TRUCK, MEDIUM, MC2 - UNIMOG, ALL TYPES
FRONT AND REAR TORQUE TUBE - PARTIAL REMOVAL

MISCELLANEOUS 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 procedures for partial removal of the front and rear torque tubes on the Unimog 4x4 family of vehicles. These procedures facilitate access to drive line components without a need to fully remove an axle assembly or transmission from the vehicle. This instruction is not intended for use on the 6x6 Medium Recovery Vehicle (MRV).

Associated Publications
2. Reference may be necessary to the latest issue of the following documents:
   a. Technical Regulation of ADF Materiel Manual – Land (TRAMM-L);
   b. EMEI Vehicle A 029 - Vehicles – General, Servicing of B Vehicles, Trailers, Motor Cycles, Stationary Equipment Auxiliary and Small Engines – Servicing Instruction;
   c. EMEI Vehicle D 108 - Recovery Equipment, Inspection of Recovery Equipment – Inspection For Serviceability;
   d. EMEI Workshop E series – Occupational Health and Safety Instructions;
   e. EMEI Vehicle G 604 - Truck Cargo Medium, MC2 - UNIMOG – Medium Grade Repair;
   f. EMEI Vehicle G 604-1 - Truck Cargo Medium, MC2 - UNIMOG – Heavy Grade Repair; and
   g. EMEI Misc Equip O 008 - Lifting Tackle Components – Inspection for Useability.

Authority
3. Procedures detailed in this instruction are to be performed by RAEME unit tradespersons, technical support sub units and sub-unit workshops authorised to carry out Medium and Heavy Grade Repairs or civilian equivalent tradespersons with suitable qualifications and having been equally trained.

GENERAL
4. Procedures contained in this instruction detail the partial separation of the front or rear torque tube from the vehicle transmission assembly. These procedures are to be used to gain access to the component parts in need of replacement or servicing action.

NOTE
This publication details partial removal of either torque tube assembly only. EMEI Vehicle G 604 must be read if complete axle assembly removal is required.

5. Component parts which can be replaced or serviced are detailed as follows:
   a. differential housing input seals;
   b. torque tube half shells;
   c. transfer case output seals; and
   d. propeller shafts and/or universal joints.
Special Equipment

6. **Unimog Torque Tube Maintenance Kit (UTTMK).** The UTTMK can be ordered by units authorised to carry out Medium or Heavy Grade Repair. Demands for the UTTMK are to be placed through the defence supply chain using NSN 4910-66-156-5930. The maintenance kit (see Figure 1) comprises the components listed in Table 1.

   a. **Support Post (leg).** The original support leg was manufactured from aluminium and was prone to damage due to overloading (as shown in Figure 7). A replacement mild steel support post will eventually replace all aluminium support posts. The steel post (as detailed at Table 1) will be less prone to such damage and will be painted pink for easy identification. The earlier aluminium support leg, if deemed ‘FF-Fully Functional’, can remain in use until it is replaced by the steel item.

![Unimog Torque Tube Maintenance Kit (UTTMK)](image)

### Table 1  UTTMK Components

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Drawing Number</th>
<th>NSN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Box (not shown), Trimcast 1100 x 550 x 310 mm</td>
<td>N/A</td>
<td>TBA</td>
</tr>
<tr>
<td>1</td>
<td>Foam Insert (not shown)</td>
<td>DE252670014</td>
<td>TBA</td>
</tr>
<tr>
<td>1</td>
<td>Lifting Bar</td>
<td>DE252670001</td>
<td>TBA</td>
</tr>
<tr>
<td>1</td>
<td>Pulling Plate</td>
<td>DE252670004</td>
<td>TBA</td>
</tr>
<tr>
<td>1</td>
<td>Support Post, Steel (coloured pink)</td>
<td>DE252670010</td>
<td>4910-66-156-5939</td>
</tr>
<tr>
<td>1</td>
<td>Lever Chain Block, 1.5 tonne</td>
<td>N/A</td>
<td>TBA</td>
</tr>
<tr>
<td>1</td>
<td>Safety Block Assembly</td>
<td>DE252670007</td>
<td>TBA</td>
</tr>
<tr>
<td>2</td>
<td>Pin Quick Release (not shown)</td>
<td>N/A</td>
<td>TBA</td>
</tr>
<tr>
<td>2</td>
<td>Flanged Hex Head Bolt, 14 mm by 70 mm by 1.5 mm, Grade 10.9 metric – pulling plate mounting</td>
<td>N/A</td>
<td>TBA</td>
</tr>
<tr>
<td>2</td>
<td>Hex Head Bolt, 10 mm by 30 mm by 1.5 mm, Grade 8.8 metric – safety block assembly mounting</td>
<td>N/A</td>
<td>TBA</td>
</tr>
</tbody>
</table>
7. **Management Aspects for the UTTMK.** The UTTMK, NSN 4910-66-156-5930 forms part of the Specialist Tooling and Test Equipment (ST & TE) suite for the UNIMOG 1700 series FOV. These kits are quantity tracked items on MILIS meaning they do not have their own 600 – Equipment Record. Kits are to be managed by the owner repair agency using a similar methodology to that of other workshop equipment such as Lifting/ Recovery and Tie-down Equipment (LRTE), vehicle jacks and safety stands.

