

INSTALLATION INSTRUCTIONS

CAT 416C BACKHOE LOADER



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INSTALLATION INSTRUCTIONS CATERPILLAR 416C BACKHOE/LOADER

GENERAL:

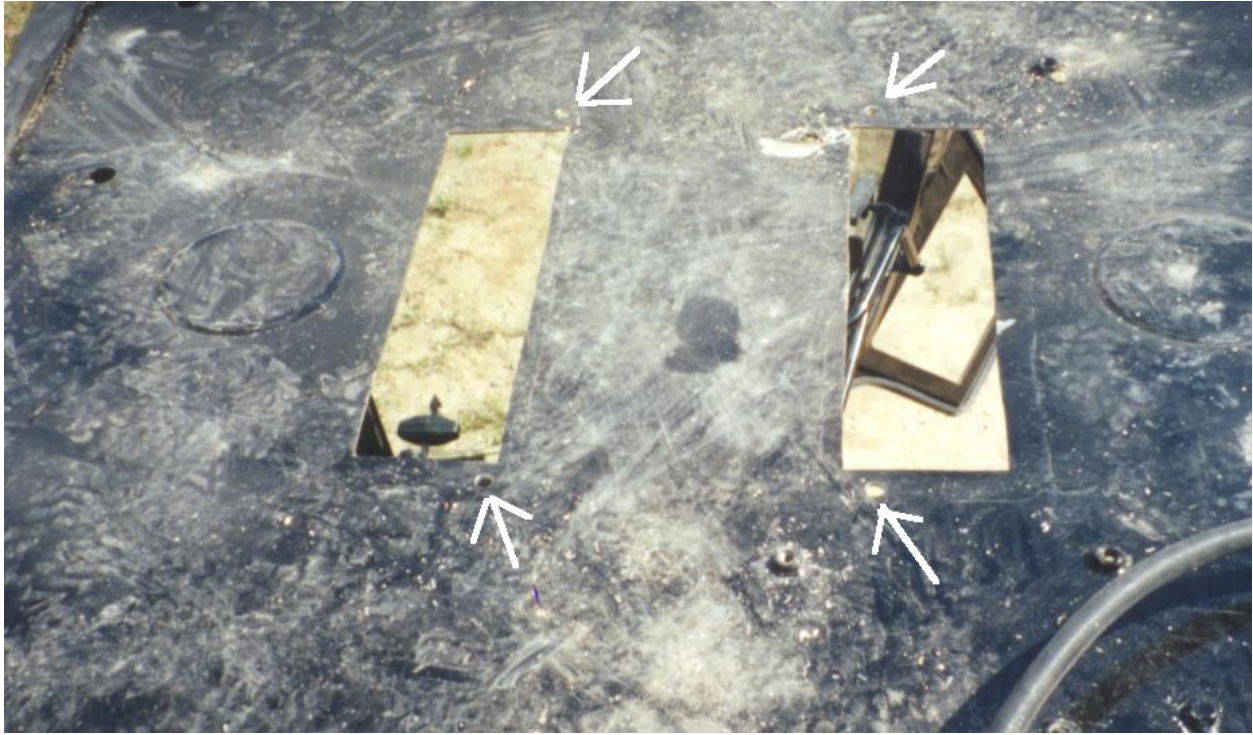
Please note that the system designed for the Caterpillar 416C backhoe/loader **is not** a factory style system. We have developed this system which will provide superior performance for cab cooling. The optional filter arrangement will allow for cab pressurizing using filtered outside air. This system consists of a rooftop mounted evaporator/blower arrangement (constructed from 12ga steel, giving superior strength), an engine driven compressor arrangement and a high performance condenser mounted in front of the radiator. All controls are integrated with the rooftop evaporator unit on one of the plenum covers.

SPECIFIC:

EVAPORATOR:

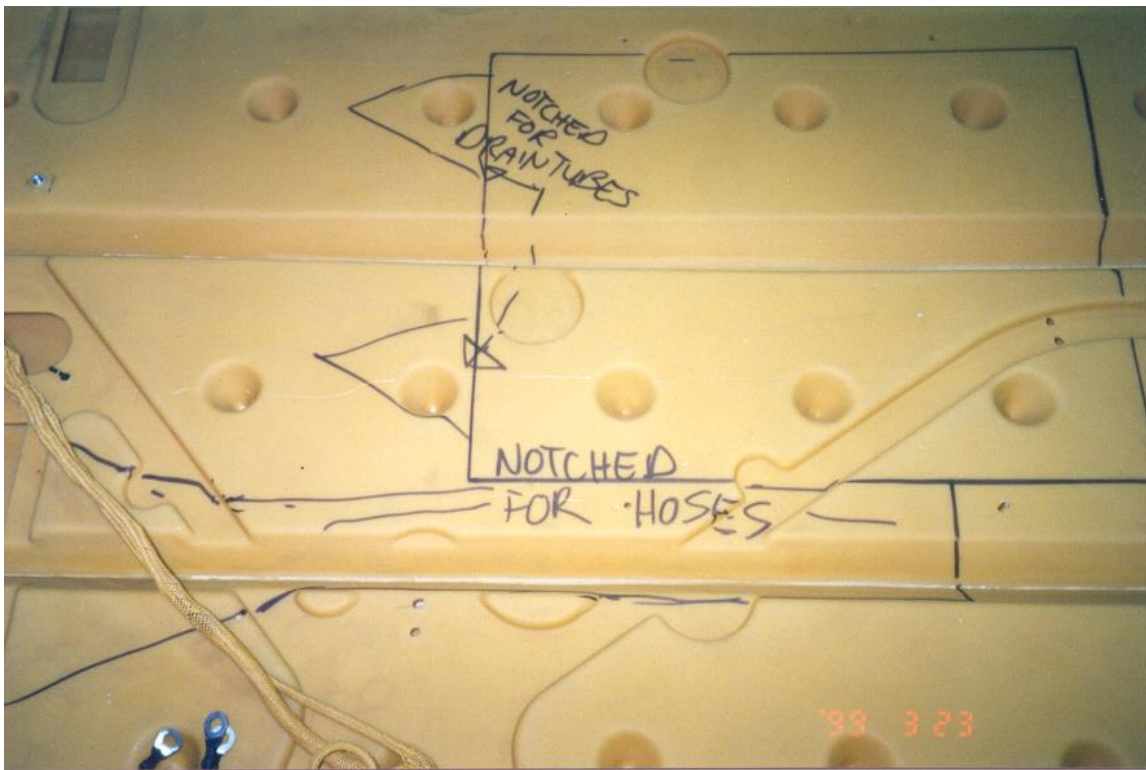
The evaporator is mounted to the steel roof of the cab and requires the removal of the plastic roof and cutting out of the plastic roof to go over the evaporator/blower arrangement.

