AVCO LYCOMING WILLIAMSPORT DIVISION
AVCO CORPORATION
WILLIAMSPORT, PENNSYLVANIA 17701

Service Instruction

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DATE: January 28, 1983

Service Instruction No. 1172C
(Supersedes Service Instruction No. 1172B)
Engineering Aspects are
FAA Approved

SUBJECT: Adjustable Oil Pressure Relief Valve Installation and Valve Seat Repair or Replacement

MODELS AFFECTED: All direct drive Avco Lycoming aircraft engines and TIGO-541 Series.

TIME OF COMPLIANCE: As required.

To provide a simplified method for adjusting oil pressure, an adjustable oil pressure relief valve P/N 77808 is available for all applicable engines. This adjustable valve is interchangeable with oil pressure relief plug P/N 76529 and can be installed on any applicable engine that is not equipped with a cage type valve seat. Crankcases incorporating a cage type valve seat can be modified to accept either of these oil pressure relief valve assemblies by removing the oil relief cage seat and installing a P/N 76530 valve seat insert. This valve seat insert is also available in oversized P/N 76530-P01 and P/N 76530-P04, as a repair item for damaged or worn seats in crankcases incorporating a cast in seat or a standard size P/N 76530 valve seat insert.

Engines that have the oil relief valve cage or a damaged insert seat P/N 76530 in the crankcase do not need to be disassembled when installing a standard or oversized valve seat insert. Crankcases with a cast in oil pressure relief seat must be split to insure all metal chips and shavings are removed after reaming the recess.

Part I of this instruction pertains to converting crankcases from the cage type valve seat to the P/N 76530 valve seat insert and repairing damaged valve seats by reaming a recess to accept an oversized valve seat insert on all applicable engines except O-320-H; O, LO, TO, LTO-360-E series engines. Part II pertains to repairing a damaged valve seat, on O-320-H; O, LO, TO, LTO-360-E series crankcases with a .500 inch oil supply galley. Part III describes installation and adjustment procedures for P/N 77808 and P/N 76529 oil relief valve assemblies.

PART I

1. Remove the oil pressure relief valve cover, gasket, spring, and ball from the oil pressure relief valve port. Use a 1/2 inch pipe thread tap or similar device to pull the cage or valve seat insert away from its seat in the crankcase.

2. Check the diameter of the recess (Diameter A in Figure 1) with a small hole gage and compare it with the diameters shown in the following chart. If the diameter of the recess is found to be .814 or less and the surface is smooth, no additional preparation is required. Proceed to install a standard valve seat insert as described in Steps 3 and 4. If the diameter of the recess is larger than .814 or rough, or if repairing a cast in valve seat, it will be necessary to either clean up the existing recess or ream a recess to accept an oversize valve seat. Install the applicable drill bushing, either P/N ST-243 or P/N ST-245 and assemble a stop collar or other limiting device on the reamer and set it to 1.015 -1.025 inch (Dimension B in Figure 1). Proceed to ream the recess to the specified dimension. After reaming remove the drill bushing and clean all metal chips from the recess.

Part No. of Valve Seat	Oversize	Outside Diameter of Valve Seat	Maximum Recess Diameter (see figure 2)	Drill Bushing Tool No.	Reamer
76530	Standard	.814 - .815	.814	———	———
76530-P01	.001	.815 - .816	.815	ST-243	ST-244 (.814 dia.)
76530-P04	.004	.818 - .819	.818	ST-245	ST-246 (.817 dia.)

3. Install the P/N ST-245 bushing. This will serve as a guide for driving the valve seat insert into place in the recess.

4. Cover the end of the P/N ST-249 drift with a small amount of grease and place the correct size valve seat on the drift with the chamfered edge outward. The grease will hold the valve seat insert in place on the drift until it is seated in the recess (see Figure 2).

5. After the valve seat insert is installed, insert the P/N ST-248 countersink through the P/N ST-245 bushing and cut a 1/16 inch wide chamfer on the inner edge of the seat (see Figure 3). After the chamfer is cut, insert the P/N ST-340 former through the bushing and tap the former lightly with a hammer. This will form the chamfered seat to the radius of the oil pressure relief valve ball.

