

TRUCK, MEDIUM, MC2 - UNIMOG - ALL TYPES

TRANSMISSION SHIFT MECHANISM

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. In some instances, cross shaft bushes have dislodged in the transmission shift mechanism pawl, causing the mechanism to jam and prevent gear selection. This modification instruction details the replacement of the two cross shaft bushes with a single, full length bush that cannot dislodge and jam the selector mechanism.
2. **Associated Publications.** Reference may be necessary to the latest issue of the following documents:
 - a. [Defence Safety Manual](#) (SAFETYMAN);
 - b. Defence Supply Chain Manual (DSCM), Volume 4, Section 3 – Supply Management Processes, Stores Accounting General (DSCM website <http://dknln009.car.defence.gov.au/dscm/index.htm>);
 - c. DSCM, Volume 6 – Manage Repairable Items;
 - d. [EMEI Vehicle G 603](#) – Truck, Cargo, Medium, MC2 and Truck, Cargo, Medium, Winch, MC2 – Unit Repair;
 - e. Technical Regulation of Army Materiel Manual (TRAMM) (available from DTR-A website <http://intranet.defence.gov.au/armyweb/Sites/DTRA>); and
 - f. TRAMM, Volume 3, Section 2, Chapter 2, Fleet Engineering Change Management Process.
3. **Authority.** ECO MHB 011/04 is the authority to carry out this modification.

GENERAL

4. **Modification Application.** This modification is to be applied to all stocks on issue or in service storage.
5. **Items Affected.** NSN 2520-12-197-8443, Shifting Finger Assembly.

WARNING

All industrial safety, work practices, and equipment operating and maintenance instructions pertaining to this EMEI are to be adhered to.

6. **Priority – Group 2.** All applicable equipment is to be modified:
 - a. when next in 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.

7. **Action Required.** Actions detailed in this instruction are to be performed by RAEME Workshops authorised to carry out Light, Medium or Heavy Grade Repairs, utilising unit technicians ECN 229, or civilian equivalents.

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.

8. **Estimated Workhours.** For initial planning purposes only, it is estimated that this modification will take 3.0 workhours to perform.
9. **Stores Required.** The stores required are listed in Table 1. The stores will be supplied in a modification kit (Table 1, Item 1) and are to be demanded through normal supply channels.
10. **Items to be Removed.** Items to be removed are listed in Table 2. All stores removed are to be processed in accordance with the Defence Supply Chain Manual (DSCM).

DETAIL

11. Proceed as follows:
 - a. Park the vehicle on level, hard standing.

WARNING

Prior to commencing this modification, ensure the compressed air system on the vehicle is drained. The components of the compressed air system are under pressure. Serious injury can occur if lines are disconnected prior to draining the air system.

- b. De-pressurise the compressed air system. To de-pressurise the system, ensure the engine is shut down and drain the compressed-air receivers.
- c. Raise and secure the cab. Refer to EMEI Vehicle G 603, Para 20.
- d. Remove the shift mechanism from the transmission housing. Refer to EMEI Vehicle G 603, Para 112. Discard the shift mechanism housing gasket.
- e. Clamp the shift mechanism housing (Figure 1 (1)) in a soft jawed vice.
- f. Remove the gate position switch (Figure 1 (9)).

