

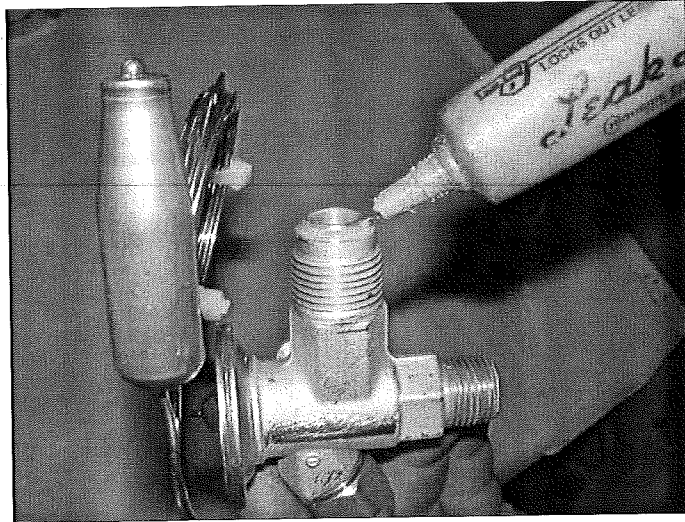
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APPENDIX A: KIT CONTENTS

IMPORTANT INFORMATION

- Always follow the Workhorse Service Manual for torques and fluid types and quantities.
- Always supply a small quantity of sealer (Lock prep) to all flare surfaces before assembly.
- Lubricate all contact surfaces between nuts and fittings with PAG oil to prevent seizing.
- Replace all used o'rings and apply PAG oil to the o'rings before reassembly.
- Always use penetrating agent on fitting nuts which are difficult to remove.
- Make sure before fitting a new compressor that it has been filled with the correct amount of oil.



1. FITMENT OF CONDENSER/FAN ASSEMBLY

Drill two 7/16 holes in the bracket underneath the radiator. (See figure 1.1). Position the condenser/fan assembly into place and bolt it onto the chassis using two M10 bolts with flat washers and nylock nuts as supplied with the kit (See figure 1.2).

