

TRUCK, ELECTRONIC, LIGHT, MC2, - LAND ROVER 110 6X6
ELECTRONIC REPAIR VEHICLE (ERV)

MODIFICATIONS TO THE MODULE AIR-CONDITIONING SYSTEM

MODIFICATION INSTRUCTION

This instruction is authorised for use by command of the Chief of the General Staff. It provides direction, mandatory controls and procedures for the operation, maintenance and support of equipment. Personnel are to carry out any action required by this instruction in accordance with GENERAL A001.

Introduction

1. This instruction details the product improvements and modifications to be carried out on the module air-conditioning system fitted to the Land Rover 6x6 ERV, to provide improved system reliability. The majority of the actions detailed in this instruction are warranty actions to be carried out by Rover Australia dealers.

2. The warranty on the Land Rover 6x6 ERV module air-conditioning is extended for 12 months or 20 000 km from the time of the modifications detailed in this instruction. The Rover Australia dealer is required to enter the Rover Service Action Numbers in the GM 120, Record Book for Service Equipment, reflecting the warranty date of repair for the commencement of the warranty extension.

General

3. *Associated Publications.* The latest issue of the following references should be read in conjunction with this instruction:

- a. EMEI Workshop A 850 - Modifications, Trial Modifications and Local Modifications to Equipment;
- b. EMEI Workshop A 851 - Modifications to Equipment - Use of Modification Record Plates and Documentary Requirements;
- c. HQ Logistic Command Equipment Maintenance Programme (EMP) 64/93 - Land Rover 6x6 ERV Module Air-Conditioning; and
- d. Rover Australia Newsletter Military 05/1993.

4. *Authority.* Rover Australia Engineering Change 2268.

5. *Modification Application.* Table 1 shows the ARN affected and the modifications required.

6. *Items Affected.* The following items of the module air-conditioning system are affected:

- a. locker extractor and condenser fans, (Rover Australia Service Action Z193);
- b. fan motor wiring, (Rover Australia Service Action Z293);
- c. electric motor pulley, (Rover Australia Service Action Z393);
- d. compressor and electric motor retaining bolts, (Rover Australia Service Action Z493);
- e. thermostat, (Rover Australia Service Action Z593);
- f. instruction plates, (Rover Australia Service Action Z693);
- g. receiver drier, (Rover Australia Service Action Z793);
- h. compressor travel locking T bolt, (Army to action);
- i. condenser mesh screen, (Army to action); and
- j. electric motor contactor, (Army to action).

7. *Priority - Group 2.* All applicable equipment is to be modified by 30 Jun 94. Vehicles in depot or pool stock are to be modified prior to issue.

Table 1 - ERV Air-Conditioner Modifications

WARRANTY ACTION BY ROVER AUSTRALIA DEALERS										ACTION BY ARMY UNITS			
ARN	VIN	DATE-IN-SERVICE	FAN MOTOR	FAN WIRING	MOTOR PULLEY	RETAINING BOLTS	THERMOSTAT	INSTR PLATE	RECEIVER DRIER	CONTACTOR	T BOLT	MESH SCREEN	MOD KIT REQUIRED
200087	429571	22-10-91	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200088	429572	22-10-91	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200299	803950	STORAGE	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200300	803951	STORAGE	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200301	803952	15-1-93	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200302	803977	15-1-93	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200303	803978	29-9-92	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NIL
200304	803979	15-1-93	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NIL
200305	803980	3-6-93	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200306	803981	STORAGE	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200307	803982	STORAGE	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200308	803983	STORAGE	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200309	803984	STORAGE	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200310	803985	STORAGE	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
200340	803946	21-12-92	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	ITEM 1 FROM TABLE 2
200341	803947	7-12-92	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES	ITEM 2 FROM TABLE 2
200342	803948	7-12-92	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES	ITEM 2 FROM TABLE 2
200343	803949	26-11-92	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	ITEM 1 FROM TABLE 2
50666	375622	24-8-92	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50723	396409	9-9-81	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50784	418210	6-9-93	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50785	418213	9-9-81	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50786	418214	16-4-92	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50787	418219	11-10-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50788	418225	5-5-92	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50789	418235	11-10-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50790	418236	11-10-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50791	418253	11-10-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50839	418257	11-10-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2

YES Modification required
 NO Modification completed, no further action required on this vehicle

Action by Rover Australia dealers - Repairs completed under warranty as detailed in Newsletter Military 05/1993
 Action by Army units - Modification to be completed by Army units, as detailed in HQ Log Comd EMP 64/93, EMEI Vehicle G 257-1 and Rover Newsletter Military 05/1993

Table 1 - Continued

WARRANTY ACTION BY ROVER AUSTRALIA DEALERS										ACTION BY ARMY UNITS			
ARN	VIN	DATE -IN-SERVICE	FAN MOTOR	FAN WIRING	MOTOR PULLEY	RETAINING BOLTS	THERMOSTAT	INSTR PLATE	RECEIVER DRIER	CONTACTOR	T BOLT	MESH SCREEN	MOD KIT REQUIRED
50840	418259	11-10-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50841	418263	11-10-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50842	429494	3-10-91	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50843	429497	3-10-91	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50844	429532	9-10-91	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50845	429535	3-12-91	YES	YES	YES	YES	YES	YES	NO	NO	YES	YES	ITEM 2 FROM TABLE 2
50846	429538	7-10-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50847	429540	6-2-92	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50848	429548	7-11-91	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50849	429554	5-11-91	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50850	429556	30-10-91	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
50861	429573	30-9-91	NO	YES	YES	YES	YES	YES	NO	NO	YES	YES	ITEM 2 FROM TABLE 2
51973	433687	9-10-91	NO	YES	YES	YES	YES	YES	NO	NO	YES	YES	ITEM 2 FROM TABLE 2
51974	433690	9-10-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
51975	433701	9-10-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
51976	433708	17-10-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
51977	433713	17-10-91	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
51978	434605	27-5-92	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
51979	434618	6-4-92	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NIL
51980	434638	21-1-92	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
51981	434676	18-5-92	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
ZNE884	463914	28-6-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2
ZNE885	434683	13-4-91	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	ITEM 1 FROM TABLE 2

