

STEERING CLUTCHES & BRAKES GROUP 11	REMOVAL	DISMANTLING	INSPECTION & REPAIR	ASSEMBLY	TESTING	INSTALLATION	ADJUSTMENTS
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STEERING CLUTCHES & BRAKES
 GROUP 11
 PAGE 1

1. DESCRIPTION
 1a. GENERAL

The steering clutches are dry, multiple disc, spring loaded units located in individual compartments between the bevel gear and final drives. Lip type seals in the bevel gear adjusters ensure that the compartments remain dry. Braking is by

bands which contract onto the clutch drums. Fig. 1 shows a cross section of the steering clutch.

The steering clutches and brakes are hydraulically operated, in sequence, from the one control valve. The steering and brake circuit in relation to the transmission circuit is shown in GROUP 9.

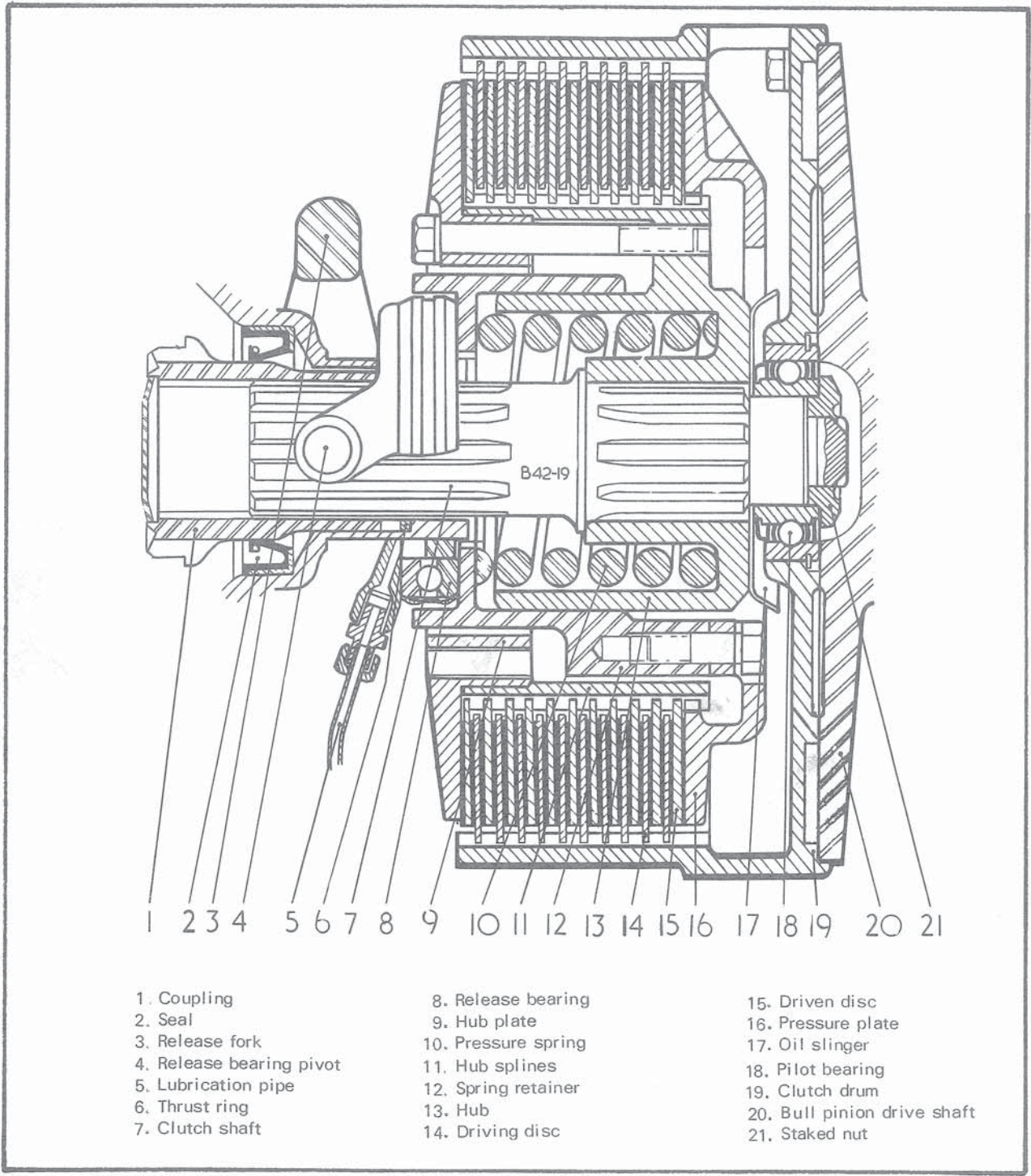


Fig. 1

1b. STEERING/BRAKE VALVE
(Refer to Fig. 2A.)

The valve contains two spools, one to control the left steering clutch and brake, and the other to control the right steering clutch and brake.

Ports (A, B & C) over each spool connect to the face side of the clutch cylinder piston and to both sides of the brake cylinder piston for that side of the machine. A supply port (D) and return port (E) are provided which are common to both spools.

The spools have hollow centres and cross drillings to provide a passage for the return oil from the rod side of the brake cylinder when in the maximum brake position.

DRIVE POSITION
(Refer to Fig. 2B.)

When the spool is in this position supply fluid is directed to the rod side of the brake cylinder piston to ensure that the brake is held off, while fluid from the face sides of the clutch and brake cylinder pistons is directed to the return port.

CLUTCH POSITION
(Refer to Fig. 2C.)

When the spool is moved to this position supply fluid is still directed to the rod side of the brake cylinder piston and is now also directed to the face side of the clutch cylinder piston to disengage the clutch. Fluid from the face side of the brake cylinder piston is still directed to the return port.

CLUTCH AND NOMINAL BRAKE POSITION
(Refer to Fig. 2D.)

When the spool is further moved to this position full supply fluid is directed to the face side of the clutch cylinder piston and to the rod side of the brake cylinder piston as before but now supply fluid is also directed to the face side of the brake cylinder piston. Due to the difference in areas between the two sides of the brake cylinder piston, the piston moves to apply the brake. Because of the restriction created by the chamfer on the spool, the pressure build up on the face side of the brake cylinder piston will be slightly delayed.

CLUTCH AND MAXIMUM BRAKE POSITION
(Refer to Fig. 2E.)

When the spool is fully depressed to this position supply fluid is directed to the face sides of the clutch and brake cylinder pistons so that the clutch is disengaged and the brake is hard on. At the same time fluid from the rod side of the brake cylinder piston is directed to the return port via the spool centre and cross drillings.

1c. DECELERATOR BRAKE PEDAL

Both brakes are operated simultaneously by mechanical linkage when the decelerator pedal is depressed. A cable operated pawl locks the decelerator/brake pedal in the down positions for parking purposes.

