

## TRUCK, HEAVY, MC3, MACK – ALL TYPES

### INSTALLATION OF AIR SYSTEM FILTER KIT

## MODIFICATION INSTRUCTION

This instruction is authorised for use by command of the Chief of Army. 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 EMEI General A 001.

### INTRODUCTION

1. This instruction details the installation of the Truckmaster air filter kit on the Mack R FOV. The installation of this kit is necessary to remove carbon, oil and excess moisture from the air system and will ensure longer life of type on all air system components installed into the system downstream from the air compressor.
2. The kit incorporates a filter assembly, two automatically controlled contaminant drain valves and a six-minute electronically controlled timer assembly.
3. Additionally, the kit comes with all the necessary hardware to enable installation by unit technicians either in barracks or in the field.
4. **Associated Publications.** Reference may be necessary to the latest issue of the following documents:
  - a. Technical Regulation of Army Materiel Manual (TRAMM) (available from DTR-A website <http://intranet.defence.gov.au/armyweb/Sites/DTRA>);
  - b. Electronic Supply Chain Manual (ESCM), Volume 4, Section 3 – Supply Management Processes, Stores Accounting General, ESCM website <http://escmv4web/8210.htm>; and
  - c. ESCM, Volume 6 – Manage Repairable Items, <http://escmv4web/2071.htm>; and
  - d. Electrical and Mechanical Engineering Instructions (EMEI) Vehicle G 747-10, Truck, Tank, Fuel, Heavy MC3, Mack Relocation of Emergency Shutdown Button.
5. **Authority.** Engineering Change Order (ECO) number MHB 34/02 Fitment of Air Filter to Mack MC 3 FOV is the authority to carry out this modification.

### GENERAL

6. **Modification Application.** This modification is to be applied to all Mack R model variants on issue to units and all stocks on in-service storage except for the following variants:
  - a. Truck, Tank, Gasoline, Heavy MC3 NSN: 2320-66-112-8852;
  - b. Truck, Tank, Fuel, Heavy, Aviation, MC3 (TTF AVN MK I) NSN: 2320-66-150-7876; and
  - c. Tank, Fuel, Heavy, Aviation and Diesel, MC3 (TTF AVN MK II) NSN: 2320-66-153-3721.

Vehicles identified for disposal or vehicles that are surplus to Commonwealth requirements are not to be modified.

7. **Items Affected.** This modification alters the following assemblies:
  - a. Left-hand chassis rail, and
  - b. the wet tank assembly.
8. **Priority - Group 2.** All applicable equipment is to be modified:
  - a. when next in a workshop for Light, Medium or Heavy Grade Repair; or
  - b. prior to issue from depot or pool stock.

**NOTE**

Where modification would delay priority issues of depot or pool stock, equipment may be issued unmodified providing the equipment record book is endorsed appropriately.

- 9. Action Required.** Actions detailed in this instruction are to be performed by technical maintenance organisations authorised to carry out Light, Medium or Heavy Grade Repairs utilising vehicle mechanic - ECN 229 or tri-Service/civilian equivalents authorised to carry out Light, Medium, or Heavy Grade Repairs.

**NOTE**

On receipt of this instruction, enter all relevant information other than date completed in the modifications section of the GM 120 – Record Book for Service Equipment.

- 10. Estimated Work Hours.** For initial planning purposes only, it is estimated that this modification will take 4.0 work hours to perform.

- 11. Stores Required.** The stores required are listed in Table 1. All stores are to be demanded through normal supply channels.

- 12. Installation Diagram.** When reading the installation diagram (Figure 1), the technician should observe the orientation note on the bottom right-hand corner, ie 'Cabin, driver's side'.

**NOTE**

Before fitting the Truckmaster air filter kit to Truck, Tank, Gasoline, Heavy, MC3 NSN: 2320-66-112-8852 variants technicians are to ensure that the modification documented in EMEI Vehicle G 747-10 - relocation of the emergency engine shutdown button, has been completed. All stocks of Truck, Tank, Gasoline, Heavy, MC3 NSN: 2320-66-112-8852 are to have both modifications detailed in EMEI Vehicle G 747-10 and EMEI Vehicle G 797-9 completed concurrently.

