

## TRUCK, TRANSPORTER, FLOATING BRIDGE, MC3, W/WINCH, MACK LAUNCH AND RECOVERY VEHICLE (LRV)

### LIFT FRAME PROXIMITY SWITCH

## 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 a modification to the lift frame to prevent excessive rearward travel of the lift frame. The addition of a second proximity (cut-out) switch will prevent the lift frame trestle from contacting the chassis rails by limiting the hydraulics through an electrical/magnetic override. The hydraulics will be able to be activated in the retrieval mode to allow for a return to the normal operating parameters.
2. **Associated Publications.** Reference may be necessary to the latest issue of the following documents:
  - a. [EMEI Vehicle G 783](#) – Truck, Transporter, Floating Bridge, MC3, W/Winch, Mack, Launch and Recovery Vehicle (LRV) – Light Grade Repair;
  - b. Technical Regulation of ADF Materiel Manual – Land ([TRAMM-L](#)) (available from DTR-A website <http://intranet.defence.gov.au/armyweb/Sites/DTRA>);
  - c. Electronic Supply Chain Manual (ESCM), Volume 4, Section 3 – Supply Management Processes, Stores Accounting General, ESCM website <http://escmweb/2157.htm>;
  - d. ESCM, Volume 6 – Manage Repairable Items, <http://escmweb/2119.htm>;
  - e. [Repair Parts Scale \(RPS\) 02216](#) – Truck, Transporter, Floating Bridge; and
  - f. Equipment User/Operator and Servicing Handbooks.
3. **Authority.** EC-003250 is the authority to carry out this modification.

### GENERAL

4. **Modification Application.** This modification is to be applied to all LRV.
5. **Items Affected.** This modification alters the following assemblies contained in RPS 02216:
  - a. Lift frame – Gp VC;
  - b. Operator platform – Gp VAA;
  - c. Solenoid valve – Gp VKAF; and
  - d. Hydraulic and electrical circuits – Gp QL and VCA.

### WARNING

**The LRV is not to be operated prior to modification unless authorised by the unit TIS. Incorrect operation of the LRV hydraulics may cause serious damage to the lift frame if it contacts the chassis rails.**

6. **Priority – Group 1.** All LRV are to be modified prior to further use/with minimum delay. Unit TIS may authorise the use of the LRV to meet priority tasking prior to modification providing the lift frame limit switch at the rear of the lift frame, Gp WHCA is inspected for serviceability and the operators are specifically instructed not to operate the lift frame lockout or utilise the limit switch override button within the cabin.
7. **Action Required.** Actions detailed in this instruction are to be performed by technical maintenance organisations authorised to carry out Heavy Grade Repairs on the LRV.

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**NOTE**

On receipt of this instruction, enter all relevant information other than date completed in the modifications section, Part 3 of the GM 120 – Record Book for Service Equipment.

**8. Task Recording.** The conduct of this modification is to be recorded in a MILIS Work Order utilising Standard Job Number 1805.

**9. Estimated Work Hours.** For initial planning purposes only, it is estimated that this modification will take 14 work hours to perform.

**10. Stores Required.** The stores required are listed in Table 1. They will be supplied as a Kit and are available on request from the DMO Engineer Equipment contact; Mr Les Williams, Email ([les.williams@defence.gov.au](mailto:les.williams@defence.gov.au)).

