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TD-15 SERIES B AND MODEL 175 AND 175 SERIES B LOADERS STEERING SYSTEM SERVICE CHART

STEERING PLANETARY

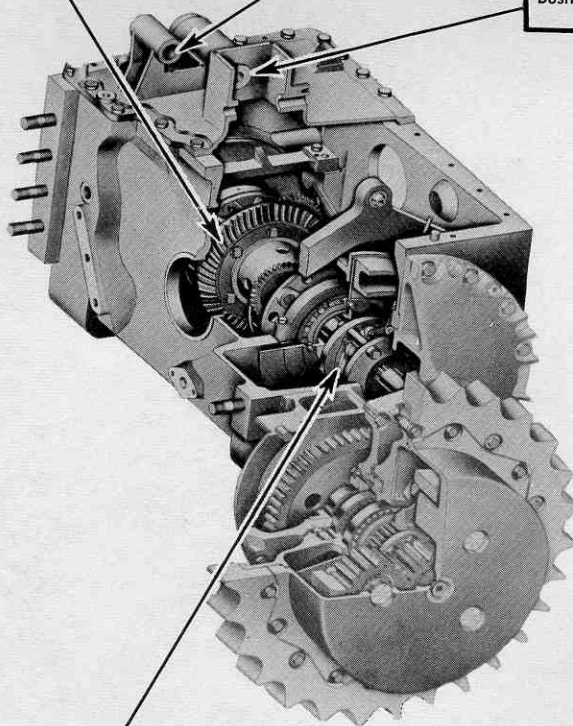
Bevel gear carrier, inches:	
Bushing ID (assembled)	2.754-2.753
Thrust washer thickness .....	.091-.093
Large sun gear (42 teeth) hub OD, inches	2.748-2.746
Planet gear carrier, inches:	
Bushings ID, (assembled)	4.815-4.813
Small sun gear (21 teeth) disc hub OD, inches	4.808-4.805
Disc thickness, inch .....	.250
Planet gear cluster (small gear, 15 teeth, large gear, 36 teeth), inches:	
Bore diameter	1.3135-1.3129
Thrust washer thickness .....	.0747
Planet gear cluster shaft diameter, inches	1.000-.9996
Backlash, bevel gear with transmission pinion, inch .....	.008-.011

PIVOT BRAKE ACTUATING BELLCRANK

Shaft OD (Inches)	1.248-1.246
Bushing ID (Assembled) (Inches)	1.2530-1.2486

BELLCRANK PUSH ROD OUTER LEVER

Shaft OD (Inches)	1.000 999
Bushing ID (Assembled) (Inches)	1.0004-1.0024



PIVOT BRAKES

Type	Multiple-disc, mechanical
How applied	Steering levers or foot pedal
Mounting	On sprocket drive pinion shaft
Number of friction surfaces, each side of actuator discs	10
Number of discs, each side of actuator discs:	
Middle disc (lined)	5
Intermediate disc (steel)	4
Disc and lining thickness, inch .....	.108-.112
Intermediate disc thickness, inch .....	.065-.069
Actuating disc balls diameter, inch	$\frac{7}{8}$



GENERAL

1. DESCRIPTION

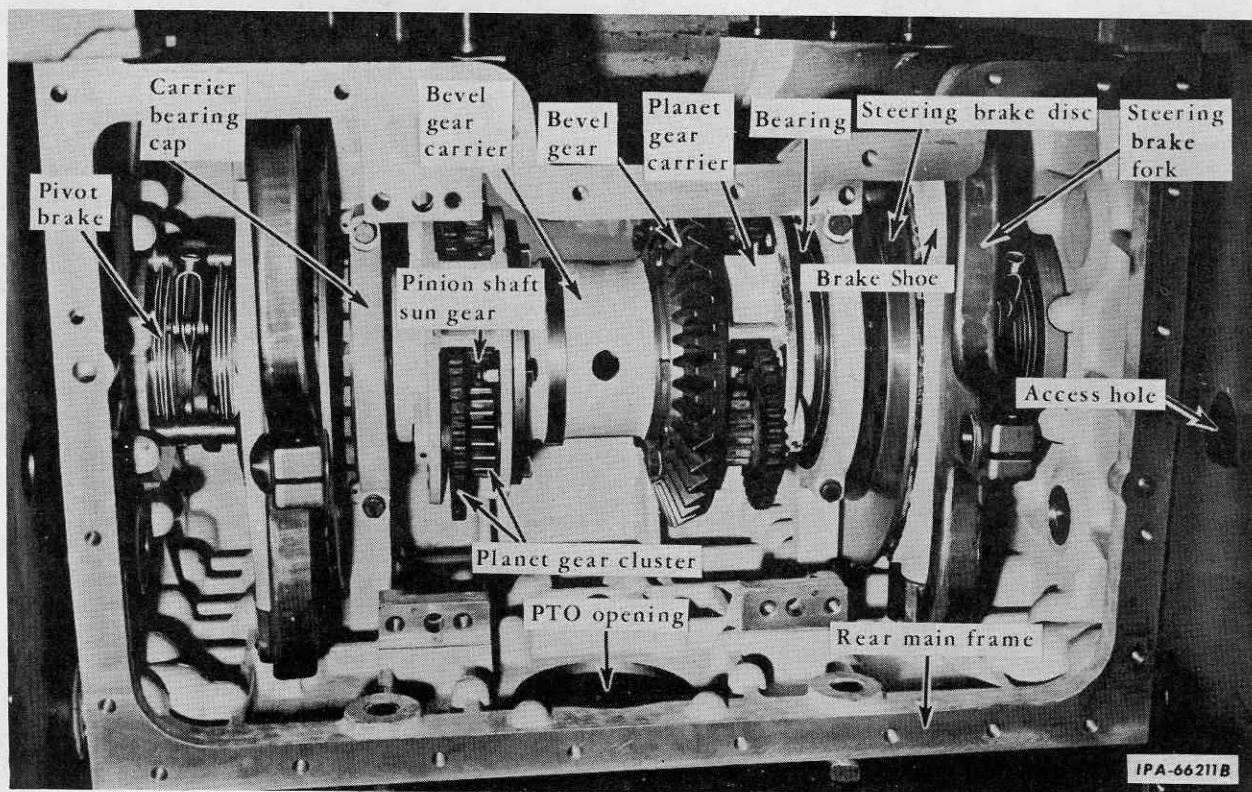
The steering system on this tractor combines a planetary gear type drive, steering brakes and pivot brakes for making short turns. These are all located in the rear main frame (Illust. 1). The steering is manually operated by hand levers. A brake pedal is used to apply both pivot brakes at the same time for stopping or holding the tractor. Hydraulic boosters are used as an assist for steering.

Steering Planetary
(Refer to Illust. 1)

This steering-planetary unit functions as an intermediate drive crosswise between the transmission and the sprocket final planetary drives. It provides a gear reduction and permits a power disconnect on each side for turning the tractor. Power to the tracks is transmitted through the drive bevel gear, which is bolted to the bevel gear carrier, the planetary gear carriers, located at both ends of the bevel gear carrier, and the sprocket drive pinion shafts out to the sprocket planetary gear drives.

