

## **Chapter 79**

### **Oil System**

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## **79-00-00**

## **GENERAL**

The EXTRA 300S is equipped with a modification of a Christen Inverted Oil System (CHRISTEN 801 series). Maintenance work or overhaul of the this system requires consultation to the manufacturer. (Refer to Christen Product Manual (P/N: Christen 70047-001) and Lycoming Operator`s Manual (P/N:60297-21). Additionally the lubrication system of the EXTRA 300S has two oil coolers which are connected to the engine by flexible tubing.

## **79-10-00**

## **INVERTED OIL SYSTEM**

The standard Christen 801 Inverted Oil System is a kit-form accessory for Lycoming aircraft engines which permits normal engine lubrication, with minimal oil loss, during aerobatic flight. When installed, it becomes a self-contained extension of the normal aircraft engine oil and breather systems. As the system control valves are gravity-operated, no connection to aircraft power sources is required (Refer to Figure 1 and 2).

The system works in all inverted and negative-g flight conditions and is particular suited to high-performance aircraft used for unlimited-class aerobatic competitions.

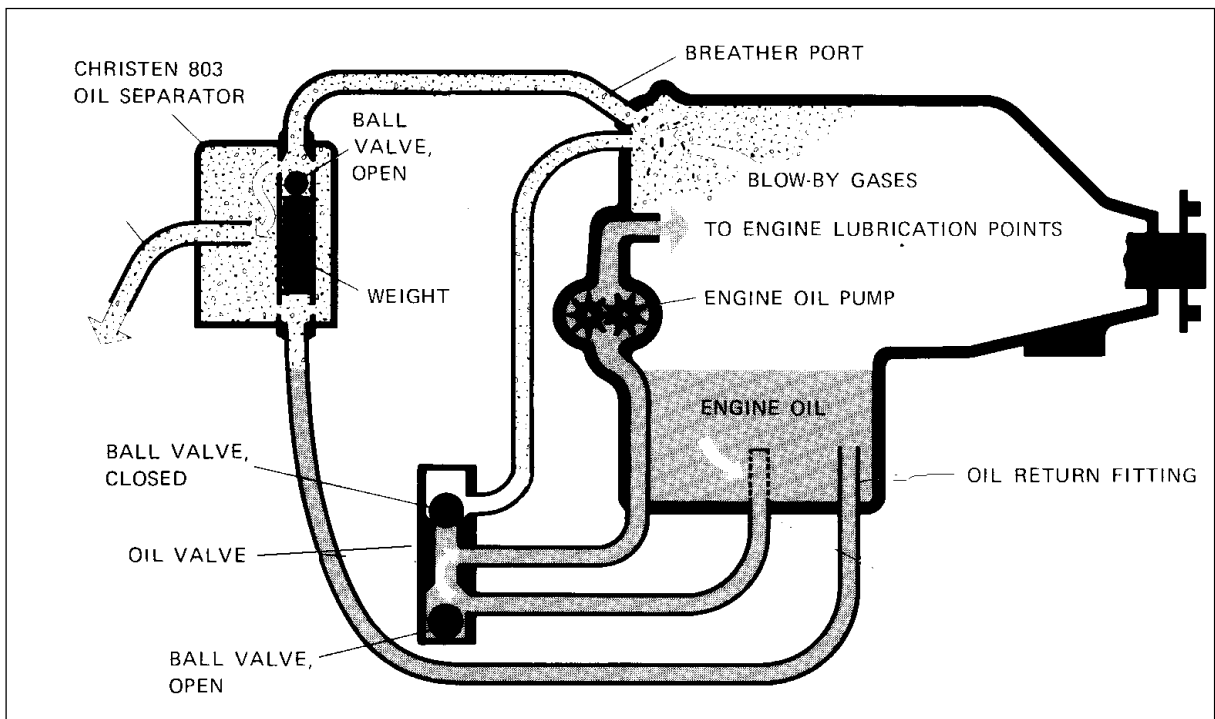
The need for modification of the standard Christen 801 Inverted Oil System results from installation requirements for different system components of the Lycoming AEIO 540 engine.

