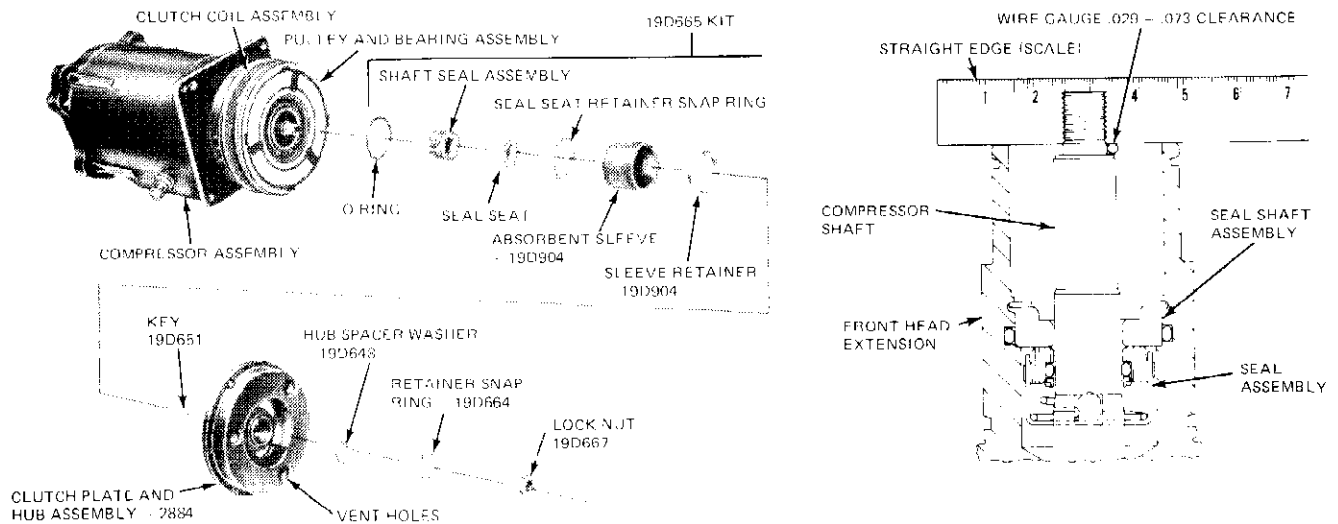




L1704-2C

FIG. 15 Compressor Shaft, Seal and Clutch Components

compressor and replace the cylinder and shaft assembly.

Removal

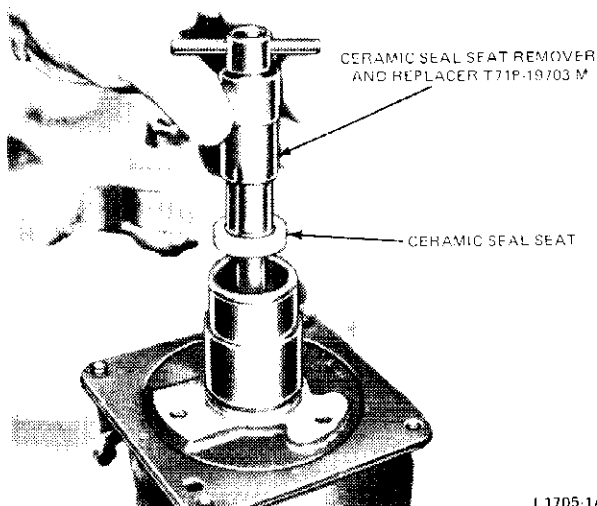
1. Remove the compressor from the car as outlined in this section.
2. Remove the clutch plate and hub assembly from the compressor as outlined in this section.
3. Remove the clutch hub assembly key from the shaft.
4. Pry out the sleeve retainer with a screwdriver and remove the absorbent sleeve (Fig. 15). Remove the

seal seat retainer ring with T71P-19703-T or Snap-On pliers PRA-25.

5. Thoroughly clean the inside of the compressor neck, the shaft, and the exposed portion of the seal seat of any dirt or foreign material. This is absolutely necessary to prevent any such material from getting into the compressor.
6. Remove the ceramic seal by rotating clockwise with Tool T71P-19703-M as shown in Fig. 16. Remove the seal seat O-ring from inside the compressor neck with tool T71P-19703-C.
7. Insert Tool T71P-19703-G on top of seal. Rotate tool clockwise while forcing tool downward until tool engages tangs of seal. Remove seal by lifting tool out of compressor neck (Fig. 17).
8. Recheck the shaft and inside of the compressor neck and be sure that these areas are perfectly clean before installing the new parts.

Installation

1. Coat the new seal seat O-ring with clean 525 viscosity compressor oil and install it in the groove inside the compressor neck, using Tool T71P-19703-J guide, T71P-19703-K sleeve and T71P-19703-L O-ring installer as shown in Fig. 18, View A, B and C.
2. Coat the O-ring and seal face of the new seal assembly with clean compressor oil and carefully engage the seal assembly onto the locking tangs of Tool T71P-19703-G (Fig. 17). Place Tool T71P-19703-H (shaft seal protector) over the end of the shaft and slide the seal down the shaft, turning the tool and applying light pressure until the seal



L1705-1A

FIG. 16 Removing or Installing the Ceramic Seal Seat

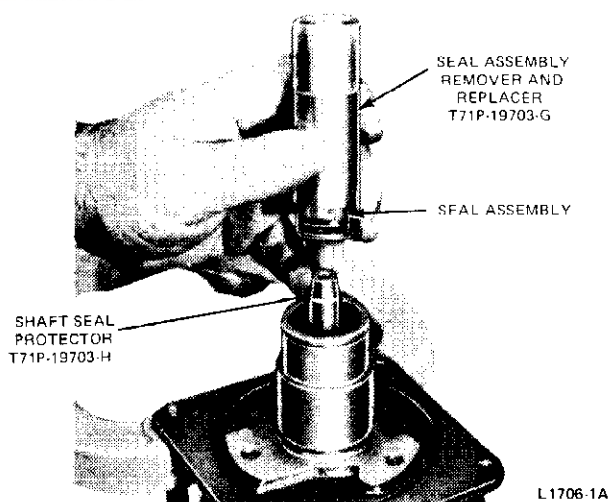


FIG. 17 Removing or Installing the Seal

assembly engages the flats on the shaft and is seated in place. Rotate the tool slightly to release from the seal and remove tool (Fig. 17).

- Coat the seal face of the ceramic seal seat with clean 525 viscosity compressor oil. Grip the seal

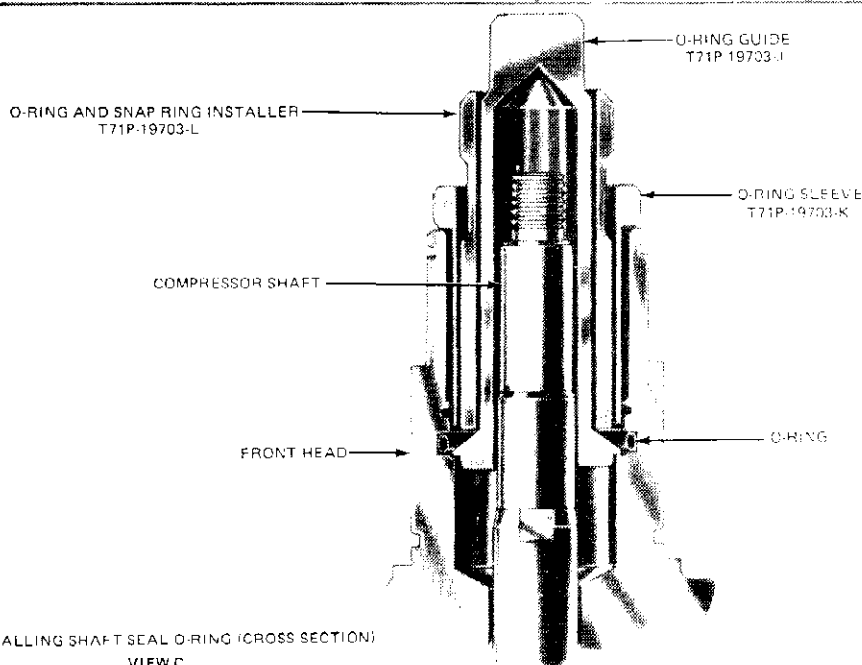
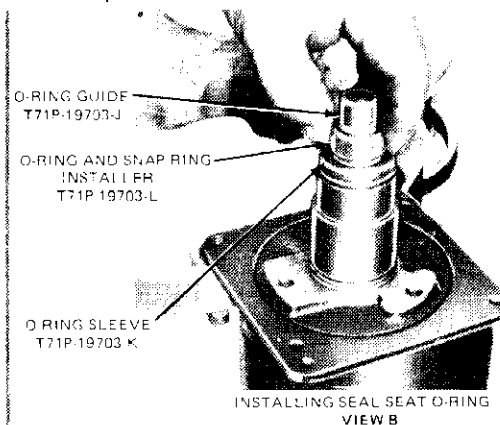
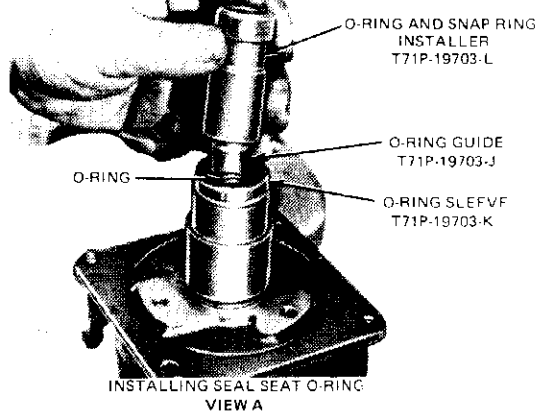
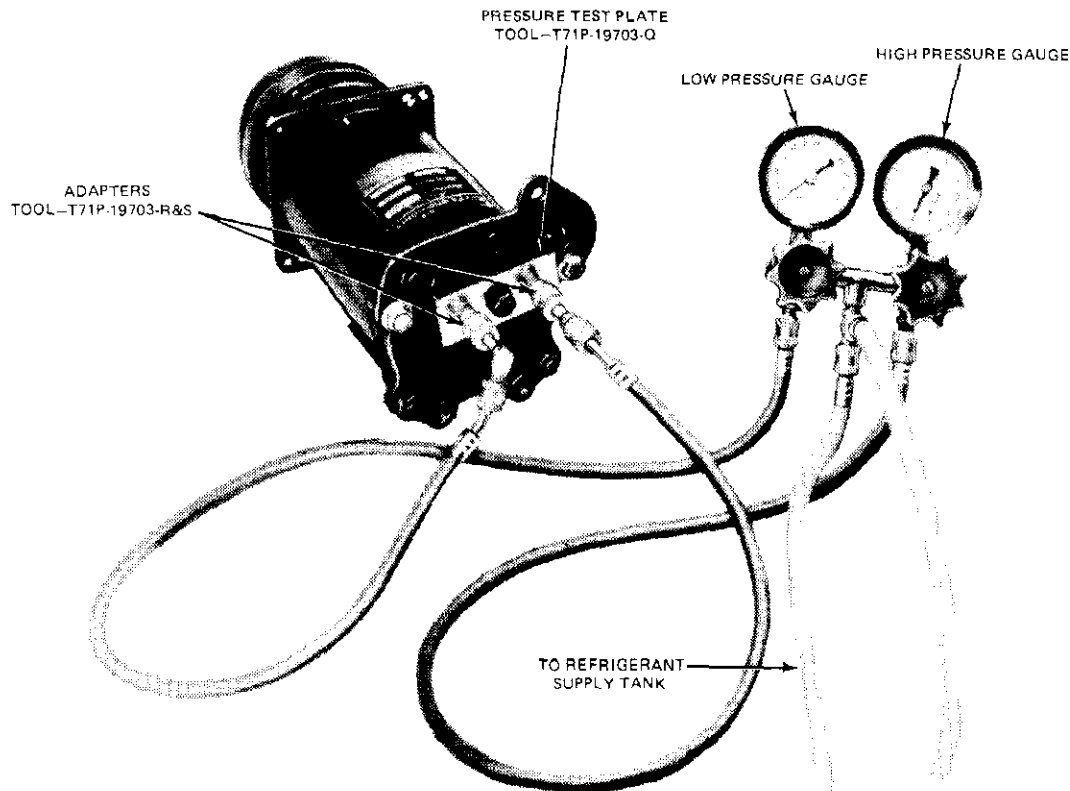


