

TRUCK, MEDIUM, MC2 – UNIMOG – ALL TYPES

STRIPPING, ASSEMBLY AND CALIBRATION OF THE WERNER WINCH TORQUE LIMITER

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 procedure to calibrate the winch torque limiter for the Werner winch fitted to the Unimog fleet of vehicles.

Special Equipment

2. The following special tools are required and can be obtained through the normal supply chain using the appropriate NIIN (refer Figure 1):

- a. Tool, Torque Limiter Setting, Unimog Winch, Male NIIN 66-152-1262 (referred to in this EMEI as the winch torque limiter drive adaptor); and
- b. Tool, Torque Limiter Setting, Unimog Winch, Female NIIN 66-152-1263 (referred to in this EMEI as the winch drive shaft securing tool).

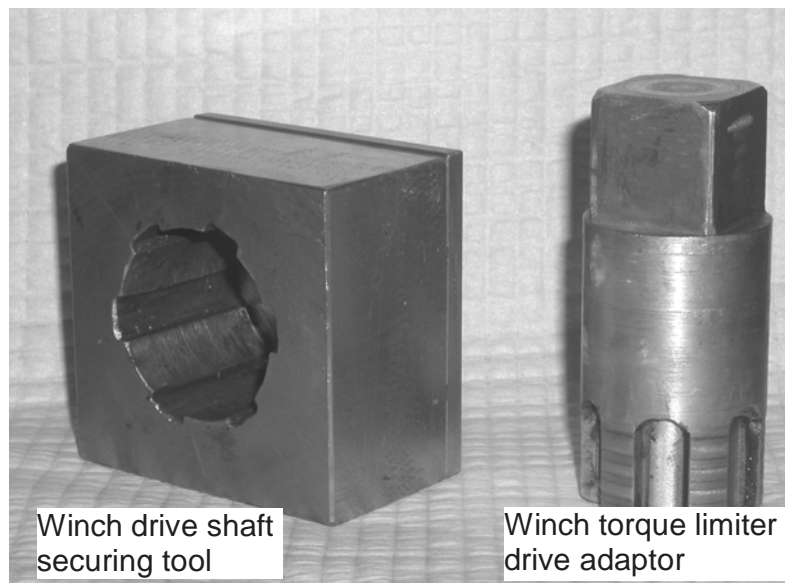


Figure 1 Torque Limiter Special Tools

3. The slotted nut spanner is available through the normal supply chain, utilising NIIN 66-149-8400, Hook Spanner, 36–71 mm.

Authority

4. This EMEI is the authority for units with Medium and Heavy Grades of Repair capability to carry out the calibration of the Werner winch torque limiter. The following trade personnel are authorised to carry out winch torque limiter calibration:

- a. qualified Vehicle Mechanic ECN 229 or civilian equivalent; and
- b. qualified Fitter Armament ECN 146 or civilian equivalent.

Calibration Frequency

5. The calibration procedure is to be carried out when one of the following conditions occur:
 - a. a major/alternate major service;
 - b. repairs to the winch torque limiter assembly; and
 - c. where there is doubt as to the integrity of the winch calibration.

Calibration Procedure

6. Prior to carrying out the calibration procedure detailed in this EME,I the winch torque limiter is to be in a clean and lubricated condition. Should the winch torque limiter not be in this condition, carry out actions contained in Paras 12 and 13.

7. Remove the torque limiter from the winch, as detailed in EMEI Vehicle G 604-1, and place the shaft of the torque limiter in the winch drive shaft securing tool, pre-positioned in a suitable vice, as shown in Figure 2.



Figure 2 Torque Limiter Located In Winch Drive Shaft Securing Tool

8. Fit winch torque limiter drive adaptor, as shown in Figure 3, inside the splines of the torque limiter. Using a $1\frac{3}{16}$ inch socket and a $\frac{3}{4}$ or 1-inch square drive tension wrench, check the break-off tension of the limiter.



Figure 3 Winch Torque Limiter Drive Adaptor Located In Torque Limiter

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9. The torque limiter is correctly calibrated when at 420 N.m the tension wrench ‘clicks off’ and at 440 N.m the winch torque limiter ‘breaks off’. When the torque limiter breaks off, the safety hub will suddenly rotate approximately 90 degrees. Proper balance and care needs to be exercised by the person conducting this step. To aid in this step, a torque wrench that provides maximum leverage should be utilised, i.e. a torque wrench where the torque required in this EMEI is in the middle of the range of the torque wrench used. Proper tension wrench operation is to be observed and care is to be taken not to jerk the wrench when conducting this procedure as it could result in an incorrect reading and calibration will be inaccurate.

