BOLT TORQUE SPECIFICATIONS (GENERAL GUIDE FOR INCH FASTENERS)

Use the "Standard Torque" charts as a general guide when tightening fasteners that DO NOT HAVE SPECIFIC TIGHTENING RECOMMENDATIONS.

Inch Fasteners Standard torque in Newton Metres (Foot Pounds)					
* Inch bolt size	SAE grade 5 **mild steel below grade 5	SAE grade 8 ISO grade 8.8 BS grade S		ISO grade 10.9 BS grade V	
		*** Non-rigid joint	**** Rigid joint	*** Non-rigid joint	**** Rigid joint
1/4 inch	6-8 (4-6)	9-12 (7-9)	11-15 (8-11)	13-18 (10-13)	16-22 (12-16)
5/16 inch	12-16 (9-12)	18-24 (13-18)	22-30 (16-22)	25-34 (18-25)	31-43 (23-32)
3/8 inch	22-30 (16-22)	31-42 (23-31)	39-53 (29-39)	44-60 (32-44)	55-75 (41-55)
7/16 inch	35-47 (26-35)	51-69 (38-51)	64-86 (47-63)	72-96 (53-71)	90-120 (66-89)
1/2 inch	54-72 (40-53)	80-104 (59-77)	100-130 (74-96)	110-140 (81-103)	140-180 (103-133)
5/8 inch	110-140 (81-103)	160-210 (118-155)	200-260 (148-192)	220-300 (162-221)	280-370 (207-273)
3/4 inch	190-250 (140-184)	280-370 (207-273)	350-460 (258-339)	390-530 (287-391)	490-660 (361-487)
7/8 inch	310-410 (228-302)	450-610 (332-450)	560-760 (413-561)	640-850 (472-672)	800-1060 (590-782)
1 inch	460-620 (339-457)	670-900 (494-664)	840-1120 (620-826)	960-1280 (708-944)	1200-1600 (885-1180)

Key to table above:

* *NOTE: The size is the diameter of the shank - not the head width.*

** *NOTE: Mild steel torque values to be used for SAE Grade 5 bolts when weld nuts, or other low strength nuts are used.*

*** *NOTE: Use these values when any of the following conditions exist:*

1. Possible damage to the joined members of the assembly may occur.
2. Thick and/or highly compressible gaskets are used between members.
3. Non-flat unmachined seating surfaces for bolt head (or nut) occurs.
4. Non-flat or non-parallel joint faces are encountered.

**** *NOTE: Use these values when ALL of the following conditions exist:*

1. Damage will not occur to the joined members of the assembly.
2. It is desirable to use this higher clamping force to ensure tightness.
3. Fastener thread is not lubricated prior to assembly.

FOUR-WHEEL DRIVE FRONT AXLE

Specification:

Use Massey Ferguson Super Tractor Universal Oil 10W-30.
or
Massey Ferguson Super Premium Universal Oil 15W-30.
or
Massey Ferguson Universal Gear Oil EP 80W-90.
or
One of the alternative lubricants listed on page 1D-12 or its equivalent.

Capacity:

Axle (each side) - AG 66/75/85 (4215, 4220, 4225, 4235, 4243, 4245, 4255)	5,6 litres (1.2 gal)(1.5 US gal).
Axle (each side) - AG 105 (4253, 4255, 4260, 4263, 4270)	7,6 litres (1.7 gal)(2 US gal).
Epicyclic hub (each side) - AG 66 (4215, 4220, 4225, 4235)	0,8 litres (1.5 pts)(1.5 US pts).
Epicyclic hub (each side) - AG 75/85 (4235, 4243, 4245, 4255)	1,0 litres (1.8 pts)(1.8 US pts).
Epicyclic hub (each side) - AG 105 (4253, 4255, 4260, 4263, 4270)	1,2 litres (2.0 pts)(2.0 US pts).

BRAKE FLUID

Use Massey Ferguson LHM Mineral Brake Fluid part number 3405 389 M1 (1 litre bottle).
or
Mineral type oil as specified in the alternative lubricants listed on page1D-12.
DO NOT use vegetable type fluid. The correct fluid is colour coded GREEN.

GENERAL

Grease Points

Use Massey Ferguson Multi-Purpose Grease NLG1 EP2 or any multi-purpose lithium-based grease. Always clean the grease gun and fittings before and after use.

Grease points are located as follows:

Two-wheel drive tractors

Front wheel hubs	2 points.
Front axle swivel pins	2 points.
Steering ram pivot pin	1 point.

Four-wheel drive tractors

Universal joints	2 points.
Front axle swivel pins	4 points

All tractors

Front axle pivot bearing	2 points.
Adjustable lift rods	4 points.
Assistor rams top bearing	2 points.

With an oil can lubricate throttle and control linkage every 250 hours.

IMPORTANT: *Severe working conditions.*
Where tractors are operating arduous work cycles, or when working in areas where there are dusty conditions, paddy fields, deep water etc, coupled with a lack of maintenance care and low specification fuel and oil, the intervals of service should be halved, particularly for oil and filter changes.

CAUTION: *Tractor lubricants and greases:*
No significant hazard when properly used and in the application for which they were designed. Frequent and/or prolonged skin contact may give rise to skin irritations. Emergency treatment of acute effects:

- Ingestion: DO NOT induce vomiting. Administer 250 ml (1/2 pint) milk or 50 ml olive oil. Seek medical advice.
- Skin Contact: Remove by wiping, wash with soap and water.
- Inhalation: Saturated vapour non-toxic at room temperature. - Remove from exposure.
- Eye contact: Wash with copious amounts of warm water.

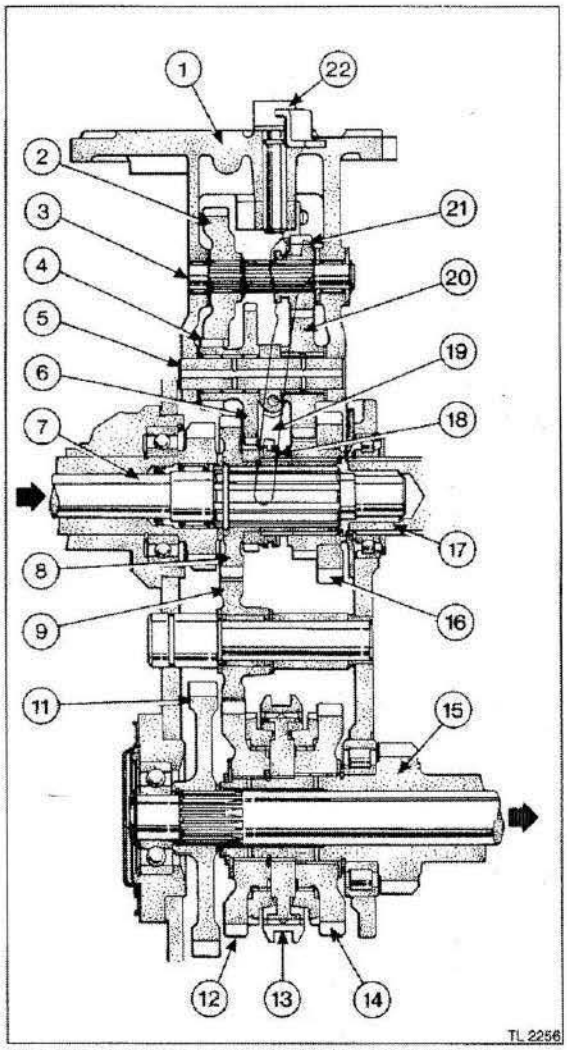


Fig.1 Creeper gearbox with simple reverse idler.