The planet gear carriers are located at the ends of the bevel gear carrier and the hubs are supported by tapered roller bearings mounted in a cage installed in the brake partitions of the main frame. The tapered bearings are pre-loaded by a circular adjusting nut in a threaded section of the bearing cages. These adjusting nuts are also used to adjust backlash between the bevel gear and pinion. A bushing and the hub of a 42 tooth gear are installed in each end of the bevel gear carrier. A bushing and the hub of a 21 tooth gear are installed in the hub of both planet gear carriers. This arrangement provides two adjacent sun gears within each planetary carrier around which the planet gear clusters rotate. Three planet gear clusters, each consisting of a 15 and 36 tooth gear, shaft and roller bearings, mesh with the large (42 tooth) and small (21 tooth) sun gears. The steering brake disc is bolted to the flanged end of the smaller sun gear hub which extends through and beyond the outer edge of the planetary carrier hubs. The sprocket drive pinion shafts extend into the steering planetary and are splined at the inner ends to the large sun gear installed in the bevel gear carrier hub.

(Continued on next page)



Illust. 1
Steering Planetary and Brakes (Stationary Back-up Shoes Removed).



GENERAL

1. DESCRIPTION - Continued

Steering Planetary Brakes
(Refer to Illust. 2 and 3)

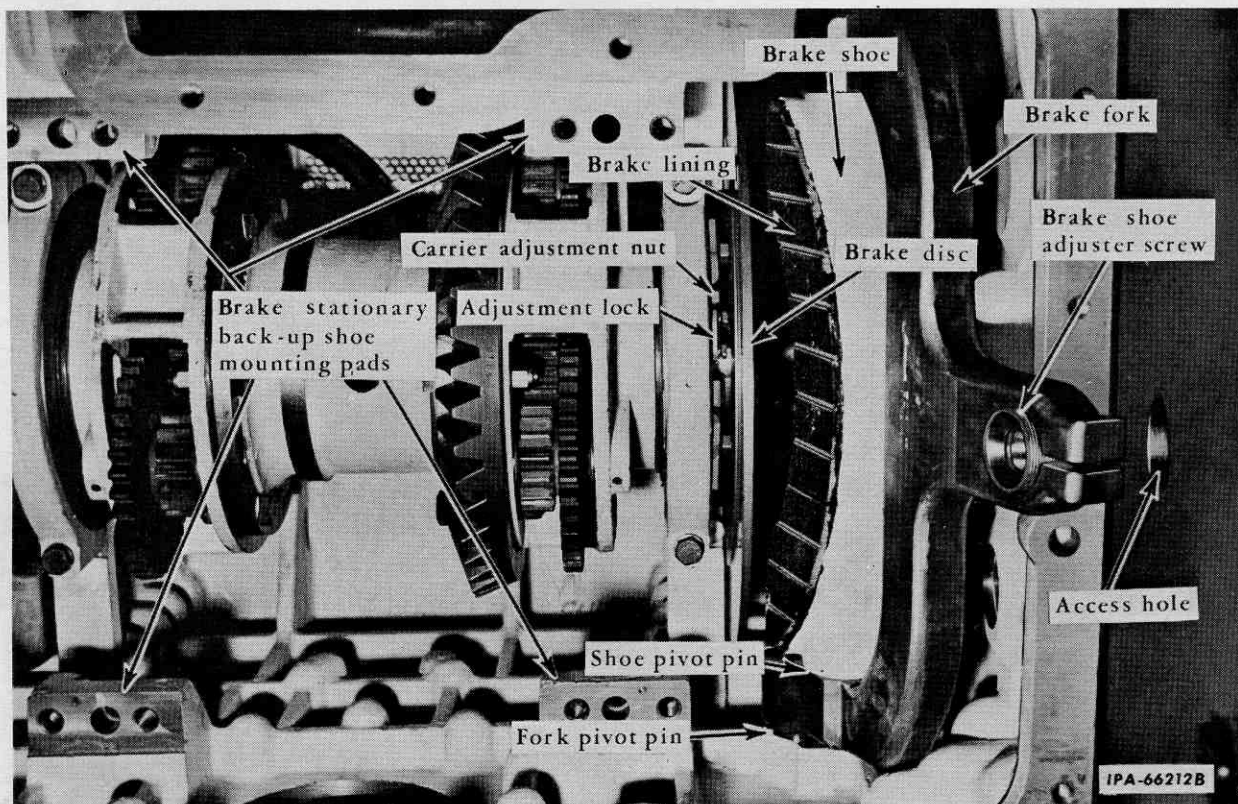
There are two sets of mechanical steering planetary brakes installed in the rear main frame, one on each side of the planetary drive unit (Illust. 1). Each brake assembly consists of a brake disc, an outer brake shoe installed in a movable fork (Illust. 2) and an inner stationary back-up brake shoe (not shown). The stationary, or inner brake shoe is secured to the mounting pads shown. Crescent shaped brake linings, bonded to the stationary shoes and to the inner sides of both movable shoes, make contact with the upper section of the brake disc. Springs installed inside the main frame cover (Illust. 3) apply pressure against the top of each fork, forcing the movable brake shoes against the brake discs. The brake shoes are released with the steering levers which are connected by levers, bellcranks and push rods. When a steering lever is pulled part way, the bellcrank moves the push rod to force the fork

away from the brake disc, causing the outer brake shoe to release the sun gear disc brake disc).

Pivot Brakes (Illust. 1 and 4)

The pivot brakes are multiple-disc type and are oil cooled by the oil in the rear main frame. They are separately housed outside of the steering-planetary compartment in each side of the rear main frame. Each brake consists of ten lined brake middle discs splined to the sprocket drive pinion shaft and eight intermediate disc held by the brake studs with an actuating disc assembly between them. Each disc assembly contains two actuator discs connected by three springs and held slightly apart by five balls trapped in matching inclined pockets or ramps. Each actuator disc is connected to the brake actuating cable (Illust. 3) by a link.

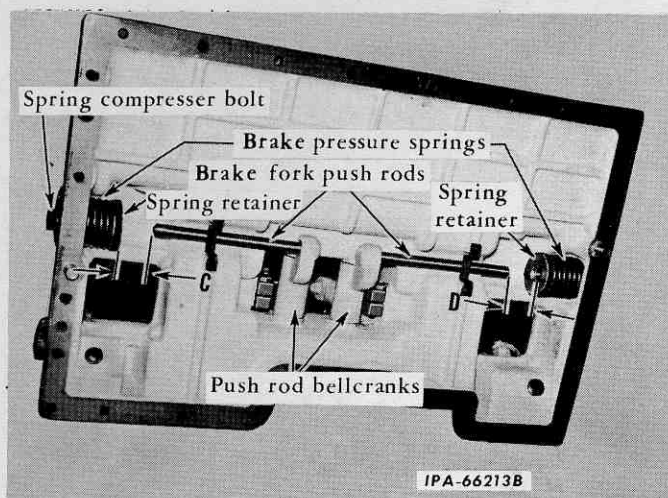
When the brake actuating cable is pulled, it causes the two actuator discs to rotate slightly



Illust. 2
 Steering Planetary Brakes (Stationary Back-up Shoes Removed).