NOTE

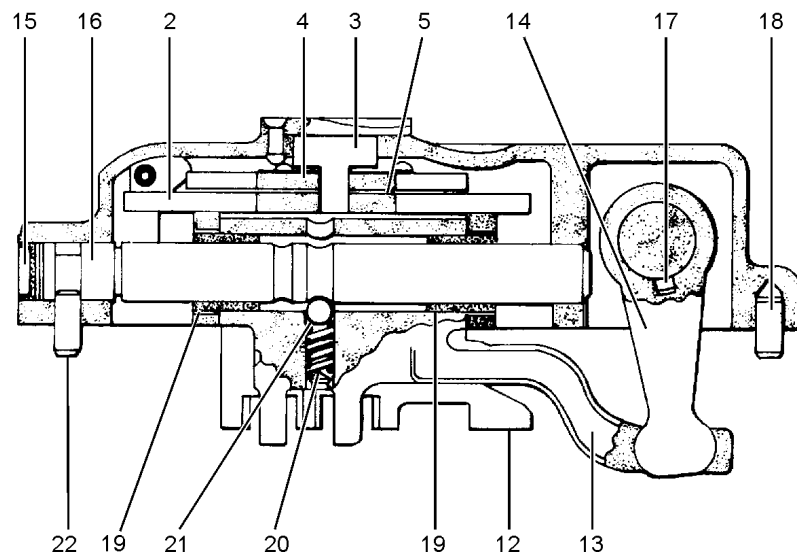
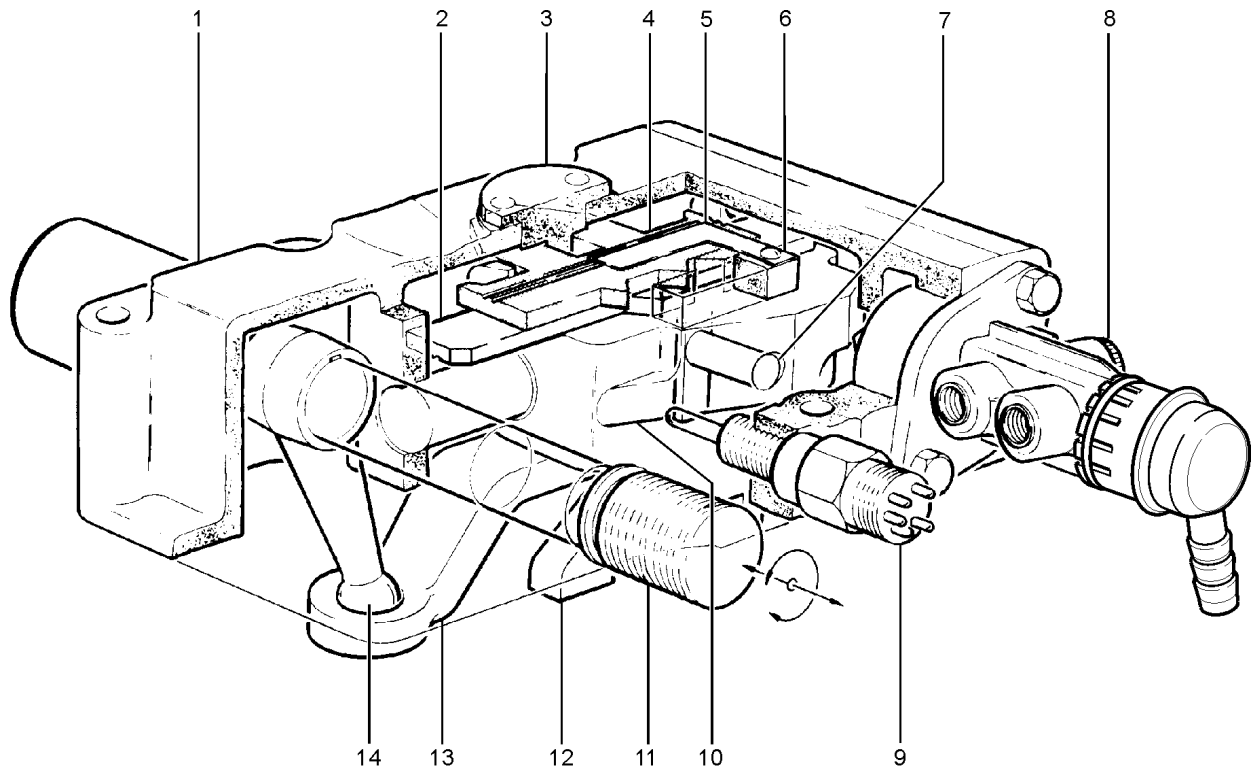
Some versions of 4/2 shift valves are fitted with a gasket or use an O-ring as the sealing medium between the valve and the shift mechanism housing.