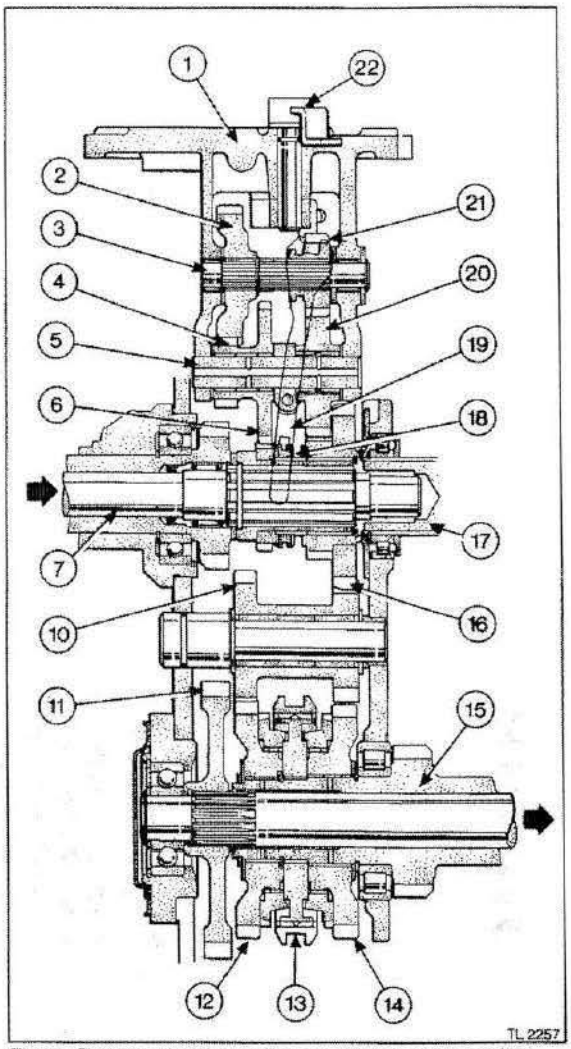
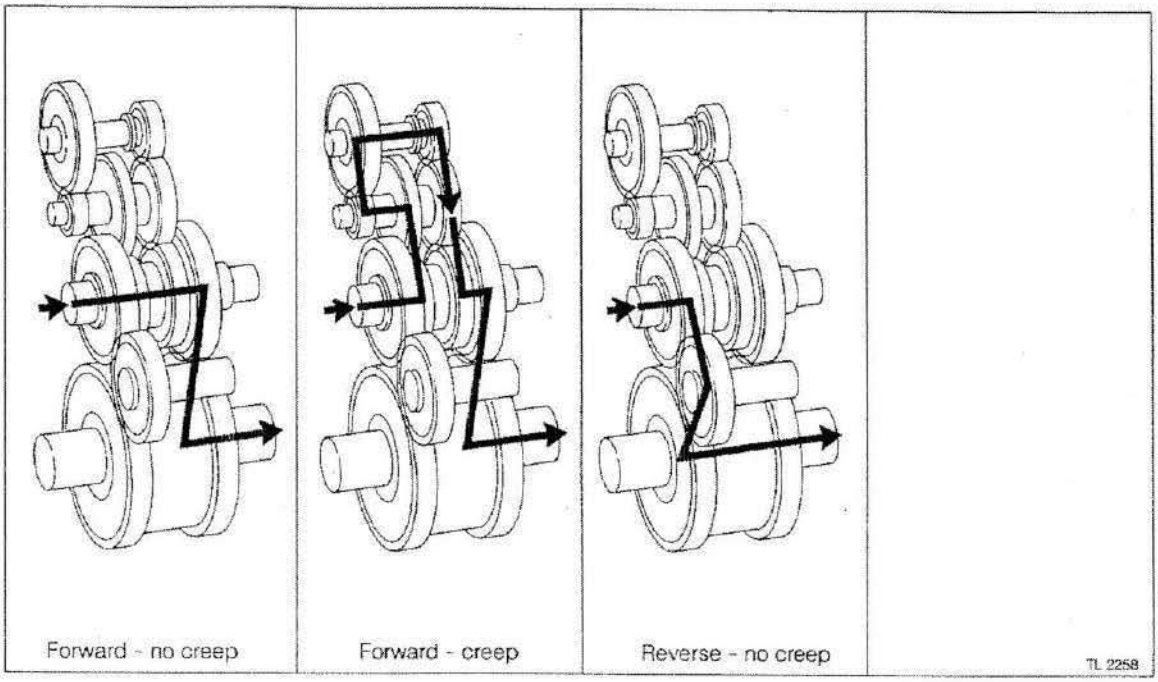


Fig.2 Creeper gearbox with compound reverse idler.

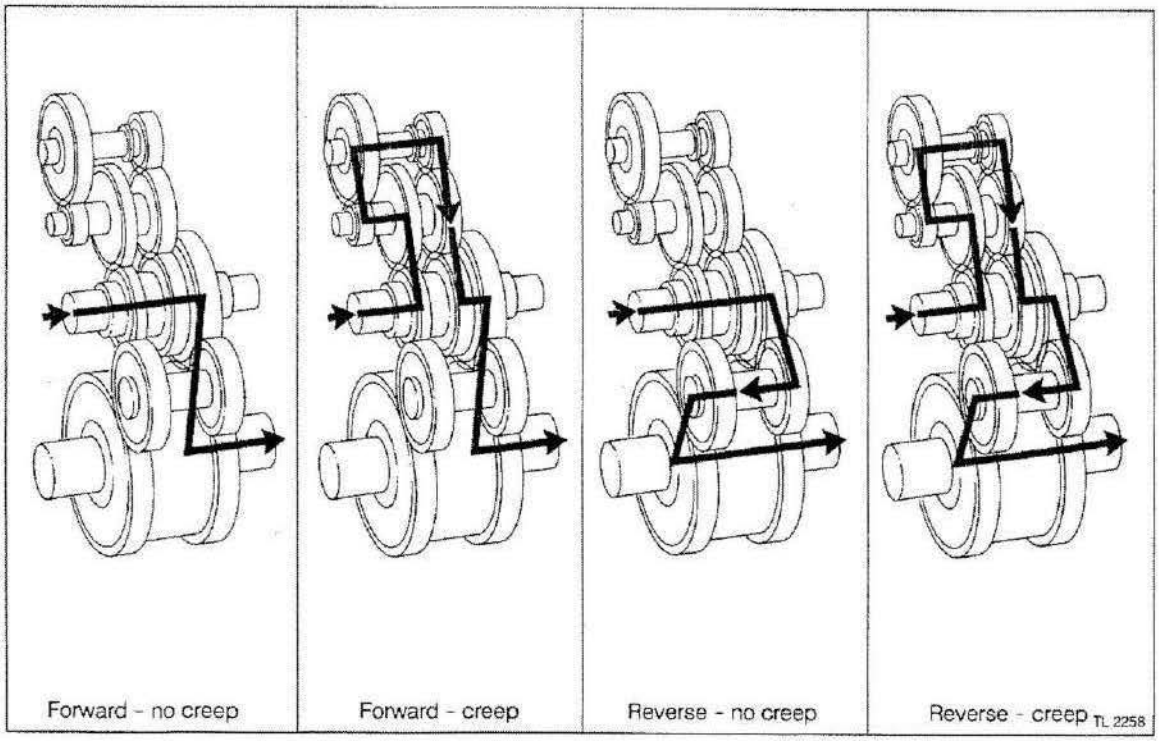
1. Creeper gearbox.
2. Intermediate gear (C).
3. Upper shaft.
4. Input driven gear (B).
5. Lower shaft.
6. Input driver gear (A).
7. Input shaft.
8. Reverse constant mesh gear.
9. Reverse idler gear - simple.
10. Reverse idler gear - compound.
11. PTO gears.
12. Reverse gear.
13. Synchromesh coupler.
14. Forward gear.
15. Layshaft.
16. Forward constant mesh gear (F).
17. Main shaft.
18. Sliding collar.
19. Selector fork.
20. Output gear (E).
21. Sliding intermediate gear 18T (D).
22. Selector lever.