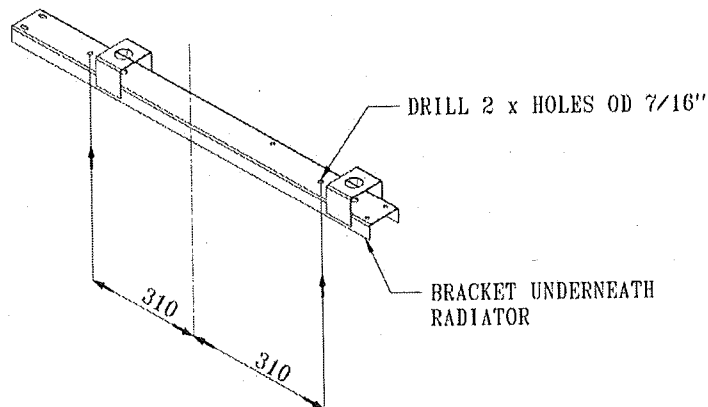


Figure 1.1

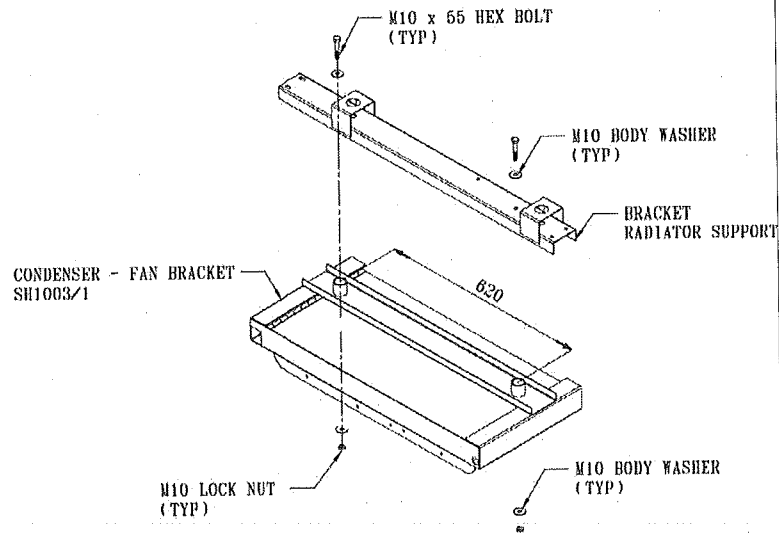


Figure 1.2

2. FITMENT OF WIRING HARNESS FOR AUXILIARY FANS

Position the relay into the right side on top of the fuse box and connect the supply (red wire with ring lug) to the auxiliary bolt (left side) on the bottom of the fuse box. Connect the neutral wire to the body using the bolt as shown in figure 2.1. Route the loom (conduit) with the two open end signal wires to the existing condenser fan supply harness. Use the crimp lugs (supplied with the kit) and connect red to red and black to black wires. (See figure 2.2) Route the conduit (male plug) from the fuse box vertical down and then in a horizontal direction towards the condenser/fan assembly. Connect the male plug to the female plug of the fan harness. Secure the conduit with cable ties as shown in figure 2.4.