FIG. 18 Installing the Shaft Seal O-Ring

seat with Tool T71P-19703-M (Fig. 16); and push it into place so as not to disturb the O-ring. Remove the tools.

- Using standard Tool T71P-19703-T or Snap-On snap-ring pliers (PRA25), install the new snap ring so that the flat face of the ring is against the seal seat (View A, Fig. 18). Tool T71P-19703-L may be used to depress the retainer ring, so that it will snap into place. **Do not try to install the ring by bumping or tapping it; such a procedure could crack the seal seat.** Remove Tool T71P-19703-H from the end of the shaft.
- With Tool T71P-19703-Q (Pressure Test Plate) and O-rings installed on compressor, leak test the compressor shaft seal as follows:
 - Using the manifold gauge set, connect the center hose to an R-12 drum and the other two hoses with adapter T71P-19703-R and -S to the high and low pressure Schrader valves (Fig. 19). Make sure that the compressor oil drain plug is up to prevent losing oil.
 - With the high pressure valve and the low pressure valve open, allow refrigerant vapor to flow into the compressor.



L1692-2B

FIG. 19 Leak Testing Compressor Shaft Seal

- c. Open the oil plug fitting in the compressor housing and allow air to exhaust until refrigerant vapor starts to flow from the fitting.
- d. Close the oil plug fitting and allow the drum pressure to stabilize in the compressor.
- e. Temporarily install the shaft nut and, with the compressor in horizontal operating position (oil sump down), rotate the compressor shaft several times in normal direction of rotation by hand.
- f. Leak test the seal with a leak detector. Correct any leak that may exist.
- g. Remove the gauge set, cap the fittings on Tool T71P-19703-Q, and then check and add oil, if necessary, as outlined under *Maintenance*.
6. Install the absorbent sleeve by rolling the material into a cylinder, overlapping the ends and slipping the sleeve into the compressor neck with the overlap toward the top of the compressor. With a small screwdriver or Tool T71P-19703-C, carefully spread the sleeve to remove the overlap so that in the final position the ends of the sleeve will butt at the top vertical centerline (View A and B, Fig. 20).
7. Position the absorbent sleeve metal retainer so that its flange face will be against the front end of the sleeve. Use Tool T71P-19703-N to install the retainer (View A and C, Fig. 20). Press or tap the tool with a mallet until the outer edge of the retainer is recessed approximately 1/32 inch from the face of the compressor neck.
8. Install the clutch and hub assembly on the compressor as outlined in this section.
9. Install the compressor on the vehicle.
10. Evacuate, charge and leak test the system, as outlined in Part 36-32 under Refrigerant Service.

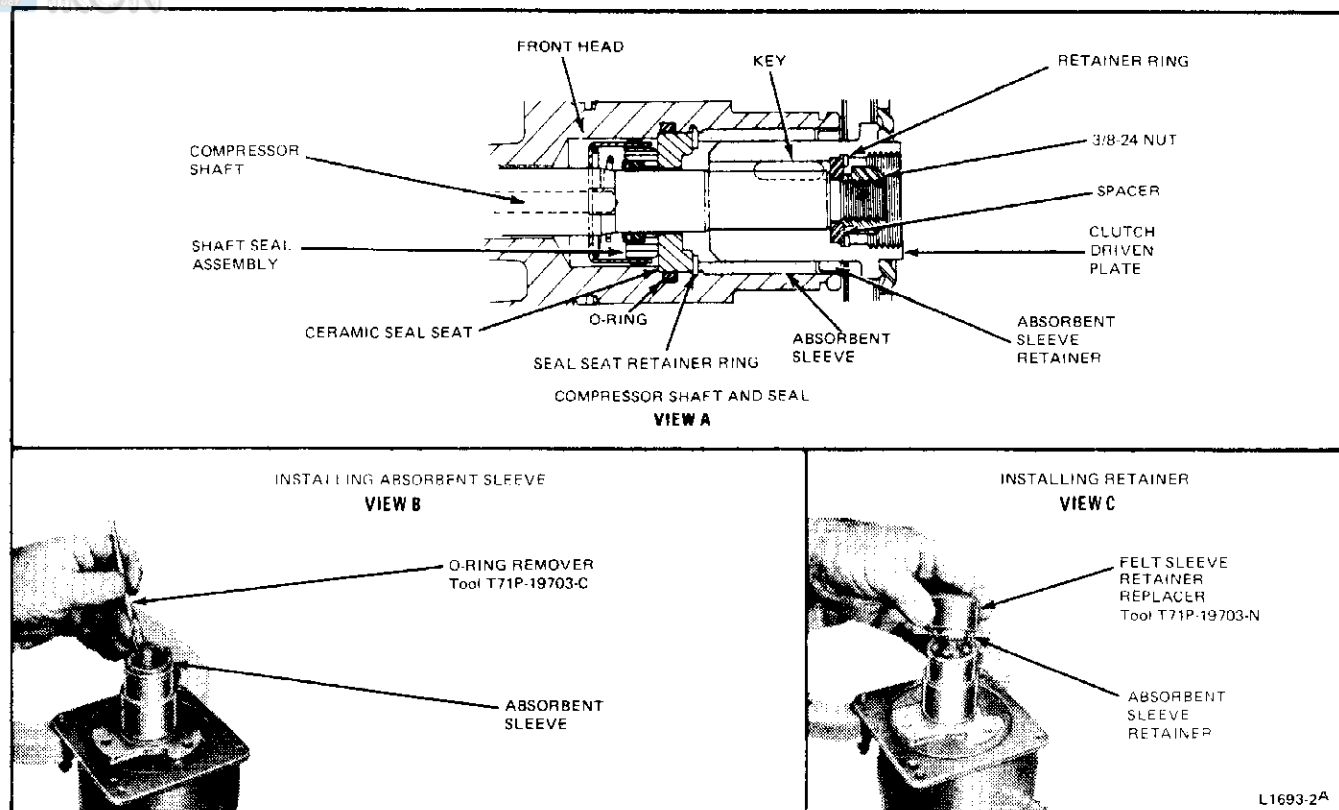


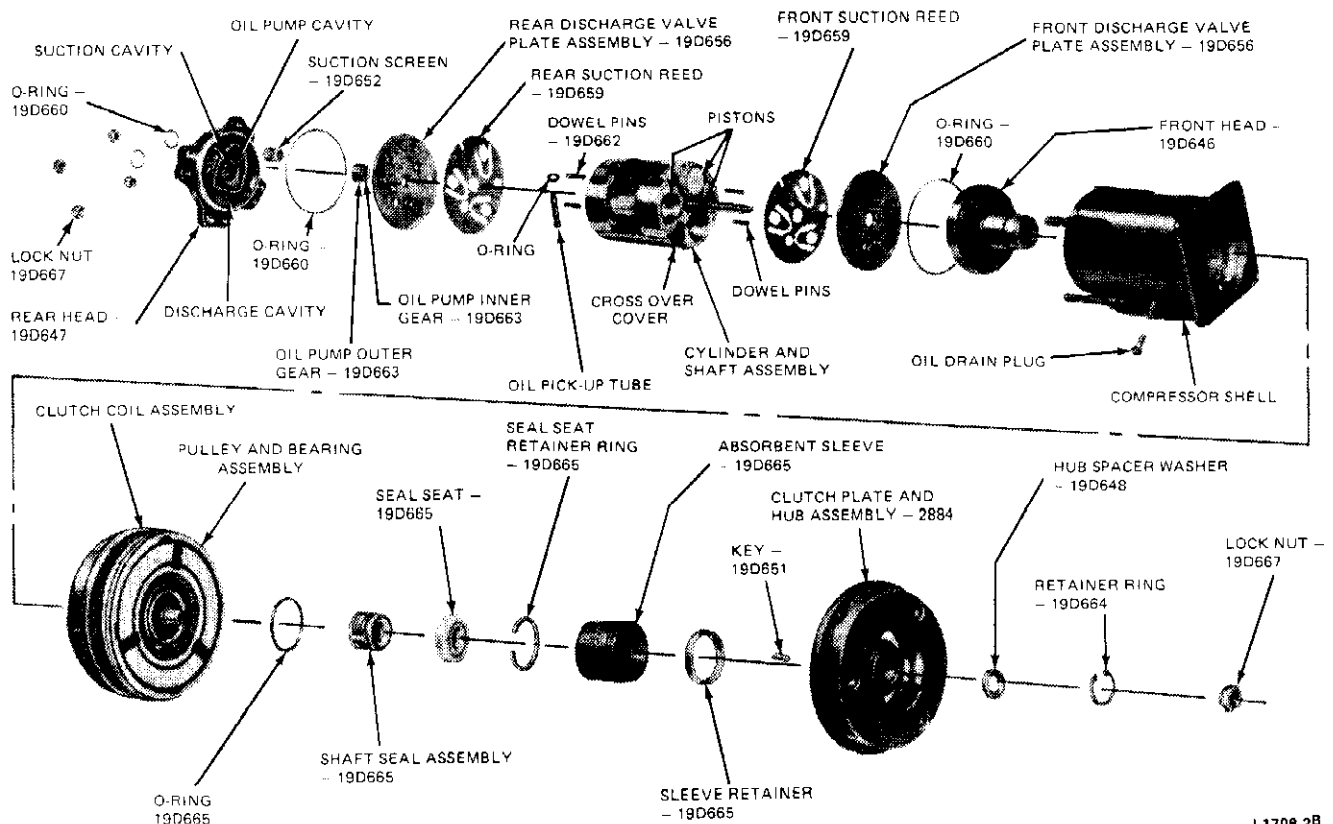
FIG. 20 Compressor Shaft and Seal, Absorbent Sleeve and Retainer

