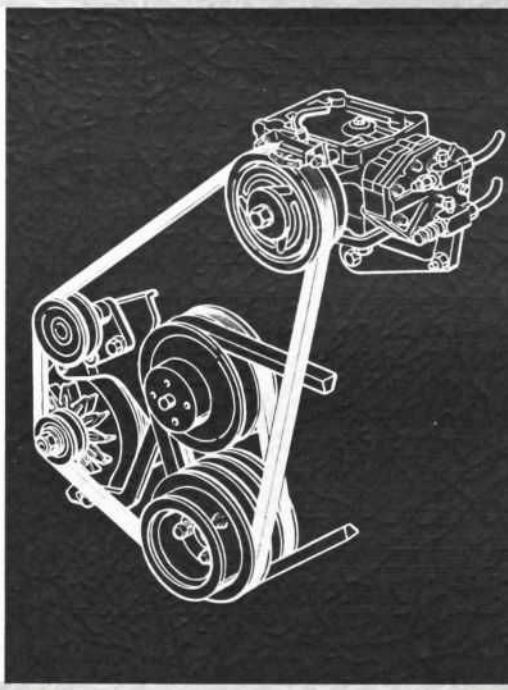
TRAINING HANDBOOK 19001.1 & 19002.1

AIR CONDITIONING DIAGNOSIS, ADJUSTMENT and REPAIR

Ford

REGISTERED TECHNICIAN

VOL. 67 S7 L2



AIR CONDITIONING DIAGNOSIS, ADJUSTMENT AND REPAIR

TRAINING HANDBOOK 19001.1 AND 19002.1 • VOL. 67 S7 L2

TABLE OF CONTENTS

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NATIONAL SERVICE ACTIVITY

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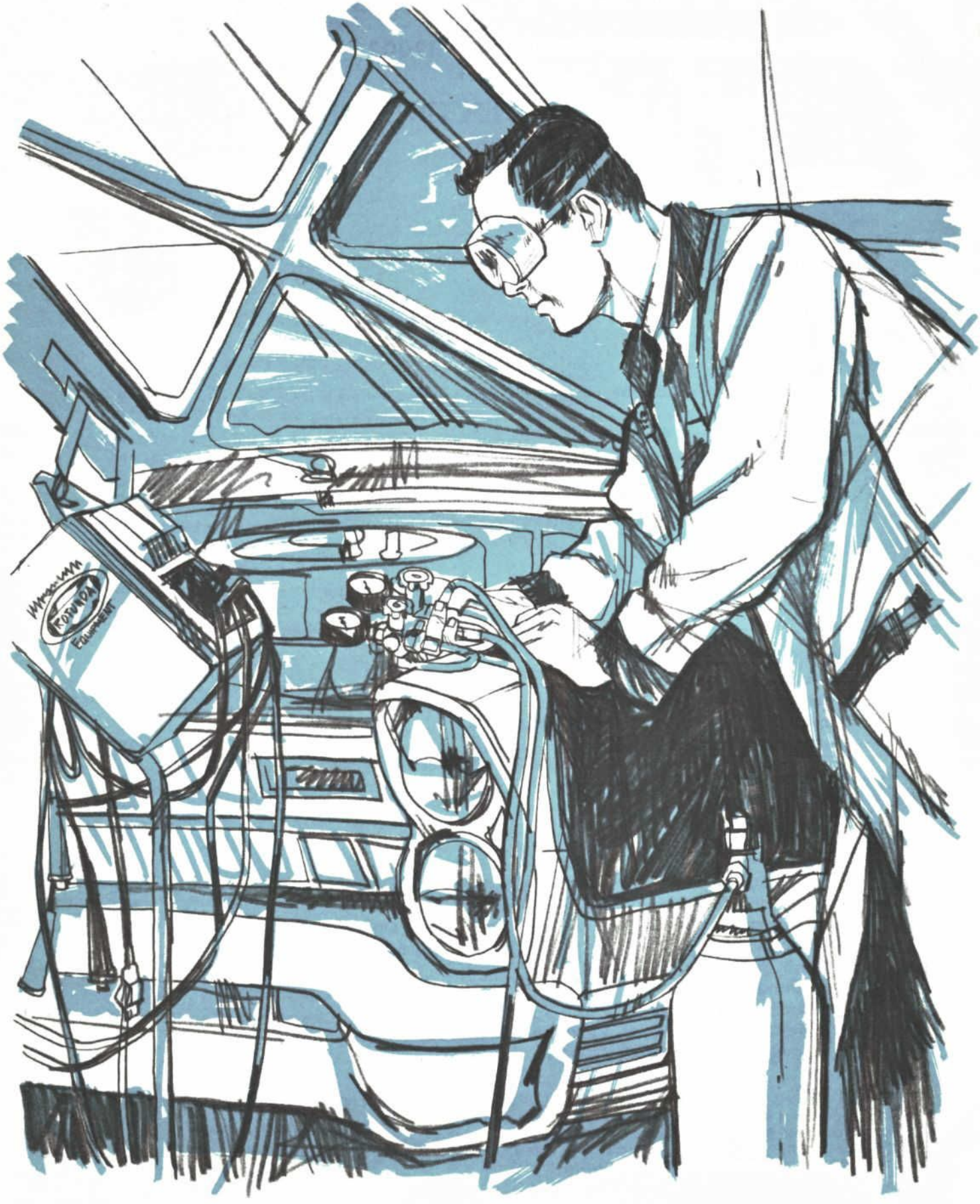
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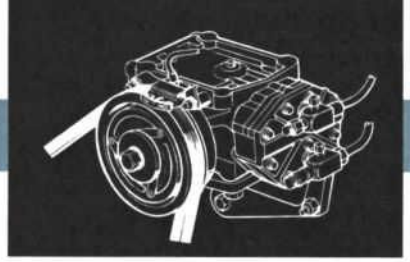


INTRODUCTION

Relatively new as far as automobile accessories or options go, air conditioning seems to be growing in huge leaps, Most of us can remember when an air conditioned car was a rarity, even in warm climates. Today, some 25 percent of new cars being built are equipped to cool the driver and passengers and make driving more pleasant and comfortable; and many more air conditioners are installed after the sale.

Thus the time has come when most Technicians must make air conditioning service a part of their capabilities. This handbook is designed to show you what air conditioning service is all about, and how you can quickly diagnose, test and repair air conditioning systems. It describes the complaints you'll most often encounter and tells where and how these complaints can originate. The safe use of air conditioning refrigerant is a most important topic also covered in detail. The handbook tells you how to make a preliminary diagnosis of system operation without test equipment, and then how to use instruments and gauges to scientifically test the different systems that must work properly to keep your customers cool. Diagnosis information also includes a section of "road map" diagnosis charts, located at the rear of the book, . . . taking you step-by-step through the procedures necessary to locate and fix specific causes of malfunction. Finally the handbook gives you specific explanations of and instructions for the various operations involved in servicing air conditioning systems.

RELATED PUBLICATIONS

For supplemental information on air conditioning operation and service, you can refer to the appropriate Owner's Handbook, Shop Manual, to the Vacuum Diagrams Book and to the Training Handbook, **How Air Conditioning Works**, course 19000.1. Also, for Lincoln-Mercury Division vehicles, refer to Vacuum Systems Diagnosis Guide Form LM 7827-67 and the Trouble Shooting Handbook, Form LM-7820.

DEFINITIONS

Technical terms used in this handbook will be explained as they are used . . . either by definition or context. For more detailed definitions of the terms consult the list at the end of the book.

IMPORTANCE OF ACCURATE DIAGNOSIS

Air conditioning has been around long enough that today's systems are quite trouble-free. However, air conditioning is the most expensive option a car buyer can buy . . . and it won't have to be inoperative very long or very often to make him hot under the collar . . . in more ways than one. To keep him cool (or to cool him off) there is no substitute for accurate diagnosis of the malfunction.

The kinds of complaints you'll receive most often are (1) insufficient, erratic or no cooling; (2) lack of cooling control; (3) noisy operation; and (4) improper air distribution. To diagnose them requires knowing the job of each part of the air conditioning system.

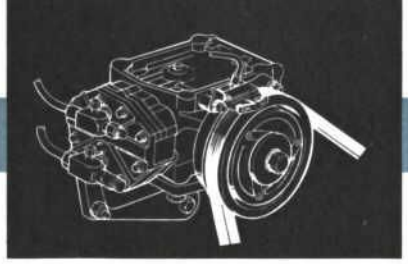
FUNCTIONS OF SYSTEMS

Actually, there are several systems involved in air conditioning . . . whether it is a hang-on unit which operates independently of the heater and defroster, or an integral unit which contains heating, defrosting and cooling in a system integrated into the vehicle's instrument panel and cowl compartment.

REFRIGERATION SYSTEM

The refrigeration system (Fig. 1) has the job of producing cool air; of cooling the air before it is blown into the passenger compartment. Cooling takes place in the coils of the **evaporator**, where a special fluid called the **refrigerant** absorbs huge quantities of heat as it vaporizes. The **expansion valve** controls the flow of refrigerant into the evaporator. The **compressor** is a vapor pump that compresses and pressurizes the refrigerant after it leaves the evaporator. In the **condenser** coils, the pressurized refrigerant vapor is cooled and converted back to a liquid to start the cycle again. A **receiver** is included as a storehouse for refrigerant and contains a drying agent to remove moisture. The **sight glass** is a window opening that permits the Technician to observe refrigerant flow during operation.

Malfunctions in the refrigeration circuit usually result in improperly controlled refrigerant flow or vaporization. The result is that less heat is taken from the air passing through the evaporator coils . . . hence, less cooling.



IMPORTANCE OF ACCURATE DIAGNOSIS

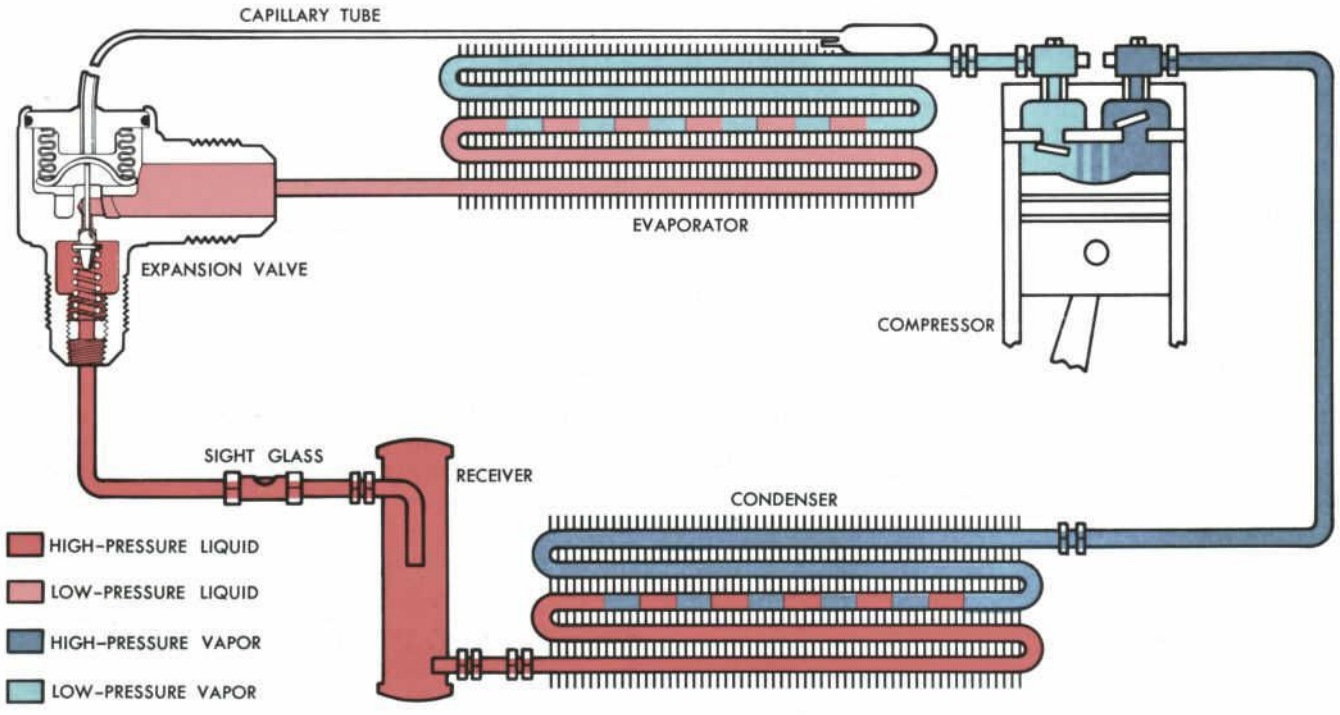


Fig. 1 — Refrigeration Circuit

COMPRESSOR CLUTCH SYSTEM

The compressor in the air conditioning system must be operating, or refrigerant will not flow. The compressor is driven by the engine through a belt, pulley and magnetic clutch. For the compressor to operate, the pulley and belt must be properly aligned and with correct belt tension, and the clutch must be functional and energized by completing its electrical circuit.

This circuit (Fig. 2) includes the clutch, the cooling control in the passenger compartment, the blower switch, a circuit breaker, and the thermostatic switch, which regulates the evaporator temperature. Excessive resistance or an open point in the circuit will result in the clutch not engaging the compressor driveshaft to the pulley.

Malfunctions in the compressor clutch system usually result in little or no cooling.

AIR DISTRIBUTION SYSTEMS

Cooling the air at the evaporator is useless unless the cool air is forced through the evaporator and distributed into the passenger compartment. So air conditioning also includes a blower with its electrical system, and (in some units) a system of vacuum-operated doors to control air flow.

In integral units, the air distribution system provides a choice of fresh-air or recirculating

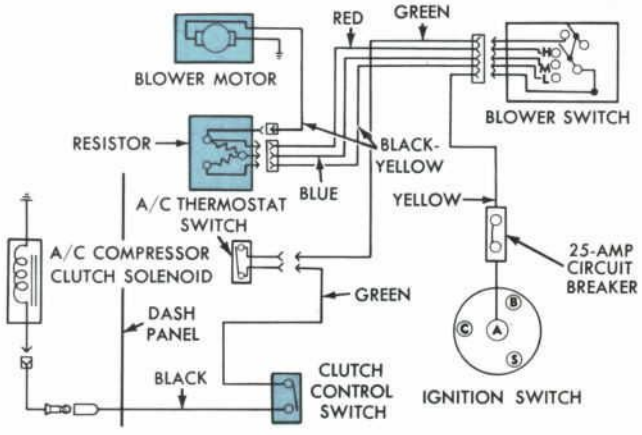
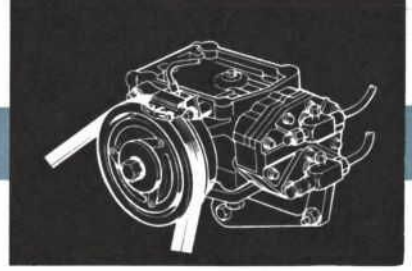


Fig. 2 — Typical Compressor Clutch and Blower Circuit

cooling by opening and closing doors. For fresh air cooling, air is taken in from outside and passed through the evaporator into the car (Fig. 3). For maximum cooling, fresh air is blocked (Fig. 4). The air inside the car is recirculated to give the evaporator multiple opportunities to cool it.

Air distribution doors also are used to route the air around heater cores in integral units.

Malfunctions in air distribution can reduce air flow or route the air over a heater core, resulting in a higher temperature.



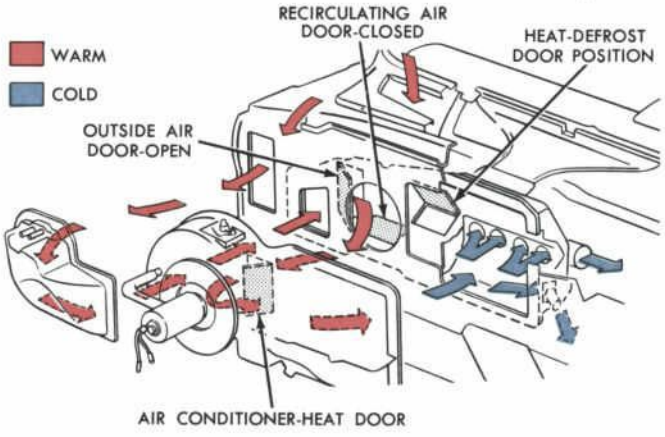


Fig. 3 — Fresh Air Cooling Flow (Ford and Mercury)

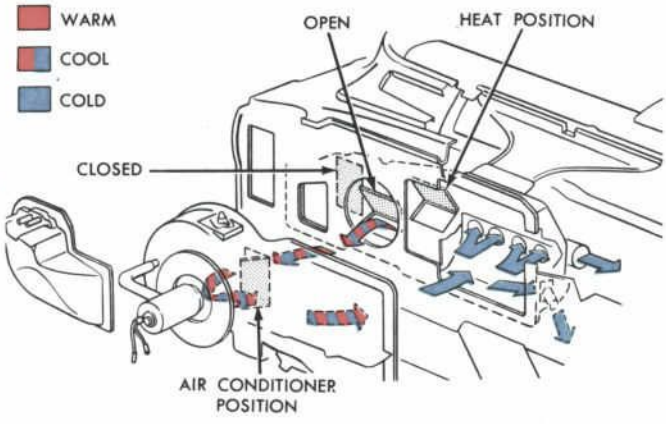


Fig. 4 — Recirculating (Maximum) Cooling Air Flow

DIAGNOSIS STEPS

Following the "Safety" precautions in this handbook, you will find diagnosis steps, aimed at isolating the trouble to a particular system of the air conditioner. You will use appropriate tools and test equipment to pinpoint the trouble within the system.

SAFETY

Refrigerant 12 is a nearly ideal refrigerant for automotive air conditioning . . . possessing many properties absent in other refrigerants. It operates at low pressure and condenses easily in the temperature ranges encountered in automobile condensers. It is non-toxic and practically non-corrosive; and is chemically stable. It is non-flammable and normally very safe to use.

However it is used under pressure, and its low boiling point (-22 degrees Fahrenheit) and chemical change when in contact with a flame require certain handling precautions for personal safety.

DON'T SPILL OR TOUCH LIQUID

Liquid refrigerant vaporizes so quickly that even a drop on your skin will remove heat from you quickly enough to cause severe frostbite. Therefore, take every precaution not to get any liquid on your skin. Open fittings very slowly to release pressure carefully. Operate all testing and service valves according to instructions. When charging the system, let the refrigerant enter as a vapor; don't pour it in.

WEAR SAFETY GOGGLES

Always wear safety goggles to service an air-conditioning system. Your eyes need the protection if there is an accidental break or disconnect in the refrigeration system. Liquid refrigerant in your eyes can blind you.

If refrigerant should get into the eyes, rinse them immediately with mineral oil to absorb the refrigerant. Follow by flooding with boric acid solution to reduce irritation. Call a physician immediately.

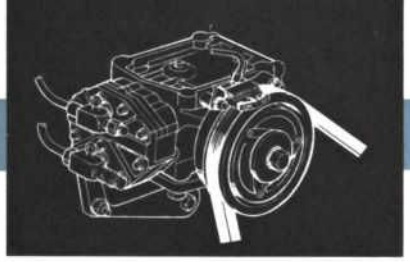
AVOID HEAT

Pressure in a refrigerant container or in the system will rise with heat. The refrigerant should never be heated unnecessarily. Store containers upright, out of the sun, and away from stoves or heat outlets. Always discharge the refrigerant from the system if the car is going into a paint oven; or if welding or steam cleaning are to be done near the system. Also watch the temperature and pressures when testing the system. Direct a fan on the condenser through the radiator grille to avoid overheating.

It is common practice to put a refrigerant bottle in a pan of warm water to raise the pressure and speed charging of the system. But never, ever, use a blow torch to make it happen faster. This could cause an extreme pressure condition and a rupture.

VENTILATION

Adequate ventilation is essential for several reasons. Though the refrigerant is non-toxic, it doesn't contain the oxygen we need to breath. . . and therefore, enough of it can be suffocating. Also, too much refrigerant vapor in the air will interfere with leak testing . . . the system will



appear to be leaking everywhere. Therefore, always discharge the refrigeration system into an exhaust outlet or through an open window or door. Perform refrigeration system service only where it is well ventilated and there is no danger of vapors collecting in low areas.

Always vent the engine exhaust to the outside atmosphere when operating the vehicle during tests.

AVOID FLAME

In contact with an open flame, refrigerant 12 forms phosgen gas, a well-known fumigator that is highly toxic to humans and animals. Never discharge a system near an open flame. When you use a flame torch to detect leaks, don't breathe the fumes.

DIAGNOSIS

The diagnosis charts in the rear of the handbook are designed to give you "road maps" to follow when you have specific complaints. Reference to the "Insufficient or No Cooling — Basic System" chart will pin point the area of complaint to a particular system causing the trouble.

The steps given in the charts are in the order of the most likely, or easiest to diagnose cause of the malfunction. They include both diagnosis and corrective action. Of course, you should proceed only as far in the charts as necessary to correct the complaint. Detailed diagnosis and servicing procedures are noted under the heading of "Diagnosis".

To diagnose Lincoln Continental air system conditions, refer to the Lincoln Continental Automatic Temperature Control Manual, Form LM-7649-67 and the Registered Service Technician Trouble Shooting Handbook, Form LM-7820.

The first steps in diagnosis should be simple operational checks of the refrigeration, electrical and air distribution systems. The purpose is to verify the complaint, and, if it is valid, to direct you to secondary diagnosis procedures.

TEST OPERATING CONDITIONS

All operational tests of the system are made with the engine operating at 1500 rpm. Cooling controls should be set in the **maximum** cooling or recirculating position. The blower should be on its highest speed.

The system must be allowed to stabilize and this will take from 10 to 15 minutes of operation.

AIR TEMPERATURE

The temperature of the air discharged from the cooling outlet (Fig. 5) gives you a fast, accurate indication of how efficiently the refrigeration system is operating. If the temperature is within design limits and the air volume is high enough (see below), the system **must** be doing its job. You may simply have to explain to Mr. Complaining Customer how to operate his controls and not to expect more than the system is designed to deliver.

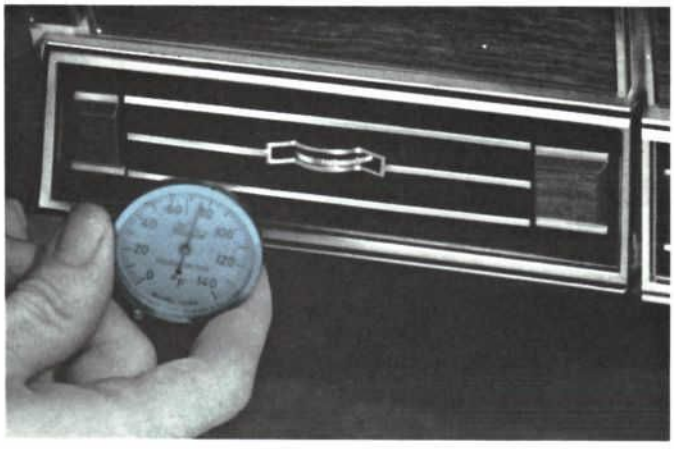


Fig. 5 — Testing Discharge Air Temperature

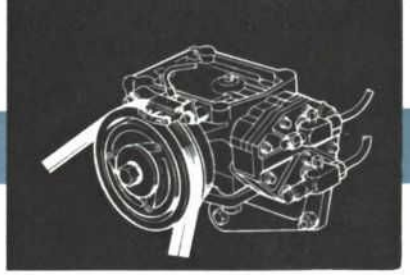
Almost any good thermometer can be used for this test. The dial-type shown is designed specially for air conditioning testing. The discharge temperature should be 68 degrees Fahrenheit or less in a 100 degree atmosphere . . . and should taper down to 58 degrees or less when the surrounding air is 80 degrees. If you're making the test indoors, consider the temperature in the shop as your basis; not the outdoor temperature.

CONSIDER HUMIDITY

In extremely humid weather, the discharge temperature will be less than when the air is dry. This happens because part of the cooling capacity is being used to dehumidify or wring moisture out of the air. Complaints of insufficient cooling are more likely to arise on a humid day. This is another fact you may have to point out to the customer.

AIR VOLUME

Check the air volume by holding your hand in front of the register outlet (Fig. 6) with the blower control on its highest setting. Compare the volume with another unit that you know is



good. If the air volume is not good and the blower seems to be turning up okay, check that all the air doors are positioned properly. Some of the air may be going to non-cooling outlets, or leaking past doors that should be closed.

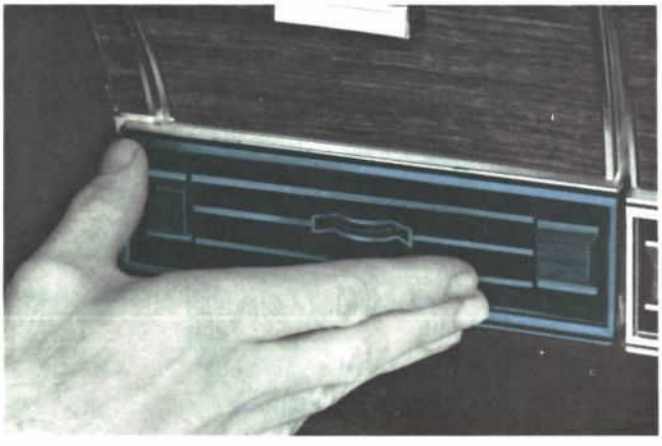


Fig. 6 — Checking Discharge Air Volume

SIGHT GLASS CHECK

If the discharge air temperature leads you to believe that the refrigeration system could be working more efficiently, a look at the sight glass is in order. The sight glass is located in the high-pressure line between the receiver and the expansion valve (Fig. 7).

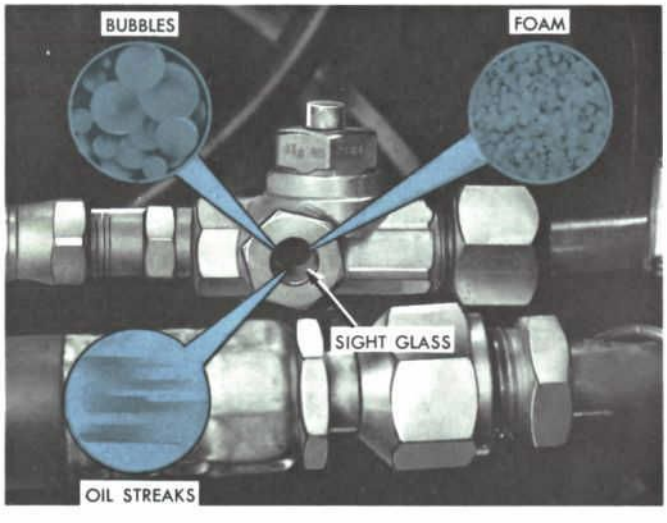


Fig. 7 — Sight Glass

Continuous bubbles or foam in the sight glass indicate that the system has lost part of its charge; that is, that some refrigerant has leaked out. Some bubbling is normal when the system is first started up. However, if there is a full charge, there should be a solid stream of clear refrigerant, with perhaps an occasional bubble at very high temperature.

CYCLE THE CLUTCH

Since the refrigerant is clear, a completely discharged system could look just like a fully charged one. To be certain you aren't mistaking an empty sight glass for a solid stream of flow, cycle the compressor clutch once or twice. To cycle the clutch, turn the cooling control off. If there is refrigerant, you'll see bubbles during the off-cycle and they'll clear during the on-cycle.

LOOK FOR COMPRESSOR OIL

Another trouble indication is compressor oil in the sight glass. It may appear in streaks, or in a constant flow. Either way it tells you the charge has been lost.

DON'T PARTIAL CHARGE

Simply recharging the system to get a good sight glass reading is not recommended on two counts: First, a lost charge means there is a leak. If not repaired, it will simply do a repeat performance. Second, it is too easy to overcharge a partially charged system. Overcharging can easily cause damage.

In any instance where the system is undercharged or overcharged, or has air in it; it must be leak tested, completely discharged, and recharged by weight. Procedures for these operations are covered in the following sections of this handbook.

"SLUGGING" NOISES

A "slugging" noise is an intermittent ping in the refrigeration system caused by faulty operation of the expansion valve. It sounds just like engine pre-ignition noise.

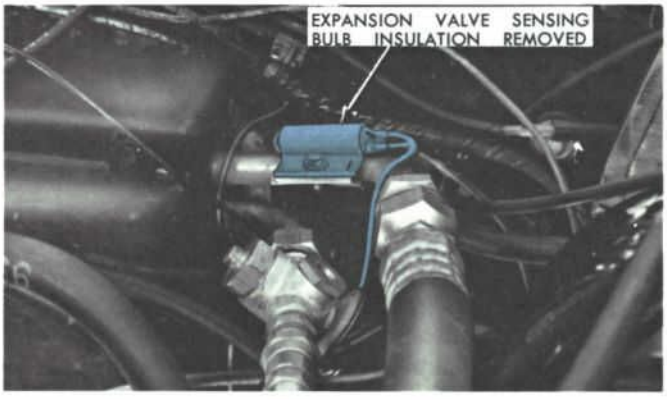
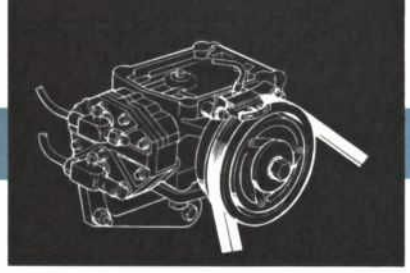


Fig. 8 — Checking Expansion Valve Bulb Contact



If you hear this noise, check the contact between the expansion valve's sensing bulb and the tube in the evaporator (Fig. 8). The surface must be clean and corrosion-free, and the bulb must clamp tightly in the tube. If the bulb is clamped properly and the "slugging" noise doesn't stop, replace the expansion valve.

Some slugging noise can occur in a normal system. If the noise is not extreme and the system seems to operate properly otherwise, it is not harmful to the system.

COMPRESSOR CLUTCH CHECKS

Noisy operation might be caused by a loose compressor clutch mounting bolt, or an improperly installed clutch field, if so equipped. Check for this condition with the engine stopped. If the clutch field is rubbing against the clutch, make certain the proper field mounting screws are being used to properly locate the field on the compressor. Tighten the clutch field screws securely. If the clutch is loose, remove it and inspect the taper and keyway.

Faulty brushes and/or slip rings can affect the clutch operation, and should be looked for in an insufficient cooling complaint. Replace worn, cracked, chipped or sticking brushes and scored or rough slip rings.

CONDENSER AIR PASSAGES

Anything that restricts air flow through the condenser can reduce the efficiency of the refrigeration system. The air flow should be unobstructed by dust, leaves, paper, dried mud and bug screens to avoid high pressures and provide maximum heat transfer.

A stiff brush and compressed air make a good condenser-cleaning team.

LINE ROUTING AND CONDITION

While visual-checking the lines, also look for clamps and brackets that are used to keep them separated (Fig. 9). These parts reduce the possibility of damage from vibration and should never be left off.

Air conditioning lines must be free of kinks which would restrict refrigerant flow. Even a single kink can greatly reduce the refrigerating capacity. A kinked line should be replaced. Also check that the lines are not routed in a way that could cause kinking or excessive heat damage from a hot manifold or pipe.

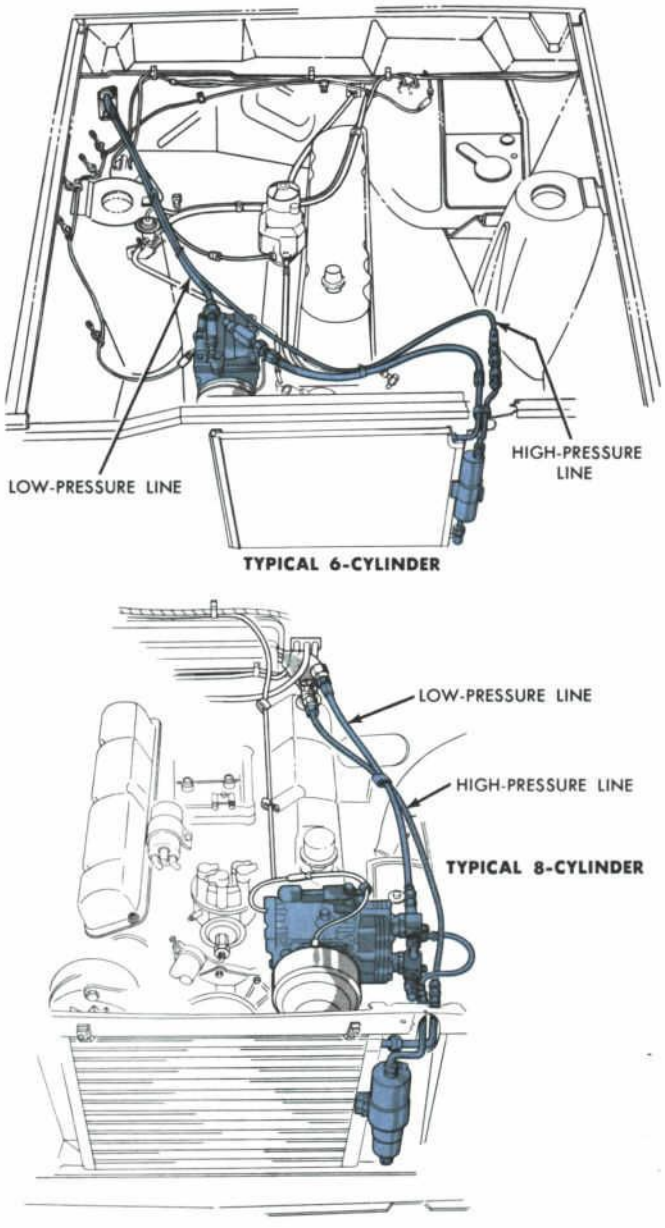
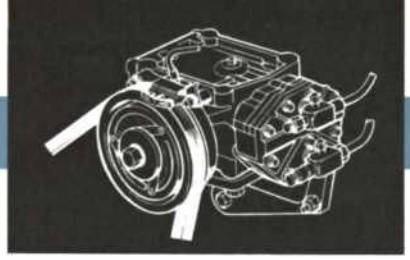


Fig. 9 — Refrigerant Line Routing

SERVICE VALVE POSITIONING

Service valves (Fig. 10) are installed in the compressor head to make the connections to the condenser and evaporator, to allow servicing the refrigerant, and to connect pressure gauges.