- g. Remove the two M8 bolts and spring washers securing the 4/2 shift valve (Figure 1 (8)) to the shift mechanism housing (Figure 1 (1)) and remove the shift valve. Discard the 4/2 shift valve O-ring or gasket, as applicable.
- h. Remove and discard the cross shaft locating dowel pin (Figure 1 (22)).
- i. Remove and discard the end cover (Figure 1 (15)).

NOTE

Take care when removing the shift finger and pawl assembly. The assembly has detent balls and springs under the lower detent plate that should not be disturbed.

- j. Slide the cross shaft (Figure 1 (16)) out of the shift mechanism housing and remove the shift finger (Figure 1 (12)) and pawl (Figure 1 (13)) as an assembly.



- | | | |
|----------------------------|-------------------------|-------------------------|
| 1. Shift mechanism housing | 8. 4/2 shift valve | 15. End cover |
| 2. Lower detent plate | 9. Gate position switch | 16. Cross shaft |
| 3. Detent stop | 10. Cam plate | 17. Woodruff key |
| 4. Upper detent plate | 11. Shift shaft | 18. Dowel pin |
| 5. Spring plate | 12. Shift finger | 19. Shaft bushing |
| 6. Fixed detent | 13. Pawl | 20. Compression spring |
| 7. Detent plunger | 14. Shift arm | 21. Ball bearing (8 mm) |

Figure 1 Shift Mechanism

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- k. Remove the detent ball (Figure 1 (21)), detent spring (Figure 1 (20)) from the shift finger and pawl assembly. Discard the detent ball and detent spring.
- l. Knock the two cross shaft bushes (Figure 1 (19)) out of the shift finger and pawl assembly using a suitable drift. Discard the bushes.

WARNING

Ensure the safety requirements for use of compressed air are strictly adhered to. Inadvertent use of compressed air equipment may result in injury to personnel.

- m. Clean and dry the components removed from the shift mechanism housing.
- n. Align the upper detent plate (Figure 1 (4)), the lower detent plate (Figure 1 (2)), and spring plate (Figure 1 (5)), ensuring the groove in the pawl is aligned with detent stop (Figure 1 (13)), see Figure 2.

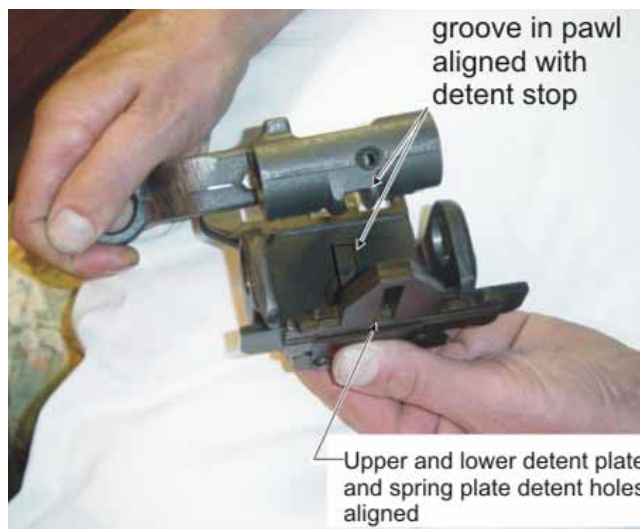


Figure 2 Pawl Installation

- o. Insert the chamfered end of the cross shaft bush (Table 1, Item 1.1) towards the pawl and align the machined groove in the outer diameter of the bush with the casting ridge on the pawl (Figure 3). When the bush is in its final position, the machined groove in the outer diameter of the bush and the casting ridge on the pawl must be aligned.

