SUPPLEMENT FOR WORKSHOP MANUAL 911

(XVII)

The supplement contains the following pages:

Contents - Supplement for Group "TRA"

STRA 13 - STRA 43

Please file these supplement as usual in the Group "TRA" in Workshop Manual 911 Volume II.

Printed in Germany

Dr. Ing. h. c. F. PORSCHE KG

January 1971

CONTENTS

Supplements for Group TRA: Technical Instructions, Accessories

Schematic Diagram

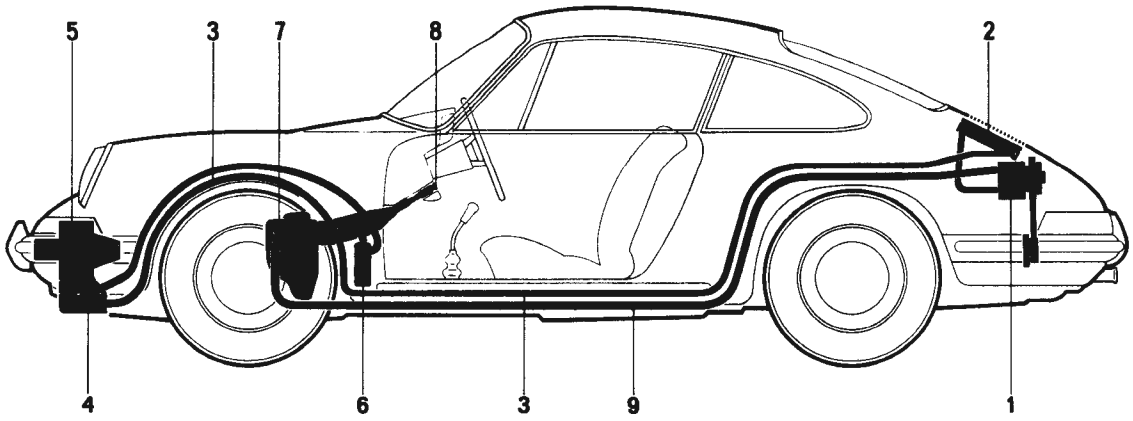


Fig. 1

1 Compressor with electromagnetic clutch
2 Condenser, rear
3 Liquide hose, left
4 Condenser, front
5 Fan for condenser
6 Receiver-drier with filter
7 Evaporator with expansion valve
8 Cold air outlet housing with temperature and blower switch
9 Suction hose, right

DESIGN AND OPERATION

Operation of the Behr Air Conditioner is fully automatic and independent of outside weather conditions and driving speeds. The system is controlled by two switches.

The 3-speed blower switch (right) turns the system "on" or "off", while simultaneously controlling the desired air volume. The temperature switch (left) permits thermostatic control of the cooling output. The system can be operated immediately after starting the vehicle again.

Basically the Behr Air Conditioner consists of the following components: a compressor with magnetic clutch; front and rear condensers; a receiver-drier; an evaporator with expansion valve; and a cold air outlet housing with temperature and blower switch.

The compressor is belt driven by the vehicle engine. An electromagnetic clutch on the compressor is controlled by an infinitely variable thermostat. Depending on the selected cold air outlet temperature, the thermostat switches the fan for the front condenser and the compressor "on" and "off", the latter via the magnetic clutch.

In its vapor phase, the refrigerant of relatively low pressure is compressed in the compressor and forced through the condensors. The absorbed evaporation and compression heat is given up to the outside air passing over condensers, while the refrigerant is simultaneously liquified. The liquid refrigerant flows from the rear condenser via the front condenser into the receiver-drier.

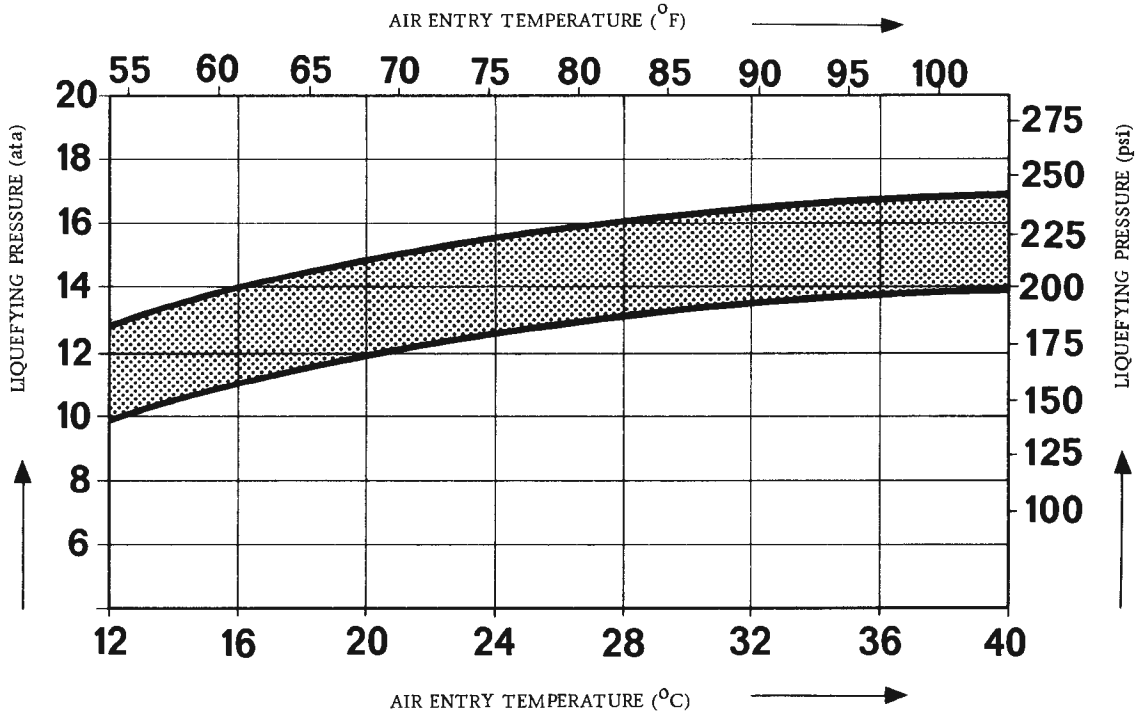
The drier element absorbs small traces of moisture that may be left in the system. From the receiver-drier the refrigerant flows on to the expansion valve. As it passes through the metering orifice of the expansion valve, the pressure and temperature of the refrigerant is reduced. The atomized liquid now enters the evaporator where, because its temperature is lower than that of the surrounding air, the heat exchange takes place. With the increase in temperature, the refrigerant changes to its vapor phase and is returned to the compressor.

