



Application Engineering Department

AE-1166-R10

Revised April 1, 1993

COPELAND OIL PUMPS

On all Copelametic compressors 5 H.P. and larger in size, and on 3 H.P. "NR" models, compressor lubrication is provided by means of a positive displacement oil pump. The pump is mounted on the bearing housing, and is driven from a slot in the crankshaft into which the flat end of the oil pump drive shaft is fitted.

Oil is forced along a hole through the center of the crankshaft to the compressor bearings and connecting rods. A spring loaded ball check valve serves as a pressure relief device, allowing oil to bypass directly to the compressor crankcase if the oil pressure rises above its fixed setting.

Since the oil pump intake is connected directly to the compressor crankcase, the oil pump inlet pressure is always crankcase pressure, and the oil pump outlet pressure will be the sum of crankcase pressure plus oil pump pressure. Therefore, the net oil pump pressure is always the pump outlet pressure minus the crankcase pressure. When the compressor is operating with the suction pressure in a vacuum, the crankcase pressure is negative and must be added to the pump outlet pressure to determine the net oil pump pressure. A typical compound gauge is calibrated in inches of mercury for vacuum readings, and 2 inches of mercury are approximately equal to 1 psi.

For example:

<u>Crankcase Pressure</u>	<u>Pump Outlet Pressure</u>	<u>Net Oil Pump Pressure</u>
50 psig	90 psig	40 psi
8" vacuum (equivalent to a reading of minus 4 psig)	36 psig	40 psi

In normal operation, the net oil pressure will vary depending on the size of the compressor, the temperature and viscosity of the oil, and the amount of clearance in the compressor bearings. Net oil pressures of 20 to 40

psi are normal, but adequate lubrication will be maintained at pressures down to 10 psi. The bypass valve is set at the factory to prevent the net pump pressure from exceeding 60 psi.

Every oil pump is given a 100% operating inspection at the Copeland factory prior to shipment. The pump is installed in a test stand and must lift oil through unprimed oil lines to a height not less than 12 inches, pick up and develop a full flow of oil within 30 seconds, must not exceed an established maximum power requirement, and must develop a minimum of 60 psi pressure with the main outlet closed. Operating pressures and reversal of the pump are checked on the test stand, and on larger compressors are checked again after the pump is installed in a compressor.

The oil pump will operate in either direction. The reversing action is accomplished by a friction plate which shifts the inlet and outlet ports. After prolonged operation in one direction, wear, corrosion, varnish formation, or burrs may develop on the reversing plate which can prevent the pump from reversing. Therefore, on installations where compressors have been in service for some time, care must be taken to maintain the original phasing of the motor if for any reason the electrical connections are disturbed.

The presence of liquid refrigerant in the crankcase can materially affect the operation of the oil pump. Violent foaming on start up can result in the loss of oil from the crankcase, and a resulting loss of oil pressure until oil returns to the crankcase. If liquid refrigerant or a refrigerant rich mixture of oil and refrigerant is drawn into the oil pump, the resulting flash gas may result in large flow variations and possibly a loss of oil pressure. Crankcase pressure may vary from suction pressure since liquid refrigerant in the crankcase can pressurize the crankcase for short intervals, THEREFORE, THE OIL PRESSURE SAFETY SWITCH LOW PRESSURE

COPELAND OIL PUMPS

998-0008-33

(M, 2D, N, 3D, 4, 6, 8, 9 MODELS)