a. **Marking of Kit Components.** It is recommended that owner units mark the main components of the UTTMK with a unique number which ensures a kit is returned to the tool store with the same items. This will help identify such parts during the conduct and writing up of the Technical Inspection.

b. **Inspection Prior to Use.** All workshop equipment used during the conduct of the maintenance tasks detailed in this EMEI are to have in-date, FF-Fully Functional labels affixed as stated in TRAMM-L. The kit is to be free from damage and complete prior to use as assessed by the tradesperson about to undertake the task.

c. **Technical Inspection (TI).** The UTTMK is to have a TI conducted, as a minimum, on an annual basis. The kit can also be inspected under the following conditions:
   (1) if 12 months has elapsed since the last inspection,
   (2) if damage to the equipment has occurred,
   (3) if directed by a higher authority, or
   (4) if equipment disposal action is being sought.

d. **Personnel Authorised to Conduct the TI.** The following personnel are authorised to carry out the TI on the UTTMK:
   (1) ECN 146 (Fitter Armament);
   (2) ECN 229 (Vehicle Mechanic);
   (3) a trade qualified light vehicle mechanic or Navy/RAAF equivalent; or
   (4) a trade qualified Fitter or Navy/RAAF equivalent.

e. **Detail of the TI.** The TI, as a minimum, is to inspect the UTTMK for the following:
   (1) **Kit Completeness.** Ensure the kit is complete when checked against the items at Table 1.
   (2) **Kit Condition.** Ensure all items are free from damage, deformation and all welds are intact. The pulling plate and lifting bar wear profiles must have less than 10% wear evident. The lever chain block is to be functionally checked and all LRTE aspects inspected for serviceability.

f. **Documentation Following the TI.** Following the TI, the UTTMK is to be affixed with a minimum to two, FF-Fully Functional labels (AD204) detailing the 12 month expiry date. One label is to be placed on the outside of the Trimcast box and the other on the body of the lever chain block.

8. **Vehicle Jack.** The UTTMK support post has been designed to fit the Jack, Dolly Type, Hydraulic, 10 Tonne NSN 4910-66-128-2330 (see Figure 2). The support post pin diameter is 38 mm and will fit the majority of the jacks held under this stock code. Some jacks, however, have different boss sizes and will not be suitable for use with the UTTMK support post. Maintenance agencies are advised to cross level 10 tonne trolley jacks in regions so all units have at least one jack suitable for use with the UTTMK.

![Figure 2  Jack, Dolly Type, Hydraulic, 10 Tonne](image-url)
NOTE

Under no circumstances should the UNIMOG, CES, metal wheel chocks be used during the following procedures. This CES item has been found to be ineffective in preventing axle movement on most workshop floor surfaces.

9. Rubber Wheel Chocks. A minimum of six rubber wheel chocks are required to carry out either front or rear partial torque tube removal. The following procedures require one axle to be firmly held while the remaining axle is winched apart and then also chocked. No specific rubber chock has been identified as many unit workshops over the years have acquired various chocks via Direct Unit Funding (DUF) and through the Defence Supply Chain. Figure 3, depicts one such suitable chock used by ASEM (VTW) and can be ordered by NIIN 66-162-0006 (Blackwoods Pty Ltd, Model CH-245, Part Number 00694535).