YES Modification required

NO Modification completed, no further action required on this vehicle

Action by Rover Australia dealers - Repairs completed under warranty as detailed in Newsletter Military 05/1993

Action by Army units - Modification to be completed by Army units, as detailed in HQ Log Comd EMP 64/93, EMEI Vehicle G 257-1 and Rover Newsletter Military 05/1993

8. Action Required. The modification is to be completed by 30 Jun 94. Any unit unable to comply with the completion date is to contact the Fleet Manager at HQ Log Comd on (03) 282 7206. Table 1 shows the ARN affected and modifications required. The applicable actions, shown in Table 1 and Para 6a - 6g, are to be carried out by Rover Australia dealers as warranty actions. The applicable actions, shown in Table 1 and Para 6h - 6j, are to be carried out by RAEME units and sub-units authorised to carry out unit, field and base repairs. The replacement of the electrical contactor, detailed in Para 23, is to be carried out by ECN 147, Electrical Fitter or civilian equivalent.

9. Estimated Manhours to Perform. For initial planning purposes only, it is estimated that this modification will take the following manhours to perform:

- a. locker extractor and condenser fans (0.45 hrs);
- b. fan motor wiring (0.25 hrs);
- c. electric motor pulley (0.6 hrs);

- d. compressor and electric motor retaining bolts (0.25 hrs);
- e. thermostat (1.25 hrs);
- f. instruction plates (0.4 hrs);
- g. receiver drier (1.25 hrs);
- h. compressor travel locking T bolt (0.10 hr);
- i. condenser mesh screen (1.0 hr); and
- j. electric motor contactor (1.0 hr).

10. Items to be Removed. The items that are removed as part of the modification are to be disposed of as detailed in GENERAL P series.

11. Stores Required. The stores required are listed in Table 2. Table 1 details the type of kit that is required for each ARN. The kit detailed in Table 2 is to be ordered from Moorebank Log Gp on the basis of one kit per vehicle as detailed in HQ Log Comd EMP 64/93. The parts in Table 3 are shown for identification purposes and are not to be ordered as part of the modification.

Table 2 - Stores to be Ordered to Complete the Modification

Item	NSN	Mfr Part No	Description	Unit of Issue	Qty per Equip
1	2590-66-128-7274	HYG 6529	Kit, Air-Conditioner Upgrade, Type 2 comprising Items 1, 2 and 3 in Table 3	kt	1
2	2590-66-128-7275	HYG 6528	Kit, Air-Conditioner Upgrade, Type 1 comprising Items 1 and 2 in Table 3	kt	1

Table 3 - Stores Contained in Modification Kit (to assist parts identification and not to be ordered to complete the modification)

Item	Mfr Part No	Description	Unit of Issue	Qty per Kit
1	HYG6522	Condenser Mesh	ea	1
2	HYG6420	'T' Bolt	ea	1
3	BYG9365	Contactora	ea	1

MODULE AIR-CONDITIONING SYSTEM MODIFICATIONS

Locker Extractor and Condenser Fans (Rover Dealer Warranty Action)

12. All applicable vehicles shown in Table 1 are to have the locker extractor fan and condenser fan replaced by a Rover Australia dealer and the fans returned to the manufacturer. The replacement procedure is detailed in the following paragraphs.

13. *Air-Conditioner Locker Extractor Fan.* Proceed as follows:

- a. Disconnect the fan wires at the 2-pin plug.
- b. Remove the four screws holding the extractor fan to locker door.
- c. Remove the fan blade from the motor by unscrewing the centre nut.
- d. Remove the fan motor from the fan shroud by unscrewing two self tapping screws.
- e. Locate the new motor in the fan shroud and secure with two self tapping screws.
- f. Locate the fan blade on to the motor shaft (making sure the shaft spacer is located before the fan blade) see Figure 1. Fit the flat washer and nut and tighten to 9 N.m.
- g. Install the fan on to the door, and reconnect the wires.
- h. Check the direction of air flow with the fan switched ON. Air should be exhausted out of the motor/compressor chamber.

14. *Condenser Extractor Fan.* Proceed as follows:

- a. Remove the six screws securing the condenser cover panel to the Module Roof and carefully raise the panel taking care not to put strain on the fans electrical leads.
- b. Disconnect the electrical leads and lift the cover panel to a safe working position.
- c. Remove the four bolts and nuts holding each fan in place.
- d. Remove the fan blade from the motor by unscrewing the centre nut.
- e. Remove the fan motor from the fan shroud by unscrewing two self tapping screws.
- f. Locate the new motor in the fan shroud and secure with two self tapping screws.
- g. Locate the fan blade on to the motor shaft (making sure the shaft spacer is located before the fan blade) see Figure 1. Fit the flat washer and nut and tighten to 9 N.m.
- h. Reassemble the fans into the condenser cover and reconnect wiring.
- i. Check the direction of air flow with the fans switched ON (air should be sucked through the condenser and blowing out through the fans and over the roof). See Figure 2.