6. Remove the P/N ST-245 drill bushing and clean the recess carefully to remove all metal chips and shavings. If the crankcase is split, remove the two P/N STD-1102 1/8-27 NPT plugs from each end of the crankcase oil galley. Wash the crankcase with solvent and blow the oil galley and oil return hole out with compressed air to remove all metal chips.

CAUTION

If all metal chips and shavings are not removed, they could cause serious damage to the engine bearings and rotating parts.

7. Install and adjust the oil pressure relief valve assembly as described in Part III of this instruction.

8. Accomplishment of this modification should be recorded in the engine log book.

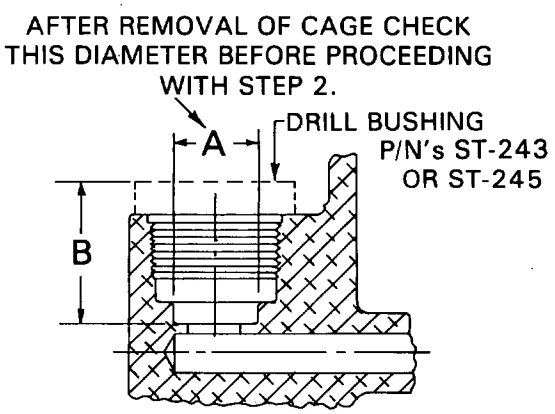


Figure 1. Section Through Crankcase Showing Recess for Installing Valve Seat

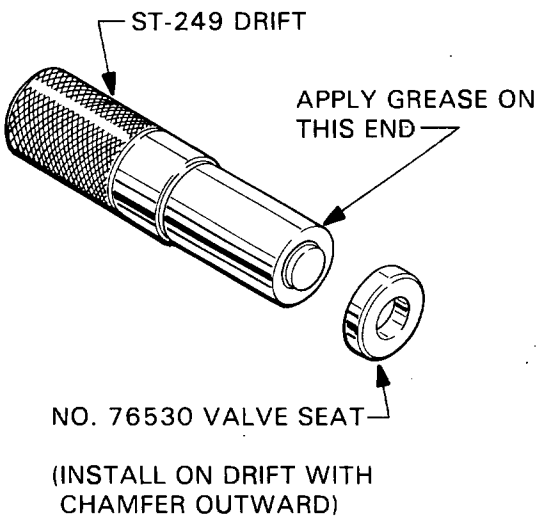
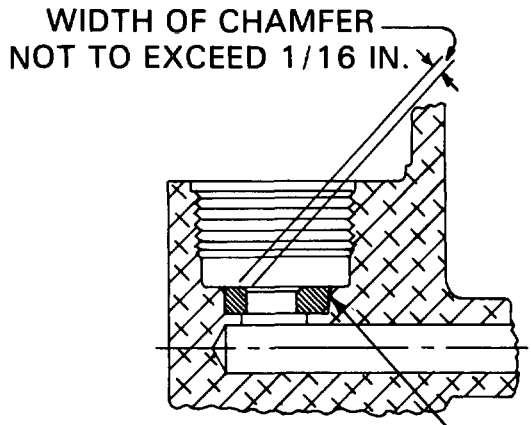


Figure 2. Oil Relief Valve Seat and Installation Tool



NOTE:
BE SURE P/N ST-245 BUSHING IS INSTALLED WHEN CUTTING CHAMFER

Figure 3. Section Through Crankcase Showing Oil Relief Valve Seat Installed

PART II

Oil pressure relief valve seats in 76 series crankcases with a .500 inch oil supply passage (see Figure 4) can be repaired by installing a P/N LW-18166 bushing or a P/N LW-18166-P04 oversize bushing. Due to insufficient material on the crankcase casting, crankcases with a .406 diameter oil supply passage cannot be repaired. If the oil supply passage measures .500 inch the bushing may be installed as specified in paragraphs 1 thru 12.

Figure 4 of this instruction is a cross section view of the oil pressure relief seat area showing the area, and dimensions to be reworked for bushing installation, and a cross section view of the bushing with fabricating dimensions. Figure 5 is a cross section view of the oil pressure relief seat area with the bushing installed showing the dimensions for finishing the bushing. The P/N LW-18166 and the P/N LW-18166-P04 bushing can be purchased from Avco Lycoming or made from AMS 4118 aluminum.

