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Category

Signalling

Title

The Claw Lock Mechanism Overhaul

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Document History

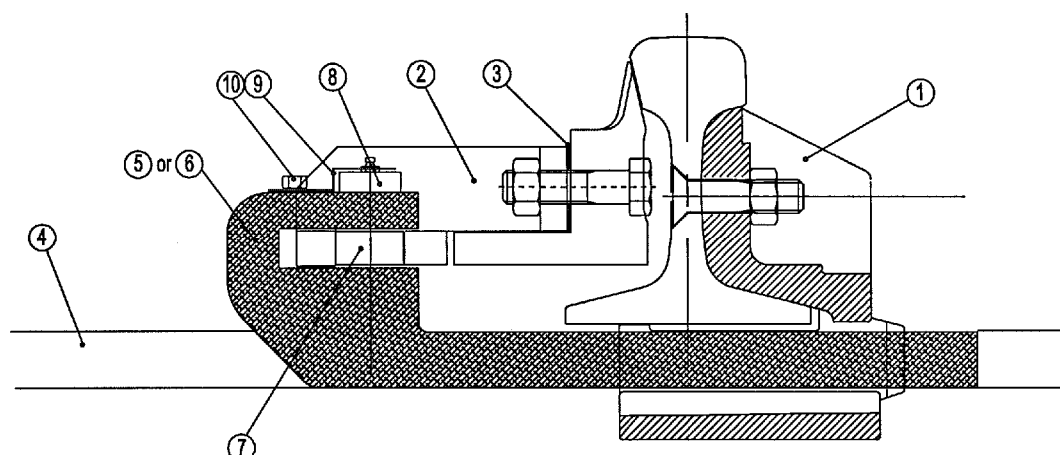
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No	Part	Manufacturer
1	Claw Lock	QR / WSA / Steelrod for 60kg,
2	Claw Bracket ¹	QR / WSA / Steelrod for Zu60,
3	Shims	1 and 2mm thick
4	Coupling bar ²	WSA / Steelrod
5	Claw Zu60 RH	QR / WSA / Steelrod
6	Claw Zu60 LH	QR / WSA / Steelrod
7	Bush	Octagonal, eccentric for Zu60 claw bracket
8	Claw Pin	For Zu60 claw
9	Claw Pin retainer	For Zu60 claw
10	Bolt, claw pin retainer with spring washer	

Figure 1.1 – Claw Lock components Zu60 Assymetric Switches

1 The Claw Lock Mechanism – All Types

For the purposes of overhaul, the claw lock mechanism is treated as a “collection of components” rather than as a mechanism. It is not necessary to remove the whole assembly from the track to carry out overhaul, but only to remove those components which require replacement.

After replacement of any component, other than claw pin retaining plates, pins or bolts, a facing point lock test must be carried out and, where necessary, adjustments made before the turnout or swing nose is returned to service.

¹ Claw brackets for front and back drives may differ in dimension due to the thickening of the switch at the back drive

² The centre section of the coupling bar for a back drive is longer than the centre section for the main drive. Refer to chapter 5 “Installation”.

The actions described for the claw lock mechanism can be applied to both turnouts and swing nose crossings. Where the word “stockrail” is used, the words “wing rail” for PRE swing nose crossings and “frame” for VAE swing nose crossings may be substituted.

1.1 To replace claw pins and/or bushes (PRE Swing Nose Excepted)

- Move the turnout or swing nose to approximately centre to take load off the claws.
- Remove the claw pin retaining plate and bolt and/or split pin, “R” pin.
- Remove the claw pin
- If the eccentric (or plain for conventional layouts) bush is to be renewed slide the bush out from inside the claw and remove. Note the orientation of the eccentric bush.
- Place the new bush into the claw bracket (same orientation as the old for the eccentric bush) and slide into the claw
- Refit the claw pin and retaining system

Retaining plate and (new) bolt. ----- Tangential turnouts

Split pin, guide bracket and nut ----- Conventional turnouts

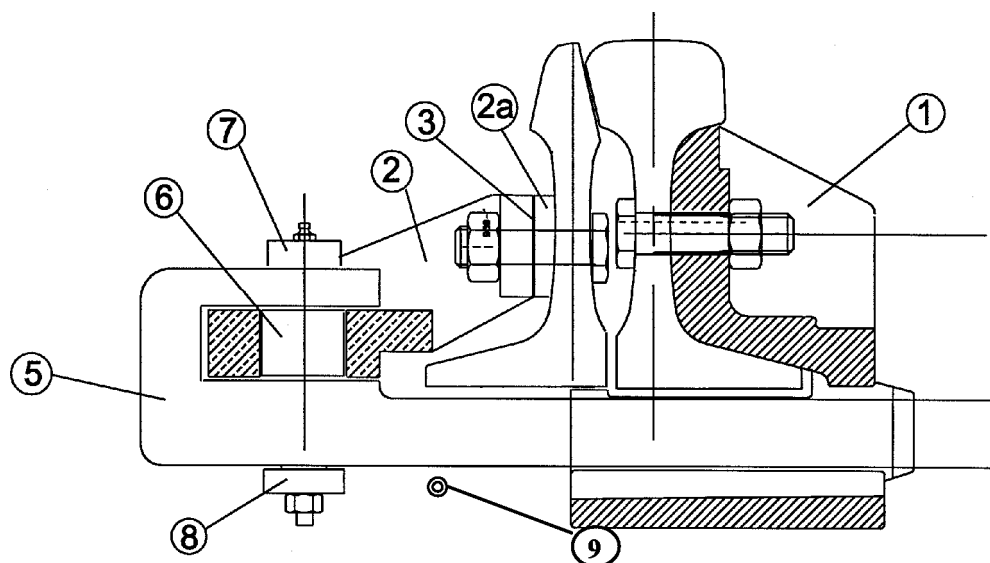
Retaining plate and split pin. ----- VAE Swing nose Xings

Retaining plate and (new) bolt plus “R” pin
and tie ----- PRE 1 in 12 to 15 Swing Nose Xings

1.2 To replace claw pins and bushes PRE Swing Nose – Beverly Hills

- The swing nose must be reverse to replace the normal claw pin and normal to replace the reverse claw pin
- Remove the split pin and washer from the bottom of the claw pin
- Remove the retaining plate and bolt from the claw
- Remove the pin
- Fit the new pin, refit the retaining plate with a new bolt and fit the washer and (new) split pin to the bottom of the claw pin
- Bushes in this assembly are a driving fit in the claw and claw bracket. If renewal is necessary the claws must be removed from the claw bracket (refer to claw renewal) and forwarded for bush replacement. The bushes in the claw bracket can be driven out and new bushes driven in with a suitable drift. It is advisable to support the claw bracket with a jack while this is being

carried out.



No	Part	Manufacturer
1	Claw Lock	QR / WSA / Steelrod, in 60,53 and 47 kg
2	Claw Bracket ³	Common to 60 kg, 53 kg and 47 kg rails
2a	Claw Bracket adaptor	60kg, 53kg, 47kg
3	Shims	1 mm, 2mm
5	Claw	QR / WSA / Steelrod
6	Claw pin bush	Rectangular non-adjustable
7	Claw pin with Nyloc nut	WSA
8	Claw guide	WSA
9	Split pin	

Fig 1.2 – Claw Lock components 60kg full height switch

1.3 Claw Renewal – all types

- Move the turnout or swing nose to approximately centre to take load off the claws.
- Remove the claw pin
- Remove the claw lock from the stockrail and slide it out along the coupling bar until it is clear of the claw. It should be possible to position the turnout so that the claw lock can be moved out far enough without have to disturb the operating mechanism coupling.