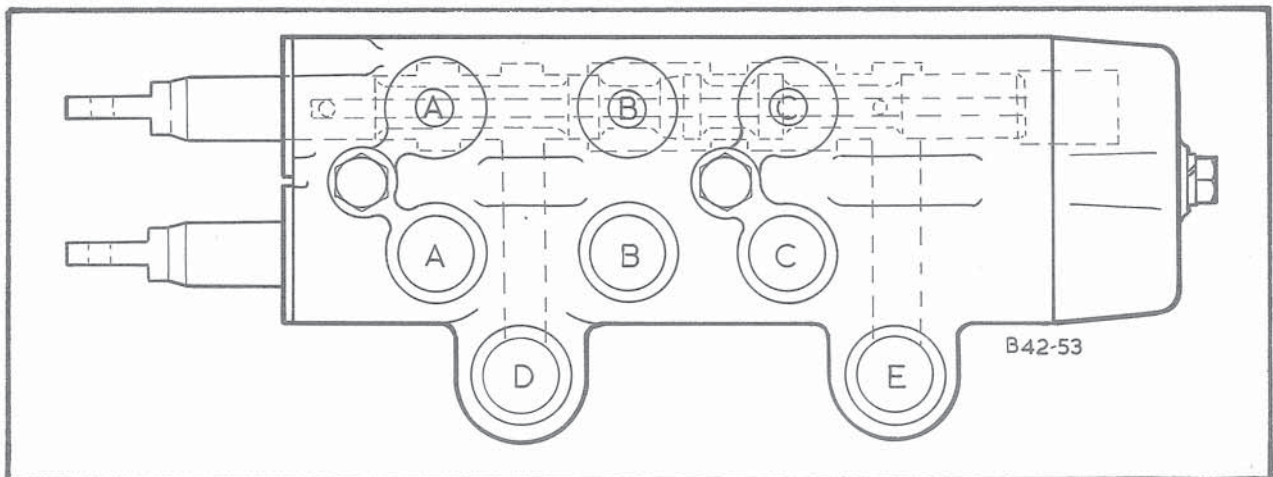


Fig. 2A

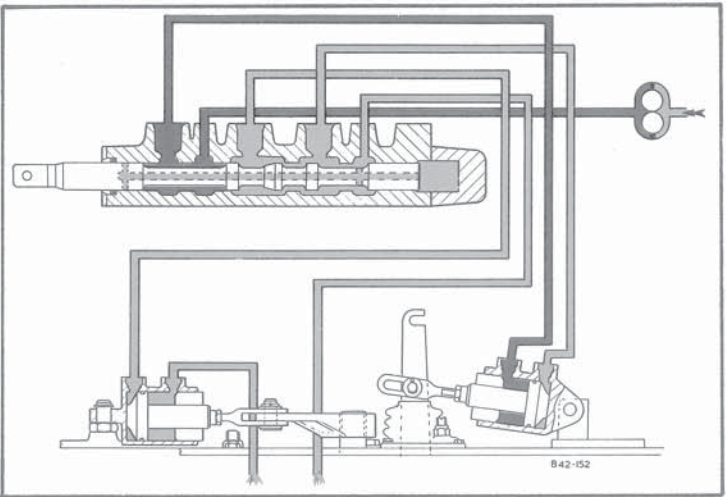


Fig. 2B

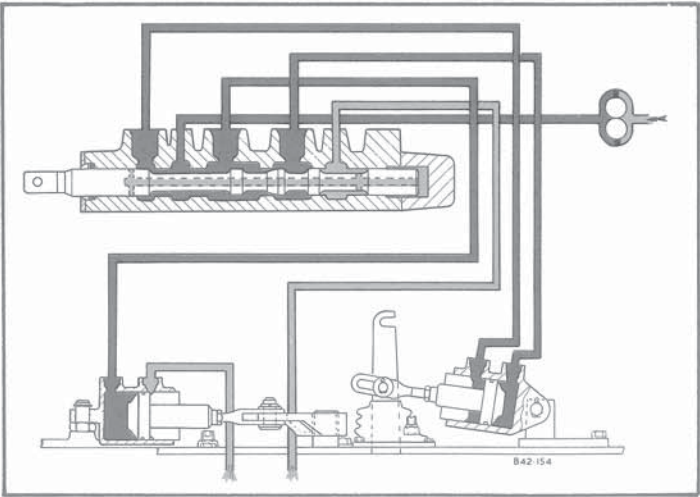


Fig. 2D

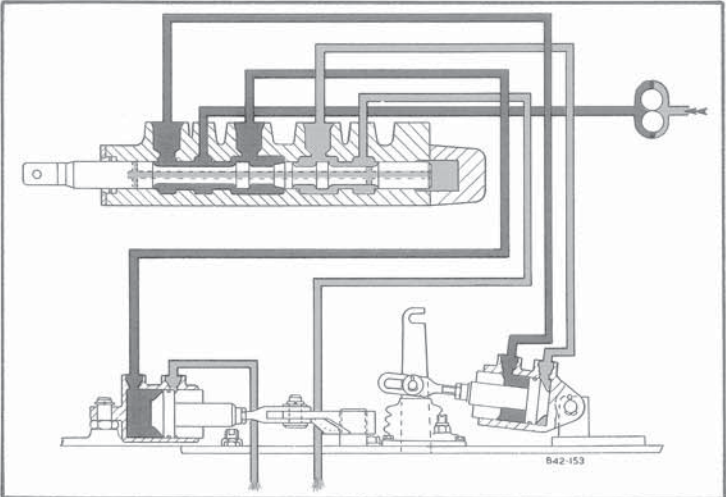


Fig. 2C

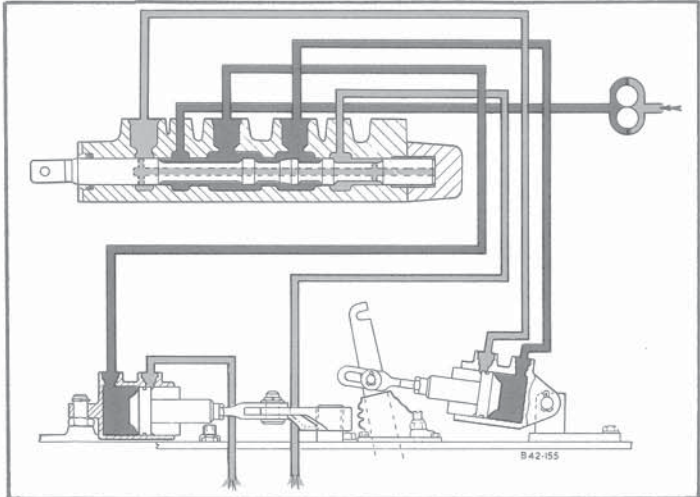


Fig. 2E

Supply fluid

Return to reservoir

2. STEERING CYLINDERS

2a. REMOVAL

- (a) Remove the cab base referring to GROUP 2.
- (b) Disconnect the hoses (3-3).
- (c) Remove the nut (1-3) to release the spring (5-3).
- (d) Remove the split pin (2-3).
- (e) Remove the split pin and washer from the underside of the pin (4-3) and withdraw the pin.
- (f) Swing the cylinder clear of the release lever and lift from the rear pivot.
- (g) To remove the release lever (1-4) check that the alignment marks are clearly visible, or scribe new ones if not, then remove the pinch bolt (6-3), nut and lockwasher.

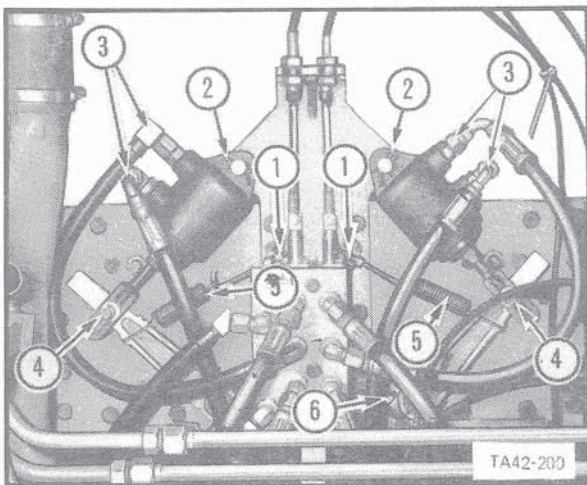


Fig. 3

- (h) Lift the release lever from the splined shaft.
- (i) If inspection proves it necessary press the bush (2-4) from the lever.

