

PART 7 — STEERING CLUTCHES AND BRAKES

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DESCRIPTION AND OPERATION

Steering clutches are multiple disc, dry type, consisting of eight steel driving discs and eight driven discs. Brakes are mechanically actuated and consist of an external contracting band and drum.

The internal toothed clutch outer hub is also the brake drum.

Steering clutches are disengaged and steering brakes are applied using two levers with dual mechanical linkage.

A master brake pedal when applied acts simultaneously upon both individual steering brakes.

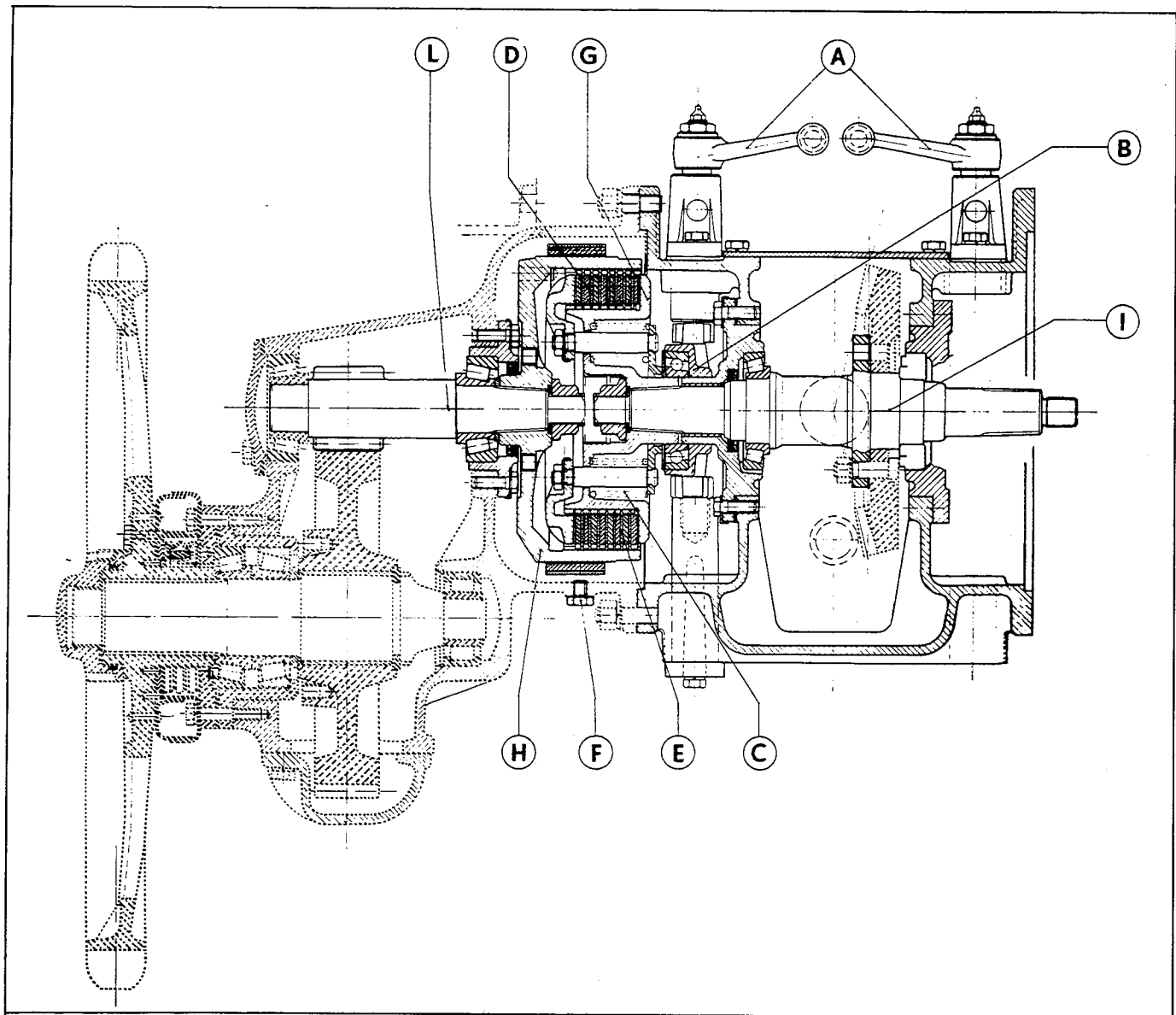


Fig. 1 — STEERING CLUTCH DIAGRAM

ADJUSTMENTS

STEERING CLUTCHES AND BRAKES

Steering clutches and brakes are controlled with two hand operated levers using multiple mechanical linkage. It is therefore important that adjustments be made accurately and correctly.

As the steering (clutch/brake) lever is pulled rearward, it passes through four successive stages of operational travel as follows:

1. Steering (clutch) lever free travel.

2. Steering clutch disengagement.

3. Steering lever free travel, between clutch disengagement and brake application.

4. Steering brake application.

The steering clutches and brakes are adjusted by performing in sequence three separate adjustments:

1. Brake band adjustment.

2. Steering clutch lever free travel.

3. Steering lever free travel between clutch disengagement and brake application.

Component	Specification	Procedure
Steering Clutch Lever	5/8 to 7/8 in. free travel	Measured at height of instrument panel
Brake Lever	1/4 in. free travel	Measured at brake lever adjustor
Brake Lever	5/8 to 7/8 in. free travel	Tighten brake band adjustor, then back off 3 clicks (1-1/2 turns)