1. Remove the headliner inside the cab.
2. Set the inside template into place on the cross beam on the ceiling and center from side to side. Drill the four holes through into the plastic roof (avoid drilling through both layers of plastic) for alignment purposes.
3. Unbolt and remove the plastic roof making sure to disconnect any electrical lines not previously taken care of.
4. With the supplied roof cut-out template, line it up on the steel roof with the four alignment holes and mark the holes to be drilled and cut out. Cut out the two rectangular through holes with a jig-saw or reciprocating saw.
5. Apply sealant to the rooftop around the through holes and set the evaporator assembly into place. Bolt down with the hardware supplied and make sure that the rooftop is well sealed.
6. Inside the cab it is necessary to drill a 1 1/4" hole in the top of each column to allow for the routing of the hoses to the evaporator. See the pictures for the location of the holes in the columns.
7. On the underside of the plastic roof set the template for the cut-out into position using the four alignment holes drilled to set it up. Mark the cutouts on the underside of the plastic roof and cut out as shown in the pictures.
8. After the installation of the rest of the system, mark and cut out the headliner around the plenums extending through the roof and install the trim panels with the louvers, filters and controls.



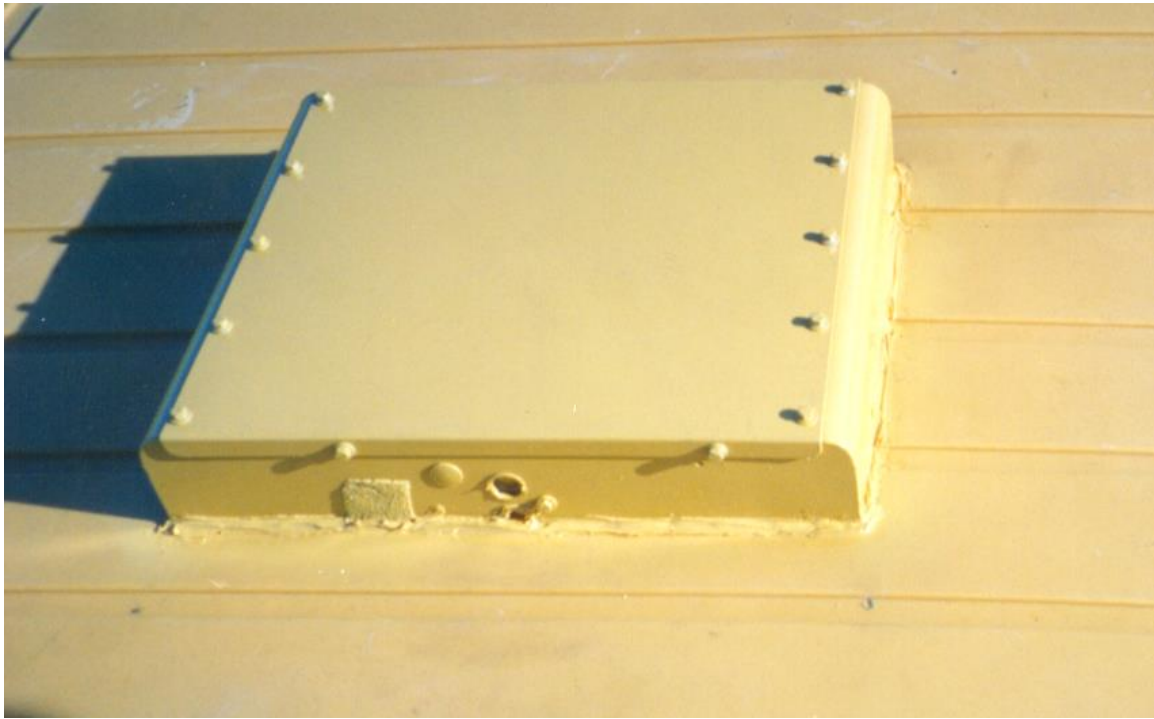
Rooftop cutouts in steel roof shown with alignment and evaporator mounting holes indicated.

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Cutouts in plastic roof. Note bottom layer cutout for hoses going forward and into cab.



Unit in position on rooftop with area sealed.



Side view of unit in place showing profile height (less than flasher unit).



Air delivery, filter and controls in place.