2b. DISMANTLING

- (a) Grip the cylinder in a vice so that the slot is in an accessible position.
- (b) Turn the bearing (5-5) until the end of the retainer wire (9-5) appears in the slot. A hole is provided in the bearing to facilitate this.

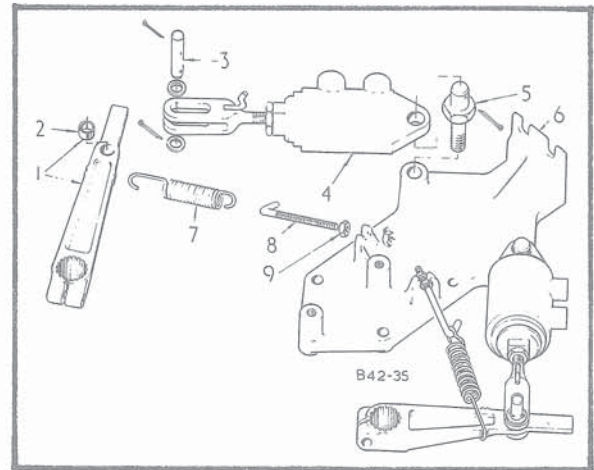


Fig. 4

- (c) Insert a thin screwdriver under the end of the retainer wire then turn the bearing to wind out the wire.
- (d) Withdraw the piston rod assembly from the cylinder.
- (e) Slacken the locknut (2-5) and screw the adjuster fork (1-5) from the piston rod (7-5).
- (f) Pull the piston rod from the bearing (5-5).
- (g) Remove and discard the scraper ring (3-5) and 'O' ring (4-5) from the bearing.
- (h) Remove and discard the 'O' ring (6-5).
- (i) Remove and discard the compression ring (8-5) from the piston.

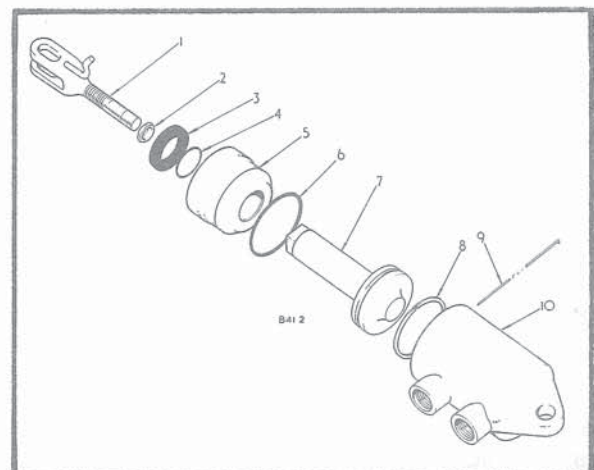


Fig. 5

2c. INSPECTION AND REPAIR

- (a) Inspect the piston and rod for wear and damage.
- (b) Inspect the cylinder bore for wear and damage.
- (c) Inspect the port threads for damage.
- (d) Inspect welds for cracks.

2d. ASSEMBLY

- (a) Fit a new 'O' ring (4-5) to the bearing bore.
- (b) Fit a new scraper ring (3-5). The seal lips must face outward and the larger diameter of the seal must be correctly located under the rim of the bore.
- (c) Fit a new 'O' ring (6-5) to the bearing OD.
- (d) Lubricate the piston rod and insert this into the bearing bore.
- (e) Fit a new compression ring (8-5) to the piston.
- (f) Lubricate the piston compression ring and the OD of the bearing then insert these into the cylinder ensuring that the small hole in the retainer wire groove is in line with the slot in the cylinder.
- (g) Grip the cylinder in a vice then insert the hooked end of the wire into the hole in the groove. Rotate the bearing to wind in the wire.
- (h) Screw the locknut (2-5) onto the adjuster fork then screw the adjuster fork into the piston rod until the distance from the centre of the rear pivot hole to the centre of the inner end of the slot measures 230 mm (9.05 in). Tighten the locknut.

2e. INSTALLATION

- (a) If this was removed, press a new bush (2-4) into the lever.
- (b) Position the release lever on the splined shaft aligning the marks made during removal.

- (c) Install and tighten the pinch bolt (6-3).
- (d) Locate the cylinder on the rear pivot and install the split pin (2-3).
- (e) Swing the cylinder onto the release lever then install the pin (4-3) complete with a washer either side of the clevis and install the split pin.
- (f) Adjust free play as detailed in para. 2f.
- (g) Locate the spring on the lever arm and on the anchor rod (8-4), then locate the anchor rod in the bracket and run on the nut (1-3) until the slack has been taken up. Tighten the nut until the spring has extended 11 mm (0.44 in) then tighten the locknut.
- (h) Connect the hoses (3-3).
- (i) Install the cab base referring to GROUP 2 but omit the deck plates.
- (j) Start the engine and operate the steering/brake levers several times to purge air from the system and check for leaks.
- (k) Install the deck plates.

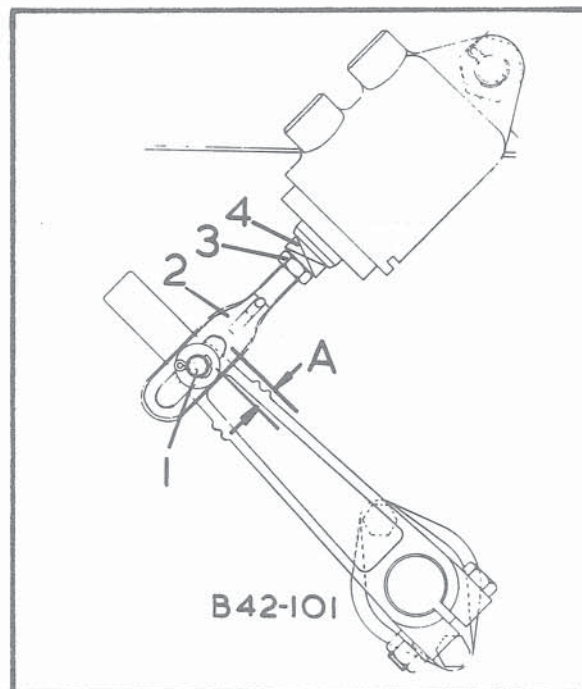


Fig. 6

2f. ADJUSTMENTS

- (a) Free play is the distance (A-6) that the connecting pin (1-6) can move in the slot in the adjusting fork (2-6).
- (b) Ensure that the cylinder is fully retracted.
- (c) Push the lever away from the cylinder.
- (d) Slacken the locknut (3-6) then turn the piston rod (4-6) until the dimension (A-6) from the inner end of the slot to the side of the connecting pin is 13 mm (0.5 in). Tighten the locknut.
- (e) If free play cannot be obtained in the above manner lift the cylinder and lever assembly and adjust the fork length so that the lever can be installed one spline forward of the scribed line then repeat operation (b) to (d).

