

**416 / 420 / 430D
CAT BACKHOE
INSTALLATION INSTRUCTIONS**

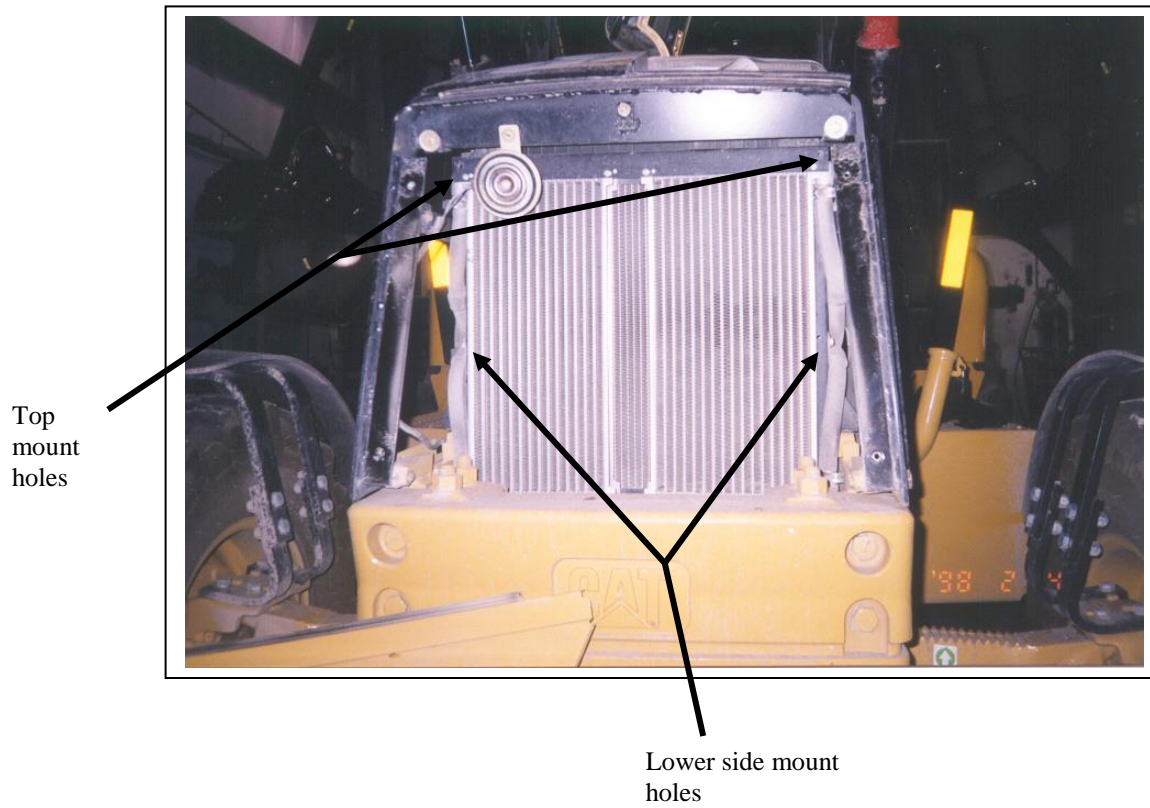


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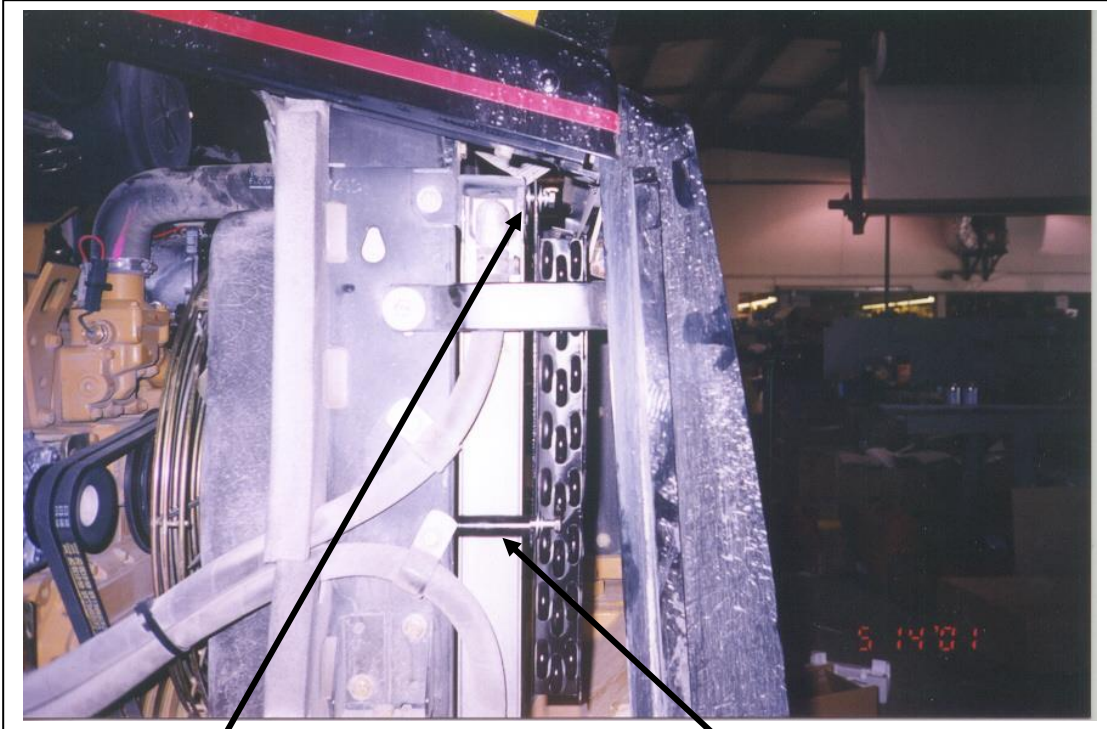
Condenser: The condenser is a high performance tube and fin unit designed to be mounted in front of the radiator and oil coolers.

Steps:

1. Remove the front screen to expose the radiator front face



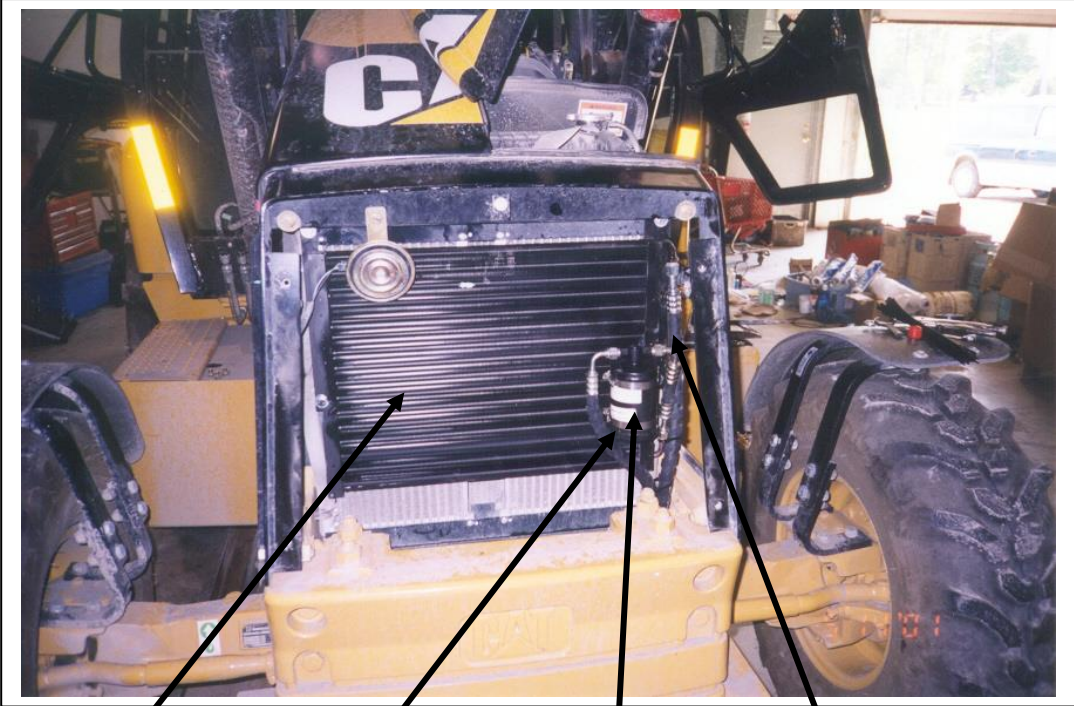
2. Hold the condenser frame up to the radiator face and bolt the top mounting flanges of the condenser frame to the 8mm threaded holes on the top of the oil coolers. Place a large OD flat washer between the mount hole and the condenser flange.
3. Bolt the lower side mounts of the condenser to the radiator frame using the long M8 bolts and spacers provided in the kit.