![Figure 3 Rubber Wheel Chocks](image)

NOTE

Prior to partial torque tube removal for transmission output or differential pinion oil seal replacement the fording pressure circuit should be checked for correct adjustment. An over pressurised fording circuit will have the same effect as a damaged seal by allowing oil into the respective torque tubes. EMEI Vehicle G 604 contains the details of this procedure.

FRONT TORQUE TUBE PARTIAL REMOVAL

Removal

**WARNING**

CRUSH HAZARD. This procedure must be performed on flat, level ground firm enough to support the dolly jack and safety stands. Failure to comply with this direction could result in serious personal injury or death.

10. To separate the front torque tube from the transmission assembly, proceed as follows:

   a. Ensure the park brake is applied.

   b. Remove the spare wheel to facilitate better access to the front torque ball housing and propeller shaft bolts.
CRUSH HAZARD. The front and rear wheels must be correctly chocked to ensure that the vehicle, or axle being worked on, does not move during the separation procedure. As discussed at paragraph 9, the use of rubber chocks is required. Failure to comply with this direction could result in serious personal injury or death.

NOTE
Under no circumstances should the UNIMOG, CES, metal wheel chocks be used during the following procedures. This CES item has been found to be ineffective in preventing axle movement on most workshop floor surfaces.

c. Chock both rear wheels by positioning wheel chocks in front of and behind each wheel.
d. Chock both front wheels by positioning wheel chocks behind each wheel.
e. Remove the clamps securing the brake line, differential lock line, vent line and brake wear indicator cable to the torque tube.
f. Remove the clamps securing the torque tube ball rubber boot and remove the vent line from the boot.
g. If an early type boot is fitted, slide it clear.
h. If a later type boot is fitted, remove the boot.
i. Use penetrating oil to lubricate the fasteners securing the front panhard rod to the chassis bracket and axle assembly.
j. Disconnect both ends of the panhard rod and remove from the vehicle.
k. Remove the two lower bolts securing the front axle halves.

WARNING
INJURY HAZARD. Only use 14 mm by 70 mm, Grade 10.9 bolts to secure the pulling plate to the front differential housing. Failure to comply may cause serious injury to personnel and damage to equipment.
l. Position the pulling plate onto the axle (see Figure 4), install the two supplied mounting bolts (as detailed in Table 1) and torque to 100 N.m.

Figure 4 Position of the Pulling Plate Mounted on the Front Differential Housing
m. Position the lifting bar in the front lower towing and lifting brackets (as shown in Figure 5) ensuring that the ‘D’ ring is to the nearside of the vehicle and install the two, 14 mm push-pull pins to retain the lifting bar in position.
NOTE

It may be necessary to remove the engine sump guard in order to overcome interference with the lever chain block.

n. Connect the hoist so that the hook (body end) is secured to the lifting bar ‘D’ ring and the hook (chain end) is secured to the pulling plate, as shown in Figure 6, ensuring there is no tension on the chain.

Figure 5  Position of the Lifting Bar Fitted to the Vehicle

Figure 6  Lever Chain Block Hooked Up to the Lift Bar and Pulling Plate

WARNING

INJURY HAZARD. Only the Jack, Dolly Type, Hydraulic, 10 Tonne NSN 4910-66-128-2330 is to be used with the UTTMK. Jack choice must ensure the support post positively fits the diameter of the jack head. Failure to comply could result in the support leg collapsing, causing serious injury to personnel and damage to equipment.

o. Prepare the 10 tonne jack by removing the headcap from the jack lifting arm.

p. Install the support post into the head of the jack ensuring a positive fit.
EQUIPMENT DAMAGE. The UTTMK support post has been prone to damage due to overloading (see Figure 7). The function of the support post is to bear the weight of the torque tube assembly only and is not intended to be used as a lifting device.

Figure 7  Support Post Damage due to Overloading

q. Position the 10 tonne jack under the torque tube at the stabiliser arm brackets (see Figure 8) and raise the jack until the support post is in light contact with, but not lifting the torque tube.

