

INSTALLATION INSTRUCTIONS

J.C.B. 214 (SERIES 3) BACKHOE LOADER



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JCB 214S (3) BACKHOE LOADER INSTRUCTIONS

EVAPORATOR COIL: The evaporator coil mounts inside the existing heater box. It slides in place beside the heater coil which is located under the control console on the right side of the cab.

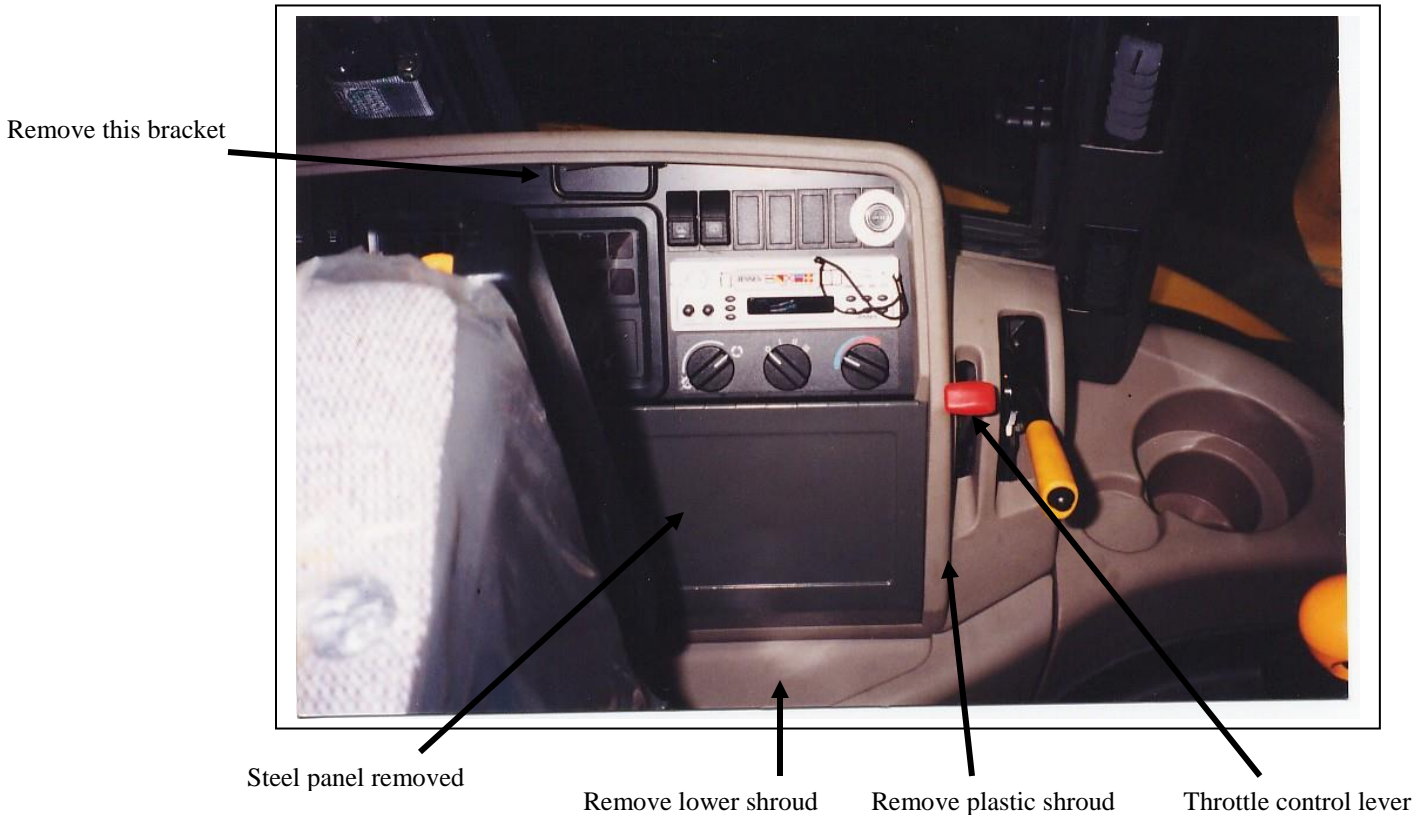
Steps:

1. Remove the operators' seat by removing the four bolts holding the seat pedestal to the floor. The seat can either be removed from the cab or just placed in the left rear corner of the cab.
2. Remove the plastic shrouds from the control console areas. To do this remove the steel gauge cover panel and un-bolt the plastic shroud over the emergency brake and the loader control. Lift this plastic shroud up to allow the main plastic shrouds to be removed.



Plastic shroud over parking brake and loader control lifted up several inches

3. Once the two main shrouds are removed the electrical console must be unbolted and swung aside to expose the heater box. Some tie wraps securing the electrical bundles will have to be cut to do this. Also disconnect the heater control cable from the heater control valve. The throttle control lever needs to be unscrewed from the right side of the electrical console as well. Open the window behind the right hand door so the electrical console can be placed in the openings. Put a piece of cardboard down first to avoid scratching the paint.



4. Unbolt the heater box from the floor. These are four M8 bolts holding it. Slip the rubber gasket off onto the air distribution panel so the heater box blower outlet is free to move. Slide the box out from the wall a bit so it is easier to remove the lid of the box. Remove all the screws and clips securing the box lid. There are two bolts in the blower mount flange that must be removed as well. Remove the lid.
5. Lift the heater coil partially out of the box so that the long aluminum flanges extending back off the heater coil can be snapped off. Replace the heater coil.

6. Install the A/C coil, with the fittings pointing to the left, behind the heater coil.



Evaporator coil

Expansion valve

Suction Fitting

7. Some modifications to the lid of the heater box need to be made before the lid is replaced. The modifications are to increase the inside air re-circulation capacity of this system. Without doing them cooling problems will result in more extreme climates. They are: a) remove the $\frac{1}{2}$ " thick foam gasket material from the metal plate that the top back of the box seals against. Use a knife to remove the foam. b) remove about 50% of the plastic from the triangular lid sections at each end of the box. These sections sit behind the evaporator coil on the air inlet side of the coil. If they are partially opened up it will allow more inside air to be re-circulated. c) remove $\frac{3}{8}$ " from the plastic of the vertical flange running along the back of the box lid. (this would have sealed to the foam gasket removed in step "A") Cut the plastic with a knife or snips.