The refrigerant for the Behr air conditioner is R-12 (also called Freon 12). The boiling point of R-12 under atmospheric pressure is approx $-22^{o}F$. R-12 is a non-explosive, non-toxic and practically odorless, chemical compound (dichlorodifluor-methane CF_2Cl_2).

SPECIFICATIONS AND TEST DATA

Coolant capacity of complete system:	39 ounces (1100 gr.) R 12
Cold air outlet temperature:	34°F to 41°F (measured at shutter)

Liquefying pressure at engine speed 1000 rpm. Related to air input temperatur measured approx. 4" (10 cm) in front of the center of the rear air entry grill.



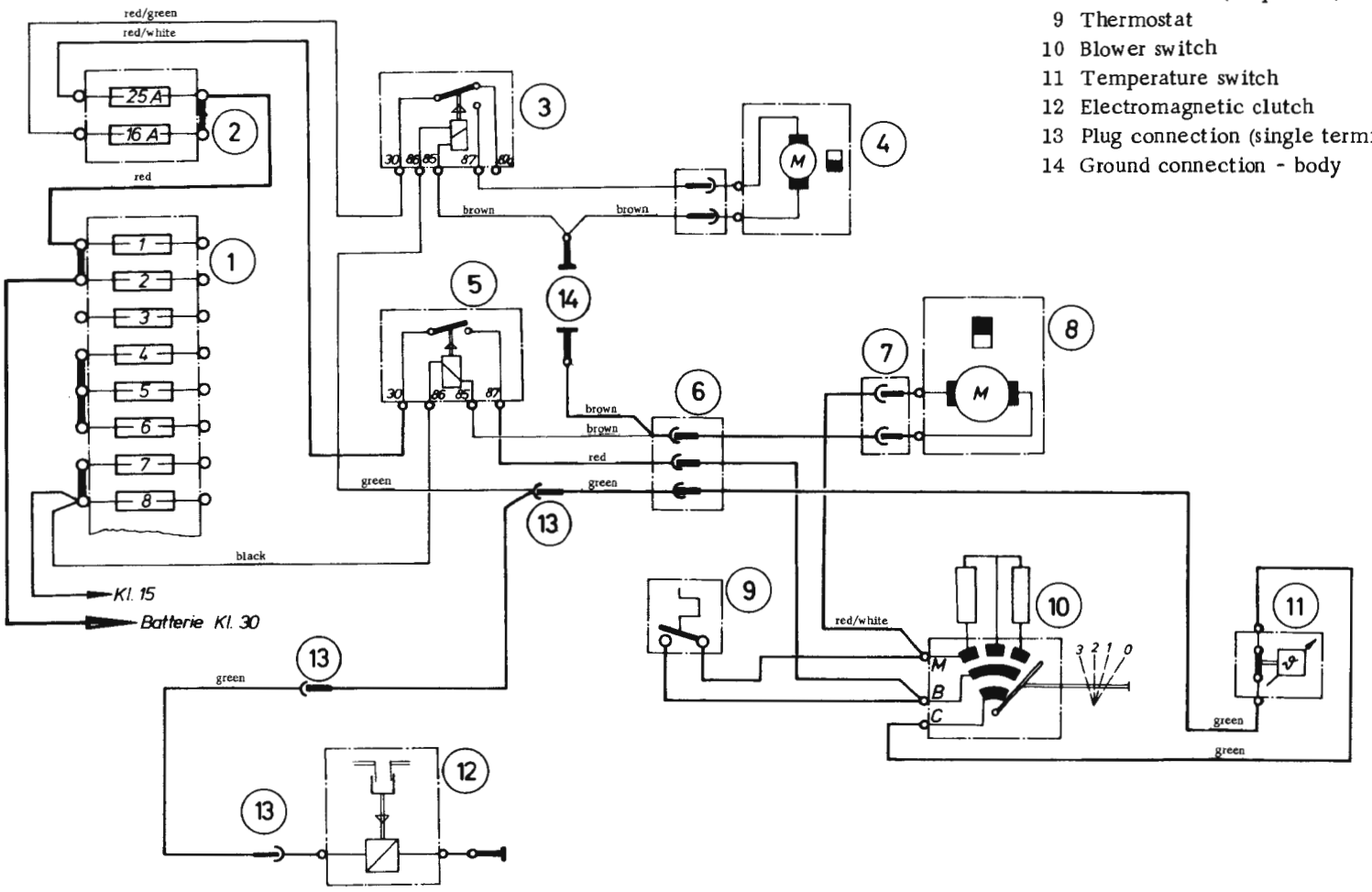
Evaporation pressure at 1000 rpm:	58 to 75,4 in./Hg

Electrical power input at 12 volts (measured at connection plug):

Evaporating blower:	approx. 184 W (blower speed III)
Condenser blower:	approx. 62 W

WIRING DIAGRAM FOR BEHR AIR CONDITIONER

(with 2 condensers)



1 Fusebox I (10 terminal)
2 Fusebox (2 terminal)
3 Standard relay
4 Fan motor (front condenser)
5 Working contact relay
6 Plug coupling (3 terminal)
7 Plug coupling (2 terminal)
8 Blower motor (evaporator)
9 Thermostat
10 Blower switch
11 Temperature switch
12 Electromagnetic clutch
13 Plug connection (single terminal)
14 Ground connection - body

Although Refrigerant - 12 is considered the safest refrigerant for use in automotive air conditioning system, the containers are under considerable pressure at ordinary temperatures. Therefore, the following safety precautions should be observed to prevent personal injury or damage to the air conditioning system.

Serious injury can result if R-12 should enter the eyes. Always wear goggles when working with R-12.

Since R-12 vapor is heavier than air ensure adequate ventilation when working in an enclosed space.

Never weld any part of an air conditioner system unless the system hat been opened and the R-12 dissipated. Failure to do so may lead to the generation of Phosgene (a toxic gas) or an explosion from pressure buildup.

Do not subject refrigerant containers to rough handling, direct flame or sunlight or temperatures above $125^{o}F$.

If, when charging a system, it is necessary to increase the vapor pressure, heat the refrigerant container by placing it in a pan of hot water with a temperature not to exceed $125^{o}F$. Never apply a direct flame to the refrigerant container.