When the system is operating, the service valves should be **back-seated**. When back-seated, the valves are screwed out to open the condenser or evaporator port to the compressor head and to block the gauge port. Conversely, when the system is being serviced it is often necessary to



front-seat the valves by screwing them inward to close the condenser or evaporator port to the compressor head and to block the gauge port.

Check that the stems are screwed out (counter-clockwise) until the valves are firmly seated for normal system operation.

COMPRESSOR VIBRATION

Noisy operation when the compressor clutch is engaged can also be traced to the compressor. With the engine off, check that the compressor mounting bolts, support bracket bolts, and clutch mounting bolts are tight. Also check the adjustment and alignment of the drive belt; and clutch runout (see next section). Then start the engine

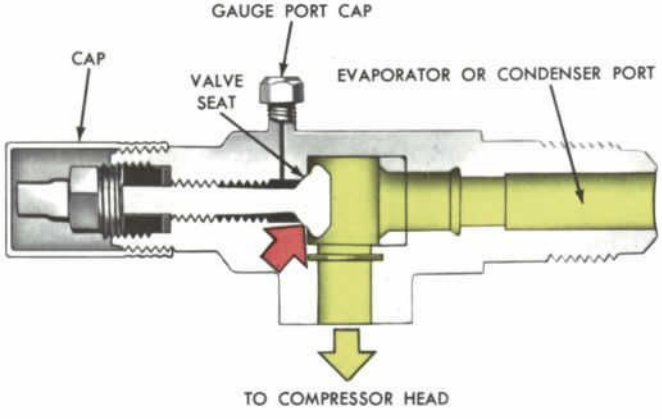


Fig. 10 — Back-Seated Service Valve

and operate the compressor to see if the noise is gone. If the noise is not eliminated, perform a compression test.

If the noise persists and sounds like a bad connecting rod, it may be caused by metal particles above the piston. Check this by removing the compressor drive belt, energizing the clutch and turning it slowly clockwise. If it turns freely, replace the compressor. Otherwise check for partial free turning with binding in spots. If this occurs, the compressor must be removed, the head and valve plate disassembled and necessary inspection and repair made. It may be required to dig the metal particles out of the piston heads.

DRIVE BELT AND CLUTCH

DRIVE BELTS

A loose drive belt will slip on the pulley and the compressor will not run at its full speed. This could be the problem if the unit is doing some cooling . . . but not as much as specified.

A drive belt tensioning gauge (Fig. 11), is recommended for checking the belt. It measures the belt deflection between two fixed points on the base of the tool. Movement of the tool's spring-loaded plunger is transmitted to a dial through a rack and pinion. The dial is calibrated in pounds, and the reading can be made while the belt is being adjusted.

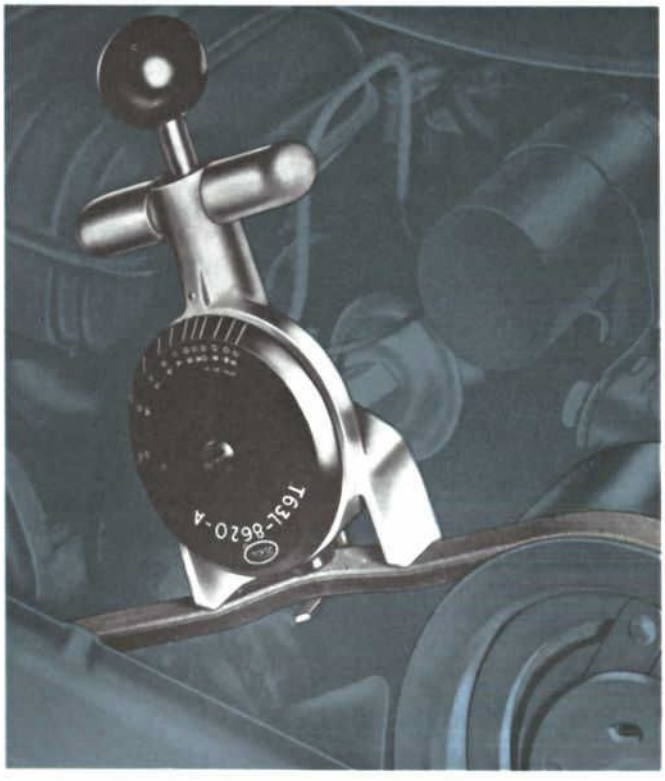


Fig. 11 — Checking Belt Tension

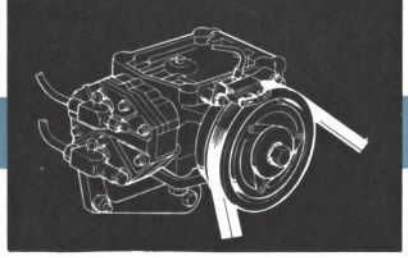
The tension should be 140 pounds for a new belt when it is installed; 110 pounds for a used belt. A belt is considered used after it has run for 10 minutes.

Making the adjustment accurately with a tension gauge also guards against failures that can be caused by excessive tension.

The drive belt also should be checked for alignment. It must come off the pulley grooves perfectly straight. There must be no sideways binds in the belt as it approaches or leaves the pulleys.

CLUTCH RUNOUT

Excessive runout of the compressor clutch also can cause noisy operation. Diagnose it by mounting a dial indicator and turning the clutch by hand with the ignition off. If total indicated runout is more than 1/32 inch, replace the clutch.



Make sure the clutch field (if so equipped) is not rubbing against the clutch.

ELECTRICAL TESTING

Malfunctions in the electrical circuit (Fig. 2) can render either the compressor or the blower inoperative. In either case, the passenger compartment won't be cooled. Diagnosis of electrical troubles consists of testing the electrical circuit functionally and with instruments. Refer to the Wiring Diagrams book, Form 7795 P for the applicable system being tested.

COMPRESSOR CLUTCH CIRCUIT TEST

When the compressor doesn't appear to be cycling, the magnetic clutch may not be holding because of excess resistance in its circuit. To begin testing the circuit, set the controls for maximum (recirculating) cooling . . . with the blower on high . . . and turn the ignition switch to the "accessory" position.

Clutch Operational Test

If the clutch is operating, you should hear a sharp click each time you turn the ignition on or off. If you don't hear the click, on a brush and holder equipped clutch assembly examine the clutch slip ring and brushes for good contact. If there is any dirt, grease or oily film on these parts clean them well and repeat the test. If the clutch still doesn't operate, make a current draw test of the circuit.

Clutch Current Draw

Fig. 12 shows how to test the clutch current draw with an ammeter. These are the steps:

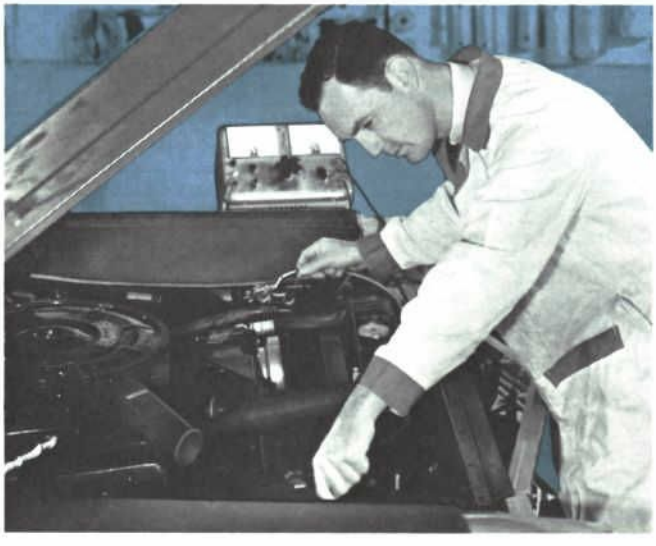


Fig. 12 — Testing Clutch Current Draw

1. Disconnect the clutch lead wire at the bullet connector near the clutch.
2. Set the ammeter to the appropriate scale for the specified current draw.
3. Connect an ammeter in series with the clutch lead and the battery positive terminal. Again you should hear a sharp click as the circuit is completed. If you don't hear it, replace the field on cars so equipped.

On a clutch with a slip ring and brush, disconnect the ammeter from the brush lead wire. Bypass the brush and holder and contact the ammeter lead to the clutch slip ring. If the clutch clicks, replace the brush and holder. If the clutch does not click, replace the clutch.

4. Connect the ammeter once again in series with the clutch lead and the battery positive terminal. Read the current draw on the ammeter and compare it with shop manual specifications.

If the current draw is correct and the clutch engages in this test . . . but not with the ignition switch . . . you'll have to move into the circuit to find where the excess resistance or open point is.

Clutch Circuit Supply Voltage Test

Testing for continuity in the clutch electrical circuit is best done with a 12-volt test light. You begin at the clutch solenoid and move back through the circuit until you find a point where the test light glows to show that there is power. The defective part must be preceding that point. The controls are set as for the clutch operational test, with the ignition switch in the "accessories" position. This is your procedure:

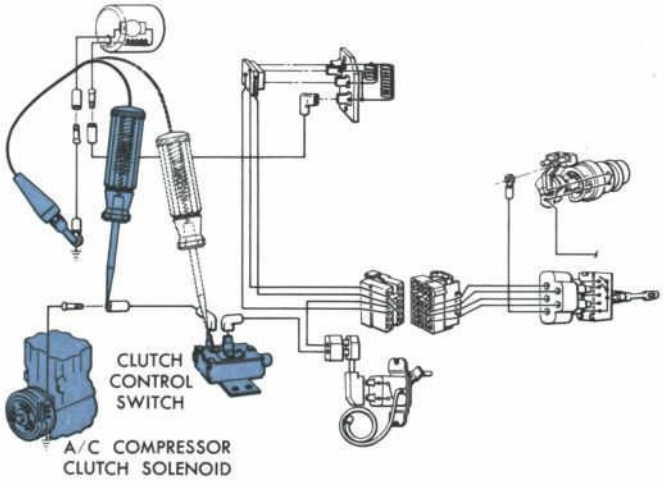
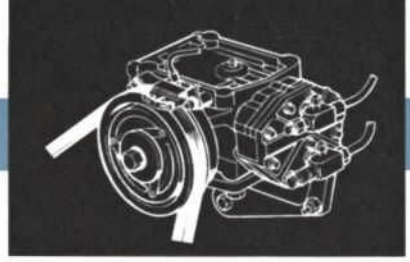


Fig. 13 — Testing Clutch Lead Continuity



1. With one end of the test light connected to a good ground, touch the probe to the lead between the clutch control switch and the clutch solenoid (Fig. 13). If the light doesn't burn, move the probe to the switch connection. If it burns now, the lead wire requires repair or replacement.
2. If the light doesn't burn in step 1, move the probe to the opposite connection on the switch (Fig. 14). Now if it burns, the switch must be misadjusted or damaged. Repair or replace it as required.

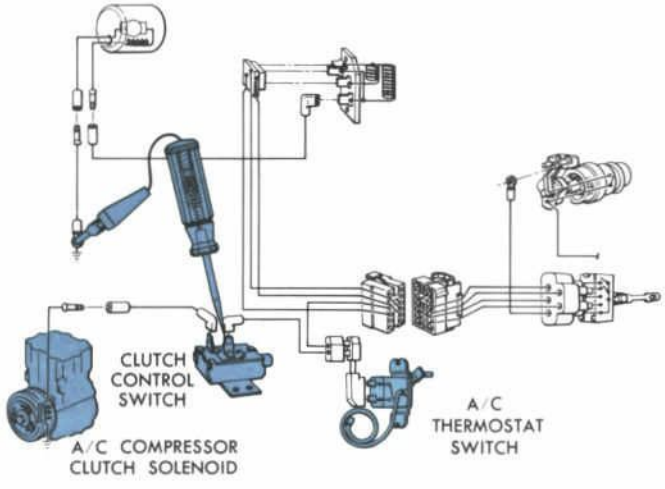


Fig. 14 — Testing Clutch Control Switch Continuity

3. Next, if required, move the test probe to the connection between the thermostatic switch and the clutch switch (Fig. 15). A glowing light here tells you the lead between the switches is open or damaged, and you should repair or replace it. If the light still doesn't glow, test for power to the thermostatic switch.

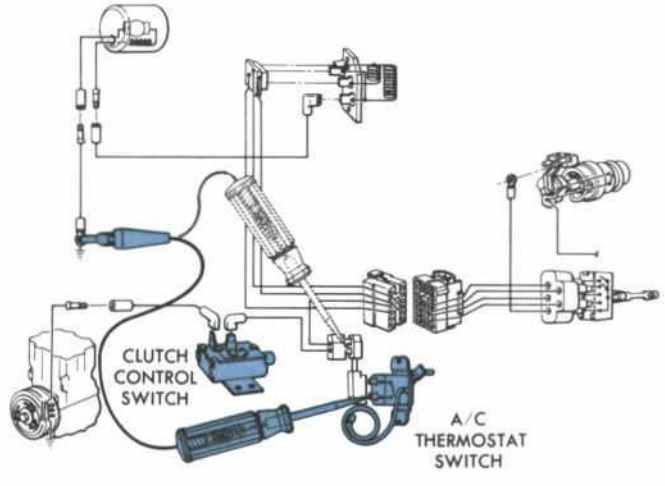


Fig. 15 — Testing Thermostatic Switch-To-Clutch Control Switch Lead

4. To test the thermostatic switch, move the probe to its input terminal (Fig. 16). If the light burns now but didn't before, the thermostatic switch isn't functioning and should be inspected and tested.

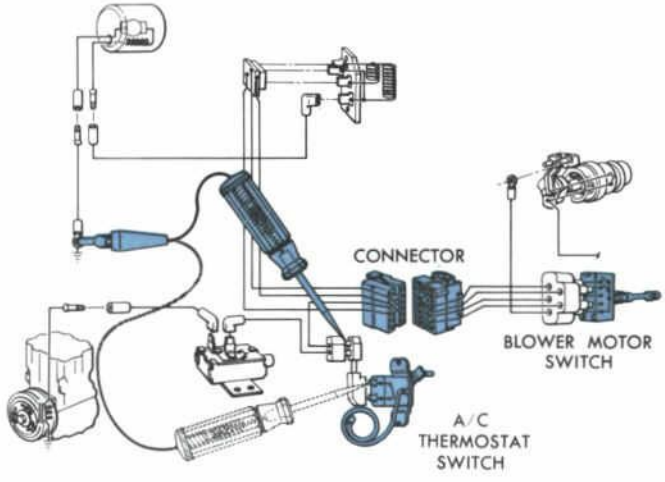


Fig. 16 — Testing Thermostatic Switch

5. The next test point is at the blower switch output terminal which connects to the thermostatic switch (Fig. 17). If the light glows at this point, replace or repair the green lead or its connection.

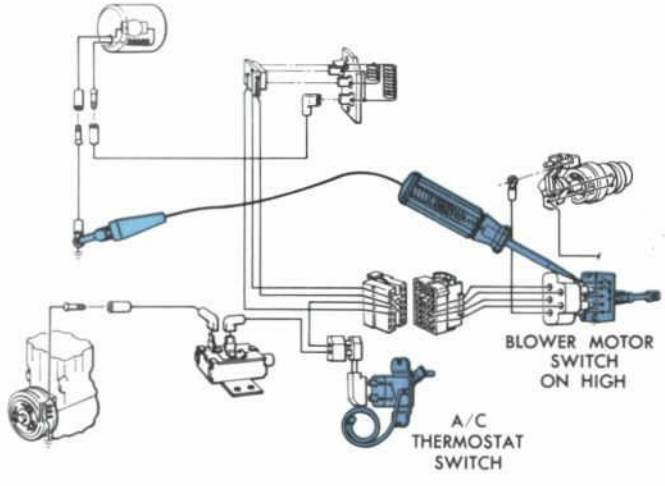
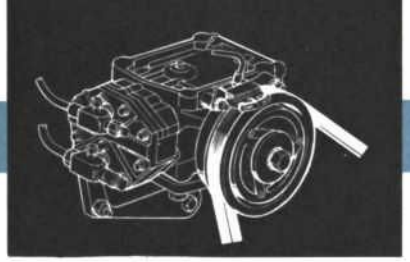


Fig. 17 — Testing Blower Switch-To-Thermostatic Switch Lead

6. Next move the probe to the opposite (ignition switch side) terminal of the blower switch (Fig. 18). A glowing light here says the blower switch isn't working right. Replace a malfunctioning blower switch.



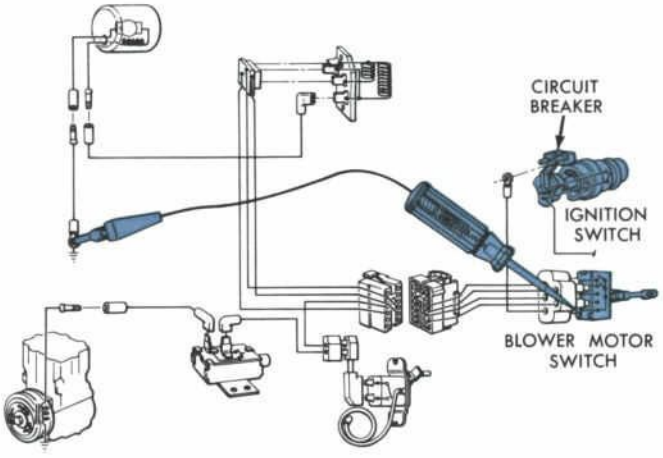


Fig. 18 — Testing Blower Switch

7. Finally, if required, move the probe to the circuit breaker terminal (Fig. 19). The breaker is usually mounted on the accessory terminal of the ignition switch. Test for power through the breaker and through the switch. If either isn't passing current, replace it.

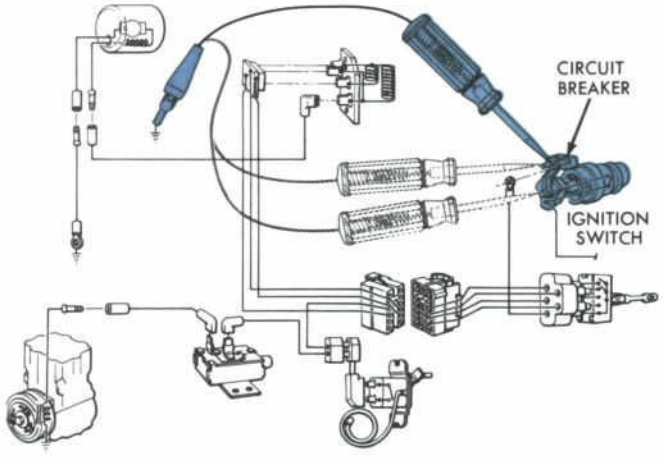


Fig. 19 — Testing Circuit Breaker

Of course, at any point in this test where you find power with the test lamp, you should discontinue further testing. Repair the malfunction and repeat the clutch operational test.

BLOWER MOTOR CIRCUIT TESTS

As you can see in Fig. 2, voltage to operate the blower motor is supplied to the blower switch from the ignition switch. The blower switch passes this voltage on full-strength to the blower resistor. The blower resistor determines the actual current draw in this part of the circuit, depending on which of its terminals receives the supply voltage. If the air volume is low or there is no air and the motor doesn't operate properly or doesn't provide three blower speeds, you can check for a voltage supply and current draw in these three branches of the circuit.

Blower Supply Voltage Test

To test the continuity of voltage to the blower motor (Fig. 20), again use the test light with one probe grounded.

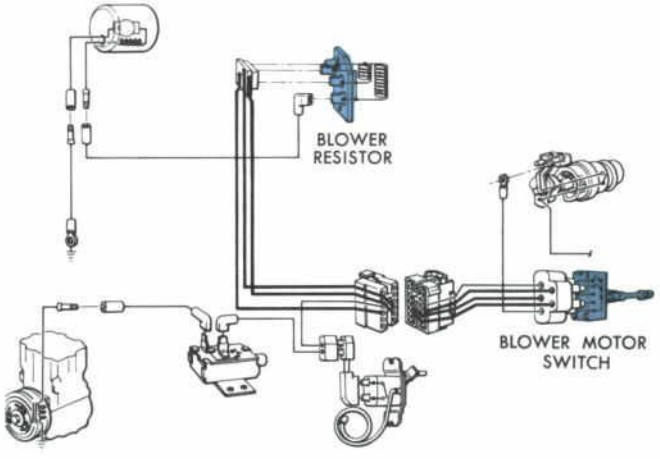
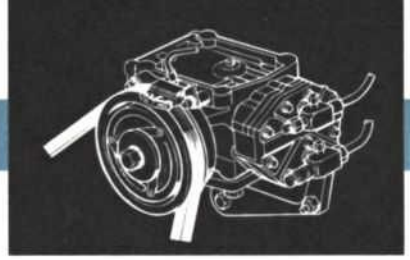


Fig. 20 — Testing Blower Supply Voltage

1. Start at the blower switch and place the probe on each of the L, M and H terminals . . . with the switch set in the corresponding positions. If the light glows at each point, the switch is passing current in each position. If not, the switch is faulty and should be replaced.

2. Move the probe to the three terminals on the resistor . . . again with the switch set to the appropriate positions (Fig. 21). A glowing light at these points means there is continuity through the leads.

3. Proceed to the resistor terminal that leads to the motor to test resistor continuity in all three blower positions. If the resistor doesn't pass current to the light, replace the resistor.



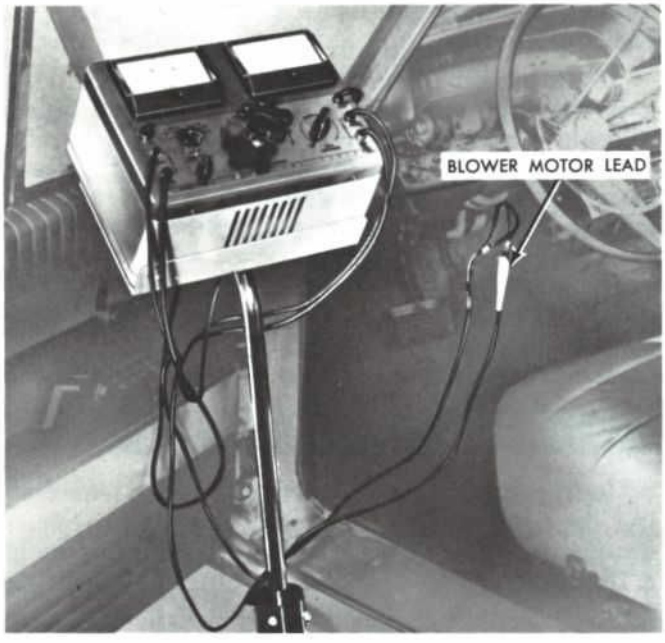


Fig. 21 — Blower Current Draw Test

4. If the trouble still isn't located, continue on to test the lead to the blower motor, the motor itself and the motor ground connection.

Remember that in these tests, the defective part is always somewhere between the points where the light burns and doesn't burn.

Blower Circuit Current Draw Test

A current draw test for resistance in the blower circuit is more conclusive than using the test light. The light will glow even with excess resistance so long as there is continuity in the circuit. The current draw test will tell you definitely if there is excess resistance. This test is illustrated in Fig. 21.

1. Set the ammeter on the appropriate scale for the specified current draw. Disconnect the blower motor positive lead at the connection closest to the blower. Connect the ammeter between this lead and the positive terminal of the battery. Connect to the battery first to prevent battery damage in case of a direct motor internal short. Read the current draw.
2. If the current draw does not meet specifications listed in the applicable shop manual and is low, or shows no current the motor is defective.
3. If current draw is excessive, remove the blower motor and wheel assembly. Check for an obstruction and/or wheel interference or grounded lead. If any is present, the motor is defective and must be replaced. If the current draw at the motor is normal, disconnect the ammeter lead at the battery terminal and connect the ammeter in series with the wiring harness lead. **Make sure the ammeter is on the appropriate scale for the specified current draw.** Check the current draw from the blower circuit and switch.
4. Turn the ignition switch on and read the current draw in each of the three blower switch positions.

If the current draw is not within specifications, there is excessive resistance somewhere in the circuit. Use an ohmmeter and/or inspection to find where it is and correct it. In general, high current draw in all three positions points to the switch or the blower; while high draw in only one position is probably in the resistor, or between the resistor and blower switch.

THERMOSTATIC SWITCH TESTS

You have two tests for a suspected malfunctioning thermostatic switch . . . a point resistance test and an operational test. If the thermostatic switch seemed to be open in the electrical test and its sensing tube was properly positioned in the evaporator, make these two tests:

Point Resistance Test

With the evaporator fairly warm or the sensing tube removed from the evaporator, connect an ohmmeter across the switch (Fig. 22).

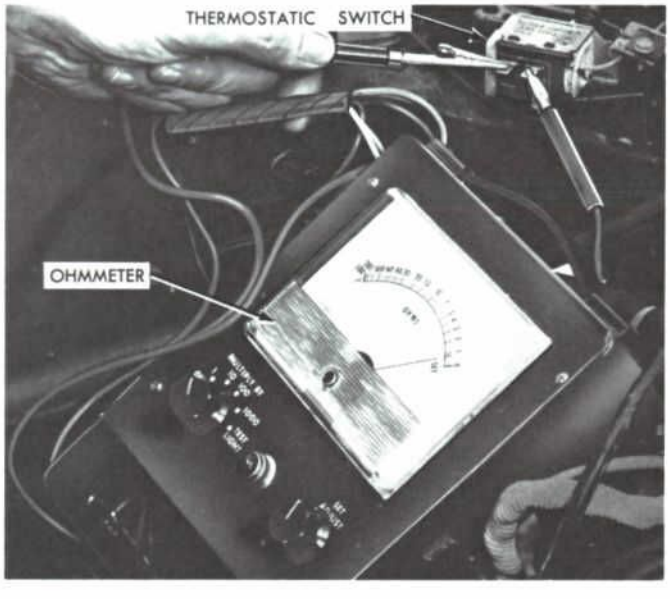
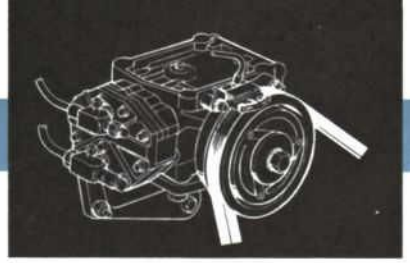


Fig. 22 — Thermostatic Switch Resistance Test



If the resistance through the points is one ohm or more, the switch is faulty and should be replaced. If the resistance is less than one ohm, remove the switch assembly for an operational test. Be extra careful when you pull the sensing tube out of the evaporator.

Operational Test

The operational test (Fig. 23) consists of checking the switch points for opening and closing when the sensing tube is alternately cooled and warmed. A properly-operating thermostatic switch (at maximum setting) opens the compressor clutch circuit when the sensing tube says the evaporator temperature is 28 degrees or lower. It closes the circuit when the evaporator temperature rises to 34 degrees.

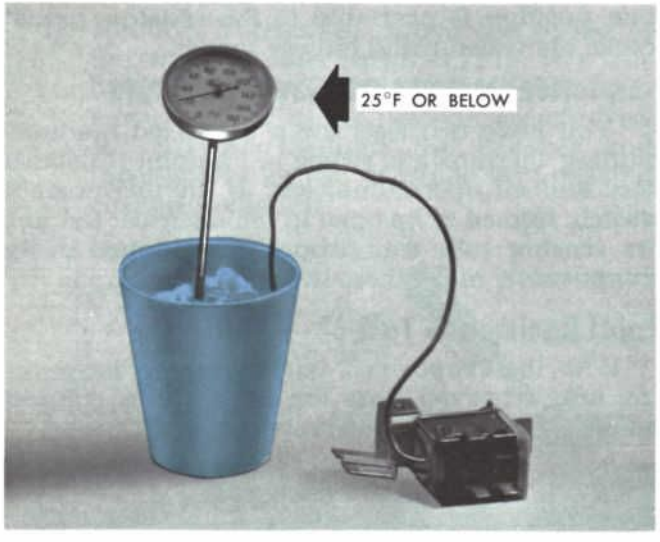


Fig. 23 — Thermostatic Switch Operational Test

For the operational test, you need a glass or pan filled with crushed ice, salt and water. This is the procedure:

1. Place a thermometer in the salt water and be certain the temperature is plus 25°F or lower. If the temperature is higher, you need more salt and ice.
2. If the thermostatic switch is adjustable, set the control for maximum cooling.
3. Put the sensing tube into the iced water. Check that the points open and stay open. If you can't see them, use an ohmmeter to check that they are open. Make sure no salt water or foreign material gets into the switch housing.
4. Remove the sensing tube and let it warm in the air. The points should close immediately with a click and not offer more than one ohm of resistance.

If the switch doesn't pass both tests (3 and 4), it is defective and should be replaced. If it does operate correctly, try reinstalling it with careful attention to contact between the sensing tube and the evaporator. An incorrectly installed tube can fall down on its job of sensing the evaporator temperature.

This concludes the tests of the electrical systems. Any lack of refrigeration efficiency that still exists must be in the refrigeration circuit itself. We'll consider those tests now.

REFRIGERATION SYSTEM TESTING

Refrigeration system testing includes leak testing the connections . . . and connecting pressure gauges into the system to isolate the problem to a malfunctioning component. Since the pressure gauges must also be used when it is necessary to discharge and recharge a leaky system, let's cover them first.

MANIFOLD GAUGE SET

Two pressure gauges (Fig. 24), mounted in a valve **manifold**, form the test assembly called the manifold gauge set.

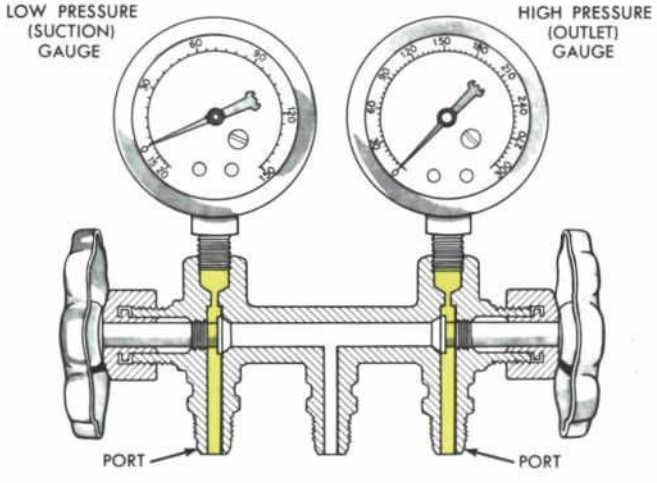
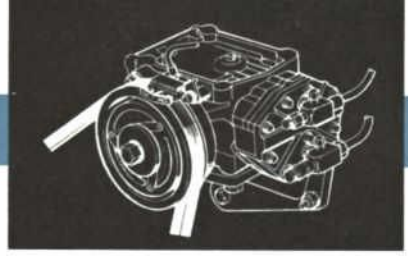


Fig. 24 — Manifold Gauge Set

Suction Gauge

The gauge on the left is a low-pressure gauge calibrated from 0-150 psi (pounds-per-square-inch) for pressure reading, and from 0-30 inches of mercury (in. Hg) to allow you to read vacuum. The low-pressure gauge is always connected to the inlet or **suction** service valve on the compressor.



For simplicity, let's call this gauge the **suction gauge** and call its reading **suction pressure** through the rest of this handbook.

Outlet Gauge

The high-pressure gauge on the right is calibrated to 300 psi. It is always connected to the **outlet** service port on the compressor. The compressor outlet, of course, operates at relatively high pressure (Fig. 1) anytime the compressor is compressing.

We'll refer to this high pressure gauge as the **outlet gauge** and to its reading as **outlet pressure** You may also hear it called **head** pressure or **discharge** pressure.

Center T-Fitting

A center T-fitting is incorporated into the manifold to service the refrigerant. For discharging or emptying the system, a hose from the T-fitting is placed into an exhaust outlet. To completely **evacuate** the system (pump it dry) we connect this fitting to a vacuum pump. For recharging, a refrigerant container is connected to the fitting.

Gauge Valves

Each side of the gauge set is equipped with a valve that can connect the gauge port to the center T-fitting. In Fig. 24, both valves are closed . . . that is, there is no refrigerant flow path to or from the T-fitting. In Fig. 25, the suction valve is open and the gauge, gauge port and center of the manifold are interconnected. Notice that the gauges are always connected to their respective ports regardless of valve positions.