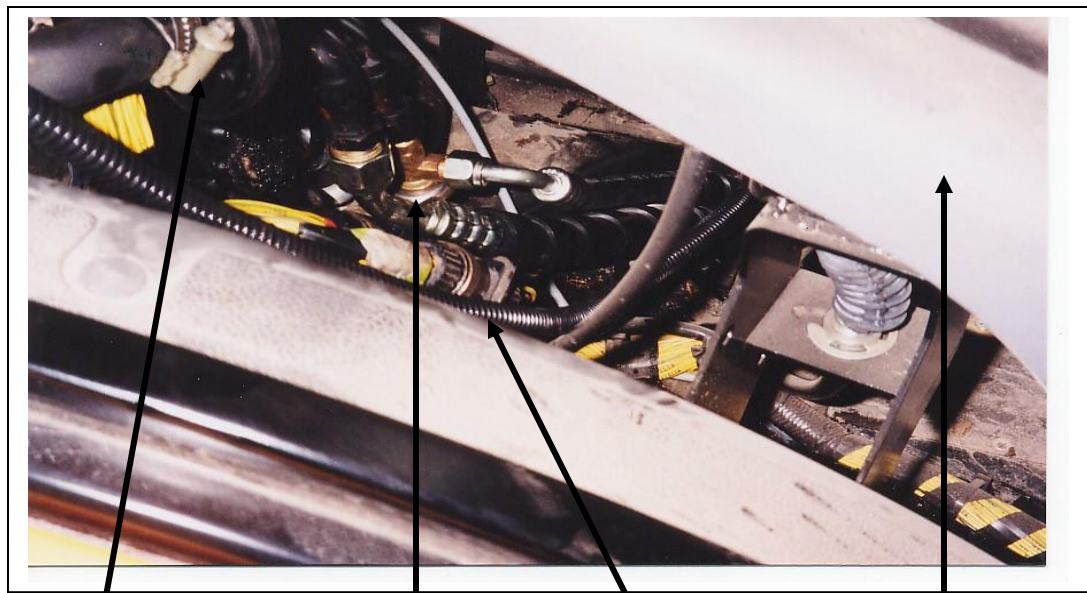
8. The other modification to improve the efficiency of the A/C heater system is to restrict the size of the outside air intake filter opening. Restrict the opening by about 75% using strips of self adhesive foam tape supplied in the kit.



Foam Tape restricting outside air intake

Filter and cover removed

9. Before installing the modified lid, the thermostat probe should be inserted into the A/C coil from the top straight down about 6". The probe should go in between the first and second row of tubes from the heater coil side about 1" to 2" in from the fitting end of the coil.



Heater control valve

A/C hoses connected to evap

Clutch wire

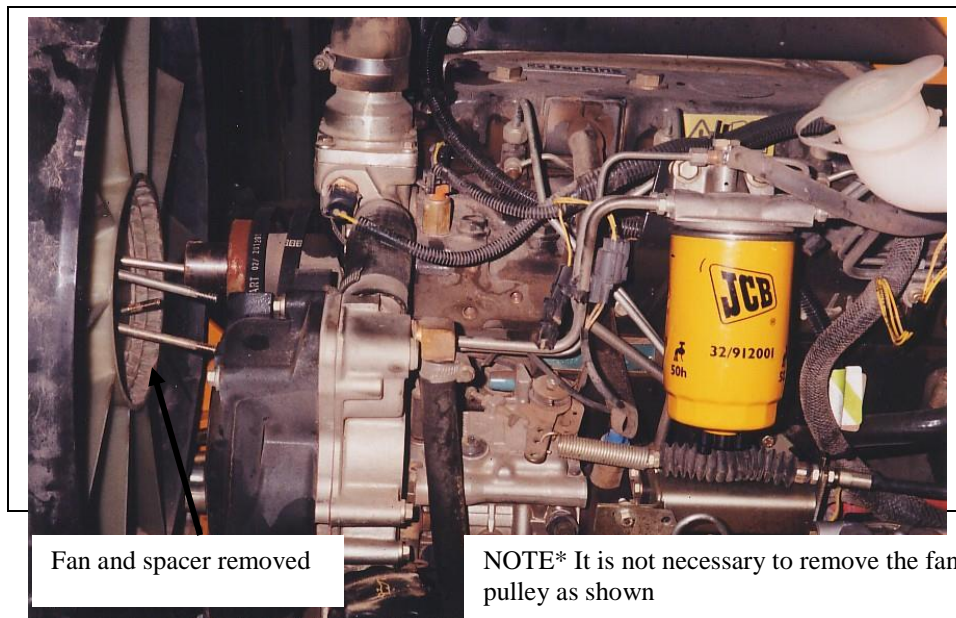
Emergency brake/loader control shroud

10. Re-install the box lid and then re-install the heater/A/C box. Re-install the electrical control console but leave all the plastic shrouds off until the system is completely installed and tested.

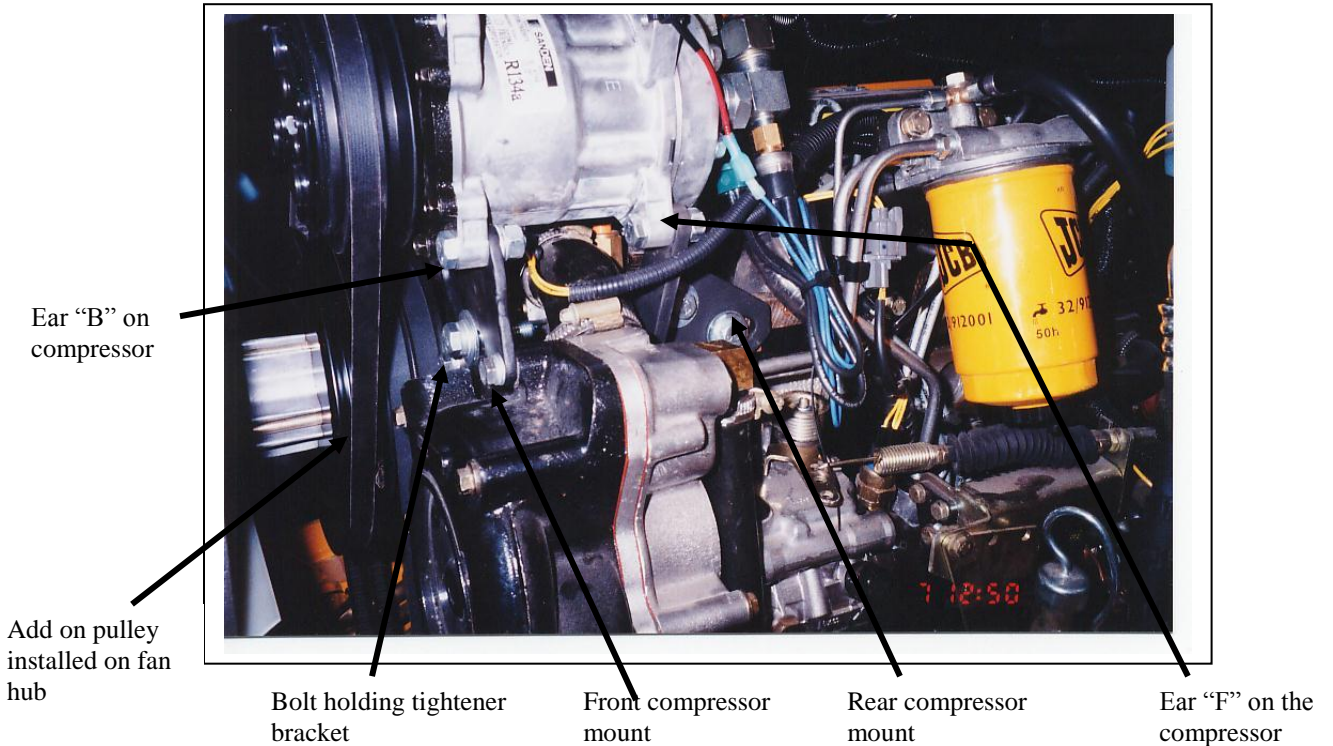
Compressor mount: The compressor is mounted off the top left corner of the engine and is driven off a third pulley on the fan hub. On some machines the third pulley exists and on others it has to be added.