MAJOR REPAIR OPERATIONS

COMPRESSOR

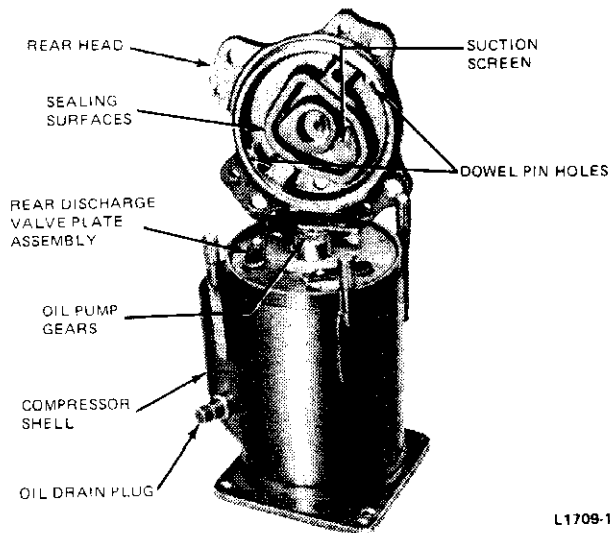
Disassembly

1. Remove the compressor from the car and the clutch assembly from the compressor as described under Removal and Installation.
2. Remove the shaft seal as described under Removal and Installation.
3. Invert the compressor and holding fixture so that the front end of the compressor shaft is down. **Additional oil may leak from the compressor at this time. All oil must be drained into a container so that total amount can be measured. A liquid measuring cup may be used for this purpose. Drained oil should then be discarded.**
4. Remove four lock nuts from the threaded studs on the compressor shell and remove the rear head (Fig. 21). Tap uniformly around the rear head if the head is binding.
5. Wipe excess oil from all sealing surfaces on the rear head casting webs, and examine the sealing surfaces (Fig. 22). If any damage is observed, head should be replaced.
6. Remove suction screen and examine for any damage or contamination. Clean or replace if necessary.
7. Paint an identifying mark (Prussian blue or other suitable marking material may be used) on exposed face of the oil pump inner and outer gears and then remove the gears. Identifying marks are to assure that the gears, if reused, will be installed in identical position.
8. Remove and discard the rear head-to-shell O-ring.
9. Carefully remove the rear discharge valve plate assembly. Use two small screwdrivers under the reed retainers and pry up on the assembly (Fig. 23). Do not position the screwdrivers between the reeds and reed seats.
10. Examine the valve reeds and seats. Replace the entire assembly, if any reeds or seats are damaged.
11. Using two small screwdrivers, carefully remove the rear suction reed. Do not pry up on the horseshoe shaped reed valves (Fig. 21).
12. Examine the reeds for damage, and replace if necessary.
13. Using oil pick-up tube remover (T71P-19703-C, Fig. 24) remove the oil pick-up tube. Remove the O-ring from the oil inlet.
14. Hold the rear end of the compressor assembly with one hand and invert the compressor and holding fixture. Hold the front head and carefully lower the internal mechanism away from shell and front head (View A, Fig. 25). **Do not tap on end of compressor shaft to remove internal mechanism. If mechanism will not slide out of compressor shell, tap on front head with a plastic hammer.**
15. Rest the compressor shell on its side and push the front head assembly through the compressor shell,



L1708-2B

FIG. 21 Compressor Disassembled

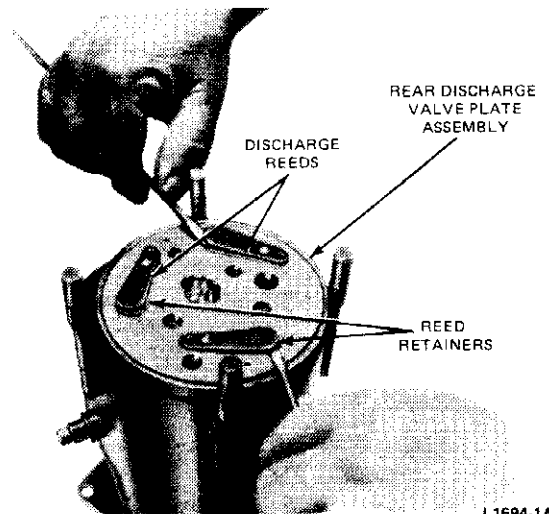


L1709-1B

FIG. 22 Rear Head Removed

being careful not to damage sealing areas on the inner side of the front head. Discard the O-ring. It may be necessary to tap on the outside of the front head, using a plastic hammer, to overcome friction of the O-ring seal between the front head and the compressor shell.

16. Wipe excess oil from the sealing surfaces on the front head casting webs and examine the sealing surface. If any damage is observed, the head should be replaced.
17. Remove the front discharge valve plate assembly and the front suction reed plate (Fig. 25). Examine the reeds and seats. Replace if necessary.



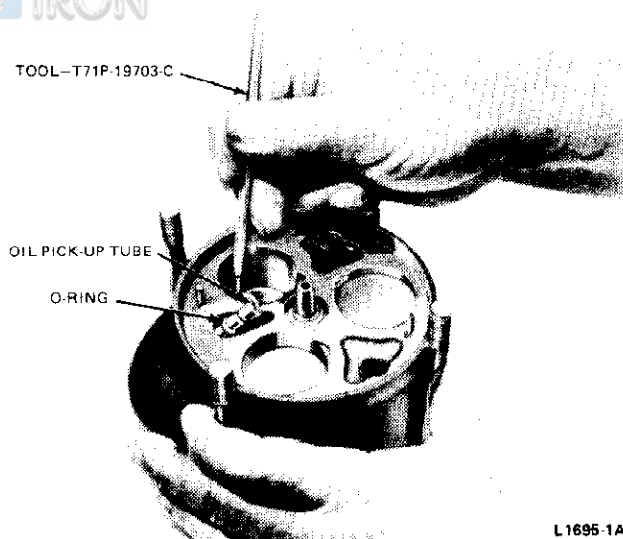
L1694-1A

FIG. 23 Removing Rear Discharge Valve Plate

18. Remove the suction cross-over cover by prying with a screwdriver between the cylinder casting and cover (Fig. 21). Examine the internal mechanism for any obvious damage. If the internal mechanism has sustained major damage due to loss of compressor oil, it is necessary to replace the cylinder and shaft assembly.
19. If broken parts or metal particles are found when the compressor is disassembled, replace the receiver-dehydrator assembly.

Assembly

1. Install the suction cross-over cover in the cylinder and shaft assembly (Fig. 21), and place the

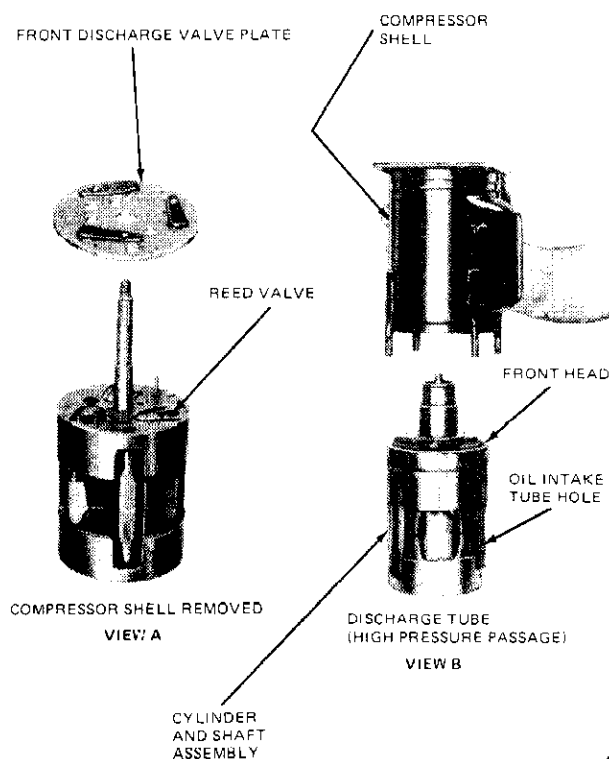


L1695-1A

FIG. 24 Removing Oil Pick-Up Tube

assembly on a support block in which a hole is bored for receiving the end of the shaft.

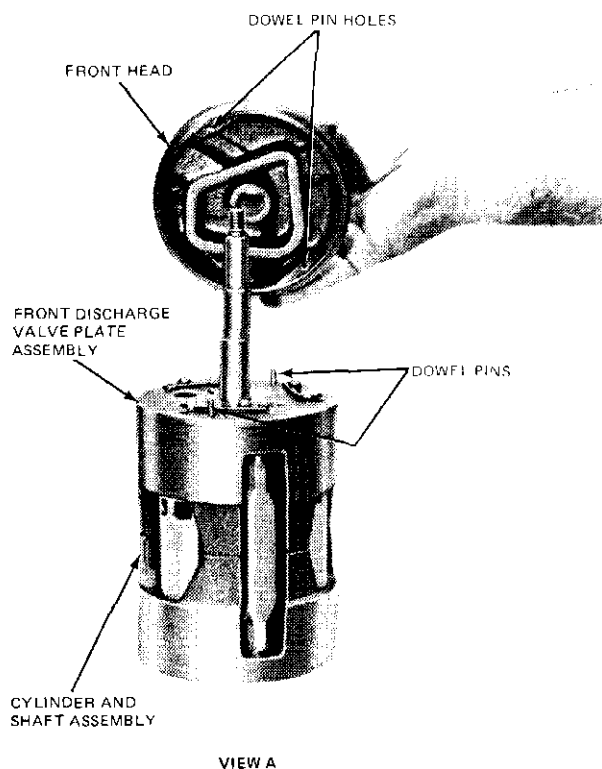
2. Install the front suction reed plate on the cylinder front half. Align the suction ports, oil return slot, and the discharge cross-over tube with dowel pins.
3. Install the front discharge valve plate assembly, aligning the holes with the dowel pins and proper openings in the front suction reed plate (View A, Fig. 26). **Front discharge plate has a large diameter hole in the center (View B, Fig. 26).**
4. Coat the sealing surfaces on webs of the compressor front head casting with 525 viscosity compressor oil.
5. Determine the exact position of the front head casting in relation to the dowel pins on the internal mechanism. Mark the position of the dowel pins on sides on internal mechanism. Mark position of dowel pins on sides of front head assembly and on sides of internal mechanism with Prussian blue. Carefully lower front head casting into position (Fig. 26), making certain that the sealing area around the center bore of the head assembly does not contact the shaft as head assembly is lowered. **Do not** rotate the head assembly to line up with the dowel pins. This would cause the sealing areas to contact the reed retainers.
6. Generously lubricate the angled groove at the lower edge of the front head casting with 525 viscosity compressor oil and install a new O-ring in the groove.
7. Coat the inside machine surfaces of the compressor shell with 525 viscosity compressor oil, and position the shell on the internal mechanism, resting on the O-ring seal.
8. Using the flat side of a small screwdriver, gently press the O-ring in around the circumference of the internal mechanism, until the compressor shell slides down over the internal mechanism. As the shell slides down, align the oil sump with the oil intake tube hole (View A, Fig. 25).
9. Holding the support block, invert the assembly and place it in the holding fixture with the front end of the shaft down. Remove the support block.