³ Claw brackets for back drives are likely to be of different dimensions to those for the main drive since the switch is thicker at the back drive.

WARNING:

The coupling bar will drop towards the ballast when the claw lock is removed from the stockrail.

- Remove the claw from the claw bracket.
- Place the new claw on the bracket making sure that the head of the claw is in the recess in the coupling bar.
- Refit the claw lock to the stockrail
- Refit the claw pin and retaining system

Retaining plate and (new) bolt. -----Tangential turnouts

Split pin, guide bracket and nut ----- Conventional turnouts

Retaining plate and split pin. ----- VAE Swing nose Xings

Retaining plate and (new) bolt plus washer
and split pin. -----PRE 1 in 24 Swing Nose Xings

Retaining plate and (new) bolt plus “R” pin
and tie ----- PRE 1 in 12 to 15 Swing Nose Xings

1.4 Claw Lock Renewal

Move the turnout or swing nose to approximately centre to take load off the claws.

The operating mechanism and where fitted, the back drive will need to be disconnected from the coupling bar where the claw lock is to be renewed.

Unbolt the claw lock from the stockrail and slide it off the coupling bar.

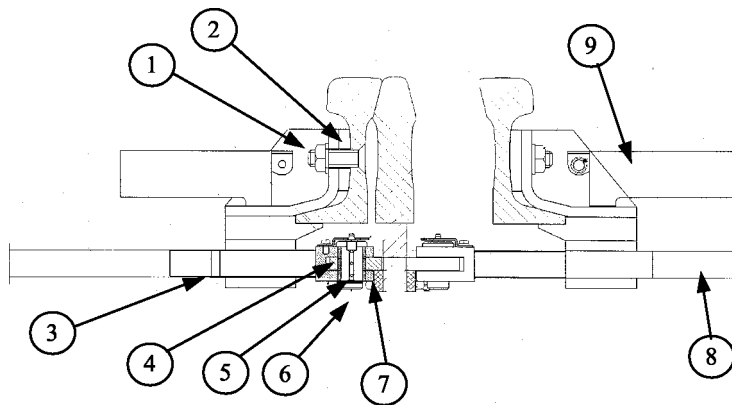
Slide the new claw lock onto the coupling bar and trial fit up to the stockrail. It must seat fully into the web of the stockrail by hand. If it does not, check that the claw lock rail stops are not binding on the underside of the stockrail. Grind down if necessary.

If the claw will still not seat properly it will be necessary to grind a small amount off the top fishing face of the claw lock casting.

A claw lock must not be forced into the stockrail by either pulling in with the bolts or by using a hammer

When satisfied with the fit, bolt the claw lock to the stockrail.

Refit the operating mechanism and, where fitted, the backdrive.



No	Part	Manufacturer
1	Claw Lock	Pacific Rail Engineering (PRE)
2	Adaptor	PRE for 60 kg rail
3	Claw	PRE
4	Claw pin retainer and bolt	PRE
5	Claw Pin	PRE
6	Split pin and washer	
7	Claw bracket	PRE
8	Coupling bar	PRE
9	Cover	PRE

Fig 1.3 – Claw lock components PRE 1 in 24 swing nose

1.5 Coupling bar Renewal

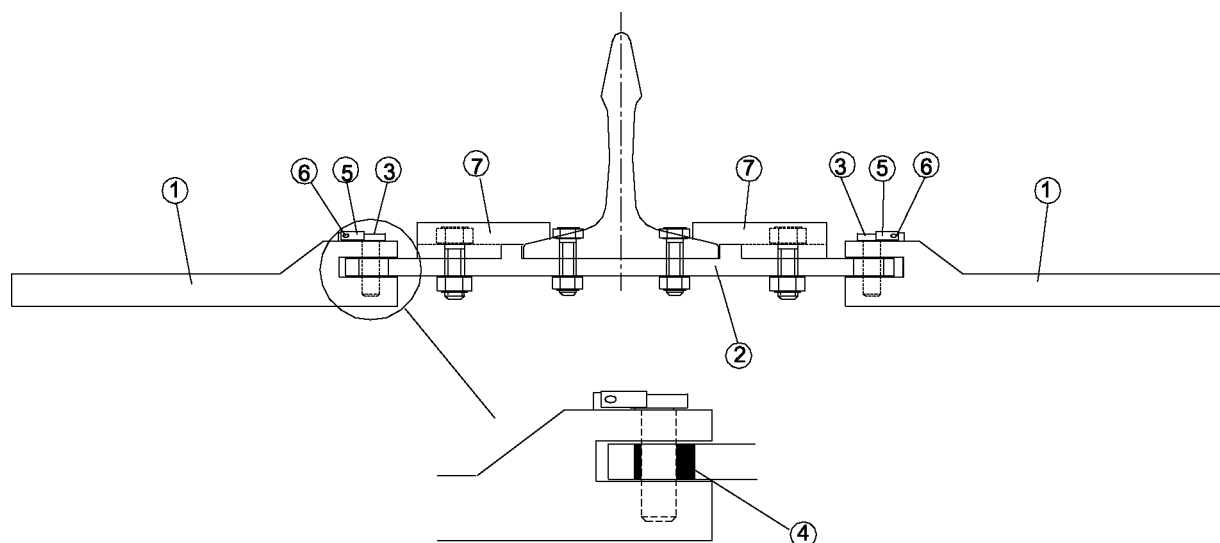
- Move the turnout or swing nose to approximately centre to take load off the claws.
- Disconnect the operating mechanism and, where fitted, the backdrive from the coupling bar
- Remove both claw locks from the stockrail and slide off the coupling bar.

WARNING:

The coupling bar will drop towards the ballast when the claw lock is removed from the stockrail

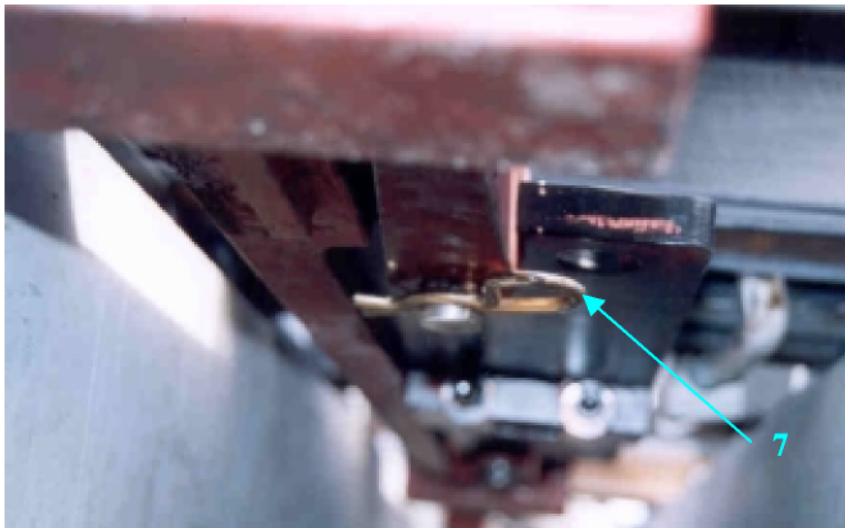
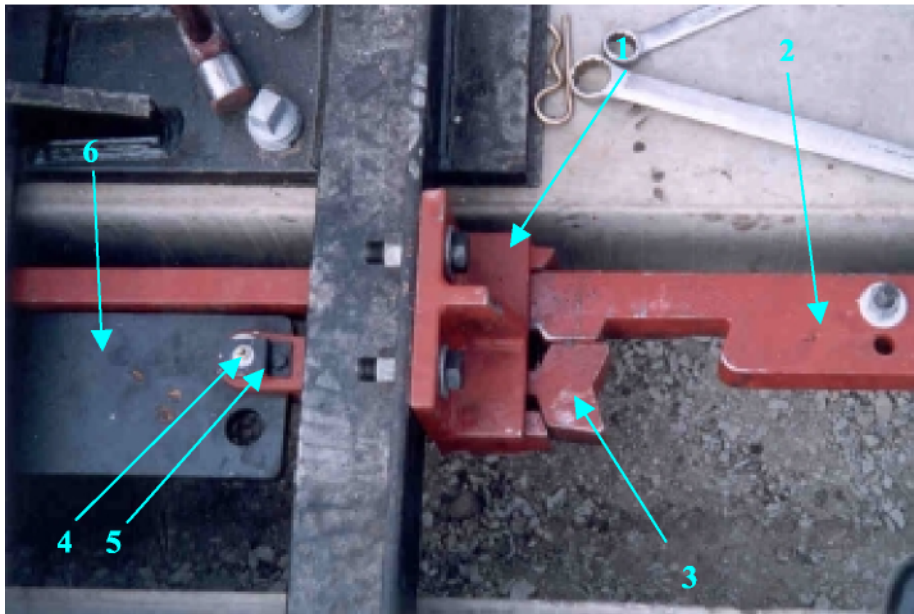
- Slide the new coupling bar under the track and align with the claws
- Slide the claw lock onto one side and loosely attach to the stockrail
- Slide the opposite claw lock over the coupling bar and attach to the stockrail

