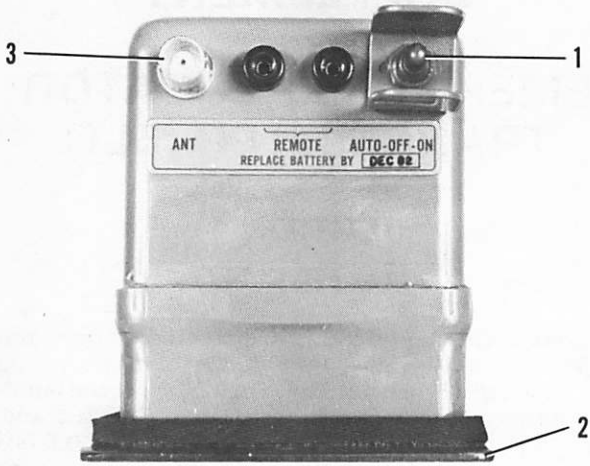
The ELT consists of a self-contained dual-frequency radio transmitter and battery power supply, and is activated by an impact of 5g or more as may be experienced in a crash landing. The ELT emits an omni-directional signal on the international distress frequencies of 121.5 and 243.0 MHz. (Some ELT units in export aircraft transmit only on 121.5 MHz.) General aviation and commercial aircraft, the FAA, and CAP monitor 121.5 MHz, and 243.0 MHz is monitored by the military. Following a crash landing, the ELT will provide line-of-sight transmission up to 100 miles at 10,000 feet. The ELT supplied in domestic aircraft transmits on both distress frequencies simultaneously at 75 mw rated power output for 50 continuous hours in the temperature range of -4°F to +131°F (-20°C to +55°C). The ELT unit in export aircraft transmits on 121.5 MHz at 25 mw rated power output for 50 continuous hours in the temperature range of -4°F to +131°F (-20°C to +55°C).

The ELT is readily identified as a bright orange unit mounted behind the baggage compartment wall in the tailcone. To gain access to the unit, remove the baggage compartment wall. The ELT is operated by a control panel at the forward facing end of the unit (see figure 1).

SECTION 2
LIMITATIONS

The following information is presented in the form of a placard located on the baggage compartment wall.

EMERGENCY LOCATOR TRANSMITTER INSTALLED AFT OF THIS PARTITION. MUST BE SERVICED IN ACCORDANCE WITH FAR PART 91.52



1. FUNCTION SELECTOR SWITCH (3-position toggle switch):

   ON - Activates transmitter instantly. Used for test purposes and if "g" switch is inoperative.

   OFF - Deactivates transmitter. Used during shipping, storage and following rescue.

   AUTO - Activates transmitter only when "g" switch receives 5g or more impact.

2. COVER - Removable for access to battery pack.

3. ANTENNA RECEPTACLE - Connects to antenna mounted on top of tailcone.

Figure 1. ELT Control Panel

SECTION 3
EMERGENCY PROCEDURES

Immediately after a forced landing where emergency assistance is required, the ELT should be utilized as follows.

1. ENSURE ELT ACTIVATION --Turn a radio transceiver ON and select 121.5 MHz. If the ELT can be heard transmitting, it was activated by the "g" switch and is functioning properly. If no emergency tone is audible, gain access to the ELT and place the function selector switch in the ON position.

2. PRIOR TO SIGHTING RESCUE AIRCRAFT -- Conserve airplane battery. Do not activate radio transceiver.

3. AFTER SIGHTING RESCUE AIRCRAFT -- Place ELT function selector switch in the OFF position, preventing radio interference. Attempt contact with rescue aircraft with the radio transceiver set to a frequency of 121.5 MHz. If no contact is established, return the function selector switch to ON immediately.

4. FOLLOWING RESCUE -- Place ELT function selector switch in the OFF position, terminating emergency transmissions.

SECTION 4
NORMAL PROCEDURES

As long as the function selector switch remains in the AUTO position, the ELT automatically activates following an impact of 5g or more over a short period of time.

Following a lightning strike, or an exceptionally hard landing, the ELT may activate although no emergency exists. To check your ELT for inadvertent activation, select 121.5 MHz on your radio transceiver and listen for an emergency tone transmission. If the ELT can be heard transmitting, place the function selector switch in the OFF position and the tone should cease. Immediately place the function selector switch in the AUTO position to re-set the ELT for normal operation.