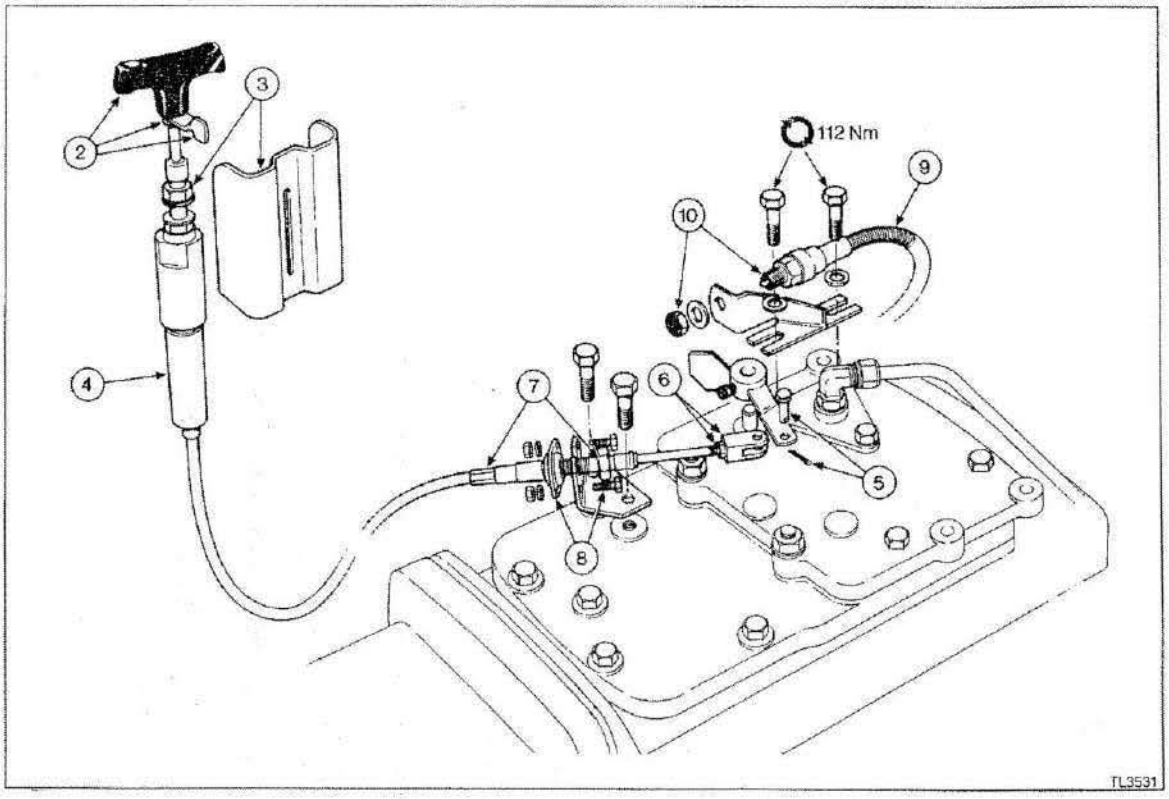
CREEPER UNIT GEAR TRAIN (Fig.3)

Simple reverse idler.



Compound reverse idler.



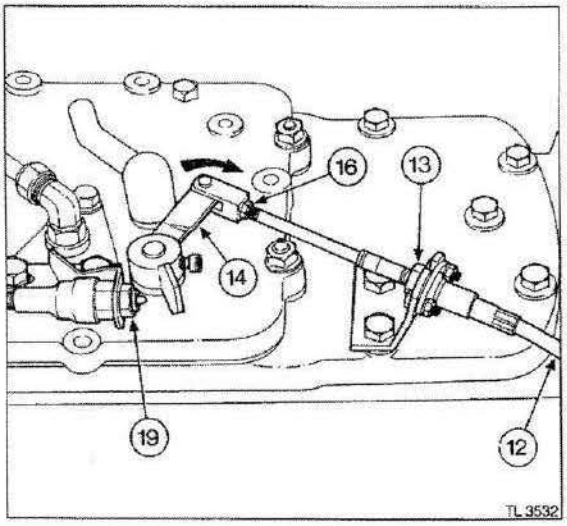


CREEPER CONTROL

Removal and Refitment 1–5B

Removal

1. Remove the floor mats and floor plates as necessary.
2. Slacken the locknut and remove the 'T' handle, guide plate and locknut.
3. Remove the locknut, plate and guard.
4. Remove the control cable from under the seat deck.
5. Remove the split pin and clevis pin from the lever on the gearbox, disconnect the cable end.
6. Slacken the locknut and remove the fork end and locknut.
7. Remove the locknut from the cable end and remove the cable from the swivel end, support bracket and tractor.
8. Remove the two nuts and bolts and the swivel joint, if necessary.
9. Disconnect the 'Engaged' light switch wiring at the plug.
10. Remove the nut and switch.



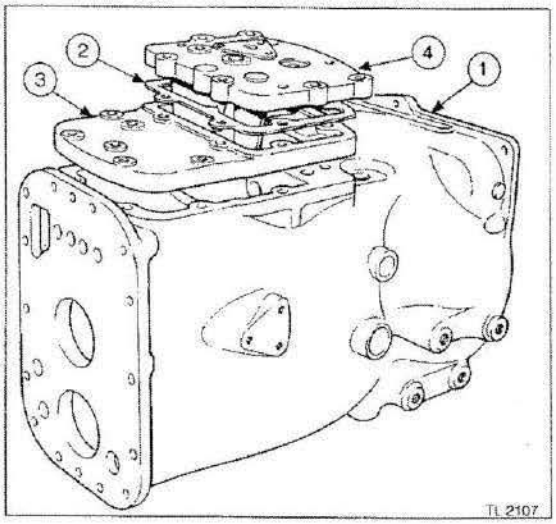
Refitment

11. Reverse procedures 1 to 10. Reset the linkage and light switch as follows:
12. Reinstall the control cable on the seat deck, ensure that the guide plate under the knob locates in the slot in the guard.
13. Pass the cable through the swivel joint and install the locknut.

14. Place the lever on the gearbox into the creep position by pulling the lever rearwards, (it may be necessary to rotate the gearbox to ensure full engagement).
15. Adjust the position of the 'T' handle so that there is 3 mm (1/8 in) clearance between the guide plate and the top of the slot when in the fully UP position.
16. With the 'T' handle UP, adjust the position of the clevis on the end of the cable so that when it is connected to the lever there is no strain on the cable.
17. Tighten all the locknuts on the fork end, swivel joint and 'T' handle.

NOTE: *The control cable is fitted with a spring loaded device to prevent overloading of the selector mechanism during engagement of the creeper drive.*

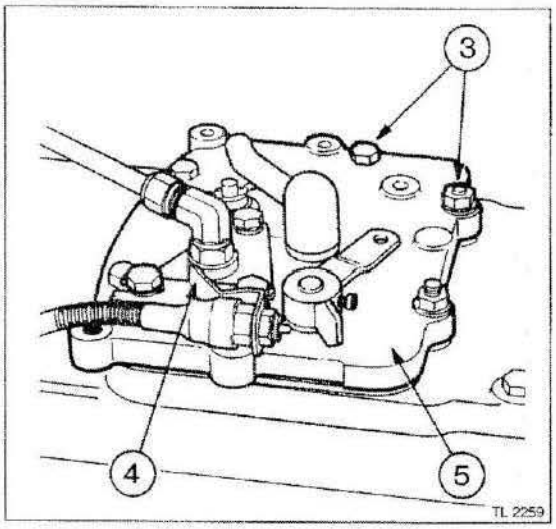
18. Check the engagement of the creeper gear. It may be necessary to run the engine to get engagement. When the 'T' handle is pulled fully UP to engage, or fully DOWN to disengage, ensure that the drive is selected correctly.
19. Check the adjustment of the creeper 'Engaged' light (snail). This should only illuminate on full engagement. If adjustment is required, slacken the two bracket bolts and move the switch until the indicator light on the instrument panel comes ON when the gear is fully engaged. Retighten the two bolts to a torque of 112 Nm (82 lbf ft).