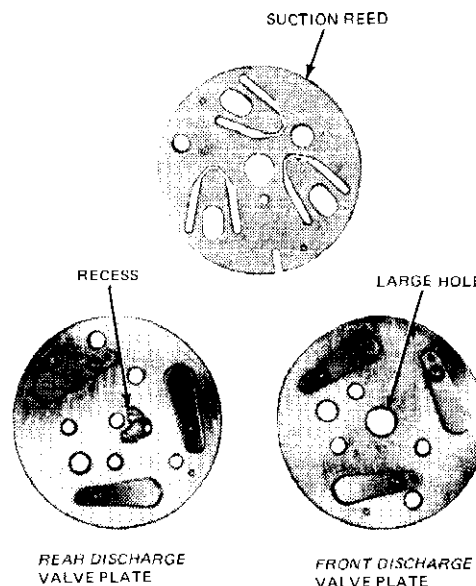
L1696-1A

FIG. 25 Front Discharge Valve Plate and Reed Valve

10. Install new dowel pins in the cylinder rear half, if previously removed.
11. Install a new O-ring in the oil pick-up tube cavity.
12. Lubricate the oil pick-up tube and install it in the cavity, rotating the compressor mechanism to align the tube with the hole in the shell baffle (Fig. 24).
13. Install the rear suction reed over the dowel pins with slot toward the sump.
14. Install the rear discharge valve plate assembly over the dowel pins with the reed retainers up.
15. Position the oil pump inner gear over the shaft with the previously applied identification mark up.
16. Position the oil pump outer gear over the inner gear with the previously applied identification mark up. When standing facing the oil sump, position the outer gear so that it meshes with the inner gear at the 9 o'clock position and the cavity between the gear teeth is at the 3 o'clock position (Fig. 22).
17. Generously oil the rear discharge valve plate assembly around outer edge where the large diameter O-ring will be placed. Oil the valve reeds, pump gears, and the area where the sealing surface will contact the rear discharge valve plate.
18. Lubricate the new head-to-shell O-ring and install it on the rear discharge valve plate, in contact with the shell.
19. Install the suction screen in the rear head casting, using care not to damage the screen.
20. Coat the sealing surface on the webs of compressor rear head casting with 525 viscosity compressor oil.
21. Install the rear head assembly over the studs on the compressor shell. The two lower threaded



VIEW A



VIEW B

L1710-2A

FIG. 26 Front Head Assembly

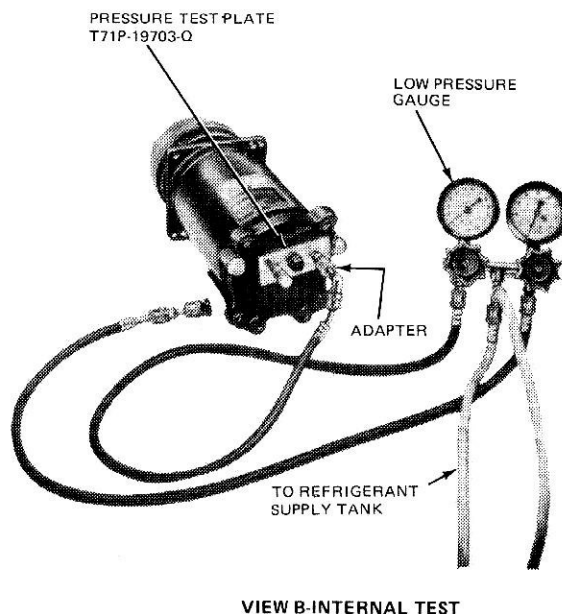
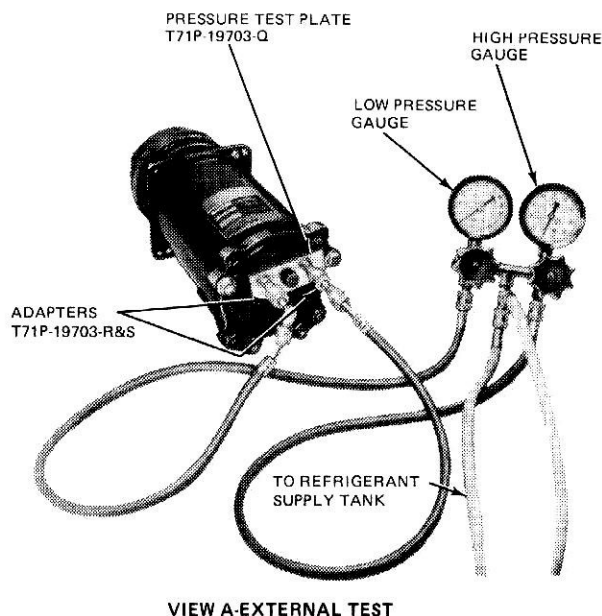
compressor mounting holes should be in alignment with the compressor sump. Make certain that the suction screen does not drop out of place when lowering the rear head into position. **If the rear head assembly will not slide down over the dowels in the internal mechanism, twist the front head assembly back and forth very slightly by hand until the rear head drops over the dowel pins.**

22. Install the nuts on the threaded shell studs and tighten evenly to 20 ft-lbs torque using a 0-25 ft-lbs torque wrench.
23. Invert the compressor in the holding fixture and install the shaft seal, as described under Removal and Installation.
24. Install compressor clutch assembly, as described under Removal and Installation.
25. Add 525 viscosity compressor oil, as described under Adding Oil.
26. Check for external and internal leaks, as described in the following procedure.

COMPRESSOR LEAK TESTING EXTERNAL AND INTERNAL

1. Rotate the clutch hub clockwise several turns to pick oil up from the sump and carry it to the piston rings and oil seals.
2. Install pressure test plate, T71P-19703-Q on the rear head of the compressor (View A, Fig. 27).
3. Attach the center hose of a manifold gauge set to a refrigerant drum standing in an upright position.

4. Connect the high and low pressure lines with adapters T71P-19703-R and -S to their corresponding fittings on the test plate.
5. Open the low pressure gauge valve, the high pressure gauge valve, and the valve on the refrigerant drum to allow the refrigerant vapor to flow into the compressor.
6. Using a leak detector, check for leaks at the oil drain fitting, compressor rear head seal, compressor front head seal, and compressor shaft seal. After checking, shut off the manifold gauge valves.
7. If an external leak is present, perform the necessary corrective procedures and repeat steps one through six to make certain that the leak has been corrected before proceeding with steps eight through twelve to check for internal leaks.
8. Disconnect the manifold gauge hoses from the test plate.
9. Connect the low pressure hose of the manifold gauge set to the high pressure fitting on the pressure test plate, T71P-19703-Q (View B, Fig. 27).
10. Open the low pressure control valve to allow refrigerant vapor to flow into the compressor.
11. Observe the reading on the pressure gauge; then close the valve. If the gauge reading drops to ten pounds or under in 30 seconds or less, it indicates that the compressor is leaking internally, at one or more of the following points:
 - a. Reed Valves.
 - b. Sealing surfaces at rear head, or sealing surfaces on front head.



L1711-2B

FIG. 27 Testing Compressor for External and Internal Leaks

- c. Cross-over tube.
d. Raised section on cylinder face.
12. If a leak is indicated in step eleven, perform the necessary corrective procedures to eliminate the internal leak and repeat steps one through eleven to make certain that the external and internal leaks are corrected. If no leak was indicated, proceed with step thirteen.

13. Disconnect the hoses from test plate.
14. If the test was performed with the compressor in the car, remove the pressure test plate from compressor. If it was performed on the bench, leave the test plate on until after the compressor is installed in the car.

SPECIFICATIONS AND SPECIAL SERVICE TOOLS

COMPRESSOR SPECIFICATIONS

OIL	BELT ADJUSTMENT		
	Minimum Operating Tension (1) (Hot Only)	Installation Tension	
		Used Belt (2)	New Belt
Capacity 10-1/2 Fluid Ounces	Predelivery only 90 lbs.	110 lbs.	140 lbs.
Specification TL 4538 Texaco 525 Viscosity Ford Part No. D1VY-19577-A	After Predelivery 70 lbs.		

(1) Check only after engine has been operating for at least ten minutes.

(2) Any belt that has operated for ten minutes or more is considered a used belt.

CL1752-2A

SPECIAL TOOLS

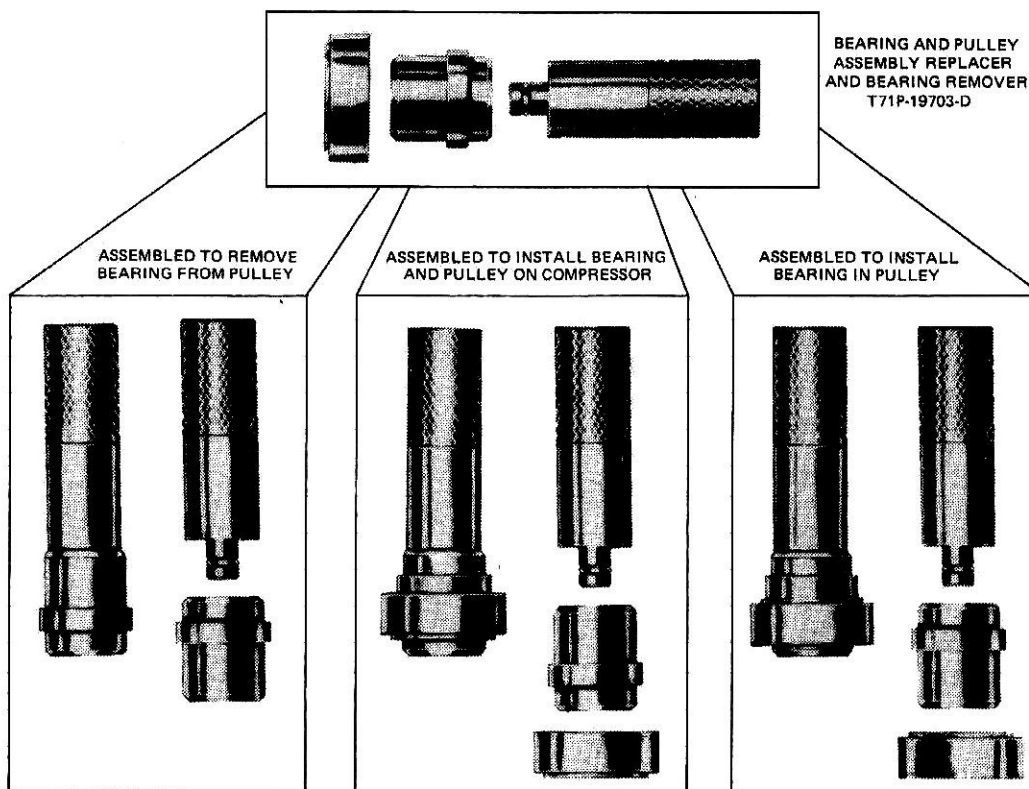
The special tools required for servicing the six-cylinder compressor are listed in Fig. 28. All of the tools are illustrated in the foregoing Sections. For clarity,

however, the functions of T71P-19703-D bearing and pulley assembly replacer and bearing remover is illustrated in Fig. 29.