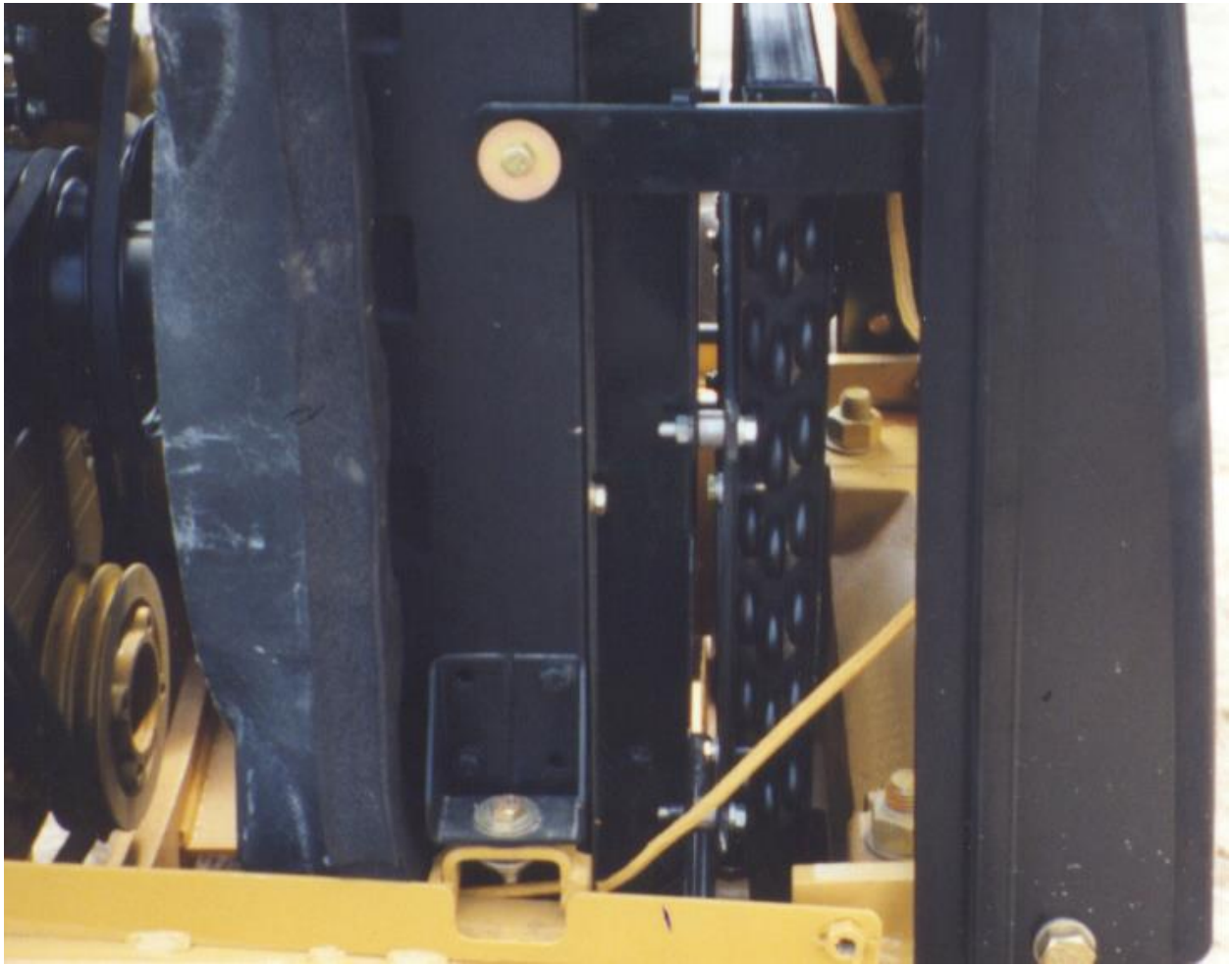
CONDENSER:

The condenser is a high performance tube and fin unit designed to be mounted so that it is in the airflow for the engine and placed in front of the radiator.

1. Remove the front screen for the radiator and expose the front of the radiator.
2. Hold the condenser assembly up into place in front of the radiator and align with the factory mounting points as shown in the pictures.
3. Using the M8 hardware supplied in the kit, mount the condenser into place, using the 1/2" thick spacers to stand it off from the mounting points.
4. The drier is integrated with the condenser frame and already is in place on the left side of the machine when mounted.
5. Secure the entire assembly into place and tighten down.



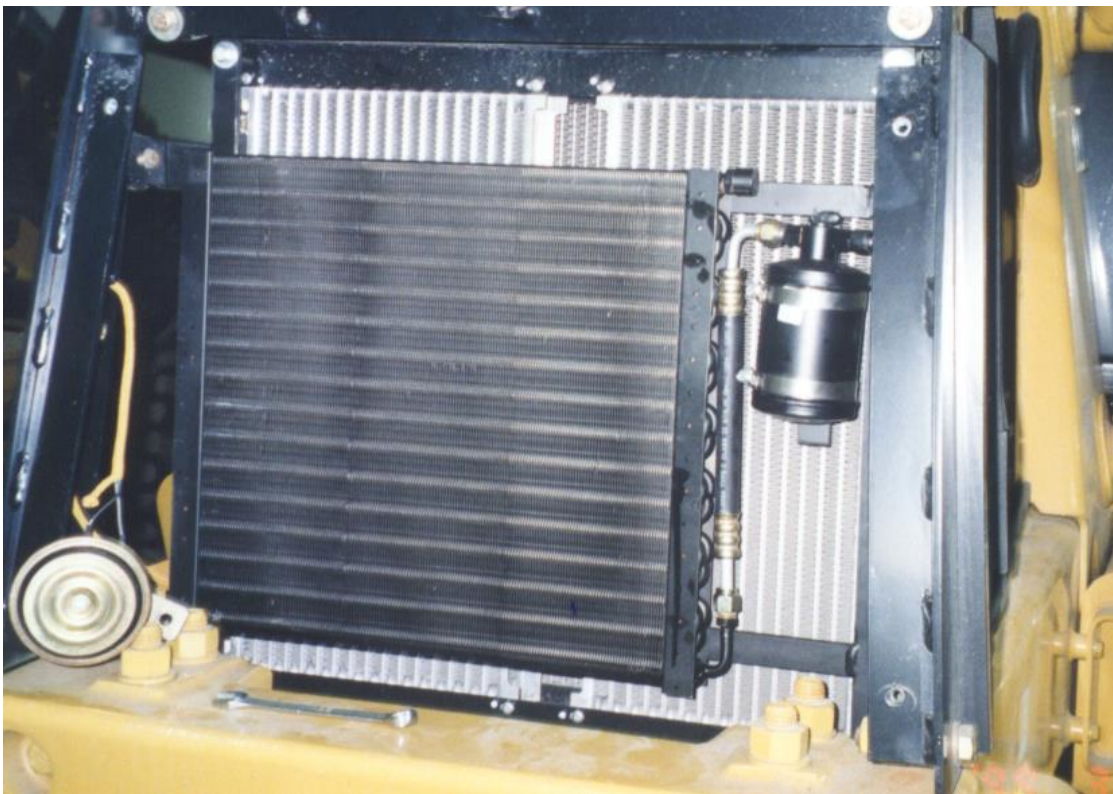
Condenser in place with drier and spacers shown (older version).