Steps:

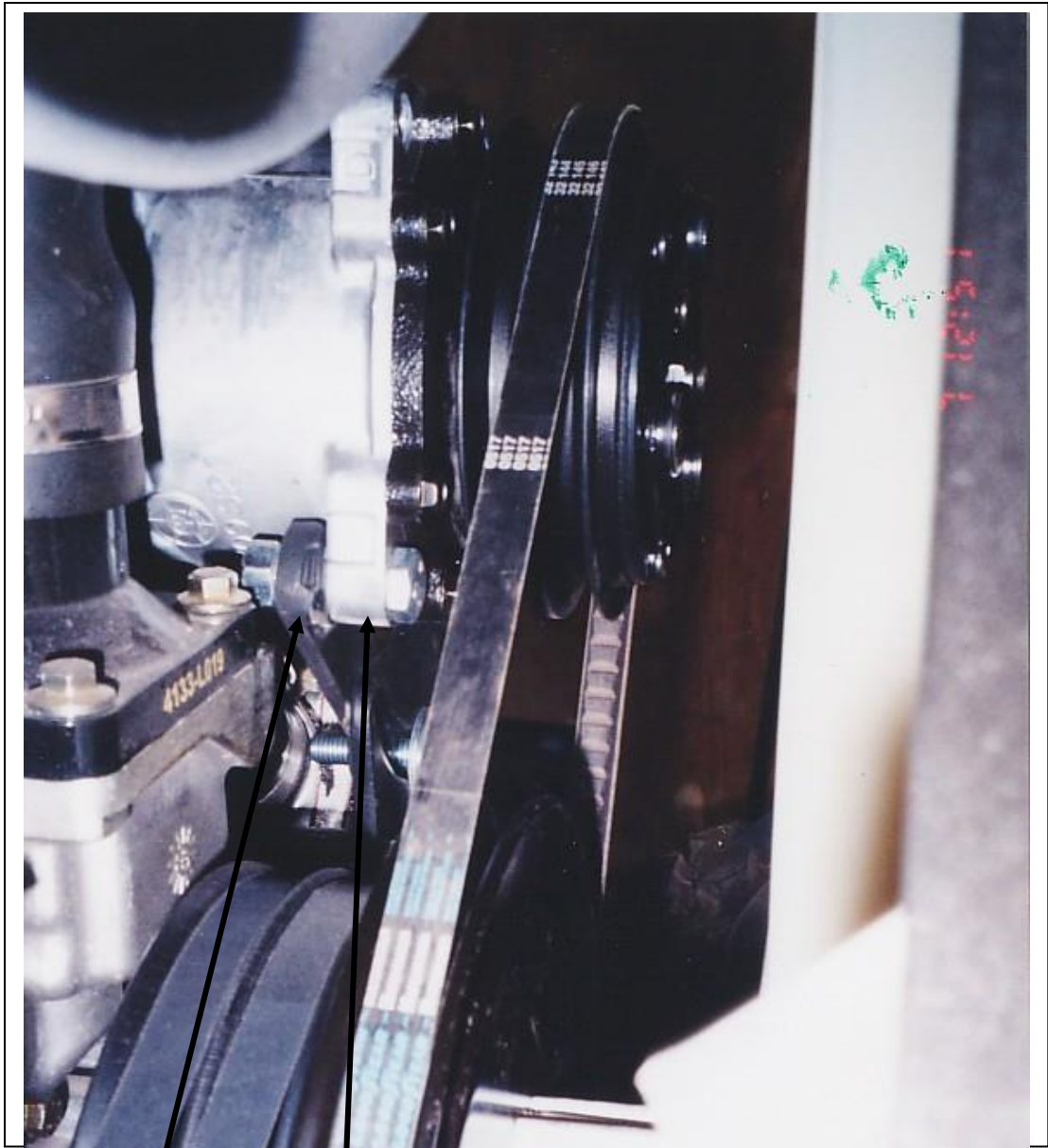
- 1) If the third pulley groove exists on the fan hub, be happy and go to step 2. If the third pulley groove is not on the fan hub, it must be installed. Unbolt the fan blades and spacer from the fan hub. Unbolt the fan shroud from the radiator flanges. Slide the fan and spacer to one side between the shroud and rad to give enough room to install the pulley over the fan hub.. The pulley goes on cupped side towards the engine. Re-install the spacer and fan and tighten down. Re-install the fan shroud.



- 2) Bolt the front compressor mount bracket onto the engine. This bracket bolts to the open M8 mounting lug on the water pump and the water pump bolt to the left of it. Remove the existing bolt from the water pump and replace it with the longer M8 bolt in the compressor mount hardware bag.



- 3) Loosely bolt the rear compressor mount bracket onto the engine head directly behind the water pump and overtop the injector pump. Do not tighten down yet.
- 4) Attach the compressor tightener arm to the rear of the front mount bracket using the threaded end of the tightener arm. The tightener arm should be bolted to the long curved hole in the front mount bracket.
- 5) Install the compressor onto the front and rear brackets. The lower left front mount ear (B) on the compressor bolts to the front mount bracket and the lower mount ear (F) on the compressor bolts to the rear compressor mount bracket.