TOOL NUMBER	DESCRIPTION	TOOL NUMBER	DESCRIPTION
T71P-19703-B	PULLEY PULLER	T71-P19703-L	"O" RING AND SNAP RING REPLACER
T71P-19703-C	"O" RING REMOVER	T71P-19703-M	CERAMIC SEAL REMOVER AND REPLACER
T71P-19703-D	BEARING AND PULLEY ASSEMBLY REPLACER AND BEARING REMOVER	T71P-19703-N	FELT SLEEVE RETAINER REPLACER
T71P-19703-E	HUB DRIVEN PLATE REMOVER	T71P-19703-P	TOOL BOX
T71P-19703-F	HUB DRIVEN PLATE REPLACER	T71P-19703-Q	PRESSURE TEST PLATE
T71P-19703-G	SEAL ASSEMBLY REMOVER AND REPLACER	T71P-19703-R	90° ADAPTER
T71P-19703-H	SHAFT SEAL PROTECTOR	T71P-19703-S	STRAIGHT ADAPTER
T71P-19703-J	"O" RING GUIDE	T71P-19703-T	SNAP RING TOOL
T71P-19703-K	"O" RING SLEEVE	T70P-4067-A	CLUTCH SPANNER WRENCH
		T57L-500-A	HOLDING FIXTURE

CL1723-2B

FIG. 28 Special Tool List for Six-Cylinder Compressor



L1724-2B

FIG. 29 Special Tool T71P-19703-D

Two – Cylinder Compressor

**PART
36-35**

SUBJECT	PAGE	SUBJECT	PAGE
TESTING		REMOVAL AND INSTALLATION (Cont'd.)	
Compressor Oil Level Check	35-2	Clutch Bearing	35-6
Crankshaft Seal Leak Test	35-1	Compressor	35-3
Oil Leakage Past Carbon Ring	35-1	Crankshaft Seal	35-5
Oil Leakage Through O-Ring	35-1	Valve Plate and Gasket	35-4
Oil Leakage Through Bellows	35-1	ADJUSTMENTS	
Refrigerant-12 – Leakage	35-1	Drive Belt	35-7
REMOVAL AND INSTALLATION		SPECIFICATIONS	35-7
Clutch	35-6		

CL2344-2B

TESTING

CRANKSHAFT SEAL LEAK TEST

The cross sectional view in Fig. 1 shows the design and the components of the seal assembly. Oil leak problems can be identified by observing the three possible leakage paths shown in Fig. 2.

OIL LEAKAGE PAST CARBON RING

Oil leakage through the carbon ring forming a streak or drip pattern as shown in the left illustration of Fig. 2 is considered normal. However, if oil is present on the surface of the compressor beyond the clutch or has sprayed on the hood and surrounding brackets, the leakage is excessive. Replace the seal assembly.

OIL LEAKAGE THROUGH O-RING

Leakage through the O-ring type gasket on the cover plate (center illustration, Fig. 2) indicates possible cracked, pinched, or split O-ring or loose mounting screws. Check the screws for good condition and proper torque as follows:

Tecumseh—4 1/2 - 6 1/2 ft-lbs

York—5-7 ft-lbs.

If there is heavy oil discharge with screws of good condition and correct torque, replace the oil seal assembly.

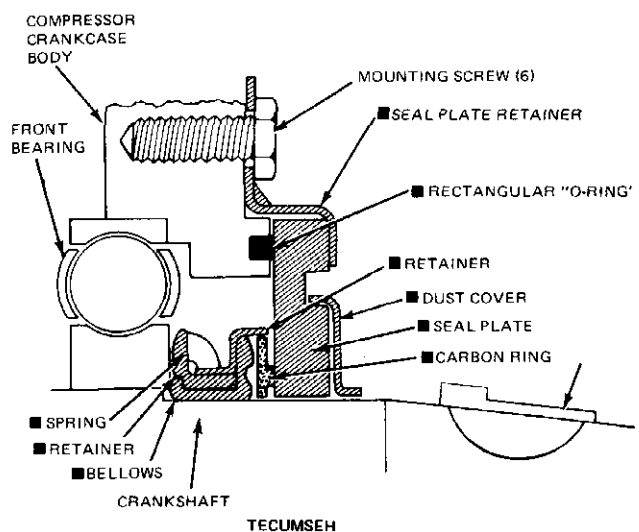
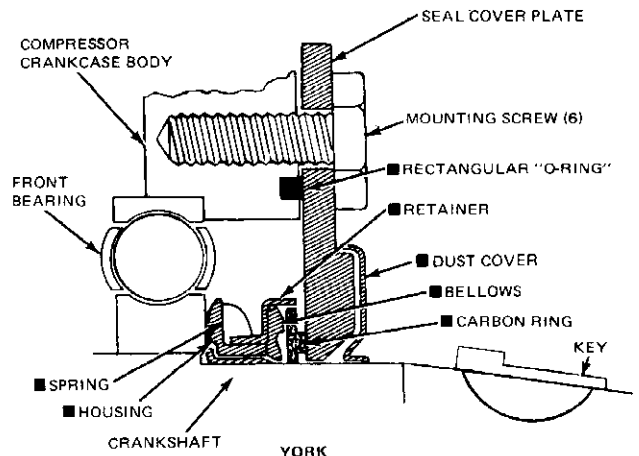
OIL LEAKAGE THROUGH DAMAGED BELLOWS

Oil will leak through the rubber bellows as shown in the right illustration of Fig. 2, if the bellows distorts or cracks due to heat. A large discharge of oil on the front of the compressor beyond the clutch indicates this type of leakage. Replace the oil seal assembly.

REFRIGERANT-12 LEAKAGE

Observe Safety Precautions outlined in Part 36-31.

Refrigerant-12 leakage through any part of the seal can be determined only by a leak detector. Be sure to



■ INDICATES SERVICED IN SEAL KIT

L1625-1P

FIG. 1 Compressor Oil Seal Cross Sectional View

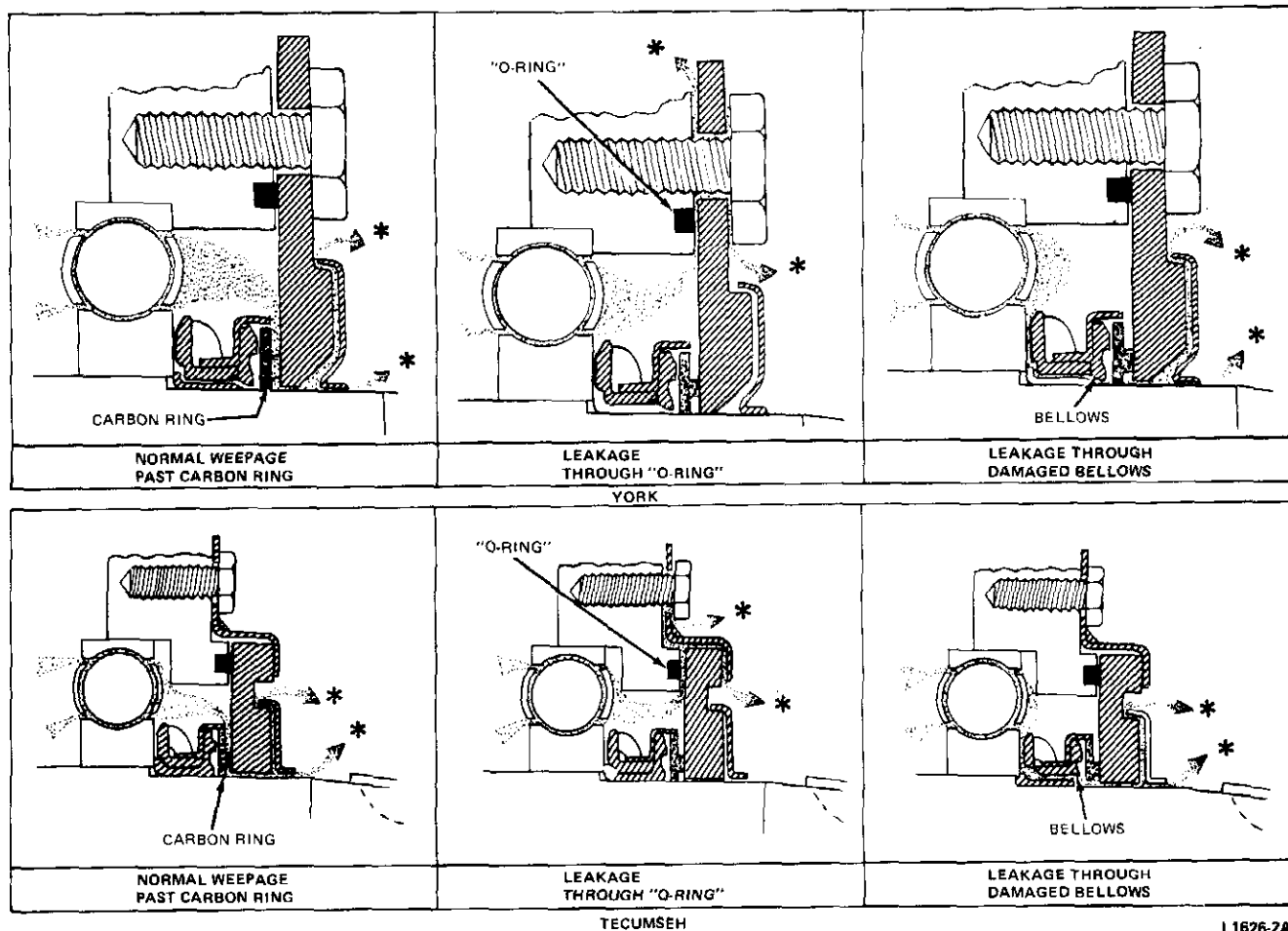


FIG. 2 Oil Leakage Paths Compressor Oil Seal

wipe all the oil away from the seal area before using the leak detector, because the oil may contain refrigerant which would give erroneous readings. If refrigerant leakage at the seal exceeds 1 oz. per year, replace the seal as outlined under Removal and Installation.

