



Piper Aircraft Corporation

Lock Haven, Pennsylvania, U.S.A.

"DOA EA-1 Approved"

March 30, 1976

M

Subject:

TIGO-541-E1A Exhaust System Modification.

Models Affected:

PA-31P Pressurized Navajo

Serial Numbers Affected:

31P-1 to 31P-7400222 Inclusive, 31P-7400224 to 31P-7630004 Inclusive, 31P-7630006 and 31P-7630007; (reference Material Required, below for individual modification kit/aircraft serial number applicability).

Compliance Time:

At the next regularly scheduled inspection interval (100 hour, annual or Programmed Inspection Event), not to exceed the next 100 hours of operation.

Purpose:

Throughout the operational life of the Pressurized Navajo, the TIGO-541-E1A exhaust system has been periodically refined and upgraded through a continuing program conducted jointly by the power-plant manufacturer- AVCO Lycoming, and Piper Aircraft to extend the service life of the exhaust system in general, and to alleviate specific reported conditions involving various exhaust system components. Thorough inspection procedures, in addition to required parts replacements were stressed in order to detect and replace unserviceable component attachments (couplings, clamps and brackets), vibration-induced tailpipe/exhaust pipe cracks, etc.

This service release provides instructions and material (in addition to related reference data--see attached AVCO Lycoming publications) to consolidate and incorporate the latest exhaust system refinements on the above referenced aircraft. New material includes new turbine tailpipe couplings, new (turbine tailpipe to wastegate tailpipe, and turbine tailpipe to exhaust transition) isolator assemblies, new support brackets, new exhaust manifold retainer assembly (reference AVCO Lycoming Service Bulletin No. 393A) and transition couplings replacement requirements, (reference AVCO Lycoming Service Bulletin No. 395). New materials are of heavy duty construction, designed to extend exhaust system component service life and reduce system maintenance/component parts replacements, as well as prevention of hazardous engine compartment conditions (fire hazard, etc.) resulting from exhaust system component failures.

Instructions:

Prior to compliance activity, it is advisable to refer to the following service releases that are either involved with or superseded by this service bulletin;

(over)

Instructions (continued):

<u>Source</u>	<u>Type</u>	<u>Number</u>	<u>Topic</u>	<u>Date</u>
Piper	Service Letter	694	Tailpipe Support/Exhaust Manifold Clamp	5/7/74 (void)
Piper	Service Bulletin	430	Exhaust System Couplings	8/7/74 (void)
Piper	Service Bulletin	462A	Tailpipe Support Bracket Installation	11/3/75
Avco Lyc.	Service Bulletin	393A	Exhaust Slip Joint Modification	2/6/76 (att.)
Avco Lyc.	Service Bulletin	395	Exhaust Transition Coupling Replacement	3/5/76 (att.)
Avco	Service	1320	Tightening Procedure - Exhaust Manifold	3/7/75
Lycoming	Instruction		Components	(attached)

1. Refer to attached sketch/instruction sheet (figure 1) which illustrates the exhaust system components to be installed or replaced (references: Piper Service Bulletin No. 462A, AVCO Lycoming Service Bulletin Nos. 393A and 395 attached, and Material Required, below).
 - a. Install new Turbine Tailpipe Coupling, Piper Part Number 555 834 per sketch/instruction sheet Instructions.
2. Reference attached AVCO Lycoming Service Instructions No. 1320 Exhaust Manifold Components Tightening Procedures.
3. Inspect complete exhaust system for cracks, exhaust leakage evidence, looseness at joints, etc; correct as required.
4. Make appropriate log book entry indicating compliance with this service bulletin; be sure to record compliance with other service releases referred to in this release.

Material Required:

1. Two (2) each per aircraft Turbine Tailpipe Coupling, Piper Part Number 555 834; applicable to aircraft serial numbers 31P-1 to 31P-7400222 inclusive, 31P-7400224 to 31P-7630004 inclusive, 31P-7630006 and 31P-7630007.
2. One (1) each per aircraft (i.e., both engines) Piper kit number 761 045, Tailpipe Isolator Replacement, applies to the following aircraft configurations:
 - a. Serial numbers 31P-1 to 31P-7400216 inclusive if Piper kit number 760 837 has been previously installed, per Piper Service Letter No. 694; and
 - b. Serial numbers 31P-7400217 to 31P-7400222 inclusive, 31P-7400224 to 31P-7630004 inclusive, 31P-7630006 and 31P-7630007.
3. One (1) each per aircraft (i.e., both engines) Piper kit number 761 046, Tailpipe Support Installation (contains new turbine tailpipe to wastegate tailpipe isolators), and One (1) each per aircraft (i.e., both engines) Piper kit number 761 047, Tailpipe Isolator Replacement (contains new isolators to replace existing turbine tailpipe to exhaust transition isolators); both kits required for aircraft serial numbers 31P-1 to 31P-7400216 inclusive if Piper kit number 760 837 has NOT been previously installed per Piper Service Letter No. 694.

Material Required (continued):

4. Per Piper Service Bulletin No. 462A - one (1) each per aircraft Piper kit number 760 974, Tail-pipe Support Bracket Installation applicable to aircraft serial numbers 31P-1 to 31P-7630009 that have not yet complied with Service Bulletin No. 462A .
5. Refer to AVCO Lycoming Service Bulletins Nos. 393A and 395 for related material requirements .

Availability of Parts:

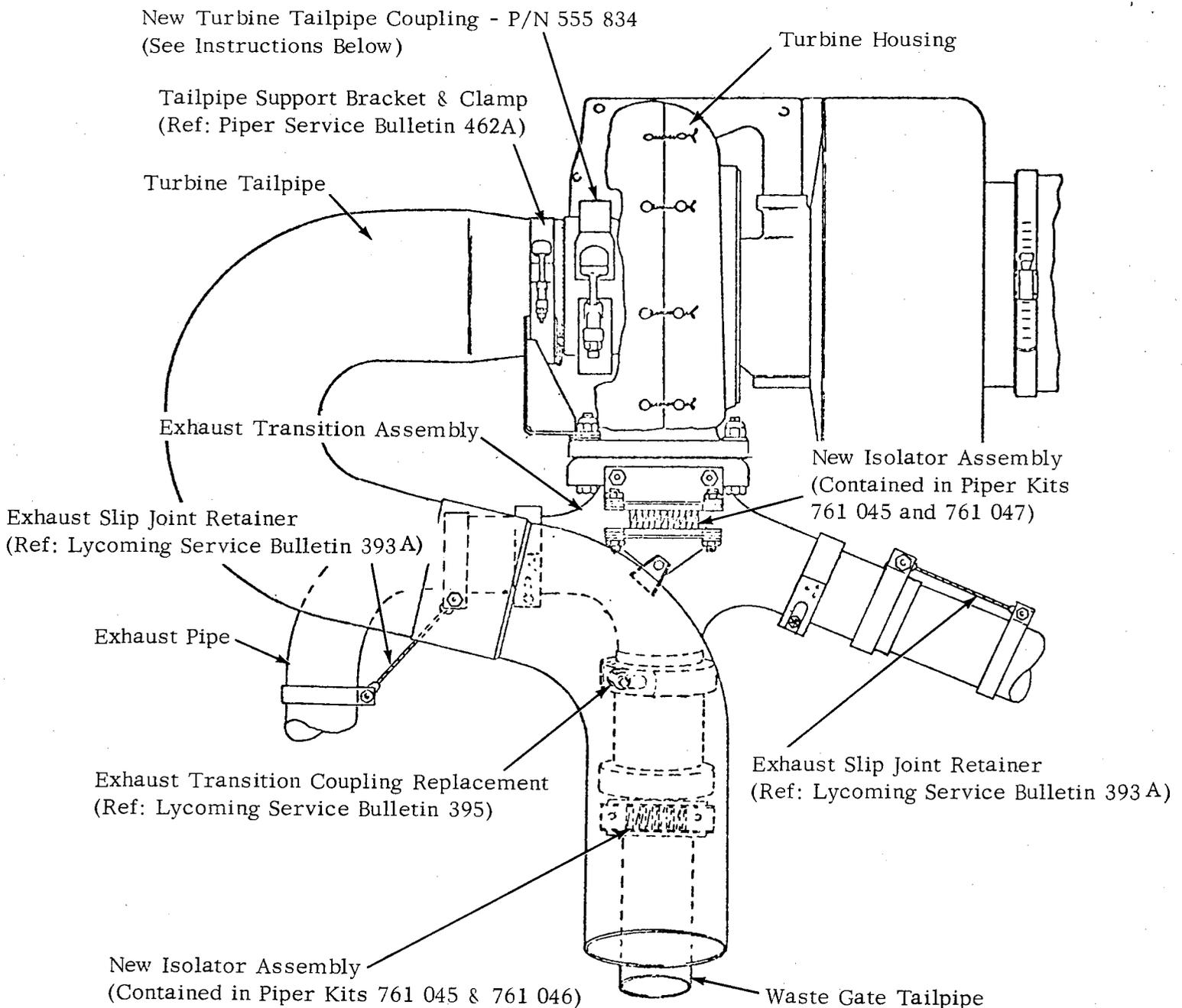
Your Piper field service facility .

