

**Avco Lycoming** **TEXTRON**

**Williamsport Division**

Avco Lycoming/Subsidiary of Textron Inc.  
652 Oliver Street  
Williamsport, PA 17701  
U.S.A.  
5/30/86

# SERVICE INSTRUCTION

DATE:

April 25, 1986

Service Instruction No. 1316A  
(Supersedes Service Instruction No. 1316)  
Engineering Aspects are  
FAA Approved

SUBJECT:

Repair of Oil Cooler By-Pass Valve Seat

MODELS AFFECTED:

**PART I:** All Avco Lycoming piston engines equipped with a P/N 75944 oil cooler bypass valve.

**PART II:** All Avco Lycoming direct drive engines that incorporate either a dual magneto drive accessory housing or a P/N 69510 oil pressure screen and temperature valve housing on an individual magneto drive accessory housing.

TIME OF COMPLIANCE:

During engine overhaul or earlier if oil leakage past the valve seat is determined to be the cause of high oil temperature.

Applicable Avco Lycoming engines installed in an aircraft that employs an external oil cooler to maintain oil temperature are equipped with a P/N 75944 valve assembly - temp. control. The P/N 75944 valve operates in a normally open position which allows engine oil to flow directly from the oil pump through the oil filter to the engine lubrication cavities. As the oil becomes hotter the valve moves toward the closed position forcing oil to circulate through the external cooler before it passes through the filter into the engine. If either the valve face of the P/N 75944 valve assembly or the seat that it acts against becomes worn or damaged to the extent that oil can pass through without being routed to the external oil cooler, the engine oil will become too hot. A worn valve seat or face is evidenced by uneven or eccentric wear marks on the seating surface of the valve.

Depending on the basic engine configuration the P/N 75944 valve is installed at different locations on the accessory housing. In all applications the valve seat that the P/N 75944 valve acts against is located in an oil passage between the oil pump and oil filtering device. The seat is located either in an oil

filter base assembly, an oil filter adapter assembly, or it is machined into the accessory housing. Refer to Figures 1, 2 and 3 of this instruction for valve and seat locations on applicable engines.

There are two separate repair procedures for worn or damaged oil cooler by-pass valve seats. Part I of this instruction describes a minor repair that involves reshaping of the valve seat by cutting a small chamfer on the valve seat edge. This chamfer will remove slight irregularities from the seat and allow more surface contact between the valve seat and valve face. This repair is applicable to all by-pass valve seats regardless of location. Oil cooler by-pass valve seats that are an integrally machined surface of an accessory housing assembly and that become worn or damaged to the extent that the chamfer will not sufficiently correct the problem can be repaired by the procedure outlined in PART II. This procedure involves reworking the valve seat area and installing a replacement bushing that is finished to original specifications forming a new valve seat. This procedure is not applicable to any by-pass valve seat located in an oil filter base assembly or an oil filter adapter assembly. To facilitate clean up of

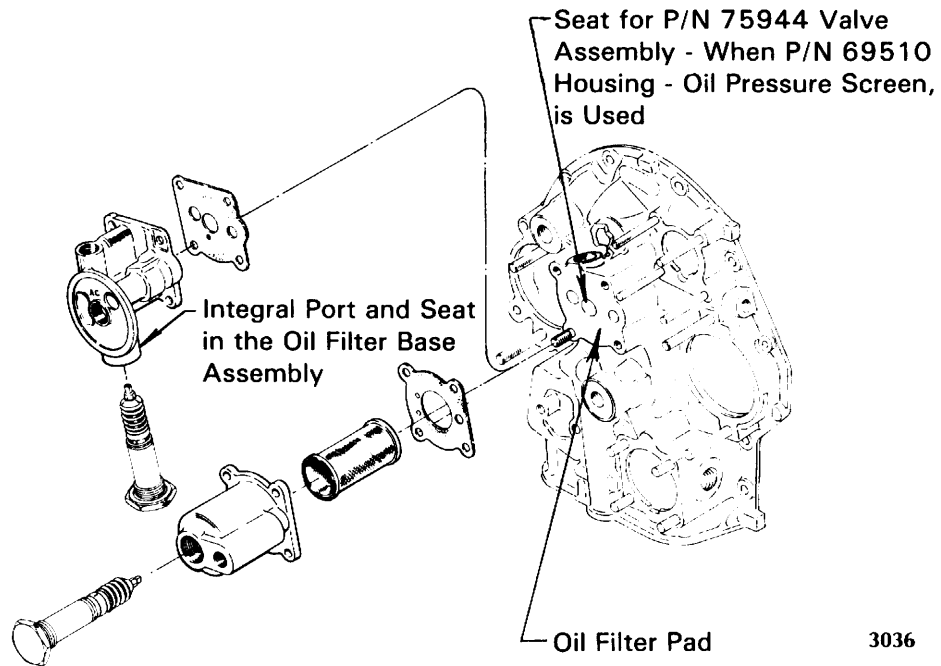


Figure 1.