CREEPER UNIT

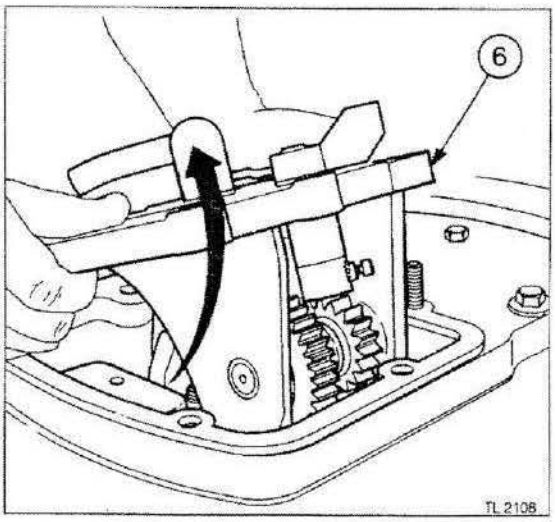
Removal and Refitment 2–5B

IMPORTANT: *The gearbox casing (1), steel shim (2) and gearbox cover (3) have been assembled in the factory as a matched set. They control the depth of mesh of the creeper unit gears with the gears on the input shaft. The steel shim (2) must NOT be changed or replaced when fitting a new creeper unit.*



Removal

1. Disconnect the creep control cable, wiring to the engaged light switch and safety start switch.
2. Remove the gearbox and range change unit from the tractor, *(see operation 1-5A).*
3. Remove the four bolts and two nuts securing the creeper unit to the top cover.
4. Remove the engaged light switch bracket.
5. Break the joint between the creeper unit and the top cover by giving the cover a side tap with a hammer.
6. Standing on the right hand side of the gearbox lift the creeper unit up vertically then tilt it as shown in the illustration so that the selector fork clears the selector collar. Ease the unit out of the gearbox at an angle so that the lower gears clear the main gearbox selector rails.



Refitment

7. Ensure that the range unit is in LOW range and a forward main gear selected so that the gearbox can be rotated to assist in re-assembly.
8. Press the interlock back so that it contacts the selector forks.
9. Move the creeper selector collar on the input shaft forwards into the engaged position.
10. Move the selector fork on the creeper unit into the engaged position i.e. the upper 18 tooth sliding gear is in mesh.
11. Ensure that the two small bronze pivoting pads on the selector fork are in the vertical position.
12. Apply Massey Ferguson Instant Multi-Gasket (Loctite 573) to the top of the cover and the steel shim. Install the steel shim as shown in the illustration.
13. Position the shuttle lever in relation to the hole that takes the safety start switch as shown in the illustration.
14. With care install the creeper unit. It will fit back into the gearbox the same way it came out by a rolling action passing the gears round under the selector rails and then down into position. As the unit is finally lowered into place it may be necessary to slightly move the shuttle lever so that it engages with the jaw in the selector fork.
15. Fit the two dowel bolts first. Refit the remaining bolts and nuts, don't forget the switch bracket and wiring clips.
16. Check that the creeper and shuttle levers have engaged correctly. Turn the gearbox over and engage all gears in turn to ensure that it is correctly assembled.

IMPORTANT: *This check and adjustment is very important. The creeper gear must only be allowed to be engaged in LOW range. Engagement in any other range will result in a very serious failure of the gearbox.*

17. Check the operation of the creeper interlock, this prevents engagement of the creeper gear in any other range except LOW range as follows:

Range change check:

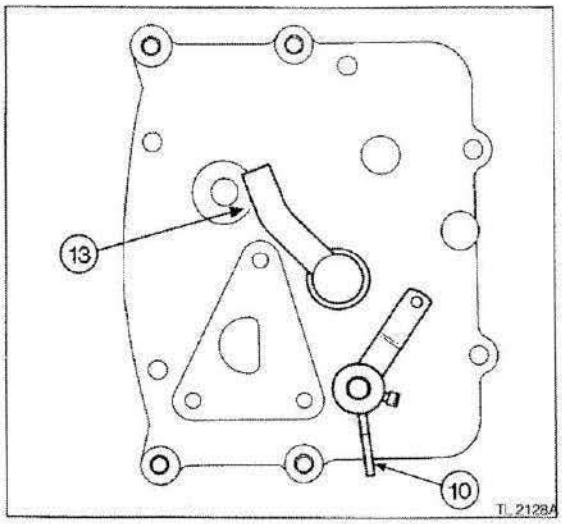
a. Select a LOW range.

b. Select 1st gear.

c. Select forward gear.

d. Engage creeper gear.

e. Move the range lever into MEDIUM range. The creeper gear should disengage. Check by rotating the gearbox input shaft. If disengagement does not take place the interlock rod length needs adjustment, *(see operation 3-5B procedures 68 to 71).*



Creep gear engagement check:

a. Select MEDIUM range.

b. Select 1st gear forward.

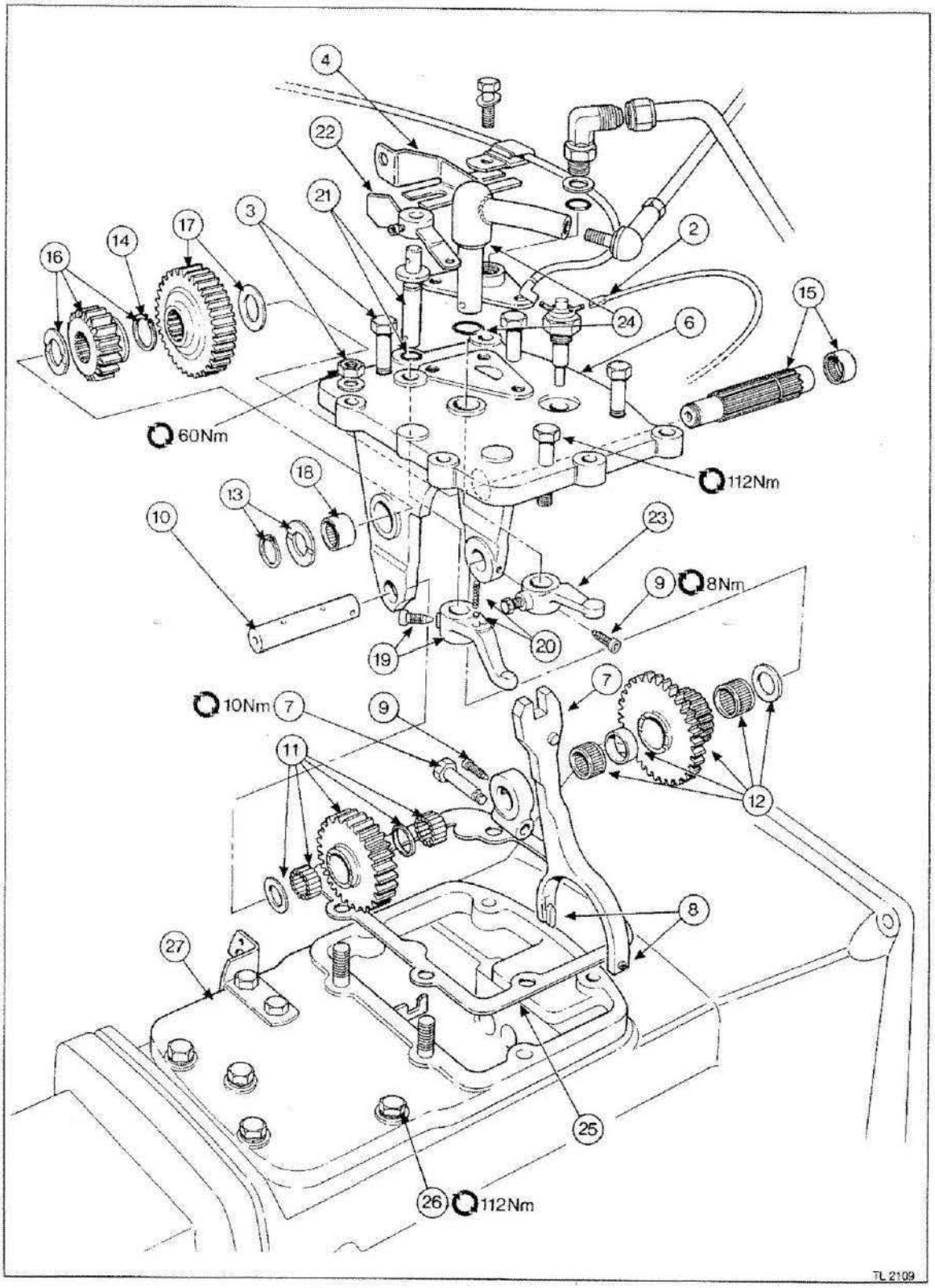
c. Creeper gear disengaged.