MAINTENANCE SCHEDULE

The following maintenance schedule applies to vehicles equipped with the Behr air conditioner (with 2 condensers)

300 to 600 miles	6,000 to 6,600 miles	Operation	then every miles
●	●	Check tension of compressor V-belt	6,000
●	●	Tighten compressor mounting bolts	6,000
	●	Clean rear condenser Check front condenser for damage Clean if required	6,000
	●	Remove pedal floor board (right) and remove any debris in intake for evaporator	6,000
●	●	Check refrigerant charge	6,000 *
●	●	Check system operation	6,000 *

* or at least every 6 months

Fig. 2

1 Bolts on compressor mounting assembly
2 Tension nut for adjusting the V-belt
3 Clutch holding bolt

Compressor Drive

Replacing V-belt

Switch "on" ignition and AC blower (so that electromagnetic clutch on compressor engages). Loosen clutch holding bolt (3) and remove pulley with special bolt. Be sure that the woodruff key in the shaft is not lost. Switch ignition "off". Replace V-belt (dimension: 12.5 x 1100 LA). Switch "on" ignition to tighten clutch holding bolt (3). Check V-belt for tension and adjust, if required. Switch "off" ignition and AC blower.

Adjusting the V-belt:

Loosen tensioning nut (2) and mounting bolts (1) on compressor plate (refer to Fig. 2).
Shift compressor by means of tension nut (2). Check V-belt tension. Tighten mounting bolts (1).
Replace worn V-belts.

Checking tension of V-belt:

The V-belt has sufficient tension when it can be depressed approximately 1/16 - 1/8 inch (2 to 3 mm) under slight thumb pressure applied between the two pulleys.

Tightening Bolts of Compressor Mounting Assembly

Check bolts on compressor mounting assembly and tighten if necessary.

Changing the Receiver-Drier

Disconnect hoses from receiver-drier (system must be drained). Remove gaskets and cap hoses, loosen clamps and remove receiver-drier. Use new gaskets for installation.

Cleaning the Condenser

The cooling capacity of the condensers is considerably reduced if clogged with debris.

Cleaning the front condenser

Remove front condenser together with stone guard, but do not loosen hoses. Clean condenser fins with compressed air (refer to Fig. 3).

Fig. 3

Cleaning the rear condenser

Open engine compartment lid. Clean condenser fins with compressed air (refer to Fig. 4).

Note:
Operate air conditioner only with the engine compartment lid closed.

Fig. 4

Checking the Refrigerant Charge

Start engine, Switch "on" air conditioner by turning blower and temperature switches completely to the right. To prevent automatic cut-out of the air conditioner system, open door and switch "on" heater. Unscrew protective cap from sight glass of receiver-drier (receiver-drier is attached under the front left fender). Check refrigeration level in sight glass after approximately 5 minutes of operation. Ball should float on top.

Fig. 5

If ball does not float in sight glass, a refrigerant loss and a leak in the system are indicated. Find cause and repair (for details refer to the Trouble Shooting Chart).

If after 1 year of operation only a slight amount of coolant is gone, simply fill up again.

Checking System for Proper Operation

Start engine. Switch "on" air conditioner. Check operation of blower fan in all speeds. Air volume should increase when the blower switch is shifted from Low to Medium and then to High.

Check operation of condenser fan. Air should be distinctly felt flowing out from under front condenser.

Run engine at approximately 2,000 rpm. Turn blower switch to Medium speed position, temperature switch completely to the right. Close windows and fresh air doors.

Insert thermometer into cold air outlet.

When the air inside the vehicle has cooled and the compressor clutch has engaged and disengaged automatically several times, the air outlet temperature should be 36°F to 43°F.

Fig. 6

If the air outlet temperature is too high or too low refer to the Trouble Shooting Chart.

EVACUATION AND CHARGING OF AIR CONDITIONER SYSTEM

(with 2 Condensers)

General

If an air conditioner system has been opened for repairs or if only a small quantity of refrigerant is still in the system, it must be purged and evacuated prior to charging with fresh refrigerant. The same applies to newly installed air conditioners.

Systems that have been open for some time, or for example, were damaged as the result of an accident, coupled with the possibility that moisture has entered into the system, must be flushed prior to evacuation and recharging (refer to "Flushing with Refrigerant R-12").

When the air conditioner system is evacuated, air and any moisture which may have entered are removed from the system.

Moisture is the greatest enemy of an air conditioner system and may result in considerably damage. A few drops of water, if they are not absorbed by the dessicant in the receiver-drier, may result in icing of the expansion valve. This would block the flow of the refrigerant and stop the cooling action. In addition, water in combination with refrigerant R-12 may form acid, which will cause metals to corrode and result in clogging of the small passages and orifices in the system.

It is important that the specified vacuum is attained during evacuation. Any air remaining in the system may result in excessive pressure and prevent full condensation of the refrigerant in the condenser.

Note:

Use a vacuum pump for evacuating the air conditioner system. Do not use the compressor as a vacuum pump.

Use only refrigerant R-12 (dichloro-difluor-methane CF_2Cl_2) for charging the air conditioner system.

Keep service connections and hoses clean and capped when not in use. Do not blow into servicing connections, charging hoses or other parts of the system by mouth or with compressed air. Use only refrigerant R-12 or nitrogen for purging.

Always use special care and cleanliness when working on refrigeration systems.

Warning!

Wear goggles when working with refrigerants.