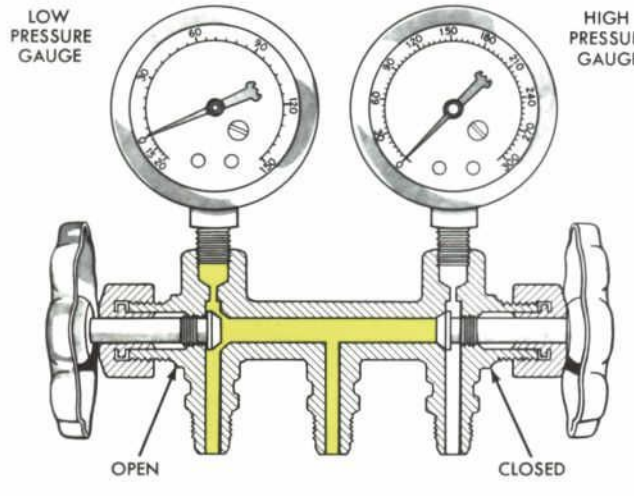


Fig. 25 — Gauge Set Suction Valve Open

Hose Connections

Hose connections to the gauge set ports are sealed vapor-tight by neoprene O-rings. It is unnecessary **and undesirable** to tighten these fittings with wrenches.

Anytime the gauge set is not in use, the hose fittings should be plugged to keep out dirt and moisture.

CONNECTING TO COMPRESSOR

To connect the gauge set to the compressor, first close both gauge set valves. Check that both service valves on the compressor are back-seated (Fig. 11). This blocks pressure in the system from the gauge port caps. You then can remove the caps and install the manifold gauge set hoses. **Be certain the suction gauge is hooked up to the inlet service valve and the outlet pressure gauge to the outlet service valve.**

PRESSURE TESTING

A pressure test, if properly interpreted, often will give definite indications of malfunctions in the refrigeration system. The key to interpreting the pressure test is comparing the suction and outlet pressures. The pressure reading will depend a good deal on how hard the system is working . . . or how much heat it is handling. On a hot, humid day, the pressures will be high; in cool weather they'll be much lower. Suction pressure usually ranges from 10-50 psi. The outlet pressure should indicate 80-300 psi (Fig. 26).

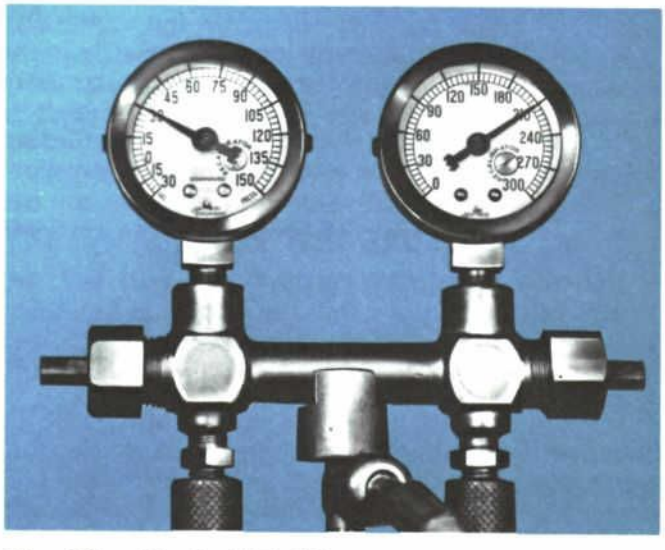
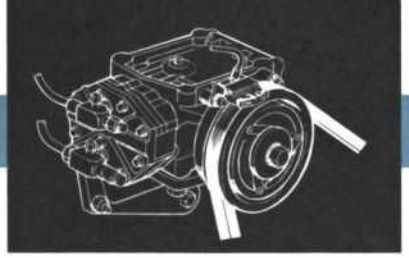


Fig. 26 — Typical Test Pressure



The test is made with the engine operating at 1500 rpm and controls set for maximum cooling and high blower speed. The gauge set valves are closed and the service valves are positioned off both seats (Fig. 27). The gauge ports, lines and compressor ports thus are interconnected.

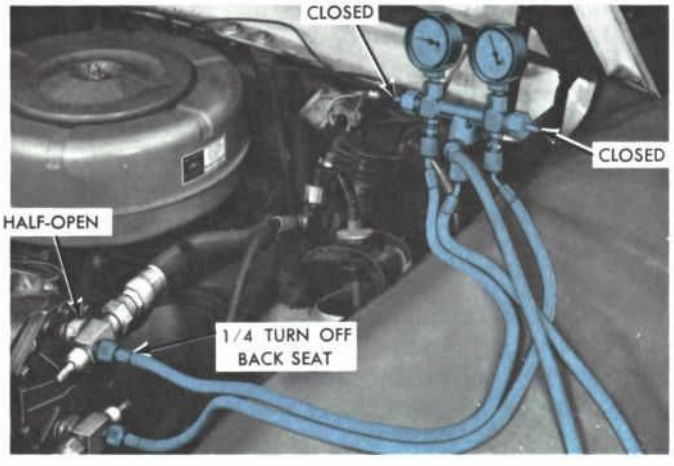


Fig. 27 — Pressure Testing

1. Turn the outlet service valve one quarter turn away (clockwise) from the back-seated position and turn the inlet service valve to the mid-position.
2. Observe the gauges. Record the pressure readings on both gauges with the system operating and normalized. If the outlet pressure fluctuates, close the service valve slightly to stabilize it. If the suction pressure does not stabilize and varies more than 10 pounds pressure on the gauge, stop the engine. Remove the expansion valve insulation. Remove the expansion valve thermal bulb and clamp. Clean the bulb, clamp and suction line thoroughly and reinstall the bulb. Make sure it is clamped securely. Install the insulation. Start the engine and check system pressure again.

PRESSURE TEST RESULTS

Normal readings on the pressure test are pretty fair indicators that the system is functioning as it should, and probably has a full charge of refrigerant. But let's see what abnormal readings tell you.

Suction Pressure Low: Outlet Pressure Normal

If only the suction pressure is abnormally low, there is probably a restriction between the receiver and the expansion valve, or between the expansion valve and the inlet service valve. Check for a restriction by feeling the lines and components. Any part that is cold to the touch or frosted up may be restricted. Repair or replace the restricted parts as required.

If there are no restrictions, exhaust the charge slowly through the suction service valve gauge port and observe the discharge system pressure gauge. If the discharge pressure does not drop below 70 pounds on the gauge, the expansion valve is stuck shut. Replace the valve. If the discharge gauge pressure does drop, exhaust the entire charge. Evacuate the system and recharge with the prescribed weight of refrigerant.

Suction Pressure Extremely Low (Vacuum)

If you read a vacuum on the suction gauge, the expansion valve is probably not opening at all. This means no refrigerant is getting into the evaporator and therefore you're getting no cooling.

Exhaust the charge slowly through the suction valve gauge port and observe the discharge (outlet) pressure gauge. If the discharge pressure does not drop below 70 psi the expansion valve is stuck shut. Replace the expansion valve.

If the discharge gauge pressure does drop, exhaust the entire charge. Evacuate the system and recharge with the prescribed weight of refrigerant.

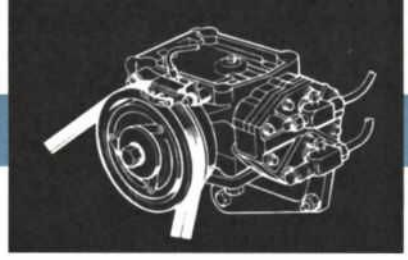
Suction Pressure High, Outlet Pressure Normal

When the suction pressure alone is abnormally high, it means the expansion valve is "flooding" the evaporator . . . that is, letting in too much liquid refrigerant. The refrigerant then hasn't room to expand and it doesn't all evaporate. Some liquid is passed on to the compressor. The suction side of the compressor, and the crankcase and head, will probably be colder than normal and may even be frosted.

Try to correct this problem first by installing the expansion valve's sensing bulb tightly in its tube in the evaporator. Unless the bulb has good contact, it will signal the valve to pass on too much refrigerant. If the problem persists with good bulb contact, replace the expansion valve.

Suction Pressure High, Outlet Pressure Low

If the suction gauge shows a very high reading and outlet pressure is very low, it means the compressor just isn't compressing the refrigerant. Typically, the two pressures may be within 30 psi of each other in this condition.



If the two pressures are equal or within 30 pounds of each other, the compressor may be defective. Perform a "Compressor Test". Repair or replace the compressor, as required.

To correct it, the compressor must be repaired. Look for a blown head gasket or faulty valves causing a leak between the inlet and outlet; or for a broken crankshaft. Compressor repairs are covered in the next section.

Outlet Pressure Above Normal

High outlet pressure with normal or near-normal suction pressure means the compressor is being overworked. The possible causes are an overcharge of refrigerant, air in the system, clogged air passages in the condenser, a restriction between the compressor inlet and the receiver or high surrounding air temperature. Look for and correct kinks in the high-pressure line and restrictions to condenser air flow. If the refrigerant is overcharged or has air in it, the system must be evacuated and fully recharged with refrigerant.

COMPRESSOR TEST

It will not be necessary to attach the Refrigerant-12 tank or vacuum pump to the manifold gauge set installed on the compressor. Set both manifold gauge valves at the maximum clockwise, or closed, position. Close the suction service valve (maximum clockwise position).

Operate the engine at 1500 rpm. Set the air conditioner controls for maximum cooling to engage the compressor clutch. The suction gauge should read 20 inches of vacuum within 30 seconds. Disengage the clutch by setting the air conditioner controls to OFF. The suction gauge should remain below zero psi for at least one minute.

If the compressor does not satisfy these two conditions after at least three cycles of clutch engagement, the compressor has either a blown head gasket or faulty valves. Remove the head and inspect the valve plate for damage. Replace the valve plate if necessary. Replace the compressor if the cylinder walls are scored or pieces of metal are imbedded in the pistons.

LEAK TESTING

Leak testing is required to avoid accidental loss of the charge anytime the system has been opened. We must also leak test whenever we know part of the charge has been lost . . . so that we can correct the leak before recharging.

The leak test operation must be performed only with the engine turned off.

A gas-operated leak detector (Fig. 28) is the tool most often used for leak testing. A copper disc in the detector is heated by the flame from a propane bottle. A "sniffer tube" or search hose is attached so that gases are drawn up and directed to the flame.

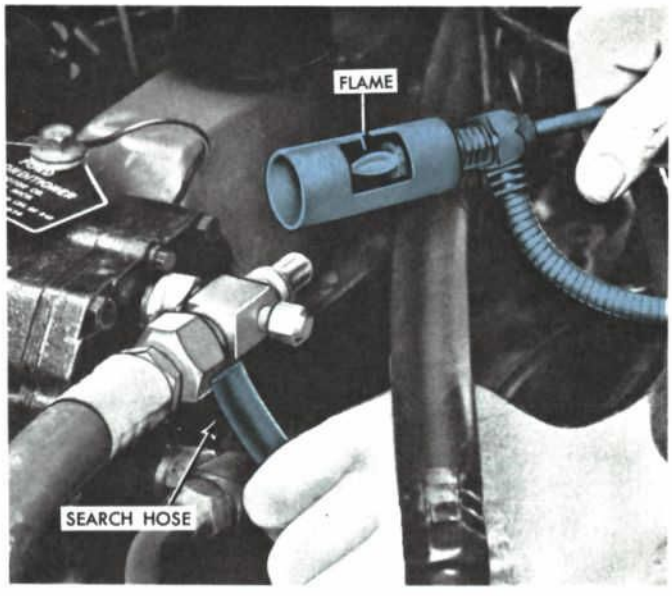


Fig. 28 — Gas-Operated Leak Detector

If these gases contain a small amount of refrigerant, the normal pale blue color of the flame turns to a yellow-green or green. A large concentration of refrigerant in the system will cause a brilliant blue or purple flame.

To use the torch, adjust the flame as small as possible. A small flame is more sensitive to leaks; a large flame detects only large leaks. Hold the end of the search hose **under** the fitting you're testing, since the refrigerant is heavier than air. Also watch that the copper element is always red hot. If the element becomes burned away, replace it.

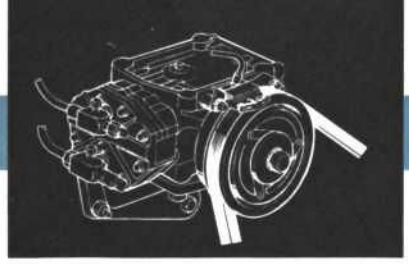
Be certain you are in a well-ventilated area. Do not breathe the fumes from the detector . . . they may be poisonous.

SERVICE

SERVICING THE REFRIGERANT

DISCHARGING THE SYSTEM

Except for the compressor, we cannot remove any refrigerant-carrying part of the system without first discharging the refrigerant. Discharging the refrigerant doesn't completely empty the system, but does relieve the pressure so we can open the system.



1. Connect the manifold gauge set to the compressor with both gauge valves closed and both service valves back-seated.
2. Connect a discharge hose (Fig. 29) to the T-fitting at the center of the manifold and put the other end into an exhaust outlet.

Fig. 29 — Discharging the Refrigerant

3. Open the outlet gauge valve to connect the high-pressure side of the compressor to the discharge hose.
4. Open the outlet service valve just slightly to let the refrigerant escape slowly as a vapor.

Should you allow the refrigerant to discharge too quickly, compressor oil may come out with it. Watch the open end of the hose and reduce the flow if you see oil.

5. As soon as the refrigerant is discharged, again back-seat the service valve and close the gauge valve. This will keep air and moisture from finding their way into the system.

Remember, if you don't have an exhaust outlet, stick the discharge hose out a window or door to the outside. Never discharge the refrigerant into any work area . . . and never get near refrigerant without safety goggles on.

EVACUATING THE SYSTEM

Before the system is charged, it must be completely evacuated with a vacuum pump. Figure 30 shows the vacuum pump and refrigerant bottle connected to the T-fitting to first evacuate and then charge the system simply by opening and closing valves. The vacuum pump outlet should be placed in an exhaust outlet.

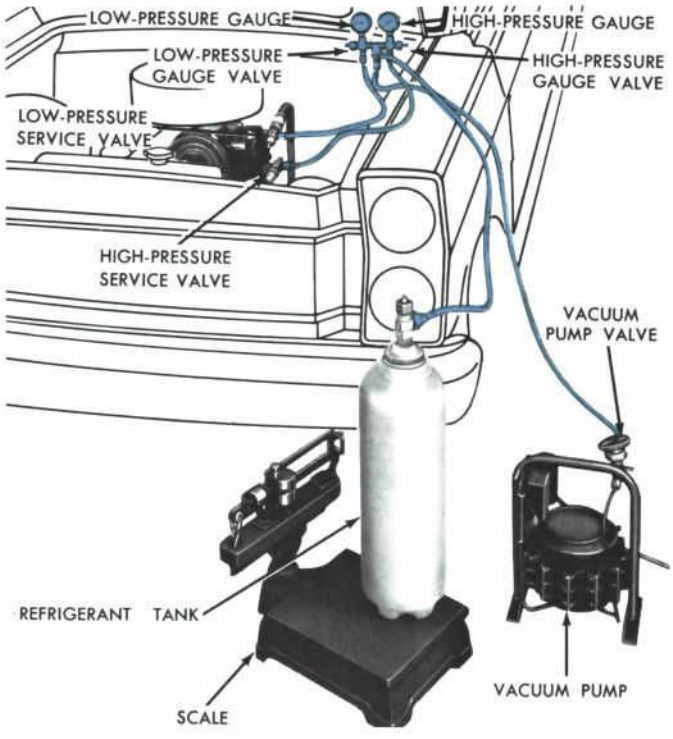


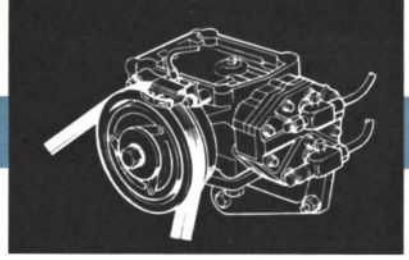
Fig. 30 — Evacuating and Charging Connections

This is the evacuation procedure:

1. Be certain the refrigerant tank valve and the vacuum pump valve are tightly closed. **Never open the vacuum pump valve when there is pressure or the pump will be damaged.**
2. Set both service valves to their mid-positions and open both gauge valves (Fig. 31).
3. Loosen a hose connection to release any pressure remaining after discharging the system. Then retighten all connections.
4. Open the vacuum pump valve and start the pump.
5. Watch for a vacuum reading of 25 inches on the suction gauge; then continue pumping for 20 to 30 minutes to remove any moisture from the system.
6. Close the vacuum valve before stopping the pump.

CHARGING

The system is charged through the suction side of the compressor with the engine operating at 1500 rpm and the controls set for maximum cooling and high blower speed. The refrigerant



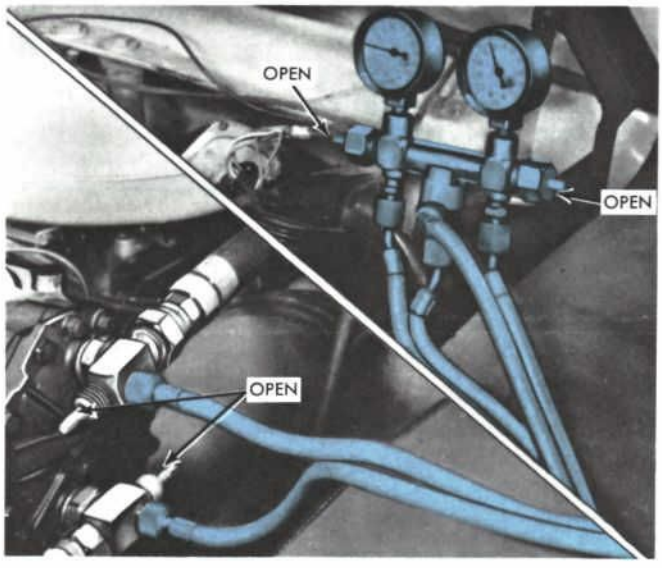


Fig. 31 — Valve Positions During Evacuating

container is left upright so that refrigerant enters as a vapor. Pouring in liquid refrigerant could damage the compressor. We measure the amount of refrigerant that goes into the system by weight. The valves are positioned as shown in Fig. 32.

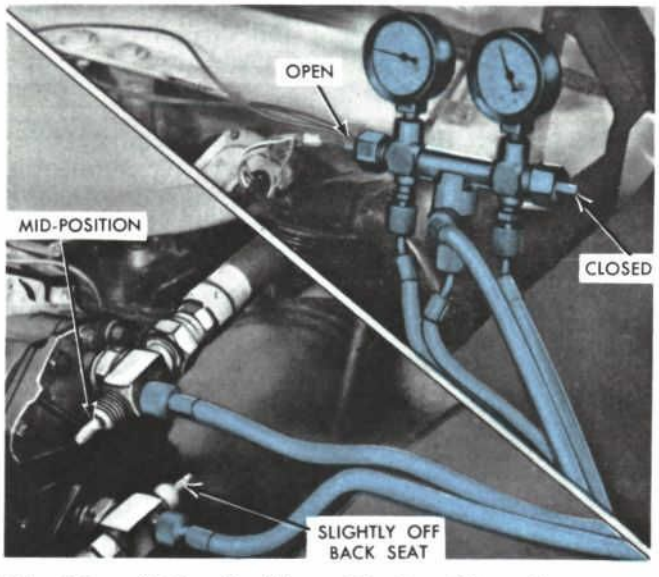


Fig. 32 — Valve Positions During Charging

1. Open the suction gauge valve to connect the center T-fitting to the inlet service valve. Close the outlet gauge valve. Leave both service valves centered.
2. Place the refrigerant tank on a scale and record its weight. Subtract the specified charge from this weight so you'll know when to stop charging.
3. With the engine operating and controls properly set, open the valve on the refrigerant tank.
4. When the scale indicates that the proper charge has been added, close the tank valve.
5. Perform a pressure test.
6. Back-seat both service valves and stop the engine.
7. Disconnect the gauge set and replace the caps on the gauge ports and the service valves.
8. Leak test the system with a flame detector. **No leaks are permissable.**

Do Not Partial Charge

The charging procedure should be performed only after discharging and evacuation. Ford does not recommend any other method. Partial charging, except to produce enough pressure for leak testing, can result in an overcharge and damage to the system.

Charging From One-Pound Cans

Refrigerant also comes in one-pound cans to make it easier to measure while you're charging the system. If you use these cans, connect them in an upright position . . . the same way as the bottle (Fig. 33). Use the special valve provided.

The can becomes very cold because the refrigerant vaporizes above the liquid level. When the can is empty, close the valve, remove the empty can, attach a new can and continue charging.

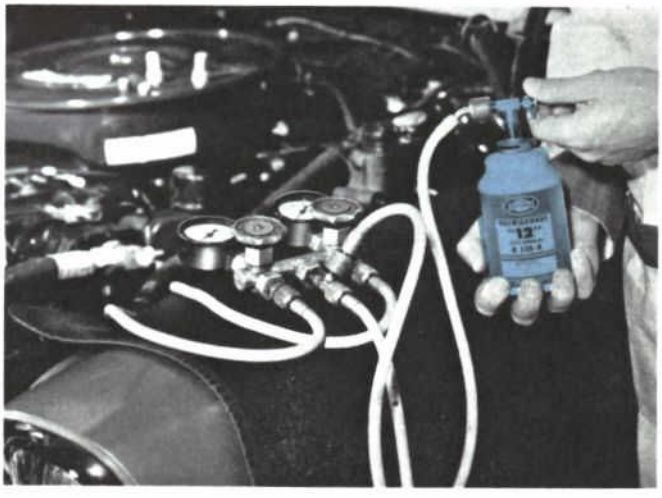
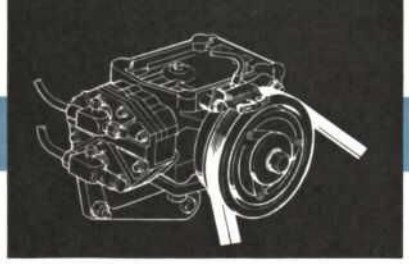


Fig. 33 — Charging with Pound Can



When you need a half pound of refrigerant such as with a 2-1/2 pound charge capacity, stop charging from one can when extreme cold is felt half-way down the can. Weigh the can to make sure one-half pound of refrigerant is installed.

AIR CONDITIONING SERVICE STATIONS

The Rotunda line of shop equipment contains two air conditioning service stations (Fig. 34), both have provision for measuring the refrigerant charge in a graduated cylinder. A 25-pound gas bottle is mounted on or in the station and feeds a five-pound capacity cylinder.

Figure 34 — Rotunda Air Conditioning Service Stations: A-Standard; B-Deluxe

These stations also contain all necessary gauges, hoses and vacuum pumps for air conditioning service. Complete instructions are included with the equipment.

COMPRESSOR SERVICE

ISOLATING THE COMPRESSOR

When only the compressor requires service, it can be isolated from the rest of the system without losing the refrigerant charge. With both service valves front-seated (Fig. 35), the suction and outlet lines to the compressor are sealed by the valve head and the compressor can be serviced. If necessary, such as to replace the compressor, the valves can be removed from the compressor head and will hold the refrigerant charge.

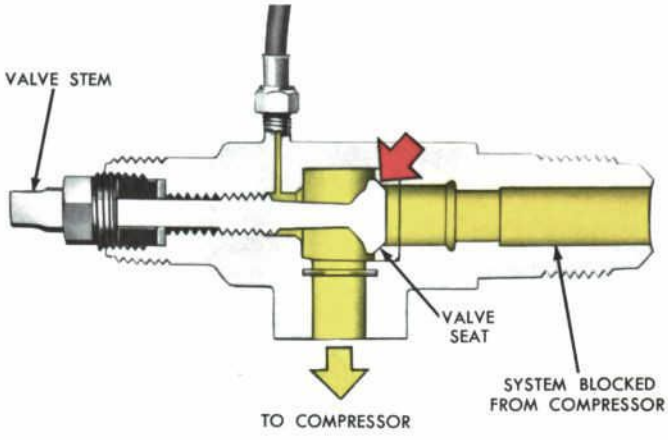


Fig. 35 — Front-Seated Service Valve

Isolate the compressor with the manifold gauge set connected (Fig. 36) as follows:

1. Turn the inlet service valve fully in until it is front-seated.
2. Operate the compressor intermittently by connecting and disconnecting the clutch lead until the **suction** (low pressure) gauge reads zero.
3. **For safety, disconnect the clutch lead before front seating the discharge service valve.** Turn the outlet service valve fully in to front-seat it.
4. Loosen the high pressure gauge port cap a small amount to relieve any remaining refrigerant pressure from the compressor. **Do not remove the cap until you are sure the pressure is relieved.**

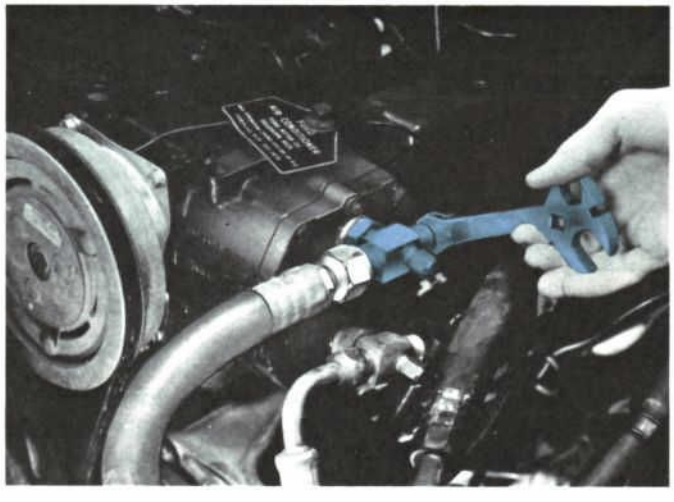
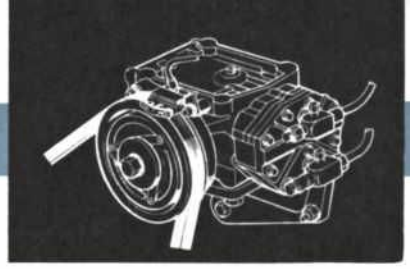


Fig. 36 — Isolating Compressor



To connect the compressor back into the system:

1. Evacuate the compressor with the vacuum pump connected to the gauge port on the outlet (high pressure) service valve; or through the manifold gauge set high pressure service valve gauge port.
2. Close the vacuum pump valve and backseat both service valves.
3. Remove the manifold gauge set hoses and replace the caps on the gauge set and service valves.
4. Check for leaks with a flame detector. **No leaks are permissable.**

CHECKING COMPRESSOR OIL LEVEL

In normal operation, it usually isn't necessary to check the compressor oil. Unless there is a leak, the oil can't go anywhere except through the sealed system. When the compressor is first started, some of its oil is pumped into the refrigeration system. Most of it is returned to the compressor crankcase after about 15 minutes of operation.

You should check the compressor oil level only if some part in the system is being replaced; of if the refrigerant is being serviced because of a system leak.

Oil Dipsticks

Compressor oil dipsticks are a do-it-yourself project. Make them from 3/16 x 1/16 flat stock as shown in Figure 37 (York Compressor) and Figure 38 (Tecumseh Compressor). Each dipstick has two ends . . . for horizontal or vertical-mount compressors.

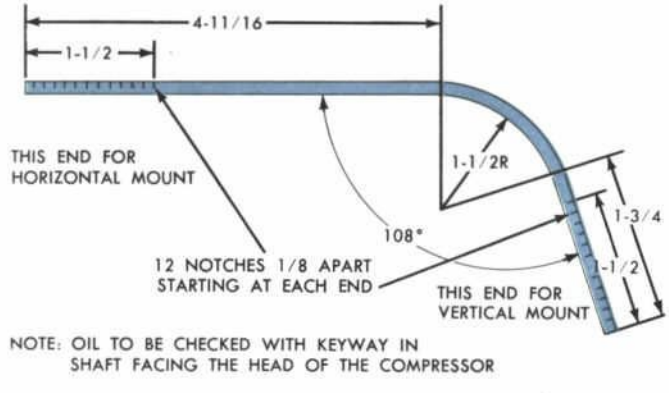


Fig. 37 — Oil Dipstick for York Compressor

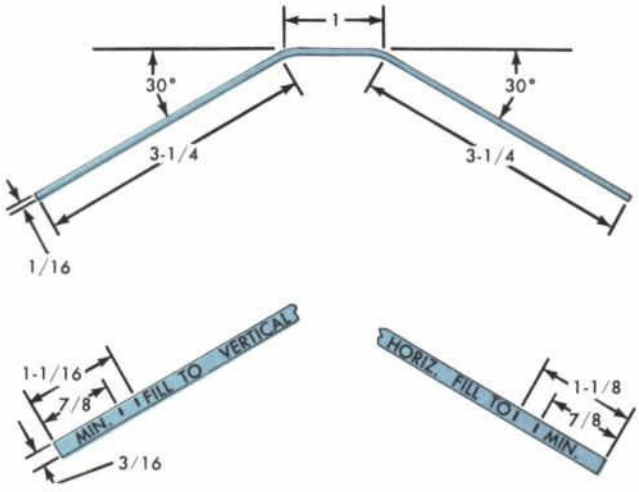


Fig. 38 — Oil Dipstick for Tecumseh Compressor

Checking Procedure

Check the oil after the system has been charged, and then has been operating at maximum output for 15 minutes. Engine speed during this time should be 1500 rpm and the surrounding air temperature 60 degrees Fahrenheit or higher.

1. Stop the engine.
2. Isolate the compressor.
3. Remove the oil filler plug (Fig. 39) very slowly to release any trapped pressure.

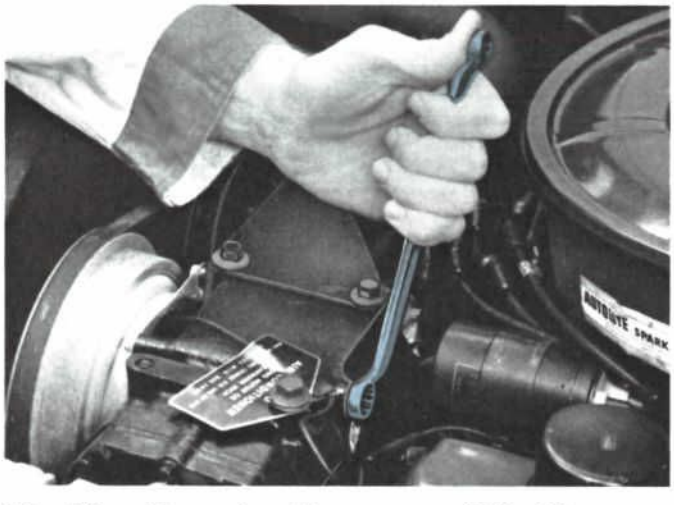
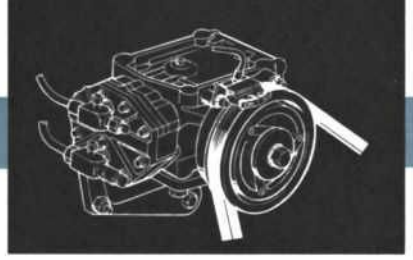


Fig. 39 — Removing Compressor Filler Plug

4. Insert the clean dipstick in the oil filler hole until it bottoms in the crankcase. If necessary, turn the compressor crankshaft slightly by hand to bottom the stick. Remove the stick and read the oil level. Compare it with the shop manual specification.



Oil Recommendations

If more oil is needed in the compressor, use one of these:

Sunisco 5 Compressor Oil
Capella E Compressor Oil

Never add engine or transmission oil.

Sometimes when a new compressor is installed, oil pumped back in from the system will over-fill the crankcase. If the oil level is higher than maximum specified, draw some out with a syringe until the proper quantity is indicated.

After replacing the filler plug, evacuate the compressor. Connect it back into the system and leak-check the filler plug opening for refrigerant leaks with a flame detector. **No leaks are permissable.**

REPLACING THE COMPRESSOR

Service compressors are shipped dehydrated and pressurized with refrigerant, and have their crankcases filled with the proper amount of oil to reduce the time required for replacement.

If the system happens to be fully discharged or evacuated when you decide to replace a compressor, it should be pressurized slightly to prevent air or moisture getting in when it's opened.

To check for a charge, connect the suction (high) pressure gauge and read the pressure. If it is a positive reading (above zero), go ahead with the replacement. Connect one center hose to the refrigerant supply tank (Fig. 30) and the other to the vacuum pump, with the vacuum pump closed, and charge the system to 50 or 60 psi outlet pressure. Check for leaks and repair any you find, except in the compressor being replaced.

Isolate Old Compressor

To remove the old compressor:

1. Front-seat the inlet (suction) service valve and operate the compressor until the suction (low pressure) gauge reading drops to 2 psi.
2. Front-seat the outlet (high pressure) service valve. The compressor is now isolated.
3. Carefully remove the service valves from the compressor (Fig. 40) and cap them to prevent dirt getting in.