Top mount bolt and washer as
a spacer

Lower side mount and spacer

4. The drier is integrated with the condenser frame and is already in place on the left side of the condenser.



Condenser

5/16" A/C
line

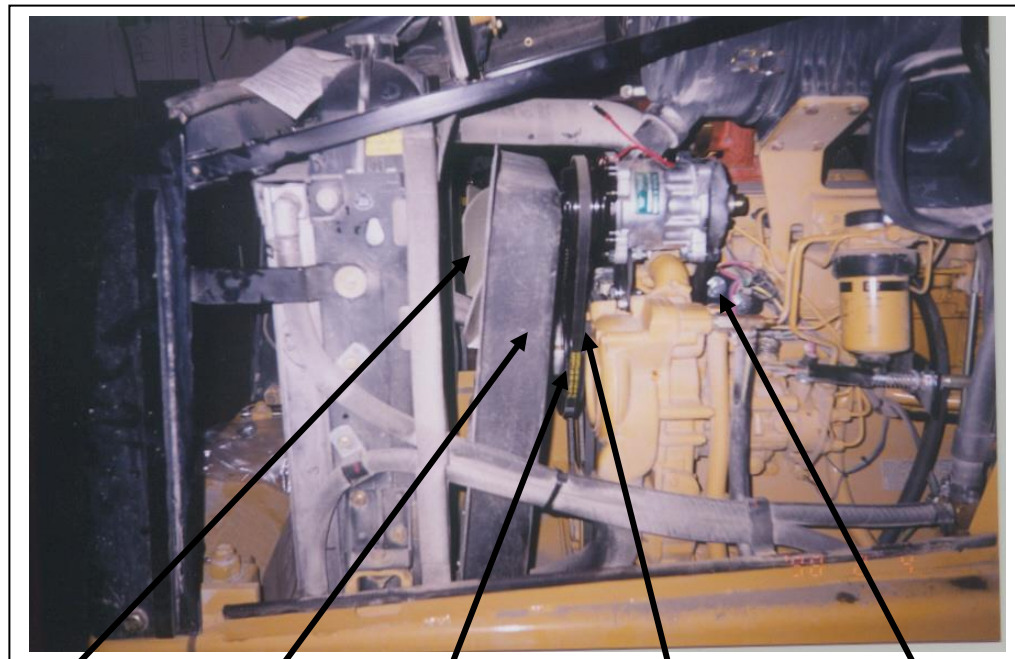
Drier

13/32" A/C line

Compressor: The compressor is an engine driven Sanden compressor similar to the Caterpillar factory compressor. The mount bracket is designed with integrated tightening features for ease of service. The compressor is driven by an A groove belt running independently of other engine functions.

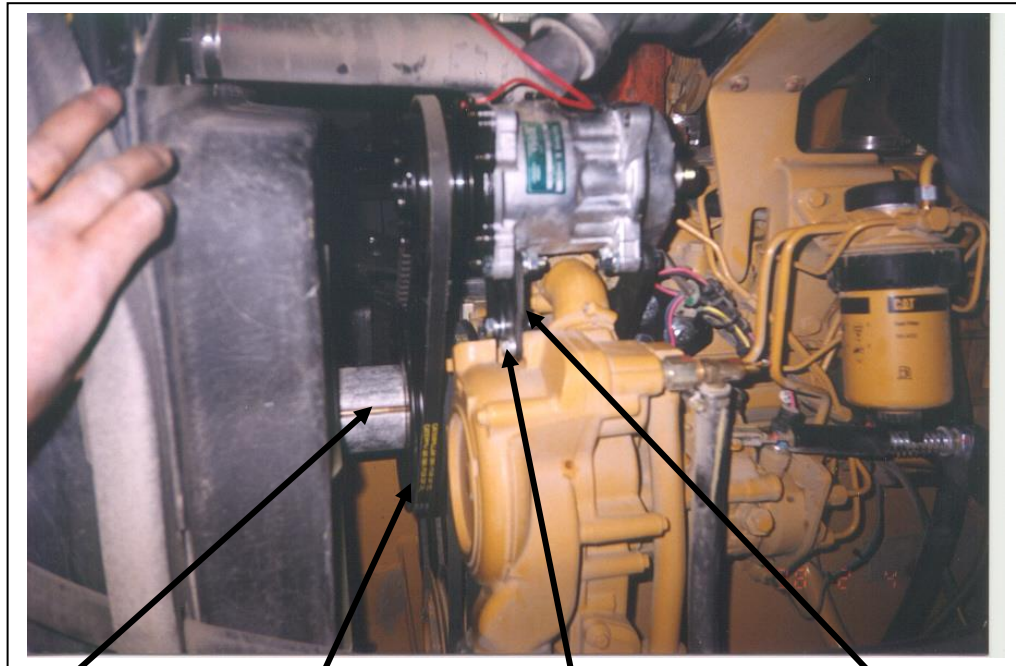
Steps:

1. Remove the side panels from both sides of the engine.
2. Remove the fan screen and the bolts securing the fan shroud to the radiator. This will make it easier to remove the fan hub bolts.
3. Remove the fan hub bolts and slide the fan spacer towards the radiator as far as possible.
4. Install the auxiliary pulley over the fan hub with the flush side of the pulley towards the radiator.