**WARNING**

**Prior to fitting the kit, ensure that the batteries are disconnected and the air system is drained. Safety glasses are to be worn when working under the vehicle.**

**NOTE**

Loctite 569 Hydraulic Sealant must be used on all hose fittings.

**DETAIL**

- 13.** Figure 1 depicts the schematics of the complete system.

**Truckmaster Air Filter Assembly**

- 14.** Install the air filter assembly as follows:
- a.** The filter (Figure 1, (6)) is to be fitted to the left-hand (LH) chassis rail of the vehicle between the LH step support brackets using the mounting bracket supplied in the kit. Figure 2 shows the dimensions for the correct positioning of the mounting bracket.

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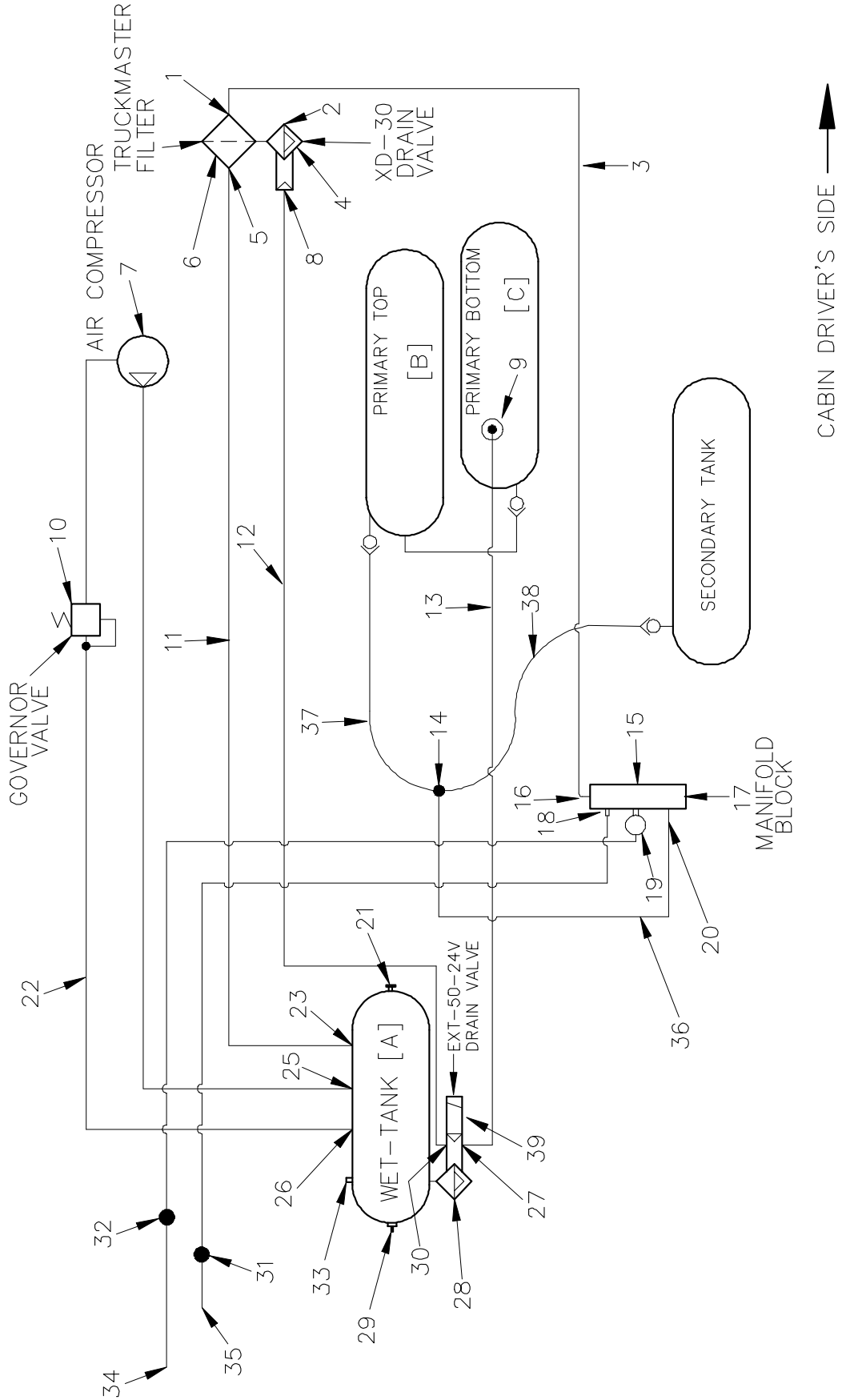
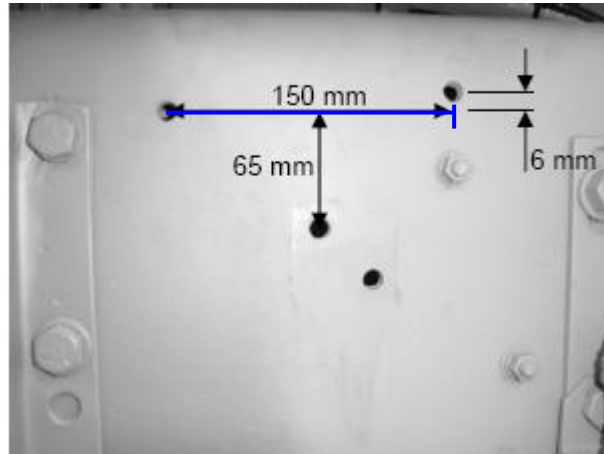