GENERAL



Illust. 3
Rear Main Frame Cover

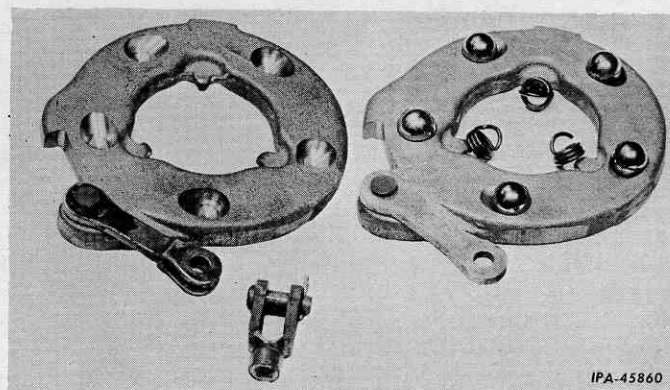
in opposite directions. This forces the five balls to roll toward the shallow end of the ramps, spreading the actuator discs apart and squeezing the lined brake middle discs against the stationary intermediate discs. On contact, the rotating lined brake discs cause one of the actuator discs to rotate a little further; thus, applying the brake tighter and providing a self-energizing action. The same action occurs in either forward or reverse travel. The ends of the brake actuating cables are equipped with over-ride slots which permit the steering levers to be pulled back part way (disengaging sun gear brake disc) without applying the pivot brakes. Further travel of the steering lever applies the pivot brake.

Steering Boosters

The hydraulic steering boosters eliminate the effort to disengage the steering brake discs. The boosters are mounted on the rear main frame cover. They are controlled independently by the steering hand levers and actuated by the oil in the rear main frame on power shift units or by the oil in the clutch system on gear drive units.

Operation

With the steering lever in the forward (applied) position, the steering brake holds the sun gear disc with attached sun gear stationary. Rotation of the bevel gear by the transmission pinion carries with it the bevel gear carrier and planetary carriers. This forces the planet gear clusters and their carrier to orbit around the stationary sun gear to which the larger planet gears are meshed. The smaller planet



Illust. 4
Pivot Brake Actuating Disc Assembly.

gears, in turn, rotate the sprocket drive pinion shaft sun gear which is splined to the shaft, resulting in a power output.

As the steering lever for one side of the tractor is pulled to the rear (released) position, the steering brake releases the brake disc and small sun gear. Rotation of the bevel gear carrier and planet gear carrier continues. The planet gear carrier induces its rotary motion to the three planet gear clusters which freewheel on their axis and cause the sun gear and disc to rotate in the opposite direction. In a wide gradual turn, the planet gears also freewheel around the larger sun gear, causing the sprocket drive pinion shaft to idle. There is no power output to the pinion shaft. The only reason the sprocket drive pinion shaft turns is that it is being dragged around by the opposite track.

In a pivot turn, however, the steering lever is pulled further to the rear, applying the pivot brake to the sprocket drive pinion shaft. This holds the larger sun gear stationary and allows that end of the planetary drive to freewheel around the sun gears and brake disc. The amount of pressure applied to the pivot brake determines the degree of the turn and the action of the gears in the steering planetary.

One brake pedal, equipped with a pawl and ratchet lock, applies both pivot brakes at the same time without moving the steering levers. Two pulleys (one movable and the other stationary), a cable assembly connected to two brake actuating bellcranks, and a pull rod connected to the brake pedal provide the brake operating linkage. When the foot brake is depressed, the pull rod pivots the movable pulley forward, causing the cable to pull the actuating bellcranks upward to apply the brakes.



GENERAL

2. SPECIFICATIONSSteering Planetary

Bevel gear carrier, inches:	
Bushing ID (assembled)	2.754 - 2.753
Thrust washer thickness . . . . .	.091 - .093
Large sun gear (42 teeth) hub OD, inches	2.748 - 2.746
Planet gear carrier, inches:	
Bushings ID (assembled)	4.815 - 4.813
Small sun gear (21 teeth) disc hub OD, inches	4.808 - 4.805
Disc thickness, inch	250
Planet gear cluster (small gear, 15 teeth, large gear, 36 teeth), inches:	
Bore diameter	1.3135 - 1.3129
Thrust washer thickness, inch . . . . .	.0747
Planet gear cluster shaft diameter, inches	1.000 - .9996
Backlash, bevel gear with transmission pinion, inch . . . . .	.008 - .011

Steering Planetary Brakes

Number of linings used (each brake)	2
Lining thickness to depth of grooves, inch	1/8
Bellcrank push rod outer lever:	
Shaft OD, inches	1.000 - .999
Bushing ID (assembled), inches	1.0004 - 1.0024
Brake fork push rod bellcrank bushing ID (assembled), inches	1.0055 - 1.0015
Brake fork push rod bellcrank shaft diameter, inches	1.000 - .998
Brake fork push rod bellcrank thrust washer thickness, inch (early machines only) . . . . .	.0383 - .0423
Bellcrank push rod length, inches	2.680
Bellcrank push rod lever washer thickness, inch (early machines only) . . . . .	.0383 - .0423
Steering brake pressure spring:	
Free length, inches	5.29
Test length, inches	3.80
Test load, lbs.	720
Steering brake bellcrank return spring:	
Free length, inches	3.40
Test length, inches	2
Test load, lbs.	35
Steering brake hand lever return spring:	
Free length, inches	4.061
Test length, inches	4.30
Test load, lbs.	50
Free length, inches	3.882
Test length, inches	4.30
Test load, lbs.	35

Pivot Brakes

Type	Multiple-disc, mechanical
How applied	Steering levers or foot pedal
Mounting	On sprocket drive pinion shaft
Number of friction surfaces, each side of actuator discs	10
Number of discs, each side of actuator discs:	
Middle disc (lined)	5
Intermediate disc (steel)	4
Disc and lining thickness, inch . . . . .	.108 - .112
Intermediate disc thickness, inch . . . . .	.065 - .069
Actuating disc balls diameter, inch	7/8 7/8



GENERAL

Brake pedal return spring:		
Free length, inches	.....	9.61
Test length, inches	.....	13-1/16
Test load, lbs.	.....	40
Brake actuating cable return spring:		
Free length, inches	.....	3.76
Test length, inches	.....	1.93
Test load, lbs.	.....	20
Free length, inches	.....	3.10
Test length, inches	.....	1.93
Test load, lbs	.....	40
Brake actuating disc extension spring:*		
Free length, inches	.....	15/16
Test length, inches	.....	1-1/16
Test load, lbs.	.....	20-28
Pivot brake actuating bell crank:		
Shaft OD, inches	.....	1.248 - 1.246
Bushing ID (assembled), inches	.....	1.2530 - 1.2486

Hydraulic Steering

Housing inside diameter, inches	.....	2.250 - 2.253
Booster piston, inches:		
Outside diameter	.....	2.247 - 2.249
Inside diameter	.....	.9990 - 1.0000
Rod diameter	.....	.998 - 1.000
Piston support inside diameter, inches	.....	1.001 - 1.004
Piston valve return spring:		
Free length, inches	.....	3.30
Test length, inches	.....	2.50
Test load, lbs.	.....	5.6
Booster piston return spring:		
Free length, inches	.....	10.33
Test length, inches	.....	12.10
Test load, lbs.	.....	.50
Piston sealing ring gap (assembled in housing) inch	.....	.001 - .006

Special Nut and Bolt Torque Data (Foot-pounds)

(Torques given are for bolts and nuts lubricated with SAE-30 engine oil.)