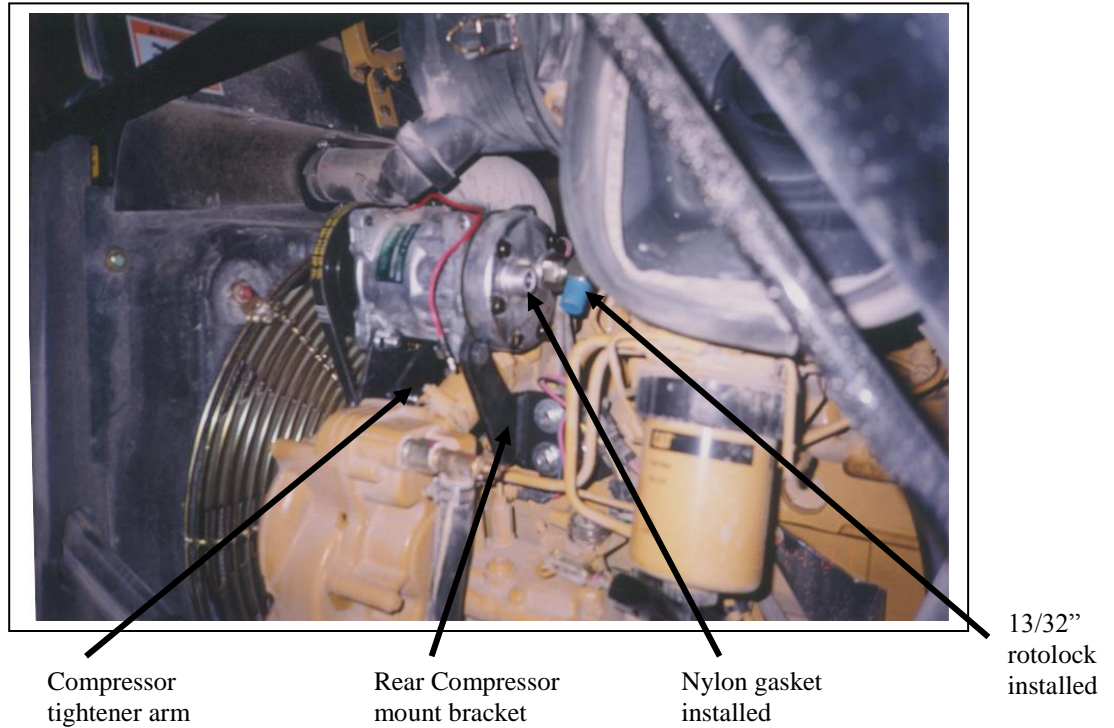
Fan Fan shroud Add on pulley Belt Rear compressor mount bracket

5. Place the supplied drive belt over the pulley and then re-install the fan spacer and fan. Ensure that the fan bolts are tight.
6. 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.

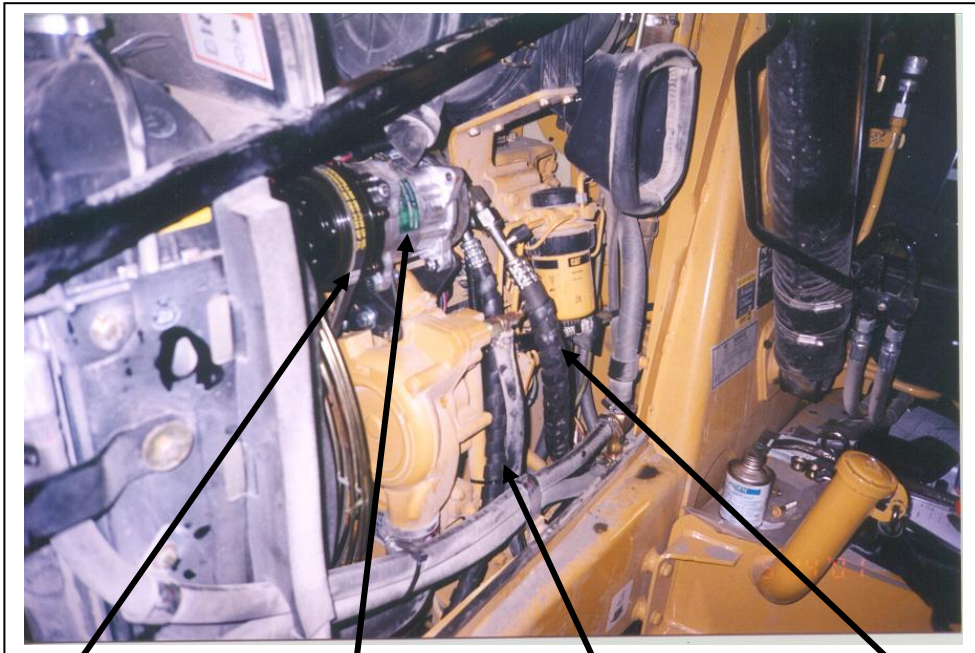


Fan spacer Add on pulley Compressor
tightener arm
bolt Front compressor
mount bracket

7. 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.
8. 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.
9. 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 left rear mount ear (F) on the compressor bolts to the rear compressor mount bracket.
10. The tightener bracket bolts to the lower right front mount ear (C) on the compressor. Install the drive belt around the aux. Pulley and the front pulley on the compressor and snug up the belt. Tighten all the front mount bolts to secure the compressor in place and properly align it.



11. 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.
12. Loosen the bolts on the compressor and fully tension the belt. Re-tighten all the mount bolts.
13. Install the rotolock fittings onto the back of the compressor with the nuts pointing down and about 45o to the left side. 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 (1) of the compressor with the binary pressure switch on the top pointing to the right at about 45o. Install the 1/2" rotolock fitting onto the left hand port (s) of the compressor with the 134A access port on the top pointing to the right at about 45o. Ensure the rotolocks are firmly tightened.



Drive belt

Compressor

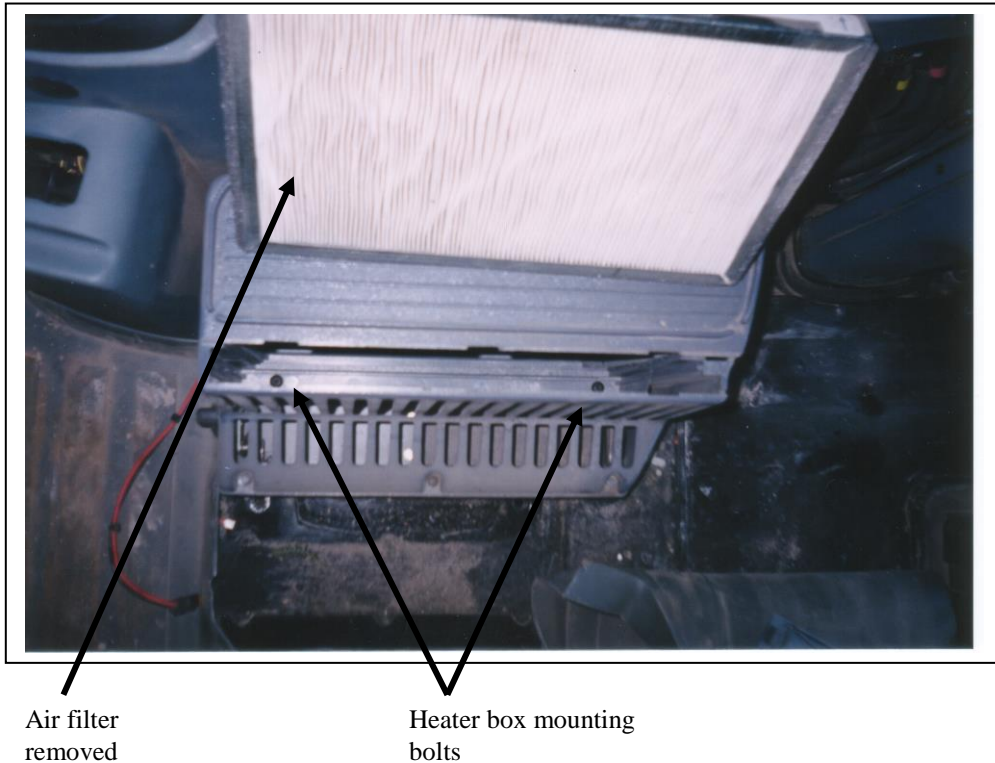
13/32" hose

1/2" hose

Evaporator: The evaporator is located in the heater A/C box located on the floor of the cab to the right of the operators seat and at the bottom of the control console. The heater coil is removed and replaced with a drop in heat/cool coil.

Steps:

1. Remove the operators seat and pedestal from the cab
2. Remove the rear floor mat from the cab and then remove the rear floor panel. This is best done by raising the lower section of the rear window.
3. Remove the heater box air filter to access the two heater box mount bolts located below the filter. Remove these bolts.