**Table 1 Stores Required**

Item	NSN	Mfr Part No	Designation or Description	Unit of Issue	Qty per Kit	Qty per Equip
1		RES 1708	Kit Proximity Switch. Comprises items 2 - 20	Kit	1	1
2	5930-99-658-4248	339-768	Actuator Magnet 39 x 25 x 10 mm	EA	1	3
3	5930-99-658-4249	339-752	Switch Proximity	EA	1	4
4		00940457	Screw M/T Zinc PI Panhead M4, 25 mm Long	EA	4	4
5	5310-66-151-8602	03755103	Washer, Flat Round 4 x 9 x 0.8 mm	EA	8	24
6	5310-66-152-3750	3378	Nut, Nyloc, 4 mm	EA	4	6
7		06149211	Screw M/T Zinc PI Panhead M4, 16 mm Long	EA	4	14
8		RES 1690	Wiring Loom	EA	1	1
9		4001-23-111-1	LED Warning Box Holding Plate	EA	1	1
10		RES 1694	LED Warning Box	EA	1	1
11		4001-23-101	Bracket Proximity Switch	EA	1	1
12		01067806	Screw M6 x 16, 316 S/S	EA	4	4
13		01051135	Washer Safety Serrated M6 S/S	EA	2	2
14		4001-23-102	Bracket Actuator Magnet	EA	1	1
15		01067903	Screw M8 x 20, 316 S/S	EA	2	2
16		01051152	Washer Safety Serrated M8 S/S	EA	2	2
17		PS1 Quickcrimp	Metal/Rubber Cable Clamp (P Clip)	EA	2	2
18	5975-66-150-5896		Tie Cable	Pk	30	30
19		4001-23-102	Spacer kit (1, 2, 3 and 6 mm Thick)	Set	1	1
20		4001-23-103	Template Installation Bracket	EA	1	1

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**11. Items to be Removed.** The items to be removed are listed in Table 2. The proximity switch and actuator magnet are to be packaged and sent to RPC utilising the included RPC label.

**Table 2 Items to be Removed**

Item	NSN	Mfr Part No	Designation or Description	Qty per Equip
1	5930-99-658-4248	339-768	Actuator Magnet 39 x 25 x 10 mm	1
2	5930-99-658-4249	339-752	Switch Proximity	1

**12. Drawings Required.** The supplied kit will contain the relevant drawings to assist with the completion and testing of the modification. The drawing numbers included in the kit are:

- a. Dwg 4001.23.000 Rev D Sh 1 and 2 – LRV Wiring;
- b. Dwg 4001.23.100 Rev B Sh 2 of 2 – Positioning of Proximity Switches and Cable P Clips on Lift Frame; and
- c. Dwg 4001.23.010 Rev B Sh 3 of 5 – Proximity Switch Wiring Harness.

#### DETAIL

**13. Manufacture of Special Tools and Jigs.** Specific templates for the positioning of the proximity switch and actuator magnet brackets are included in the supplied kit.

#### Modification of the lift frame

**14. Proximity Switch and Actuator Magnet Removal.** The existing proximity switch, actuator magnet and associated brackets are to be removed from the LRV in the following manner:

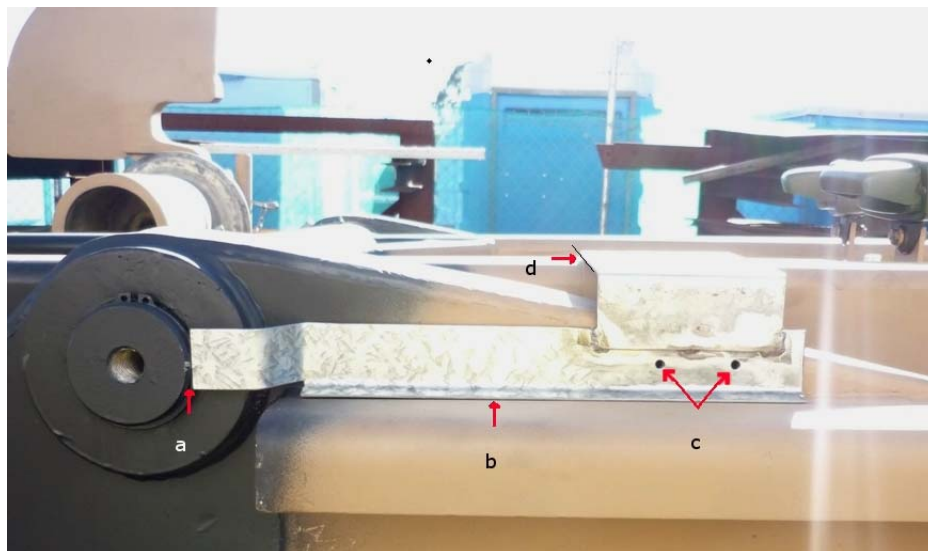
- a. Disconnect the wiring from the currently fitted proximity switch (Gp WHCA). Remove the proximity switch and actuator magnet. Remove the mounting brackets and grind the area smooth for patch painting. Insulate and secure the wiring to the lift frame.
- b. Package and return the old proximity switch and actuator magnet to RPC as per the supplied label in the kit.

