

Artikel 963 A/C kompressor diagnos och service

1965-66-67 York and Tecumseh Compressors

In view of and in an effort to correct complaints, relating to A/C compressor failures, the following systematic procedure has been prepared. It is recommended that this procedure be implemented to determine the actual cause of a problem prior to attempting any repairs.

The accompanying procedure is arranged as follows:

SECTION I — A/C Compressor Diagnosis

- I. Noise or vibration which stops when compressor cycles "Off"
- II. Noise or vibration when compressor cycles "Off"
- III. Noise coming from compressor when either "On" or "Off"
- IV. Compressor not pumping (no cooling) V Compressor not pumping properly (insufficient cooling)
- VI. Compressor leaks refrigerant

SECTION II — Changing Compressors

SECTION III — Crankshaft and Seal

- A. Seal assembly — removal
- B. Seal assembly — installation

SECTION IV — Valve Plate and Head Gasket Replacement Procedures

SECTION V — Compressor Oil Level Check

FIGURE GUIDE

- Figure 1 — York Compressor
- Figure 2 — York Compressor — valve plate and oil seal assembly
- Figure 3 — Oil level dip stick — York
- Figure 4 — Tecumseh Compressor
- Figure 5 — Tecumseh Compressor — valve plate and oil seal assembly
- Figure 6 — Oil level dip stick — Tecumseh
- Figure 7 — Compressor Specifications, Compressor Bolt Torque Specifications, Oil Charge Chart

SECTION I

A/C COMPRESSOR DIAGNOSIS

I. Noise or vibration which stops when compressor cycles "OFF"

- A.** Check all belts including alternator and power steering belts. Reset to 90—120 pounds, unless otherwise specified.
- B.** Check for belt alignment (visual) and adjust or repair as required.
- C.** Check for loose A/C clutch. Remove clutch and inspect taper and keyway if looseness is suspected. Torque clutch mounting bolt to 20-30 ft. pounds.
- D.** Check for loose mounting bolts on all compressor mounting brackets and retorque. All 5/16" bolts and compressor mounting bolts - 20-30 ft. lb., all others are 30-45 ft.

lbs.

E. Check clutch runout. Run engine at idle. Maximum allowable runout is 1/32".
Replace as required.

F. Check for slugging

If the noise appears intermittently and is similar to engine pre-ignition ping, it is caused by faulty expansion valve operation.

Check expansion valve bulb clamp for proper retention to core tube. Bulb and clamp must be clean and clamped tight to core tube and properly wrapped with insulation tape.

If bulb is clamped and wrapped properly and problem still exists, replace expansion valve.

G. Check discharge pressure. Connect A/C gauges — Run engine at 1000 rpm, A/C on maximum cooling and high blower. If discharge pressure exceeds 250 psi (275 psi for 90° F. ambient), check condenser fins for dirt and insects and clean as required. If discharge pressure is still too high, slowly exhaust the refrigerant charge through the discharge service valve. Do not exhaust the system too fast or the oil as well as the refrigerant will be exhausted.

Note: Wear goggles. Do not exhaust in a closely confined area or in the presence of an open flame.

After the refrigerant is exhausted, evacuate the system and recharge with the specified amount of Refrigerant-12 shown on the tag on or near the compressor.

H. Check compressor oil level

If compressor is low on oil, there is a leak somewhere in the refrigerant system. Locate and repair leak, and recharge system with specified amount of Refrigerant-12.

Refer to Section 5 — Compressor Oil Level Check and Figure 7 - Oil Charge Chart.

I. Check compressor

Compressor rumble (main bearings) and knock (rod bearings) require compressor replacement.

Note: Do not confuse your diagnosis with the normal pumping sounds made by a properly functioning compressor.

If, after checking the above items and making the necessary corrections, the noise or vibration is still objectionable, the problem is not the fault of the compressor.

Replacing the compressor may fix the problem temporarily, but the noise and vibration will eventually return.