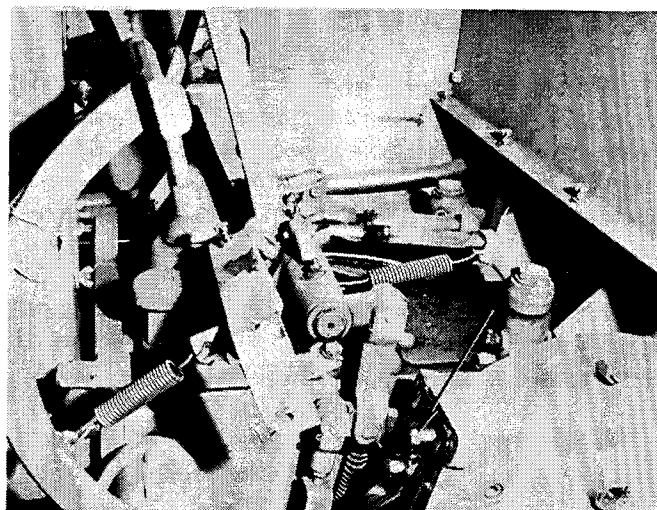


Fig. 2 — BRAKE BAND ADJUSTOR

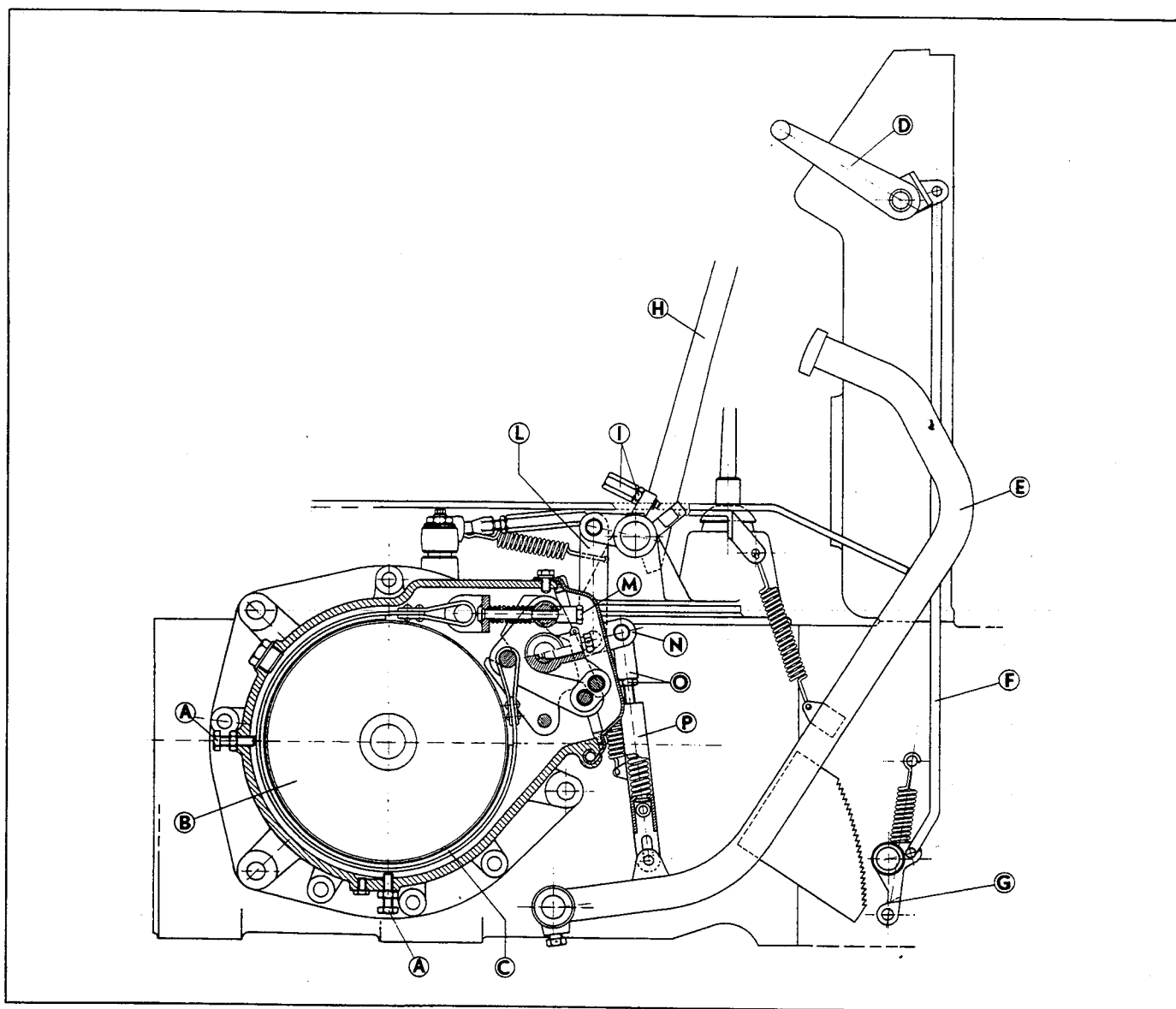


Fig. 3 — BRAKE SYSTEM DIAGRAM

BRAKE BAND ADJUSTMENT

Remove clutch and brake compartment cover. Turn brake band adjuster, Fig. 2, clockwise removing all clearance between brake band lining and drum, then loosen adjuster (turn counterclockwise) 1-1/2 turns (3 clicks). Replace cover.

Additional information: Two brake band positioning bolts are located on each brake compartment housing, see Fig. 3.

These adjusters are primarily for locating new brake bands in relation to the drums.

Adjustment is as follows:

Loosen locknuts and turn bolts in (clockwise) until lining bottoms on brake drum, then back out bolt two turns. Secure with locknuts.

BRAKE PEDAL FREE TRAVEL ADJUSTMENT

The brake pedal free travel should be 5/8" to 3/4".