Remove Compressor Clutch

4. Energize the compressor clutch, and loosen and remove the clutch mounting bolt.

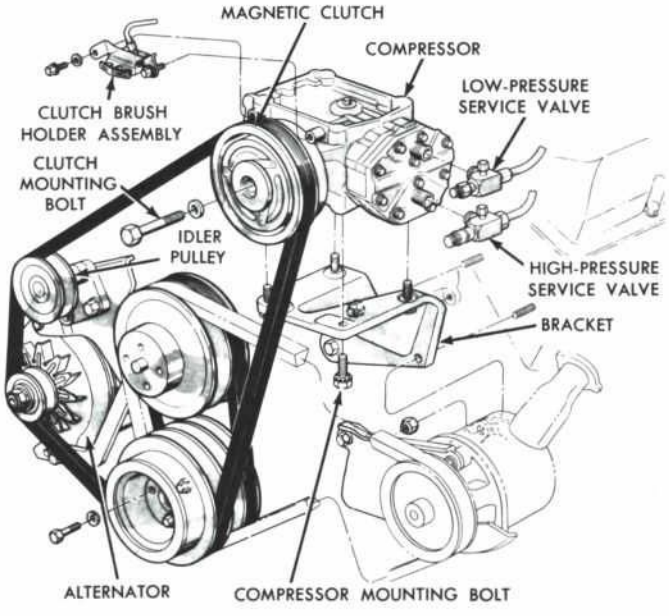


Fig. 40 — Typical Compressor Installation

5. **Do not drive off the clutch with a hammer.** Install a 5/8-11 bolt in the clutch driveshaft hole (Fig. 41). With the clutch still energized, tighten the bolt to loosen the clutch from the shaft.
6. De-energize the clutch and disconnect the lead wire at the bullet connector.

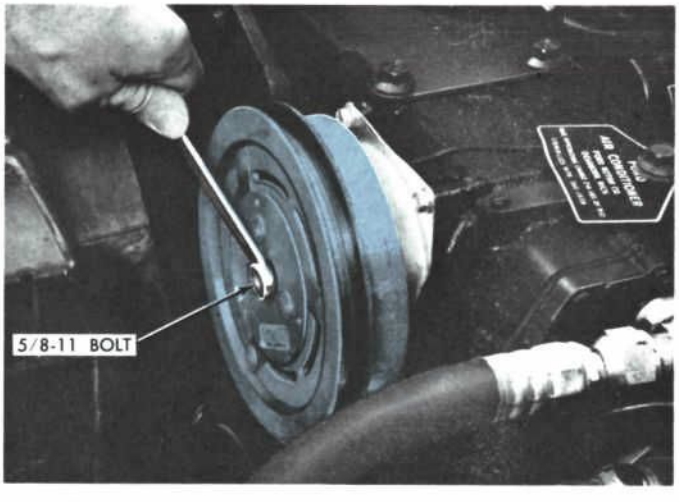
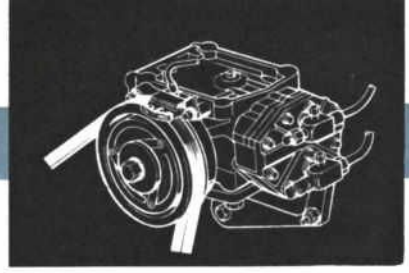


Fig. 41 — Removing Compressor Clutch

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

Check Brushes

8. Examine the applicable field or clutch



brushes to determine if replacement is necessary.

Remove Compressor

9. Remove the compressor mounting bolts and carefully remove the compressor from the car. Remove the clutch brushes or field from the compressor.
10. If the replacement is under warranty, seal the ports in the compressor head and tag the unit with the claim number.

Install New Compressor

Installing the new compressor, be sure to leave the plugs in the service valve ports as long as possible. The refrigeration line connections are made after the compressor is mounted and the clutch and belts installed.

1. Install the applicable clutch brush and holder or field assembly on the compressor. Make sure the specified field mounting bolts are used. Carefully mount the new compressor and install the mounting bolts to the torque specified in the shop manual.
2. Install the magnetic clutch with a new bolt and washer. Be careful to align the clutch properly with the crankshaft and drive key.
3. Energize the clutch and torque the mounting bolt to 20-30 foot pounds.
4. Install the drive belt and adjust the belt tension as described on page 9 (Fig. 8).
5. Install new O-rings in the service valve fittings. (O-rings are included with service compressors). Inspect the mounting surfaces on the valves for cleanliness.
6. Remove the shipping caps and plugs from the valve ports in the compressor. Make sure the valve O-ring gaskets are properly positioned. Install the service valves, being careful to align them properly.
7. Tighten the service valve-connecting flare nuts to a maximum of 35 foot pounds torque.

Always be very careful not to get dirt or other foreign material in the compressor during installation. Never leave a new replacement compressor unsealed for more than five minutes.

8. Leave the service valves front-seated and evacuate the compressor to 25 in. Hg. vacuum with the vacuum pump.
9. Close the vacuum pump valve and stop the pump.
10. Back-seat the service valves and operate the system for five minutes at fast idle.
11. Check for leaks with a flame detector. **No leaks are permissable.**
12. Check the drive belt alignment.
13. Check the refrigerant oil level.

OPENING THE REFRIGERATION SYSTEM

To service other refrigerant-carrying parts of the system, the refrigerant must be discharged (Fig. 29). After discharging, open the system very carefully in case all the refrigerant wasn't removed. Whenever possible, use two wrenches (Fig. 42), to avoid twisting the tubing and deforming or breaking a service valve or fitting. Use special tubing wrenches for tube fittings. They will not crush the fittings as end wrenches might.

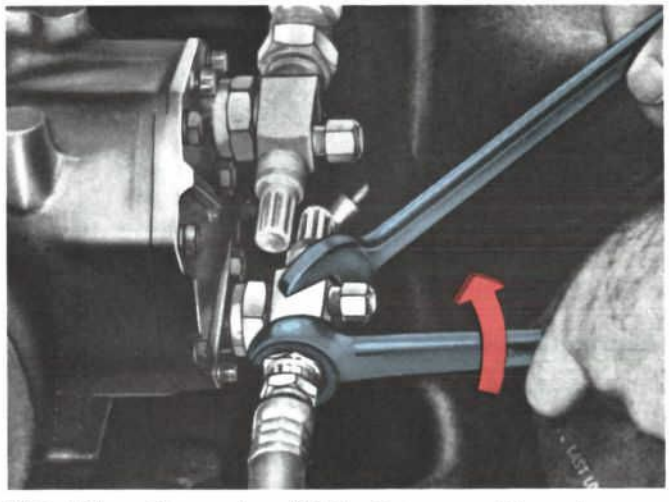
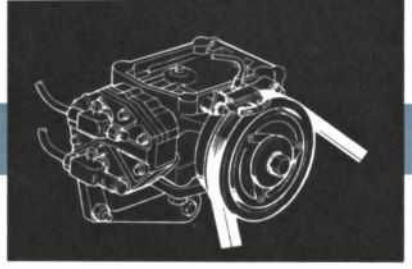


Fig. 42 — Removing High-Pressure Line at Compressor

EXPANSION VALVE REMOVAL AND TESTING

If your original diagnosis indicated a faulty expansion valve use a sharp knife to cut through the insulating material around the valve and remove the insulation wrapping from the sensing bulb. Check the contact between the sensing bulb and the evaporator outlet tube. The surface must be clean and corrosion free and the bulb clipped firmly to the tube. Make any necessary corrections. Wrap the insulating material around the valve again and recheck system pressures.

If your diagnosis indicated a faulty expansion valve, and correcting the sensing bulb contact did not eliminate the trouble, the valve must be removed for testing:



1. Discharge the system.
2. Use a sharp knife to cut through the insulating material around the valve. Peel the material back from the valve.
3. Remove the sensing bulb clip and carefully pull the bulb from the evaporator tube. If an external pressure balance tube is used, disconnect it.
4. Use two wrenches to disconnect the high pressure line that leads from the condenser (Fig. 43). Front-seat the outlet service valve or plug the disconnected line.

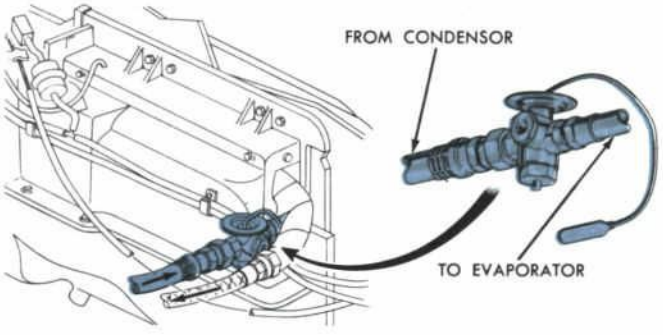


Fig. 43 — Expansion Valve Installation

5. Hold the expansion valve fitting in the evaporator with a wrench and screw the valve out.

Testing Expansion Valve

To test the expansion valve, blow through it. It should be open. If you cannot blow through the valve, the sensing bulb has lost its charge. Replace the valve.

INSTALLING EXPANSION VALVE

1. Install a new expansion valve to the core.
2. Position the sensing bulb in the clamp and tighten the retaining screws. Be sure that both the sensing bulb and clamp are clean.
3. Connect the high pressure hose to the expansion valve.
4. Evacuate and charge the system.
5. Test the connections for leaks with a flame detector. No leaks are permissable. Then install the insulation.

COMPRESSOR REPAIR

VALVE PLATE AND HEAD GASKET SERVICE

Identical procedures are used for replacing a blown head gasket or a faulty valve plate . . . both conditions that you diagnose by pressure testing. Failure of the compressor to develop output pressure is usually traced to one or the other.

If, at disassembly, you find that the valve plate has caused the cylinder walls to become scored, or has imbedded metal in the piston head that cannot be removed, reassemble and replace the compressor.

Removing Cylinder Head and Valve Plate

1. Isolate and remove the compressor.
2. Remove all bolts from the cylinder head (Fig. 44).

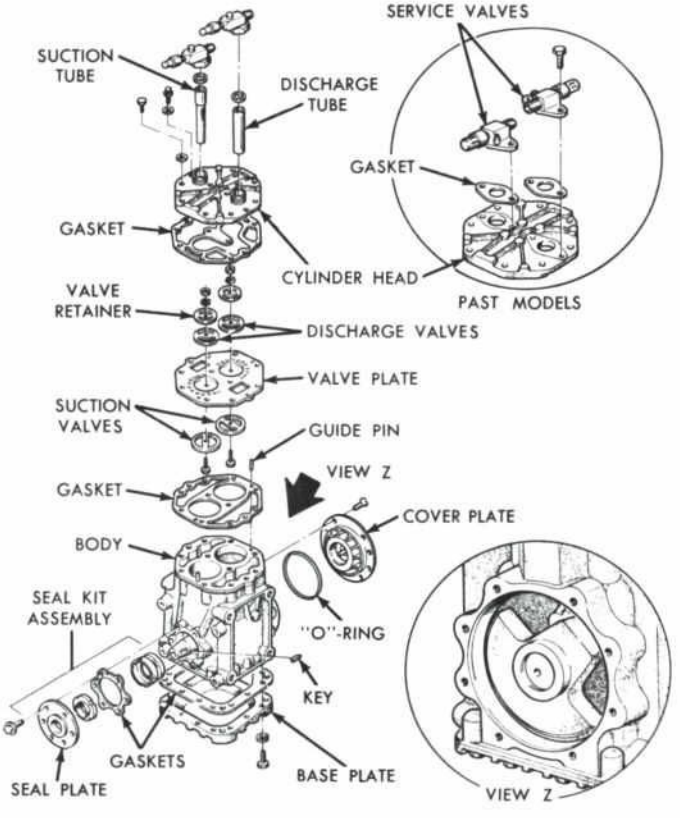
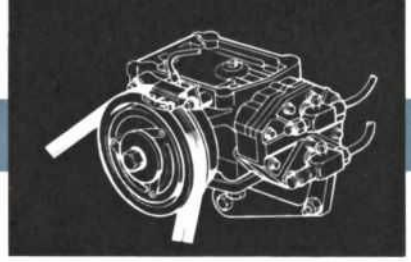


Fig. 44 — Compressor Service — York Compressor

3. Remove the valve plate and cylinder head assembly from the crankcase by tapping upward with a fiber hammer on the overhanging edge of valve plate. **Don't** pry on the head.
4. Remove the valve plate from the cylinder head by holding the cylinder head and tapping against the valve plate.
5. Remove all particles of gasket, dirt and foreign material from surfaces of the cyl-



inder head and cylinder face, being sure not to scratch or nick mating surfaces or any edges.

Installing Head and Valve Plate — York Compressor

1. Apply a thin film of clean refrigerant oil on the area of the crankcase 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.
2. Install the valve plate over the gasket so the dowel pins locate it.
3. Place the new head gasket in position on the valve plate so the dowel pins go through the dowel pin holes in the gasket.
4. Apply a light film of clean refrigerant oil on the machined surface of the cylinder head which matches the head gasket. Place the head on the cylinder head gasket so that the dowel pins go into the dowel pin holes in the head.
5. Insert the two longer cap screws in the center of the head. Insert the remaining head cap screws around the edge. Insert four twelve-point head screws in the holes closest to the service ports. Run in all cap screws until they contact the head.
6. 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.

Installing Head and Valve Plate — Tecumseh Compressor

1. Apply a thin film of clean refrigerant oil on the area of the crankcase to be covered by the valve plate gasket. Position the valve plate gasket on the crankcase cylinder face (Fig. 45).
2. Apply a thin film of refrigerant oil to both sides of the valve plate assembly. Place the valve plate assembly over the valve gasket so that the letter "S" stamped on the valve plate is visible on the same side as the word "SUCTION" on the front of the crankcase, and so that its mounting holes properly line up with those of the valve plate gasket and cylinder face.
3. 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.
4. 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 the front of the crankcase and its holes lined up with the holes in the gaskets, valve plate and cylinder.
5. Insert mounting bolts in the head, with four twelve-point head bolts in the holes closest to the service ports. Run in all bolts until they contact the head. Tighten them in a sequence so that the bolts diagonally opposite each other are evenly drawn to a torque of 20-24 ft. lbs.

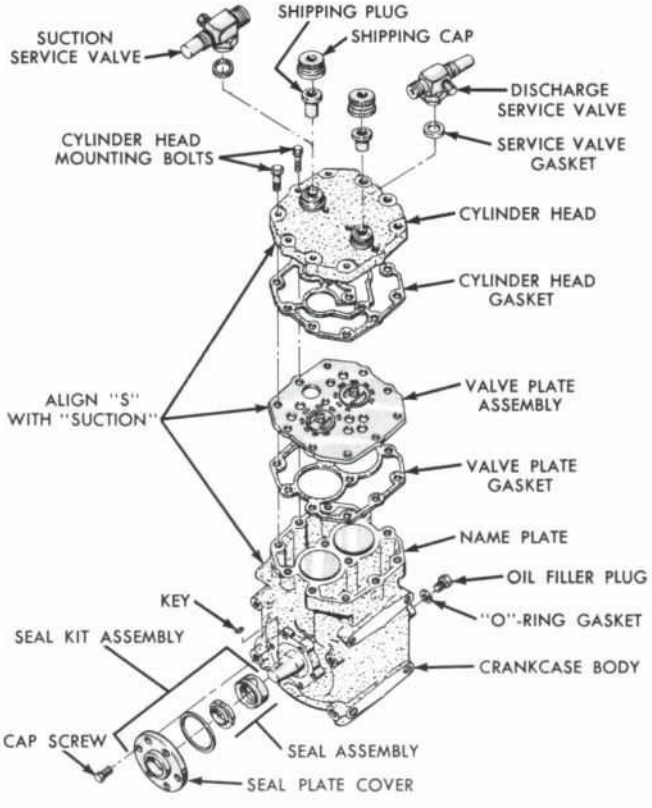
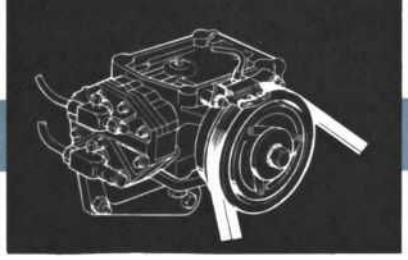


Fig. 45 — Compressor Service — Tecumseh Compressor

After reassembling the compressor, install it in the vehicle, evacuate it, and leak test it with a flame detector. **No leaks are permissable.** One-



half hour after reassembly, again tighten the cylinder head bolts to the specified torque.

CRANKSHAFT SEAL REPLACEMENT

Extreme care is a must when you service the crankshaft seal to avoid damaging lapped surfaces and other seal parts. The seal surface on the shaft must be completely free of scratches or burrs. The entire seal housing cavity must be perfectly clean.

Removing Crankshaft Seal Assembly

1. Isolate and remove the compressor.
2. Wash or clean the seal plate and adjoining surfaces of all dirt and foreign materials.
3. Remove the seal plate cap screws (Figs. 44-45) 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. The drive ring is the part 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.

Inspecting and Cleaning Seal Area

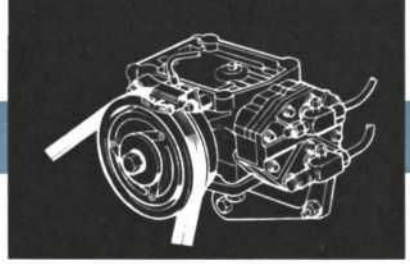
1. Inspect the face of the crankshaft front bearing journal in the seal housing to make certain that there are no nicks or burrs. Check the shaft surface to be sure it is not cut or scratched. Check all parts of seal assembly to be installed for transit or handling damage.
2. Inspect internal compressor components for foreign material before replacing seal assembly.
3. Wash all portions of the seal assembly in clean refrigerant oil.

Replacing Seal Assembly — York Compressor

1. 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 that the slots in the seal drive ring engage the drive pins on the shaft bearing journal face.
2. If the carbon ring is separate, place it in the ring retainer so that the polished surface is facing out. The carbon ring must engage the driving lugs and be fully seated in the ring retainer.
3. Place a very light film of clean refrigerant 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.
4. Place the seal plate cover in position with the polished surface facing the carbon ring, and insert the cap screws.
5. 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.
6. After equal clearance is obtained, tighten diagonally opposite cap screws evenly to the specified torque.

Replacing Seal Assembly — Tecumseh Compressor

1. Remove the new shaft seal washer from the bellows seal assembly. Coat the exposed surface of the crankshaft with clean refrigerant oil. Dip new bellows seal assembly and shaft seal washer in clean refrigerant oil.
2. Place the bellows seal assembly over the shaft with the shaft seal washer retaining end going on last. Push the bellows seal assembly by hand on the shaft to a position beyond the shaft taper.
3. Check to see that the bellows seal assembly and shaft are free from dirt and foreign material. Assemble the shaft seal washer in the bellows seal assembly. Assemble the seal washer so that the raised rim is away from the bellows seal assembly and that the notches in the washer line up with the nibs in the bellows seal assembly. Cover exposed surface of the shaft seal washer with clean refrigerant oil.
4. Insert a new rectangular-section O-ring in the crankcase groove.
5. Place a new front seal plate over the shaft. Properly line up the mounting holes. With



a hand on each side of the seal plate, push the plate up against the crankcase.

6. Insert the six cap screws in circular sequence and tighten them to the specified torque. Rotate the shaft by hand 15 to 20 revolutions to seat the seal.

After the seal and plate are reassembled, install the compressor, clutch and belt on the vehicle. Check the refrigerant charge and the compressor oil level. Leak test the system with a flame detector. No leaks are permissable.

COMPRESSOR SPECIFICATIONS

Some specifications for Ford air-conditioning compressors are shown in Fig. 46. They include bolt torque specifications and compressor oil charges.

COMPRESSOR SPECIFICATIONS

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

COMPRESSOR BOLT TORQUE SPECIFICATIONS

	Torque Ft. Lb.	
	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

OIL CHARGE CHART

	Oil Level					
	Minimum		Maximum and Initial Charge			
	Dip Stick Depth		Dip Stick Depth		Fluid Ounces	
	York	Tecumseh	York	Tecumseh	York	Tecumseh
Vertical	7/8"	7/8"	1-1/8"	1-3/8"	10	11
Horizontal	13/16"	7/8"	1-3/16"	1-5/8"	10	11

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 up to minimum oil level only.

TYPE OIL—"Suniso" #5, "Texaco" Capella E or Equivalent.

Fig. 46 — Compressor Specifications

DEFINITIONS

Ammeter — An electrical meter used to measure current flow or draw.

Back-Seated — A condition where a valve is screwed out against a secondary or back seat when the primary valve ports are opened to each other. Back-seating blocks the ports from the valve stem or from an auxiliary port behind the seal. See Fig. 11.

Compression — Reducing the volume of gas by squeezing it into a smaller space. Increased pressure and temperature always accompany compression.

Compressor — A machine for squeezing a vapor into a smaller space so as to raise the vapor pressure and temperature.

Condenser — A heat exchanger in which a vapor is changed to the liquid state by removing heat from the vapor.

Continuity — A continuous electrical path. A closed circuit has continuity; an open circuit does not have it.

Current — The flow of electricity in a circuit. Measured in amperes (amps).

Dehumidify — To remove water vapor from the air.

Discharge — To release the refrigerant from the system.

Discharge Pressure — Pressure at the compressor outlet (head pressure).

Draw — The amount of electrical current a circuit uses or draws. Excess resistance reduces draw; therefore a draw test is an inverse measure of resistance.

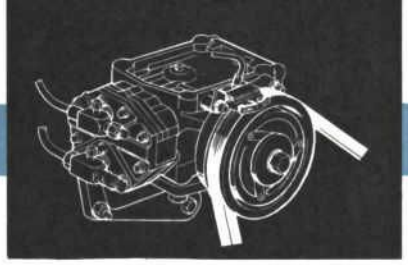
Evaporator — A heat exchanger in which the liquid refrigerant absorbs heat and boils. The heat is transferred to the refrigerant from the air passing over the evaporator.

Evacuate — To pump the refrigeration system completely empty with a vacuum pump.

Expansion Valve — A metering device that controls the amount of refrigerant sprayed into the evaporator and controls expansion of the refrigerant in the evaporator.

Front-Seated — The condition where a valve is screwed in to seal against its primary or front seat. A front-seated valve blocks its primary ports from each other.

Gauge Pressure — A pressure scale which ignores atmospheric pressure of 14.7 psi absolute is zero psi gauge.



Head Pressure — Pressure at the compressor outlet (discharge pressure).

Humidity — Water vapor in the air (see relative humidity and absolute humidity).

High Pressure Service Valve — Valve at the compressor outlet.

Inlet Service Valve — Valve at the low pressure inlet (suction) side of the compressor.

Ohmmeter — An electrical meter used to measure resistance to current.

Outlet Pressure — Pressure at the compressor outlet.

Outlet Side — The high pressure outlet side of the compressor.

Pressure — Force per unit area. An equalized outward push present in any fluid that is trapped and squeezed or compressed.

Refrigeration — Cooling an object or substance by removal of heat.

Suction Pressure — Pressure at the compressor inlet.

Suction Side — The low pressure inlet side of the compressor.

Thermometer — A device which operates by thermal expansion and measures the intensity of heat (temperature).

Vacuum — A condition of pressure less than atmospheric pressure. Vacuum can be measured in psi, but is more commonly measured in inches of mercury (Hg). A perfect vacuum is 29.92 inches of Hg. This is based on the fact that a perfect vacuum above a column of mercury will support the column to a height of 29.92 inches.

Vapor — A gas.

Vaporization — The changing of a substance to the gaseous (vapor) state. Vaporization is a general term including evaporation, boiling and sublimation.

Voltage — An electrical force that produces current flow when connected across a continuous circuit.

DIAGNOSIS CHARTS

The problem conditions and diagnosis procedures are grouped into the following categories:

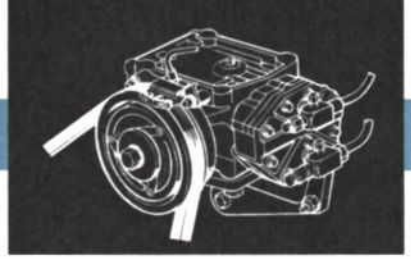
PERFORMANCE CONDITIONS – BASIC A/C SYSTEMS

A/C AIR SYSTEM CONDITIONS

The tables and the air conditioner-heater vacuum schematic diagram for the various vehicle models (Figs. 47 through 54), when used with the A/C Air System Conditions "road maps" will provide the repair procedures and the component conditions for any given control lever position.

Refer to Fig. 47. For example purposes, the functional control lever (Column "C") is placed in MAX.-AC and the temperature control lever (Column B) is placed in COOL. By reading downward in the MAX. column (C) and to the right from each A/C component listed in column A, the condition of each listed component for the given control lever position is noted. From this information, the mechanic can tell the applied condition of the various controls. He can also tell the vacuum application and color code of the vacuum motor and vacuum lines, and the application of the blower switch and clutch switch. Reference to the A/C Heater Vacuum Schematic Diagram (Fig. 48) will enable the mechanic to make quick checks with a vacuum gauge at the applicable color coded connections and vacuum motors.

Diagnosis of vacuum controlled systems is basically similar to electrical diagnosis. That is, the vacuum system must be complete from the source to the vacuum components. Any leaks, like a bad connection, will make the system inoperative. If a leak develops in one of the vacuum systems, one or all of the vacuum components may become inoperative. This would be dependent on the location of the vacuum leak. If the leak is in the vacuum supply, all systems will become inoperative. If the leak is in the component side of the vacuum control for the specific system, all other systems will operate when the leaking system is off.



When testing a vacuum control system, a minimum of 14 inches of mercury vacuum should be available at all points where vacuum is applied. This can be checked with a Rotunda Fuel Pump Tester Gauge (ARE 345) and two Distributor Tester hose adapters (Marked Q) connected together with a coupling. This will allow the Fuel Pump Tester Gauge Hose to be adapted to any other vacuum hose or rubber connector in the vacuum systems.

Failure to maintain 14 inches of mercury vacuum during vacuum system tests could be caused by a bad hose connection, resulting in a vacuum leak. When checking for vacuum between two points, trace the hose along the entire routing to be sure it is not crossed with another hose and connected to the wrong connection.

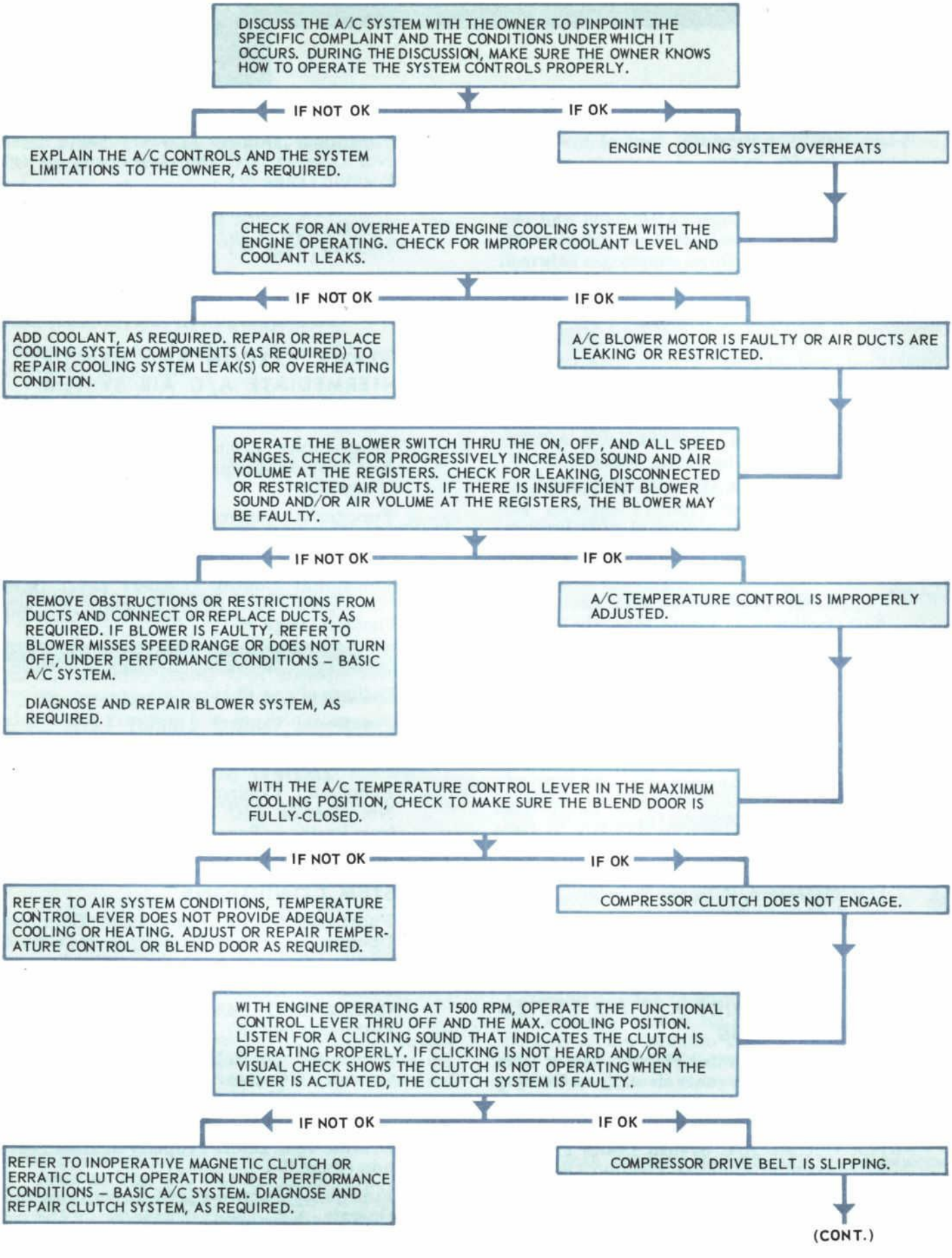
THUNDERBIRD A/C AIR SYSTEM CONDITIONS

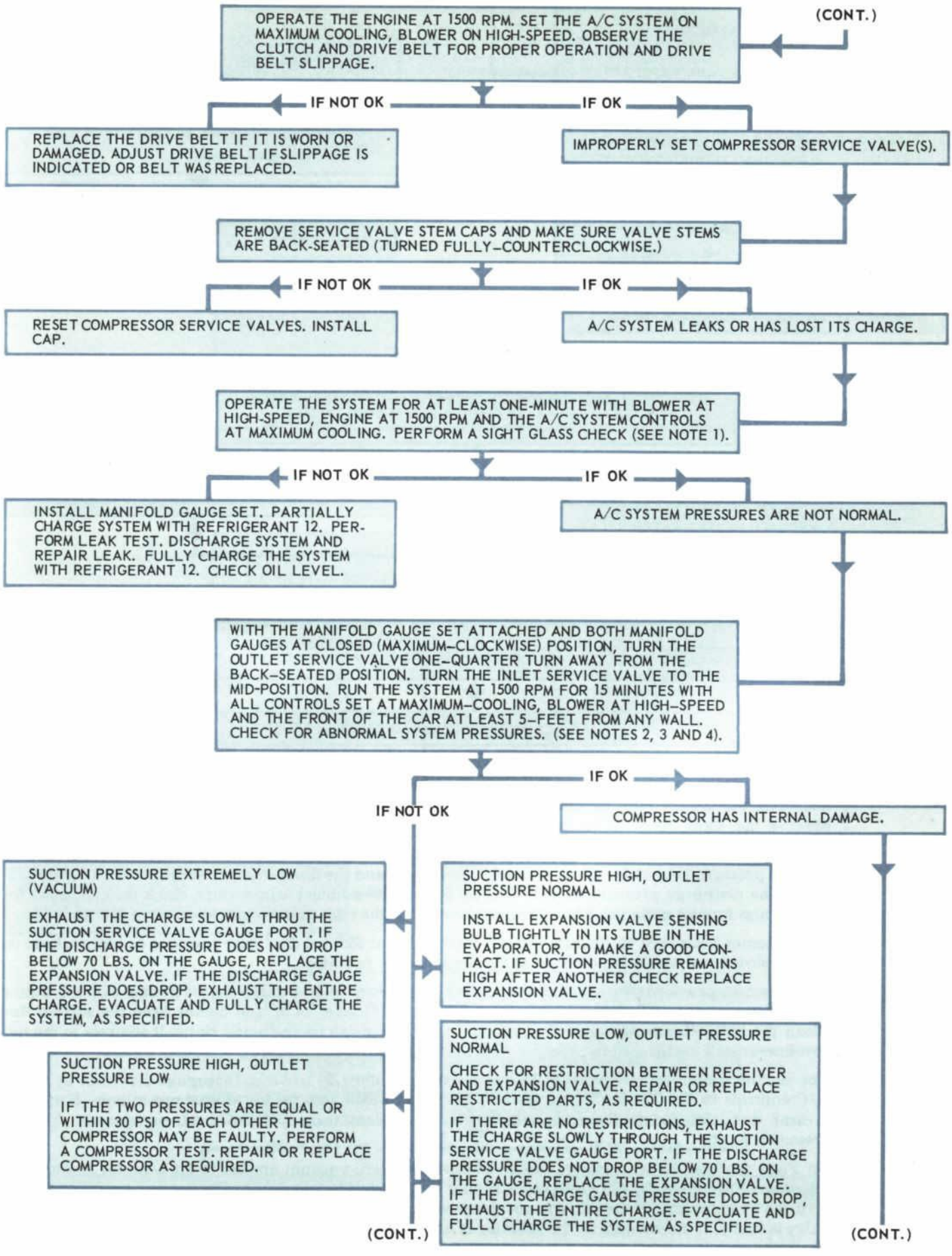
FORD AND MERCURY A/C AIR SYSTEM CONDITIONS

