

TRUCK, HEAVY, MC3 - MACK - ALL TYPES

REPLACEMENT OF WHEEL STUDS AND NUTS

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 procedure for a fleet-wide wheel stud and nut replacement for the Mack 'R' Series family of vehicles (FOV).
2. The Mack 'R' Series FOV has been prone to wheels studs shearing off resulting in complete wheel assemblies separating from the vehicle. Investigation has identified several contributing factors which may have lead to these failures. The possible causes for these failures are:
 - a. Over-tightening of the wheel nuts during wheel changing;
 - b. tightening wheel nuts while wheel assemblies are hot, resulting in stud fractures from contraction of components as they cool; and
 - c. incorrect or lack of retension procedures after wheel assembly replacement.
3. Due to the age of the subject fleet and previous procedures, the current condition of the studs as fitted to the 'R' series cannot be guaranteed.

Associated Publications

4. The procedure detailed within this EMEI must be read in conjunction with the latest version of the following publications:
 - a. EMEI Vehicle G 799-26 – Use of Torque Wrench for Tightening Wheel Nuts – Miscellaneous Instruction;
 - b. EMEI Vehicle G 799-23 –Identification of Rims and Approved Rim and Tyre Configurations – Miscellaneous Instruction;
 - c. EMEI Vehicle G 703 – Truck, Cargo, MC3, Mack - Light Grade Repair;
 - d. Repair Parts Scale 02160 – Truck, Cargo, MC3, Mack (Mack Base Line); and
 - e. Technical Regulation of Army Materiel Manual (TRAMM) (available from DTR-A website <http://intranet.defence.gov.au/armyweb/Sites/DTRA>).
5. **Authority.** This EMEI is issued under the authority of the Chief Engineer, LV SPO, DMO.

GENERAL

6. **Modification Application.** The wheel stud replacement is to occur to the entire Mack 'R' Series FOV, with the exception of those Mack Wreckers not converted to Heavy Recovery Vehicles (HRV) and any other Mack 'R' Series earmarked for possible disposal. Serviceable stock of complete axle assemblies, as detailed in paragraph 7, are to have all studs and wheel nuts replaced prior to being issued. This will prevent the migration of earlier studs being fitted back onto vehicles previously modified.
7. **Items Affected.** This instruction affects the following rotatable assemblies:
 - a. the front axle assembly, complete (RPS 02160, Group K, Item 001);
 - b. the intermediate axle assembly, complete (RPS 02160, Group JA, Item 001); and
 - c. the rear axle assembly, complete (RPS 02160, Group JA, Item 002).

- 8. Priority – Group 1.** All subject vehicles listed in paragraph 6 are to have this modification carried out with minimum delay and by NLT 30 Jun 08. Vehicles not modified by the cut-off date are to be re-classified “**XX- Do Not Use**”, until such time as the wheel stud replacement is carried out.
- 9. Action Required.** Actions detailed in this instruction are to be performed initially wherever possible by vehicle owner unit integral maintenance support. Future wheel stud and nut replacement can be performed by suitably qualified tradespersons authorised to carry out Light Grade Repair.
- 10. Estimated Repair Time (ERT).** For initial planning purposes the ERT to affect this procedure is 15.0 hours per vehicle. For single axle assemblies held as stock, the ERT for stud replacement is 5.0 hours.

NOTE

The time taken to drive the vehicle a total of 80 kilometres for wheel nut re-tension has not been factored in to the ERT for stud replacement. It is suggested wherever possible that ECN 109, Mack ‘R’ Series drivers, or equivalent be utilised for this task rather than the tradesperson performing the task.