To adjust, remove brake compartment inspection cover. Turn adjustor in (clockwise)

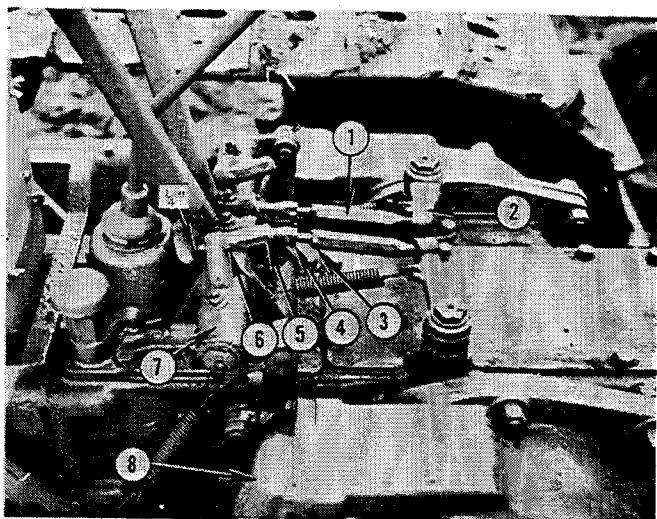


Fig. 4 — STEERING LINKAGE ADJUSTMENT

1. Steering Clutch Linkage
2. Steering Clutch Release Lever
3. Clutch Linkage Adjustor Locknut
4. Clutch Linkage Adjustor
5. Brake Lever Adjustor (Cover)
6. Brake Lever Adjustor (Locknut)
7. Brake Lever (Belcrank)
8. Brake-Clutch Compartment Cover

until brake band is tight against drum, then back out adjustor 1-1/2 turns (3 clicks).

STEERING LEVER FREE TRAVEL ADJUSTMENT

(1st Stage)

Adjust steering clutch linkage, No. 1, Fig. 4, to provide for 5/8 to 7/8 inch lever free travel measured at instrument panel height.

To adjust free travel, loosen locknut, No. 3, Fig. 4, and shorten or lengthen steering clutch control linkage by turning adjustor accordingly. Secure adjustor with locknut.

(2nd Stage)

NOTE: It is especially important that this adjustment be made correctly to assure that the steering clutch is completely disengaged before brake application commences.

Always adjust brake bands and clutch lever "Free Travel, 1st Stage" before attempting to make this adjustment.

1. Lift track (or tracks) off ground. Loader/Dozer and Ripper can be used to lift Crawler, if so equipped, otherwise use jack.

2. Pull steering lever rearward just far enough to disengage steering clutch. This can be determined by a second person attempting to rotate track (pry bar can be used as an aid if required).

3. With steering lever held in the exact position outlined in step 2, adjust the brake lever "adjustor" to provide for 1/4" clearance between the "adjustor" and pick-up lug on steering lever. See Fig. 4. Use a 1/4" gauge. A 1/4" thick end wrench may be used as a gauge.

NOTE: Depress brake pedal when adjusting (1/4" clearance) to assure all play is removed from brake linkage.

STEERING CLUTCHES

To gain access to the steering clutch and brake assemblies, it is necessary to remove the final drive assemblies. Specific details on removal procedures of the final drive assemblies are covered in Part 8 of this Manual.

REPLACEMENT OF CLUTCH PLATES AND DISCS

It is not necessary to remove the clutch assembly from center reduction drive shaft in order to replace clutch discs and plates.

DISASSEMBLY

Procedures for replacing clutch discs and plates are, as follows:

1. Place steering clutch lever in the disengaged position. This will compress clutch pressure springs and release tension on spring retaining nuts.

2. Remove pressure spring retaining nuts and safety locks, Nos. 3 and 4, Fig. 5.

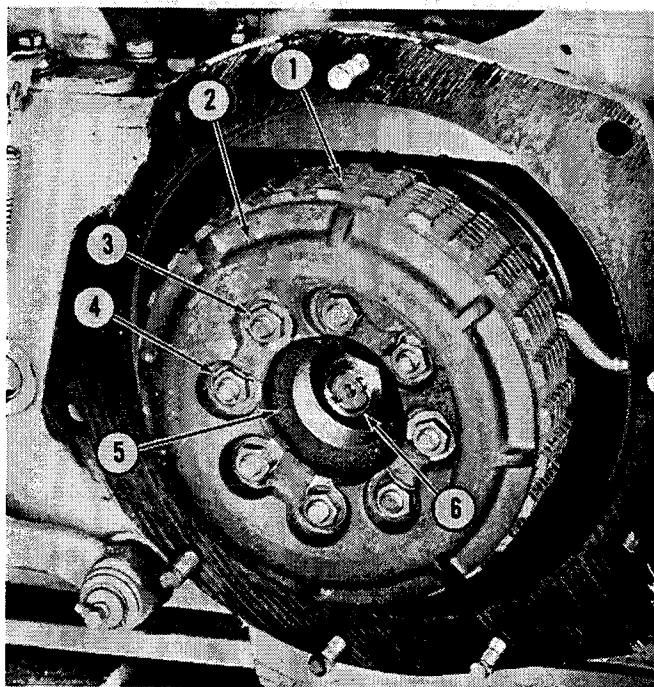


Fig. 5 — STEERING CLUTCH ASSEMBLY

1. Clutch Driven Discs
2. Clutch Pressure Plate
3. Pressure Spring Retaining Nuts
4. Safety Locks
5. Clutch Inner Hub
6. Reduction Shaft Nut

3. Remove pressure plate, No. 2, Fig. 5.

4. Remove eight driving plates and eight driven discs.

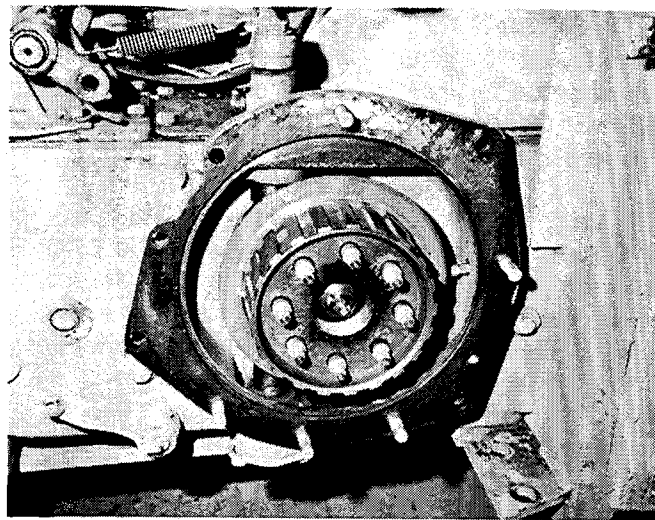


Fig. 6 — STEERING CLUTCH HUB

INSPECTION

Clean splines on inner clutch hub thoroughly with a wire brush. Inspect splines for excessive wear. Place a driving plate on inner hub and check to see if plate will move freely.