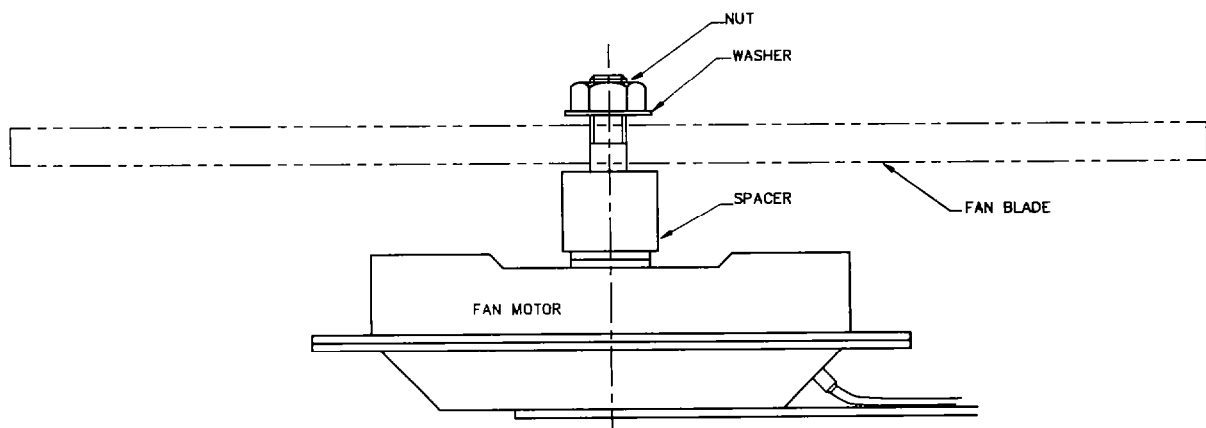


Figure 1 - Fan Blade Location

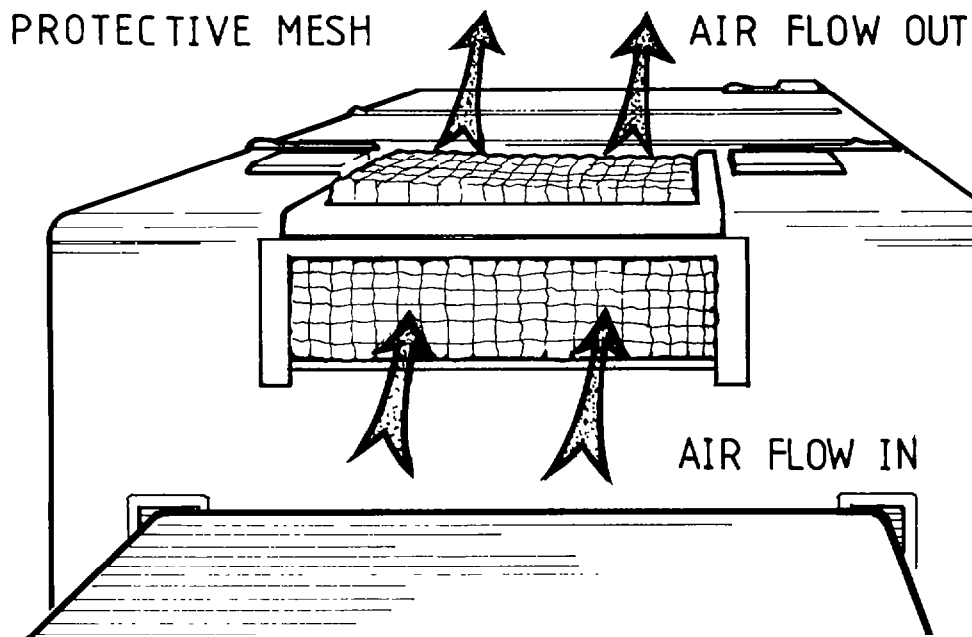


Figure 2 - Direction of Air Flow for Condenser Fan

Fan Motor Wiring (Rover Dealer Warranty Action)

15. All applicable vehicles shown in Table 1 are to be checked by a Rover Australia dealer, after the installation of locker fans, to ensure that when the locker door is fully opened the compressor and fan wiring looms are not taut. The wiring is to be re-routed to provide slack in the wiring and secured with cable ties.

Electric Motor Pulley (Rover Dealer Warranty Action)

16. All applicable vehicles shown in Table 1 are to have the electric motor drive pulley checked for alignment, vibration and security by a Rover Australia dealer. The drive belt and motor pulley are to be checked for excessive run out or vibration with the air-conditioner operating. The pulley is to be checked for security when the air-conditioning system is **OFF**. If excessive run out or vibration is evident, the pulley or shaft taper key is to be replaced by the dealer.

Compressor and Electric Motor Retaining Bolts (Rover Dealer Warranty Action)

17. All applicable vehicles shown in Table 1 are to have the securing bolts for the electric motor, compressor mounting plate and rubber mount checked by a Rover Australia dealer for any indication of lost clamping. If any securing bolts are loose, the bolts must be removed, threads cleaned, Loctite 242 applied to the threads and the bolts refitted and tightened.

Thermostat (Rover Dealer Warranty Action)

18. All applicable vehicles shown in Table 1 are to have the thermostat replaced by a Rover Australia

dealer. During the replacement, the drip tray is to be inspected by the dealer for damage and replaced if necessary. The replacement procedure is as follows:

- a. Remove the two screws at the back of the air intake tray and remove (front is retained by Velcro).
- b. Remove the Air-Conditioner Louvre/drain tray cowl by removing five Philips head screws at the front, two side screws and three screws at the rear.
- c. Drill an access hole through the storage lockers in line with side screw, initially using 1.5 mm pilot drill bit and then enlarging with a 6 mm drill bit. (Ref dimension is 78 mm back from the outer skin inner edge, inside locker).
- d. Lower the front of the cover down and gain access to the thermostat and wiring.
- e. Note the wiring connections at the switch and then disconnect.
- f. Observe the position of the thermostat coil and probe, slide it out from the evaporator.

NOTE

Replacement thermostat probe is to be similarly refitted.

- g. Carefully remove the drain tubes and lower the cowl.

- h. Replace the thermostat with the one supplied.
- i. Refitting is the reverse of steps in Para 18a - 18h taking care when replacing the probe into the evaporator and refitting the drain tubes. Also ensure the drain tubes are sealed by lightly applying silastic.
- j. Carry out a function check of the air-conditioner system, observing in particular the clutch cut-in and cut-out as the temperature control switch is moved.

Instruction Plates (Rover Dealer Warranty Action)

19. All applicable vehicles shown in Table 1 are to have the instruction and warning plates replaced by a Rover Australia dealer. Figure 3 shows the location of the plates. Both plates have a self adhesive backing, with the instruction plate being secured with an additional four self tapping screws.