Right side of condenser showing mounting brackets and spacers (older version).



New style condenser assembly in place.



New style condenser in place.

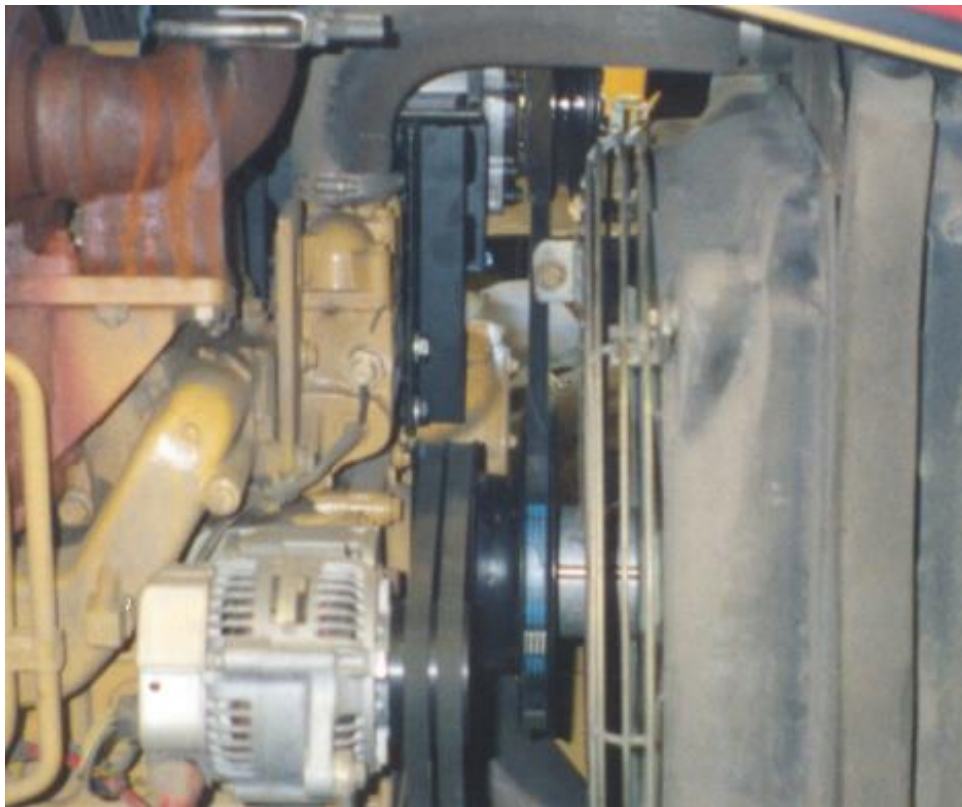
COMPRESSOR:

The compressor is an engine driven Sanden SD model compressor similar to Caterpillar factory systems. The mount bracket is designed with integrated tightening features for ease of use. The compressor is driven with a V-belt independent of other machine operating systems.

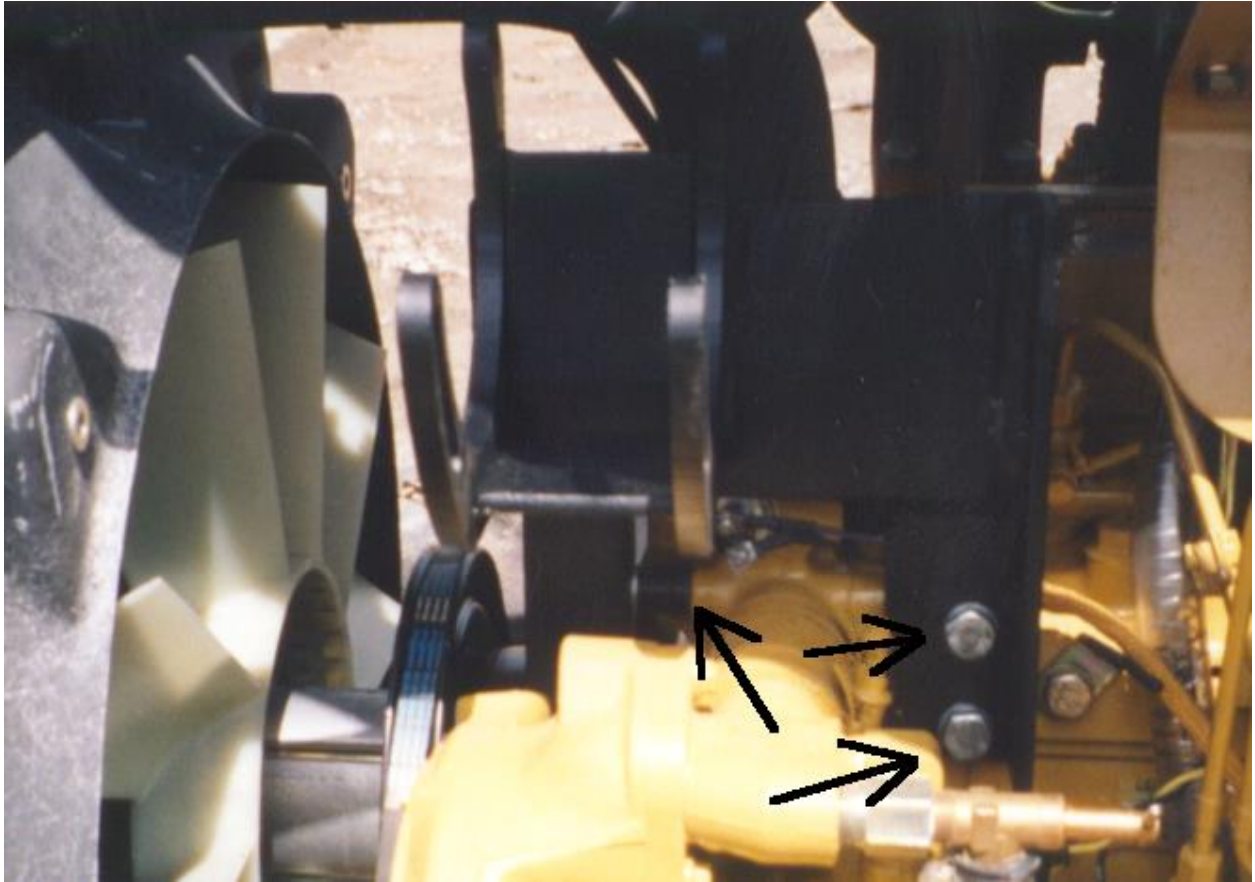
1. Open the top access panel of the engine and remove the left side panel. Remove the right side panel at this time as well.
2. Remove the upper and lower fan screen. Remove the bolts securing the fan shroud to the radiator. This will make the access to the fan bolts easier.
3. Loosen the fan bolts and slide the fan and spacer assembly as far toward the radiator as possible.
4. Install the accessory pulley included in the kit to the fan hub assembly between the fan pulley and the spacer to the fan. The pulley will be 'reversed', with the recessed side toward the fan.
5. Put the V-belt provided into position and re-bolt the fan to the hub assembly leaving the spacer in place as before. This operation is easier now than with the fan reassembled.
6. Re-secure the fan shroud and remount the fan screens.
7. Bolt the compressor mount into position on the bolt holes indicated in the picture below. Use the hardware supplied for the two rearmost bolt locations and for the front bolt location. It will be necessary to remove the existing bolt at the front mounting location and replace with the longer hardware in the kit. Use the spacers supplied as required.
8. Set the compressor into position on the mount and check for belt alignment. Finish securing the mount in place and mount the compressor with the hardware supplied.
9. Put the belt in place on the compressor and tighten to correct tension.