NOTE

Installation procedures for the P/N LW-18166 and P/N LW-18166-P04 bushings are identical with the exception of dimensions specified in the following paragraph 4. Paragraph 4 specifies dimensions for P/N LW-18166 bushing. Paragraph 4 A. specifies dimensions for P/N LW-18166-P04 bushing.

1. Disassemble the crankcase and position the right crankcase half on a lathe or drill press capable of performing the necessary work. Dimensions specified within this instruction are measured from the oil pressure relief plug gasket surface of the crankcase (see Figure 4). All machine work must be concentric with the pitch diameter of the threads within .004 inch total indicator reading.

2. Using a .578 inch diameter drill, drill to a depth of 1.28 inch (see Figure 4).

3. Counterbore .94 inch diameter x .03 radius to a depth of .97 inch, countersink the inner edge 90° by .68 inch diameter. Lycoming Service tool P/N ST-248 countersink and P/N ST-245 bushing may be used for the countersink operation. (See Figure 4.)

4. Finish ream the .578 diameter recess using a .619/.620 inch diameter bottom reamer with a .02 radius to a depth of 1.25 inches. P/N LW-18166 bushing. (See Figure 4.)

A. Finish ream the bushing recess to a depth of 1.25 inches. Use a .625/.626 diameter reamer with a .02 radius. P/N LW-18166-P04 bushing.

5. Clean the bushing and recess per Loctite instructions. Apply Loctite 270 or equivalent material. Press the bushing into the recess tight against the flat surface as shown in Figure 5.

6. Counterbore the bushing head to a depth of .860/.870 inch (see Figure 5).

7. Drill the ID of the bushing .500 inch diameter to a depth of 1.28 inches (see Figure 5).

8. Countersink the oil relief ball seat 80° x .60 inch diameter. Use P/N ST-439 countersink and P/N ST-245 bushing (see Figure 5).

9. Insert the P/N ST-340 former thru the P/N ST-245 bushing, tap the former lightly with a hammer. This will form the seat to the radius of the oil relief ball.

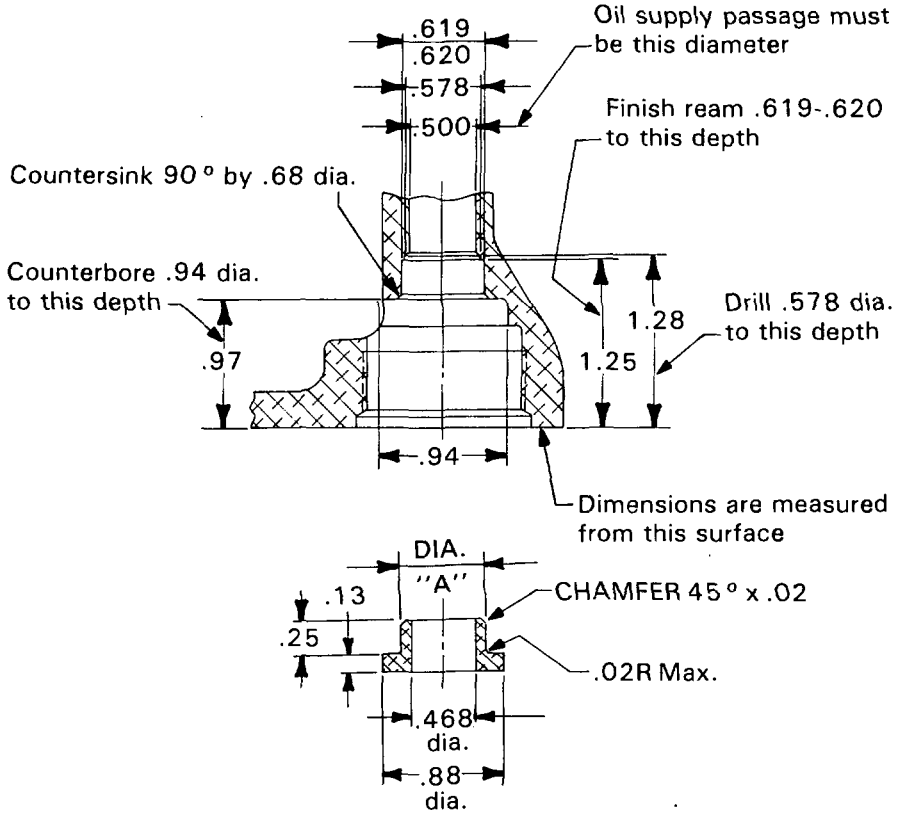
10. Remove all metal chips and shavings from the crankcase.