Individual Magneto Accessory Housing With Optional Oil Filter Base Assembly or Oil Pressure Screen Housing

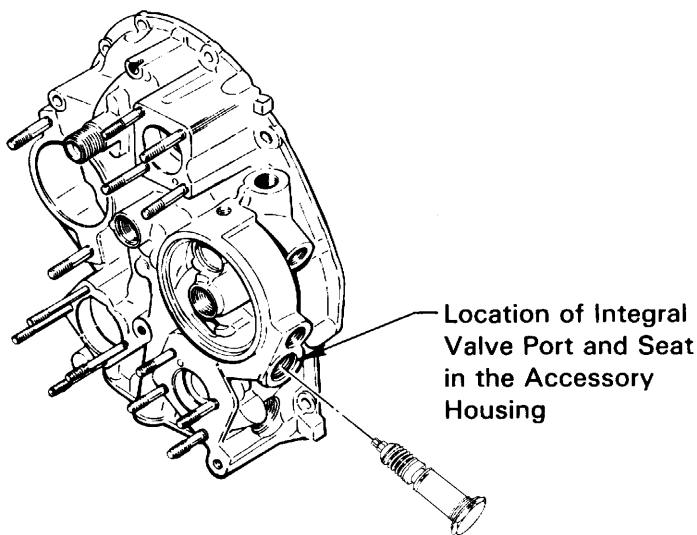


Figure 2.

Dual Magneto Accessory Housing With Integral Valve Port and Seat

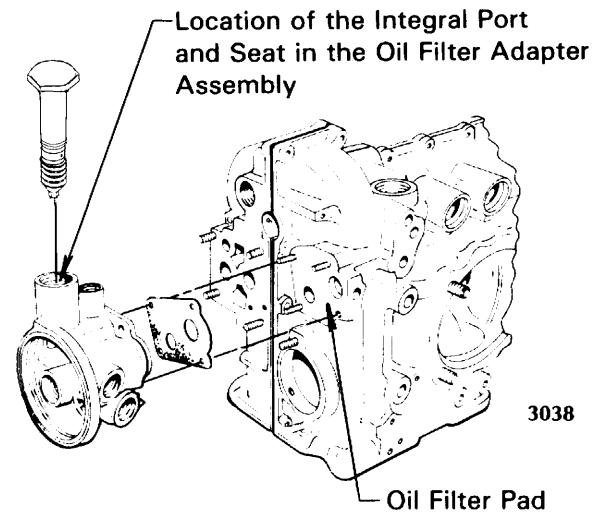


Figure 3.

Integral Accessory Housing - 76 Series Engines

the aluminum chips produced during this procedure, the accessory housing assembly must be removed from the engine. The oil pump must also be removed from the accessory housing. If the accessory housing is removed from an engine prior to any scheduled engine tear down the sump gasket must also be replaced. Remove the sump and all related attaching parts as required to facilitate installation of a new gasket. Reassemble the sump and related parts using new gaskets and seals as required. Use new gaskets and seals as required, during installation of the accessory housing assembly also.

**PART I**

**Refacing of the Oil Cooler By-Pass Valve Seat**

**NOTE**

Figure 4 of this instruction shows the P/N ST-388 reaming tool assembled in an oil filter base assembly. This installation is typical for all locations of the oil cooler by-pass valve.