Condenser fan relay

Positive bolt

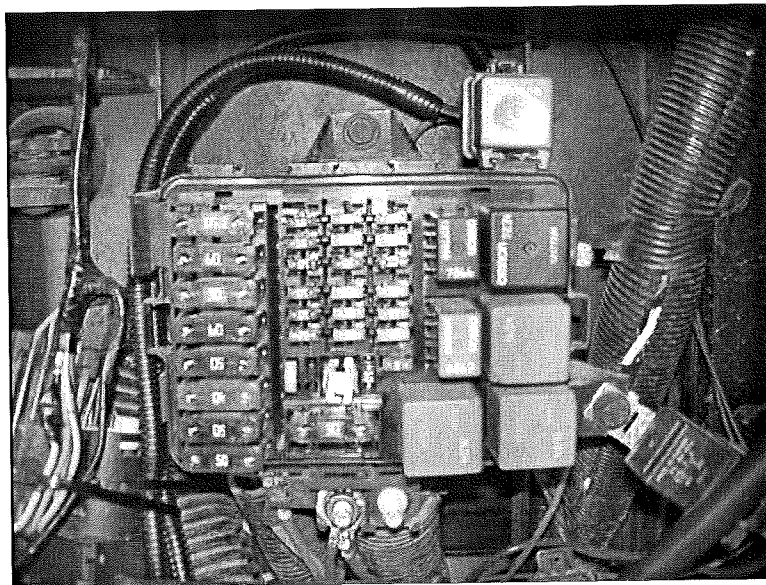


Figure 2.1
Connection Points

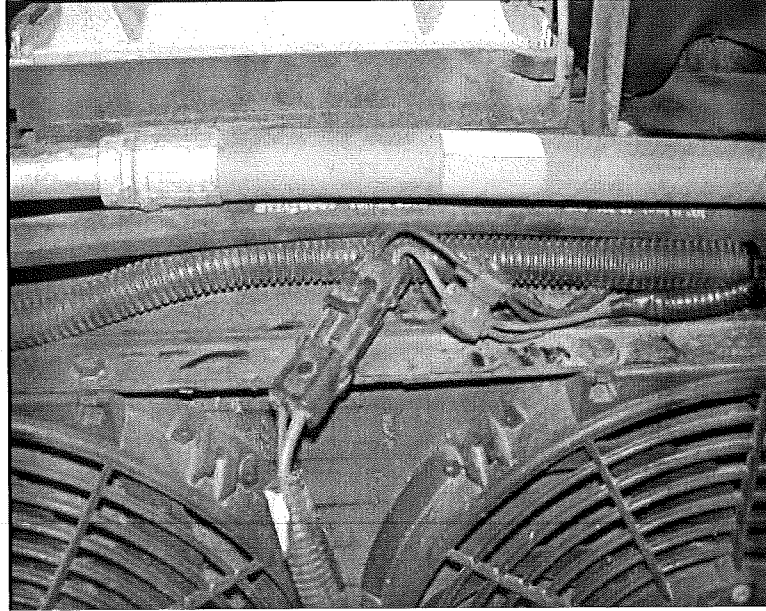


Figure 2.2

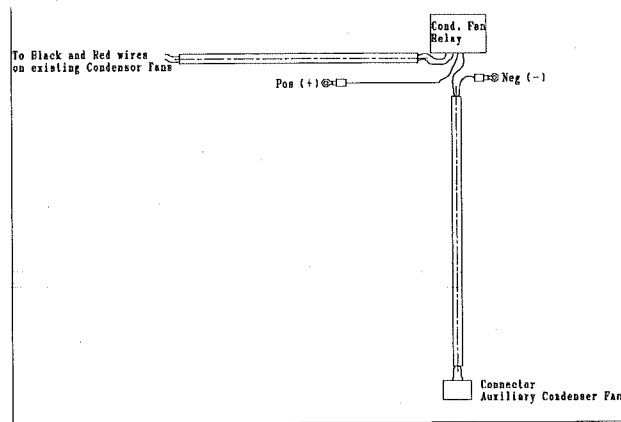


Fig 2.3 Harness kit SH1001/1

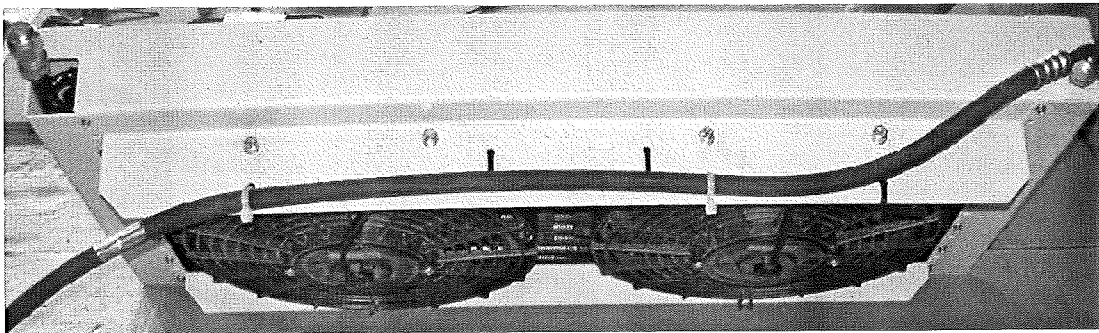


Figure 2.4: Condenser Fan assy

3. EVAPORATOR MODIFICATION

3.1 FITMENT OF EXPANSION VALVE – DENSO EVAPORATOR

3.1.1 Removing the DENSO evaporator box from the RV

The DENSO Evaporator has to be removed from the vehicle to replace the existing expansion valve with a new expansion valve.

Unscrew the liquid and suction aircon fittings on the front of the evaporator box.

Unplug the harness on the inside of the vehicle which connects the evaporator box with the vehicle.

Remove all bolts securing the evaporator box to the vehicle fire wall. Remove the bracket that secures the evaporator box to the heater box on top. Remove the evaporator box slowly from the fire wall and thereafter from the vehicle.

3.1.2 Replacement of the expansion valve

Remove the fan by unscrewing the three screws on the face of the fan.

Remove the two C-clips securing the evaporator box halves and then unscrew the nine securing screws. (See figure 3.1)

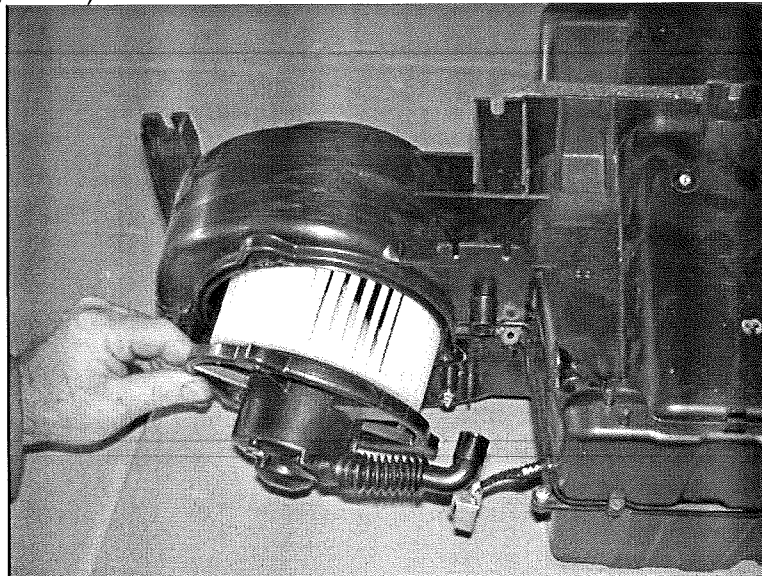


Figure 3.1: Evaporator fan dis-assembly



Figure 3.2: Standard Evaporator core

Installation Instructions - Air Conditioning Kit - Crystal Air – AC1001/1

After removing the top halve of the box, remove the thermostat probe from the evaporator core. The evaporator core together with the expansion valve and pipe assembly can now be removed. Remove the existing expansion valve and sensing bulb and replace it with the new expansion valve by using the adaptor fittings labeled "DENSO".