- Tighten both claw locks
- Refit the backdrive and operating mechanism.



No	Part	Type
1	Claw	VAE
2	Claw Bracket	VAE
3	Claw Pin	VAE
4	Eccentric bush	VAE
5	Claw pin retainer	VAE
6	Split Pin	
7	Clamp plate	VAE
	Claw Lock	VAE
	Coupling Bar	VAE

Fig 1.4 – Claw lock components VAE swing nose



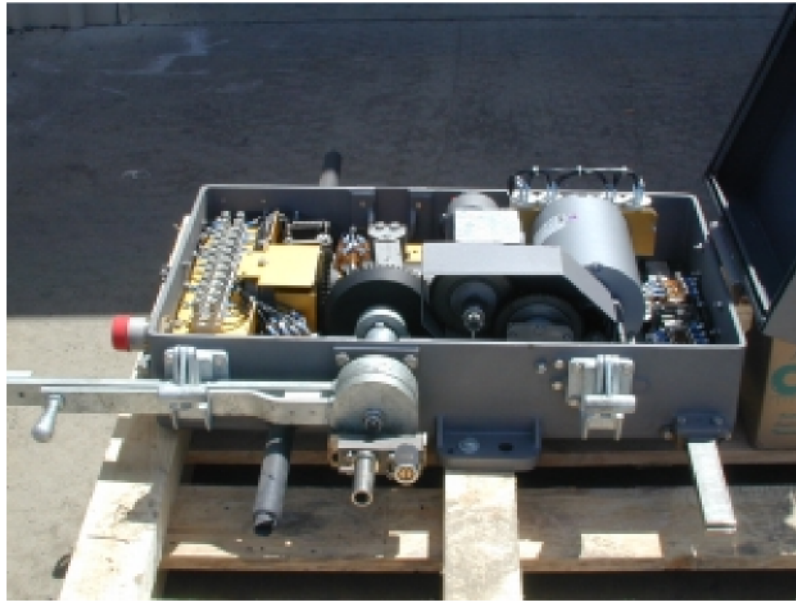
No	Part	Manufacturer
1	Claw Lock	PRE
2	Coupling Bar	PRE
3	Claw	PRE
4	Claw Pin	PRE
5	Claw Pin retainer and bolt	PRE
6	Claw Bracket	PRE
7	"R" pin	

Fig 1.5 – Claw Lock Components – PRE 1 in 12 to 15 swing nose

2 Claw Lock Assembly Part Numbers

To be inserted when ID and cataloguing of components is completed

3 Westinghouse 84M Series Switch Machines



3.1 General

This section describes only clutch and snubber overhaul and machine hand changeover. It does not describe gearbox dismantling or bearing renewal and does not contain a comprehensive list of parts.

A detailed Workshop Manual, **document TTTO_84M**, is available from Westinghouse Signals Australia. This should be obtained and used where major mechanism overhaul is contemplated.

The intervals at which a switch machine requires overhaul will depend on :-

- Usage
- Type of turnout or swing nose being driven
- Rail traffic types and tonnages
- Variation in turnout and road bed condition over time.

Since all of the above will vary from area to area and may vary from location to location, overhaul is to be carried out on an “as required” basis.

Virtually all of the moving parts in an 84 series machine will, at some stage, wear to the point that operation will be compromised. Examples of these parts are:

- Clutch disks and springs.
- On hand crank machines, the crank bearing sleeve and switch linkage.
- Detector slide bearings in the case

- Detector rollers and roller linkages
- Motor control contact rollers and throwover linkages.
- Throw bar bearings in the case
- Pinion teeth and throw bar rack teeth
- Gearbox mainshaft bearings
- Worm and worm wheel teeth
- Worm gear shaft bearings
- Wormshaft gear, intermediate pinion and intermediate gear teeth
- Shaft or bearings for the intermediate pinion and gear
- The snubber friction disk
- Detents in the throw bar.

All of these parts can be replaced provided that the wear has not been allowed to extend into cast components such as the case and gearbox castings. If this happens, the machine has little more than scrap value.

Where a symbol is shown against a procedure, the procedure can be carried out without removing the machine from the points.

Where a symbol is shown against a procedure, the procedure is best carried out in a workshop.

However, where a machine requires attention to more than one assembly, eg clutch and hand throw mechanism, then it would be advisable to remove the machine from site for overhaul.

3.2 Clutch (and Snubber) Replacement 84M and D84M Mechanisms

This clutch is located on the end of the worm shaft on the same side of the mechanism as the motor pinion.

3.2.1 Relace clutch springs

- Remove the split pin and retaining nut from the end of the clutch shaft.
- Remove the old spring (Belville washer assembly).
- Fit the new spring, refit the locknut and adjust the clutch to slip with a load of 6.5 to 7 kn
- Fit a new split pin.