d. Try to select creeper or gear whilst rotating the input shaft. This must be prevented by the interlock. If engagement takes place the interlock rod length needs adjustment, *(see operation 3-5B procedures 68 to 71).*

e. Repeat the above check with a HIGH range, forward gear selected.

18. Tighten all the creeper unit and gearbox cover bolts to a torque of 112 Nm (82 lbf ft). Nuts to a torque of 60 Nm (44 lbf ft)
19. Install the gearbox assembly back into the tractor.
20. Reconnect the creeper operating cable and adjust, *(see operation 1-5B).*

12 x 12 Creeper Gearbox



CREEPER UNIT

Overhaul 3–5B

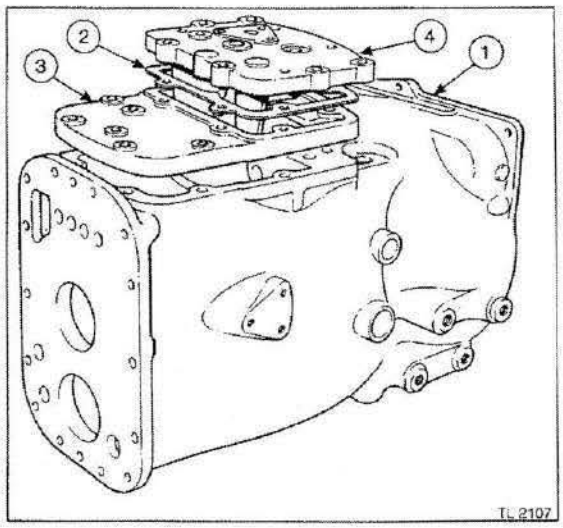
IMPORTANT: *The gearbox casing (1), steel shim (2) and gearbox cover (3) have been assembled in the factory as a matched set. They control the depth of mesh of the creeper unit gears with the gears on the input shaft. These three components must NOT be changed or replaced. In the event of a serious failure which involves the changing of the gearbox casing or the gearbox cover contact the Massey Ferguson Limited, Service Department, Banner Lane, Coventry, England, CV4 9GF, who will provide a matched set.*

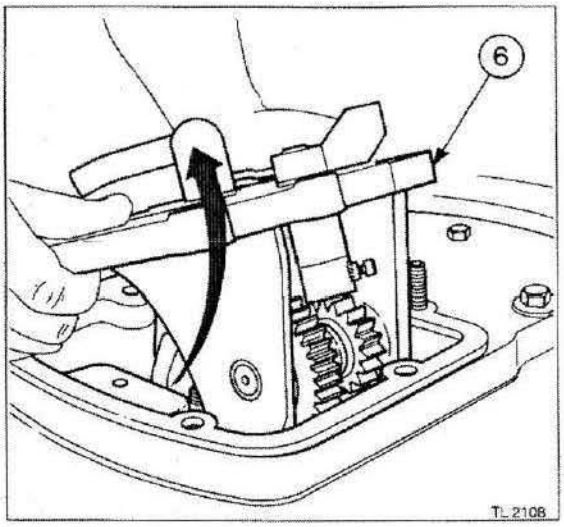
Dis–assembly

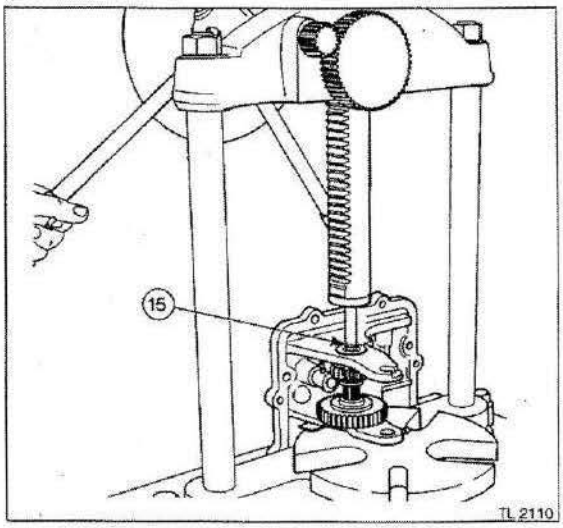
1. Remove the gearbox and range change unit from the tractor, *(see operation 1-5A).*
2. Disconnect the creep control cable, wiring to the engaged light switch and safety start switch.

Creeper Unit

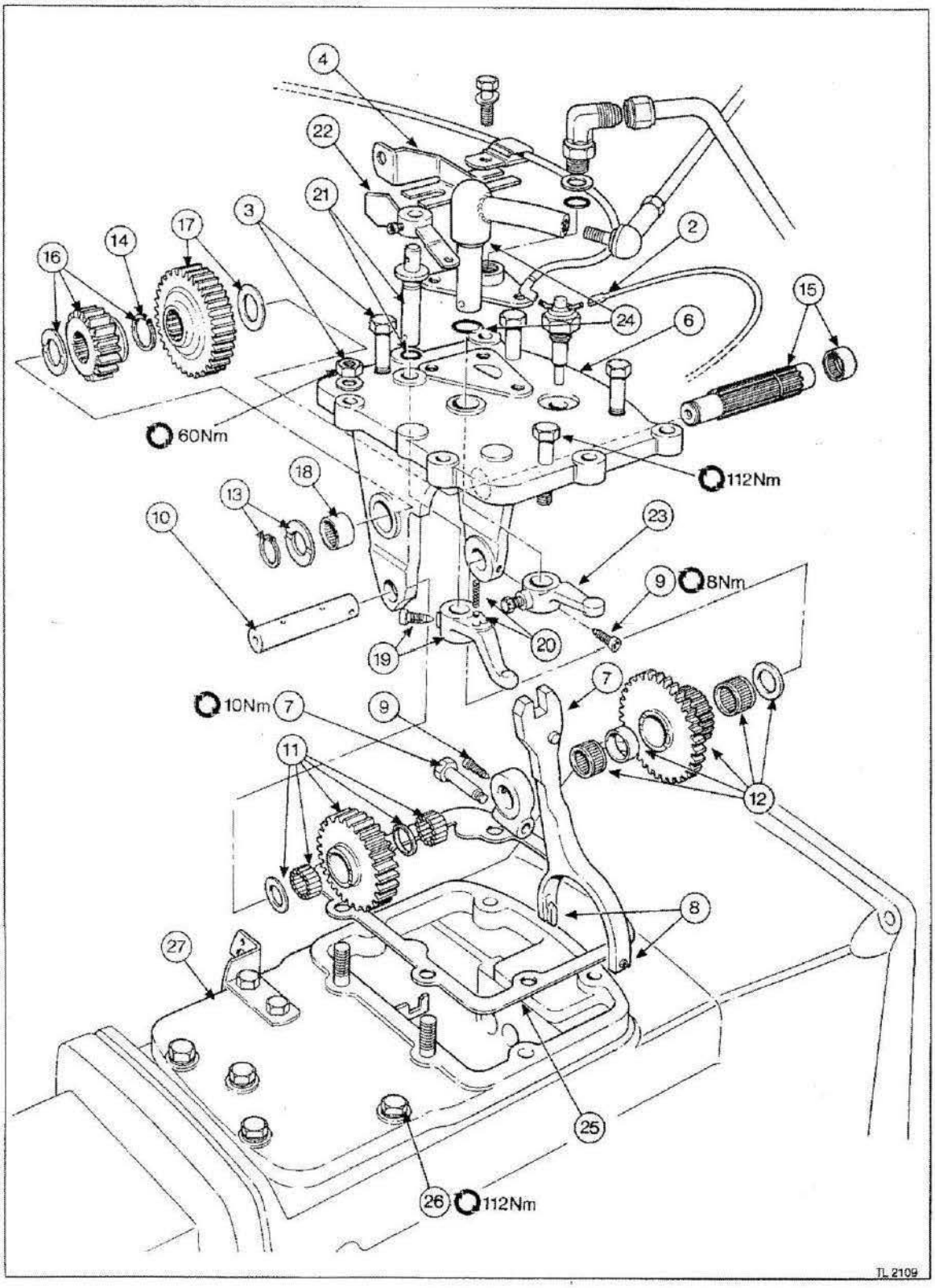
3. Remove the four bolts and two nuts securing the creeper unit to the top cover.
4. Remove the engaged light switch bracket.
5. Break the joint between the creeper unit and the top cover by giving the cover a side tap with a hammer.
6. Standing on the right hand side of the gearbox lift the creeper unit up vertically then tilt it as shown in the illustration so that the selector fork clears the selector collar. Ease the unit out of the gearbox at an angle so that the lower gears clear the main gearbox selector rails.
7. With the unit on a work bench, remove the selector fork pivot bolt and fork assembly.
8. If necessary, remove the two spring clips and the two bronze pivoting pads.
9. Remove the locking screws from the pivot bearing and casting.
10. Slide the lower shaft out of the gears, pivot bearing and housing. Carry out this task carefully, the single gear contains two sets of uncaged needle roller bearings.
11. Remove the output gear, bearings, spacer and thrust washer. Empty the washers and roller bearings into a clean container.
12. Remove the input gear, caged needle roller bearings, spacers and thrust washer.
13. Remove the intermediate shaft circlip and thrust washer.
14. Open-up the central circlip and slide it along the shaft towards the small sliding gear.