79-10-01

Principles of Operation

Normal flight

During normal flight, the weighted ball valve at the top of the oil separator is open, allowing blow-by gases from the engine crankcase to be vented from the breather port to the top of the oil separator and out through the overboard breather line. The top ball valve of the oil valve is closed and the bottom ball valve is open, allowing oil to flow from the sump fitting to the oil pump and out to the engine lubrication points.

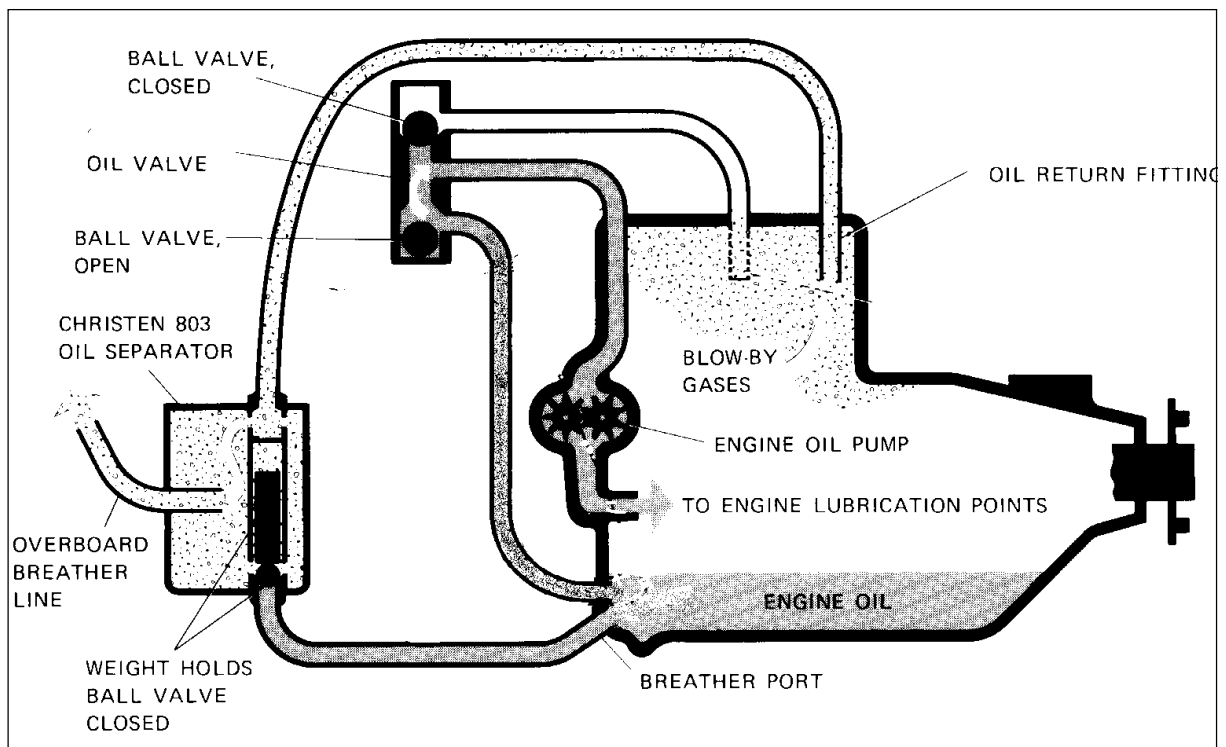


*Inverted Oil System, Normal Flight  
 Figure 1*

### Inverted flight

When the aircraft is inverted, engine oil falls to the top of the crankcase. The weighted ball valve in the oil separator closes, preventing overboard loss of oil through the top of the oil separator. Blow-by gasses from the engine crankcase are vented from the sump to the bottom of the oil separator and out through the overboard breather line. The top ball valve of the oil valve is open, and the bottom valve is closed, allowing oil to flow out from the breather port to the oil valve, through the sump fitting and the sump screen, to the oil pump and out to the engine lubrication points.