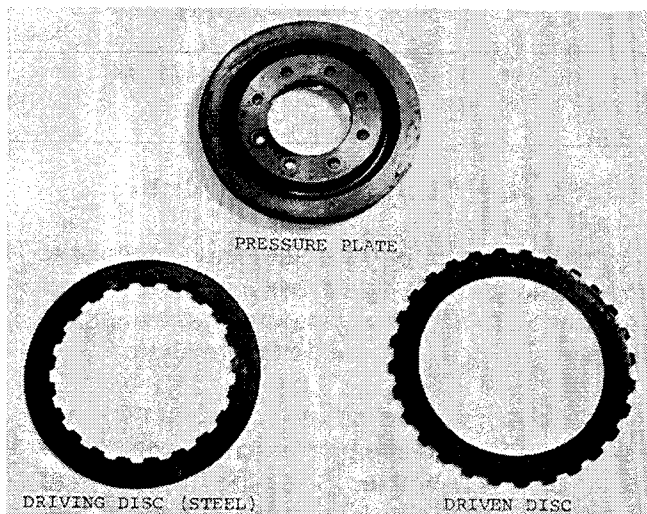


Fig. 7 — CLUTCH DISCS AND PRESSURE PLATE

NOTE: When steering clutch is disengaged, there is a slight side movement of driving plates on the splines of clutch inner hub. If driving plate movement is restricted, due to faulty splines or defective teeth on driving plates, the clutch will drag when disengaged.

Check steel driving plates for wear and deformity. If they are warped, or otherwise deformed due to heat from friction, they must be replaced. Check plate internal teeth for wear. Replace plates, if teeth are worn.

Inspect driven discs for wear. If they are worn in excess of the wear limits, which is 0.05 of an inch, they must be replaced. If they do not exceed the wear limits, inspect the external teeth for wear. If discs have become contaminated with oil replacement is recommended.

Inspect pressure plate for cracks or deformity. If warped or cracked, it must be replaced. Wear is not a replacement factor, as the pressure plate makes contact with a driving plate rather than a driven disc.

REASSEMBLY

Reassemble the clutch plates and discs as follows:

1. With clutch release lever in the disengaged position, assemble discs and plates on the clutch inner hub, commencing with a driven disc and ending with a driving plate.

2. Install the clutch pressure plate, safety locks, and the pressure spring retaining nuts.

3. Tighten nuts to 145 ft.-lbs. torque, secure with safety locks.

REMOVAL OF CLUTCH ASSEMBLY

If clutch is to be disassembled, the best method is to remove the pressure plate, driven plates and driving discs, before removing the assembly from center reduction drive shaft.

If clutch assembly is being removed to gain access to clutch release bearing only, and clutch is not to be disassembled, then the best method is to remove the clutch assembly intact. See Fig. 8.

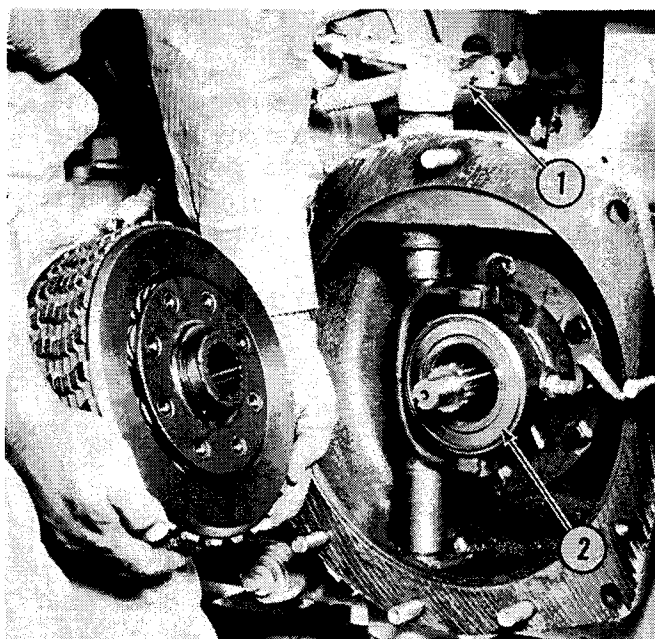


Fig. 8 — REMOVING STEERING CLUTCH ASSEMBLY

1. Clutch Release Arm
2. Clutch Release Bearing

To remove clutch assembly when further disassembly is planned, proceed as follows:

1. Secure steering clutch lever in the disengaged position. This will compress the clutch pressure springs and release tension on the spring retaining nuts.

2. Remove pressure spring retaining nuts and safety locks, Nos. 3 and 4, Fig. 5.

3. Remove pressure plate, No. 2, Fig. 5.

4. Remove the eight driving plates and the eight driven discs.

5. Loosen center reduction shaft nut, No. 6, Fig. 5.



CAUTION: As a safety precaution, do not remove the reduction shaft nut until after completion of operation in sub-paragraph 6a, listed below.