CAUTION

If all metal chips and shavings are not removed, they could cause serious damage to the engine bearings and rotating parts.

11. Install and adjust the oil pressure relief valve assembly as described in Part III of this instruction.

12. Crankcases modified as described above should be identified with the suffix "-85" following the part number. Accomplishment of this modification should also be recorded in the engine log book.



Part Number	Size	Dia. "A"
LW-18166	Standard	.621/.622
LW-18166-P04	.004 oversize	.625/.626

Figure 4. Section Through Crankcase Showing Recess for Bushing Installation

PART III

1. Install the oil pressure relief valve assembly, either the P/N 77808 adjustable valve assembly or the P/N 76529 valve assembly plug, along with a P/N STD-1045 gasket, P/N 1028B ball and the appropriate spring in the oil pressure relief port. Apply an anti-seize compound, FEL-PRO, C5A or an equivalent material, to the threads prior to assembly. Consult the applicable Avco Lycoming Parts Catalog for the correct spring.

2. Tighten the oil relief valve assembly until the gasket is in contact with the mating surfaces. Then finish tightening by turning the assembly 90°.

3. Oil pressure is adjusted by turning the slotted screw or the hex nut on the end of the adjustable oil pressure relief valve P/N 77808 or by increasing or decreasing the number of P/N STD-425 washers installed between the spring and the base of the P/N 76529 oil pressure relief plug (see Figure 6). Adjust the oil pressure after the engine is thoroughly warm. Normal oil pressure can be expected to vary from 100 psi during starting and warm up to 25 psi at idle when the engine is warm. See the oil pressure specifications in the applicable Operator's Manual before making any adjustments.

PARTS DATA:

SPECIAL TOOLS REQUIRED:

PART NUMBER	DESCRIPTION
ST-243	DRILL BUSHING (.001 o/s)
ST-245	DRILL BUSHING (.004 o/s)
ST-244	REAMER, Valve Seat Recess (.001 o/s) (.814 dia.)
ST-246	REAMER, Valve Seat Recess (.004 o/s) (.817 dia.)
ST-249	DRIFT, Bushing
ST-248	COUNTERSINK, Valve Seat Chamfer (90°)
ST-340	FORMER, Oil Relief Valve Seat
ST-439	COUNTERSINK, Valve Seat Chamfer (80°)

PARTS REQUIRED:

PART I:

P/N 77629 Kit - Adjustable Oil Pressure Relief Valve - consists of:

P/N STD-1045 gasket; P/N 1028-B ball; P/N 61084 spring; P/N 77808 adjustable valve assembly; P/N 76530 Std. seat; P/N 76530-P01 (.001 o/s) seat; P/N 76530-P04 (.004 o/s) seat.

PART II:

P/N LW-18166 Bushing.
P/N LW-18166-P04 Bushing.

NOTE: Revision "C" changes text, adds models and adds tools.