Any oil in the lines which fails to return to the sump during the transition between normal and inverted flight drains into the oil separator. This oil then returns to the sump from the bottom of the oil separator during periods of normal flight.



*Inverted Oil System, Inverted Flight*  
 Figure 2

## 79-20-00

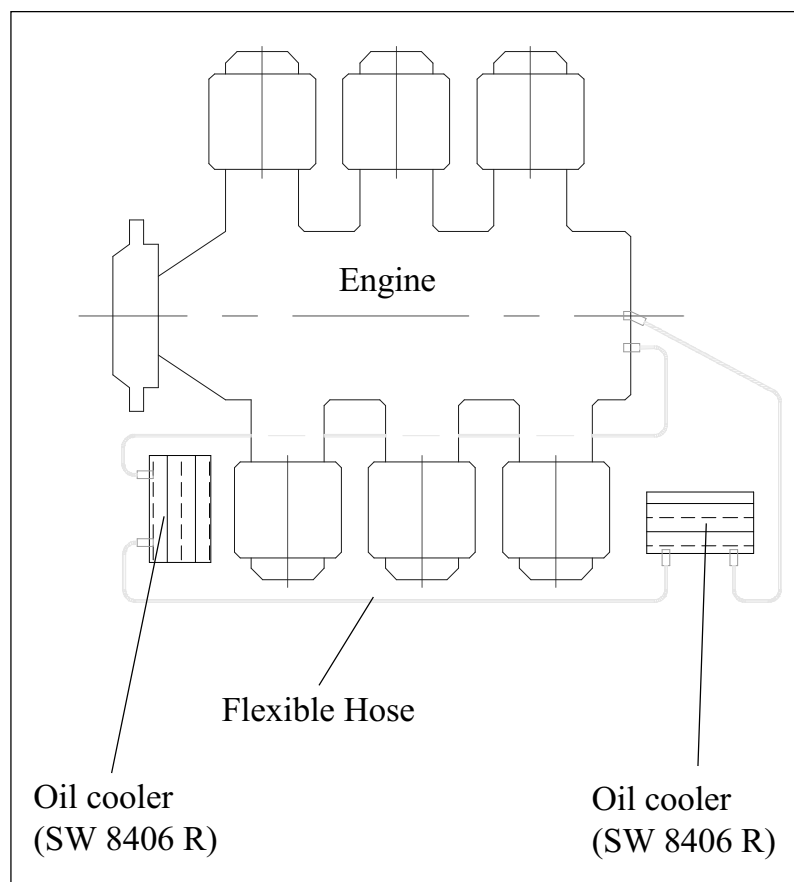
## OIL COOLER

The lubrication system of the EXTRA 300S has two oil coolers which are mounted on the left front and left rear engine baffles and connected to the engine by flexible hose. The two oil coolers (SW 8406 R) are produced by the STEWART WARNER SOUTH WIND Corporation.

## 79-20-01

## Principles of Operation

In operation the hot lubricating oil leaving the engine is pumped by an engine-driven pump to a hose connector on the engine mount which directs the oil to the oil coolers. The oil is cooled in passing through the oil cooler and returned to the engine lubricating circuit through the return hose tubing connecting the engine mount connector.



*Oil Cooling System  
Figure 3*

## **79-30-00**

## **INSTALLATION**

Before making installations and repairs to the aircraft plumbing, it is important to make accurate identification of plumbing materials.