FAIRLANE, FALCON AND MERCURY INTERMEDIATE A/C AIR SYSTEM CONDITIONS

MUSTANG AND COUGAR A/C AIR SYSTEM CONDITIONS

INSUFFICIENT, ERRATIC OR NO COOLING




OPERATE THE ENGINE AT 1500 RPM. SET THE A/C SYSTEM ON MAXIMUM COOLING, BLOWER ON HIGH-SPEED. OBSERVE THE CLUTCH AND DRIVE BELT FOR PROPER OPERATION AND DRIVE BELT SLIPPAGE.
(CONT.)
IF NOT OK
IF OK
REPLACE THE DRIVE BELT IF IT IS WORN OR DAMAGED. ADJUST DRIVE BELT IF SLIPPAGE IS INDICATED OR BELT WAS REPLACED.
IMPROPERLY SET COMPRESSOR SERVICE VALVE(S).
REMOVE SERVICE VALVE STEM CAPS AND MAKE SURE VALVE STEMS ARE BACK-SEATED (TURNED FULLY-COUNTERCLOCKWISE.)
IF NOT OK
IF OK
RESET COMPRESSOR SERVICE VALVES. INSTALL CAP.
A/C SYSTEM LEAKS OR HAS LOST ITS CHARGE.
OPERATE THE SYSTEM FOR AT LEAST ONE-MINUTE WITH BLOWER AT HIGH-SPEED, ENGINE AT 1500 RPM AND THE A/C SYSTEM CONTROLS AT MAXIMUM COOLING. PERFORM A SIGHT GLASS CHECK (SEE NOTE 1).
IF NOT OK
IF OK
INSTALL MANIFOLD GAUGE SET. PARTIALLY CHARGE SYSTEM WITH REFRIGERANT 12. PERFORM LEAK TEST. DISCHARGE SYSTEM AND REPAIR LEAK. FULLY CHARGE THE SYSTEM WITH REFRIGERANT 12. CHECK OIL LEVEL.
A/C SYSTEM PRESSURES ARE NOT NORMAL.
WITH THE MANIFOLD GAUGE SET ATTACHED AND BOTH MANIFOLD GAUGES AT CLOSED (MAXIMUM-CLOCKWISE) POSITION, TURN THE OUTLET SERVICE VALVE ONE-QUARTER TURN AWAY FROM THE BACK-SEATED POSITION. TURN THE INLET SERVICE VALVE TO THE MID-POSITION. RUN THE SYSTEM AT 1500 RPM FOR 15 MINUTES WITH ALL CONTROLS SET AT MAXIMUM-COOLING, BLOWER AT HIGH-SPEED AND THE FRONT OF THE CAR AT LEAST 5-FEET FROM ANY WALL. CHECK FOR ABNORMAL SYSTEM PRESSURES. (SEE NOTES 2, 3 AND 4).
IF OK
IF NOT OK
COMPRESSOR HAS INTERNAL DAMAGE.
SUCTION PRESSURE EXTREMELY LOW (VACUUM)
EXHAUST THE CHARGE SLOWLY THRU THE SUCTION SERVICE VALVE GAUGE PORT. IF THE DISCHARGE PRESSURE DOES NOT DROP BELOW 70 LBS. ON THE GAUGE, REPLACE THE EXPANSION VALVE. IF THE DISCHARGE GAUGE PRESSURE DOES DROP, EXHAUST THE ENTIRE CHARGE. EVACUATE AND FULLY CHARGE THE SYSTEM, AS SPECIFIED.
SUCTION PRESSURE HIGH, OUTLET PRESSURE NORMAL
INSTALL EXPANSION VALVE SENSING BULB TIGHTLY IN ITS TUBE IN THE EVAPORATOR, TO MAKE A GOOD CONTACT. IF SUCTION PRESSURE REMAINS HIGH AFTER ANOTHER CHECK REPLACE EXPANSION VALVE.
SUCTION PRESSURE HIGH, OUTLET PRESSURE LOW
IF THE TWO PRESSURES ARE EQUAL OR WITHIN 30 PSI OF EACH OTHER THE COMPRESSOR MAY BE FAULTY. PERFORM A COMPRESSOR TEST. REPAIR OR REPLACE COMPRESSOR AS REQUIRED.
SUCTION PRESSURE LOW, OUTLET PRESSURE NORMAL
CHECK FOR RESTRICTION BETWEEN RECEIVER AND EXPANSION VALVE. REPAIR OR REPLACE RESTRICTED PARTS, AS REQUIRED.
IF THERE ARE NO RESTRICTIONS, EXHAUST THE CHARGE SLOWLY THROUGH THE SUCTION SERVICE VALVE GAUGE PORT. IF THE DISCHARGE PRESSURE DOES NOT DROP BELOW 70 LBS. ON THE GAUGE, REPLACE THE EXPANSION VALVE. IF THE DISCHARGE GAUGE PRESSURE DOES DROP, EXHAUST THE ENTIRE CHARGE. EVACUATE AND FULLY CHARGE THE SYSTEM, AS SPECIFIED.
(CONT.)
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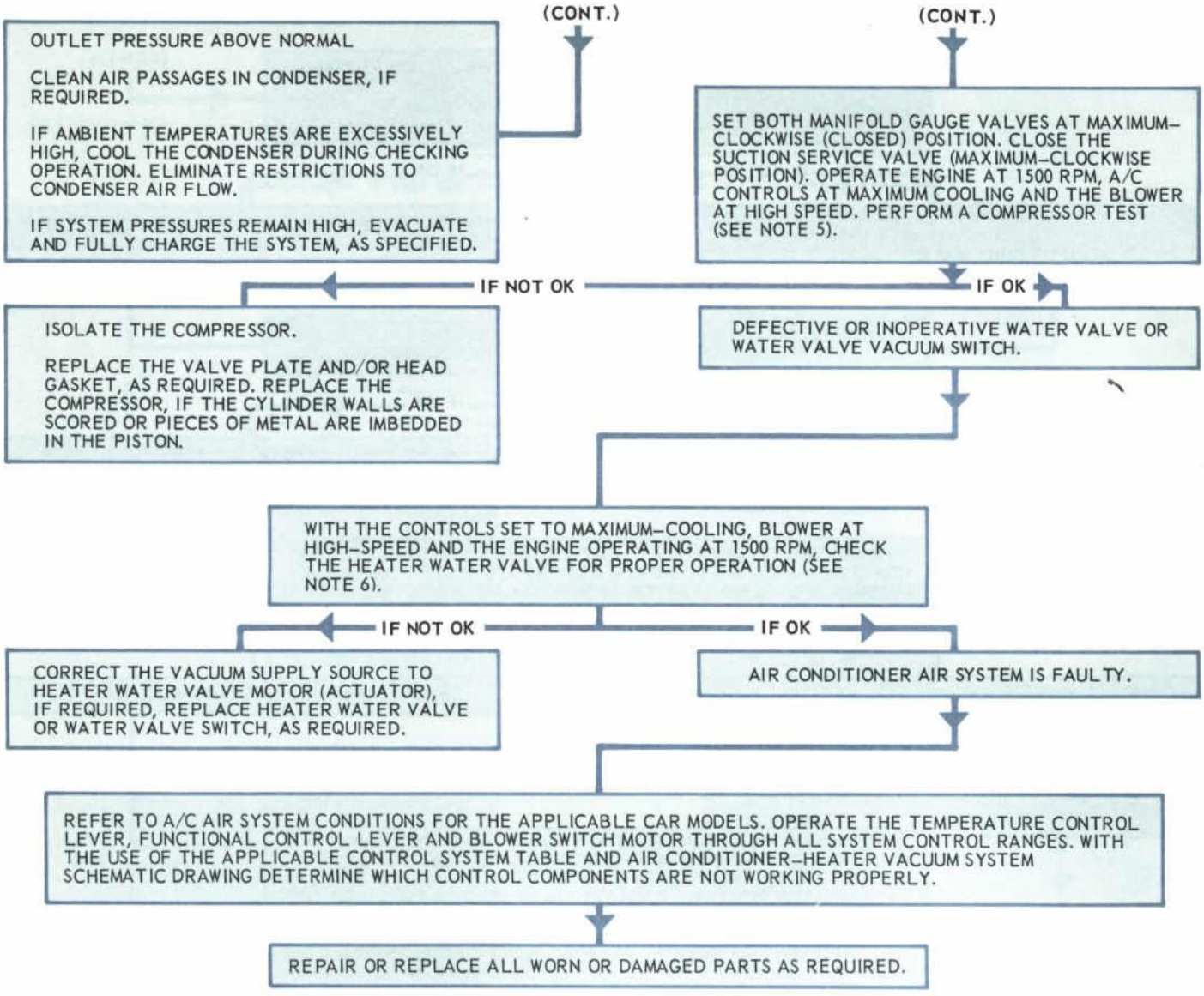

NOTE 1. If bubbles or foam are shown on the sight glass, the system is only partially charged. If no bubbles are observed, the system may be fully charged or completely out of refrigerant. Turn the system off and observe the sight glass. If no foam or small bubbles occur within two minutes, the system has lost its charge.

NOTE 2. Suction pressure should be approximately 10-30 psi and the discharge pressure between 180 and 225 psi. If the discharge pressure exceeds 250 psi for a 90°F ambient temperature, check the condenser fins for dirt and foreign material. Flush the condenser from the rear with a water hose.

NOTE 3. If it becomes necessary to operate the air conditioner at 225 psi discharge pressure or higher, keep the the pressure down with a fan directed at the condenser or radiator.

NOTE 4. If the suction pressure does not stabilize and varies more than 10 pounds on the gauge, stop the engine. Remove the expansion valve insulation. Remove the thermal bulb and clamp from the suction line. Clean the bulb, clamp and suction line contact points. Install the bulb and clamp it securely to the suction line. Install the insulation carefully. Start the engine and check system pressures again.

NOTE 5. The suction gauge should read 20 inches of vacuum within 30 seconds. Disengage the clutch by setting A/C controls to Off. The suction gauge should remain below zero psi for at least one minute. If the compressor does not satisfy these two conditions after at least three cycles of clutch engagement, the compressor is faulty.

NOTE 6. On Ford models, the water valve should be open with zero vacuum applied to the actuator (motor). On all except Ford models, the water valve should be closed at zero vacuum. Check to make sure the valve is closed to water flow. If the valve is not closed with the proper vacuum applied to the actuator, the water valve is faulty. If the vacuum at the actuator is not as specified, trace the vacuum circuit to find the cause.

BLOWER MISSES SPEED RANGE OR DOES NOT TURN OFF

TURN THE IGNITION SWITCH TO THE ACCESSORY POSITION, A/C CONTROL TO MAXIMUM COOLING, AND OPERATE BLOWER MOTOR THRU ALL SPEED RANGES AND OFF. CHECK FOR PROGRESSIVELY INCREASED SOUND AND AIR VOLUME AT THE REGISTERS. IF THERE IS INADEQUATE OR NO AIR OR SOUND, VISUALLY INSPECT THE CIRCUIT AT THE BLOWER MOTOR FOR OBVIOUS LOOSE OR BROKEN CONNECTIONS.

IF NOT OK → CONNECT, REPAIR OR REPLACE LEAD WIRES OR CONNECTORS, AS REQUIRED. CHECK BLOWER OPERATION.

IF OK → BLOWER MOTOR IS INOPERATIVE.

GROUND ONE TEST LAMP PROBE. MOVE OTHER PROBE TO BLOWER MOTOR LEAD WIRE (ORANGE). IF TEST LAMP DOES NOT GLOW. CHECK FOR IMPROPERLY GROUNDED MOTOR LEAD.

GROUND ONE TEST LAMP PROBE AND MOVE THE OTHER PROBE TO THE BLOWER MOTOR GROUND LEAD. IF TEST LAMP GLOWS, GROUND LEAD WIRE IS FAULTY.

IF NOT OK → PROPERLY GROUND THE CIRCUIT OR REPLACE THE GROUND LEAD WIRE, IF REQUIRED.

IF OK → BLOWER MOTOR CURRENT DRAW IS NOT TO SPECIFICATION.

CONNECT AN AMMETER TO THE POSITIVE TERMINAL OF THE BATTERY AND THE POSITIVE LEAD OF THE BLOWER. USE CARE TO PREVENT BATTERY DAMAGE IN CASE OF A DIRECT MOTOR INTERNAL SHORT. WITH AMMETER ON THE APPROPRIATE SCALE FOR THE SPECIFIED CURRENT DRAW, READ CURRENT DRAW.

IF NOT OK → CURRENT DRAW IS EXCESSIVE.

CHECK FOR AN OBSTRUCTION OR BLOWER WHEEL INTERFERENCE. CHECK FOR A GROUNDED LEAD. REPAIR OR REPLACE FAULTY BLOWER WHEEL OR REMOVE OBSTRUCTION. REPAIR OR REPLACE LEAD WIRE, IF REQUIRED. TEST CURRENT DRAW. REPLACE MOTOR IF CURRENT DRAW IS STILL EXCESSIVE.

CURRENT DRAW IS LOW OR SHOWS NO CURRENT.

REPLACE THE BLOWER MOTOR.

IF OK → BLOWER MOTOR CIRCUIT CURRENT DRAW IS NOT TO SPECIFICATION.

CONNECT THE AMMETER LEAD AT THE BATTERY POSITIVE TERMINAL. CONNECT THE AMMETER IN SERIES WITH THE WIRING HARNESS LEAD. WITH THE A/C CONTROL LEVER ON MAXIMUM COOLING AND THE IGNITION SWITCH ON, CHECK CURRENT DRAW IN EACH OF THE BLOWER SWITCH POSITIONS. IF THE CURRENT DRAW IS NOT WITHIN SPECIFICATION, CHECK FOR FAULTY LEAD WIRE (UNDER THE INSTRUMENT PANEL) BETWEEN BLOWER SWITCH AND THERMOSTATIC SWITCH WITH A TEST LIGHT AND/OR OHMMETER.

IF NOT OK → IF TEST LIGHT GLOWS, REPAIR OR REPLACE THE BLOWER SWITCH TO THERMOSTATIC SWITCH LEAD WIRE, AS REQUIRED.

IF OK → FAULTY BLOWER SWITCH.

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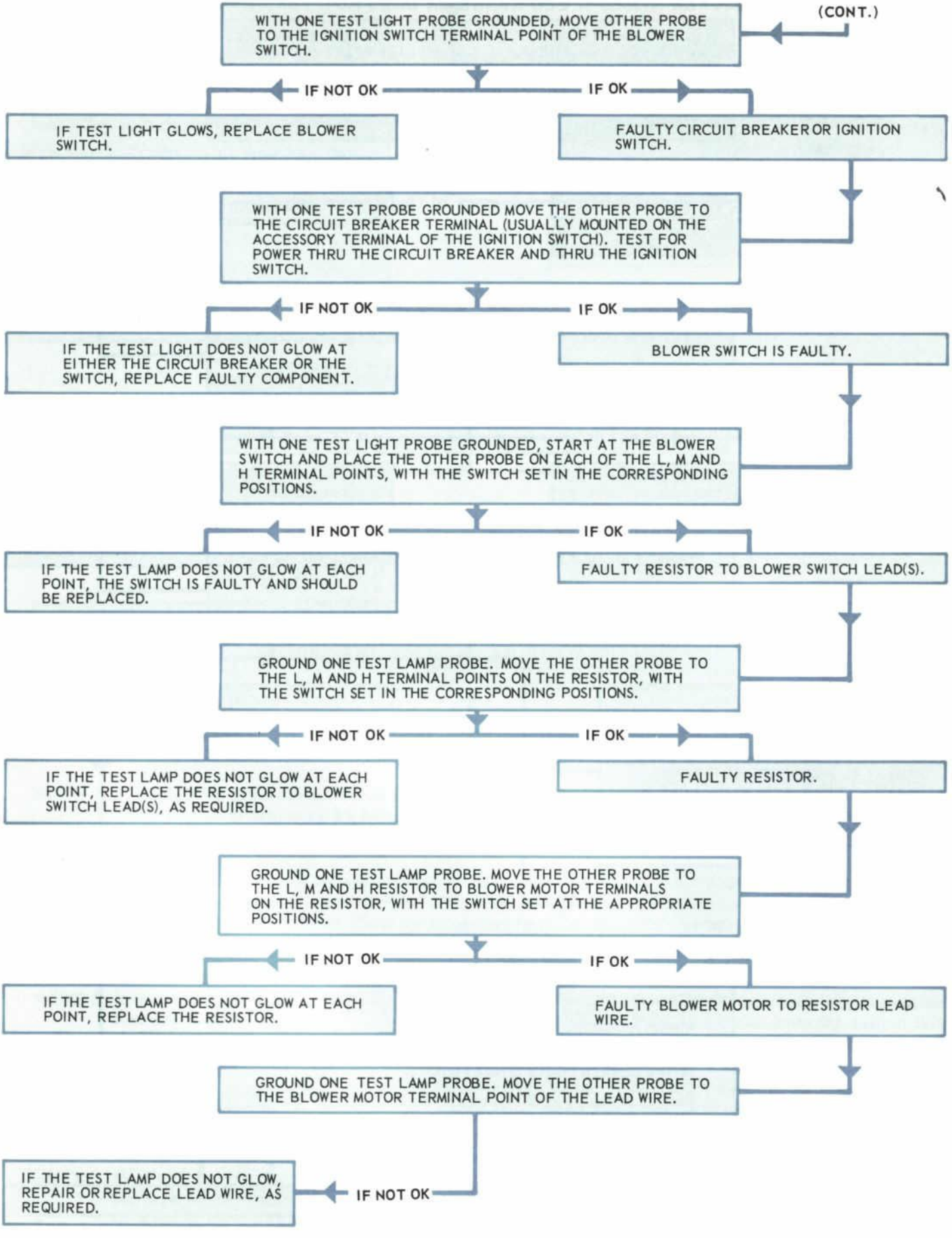
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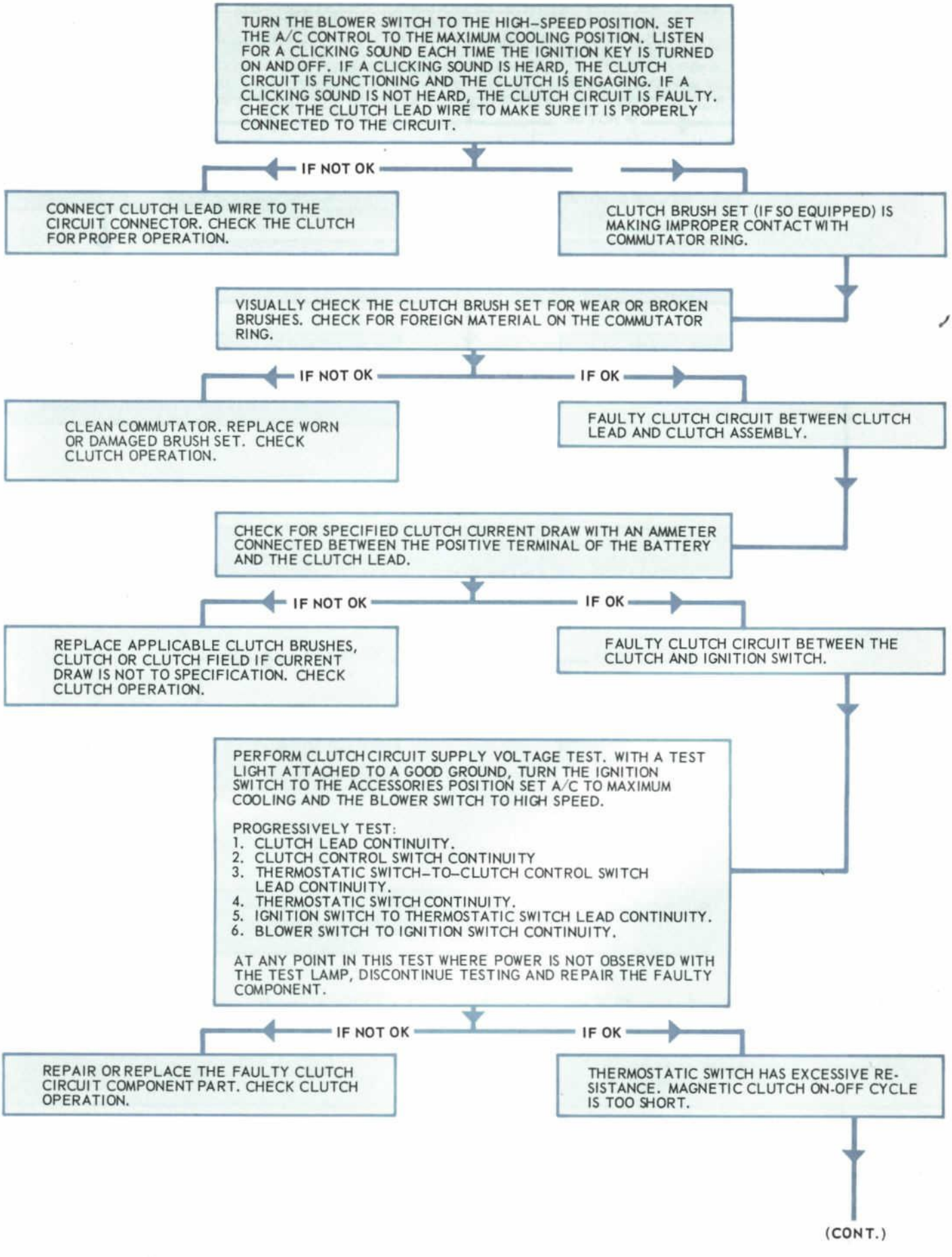
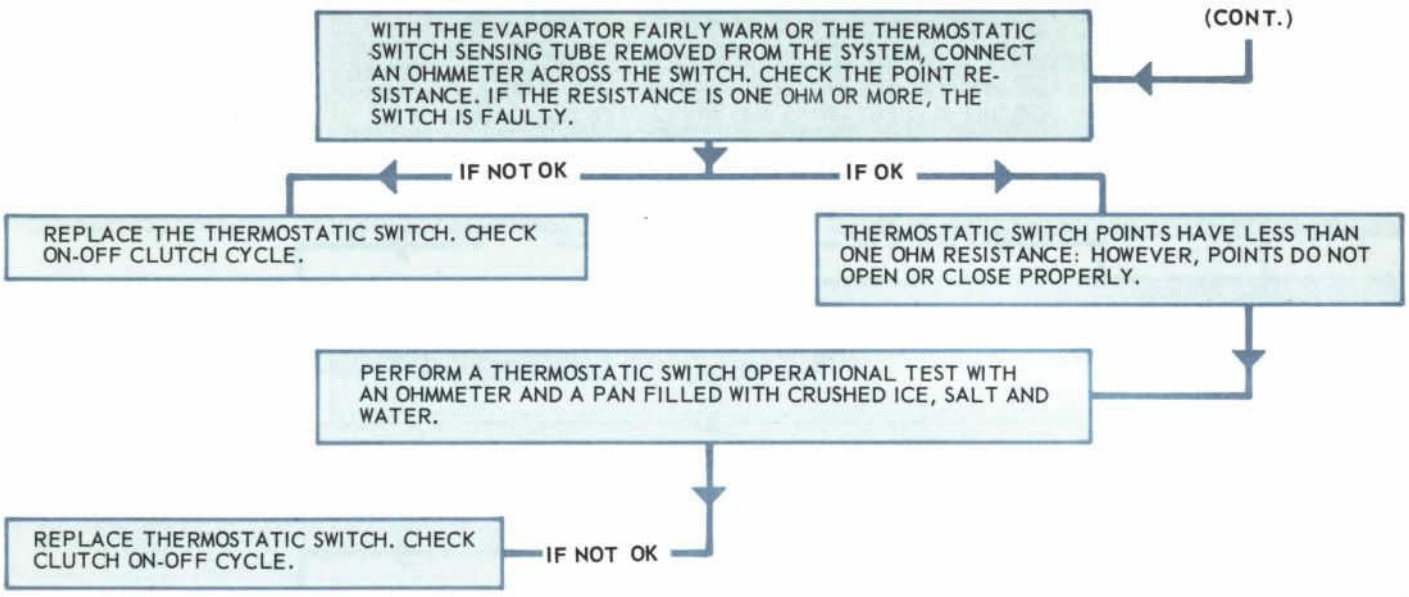
WITH ONE TEST LIGHT PROBE GROUNDED, MOVE OTHER PROBE TO THE IGNITION SWITCH TERMINAL POINT OF THE BLOWER SWITCH.
IF NOT OK
IF OK
IF TEST LIGHT GLOWS, REPLACE BLOWER SWITCH.
FAULTY CIRCUIT BREAKER OR IGNITION SWITCH.
WITH ONE TEST PROBE GROUNDED MOVE THE OTHER PROBE TO THE CIRCUIT BREAKER TERMINAL (USUALLY MOUNTED ON THE ACCESSORY TERMINAL OF THE IGNITION SWITCH). TEST FOR POWER THRU THE CIRCUIT BREAKER AND THRU THE IGNITION SWITCH.
IF NOT OK
IF OK
IF THE TEST LIGHT DOES NOT GLOW AT EITHER THE CIRCUIT BREAKER OR THE SWITCH, REPLACE FAULTY COMPONENT.
BLOWER SWITCH IS FAULTY.
WITH ONE TEST LIGHT PROBE GROUNDED, START AT THE BLOWER SWITCH AND PLACE THE OTHER PROBE ON EACH OF THE L, M AND H TERMINAL POINTS, WITH THE SWITCH SET IN THE CORRESPONDING POSITIONS.
IF NOT OK
IF OK
IF THE TEST LAMP DOES NOT GLOW AT EACH POINT, THE SWITCH IS FAULTY AND SHOULD BE REPLACED.
FAULTY RESISTOR TO BLOWER SWITCH LEAD(S).
GROUND ONE TEST LAMP PROBE. MOVE THE OTHER PROBE TO THE L, M AND H TERMINAL POINTS ON THE RESISTOR, WITH THE SWITCH SET IN THE CORRESPONDING POSITIONS.
IF NOT OK
IF OK
IF THE TEST LAMP DOES NOT GLOW AT EACH POINT, REPLACE THE RESISTOR TO BLOWER SWITCH LEAD(S), AS REQUIRED.
FAULTY RESISTOR.
GROUND ONE TEST LAMP PROBE. MOVE THE OTHER PROBE TO THE L, M AND H RESISTOR TO BLOWER MOTOR TERMINALS ON THE RESISTOR, WITH THE SWITCH SET AT THE APPROPRIATE POSITIONS.
IF NOT OK
IF OK
IF THE TEST LAMP DOES NOT GLOW AT EACH POINT, REPLACE THE RESISTOR.
FAULTY BLOWER MOTOR TO RESISTOR LEAD WIRE.
GROUND ONE TEST LAMP PROBE. MOVE THE OTHER PROBE TO THE BLOWER MOTOR TERMINAL POINT OF THE LEAD WIRE.
IF THE TEST LAMP DOES NOT GLOW, REPAIR OR REPLACE LEAD WIRE, AS REQUIRED.
IF NOT OK

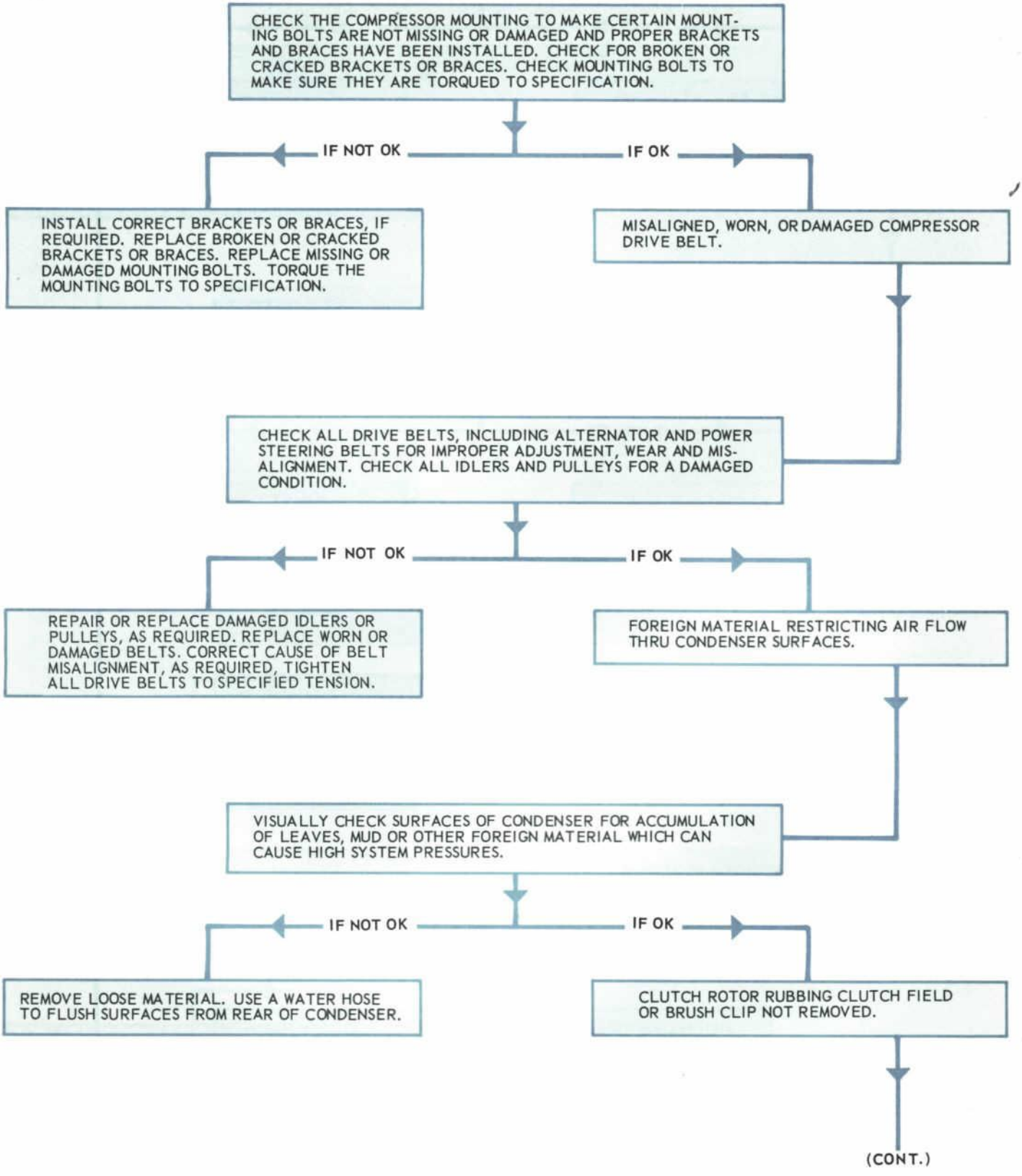
INOPERATIVE MAGNETIC CLUTCH OR ERRATIC CLUTCH OPERATION

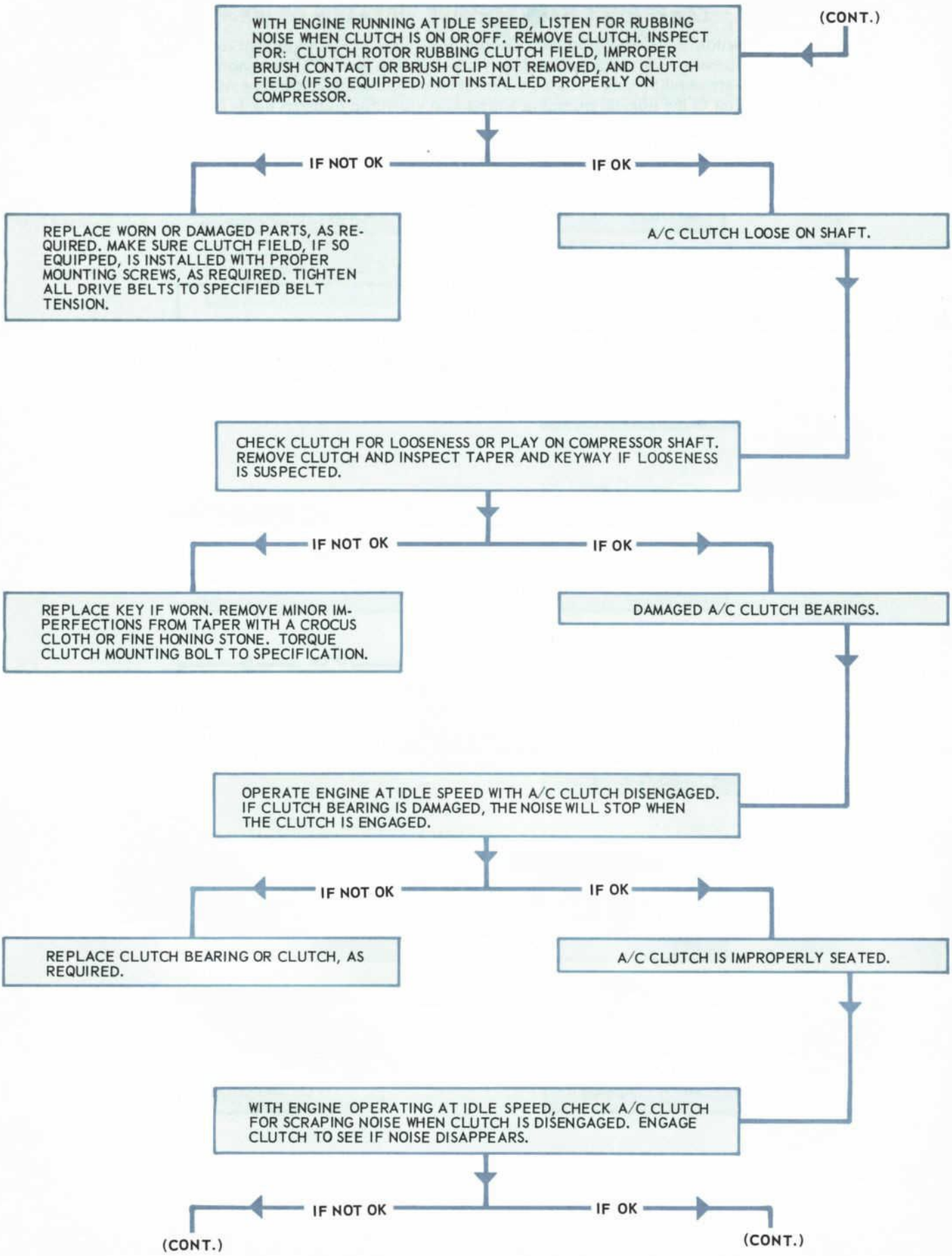



(CONT.)
WITH THE EVAPORATOR FAIRLY WARM OR THE THERMOSTATIC SWITCH SENSING TUBE REMOVED FROM THE SYSTEM, CONNECT AN OHMMETER ACROSS THE SWITCH. CHECK THE POINT RESISTANCE. IF THE RESISTANCE IS ONE OHM OR MORE, THE SWITCH IS FAULTY.
IF NOT OK
IF OK
REPLACE THE THERMOSTATIC SWITCH. CHECK ON-OFF CLUTCH CYCLE.
THERMOSTATIC SWITCH POINTS HAVE LESS THAN ONE OHM RESISTANCE: HOWEVER, POINTS DO NOT OPEN OR CLOSE PROPERLY.
PERFORM A THERMOSTATIC SWITCH OPERATIONAL TEST WITH AN OHMMETER AND A PAN FILLED WITH CRUSHED ICE, SALT AND WATER.
REPLACE THERMOSTATIC SWITCH. CHECK CLUTCH ON-OFF CYCLE.
IF NOT OK

COMPRESSOR HAS EXCESSIVE VIBRATION OR NOISE

Some noise and vibration is normal in all air conditioning systems. High ambient temperatures and progressively increased system pressures will increase the noise and vibration level. This is a normal condition. Comparison and experience with air conditioning systems under various operating conditions will tell the mechanic which systems are not conforming to the normal pumping sound and vibration patterns made by a properly functioning compressor.