Figure 8  Position of the Dolly Jack with the Support Post

r. Remove the bolts securing the front torque ball housing to the main transmission and slide the housing clear.

s. Position the safety block assembly on the ground beneath the vehicle adjacent to where the torque tube is to be separated.
WARNING

INJURY HAZARDS. Exercise extreme caution when placing fingers in the gap between the torque tube and transmission housing while fitting the Safety Block Assembly. Do not unduly expose fingers to the gap during fitting of the block. Accidental movement of the torque tube can result in serious injury to personnel and damage to components.

The safety block assembly must be installed before removing the propeller shaft bolts. Failure to comply can result in serious injury to personnel and damage to components.

CAUTION

SUPPORT POST DAMAGE. Avoid overloading of the support post by ensuring the saddle of the post only maintains light contact with the torque tube assembly during winching. As the torque tube separates, the vehicle’s suspension becomes loaded which can subject the support post to unnecessary overloading. It may be necessary to slightly lower the jack several times during winching so an ‘air gap’ is maintained with the torque tube assembly.

NOTE

The front axle should be moved only far enough to provide sufficient access to remove the torque tube ball shells and to install the safety block assembly.

t. Carefully operate the lever chain block until the torque tube separates far enough from the transfer case front housing to provide sufficient access to remove the torque tube ball half shells.

u. Reposition the chocks behind the front wheels.

v. Carefully remove the two front torque ball half shells.

NOTE

Only use 10 mm by 30 mm bolts, as supplied in the UTTMK (as detailed in Table 1) to secure the safety block assembly to the transfer case front output housing.

The safety block assembly can be moved around the perimeter of the transfer case output housing to facilitate best access to the propeller shaft bolts.

w. Position the safety block assembly on the transfer case front output housing (see Figure 9) and fit the two bolts provided and firmly tighten.

Figure 9  Position of the Safety Block Assembly on the Transmission
x. Reposition the front wheel chocks to allow the front axle to move rearward far enough for the torque tube to seat on the safety block assembly.

**NOTE**

The jack may need to be lifted or lowered slightly to enable the torque tube ball to move back onto the safety block assembly.

y. Carefully operate the lever chain block until the torque tube ball just contacts the safety block assembly (see Figure 10) ensuring tension remains on the lever chain block.

![Figure 10](image)

**Figure 10** Position of the Torque Tube Resting Against the Safety Block Assembly

z. Re-chock the front wheels.

### WARNING

**INJURY HAZARD.** Exercise extreme caution when removing the propeller shaft bolts. Do not unduly expose fingers within the gap between the torque tube and transfer case front output flange. Failure to comply could result in serious personal injury.

aa. Remove the bolts securing the propeller shaft to the transmission output flange.

bb. Using a suitable lever, push the propeller shaft into the torque tube as far as practicable.

cc. Remove the torque ball shims and inspect for damage.

dd. If the shims are damaged, note the size and quantity and replace as required.

ee. Carefully set aside the undamaged shims for later use.

ff. Reposition the front wheel chocks to allow the axle to be moved far enough forward to facilitate lowering of the torque tube.

### CAUTION

**STABILITY HAZARD.** The torque tube is only to be separated from the transfer case front housing far enough to allow clearance for the torque tube to be lowered. This will help reduce the likelihood of damage to any associated equipment.

gg. Carefully operate the lever chain block until the torque tube separates far enough from the safety block assembly to allow the torque tube to be lowered.

hh. Re-chock both front and rear of the front wheels.
CRUSH HAZARD. Ensure both front and rear of the front wheels are firmly chocked after the torque tube has been lowered to ensure the front axle is not able to move. Failure to comply with this direction could result in serious personal injury or death.

STABILITY HAZARD. Only lower the torque tube far enough to facilitate removal of the torque ball housing. This will help reduce the likelihood of damage to any associated equipment.

ii. Carefully lower the torque tube on to a safety stand and ensure the assembly is stable.
jj. Firmly re-chock both front and rear of the front wheels.

11. Carry out the necessary adjustments and repairs in accordance with EMEI Vehicle G 604 and G 604-1.

12. To remove the propeller shaft and torque tube, proceed as follows:
   a. Ensure the torque tube is correctly supported using the dolly jack fitted with the support leg and a safety stand.
   b. Remove the bolts securing the two axle struts to the torque tube brackets.
   c. Remove the bolts securing the torque tube to the axle assembly, keeping the plastic end cover on the propeller shaft.
   d. Carry out the necessary adjustments and repairs in accordance with EMEI Vehicle G 604 and G 604-1.