Bevel gear dowel bolts	.....	80 - 90
Bevel gear carrier bolts	.....	80 - 90
Planet carrier dowel bolts	.....	80 - 90
Pivot brake stud	.....	125 maximum
Pivot brake stud nut.	.....	75 maximum
Sprocket drive carrier stud nuts and cap screws	.....	290 - 320
Foot brake idler pulley stud shaft	.....	290 - 320
Foot brake moveable pulley support stud	.....	290 - 320

*Specifications measured from inside to inside of end loops.



GENERAL

3. CHECKING MECHANICAL PROBLEMS

PROBABLE CAUSE

REMEDY

Tractor Does Not Move

- | | |
|--|--|
| 1. Brake pedal locked | Release brake pedal from latching pawls. |
| 2. Engine clutch faulty (if equipped) | Refer to "ENGINE CLUTCH" Section. |
| 3. Transmission faulty | Refer to "TRANSMISSION" Section. |
| 4. Steering planetary brakes slip, levers have no free play due to improperly adjusted brake shoes or worn linings | Adjust brake shoes or replace linings. |
| 5. Steering planetary brakes slip due to weak, broken or improperly tensioned brake spring | Adjust or replace brake spring. |

Tractor Moves with Pivot Brakes Locked (Brakes Do Not Hold)

- | | |
|---|----------------------------------|
| 1. Brake disc lining worn | Install new discs. |
| 2. Brakes out of adjustment | Adjust pivot brakes. |
| 3. Pivot brake linkage disconnected or broken | Repair or replace linkage parts. |

Tractor Does Not Turn (Steering Planetary Brake Does Not Disengage)

- | | |
|--|----------------------|
| 1. Excessive steering lever free play | Adjust clutch shoes. |
| 2. Worn, disconnected or improperly adjusted linkage | Repair or adjust. |
| 3. Bent or warped sun gear disc | Replace. |

Tractor Will Not Make Pivot Turn

- | | |
|--|--|
| 1. Steering planetary brake does not disengage | Refer to "Tractor Does Not Turn" problem above. |
| 2. Pivot brake does not hold | Refer to "Tractor Moves with Pivot Brakes Locked" problem above. |

Tractor Creeps to One Side

- | | |
|---|--|
| 1. Track chain loose on one side | Adjust track chain tension. (Refer to "TRACKS AND TRACK FRAME" Section.) |
| 2. Track frame bent or misaligned | Correct or replace parts as necessary. |
| 3. Steering planetary brake on one side slips | Adjust brake shoes. |

Tractor Loses Pulling Power

- | | |
|--|--|
| 1. Pivot brakes drag | Adjust brakes. |
| 2. Steering planetary brakes slip | Adjust for correct steering lever free play. |
| 3. Engine clutch slips (if equipped) | Refer to "ENGINE CLUTCH" Section. |

Steering Planetary Brakes Overheat

- | | |
|---|--|
| 1. Improper use of brake pedal | Pivot brake pedal should never be applied unless steering planetary brakes or engine clutch is disengaged. |
| 2. Steering planetary brakes slip:
(a) Brake shoes out of adjustment or linings worn | Adjust or reline shoes. |
| (b) Brake spring improperly tensioned | Adjust brake spring tension. |
| 3. Bent or warped sun gear disc | Replace. |

Pivot Brakes Overheat

- | | |
|--|---|
| 1. Pivot brakes drag | Adjust brakes. |
| 2. Steering planetary brake does not disengage | Refer to "Tractor Does Not Turn" problem above. |
| 3. Binding in brake controls | Free controls and lubricate with light oil. |

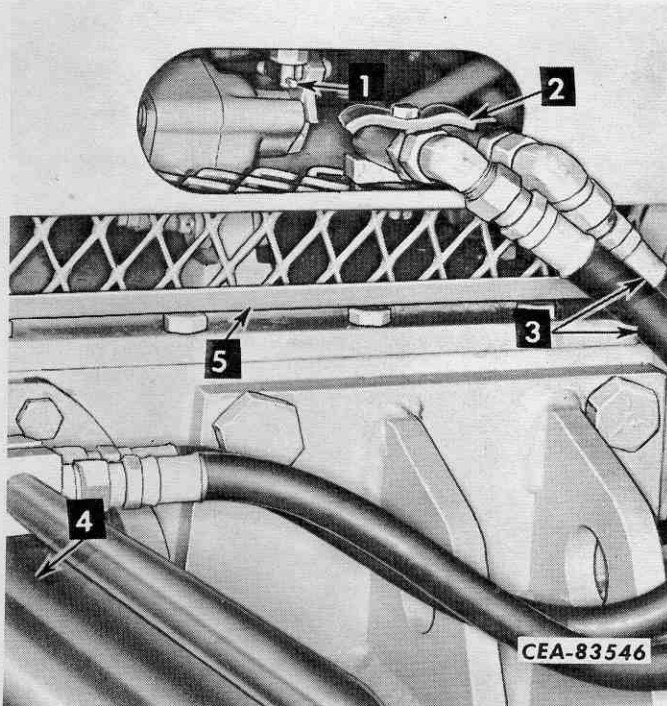


STEERING PLANETARY

4. REMOVAL

NOTE: Disconnected hydraulic lines must be properly capped with the correct size plastic cap. If caps are not available, use tape or rubber stoppers. Openings must never be plugged with rags. This practice could introduce dirt or lint into critical hydraulic components. Remove all dirt accumulation from the main frame cover. Excessive dirt pack-up could cause binding of external brake linkage and result in premature brake failure. Tag all disconnected lines to facilitate faster and correct installation.

1. Remove the sprocket rock shield (if equipped). Disconnect the track chain and clear it from the sprocket. It is not necessary to remove the track chain from under the track frame (refer to section 10, "TRACKS AND TRACK FRAME" for removal).



Illust. 5
Scarifier Connection (If Equipped).

- | | |
|------------------------------|---------------------|
| 1. Fuel tank shut-off valve. | 3. Hydraulic hoses. |
| 2. Tube clamp. | 4. Scarifier. |
| | 5. Rear cover. |

2. Drain the rear main frame by removing the plug in the underside of the frame.

3. Drain the equipment hydraulic system. It is not necessary to drain the fuel tank, closing the fuel shut-off valve (1, Illust. 5) is sufficient.