SECTION 5
PERFORMANCE

There is no change to the airplane performance data when this equipment is installed.

SUPPLEMENT

OPTIONAL SLAVED HORIZONTAL SITUATION INDICATOR (HSI)
(TYPE IG-832A)

(STANDARD EQUIPMENT ON 400B IFC SYSTEM)

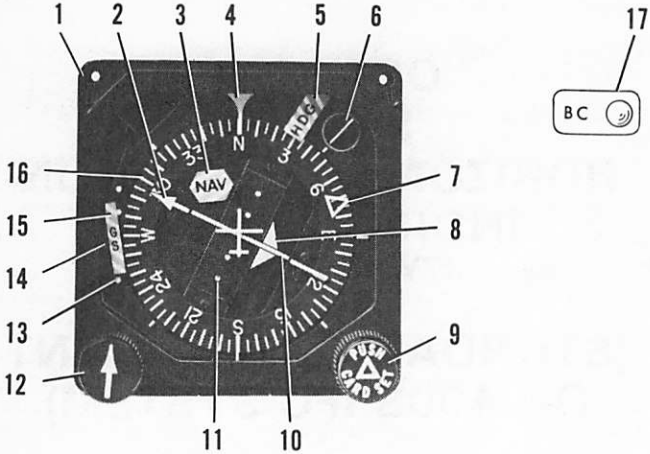
SECTION 1
GENERAL

The IG-832A Horizontal Situation Indicator (HSI) is an additional navigation indicator option available with Cessna 300 or 400 Nav/Com radios. When dual Nav/Coms are installed, the HSI is coupled to the first Nav/Com and a standard 300 or 400 series VOR/LOC indicator is coupled to the second Nav/Com.

This system consists of a Horizontal Situation Indicator (HSI), a SA-832A remote slaving accessory without course datum or an alternate SA-832B with a bootstrap syncro transmitter for RMI and Course Datum operation, a remote magnetic flux detector and a remote VOR/LOC converter which is only installed without a RNAV installation. The HSI features the modified ARINC face presentation, providing a slaved gyro heading display with a built-in slaving indicator and full ILS navigation capability. When the HSI is installed with a 400B series Autopilot, a BC light is installed on the instrument panel, adjacent to the HSI, to alert the pilot of back-course operations. Each control and indicator function is described in Figure 1.

SECTION 2
LIMITATIONS

There is no change to the airplane limitations when this instrument is installed.



1. HORIZONTAL SITUATION INDICATOR (HSI) - Provides a pictorial presentation of aircraft deviation relative to VOR radials and localizer beams. It also displays glide slope deviations and gives heading reference with respect to magnetic north.

2. OMNI BEARING POINTER - Indicates selected VOR course or localizer course on compass card (16). The selected VOR radial or localizer heading remains set on the compass card when the compass card (16) is rotated.

3. NAV FLAG - When flag is in view, indicates that the NAV receiver signal being received is not reliable.

4. HEADING REFERENCE (LUBBER LINE) - Indicates aircraft magnetic heading on compass card (16).

5. HEADING WARNING FLAG (HDG) - When flag is in view the heading display is invalid due to interruption of either electrical or vacuum power.

6. GYRO SLAVING INDICATOR - Displays visual indication of heading indicator and flux detector synchronization. When slaving needle is aligned with the HSI 45° right index, it shows that the heading indicator agrees with the aircraft magnetic heading. Off-center pointer deflections show the direction of heading indicator error relative to aircraft magnetic heading. The compass CARD SET knob (9) may be used at any time to more rapidly accomplish synchronization of the heading indicator reading with magnetic heading as indicated by the slaving indicator.

Figure 1. Horizontal Situation Indicator (HSI) (Type IG-832A)
(Sheet 1 of 2)

7. HEADING BUG - Indicates selected reference heading relative to the compass card (16).

8. TO/FROM INDICATOR FLAG -- Indicates direction of VOR station relative to selected course.

9. HEADING SELECTOR AND CARD SET KNOB (PUSH△CARD SET) - When rotated in normal (out) position, positions heading "bug" (7) on compass card (16) to indicate selected heading for reference or for autopilot tracking. When pushed in and rotated, sets compass card (16) to agree with magnetic compass. The omni bearing pointer (2), heading bug (7), and deviation bar (10) rotate with the compass card (16).