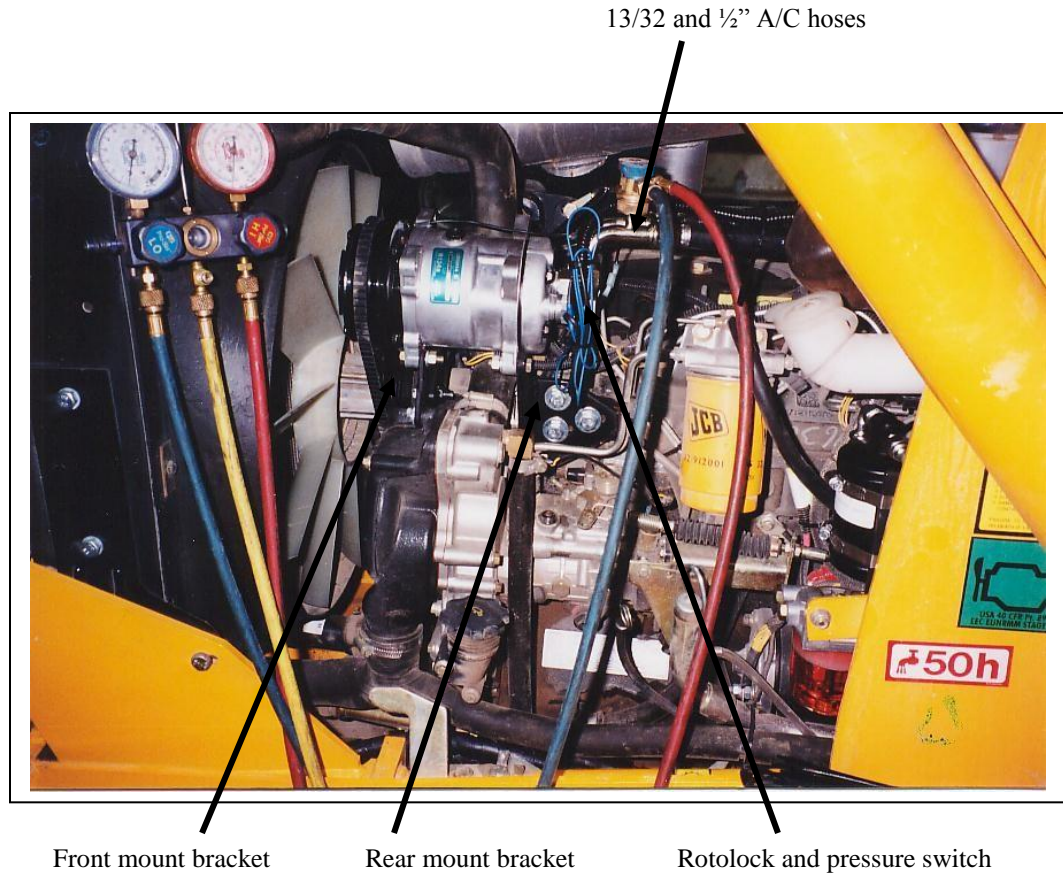
Compressor tightener bracket

Ear "C" on compressor

6)

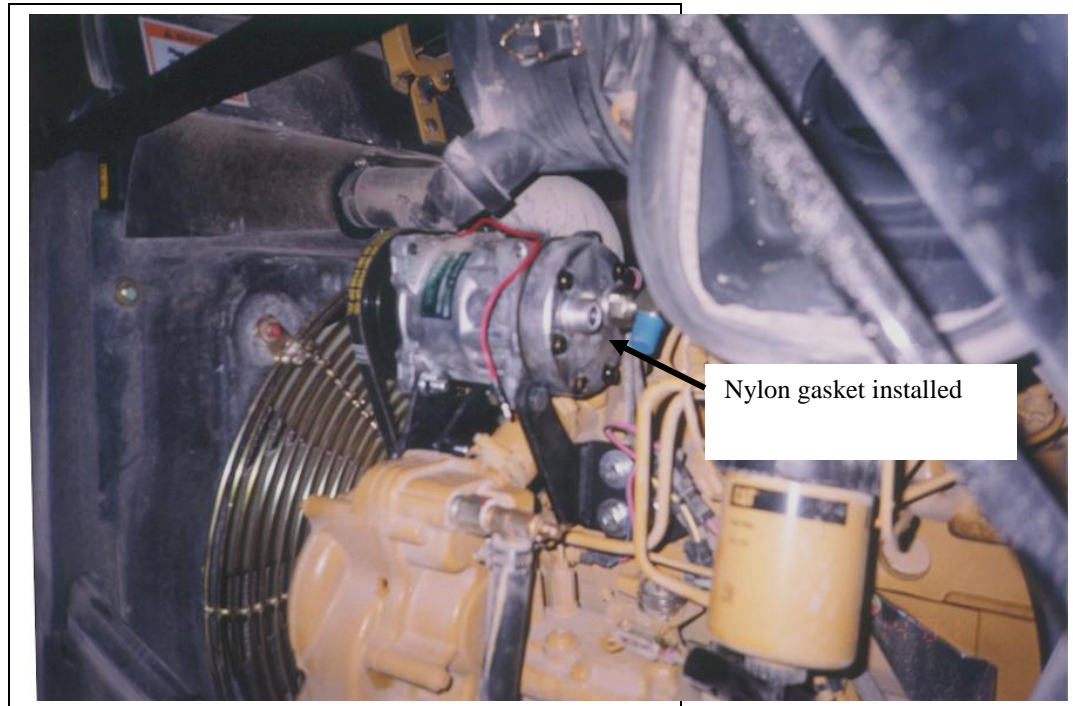
possibilities. Determine the proper length and use that belt.

- 7) Tighten the rear bracket to the ear of the compressor so that the rear bracket is pulled into place on the engine. Fully tighten the three bolts on the engine head for the rear bracket.



- 8) Loosen the bolts on the compressor and fully tension the belt. Re-tighten all the mount bolts.

- 9) Install the rotolock fittings onto the back of the compressor with the fittings pointing straight up. Remove the caps on the back of the compressor and install the white nylon gaskets into the grooves on the rear of the compressor ports. Oil the contact surfaces of the rotolock fittings. Install the 13/32" rotolock fitting onto the right hand port (D) of the compressor with the binary switch on the bottom pointing straight down. Install the 1/2" rotolock fitting onto the left hand port(s) of the compressor with the 134A access port on the bottom pointing straight down. Ensure the rotolocks are firmly tightened.