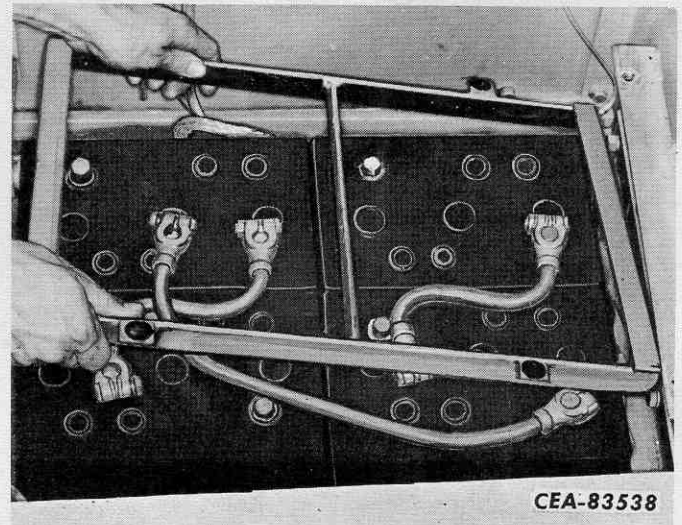
4. UNITS EQUIPPED WITH SCARIFIER: Disconnect the hydraulic hoses (3) from the front tubing at the rear cover. Remove the cap screw, lockwasher and nut securing the tube clamp (2) to the rear cover (5) and remove the clamp (Illust. 5).

5. Remove the cap screws, lockwashers, flat washers and nuts securing the rear cover (5, Illust. 5) to the rear frame and fuel tank support and remove the rear cover.

6. Remove the bottom seat cushion. Remove the four cap screws and lockwashers securing the seat frame to the seat side sheets. Lift off the seat frame with bottom and rear air baffles.

7. Disconnect the battery cables at one end in such a manner so each battery can be removed independently. Remove the four cap screws, flat washers and lockwashers securing the battery support top bracket and remove the bracket. Mark the batteries to insure installation in the same location and remove the four batteries (Illust. 6).

(Continued on next page)



Illust. 6
Removing the Battery Support
Top Bracket.

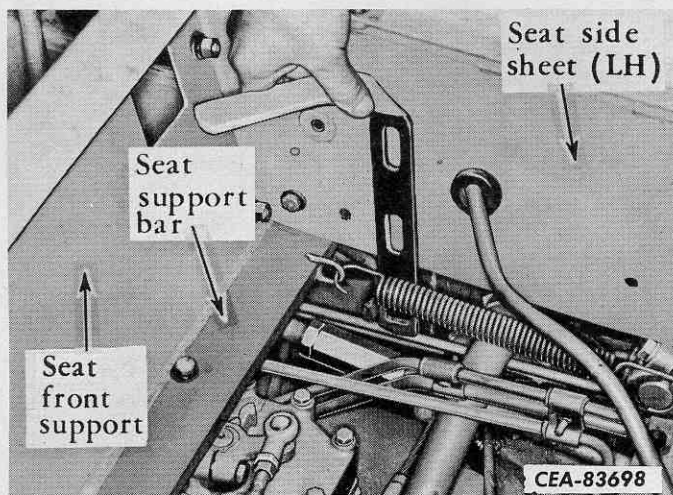


STEERING PLANETARY

4. REMOVAL - Continued

8. Remove the two cap screws, flat washers and lock washers securing the battery bottom bracket to the seat support bar. Remove the two cap screws lock washers and nuts securing the bracket at the rear to the seat side sheets and remove the bracket.

9. Remove the side cover enclosing the equipment control valve on the RH fender. Reach in through the cover opening to remove the nuts and lock washers securing the two operating lever guides to the seat side sheet. Remove the guides and the two flat washers from between the seat side sheet and operating lever. Disengage the operating lever from the brake pedal pawl and the opening in the seat front support and lift out the operating lever (Illust. 7).

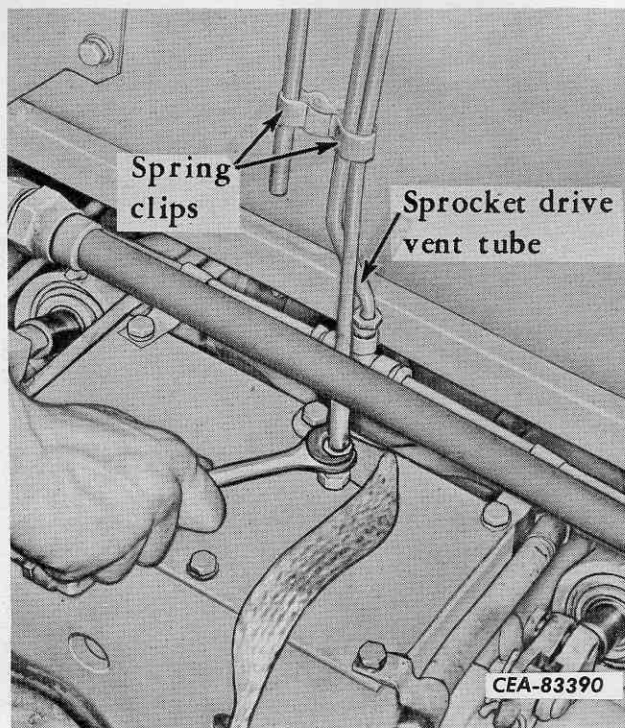


Illust. 7

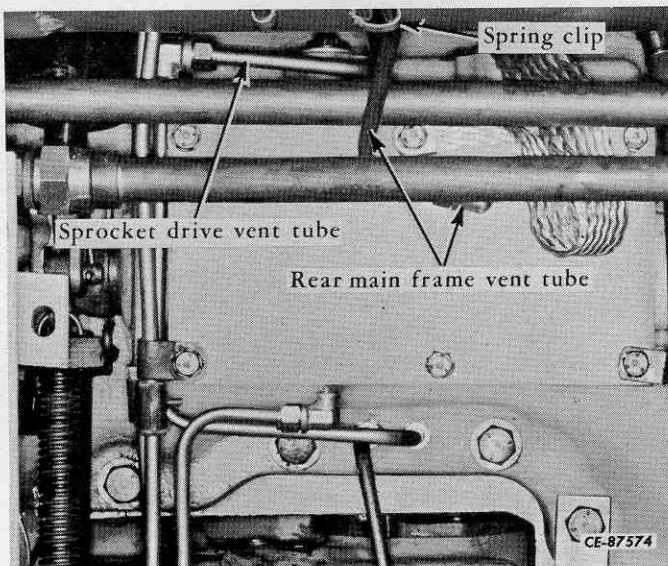
Removing the Brake Pawl Operating Lever.

10. Disconnect the fuel tank outlet tube (4) and return tube (5) at the bottom of the tank (Illust. 11).

11. Disconnect the sprocket drive and the rear main frame vent tubes. Bend back the spring clips securing the tubes to the front of the fuel tank and remove the vent tubes (Illust. 8 and 8A).