II. Noise or vibration when compressor cycles "OFF"

A. Clutch face plate rubbing or failed bearings. Replace clutch.

III. Noise coming from compressor when either "ON" or "OFF"

A. Clutch rotor rubbing clutch field or brush clip not removed. Remove clutch, inspect and replace if necessary.

IV. Compressor not pumping (no cooling)

A. Clutch not engaged

Turn A/C and ignition "ON." Supply 12 volts directly to the clutch lead wire.

1. If clutch does not engage (audible click), the clutch lead wire, brushes, or field is defective. Repair or replace as required.

2. If clutch does engage, the open circuit is either in the wiring, A/C thermostat, A/C mode switch or blower switch. Trace the circuit back until the defect is found and repair or replace as required.

B. No refrigerant in system Operate A/C system for at least 1 minute. Turn system off and observe sight glass closely for bubbles or foam. If no foam or bubbles appear within 2 minutes, the system has lost its charge. Charge system to 50 p.s.i. with Refrigerant-12. Locate leak and repair. Recharge system with specified amount of R-12. Check compressor oil level after operating system for 15 minutes. Refer to Figure 7 - Oil Charge Chart.

C. Compressor rotating

Connect A/C gauges. Run engine at 1000 rpm, A/C on maximum cooling and high blower.

1. If suction and discharge pressures are equal when compressor is running, and system has sufficient charge, compressor crankshaft is broken. Replace compressor.

D. Compressor does not rotate when clutch engages.

Replace compressor and clutch assembly as required.

V. Compressor not pumping properly (insufficient cooling)

Attach A/C gauges. Run engine at 1000 rpm, A/C on maximum cooling and high blower.

A. Suction pressure less than 10 p.s.i.

Check bubbles in sight glass.

1. If no bubbles are present, the expansion valve is defective or plugged. Repair or replace as required.
2. If bubbles are present, the system is low on charge. Repair leak and recharge the system with the specified amount of Refrigerant-12.

B. Suction and discharge pressures reasonably normal

Suction pressure between 10 and 30 p.s.i., discharge pressure between 180 and 225 p.s.i.

C. Suction pressure too high or discharge pressure too low.

1. Check compressor

(a) With system operating, close the suction service valve. The suction pressure gauge should read at least 20 inches of vacuum within 30 seconds.

(b) Disengage the clutch. The suction gauge should read below "0" p.s.i. for at least one minute.

If the compressor does not satisfy these two conditions after at least 3 cycles of the clutch, the compressor has either a blown head gasket or faulty valves. Remove the head and inspect for damage. Repair as required. Refer to Section 4.

Note: A compressor with scored cylinder walls or pieces of metal imbedded in the pistons should be reassembled and replaced.

2. Check expansion valve

(a) Check expansion valve bulb clamp to assure good contact. Bulb and clamp must be clean and tight and properly wrapped with insulation.

(b) If bulb is clamped and insulated properly and suction pressure is still too high, replace expansion valve.

VI. Compressor leaks refrigerant

Completely check compressor for leaks with a torch type leak detector in accordance with the vehicle shop manual.

A. Leaks at service valve connection. Isolate compressor and replace teflon service valve port gaskets.

B. Leak at front seal.

Refer to Section 3 for seal replacement.

C. Leak at head area.

Refer to Section 4 for gasket replacement.

D. Leaks refrigerant through crank-case.

Replace compressor.

E. Leaks at back plate or bottom plate.

Replace compressor.

SECTION II

CHANGING COMPRESSORS

To reduce the amount of time to make a compressor replacement, the service compressors are dehydrated and filled with refrigerant (R-12) and the proper amount of refrigerant oil is in the crank-case when received.

1. Connect pressure gauge on suction gauge port and check pressure. If gauge shows a pressure above zero gauge pressure and compressor can be operated, front seat the suction service valve and operate compressor until suction pressure is reduced to two pounds, p.s.i.

If pressure gauge reading indicates zero or a vacuum, refrigerant should be added to have positive gauge pressure to prevent air or moisture from entering the system when system is opened. To pressurize system, connect refrigerant supply line to compressor suction gauge port and charge system to 50-60 lbs. gauge pressure. Check system for leaks and repair any found, other than in compressor being removed.