### **79-30-01**

#### **Fittings**

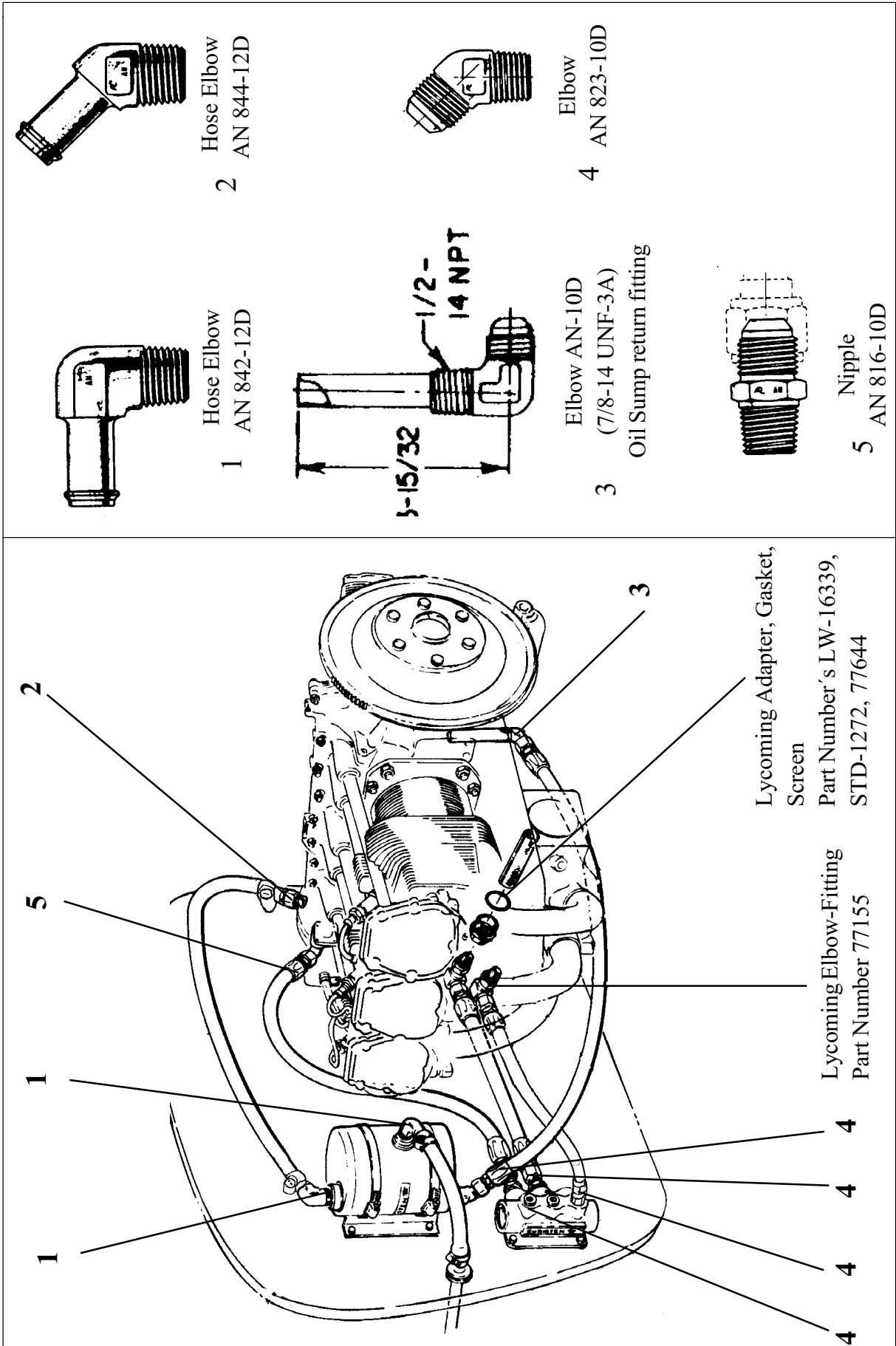
General information concerning fittings used in the Extra 300S you find in Chapter 20-10-08.

#### **Inverted Oil System**

The hose and fitting installation is modified to the standard Christen Inverted Oil System. The connections of the Inverted Oil System still consist of AN (Army/Navy) Standard fittings. The position of this AN-fittings at the engine is shown in the figure 4 on following page 8.