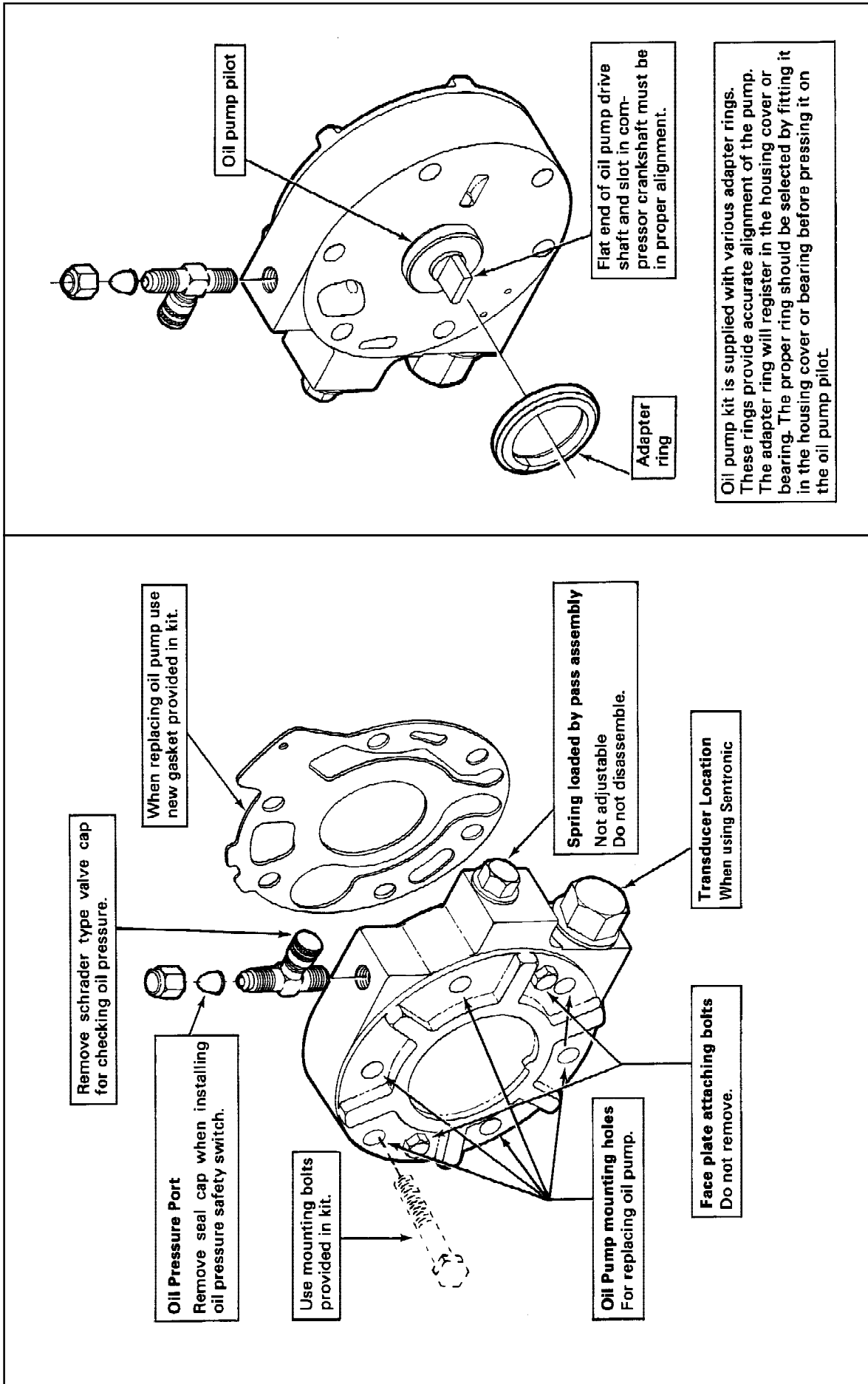
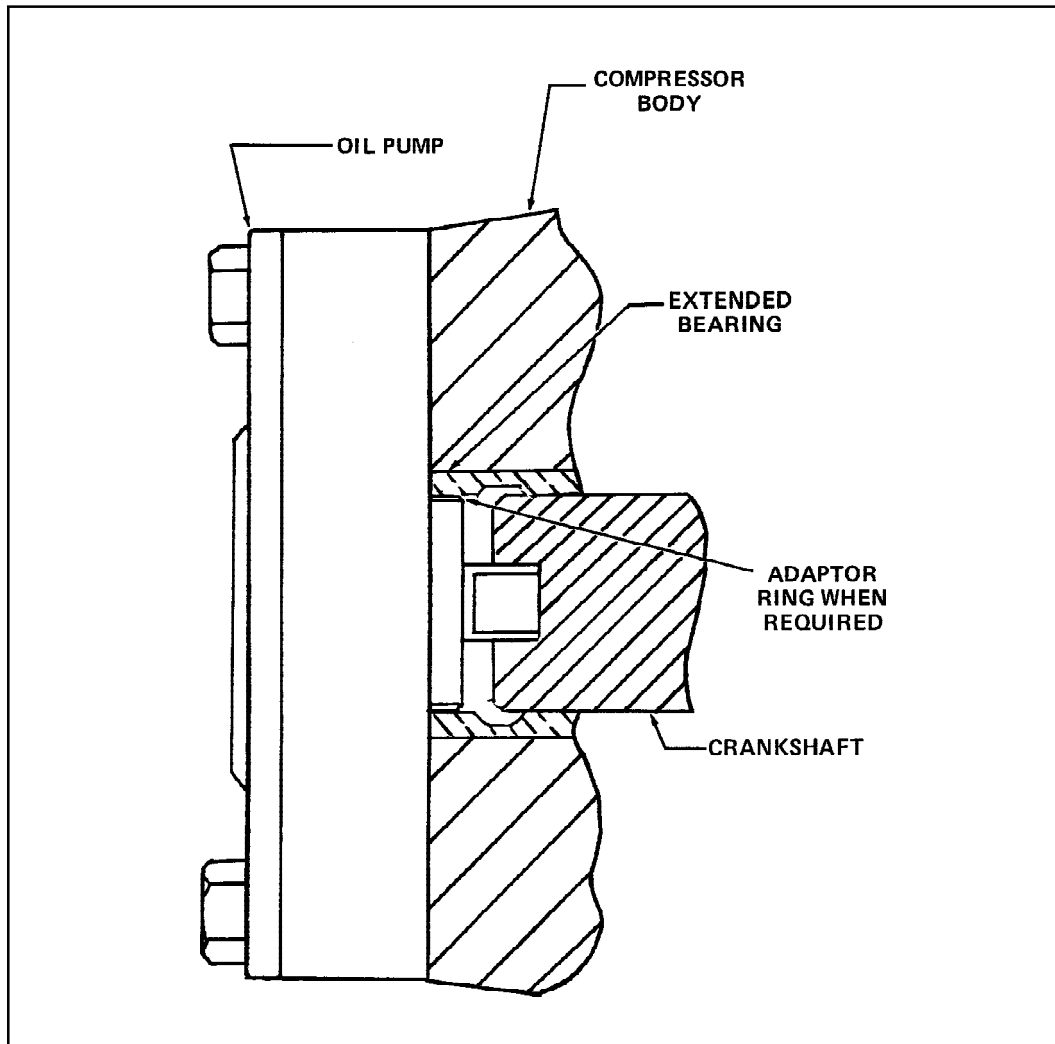