If no leak is found at the compressor crankshaft seal, thoroughly check all system fittings and lines for leaks.

COMPRESSOR OIL LEVEL CHECK

Observe Safety Precautions outlined in Part 36-31.

Under normal conditions, when the air conditioning system is operating satisfactorily, the compressor oil level need not be checked. There is no place for the oil to go except inside the sealed system. When the engine is first started, some of the oil will be pumped into the rest of the refrigerant system. After several minutes of operation, most of the oil is returned to the compressor crankcase. **Check the compressor oil level only if any portion of the refrigerant system is being replaced, or if there was a leak in the system and the refrigerant is being replaced.**

1. After the system has been charged, operate the system for about ten minutes or until the pressures have been stabilized in a surrounding temperature of 60 degrees or above.
2. Stop the engine. With Schrader or equivalent type service valves, discharge the entire system (Part 36-32).

3. Remove the oil filler plug from the compressor. Insert a flattened 1/8-inch diameter rod (Fig. 3) in the oil filler hole until it bottoms. The rod or dipstick fashioned for the particular compressor (Figs. 4 or 5) should be used. **The dipstick must be wiped completely clean before insertion.** If necessary, slightly rotate the compressor crankshaft by hand so that the dipstick will clear the crankshaft.

On horizontally mounted compressors, the oil check hole is located on the side of the crankcase that faces up. On the opposite or downward side, there is a corresponding boss provided on the inner wall as an alternate oil check hole for a different mounting. When checking the oil level on such a compressor, angle the dipstick so that it bottoms against the lower side of the crankcase and not against the boss.

4. Pull out the dipstick, and check the oil indication. It should show at least the minimum amount of oil as indicated in Figs. 4 and 5. **If the oil level is low, add oil, (Ford Part No. C9AZ-19577-A or equivalent).** If too much oil is indicated proceed as follows:
 - a. Draw out all of the oil using a trap similar to that shown in Fig. 3, or remove the compressor from the vehicle and pour the oil out of the crankcase.
 - b. Add approximately 4 oz. of oil to the crankcase, and replace the filler plug. Reinstall the compressor, if it was removed.
5. Replace the oil filler plug. Evacuate and charge the system.

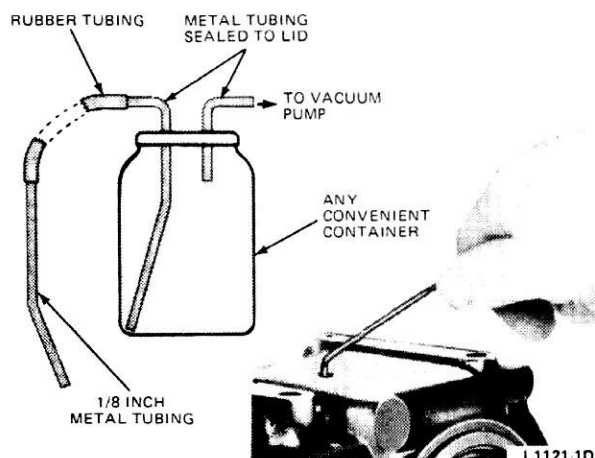
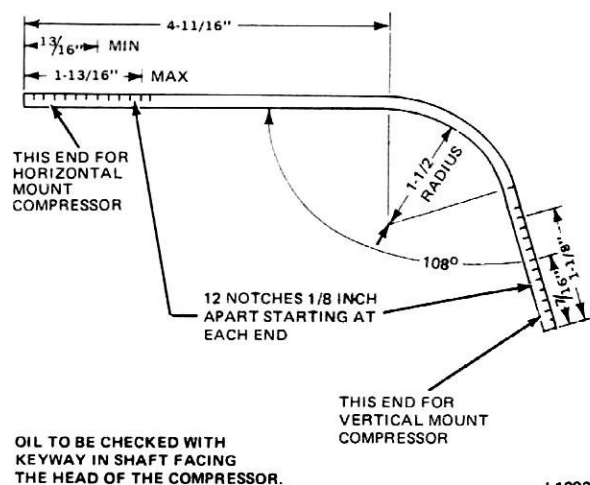


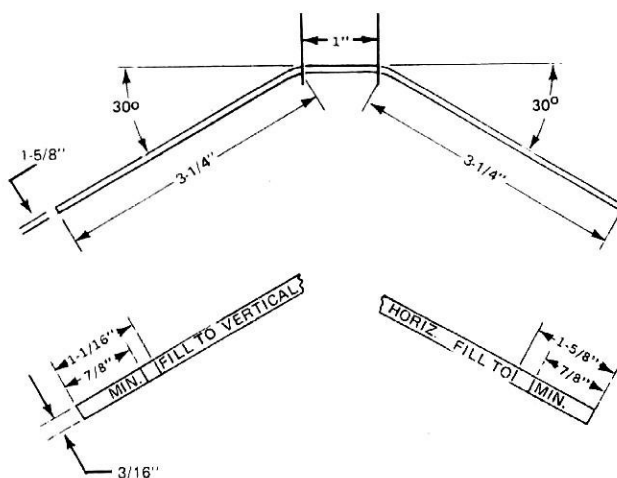
FIG. 3 Compressor Oil Level Check and Oil Trap

6. Check the compressor filler plug area for leaks with a leak detector.



L1293-1B

FIG. 4 York Compressor Oil Level Dipstick



L1294-1A

FIG. 5 Tecumseh Compressor Oil Level Dipstick

REMOVAL AND INSTALLATION

COMPRESSOR

All compressor replacement operations, except belt replacement, can be performed only after the unit has been relieved of its refrigerant charge. For units with Schrader-type service valves, discharge the entire refrigerant system (Part 36-32). Observe the Safety Precautions outlined in Part 36-31.

To reduce the amount of time to make a compressor replacement, the service compressors are dehydrated and the proper amount of the specified refrigerant oil is in the crankcase when received.

When replacing a compressor, first check the oil level in the old compressor. Then remove oil from the new compressor in an amount that will make the new compressor oil level the same as that in the old compressor. This procedure will keep the amount of oil in the system constant. Failure to use this procedure is

the most common reason for excessive oil in the crankcase. Refer to Compressor Oil Level Check, under Testing in this Part.

Removal

1. Discharge the system (Part 36-32) and disconnect the two hoses from the compressor.
2. Energize the clutch and loosen and remove the clutch mounting bolt.
3. Install a 5/8-11 bolt in the clutch drive shaft hole. With the clutch still energized, tighten the bolt to loosen the clutch from the shaft. Disconnect the clutch wire at the bullet connector.
4. Loosen the idler pulley or alternator and remove the drive belt and the clutch, then remove the mounting bolts and the compressor.

Installation

Before installing the compressor, carefully remove any burrs or dirt that may be on the compressor shaft. The shaft must be dry and brightly polished.

1. Mount the clutch on the shaft and install the mounting screw and washer finger-tight. Place the compressor on the mounting bracket and install the four mounting bolts finger-tight.
2. Connect the clutch wire, energize the clutch and torque the clutch mounting bolt to 15-23 ft-lbs. Tighten the compressor mounting bolts into the compressor to specification.
3. Install the belt and adjust and tighten the idler pulley.
4. When Schrader-type service valves are used, connect the two hoses to the compressor; and then evacuate, charge, and leak test the system as outlined in Part 36-32.

VALVE PLATE AND HEAD GASKET

The procedure for replacing a blown head gasket is identical to the procedure for replacing the valve plate except that the old valve plate is used. If a broken valve plate has caused the cylinder walls to become scored or has imbedded pieces of metal in the pistons, the compressor should be replaced.

Removal-All Compressors

1. Discharge the system (Schrader Valves—Part 36-32). Observe Safety Precautions outlined in Part 36-31. Place a clean drip pan under the horizontally mounted compressor.
2. Remove the cylinder head bolts.
3. Remove the valve plate and cylinder head from the compressor by tapping upward with a fiber hammer on the overhanging edge of the valve plate.
4. Remove the valve plate from the cylinder head by holding the head and tapping against the valve plate.
5. Remove the drip pan from under the horizontally mounted compressor. Then, remove all particles of gasket, dirt and foreign material from the surface of the cylinder head and cylinder face. **Be extremely careful not to scratch or nick the mating surfaces or any edges.**

Installation (York Compressor Fig. 6)

1. Apply a thin film of clean refrigeration oil to each side of the valve plate gasket (Fig. 6).
2. Place the new valve plate gasket in position on the crankcase, so that the crankcase dowel pins go through the dowel pin holes in the gasket (Fig. 6).
3. Place the valve plate in position on the cylinder, so that the dowel pins go through the dowel pin holes (Fig. 6).
4. Apply a light film of clean refrigeration oil on each side of the cylinder head gasket. Then, place the gasket and cylinder head on the cylinder with the dowel pins inserted into the dowel pin holes in the gasket and head.
5. Insert the two longer cap screws in the two center holes of the cylinder head. Then, insert the remaining cap screws in the holes around the edge

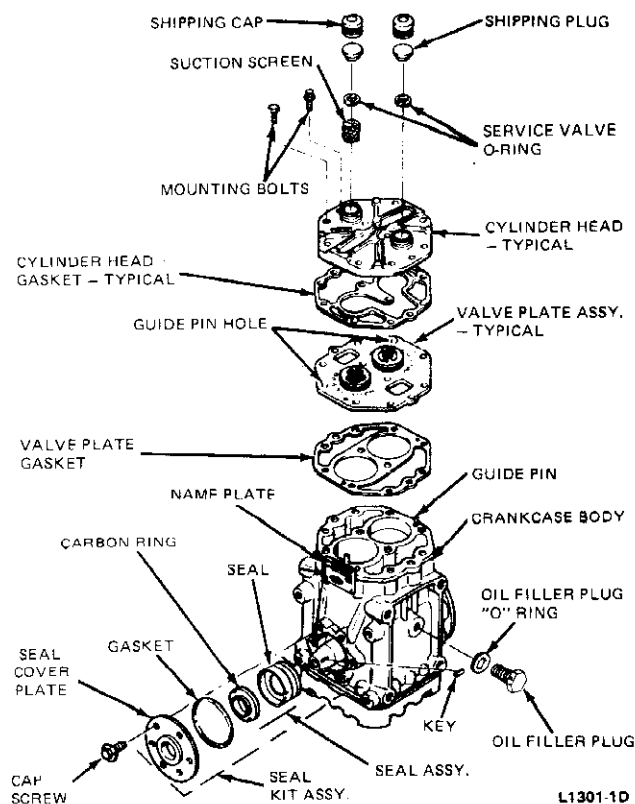


FIG. 6 York Compressor Disassembled

of the cylinder head. The four 12-point head screws should be inserted into the four holes closest to the service ports.