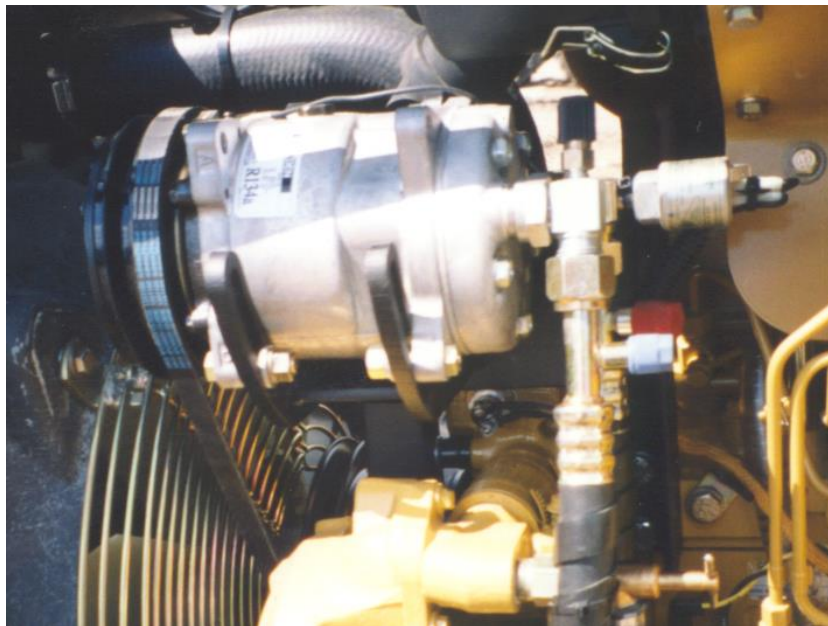
View showing drive pulley and V-belt to compressor.



Back view of drive assembly.



Compressor mount in place with bolt locations indicated.



Mount in place with compressor mounted on it.

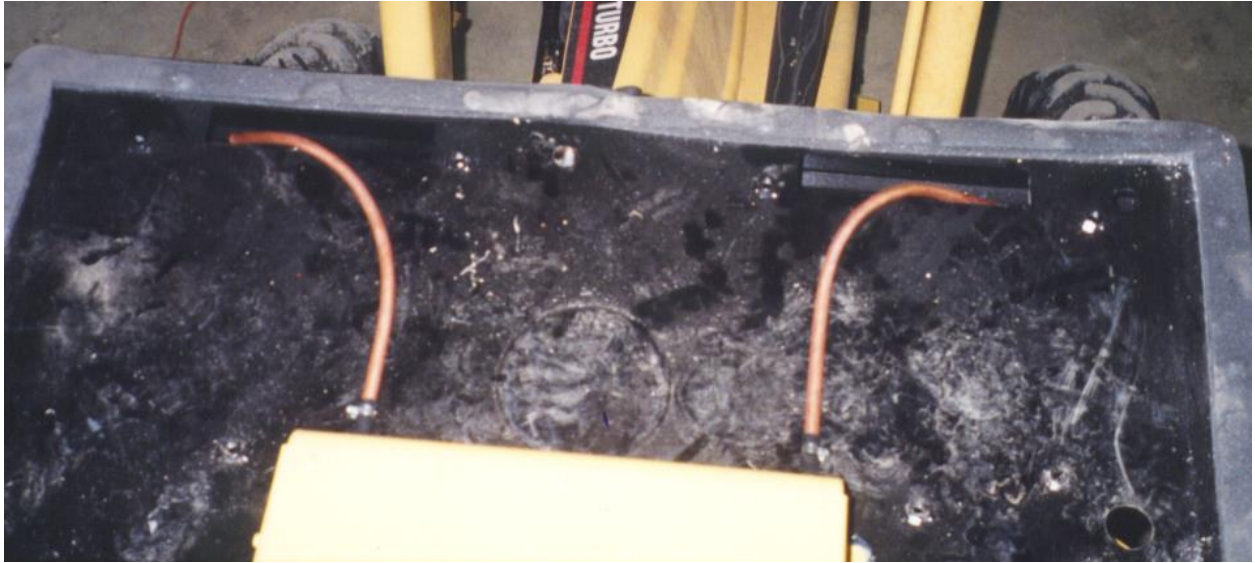
DRAIN TUBE ASSEMBLIES:

The drain tubes are connected to the evaporator box and then run toward the front and rear of the cab. Each drain tube section will contain a piece of copper tube with plastic drain hose attached. The copper section prevents the tubes from collapsing when the plastic roof is replaced.