- 11. Standard Job.** A Standard Job, number 6102, has been raised on MMM of SDSS to assist repair agencies to schedule work loads of maintenance through facilities. The Standard Job will also provide the means for DMO, Med/Hvy B Vehicle Section to monitor the progress of the stud replacement across the Mack ‘R’ Series FOV. **Repair managers are to ensure a Standard Job is raised against each subject vehicle to allow for complete tracking of the program.**
- 12. Stores Required.** Kits have been assembled by the Original Equipment Manufacturer (OEM), Mack Trucks (MT). Each kit contains all the wheel studs and nuts required for one vehicle. The kit includes six separate boxes; one for each wheel station and a wheel stud placard. Those maintenance agencies with the task to rectify stock of axle assemblies will need to order a quantity of kits which can be broken down as required. Refer Table 1 for the stores required to complete this instruction. All items at Table 1 are included in the APL attached to Standard Job 6102.

Table 1 Stores Required

Item	NSN	Description	Qty per vehicle
1	2530-66-154-9018	Wheel Stud Kit, Vehicle Axles; Front Steer and Rear Drive Wheel	1
2	5330-66-117-2163	Seal Plain Encased, Front Hub	2
3	5330-01-028-8887	Seal, Plain Encased, Rear Hub	4

- 13. Special Equipment Required.** All equipment required to perform the task should be part of standard workshop holdings by those workshops authorised to conduct light grade repair on the Mack ‘R’ Series FOV.

PREPARATION OF STUD KIT PRIOR TO USE

- 14. Kit Anomalies.** Random quality audit checks conducted by LV SPO personnel have identified the deliverable quality of the wheel stud kits to be less than perfect. Some kits have been found with defective, deficient and/or surplus items. It is suggested to units with more than one vehicle for stud replacement that the kits being used are topped up from the final kit. Prior to the final vehicle being called in for stud replacement, the remaining kit can be made complete by ordering individual items where necessary. MT have accepted responsibility for the kit anomalies and have supplied Defence a quantity of individual kit components to top-up the remaining kit prior to it being fitted.

WARNING

When lubricating the first couple of threads of the wheel studs or nuts, do not use penetrating oil and do not allow grease or anti-seize compound to contact the mating surfaces of the nuts and rims.

Do not use any form of lubricant on the wheel hub stud retaining threads or nuts.

- 15. Inspection of Components.** The new studs can be easily identified by the letter ‘A’ stamped into the outer end of the wheel studs. Prior to use, all stud threads are to be inspected for serviceability. Studs found severely damaged

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i.e. crushed threads, are not to be used. Intermediate and rear inner wheel nuts are to have the internal threads inspected to ensure adequate electroplating has occurred to minimise corrosion of the wheel nuts to studs. Wheel nuts without sufficient electroplating are not to be used. All serviceable studs are to have the thread condition confirmed by running a serviceable, old wheel nut down the thread of the new stud. A small amount of grease or anti-seize compound applied to the first couple of threads will assist in preventing galling and future corrosion.

NOTE

It may be difficult to start the nuts on new wheel studs, particularly the rear inner wheel nut threads. To avoid cross threading, ensure the nut is started on the thread sufficiently, prior to running the nut down the threads.

DETAIL

16. Front Wheel Stud Replacement. To replace the front wheel studs, proceed as follows:

- a. Apply the park brake.
- b. Jack up the front of the vehicle.
- c. Place the front of the vehicle on safety stands.
- d. Remove the wheels.
- e. Remove the brake drum.
- f. Remove the axle half-shaft.
- g. Remove the hub assembly.
- h. Remove the hub seal and inner bearing.

NOTE

Whilst carrying out this procedure, the inspection and/or replacement of components such as brake linings, brake drum condition and wheel bearing condition need to be considered prior to re-assembly.

- i. Remove the wheel stud retaining nuts.
- j. Press out all the existing wheel studs and press in the new studs.
- k. Torque new wheel stud retaining nuts to 285 N.m (210 lbf.ft).
- l. Refit the wheel bearing.
- m. Replace the hub seal.
- n. Refit the hub.
- o. Adjust the wheel bearings.
- p. Refit the axle half-shaft.
- q. Refit the brake drum.
- r. Refit the wheel and wheel nuts and tighten the nuts to secure the rim.
- s. Remove the safety stands.
- t. Lower the vehicle to the ground.
- u. Torque the wheel nuts to 645 N.m (475 lbf.ft).