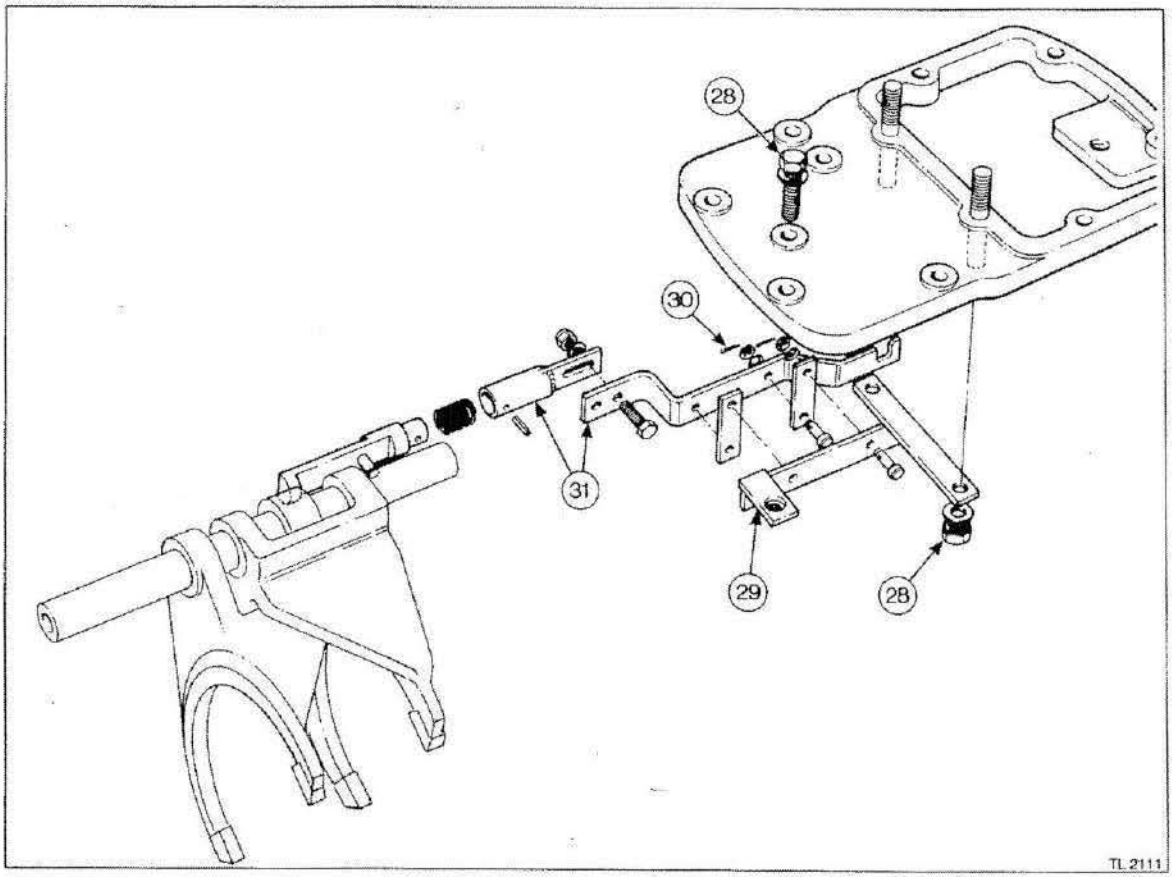






12 x 12 Creeper Gearbox





15. Place the creeper unit on its side under a hand press. Gently press the shaft from the back to the front (left to right looking at the illustration). This will enable the shaft to press the front caged needle roller bearing out of the casting. This bearing must be renewed on re-assembly.
16. Remove the sliding intermediate gear, thrust washer and circlip.
17. Remove the intermediate fixed gear and thrust washer.
18. If necessary, remove the rear needle roller bearing. If this bearing is removed it must be renewed on re-assembly.
19. Remove the lower selector lever lock screw and lever.
20. Remove the ball and spring.
21. Remove the creeper selector shaft and 'O' ring. Discard the 'O' ring.
22. If necessary, remove the upper selector lever lock screw and lever.
23. If necessary, remove the shuttle lever lock screw and lever.
24. Remove the selector shaft and 'O' ring. Discard the 'O' ring.