Connections on Compressor

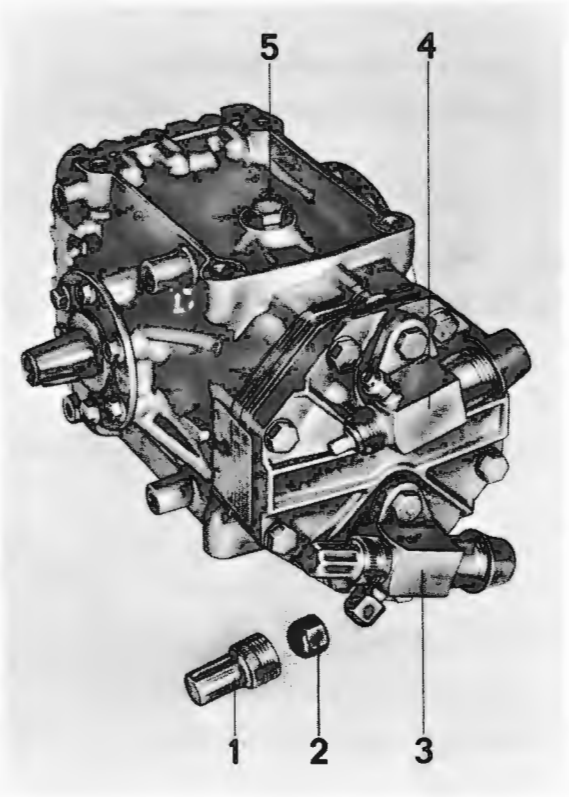


Fig. 7

1 Protective cap (valve spindle)

2 Protective cap (service gauge port)

3 Service valve (suction)

4 Service valve (discharge)

5 Oil inspection plug

Operation of Service Valves

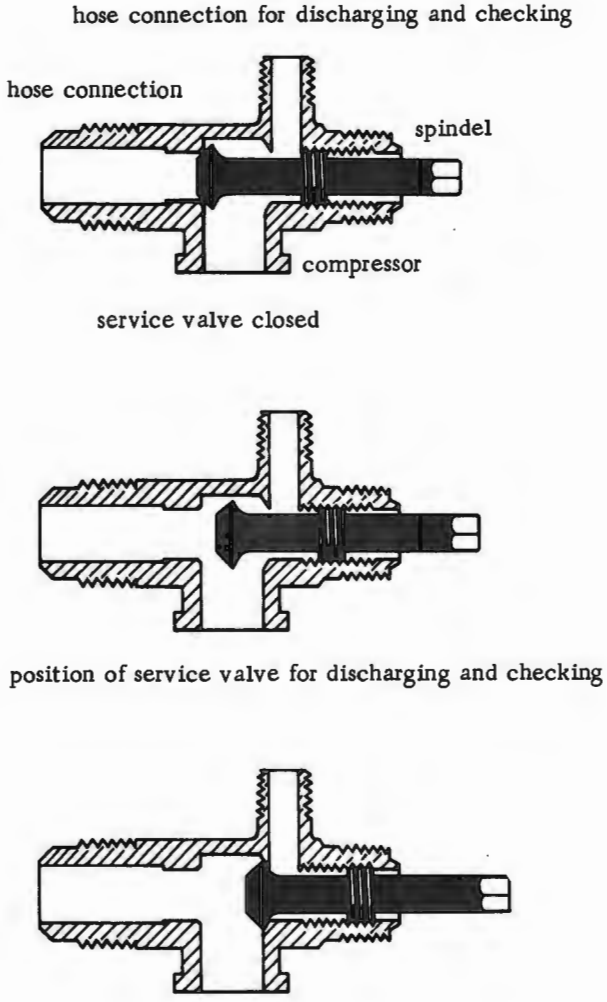


Fig. 8

Connection of Fittings for Evacuating and Charging the System

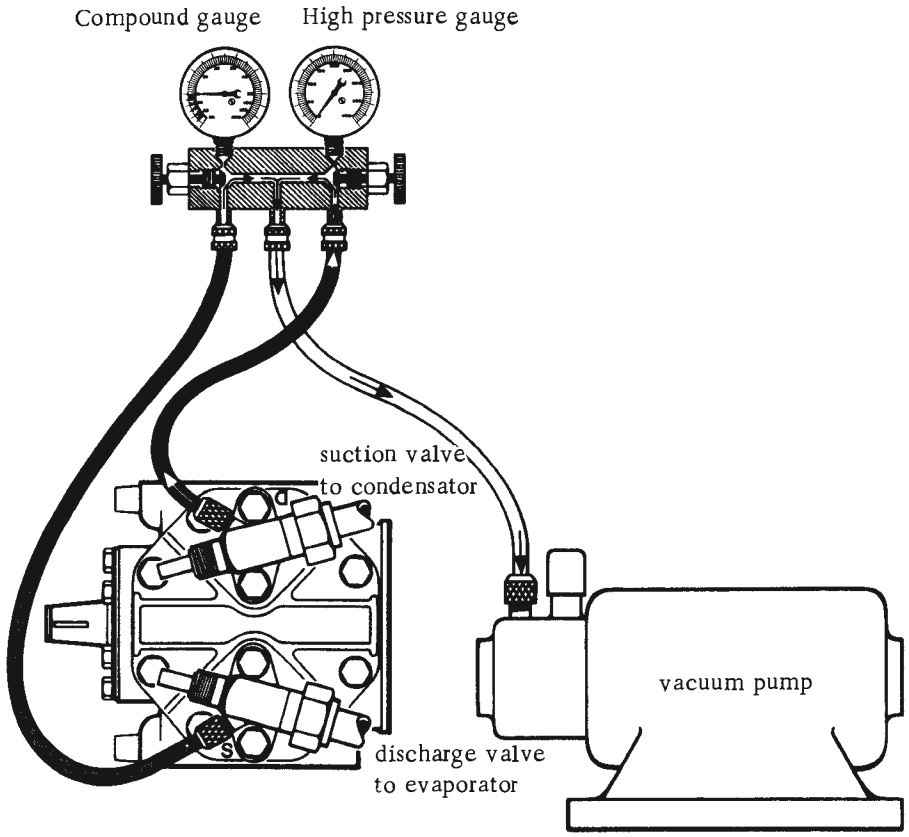


Fig. 9

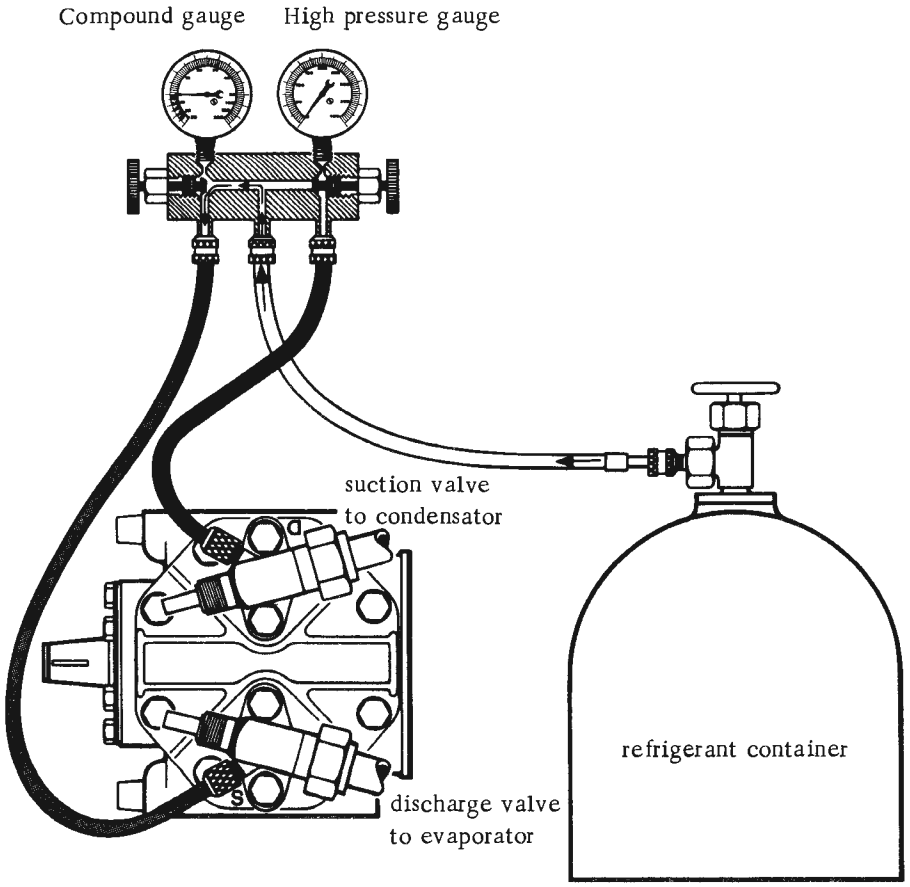


Fig. 10

Evacuating the System

1. Shut off vehicle engine.

2. Check operation of evaporator blower and electromagnetic clutch.

3. Check compressor oil level. (Refer to "Compressor Oil Check").

4. Unscrew protective caps from service valves on compressor (refer to Fig. 7).

5. Connect hoses of manifold gauge set (refer to Fig. 9). Connect hose from compound gauge to suction service valve (designation on cylinder head "Suction").