17. Intermediate and Rear Wheel Stud Replacement. To replace the intermediate and rear wheel studs, proceed as follows:

- a. Apply the park brake.
- b. Jack up the rear of the vehicle.
- c. Place the vehicle on safety stands.

- d. Remove the wheels.
- e. Fit the spring brake chamber release studs and wind off the spring brakes.
- f. Remove the axle drive flange.
- g. Remove the brake drum and hub assembly from the spindle.
- h. Stand the hub and drum assembly and remove the nuts retaining the drum to the hub.
- i. Remove the hub seal and inner bearing.

NOTE

Whilst carrying out this procedure, the inspection and/or replacement of components such as brake linings, brake drum condition and wheel bearing condition need to be considered prior to re-assembly.

- j. Place the hub face down and drive out the old wheel studs.
- k. Turn over the hub, fit the old inner wheel nuts onto the new studs and drive the new studs in.

NOTE

Pressing the rear studs in or out should not be required as the shafts of the rear studs do not have splines making them easier to replace compared to the front studs.

- l. Remove the old inner wheel nuts.
- m. Refit the brake drum, spacer, stud retaining washers and nuts and torque them to 260 N.m (190 lbf.ft) - no lubricant to be used.
- n. Refit the inner bearings.
- o. Replace the hub seal.
- p. Refit the hub.
- q. Adjust the wheel bearings.
- r. Refit the axle drive flange.
- s. Back off the spring brake chamber release studs.
- t. Refit the wheel and wheel nuts and tighten the nuts to secure the rim.
- u. Remove the safety stands.
- v. Lower the vehicle to the ground.
- w. Torque the wheel nuts to 645 N.m (475 lbf.ft).

WARNING

Re-check the torque of all wheel nuts after 40 kilometres. It will be necessary after 40 kilometres to slacken the outer wheel nuts on the rear and intermediate axles, in order to check the tension of the inner wheel nuts. A further 40 kilometres is required prior to re-checking the outer wheel nut tensions. Wheel nuts must be tensioned cold or at the ambient temperature of the day.

RECORDING ACTION

18. On completion of the wheel stud and nut replacement, the placard is to be centre-punched adjacent to the year completed, refer Figure 1, and the following action carried out:

- a. **Wheel Stud Placard.** The wheel stud placard is to be riveted to the vehicle in the following locations:



Figure 1 Wheel Stud Placard

- (1) **HRV.** For the HRV, the placard is to be positioned on the driver's side door-jamb above the washer bottle filler cap.
- (2) **All other Variants.** For all other variants, the placard is to be affixed to the right hand side, lower, cabin gusset. Refer Figure 2.



Figure 2 Right Hand Side, Lower, Cabin Gusset

- b. **Vehicle Modification Record Plate.** On completion of the modification, deface the number 52 on the Modification Record Plate in accordance with TRAMM, Volume 3, Section 2, Chapter 2, Annex D.
- c. **GM 120 Entry.** Complete the modification details in Part 3 of the GM 120 – Record Book for Service Equipment.
- d. **Notification of Modification.** Forward the modification completion details using form GM 119 – Advice of Change in Build State (TRAMM, Volume 3, Section 2, Chapter 3, Annex c) to:

ADFLM Med/Hvy B Vehicle Section,
LV SPO, DMO, VBM D1, Victoria Barracks,
St Kilda Rd SOUTHBANK VIC 3006.

19. Future Wheel Stud Changes. The wheel stud placard is to be struck whenever all studs have been replaced on a particular wheel station on a new calendar year, refer Figure 1. This could be as a result of axle assembly, wheel hub assembly or when all studs on a particular hub assembly have been changed. The placard is to be struck adjacent to the respective wheel station that has had all studs replaced. This EMEI will remain a source document for future wheel stud replacement on the subject fleet after the initial replacement of the wheel studs and nuts is performed.

END

Distribution List: **VEH G 50.0 – Code 2** (Maint Level)
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