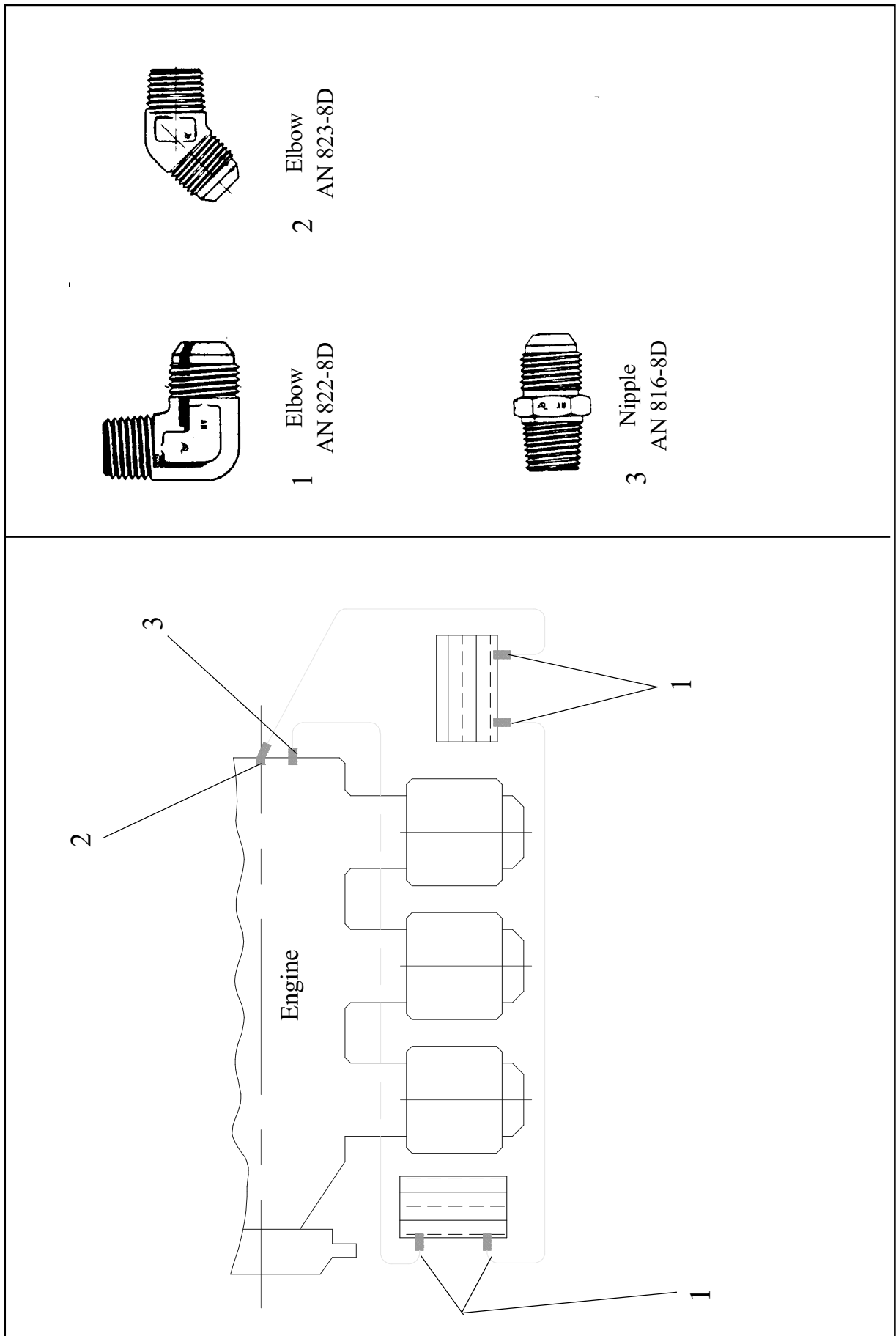
#### **Oil Cooling System**

The flexible tubing of the oil cooling system are connected by AN Standard fittings with equal size (8D), but different connection angle. The position of this AN-fittings at the engine is shown in the figure 5 on page 9.