   Connect hose from high pressure gauge to discharge service valve (designation on cylinder head "Discharge").

   Connect center hose to vacuum pump.

6. Turn spindles of both service valves completely "out" (counter-clockwise), then "in" for approximately 1 - 2 turns (clockwise).

7. Open both hand valves on manifold gauge set.

8. Switch on vacuum pump and evacuate system until low pressure gauge of manifold gauge set indicates approximately 28" mercury (HG).

9. Close both hand valves of manifold gauge set, then switch off vacuum pump.

10. Vacuum test

    If the vacuum reading is held for approximately 10 minutes, the system has no major leaks.

Charging the System

1. Start vehicle engine and set to fast idling speed (approximately 1,000 rpm).

2. Close engine lid, making sure that the hoses are not squeezed shut.

3. Place refrigerant container on a scale having a 2 ounce (50 gr.) graduation (refrigerant container must be positioned with valve up).

   When using a charging cylinder, set refrigerant level on correct scale and mark.

4. Switch "on" air conditioner system: turn blower temperature switch completely to the right.

5. Slowly open hand valve on manifold gauge set (suction side) and permit refrigerant to enter.

6. Watch sight glass in receiver-drier (receiver-drier is attached under front left fender). As soon as the ball in the sight glass rises, close hand valve on manifold gauge set (suction side).

7. Run air conditioner system for approximately 5 minutes, then check refrigerant level in sight glass. Add refrigerant if required.

   Ball must float on top. Refrigerant charge: 39 ounces (1100 gr.) check quantity on scale.

   Caution:

   To preclude any possibility of damaging compressor, do not overcharge the air conditioner system.

8. Check operating pressures (refer to output diagram). Check cold air outlet temperature and temperature switch setting.

9. Stop engine, close refrigerant container. Turn spindles of service valves completely out (operating position).

   Detach manifold gauge set hoses, cover compressor service valves and ports with protective caps.

Flushing with Refrigerant R-12

General

Upon completion of repairs to the system, it must be flushed with refrigerant.

Check oil level in the compressor. In systems which were open for an extended period it is advisable to change the compressor oil.

1. Shut off vehicle engine.
2. Connect hoses of manifold gauge set to compressor (refer to Fig. 10).
3. Start vacuum pump. Upon reaching the lowest vacuum reading, continue to evacuate for another 10 minutes.
4. Close both valves of manifold gauge set. Stop vacuum pump and remove hose.
5. Connect refrigerant container to center hose. Open refrigerant container. Loosen center hose on manifold slightly, permit air to escape from hose until refrigerant flows out, then tighten connection.
6. Open suction valve of manifold slowly and permit refrigerant to enter until the pressure gauges of the manifold are stabilized.
7. Close refrigerant container and suction valve of manifold.
8. Start vehicle engine and set to fast idling speed. Close engine lid, making sure that the hoses are not squeezed shut. Start air conditioner and operate for approximately 10 minutes.
9. Stop vehicle engine and air conditioner.
10. Drain refrigerant (refer to "Draining of System").
11. Change receiver-drier, evacuate and charte air conditioner system.

Leak test

The largest portion of all repair work on air conditioners consists of determining and repairing leaks.

Vibrations and shocks on the vhicle will cause leaks, particularly on hose and tubing connections. Such leaks can be quickly repaired by tightening the connections or changing the gaskets.

Leak Detecting Equipment

Various models of leak detectors may be used in air conditioner systems for finding leaks. The instructions of the manufacturers of such equipment must be observed. Electronic leak detectors should be preferred, since they are more accurate and safer than detectors using an open flame.

If an air conditioner system looses a considerable quantity of refrigerant within a service period, the system should be checked for leaks. Upon completion of repairs or upon installation of a new air conditioner system, a leak test is absolutely vital.

1. Put leak detector in operation.

2. Pass detector hose or probe slowly along refrigerant hoses, hose connections, condensers, etc. Since refrigerant R-12 is heavier than air, the detector hose or probe must be passed below the parts to be checked.

3. To check the evaporator for leaks, hold detector hose or probe against opening of condensate drain plug.

Draining the System

The air conditioner system must be drained prior to starting repairs. Be sure to observe the respective safety instructions. Drained air conditioner systems must be capped immediately to prevent the entry of dirt and moisture.

Caution:

Never operate an air conditioner system that has been drained.

1. Shut off vehicle engine.

2. Connect hoses of manifold gauge set to compressor. Suspend center hose in downward direction and cover with a rag.

3. Close both valves on manifold gauge set rotate spindles of both service valves inward approximately 1 - 2 turns.

4. Open high side hand valve on manifold gauge set slowly, permit refrigerant to flow out while making sure that no oil is carried along from the compressor and blown out. Reduce valve opening if required.

5. When the pressure gauge at pressure end of filling fitting has dropped to approx. 3 atü (42 psi), open valve on suction end of filling fittings slowly, making sure that no cold flowing oil escapes. Throttle valves, if required.

6. Watch pressure gauges of filling fittings. As soon as the pressure drops, slowly continue opening valves until the pressure gauges indicate 0 pressure.

   Upon completion of the repair work, evacuate air conditioner system again and fill up.

Adding Refrigerant to the System

If after a long period of operation only a slight amount of refrigerant is missing and no leaks are found in the system, only a partial recharge of the system is required.

1. Shut off vehicle engine, connect hoses of manifold gauge set to compressor (refer to Fig. 10). Connect refrigerant container to center hose.

2. Open refrigerant container. Open both hand valves on manifold gauge set. Loosen hoses on service valves slightly, permit air to escape from hoses until refrigerant flows out. Then tighten connections. close both valves on manifold gauge set.

3. Screw both spindles of service valves in 1 - 2 turns (clockwise).

   Recharge system (as described in section "Charging the System", Items 1 - 8) to compensate for loss.

4. Stop engine, close coolant bottle, screw spindels of angle valve out completely (operating position), disconnect filling hoses, close valves on compressor with caps and locking nuts.