Installation

13. To connect the front torque tube assembly to the front axle assembly, proceed as follows:
   a. Ensure the safety block assembly is correctly installed.
   b. Coat the torque arm ball generously with molybdenum-disulphide grease XG-276.
   c. Coat the torque tube flange with sealing compound Terostat 56 (MPN 001.989.58.20).
   d. Using a safety stand and the dolly jack fitted with the support post, position the torque tube on the axle assembly.
   e. Install and firmly tighten the bolts to secure the torque tube to the front axle assembly.
   f. Torque the bolts to 200 N.m.
   g. Thoroughly clean the threads on the axle strut securing nuts and bolts and apply loctite 243 (thread locker) to the threads.
   h. Position the axle struts onto the torque tube brackets and install all fasteners and firmly tighten.
   i. Torque the fasteners to 350 N.m.
   j. Clean the inner splines of the propeller shaft and fill the cavity behind the profile inside the shaft with 50 gm of long-life lubricating grease XG-291.
   k. Install the propeller shaft with the plastic end cover into the torque tube.

14. To connect the torque tube assembly to the transmission, proceed as follows:
   a. Ensure the safety block assembly is still correctly installed.
   b. Using the 10 tonne jack fitted with the support post, raise the torque tube until the propeller shaft is correctly aligned with the transmission output flange.
c. Reposition the front wheel chocks to allow the front axle to move rearward to allow the propeller shaft to be reattached to the transfer case output flange.

d. Carefully operate the lever chain block until the torque tube ball rests fully on the safety block assembly (see Figure 10) ensuring tension remains on the hoist chain.

e. Re-chock the front wheels.

NOTE

Torque ball shims are installed between the torque ball housing and the main transmission to ensure the correct torque setting on the torque ball is achieved. The procedure to measure and adjust the torque setting is detailed in EMEI Vehicle G 604 - Medium Grade Repair.

f. Install the torque ball shims.

WARNING

INJURY HAZARD. Exercise extreme caution when installing the propeller shaft bolts. Do not unduly expose fingers to the gap when installing the bolts. Failure to comply may cause serious injury to personnel.

g. Position the propeller shaft flange onto the transfer case front output flange ensuring all bolt holes are correctly aligned.

h. Install the four securing bolts and firmly tighten.

i. Torque the bolts to 100 N.m.

j. Reposition the front wheel chocks to allow the axle to be moved far enough forward to facilitate installing the torque tube ball shells.

STABILITY HAZARD. The torque tube must be separated only far enough to allow adequate access for installing the torque tube ball shells. This will help reduce the likelihood of damage to any associated equipment.

k. Carefully operate the lever chain block until the torque tube separates far enough from the transfer case front housing to provide sufficient access to install the torque tube ball shells.

l. Re-chock the front wheels.

m. Remove the safety block assembly.

n. Coat the torque ball shells with molybdenum-disulphide grease XG-276.

o. Install the torque ball shells.

p. Reposition the front wheel chocks to allow the front axle to move rearward far enough for the torque tube to seat into position on the transfer case housing.

q. Carefully operate the lever chain block until the torque tube rests fully in position on the transmission front output housing and tension remains on the lever chain block.

r. Re-chock the front wheels.

s. Slide the torque ball housing into position.

t. Install the mounting bolts to secure the housing and torque bolts to 60 N.m.

u. Lower and remove the dolly jack.

v. Remove the support leg from the jack lifting arm and re-install the headcap.

w. Remove the safety stand.
x. Unhook and remove the lever chain block.
y. Remove the lifting bar.
z. Remove the bolts securing the pulling plate to the front axle housing and remove the plate.
aa. Apply Loctite 243 to the threads of the two original front axle housing bolts.
bb. Re-install the bolts into the axle housing and torque bolts to 200 N.m.
c. Position the front panhard rod in the chassis bracket.
dd. Install the bolt and nut to secure the panhard rod to the bracket and torque nut to 300 N.m.
e. If a later type torque ball boot is to be fitted, install the boot onto the tube in position over the casing.
f. If an early type boot is fitted, slide the boot into position over the casing.
gg. Install the clamps to secure the boot.
hh. Position the brake line, differential lock line, vent line and brake wear indicator cable on the torque tube.
i. Install the clamps and firmly tighten to secure the lines.
jj. Remove the wheel chocks.
kk. Road test the vehicle.
ll. Check/clean and re-stow the UTTMK components and return kit to the store.