(CONT.)
WITH ENGINE RUNNING AT IDLE SPEED, LISTEN FOR RUBBING NOISE WHEN CLUTCH IS ON OR OFF. REMOVE CLUTCH. INSPECT FOR: CLUTCH ROTOR RUBBING CLUTCH FIELD, IMPROPER BRUSH CONTACT OR BRUSH CLIP NOT REMOVED, AND CLUTCH FIELD (IF SO EQUIPPED) NOT INSTALLED PROPERLY ON COMPRESSOR.
IF NOT OK
IF OK
REPLACE WORN OR DAMAGED PARTS, AS REQUIRED. MAKE SURE CLUTCH FIELD, IF SO EQUIPPED, IS INSTALLED WITH PROPER MOUNTING SCREWS, AS REQUIRED. TIGHTEN ALL DRIVE BELTS TO SPECIFIED BELT TENSION.
A/C CLUTCH LOOSE ON SHAFT.
CHECK CLUTCH FOR LOOSENESS OR PLAY ON COMPRESSOR SHAFT. REMOVE CLUTCH AND INSPECT TAPER AND KEYWAY IF LOOSENESS IS SUSPECTED.
IF NOT OK
IF OK
REPLACE KEY IF WORN. REMOVE MINOR IMPERFECTIONS FROM TAPER WITH A CROCUS CLOTH OR FINE HONING STONE. TORQUE CLUTCH MOUNTING BOLT TO SPECIFICATION.
DAMAGED A/C CLUTCH BEARINGS.
OPERATE ENGINE AT IDLE SPEED WITH A/C CLUTCH DISENGAGED. IF CLUTCH BEARING IS DAMAGED, THE NOISE WILL STOP WHEN THE CLUTCH IS ENGAGED.
IF NOT OK
IF OK
REPLACE CLUTCH BEARING OR CLUTCH, AS REQUIRED.
A/C CLUTCH IS IMPROPERLY SEATED.
WITH ENGINE OPERATING AT IDLE SPEED, CHECK A/C CLUTCH FOR SCRAPING NOISE WHEN CLUTCH IS DISENGAGED. ENGAGE CLUTCH TO SEE IF NOISE DISAPPEARS.
IF NOT OK
IF OK
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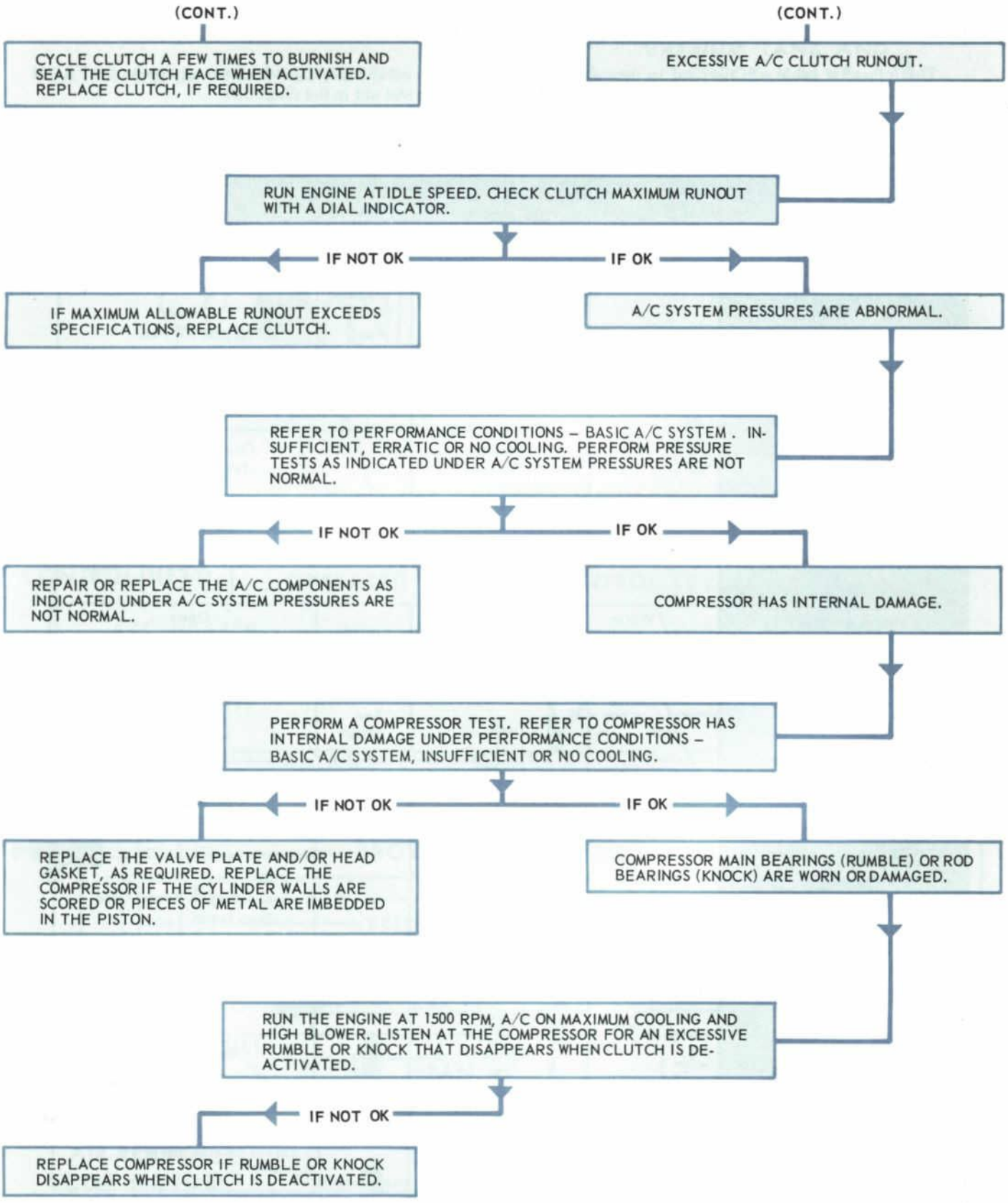

(CONT.)
CYCLE CLUTCH A FEW TIMES TO BURNISH AND SEAT THE CLUTCH FACE WHEN ACTIVATED. REPLACE CLUTCH, IF REQUIRED.
(CONT.)
EXCESSIVE A/C CLUTCH RUNOUT.
RUN ENGINE AT IDLE SPEED. CHECK CLUTCH MAXIMUM RUNOUT WITH A DIAL INDICATOR.
IF NOT OK
IF OK
IF MAXIMUM ALLOWABLE RUNOUT EXCEEDS SPECIFICATIONS, REPLACE CLUTCH.
A/C SYSTEM PRESSURES ARE ABNORMAL.
REFER TO PERFORMANCE CONDITIONS – BASIC A/C SYSTEM. INSUFFICIENT, ERRATIC OR NO COOLING. PERFORM PRESSURE TESTS AS INDICATED UNDER A/C SYSTEM PRESSURES ARE NOT NORMAL.
IF NOT OK
IF OK
REPAIR OR REPLACE THE A/C COMPONENTS AS INDICATED UNDER A/C SYSTEM PRESSURES ARE NOT NORMAL.
COMPRESSOR HAS INTERNAL DAMAGE.
PERFORM A COMPRESSOR TEST. REFER TO COMPRESSOR HAS INTERNAL DAMAGE UNDER PERFORMANCE CONDITIONS – BASIC A/C SYSTEM, INSUFFICIENT OR NO COOLING.
IF NOT OK
IF OK
REPLACE THE VALVE PLATE AND/OR HEAD GASKET, AS REQUIRED. REPLACE THE COMPRESSOR IF THE CYLINDER WALLS ARE SCORED OR PIECES OF METAL ARE IMBEDDED IN THE PISTON.
COMPRESSOR MAIN BEARINGS (RUMBLE) OR ROD BEARINGS (KNOCK) ARE WORN OR DAMAGED.
RUN THE ENGINE AT 1500 RPM, A/C ON MAXIMUM COOLING AND HIGH BLOWER. LISTEN AT THE COMPRESSOR FOR AN EXCESSIVE RUMBLE OR KNOCK THAT DISAPPEARS WHEN CLUTCH IS DE-ACTIVATED.
IF NOT OK
REPLACE COMPRESSOR IF RUMBLE OR KNOCK DISAPPEARS WHEN CLUTCH IS DEACTIVATED.

A/C-HEATER CONTROL – THUNDERBIRD

The following table can be used to determine any of the system component conditions for any given control lever position. The vacuum schematic on the following page will aid in the diagnosis.

Thunderbird A/C – Heater Control System a/		Temp. Control (Lower) Lever (Bowden Cable Controlled)	Functional Control (Upper) Lever Position (Vacuum Controlled)					
			A/C		Off	Heat	Partial Defrost	Full Defrost
			Max.	Fresh				
Fresh Air Recirc. Door Brown			Open (Recirc. Pos.) VAC.	Closed (Fresh Air Pos.) NV.	Open (Recirc. Pos.) VAC.	Closed (Fresh Air Pos.) NV.		
Register Air Door	TAN		Open VAC.		Closed NV.			
Heater Core Restrictor (Shutter)	TAN		Closed VAC.		Open NV.			
Heat-Defrost Door	Partial Def – Red Full Def – Yellow & Red		Heat Position N V.				Part. Def. VAC.	Full Def. VAC.
Water Valve Blue		Warm	Open NV.		Closed VAC.	Open NV.		
		Mod						
		Cool						
Water Valve Vacuum Switch – Supply – White To Water Valve – Gray		Warm	Open NV.		NV. See Note*	Open NV.		
		Mod						
		Cool	Closed Vacuum					
Temperature Blend Door (Bowden Cable Controlled)		Warm	All Cold Air Passes Thru Heater Core			Outside Air Passes Thru Heater Core		
		Mod	Cold Air Passes Thru and Around Heater Core Then Mixed			Outside Air Passes Thru and Around Heater Core Then Mixed		
		Cool	All Cold Air Bypasses Heater Core			Outside Air Bypasses Heater Core		
Blower Switch			Manually On L-M-H		Man. Off	Manually On L-M-H Off – Ram Air		
A/C Clutch Switch (In Series with Blower Switch)			Automatically Off – On by Thermostat Switch		Manually Off by Blower Selector Lever			

* In OFF position water valve is closed by selector lever and overrides temp. lever.

a/ Colors indicate vacuum hose color code.

L – Low
M – Medium
H – High

VAC. – Vacuum
NV. – No Vacuum
MOD. – Modulated
PART. – Partial
DEF. – Defrost

Fig. 47—A/C-Heater Control--Thunderbird

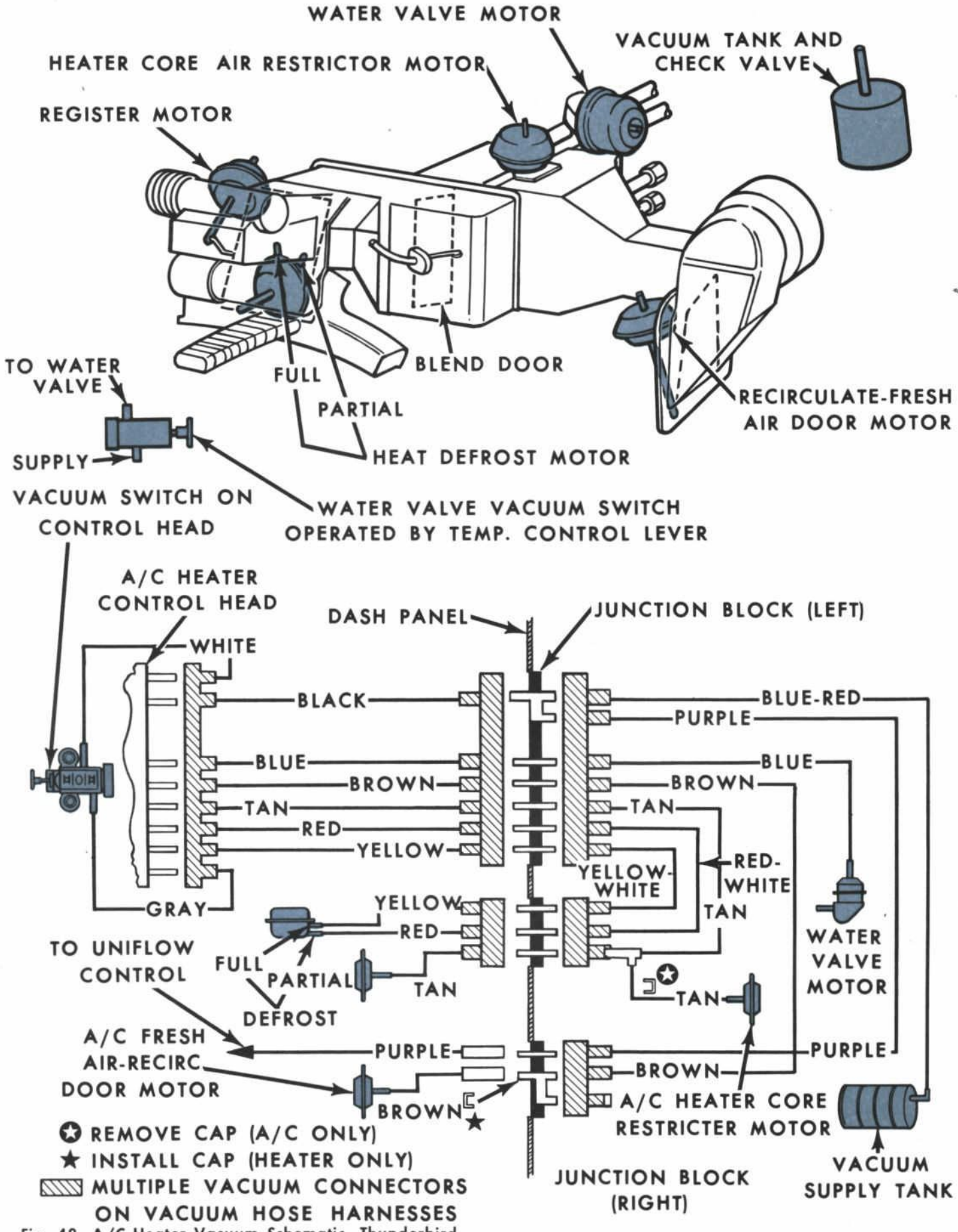
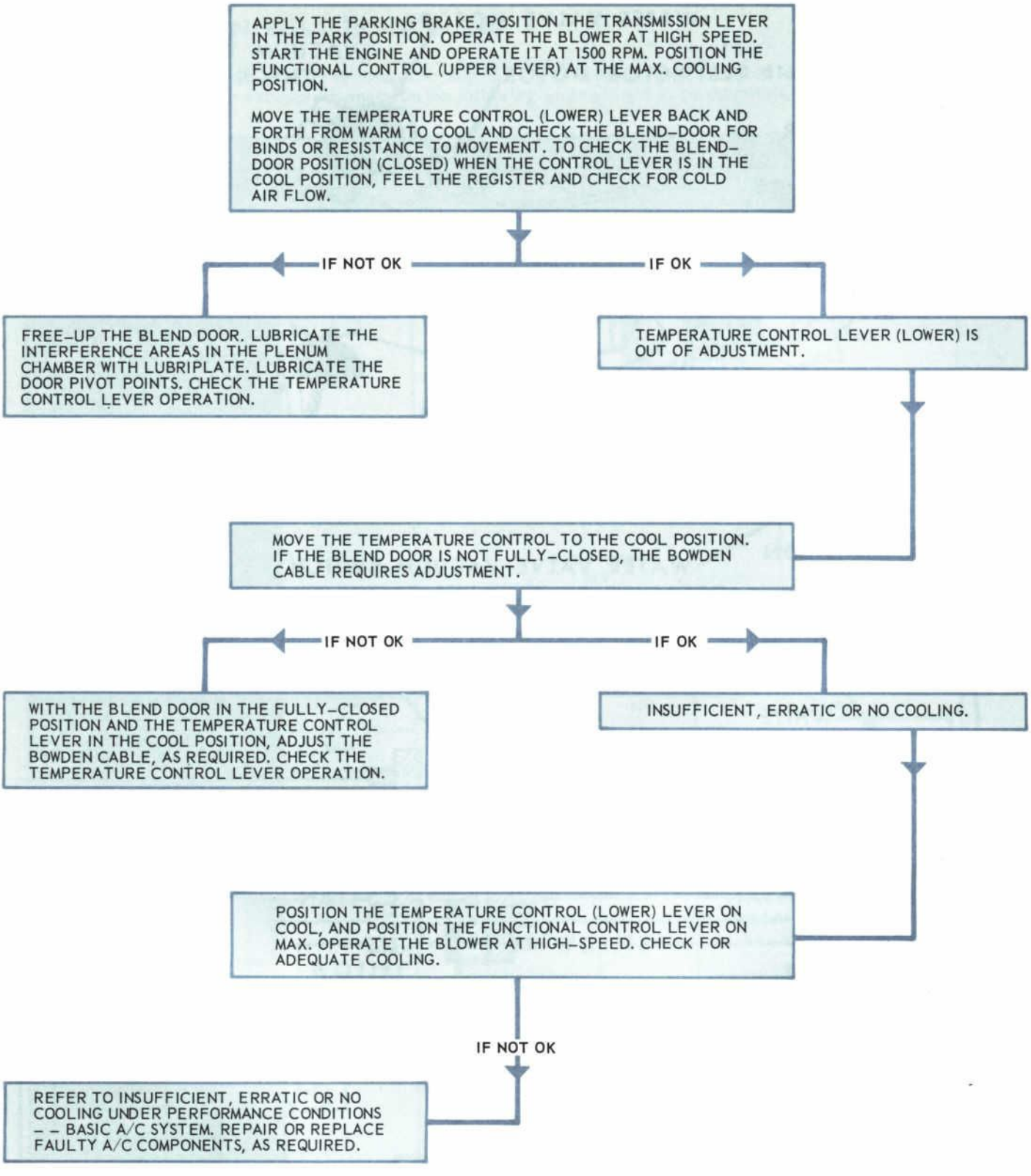


Fig. 48—A/C-Heater Vacuum Schematic--Thunderbird

TEMPERATURE CONTROL (LOWER) LEVER DOES NOT PROVIDE ADEQUATE HEATING OR COOLING



FUNCTIONAL CONTROL (UPPER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN MAXIMUM COOLING POSITION

APPLY PARKING BRAKES. POSITION THE TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM WITH THE BLOWER ON HIGH-SPEED. POSITION THE FUNCTIONAL CONTROL LEVER IN THE MAX. POSITION.

OBSERVE THE AIR FLOW AT THE REGISTERS, DEFROSTERS, AND HEAT DUCT TO CHECK THE FOLLOWING DOORS FOR PROPER OPERATION.

1. FRESH (OUTSIDE) AIR DOOR -- OPEN -- FRESH AIR FLOW
2. REGISTER AIR DOOR -- OPEN -- COLD AIR FLOW AT REGISTERS.
3. HEATER CORE RESTRICTOR DOOR -- CLOSED -- NO HEAT FROM DEFROSTER.
4. HEAT-DEFROST DOOR -- CLOSED -- NO HEAT FROM REGISTERS OR DEFROSTER.

IF THE DOORS ARE NOT IN THE POSITIONS INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG.) WITH THE VACUUM PROBE CONNECTED BETWEEN THE VACUUM SUPPLY TANK INLET LINE (BLUE-RED) AND THE SUPPLY TANK. IF VACUUM IS NOT TO SPECIFICATIONS AT THIS LOCATION, CHECK FOR VACUUM LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE AND VACUUM SUPPLY TANK, AND THE VACUUM LINE (BLUE-RED). IF VACUUM IS STILL NOT TO SPECIFICATION, CHECK FOR THE SPECIFIED VACUUM AT THE UNIFLOW HOSE CONNECTIONS AT THE RIGHT AND LEFT JUNCTION BLOCKS.

IF NOT OK

REPAIR OR REPLACE FAULTY COMPONENT CAUSING VACUUM LEAKAGE.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED OR LEAKING.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR. NO VACUUM SHOULD BE PRESENT AT THE HEAT-DEFROST DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR IMPROPER VACUUM OR CROSSED HOSE CONNECTIONS AT THE CONTROL ASSEMBLY AND THE VACUUM HARNESS AT THE JUNCTION BLOCKS.

VACUUM (14" HG) SHOULD BE PRESENT AT THE FRESH AIR RECIRCULATING DOOR MOTOR, HEATER CORE RESTRICTOR MOTOR AND THE REGISTER AIR DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER VACUUM OR HOSE CONNECTIONS AT THE CONTROL ASSEMBLY, HARNESSES AND AT THE JUNCTION BLOCKS. IF THE HOSE CONNECTIONS, HARNESSES AND JUNCTION BLOCKS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE FAULTY HOSES, HARNESS OR JUNCTION BLOCKS. REPLACE CONTROL ASSEMBLY IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR MOTOR IS FAULTY.

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(CONT.)

IF NO VACUUM IS PRESENT AT THE HEAT DEFROST DOOR MOTOR, CHECK THE OPERATION OF THE DOORS BY HAND FOR A BINDING OR OBSTRUCTED CONDITION. IF VACUUM IS PRESENT AT THE FRESH AIR RECIRCULATING DOOR MOTOR, HEATER CORE RESTRICTOR MOTOR AND THE REGISTER AIR DOOR MOTOR, CHECK THE OPERATION OF THE DOORS BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

IF REQUIRED, CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION. LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS FOR PROPER OPERATION.

FUNCTIONAL CONTROL (UPPER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN FRESH POSITION

APPLY PARKING BRAKES, POSITION THE TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM WITH THE BLOWER ON HIGH SPEED. POSITION THE FUNCTIONAL CONTROL LEVER IN THE FRESH POSITION.

OBSERVE THE AIR FLOW AT THE REGISTERS, DEFROSTERS, AND HEAT DUCT TO CHECK THE FOLLOWING DOORS FOR PROPER OPERATION.

1. FRESH (OUTSIDE) AIR DOOR – – CLOSED – – NO FRESH AIR FLOW.
2. REGISTER AIR DOOR – – OPEN – – COLD AIR FLOW AT REGISTERS.
3. HEATER CORE RESTRICTOR DOOR – – CLOSED – – NO HEAT FROM DEFROSTER.
4. HEAT–DEFROST DOOR – – CLOSED – – NO HEAT FROM REGISTERS OR DEFROSTER.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM PROBE CONNECTED BETWEEN THE VACUUM SUPPLY TANK INLET LINE AND THE SUPPLY TANK. IF VACUUM IS NOT TO SPECIFICATIONS AT THIS LOCATION, CHECK FOR VACUUM LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE AND VACUUM SUPPLY TANK, AND THE VACUUM LINE (BLUE–RED). IF VACUUM IS STILL NOT TO SPECIFICATION, CHECK FOR THE SPECIFIED VACUUM AT THE UNIFLOW HOSE CONNECTIONS AT THE RIGHT AND LEFT JUNCTION BLOCKS.

IF NOT OK

IF OK

REPAIR OR REPLACE FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE A/C DOOR OPERATION.

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED OR LEAKING.

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(CONT.)

CHECK THE DOOR POSITIONS. IF AIR FLOW INDICATES A DOOR IS NOT POSITIONED AS NOTED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE FRESH AIR RE-CIRCULATING DOOR MOTOR AND THE HEAT–DEFROST DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR IMPROPER VACUUM OR CROSSED HOSE CONNECTION AT THE CONTROL ASSEMBLY AND THE VACUUM HARNESSES AT THE JUNCTION BLOCKS.

VACUUM (14" HG) SHOULD BE PRESENT AT THE HEATER CORE RESTRICTOR MOTOR AND THE REGISTER AIR DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER VACUUM OR CROSSED HOSE CONNECTIONS AT THE CONTROL ASSEMBLY, HARNESSES AND AT THE JUNCTION BLOCKS. IF THE HOSE CONNECTIONS, HARNESSES AND JUNCTION BLOCKS ARE IN-STALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE FAULTY HOSES, HARNESSES, OR JUNCTION BLOCKS. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE HEAT-DEFROST DOOR MOTOR OR THE FRESH AIR RECIRCULATING DOOR MOTOR, CHECK THE OPERATION OF THE DOORS FOR A BINDING OR OBSTRUCTED CONDITION.

IF VACUUM IS PRESENT AT THE HEATER CORE RESTRICTOR MOTOR AND THE REGISTER AIR DOOR MOTOR, CHECK THE OPERATION OF THE DOOR FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

IF REQUIRED, CORRECT CAUSE OF OBSTRUC-TION OR BIND CONDITION, AND LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. ALSO LUBRICATE DOOR PIVOT PLATE. IF DOOR WAS NOT OB-STRUCTED OR BINDING, REPLACE THE APPLIC-ABLE DOOR MOTOR. CHECK THE DOORS FOR PROPER OPERATION.

FUNCTIONAL CONTROL (UPPER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN OFF POSITION

APPLY PARKING BRAKES. POSITION THE TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM WITH THE BLOWER ON HIGH SPEED. POSITION THE FUNCTIONAL CONTROL LEVER IN THE OFF POSITION.

OBSERVE THE AIR FLOW AT THE REGISTERS, DEFROSTERS, AND HEAT DUCT TO CHECK THE FOLLOWING DOORS FOR PROPER OPERATION.

1. FRESH (OUTSIDE) AIR DOOR – CLOSED – NO FRESH AIR FLOW.
2. REGISTER AIR DOOR – CLOSED – COLD AIR FLOW AT REGISTERS.
3. HEATER CORE RESTRICTOR DOOR – OPEN – NO HEAT FROM DEFROSTER.
4. HEAT – DEFROST DOOR – CLOSED – NO HEAT FROM REGISTERS OR DEFROSTER.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM PROBE CONNECTED BETWEEN THE VACUUM SUPPLY TANK INLET LINE (BLUE–RED) AND THE SUPPLY TANK. IF VACUUM IS NOT TO SPECIFICATIONS AT THESE LOCATIONS, CHECK FOR VACUUM LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE AND VACUUM SUPPLY TANK, AND THE VACUUM LINE (BLUE–RED). IF VACUUM IS STILL NOT TO SPECIFICATION, CHECK FOR THE SPECIFIED VACUUM AT THE UNIFLOW HOSE CONNECTIONS AT THE RIGHT AND LEFT JUNCTION BLOCKS.

IF NOT OK

REPAIR OR REPLACE FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE A/C DOOR OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED OR LEAKING.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR. NO VACUUM SHOULD BE PRESENT AT THE REGISTER AIR DOOR MOTOR, HEATER CORE RESTRICTOR DOOR MOTOR AND THE HEAT-DEFROST MOTOR. IF VACUUM IS PRESENT, CHECK FOR IMPROPER VACUUM OR CROSSED HOSE CONNECTIONS AT THE CONTROL ASSEMBLY AND THE VACUUM HARNESS AT THE JUNCTION BLOCKS.

VACUUM (14" HG) SHOULD BE PRESENT AT THE FRESH AIR RECIRCULATING DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER VACUUM OR CROSSED HOSE CONNECTIONS AT THE CONTROL ASSEMBLY, HARNESSES AND AT THE JUNCTION BLOCKS. IF THE HOSE CONNECTIONS, HARNESSES AND JUNCTION BLOCKS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE FAULTY HOSES, HARNESS OR JUNCTION BLOCKS. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE REGISTER AIR DOOR MOTOR, HEATER CORE RESTRICTOR DOOR MOTOR AND THE HEAT-DEFROST DOOR MOTOR, CHECK THE OPERATION OF THE DOORS BY HAND FOR A BINDING OR OBSTRUCTED CONDITION. IF VACUUM IS PRESENT AT THE FRESH AIR RECIRCULATING DOOR MOTOR, CHECK THE OPERATION OF THE DOOR BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

IF REQUIRED, CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION. LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS FOR PROPER OPERATION.

FUNCTIONAL CONTROL (UPPER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN HEAT POSITION

APPLY PARKING BRAKES. POSITION THE TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM WITH THE BLOWER ON HIGH SPEED. POSITION THE FUNCTIONAL CONTROL LEVER IN THE HEAT POSITION.

OBSERVE THE AIR FLOW AT THE REGISTERS, DEFROSTERS, AND HEAT DUCT TO CHECK THE FOLLOWING DOORS FOR PROPER OPERATION.

1. FRESH (OUTSIDE) AIR DOOR – CLOSED – NO FRESH AIR FLOW.
2. REGISTER AIR DOOR – CLOSED – HOT AIR FLOW AT REGISTERS.
3. HEATER CORE RESTRICTOR DOOR – OPEN – HEAT FROM DEFROSTER.
4. HEAT–DEFROST DOOR – CLOSED – HEAT FROM REGISTERS. NO HEAT FROM DEFROSTER.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM PROBE CONNECTED BETWEEN THE VACUUM SUPPLY TANK INLET LINE (BLUE–RED) AND THE SUPPLY TANK. IF VACUUM IS NOT TO SPECIFICATION AT THESE LOCATIONS, CHECK FOR VACUUM LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE AND VACUUM SUPPLY TANK, AND THE VACUUM LINE (BLUE–RED). IF VACUUM IS STILL NOT TO SPECIFICATION, CHECK FOR THE SPECIFIED VACUUM AT THE UNIFLOW HOSE CONNECTIONS AT THE RIGHT AND LEFT JUNCTION BLOCKS.

IF NOT OK → REPAIR OR REPLACE FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE A/C DOOR OPERATION.

IF OK → CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED OR LEAKING.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE FRESH AIR RECIRCULATING DOOR MOTOR HEAT-DEFROST MOTOR, HEATER CORE RESTRICTOR MOTOR, AND REGISTER AIR DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR LEAKING VACUUM HOSES OR CROSSED HOSE CONNECTIONS AT THE CONTROL ASSEMBLY AND THE VACUUM HARNESSES AT THE JUNCTION BLOCKS.

IF NOT OK → CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE FAULTY HOSES, HARNESSES OR JUNCTION BLOCKS. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK → DOORS BIND OR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE HEAT-DEFROST DOOR MOTOR, FRESH AIR RECIRCULATING DOOR MOTOR, HEATER CORE RESTRICTOR MOTOR OR THE REGISTER AIR DOOR MOTOR, CHECK THE OPERATION OF THE DOORS BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK → IF REQUIRED, CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION. LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS FOR PROPER OPERATION.

FUNCTIONAL CONTROL (UPPER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN PARTIAL DEFROST POSITION

APPLY PARKING BRAKES, POSITION THE TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM WITH THE BLOWER ON HIGH SPEED. POSITION THE FUNCTIONAL CONTROL LEVER IN THE PARTIAL DEFROST POSITION.

OBSERVE THE AIR FLOW AT THE REGISTERS, DEFROSTERS, AND HEAT DUCT TO CHECK THE FOLLOWING DOORS FOR PROPER OPERATION.