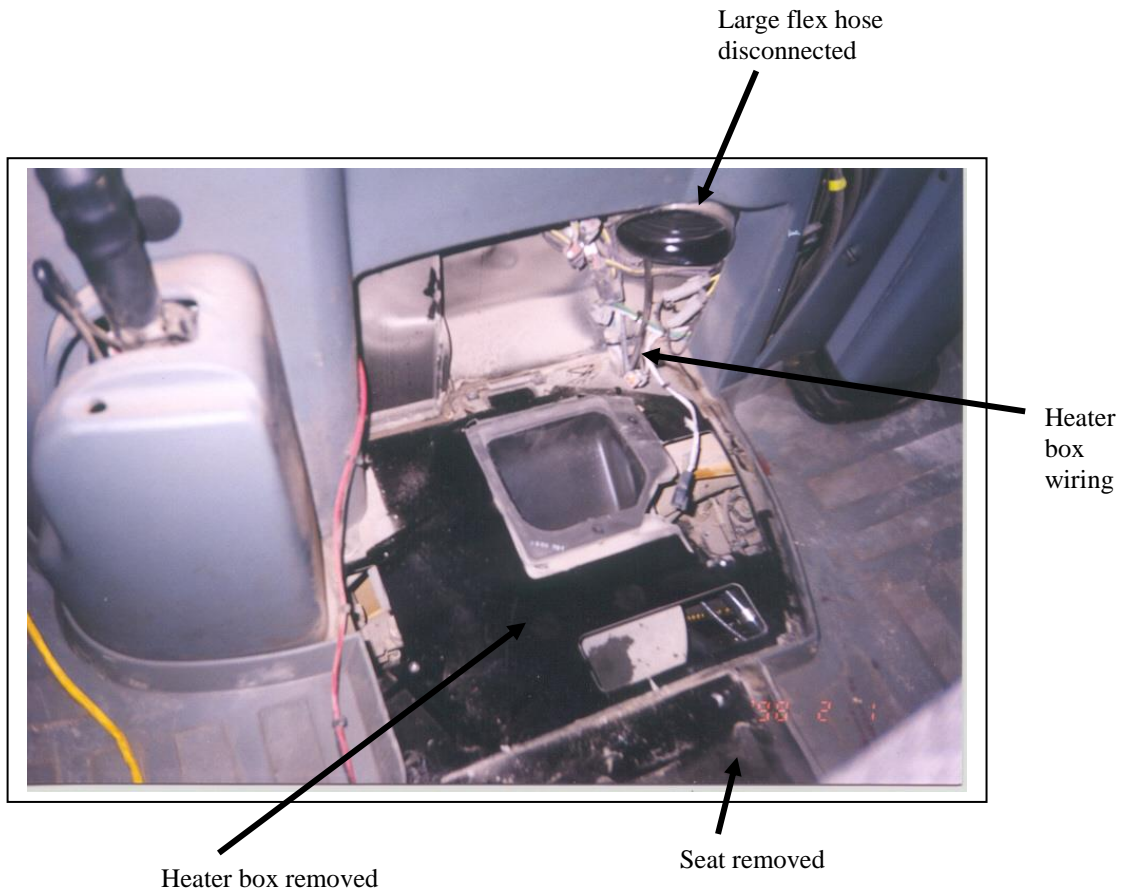
4. Remove the plastic access panel from the control console side to the rear of the heater box. Unbolt the plastic “leg” that is between the heater box and the access panel. This will facilitate much easier access to the rear of the heater box.



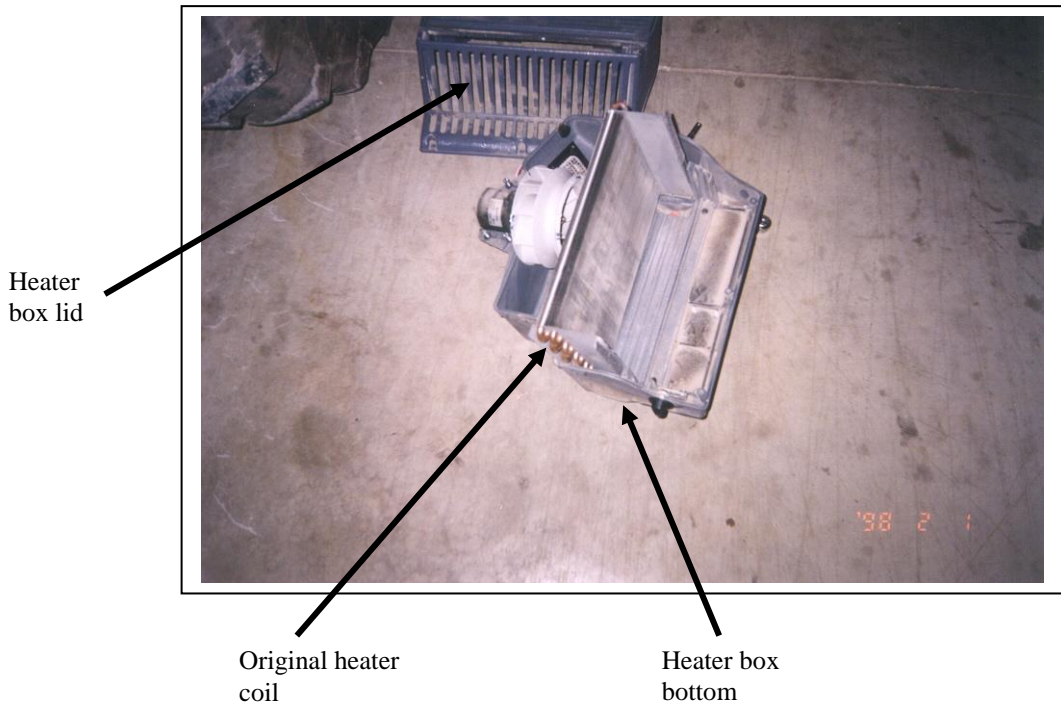
Plastic access panel
mounts behind here

Plastic access panel
removed

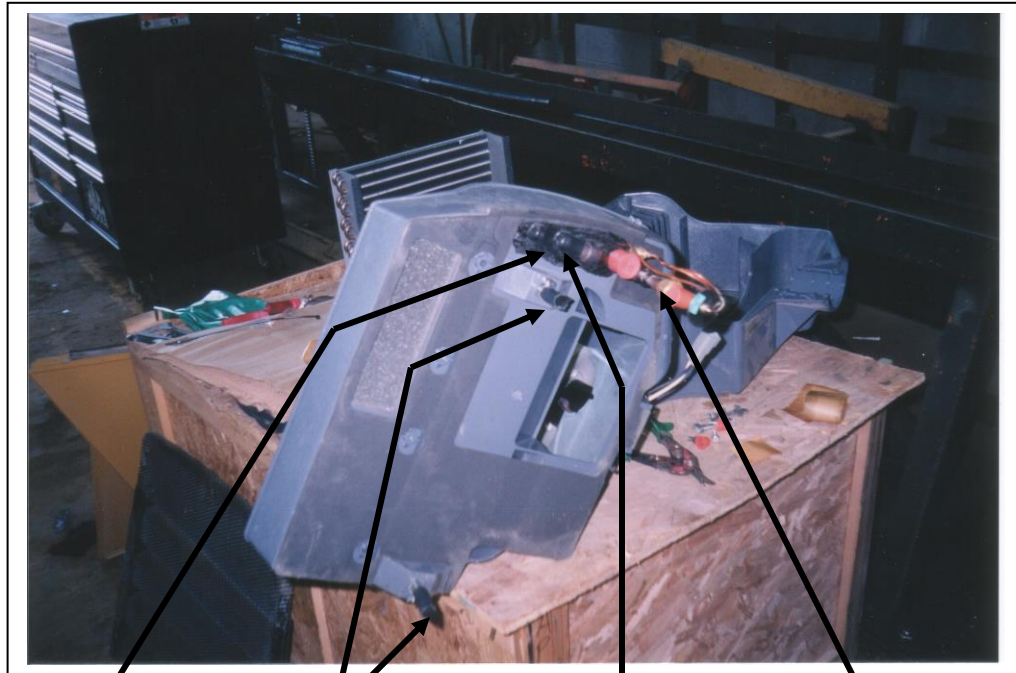
5. Clamp off and disconnect the two heater hoses from the heater coil underneath the box.
6. Disconnect the large flex hose connected to the rear of the box. Disconnect the wire harness to the box.
7. Remove the box from the cab.