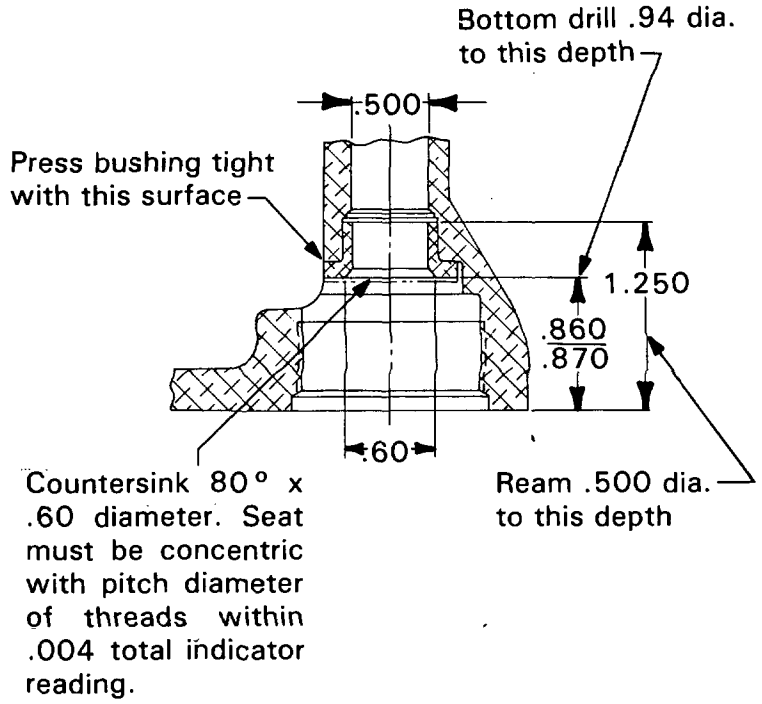


Figure 5. Section Through Crankcase Showing Bushing Installed

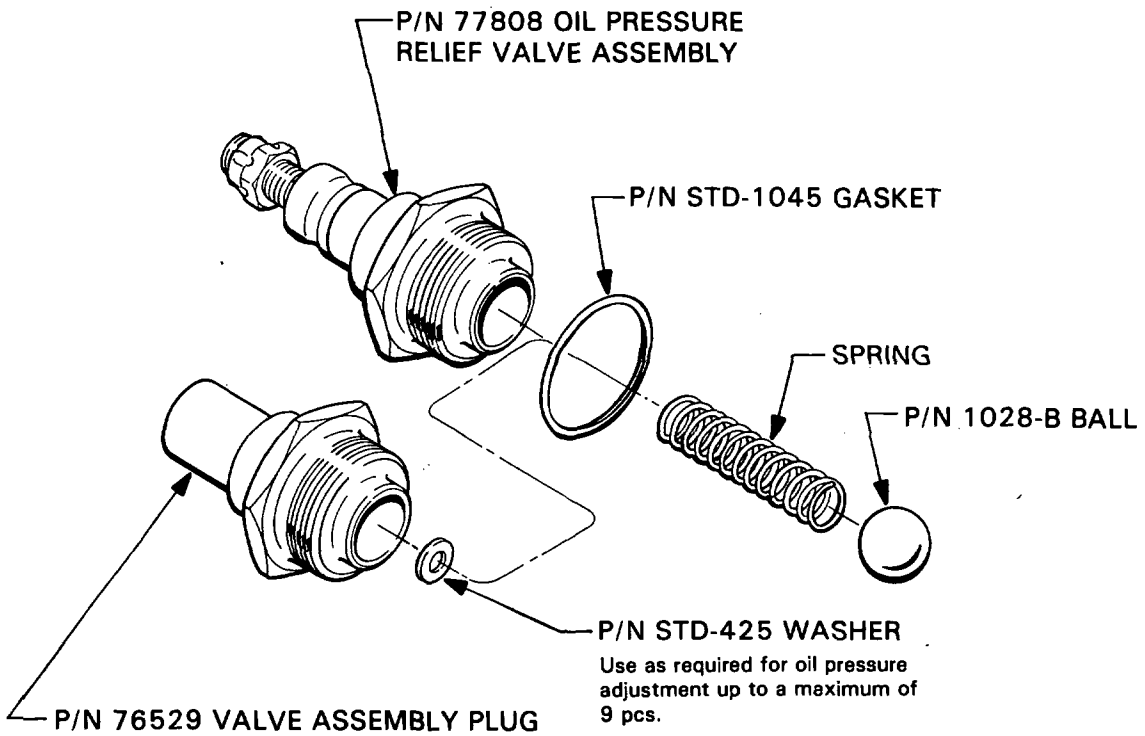


Figure 6. Oil Pressure Relief Valve Component Parts