**15. Proximity Switch and Actuator Magnet Installation.** The actuator magnet and proximity switches are pre-installed on the new brackets included in the modification kit. The procedures to attach the brackets to the LRV lift frame and sub-frame are as follows:

#### NOTE

Accuracy when utilising the templates is paramount as misalignment will greatly effect the lift frame maximum raised heights.

- a. The template reference point for the actuator magnet bracket is the forward edge of the rear pivot (Figure 1.a) of the rear lift frame. Position the template on the horizontal face of the chassis rail (Figure 1.b) ensuring contact with the rear pivot.



**Figure 1 Mounting Bracket Template Reference**

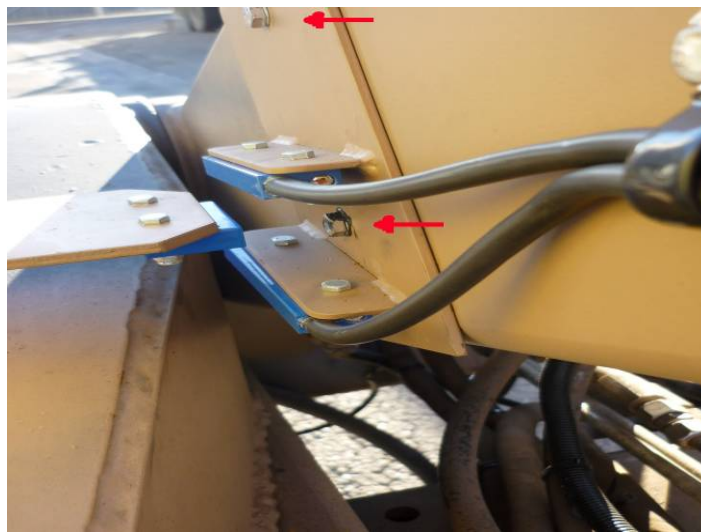
- b. Mark the two holes (Figure 1.c) for the actuator magnet mounting bracket on the sub frame and also draw a line along the rear side of the upper bracket for the proximity switches (Figure 1.d).
- c. Remove the template and drill qty 2 x 6.8 mm holes in the lift frame for the actuator magnet mounting bracket M8 screws. Utilising an 8 mm tap, tap a thread through the two holes in the lift frame for the M8 screws.

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**CAUTION**

Operation of the LRV lift frame limit switch override button may cause serious damage to the lift frame if it contacts the chassis rails. Ensure an observer is present during the testing phase.

- d. Lock the front and rear lift frames and raise them sufficiently to allow access for drilling and tapping. The reference point for the proximity switch bracket is the line marked on the horizontal upper side of the rear lift frame (Figure 1.d). Align the proximity switch bracket to the line previously marked on the rear lift frame and carefully mark the two holes for installation. Remove the bracket and drill qty 2 x 5.0 mm holes in the upper lift frame. Utilising a 6 mm tap, tap a thread through the lift frame for the M6 screws.
- e. Fill the tapped holes with Sikaflex, attach the mounting bracket complete with proximity switches to the lift frame utilising the M6 screws and safety serrated M6 S/S washers as per Figure 2.



**Figure 2 Proximity Switches and Bracket Mounting**

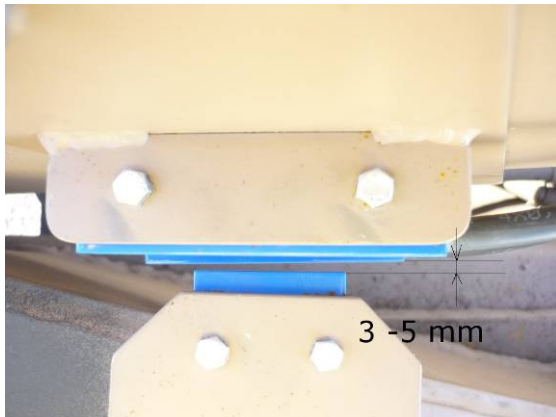
- f. Attach the mounting bracket complete with actuator magnet to the sub frame utilising the M8 screws and safety serrated M8 S/S washers as per Figure 3.