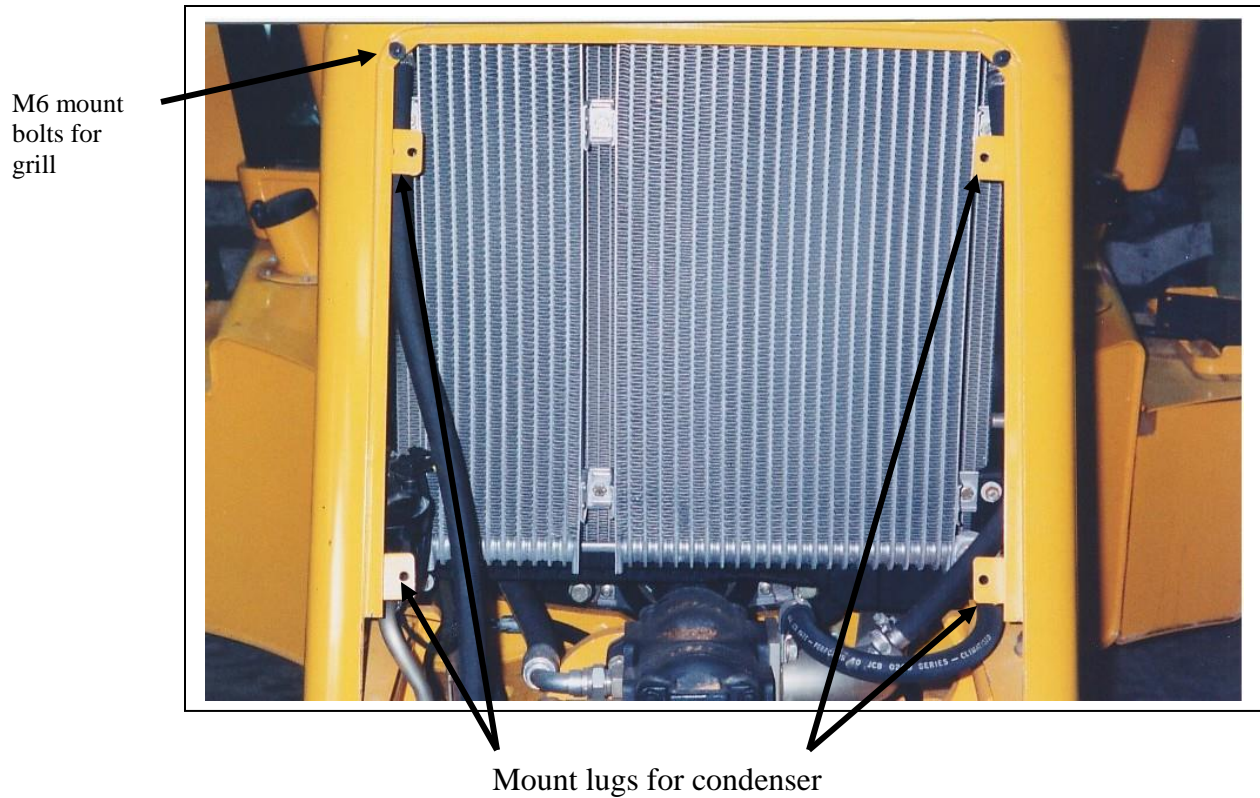


****NOTE**** A similar mount on a different machine used to show the nylon rotolock gasket installation only

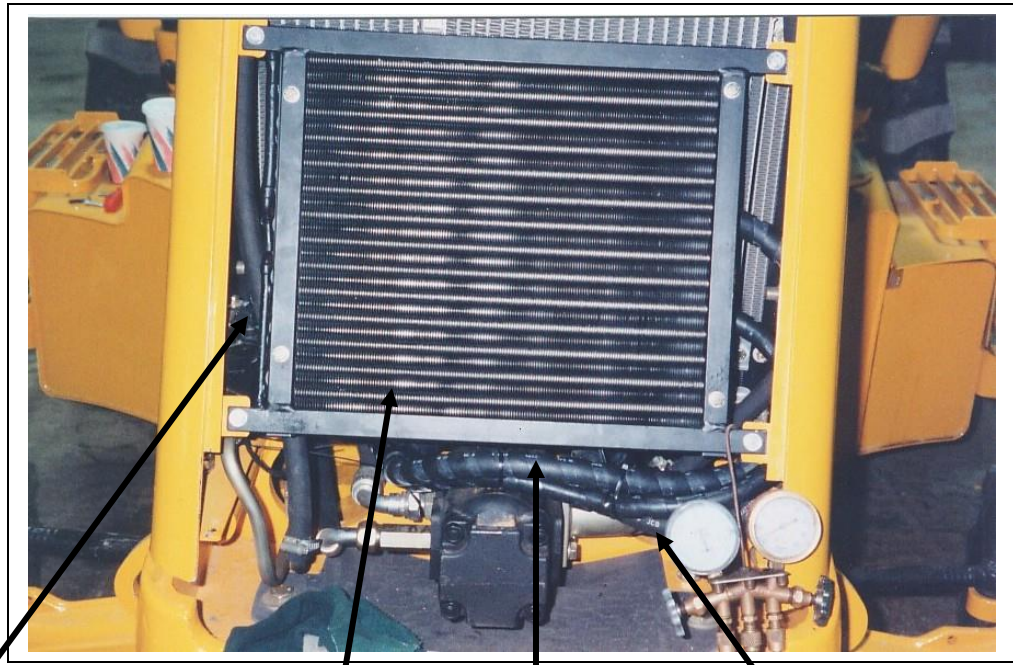
Condenser: The condenser mounts across the front face of the radiator on four existing mount lugs coming out from the front grill frame.

Steps:

- 1) Remove the front grill by removing the two M6 bolts from the top corners. Lift the front grill up and out.



- 2) Hold the condenser up in place on the front side of the four mount lugs. Bolt the condenser in place using the hardware provided. Ensure that the fittings are on the right side of the condenser pointing back towards the radiator.



Fitting side

Condenser bolted in place

13/32" hose

5/16" hose

- 3) Secure the condenser bolts tightly and check that the condenser is not rubbing on any hoses. Move and secure any hoses in contact with the condenser.



13/32 90° fitting

5/16" 90° fitting

- 4) It may be necessary to relocate the horn to the lower right mount bracket so the horn is located below the condenser. A bend may have to be put in the horn mount bracket.



Horn relocated

Drier : The receiver drier is mounted on the left side of the engine off of the back bolt of the fuel separator mount.

Steps:

- 1) Remove the existing back bolt of the fuel separator mount.
- 2) Use the same hardware to bolt the straight drier bracket to the engine side of the back fuel separator mount. Position the bracket straight up.



Receiver drier

Straight mount bracket

Rear bolt of fuel separator mount

Drier inlet

- 3) Clamp the drier to the mount bracket using the two #48 gear clamps provided. Position the drier so that the inlet and outlet are 90o to the engine. Have the drier inlet (marked IN) pointing towards the outside of the machine. Check that the drier is clear of all hoses and linkages that could rub on the drier.

Hose runs: The hoses are all pre-crimped and pressure tested for leaks. Use the correct “O” rings and oil all contact surfaces with PAG oil.

13/32” Hose Compressor to Condenser

The hose runs from the rotolock on the compressor fitting (the 90° at the end of the hose with the 134A access port) to the top fitting on the condenser. The hose is routed down along the side of the engine and then forward along the side of the radiator. The hoses run behind the condenser with the 13/32” 90° fitting connecting to the top fitting. See the pictures for the condenser installation.