3. BRAKE CYLINDERS

3a. REMOVAL

- (a) Remove the cab base referring to GROUP 2.
- (b) Disconnect the hoses (2-7).
- (c) Disconnect the spring (5-7).
- (d) Remove the split pin (3-7) and washer then withdraw the pin (4-7).
- (e) Remove the split pin (1-7) and lift the cylinder clear of the machine.

3b. DISMANTLING

Refer to para. 2b.

3c. INSPECTION AND REPAIR

Refer to para. 2c.

3d. ASSEMBLY

Refer to para. 2d.

3e. INSTALLATION

- (a) Position the cylinder on the pivot pin, ensuring that the clevis fork is around the brake lever, then install the split pin (1-7).
- (b) Install the pin (4-7) and secure with the washer and split pin (3-7).

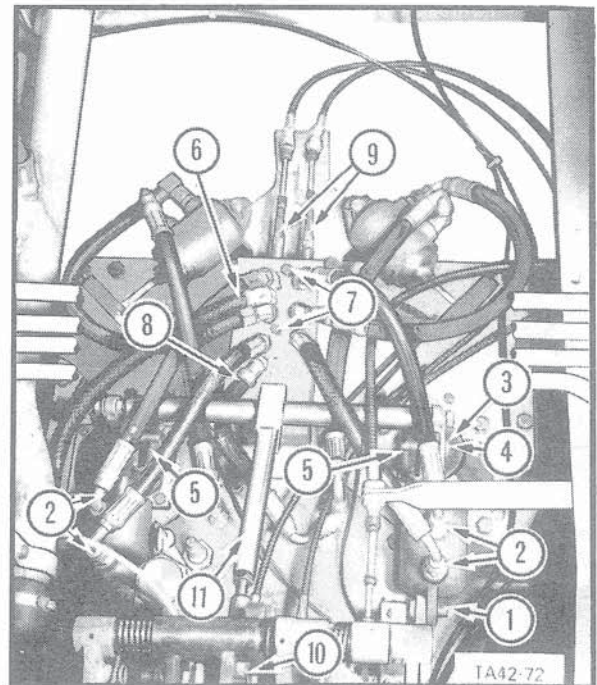


Fig. 7

- (c) Check the brakes and adjust as necessary referring to para. 4e.
- (d) Install the spring (5-7).
- (e) Connect the hoses (2-7).
- (f) Install the cab base referring to GROUP 2 but omitting the deck plates.
- (g) Start the engine and operate the steering/brake levers several times to purge air from the system and check for leaks.
- (h) Install the deck plates.

4. BRAKES

4a. REMOVAL

- (a) Remove the steering and brake cylinders referring to para. 2 and 3. Remove the steering/brake valve referring to para. 8.
- (b) Remove the split pin and clevis pin (10-7) and lift out the brake rod (11-7).
- (c) Slacken the nuts (3-8) at both ball ends and withdraw the brake cross rod (1-8). Take care not to lose the springs in the ends of the cross rod.

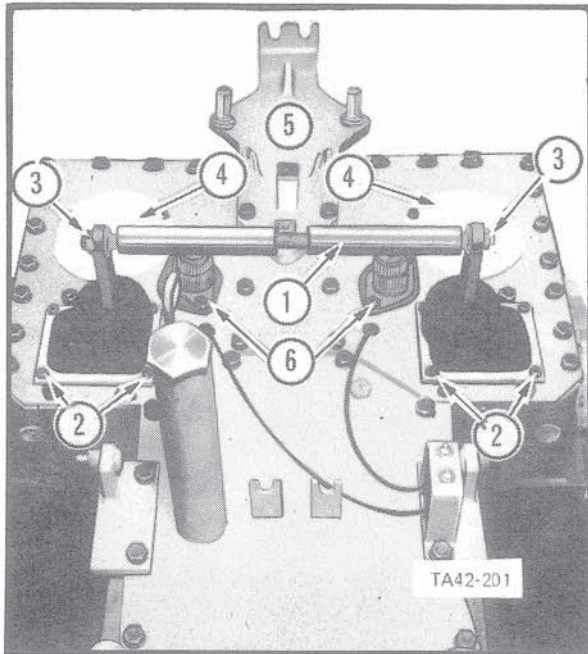


Fig. 8

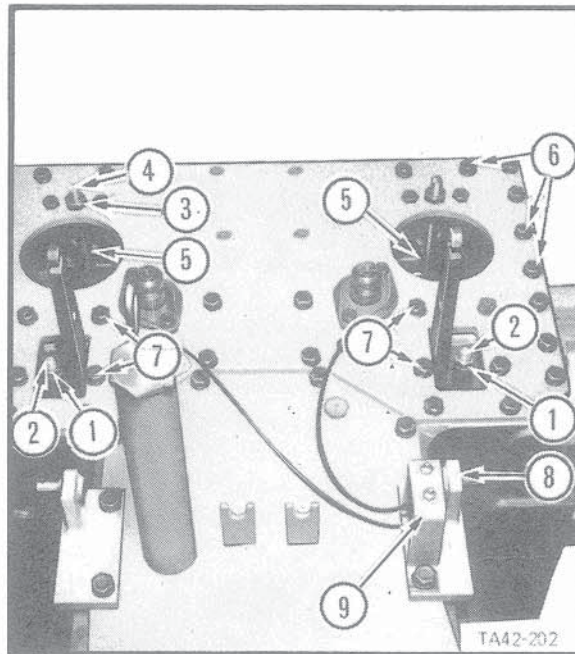


Fig. 9

- (d) Remove the steering cylinder support bracket (5-8).
- (e) Remove the bolts (2-8) and lift off the rubber boots and retainers.
- (f) Remove the clutch release shaft upper bearings (6-8).
- (g) Remove the panels (4-8).
- (h) Slacken the locknuts (3-9) and screw out the brake band set screws (4-9).
- (i) Slacken the locknuts (1-9) until the springs (5-9) are free to be removed.
- (j) Remove the brake lever support bolts (7-9).
- (k) Remove the left brake cylinder bracket (8-9) to free the lubricator bracket (9-9).
- (l) Remove the top cover bolts (6-9) and lift off the top cover as far as the lubricator tubes will allow. To completely remove the top cover, disconnect the lubricator tubes at the clutch release bearings.

- (m) Slacken the locknuts (8-10), screw the adjuster screws (9-10) from the collars (10-10) then thread the brake band and lever assemblies out of the main frame.

4b. DISMANTLING

- (a) Remove the split pins and push out the joint pins (1-10) to separate the band sections.
- (b) Remove the locknut (3-10), spacer tube (4-10), adjuster screw (9-10) with nut (8-10), spring (7-10) and spacer (6-10) from the adjuster pin (5-10).
- (c) Remove the screw (11-10) and spring washer then push out the pivot shaft (2-10) to free the lever and front band section from the support bracket.
- (d) Push out the pivot joint pin (12-10) to free the front band section from the lever.
- (e) Push the adjuster pin (5-10) out of the lever.
- (f) Drill out the rivets to separate the brake linings from the band sections.