1. The drain tubes from the front of the box (with the factory drain extensions) are run forward to the rectangular holes in the front top corners of the cab roof. The drain tubes are fed down and connected to the drain lines run up the columns with the hoses.
2. The drain tubes running to the rear of the cab are run from the added on drain extensions that are run out the side of the box and then back. These drain lines are routed to the rear corners of the cab. The lines are left to extend beyond the outside edge of the cab at the rear corner posts and left to lie against the posts.
3. Drain restrictors are added in to prevent air from being drawn in through the lines by the blowers.



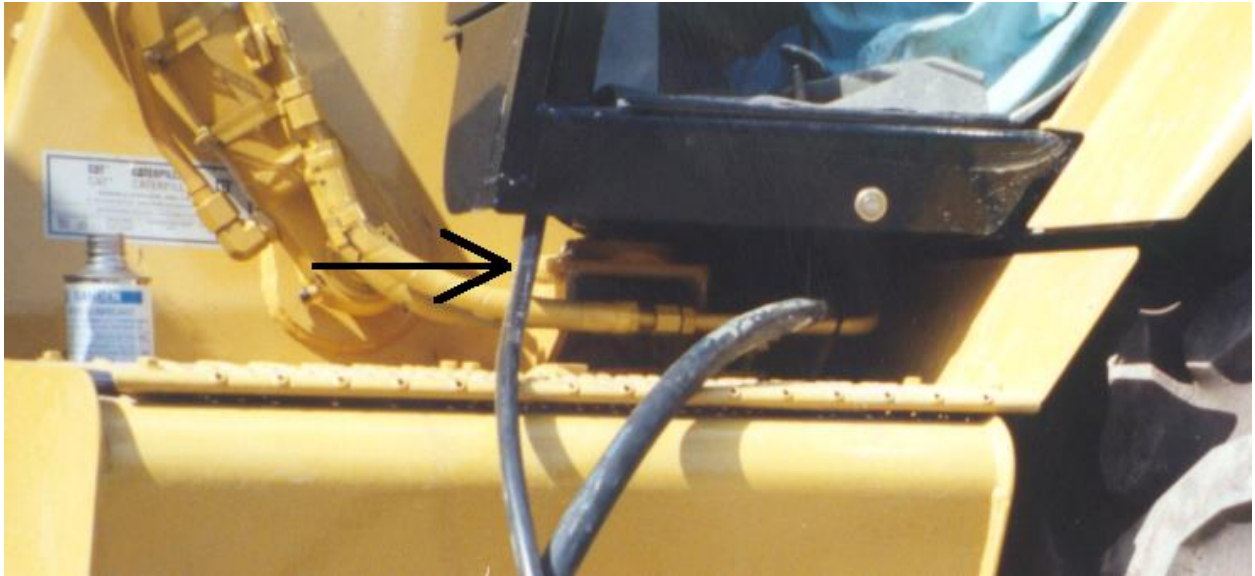
Drain tubes running to rear corners of cab.



Drain tubes running to front of cab.



Drain tube and hoses running through front rectangular opening in roof.



Drain tube (indicated) at bottom of column.

HOSES:

The hoses are standard refrigerant hoses (Goodyear Galaxy brand – barrier type hoses) with fittings attached. Our fittings are all steel construction and are designed to be used with ATCO style beadlock crimpers. All fittings are O-ring style for best sealing abilities.

5/16” Hose Drier to Evaporator:

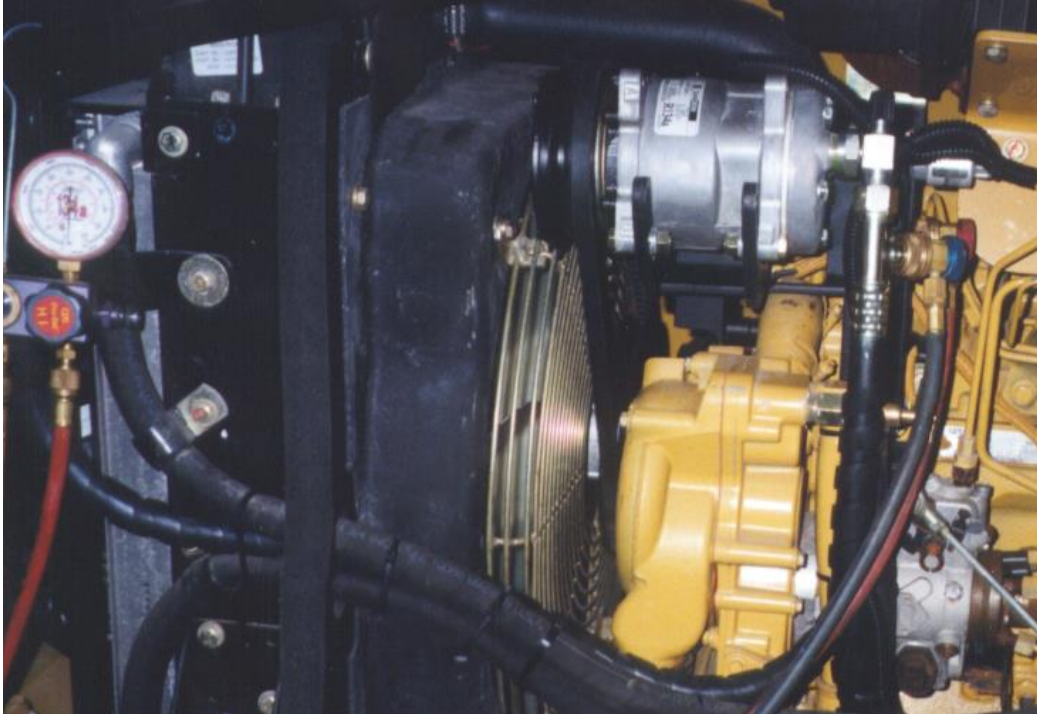
The pre-crimped 90o fitting on the 5/16” line is connected to the ‘OUTLET’ fitting of the drier mounted on the condenser frame. The hose is run down and across the front of the condenser and back along the RIGHT side of the engine. The hose is routed under the cab and run up the right front corner post to the opening in the top already drilled. NOTE that it is easier to run the drain hoses down the columns prior to running the refrigerant hoses up the column. In the case of the 5/16” hose the clutch wire should also be run down the column before running the hose up. From here run the hose through the rectangular opening and out to the evaporator. Cut the hose to length and crimp on the supplied fitting. Connect to the smaller fitting on the evaporator case. Hosewrap the line where it may chafe or be cut by a sharp edge. Cable ties are supplied to secure the hose as needed. The hose must be wrapped where it is under the plastic roof.