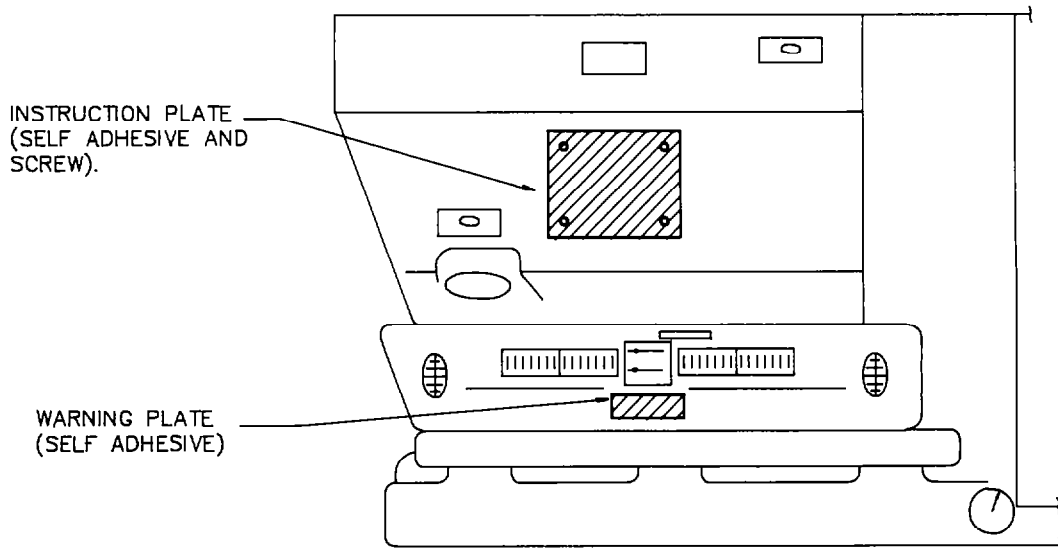


Figure 3 - Fitting of Instruction and Warning Plates

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Receiver Drier (Rover Dealer Warranty Action)

20. All applicable vehicles shown in Table 1 are to have the receiver/drier checked for correct fitting by a Rover Australia dealer. The receiver/drier is correctly fitted when the pressure switch faces the condenser when viewed through the mesh screen as shown in Figure 4. If the receiver/drier is incorrectly fitted then a new item is to be correctly fitted, under warranty, by the Rover Dealer.

Condenser Mesh Screen (Army Action)

21. All applicable vehicles shown in Table 1 are to have the existing mesh screen for the condenser fans modified by Army tradesmen. Proceed as follows:

- a. Remove the existing condenser screens from the vehicle.
- b. Position the new mesh screen (Item 1, Table 3) directly above the fan area so that the chamfered corners face rearwards, as shown in Figure 5.

- c. Weld the new screen to the existing screen and paint damaged areas with cold gal paint and black paint.
- d. Refit the screens to the vehicle.

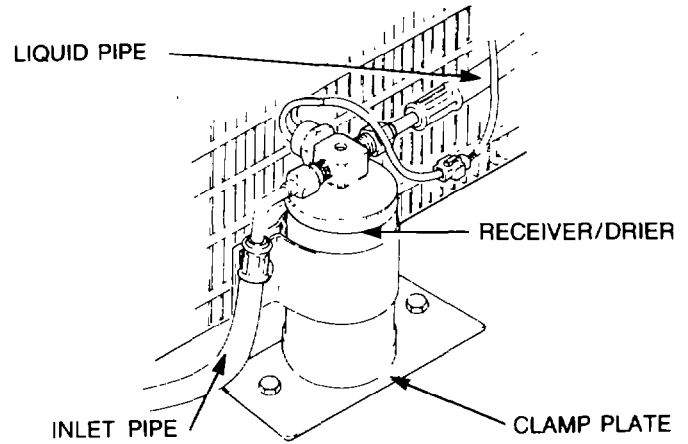


Figure 4 - Correct Fitting of Receiver/Drier

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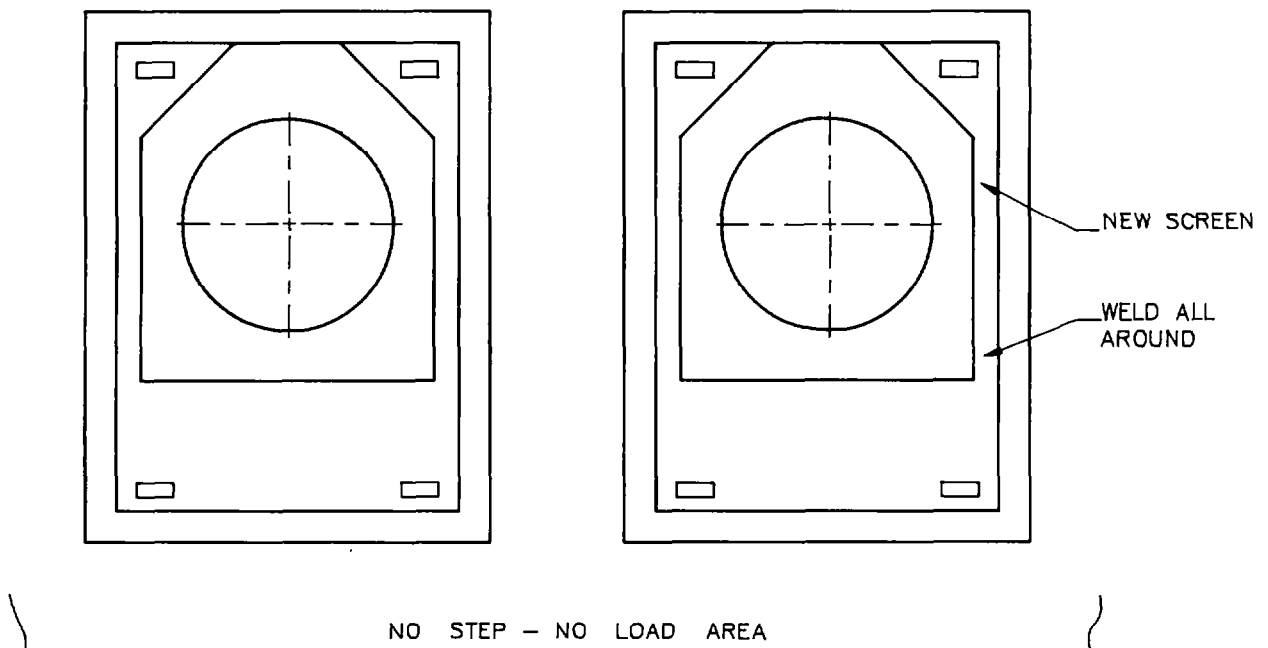