Compressor Oil Check

General

All compressors are supplied by the manufacturer completely charged with oil and protective gas.

Always check the oil level in a compressor prior to connecting it into the system or upon completion of repairs to the system. Check oil level again after putting air conditioner system in operation following a minimum operating period of 10 - 12 minutes.

Note

For refills of oil changes use refrigerant oil "Texaco Capella B Inhibited or 3 G Dual-Inhibited (Sun Oil Company)" only.

Checking Oil level with System Charged

1. Be sure vehicle engine is not running.
2. Connect manifold gauge set. Connect center hose to refrigerant container.
3. Open refrigerant container. Open both hand valves on manifold gauge set. Loosen hoses on service valves slightly, permit air to escape from hoses until refrigerant flows out. Then tighten connections.
4. Close both hand valves on manifold gauge set and refrigerant container.
5. Screw spindels of both service valves completely out. (Normally, both valves are already in this position.)
6. Start vehicle engine and run at idling speed.
7. Engage air conditioner.
8. Slowly rotate spindle of service valve inward (suction side) until suction pressure reads 0 or a little below, then screw spindle completely in and stop engine immediately.
9. As soon as the suction pressure has increased slightly above 0, screw spindel of service valve (discharge side) completely in.
10. Unscrew oil inspection plug slowly, bleed off residual pressure carefully. Remove oil inspection plug and seal.

11. Check oil level with oil dipstick (add refrigerant oil according to chart).

12. Clean sealing surface. Screw oil inspection plug with seal for approximately 2 - 3 turns. Slowly unscrew (counterclockwise) spindle of service valve (suction side). Parge air from compressor until refrigerant emerges on oil inspection plug. Tighten oil inspection plug to a torque of 28 ft.lb. (4 mkg).

13. Back seat both service valves completely. Start vehicle engine. Engage air conditioner and check refrigerant level after approximately 5 minutes of operation. Add refrigerant if required.

Inspection of Oil Level prior to Operating System

(Refrigerant discharged from system)

1. Slowly open oil inspection plug and permit protective gas to escape from compressor.

2. Remove oil inspection plug and seal.

3. Check oil level with dipstick. Add refrigerant oil according to chart if required.

4. Clean sealing surface, screw in oil inspection plug together with seal.

Oil Level Chart

Oil level filled by manufacturer inches (mm)	Oil level following operation, inches (mm)	
	Minimum	Maximum
1 3/16 (30)	13/16 (21)	1 3/16 (30)

TOOLS REQUIRED FOR SERVICE AND REPAIRS OF BEHR AIR CONDITIONER SYSTEMS

Available from: "Dealers in Refrigerating Equipment"

Description	Application
Rachet with extension, socket with 1/4" quare opening.	Actuation of service valves
Special bolt	Removal of electromagnetic clutch from compressor
Line connector - 7/16"	Connector for refrigerant container charging hose
Manifold gauge set	Checking, charging and draining of system
Vacuum pump	To evacuate system in combination with manifold gauge set
Electronic leak detector for Freon and Halide gases	Checking of system for leaks
Technical thermometer	Checking evaporator air outlet temperature
Goggles	To protect eyes when working with refrigerant - 12
Oil dipstick	Checking of oil level in compressor
Oil can, pressure type	For refrigerant oil

Replacement of Electromagnetic Clutch

Removal

1. Switch "on" ignition and blower switch (to permit engagement of clutch).
2. Unscrew clutch holding bolt - item 3 (refer to Fig. 2).
3. Switch "off" ignition and blower switch.
4. Loosen V-belt (to permit shifting compressor to the left. Loosen mounting bolts and screw tensioning nut back).
5. Remove clutch hub with special bolt.
6. Remove woodruff key from compressor shaft.
7. Disconnect coil cable.
8. Unscrew stationary field screws.
9. Remove stationary field.

Installation

1. Install stationary field with new screws (since expanding screws can be used only once) 9 ft.lb. (1.35 mkg).
2. Connect cable of holding coil to terminal on compressor.
3. Insert woodruff key on compressor shaft.
4. Attach clutch hub with belt in position and secure with clutch holding bolt.
5. Switch "on" ignition and blower switch.
6. Tighten clutch holding bolt.
7. Switch "off" ignition and blower switch.
8. Adjust V-belt tension (refer to maintenance services).

Replacement of Compressor:

Removal

1. Drain system (refer to page STRA 27).
2. Close both service valves on compressor (turn spindles completely in front seated). Remove hoses of manifold gauge set.
3. Remove electromagnetic clutch (refer to page STRA 32).
4. Disconnect and remove upper hose (discharge side).
5. Remove gasket and cap hose.
6. Loosen tensioning nut - item 2 (refer to Fig. 2).
7. Unscrew mounting bolts - item 1 (refer to Fig. 2).
8. Lift compressor from its guides and pull over to the end plate (refer to Fig. 11). Use rag to protect paintwork.
9. Disconnect and remove bottom hose (suction side).
10. Remove gasket and cap hose.
11. Remove compressor plate.

Installation

1. Attach compressor plate to compressor, tighten bolts to 28 ft.lb. (4 mkg).
2. Fit bottom hose connection with new gasket. Be sure that the sealing cones are uniformly seated.
3. Place compressor on carrier.
4. Loosely screw mounting bolts down, so that compressor can still be shifted.
5. Fit upper hose connection with new gasket (watch sealing cone).
6. Install electromagnetic clutch.
7. Connect electric cables.
8. Tension V-belt (refer to page STRA 18).
9. Tighten mounting bolts.

Fig. 11

Replacement of Front Condensers

Removal (refer to Fig. 12)

1. Drain system (refer to page STRA 27).

2. Loosen coupling nuts at condenser fittings, use back up wrench.

3. Pull off hoses and close with plugs after removing gaskets.

4. Remove the 2 condenser mounting hexagon nuts in the front luggage compartment (at right and left next to air baffle plate).

5. Remove stone guard, condenser and hexagon screws.

Note:

If the condenser sticks to vehicle floor, carefully remove by applying a wide screwdriver blade against its mounting lugs.

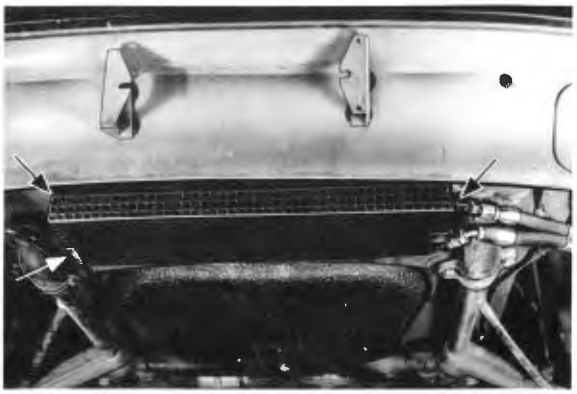


Fig. 12

Arrows show position of the mounting bolts.