Figure 1



COMPRESSOR WITH ADAPTER RING

Figure 2

CONNECTION SHOULD ALWAYS BE CONNECTED TO THE CRANKCASE ON CAP TUBE STYLE PRESSURE CONTROLS. Oil pressure is measured through the transducer with the Sentronic control.

During a rapid pull-down of the refrigerant evaporating temperature, the amount of refrigerant in solution in the crankcase oil will be reduced, and may cause flash gas at the oil pump. During this period the oil pump must pump both the flash gas and oil, and as a result the oil pressure may decrease temporarily. This will merely cause the oil pump to bypass less oil, and as long as the oil pressure remains above 9 psi, adequate lubrication will be maintained. As soon as stable conditions are reached and liquid refrigerant is no longer reaching the pump, the oil pressure will return to normal.

On the initial start-up of a system, or if abnormal noise causes any question regarding lubrication, it is recommended that a gauge be attached to the Schrader valve so that the oil pressure can be monitored while the compressor is in operation. The Schrader valve is for

pressure checking only and is normally closed, so the oil pressure safety control must never be connected to this port.

The oil pump face plate is held in place by the two bolts shown in Figure 1. (Note that these are smaller than the six mounting bolts). The face plate seats on an "O" ring seal and **should not be removed**. Do not put a gasket between the face plate and the oil pump body, or the oil pump will be rendered inoperative.

The bolt holding the spring loaded bypass assembly in place **should not be removed**. The bypass pressure is not adjustable, and the bolt is provided for access during original assembly or factory maintenance, but it is not intended for field repairs. If the bolt is removed, the spring or other components are easily lost or damaged, rendering the oil pump inoperative.

Field Replacement of Oil Pumps

If it is determined that the oil pump is not functioning properly, replace the oil pump and not the compressor.