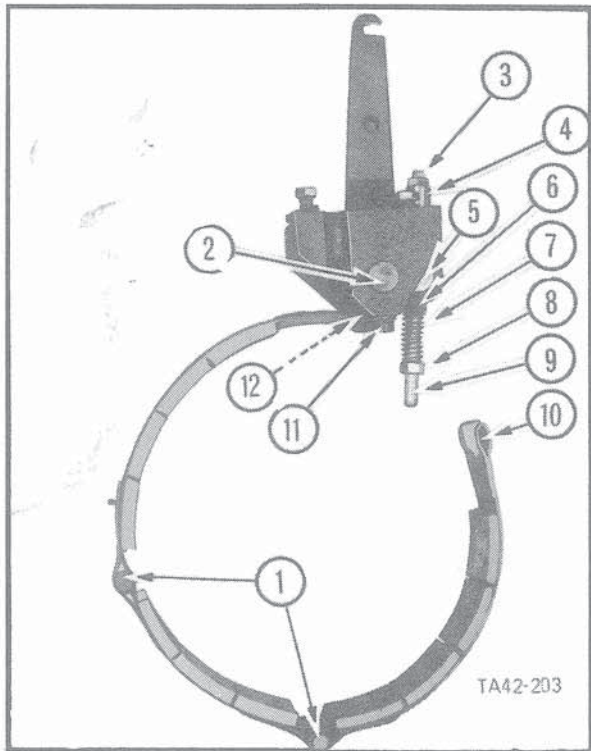


Fig. 10

4c. ASSEMBLY

(a) Position the brake linings on the bands locating with the rivets ensuring that the linings and rivet heads are correctly seated before setting the outer ends of the rivets.

(b) Locate the front band section in the lever and push in the pivot pin (12-10).

(c) Push the adjuster pin (5-10) into the lever then position the lever in the support bracket and locate with the pivot shaft (2-10). Secure the pivot shaft with the screw (11-10) and spring washer.

(d) Join the sections of the band together with the joint pins (1-10) and split pins ensuring that the head of the pin will be to the outside when the bands are installed on the clutch drum.

(e) Screw the nut (8-10) onto the adjuster screw. Thread the spring (7-10) and spacer (6-10) onto the screw then insert the screw through the adjuster pin (5-10). Thread on the spacer tube (4-10) and nut (3-10) finger tight.

4d. INSTALLATION

(a) Thread the brake band and lever assemblies into the mainframe and screw the adjusting screws into the collars (10-10). Tighten the locknuts (8-10).

(b) Position the top cover so that the lubricator tubes can be connected, if these were disconnected, then locate the top cover and secure with the bolts (6-9).

(c) Secure the brake lever supports to the top cover with the bolts (7-9).

(d) Connect the springs (5-9).

(e) Install the panels (4-8).

(f) Install the clutch release shaft upper bearings (6-8).

(g) Install the rubber boots, retainers and bolts (2-8).

(h) Install the steering cylinder support bracket (5-8).

(i) Install the lubricator bracket (11-8), and left brake cylinder bracket (10-8).

(j) Install the steering/brake valve referring to para. 8. Install the steering and brake cylinders referring to para. 2 and 3.

(k) Adjust the brakes referring to para. 4e.

(l) Position the springs and ball ends at each end of the cross rod (1-8) then position the ball ends in the slots of the brake levers ensuring that there is a plain washer either side of each lever. Tighten the nuts (3-8).

(m) Locate the brake rod on the cross rod then secure to the brake/decelerator pedal with the pin (10-7) and split pin. There must be 3.00 mm (0.125 in) clearance between the brake rod and cross rod when in the normal operating position. If necessary adjust the length of the brake rod (11-7) to suit.

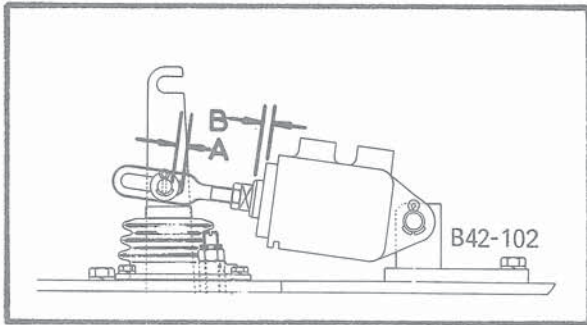


Fig. 11

4e. ADJUSTMENTS

(a) Ensure that the brake cylinder is fully retracted and that the clevis is fully screwed into the piston rod.

(b) Tighten the locknut (1-9) until the distance (A-11) between the side of the pin and the end of the slot is 6 to 8 mm (0.25 to 0.31 in).

(c) Push the brake lever away from the cylinder to hold the brake in the ON position and screw in the set screw (4-9) until it contacts the brake band then back off one half turn. Tighten the locknut (3-9).

(d) With maximum hydraulic power operate the brake cylinder and measure the extension (B-11) of the piston rod. This must be 12 to 15 mm (0.5 to 0.62 in). If necessary further adjust the locknut (1-9) to achieve this.

5. DECELERATOR/BRAKE LINKAGE

Refer to GROUP 6.

6. STEERING CLUTCHES

6a. REMOVAL

(a) Remove the brakes referring to para. 4a.

(b) On the underside of the mainframe, remove the bolt (1-12) lockplates (2 & 3-12) and nut (4-12). Screw out the clutch release shaft lower pivot (5-12) then remove the release shaft (6-12) and bushings (7-12) from the release bearing.

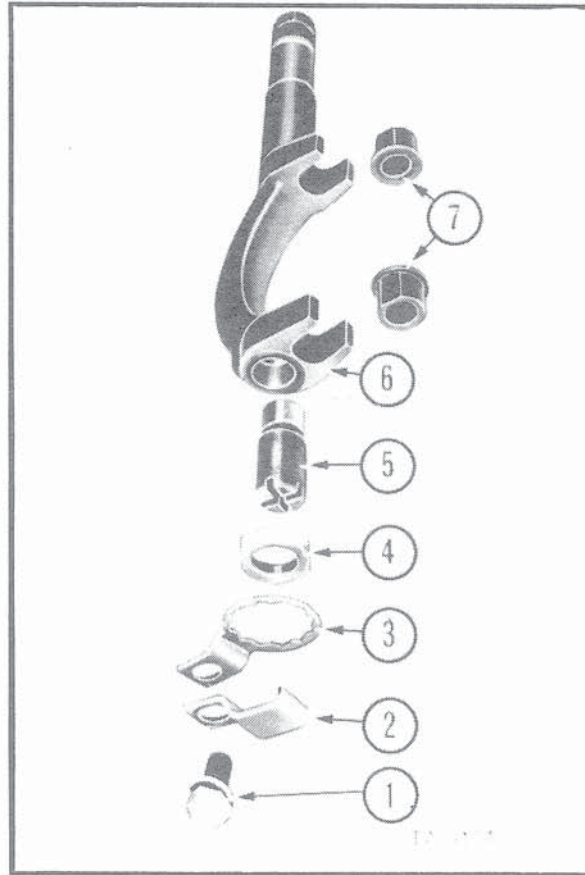


Fig. 12

(c) Install and tighten three compression bolts (2-13), part number 704 221R1 into the clutch, then remove the bolts and Dowty washers which secure the bevel gear adjuster ring (3-13). DO NOT remove the bolts (5-13) which lock the adjuster to the ring.

(d) Lever the adjuster ring (3-13) toward the clutch to expose the clutch coupling (4-13) then lever the coupling into the clutch.

(e) Remove the bolts (1-13). Unless the track is clear of the ground, or disconnected, turning the drum (6-13) for access to these bolts will move the loader.

(f) Securely sling the clutch assembly and lift it clear of the machine.