10. COURSE (OMNI) DEVIATION BAR - Bar is center portion of omni bearing pointer and moves laterally to pictorially indicate relationship of aircraft to selected course. It relates in degrees of angular displacement from VOR radials or localizer beam center.

11. COURSE DEVIATION DOTS - Indicates aircraft displacement from VOR, or localizer beam center. A course deviation bar displacement of 2 dots represents full scale (VOR = ±10° or LOC = ±2½°) deviation from beam centerline.

12. COURSE SELECTOR (↑) KNOB - When rotated, positions omni bearing pointer (2) on the compass card (16) to select desired VOR radial or localizer course.

13. GLIDE SLOPE SCALE - Indicates displacement from glide slope beam center. A glide slope deviation bar displacement of 2 dots, represents full scale (0.7°) deviation above or below glide slope beam centerline.

14. GLIDE SLOPE POINTER - Indicates on glide slope scale (13) aircraft displacement from glide slope beam center.

15. GLIDE SLOPE FLAG - When in view, indicates glide slope receiver signal is not reliable.

16. COMPASS CARD - Rotates to display heading of airplane with reference to lubber line (4).

17. BACK-COURSE LIGHT (BC) (Installed in a remote position, as shown, with a 400B Autopilot only. The BC light is incorporated in the mode selector on the 400B IFC system.) - Remote amber BC light installed with a 400B Autopilot will illuminate when back-course operation is selected by the REV SNS (Reverse Sense) LOC 1 switch located in the autopilot accessory unit. With 400B IFC system, when back-course operation is selected, the BC light incorporated in the MODE SELECTOR will illuminate green.

CAUTION

When back-course operation is selected, the course (omni) deviation bar on the HSI does not reverse. However, selection of back-course operation will always cause the localizer signal to the autopilot to reverse for back-course operation.

Figure 1. Horizontal Situation Indicator (HSI) (Type IG-832A) (Sheet 2 of 2)

SECTION 3
EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this instrument is installed.

SECTION 4
NORMAL PROCEDURES

CAUTION

Both electrical and vacuum power must be supplied to this instrument for proper functioning. Absence of either will result in unreliable heading information.However, loss of the vacuum power will not affect the omni bearing pointer or glide slope pointer.

Normal procedures for operation of this system differ little from those required for the more conventional Course Deviation Indicators. However, several small differences are worth noting.

The rectilinear movement of the omni deviation bar in combination with the rotation of the compass card in response to heading changes, provides an intuitive picture of the navigation situation at a glance when tuned to an omni station. When tuned to a localizer frequency, the omni bearing pointer must be set to the inbound front course for both front and back-course approaches to retain this pictorial presentation.

When the HSI system is installed with a Cessna 400B (Type IF-550A) Autopilot, a back-course indicator light labeled BC, is mounted adjacent to the HSI and will illuminate amber when the reverse sense (REV SNS) switch (mounted in the autopilot accessory unit) is placed in the ON (LOC 1) position to alert the pilot that back-course operation is selected. The BC light is incorporated in the MODE SELECTOR on the 400B IFCS system. The HSI needle will not be reversed but the LOC signals to the autopilot will be. Light dimming for both types of BC lighting is provided for low ambient light conditions.

For normal procedures with autopilots, refer to the 400B and 400B IFCS Autopilot Supplements in this handbook if they are listed in this section as options. A description of course datum and autopilot procedures for course datum are incorporated in the appropriate autopilot supplements.

SECTION 5
PERFORMANCE

There is no change to the airplane performance when this instrument is installed.

SUPPLEMENT

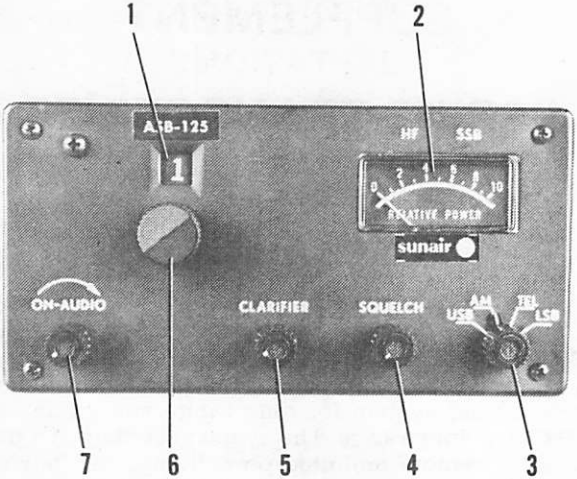
SSB HF TRANSCEIVER
(TYPE ASB-125)