Copeland 4-1166

The oil pump is mounted on the compressor bearing housing by means of the six bolts shown in Figure 1. Compressor bearing housings are not interchangeable on compressor bodies and should not be removed.

Gaskets installed between the oil pump and the compressor body are shown in Figure 3. The tabs on the gasket have been added solely for aid in identification and alignment. The gasket must be installed with the tab in the position shown (11 o'clock position when viewed facing the compressor) and the part number stamp at the one o'clock position. If the gasket is installed in any other position, the oil ports will be blocked.

Note: The oil pump gasket for 2D, M, N, 9 & 3D compressors is not interchangeable with the 4, 6, & 8 model oil pump gasket.

However, old style gaskets without the cut-outs shown in Figure 3, cannot be used with the new oil pump.

SENTRONIC

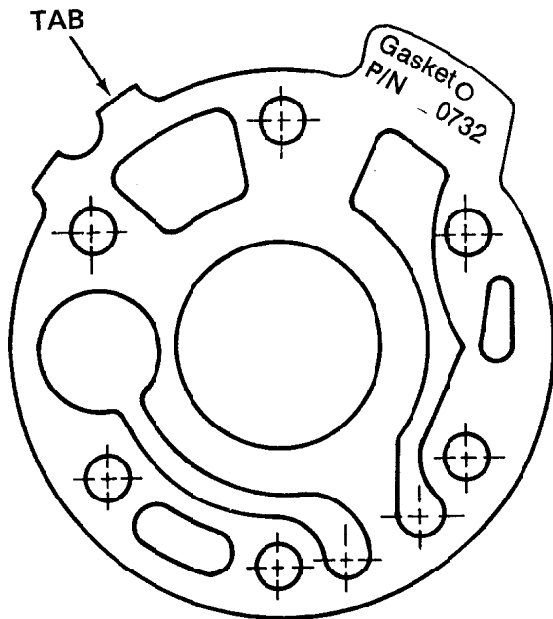
For additional information on Sentronic, see AE 8-1275.

Adapter Rings for Service

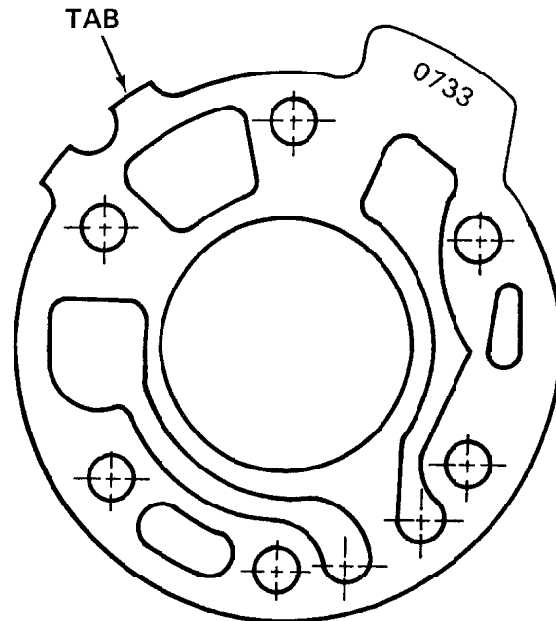
Since there have been a number of changes in bearing design over the years on these models, the oil pump in the service kit is furnished with a 1-1/8" diameter shoulder on the oil pump drive shaft. An adapter may be required to fit the register in the bearing or bearing housing as shown in Figure 2.

WARNING - The oil pump pilot shoulder must register snugly in either the bearing housing or bearing (depending on the compressor design) to insure centering the oil pump. See Figure 2. If not properly registered, the resulting misalignment can result in excessive wear and possible failure of the oil pump. Tolerances are very critical for proper operation and extreme care must be taken to insure that the proper oil pump, and adapter if required, is used.

Note: Install gasket in position shown with tab in 11 o'clock position, Part Number at one o'clock position. Improper installation will block oil ports.



Oil pump gasket for all M, 2D N, 3D, 9 model
Copelametic Compressors
Copeland Part No. 020-0732-00



Oil pump gasket for all 4, 6, 8 model
Copelametic Compressors
Copeland Part No. 020-0733-00

Figure 3