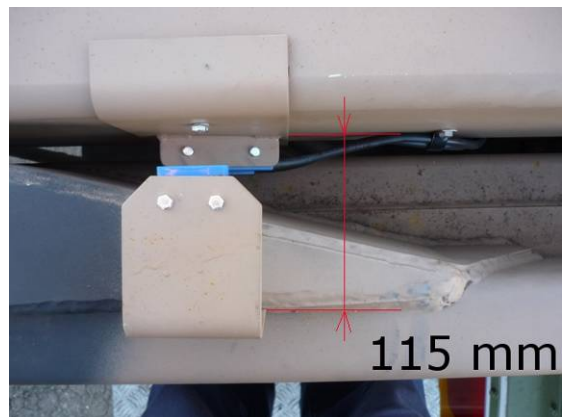
**Figure 3 Actuator Magnet Mounting Bracket**

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- g. The proximity switches and the actuator magnet are to be parallel at the point of alignment and are to have a gap of between 3 – 5 mm as shown in Figure 4. Small adjustments in alignment can be made utilising the slotted holes on the switch and magnet.



**Figure 4 Proximity Switch Gap**



**Figure 5 Lift Frame to Sub Frame Distance**

- h. If the brackets are too close, check the distance between the side of the lift frame and sub frame. If this is less than 115 mm, insert the required spacers under the actuator magnet mount to achieve the dimension of 115 mm as per figure 5. Refill the holes with Sikaflex and reattach the bracket.

**Modification of the operator platform**

**16. LED Warning Box Installation.** The LED warning box, complete with label, is installed onto the steel mesh protector panel of the operator platform (Ref 5.b) next to the existing HAPI warning box (Figure 6).



**Figure 6 LED Warning Box**



**Figure 7 LED Warning Box Mounting Plate**

- 17. The mounting procedure is as follows:
  - a. Remove the holding plate from the rear of the LED warning box and place the warning box on the inside of the mesh (150 mm above the lower element and 160 mm from the left side of the steel mesh protector panel). Place the holding plate on the rear side of the steel mesh protector panel (Figure 7) and align it to the warning box. Secure the plate to the warning box utilising the supplied four M4 screws, washers and locknuts.

**Wiring harness installation**

**18.** The wiring harness (Figure 8) has connectors/terminals that are ready for direct connection.

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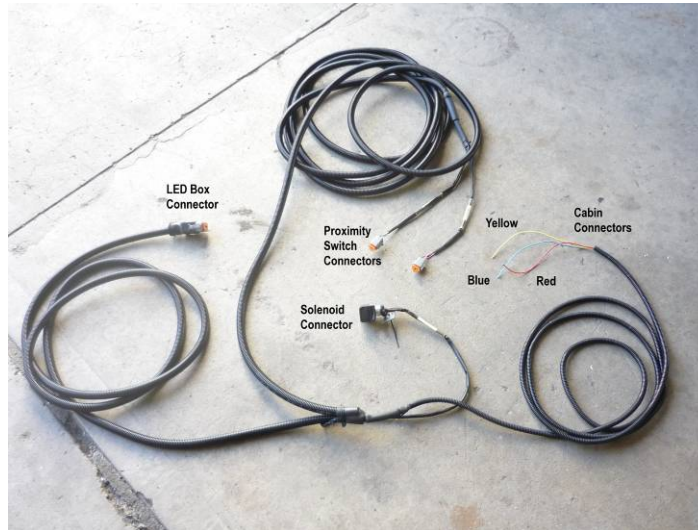


Figure 8 Wiring Harness

19. **Lift Frame and Proximity Switch.** The procedure to route the supplied wiring loom is as follows:

- a. Place the supplied wiring harness (Figure 8) along the underside of the drivers side chassis rail (beside the hydraulic pipes) ensuring that the proximity switch connectors (3 pin female plug) are facing the rear of the vehicle. Route the harness up to the under side of the cabin as per Figures 9 - 16. The harness is to be secured to the existing hydraulic pipes utilising cable ties after the harness has been connected. Secure with a cable tie every 500 mm.