8. Remove the lid of the box and then remove the heater coil from the box.



9. Remove the drain tube knockouts from the bottom of the box and glue in the copper drain tube extensions into the box.
10. Mount the heat/cool coil into the box and seal the pipe work around the bottom of the box using tar tape.



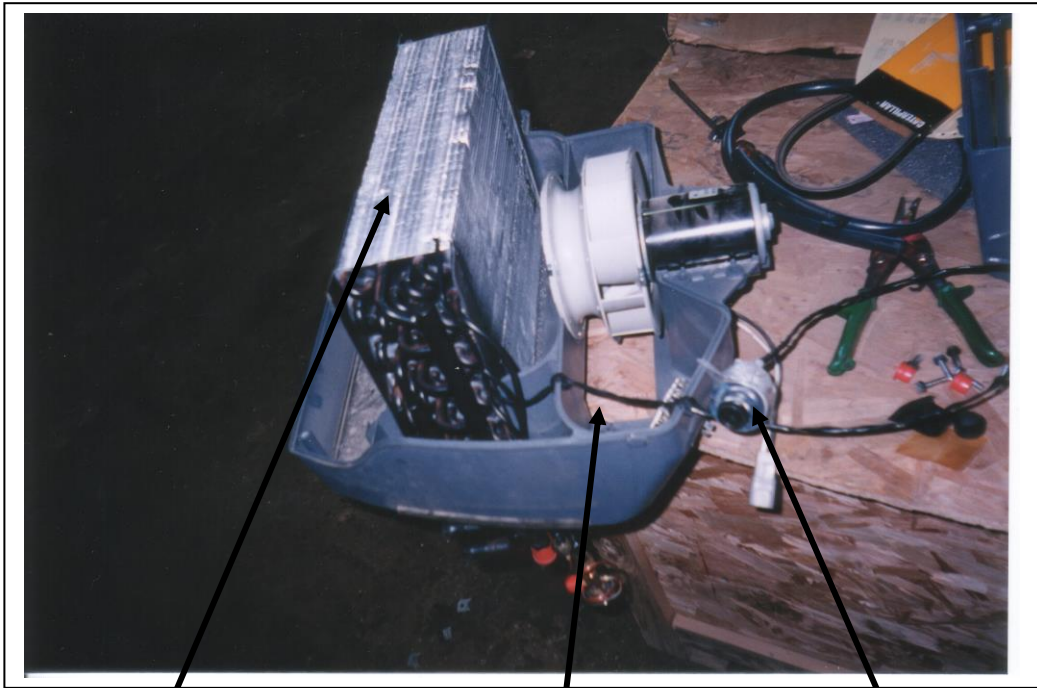
Tar tape

Drain tubes

Heater
outlets

Expansion
valve

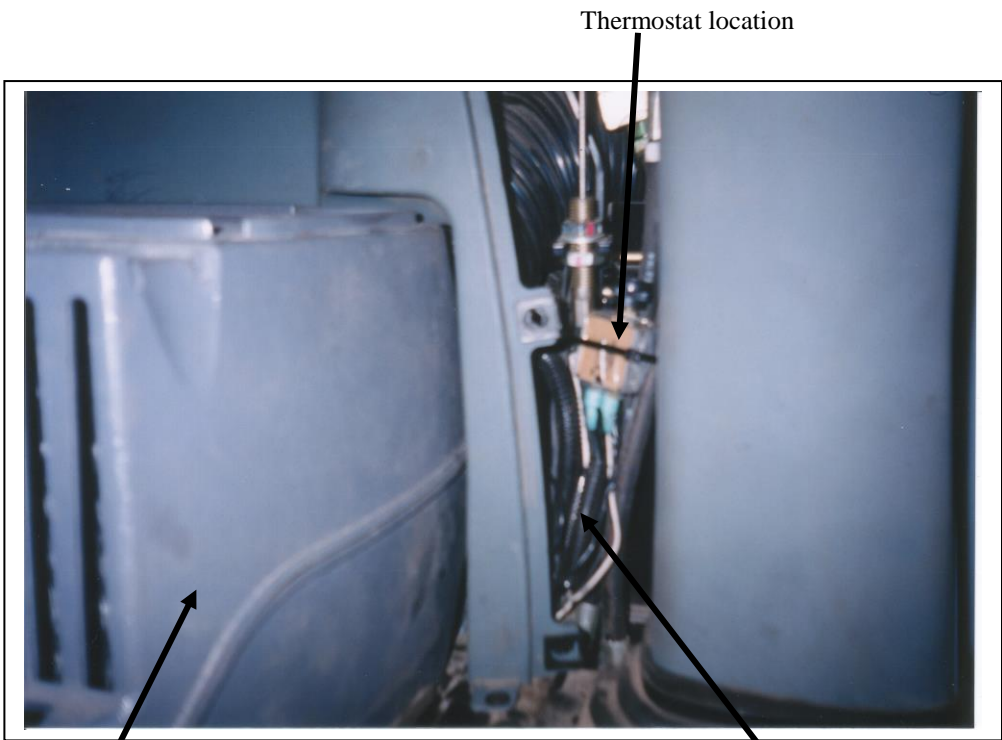
11. Insert the thermostat probe into the coil between the first and second row of tubes 1” from the fitting end of the coil.
12. Run the thermostat probe outside the box through the right rear corner of the box.



Heat/cool coil

Thermostat probe

Thermostat body



Thermostat location

Heater box

Plastic access panel removed

13. Replace the lid of the box.
14. Install short sections of drain tube onto the drain tube extensions and put restricters in the ends of the tube.
15. Re-install the box into the cab. Be careful of the drain tubes and make sure that they get routed down through the holes in the floor.
16. Re-connect the electrical plug and the flex hose at the back of the box and then bolt the box to the floor.
17. Locate the thermostat, so it can be accessed through the plastic access panel just to the rear of the box.
18. Replace the two position heater switch with the supplied three position heater A/C switch.



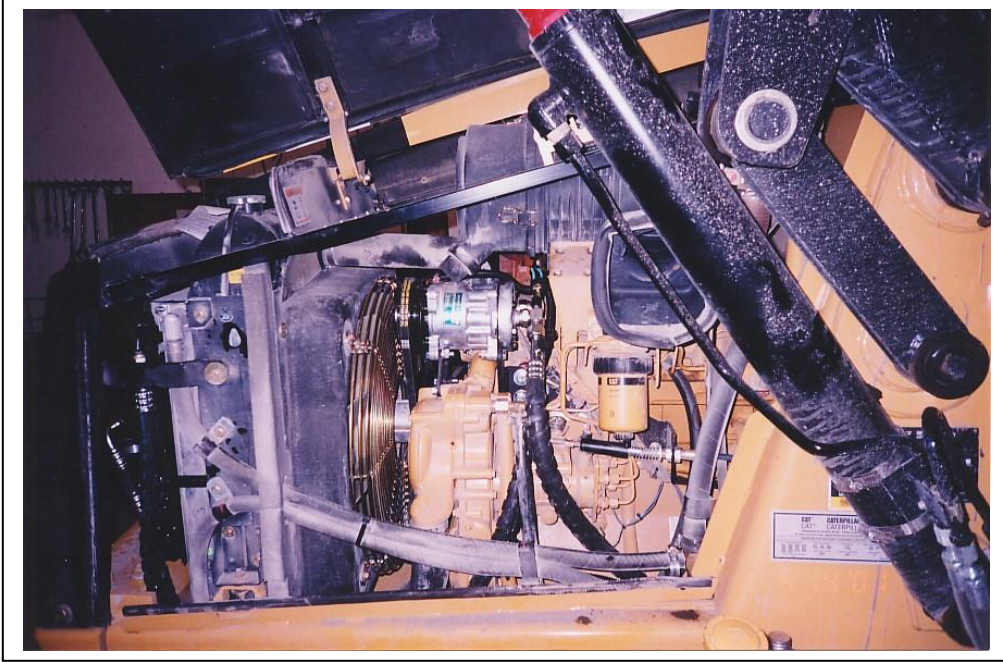
A/C heat rocker
switch

Heat A/C box

Hose Runs:

Steps

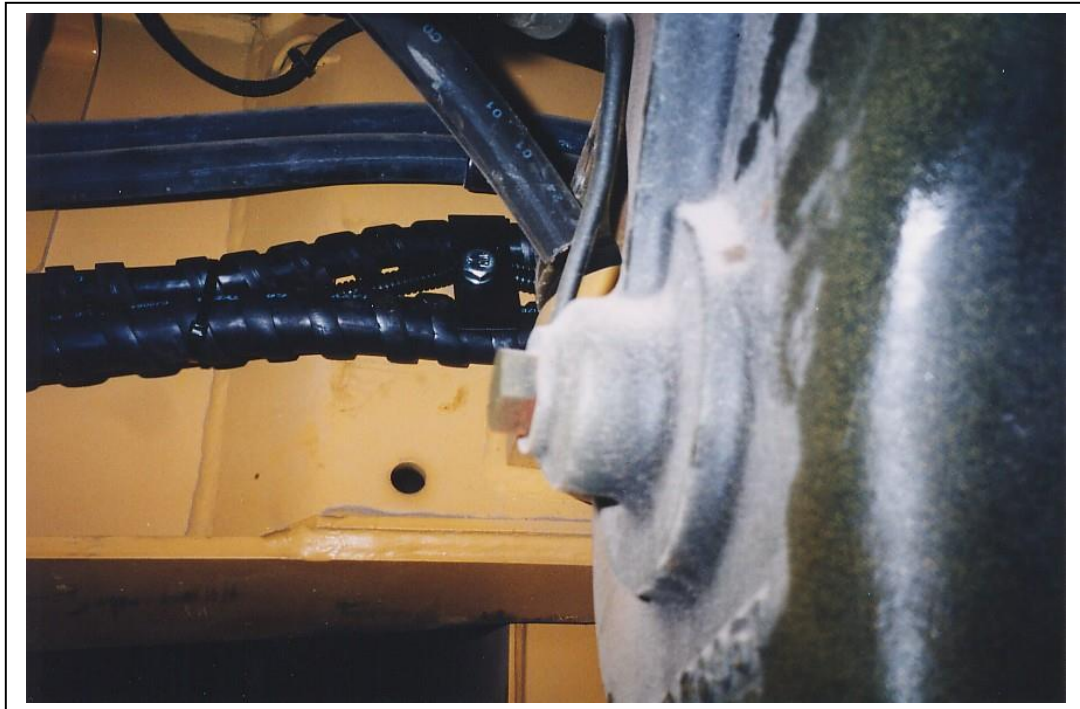
- 1) Starting at the 13/32" rotolock on the back of the compressor (closest to engine), connect the straight fitting c/w 134A port on the 13/32" hose to the rotolock. Use the correct "O" ring and oil all contact surfaces.



- 2) Route the hose down the side of the engine and then forward under the lower rad hose and under the left side of the radiator. Bring the 13/32" hose up the side of the condenser and attach it to the top fitting on the condenser. Use the correct "O" ring and oil all contact surfaces.



- 3) At the outlet fitting on the drier connect the 5/16" 90° female fitting. Use the correct "O" ring and oil all contact surfaces.
- 4) Route the 5/16" hose back along with the 13/32" hose into the engine area. When the 13/32" hose turns up to the compressor keep the 5/16" hose running straight back towards the cab.
- 5) Connect the straight fitting on the 5/8" hose to the suction rotolock on the compressor. Use the correct "O" ring and oil all contact surfaces.
- 6) Route the 5/8" hose down the side of the engine to the 5/16" hose and then run both hoses (and clutch wire) along the inside of the left main frame member. Follow along just below the heater lines. Use the bolts, metal plates and tie wraps supplied to secure the hoses along the frame member.



- 7) Keep the hoses running back along the frame member and then over the rear axle. Bring the hoses across to the heater/AC box following the heater hoses.



- 8) Connect the 5/16" straight fitting to the expansion valve. Use the correct "O" ring and oil all contact surfaces.



- 9) Connect the 5/8" 90° fitting to the suction line at the evaporator. Use the correct "O" ring and oil all contact surfaces.
- 10) When all hoses are connected, pressure test the system to 250 psi using nitrogen. Check for any leaks
- 11) Vacuum the system for at least ½ hour.
- 12) Add 2oz of Sanden SP20 PAG oil to the system.
- 13) Charge with 3 lbs of R134A refrigerant.

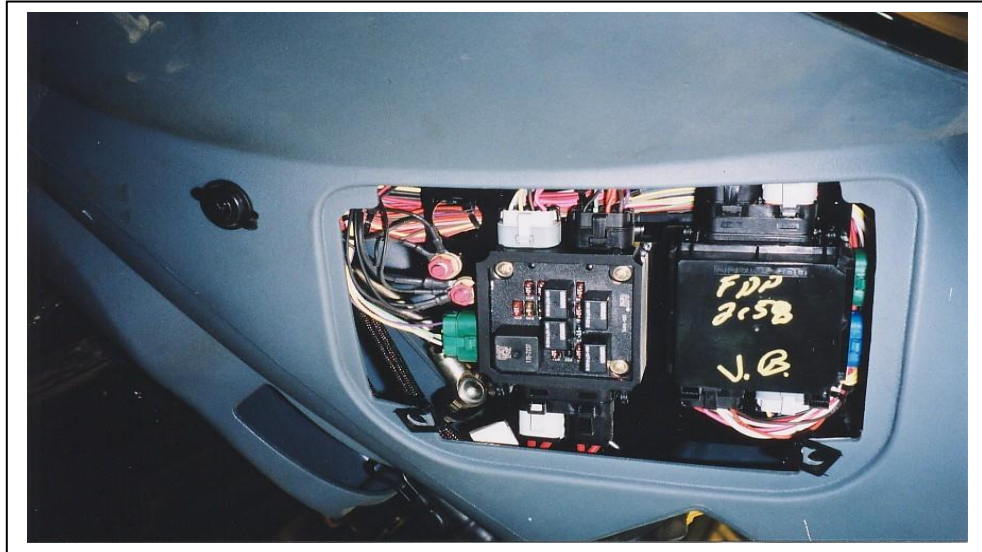
Charging with any other types of refrigerant will void all warranties.

Electrical:

The electrical system uses a combination of Cat factory wiring and fuse placement and Artic Wolf © wiring.