2. With compressor stopped and a positive suction pressure of 2 pounds in compressor, front seat discharge service valve and check to see that suction service valve is also front seated.

3. Remove suction and discharge service valves from compressor carefully. Cap the service valves.

4. Energize the clutch, loosen and remove the clutch mounting bolt. Install a 5/8-11 bolt in the clutch driveshaft hole. With the clutch still energized, tighten the bolt to loosen the clutch from the shaft. Disconnect the clutch wire at the bullet connector.

5. Loosen the idler pulley and remove the drive belt and clutch.

6. Remove the compressor mounting bolts and remove the compressor from the car.

7. Install compressor using specified torque for mounting bolts.

8. Install the clutch, the clutch mounting bolt and washer. Energize the clutch and torque the clutch mounting bolt to 20-30 ft. lbs.

9. Install and adjust the belt to specification (90-120 units).

10. Install service valves -

Service replacement compressors have new "O" ring gaskets in each service valve fitting. Install new "O" ring service valve gaskets when re-installing a repaired compressor. Check to see that valve mounting surfaces on both valves and compressor are clean and that O-ring valve mounting gaskets are properly positioned.

Remove the shipping cap and rubber plugs from the two service valve ports on the compressor. Align valves to cylinder head and tighten flare nuts to 35 ft. lbs. maximum.

Special care should be taken so that no dirt or foreign material enters compressor during installation. A new replacement compressor should not be left unsealed to the atmosphere longer than is absolutely necessary for preparation and actual installation. In no cases should the compressor be open to atmosphere for more than five minutes.

11. With service valves in closed (front seated) position, connect vacuum pump to discharge and suction gauge ports of service valves and evacuate to 29 inches. Stop vacuum pump and close its lines to compressor.
12. Open suction valve until a minimum pressure of 50 pounds in crank-case is reached. Close suction service valve. Open vacuum pump line valves very slowly and operate vacuum pump until a vacuum of 28 inches is reached. Stop vacuum pump and break vacuum in compressor by opening suction service valve until a pressure of 3 pounds is reached. Back seat discharge service valve which closes discharge gauge port.
13. If necessary, charge system with refrigerant to specified limits through suction service valve gauge port. Open suction service valve and cap service valve gauge port and operate system for 5 minutes at fast idle and check for leaks. **NO LEAKS ARE PERMISSIBLE.**
14. Periodically check oil level as specified in oil charge chart, Figure 7.
15. Seal off discharge and suction connection ports of defective compressor and tag the compressor with claim number.

SECTION III

CRANKSHAFT SEAL

When servicing the shaft seal, extreme care must be taken when removing or installing the parts to prevent damage to the lapped surfaces and other seal parts. The portion of the shaft on which the seal assembly fits must be free of scratches, burrs, and dirt, and the entire seal housing cavity must be clean.

A. SEAL ASSEMBLY - REMOVAL

1. Isolate and remove the compressor and clutch from the vehicle as shown in Changing Compressors, Section 1, Items 1 thru 6.
2. Wash or clean seal plate and adjoining surfaces of all dirt and foreign materials.
3. Remove the seal plate cap screws and gently pry the seal plate loose, being careful not to mar or scratch the flat sealing surfaces of the polished shaft surface.
4. Do not pry or force the carbon ring with a hard sharp object in such a manner as to damage the carbon ring. In some cases, it may be bonded to the retainer.
5. Remove the seal assembly from the shaft by prying behind the drive ring which is that portion of the seal assembly farthest back on the shaft. When prying the seal assembly from the shaft, do not scratch the crankshaft or the seal housing face on the crankcase.

B. SEAL ASSEMBLY - INSTALLATION

1. 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 shaft surface to be sure it is not cut or scratched. Check all parts of seal assembly to be installed for transit or handling damage.
2. Inspect internal compressor components for foreign material before replacing seal assembly.
3. Wash all portions of the seal assembly in clean refrigeration oil.
4. Tecumseh Compressor — refer to illustration of Tecumseh Oil Seal Kit — Figure 5, View B.
 - (a) Remove new shaft seal washer from bellows seal assembly. Coat the exposed surface of crankshaft with clean refrigeration oil. Dip new bellows

seal assembly and shaft seal washer in clean refrigeration oil. Place bellows seal assembly over shaft with end for holding shaft seal washer going on last. Push bellows seal assembly by hand on shaft to a position beyond taper of shaft.