13/32” Hose Compressor to Condenser:

The 13/32” hose has pre-crimped fittings at both ends. Connect the straight fitting with the charging adapter to the discharge side rotolock fitting on the back of the compressor and run the hose down. The hose is routed forward with the hydraulic lines and up to the condenser. The 45o fitting connects to the top fitting on the condenser. It is a good idea to make sure the entire length of the hose is wrapped.

1/2” Hose Compressor to Evaporator:

The 1/2” hose has a pre-crimped straight fitting with a charging port on one end. This end connects to the rotolock fitting on the suction port on the compressor. The hose is run down with the 13/32” hose and then routed back under the cab. The hose is then run up the LEFT front column after the drain hose is run down. The hose runs across the inside top of the roof over to the rectangular opening on the right of the cab. Run the hose up to the evaporator with the 5/16” hose. Cut to length, crimp on the fitting supplied and connect to the outlet fitting (the larger one) at the evaporator.



Hoses at compressor and running forward to condenser.



Hoses at condenser.



Hoses on roof to evaporator inlet and outlet fittings.

ELECTRICAL:

The electrical system is set up as a very straight forward arrangement for installation and servicing simplicity.

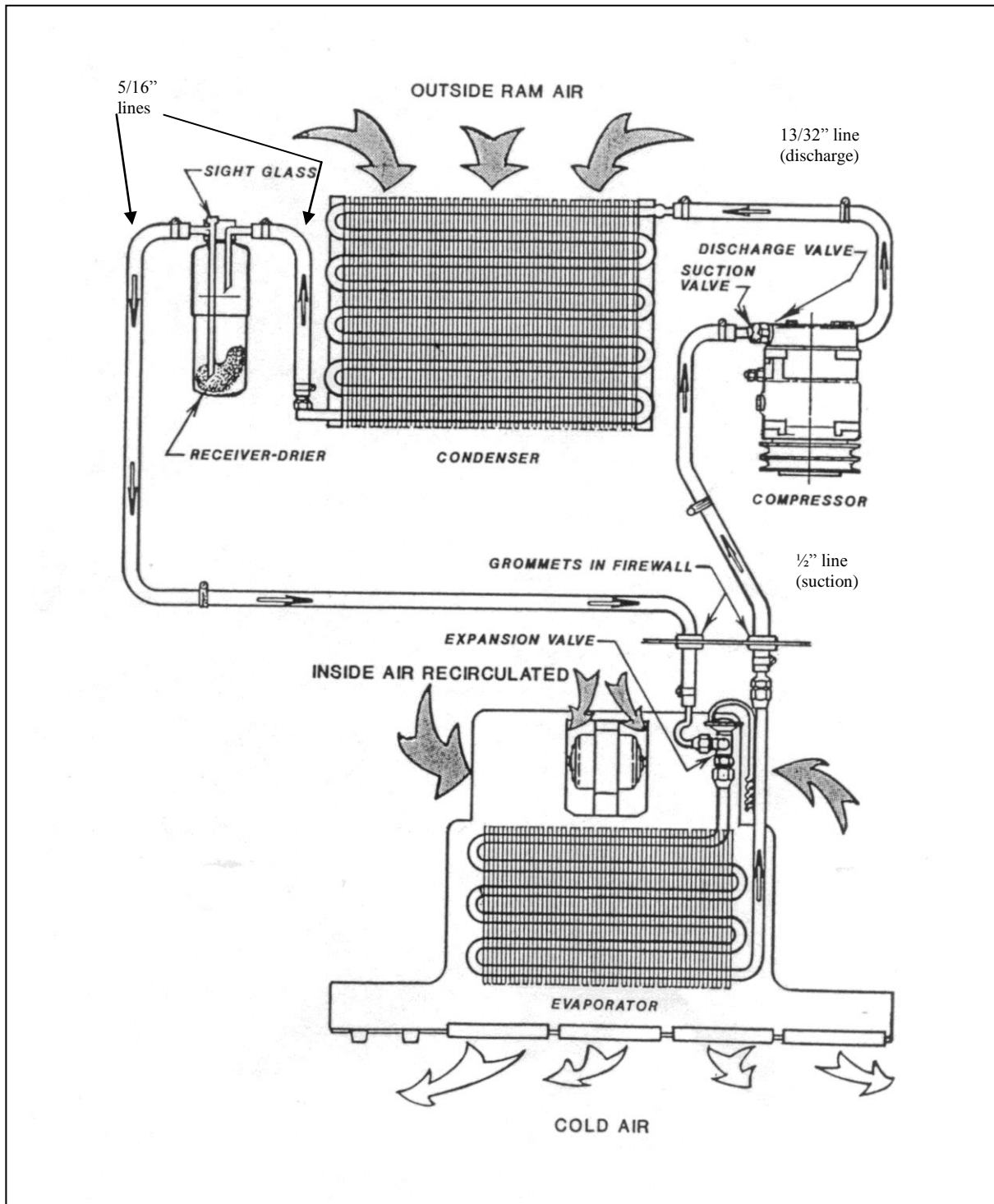
1. Main power is taken from the fuse panel in the roofline. Find wire #111 (large yellow) and connect the 10ga red wire supplied to it.
2. Run the 10ga red to the circuit breaker supplied. From the circuit breaker run the power supply wire to the evaporator assembly.
3. Run the clutch wire from the evaporator assembly into the front right hose column and down with the 5/16" hose. Run forward to the compressor.
4. Connect the end of the clutch wire to the binary switch on the rotolock fitting on the compressor. Connect the clutch wire from the compressor to the other terminal of the switch.