Effectivity Date:

This service release is effective upon receipt .

Summary:

Please contact your Piper field service facility to make arrangements for compliance with this (and related) service release(s), in accordance with the provisions of Compliance Time, above. Material specified in Material Required nos. 1., 2. and 3., (above) applicable to your aircraft is available at no charge through your Piper field service facility. Remaining specified modification material provisions are contained in the appropriate related service release, a copy of each attached to this release for your ready reference .



INSTRUCTIONS - Turbine Tailpipe Coupling Replacement

1. Remove engine cowling from both engines to gain access to the turbine tailpipe couplings.
2. Remove existing couplings and install new couplings P/N 555 834 as follows:
 - a. Install coupling over end of tailpipe flange, spreading clamp a minimum amount.
 - b. Fit tailpipe flange to turbine flange, making certain flange faces are butted together with no gap.
 - c. Position tailpipe for clearance with exhaust pipe. Slide coupling over flanges and tighten. Torque to 45-55 inch pounds.
3. Reinstall engine cowling and make proper logbook entry of coupling replacement.

Figure 1.

AVCO LYCOMING DIVISION

WILLIAMSPORT, PENNSYLVANIA 17701

Service Bulletin



DATE: February 6, 1976

Service Bulletin No. 393A
(Supersedes Service Bulletin No. 393)
Engineering Aspects are
FAA (DEER) Approved

SUBJECT: Exhaust Slip Joint Modification

MODELS AFFECTED: TIGO-541-E series engines with serial numbers 101-62 thru 649-62 and remanufactured engines shipped prior to October 1, 1975.

TIME OF COMPLIANCE: At next 100 hour engine inspection except engines modified in accordance with Service Bulletin No. 378 in which case change is required in next 25 hours.

Two previous methods have been used to prevent separation of the exhaust pipe slip joints at the rear of the left and right exhaust manifolds. Briefly, Service Bulletin No. 368 describes a spring tensioned rod and clamp device while in Service Bulletin No. 378 a U-bolt clamp assembly and slitted adapter pipe was used. These methods have been found to be unsatisfactory, and therefore it is recommended that the following modification be made to provide a secure slip joint.

1. Remove spring tensioned rod and clamps or u-bolt clamps as may be the case. These parts are not reused.
2. Inspect exhaust adapter pipes for cracks around flange fillet and slits. (Pipes with or without slits may be reused.) Pay particular attention to condition of slip joint, noting any damage which may prevent free movement of the joint. In addition,