1. FRESH (OUTSIDE) AIR DOOR – CLOSED – NO FRESH AIR FLOW.
2. REGISTER AIR DOOR – CLOSED – HOT AIR FLOW AT REGISTERS.
3. HEATER CORE RESTRICTOR DOOR – OPEN – HEAT FROM DEFROSTER.
4. HEAT–DEFROST DOOR – OPEN – HEAT FROM REGISTERS AND DEFROSTER.

IF THE DOORS ARE NOT IN THE POSITIONS INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM PROBE CONNECTED BETWEEN THE VACUUM SUPPLY TANK INLET LINE (BLUE–RED) AND THE TANK.

IF VACUUM IS NOT TO SPECIFICATIONS AT THESE LOCATIONS, CHECK FOR VACUUM LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE AND VACUUM SUPPLY TANK AND THE VACUUM LINE (BLUE–RED). IF VACUUM IS STILL NOT TO SPECIFICATION, CHECK FOR THE SPECIFIED VACUUM AT THE UNIFLOW HOSE CONNECTIONS AT THE RIGHT AND LEFT JUNCTION BLOCKS.

IF NOT OK

REPAIR OR REPLACE FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE A/C DOOR OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED OR LEAKING.

CHECK THE DOOR POSITIONS. IF AIR FLOW INDICATES A DOOR IS NOT POSITIONED AS NOTED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE FRESH AIR RECIRCULATING DOOR MOTOR, REGISTER AIR DOOR MOTOR AND HEATER CORE RESTRICTOR DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR VACUUM OR IMPROPER (CROSSED HOSE) CONNECTIONS AT THE CONTROL ASSEMBLY, HARNESSES AND AT THE JUNCTION BLOCKS. IF THE HOSE CONNECTIONS, HARNESSES AND JUNCTION BLOCKS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE FAULTY HOSES, HARNESSES OR JUNCTION BLOCKS. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE FRESH AIR RECIRCULATING DOOR MOTOR, REGISTER AIR DOOR MOTOR AND HEATER CORE RESTRICTOR MOTOR, CHECK THE OPERATION OF THE DOOR BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF VACUUM IS PRESENT AT THE HEAT–DEFROST DOOR MOTOR, CHECK THE OPERATION OF THE DOOR BY HAND FOR BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

IF REQUIRED, CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION. LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS FOR PROPER OPERATION.

FUNCTIONAL CONTROL (UPPER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN FULL DEFROST POSITION

APPLY PARKING BRAKES, POSITION THE TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM WITH THE BLOWER ON HIGH-SPEED. POSITION THE FUNCTIONAL CONTROL LEVER IN THE FULL DEFROST POSITION.

OBSERVE THE AIR FLOW AT THE REGISTERS, DEFROSTERS, AND HEAT DUCT TO CHECK THE FOLLOWING DOORS FOR PROPER OPERATION.

1. FRESH (OUTSIDE) AIR DOOR – CLOSED – NO FRESH AIR FLOW.
2. REGISTER AIR DOOR – CLOSED – WARM AIR FLOW AT REGISTER.
3. HEATER CORE RESTRICTOR DOOR – OPEN – HEAT FROM DEFROSTER.
4. HEAT-DEFROST DOOR – OPEN – HEAT FROM DEFROSTERS.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM PROBE CONNECTED BETWEEN THE VACUUM SUPPLY TANK INLET LINE (BLUE-RED) AND THE SUPPLY TANK.

IF VACUUM IS NOT TO SPECIFICATIONS AT THESE LOCATIONS, CHECK FOR VACUUM LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE AND VACUUM SUPPLY TANK AND THE VACUUM OUTLET LINE (BLUE-RED). IF VACUUM IS STILL NOT TO SPECIFICATION, CHECK FOR THE SPECIFIED VACUUM AT THE UNIFLOW HOSE CONNECTIONS AT THE RIGHT AND LEFT JUNCTION BLOCKS.

IF NOT OK

REPAIR OR REPLACE FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE A/C DOOR OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED OR LEAKING.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE FRESH AIR RECIRCULATING DOOR MOTOR, REGISTER AIR DOOR MOTOR AND THE HEATER CORE RESTRICTOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR LEAKING VACUUM HOSES OR CROSSED HOSE CONNECTIONS AT THE CONTROL ASSEMBLY AND THE VACUUM HARNESSES AT THE JUNCTION BLOCKS.

VACUUM (14" HG) SHOULD BE PRESENT AT THE HEAT-DEFROST MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR LEAKING HOSES, IMPROPER VACUUM OR CROSSED HOSE CONNECTIONS AT THE CONTROL ASSEMBLY, HARNESSES AND JUNCTION BLOCKS. IF THE HOSE CONNECTIONS, HARNESSES AND JUNCTION BLOCKS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE FAULTY HOSES, HARNESSES OR JUNCTION BLOCKS. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR MOTOR IS FAULTY

IF NO VACUUM IS PRESENT AT THE HEAT-DEFROST DOOR MOTOR OR THE FRESH AIR RECIRCULATING DOOR MOTOR, REGISTER AIR DOOR MOTOR AND THE HEATER CORE RESTRICTOR MOTOR, CHECK THE OPERATION OF THE DOORS BY HAND FOR A BINDING OR OBSTRUCTED CONDITION. IF VACUUM IS PRESENT AT THE HEAT-DEFROST MOTOR, CHECK THE OPERATION OF THE DOOR BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

IF REQUIRED, CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION. LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS FOR PROPER OPERATION.

A/C-HEATER CONTROL—FORD AND MERCURY

The following table can be used to determine any of the system component conditions for any given control lever position. The vacuum schematic on the following page will aid in the diagnosis.

Ford / Mercury A/C – Heater Control System a/		Temp. Control (Lower) Lever (Bowden Cable Controlled)	Functional Control (Upper) Lever				
			A/C		OFF	HEAT	
			MAX.	FRESH		HEAT	DEFROST
AIR DOORS	Outside Recirc. White		Closed NV.	Open VAC.	Closed NV.	Open VAC.	
	Recirc. White		Open NV.	Closed VAC.	Open NV.	Closed VAC.	
	A/C Heat Blue		A/C Position NV		Heat Position VAC.		
	Heat-Defrost Red		Heat Position NV				Defrost Position VAC.
Temperature Regulator Valve (1/8 Blue) (3/16 Brown) Cable Controlled		Low	No Vacuum Available To The Valve		Closed By Cable NV Thru Valve		
		Mod			Partially Opened By Cable Metering Vacuum		
		High			Fully Opened By Cable Full Vac. Thru Valve		
Water Valve Brown		Low	Closed NV		Closed NV		
		Mod			Partially Open-Metered Vac.		
		High			Full Open-Full Vac.		
Clutch Switch			On		Off		
Blower Switch			Manually On – L-M-H		Man. Off	Man. On – L-M-H Off – Ram	Manually On – L-M-H
A/C Switch		Low	On Max.		Off		
		Mod	On Mod.				
		High	On Min.				

L–Low
M–Medium
H–High

Min.–Minimum
Mod–Modulated
Max.–Maximum
Man.–Manually

Vac.–Vacuum
NV–No Vacuum
Pos.–Position

a/ Colors indicate vacuum hose color code.

Fig. 49—A/C-Heater Control--Ford and Mercury

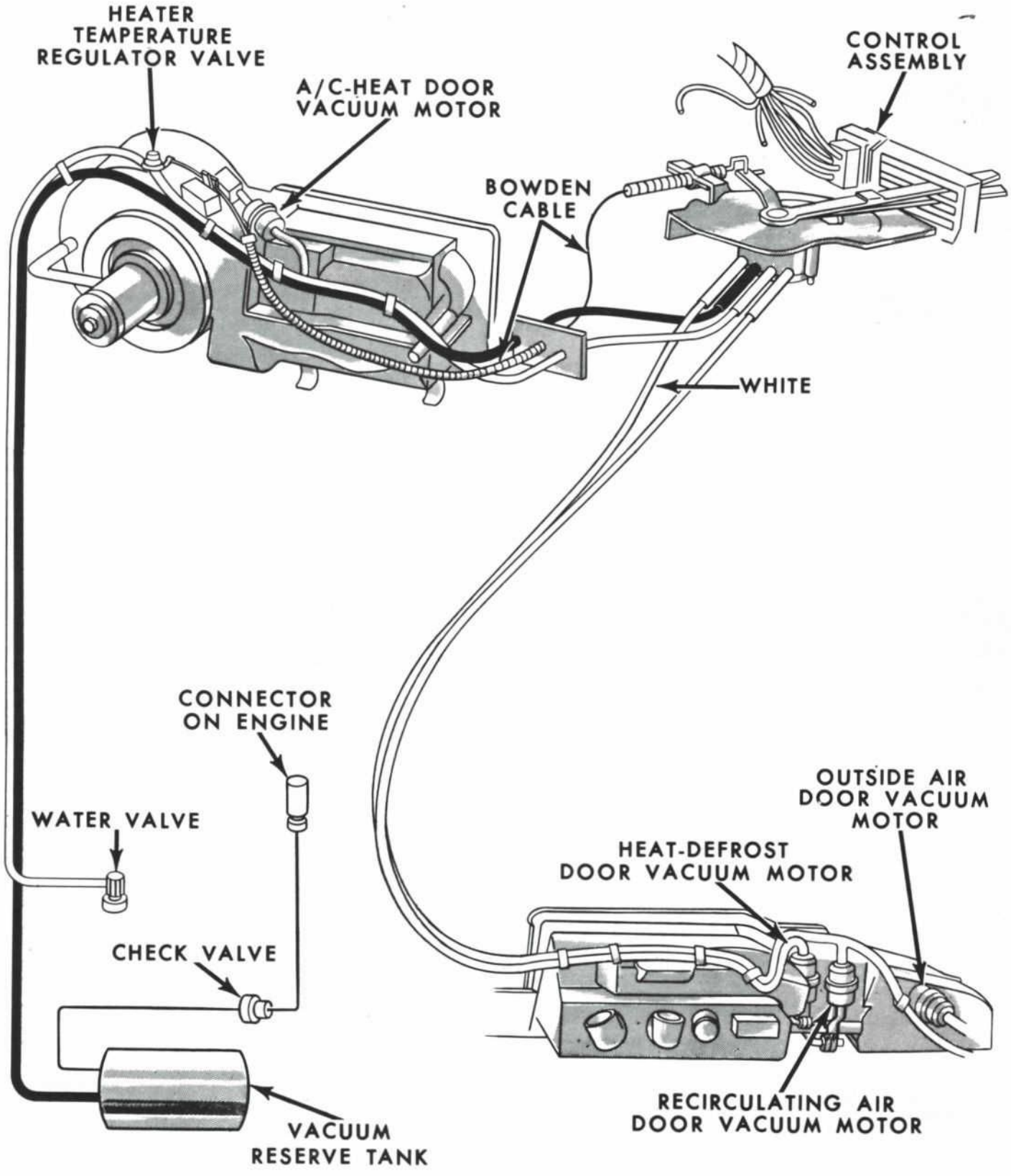

Fig. 50—A/C-Heater Vacuum Schematic--Ford and Mercury

TEMPERATURE CONTROL (UPPER) LEVER DOOR NOT PROVIDE ADEQUATE HEATING OR COOLING

MOVE TEMPERATURE CONTROL (UPPER) LEVER FROM HEAT TO COOLING WHILE OBSERVING THE OPERATION OF THE THERMOSTATIC SWITCH AND THE HEATER WATER CONTROL VALVE. CHECK TO MAKE SURE ROD BETWEEN HEATER WATER CONTROL VALVE AND THERMOSTATIC SWITCH IS INSTALLED PROPERLY. CHECK OPERATION OF THERMOSTATIC SWITCH AND WATER CONTROL VALVE TO MAKE SURE THERE IS FULL TRAVEL.

IF NOT OK

MAKE SURE ROD IS INSTALLED PROPERLY. ADJUST TEMPERATURE CONTROL BOWDEN CABLE, AS REQUIRED, WITH THE A/C HEAT DOOR FULLY CLOSED.

IF OK

A/C SYSTEM IS NOT OPERATING PROPERLY.

START THE ENGINE. POSITION TEMPERATURE CONTROL LEVER ON MAXIMUM COOLING WITH BLOWER ON HIGH SPEED. CHECK FOR ADEQUATE COOLING.

IF NOT OK

REFER TO INSUFFICIENT, ERRATIC OR NO COOLING UNDER PERFORMANCE CONDITIONS – BASIC A/C SYSTEM

FUNCTIONAL CONTROL (LOWER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN MAXIMUM COOLING POSITION

APPLY PARKING BRAKES POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION.

OPERATE THE ENGINE AT 1500 RPM. POSITION FUNCTIONAL CONTROL (LOWER) LEVER IN MAXIMUM COOLING POSITION. CHECK POSITION OF DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE AIR DOOR – CLOSED
2. RECIRCULATING DOOR – OPEN
3. HEAT DEFROST DOOR – CLOSED
4. A/C – HEAT DOOR – CLOSED.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK INLET LINE AND THE VACUUM TANK. ALSO CHECK FOR SPECIFIED VACUUM (14" HG) AT A/C HEAT DOOR VACUUM MOTOR (ACTUATOR) WITH LOWER LEVER IN HEAT POSITION.

IF VACUUM IS NOT TO SPECIFICATIONS AT THESE LOCATIONS, CHECK FOR VACUUM LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE, RESERVE TANK, AND VACUUM OUTLET LINE AT THE CONTROL ASSEMBLY.

IF NOT OK

REPAIR OR REPLACE FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK DOOR OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

(CONT.)

(CONT.)

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR. NO VACUUM SHOULD BE PRESENT. IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) HOSE CONNECTIONS AT THE CONTROL ASSEMBLY. IF HOSE CONNECTIONS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTINGS, IF REQUIRED. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOOR(S) BIND OR DOOR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE APPLICABLE DOOR VACUUM MOTOR WHEN CHECKED WITH THE VACUUM PROBE, CHECK THE OPERATION OF THE DOOR(S) BY HAND FOR A BINDING OR OBSTRUCTED CONDITION. IF A BINDING OR OBSTRUCTED CONDITION DOES NOT EXIST AT THE DOOR(S), THE MOTOR IS FAULTY.

IF NOT OK

CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION IF REQUIRED. LUBRICATE THE INTERFERENCE AREAS IN THE PLENUM CHAMBER WITH LUBRIPLATE, AND LUBRICATE DOOR PIVOT POINTS.

IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR.

FUNCTIONAL CONTROL (LOWER) LEVER DOES NOT OPERATE A/C SYSTEM DOORS PROPERLY IN FRESH AIR POSITION

APPLY PARKING BRAKES, POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION FUNCTIONAL CONTROL LOWER LEVER IN THE FRESH AIR POSITION AND THE BLOWER IN HIGH SPEED. CHECK POSITION OF DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE AIR DOOR – OPEN.
2. A/C – HEAT DOOR – CLOSED.
3. RECIRCULATING AIR DOOR – CLOSED.
4. HEAT–DEFROST DOOR – CLOSED.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK INLET LINE AND THE VACUUM TANK. ALSO, CHECK FOR THE SPECIFIED VACUUM (14" HG) AT THE A/C HEAT DOOR VACUUM MOTOR (ACTUATOR) WITH LOWER LEVER IN THE HEAT POSITION.

IF VACUUM IS NOT TO SPECIFICATIONS AT THESE LOCATIONS, CHECK FOR VACUUM LEAKAGE BETWEEN: THE CONNECTOR ON THE ENGINE, CHECK VALVE, SUPPLY TANK, AND VACUUM OUTLET LINE AT THE CONTROL ASSEMBLY.

IF NOT OK

REPAIR FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE A/C DOOR OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

(CONT.)

CHECK THE DOOR POSITION, IF A DOOR IS NOT POSITIONED AS INDICATED, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE A/C HEAT DOOR MOTOR AND THE HEAT–DEFROST DOOR MOTOR. IF VACUUM IS P IS PRESENT, CHECK FOR IMPROPER (CROSSED) HOSE CONNECTIONS A CONNECTIONS AT THE CONTROL ASSEMBLY.

VACUUM SHOULD BE PRESENT AT THE OUTSIDE AIR DOOR MOTOR AND RECIRCULATING AIR DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) HOSE CONNECTIONS AT THE CONTROL ASSEMBLY.

IF HOSE CONNECTIONS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

(CONT.)

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR DOOR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE HEAT–DEFROST DOOR MOTOR OR A/C–HEAT DOOR MOTORS, CHECK THE OPERATION OF THE DOORS BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF VACUUM IS PRESENT AT THE OUTSIDE AIR DOOR OR RECIRCULATING AIR DOOR MOTORS, CHECK THE OPERATION OF THE DOORS BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION, IF REQUIRED. LUBRICATE THE INTERFERENCE AREAS IN THE PLENUM CHAMBER WITH LUBRIPLATE, AND LUBRICATE DOOR PIVOT POINTS.

IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR.

FUNCTIONAL CONTROL (LOWER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN OFF POSITION

APPLY PARKING BRAKES, POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION FUNCTIONAL CONTROL LOWER LEVER IN THE OFF POSITION AND THE BLOWER IN HIGH SPEED. CHECK POSITION OF DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE AIR DOOR – CLOSED.
2. A/C–HEAT DOOR – OPEN.
3. RECIRCULATING AIR DOOR – OPEN.
4. HEAT–DEFROST DOOR – CLOSED.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14'' HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK INLET LINE AND THE VACUUM TANK. ALSO, CHECK FOR THE SPECIFIED VACUUM (14'' HG) AT THE A/C HEAT DOOR VACUUM MOTOR (ACTUATOR) WITH LOWER LEVER IN THE HEAT POSITION.

IF VACUUM IS NOT TO SPECIFICATIONS AT THESE LOCATIONS, CHECK FOR VACUUM LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE; CHECK VALVE, RESERVE TANK, AND VACUUM OUTLET LINE AT THE CONTROL ASSEMBLY.

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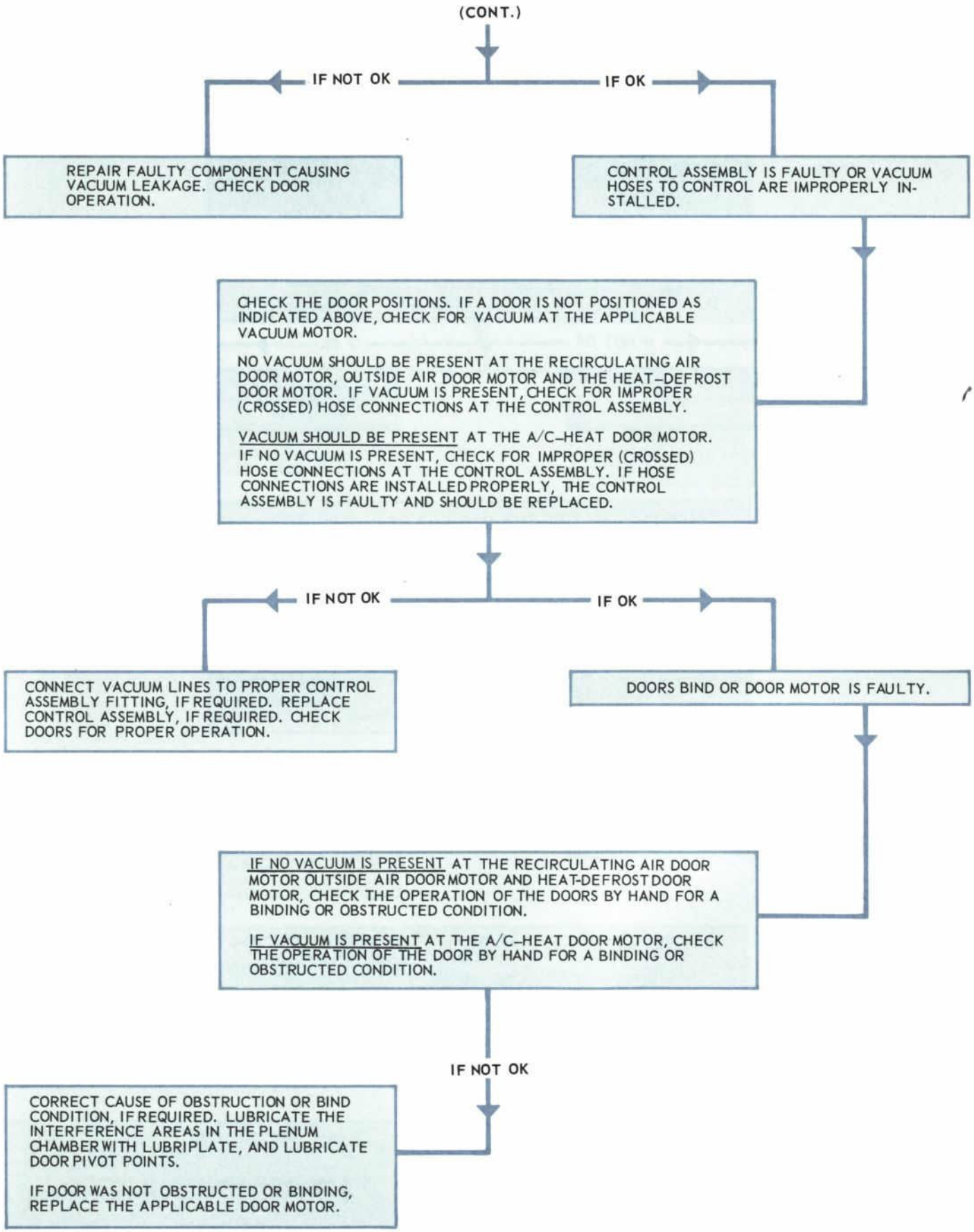
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IF NOT OK
IF OK
REPAIR FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK DOOR OPERATION.
CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.
CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.
NO VACUUM SHOULD BE PRESENT AT THE RECIRCULATING AIR DOOR MOTOR, OUTSIDE AIR DOOR MOTOR AND THE HEAT–DEFROST DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) HOSE CONNECTIONS AT THE CONTROL ASSEMBLY.
VACUUM SHOULD BE PRESENT AT THE A/C–HEAT DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) HOSE CONNECTIONS AT THE CONTROL ASSEMBLY. IF HOSE CONNECTIONS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.
IF NOT OK
IF OK
CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.
DOORS BIND OR DOOR MOTOR IS FAULTY.
IF NO VACUUM IS PRESENT AT THE RECIRCULATING AIR DOOR MOTOR OUTSIDE AIR DOOR MOTOR AND HEAT-DEFROST DOOR MOTOR, CHECK THE OPERATION OF THE DOORS BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.
IF VACUUM IS PRESENT AT THE A/C–HEAT DOOR MOTOR, CHECK THE OPERATION OF THE DOOR BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.
IF NOT OK
CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION, IF REQUIRED. LUBRICATE THE INTERFERENCE AREAS IN THE PLENUM CHAMBER WITH LUBRIPLATE, AND LUBRICATE DOOR PIVOT POINTS.
IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR.

FUNCTIONAL CONTROL (LOWER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN HEAT POSITION

APPLY PARKING BRAKES, POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION FUNCTIONAL CONTROL LOWER LEVER IN THE HEAT POSITION AND THE BLOWER IN HIGH SPEED. CHECK POSITION OF DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE AIR DOOR – OPEN.
2. A/C–HEAT DOOR – OPEN.
3. RECIRCULATING AIR DOOR – CLOSED.
4. HEAT–DEFROST DOOR – CLOSED.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK INLET LINE AND THE VACUUM TANK. ALSO, CHECK FOR THE SPECIFIED VACUUM (14" HG) AT THE A/C–HEAT DOOR VACUUM MOTOR (ACTUATOR) WITH LOWER LEVER IN THE HEAT POSITION.

IF VACUUM IS NOT TO SPECIFICATIONS AT THESE LOCATIONS, CHECK FOR VACUUM LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE, RESERVE TANK, AND VACUUM OUTLET LINE AT THE CONTROL ASSEMBLY.

IF NOT OK → REPAIR FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK DOOR OPERATION.

IF OK → CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE HEAT–DEFROST DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) HOSE CONNECTIONS AT THE CONTROL ASSEMBLY.

VACUUM SHOULD BE PRESENT AT THE OUTSIDE AIR DOOR MOTOR AND RECIRCULATING AIR DOOR MOTOR AND THE A/C–HEAT DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) HOSE CONNECTIONS AT THE CONTROL ASSEMBLY. IF HOSE CONNECTIONS ARE INSTALLED PROPERLY THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK → CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK → DOORS BIND OR DOOR MOTOR IS FAULTY

IF NO VACUUM IS PRESENT AT THE HEAT–DEFROST DOOR MOTOR, CHECK THE OPERATION OF THE DOOR BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF VACUUM IS PRESENT AT THE OUTSIDE AIR DOOR MOTOR, RECIRCULATING AIR DOOR MOTOR, AND THE A/C–HEAT DOOR MOTOR, CHECK THE OPERATION OF THE DOORS BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK →

CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION, IF REQUIRED. LUBRICATE THE INTERFERENCE AREAS IN THE PLENUM CHAMBER WITH LUBRIPLATE, AND LUBRICATE DOOR PIVOT POINTS.

IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR.

FUNCTIONAL CONTROL (LOWER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN DEFROST POSITION

APPLY PARKING BRAKES, POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION FUNCTIONAL CONTROL LOWER LEVER IN THE DEFROST POSITION. OPERATE THE BLOWER AT HIGH SPEED. CHECK POSITION OF DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE AIR DOOR – OPEN.
2. A/C–HEAT DOOR – OPEN.
3. RECIRCULATING AIR DOOR – CLOSED.
4. HEAT–DEFROST DOOR – CLOSED.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK INLET LINE AND THE VACUUM TANK. ALSO, CHECK FOR THE SPECIFIED VACUUM (14" HG) AT THE A/C–HEAT DOOR VACUUM MOTOR (ACTUATOR) WITH LOWER LEVER IN THE HEAT POSITION.

IF VACUUM IS NOT TO SPECIFICATIONS AT THESE LOCATIONS, CHECK FOR VACUUM LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE, RESERVE TANK, AND VACUUM OUTLET LINE AT THE CONTROL ASSEMBLY.

IF NOT OK

REPAIR FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK DOOR OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITION. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

VACUUM SHOULD BE PRESENT AT THE OUTSIDE AIR DOOR MOTOR, RECIRCULATING AIR DOOR MOTOR, A/C–HEAT DOOR MOTOR AND THE HEAT–DEFROST DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED HOSE) CONNECTIONS AT THE CO CONTROL ASSEMBLY. IF HOSE CONNECTIONS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR DOOR MOTOR IS FAULTY.

IF VACUUM IS PRESENT AT THE OUTSIDE AIR DOOR MOTOR, RECIRCULATING AIR DOOR MOTOR, A/C–HEAT DOOR MOTOR AND THE HEAT–DEFROST DOOR MOTOR, CHECK THE OPERATION OF THE DOORS BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION, IF REQUIRED. LUBRICATE THE INTERFERENCE AREAS IN THE PLENUM CHAMBER WITH LUBRIPLATE AND LUBRICATE DOOR PIVOT POINTS.

IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR.

A/C-HEATER CONTROL--FAIRLANE, FALCON AND MERCURY INTERMEDIATE

The following table can be used to determine any of the system component conditions for any given control lever position. The vacuum schematic on the following page will aid in the diagnosis.

Fairlane-Falcon Mercury Intermed. A/C-Heater Control System a/		Temperature Control Lever (Bowden Cable Controlled)	Functional Control Lever Position				
			A/C		OFF	HEAT	
			MAX.	FRESH		HEAT	DEFROST
AIR DOORS	Outside-Recirc. (White)		Recirc.-Pos. VAC.	Open to Outside NV.	Recirc.-Pos. VAC.	Open to Outside NV.	
	A/C-Heat (Blue)		A/C Position VAC.		Heat Position NV.		
	Heat-Def. (Red)		Heat Position NV.				Def. Pos. VAC.
Clutch Switch			ON – (by A/C-Heat Door Arm)		OFF – (by A/C-Heat Door Arm)		
Blower Switch			Manually On L-M-H Off – No Air Flow	On L-M-H Off – Ram Air#	Off + On-Recirc. Air Out Heat Duct	Manually on L-M-H Off – Ram Air	
Water Valve Vac. Switch (Blue)		Cool	Open (By Temp. – Blend Door Arm)				
		Mod Warm	Sealed (At Rest – Sprung Position)				
Water Valve (Blue)		Cool	Closed – VAC.				
		Mod Warm	Open – NV.				
Water Valve (Yellow)*			Closed – VAC.		Open – NV.		
Temp. Door		Cool	All Cold Air Bypasses Heater Core			Outside Air Bypasses Heater Core	
		Mod	Cold Air Passes Thru and Around Heater Core Then Mixed			Outside Air Passes Thru and Around Heater Core Then Mixed	
		Warm	All Cold Air Passes Thru Heater Core			Outside Air Passes Thru Heater Core	

L – Low
M – Medium
H – High

VAC. – Vacuum
NV. – No Vacuum
MOD. – Modulated

a/ Colors Indicate Vacuum Hose Color Coding

– Under the conditions specified under the A/C FRESH position and with the blower switch turned off, it is possible to receive outside ram air through the A/C registers. This will be ambient air if the temperature blend door is in the COOL position or partially heated air if the temperature blend door is in the MOD or WARM position.

* – The water valve vacuum motor color coded yellow has vacuum applied and removed under the same conditions as the A/C-heat door vacuum motor. Both motors receive vacuum from the same supply line from the control head.

+ – Recirculated Air – Not Recommended. Please note that under the conditions specified in the chart in the OFF position and the blower switch on, it is possible to receive recirculated air; either at inside temperature or reheated temperature, out of the heat ducts.

Fig. 51–A/C-Heater Control--Fairlane, Falcon and Mercury Intermediate

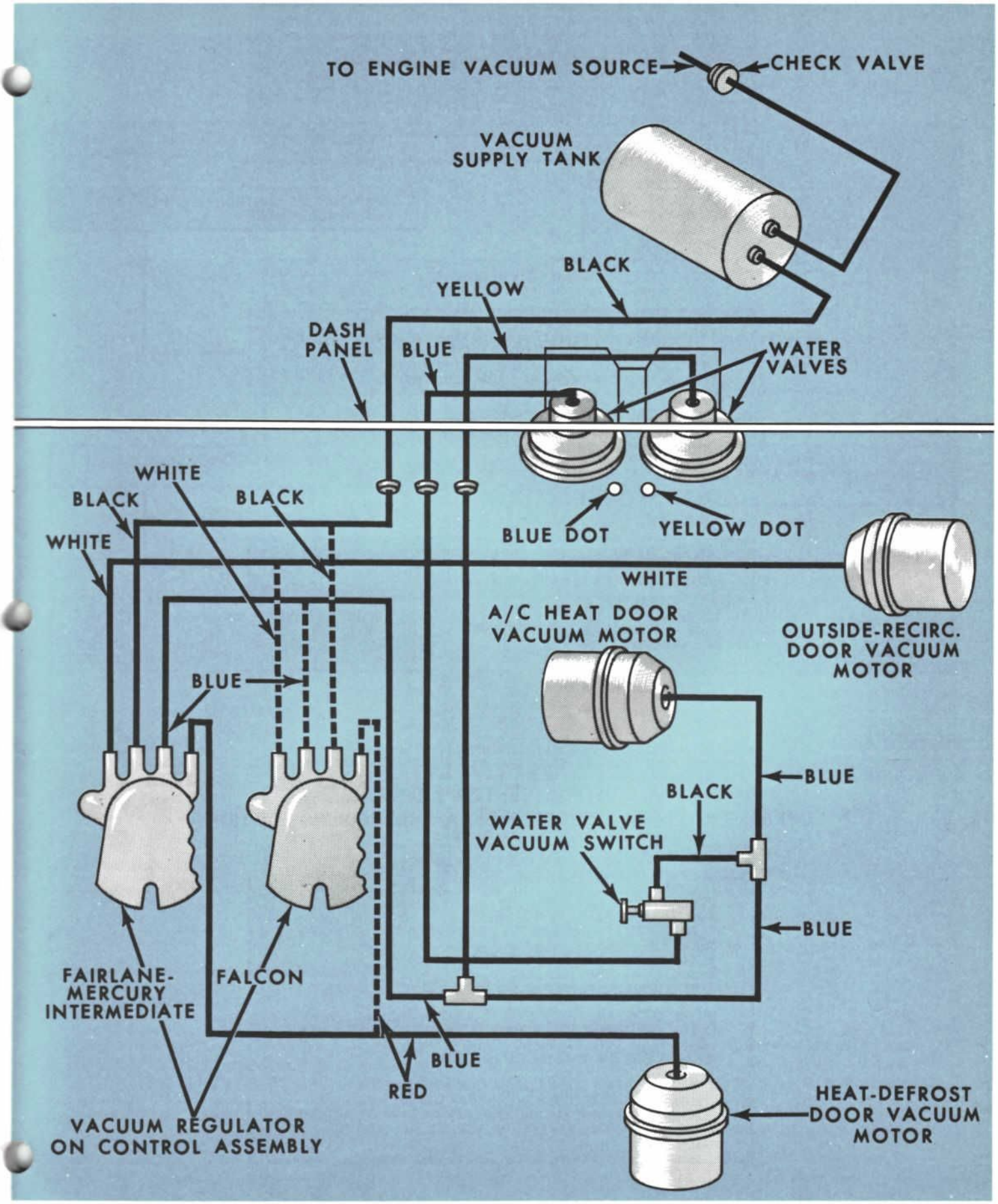

Fig. 52—A/C-Heater Vacuum Schematic--Fairlane, Falcon and Mercury Intermediate

TEMPERATURE CONTROL (LEFT) LEVER DOES NOT PROVIDE ADEQUATE HEATING OR COOLING

APPLY THE PARKING BRAKE. POSITION THE TRANSMISSION LEVER IN THE PARK POSITION. START THE ENGINE AND OPERATE IT AT 1500 RPM. OPERATE THE BLOWER AT HIGH SPEED. MOVE THE TEMPERATURE CONTROL (LEFT) LEVER BACK AND FORTH FROM COOL TO WARM AND CHECK THE BLEND-DOOR FOR BINDS OR RESISTANCE. CHECK THE HEAT DOOR POSITION WHEN THE CONTROL LEVER IS IN THE COOL POSITION TO SEE IF IT IS POSITIONED PROPERLY (FULLY CLOSED).