Figure 9 Harness to Hydraulic Pipes



Figure 10 Harness Loop for Lift Frame



Figure 11 Harness to Chassis

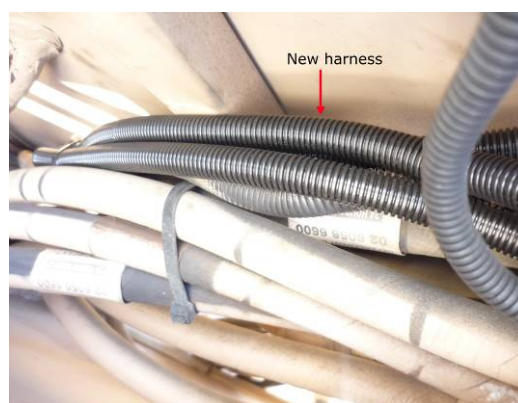


Figure 12 Harness under Operator Platform

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**Figure 13 Harness to Solenoid Valve**



**Figure 14 Harness at Operator Platform**

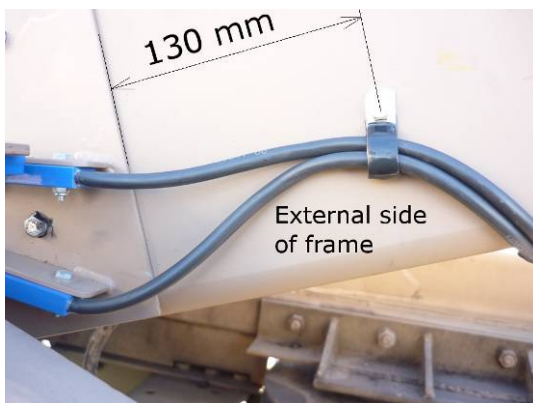


**Figure 15 Harness under Front Traverse**

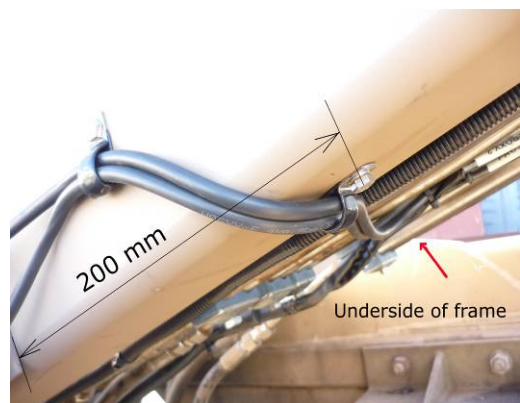


**Figure 16 Harness to Cabin Rear**

- b. Mark and drill 5 mm holes on the external and underside surface of the lift frame as per Figure 17 and 18. Utilising a 6 mm tap, tap a thread through the lift frame for the M6 screws and fit the two cable P clips utilising Sikaflex and 6 mm screws.



**Figure 17 Lift Frame Drivers Side P Clip**



**Figure 18 Lift Frame underside P Clip**

**NOTE**

When the lift frame is raised, the harness from the proximity switch will be stretched. Ensure sufficient cable is allowed to prevent the harness from breaking.

Proximity switch one is the upper switch on the bracket. Proximity switch two is the lower switch (Figure 19).

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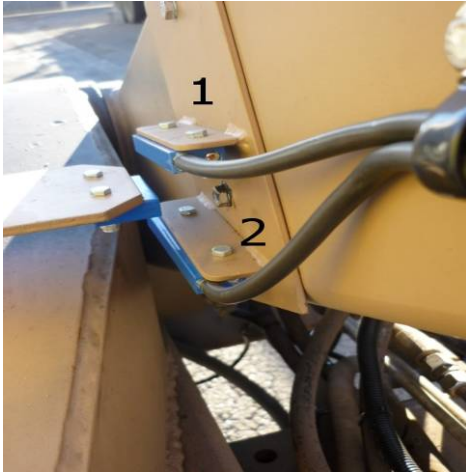


Figure 19 Proximity Switch Identification



Figure 20 Proximity Switch Loom Connection

- c. Connect the harness proximity switch plug to the proximity switches (Figure 20) and loosely secure it to the cable P clips. When allowances are made for the raised lift arm, tighten the cable P clips at the lift arm. (This can be completed at the end of the task). See Figure 10.a, for the looping of the harness.