6. Remove clutch inner hub from center reduction shaft, as follows:

a. Move the steering clutch release lever to the disengaged position and tap the end of the inner clutch hub with a non-metallic-faced

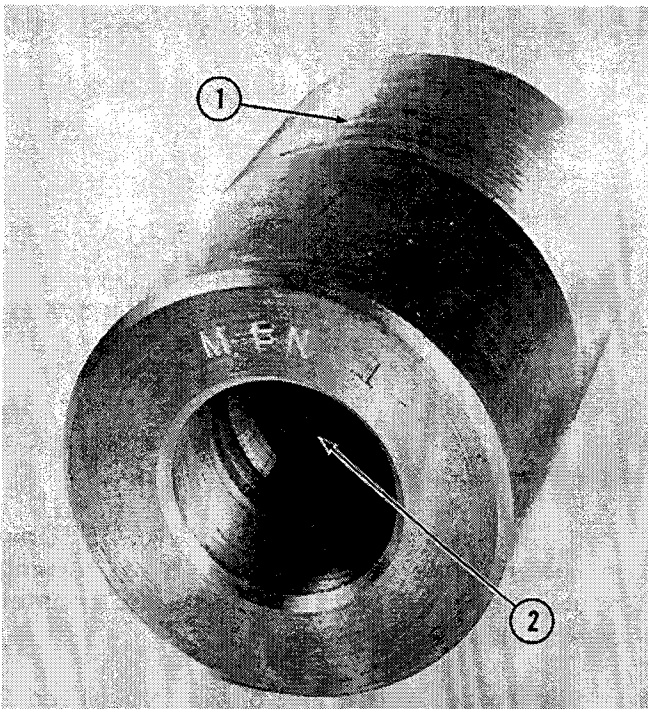


Fig. 9 — CLUTCH HUB PULLER, MFN-1

hammer. If this method does not prove to be effective, then proceed as follows:

Move the steering clutch lever back to the engaged position and remove the reduction shaft nut. Install special puller MFN 1, and pull the inner hub. This tool is designed to be used with a standard puller shaft. The inner threads are standard American threads. The outer threads are metric to fit the threads on the clutch inner hub. See Fig. 9.

7. The pressure spring retainer assembly and pressure springs may now be freely removed from clutch inner hub assembly.

INSPECTION

Inspect clutch driving plates, driven discs and the clutch inner hub as previously outlined under "REPLACEMENT OF CLUTCH PLATES AND DISCS".

In addition to the above, test the clutch pressure springs with a suitable spring tester. If the springs do not register within limits of specified test load rating, they should be replaced. See Specifications.

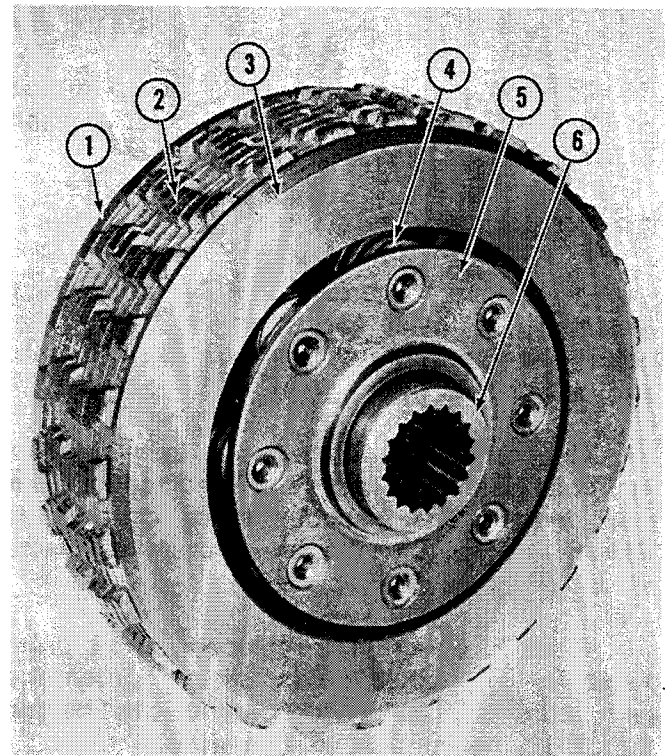


Fig. 10 — STEERING CLUTCH ASSEMBLY

1. Pressure Plate
2. Clutch Discs
3. Inner Hub Pressure Plate
4. Clutch Pressure Springs
5. Pressure Spring Retainer Assembly
6. Clutch Inner Hub

REINSTALLING

To reinstall steering clutch assembly, proceed as follows:

1. Reassemble clutch inner hub, pressure springs and spring retainer assembly.

2. Install inner hub assembly on the reduction drive shaft. Install a new reduction shaft nut and tighten to 145 ft.-lbs. torque. Stake nut flange at both keyways.

3. Assemble clutch discs and plates on clutch inner hub, commencing with a driven disc and ending with a driving plate.

4. Install clutch pressure plate, locks and the pressure spring retaining nuts.

5. Tighten the nuts and secure with the locks.

STEERING BRAKES

To gain access to steering brake drums and brake bands, it is necessary to remove the final drive assemblies.

BRAKE DRUMS

To remove the brake drum, remove drum retaining nut. Install two (metric thread) puller bolts, see Fig. 11, and pull brake drum from final drive pinion shaft.

Inspect the face of the brake drum for scoring or excessive wear. See Specifications for turn down limits. Inspect internal clutch disc splines for wear. If the brake drum is unserviceable, it should be replaced.

When brake drum is replaced, a new drum retaining nut should be installed. Tighten the new nut to 145 ft.-lbs. torque and lock the nut by staking the flange at both keyways.

BRAKE BANDS

REMOVAL

1. Remove final drive housings. See Part 8 of this manual.

2. Remove brake drums, previously outlined in this part of the manual.

3. Remove brake band adjusting nut. See Fig. 13.

4. Cut lock wire and remove set screw, No. 4, Fig. 14. Remove snap ring, No. 1, spacer, No. 2, and bellcrank, No. 3.

5. Remove bellcrank supports, No. 1 and 2, Fig. 15, after first removing two allen headed capscrews securing each support.