Positions of AN-Fittings in the Inverted Oil System  
 Figure 4





*Positions of AN-Fittings in the Oil Cooling System  
Figure 5*

## 79-30-02

## Flexible Hoses

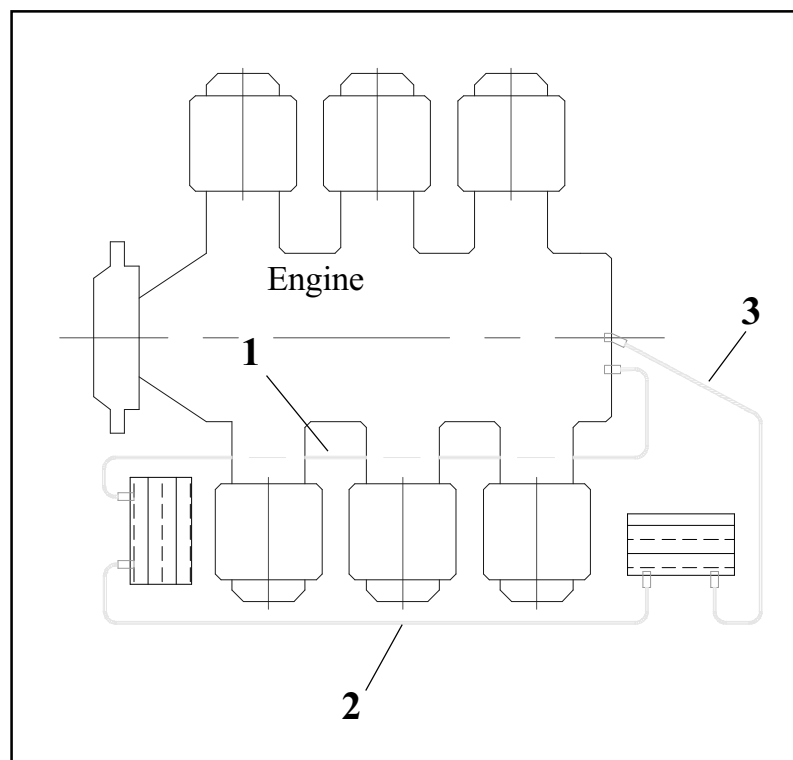
General information concerning flexible hoses you find in Chapter 20-10-07.

### IMPORTANT

**If replacement of oil lines is necessary, cover the oil lines of the engine department with AEROQUIP AE102 fire sleeves as per Chapter 20-10-07 except the AEROQUIP 637/MIL-H 6000 hoses.**

### Oil Cooling System

The position and identification of the flexible hose at the engine and the oil cooling system is shown in Figure 6:

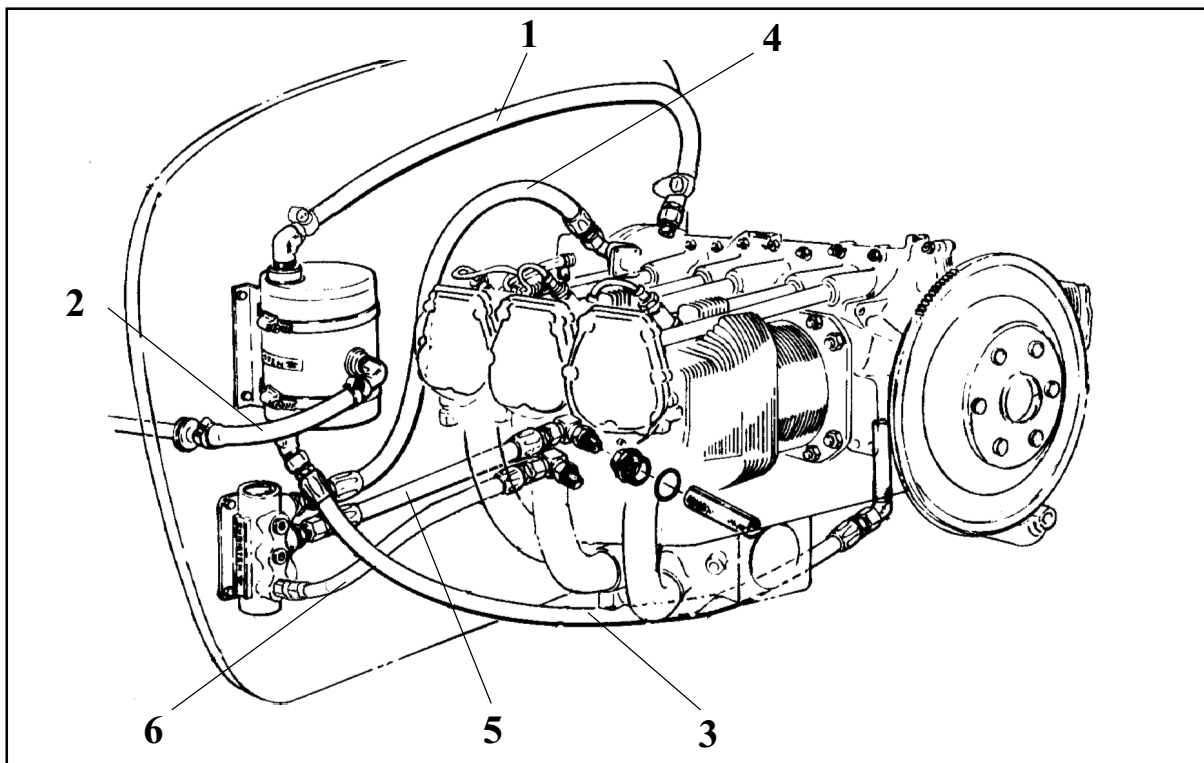


*Positions of AEROQUIP-Hose in the Oil Cooling System  
 Figure 6*

- |          |                                   |   |  |
|----------|-----------------------------------|---|--|
| <b>1</b> | AEROQUIP 303-8<br>PN: PC-63601A21 | + | Hose Fittings 491-8D<br>hose lenght: 1210 mm |
| <b>2</b> | AEROQUIP 303-8<br>PN: PC-63601A22 | + | Hose Fittings 491-8D<br>hose lenght: 1030 mm |
| <b>3</b> | AEROQUIP 303-8<br>PN: PC-63601A23 | + | Hose Fittings 491-8D<br>hose lenght: 600 mm  |

## Inverted Oil System

The position and identification of the flexible hose at the engine and the inverted oil system is shown in Figure 7:



*Positions of AEROQUIP-Hose in the Inverted Oil System  
Figure 7*

- |          |  |                    |
|----------|--|--------------------|
| <b>1</b> | AEROQUIP 637/ MIL-H 6000 + Hose clips<br>PN: PC-63601A27   | hose lenght: 580mm |
| <b>2</b> | AEROQUIP 637/ MIL-H 6000 + Hose clips<br>PN: PC-63601A28   | hose lenght: 350mm |
| <b>3</b> | AEROQUIP 303-10 + Hose Fittings 491-10D<br>PN: PC-63601A29 | hose lenght: 830mm |
| <b>4</b> | AEROQUIP 303-10 + Hose Fittings 491-10D<br>PN: PC-63601A25 | hose lenght: 400mm |
| <b>5</b> | AEROQUIP 303-10 + Hose Fittings 491-10D<br>PN: PC-63601A24 | hose lenght: 220mm |
| <b>6</b> | AEROQUIP 303-10 + Hose Fittings 491-10D<br>PN: PC-63601A26 | hose lenght: 200mm |

## **79-40-00**

## **MAINTENANCE**

The inverted oil system normally requires no maintenance. During major overhauls or when repairs require sump removal, inspect sump for excessive deposits of sludge, varnish, or foreign material. If sump is dirty, remove and thoroughly clean all hoses and components; then use compressed air blast for drying and cleanout before reassembly.

### **79-40-01**

### **Reseating Valve Balls**

Marginal oil loss of valve may result from nicks in the valve seats which cause leakage when the valve should be closed. Such nicks can be caused by mishandling or by small chips of metal being caught between the ball and the seat as the valve operates during initial run-in of a new or overhauled engine. For more information of the valve leakage test refer to Lycoming Operator`s Manual.

### **79-40-02**

### **Cleaning Inverted Oil System**

The inverted oil system must be flushed with a suitable petroleum solvent, such as varsol, every 300 (three hundred) hours of engine operation or when there is evidence of the loss of oil through the breather line after normal flight.