6. Tighten all head cap screws until they contact the head. Then, torque the two center screws to 15-23 ft-lbs.
7. Tighten the remaining cap screws in a pattern so that the cap screws diagonally opposite each other are evenly tightened to 15-23 ft-lbs. After the cylinder head has been installed 1/2 hour, retorque the head bolts to 15-23 ft-lbs.
8. Inspect the top of the cylinder head service valve ports to be sure that they are free of nicks and imperfections. Connect the service valves with new O-rings to the correct compressor ports and torque to specification. Then, check the compressor oil level and add or remove oil as required. (See Compressor Oil Level Check in this Part.) Evacuate and charge the system, whichever is applicable.

Installation (Tecumseh Compressor Fig. 7)

1. Apply a thin film of clean refrigeration oil to each side of the valve plate gasket (Fig. 7).
2. Place the new valve plate gasket on the crankcase cylinder face and align the bolt holes.
3. Place the valve plate on the valve plate gasket, so that the letter "S" (stamped on the valve plate) is on the same side of the crankcase as the word SUCTION. Align the bolt holes.
4. Apply a thin film of clean refrigeration oil on each side of the head gasket.
5. Place the head gasket on the valve plate with the largest hole of the gasket over the largest hole of

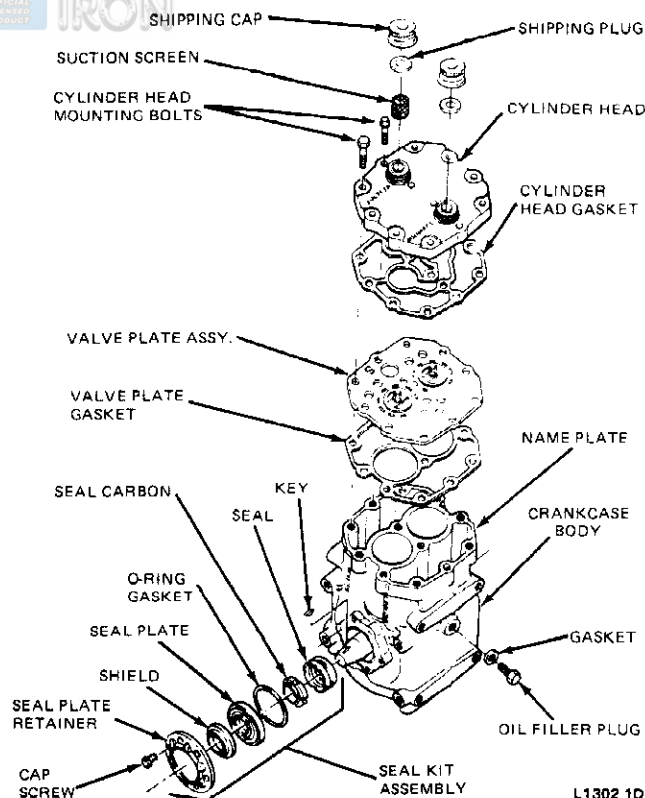


FIG. 7 Tecumseh Compressor Disassembled

the valve plate. Line up the holes of the gasket with those of the valve plate.

6. Position the cylinder head on the compressor. **The word SUCTION on the head must be up and on the same side as the word SUCTION on the compressor crankcase.**
7. Align the bolt holes of the cylinder head, gaskets and valve plate with the holes in the compressor crankcase.
8. Install the cylinder head attaching bolts in the bolt holes. The four 12-point head bolts must be inserted in the four holes nearest the head service ports.
9. Tighten the bolts until they contact the top surface of the cylinder head. Then, tighten the head bolts in a sequence, so that the bolts diagonally opposite each other are evenly tightened to a torque of 20-24 ft-lbs.

After the cylinder head has been installed 1/2 hour, retorque the head bolts to 20-24 ft-lbs.

10. Inspect the top of the cylinder head service valve ports to be sure that they are free of nicks and imperfections.

Connect the service valves with new O-rings to the correct compressor ports and torque to specification.

11. Check the compressor oil level and add or remove oil as required. (See Compressor Oil Level Check in this Part.) Evacuate and charge the system.

CRANKSHAFT SEAL

Removal-All Compressors

1. Observe the Safety Precautions outlined in Part 36-31.

2. Discharge the system (Part 36-32). Loosen and remove the belt.
3. Remove the clutch (see Clutch Removal in this Part) and remove the Woodruff key. Carefully remove the secondary dust shield so as to avoid marring the shaft.
4. Carefully remove all accumulated dirt and foreign material from the seal plate and surrounding area of the compressor, and position a small drain pan beneath the seal plate.
5. Remove the seal plate cap screws, and gently remove the plate and gasket. Do not mar or scratch the sealing surfaces, or the polished shaft surface.
6. Remove the carbon seal ring and seal housing assembly from the crankshaft. A disassembled view of the crankshaft seal assembly is included in Figs. 6 and 7.
7. Make certain that the shaft, the seal plate and the compressor gasket surfaces are completely clean.
8. Check the face of the crankshaft front bearing journal in the seal housing to make certain that there are no nicks or burrs. Check the crankshaft surface to be sure it is not damaged. Check all parts of the seal assembly to be sure that they are not damaged.
9. Inspect the compressor internal components for damage.

Installation-Tecumseh Compressor

1. Wash the new seal assembly components in clean refrigeration oil.
2. Coat the exposed surface of the crankshaft with clean refrigeration oil.
3. Place the seal (Fig. 7) over the compressor shaft with the end that fits the carbon ring facing out.
4. Position the carbon ring over the shaft and to the seal. The raised rim of the carbon ring must face outward.
5. Insert the O-ring in the crankcase mating surface for the seal plate.
6. Position the seal plate, shield and seal plate retainer to the compressor crankcase and align the cover attaching screw holes. Push the seal plate retainer against the mating surface of the crankcase and install the six attaching screws. Torque the screws in a circular sequence to 54-78 in-lbs.
7. Rotate the shaft by hand 15 to 20 revolutions to seat the seal.
8. Make certain that there are no burrs or dirt on the compressor shaft. Install the key and magnetic clutch on the shaft.
9. Install the belt and adjust the tension to specifications.
10. Check the compressor oil level (See Testing in this Part).

Installation-York Compressor

1. Wash the new seal assembly components in clean refrigeration oil.
2. Position the seal over the end of the shaft with the carbon ring retainer facing out. Move the seal in

and out on the shaft a few times to insure a good seal between the seal and the shaft.

3. Push the seal all-the-way on the shaft.
4. Place the carbon ring (Fig. 6) over the shaft and in the seal ring retainer. The polished surface of the carbon ring must face out and the lugs must engage the ring retainer and be fully seated.
5. Apply a light film of clean refrigeration oil on the matching faces of the crankcase and seal cover plate. Then, place the gasket in position on the crankcase face.
6. Place the seal cover plate in position (Fig. 6), with the polished side facing the carbon ring. Then, install the cap screws. Tighten the cap screws evenly while turning the crankshaft. Be sure that the clearance between the crankshaft and the hole in the seal cover plate is even all around the shaft. If the clearance is not equal all around the shaft, gently tap the seal face into position until the clearance is equal. Then, tighten diagonally opposite cover plate cap screws evenly to 7-13 ft-lbs (large seal) and 5-7 ft-lbs (small seal).
7. Make certain that there are no burrs or dirt on the compressor shaft. Install the key and magnetic clutch on the shaft.
8. Install the belt and adjust the tension to specification.
9. Check the compressor oil level (See Testing in this Part).

CLUTCH

Removal

1. Loosen and remove the belt.
2. Energize the clutch and loosen and remove the clutch mounting bolt.
3. Install a 5/8-11-bolt in the clutch drive shaft hole. With the clutch still energized, tighten the bolt to loosen the clutch from the shaft, then remove the magnetic clutch.

Installation

1. Carefully remove any burrs or dirt that may be on the compressor shaft. The shaft must be dry and brightly polished. Install the clutch, the clutch mounting bolt, and the washer.
2. Energize the clutch, and torque the bolt to specification.
3. Install and adjust the belt.

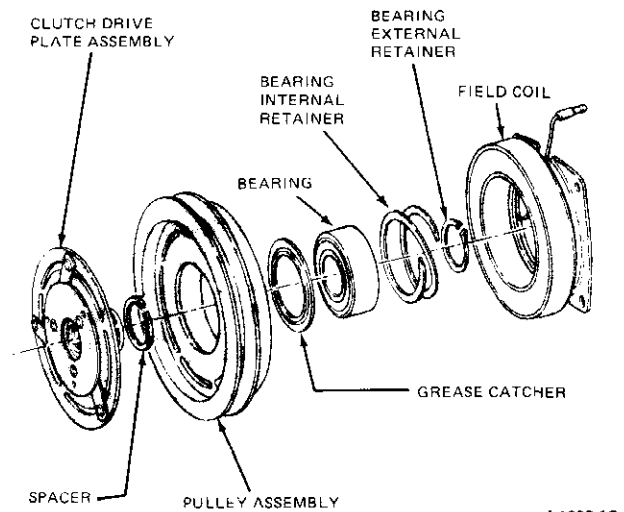
CLUTCH BEARING

When installing a new bearing, extreme care must be taken to support the bearing and the clutch assembly so as not to place any pressure on the balls of the bearing.

The following procedure should be rigidly adhered to during bearing replacement. Any exceptions due to clutch design are noted. Refer to Fig. 8.

Removal

1. Remove the clutch assembly from the compressor shaft as outlined in the preceding procedure.



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FIG. 8 A/C Clutch Assembly

2. With the clutch assembly face down, remove the external bearing retainer from the drive plate shaft.
3. Support the clutch, face down, by the outer edge so as to clear the drive plate. Insert a 5/8-11-inch bolt through the drive plate shaft and hand tighten the bolt.
4. Smoothly apply enough pressure on the bolt to free the shaft from the bearing inner race, then, remove the drive plate assembly. Before proceeding, check the drive face plate for any excessive warping or breakage. Replace the entire clutch assembly if any damage is evident.
5. Remove the **internal** bearing retainer from the pulley assembly. Support the pulley assembly, face up, by the bearing bore making certain that there is no interference when the bearing is pressed out. With a suitable plug, force the bearing out of the pulley assembly by the inner race. The plug should clear the metal grease catcher, but do not remove the grease catcher from the pulley assembly.