REAR TORQUE TUBE PARTIAL REMOVAL

Removal

**WARNING**

**CRUSH HAZARD.** This procedure must be performed on flat, level ground firm enough to support the dolly jack and safety stands. Failure to comply with this direction could result in serious personal injury or death.

15. Separate the rear torque tube from the transmission assembly as follows:
a. Ensure the park brake is applied.
b. Remove the spare wheel to facilitate better access to the rear torque ball housing and propeller shaft bolts.

**WARNING**

**CRUSH HAZARD.** The front and rear wheels must be correctly chocked to ensure that the vehicle, or axle being worked on, does not move during the separation procedure. As discussed at paragraph 9, the use of rubber chocks is required. Failure to comply with this direction could result in serious personal injury or death.

c. Chock both front wheels by positioning wheel chocks in front of and behind the wheels.
d. Chock both rear wheels by positioning wheel chocks in front of the wheels.
e. Manually release the park brake.
f. Disconnect the automatic load-dependant brake (ALB) valve linkage from the torque tube.
g. Remove the clamps securing the brake line, the differential lock line and the vent line.
h. Remove the clamps securing the torque tube ball rubber boot and remove the vent line from the boot.
i. If an early type boot is fitted, slide it clear.
j. If a later type boot is fitted, remove the boot.

k. Use penetrating oil to lubricate the bolt and nut securing the rear panhard rod to the chassis bracket.

l. Remove the nut and bolt and separate the panhard rod from the bracket.

m. It may be necessary to partially remove the ditching tool bracket, by removing the uppermost bolt that secures it to the tray chassis cross member. This will help facilitate installation of the lifting bar on the rear lifting points (see Figure 11).

n. Position the lifting bar on the lifting points on the rear of the vehicle with the D ring in line with the differential housing and secure with the provided push-pull pins.

o. Remove the two uppermost 14 mm internal hex head bolts on the rear side of the axle housing securing the rear axle halves (see Figure 11). This then allows the pulling plate to be installed.

**WARNING**

INJURY HAZARD. Only use 14 mm by 70 mm, Grade 10.9 bolts to secure the pulling plate to the rear differential housing. Failure to comply may cause serious to personnel and damage to equipment.

p. Position the pulling plate on the top of the rear differential housing using the two 14 mm by 70 mm bolts supplied in the UTTMK and torque to 100 N.m.

**NOTE**

q. Hook up the lever chain block between the pulling plate and the lifting bar, as shown in Figure 11, ensuring that there is only enough tension on the lever chain block to support the hoist mechanism.
Only the Jack, Dolly Type, Hydraulic, 10 Tonne NSN 4910-66-128-2330 is to be used with the UTTMK. Jack choice must ensure the support leg positively fits the diameter of the support leg. Failure to comply can result in the support leg collapsing causing serious injury to personnel and damage to equipment.

EQUIPMENT DAMAGE. The UTTMK support post has been prone to damage due to overloading (see Figure 12). The function of the support post is to bear the weight of the torque tube assembly only and is not intended to be used as a lifting device.

<table>
<thead>
<tr>
<th>Figure 12 Support Post Damage due to Overloading</th>
</tr>
</thead>
<tbody>
<tr>
<td>r. Prepare the 10 tonne jack by removing the headcap from the jack lifting arm and installing the support post ensuring positive engagement into the jack.</td>
</tr>
<tr>
<td>s. Position the jack under the torque tube at the rear stabiliser arm brackets (see Figure 11).</td>
</tr>
<tr>
<td>t. Raise the jack until the support post is in contact with, but not lifting the torque tube.</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Figure 13 Position of the 10 tonne Jack with the Support Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>u. Remove the bolts securing the rear torque ball housing to the main transmission and slide the housing clear.</td>
</tr>
<tr>
<td>v. Position the safety block assembly on the ground beneath the vehicle adjacent to where the torque tube is to be separated.</td>
</tr>
<tr>
<td>w. Operate the lever chain block until there is a slight tension on the tackle, check the position of the tackle and adjust as required.</td>
</tr>
</tbody>
</table>
SUPPORT POST DAMAGE. Avoid overloading of the support post by ensuring the saddle of the post only maintains light contact with the torque tube assembly during winching. As the torque tube separates, the vehicle’s suspension becomes loaded which can subject the support post to unnecessary overloading. It may be necessary to slightly lower the jack several times during winching so an ‘air gap’ is maintained with the torque tube assembly.