Installation

For installation of stone guard with condenser reverse the procedure and not the following: Carefully insert seals between condenser and luggage compartment floor to prevent air leaks. When attaching the hose connections, be sure that the sealing cones are seated uniformly. Always use new gaskets.

Replacement of Rear Condenser

Removal

1. Drain system (refer to page STRA 27).

2. Loosen coupling nuts at condenser fittings, use back up wrench.

3. Pull off hoses and close with plugs after removing seals.

4. Loosen angle bracket on center web of engine compartment lid.

5. Remove screw connections on both lid hinges and remove condenser.

Installation

For installation of condenser reverse the procedure and note the following: When connecting the hoses to the condenser, be sure that the sealing cones are seated uniformly. Always use new gaskets.

Replacement of Cooling Blower for Front Condenser:

Fold back mats in front luggage compartment and remove both battery ground straps.

Removal

1. Disconnect fan wires at connection plug.
2. Remove rubber clamping strap.
3. Pull ventilating outlets of fan out of air duct with a light, rotating motion (refer to Fig. 13).
4. Pull fan (in direction of passenger compartment) out of seal in front bulkhead.
5. Check condition of seal and replace if required.

Fig. 13

Installation

1. Push round fan outlet through seal in front bulkhead until outlet can be introduced into air box opening by a rotating motion.

   Note:
   Be sure that the seal on the air guide box is not damaged or torn loose.

2. Attach rubber clamping strap.
3. Connect fan wire to plug connection.
4. Check fan for operation (refer to page STRA 20).

Replacement of Electric Motor for Condenser Fan:

Removal

1. Remove condenser fan.
2. Unscrew mounting screws of fan cover.
3. Pull cover from cable sleeve.
4. Loosen hexagon socket screw in fan wheel hub and remove fan wheel.
5. Loosen clamping strap and remove motor.

For installation of the fan motor reverse the procedure.

Removal of Evaporator Housing

1. Drain system (refer to page STRA 27).
2. Remove right floor mat in passenger compartment.
3. Remove pedal floor board.
4. Unscrew Philips head screws for grating and remove grating.
5. Carefully pull out plastic duct.
6. Pivot bolt on bottom of front luggage compartment and open flap.
7. Loosen hose clamp of air flex hose and push hose from adapter on evaporator housing.
8. Pull temperature sensor from its guide tube in evaporator housing.
9. Loosen hose connections on expansion valve .
10. Pull off hoses and close with plugs after removing gaskets.
11. Disconnect blower motor cable plug at terminal.
12. Remove screw connections of mounting bracket on body.
13. Remove evaporator housing from cavity.

    Caution:
    Do not damage air flex hose and temperature sensor.

Installation of Evaporator Housing

Reverse procedure to install evaporator housing and note the following: Tighten fastening brackets of evaporator housing only upon assembly of plastic socket (right side). Carefully connect hoses with new gaskets.

Replacement of Evaporator

Removal

1. Remove evaporator housing.
2. Push off clamps in lateral direction and remove cover.
   Note:
   Clamps can be removed in one direction only!
3. Remove evaporator from its housing.

Installation

For installation of evaporator reverse the procedure.

Replacement of Evaporator Blower Motor

Removal

1. Remove evaporator housing.

2. Push clamps off in lateral direction and remove cover.
   Note:
   Clamps can be removed in one direction only!

3. Unscrew blower motor base plate.

4. Pull cable from blower motor.

5. Remove clamps of blower motor. Take motor out in direction of blower wheel.

Installation

Reverse the procedure for installation of blower motor. For proper seating of clamps refer to Fig. 14.

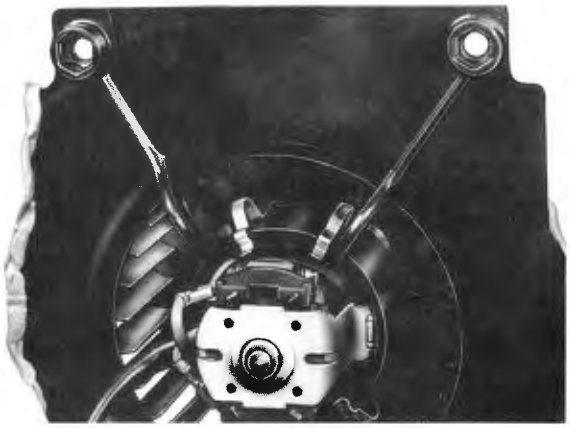


Fig. 14

Replacement of Expansion Valves

Removal

1. Drain system (refer to page STRA 27).

2. Pull insulating compound from expansion valve.

3. Remove clamp (holder for temperature sensor on connecting pipe of evaporator).

4. Unscrew coupling nuts of hose lines and compensating line.

5. Remove expansion valve. Remove gaskets and cap hoses.

Installation

Reverse procedure for installation of expansion valve.

Note:

Maintain good metallic contact between temperature sensor and tail pipe of evaporator. Fit hose connections carefully. Always use new gaskets.

REPLACEMENT OF PARTS ON COLD AIR OUTLET HOUSING

Removal of Cold Air Outlet Housing

1. Remove ground strap on both batteries.
2. Disconnect plug connections in cavity near evaporator.
3. Remove cable sleeve from partition and push cable assembly into passenger compartment.
4. Loosen clamping strap of air flex hose on evaporator housing. Push air flex hose back so that temperature sensor line moves easily between the evaporator housing and the hose.
5. Carefully pull temperature sensor line out of guide tube in evaporator housing.
6. Unscrew mounting screws of cold air outlet housing.

Note

When removing the cold air outlet housing, be sure that the temperature sensor line is not caught or bent.

Installation of Cold Air Outlet Housing

Reverse procedure for installation of cold air outlet housing.

REPLACEMENT OF TEMPERATURE SWITCH

Removal

1. Remove cold air outlet housing.
2. Pull knob from temperature switch (left = temperature switch; right = three-speed blower switch).
3. Unscrew hex. nuts and remove washer.
4. Unscrew mounting screws of left upholstery molding until the molding can be removed.
5. Push upholstery molding away from temperature switch.
6. Pull temperature switch out of housing until cable connections are accessible.
7. Disconnect cable.
8. Carefully straighten temperature sensor line for easy removal through common cable jacket.

Note

In the housing are cable terminals (identified by round elevation on housing top) which must be straightened, if necessary.

Installation

Reverse procedure for installtion of temperature switch and note the following:
When tightening the mounting screws for the upholstery molding, align bearings so that the louvers operate uniformly and smoothly.