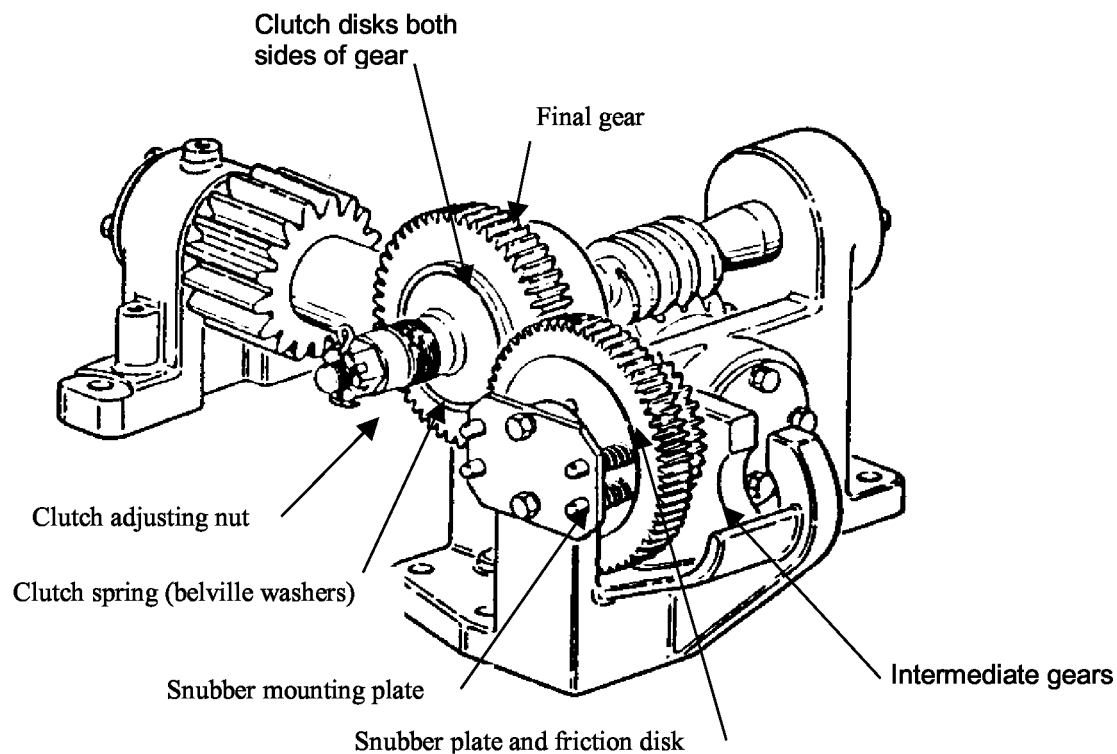


Fig 3.1 – Clutch and snubber non-trailable machines

3.2.2 Renew clutch and snubber friction disks

Tools	Parts
Combination pliers	Clutch disk spring p/n <i>TBA</i>
200 mm Screwdriver	Clutch friction disks (3) p/n 4335303001
19 mm socket or ring spanner	Split pin 4 mm dia x 25 long
13 mm socket with extension	Grease
External circlip pliers	Bush, final gear p/n ????
Drift 10 mm dia x 175 long	solvent
0.5 kg ball peen hammer	
Lint free cloth	

Removal

1. Disconnect and remove the motor (complete with pinion)
2. Remove the two M8 screws from the snubber assembly and remove the mounting plate and springs.
3. Remove the circlip retaining the intermediate gear shaft and, with a suitable drift, gently tap the shaft out of the gearbox (try not to dislodge the bearing from the gearbox housing). A 3/8" BSP plug in the side of the case gives access for the drift.
4. Remove the intermediate gears and the snubber plate and friction disk.
5. Remove the split pin, nut, outer pressure ring, spring assembly and inner pressure ring from the clutch shaft.
6. Remove the clutch plate and outer friction disk
7. Slide the final gear off the shaft and remove the inner friction disk.
8. Thoroughly clean both sides of the final gear and the inner and outer clutch plates. Use an approved solvent wetted cloth taking care not to splash the solvent on other parts of the machine.

Check the condition of the bush in the centre of the gear and relace if necessary. (unless there has been considerable clutch slip, wear on this bush should be minimal)

Replacement

1. Fit a new inner friction disk and refit the final gear
2. Fit a new outer friction disk and refit the outer clutch plate.
3. Replace the inner pressure ring, disk spring, outer pressure ring and retaining nut.
4. Position the intermediate gears, snubber friction disk and snubber plate and drive the intermediate shaft back into the gearbox.
5. Refit the circlip
6. Refit the snubber mounting plate and springs
7. Refit the motor and reconnect.
8. Adjust the clutch to slip with a load of 6.5 to 7 kn
9. Fit a new split pin to the clutch retaining nut.

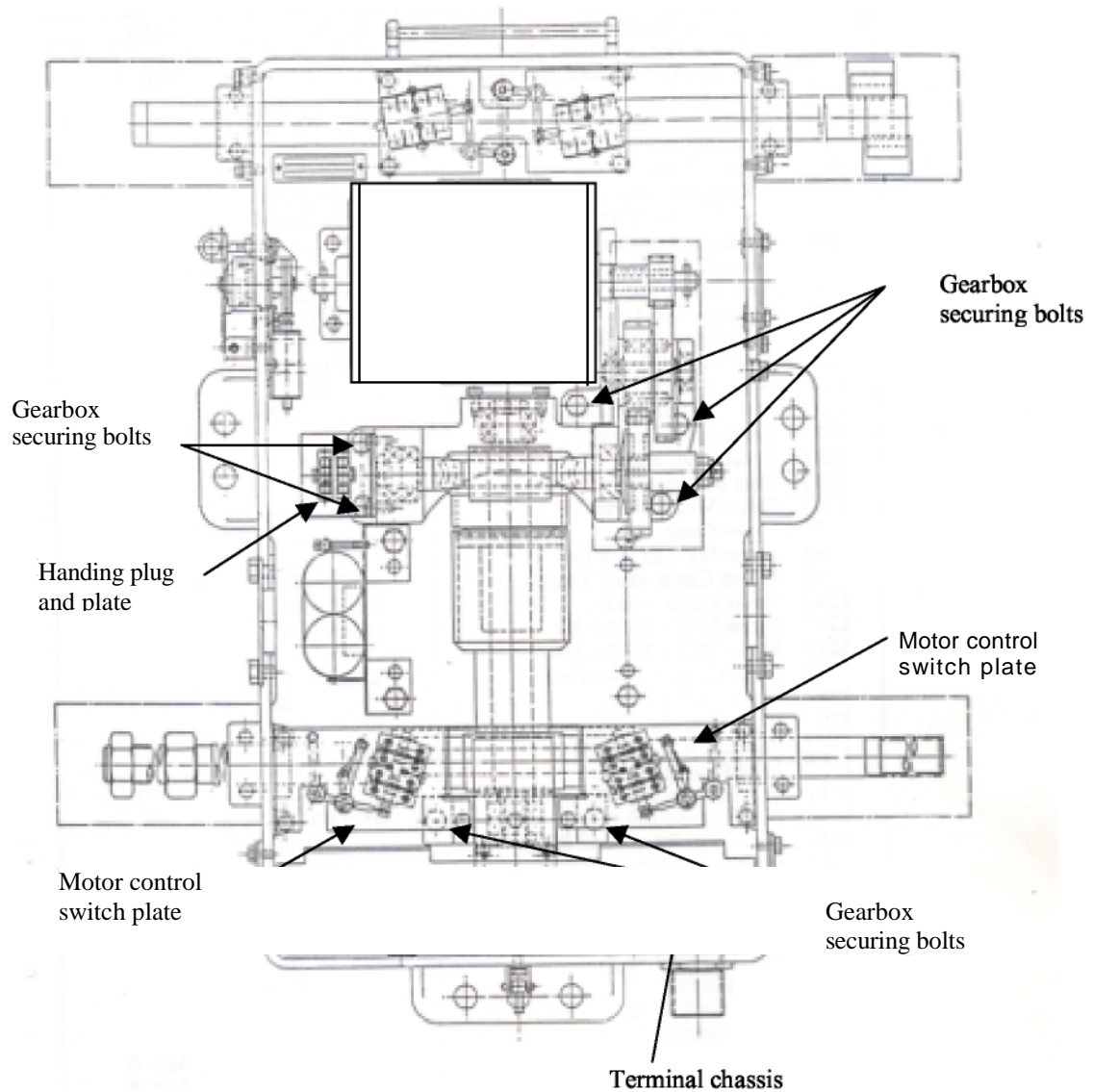


Figure 3.2 - T84M Machine (trailable with hand crank)

3.3 Clutch and Snubber Replacement T84M and TD84M Machines.

As the clutch replacement on T84M and TD84M machines requires removal of the gearbox from the machine, there are other tasks which should be carried out while the gearbox is out of the machine. These tasks are included in this section under “clutch replacement”.