Figure 1 Pneumatic System Schematic Diagram



**Figure 2 Filter Bracket Location – Dimensions**

- b. Scribe a line approximately 15 mm vertically down from the centre of the rear upper hole.
- c. Scribe a line horizontally from the centre of front lower hole across to where it meets the vertical line below the rear hole (this line is approximately 150 mm long).
- d. Find the centre point of the horizontal line between the two holes and mark it.
- e. Remove the mounting bracket from the top of the Truckmaster air filter assembly.

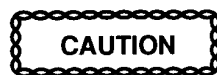
**NOTE**

Retain all the components for further use.

- f. Position the mounting bracket against the chassis rail with its top edge level with the horizontal line.
- g. Align the bracket centre point with the centre mark on the horizontal line.
- h. Mark the position of the upper hole on the vertical face of the mounting bracket onto the chassis rail.

**NOTE**

This mark will be the position of the upper mounting hole for the mounting bracket and will be approximately 65 mm below the horizontal line.



**Before drilling, take precautions not to damage any hoses, wiring looms or lines behind the chassis rail.**

- i. Drill a 10 mm hole in the chassis rail at the position marked in Para 15.h.
- j. Install the mounting bracket on to the chassis rail using a 1<sup>3</sup>/<sub>4</sub> in x <sup>3</sup>/<sub>8</sub> in bolt, washers and Nyloc nut (Table 1, Items 28, 30 and 31).
- k. Ensure the mounting bracket is level with the horizontal line.
- l. Tighten the nut firmly to hold the bracket in position.
- m. Using the mounting bracket as a template drill another 10 mm diameter hole in the chassis at the lower mounting hole position.
- n. Secure the bracket via the lower hole using a 1<sup>3</sup>/<sub>4</sub> in x <sup>3</sup>/<sub>8</sub> in bolt, washers and Nyloc nut (Table 1, Items 28, 30 and 31).
- o. Tighten the mounting bolts to 30 lbf.ft (40.6 N.m).
- p. Assemble two connectors (Table 1, Item 11) to the Truckmaster filter <sup>1</sup>/<sub>2</sub> in inlet and outlet ports (Figure 1, (1) and (5)).