NOTE

The rear axle should be moved only far enough to provide sufficient access to remove the torque tube ball shells and install the Safety Block Assembly.

x. Carefully operate the lever chain block until the torque tube separates far enough from the transfer case rear housing to provide sufficient access to remove the torque tube ball shells and to install the safety block assembly.

y. Re-chock the rear wheels.

INJURY HAZARDS. Do not carry out repairs to the axle, torque tube and transfer case rear output housing components once the axle assembly has been winched apart, unless the axle is properly secured and the safety block assembly is installed.

Exercise extreme caution when placing fingers in the gap between the torque tube and the transfer case rear housing while installing the safety block assembly. Do not unduly expose fingers within the gap during the safety block installation. Accidental movement of the torque tube could result in serious injury to personnel and/or damage to components.

The safety block assembly must be installed prior to removing the propeller shaft bolts. Failure to comply can result in serious injury to personnel and/or damage to components.

NOTE

Use only the two 10 mm by 30 mm bolts supplied with the UTTMK to secure the safety block assembly.

z. Position the safety block assembly on the transfer case rear output housing.

aa. Fit the two 10 mm by 30 mm bolts provided and torque to 60 N.m (see Figure 12).

bb. Relieve sufficient tension off the lever chain block to allow the torque tube to rest onto the safety block assembly.
Figure 14  Position of the Safety Block Assembly Fitted to the Rear of the Transmission

**WARNING**

INJURY HAZARD. Exercise extreme caution when removing the propeller shaft bolts. Do not unduly expose fingers within the gap when removing the bolts. Failure to comply may cause serious injury.

cc. Remove the bolts securing the propeller shaft to the transfer case output flange.

dd. Using a suitable lever, push the propeller shaft into the torque tube as far as possible.

ee. Remove the torque ball shims and inspect for damage.

ff. If the shims are damaged, note the size and quantity and replace as required.

gg. Carefully set aside the undamaged shims for later use.

hh. Reposition the rear wheel chocks to allow the axle to be moved rearward far enough to facilitate lowering of the torque tube.

**CAUTION**

STABILITY HAZARD. The torque tube must be separated only far enough to allow the torque tube to be lowered. This will help reduce the likelihood of damage to any associated equipment.

ii. Carefully operate the lever chain block until the torque tube separates from the safety block assembly far enough to allow the torque tube to be lowered.

jj. Re-chock the rear wheels.

kk. Adjust the safety stand to allow the torque tube to be lowered to the desired height.
NOTE

Only lower the torque tube far enough to facilitate removal of the torque ball housing.

WARNING

CRUSH HAZARD. Ensure both front and rear of the rear wheels are firmly chocked after the torque tube has been lowered to ensure the rear axle is not able to move. Failure to comply with this direction could result in serious personal injury or death.

II. Carefully lower the torque tube on to a safety stand and ensure the assembly is stable.

NOTE

When lowering the torque tube ensure that the ALB valve bracket does not foul the brake lines, differential lock line or differential breather lines.

mm. Firmly re-chock both the front and rear of the rear wheels.

nn. The 10 tonne jack can now be removed if necessary.

16. Carry out the necessary adjustments and repairs in accordance with EMEI Vehicle G 604 and G 604-1.

17. To remove the propeller shaft and torque tube, proceed as follows:
   a. Ensure the torque tube is correctly supported by the 10 tonne jack and safety stand at a height to facilitate the removal of the propeller shaft and torque tube.
   b. Remove the bolts securing the two axle struts to the torque tube brackets.
   c. Remove the bolts securing the torque tube to the rear axle assembly.
   d. Remove the propeller shaft and torque tube, keeping the plastic end cover (if fitted) on the propeller shaft.
   e. Carry out the necessary adjustments and repairs in accordance with EMEI Vehicle G 604 and G 604-1.