Installation

Before installing the bearing, be sure that all bearing contact surfaces are clean.

1. Support the pulley assembly face down, near the bearing bore, but do not support it by the sides of the pulley grooves as this may bend the pulley assembly.
2. Press a new bearing into the bearing bore by the outer race. **Do not press the bearing in by the inner race.**

Pressure should be uniform and in line with the axis of the bearing bore. Replace the **internal** bearing retainer.

3. Support the pulley assembly, face up, by the bearing inner race. Insert a 5/8-11-inch bolt into the front of the drive face plate and carefully press the shaft into the bearing inner race, exerting pressure on the bolt. Be certain that the shaft is in line with the axis of the bearing bore.
4. Replace the **external** bearing retainer onto the drive plate shaft. Rotate the pulley relative to the

drive plate to make certain that there is free rotation and there is not looseness of the assembly before installing the clutch onto the compressor.

5. Install the clutch assembly on the compressor shaft.

ADJUSTMENTS

DRIVE BELT

Adjust the belt by repositioning the idler pulley if so equipped. Otherwise, follow this procedure.

1. Loosen the alternator-to-brackets attaching bolts.
2. Install the tension gauge on the compressor clutch drive belt. Move the alternator toward or away

from the engine until the specified belt tension is obtained. Remove the gauge. Tighten the alternator bolts. Install the tension gauge and check the belt tension.

SPECIFICATIONS

TWO-CYLINDER A/C COMPRESSOR SPECIFICATIONS				
Torque Limits (Ft.-Lbs)			Compressor Oil Capacities ①	
Description	Tecumseh	York		
Cylinder Head	20-24	15-23	Compressor Oil Capacities ① Tecumseh ② 7/8 Inch Min. (11 Fluid Ounces) 1-3/8 Inch Max. York ② 7/8 Inch Min. (10 Fluid Ounces) 1-1/8 Inch Max. ① Use ESA-M2C31-A (Ford Part No. C9AZ-19577-A) oil. ② Do not add oil if dip stick indicates proper level of oil between minimum and maximum. If dip stick is below minimum level, add oil to minimum oil level only.	Horizontal 7/8 Inch Min. 1-5/8 Inch Max.
Front Seal Plate	54-78 In.-Lb	7-13 (large seal) 5-7 (small seal) ⑤		13/16 Inch Min. 1-3/16 Inch Max.
Service Valve (Tube-O)	20 ± 10	20 ± 10		
Mounting Bolt	20-30	20-30		
Oil Filler Plug	18-22	4-11		
Clutch Mounting	20-30	20-30		
Base Plate		14-22		
Back Plate		9-17		
Pressure Relief Valve	8-10	4-11		
BELT ADJUSTMENT				
Minimum Operating Tension (Hot Only) ③			Installation Tension	
Predelivery Only		After Predelivery	Used Belt ④	New Belt
90 lbs.		70 lbs.	110 lbs.	140 lbs.
Belt Tension Tool		T63L-8620-A		
Compressor Clutch Run-Out		1/32 Inch Maximum		
③ Check only after engine has been operating for at least ten minutes.			⑤ Small seal plate has 1/4-inch screws.	
④ Any belt that has operated for ten minutes or more is considered a used belt.				

CL1273-ZF

Granada and Monarch Heater — Air Conditioner System

**PART
36-40**

SUBJECT	PAGE	SUBJECT	PAGE
DESCRIPTION AND OPERATION		REMOVAL AND INSTALLATION	
Air Distribution Ducts and Registers	40-2	Blower Motor and Wheel	40-8
Ambient Air Temperature Switch	40-6	Condenser	40-8
Compressor Assembly	40-6	Control Head Assembly	40-6
Controls	40-1	Defroster Nozzle	40-8
Evaporator Case Assembly	40-2	Evaporator Case Assembly	40-6
Refrigerant Charging Valves	40-6	Evaporator Core	40-7
System Operation	40-1	Heater Core	40-7
Vacuum Motors	40-6		
ADJUSTMENTS		SPECIFICATIONS	40-14
Temperature Control Cable	40-6		

CL2345-2B

DESCRIPTION AND OPERATION

The Granada and Monarch heater—air conditioning system is an independent case type, wherein the principal parts of the system are all housed in a single case attached to the passenger compartment side of the dash panel. The blower is located upstream of the evaporator and heater cores. The unit is a fresh air type with provision for recirculating interior air for rapid cooling when required.

The control head used is the Universal type, similar to other Ford manually controlled A/C systems. This model uses an improved snap-lock feature for retaining the electrical connectors, as do all other Universal Control heads.

Vertical vanes in the left instrument panel register can be moved from side to side and pivoted up and down for air distribution. They are moved to the right to minimize air flow. Horizontal vanes in the two center registers and the right register can be moved up and down and pivoted side to side for air distribution. These vanes are moved upward to close or minimize air flow.

SYSTEM OPERATION

In all Function Control (Air Control) Lever positions but OFF and A/C (with the temperature control lever in maximum cool position) outside air is drawn directly into the system from the cowl air intake by the blower motor and wheel. The air is then forced through the evaporator core, and, depending on the position of the Temperature Blend Door, is forced through and/or around the heater core into the distribution ducts to the instrument panel registers, defroster nozzles or floor

discharge duct, depending on the setting of the Function Control (Air Control) Lever.

Refer to the Air Flow Schematic and Vacuum Control Charts in Fig. 1 and electrical wiring diagram shown in Fig. 16.

CONTROLS

Function Control (Air Control) Lever

The Function Control (Air Control) Lever (see FIG. 2) actuates a 9-port vacuum selector that controls the vacuum motors of the Heat-Defrost Door and the A/C Defrost Door. It also operates the blower off-on switch and activates the A/C clutch circuit in the A/C, DEFOG and DEFROST positions. Selections of all positions except OFF and A/C will vent the vacuum motor of the outside-recirculating air door and thus open the system to outside air. This occurs regardless of the Temperature Control Lever position.

Compressor clutch engagement is dependent upon an ambient temperature cut-off switch and the Function Control Lever position. The clutch will engage when the Function Control Lever is in the A/C, DEFOG and DEFROST positions and the ambient air temperature is above 40°F to 55°F.

The blower motor runs at all times except when the Function Control Lever is in the OFF position. A separate four-position four-speed blower switch is used to regulate volume of air flow, but cannot turn the blower off.

Temperature Control Lever

The Temperature Control Lever actuates a 3-port vacuum selector that is inter-connected with the Function Control Lever 9-port vacuum selector valve at the main vacuum connector (Fig. 3). It controls the outside—recirculating air door motor in OFF and A/C but is overridden by the Function Control Lever selector valve in all other positions. It also controls the water valve motor and the Temperature Blend Door; the latter by means of cable connected from the Temperature Control Lever to the temperature blend door crank arm.

In A/C, HI-LO, HEAT, DEFOG and DEFROST positions, the water valve opens (hot water to heater core) when the Temperature Control Lever has moved approximately 1/2 inch to the right of the extreme left position. The water valve will close when the Function Control Lever is in ECONOMY VENT or OFF positions, regardless of the Temperature Control Lever setting, due to the venting action of the Function Lever, 9-port vacuum selector valve.

The system will be in the recirculating (inside) air position when the Temperature Control Lever is in the COOL position and the Function Control Lever is in the OFF and A/C positions. When in A/C position, when the Temperature Control Lever has moved approximately 1 inch to the right of the extreme left position, the system operates with outside air.

Blower Switch

The blower switch is located on the left side of the control head assembly.

Water Valve

The water valve is located in the engine compartment in the heater core inlet water line, near the dash panel.

Resistor Assembly

The resistor assembly is located on the top surface of the upper evaporator case, near the blower motor.

The resistor assembly also contains a thermal limiter which is used as a temperature protecting fuse. The thermal limiter is located a pre-set distance from the resistor coils (Fig. 5). If the temperature of the thermal limiter reaches 300°F (149°C), the limiter contacts will open interrupting the blower motor circuit for all blower speeds except high blower.

EVAPORATOR CASE ASSEMBLY

The evaporator case assembly (Figs. 4 and 6) is located under the instrument panel to the right of the vehicle center line. The blower motor and wheel are located in the scroll portion of the evaporator assembly on the right side of the evaporator case.

The blower motor and wheel can be serviced by removing the bolts at the lower edge of the instrument panel at the right cowl side and at the brace below the glove box. Refer to Removal and Installation for complete instructions.

AIR DISTRIBUTION DUCTS AND REGISTERS

The air distribution ducts (Fig. 4) are of a conventional design and the one-piece plenum provides

accessibility for heater core removal without disturbing the evaporator case (Fig. 6).

Combination Valve

This valve (Fig. 7) combines the functions of the Thermal Expansion Valve and the Suction Throttling Valve. Much of the plumbing formerly associated with these two valves has been eliminated. The combination valve is non-adjustable.

For testing, the same basic procedures apply for on-the-car diagnosis. Generally, system test performed on the car, before any parts are removed, will be all that is needed to determine the proper operation of this combination valve.

The following are functions of the new valve:

1. The expansion valve must regulate the flow of liquid refrigerant during A/C operation.
2. The suction throttling valve maintains evaporator pressure above 28.5 psi to prevent condensate water from freezing on the evaporator core. Compressor suction pressure will always be less than the evaporator pressure, the amount depending on compressor speed and system heat load at the time the readings are taken. A defective compressor may not be able to pull-down the suction pressure to the control pressure range of the STV.
3. The pressure differential valve is a Schrader type valve that has been calibrated to open at a pressure range of 10 to 20 psi. Its function is to by-pass oil laden refrigerant around the restriction formed when the STV is closed (due to reduced heat load on A/C system) and thereby provide an assured oil return to the compressor. Under high heat loads this valve has no function since ample refrigerant is moving through the compressor suction line back to the compressor. Substitution of a Schrader valve core from one of the gauge port valves could result in compressor damage by oil starvation because the substituted valve core would never open. The calibrated pressure differential valve core is supplied installed in the expansion valve service part to make improper substitutions unlikely.

The functions of the Thermal Expansion Valve and the Suction Throttling Valve have been combined into one unit for improved reliability through simplicity and rugged interconnecting plumbing.

The expansion valve is a modification of the type that has been used for several years. The thermal element is part of the push-rod mechanism and not a bulb at the end of the tube connected to the top of the diaphragm. Liquid refrigerant is controlled by the push-rod forcing the ball off of its seat and the coil spring exerting pressure on the ball to keep the ball on its seat. Push-rod pressure is high only when suction temperature and pressure are high.

The suction throttling valve is the same mechanism used inside past model STV assemblies but with a threaded attachment and "O" ring seals. Its purpose is to control suction pressure in the evaporator to prevent ice or frost from blocking the flow of air through