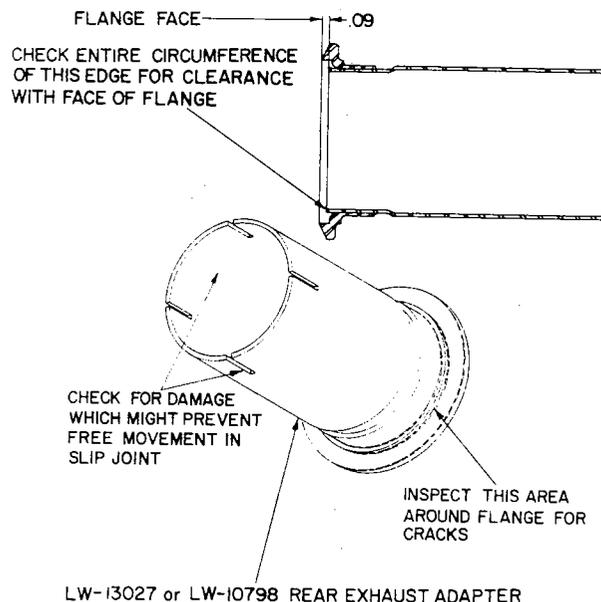


Figure 1. Exhaust Adapter Pipe Showing Areas Requiring Inspection

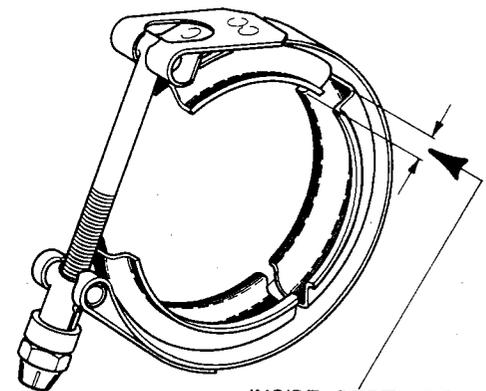


Figure 2. Exhaust Manifold Coupling Inspection Requirement

check the end of the adapter pipe inside the flange mouth; it must be .090 inch below the surface of the flange face. Use a hand grinder if necessary to obtain this clearance. (See figure 1.)

3. Reassemble exhaust adapter pipes to transition assembly using new 78083 gaskets. Check coupling part number. MVT69183-200 Avco Lycoming P/N LW-12093-5 is the number of the correct coupling to be used. Inspect the 3 v-band sections of each coupling with a depth micrometer as shown in figure 2. Any dimension obtained under .230 inch renders the coupling unfit for further service.

NOTE

The exhaust adapter pipes attached to nos. 5 and 6 cylinders, along with the segments attached to the transition assembly, are especially subject to cracks in the area of weldments and attaching flanges. Replace any that indicate such defects.

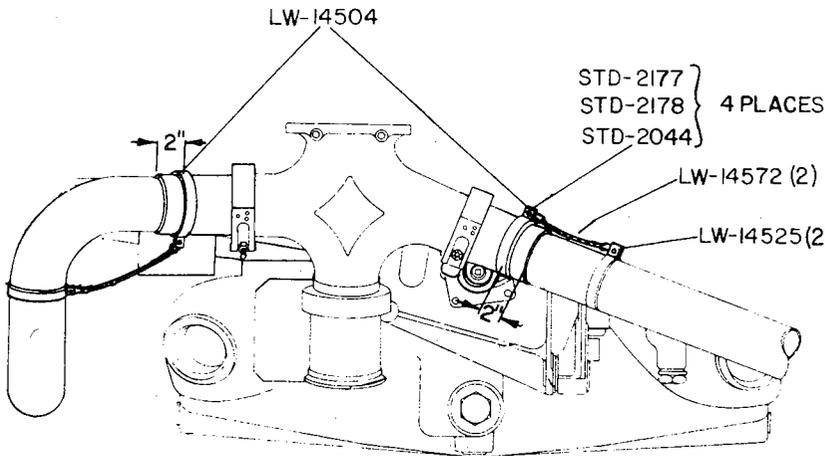
4. Before installing the couplings around the adapter pipes, make sure the entire exhaust assembly is in alignment; that is, mating flanges must match each other. Support the exhaust system in this position and proceed to install couplings around flange and engage latch. Tighten coupling nut to 50 inch pounds initial torque. Tap outer periphery of coupling with mallet to distribute band tension.

5. Check torque and continue tightening to a final torque of 70/80 inch pounds, tapping coupling until torque reading stabilizes.

CAUTION

Do not exceed tightening torque specified for couplings, or open them far enough to damage the coupling wrapper. Over torquing spreads the v-band section of the coupling and impairs its retaining qualities.

6. Assemble clamps LW-14504 on adapter pipes approximately 2 inches from slip joint and LW-14525 clamps on left and right exhaust pipes. Connect cable assemblies LW-14572 to clamps with attaching parts STD-2177 bolt, STD-2178 washer and STD-2044 nuts. Attach these cables, leaving enough slack to provide 1/4 inch deflection of the cables after assembly. (See figure 3.) Tighten nuts to 60 ± 10 inch/lbs.



NOTE
 RIG CABLES (LW-14572) TO PROVIDE 1/4 INCH DEFLECTION WHEN MEASURED MIDWAY BETWEEN CLAMPS—BOTH SIDES.