NOTE

Break off is when the indexing ring and the balls act against the spring discs and ‘roll’ over the ball indents of the indexing ring and the safety device hub.

- 10.** If the torque limiter calibration is not correct, carry out the following:
- a.** Remove the security spring and using a suitable magnet, remove the two block stops from the torque limiter.
 - b.** If the torque limiter broke off before 440 N.m, using the slotted nut spanner mentioned in Para 3, rotate the slotted nut clockwise, to increase the tractive force. If the tension wrench clicked off at 440 N.m, the slotted nut will need to be rotated anticlockwise to decrease the tractive force.
 - c.** When tension values are correct as per Para 9, ensure that the positions to refit the block stops are aligned, refit the block stops and the security spring.
- 11.** With the torque limiter correctly calibrated, refit the torque limiter back onto the winch, as detailed in EMEI Vehicle G 604-1.

Strip and Assembly

NOTE

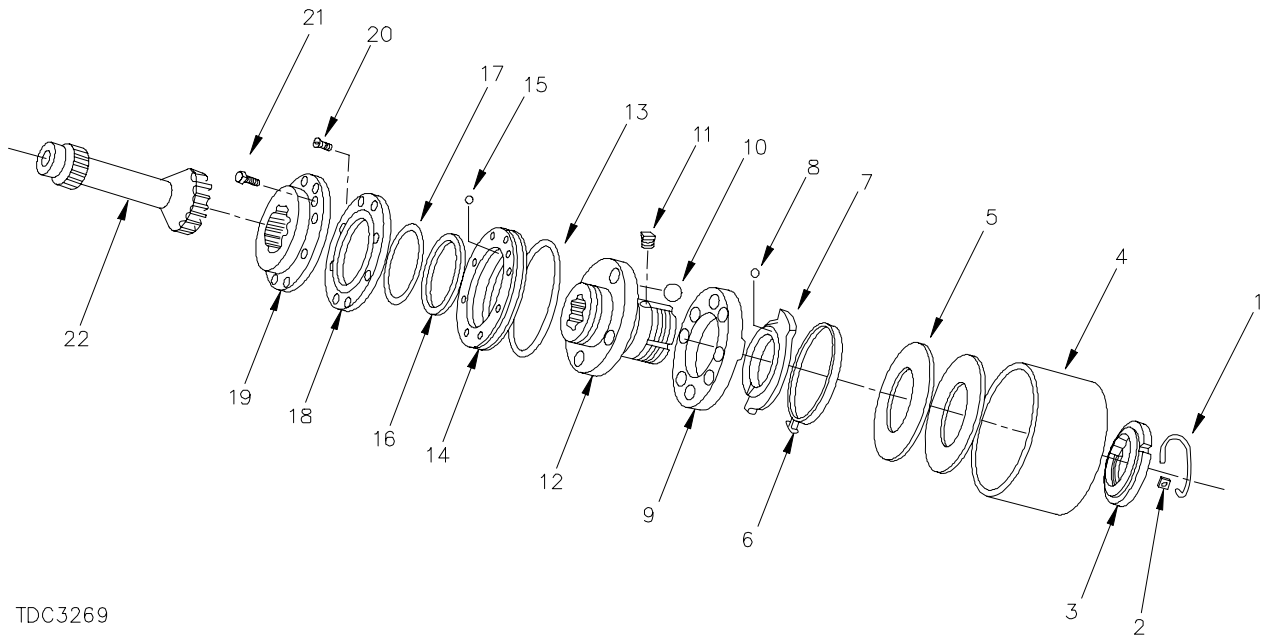
As a guide to the following procedure, an exploded diagram of the torque limiter is located at Figure 4.