Installation

18. To connect the rear torque tube assembly to the rear axle assembly, proceed as follows:
   a. Ensure the safety block assembly is correctly installed.
   b. Coat the torque tube ball with molybdenum-disulphide grease XG-276.
   c. Coat the torque tube flange with sealing compound Terostat 56 (MPN 001.989.58.20).
   d. Using a safety stand and the dolly jack fitted with the support post, position the torque tube on the rear axle assembly.
   e. Install and firmly tighten the bolts to secure the torque tube to the rear axle assembly.
   f. Torque the bolts to 200 N.m.
   g. Thoroughly clean the threads on the axle strut securing bolts and apply Loctite 243 to the threads.
   h. Position the axle struts on the torque tube brackets and install the bolts and firmly tighten.
   i. Torque the bolts to 350 N.m.
   j. Clean the inner splines of the propeller shaft and fill the cavity behind the profile inside the shaft with 50 gm of long-life lubricating grease XG-291.
   k. Install the propeller shaft into the torque tube.

19. To connect the rear torque tube assembly to the transmission, proceed as follows:
   a. Ensure the safety block assembly is still correctly installed.
b. Using the 10 tonne jack fitted with the support post, raise the torque tube until the propeller shaft is aligned with the transfer case rear output flange.

c. Reposition the rear wheel chocks to allow the rear axle to move forward far enough to allow the propeller shaft to be reconnected to the transfer case rear output flange.

d. Carefully operate the lever chain block until the torque tube rests fully on the safety block assembly (see Fig 13) ensuring slight tension remains on the lever chain block.

Figure 15  Position of Rear Torque Tube Against the Safety Block Assembly

e. Re-chock the rear wheels.

NOTE
Torque ball shims are installed between the torque ball housing and the main transmission to ensure the correct torque setting on the torque ball. The procedure to measure and adjust the torque setting is detailed in EMEI VEH G 604 – Medium Grade Repair.

f. Install the torque ball shims.

WARNING
INJURY HAZARD. Exercise extreme caution when installing the propeller shaft bolts. Do not unduly expose fingers to the gap when installing the bolts. Failure to comply may cause serious injury.

g. Position the propeller shaft flange onto the transfer case rear output flange, ensuring all bolt holes are correctly aligned.

h. Install the securing bolts and firmly tighten.

i. Torque the bolts to 100 N.m.

j. Reposition the rear wheel chocks to allow the axle to be moved rearward far enough to facilitate installing the torque tube ball shells.

k. Carefully operate the lever chain block until the torque tube ball separates far enough from the transfer case rear housing to provide sufficient access to install the torque tube ball shells.

l. Re-chock the rear wheels.

m. Remove the safety block assembly.

n. Coat the torque ball shells with molybdenum-disulphide grease XG-276.

o. Install the torque ball shells.

p. Reposition the rear wheel chocks to allow the axle to move far enough forward for the torque tube to seat in position on the transfer case rear output housing.
q. Carefully operate the lever chain block until the torque tube rests fully in position on the transfer case rear output housing, ensuring slight tension remains on the lever chain block.

r. Re-chock the rear wheels.

s. Slide the torque ball housing into position and install the mounting bolts to secure the housing.

t. Torque the bolts to 60 N.m.

u. Lower and remove the dolly jack.

v. Remove the support post from the 10 tonne jack and re-install the headcap to the jack.

w. Remove the safety stand.

x. Unhook and remove the lever chain block.

y. Position the rear panhard rod in the chassis bracket.

z. Install the bolt and nut to secure the panhard rod to the bracket.

aa. Torque the nut to 300 N.m.

bb. If a later type torque ball boot is to be fitted, install the boot onto the tube in position over the casing.

cc. If an early type boot is fitted, slide the boot into position over the casing.

dd. Install the clamps to secure the boot.

ee. Position the brake line, the differential lock line and the vent line on to the torque tube.

ff. Install the clamps and firmly tighten to secure the lines.

gg. Connect the ALB valve linkage to the torque tube.

hh. Manually apply the park brake.

ii. Remove the wheel chocks.

jj. Road test the vehicle.

kk. Check/clean and re-stow the UTTMK components and return the kit to the store.

END

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