Figure 3. Area of Transition Assembly Showing Cable Assembly

NOTE

The following kit to perform this modification is supplied through Avco Lycoming Distributors. Parts must be ordered before June 1, 1976. Allowance for labor and full part credit, F. O. B. Williamsport, Pa. will be provided in accordance with the following schedule:

1. Engines in compliance with Service Bulletin No. 378 3 hours labor
2. Engines in compliance with Service Bulletin No. 368 1 hour labor

Furnish engine serial numbers to your Avco Lycoming Distributor for ordering parts and submission of a Warranty Application.

PARTS DATA:

Kit No. LW-14608 Exhaust Manifold Retainer (for 2 engines)

Consists of:

Qty.	Part No.	Description
4	LW-14504	Clamp, exhaust pipe
4	LW-14525	Clamp, exhaust pipe
4	LW-14572	Cable Assy.
8	STD-2177	Bolt, 1/4-20 x 15/16
8	STD-2178	Washer
8	STD-2044	Nut, self-locking
4	78083	Gasket, v-band coupling

19025, 19025-A - These numbers for Avco Lycoming reference only.

NOTE: Revision "A" adds rigging instructions for cable assembly.

AVCO LYCOMING DIVISION

WILLIAMSPORT, PENNSYLVANIA 17701

Service Bulletin



DATE: March 5, 1976

Service Bulletin No. 395
Engineering Aspects are
FAA (DEER) Approved

SUBJECT: Transition Coupling Replacement

MODELS AFFECTED: TIGO-541-E series engines.

TIME OF COMPLIANCE: During engine overhaul and after each 600 hour period of engine operation; or anytime evidence of leakage is observed in this area.

It has been determined that over a long period of time continuous use of the Marmon clamp LW-12125-3 (MVT69197-225) possibly can result in failure from erosion and deterioration, causing severe loss of engine power because of separation from the controlling waste gate. Replacement of the clamp and gasket is accomplished as follows:

1. Loosen the nut that attaches the Marmon clamp located between the transition assembly and the exhaust bypass valve. See figure 1. Remove the clamp and gasket.
2. Examine the mating flanges of both the transition assembly and the exhaust bypass valve; both should be perfectly free from any carbon deposits that may have accumu-

lated on any area that contacts the gasket or the clamp. Clean with any suitable carbon solvent such as Liquid Wrench.

3. Assemble a new coupling over the flange of the exhaust bypass valve.

CAUTION

Do not spread the coupling to force it over the outside of the pipe; it must be passed over the end of the pipe. If the clamp is spread open excessively, its sealing properties will be destroyed.

4. Place the gasket P/N 75845 in its proper position between the two mating flanges. Be sure it is seated firmly. Also be sure it is not upsidedown; that is, the straight, vertical side must face upward. See figure 2.