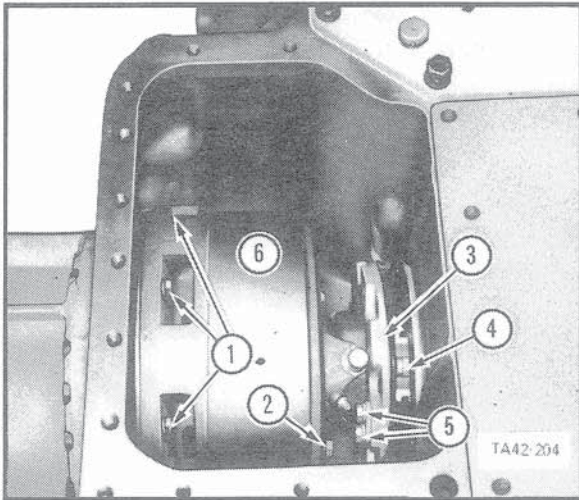


Fig. 13

6b. DISMANTLING

(a) Remove the coupling (1-14), adjuster ring assembly (2-14) and release bearing (3-14). Remove the thrust ring, 'O' ring, gasket and oil seal from the adjuster assembly.

(b) Knock out the indentations (2-15) then remove the nut (1-15). Lift off the clutch drum (3-15) and oil slinger beneath. Press the pilot bearing from the drum. Withdraw the clutch shaft from the other end of the assembly.

(c) Remove the compression bolts (4-14) from the hub plate and screw them into the tapped

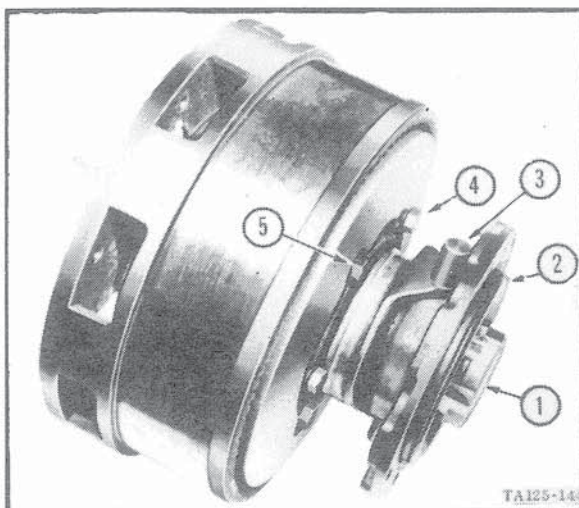


Fig. 14

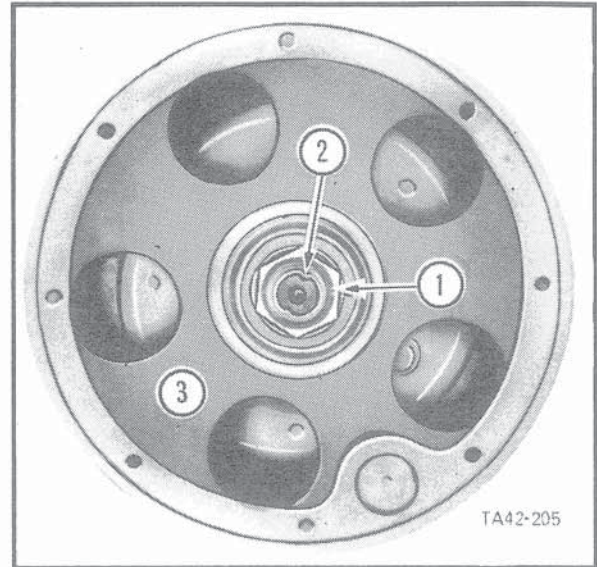


Fig. 15

holes in the pressure plate as shown in Fig. 16.

CAUTION: DO NOT ATTEMPT TO REMOVE THE HUB PLATE UNLESS THE COMPRESSION BOLTS (1-16) ARE INSTALLED INTO THE PRESSURE PLATE.

(d) Remove the bolts (5-14) then lift off the hub plate and clutch discs.

(e) Position the hub and pressure plate on a press and apply a load to the hub as shown in

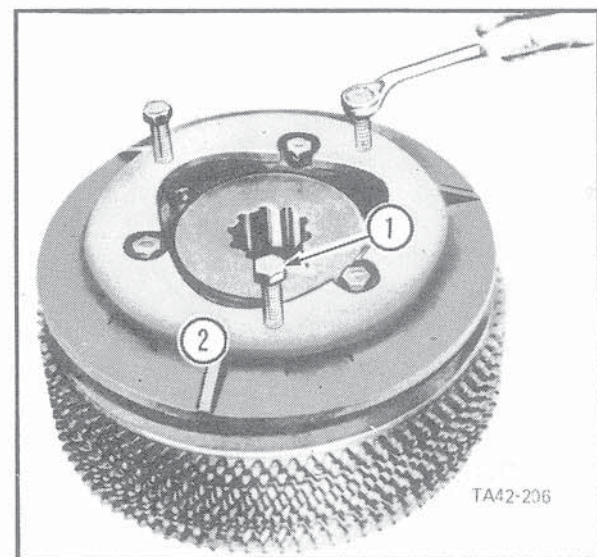


Fig. 16

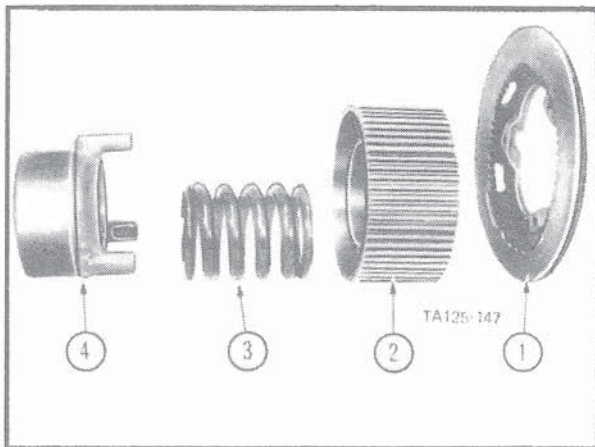


Fig. 17

Fig. 18. Remove the compression bolts (1-16) and dowel bolts (2-16).

(f) Slowly release the press then lift off the pressure plate (1-17) and hub (2-17). Remove the spring (3-17) from the retainer (4-17).

6c. INSPECTION AND REPAIR

(a) Inspect the brake contact area of the clutch drum for scoring and cracks. If necessary skim the drum but do not reduce the drum diameter to less than 305.56 mm (12.030 in). If this diameter is reached before the surface has cleaned up, the drum must be rejected.

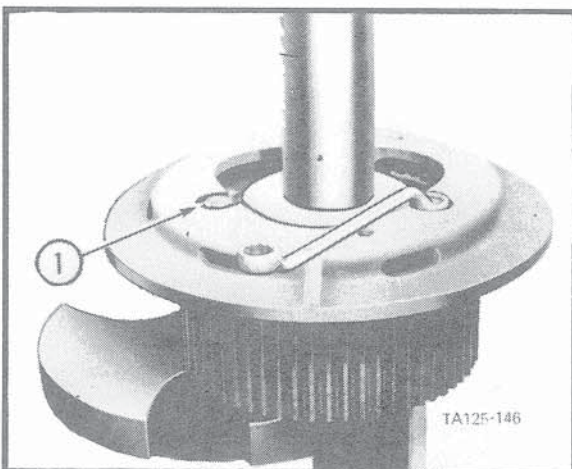


Fig. 18

(b) Inspect splines for wear. Clean off small burrs with a fine carborundum stone.