6. Remove pivot pin, No. 3, Fig. 15. Drive pin toward inner side of final drive housing. Shoulder on head of pin fits flush into counter-bore on final drive housing.

7. Remove supporting plates, No. 1 and 2, Fig. 16.

8. Remove brake band anchor pin, No. 1, Fig. 17. Pin is secured with snap rings on each end.

9. Remove brake band from final drive housings.

BRAKE LINING

Brake lining and rivets are available for replacement. Each band contains 3 separate sections of lining.

Check face of brake drums for scoring

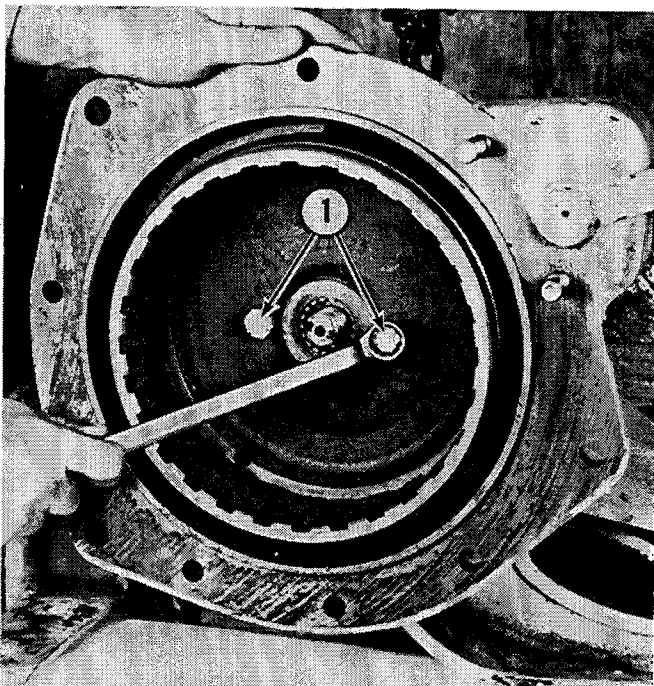


Fig. 11 — PULLING BRAKE DRUM
1. Puller Bolts (Metric Threads)

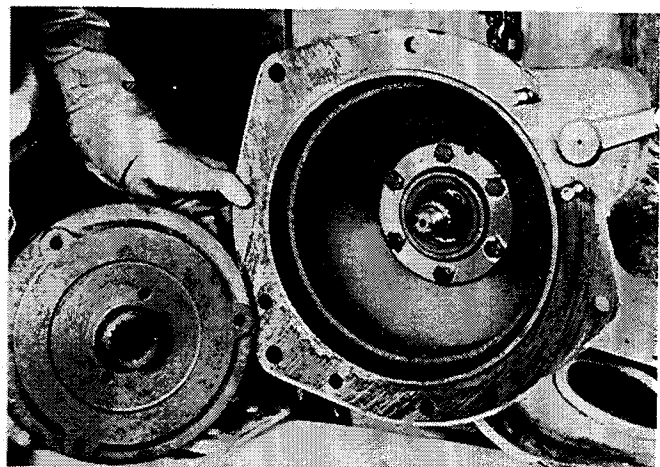


Fig. 12 — BRAKE DRUM REMOVED

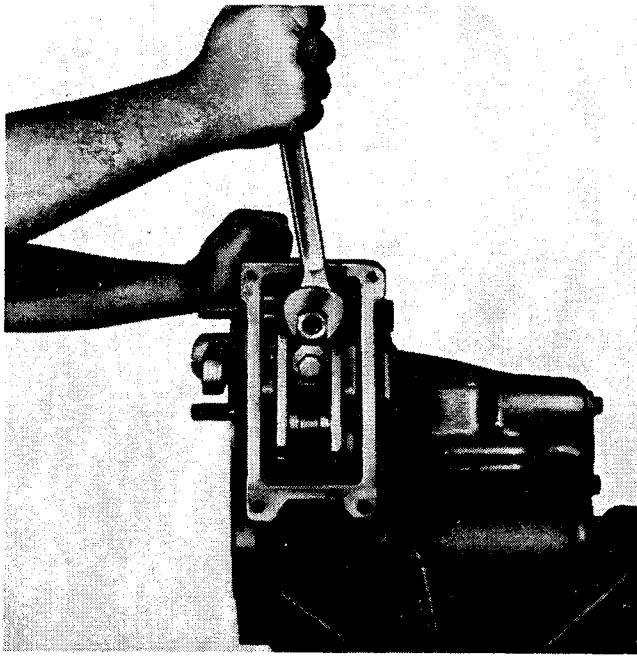


Fig. 13 — REMOVING BRAKE BAND ADJUSTING NUT

when installing new linings. Drums may be turned down on brake drum lathe. See Specifications Section in this part of the manual for turn down limitations.