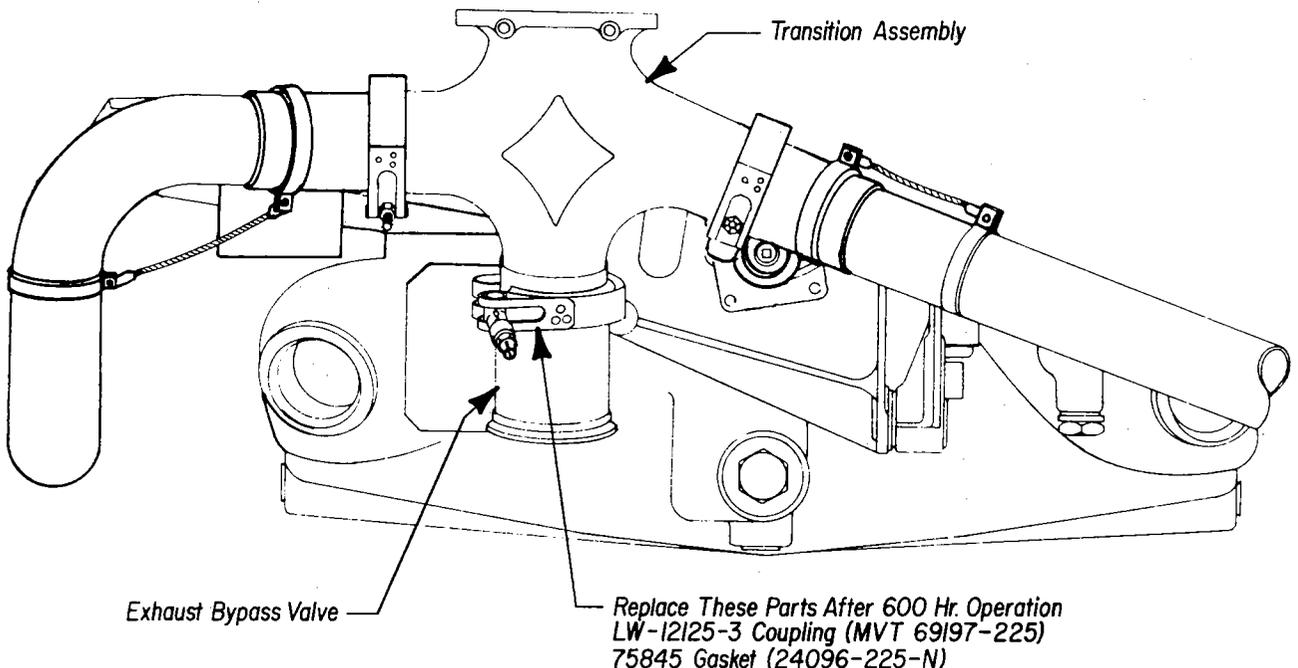


Figure 1. Diagram of Rear Portion of Engine Showing Location of Coupling to Attach Transition Assembly and Exhaust Bypass Valve

5. With the flanges together, position the coupling over the flanges.

6. Press the coupling around the flanges and engage the latch. Tighten the coupling nut to about 60 inch pounds torque. Then tap around the outer periphery of the coupling with a mallet to distribute band tension.

7. Check the torque on the coupling nut and this time tighten to 80/90 inch lbs. Again tap around the periphery of the coupling and recheck the torque. Repeat this procedure until the maximum torque of 80/90 inch pounds is attained. Do not exceed 90 inch pounds torque.

8. Examine the other couplings associated with the transition assembly to be sure they were not disturbed.

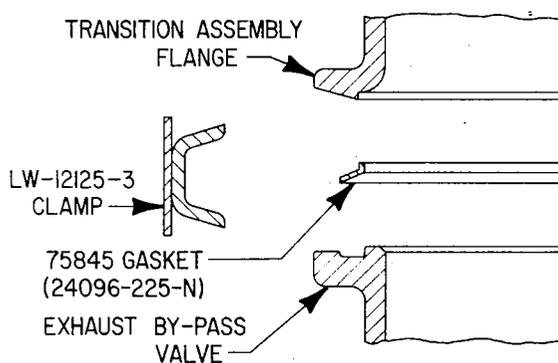


Figure 2. Diagram of Section Thru Transition and Exhaust Bypass Valve Showing Details of Clamp and Gasket Assembly

Service Instruction



DATE: March 7, 1975 Service Instruction No. 1320
Engineering Aspects are
FAA (DEER) Approved

SUBJECT: Tightening Procedure for Exhaust Manifold Components

MODELS AFFECTED: All Avco Lycoming turbocharged aircraft engines.

TIME OF COMPLIANCE: At anytime exhaust manifold system components are removed or replaced.

When it is necessary to remove or replace any part of the exhaust manifold system on Avco Lycoming turbocharged engines precautions must be taken when re-assembling parts to the engine; uneven tightening may cause damage resulting in probable loss of exhaust gas pressure.

Exhaust manifolding for Avco Lycoming turbocharged engines, covers both right and left half of the engine beginning at no. 1 and no. 2 cylinders at the front of the engine and continues to the transition assembly at the rear of the engine. If any component of this system is removed or replaced, for any reason, loosen all attachments on that side before installing the new or removed component. Then, during assembly tighten each attaching part equally and uniformly; that is, partially tighten all of the fastenings before securely tightening any one of them. Never fully tighten any part of the exhaust system fully before proceeding to another part on the same side of the engine. Tighten each part on each side of the engine equally.

If the replacement or removal of any exhaust manifold component requires the removal of a crush-proof gasket, a new gasket should be reassembled to the engine. Do not reuse a crush-proof gasket. These gaskets are usually found at cylinder exhaust ports and at v-band clamp locations.

CAUTION

Anytime a clamp is assembled over an exhaust system component be very careful not to spread or force the clamp beyond its normal open position. To do so will either distort its shape and cause an ineffective seal or it will rupture the metal and result in eventual failure of the clamp.