MISCELLANEOUS:

Before closing up all the panels on the machine it is best to test the system for leaks and electrical performance. Replace the panels in the same manner as they were removed and make sure that everything is secure.

The system will require 2.5 lbs to 2.75 lbs for a full charge of R-134a.

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.
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- 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.

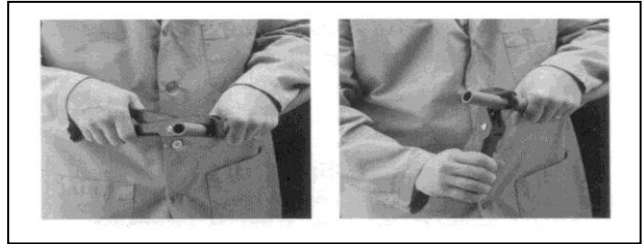
By looking at all these different factors, the area of an evaporator coil most likely to be the coldest can be determined.

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.

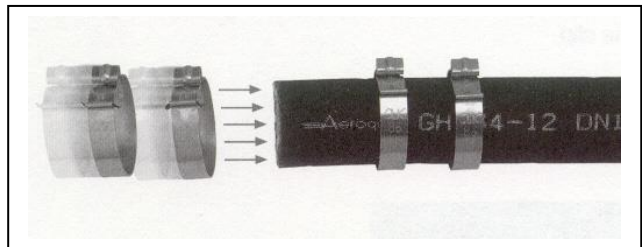
If the thermostat doesn't cycle off after a reasonable cool down period, and the air outlet temperature has dropped below 40° F, the cut in and cut out settings should be adjusted until the compressor is cycling on and off regularly. Let the system run for a decent time period (at least 15 min) and then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

Aeroquip E-Z Clip Assembly Instructions

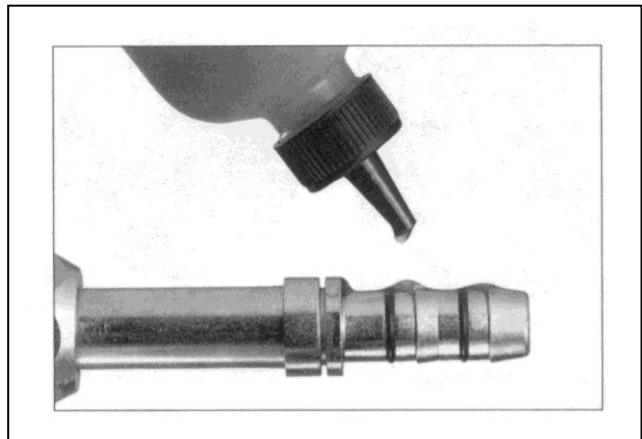
Step 1. Cut the hose to proper length with an appropriate cutting tool. Aeroquip's hand held hose cutter has been specially designed for cutting all non-wire reinforced hose, such as GH-134 Multi-Refrigerant hose. Be sure the cut is made square to the hose length.



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.

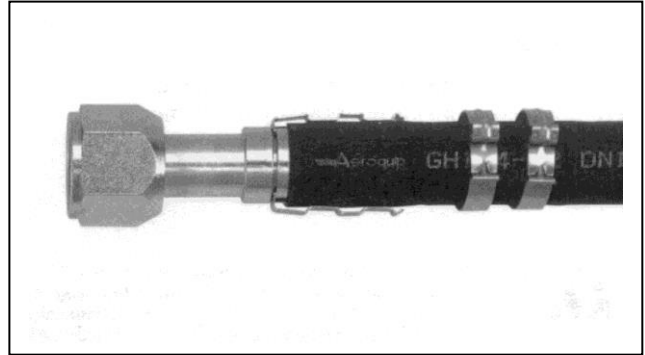


Step 4. Insert the nipple into the hose. To ensure that the nipple is fully inserted, check the gap between the cut end of the hose and the shoulder on the nipple. Care should be taken to avoid kinking or other damage to the hose during nipple insertion. NOTE: Be sure to wipe excess oil from the nipple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

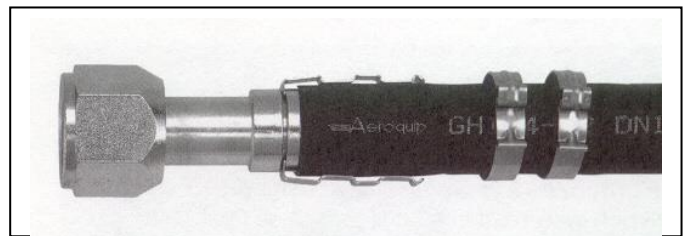


Step 5. Snap the cage into the groove on the nipple. The arms should extend over the hose length. When the cage has been correctly installed in the cage groove, the cage will be able to rotate in the groove. This step **MUST** be performed to ensure:

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.