(c) Inspect the pilot and release bearings for wear.

(d) Inspect the clutch driving discs for distortion. If a 0.38 mm (0.015 in) feeler gauge can be inserted between the disc and a surface plate, the disc must be rejected.

(e) Change all friction discs that have broken teeth or glazed surfaces.

(f) Check the spring to specifications.

(g) Check the thickness of the clutch coupling thrust washer.

6d. ASSEMBLY

(a) Position the spring (3-17) in the retainer (4-17) then position the hub (2-17) on the spring aligning the legs of the retainer with the slots in the hub.

(b) Position the pressure plate (1-17) on the hub splines selecting the best position to align the dowel bolt holes, apply a load to the hub centre to compress the spring then install the dowel bolts (1-18) and their lockwashers. Release the load.

(c) Insert the shaft in the hub and position the oil slinger on the end of the shaft.

(d) Fit the pilot bearing in the clutch drum, install the drum on the shaft then screw on a new nut (2-15) and tighten to 34.6 to 41.4 kgm (250 to 300 lbft). Stake the nut into the indentations of the shaft.

(e) Install the clutch discs alternately starting with a friction disc.

(f) Position the hub plate on the hub then compress the clutch assembly and tighten the bolts (5-14). Use the press to check the operation of the clutch then compress the clutch and install the compression bolts (4-14).

(g) Press a new oil seal (3-19) into the adjuster assembly (6-19). The seal lips must face the bevel gear.

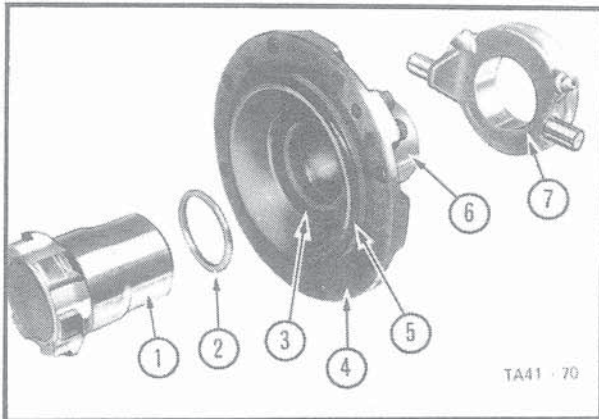


Fig. 19

(h) Install the thrust washer (2-19) with the chamfer toward the clutch then carefully insert the coupling (1-19) through the seal and up to the thrust washer.

(i) Locate the release bearing (7-19) on the bevel gear adjuster, fit a new gasket (4-19) and 'O' ring (5-19) then position the adjuster assembly on the clutch shaft turning the coupling as necessary to engage the splines. Push the coupling fully home.

6e. INSTALLATION

(a) Securely sling the clutch and lower it into the compartment.

(b) Install and tighten the bolts (1-13) turning the drum as necessary.

(c) Lever the coupling (4-13) into the mating splines in the bevel gear hub.

(d) Position the adjuster ring assembly (3-13) so that the bolts (5-13) are in approximately the 1 o'clock position. Install the Dowty washers and bolts using special spanner IH 7444 to tighten the bolts. Remove the compression bolts (2-13).

(e) Install the bushings (7-12) on the release bearing arms then locate the release shaft (6-12) on the bushings. Screw the lower pivot (5-12) into the mainframe to engage the end of the release shaft then adjust the lower pivot so that

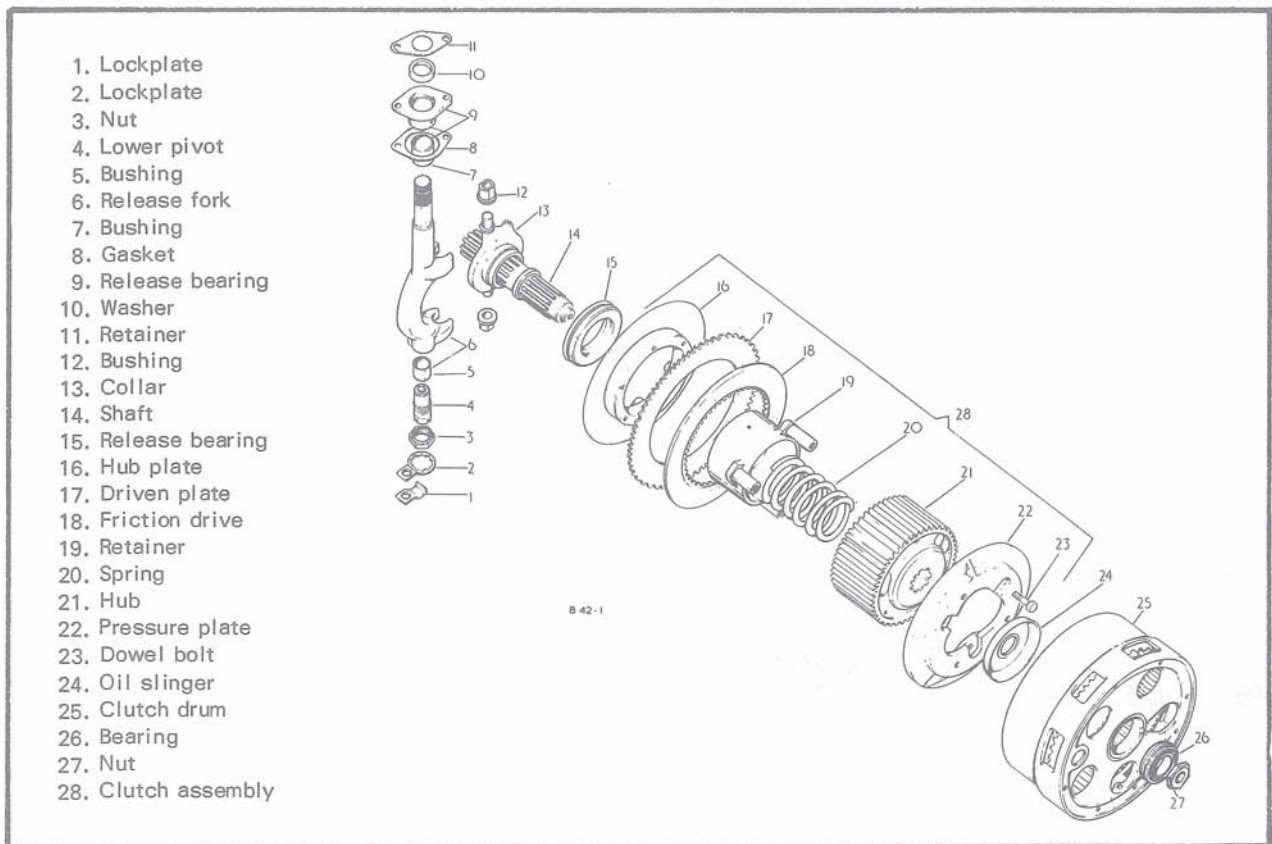


Fig. 20

the release shaft is equally disposed about the release bearing. Tighten the locknut (4-12) then install the lockplates (2 & 3-12) and secure with the bolt (1-12).

(f) Install the brakes referring to para. 4d.

7. BULL PINION DRIVE SHAFT

7a. REMOVAL

(a) Remove the bull pinion referring to GROUP 12.

(b) Remove the steering clutch referring to para. 6a.