3.3.1 Snubber replacement

Refer to clause 3.2.2

3.3.2 Clutch Replacement

3.3.2.1 Gearbox Removal – T84M

Tools	Parts
19 mm socket	None required
13 mm socket	
24 mm socket	
150 or 200 mm screwdriver	
Ratchet and extension for sockets	
2 – 3 m of 8 or 10 mm rope	

1. Disconnect and remove the motor
2. Disconnect external wiring (all circuits must be isolated before disconnection). Remove the screws holding the terminal chassis and motor control switch plates into the case.
3. Carefully drape these plates over the side of the case with internal wiring remaining connected.

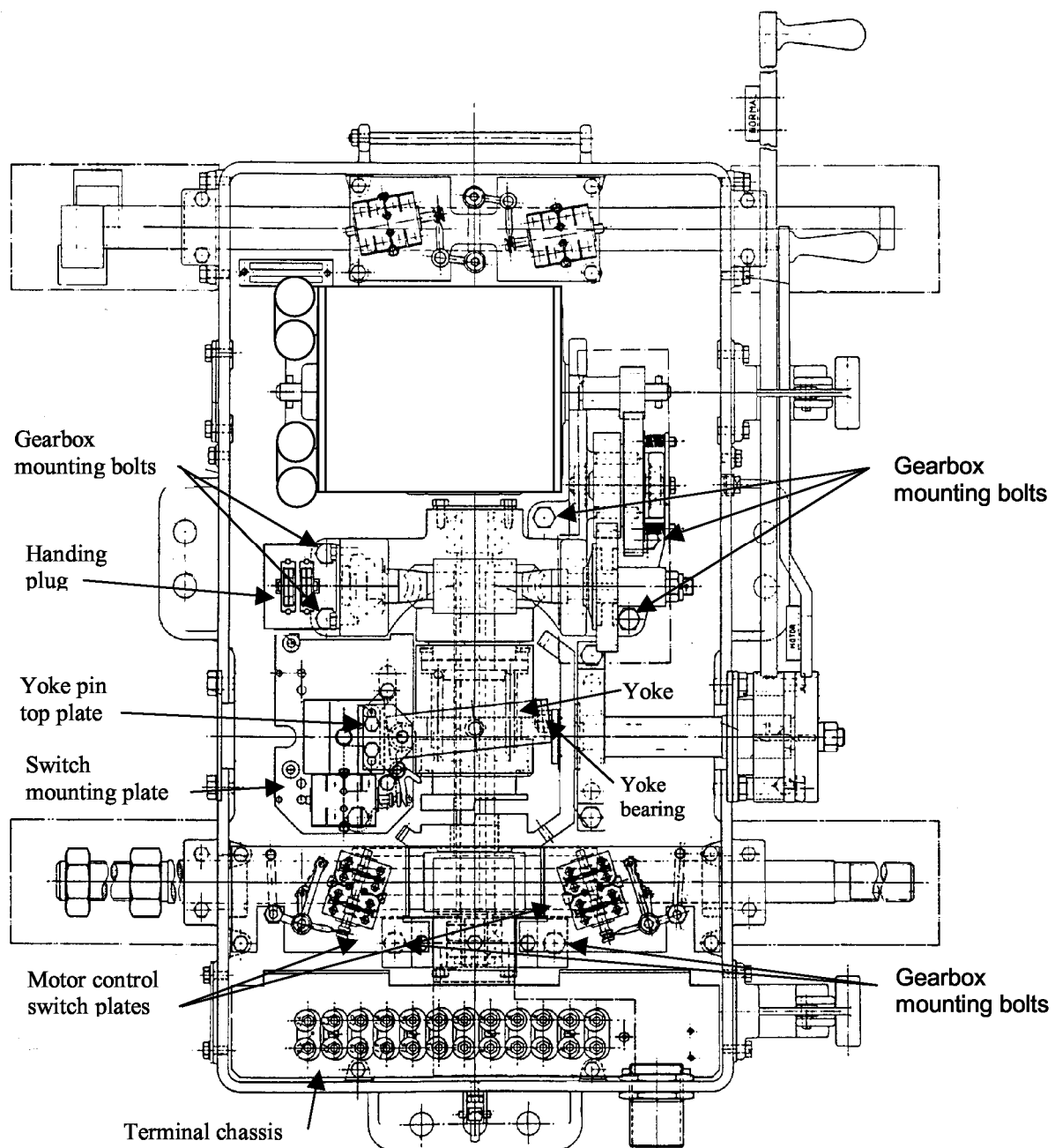


Fig 3.3 – TD84M machine (Trailable with hand throw lever)

4. Remove the handing plug from the plug plate on the side of the gearbox. Alternatively remove the handing plug and plate from the gearbox.
5. The gearbox and bearing housing must be removed as a unit
6. Remove the seven M12 screws securing the gearbox assembly and, using a rope looped around the gearbox, lift vertically from the locating dowels and out of the case

Gearbox Removal TD84M

Tools	Parts
19 mm socket	None required
13 mm socket	
24 mm socket	
150 or 200 mm screwdriver	
Ratchet and extension for sockets	
2 – 3 m of 8 or 10 mm rope	

1. Disconnect and remove the motor
2. Remove the screws holding the terminal chassis and motor control switch plates into the case. There is no need to disconnect wiring.
3. Carefully drape these plates over the side of the case
4. Remove the handing plug from the plug plate on the side of the gearbox. Alternatively remove the handing plug and plate from the gearbox
5. Place the machine in hand throw mode and operate the hand throw lever until the machine is in mid stroke. Mark the hand throw gears where they mesh to assist in re-assembly.
6. Remove the two M8 screws holding the yoke pin in place.
7. Remove the top plate and slide the yoke pin up to remove it
8. Slide the yoke forward off the selector, rotate it and remove it
9. Remove the selector bearing
10. Remove the bolts securing the switch mounting plate and move the plate and switch complete sufficiently to clear the hand throw clutch.
11. The gearbox and bearing housing must be removed as a unit
12. Remove the seven M12 screws securing the gearbox assembly and, using a rope looped around the gearbox, lift vertically from the locating dowels and out of the case

Tools	Parts
13 mm socket	None Required
24 mm socket	
Ratchet and extension for socket	
150 or 200 mm screwdriver	
300mm G clamp	

3.3.2.2 Clutch Dis-assembly

1. Remove the gearbox assembly to a workshop or depot.
2. Remove the cover plate on the main shaft bearing housing

WARNING:

On non dual control machines (T84M), the clutch assembly/ main shaft is pre-loaded. Use a 300mm G clamp or similar across the back of the spring housing and gearbox to prevent components springing apart.

3. Remove the bearing locknut (note the locking washer tabs) and remove the housing from the shaft
4. Release the G clamp slowly and carefully
5. Slide the pinion, spacer and spring housing off the shaft
6. Clutch plates and friction disks can now be removed.

3.3.2.3 Clutch Reconditioning and Reassembly

Tools	Parts
13 mm socket	Clutch friction disks p/n 4335314401
24 mm socket	Clutch plate inner p/n 4335314601
Ratchet and extension for socket	Clutch plate outer p/n 4335314501
150 or 200 mm screwdriver	Ball bearing 4405/35 *Circlip pliers
Brass Drifts (various diameters)	Ball bearing 4405/36 *
300mm G clamp	Lock (tab) washer p/n 4405/38 *

*Only where examination shows it to be necessary

Check all main shaft bearings for roughness or side play. If the machine has been in service for more than 5 years or if there is any suspected defect, remove the bearings and wash to remove all grease and contamination.