Figure 5 - Position of Condenser Fan Mesh Screens

Compressor Travel 'T' bolt (Army Action)

22. All applicable vehicles shown in Table 1 are to have the existing travel locking bolt for the compressor replaced by Army tradesmen with a 'T' bolt (Item 2, Table 3). Proceed as follows:

- a. Open the air-conditioner locker door and remove the existing travel locking bolt (see Figure 6).
- b. Fit the new 'T' bolt (Item 2, Table 3) in its place and secure the 'T' bolt chain washer under the head of the screw used to locate the rubber mount on the right side of the compressor mount plate.

c. Locate the position of the bolt storage hole (see Figure 6) as follows:

- (1) draw a transverse line from the rearmost edge of the door opening;
- (2) draw a longitudinal line parallel to, and 22 mm outboard from, the floor mounted tubular frame; and
- (3) drill an 11.0 mm diameter hole down through the plywood floor but not through the lower metal skin.

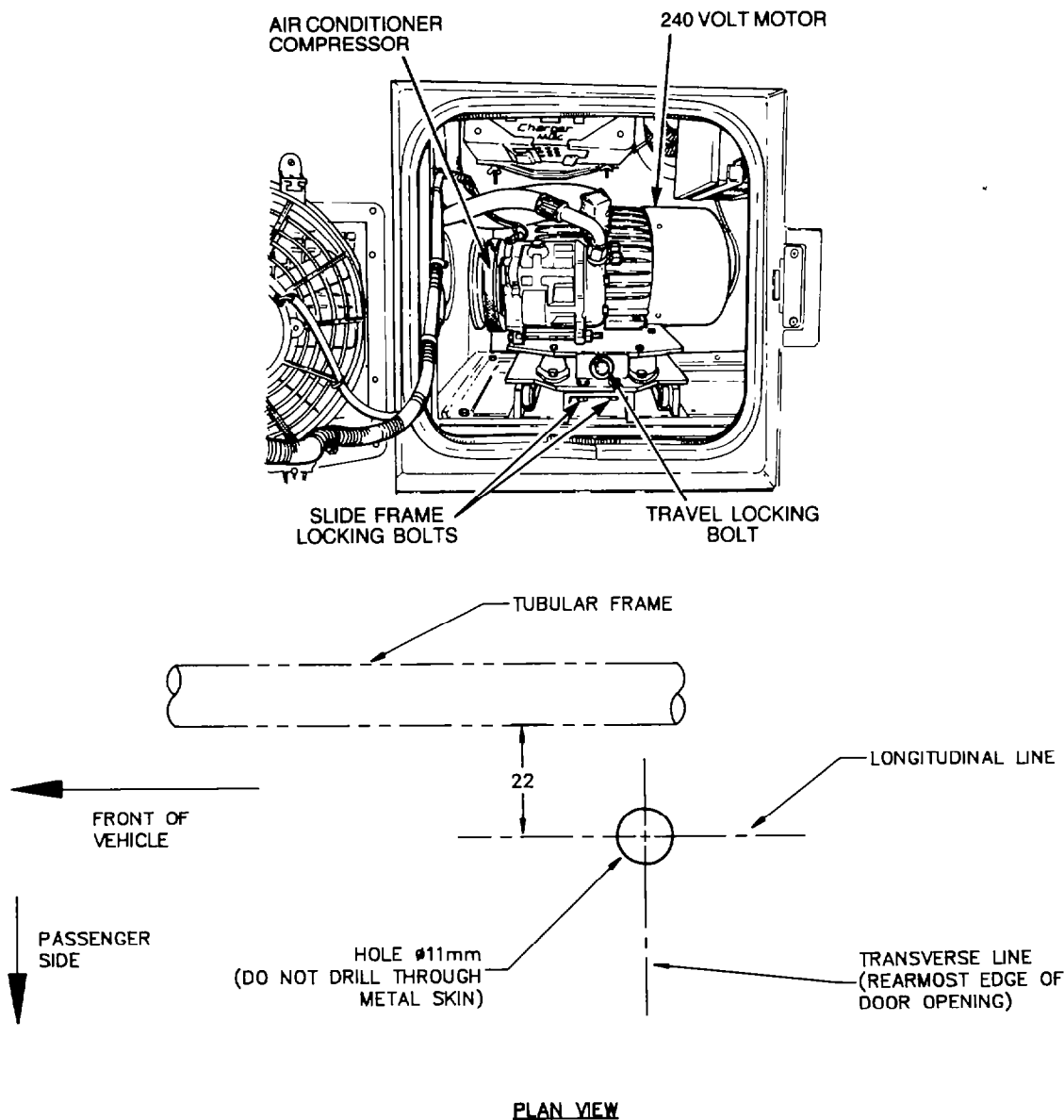


Figure 6 - Location of Travel Locking Bolt and Storage Hole

Electric Motor Contactor (Army Action)

23. All applicable vehicles shown in Table 1 are to have the contactor (Item 3, Table 3) replaced by Army tradesmen. The contactor is being replaced due to constant problems with burnout. The failures are associated with the output limit of the 15 KVA generator when it is subjected to an instantaneous 240 volt motor start up load and corresponding voltage drop at the contactor coil. Proceed as follows:

- a. Disconnect the power supply.
- b. Slide out the electrical lead storage bin at the front LH bench, remove the floor mounted lock and slider.
- c. Locate the access panel inside the module on the front left hand side of the footwell adjacent to the transformer. Remove the eight Philips head retaining screws and remove the panel.
- d. Identify the power box (Figure 7, Item 1) and remove the cover, then slide out the power divider plate.
- e. Slide the timer (Figure 7, Item 18) off the contactor by depressing the locking tongue at the front face.
- f. Unscrew overload mechanism from C1 contacts and retain (Figure 7, Item 19).
- g. Remove the four big headed screws holding the relay mounting plate in the back of the power box and slide out to provide access to the contactor base retaining screws nuts.
- h. Disconnect all wires and fixing screws from 'C1' contactor and remove from the control box (Figure 7, Item 15, 13).
- i. Install new contactor 'C1' with 24 volt DC coil.
- j. Connect the new contactor 'C1' as shown in circuit diagram Figure 8.