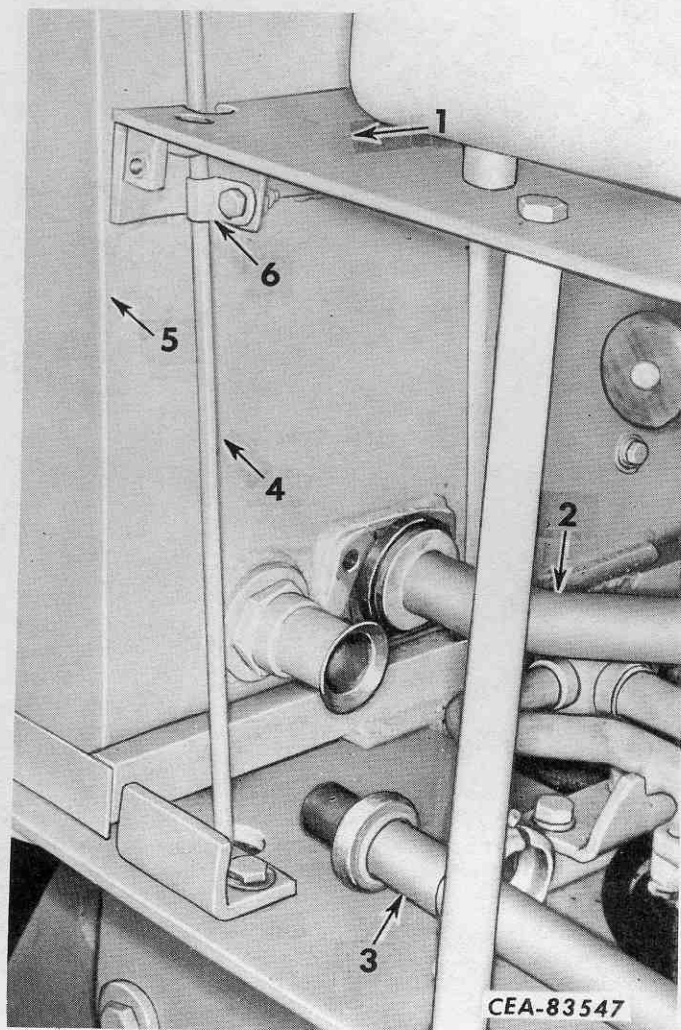
Illust. 8
Disconnecting the Rear Main
Frame Vent Tube.
(Units with External Piping.)



Illust. 8A
Sprocket Drive and Rear Main
Frame Vent Tubes
(Units with Internal Piping.)



STEERING PLANETARY



Illust. 9
Equipment Hydraulic Oil Tank
Disconnect Points.

1. Valve top cover.
2. Pump inlet tube.
3. Valve return tube.
4. Hydraulic oil tank vent tube.
5. Hydraulic oil tank.
6. Vent tube clamp.

12. Remove the clamp halves securing the equipment pump inlet tube (2) at the hydraulic oil tank (5). Disconnect the control valve return tube (3) at the valve and the hydraulic oil tank and remove the return tube (Illust. 9).

13. Remove the two cap screws, lock washers, flat washers and nuts securing the control valve top cover (1) to the hydraulic oil tank bracket. Disconnect tank vent tube (4) at the valve on the

tank. Remove the cap screw, lock washer and nut securing the vent tube clamp (6) to the tank bracket and remove the vent tube (Illust. 9).

14. Remove the cap screws, lock washers and flat washers securing the seat side sheets (Illust. 10) to the front of the fuel tank.

15. Disconnect the electrical wire at the rear light and thread the wire through the spring clips. Remove the nut and lock washer securing the rear light to the bracket and remove the rear light and clamps.



Illust. 10
Removing the Fuel Tank and Hydraulic
Oil Tank as an Assembly.

16. Remove two of the mounting cap screws from the hydraulic oil tank top cover and connect a cable. Attach a cable to the rear light bracket and secure the cables to the lifting device (Illust. 10).

17. Remove the cap screws, flat washers and nuts securing the fuel tank and hydraulic oil tank support to the rear frame. Start the assembly up by prying between the support and rear frame. Then lift the assembly off the rear of the machine (Illust. 10).

(Continued on next page)



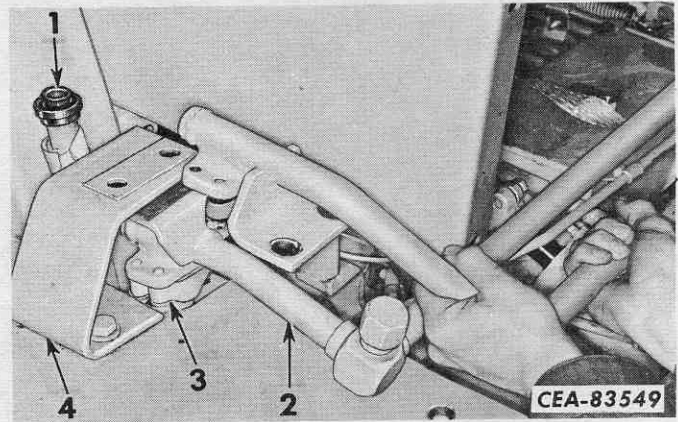
STEERING PLANETARY

4. REMOVAL - Continued

18. Disconnect the scarifier front oil tubes (if equipped) at the control valve and remove the tubes (Illustr. 11).

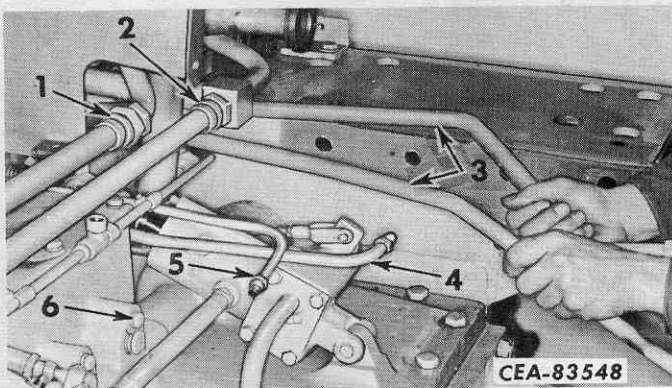
19. MODEL 175 LOADER ONLY: Loosen the lift cylinder crossover tubes at the connections (1 and 2, Illustr. 11). Remove the clamp halves securing the cylinder hose (1) (rod end) to the crossover tube. Remove the two cap screws, lock washers, flat washers and nuts securing the crossover tube (rod end) to the bracket (4) and remove the crossover tube (Illustr. 12).

20. MODEL 175 LOADER ONLY: Remove the two cap screws, lock washers, flat washers and nuts securing the bracket (4) to the frame and remove the bracket. Remove the clamp halves securing the cylinder hose (3) (head end) to the crossover tube (2) and remove the crossover tube (Illustr. 12).



Illustr. 12
Removing the Lift Cylinder Crossover Tube
(Rod End).

1. Lift cylinder hose (rod end).
2. Lift cylinder crossover tube (head end).
3. Lift cylinder hose (head end).
4. Mounting bracket.



Illustr. 11
Removing the Scarifier Front Oil Tubes
(If Equipped).

1. Lift cylinder crossover tube connection (rod end).
2. Lift cylinder crossover tube connection (head end).
3. Scarifier front oil tubes (if equipped).
4. Fuel tank outlet tube.
5. Fuel tank return tube.
6. Bellcrank shaft retaining cap screw.

21. Remove the cap screws, lock washers, flat washers and nuts securing the RH seat side sheet to the seat front support and the control valve top and front covers. Tip the seat side sheet up and back as far as the battery cable (8, Illustr. 13) or (6, Illustr. 13A) will allow.