20. **Solenoid valve.** Unscrew and remove the existing harness connector from the solenoid coil. Replace the current connector on the coil with the supplied DIN connector (complete with LED) assembled to one of the harness terminals as per Figure 21. Refit and tighten the locking screw (Figure 22).

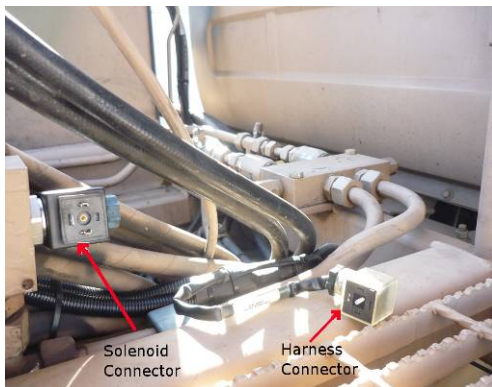


Figure 21 Solenoid Valve

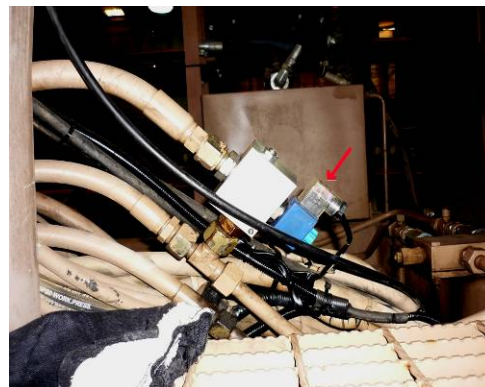


Figure 22 Solenoid and DIN Assembly

21. **Operator Platform.** Route the 12 pin female plug for the LED warning box on the harness along the side of the solenoid valve and under the front cover of the control panel to the male connector plug on the assembled LED warning box mounted on the panel. Figures 23 – 26 show the routing of the harness.



Figure 23 Harness at Control Platform



Figure 24 Harness under Control Panel

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Figure 25 Harness at Control Panel



Figure 26 Harness to LED Warning Box

22. **Vehicle Cabin.** Route the harness under the vehicle cabin and through the existing hole in the cabin floor as shown in Figure 16. The three terminals of the harness are to replace the existing connectors to the control panel of the PTO in the vehicle cabin.

- a. Red wire – ignition supply to the proximity switch circuit (the additional red wire at the override switch is the warning light and must be included in the connection). Connect between the PTO warning light and the fuse;
- b. Yellow wire – earth side of override switch. Remove the existing yellow wire from the switch and replace with new wire with fitted eye connector. Secure old wire to the loom and tape; and
- c. Blue wire – PTO warning light earth. Connect between the PTO warning light earth and the PTO air pressure indicator connection.

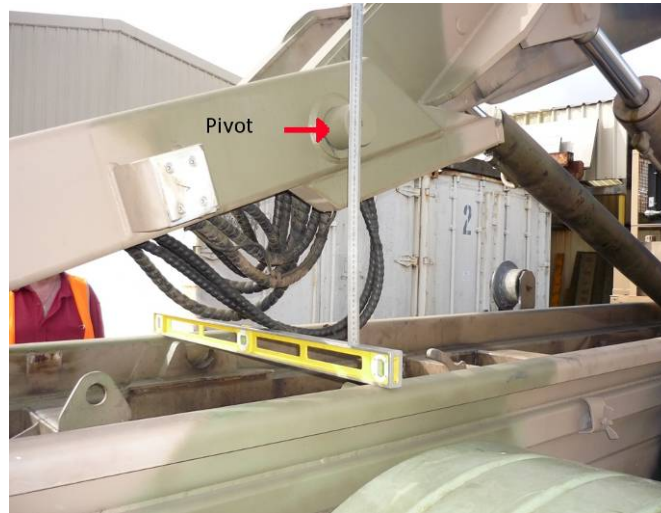


**Operation of the LRV lift frame limit switch override button may cause serious damage to the lift frame if it contacts the chassis rails. Ensure an observer is present during the testing phase.**

23. **Post Modification Testing.** Conduct a functional test of the LRV lift frame in the following sequence to ensure the integrity of the modification:

- a. Conduct first parade checks, start the LRV and bring to operating temperature.
- b. Engage the PTO. The red LED on the DIN connector (at solenoid valve) will illuminate. The indicator light is also illuminated on the LED warning light box (System Operating) on the operators' control console showing that the hydraulic pump PTO is engaged, the solenoid valve is activated and the system is ready to be raised.
- c. Raise the engine speed to 1350 RPM.
- d. Lock the lift frames together by pushing forward (Engage) the lift frame locking lever.
- e. Push forward the lever of the direction valve 'Lift Frame'.
- f. Raise the locked lift frames until the centre of the rear lift frame to front lift frame pivot pin (GpVC Sheet 1 Item 19) is 450 – 460 mm above the top of the chassis rail (first proximity switch activation) as shown in Figure 27.

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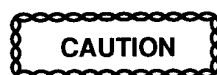
**Figure 27 Proximity Switch 'Lift Max 1' Setting**

- g.** At this stage the first proximity switch (uppermost) should be activated illuminating the 'Lift Max 1' light and extinguishing the 'System Operating' light on the LED warning light box preventing further lift frame travel. The LED on the solenoid valve is also extinguished.
- h.** To adjust the position of the proximity switch actuator magnet on the drivers side of the lift frame (uppermost switch), loosen the mounting screws and slide the magnet (on the chassis rail) until the 'Lift Max 1' light on the LED warning light box is illuminated. Tighten the magnet mounting screws and recheck the activation sequence. The magnets should be parallel and between 3 – 5 mm apart as shown in Figure 5.

**NOTE**

The override button must be continually depressed to allow continued lifting once the 'Lift Max 1' position has been reached.

- i.** To continue lifting, depress the 'Override button' (inside the cabin and beside the PTO control). The 'System Operating' and the 'Override Activated' lights on the LED warning light box will be illuminated. The 'Lift Max 1' light on the LED warning light box will remain illuminated during further upward movement of the lift frame alerting the operator.



**Operation of the LRV lift frame limit switch override button may cause serious damage to the lift frame if it contacts the chassis rails. Ensure an observer is present during the testing phase.**

- j.** With the override button being depressed, push forward the lever of the direction valve 'Lift Frame' to raise the lift frame until a distance between 75 - 85 mm is reached between the chassis rail end and the trestle of the rear lift frame (Figures 28 - 29) (second proximity switch activation). At this stage the second proximity switch (bottom switch on the drivers side of the lift frame) will activate, illuminating the 'Lift Max 2' light with the currently illuminated 'Lift Max 1' light and extinguishing the 'System Operating' light on the LED warning light box preventing further lift frame travel.

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Figure 28 Rear Trestle to Chassis Position



Figure 29 Rear Trestle to Chassis  
Measurement

**NOTE**

The override button must be continually depressed during adjustment of the switches.

- k. To adjust the position of the proximity switch and magnet on the drivers side of the lift frame, slide the magnets until the 'Lift Max 2' light on the LED warning light box is illuminated and the 'System Operating' light on the LED warning light box is extinguished. Recheck the activation of the first proximity switch.

**NOTE**

The lift frame will not continue to raise when a distance between 75 - 85 mm is reached between the chassis rail end and the trestle of the rear lift frame.

- l. Once the 'Lift Max 2' position has been reached, the lift frame will not be able to be raised any further when the lever of the direction valve 'Lift Frame' is pushed forward. Pull the lever of the direction valve 'Lift Frame' back until the 'System Operating' light on the LED warning light box is illuminated (system is ready for lifting with the override button depressed) and the 'Lift Max 2' light on the LED warning light box is extinguished. The 'Lift Max 1' light on the LED warning light box will remain illuminated.
- m. Operation of the lift frame within the range of the override and the Lift Max 2 position is now available within the safe working parameters with the override button depressed. The 'System Operating' light on the LED warning light box and the 'Override activated' light will both be illuminated.

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

- a. Deface the number 18 on the equipment modification record plate located under the hydraulic controls on the LRV operators platform.
- b. Complete the modification details in Part 3 of 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:  
National Fleet Manager - Engineer Equipment  
Engineer SPO, DMO  
Victoria Barracks, St Kilda Rd  
SOUTHBANK VIC 3006

**END**

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