5/16” hose Condenser to Drier

The hose runs from the condenser outlet fitting (bottom) to the drier along with the 13/32” line from the compressor. Connect the 90° fitting to the condenser and loop the hose behind the condenser and back beside the radiator and out along the frame on the left side of the machine. Connect the other 90° fitting to the “INLET” fitting on the drier.

5/16” Hose Drier to Evaporator

The hose runs from the drier along the side of the frame and up into the cab on the right side of the operator. The hose is run into the cab with the ½” suction line from the compressor. Run both the lines up into the cab through the existing grommet near where the evaporator fittings are exposed. The grommet may need to be slit to allow the hoses through. Connect the 90° fitting to the expansion valve outlet.

½” Hose Evaporator to Compressor

The ½” hose is first to connect at the compressor using the 90° fitting with the 134A access port for charging on it. Connect this fitting to the compressor fitting and run the hose back as shown. The hose will cross over to the right side of the machine under the cab and behind the engine with the 5/16” hose. It then follows the 5/16” hose into the cab and up to the evaporator. Connect the 45° fitting to the suction line outlet. It is a good idea to run the compressor clutch wire along with the hoses at the same time. This will make a neater installation and make it easier to trouble shoot the electrical system.

Heater line Shutoff Taps

JCB does not supply heater taps on the engine block. It is very common for the heater control valve in the cab to not shut tightly. This will allow anti-freeze to flow through the heater coil and partially re-heat the cooled air. To eliminate this problem an inline heater tap needs to be installed at the engine.

The factory heater line connects at the engine making accessibility difficult. The best place to locate the tap is on the heater line coming off the left back corner of the engine.

Steps:

- 1) Clamp off the heater line as close to the engine as possible and again about 4" farther along. Cut the 5/8" heater line in half between the two clamps.
- 2) Install the inline heater tap using the gear clamps provided. Orient the tap so that the shut-off valve is most accessible. Shut it for A/C, open it for heat.

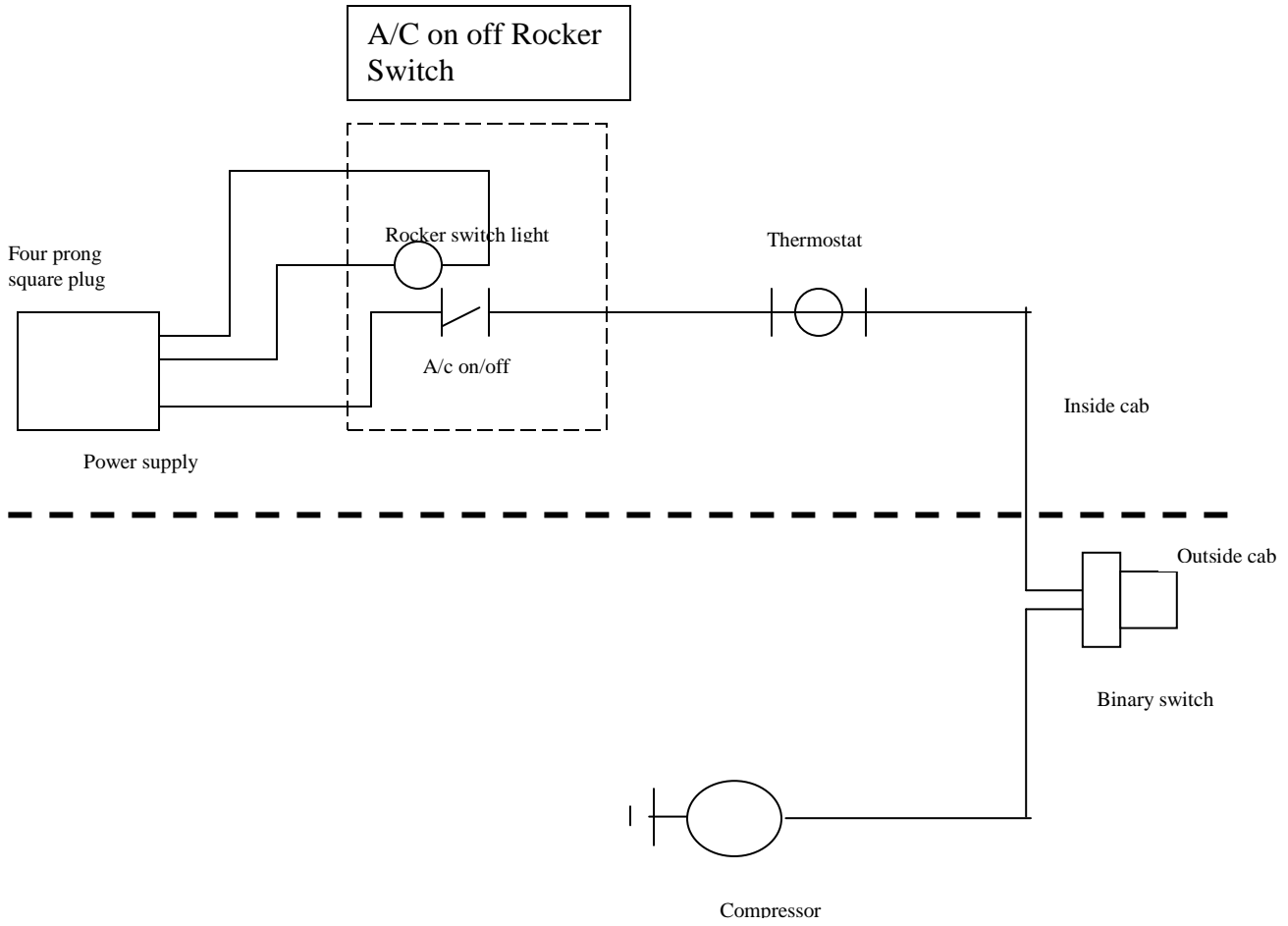
*****NOTE***** Make sure that the end user of the machine knows that the tap is there and why. This will reduce your un-needed service calls in both the spring and fall.

Electrical: The electrical system for the JCB backhoe consists of the factory rocker switch, a rotary thermostat and the clutch wire out to the binary pressure switch and compressor.