Make sure that the no. 5 orifice is installed before securing the adaptor on the liquid side of the expansion valve.

Strap the sensing bulb into the new position as shown in figure 3.3.

Insulate the sensing bulb with no drip tape (see figure 3.4).

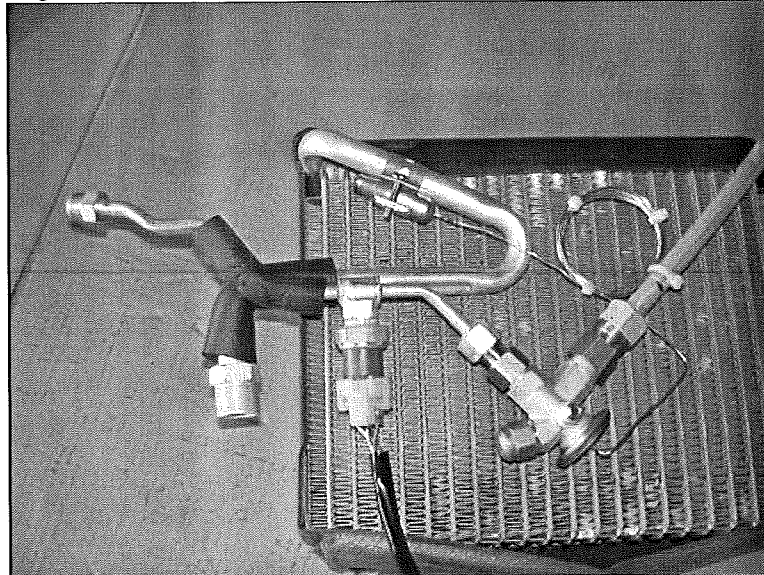


Figure 3.3: Evaporator core with new expansion valve fitted

Fit the pigtail pipe to the side of the expansion valve and route the pipe in the middle of the liquid and suction pipes towards the outside of the evaporator box.

Sensing bulb insulated

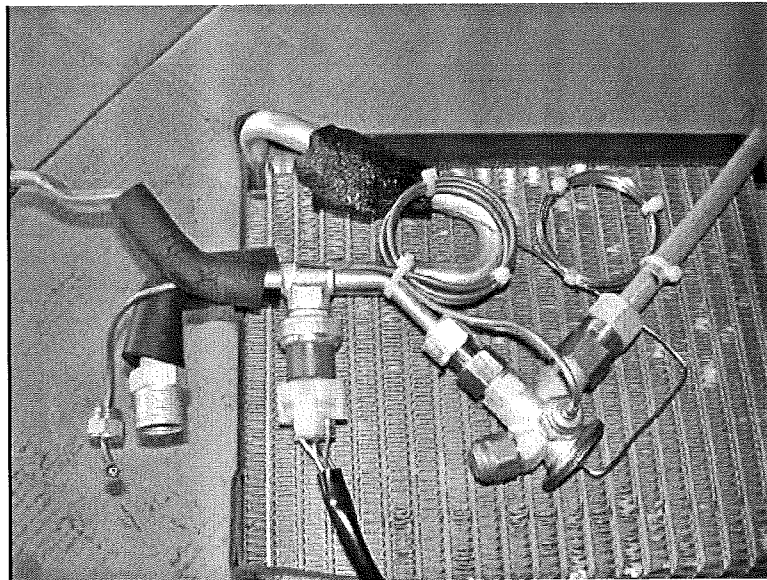


Figure 3.4:

Re-install the evaporator core back into the evaporator box and make sure that the new expansion valve is properly positioned to prevent the core from being damaged. Route the liquid pipe to exit the box in the same position as previously. The pigtail pipe must be routed to exit the box in the middle of the liquid and suction pipe. (See figure 3.4.) Coil the sensing bulb tube and secure properly with cable ties. Add silicon to prevent vibration damage. Re-assemble the evaporator box with fan assembly and install into the RV. Install the equalizing adaptor (DENSO) before securing the male and female suction fitting. Screw the pigtail onto the above equalizing fittings. Coil the remaining equalizing pipe and secure with cable ties. Add silicon to prevent vibration damage. (See figure 3.5)
Coils secured and clear silicone applied