22. Remove the two booster springs (6, Illustr. 13) or (3, Illustr. 13A).

23. UNITS WITH EXTERNAL PIPING: Disconnect the sprocket drive rear vent tubes (2) at the front connection (5) on each side of the unit. Remove the cap screw, lock washer and clamp securing the vent tubes to the frame on each side of the unit. Remove the two cap screws, lock washers and clamps (1) securing the vent tubes to the inspection cover and remove the vent tubes (Illustr. 13).

UNITS WITH INTERNAL PIPING: Disconnect the oil tube (5, Illustr. 13A) at the rear main frame cover and at the transmission main pressure regulating valve connection. Remove the tube.

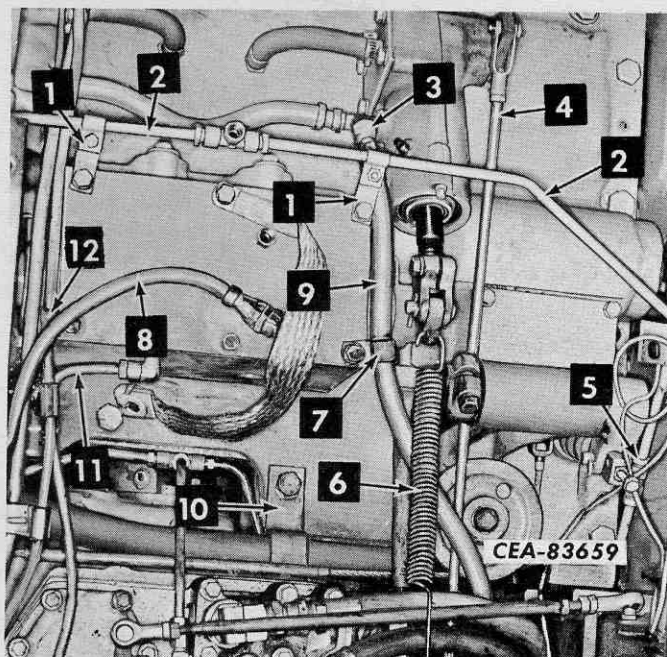
24. Remove the cap screw, lock washer and clamp (7) or (10) securing the pressure filter-to-booster inlet hose (9) to the rear main frame cover. Disconnect the hose at the tee connection (1) or (3) and move the hose out of the way to facilitate removal of the rear main frame cover (Illustr. 13 or 13A).

25. Disconnect the two steering booster operating rods (4, Illustr. 13) or (2, Illustr. 13A) at the steering levers by removing the cotter and pulling it from the lever. Remove the cotter and end pin securing the operating rods at the boosters and remove the operating rods.

(Continued on page 12)

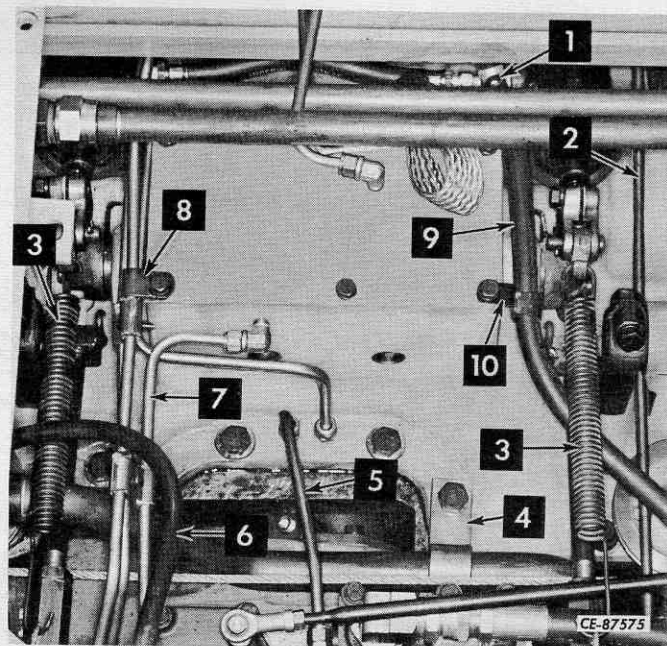


STEERING PLANETARY



Illust. 13
Rear Main Frame Cover Disconnect Points.
(Units with External Piping.)

1. Vent tube clamp.
2. Sprocket drive vent tubes.
3. Booster hose connection.
4. Booster operating rod.
5. Vent tube connection.
6. Booster spring.
7. Booster hose clamp.
8. Battery cable.
9. Pressure filter-to-booster inlet hose.
10. Equipment pump pressure tube clamp (loader only).
11. Torque converter vent tube.
12. Fuel tube clamp.



Illust. 13A
Rear Main Frame Cover Disconnect Points.
(Units with Internal Piping.)

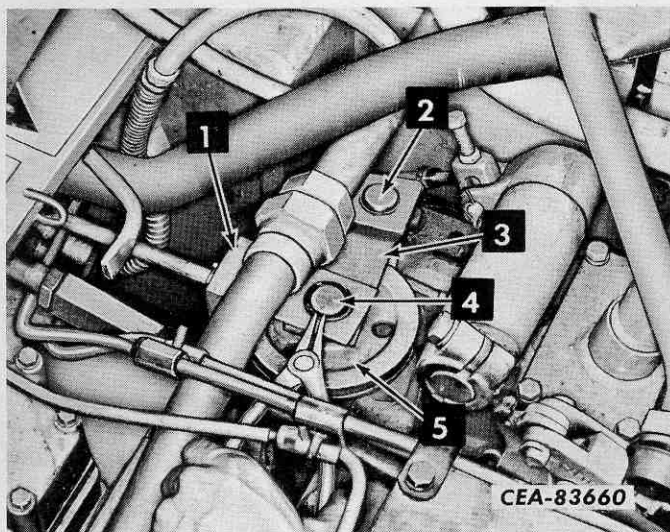
1. Booster hose connection.
2. Booster operating rod.
3. Booster spring.
4. Equipment pump pressure tube clamp (loader only).
5. Oil tube.
6. Battery cable.
7. Converter vent tube.
8. Fuel tube clamp.
9. Booster inlet hose.
10. Booster hose clamp.



STEERING PLANETARY

4. REMOVAL - Continued

26. Loosen the rear jam nut on the brake pull rods (long) (5). Remove the cotter and end pin securing each of the brake pull rods (long) to the outer levers (6). Depress the brake pedal and pull back the steering levers to enable turning the pull rods 90 degrees so the rod pick-up bracket (4) is up (Illust. 15).



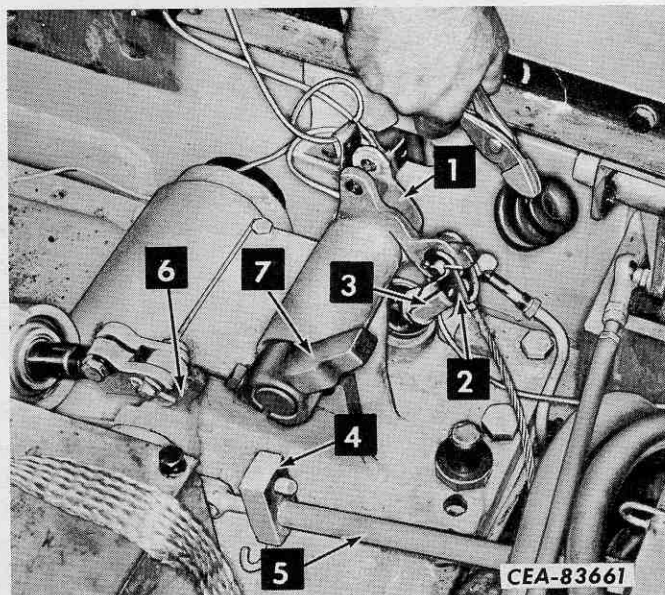
Illust. 14

Removing the Brake Cable Moveable Pulley Retaining Snap Ring.