NOTE

Revisions to the circuits are shown in Figures 9 and 10. A revised circuit diagram for EMEI Vehicle G 253 will be issued separately.

The 24 volt connections can be made at the transparent relay base, right hand side top deck.

The relay is redundant and should be discarded.

- k. Reverse the dismantling procedure detailed in Para 23a - 23h.
- l. Ensure the timer is set 2 to 3 seconds and the motor overload is set to automatic.
- m. Connect the power supply and carry out full functional check.

24. Post Modification Testing. Check the operation of the module air-conditioner and all electrical circuits.

25. Recording Action. On completion of the modification:

- a. deface the number 28 on the modification plate located on the drivers seat base;
- b. enter the details of the modification in Part 3 of the GM 120, Record Book for Service Equipment;
- c. ensure that the Rover Australia dealer has entered the repair date and Service Action Numbers Z193, Z293, Z393, Z493, Z593, Z693 and Z793 in the GM 120; and
- d. report the completion date of the modification and ARN of vehicle to the Regional Fleet Managers as detailed in HQ Log Comd EMP 64/93.

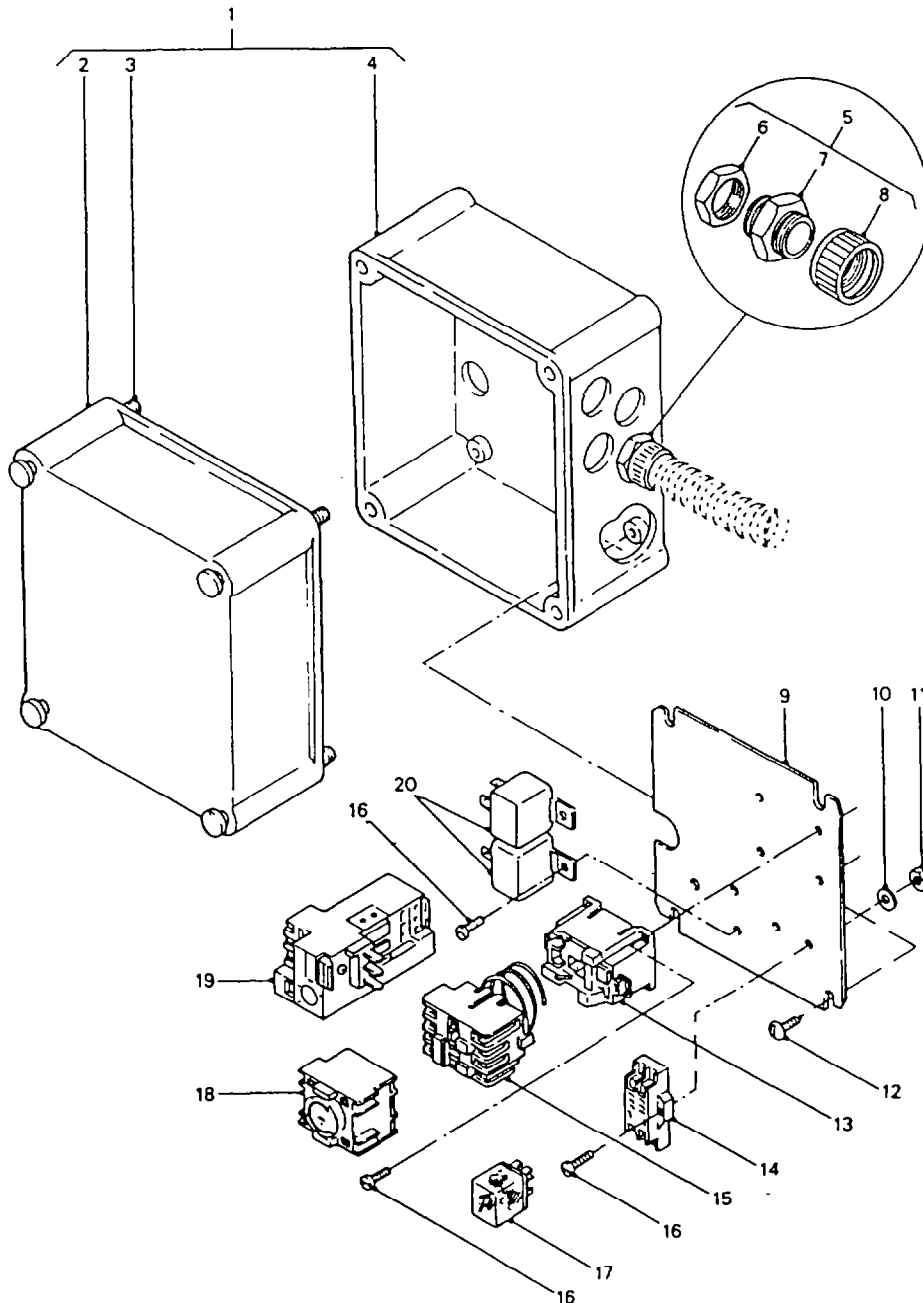


Figure 7 - Air-Conditioner and Thermostat Switch Relay Box

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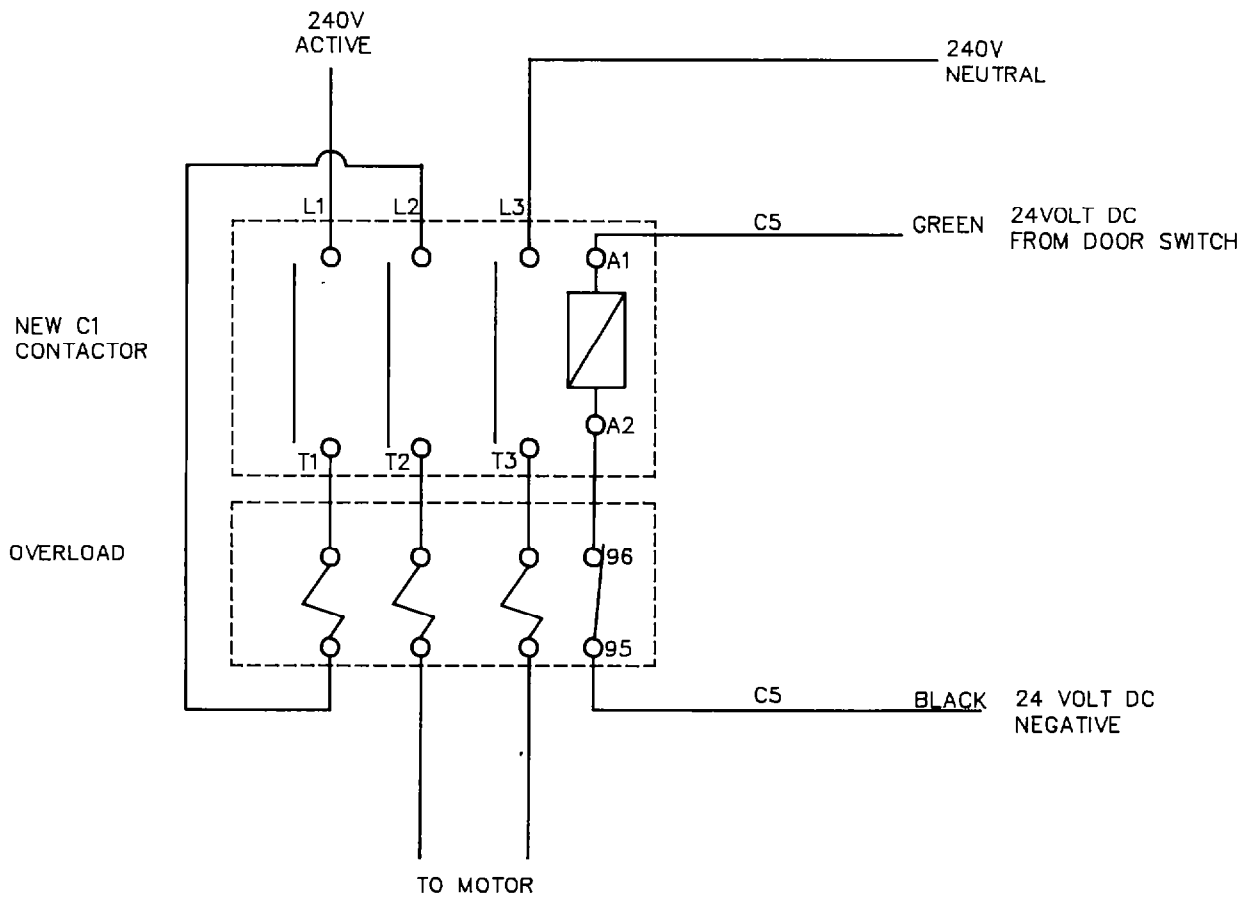
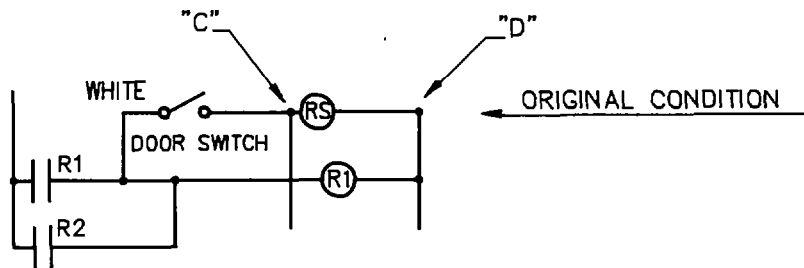
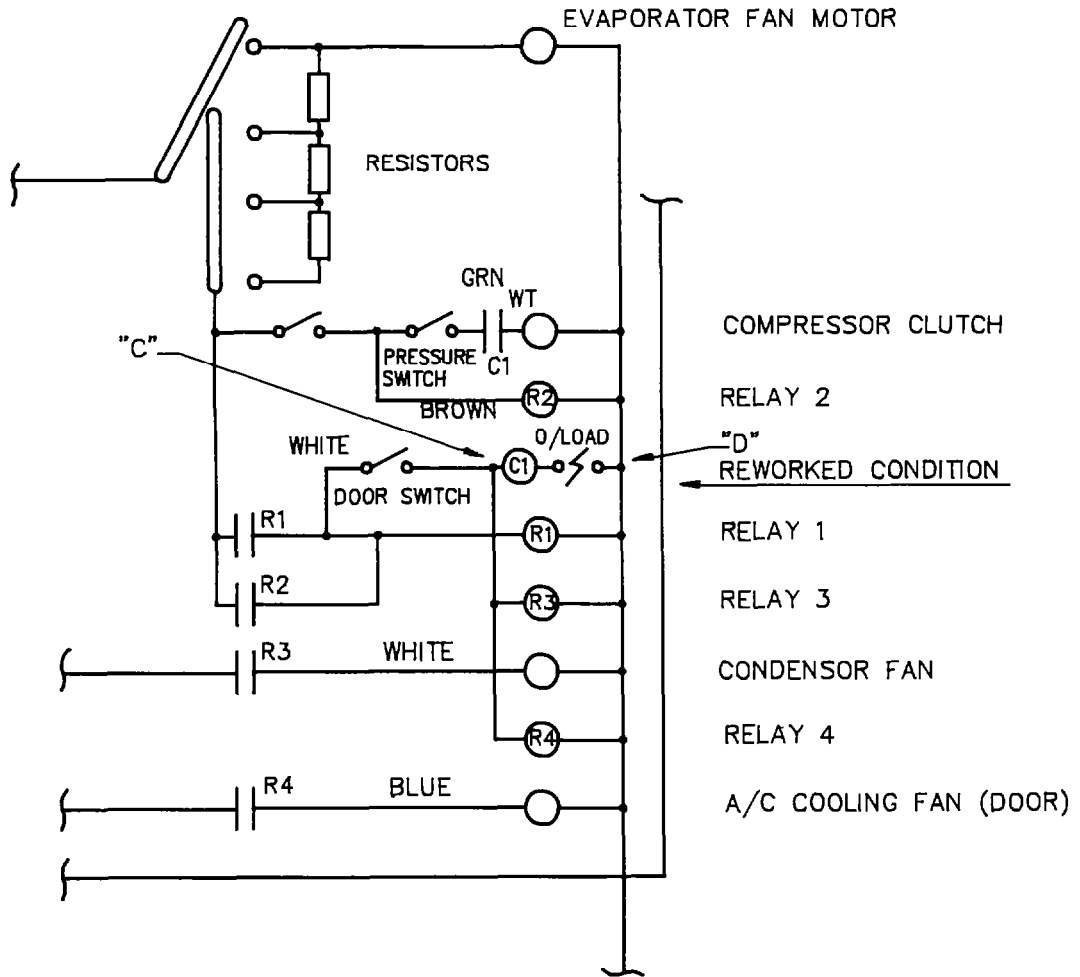