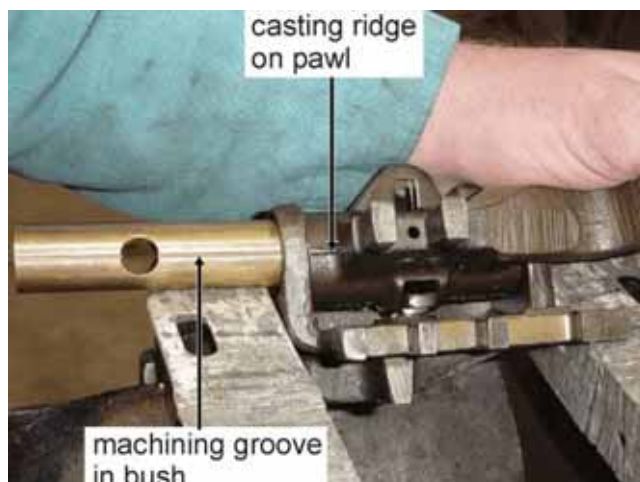


Figure 3 Cross Shaft Bush Alignment

NOTE

The locking agent (Loctite 609) (Table 1, Item 1.4) must only be applied through the pawl detent spring and ball locating hole (Figure 4). Do not apply the locking agent, until the cross shaft bush is inserted through the pawl and the chamfered end of the bush is visible at the detent spring and ball-locating hole (Figure 4). If the locking agent is applied prior to the bush being inserted to the detent spring and ball locating hole, the bush may become bonded to the pawl end of the shift finger when the bush is finally located. As a result, shift lever operation will be stiff. If the bush becomes bonded to the pawl end of the shift finger, the assembly must be stripped, cleaned of all locking agent residue, and reassembled as described in Subparas m. to q.

- p. Push the cross shaft bush (by hand) into the pawl, until the chamfered end of the bush appears at the detent spring and ball locating hole is in the centre of the pawl. At the same time, the detent spring and ball-locating hole in the bush will just begin to be covered by the pawl, see Figure 4.

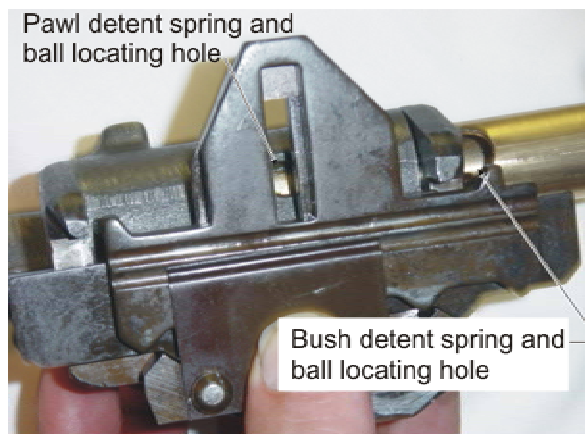


Figure 4 Detent Spring and Ball Locating Holes

- q. Commence applying the locking agent through the pawl detent spring and ball-locating hole (Figure 4); at the same time working the cross shaft bush forward in a twisting motion. Continue to apply locking agent to gain maximum coverage of the locking agent between the bush and the pawl surfaces. Cease the application of the locking agent, just before the detent spring and ball locating hole in the bush aligns with the detent spring and ball locating hole in the pawl. Ensure that before the bush is ready to be knocked into its final position the machined groove in the outer diameter of the bush and the casting ridge on the pawl are aligned, see Figure 3.
- r. With the drift (Table 1, Item 1.3) gently drive the cross shaft bush through the last part of its travel until the ends of the bush are flush at both ends of the shift finger.
- s. Allow the shifting assembly to sit for a minimum fifteen minutes to allow the locking agent to cure.
- t. Apply a light film of lubricant (XG-291) to the shift arm locating hole in the pawl and inside each end of the cross shaft bush.
- u. Install the new detent spring (Table 1, Item 1.7) and the new detent ball (Table 1, Item 1.8) into position in the pawl, either through the pawl detent spring and ball-locating hole, or through the centre of the cross shaft bush.
- v. Insert the dummy shaft (Table 1, Item 1.2) into the cross shaft bush with the chamfered end leading. Engage the ball and compress the spring to retain the spring and ball in position.
- w. Install the shift finger and pawl assembly into the shift mechanism housing.
- x. Hold the shift finger and pawl assembly against the 4/2 shift valve end of the shift mechanism housing, and push the cross shaft (Fig 1 (16)) through the shift finger and pawl assembly. Recover the dummy shaft as it is pushed out of the assembly.
- y. Insert the new cross shaft locating dowel pin (Table 1, Item 1.6) through the shift mechanism housing and into the groove in the cross shaft.