Steps

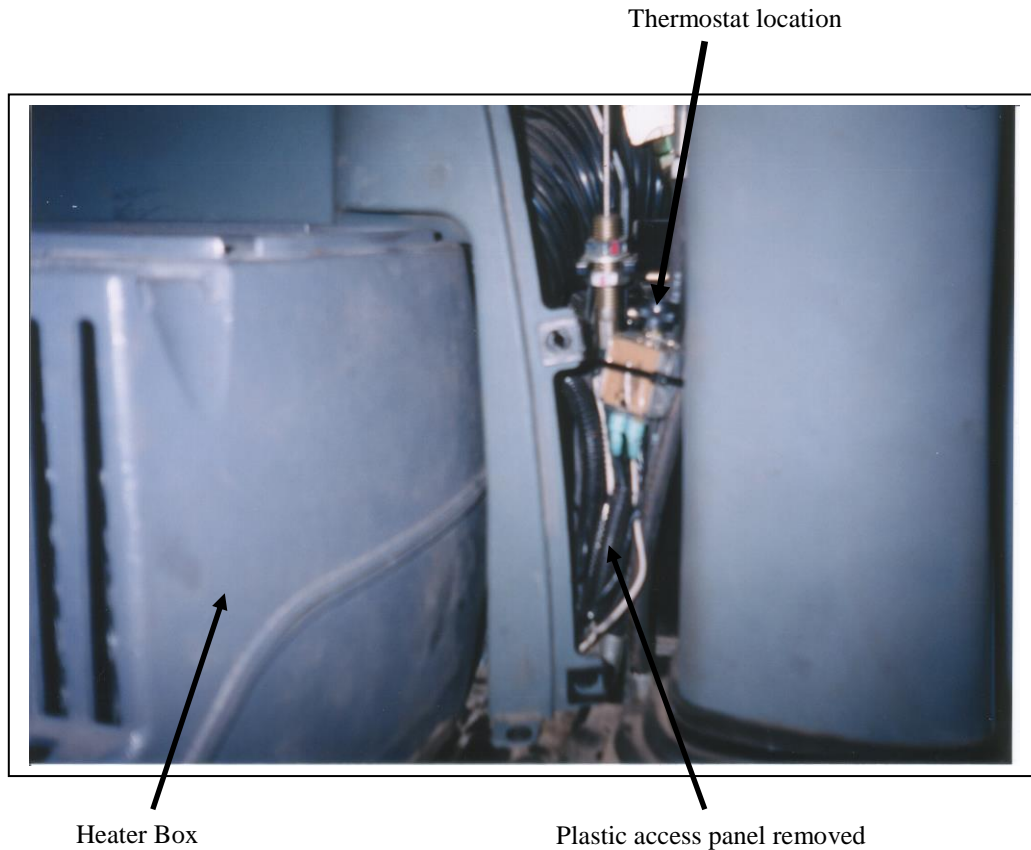
- 1) Locate the fuse boxes and remove the cover from the inside fuse box. (closest to the parking brake)
- 2) Install the supplied 10 amp mini ATO fuse in the empty fuse holder closest to the parking brake.



- 3) Re-install all the covers.
- 4) Remove the heater on/off rocker switch from the climate control console just behind the bucket control lever.
- 5) Replace the two position rocker switch with the three position AC/OFF/HEAT rocker switch and actuator supplied



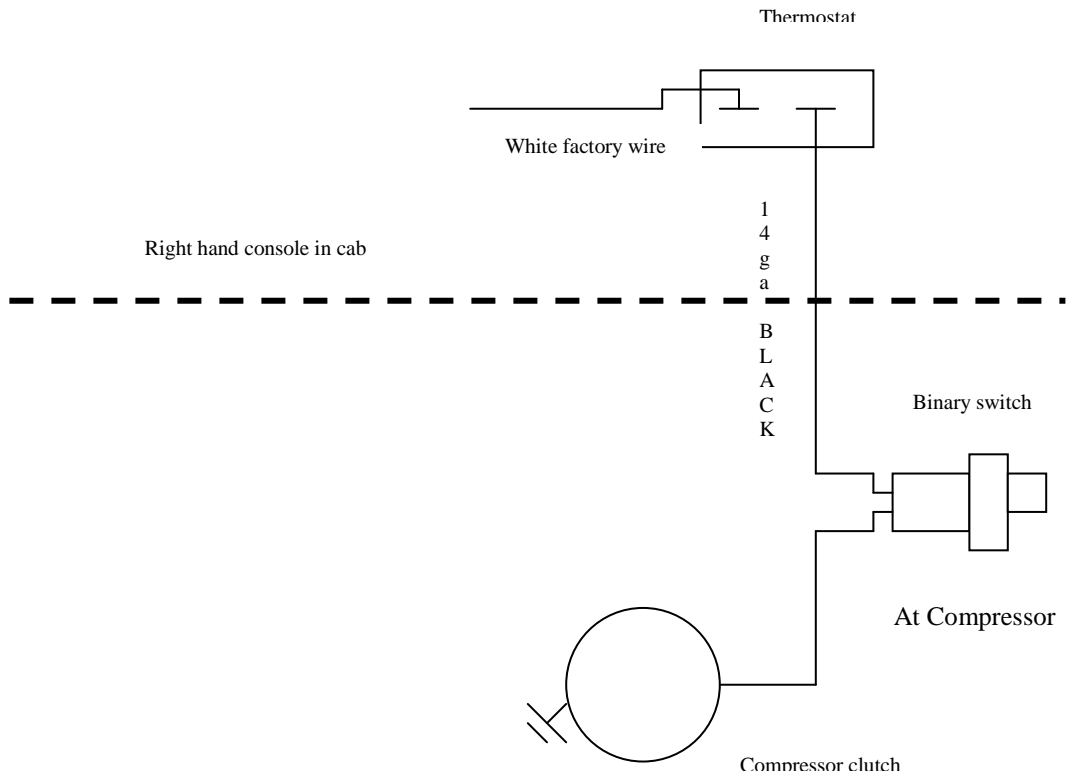
- 6) Re-install the new switch back into the hole.
- 7) Locate the thermostat power wire behind the heater A/C box. The wire is white. It will have power on it when the key is on and the rocker switch is turned to the AC position. Use a test light to check. Cut the existing plug off the wire and crimp on a blue female quick disconnect.