**NOTE**

When fitted, the connectors are to be in line with the filter body with the open ends pointing towards the bottom of the filter body as shown in Figure 3.



**Figure 3 Truckmaster Filter and Dumpmaster XD-30 Drain Valve Assembly**

- q. Mount the Truckmaster air filter assembly to the mounting bracket using the hardware removed in Para 14.e above with the inlet port towards the front of the vehicle.

**NOTE**

The inlet port is indicated by an arrow directly above the port and is to be positioned toward the front of the vehicle when mounted on the mounting bracket.

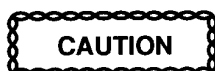
- r. Install the connector (Table 1, Item 13) on the Dumpmaster XD-30 drain valve, at the bottom of the filter assembly 1/8 in actuating port (Figure 1, (8)).
- s. Install the connector (Table 1, Item 15) to the Dumpmaster XD-30 drain valve 3/8 in exhaust port (Figure 1, (2)).
- t. Cut a 50 mm length of 1/2 in nylon tubing (Table 1, Item 21), using the hose cutter (Table 1, Item 37),
- u. Connect the tube to the connector installed IN Para 14.s (Table 1, Item 15), (Figure 1, (2)).
- v. The Truckmaster filter and Dumpmaster XD-30 drain valve installation is shown IN Figure 3.

**Wet Tank**

- 15. The wet tank, associated components and air piping is to be modified as follows:
  - a. Identify the wet tank (Figure 1, (25)).

**NOTE**

The wet tank is the first air tank directly downstream of the air compressor and is fitted with a pressure relief valve (Figure 1, (33)).



**Do not disconnect the steel braided rubber airline (compressor discharge pipe) connected to the top of the wet tank.**

- b. Disconnect the two 1/2 in supply airlines (Figure 1, (21) and (23)) from the wet tank.

**NOTE**

The two airlines that have been disconnected will now be renumbered Figure 1, (37) and (38).

- c. Remove the attached collapsible olives from the two airlines that have been renumbered Figure 1, (37) and (38) using the tube cutter.
- d. Remove the union (Figure 1, (21)) from the wet tank and plug the opening (Figure 1, (21)) with a ½ in plug (Table 1, Item 18).
- e. Disconnect the two ¼ in airlines from the T-piece (Figure 1, (26)).

**NOTE**

One of these two ¼ in airlines is the Governor Pressure Sensing line (Figure 1, (22)). The other ¼ in airline is a supply line (Figure 1, (35)).

- f. Determine which one of these airlines is the governor sensing line and identify it for use in a subsequent step.

**NOTE**

The governor sensing line can be found by removing the air line at the bottom of the governor valve marked RES, blowing compressed air into the airline and locating its exit point at the wet tank end. The governor valve is located in the engine bay on the driver's side firewall, as shown in Figure 4.



**Figure 4 Location of Governor Valve**

- g. Remove the T-piece (Figure 1, (26)) from the wet tank.
- h. Remove the attached connector from the supply line (Figure 1, (35)) using the tube cutter.

**NOTE**

Ensure that the cut is clean and straight as a union joiner (Table 1, Item 7) will be assembled to this end.

- i. Remove one of the connectors from the T-piece that was removed IN Para 15.g.
- j. Fit the connector to the wet tank at the port where the T-piece was previously fitted (Figure 1, (26)).
- k. Reconnect the previously identified governor pressure sensing airline to the connector (Figure 1, (26)) on the wet tank.
- l. Remove the ⅜ in airline from the wet tank pressure protection valve (Figure 1, (29)).
- m. Remove the connector from the wet tank pressure protection valve.
- n. Remove the pressure protection valve from the wet tank and plug the port (Figure 1, (29)) with a ¼ in plug (Table 1, Item 17).