(b) Assemble shaft seal washer in bellows seal assembly, checking before doing so to see that bellows seal assembly and shaft are free from dirt and foreign material. Assemble seal washer so that raised rim is away from bellows seal assembly and that the notches in washer line up with the ribs in bellows seal assembly. Cover exposed surface of shaft seal washer with clean refrigerant oil.

(c) Insert new rectangular-section O-ring in crankcase mating surface for seal plate.

(d) Place new front seal plate over shaft. Properly line up mounting holes. With hand on each side of front seal plate, push plate up against crankcase. Insert the six cap screws in circular sequence to torque specified, (6-10 ft. lb.).

(e) Rotate shaft by hand 15 to 20 revolutions to seat seal.

5. York Compressor — refer to illustration of York Oil Seal Kit - Figure 2, View B.

(a) Dip the new seal in clean refrigerant oil. Push the seal assembly, less the carbon ring if it is free, over the end of the shaft with the carbon ring retainer facing out. Move the assembly in and out on the shaft a few times to insure a good seal between the neoprene ring and the shaft. Push the seal assembly all the way on the shaft making sure the slots in the seal drive ring engage the drive pins on the shaft bearing journal face.

(b) If the carbon ring is separate, place it in the ring retainer so the polished surface is facing out. The carbon ring must engage the driving lugs and be fully seated in the ring retainer.

(c) Place a very light film of clean refrigeration oil on the matching metal faces where the seal plate gasket is to be placed. Place the seal plate gasket in position on the seal housing face.

(d) Place the seal face plate in position with the polished portion facing the carbon ring and insert the cap screws. Turn in the cap screws evenly while rotating the shaft, making sure there is even clearance between the shaft and shaft hole in the face plate.

If clearance is not the same all around the shaft, gently tap the seal face plate into a position until there is equal clearance. After equal clearance is obtained, tighten all the cap screws by tightening diagonally opposite cap screws evenly to the required torque, (7-13 ft. lb.).

6. Install the compressor, clutch and drive belt. Refer to Section 1 — Changing Compressors, Items 8 and 9.

7. Install service valves, check refrigerant charge in system and compressor oil level. Refer to Section 1— Changing Compressors, Items 10 thru 15.

SECTION IV

Valve Plate and Head Gasket Replacement Procedure.

The procedure for repairing a blown head gasket is identical to the procedure for repairing a faulty valve plate except the old valve plate is used when repairing a blown head gasket.

If a faulty valve plate has caused the cylinder walls to become scored or has imbedded pieces of metal in the head of the piston, the compressor should be reassembled and replaced.

To make these replacements, the procedure is as follows:

1. Isolate and remove the compressor as shown in Section 1, Item 1 thru 6.
2. Remove all bolts from cylinder head.
3. Remove valve plate and cylinder head assembly from crankcase by tapping upward with fiber hammer on the overhanging edge of valve plate.
4. Remove valve plate from cylinder head by holding cylinder head and tapping against the valve plate.
5. Remove all particles of gasket, dirt and foreign material from surface of cylinder head and cylinder face, being sure not to scratch or nick mating surfaces or any edges.
6. York Compressor — Figure 1
 - A. Apply a thin film of clean refrigeration oil on the area of the crank-case to be covered by the valve plate gasket. Place the new valve plate gasket in position on the cylinder so the dowel pins in the crankcase go through the dowel pin holes in the gasket. Figure 2, View A.
 - B. Place the new head gasket in position on the valve plate so the dowel pins go through the dowel pin holes in the gasket.
 - C. Apply a light film of clean refrigeration oil on the machined surface of the cylinder head which matches the head gasket. Place the head on the cylinder head gasket so the dowel pins go into the dowel pin holes in the head.
 - D. Insert the two longer cap screws in the center of the head. Insert the remaining head cap screws around the edge. The 4 twelve point head screws are to be inserted into the holes closest to the service ports. Run in all cap screws until they contact the head. Tighten the center screws to 15-23 ft. lbs. then tighten the remaining cap screws in a pattern so cap screws diagonally opposite each other are evenly drawn to the torque of 15-23 ft. lbs.
7. Tecumseh Compressor — Figure 4
 - A. Apply a thin film of clean refrigerant oil on the area of the crank-case to be covered by the valve plate gasket. Position the valve plate gasket on the crankcase cylinder face.
 - B. Apply a thin film of refrigerant oil to both sides of the valve plate assembly. Place the valve plate assembly over the valve plate gasket so that the letter "S" stamped on the valve plate is visible on the same side as the word "SUCTION" on front of the crankcase, and so that its mounting holes properly line up with those of the valve plate gasket and cylinder face. Figure 5, View A.
 - C. Place the new cylinder head gasket over the valve plate assembly so that the largest circular hole in the gasket is over the largest circular hole in the valve plate assembly. Line up the bolt holes in the gasket with those on the valve plate.
 - D. Apply a thin coat of refrigerant oil on the machined surface of the cylinder head which matches the head gasket. Position the cylinder head over the cylinder head gasket so that the side of the head which has the word "SUCTION" is up and on the same side as the word "SUCTION" on front of the crankcase and its holes lined up with holes in gaskets, valve plate, and cylinder.
 - E. Insert the mounting bolts in the head. The four (4) twelve point head bolts are inserted in the holes closest to the service ports. Run in all bolts until they contact the head. Tighten in a sequence so that the bolts diagonally opposite each other are evenly drawn to a torque of 20-24 ft. lbs.
8. Inspect top of service valve ports to see that they are free from nicks or imperfections and replace the teflon washers. Connect service valves to correct ports and tighten to 35 ft. lbs. maximum.

9. After a period of 1/2 hour from time of assembly of the valve plate, re torque the cylinder head bolts to specifications. Refer to Figure 7.

SECTION V

Compressor Oil Level Check

Under normal conditions, when the air cooling 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 car is first started, some of the oil will be pumped into the rest of the system. After 15 minutes of operation, most of the oil is returned to the compressor crankcase.

Check the compressor oil level only if a portion of the refrigerant system is being replaced, or if there was a leak in the system and the refrigerant is being replaced.

Check the oil after the system has been charged and has been operating at an engine speed of 1500 rpm for 15 minutes in 60°F. surrounding air temperature or above. Turn off the engine, and isolate the compressor. Remove the oil filler plug from the compressor; insert a dip stick in the oil filler hole until it bottoms. Refer to Figures 3 and 6.

It may be necessary to rotate the compressor crankshaft slightly by hand so that the dip stick will clear the crankcase. Refer to Oil Charge Chart, Figure 7.

If additional oil is needed in the compressor, add Suniso 5 or Capella E refrigerator compressor oil or equivalents. **DO NOT USE ENGINE OR TRANSMISSION OIL.**

If oil level is higher than the maximum, as might happen if a new compressor is installed and oil already in the system is pumped back to the compressor, draw out the excess oil until the proper quantity is indicated.

Replace the oil filler plug, then evacuate and connect the compressor back into the system. Be sure to check the compressor filler opening for leaks.

Figure 7

COMPRESSOR SPECIFICATIONS

| Make | Refrigerant | Cubic Inch Displacement | Bore | Stroke |
|-------------------|--------------------|--------------------------------|-------------|---------------|
| York and Tecumseh | R-12 | 10.3 | 1.875 | 1.875 |

COMPRESSOR BOLT TORQUE SPECIFICATIONS (FT/LBS)

| | York | Tecumseh |
|--------------------------|-------------|-----------------|
| Cylinder Head | 15-23 | 20-24 |
| Seal Plate | 7-13 | 6-10 |
| Base Plate | 14-22 | — |
| Back Plate | 9-17 | — |
| Oil Filler Plug | 4-11 | 18-22 |
| Clutch Mounting | 20-30 | 20-30 |
| Service Valve (Rotalock) | 25-35 | 25-35 |

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