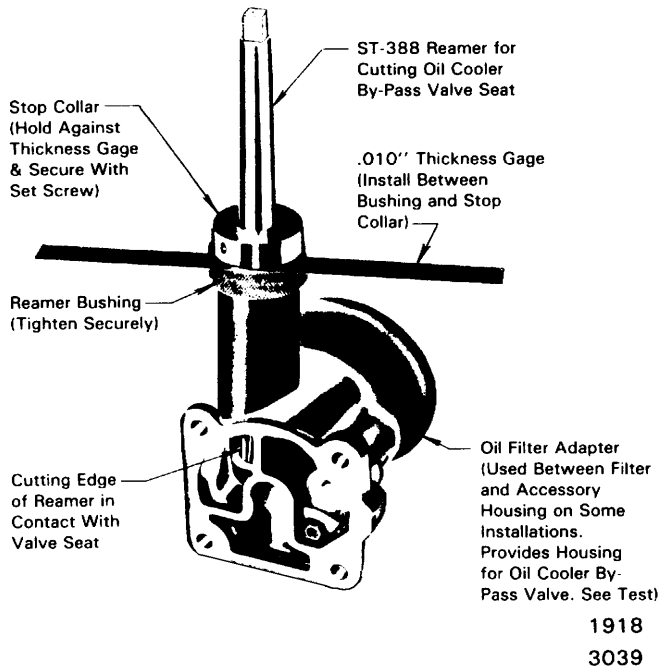


Figure 4.

Oil Filter Base Assembly Showing Reamer Cutting Edge in Position

**CAUTION**

AVCO LYCOMING SPECIAL SERVICE TOOLS P/N ST-388-1 REAMER, P/N ST-457 DRILL, P/N ST-459 REAMER AND SPOTFACER AND ST-462 REAMER ARE ALL DESIGNED TO BE USED WITH P/N ST-388-2 GUIDE BUSHING AND ST-388-3 STOP COLLAR. INSURE THE CORRECT CUTTING TOOL IS UTILIZED FOR THE OPERATION BEING ACCOMPLISHED.

1. Apply a small amount of all-purpose grease on the fluted end of P/N ST-388-1 reamer. Insert the P/N ST-388-1 Reamer thru the ST-388-2 guide bushing and install it in the oil cooler bypass valve housing. Engage the threads of the guide bushing with the threads of the valve housing and tighten the guide bushing firmly. See Figure 4.

2. Insure the chamfered end of the reamer is in contact with the valve seat in the housing.

3. Place a .010 inch thickness gage on top of the bushing. Install the P/N ST-388-3 stop collar on the reamer and move it down against the thickness gauge. Lock the stop collar in place by tightening the 10-32 x 3/8 inch set screw on the side of the collar. Remove the thickness gage.

**CAUTION**

IF THE CHAMFER IS CUT TO A DEPTH EXCEEDING THE .010 INCH LIMIT, THE EXTENDED VALVE FACE WILL NOT MAKE POSITIVE CONTACT WITH THE SEAT.

4. Place a tee-handle on the reamer and turn the reamer until the stop collar is in contact with the outer surface of the bushing.

5. Remove the ST-388 tool from the housing and clean all grease and metal chips from the reworked area. Where the operation has been accomplished through the oil pressure screen housing, remove the housing, screen and gasket. Clean the seat area and parts. Reassemble with a new gasket.

6. Reassemble any parts that have been removed in accordance with the applicable overhaul

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manual. Refer to the oil filter manufacturers recommended torque when installing a new oil filter. The oil cooler by-pass valve P/N 75944 is torqued to 300 inch lbs.

## PART II

### Oil Cooler By-Pass Valve Seat Replacement

#### NOTE

As stated before; this procedure is applicable to oil cooler bypass valve seats that are an integrally machined surface of an accessory housing assembly only. The procedure is not applicable to oil cooler valve seats that are located in an oil filter adapter assembly or an oil filter base assembly.

1. Fabricate a repair bushing from A.M.S. 4118 aluminum, refer to Figure 5 for bushing dimensions.

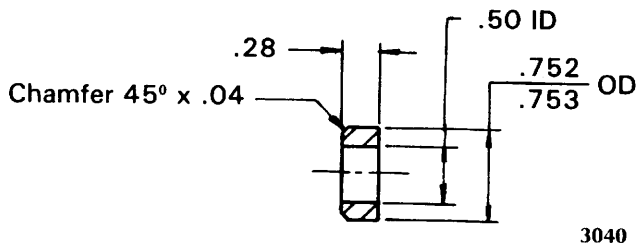


Figure 5. Repair Bushing Dimensions

#### CAUTION

AVCO LYCOMING SPECIAL TOOLS P/N ST-388-1 REAMER, P/N ST-457 DRILL, P/N ST-459 REAMER AND SPOT FACER AND ST-462 REAMER ARE ALL DESIGNED FOR USE WITH P/N ST-388-2 GUIDE BUSHING AND ST-388-3 STOP COLLAR. INSURE THE CORRECT CUTTING TOOL IS UTILIZED FOR THE OPERATION BEING ACCOMPLISHED.