- o. Assemble connector (Table 1, Item 11) to the port (Figure 1, (23)) on the wet tank.
- p. Connect  $\frac{5}{8}$  in tubing from this connector to the inlet port connector (Figure 1, (5)) on the Truckmaster filter (indicated by an arrow on the filter head).

**NOTE**

If space does not allow the Dumpmaster drain valve to be rotated into position, unscrew both ends of the valve and reassemble once the valve is in position.

- q. Remove the manual drain cock from the wet tank, and assemble the Dumpmaster EXT-50 Drain Valve into this port on the left bottom/underbelly of the wet tank at position Figure 1, (39).



**Do not use the body of the drain valve to tighten the valve into the wet tank. Use the correct size spanner on the valve fitting.**

- r. Assemble the remaining two connectors (Table 1, Item 13) to the Dumpmaster EXT-50 drain valve on the wet tank in the 'A' and 'P' ports, Figure 1, (27) and Figure 1, (30) respectively.
- s. Connect  $\frac{1}{4}$  in tubing from the 'A' port on the Dumpmaster EXT-50 drain valve on the wet tank at Figure 1, (30), to Figure 1, (8) on the Dumpmaster XD-30 drain valve attached to the Truckmaster filter.
- t. Remove the plug from the Primary Bottom tank 'C' (Figure 1, (9)) and install the adaptor (Table 1, Item 16) and the connector (Table 1, Item 14) in this position.
- u. Connect  $\frac{1}{4}$  in tubing from Figure 1, (9) to the connector at the 'P' port on the Dumpmaster EXT-50 Drain Valve (Figure 1, (27)) fitted to the wet tank.
- v. Assemble the connector (Table 1, Item 15) to the port Figure 1, (28) on the Dumpmaster EXT-50 Drain valve fitted to the wet tank.
- w. Fit 50 mm of  $\frac{1}{2}$  in tubing to this connector.
- x. The completed wet tank installation is depicted in Figure 5.



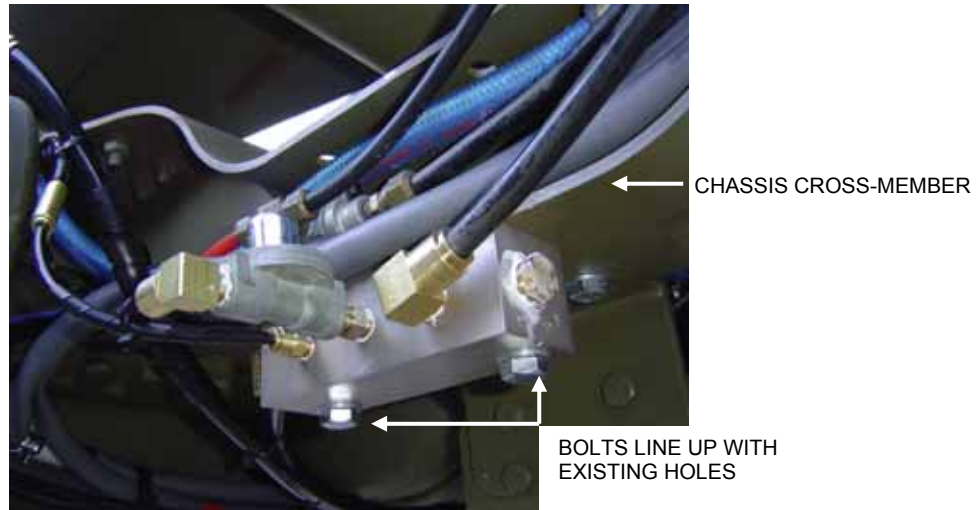
**Figure 5 Wet Tank Installation**

- y. Once all the hoses have been installed, apply spiral wrap (Table 1, Items 24 to 26) to any hoses or lines that may be affected by rubbing action and secure it with cable ties (Table 1, Items 3 and 4).