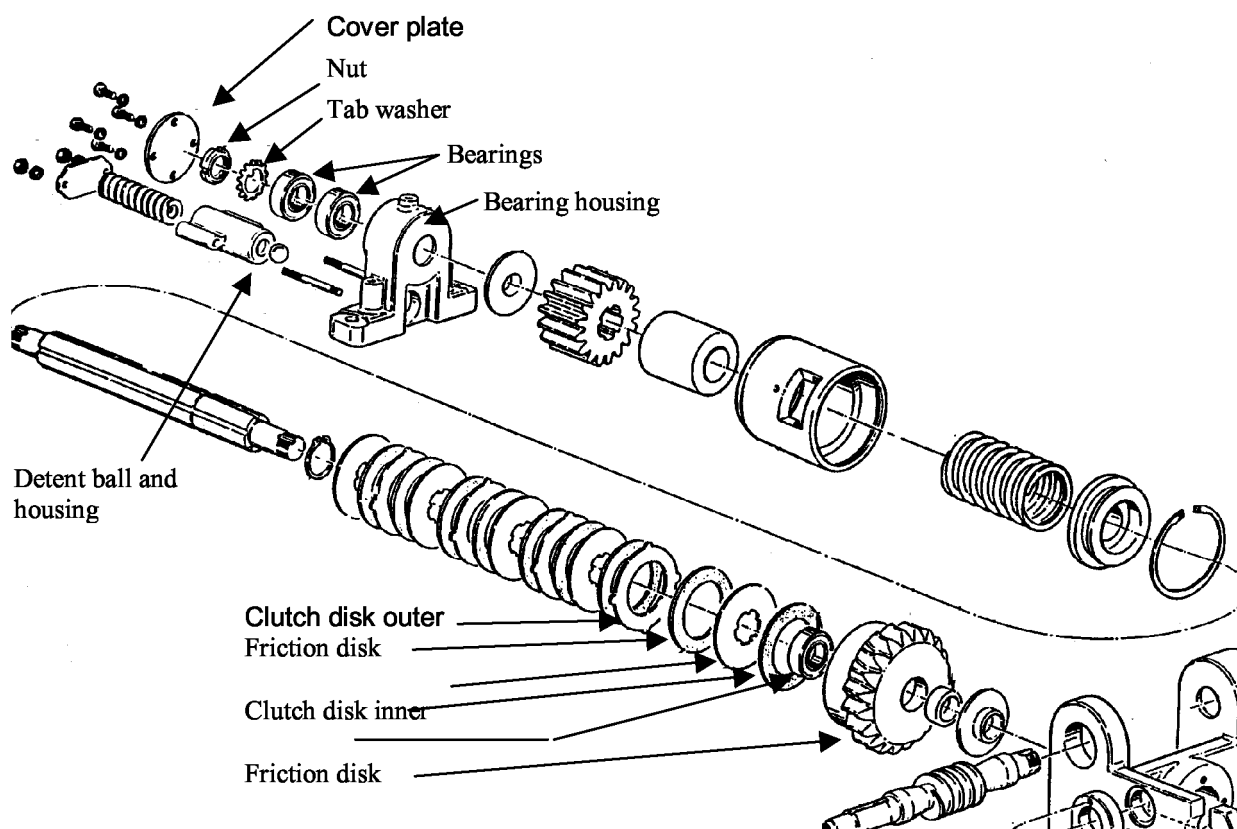


Figure 3.4 – Trail clutch assembly

1. Examine the bearings and replace if worn or damaged.
2. Re grease the bearings with Shell “Retinax AM” or Molybond “Ultrplex M” or Caltex “Molygrease EP2”.
3. Clean the main shaft.
4. If the bearings at the worm wheel end of the main shaft have been removed, replace and refit the main shaft into the gearbox casting. Refit the thrust washer, bearing spacer, worm wheel and bearing.
5. Thoroughly clean the clutch plates. Replace any damaged plates
6. Renew friction disks.
7. Before commencing clutch re-assembly, examine the condition of the detent ball and spring casing fitted to the main shaft bearing housing.. Replace if there is visible wear or damage to either ball or housing.

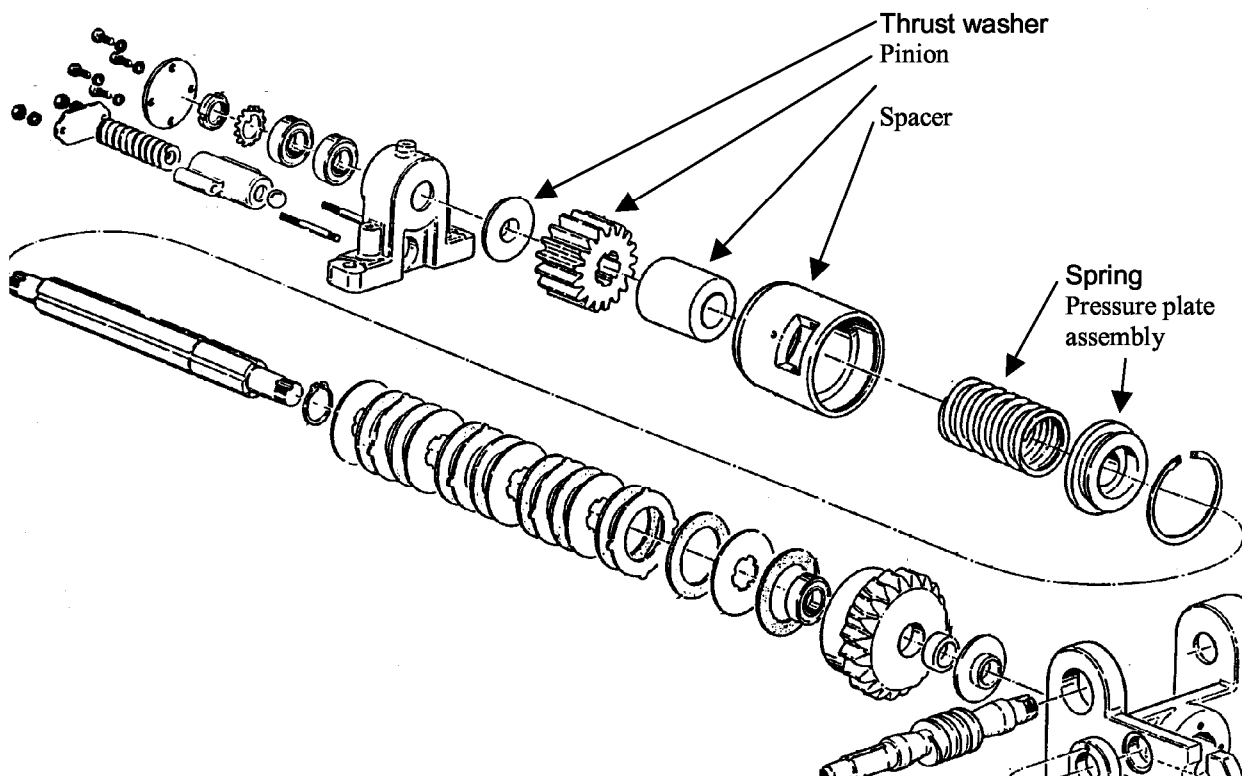


Fig 3.5 – Trail Clutch order of assembly

8. Replace the clutch plates and friction disks on the shaft noting the correct order from the worm wheel end. Friction disk, clutch plate inner, friction disk, clutch plate outer, repeated four times, then finishing with friction disk, clutch plate inner.
9. Replace the spring sleeve and pressure plate assembly back onto the shaft
10. If a T84M, replace the spacer, pinion and thrust washer onto the shaft.
11. If a TD84M, replace the hand throw clutch, bevel pinion, thrust washer, pinion and thrust washer onto the shaft.
12. Replace the bearing housing onto the shaft and slide the bearings into the housing. Bearings fit “back to back”
13. Refit the tab washer and locknut.
14. Note that on T84M machines it is necessary to clamp the gearbox and clutch assembly to refit the tab washer and nut.
15. Secure the nut using previously unused tabs on the tab washer. (Replace this washer if all tabs have been previously used).
16. The gearbox is now ready for refitting into the machine.