- 12.** Strip the torque limiter as follows:
- a.** Place the torque limiter drive shaft into the winch drive shaft securing tool, as per Figure 2, and remove the security spring.
 - b.** Remove the two block stops using a suitable magnet, then remove the slotted nut and housing cover from the torque limiter.
 - c.** Remove the two bevel spring discs and take note of their thickness (3 mm or 4 mm). Only 3 mm spring discs are to be used.
 - d.** Remove the large retaining spring and thrust washer.
 - e.** Carefully remove the 7 mm ball bearings, ensuring that there are 34 in quantity.
 - f.** Remove the indexing ring disc and the two thrust washer locating pins.
 - g.** Remove the four 24 mm balls.
 - h.** Loosen the eight hex-head screws retaining the driving flange to the disc flange. Due to the fact that Loctite is used as a locking agent, heat may be required to break the bond on the screws.
 - i.** Remove the assembly from the winch drive shaft securing tool and place on a workbench with winch drive shaft facing upwards.
 - j.** Continue to remove the eight hex-head screws retaining the driving flange to the disc flange.
 - k.** Remove the driving flange and the winch drive shaft from the assembly.
 - l.** Remove the countersunk screw from the disc flange and remove the disc flange.
 - m.** Separate the shim and the ball retaining ring from the ring bearing.
 - n.** Carefully remove the $\frac{3}{8}$ inch (9.5 mm) ball bearings (18 in total) and the ring bearing from the safety device hub.

- o. Remove the O-ring from the external groove of the ring bearing.
- p. Clean all parts, and inspect for any wear or defects and replace parts as necessary.
13. Assemble the torque limiter as follows:
- a. Ensure all torque limiter parts are clean and completely dry, then coat all surfaces with XG 274 grease.
- b. Place the safety device hub on a suitable workbench with the threaded end facing downwards.
- c. Grease the O-ring and fit it to the external groove in the ring bearing.
- d. Fit the ring bearing to the safety device hub with the large ball sockets facing downwards.
- e. Lubricate and fit the $\frac{3}{8}$ inch (9.5 mm) ball bearings into the ring bearing. Ensure there are 18 ball bearings fitted.
- f. Lubricate and fit the ball retaining ring ensuring the inner chamfer is facing toward the ball bearings, then fit the shim to the flat face of the ball retaining ring.
- g. Fit the disc flange with the internal recess facing downwards and ensure that the countersunk screw holes of the disc flange and the ring bearing are aligned.
- h. While lifting the ring bearing slightly to contact the disc flange, ensure the ball retaining ring and shim are seated correctly in the internal recess of the disc flange. This will be indicated when the surfaces of the ring bearing and the disc flange are in contact.
- i. Fit and tighten the countersunk screw to secure the ring bearing and the disc flange. No thread-locking agent is to be applied to this screw.
- j. Ensure the ball retaining ring with ring disc fitted rotates freely.
- k. Place the winch drive shaft and the driving flange onto the safety hub assembly. Apply Loctite 243 to the eight hex head screws and fit to the driving flange.
- l. Install the torque limiter assembly into the winch drive shaft securing tool as per Figure 2 and tighten the hex-head screws to 20 N.m.
- m. Fit the two thrust washer locating pins.
- n. Lubricate and fit the four 24 mm balls into the recess of the safety device hub and fit the indexing ring disc ensuring that the external lugs are uppermost.
- o. Lubricate the 7 mm ball bearings with XG 274 grease ensuring there are 34 of them and place into the indexing ring disc groove.
- p. Lubricate and fit the thrust washer to the indexing ring disc, ensuring that the ball race surface is facing downwards and the small lug on the thrust washer is aligned with the small lug on the indexing ring disc. Ensure the thrust washer locating pins engage the recesses in the thrust washer.
- q. Refit the spring around the thrust washer ensuring an end of the spring is on each side of the small lug on the thrust washer.
- r. Fit the spring discs to the safety device hub with the concave of the first spring facing upwards and the concave of the second spring facing downward.
- s. Lubricate the inner surface of the housing cover and fit to the torque limiter assembly.
- t. Fit the slotted nut with the collar facing downwards, but do not tighten. Calibrate the torque limiter as detailed in calibration procedure in Para 10.

Recording Action

14. Where the situation exists that the winch is fitted to a vehicle, the GM 120 – Record Book For Service Equipment is to have the following information placed in Part 4:
- a. winch torque limiter checked/calibrated;
- b. authorised workshop facility; and
- c. date calibration conducted.



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1	Security spring	12	Safety device hub
2	Block stop	13	O-ring
3	Slotted nut	14	Ring bearing
4	Housing cover	15	Ball bearing $\frac{3}{8}$ inch (9.5mm)
5	Bevel spring disc	16	Ball retaining ring
6	Spring	17	Shim
7	Thrust washer	18	Disc flange
8	Ball bearing, 7 mm	19	Driving flange
9	Indexing ring disc	20	Countersunk screw
10	Ball bearing	21	Hex socket head screw
11	Thrust washer locating pin	22	Winch drive shaft

Figure 4 Exploded View of Winch Torque Limiter

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END

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