**16. Manifold Block Assembly.** Fit the manifold block to the vehicle cross member as follows:

**NOTE**

The manifold block must be installed on the vehicle cross member using the existing holes in the cross member (Figure 6). The three ports must face the rear of the vehicle with the two  $\frac{1}{4}$  in ports pointing towards the passenger chassis rail and the  $\frac{3}{8}$  in port pointing towards the driver's side chassis rail.



**Figure 6 Manifold Block Installation**

- a. Install the connector (Table 1, Item 12) to the port (Figure 1, (16)) in the manifold block.
- b. Install the connector (Table 1, Item 15) to the port (Figure 1, (20)) in the manifold block.
- c. Position the manifold block (Figure 1, (15)) on the vehicle cross member over the existing holes as shown in Figure 6 and secure it with the  $2\frac{1}{4}$  in x  $\frac{1}{2}$  in bolts, washers and Nyloc nuts (Table 1, Items 27, 29 and 32). Flat washers are to be used under the bolt heads and Nyloc nuts.
- d. Tighten the bolts to 65 lbf.ft (88 N.m).
- e. Install the  $\frac{1}{4}$  in NPT Hexagonal Nipple (Table 1, Item 8) to the middle  $\frac{1}{4}$  in port of the manifold block (Figure 1(19)).
- f. Screw the pressure protection valve to this nipple, ensuring that the arrow on the valve is pointing to the rear of the vehicle.
- g. Install the connector (Table 1, Item 10) to the pressure protection valve.
- h. Install the connector (Table 1, Item 9) to the port (Figure 1, (18)) in the manifold block.
- i. Insert the plug (Table 1, Item 19) to the port (Figure 1, (17)) in the manifold block.
- j. Connect  $\frac{5}{8}$  in tubing from the port (Figure 1, (16)) to the outlet port (Figure 1, (1)) of the filter.
- k. Install the line joiner (Table 1, Item 7) on the  $\frac{1}{4}$  in supply line (Figure 1, (35)) at Figure 1, (31).
- l. Connect  $\frac{1}{4}$  in tubing from this joiner to the connector (Figure 1, (18)) in the manifold block.
- m. Assemble line joiner (Table 1, Item 6) to the  $\frac{3}{8}$  in supply line (Figure 1, (34)) at Figure 1(32).
- n. Connect  $\frac{3}{8}$  in tubing from the joiner to the connector at Figure 1, (19) in the manifold block.
- o. Assemble the union T-piece (Figure 1, (14), Table 1, Item 5) to both  $\frac{1}{2}$  in supply lines Figure 1, (37) and (38). The lines Figure 1, (37) and (38) were previously described in Para 15.b.
- p. Connect  $\frac{1}{2}$  in tubing from the union T-piece at Figure 1, (14) to the connector at Figure 1, (20) on the manifold block.
- q. Once all hoses have been installed, apply spiral wrap (Table 1, Items 24 to 26) to any hoses or lines that may be affected by rubbing action and secure it with cable ties (Table 1, Items 3 and 4).



- r. A completed manifold block Installation is depicted in Figure 6.

**17. Electrical Harness Installation.** The electrical harness of the Truckmaster filter kit consists of the following items:

- a. a solenoid coil, mounted on the LH side of the Dumpmaster drain valve attached to the under side of the wet tank;
- b. a wiring loom that connects the solenoid on the wet tank to the timer assembly; and
- c. a six-minute electronic timer assembly.

**NOTE**

The solenoid coil, as attached to the Dumpmaster drain valve EXT-50-24v, is pre-assembled in the factory with the aluminium locknut secured with Loctite 222.

**18.** Install the electrical components as follows:

- a. Remove the fuse panel steel cover.
- b. Connect the female sealed plug end of the wiring harness to the male plug end on the solenoid coil on the under side of the wet tank.
- c. Run the wiring harness along the LH chassis rail, up through the engine bay and through the passenger side of the firewall, as shown at Figure 7.