IF NOT OK

FREE UP THE DOOR. LUBRICATE THE INTERFERENCE AREAS IN THE PLENUM CHAMBER WITH LUBRIPLATE. LUBRICATE THE DOOR PIVOT POINTS. CHECK THE TEMPERATURE CONTROL LEVER FOR PROPER OPERATION.

IF OK

TEMPERATURE CONTROL LEVER (LEFT) IS OUT OF ADJUSTMENT.

MOVE THE TEMPERATURE CONTROL TO THE HEAT POSITION. IF THE BLEND DOOR IS NOT FULLY OPEN THE BOWDEN CABLE REQUIRES ADJUSTMENT AT THE DOOR ACTUATING CAM. INSERT A 1/8" DRILL THRU THE CAM AND INTO THE BRACKET TO POSITION THE DOOR PROPERLY FOR ADJUSTMENT.

IF NOT OK

ADJUST THE BOWDEN CABLE, AS REQUIRED. CHECK THE TEMPERATURE CONTROL OPERATION.

IF OK

A/C SYSTEM DOES NOT PROVIDE ADEQUATE COOLING.

REFER TO INSUFFICIENT, ERRATIC OF NO COOLING UNDER PERFORMANCE CONDITIONS – BASIC A/C SYSTEM. CHECK THE A/C SYSTEM AS INDICATED.

IF NOT OK

REPAIR OR REPLACE WORN OR DAMAGED PARTS, AS REQUIRED.

FUNCTIONAL CONTROL (CENTER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN MAXIMUM COOLING POSITION

APPLY PARKING BRAKES. POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION THE FUNCTIONAL CONTROL (CENTER) LEVER IN THE "MAX." POSITION BLOWER ON HIGH SPEED AND THE TEMPERATURE CONTROL (LEFT) LEVER IN THE "COOL" POSITION. CHECK THE POSITION OF THE DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE – RECIRCULATING DOOR – CLOSED.
2. A/C-HEAT DOOR – CLOSED.
3. HEAT-DEFROST DOOR – CLOSED.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK HOSE (BLACK) AND THE VACUUM TANK.

IF VACUUM IS NOT TO SPECIFICATION AT THIS LOCATION, CHECK FOR VACUUM COMPONENT LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE, VACUUM SUPPLY TANK AND THE VACUUM LINE (BLACK) AT THE CONTROL ASSEMBLY.

(CONT.)

(CONT.)

IF NOT OK

REPAIR OR REPLACE FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE DOOR POSITIONS.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE HEAT-DEFROST DOOR MOTOR (RED). IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE CONTROL ASSEMBLY.

VACUUM (14" HG) SHOULD BE PRESENT AT THE OUTSIDE RECIRCULATING DOOR MOTOR (WHITE) AND THE A/C-HEAT DOOR MOTOR (BLUE). IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE WATER VALVE VACUUM SWITCH, T-CONNECTORS OR CONTROL ASSEMBLY. IF THE HOSE CONNECTIONS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR DOOR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE HEAT-DEFROST DOOR MOTOR (RED), CHECK THE DOOR OPERATION BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF VACUUM (14" HG) IS PRESENT AT THE OUTSIDE RECIRCULATING DOOR MOTOR (WHITE) AND THE A/C-HEAT DOOR MOTOR (BLUE), CHECK THE OPERATION OF THE DOOR BY HAND FOR BINDING OR OBSTRUCTED CONDITIONS.

IF NOT OK

CORRECT THE CAUSE OF OBSTRUCTION OR BIND CONDITION (IF REQUIRED). LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS AND CONTROL SYSTEM FOR PROPER OPERATION.

FUNCTIONAL CONTROL (CENTER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN FRESH POSITION

APPLY PARKING BRAKES. POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION THE FUNCTIONAL CONTROL (CENTER) LEVER IN THE FRESH POSITION, BLOWER ON HIGH SPEED AND THE TEMPERATURE CONTROL (LEFT) LEVER IN THE COOL POSITION. CHECK THE POSITION OF THE DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE – RECIRCULATING DOOR – OPEN.
2. A/C–HEAT DOOR – CLOSED.
3. HEAT–DEFROST DOOR – CLOSED.

IF THE DOORS ARE NOT IN THE POSITIONS INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK HOSE (BLACK) AND THE VACUUM TANK.

IF VACUUM IS NOT TO SPECIFICATION AT THIS LOCATION, CHECK FOR VACUUM COMPONENT LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE, VACUUM SUPPLY TANK AND THE VACUUM LINE (BLACK) AT THE CONTROL ASSEMBLY.

IF NOT OK → REPAIR OR REPLACE (AS REQUIRED) FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE DOORS AND CONTROLS FOR PROPER OPERATION.

IF OK → CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE OUTSIDE RECIRCULATING DOOR MOTOR (WHITE) AND THE HEAT–DEFROST DOOR MOTOR (RED). IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE CONTROL ASSEMBLY.

VACUUM (14" HG) SHOULD BE PRESENT AT THE A/C–HEAT DOOR MOTOR (BLUE). IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE WATER VALVE VACUUM SWITCH, T–CONNECTORS AND THE CONTROL ASSEMBLY. IF THE HOSE CONNECTIONS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK → CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS AND CONTROL SYSTEM FOR PROPER OPERATION.

IF OK → DOORS BIND OR DOOR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE OUTSIDE RECIRCULATING DOOR MOTOR (WHITE) AND THE HEAT–DEFROST DOOR MOTOR (RED), CHECK THE DOOR OPERATION BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF VACUUM (14" HG) IS PRESENT AT THE A/C–HEAT DOOR MOTOR (BLUE), CHECK THE OPERATION OF THE DOOR BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK → CORRECT THE CAUSE OF OBSTRUCTION OR BIND CONDITION (IF REQUIRED). LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS AND CONTROL SYSTEM FOR PROPER OPERATION.

FUNCTIONAL CONTROL (CENTER) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN OFF POSITION

APPLY PARKING BRAKES. POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION THE FUNCTIONAL CONTROL (CENTER) LEVER IN THE OFF POSITION, BLOWER ON HIGH SPEED AND THE TEMPERATURE CONTROL (LEFT) LEVER IN THE COOL POSITION. CHECK POSITION OF THE DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE – RECIRCULATING DOOR – CLOSED.
2. A/C–HEAT DOOR – OPEN.
3. HEAT–DEFROST DOOR – CLOSED

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK HOSE (BLACK) AND THE VACUUM TANK.

IF VACUUM IS NOT TO SPECIFICATION AT THESE LOCATIONS, CHECK FOR VACUUM COMPONENT LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE, VACUUM SUPPLY TANK AND THE VACUUM LINE (BLACK) AT THE CONTROL ASSEMBLY.

IF NOT OK

REPAIR OR REPLACE FAULTY COMPONENT (AS REQUIRED) CAUSING VACUUM LEAKAGE.

CHECK THE DOOR OPERATING POSITIONS AND CONTROL OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE HEAT–DEFROST DOOR MOTOR (RED), AND THE A/C–HEAT DOOR MOTOR (BLUE). IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE VACUUM WATER VALVE, T–CONNECTORS AND AT THE CONTROL ASSEMBLY.

VACUUM (14" HG) SHOULD BE PRESENT AT THE OUTSIDE RECIRCULATING DOOR MOTOR (WHITE). IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE CONTROL ASSEMBLY. IF THE HOSE CONNECTIONS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE THE CONTROL ASSEMBLY, IF REQUIRED. CHECK THE DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR DOOR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE HEAT–DEFROST DOOR MOTOR (RED) OR THE A/C–HEAT DOOR MOTOR (BLUE), CHECK THE DOOR OPERATION BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

VACUUM (14" HG) IS PRESENT AT THE OUTSIDE RECIRCULATING DOOR MOTOR (WHITE), CHECK THE OPERATION OF THE DOOR BY HAND FOR BINDING OR OBSTRUCTED CONDITIONS.

IF NOT OK

CORRECT THE CAUSE OF OBSTRUCTION OR BIND CONDITION (IF REQUIRED). LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS AND CONTROL SYSTEM FOR PROPER OPERATION.

FUNCTIONAL CONTROL (RIGHT) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN HEAT POSITION

APPLY PARKING BRAKES. POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION THE FUNCTIONAL CONTROL (RIGHT) LEVER IN THE HEAT POSITION, BLOWER ON HIGH SPEED AND THE TEMPERATURE CONTROL (LEFT) LEVER IN THE WARM POSITION. CHECK THE POSITION OF THE DOORS TO SEE IF THEY ARE AS FOLLOWS:
1. OUTSIDE – RECIRCULATING DOOR – OPEN TO OUTSIDE.
2. A/C–HEAT DOOR – OPEN.
3. HEAT–DEFROST DOOR – CLOSED.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG), WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK HOSE (BLACK) AND THE VACUUM TANK.

IF VACUUM IS NOT TO SPECIFICATION, AT THESE LOCATIONS, CHECK FOR VACUUM COMPONENT LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE, VACUUM SUPPLY TANK AND THE VACUUM OUTLET LINE (BLACK) AT THE CONTROL ASSEMBLY.

IF NOT OK

REPAIR OR REPLACE (AS REQUIRED) FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE DOOR POSITIONS.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE HEAT–DEFROST DOOR MOTOR (RED), A/C–HEAT DOOR MOTOR, AND THE OUTSIDE–RECIRCULATING DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR IMPROPERLY INSTALLED (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE WATER VALVE, T–CONNECTORS AND AT THE CONTROL ASSEMBLY.

IF THE HOSE CONNECTIONS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE THE CONTROL ASSEMBLY IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR DOOR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE HEAT–DEFROST DOOR MOTOR (RED), A/C–HEAT DOOR MOTOR (BLUE) OR THE OUTSIDE – RECIRCULATING DOOR MOTOR (WHITE), CHECK THE DOOR OPERATION BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

CORRECT THE CAUSE OF OBSTRUCTION OR BIND CONDITION (IF REQUIRED). LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF THE DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS AND CONTROL SYSTEM FOR PROPER OPERATION.

FUNCTIONAL CONTROL (RIGHT) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN DEFROST POSITION

APPLY PARKING BRAKES. POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION THE FUNCTIONAL CONTROL (RIGHT) LEVER IN THE DEFROST POSITION, BLOWER ON HIGH SPEED, AND THE TEMPERATURE CONTROL (LEFT) LEVER IN THE WARM POSITION. CHECK THE POSITION OF THE DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE – RECIRCULATING DOOR -- OPEN TO OUTSIDE.
2. A/C–HEAT DOOR – OPEN.
3. HEAT–DEFROST DOOR – OPEN

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK HOSE (BLACK) AND THE VACUUM TANK.

IF VACUUM IS NOT TO SPECIFICATION, AT THESE LOCATIONS, CHECK FOR VACUUM COMPONENT LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE, VACUUM SUPPLY TANK AND THE VACUUM OUTLET LINE (BLACK) AT THE CONTROL ASSEMBLY.

IF NOT OK

REPAIR OR REPLACE (AS REQUIRED) FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE DOOR POSITIONS.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE OUTSIDE RECIRCULATING DOOR MOTOR (WHITE) AND THE A/C–HEAT DOOR MOTOR (BLUE). IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE WATER VALVE SWITCH, T–CONNECTORS AND THE CONTROL ASSEMBLY.

VACUUM (14" HG) SHOULD BE PRESENT AT THE HEAT–DEFROST DOOR MOTOR (RED). IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE CONTROL ASSEMBLY. IF THE HOSE CONNECTIONS ARE INSTALLED PROPERLY, THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE THE CONTROL ASSEMBLY, IF REQUIRED. CHECK THE DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR DOOR MOTOR IS FAULTY.

IF VACUUM (14" HG) IS PRESENT AT THE HEAT–DEFROST DOOR MOTOR (RED), CHECK THE OPERATION OF THE DOOR BY HAND FOR BINDING OR OBSTRUCTED CONDITIONS.

IF NOT OK

CORRECT THE CAUSE OF OBSTRUCTION OR BIND CONDITION (IF REQUIRED). LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS AND CONTROL SYSTEM FOR PROPER OPERATION.

A/C-HEATER CONTROL – MUSTANG AND MERCURY COUGAR

The following table can be used to determine any of the system component conditions for any given control lever position. The vacuum schematic on the chart page will aid in the diagnosis.

Mustang and Mercury Cougar A/C – Heater Control System a/		Temperature Control Lever (Bowden Cable Controlled)	Functional Control Lever Position				
			A/C		OFF	HEAT	
			MAX.	FRESH		HEAT	DEFROST
AIR DOORS	Outside Recirc. White		Open to Recirc. V	Open to Outside NV	Open to Recirc. V	Open to Outside NV	
	A/C Heat Blue		A/C Position V		Heat Position NV		A/C Position V
	A/C Defrost Red		A/C Position NV			Defrost Position V	
	Reheat Green		Blend Position (Closed) NV			Heat Position (Open) V	
Clutch Switch			On – (by A/C-Defrost Door Arm)			Off – (by A/C-Defrost Door Arm)	
Blower Switch			Manually On – L-M-H	On – L-M-H# Off – Ram Air	Off On*	On – L-M-H Off – Ram Air	
Water Valve Vacuum Switch Purple		Cool	Open (by Temp. Blend Door Arm)				
		Mod	Sealed (by Temp. Blend Door Arm)				
		Warm					
Water Valve Purple		Cool	Closed V				
		Mod	Open NV				
		Warm					
TEMP DOOR		Cool	All Cold Air Bypasses Heater Core			Outside Air Bypasses Heater Core	
		Mod	Cold Air Passes Thru and Around Heater Core Then Mixed			Outside Air Passes Thru and Around Heater Core Then Mixed	
		Warm	All Cold Air Passes Thru Heater Core			Outside Air Passes Thru Heater Core	

L – Low
M – Medium
H – High

V – Vacuum
NV – No Vacuum
MOD – Modulated

* Recirculated Air – Not Recommended. Please note that under the conditions specified in the chart in the OFF position and the blower switch is turned on, it is possible to receive cooled air out of the heater duct, depending upon the position of the temperature blend door.

\# Under the conditions specified under the A/C FRESH position and with the blower switch turned off, it is possible to receive outside ram air through the A/C registers. This will be ambient air if the temperature blend door is in the COOL position or partially or fully heated air if the temperature blend door is in the MOD or WARM position.

a/ Colors indicate vacuum hose color code.

Fig. 53–A/C-Heater Control--Mustang and Mercury Cougar

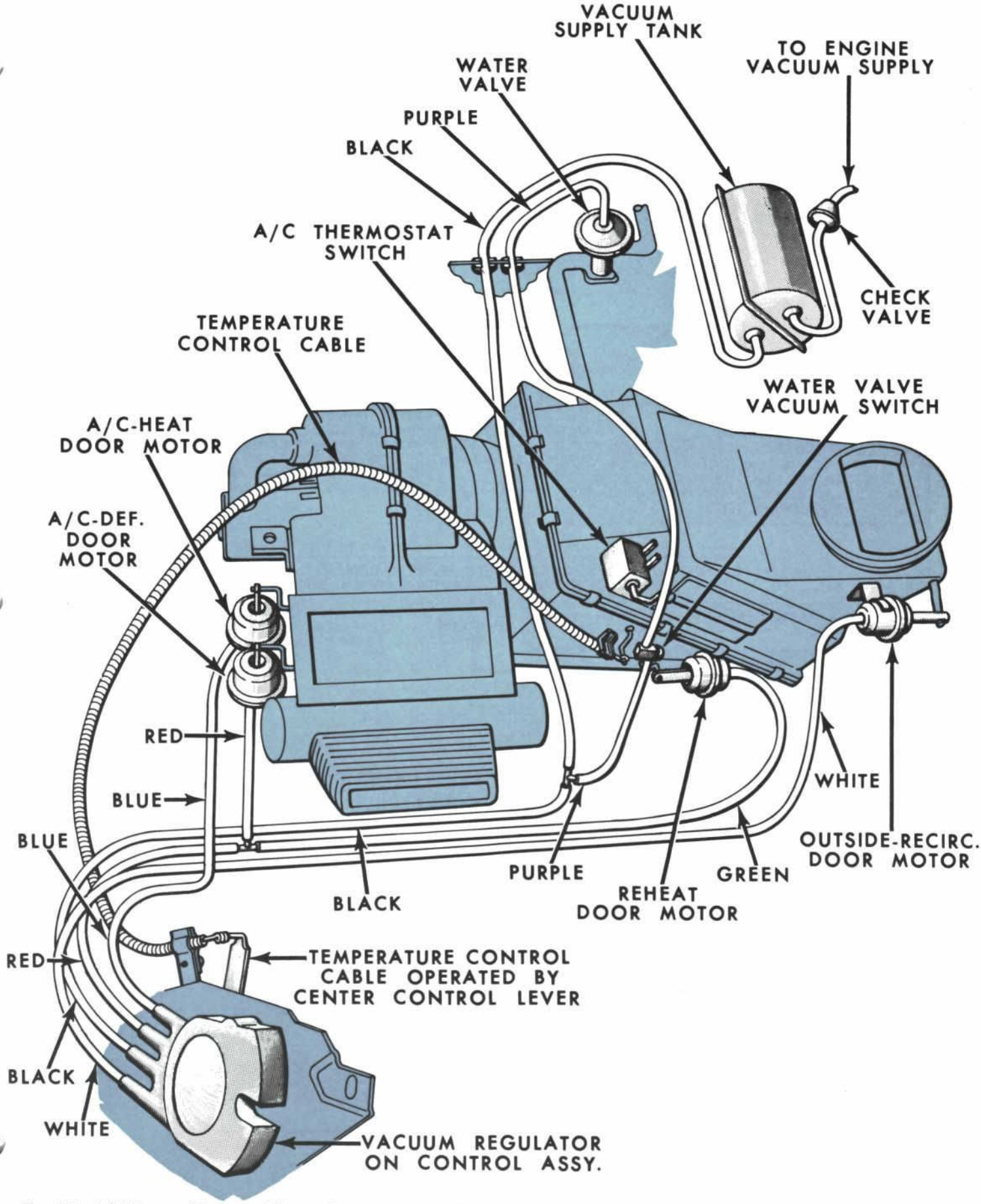

Fig. 54—A/C-Heater Vacuum Schematic--Mustang and Mercury Cougar

TEMPERATURE CONTROL (CENTER) LEVER DOES NOT PROVIDE ADEQUATE HEATING OR COOLING

APPLY THE PARKING BRAKE. POSITION THE TRANSMISSION LEVER IN THE PARK POSITION. START THE ENGINE AND OPERATE IT AT 1500 RPM. OPERATE THE BLOWER AT HIGH SPEED.

MOVE THE TEMPERATURE CONTROL (CENTER) LEVER BACK AND FORTH FROM COOL TO WARM AND CHECK THE BLEND-DOOR FOR BINDS OR RESISTANCE. CHECK THE BLEND DOOR POSITION WHEN THE CONTROL LEVER IS IN THE COOL POSITION TO SEE IF IT IS POSITIONED PROPERLY (FULLY-CLOSED).

IF NOT OK

FREE UP THE BLEND DOOR. LUBRICATE THE INTERFERENCE AREAS IN THE PLENUM CHAMBER WITH LUBRIPLATE. LUBRICATE THE DOOR PIVOT POINTS. CHECK THE TEMPERATURE CONTROL LEVER FOR PROPER OPERATION.

IF OK

TEMPERATURE CONTROL LEVER (CENTER) IS OUT OF ADJUSTMENT.

MOVE THE TEMPERATURE CONTROL LEVER TO THE COOL POSITION. IF THE BLEND DOOR IS NOT FULLY-CLOSED THE BOWDEN CABLE REQUIRES ADJUSTMENT.

IF NOT OK

WITH THE BLEND DOOR IN THE FULLY-CLOSED POSITION AND THE TEMPERATURE CONTROL IN THE COOL POSITION, ADJUST THE BOWDEN CABLE, AS REQUIRED. CHECK THE TEMPERATURE CONTROL OPERATION.

IF OK

A/C SYSTEM DOES NOT PROVIDE ADEQUATE COOLING.

REFER TO INSUFFICIENT, ERRATIC OR NO COOLING UNDER PERFORMANCE CONDITIONS - BASIC A/C SYSTEM. CHECK THE A/C SYSTEM AS INDICATED.

IF NOT OK

ADJUST, REPAIR OR REPLACE WORN OR DAMAGED PARTS, AS REQUIRED.

FUNCTIONAL CONTROL (LEFT) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN MAXIMUM COOLING POSITION

APPLY PARKING BRAKES. POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION FUNCTIONAL CONTROL LEVER IN THE MAX. POSITION AND THE BLOWER AT HIGH SPEED. CHECK THE POSITION OF THE DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE - RECIRCULATING DOOR--OPEN TO RECIRC.
2. A/C - HEAT DOOR--CLOSED.
3. A/C-DEFROST DOOR--CLOSED.
4. REHEAT DOOR--CLOSED.

IF THE DOORS ARE NOT IN THE POSITIONS INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK LINE (BLACK) AND THE VACUUM TANK.

IF VACUUM IS NOT TO SPECIFICATION AT THIS LOCATION, CHECK FOR VACUUM COMPONENT LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE; CHECK VALVE, VACUUM SUPPLY TANK, AND VACUUM LINE (BLACK) AT THE CONTROL ASSEMBLY.

(CONT.)

(CONT.)

IF NOT OK

REPAIR OR REPLACE (AS REQUIRED) FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE DOOR OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE A/C-DEFROST DOOR MOTOR AND THE REHEAT DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE HOSE CONNECTORS OR THE CONTROL ASSEMBLY.

VACUUM SHOULD BE PRESENT AT THE OUTSIDE RECIRCULATING DOOR MOTOR AND THE HEAT DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE CONTROL ASSEMBLY. IF HOSE CONNECTIONS ARE INSTALLED PROPERLY THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION

IF OK

DOORS BIND OR DOOR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE A/C-DEFROST DOOR MOTOR OR THE REHEAT DOOR MOTOR, CHECK THE DOOR OPERATION BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF VACUUM IS PRESENT AT THE OUTSIDE DOOR MOTOR AND THE HEAT DOOR MOTOR, CHECK THE OPERATION OF THE DOOR BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

CORRECT THE CAUSE OF OBSTRUCTION OR BIND CONDITION (IF REQUIRED). LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS AND CONTROL SYSTEM FOR PROPER OPERATION.

FUNCTIONAL CONTROL (LEFT) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN FRESH POSITION

APPLY PARKING BRAKES. POSITION THE TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION FUNCTIONAL CONTROL LEVER IN THE FRESH POSITION AND THE BLOWER ON HIGH SPEED. CHECK THE POSITION OF THE DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE–RECIRCULATING DOOR––OPEN TO OUTSIDE AIR.
2. A/C–HEAT DOOR––CLOSED.
3. A/C–DEFROST DOOR––OPEN.
4. REHEAT DOOR––OPEN.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK LINE (BLACK) AND THE VACUUM TANK. IF VACUUM IS NOT TO SPECIFICATION AT THESE LOCATIONS, CHECK FOR VACUUM COMPONENT LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE, VACUUM SUPPLY TANK, AND VACUUM OUTLET LINE (BLACK) AT THE CONTROL ASSEMBLY.

IF NOT OK

REPAIR OR REPLACE (AS REQUIRED) FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE DOOR OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE OUTSIDE–RECIRCULATING DOOR MOTOR, A/C–DEFROST DOOR MOTOR AND THE REHEAT DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE T–CONNECTOR, IF SO EQUIPPED, AND AT THE CONTROL ASSEMBLY.

VACUUM SHOULD BE PRESENT AT THE HEAT DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE CONTROL ASSEMBLY. IF HOSE CONNECTIONS ARE INSTALLED PROPERLY THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR DOOR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE OUTSIDE–RECIRCULATING DOOR MOTOR, A/C–DEFROST DOOR MOTOR OR THE REHEAT DOOR MOTOR, CHECK THE DOOR OPERATION BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF VACUUM IS PRESENT AT THE HEAT DOOR MOTOR, CHECK THE OPERATION OF THE DOOR BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION (IF REQUIRED). LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS AND CONTROL SYSTEM FOR PROPER OPERATION.

FUNCTIONAL CONTROL (LEFT) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN OFF POSITION

APPLY PARKING BRAKES. POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION FUNCTIONAL CONTROL LEVER IN THE FRESH POSITION AND THE BLOWER ON HIGH SPEED. CHECK THE POSITION OF THE DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE–RECIRCULATING DOOR––OPEN TO RECIRC.
2. A/C HEAT DOOR––OPEN.
3. A/C–DEFROST DOOR––CLOSED.
4. REHEAT DOOR––CLOSED.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14"HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK LINE (BLACK) AND THE VACUUM TANK.

IF VACUUM IS NOT TO SPECIFICATION AT THESE LOCATIONS, CHECK FOR VACUUM COMPONENT LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE VACUUM SUPPLY TANK, AND VACUUM OUTLET LINE (BLACK) AT THE CONTROL ASSEMBLY.

IF NOT OK

REPAIR OR REPLACE (AS REQUIRED) FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE DOOR OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE A/C HEAT DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT TOE CONTROL ASSEMBLY.

VACUUM SHOULD BE PRESENT AT THE REHEAT DOOR MOTOR, OUTSIDE RECIRCULATING DOOR MOTOR, AND THE DEFROST DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE CONTROL ASSEMBLY. IF HOSE CONNECTIONS ARE INSTALLED PROPERLY THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR DOOR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE A/C HEAT DOOR MOTOR, CHECK THE DOOR OPERATION BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF VACUUM IS PRESENT AT THE REHEAT DOOR MOTOR, OUTSIDE RECIRCULATING DOOR MOTOR AND DEFROST DOOR MOTOR, CHECK THE OPERATION OF THE DOOR BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

CORRECT CAUSE OF OBSTRUCTION OR BIND CONDITION (IF REQUIRED), LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS AND CONTROL SYSTEM FOR PROPER OPERATION.

FUNCTIONAL CONTROL (LEFT) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN HEAT POSITION

APPLY PARKING BRAKES. POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION FUNCTIONAL CONTROL LEVER IN THE FRESH POSITION AND THE BLOWER AT HIGH SPEED. CHECK THE POSITION OF THE DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE–RECIRCULATING DOOR – – OPEN TO OUTSIDE.
2. A/C HEAT DOOR – – CLOSED.
3. A/C–DEFROST DOOR – – OPEN.
4. REHEAT DOOR – – OPEN,

IF THE DOORS ARE NOT IN THE POSITIONS INDICATED ABOVE, CHECK FOR SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK LINE (BLACK) AND THE VACUUM TANK. IF VACUUM IS NOT TO SPECIFICATION AT THESE LOCATIONS, CHECK FOR VACUUM COMPONENT LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE; CHECK VALVE, VACUUM SUPPLY TANK, AND VACUUM OUTLET LINE (BLACK) AT THE CONTROL ASSEMBLY.

IF NOT OK

REPAIR OR REPLACE (AS REQUIRED) FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE DOOR OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE OUTSIDE–RECIRCULATING DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE CONTROL ASSEMBLY.

VACUUM SHOULD BE PRESENT AT THE HEAT DOOR MOTOR, DEFROST DOOR MOTOR AND THE REHEAT DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE T–CONNECTOR (IF SO EQUIPPED) AND AT THE CONTROL ASSEMBLY. IF HOSE CONNECTIONS ARE INSTALLED PROPERLY THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT VACUUM LINES TO PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE CONTROL ASSEMBLY, IF REQUIRED. CHECK DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR DOOR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE OUTSIDE–RECIRCULATING DOOR MOTOR, CHECK THE DOOR OPERATION BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF VACUUM IS PRESENT AT THE A/C–HEAT DOOR MOTOR, A/C–DEFROST DOOR MOTOR AND THE REHEAT DOOR MOTOR, CHECK THE OPERATION OF THE DOOR BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

CORRECT THE CAUSE OF THE OBSTRUCTION OR BIND CONDITION (IF REQUIRED). LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE THE DOOR PIVOT POINTS. IF THE DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS AND CONTROL SYSTEM FOR PROPER OPERATION.

FUNCTIONAL CONTROL (LEFT) LEVER DOES NOT OPERATE A/C DOORS PROPERLY IN DEFROST POSITION

APPLY PARKING BRAKES. POSITION TRANSMISSION LEVER IN NEUTRAL OR PARK POSITION. OPERATE THE ENGINE AT 1500 RPM. POSITION FUNCTIONAL CONTROL LEVER IN THE FRESH POSITION AND THE BLOWER ON HIGH SPEED. CHECK THE POSITION OF THE DOORS TO SEE IF THEY ARE AS FOLLOWS:

1. OUTSIDE–RECIRCULATING DOOR – – OPEN TO OUTSIDE.
2. A/C–HEAT DOOR – – CLOSED.
3. A/C–DEFROST DOOR – – CLOSED.
4. REHEAT DOOR – – CLOSED.

IF THE DOORS ARE NOT IN THE POSITION INDICATED ABOVE, CHECK FOR THE SPECIFIED VACUUM (14" HG) WITH THE VACUUM LEAK PROBE CONNECTED BETWEEN THE VACUUM TANK LINE (BLACK) AND THE VACUUM TANK. ALSO, CHECK FOR THE SPECIFIED VACUUM (14" HG) AT THE A/C–HEAT DOOR VACUUM MOTOR WITH THE TEMPERATURE CONTROL (CENTER) LEVER IN THE WARM POSITION. IF VACUUM IS NOT TO SPECIFICATION AT THESE LOCATIONS, CHECK FOR VACUUM COMPONENT LEAKAGE BETWEEN THE CONNECTOR ON THE ENGINE, CHECK VALVE, VACUUM SUPPLY TANK, AND VACUUM OUTLET LINE (BLACK) AT THE CONTROL ASSEMBLY.

IF NOT OK

REPAIR OR REPLACE (AS REQUIRED) FAULTY COMPONENT CAUSING VACUUM LEAKAGE. CHECK THE DOOR OPERATION.

IF OK

CONTROL ASSEMBLY IS FAULTY OR VACUUM HOSES TO CONTROL ARE IMPROPERLY INSTALLED.

CHECK THE DOOR POSITIONS. IF A DOOR IS NOT POSITIONED AS INDICATED ABOVE, CHECK FOR VACUUM AT THE APPLICABLE VACUUM MOTOR.

NO VACUUM SHOULD BE PRESENT AT THE OUTSIDE–RECIRCULATING DOOR MOTOR, A/C–DEFROST DOOR MOTOR AND THE REHEAT DOOR MOTOR. IF VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE CONTROL ASSEMBLY.

VACUUM SHOULD BE PRESENT AT THE HEAT DOOR MOTOR. IF NO VACUUM IS PRESENT, CHECK FOR IMPROPER (CROSSED) OR LEAKING HOSE CONNECTIONS AT THE CONTROL ASSEMBLY. IF HOSE CONNECTIONS ARE INSTALLED PROPERLY THE CONTROL ASSEMBLY IS FAULTY AND SHOULD BE REPLACED.

IF NOT OK

CONNECT THE VACUUM LINES TO THE PROPER CONTROL ASSEMBLY FITTING, IF REQUIRED. REPLACE THE CONTROL ASSEMBLY, IF REQUIRED. CHECK THE DOORS FOR PROPER OPERATION.

IF OK

DOORS BIND OR DOOR MOTOR IS FAULTY.

IF NO VACUUM IS PRESENT AT THE OUTSIDE–RECIRCULATING DOOR MOTOR, A/C–DEFROST DOOR MOTOR OR THE REHEAT DOOR MOTOR, CHECK THE DOOR OPERATION BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF VACUUM IS PRESENT AT THE HEAT DOOR MOTOR, CHECK THE OPERATION OF THE DOOR BY HAND FOR A BINDING OR OBSTRUCTED CONDITION.

IF NOT OK

CORRECT THE CAUSE OF THE OBSTRUCTION OR BIND CONDITION (IF REQUIRED). LUBRICATE DOOR EDGES AND PLENUM CHAMBER CONTACT SURFACES WITH LUBRIPLATE. LUBRICATE DOOR PIVOT POINTS. IF DOOR WAS NOT OBSTRUCTED OR BINDING, REPLACE THE APPLICABLE DOOR MOTOR. CHECK THE DOORS AND CONTROL SYSTEM FOR PROPER OPERATION.

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