SECTION 1
GENERAL

The ASB-125 HF transceiver is an airborne, 10-channel, single sideband (SSB) radio with a compatible amplitude modulated (AM) transmitting-receiving system for long range voice communications in the 2 to 18 MHz frequency range. The system consists of a panel mounted receiver/exciter, a remote mounted power amplifier/power supply, an antenna coupler and an externally mounted, fixed wire, medium/high frequency antenna.

A channel selector knob determines the operating frequency of the transceiver which has predetermined crystals installed to provide the desired operating frequencies. A mode selector control is provided to supply the type of emission required for the channel, either sideband, AM or telephone for public correspondence. An audio knob, clarifier knob and squelch knob are provided to assist in audio operation during receive. In addition to the aforementioned controls, which are all located on the receiver/exciter, a meter is incorporated to provide antenna loading readouts.

The system utilizes the airplane microphone, headphone and speaker. Operation and description of the audio control panels used in conjunction with this radio are shown and described in another supplement in this section.



1. CHANNEL WINDOW - Displays selected channel.

2. RELATIVE POWER METER - Indicates relative radiated power of the power amplifier/antenna system.

3. MODE SELECTOR CONTROL - Selects one of the desired operating modes:
   - USB - Selects upper sideband operation for long range voice communications.
   - AM - Selects compatible AM operation and full AM reception.
   - TEL - Selects upper sideband with reduced carrier, used for public correspondence telephone and ship-to-shore.
   - LSB - (Optional) Selects lower sideband operation (not legal in U.S., Canada and most other countries).

4. SQUELCH CONTROL - Used to adjust signal threshold necessary to activate receiver audio. Clockwise rotation increases background noise (decreases squelch action); counterclockwise rotation decreases background noise.

5. CLARIFIER CONTROL - Used to "clarify" single sideband speech during receive while in USB mode only.

6. CHANNEL SELECTOR CONTROL - Selects desired channel. Also selects AM mode if channel frequency is 2003 kHz, 2182 kHz or 2638 kHz.

7. ON - AUDIO CONTROL - Turns set ON and controls receiver audio gain.

Figure 1. SSB HF Transceiver Operating Controls

SECTION 2
LIMITATIONS

There is no change to the airplane limitations when this avionic equipment is installed.

SECTION 3
EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures when this avionic equipment is installed.

SECTION 4
NORMAL PROCEDURES

COMMUNICATIONS TRANSCEIVER OPERATION:

NOTE

The pilot should be aware of the two following radio operational restrictions:

a. For sideband operation in the United States, Canada and various other countries, only the upper sideband may be used. Use of lower sideband is prohibited.
b. Only AM transmissions are permitted on frequencies 2003 kHz, 2182 kHz and 2638 kHz. The selection of these channels will automatically select the AM mode of transmission.

1. XMTR SEL Switch (on audio control panel) -- SELECT transceiver.
2. SPEAKER/PHONE Selector Switches (on audio control panel) -- SELECT desired mode.
3. ON-AUDIO Control -- ON (allow equipment to warm up for 5 minutes for sideband or one minute for AM operation and adjust audio to comfortable listening level).
4. Channel Selector Control -- SELECT desired frequency.
5. Mode Selector Control -- SELECT operating mode.

6. SQUELCH Control -- ADJUST clockwise for normal background noise output, then slowly adjust counterclockwise until the receiver is silent.
7. CLARIFIER Control -- ADJUST when upper single sideband RF signal is being received for maximum clarity.
8. Mike Button:
   a. To Transmit -- DEPRESS and SPEAK into microphone.

NOTE

Sidetone and interphone intercom are not available on this radio.

   b. To Receive -- RELEASE mike button.

NOTE

Voice communications are not available in the LSB mode.

NOTE

Lower sideband (LSB) mode is not legal in the U.S., Canada, and most other countries.

SECTION 5
PERFORMANCE

There is no change to the airplane performance when this avionic equipment is installed. However, the installation of an externally mounted antenna or several related external antennas, will result in a minor reduction in cruise performance.