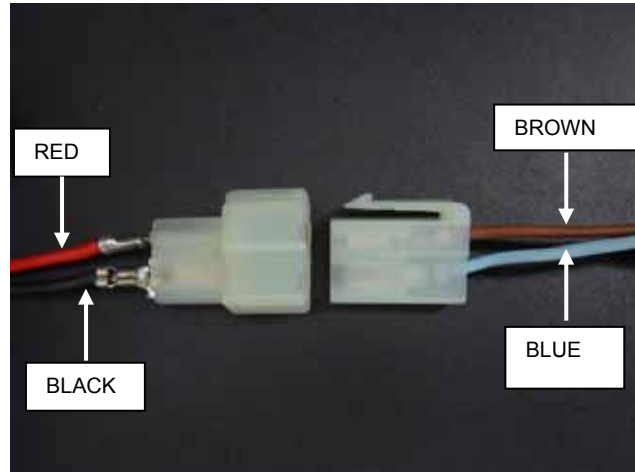
**Figure 7 Wiring Harness Entry Point**

- d. Once the wiring harness has been brought through the firewall, attach the female portion of the white connector socket to the male electrical connections on the harness.



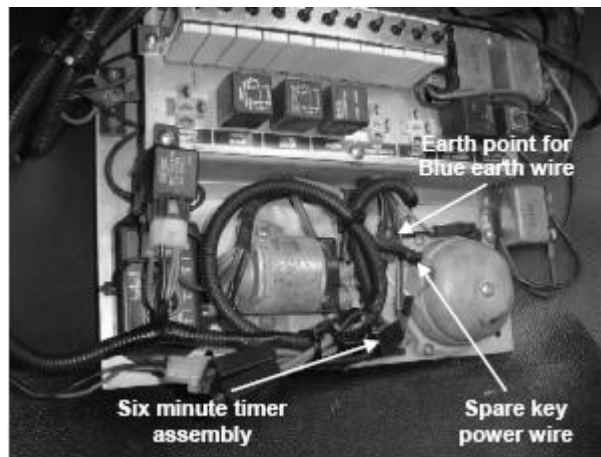
**Ensure that the red wire on the wiring harness corresponds with the brown wire on the six-minute timer assembly, i.e. positive to positive**

- e. Plug together the white electrical connector sockets on the wiring harness and the six-minute timer assembly, as shown in Figure 8.



**Figure 8 Wiring Harness Alignment**

- f. Connect the power wire of the six-minute timer assembly to the fuse panel utilising the bullet connector on the spare key power wire located near the kysor alarm (Figure 9).
- g. The eyelet connector for the earth wire is to be attached to the Kysor alarm mounting self-tapping screw (Figure 9).



**Figure 9 Location Of Six-Minute Timer**

**NOTE**

The power connection at the fuse panel should only have voltage with the key turned on.

- h. Test that the connection at the fuse panel only has voltage when the key is turned on..
  - i. Secure wiring harness as appropriate using cable ties (Table 1, Items 3 and 4).
  - j. Replace the fuse panel steel cover.
  - k. Close all the air tank drain cocks.
  - l. Re-connect the batteries.
- 19. Post Modification Testing.** Test the completed modification as follows:
- a. Check that all the air tank drain cocks and the manual drain valves on the Dumpmaster drain valves are closed.
  - b. Start the engine and allow the air pressure to build up.
  - c. Check for air leaks (rectify as necessary).

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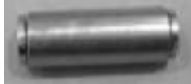







- d.** Check that the EXT-50 and XD-30 drain valves vent to atmosphere at approximately a 6 minute interval with a second vent occurring approximately six seconds later.
- e.** If the system fails to vent at the correct intervals proceed as follows:
  - (1)** Recheck the installation of the kit.
  - (2)** Carry out troubleshooting in accordance with EMEI Vehicle G 703.