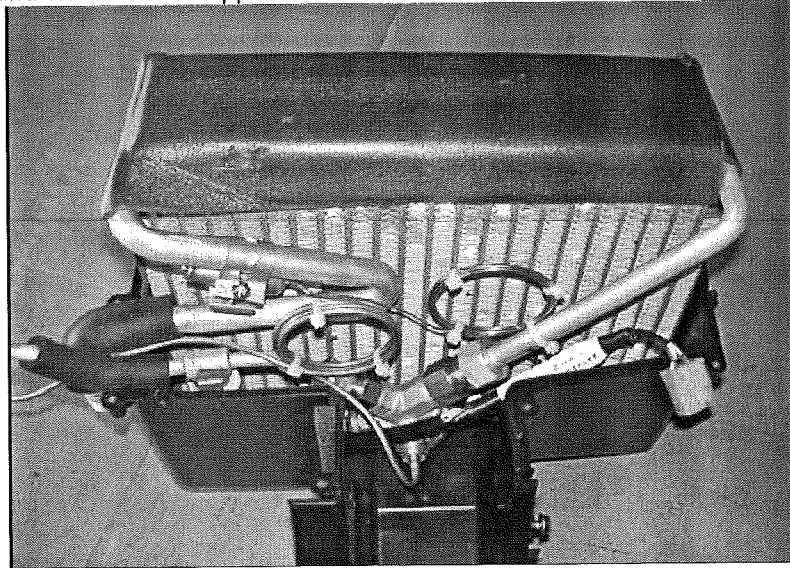


Figure 3.5

3.2 FITMENT OF EXPANSION VALVE – SCS EVAPORATOR

Unscrew the liquid and suction fittings from the existing expansion valve on the outside of the evaporator box and remove the expansion valve.

Fit the new expansion valve using the expansion valve adaptor fittings labeled "SCS"

Fit the equalizing adaptor fitting in line with the suction hose fitting.

(See figure 3.6)

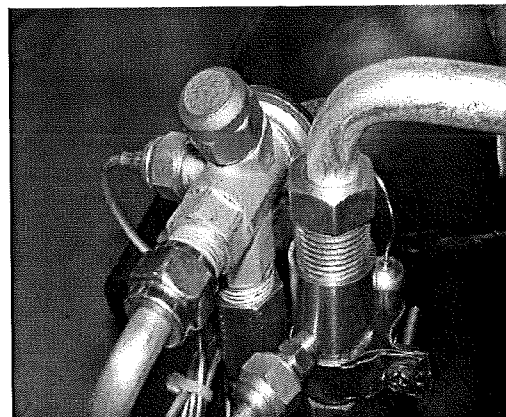
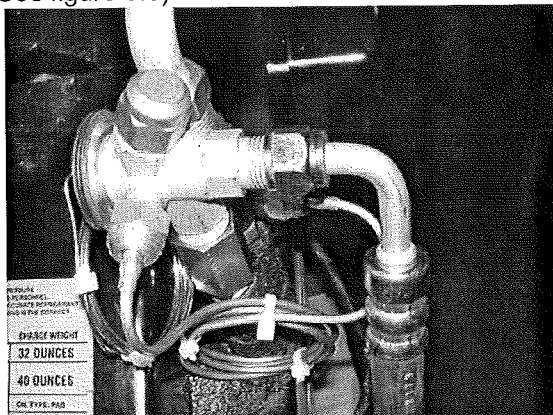


Figure 3.6: New expansion valve

Fit the pigtail to the side of the expansion valve and then onto the equalizing adaptor fitting.

Secure the sensing bulb onto the above equalizing adaptor fitting.

Coil the remaining equalizing pipe and secure with cable ties. Add silicon to prevent vibration damage. Insulate the sensing bulb with no drip tape.

3.3 FITMENT OF EXPANSION VALVE – EVANS EVAPORATOR

Follow the same procedure as in paragraph 3.2 except for using a different equalizing adaptor fitting labeled "EVANS". (See figure 3.6)

4. FITMENT OF AIRCON RUBBER HOSES

Remove the existing aircon hose which links the filter drier with the evaporator box. Fit the short hose between the filter drier and the left side of the auxiliary condenser. Route the long hose from the right hand side of the auxiliary condenser to the expansion valve.

Fit the 90° flare fitting to the expansion valve by first inserting the *orifice into the expansion valve and then screw the fitting onto the orifice side of the valve. (See figure 4.1).

*Use no. 5 orifice with SCS and EVANS evaporators.