INSTALLING BRAKE BANDS

Using brake band removal procedures as a

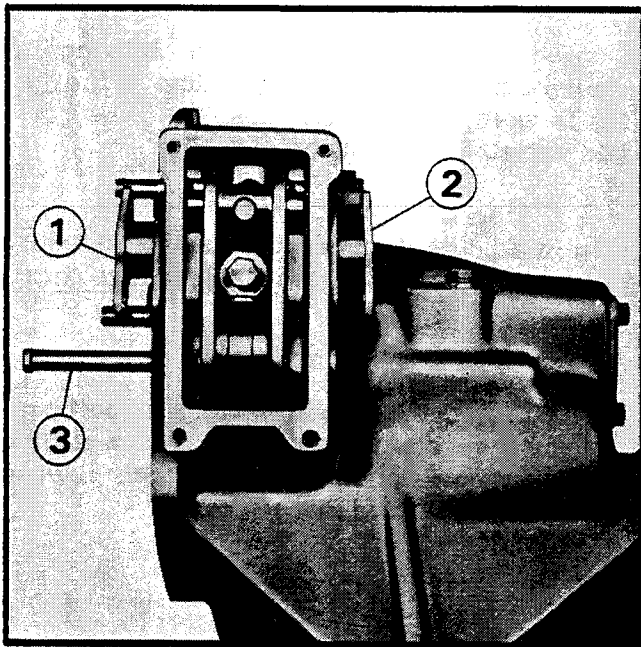


Fig. 15 — REMOVING BELCRANK SUPPORTS AND PIVOT PIN

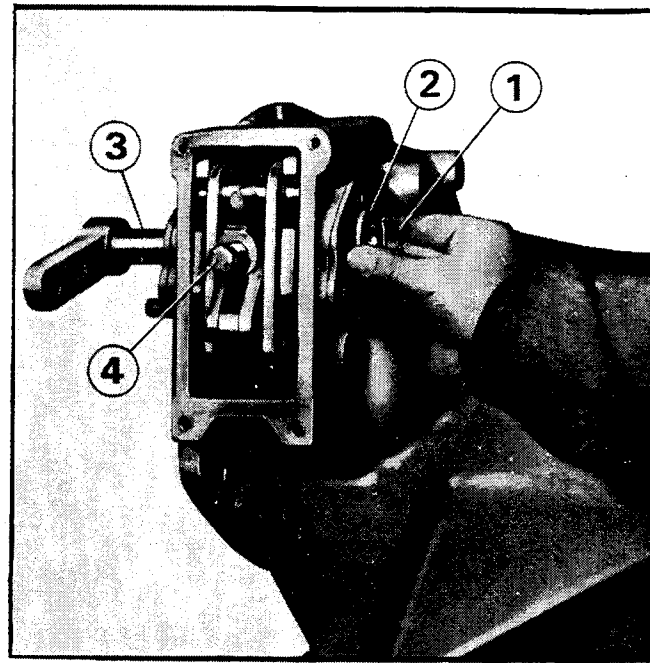


Fig. 14 — REMOVING BELCRANK

guide, reverse procedures for installing brake bands.

NOTE: Secure setscrew, No. 4, Fig. 14, with lockwire.

IMPORTANT: Before installing new or rebuilt brake bands, back off the brake band adjusting capscrews. Perform all adjustments listed under the heading "Adjustments" in this part of the manual.

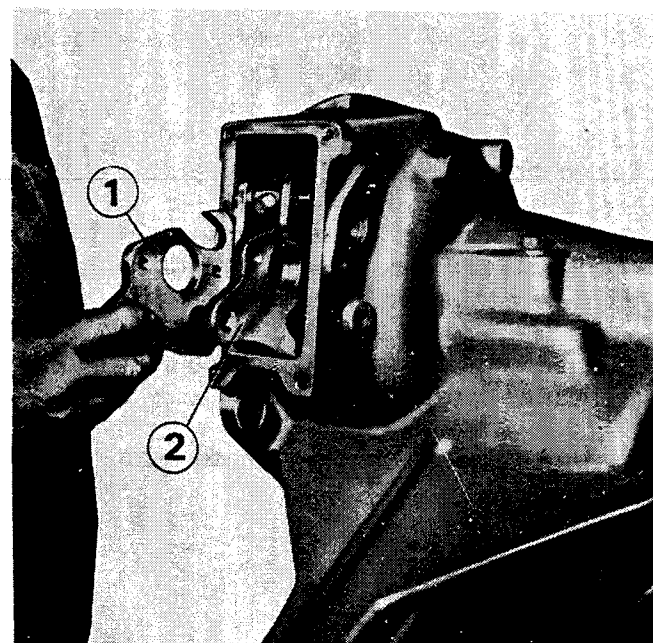


Fig. 16 — REMOVING SUPPORTING PLATES

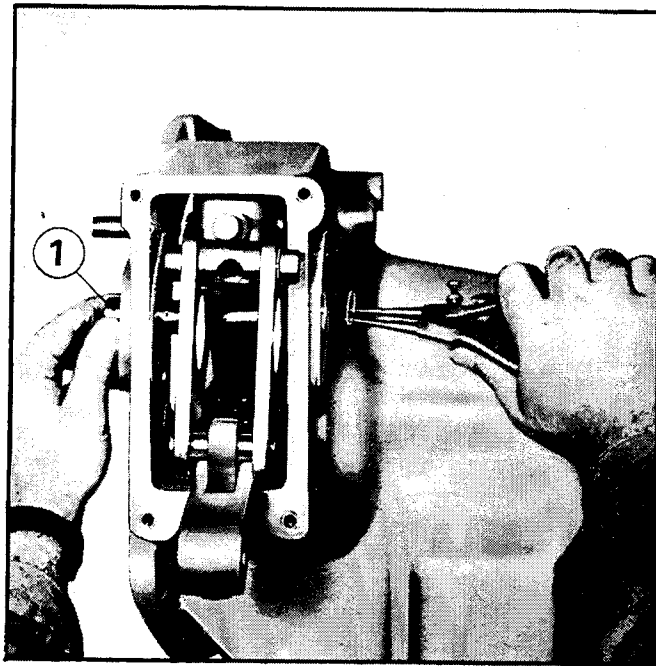


Fig. 17 — REMOVING ANCHOR PIN

CLUTCH RELEASE BEARINGS

To gain access to the clutch release bearings, it is necessary to remove the steering clutch assemblies.

REPLACEMENT

To replace a clutch release bearing, refer to Fig. 18, and proceed as follows:

1. Disconnect clutch release bearing lubrication hose, No. 4, Fig. 18.

NOTE: Before attempting to loosen the lubrication hose, remove the attaching lock plate on the outer side of steering clutch housing. After lock plate has been loosened, then hose can be rotated freely at bearing carrier connection.