2. Insert the P/N ST-457 drill through the P/N ST-388-2 guide bushing. Install the P/N ST-388-3 stop collar on the drill, shank and set the stop collar to allow the drill to cut to a depth of 3.510/3.520 inches from the outer gasket surface of the valve housing.

ing. Refer to figure 6 for a typical example of an assembled bushing, stop collar and cutting tool.

3. Clamp the accessory housing assembly in a suitable holding fixture. Install the assembled cutting tool in the valve housing. Insure the guide bushing is turned tight against the outer gasket surface.

4. Using a tee-handle and an adequate amount of cutting lubricant turn the tool in until the stop collar contacts the top surface of the guide bushing. Remove and disassemble the tool. Clean all chips and shavings from the recess.

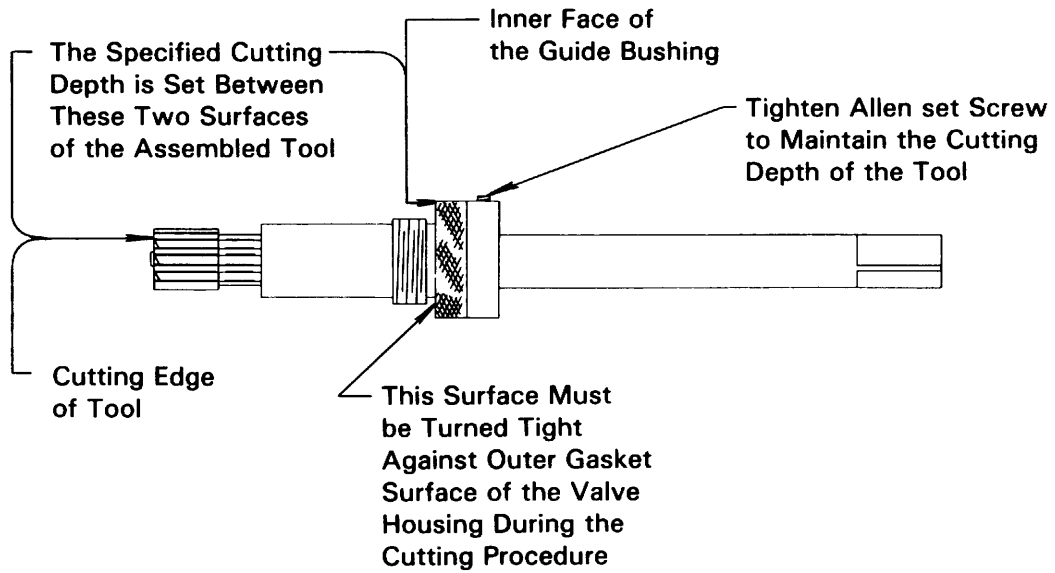
5. Install P/N ST-462 reamer into P/N ST-388-2 guide bushing. Install P/N ST-388-3 stop collar on the reamer. Set the stop collar to allow the reamer to cut 3.520/3.530 inch from the gasket surface, refer to figure 6 and figure 7. Ream the recess using the procedures outlined in step 4. Disassemble the stop collar reamer and guide. Remove all chips and shavings from the valve housing.

#### CAUTION

IN THE FOLLOWING STEP, DO NOT EXERT MORE FORCE OR HAMMER THE DRIFT MORE THAN IS REQUIRED TO SEAT THE REPAIR BUSHING IN THE RECESS. TO DO SO WILL EXPAND THE ID OF THE RECESS AND LOOSEN THE BUSHING.