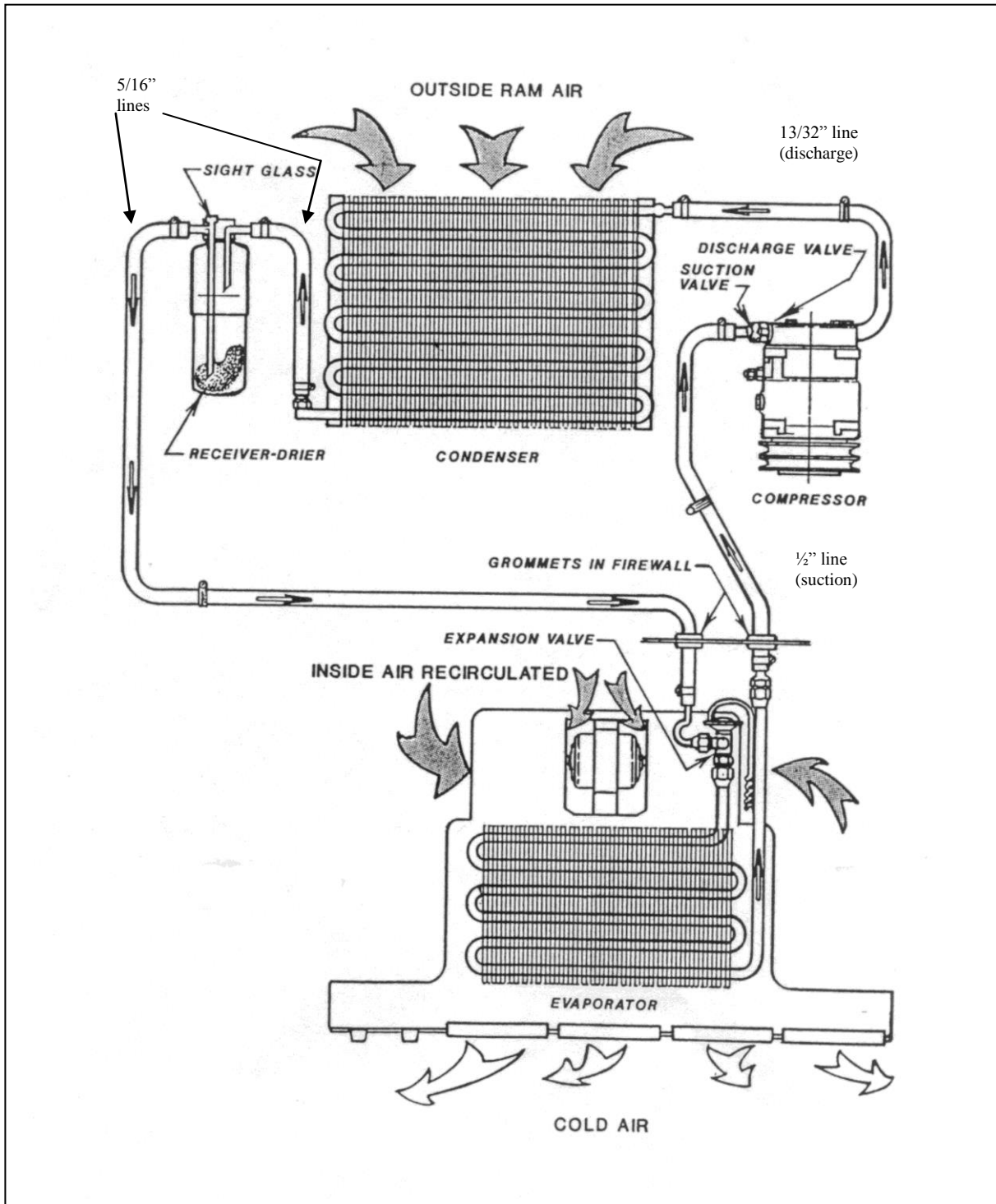
- 8) Connect the white wire to one terminal on the thermostat. Connect the supplied 14 gauge black clutch wire in loom to the other terminal on the thermostat. Run the wire out of the cab and along with the A/C hoses to the binary switch on the compressor.
- 9) Cut the wire to length and crimp on a blue female quick disconnect terminal. Plug the wire into one terminal at the binary switch. Plug the compressor clutch wire into the other terminal on the binary switch.
- 10) Test the system when there is pressure in it to ensure the compressor clutch engages.

420D CAT BACKHOE

12 Volt System



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.

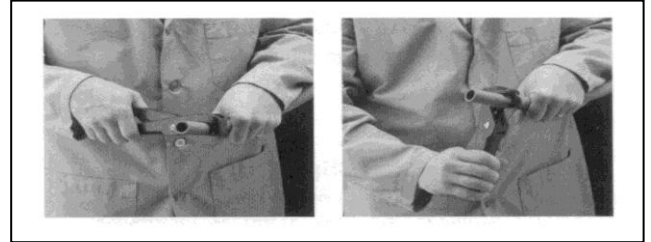
By looking at all these different factors, the area of an evaporator coil most likely to be the coldest can be determined.

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.

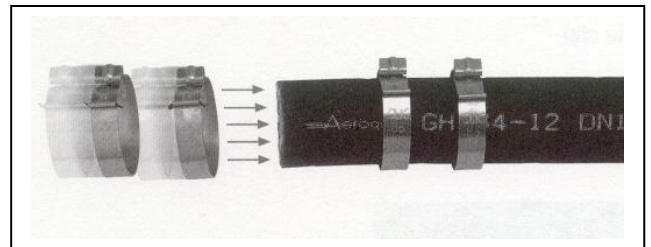
If the thermostat doesn't cycle off after a reasonable cool down period, and the air outlet temperature has dropped below 40° F, the cut in and cut out settings should be adjusted until the compressor is cycling on and off regularly. Let the system run for a decent time period (at least 15 min) and then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

Aeroquip E-Z Clip Assembly Instructions

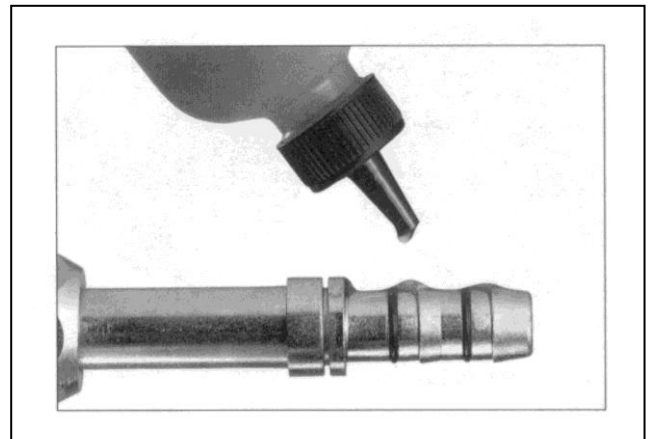
Step 1. Cut the hose to proper length with an appropriate cutting tool. Aeroquip's hand held hose cutter has been specially designed for cutting all non-wire reinforced hose, such as GH-134 Multi-Refrigerant hose. Be sure the cut is made square to the hose length.



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.



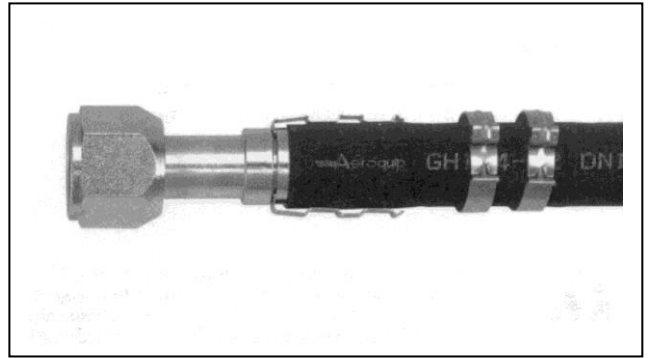
Step 4. Insert the nipple into the hose. To ensure that the nipple is fully inserted, check the gap between the cut end of the hose and the shoulder on the nipple. Care should be taken to avoid kinking or other damage to the hose during nipple insertion.

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

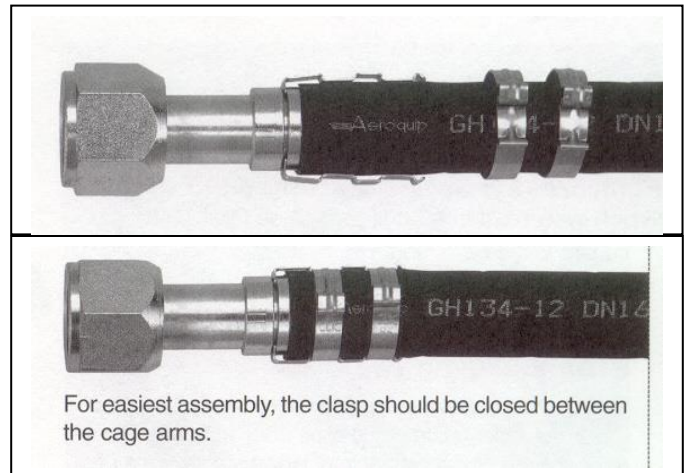


Step 5. Snap the cage into the groove on the nipple. The arms should extend over the hose length. When the cage has been correctly installed in the cage groove, the cage will be able to rotate in the groove. This step **MUST** be performed to ensure:

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.