3.3.2.4 Gearbox Replacement

Tools	Parts
19 mm socket	Throw bar p/n 3335305001*
13 mm socket	
24 mm socket	* if examination determines necessary
Ratchet and extension for sockets	
150 or 200 mm screwdriver	
2 – 3 m of 8 or 10 mm rope	

Before replacing the gearbox into the machine examine the condition of the detent recesses in the throw bar. If the recesses show significant wear or if there is significant grooving between recesses, replace the throw bar.

1. Place the gearbox back into the machine ensuring that it seats correctly on the locating dowels
2. Fit and tighten the M12 bolts securing the gearbox and main shaft bearing housings into the case.

For 84M and T84M machines

- Refit the handing plug to the side of the gearbox
- Refit the motor operating switch plate and terminal chassis
- Refit the motor and re-connect.

For D84M and TD84M machines

- Refit the hand switch plate
- Refit the selector bearing
- Refit the yoke
- Refit the yoke pin
- Replace the top plate and bolts and tighten
- Refit the handing plug to the side of the gearbox
- Refit the motor operating switch plates and terminal chassis
- Reconnect external wiring
- Refit the motor and re-connect.

3.3.2.5 Clutch Adjustment

For T84M and TD84M Machines

1. Using the 6mm diameter rods, rotate the pressure plate until the grub screw is visible in the window in the housing.
2. Loosen the grub screw
3. With one bar in the pressure plate and one in the adjusting ring, turn the adjusting ring. Viewed from the worm wheel end, turning clockwise increases the load.
4. Set to give a thrust at the throw bar of 4 to 4.5 kn
5. Re-tighten the grub screw

Grub screw Adjusting ring

3.4 Hand Throw Mechanism Removal or Change of Hand - D84M and TD84M Machines

3.4.1 Removal

1. *If changing hand*, remove the blanking plates from the opposite side of the machine to the levers. Clean the inner and outer mounting faces in the case
2. Place the machine into hand throw mode and operate the hand throw lever until the machine is in mid stroke. Mark the hand throw bevel gears to assist in re-assembly (marking gear to gear, as close to mesh point as possible, is best)
3. *If changing hand*, remove the lever supports
4. Remove the M16 nut securing the selector lever and remove the lever along with the interlocking ball bearing and woodruff key.
5. Remove the two screws at the bottom of the interlocking plate and remove the plate
6. Withdraw the hand throw lever taking care not to loose the keys from the shaft.
7. Remove the two screws from the hand throw bearing plate and remove the plate. (A light tap with a mallet may be necessary).
8. *If changing hand*, disconnect the wires from the motor/hand detection switch. (These wire are positioned in the loom so that they are suitable for right or left hand operation).
9. Remove the screws securing the yoke pin top plate and remove the plate.
10. Slide the yoke pin up and remove it
11. Slide the yoke forward off the selector, rotate and remove it. Remove the selector bearing.
12. *If changing hand*, remove the screws securing the switch plate and yoke mounting and remove.
13. Unbolt the bearing housing and lift off the locating dowels.