2. Remove clutch release arm, No. 1, Fig. 8.

3. Remove upper and lower clutch release fork supports, Nos. 1 and 5, Fig. 18.

4. Remove clutch release bearing, No. 3, and clutch release fork, No. 2.

5. Inspect clutch release bearing and sleeve assembly for serviceability. If the bearing is worn, excessively loose, or does not rotate smoothly, it should be replaced.

6. Inspect clutch release fork for excessive wear. Check upper and lower fork support bushings. Replace all worn and defective parts.

NOTE: Reduction shaft bearing support contains 2 special thin headed bolts to provide working clearance for the clutch release bearing forks. See Fig. 19.

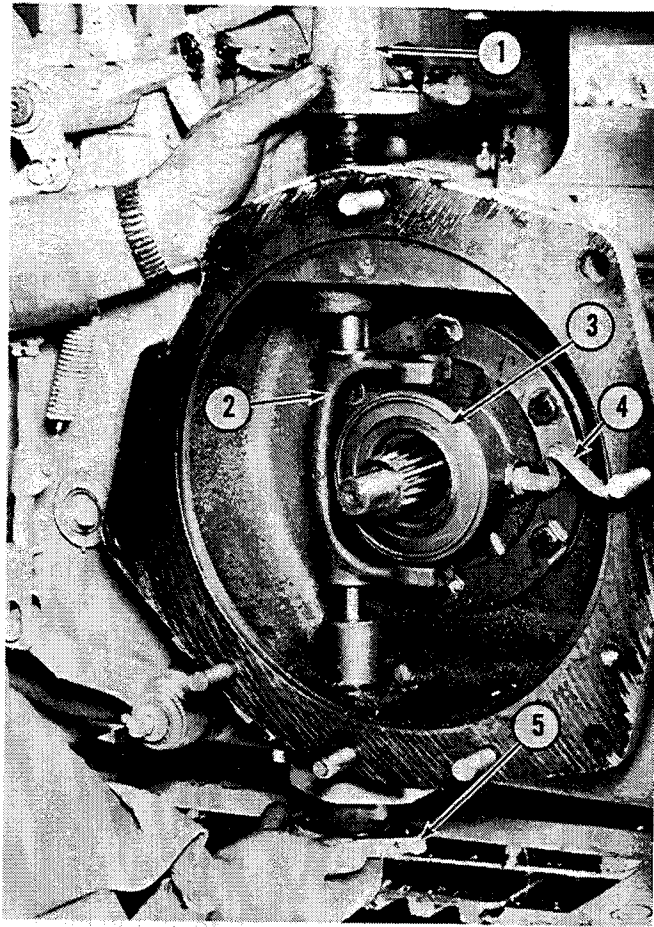


Fig. 18 — REMOVING CLUTCH RELEASE BEARING

1. Upper Clutch Release Fork Support
2. Clutch Release Fork
3. Clutch Release Bearing
4. Clutch Release Bearing Lubrication Hose
5. Lower Clutch Release Fork Support

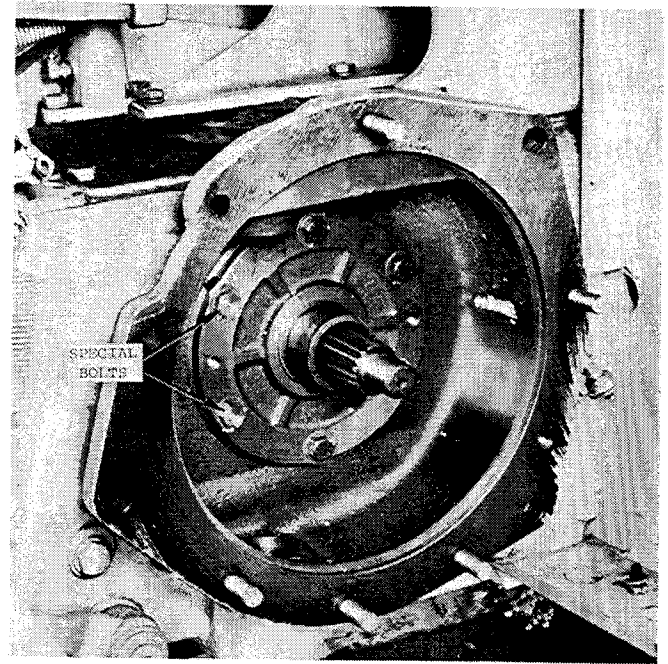


Fig. 19 — STEERING CLUTCH HOUSING

SPECIFICATIONS

BRAKES:

Friction Linings:

Number (each band)	3
Thickness	0.24 in. (6 mm)
Wear Limit	0.08 in. (2 mm)
Steering Clutch Drum External Dia.	10.23 in. (260 mm)
Min. Dia. After Lathe Turning	10.19 in. (259 mm)
Total Wear Allowed	10.15 in. (258 mm)
Tightening Torque of the Nut Securing the Steering Clutch Drum	145 ft.-lbs. (20 Kg)

STEERING CLUTCH:

Driven Discs:

Number (each clutch)	8
Thickness	0.19 ± 0.003 in. (5 ± 0.1 mm)
Wear Limit	0.05 in (1.5 mm)

Driving Discs:

Number (each clutch)	8
Thickness	0.07 in. (2 mm)

Springs:

Number (each clutch)	8
Free Length	2.6 in. (66 mm)
Length (under load)	1.96 in. (50 mm)
Load	151 lb. (68.5 Kg)
Torque of the Nut on the Guide Spring Stud	45 ft.-lbs. (6 Kgm)
Torque of the Nut Securing the Steering Clutch on the Crown Wheel Shaft	145 ft.-lbs. (20 Kgm)