Adjustment of Temperature Switch:

1. Remove cold air outlet housing.

2. Pull off knob of temperature switch (left = temperature switch; right = three-speed fan switch)

3. Unscrew hex. nut and remove washer.

4. Unscrew mounting screws of left upholstery molding until the molding can be removed.

5. Push upholstery molding away from temperature switch.

6. Pull temperature switch out of housing until right switch end is accessible. (Left switch end= temperature sensor connection; right switch end = Pertinax plate).

7. Push off Pertinax plate at right switch end.

8. Perform temperature corrections by turning the set screw. Turing in direction "cold" = colder. Turing opposite to direction "cold" = warmer. 1 turn of set screw corresponds to approximately $5^{o}F$ ($3^{o}C$).

Replacement of fan switch:

Removal

1. Remove cold air outlet housing.

2. Pull knob from fan switch (Left = temperature switch; right = three-speed fan switch).

3. Unscrew hex. nuts and remove washers.

4. Unscrew mounting screws of right upholstery molding until the molding can be removed. (The three louvers with their bearings should not be removed, since they are accurately spaced by washers.)

5. Push upholstery molding away from blower switch.

6. Pull fan switch out of housing until cable connections are accessible.
   Caution:
   Do not tear off thermostat glued to side of housing.

7. Disconnect cable and pull out switch.

Installation

Reverse procedure for installation of blower switch and note the following:
When tightening the mounting screws for the upholstery molding, align bearings so that the louvers operate uniformly and smoothly.

Symptom	Possible Cause	Remedy
I NO COOLING OUTPUT		
None or insufficient refrigerant in system	System leaks	Check system (sight check), evacuate and fill with approx. 7 ounces (200 gr.) refrigerant. Check system with leak detector for leaks, repair. Adjust refrigerant to correct level. Check oil level in compressor. If the system has been empty for an extended period, damaged by an accident or opened, always replace receiver-drier.
V-belt slipping or missing	V-belt loose or broken	Tighten V-belt or replace.
Electrical components not operating	Fuse blown	Replace fuse
	Wires loose or broken	Check wires and connections and replace if required.
	Switches defective	Check switches, replace defective switches.
	Electromagnetic clutch not operating	Check electromagnetic clutch for continuity. Replace if required.
Evaporator fan motor not running	Fan motor or switch defective	Check electrical connections, replace defective parts.
Compressor crankshaft not turning	Compressor defective	Replace compressor.
Discharge pressure normal or too high, suction pressure too low	Expansion valve clogged	Clean filter in expansion valve and replace expansion valve if required. Remove blockage, flush system. Drain refrigerant, flush system, replace receiver-drier.
Differential between suction and discharge pressure too low (Observe data in technical data sheet)	Cylinder head gaskets or compressor valves defective	Replace cylinder head gaskets or valve plate

Symptom	Possible Cause	Remedy
Insufficient refrigerant in system	Leak in system	Check system for leaks, add refrigerant, check oil level in compressor.
Suction pressure too high, discharge pressure too high	System overcharged	Reduce refrigerant to correct level
Insufficient air at outlet with fan at highest speed	Evaporator iced up; Temperature switch defective or temperature switch capillaries bent	Replace temperature switch
	Temperature switch thermosat setting too low	Set temperature switch thermostat as required: remove temperature switch, pull off Pertinax plate. Turn set screw in direction of arrow "cold" One turn approximately $5^{o}F$ ($3^{o}C$).
	Temperature switch capillaries incorrectly installed	Insert capillaries completely into pipe between evaporator fins.
	Fan motor defective	Replace fan motor.
	Fan switch defective	Replace fan switch.
	Bad ground connection	Check connection.
	Evaporator fins clogged	Clean evaporator with compressed air.
	Air guide hose or duct leaks	Check and correct air guide assembly.
V-belt slips	V-belt loose	Tighten V-belt
	System overcharged	Adjust refrigerant to correct level.
	Condenser contaminated	Clean condenser.
	Fan for front condenser inoperative	Check electrical connections, replace defective parts.
Cooling effect drops as speed increases	Fresh air flap open	Close fresh air flap.
Air cooling insufficient, clutch cuts out too soon	Temperature switch thermostat maladjusted	Temperature switch thermostat must be adjusted correctly. Remove temperature switch. Pull off Pertinax plate. Turn set screw in direction of arrow "cold". One turn approximately $5^{o}F$ ($3^{o}C$).

Symptom	Possible Cause	Remedy
Air cooling insufficient discharge pressure normal or slightly low,	Strainer in expansion valve clogged	Remove expansion valve, clean and replace, if required.
	Moisture in system	Clean system.
		Clean system, replace receiver-drier.
Discharge pressure normal or low, suction pressure high	Cylinder head or valve plate gasket broken, valve defective or valve plate broken	Replace gaskets or valve plate.
Discharge pressure high, suction pressure normal	Moisture in system	Drain refrigerant, replace receiver-drier. Evacuate system and recharge.
	Condensers dirty. Fan for front condenser inoperative	Clean condenser fins with compressed air. Remove front condenser, but do not loosen hoses.
Heavy knocking in compressor	Connecting rods loose or rod bearing worn out, piston broken	Replace compressor.
Metallic ticking in compressor	Broken valve	Replace valve plate.
Clutch noisy when disconnected	Return spring of clutch too weak, clutch bearings defective	Replace clutch.
	Mounting bolt loose	
Clutch engages and disengages in rapid sequence	Winding defective (Coil body has loose contacts)	Replace clutch
	Temperature switch defective	Replace temperature switch
V-belt drags or whips	V-belt loose or worn	Tighten V-belt or replace
	Excessive refrigerant charge in system	Reduce refrigerant to correct level
Knocking noises in compressor (liquid refrigerant knock)	Expansion valve stuck in open position	Replace expansion valve
	Sensor of expansion valve not correctly attached to evaporator outlet or loose	Attach sensor to intake pipe with clips. Sensor must have metallic contact.

Symptom	Possible Cause	Remedy
Dull noise in compressor, increased discharge and suction pressure	Too much refrigerant in system Fan for front condenser inoperative	Adjust refrigerant to correct level. Check electrical connections, replace defective parts.
Compressor mounting causes noise (heavy humming or drumming	Compressor mounting loose Compressor mounting broken	Check mounting bolts and tighten Replace broken parts.
Hissing noises in expansion valve	Not enough refrigerant in system	Charge with refrigerant.
Compressor too loud, crankcase too hot	Oil level too low No refrigerant in system	Add oil Recharge with refrigerant.
Blower noisy	Blower motor worn Fan wheel scraping	Replace blower motor Check mounting of blower motor, align and tighten. Check fan wheel for runout and replace if required.