Gearbox Top Cover

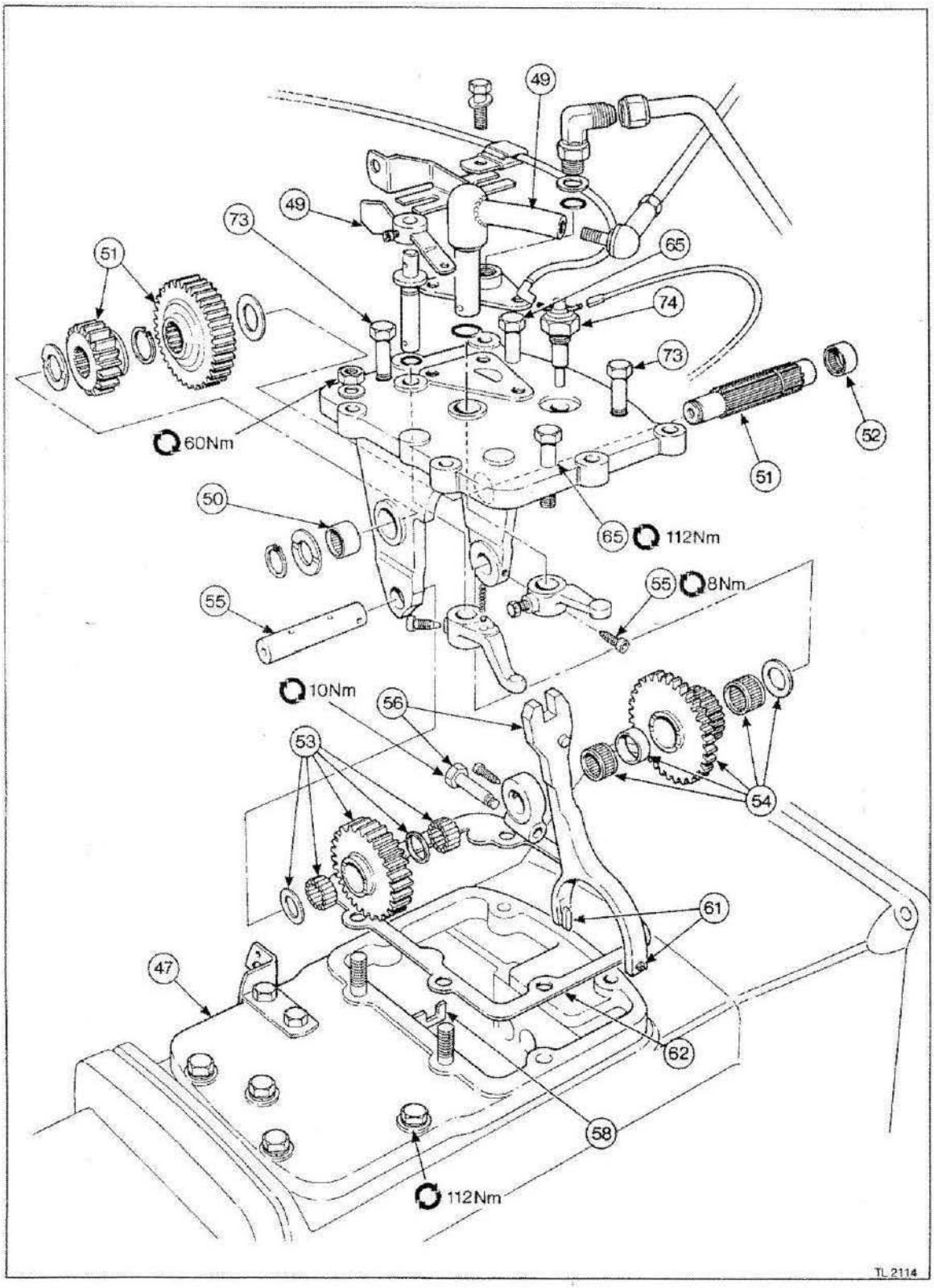
25. Remove the steel shim and retain.
26. Remove the remaining top cover bolts.
27. Lift the cover up and forwards so that the interlock rod which passes into the range unit can be withdrawn.

Interlock

The interlock prevents the creeper unit being engaged in any other gear except LOW range. A rod passes from the creep selector fork to the range unit selector forks. This rod has been set in the factory and should not require any attention. DO NOT alter the length adjustment unless new parts are being fitted.

28. Remove the two nuts and washers, and the single bolt.
29. Remove the assembly from the cover.
30. If necessary, remove the split pins, plain washers, spring washers and clevis pins .
31. Dismantle the linkage.

12 x 12 Creeper Gearbox



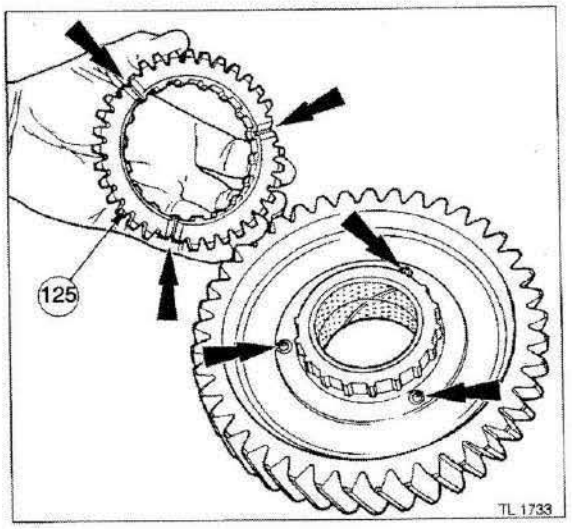
Main Shaft

125. Fit the synchromesh ring on first gear ensuring that the synchromesh alignment pins are opposite the 'V' groove in the synchromesh cone hub.

NOTE: *Use petroleum jelly to hold all the synchromesh cones, baulk rings and hubs in place during the assembly process.*

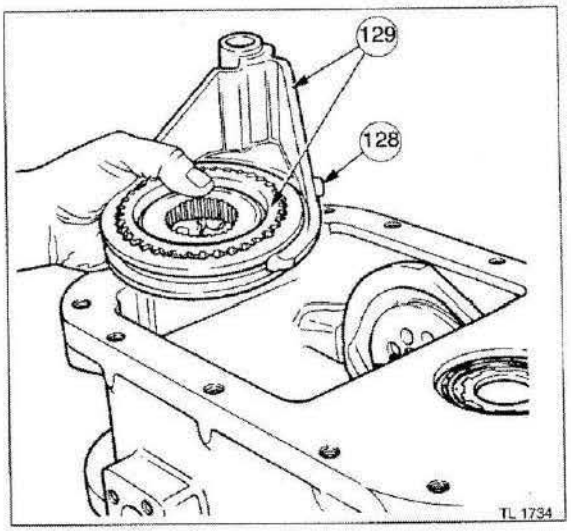
126. Place the special tool MF.477 on the inner face of the rear web of the box. This is to hold all the gears in their running position during assembly.

127. Place the low range gear in position with the synchromesh cone uppermost.



128. Fit the small rollers to the medium/low range and high range selector forks with some petroleum jelly.

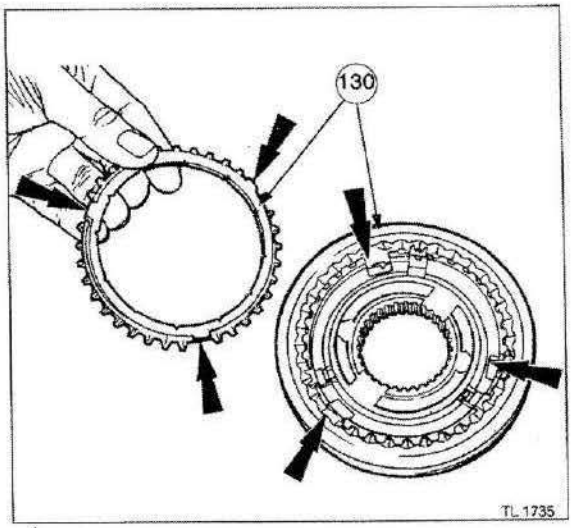
129. Fit the selector fork to the synchromesh hub assembly and lower it into position in the box, simultaneously engaging the selector fork roller in the cam track.



130. Ensure that the locating blocks on the low range baulk ring are engaged in the slots of the hub.

131. Refit the medium range gear ensuring that the spring loaded plungers locate in the 'V' grooves in the back of the synchromesh cone, as described for the first range gear.