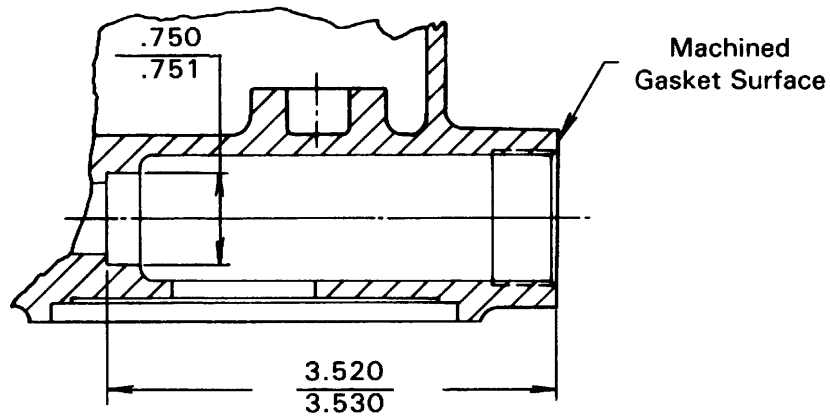
6. Coat the tip of P/N ST-458 drift with a small amount of all purpose grease. This will hold the repair bushing in place on the drift. Insert the drift through the P/N ST-388-2 guide bushing. Set the repair bushing into the grease on the tip of the drift with the chamfered edge facing away from the drift. Install the guide bushing in the valve housing and press or drive the repair bushing into the recess. Remove the drift and guide bushing from the valve housing.

7. Insert the combination reamer and spotfacer P/N ST-459 through the P/N ST-388-2 guide bushing. Install P/N ST-388-3 stop collar and set it to allow the spotfacing edge of the tool to cut to a depth of 3.277/3.283 inch, refer to figure 8. This tool arrangement will ream the bushing ID to the original dimension and cut the valve seat edge to the



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**Figure 6**  
Typical View of Assembled Bushing,  
Stop Collar and Cutting Tool



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**Figure 7.** Dimensions of Recess for Repair Bushing in Valve Housing

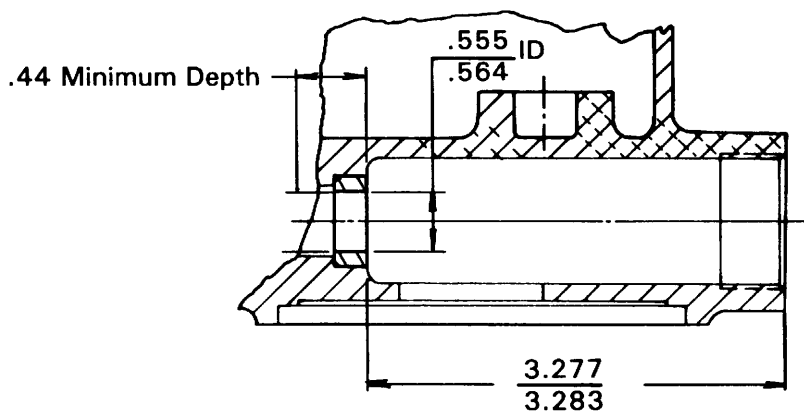
proper depth. Install the guide bushing in the valve housing; insure the bushing head is turned tight against the gasket surface. Using a tee handle and an adequate amount of cutting lubricant, turn the cutting tool in until the stop collar contacts the guide bushing head. Do not force the cutting tool into the repair bushing. Apply a light and even pressure while turning the cutting tool. Rotate the tool four or five extra revolutions to insure the repair bushing is finished flat and smooth. Remove

and disassemble the cutting tool, stop collar and bushing.

8. Clean all chips and shavings from the accessory housing.

**NOTE**

If it is deemed necessary at a later date, the procedure outlined in Part I of this instruction may be applied to the repair bushing.



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Figure 8. Finished Dimensions of Repair Bushing and Valve Housing

**SPECIAL TOOLS:**

QTY.	TOOL NO.	CONSISTS OF
1	ST-388	ST-388-1 Reamer, ST-388-2 Guide Bushing, ST-388-3 Stop Collar. (To cut chamfer on valve seat edge.)
1	ST-457	Drill - (1st step in cutting recess)
1	ST-462	Reamer - (Final step in cutting recess)
1	ST-458	Drift (Install repair bushing)
1	ST-459	Reamer and Spotface (Finish repair bushing to original dimensions)

**NOTE:** Revision "A" changes text; adds additional repair procedure and adds special tools.

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# SERVICE INSTRUCTION

September 17, 1987

Supplement No. 1

to

Service Instruction No. 1316A

The repair bushing described on page 4 of 6 of Service Instruction No. 1316A is now available through authorized Avco Lycoming Textron Distributors as P/N 01K19728 Bushing-Repair oil cooler bypass valve seat.

22679 — This number for Avco Lycoming Textron reference only.