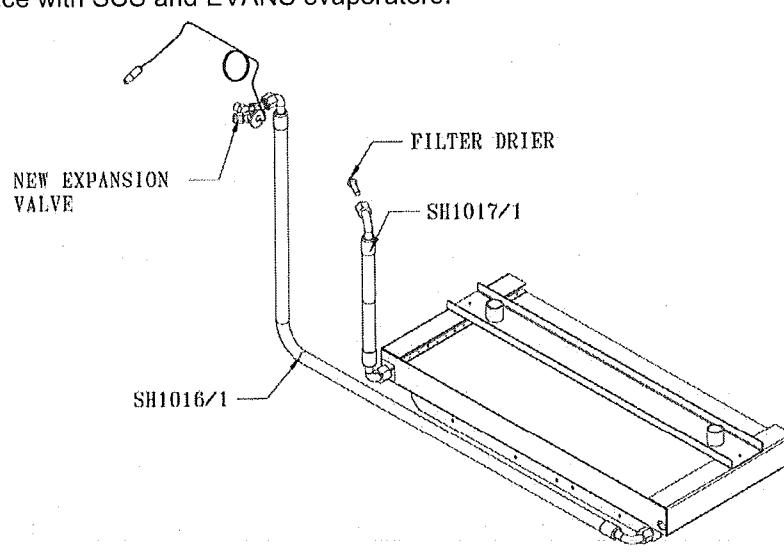


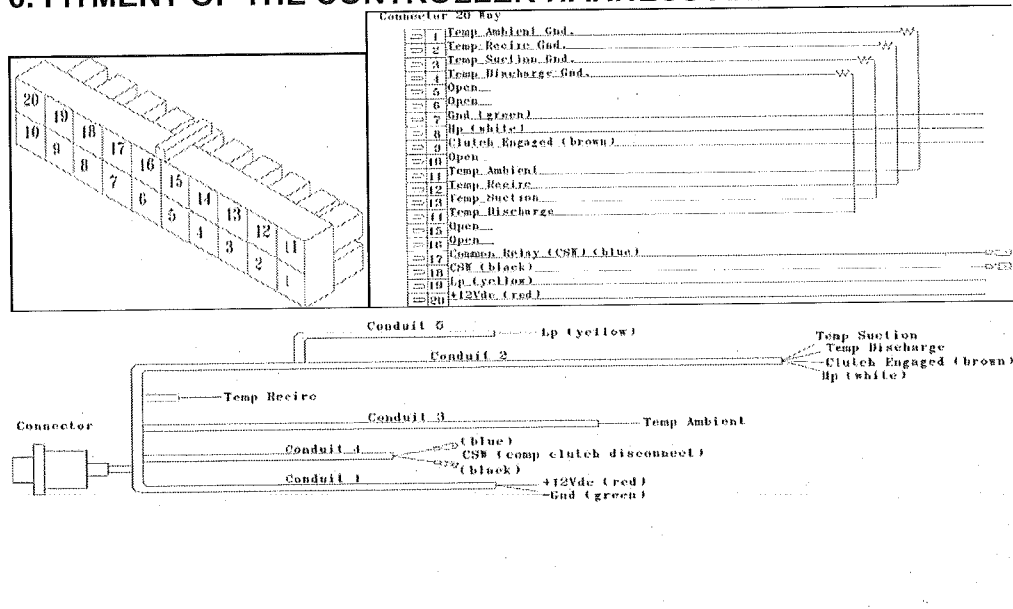
Figure 4.1: Aircon Rubber hose fitment

5. FITMENT OF COMPRESSOR AND BELT

Following the replacement procedure from the Workhorse Service Manual, relieve the tension on the tensioner device and remove the belt from the engine.

Loosen the holding clamp on the suction and discharge hoses on the compressor. Loosen the four bolts on the compressor and remove the compressor from the engine. Place the new compressor into position and tighten the four bolts. **Make sure the compressor is filled with the required oil charge per Workhorse Service Manual.** Fit the new belt and route as described in the Workhorse Service Manual.

6. FITMENT OF THE CONTROLLER HARNESS AND CONTROLLER



Install the controller underneath the dash (front console) or on the sidewall underneath the dash on the passenger side of the RV by using two self tapping screws. Cut 1 ¼ inch hole in the side fire wall with a hole saw. Connect the control harness to the controller and route loom (conduit 1) underneath the dash and connect the positive wire to a switched (+12 Volt) supply. This 12 Volt supply must be switched when the AC is switched on. Connect the negative wire to an earth terminal (example the radio earth). Use the crimp lugs supplied in the kit. Route conduit 2 through the hole in the side fire wall towards the AC compressor. Secure the temperature probes to the suction and liquid fittings on top of the compressor as labeled. Use two cable ties to secure each probe. (See figure 6.2)