132. Replace the four-wheel drive gear with the grooved thrust face downwards.

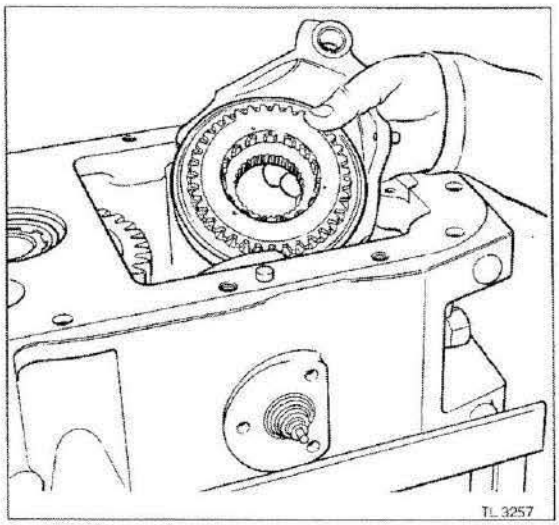


133. Fit the selector fork to the synchromesh hub, complete with baulk ring and synchromesh cone. Pull the selector fork and coupler 'up' to engage High range with the baulk ring. Install with the flat face downwards, engaging the selector fork roller in the cam plate track.

134. Align the splines of all the gears and synchromesh hubs in the pack.

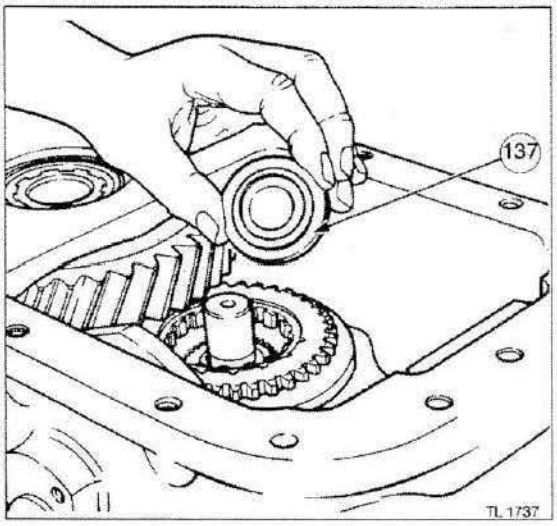
135. Take the main shaft with the taper roller bearing cone, sleeve and thrust washer fitted. Pass it up through the gear pack carefully fitting all the gears and synchromesh hubs.

136. Fit the bearing cap without any shims to hold the shaft in place.



137. Place the thrust washer on the shaft with the reduced diameter facing upwards.

IMPORTANT: *Under no circumstance is the roller bearing, procedure 138, to be fitted to the main shaft with a hammer and punch. Damage to the bearing will result in a seizure of the gearbox and extensive failure of many of the components.*



138. Place the small taper roller bearing on the end of the screwed rod of special tool MF.476.

139. Fit special tool MF.476 over the main shaft. Screw down the central screw until it locates in the end of the shaft. Tighten the lock-nut.

140. Screw down the large hexagon nut on MF.476 to press the taper roller bearing into position.

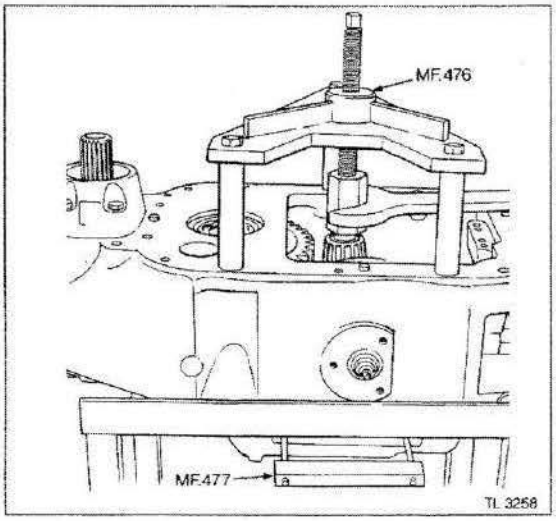
141. Check that the bearing is pressed fully home by trying to turn the thrust washer under the bearing.

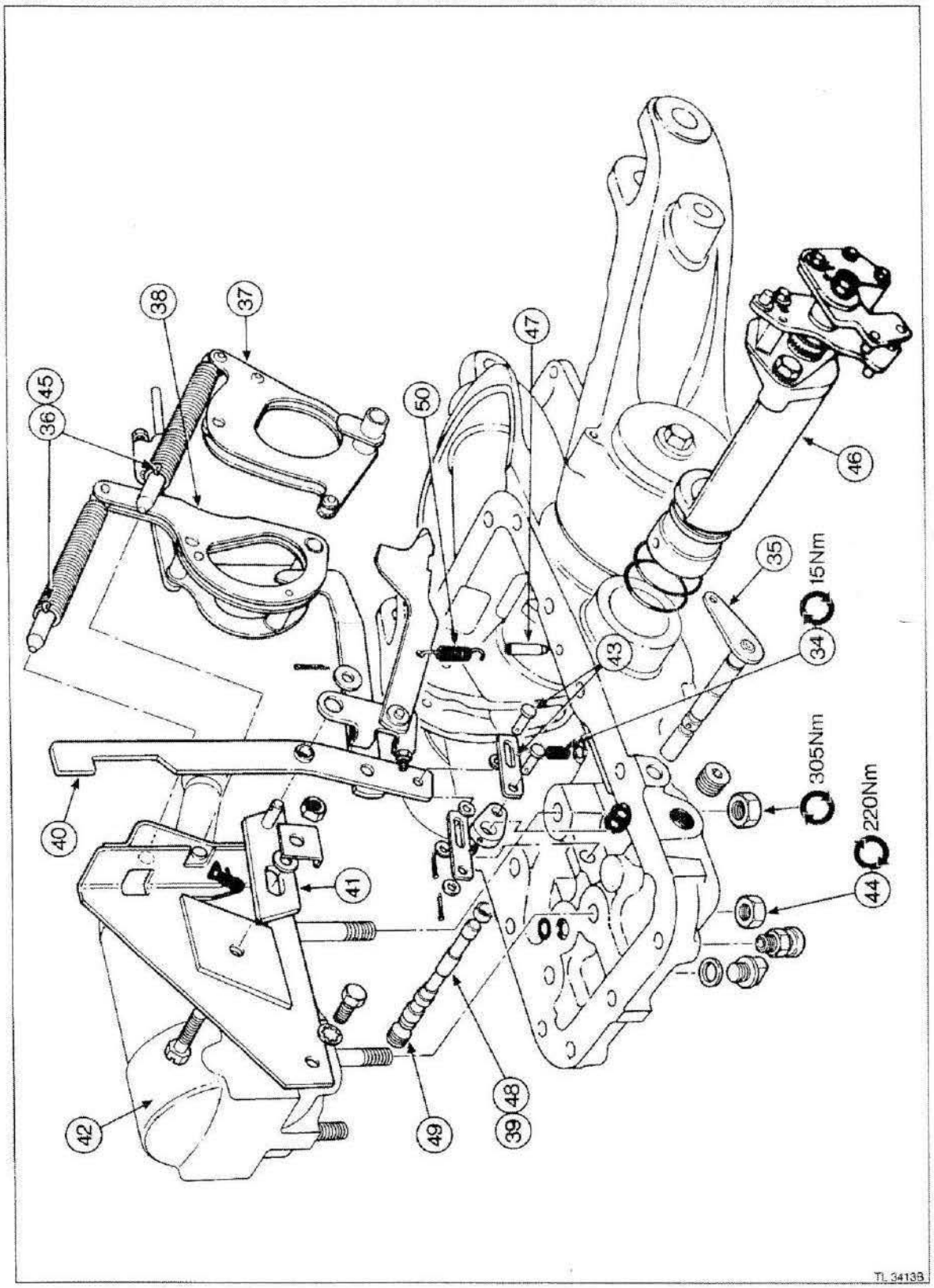
142. Remove special tools MF.476 and MF.477.

143. Replace the selector shaft, apply Massey Ferguson Studlock (Loctite 270) to the threads of the bolt and tighten to a torque of 30 Nm (22 lbf ft).

144. Replace the selector shaft support plate, apply Massey Ferguson Studlock (Loctite 270) to the threads of all the bolts and tighten to a torque of 30 Nm (22 lbf ft).

145. Rotate the shafts to ensure that all the gears are free to rotate.

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