**20. Recording Action.** On completion of the modification, the following action is to be taken in accordance with TRAMM:

- a.** Deface the number #29 on the vehicle modification record plate.
- b.** Complete the modification details in the GM 120 – Record Book for Service Equipment.
- c.** Forward the modification completion details using form GM 119 – Advice of Change in Build State to:

Technical Adviser Mack Fleet, Mdm & Hvy B Vehicles  
CGSVSPO, DMO  
7th Floor, Defence Plaza Melbourne  
Bourke St  
MELBOURNE VIC 3000

**Table 1 Stores Required**

Serial	NSN	Mfr Part No	Designation or Description	Unit of Issue	Qty
1	2530-66-149-1338	GP-149-1338	Air Filter Drier Kit, Mack MC3	KT	N/A
2			Loctite 569 Hydraulic Sealant	EA	N/A
3	5975-66-150-5879		Strap, Tiedown, Electrical Components – 368 mm long x 7.6 mm wide, black	EA	N/A
4	5975-66-150-5856		Strap, Tiedown, Electrical Components – 160 mm long x 4.8 mm wide, black	EA	N/A
<b>The Filter kit consists of the following items:</b>					
5		GP64DOT08	Union Tee, ½ in Tube x ½ in Tube x ½ in Tube 	EA	1
6		GP62DOT06	Union Joiner ¾ in Tube 	EA	1
7		GP62DOT04	Union Joiner ¼ in Tube 	EA	1
8		XD-04	¼ in Hex Nipple 	EA	1
9		GP68DOT0404	Connector ¼ in NPT Male x ¼ in Tube Straight 	EA	1
10		GP69DOT0604	Connector ¼ in NPT Male x ¾ in Tube Elbow 	EA	
11		GP69DOT1008	Connector ½ in NPT Male x ¾ in Tube Elbow 	EA	3
12		GP54DOT1006	Connector ½ in NPT Male x ¾ in Tube 45 Deg 	EA	1
13		GP69DOT0402	Connector ½ in NPT Male x ¼ in Tube Elbow 	EA	3

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Table 2 Stores Required (Continued)

Serial	NSN	Mfr Part No	Designation or Description	Unit of Issue	Qty
14		GP69DOT0404	Connector ¼ in NPT Male x ¼ in Tube Elbow 	EA	1
15		GP69DOT0806	Connector ⅝ in NPT Male x ½ in Tube Elbow 	EA	3
16		GP241500M/250FA	Adaptor ½ in NPT Male x ¼ in NPT Female 	EA	1
17		GP250P	Plug ¼ in NPT 	EA	1
18		GP500P	Plug ½ in NPT 	EA	1
19		GP375P	Plug ⅜ in NPT 	EA	1
20		NT10010BK.100	Air Brake Tube ⅝ in OD	MT	5
21		NT10008BK.25	Air Brake Tube ½ in OD	MT	1
22		NT10004BK.250	Air Brake Tube ¼ in OD	MT	7
23		NT10006BK.250	Air Brake Tube ⅝ in OD	MT	2
24		OMESW20	Spiral Wrap ⅝ in Tube	MT	2
25		OMESW15	Spiral Wrap ⅜ in Tube	MT	0.5
26		OMESW8	Spiral Wrap ¼ in Tube	MT	1
27		030C12055	Bolt 2 ¼ in x ½ in UNC	EA	2
28		030F10045	Bolt 1 ¾ in x ⅝ in UNF	EA	2
29		200C12	Nyloc Nut ½ in UNC	EA	2
30		200F10	Nyloc Nut ⅝ in UNF	EA	2
31		1403834	Washer Flat ⅝ in	EA	4
32		120121	Washer Flat ½ in	EA	4
33		GEN-12433	Manifold Block	EA	1
34		ETP-800-24V	Truckmaster Filter	EA	1
35		XD-30	Dumpmaster Drain Valve	EA	1
36		EXT-50-24V	Dumpmaster Drain Valve	EA	1
37		T-191	Cutter, Plastic, Air Brake Tube	EA	1

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END

Distribution List: **VEH G 50.0 – Code 2** (Maint Level)  
(Sponsor: CGSVSPO, Med/Hvy B Vehicles Section)  
Authority: ECO LVSP0 038/08