Steps:

- 1) Find the empty 4 prong electrical connector coming out of the wiring bundle behind the upper right rocker switch panel. The plug will have to be cut off and wire extensions added to the four wires. Determine which two wires supply power for the switch light and which wire is the main power in. Leave the last wire out. Plug the four wires into their appropriate spots. (use other existing switches for guidance) Double check that the switch lights up when the dash lights are activated and that power flows through the switch when it is turned on.
- 2) From the main power outlet from the rocker switch run a 14 gauge black wire to the thermostat switch. Plug the wire coming into the cab with the hoses into the other terminal of the thermostat.
- 3) The thermostat is a rotary one but it is being set up and used as a pre-set thermostat. It can be secured beside the evaporator/heater box using tie wraps. Tie it to hoses or wire bundles but not moving linkages. When the install is complete set the thermostat so that it cycles the compressor on and off without allowing the evaporator coil to freeze up.
- 4) The clutch wire, previously run with the A/C hoses, is connected to the thermostat inside the cab and to one terminal on the binary switch at the compressor on the engine. The clutch wire on the compressor is connected to the other terminal on the binary switch.
- 5) When the system has pressure in it check for proper electrical function. The compressor will not engage until there is at least 30psi pressure in the system.

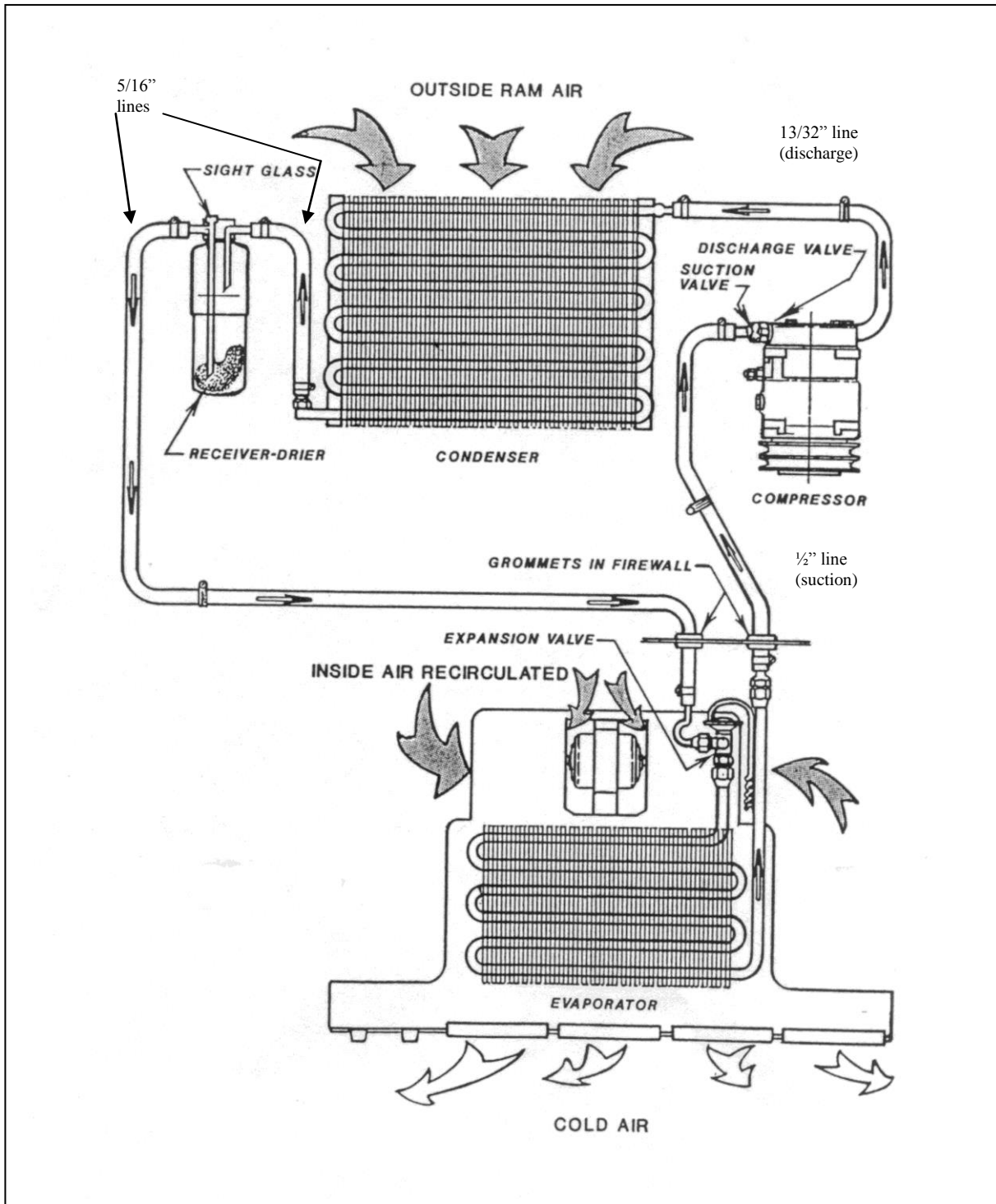
Electrical



CHARGING AND TESTING

- 1) Pressure test the system using nitrogen to a pressure of 250 psi. Check for leaks.
- 2) Add 2oz of SP20 Sanden PAG oil to the system.
- 3) Vacuum the system for at least ½ hour.
- 4) Check that the vacuum holds.
- 5) Fill the system with 2.5 of R134a refrigerant. **DO NOT USE ANY OTHER TYPE OF REFRIGERANT OR IT WILL VOID THE WARRANTY.**
- 6) Test the system. Check the cycling temperature of the thermostat. Adjust the thermostat settings if required to avoid coil freeze up problems. See the thermostat setting procedures at the end of these instructions.

Refrigerant Flow Pattern in a Standard Air Conditioning System



Thermostat Setting Procedures

- 1) Thermostat types
 - a) preset
 - b) adjustable
 - a) A preset thermostat is adjusted to its specific cut in and cut out temperatures when manufactured and does not have a rotary adjustment for the operator.
 - b) An adjustable or rotary thermostat has been manufactured to a predetermined cut in and cut out temperatures, but it is also operator adjustable to achieve the desired comfort level.

Both types of thermostats can have their factory settings adjusted by turning the setting screws on the body of the thermostat. One body type has the setting screws mounted externally and labeled for direction of rotation. The other body type requires the removal of the plastic end plate to expose the set screw.

- 2) Thermostat probe location: The location of the thermostat probe in an evaporator coil can be very important to achieve the maximum cooling potential of the coil while also preventing coil freeze-up. There is no set location for the thermostat probe to be put that will be optimum for all systems, but several rules of thumb may be followed:
 - a) Insert the probe in the coldest area of the evaporator coil.
 - b) Insert the probe from the top of the coil down, if possible.
 - c) Make sure that at least the last 3" of the thermostat probe are in the coil.