- z. Coat the new end cover (Table 1, Item 1.9) with a locking agent (Loctite 241).
- aa. Install the end cover in the end of the cross shaft bore in the shift mechanism housing.

NOTE

Some versions of 4/2 shift valves are fitted with a gasket (Table 1, Item 1.10) or use an O-ring (Table 1, Item 1.11) as the sealing medium between the valve and the shift mechanism housing.

- ab. Install a new gasket ((Table 1, Item 1.10) or O-ring (Table 1, Item 1.11) (as applicable) on the 4/2 shift valve. Lubricate the O-ring with petroleum jelly prior to assembly.
 - ac. Coat the threads of the two M6 mounting bolts that secure the 4/2 shift valve with a locking agent (Loctite 241).
 - ad. Install the 4/2 shift valve in the shift mechanism housing and secure with the two M6 mounting bolts fitted with spring washers. Torque the bolts to 25 N.m.
 - ae. Coat the threads of the gate position switch (Fig 1 (9)) with a locking agent (Loctite 241). Screw the switch into the housing and tighten.
 - af. Lubricate the shift mechanism with oil (OEP 220) and check the operation of the mechanism by hand. Repair as required.
 - ag. Engrave the number 36 on the top face of the shift mechanism housing, see Para 13.
 - ah. Fit the new shift mechanism housing gasket (Table 1, Item 1.5) to the transmission and install the shift mechanism on the transmission. Refer to EMEI Vehicle G 603, Para 115.
 - ai. Check the adjustment of the gear change linkage, adjust if required. Refer to EMEI Vehicle G 603, Para 116.
12. **Post Modification Testing.** Road-test the vehicle, test the operation of the transmission through all gears, and check for air and oil leaks. Rectify as required.
13. **Recording Action.** On completion of the modification, the following actions are to be carried out in accordance with TRAMM, Volume 3, Section 2, Annex D:
- a. Deface the number 36 on the vehicle modification record plate.
 - b. Engrave the number 36 on the top face of the shift mechanism housing (Figure 5).



Figure 5 Position of Numerals

- c. Complete the modification details in Part 3 of the GM 120 – Record Book for Service Equipment.
- d. Forward the modification details using GM 119 – Advice of Change in Build State (TRAMM, Volume 2, Section 2, Chapter 3, Annex C) to:

National Technical Advisor – Unimog
Mdm & Hvy B Veh, LV SPO
Victoria Barracks, St Kilda Rd
SOUTHBANK VIC 3006

Table 1 Stores Required

Item	NSN	Mfr Part No	Designation or Description	Unit of Issue	Qty per Kit	Qty per Equip
1	2520-66-152-8872	YA 425 268 00 50	Kit, Unimog Transmission Selector Modification consisting of:	Each	NA	1
1.1	TBA	DE 251890001	Bush, Shift Mechanism Cross Shaft	Each	1	
1.2	Not scaled	DE 251890002	Dummy Cross Shaft	Each	1	
1.3	Not scaled	DE 251890003	Assembly Drift	Each	1	
1.4	Not scaled	Loctite 609	Single Application Pack, 0.5 ml	Each	1	
1.5	5330-66-135-2706	4372610480	Gasket, Selector Box to Transmission	Each	1	
1.6	5315-12-130-4922	000007 008207	Pin, Straight, Headless	Each	1	
1.7	5360-01-244-6165	002098 001029	Spring, Helical, Compression	Each	1	
1.8	3110-12-124-0824	005401 308000	Ball, Bearing	Each	1	
1.9	5340-12-356-1541	000443 018003	Plug, Expansion	Each	1	
1.10	5330-12-173-7796	425 261 26 80	Gasket, 4/2 Shift Valve	Each	1	
1.11	5330-66-130-3215	0149978148	Packing, Preformed	Each	1	

Table 2 Items to be Removed

Item	NSN	Mfr Part No	Designation or Description	Qty per Equip
1	5365-12-198-6925	425 268 07 50	Bushing	2

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END

Distribution List: **VEH G 30.0 – Code 2** (Maint Level)
(Sponsor: LV SPO, Mdm/Hvy B Veh)
(DMO ECO MHB 011/04)