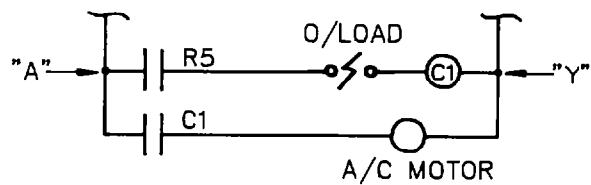
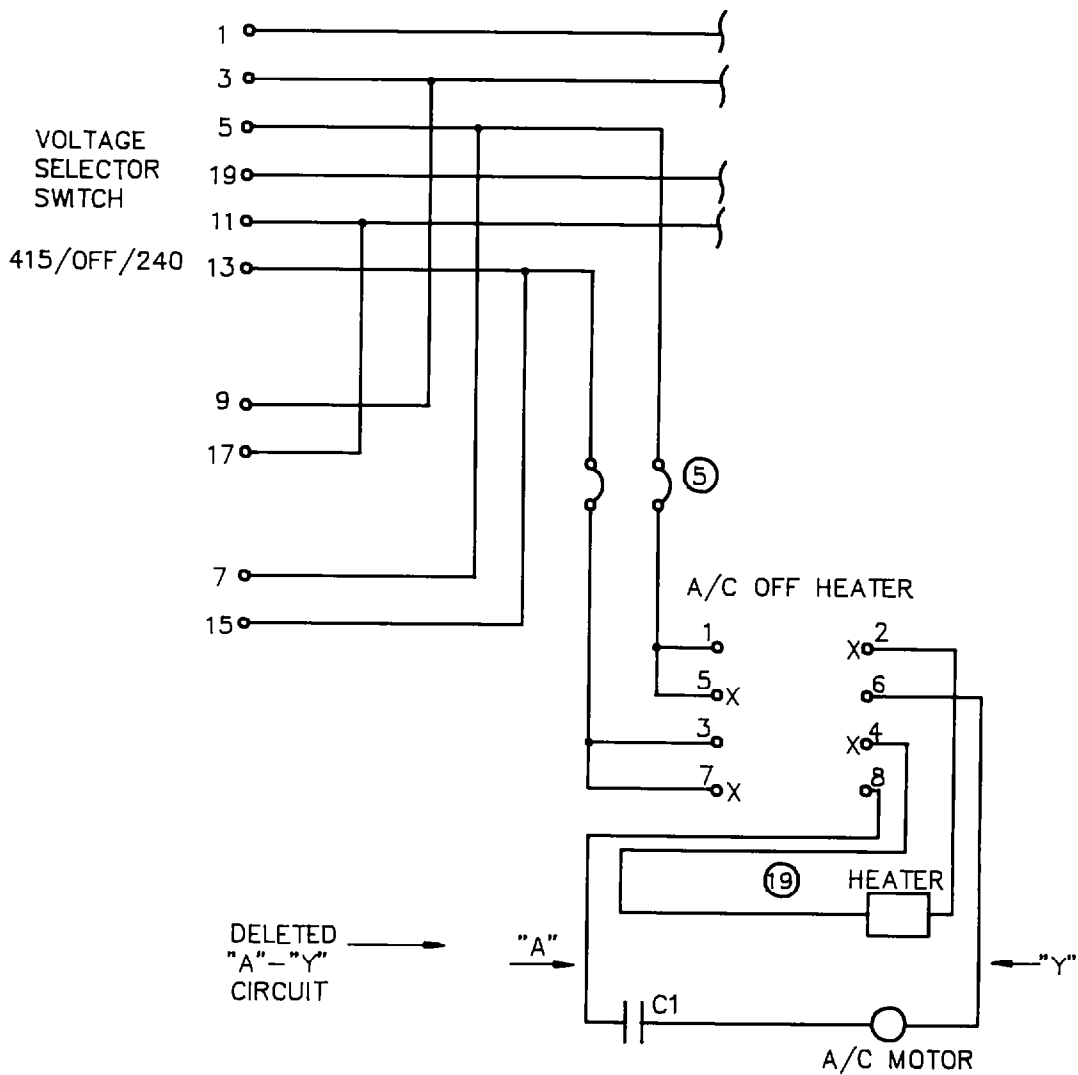
Figure 8 - Connection of C1 Contactor Wiring



NOTE: CIRCUIT "C" AND "D" REVISED FROM 'ORIGINAL' CONDITION TO 'REWORKED' CONDITION.

Figure 9 - Revised Wiring (Door Switch)

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ORIGINAL CIRCUIT

Figure 10 - Revised Wiring (AC Motor)

END

List VEH G 20.4 - Code 1 (MEA 930158)

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