To find the most likely area where the coil is the coldest, consider these factors:

- 1) Direction of air flow through the coil.
 - 2) The coil area likely to have the lowest air flow.
 - 3) The inlet locations of the refrigerant into the coil.
 - 4) The inlet of the hotter outside air into the coil area.
-
- 1) Usually the coldest side of the evaporator coil will be the air outlet side. Often the thermostat probe can be inserted between the last and second last row of tubes.
 - 2) The lower air flow area of the evaporator coil in most systems tends to be near either end of the coil. These areas will be colder
 - 3) The area of the coil that the refrigerant inlet tube(s) occupy should be the coldest part of the coil.
 - 4) If the system is equipped with an outside air intake, where and how that air is brought into the evaporator area can have a large effect on the coil temperature. If all the outside air is piped into the evaporator in one area, that area will be considerably warmer in hot weather.

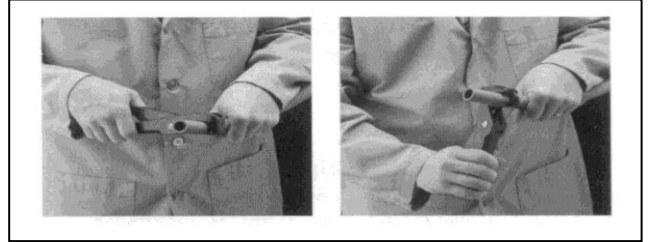
By looking at all these different factors, the area of an evaporator coil most likely to be the coldest can be determined.

Once the probe is inserted, the A/C system needs to be tested. Run the system to ensure that the thermostat is cycling the compressor off at the appropriate temperature. A core temperature ranging between 25° and 30° F should cause the thermostat to cycle off. The air temperature at the vent outlet closest to the evaporator coil should be between 38° F and 45° F when the compressor cycles off.

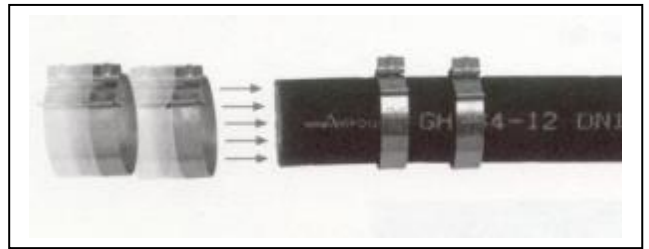
If the thermostat doesn't cycle off after a reasonable cool down period, and the air outlet temperature has dropped below 40° F, the cut in and cut out settings should be adjusted until the compressor is cycling on and off regularly. Let the system run for a decent time period (at least 15 min) and then check the evaporator coil for any signs of freezing.

Aeroquip E-Z Clip Assembly Instructions

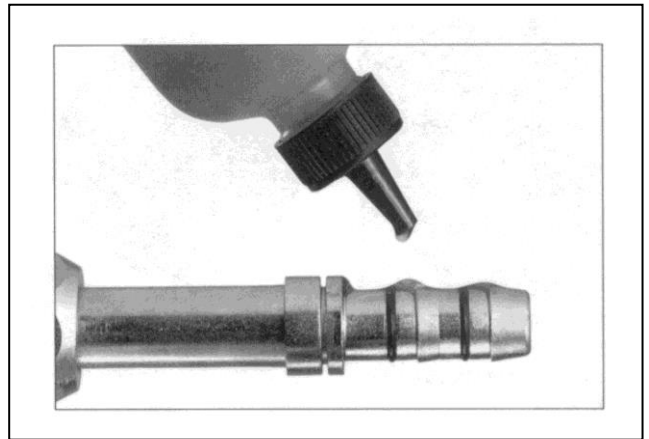
Step 1. Cut the hose to proper length with an appropriate cutting tool. Aeroquip's hand held hose cutter has been specially designed for cutting all non-wire reinforced hose, such as GH-134 Multi-Refrigerant hose. Be sure the cut is made square to the hose length.



Step 2. Install two proper-sized clips onto the cut end of the hose. Orientation of the clips does not affect the performance of the connection. However, for ease of assembly, both clips should have the same orientation. NOTE: Failure to slide the clips over the hose at this time will require the clips to be stretched over the hose or fitting later. This may permanently damage the clip.



Step 3. Lubricate the nipple with a generous amount of the refrigeration or A/C system's compressor lubricating oil. This MUST be done to lower the force of nipple insertion.



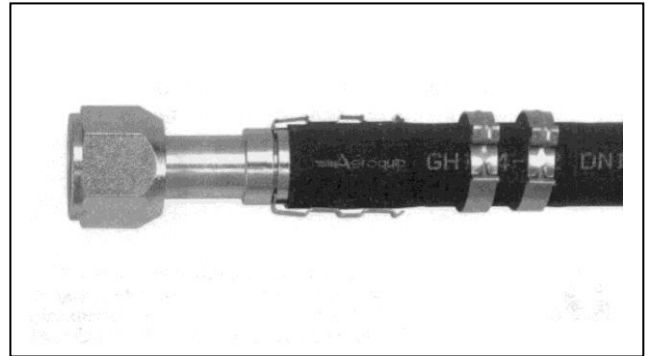
Step 4. Insert the nipple into the hose. To ensure that the nipple is fully inserted, check the gap between the cut end of the hose and the shoulder on the nipple. Care should be taken to avoid kinking or other damage to the hose during nipple insertion.

NOTE: Be sure to wipe excess oil from the nipple and hose.

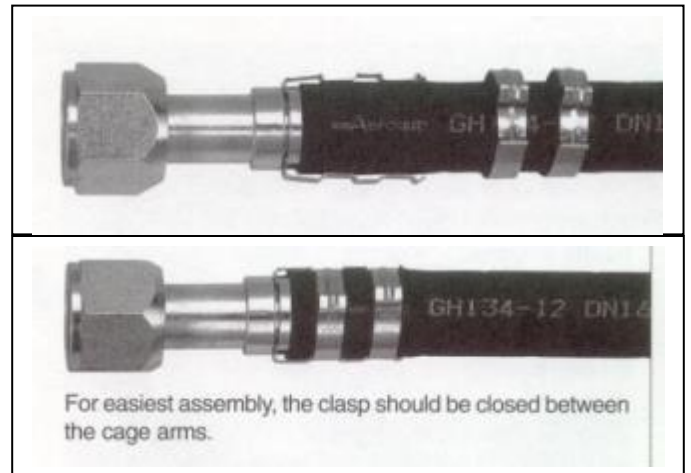


Step 5. Snap the cage into the groove on the nipple. The arms should extend over the hose length. When the cage has been correctly installed in the cage groove, the cage will be able to rotate in the groove. This step **MUST** be performed to ensure:

1. The clips will be located over the O-rings on the nipple.
2. The connection will be compatible with the connection's pressure rating.



Step 6. Slide the clips over the cage arms and into the channels on each arm.



Step 7. Use the pliers to close the clips. The pliers should be positioned squarely on the clip connection points and should remain square during the closing of the clip.

NOTICE: E-Z Clip components should not be reused.