Probes fitted on pipes

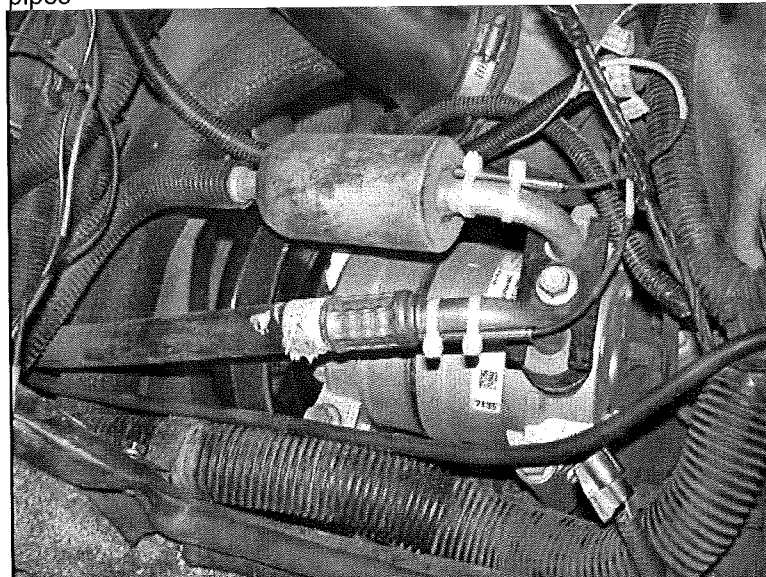
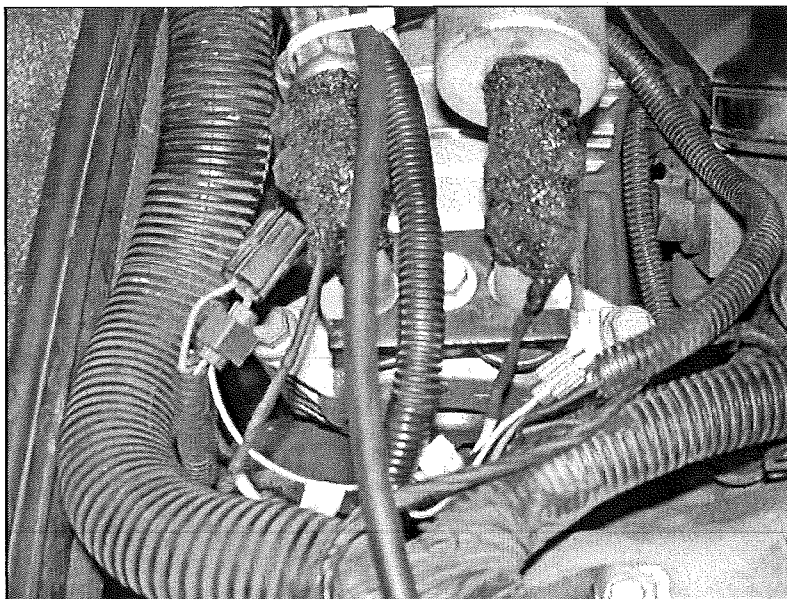


Figure 6.2: Wiring and Probes on compressor

Insulate the probes with no drip tape. Open the existing clutch loom (conduit) as close as possible to the split of the main harness. Connect the clutch wire to the dark green wire of the clutch harness and make sure that the connection is done on the supply side of the inline diode. Use the crimp lugs supplied in the kit. (See figure 6.3).



Figures 6.3
Probes insulated

Connect the HP wire to the dark green/white wire of the HP switch at the back of the compressor using the crimp lugs supplied in the kit. (See figure 6.3) Secure loom (conduit 2) to the rubber suction pipe of the compressor with cable ties. Route loom (conduit 3) to the right front side of the vehicle and secure the ambient temperature probe above the right front headlight. Make sure that the temperature probe does not touch any surrounding object such as metal brackets and body work.

Install the recirculation temperature probe into the distinctive evaporator air hose outlet duct outlet hoses as close as possible to the fan by making a hole in the hose duct and inserting the probe halfway into the pipe and then securing it with no drip tape. Route loom (conduit 4) to the thermostat of the evaporator and connect in series with any one of the terminals. On the SCS and EVANS evaporators the thermostat is placed on the outside of the evaporator box in the front of the RV. In this case the loom (conduit) should be routed through the hole in the fire wall to the outside of the evaporator. On the DENSO evaporator the thermostat is placed on the inside next to the fan. Route loom (conduit 5) through the hole in the firewall to the LP switch on the filter drier (mounted onto the condenser). Use a crimp lug to connect the wire to the dark green wire on the switch. Secure the loom (conduit) with cable ties. Cover the hole in the fire wall with no drip tape and secure all loose looms (conduit) and wires with cable ties.