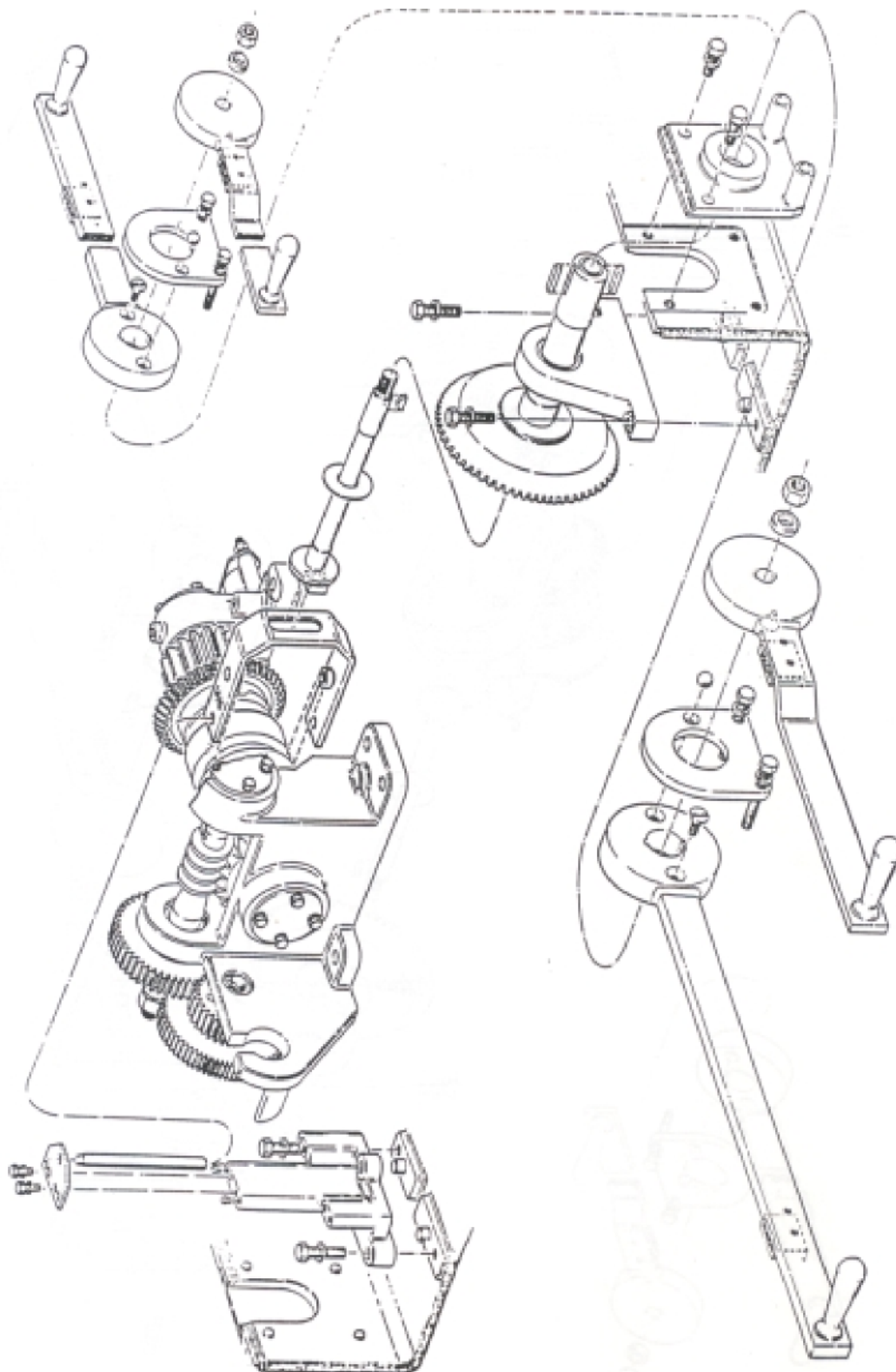


Fig 3.7 - LH hand throw assembly

3.4.2 Replacement - Same or Opposite Hand

1. Clean any dirt and paint from the surface of the bearing housing mount and dowels in the case (opposite side housing mount and dowels if changing hand).
2. Fit the yoke mounting and switch plate and slip the yoke loosely around the shaft. Note that the yoke must be fitted with the letters “LH” or “RH” upwards depending on the hand of machine being assembled.
3. Fit the bearing housing onto the dowels but only screw down finger tight. Ensure that the previously marked teeth on the gears are aligned.
4. Fit the selector bearing and slide the yoke onto the selector.
5. Fit the yoke pin and top plate and secure.
6. Temporarily fit the hand throw lever (lever should be fitted vertical at mid stroke)
7. With the selector in the hand position (clutch engaged), operate the machine and ensure that the stroke is even both sides of mid point. At each ‘end of stroke’ position there should be between 10 and 15 mm from the end of the rack to the side of the case.
8. If this needs adjustment, remove the screws from the bearing housing and carefully lift the housing until the bevel gear teeth disengage. Ensure that the selector bearing remains in the yoke. Turn the bevel pinion one tooth in the required direction and refit the bearing housing.
9. Check that throw is now even. If so tighten down the bearing housing.
10. Refit the hand throw bearing plate and hand throw lever
11. Refit the interlocking plate and ball (ball position will depend on hand and lay of points). Ensure that the countersunk screw is placed in the unused ball recess in the hand throw lever.
12. Refit the selector lever
13. Refit the lever supports and blanking plates
14. Reverse the labels on the hand throw and selector levers where necessary.

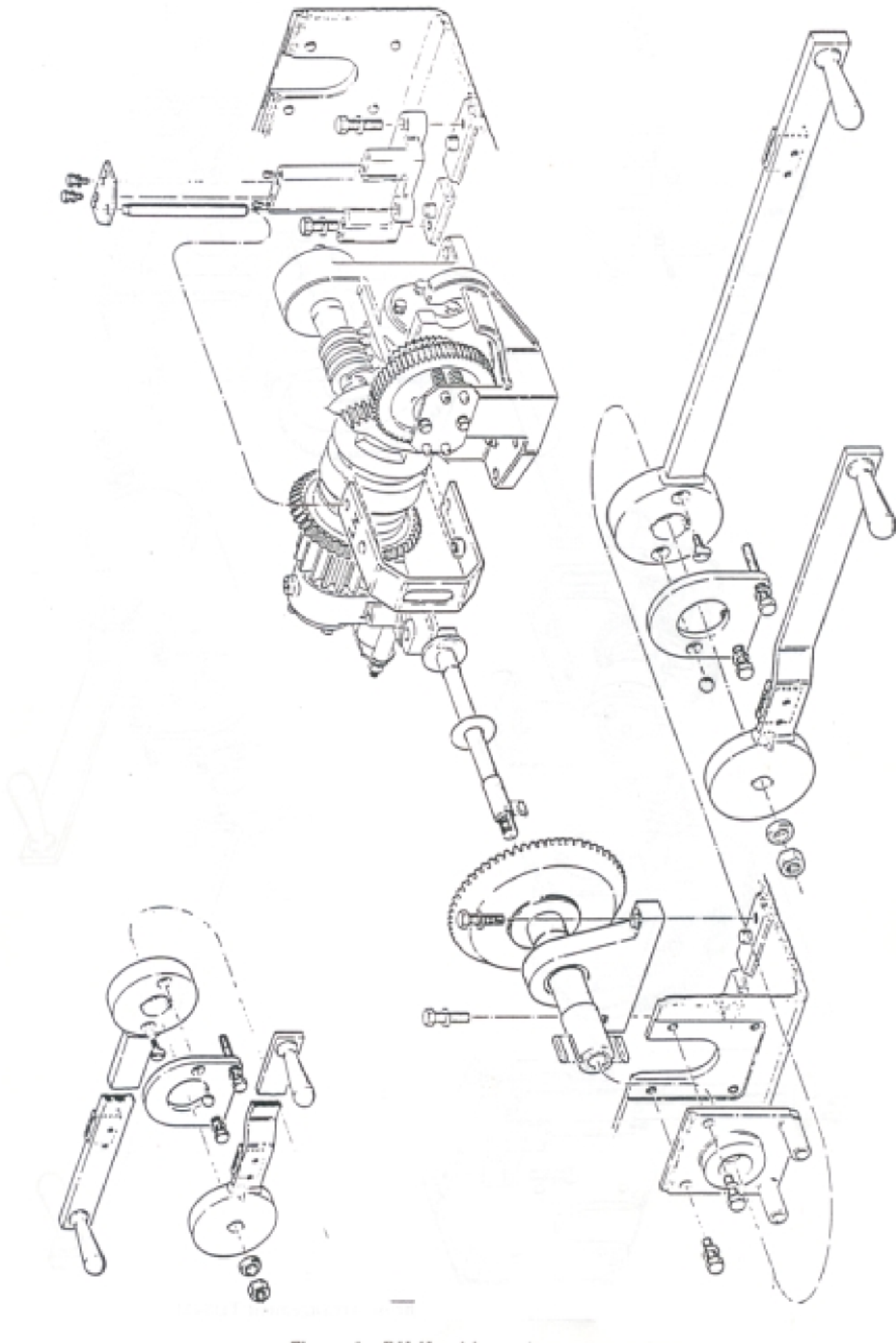


Fig 3.8 – Hand throw mechanism right hand

3.5 Detector Slide Bearing renewal

Refer to Westinghouse Signals Australia Manual TTTO_84M

3.6 Throw Bar Bearing Renewal

Refer to Westinghouse Signals Australia Manual TTTO_84M

4 Spare parts 84M Series Machines

4.1 84M series of mechanisms – common parts

Part	Part Number
Case	0335305901
Detector bar (top)	2335201303
Detector bar (bottom)	2335201304
Detector Switch Unit	3335203801
Cut off switch complete LH	3335201002
Cut off switch complete RH	3335201001
Throw bar	3335305001
Rack – drive	2335304901
Cover complete	3335201501
Bearing – detector slide	3335301901
Motor 110/120 V 50 Hz	1520100204
Capacitor 50 mfd 250 V	3166/26

4.1.1 84M Non trailable, non dual control machine

Part	Part Number
Gearbox complete	1335202801
Capacitor Unit	3335204102
Hand Crank Switch	3335200701
Wiring Harness	3340304401
Plug complete – hand crank aperture	4335201201

4.1.2 T84M Trailable, non dual control machine

Part	Part Number
Gearbox complete	1335202703
Capacitor Unit	3335204102
Hand Crank Switch	3335200701
Wiring Harness	3335200401
Plug complete – hand crank aperture	4335201201
Clutch Spring	4177300901

4.1.3 D84M Non trailable, dual control machine

Part	Part Number
Gearbox complete	
Capacitor Unit	2520200402
Hand Throw Switch	3335202501
Wiring Harness	3335205101
Lever, Selector (hand/power)	2335321501
Lever, Hand Throw	2335321401

4.1.4 TD84M Trailable, dual control machine

Part	Part Number
Gearbox complete	1335202703
Capacitor Unit	2520200402
Hand Throw Switch	3335202501
Wiring Harness	3335205101
Clutch Spring	4177300901
Lever, Selector (hand/power)	2335321501
Lever, Hand Throw	2335321401

5 Pneumatic Cylinders

Arrangements have been made to have the latched pneumatic cylinders used with claw locks returned to their respective manufacturers when overhaul is required.

Consequently overhaul procedures are not included in this manual.