(c) Turn the shaft as necessary to remove the four bolts (1-21).

(d) Withdraw the shaft assembly (2-21) from the clutch compartment.

7d. DISMANTLING

(a) Remove the circlips (1 & 2-22).

(b) Withdraw the bearing and cage assembly (3 & 4-22) from the shaft.

(c) Remove the circlip which secures the bearing in the cage and press the bearing from the cage.

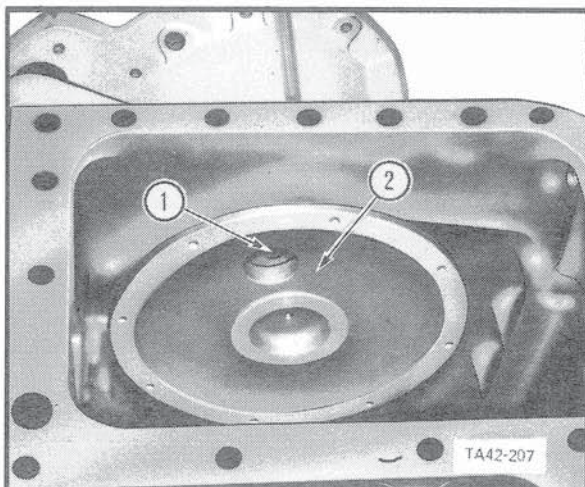


Fig. 21

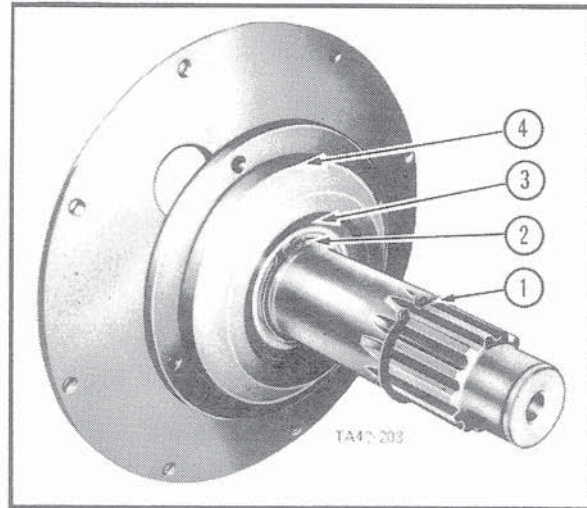


Fig. 22

7c. ASSEMBLY

(a) Apply a film of Loctite 270 to the OD of the bearing and press the bearing into the cage. Secure with the circlip.

(b) Install the bearing and cage assembly (3 & 4-22) on the shaft and secure with the circlip (2-22).

(c) Install the circlip (1-22).

7d. INSTALLATION

(a) Position a new gasket on the bearing cage, position the shaft assembly in the clutch compartment then secure with the bolts (1-21).

(b) Install the steering clutch referring to para. 6e.

(c) Install the bull pinion referring to GROUP 12.

8. STEERING/BRAKE VALVE

8a. REMOVAL

(a) Disconnect the control cables (9-7), supply hose (6-7) and return hose (8-7).

(b) Identify and disconnect each of the cylinder hoses at the valve.

(c) Remove the bolts (7-7) and lift the valve clear.

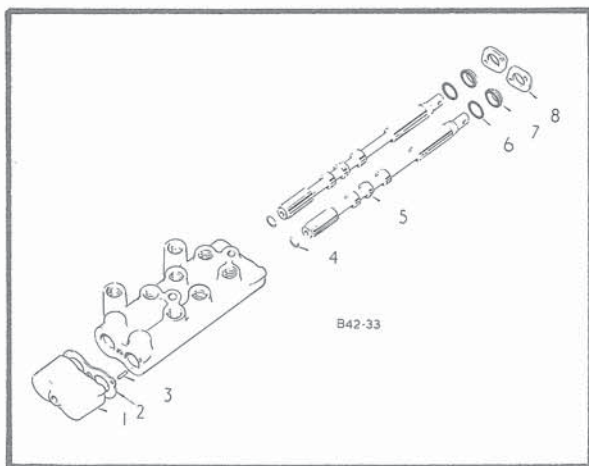


Fig. 23

8b. DISMANTLING

- (a) Remove the centre bolt to free the end cover (1-23) and gasket (2-23) from the roll pin (3-23).
- (b) Withdraw the spools (5-23) from the cover end noting the bore to which each spool belongs.
- (c) Remove the circlips (4-23) from the end of the spools.
- (d) Remove the screws to free the seal retainers (8-23) then remove the wiper seals (7-23) and 'O' rings (6-23).

8c. INSPECTION AND REPAIR

- (a) Check spools for straightness, wear and damage.
- (b) Check that the grooves in the centre lands are clear.
- (c) Check that the spool hollow centres and cross drillings are free from obstruction.

8d. ASSEMBLY

- (a) Install new circlips (4-23) on the ends of spools then install the spools in their respective bores from the cover end. If new spools are being installed select the bores which provide the closest fit.
- (b) Install new 'O' rings (6-23) and wiper seals (7-23) on the eye ends of the spools and carefully enter these into position in the valve body.
- (c) Install the seal retainers (8-23).
- (d) Install a new gasket (2-23) and the end cover (1-23).

8e. TESTING

- (a) The test rig must be capable of supplying up to 23 to 32 litre/min (5 to 7 UK gal/min) with a regulator between the pump and the valve set at 16,2 to 17,5 kg/cm² (230 to 250 lb/in²).
- (b) Retract the spools and fill the valve with oil.
- (c) Connect the supply port and plug all other ports then supply 8 to 10 litre/min (1,8 to 2,2 UK gal/min) to the valve. Select all spool positions with each spool in turn. There must be no external leakage.
- (d) Remove the return port plug. With the spools in the position specified in the table check that the leakage from the return port does not exceed the figures listed.

SPOOL POSITION		litre/min (UK gal/min)
1. Drive	2. Drive	2.0 (0.44)
	2. Clutch	2.5 (0.55)
	2. Maximum Brake	2.0 (0.44)
2. Drive	1. Clutch	2.5 (0.55)
	1. Maximum Brake	2.0 (0.44)

(e) Plug the return port. Run the rig to supply 23 to 32 litre/min (5 to 7 UK gal/min) then first with one then the other spool in drive, check the flow from each service port in turn over the opposite spool. The table shows the percentage of the supply flow, 10% tolerance permitted.

VALVE PORT	SPOOL POSITIONS			
	Drive	Clutch	Nominal Brake	Max. Brake
Clutch Faceside	0	100	100	100
Brake Faceside	0	0	*	100
Brake Rodside	100	100	100	0

* Flow checks for spools in this position consist of checking each spool location for commencement of flow and 50% flow. The spool will be retracted 19,0 mm (0.75 in) and 20 mm (0.79 in)

respectively from the fully extended position with a tolerance of ± 2.0 mm (0.08 in) on each figure but only ± 0.5 mm (0.02 in) on the difference.

(f) Plug the supply port, supply 8 to 10 litre/min (1.8 to 2.2 UK gal/min) to each brake cylinder rod side port in turn and with the respective spool in the maximum brake position check that the flow from the return port is 80 to 100% of supply flow.

8f. INSTALLATION

- (a) Position the valve and secure with the bolts (7-7).
- (b) Connect the cylinder hoses as identified during removal.
- (c) Connect the supply hose (6-7), return hose (8-7) and control cables (9-7).