7. COMMISSIONING OF SYSTEM

Once the kit has been installed, all aircon hoses fitted and all electrical connectors secured, the re-commission of the system can be done in the following sequence:

7.1 Vacuum leak test and re-gas

7.1.1 Pressure test

Ideally high pressure nitrogen gas (N₂) should be used to pressure test the aircon system. If available charge the system (through both high and low charge ports) to 220PSI (1500kPa). Use soapy water to check for leaks at all new hose and fitting connections. If refrigerant is used in stead of Nitrogen, bear in mind that the test pressure will much less (60 – 100 PSI) depending on the ambient temperature.

7.1.2 Vacuum

After pressure testing for leaks, draw vacuum to at least 10-4mbar for at least one hour to allow any water molecules in the system to evaporate and be withdrawn from the system. If time allows leave the system under vacuum for 30 minutes to verify on the gauges that the system is leak tight.

7.1.3 Charge

With the system under vacuum, charge 1,25kg R134a refrigerant into the system. The easiest is to charge liquid through both high and low pressure ports simultaneously. **The system must be off when this is done.** In cold conditions it may not be possible to add the full charge in this way. It would then be necessary to run the system in order to fill the balance of the charge. **Only gas and not liquid can be charged when the system is running.**

7.2 Running the system for the first time

- a) With the charging hoses still connected, make sure the charge valves on both ports are closed.
- b) Switch on the vehicle ignition without starting the engine.
- c) Switch on the cabin fan to low speed.
- d) Switch on the aircon by pressing the dash AC switch. The "click" sound of the compressor clutch being activated should be audible. Repeat switching the AC on and off to verify the clutch is activated.
- e) Start the vehicle engine and switch on the aircon. Select the cabin vent fan to maximum speed.
- g) Verify the compressor to be running and charge the system with gas (if still required) to the full 1,25kg R134a charge.
- h) After a few minutes the auxiliary condenser fans should automatically switch on. The switching of these fans will cycle, depending on the ambient temperature.
- i) Verify the system to be functional with cold air discharged into the vehicle cabin.
- j) Visually inspect the installation for any loose or vibrating parts and secure where necessary.
- k) A final leak test can be performed on new connections.

**APPENDIX A
KIT CONTENTS**

ITEM NO	QTY	DESCRIPTION	PART NR
1	1	COMPRESSOR	
2	1	CONDENSER COIL SCS	
3	2	CONDENSER FANS	
4	1	CONNECTOR HARNESS (FANS)	
5	1	CONDENSER/FAN BRACKET	SH1003/1
6	1	SET FASTENERS	SH1004/1
7	1	COMPRESSOR PULLEY	SH1008/1
8	1	V-RIBBED BELT	SH1014/1
9	1	EXPANSION VALVE (COMPLETE)	SH1013/1
10	1	ORIFICE NO 4 (EVANS)	SH1025/1
11	1	ORIFICE NO 5 (DENSO/SCS)	SH1024/1
12	1	EQUALISING PIPE (PIG TAIL)	SH1005/1
13	1	EXPANSION VALVE ADAPTOR (DENSO)	SH1012/1
14	1	EXPANSION VALVE ADAPTOR (DENSO)	SH1007/1
15	1	EQUALISING ADAPTOR (DENSO)	SH1022/1
16	1	FLARE ADAPTOR (DENSO)	SH1023/1
17	1	EXPANSION VALVE ADPTR (SCS/EVANS)	SH1011/1
18	1	EXPANSION VALVE ADAPTOR (KIT B)	SH1002/1
19	1	EQUALISING ADAPTOR (SCS)	SH1015/1
20	1	CONDENSER FITTING (WELD ON)	SH1018/1
21	1	CONTROLLER	SH1009/1
22	1	CONTROLLER WIRING KIT	SH1020/1
23	1	HARNESS KIT	SH1001/1
24	1	LIQUID HOSE (IN)	SH1016/1
25	1	LIQUID HOSE (OUT)	SH1017/1
26	1	INSTALLATION INSTRUCTION	AC1001/1
27	1	EQUALISING ADAPTOR (EVANS)	SH1010/1