1. Brake pedal pull rod.
2. Support stud.
3. Pulley support.
4. Pulley shaft.
5. Moveable pulley.

27. Remove the snap ring and spacer securing the brake cable idler pulley to the stud on the left hand side of the rear main frame cover. Remove the idler pulley.

Remove the snap ring securing the brake pedal pull rod (1) and pulley support (3) to the pulley shaft. Remove the snap ring securing the pulley support to the support stud (2). Lift the brake pedal pull rod as far as possible and tap the pulley shaft (4) with lower snap ring down and out from the pull rod. Remove the moveable pulley (5) and pulley support from the pull rod (Illust. 14).



Illust. 15

Removing the Brake Actuating Cable Boot.

1. Brake actuating bellcrank.
2. Brake pedal actuating cable.
3. Brake actuating cable.
4. Pull rod pick-up bracket.
5. Brake pull rod (long).
6. Outer lever.
7. Brake pick-up lever.

28. Remove the cotter and end pin securing the brake actuating cable (3) to the actuating bellcrank (1). Turn the bellcrank up as far as possible and, using pliers or other suitable tool, pull the rubber boot from the cable. (Illust. 15). Push the cable (3) down into the rear main frame cover. Disconnect the brake pedal actuating cable (2) from the bellcrank by removing the cotter and end pin (Illust. 15). Repeat for cables on the other side of the rear main frame cover.

NOTE: On the right hand side of the unit, remove the rear main frame oil level dipstick. Then remove the inspection cover with dipstick pipe. With these items removed, a large screwdriver or other suitable tool can be used to pry under the bellcrank (1, Illust. 15) to push the brake actuating cable into the rear main frame. On later units, the dipstick is not mounted on the inspection cover. On these units the inspection cover is located farther back on the main frame cover but the cover opening may still be utilized to aid in removal and installation of the brake cable.



STEERING PLANETARY

29. Remove the cap screw and lock washer securing the fuel tube clamp (8) or (12) to the rear main frame cover. Disconnect the vent tube (7) or (11) at the rear main frame cover. On loader machines, remove the clamp (4) or (10) (Illust. 13 or 13A).

30. MODEL 175 LOADER ONLY: Remove the vertical circuit relief valve from the control valve to provide clearance for loosening the lift cylinder crossover tube at the valve. Loosen the tube at the valve and remove the cap screws, lock washers and bracket securing the tube on the fender. This will enable the tube to be lifted and allow the rear main frame cover to be raised sufficiently to clear the RH brake fork as the cover is removed (Illust. 39).

31. Remove the cap screws securing the rear power take-off cover to the rear main frame. Remove the power take-off cover and cover gasket.

32. Relieve the brake spring pressure as follows: To gain access to the spring retainer (24, Illust. 28), remove the square socket pipe plug (each side of unit) from the rear main frame cover using a 3/4 inch drive extension and breaker bar. Access to this plug is provided in the front frame below the fender (Illust. 41). Use two cap screws (1-14UNF x 3-1/4 inches in length) and two round flat washers (2-1/4 inches OD) as spring compressors. Earlier units will require a 3/4-16UNF cap screw to thread into the spring retainer. Thin head cap screws should be used as they will be removed with the cover and must clear the front frame. If thin head cap screws are not available, grind the head of the cap screws sufficiently so they will clear the inner face of the front frame after being tightened.

Insert the cap screw with washer through the opening provided to engage the thread in the spring retainer. Alternately tighten the cap screw and reach in through the rear power take-off opening to push the brake fork (23, Illust. 28) to the outside of the unit against the spring retainer. Continue in this manner until the brake fork and adjusting screw (22, Illust. 28) are clear of the push rod (21, Illust. 28). Compress the brake spring on the other side of the unit in the same manner.

NOTE: Leave the springs compressed to facilitate cover removal and installation, removing the cap screws only if spring replacement is necessary.

33. Remove the cover mounting cap screws.

34. UNITS WITH EXTERNAL PIPING: If necessary, bend the sprocket drive front vent tube (at the front end on each side of the cover) slightly to prevent interference with cover removal.

35. Raise the fuel tank fuel tubes, torque converter vent tube and brake pedal operating rod as high as possible and secure in this position with a heavy twine (Illust. 39).

36. Free the cover from the dowels by turning in the four set screws provided in the cover. Remove the two rear set screws and the front set screw on the LH side and insert eyebolts in the tapped holes. Attach a hoist (Illust. 39).

37. Lift the cover up slightly and start the cover off the rear of the frame. As the cover is moved back, check that the brake forks are moved outward and clear of the push rods and that the steering lever pull rods (5, Illust. 15) do not hang up. On the loader machines it will also be necessary to pry the crossover tube up to allow the cover to clear the RH brake fork (Illust. 39).

38. MODEL 175 LOADER ONLY: Remove the pivot brakes and the sprocket drive pinion shaft from both sides of the unit (refer to "PIVOT BRAKES" in this section).

TD-15 (SERIES B) ONLY: The pivot brake and the sprocket drive pinion shaft can be removed as described under "PIVOT BRAKES" in this section if desired. Due to the time involved in removing and installing the pivot shaft caps secured to the sprocket drive carrier, it is suggested that only the pinion shaft be removed as described under "SPROCKET DRIVE PINION" in section 9, "SPROCKET AND SPROCKET DRIVE."

39. Remove the cap screws securing the brake back-up shoes (31, Illust. 28) to the rear main frame. Use push screws in the tapped holes provided to free the shoes from the dowels. Mark or tag the shoes according to right and left positions for reassembly.

40. Tip the brake forks to the outside and wire the shoes to the forks to keep the shoes

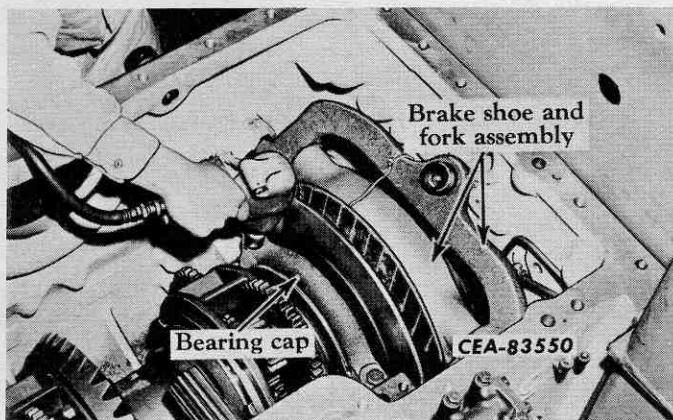
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STEERING PLANETARY

4. REMOVAL - Continued

in a vertical position. This will reduce interference on planetary removal (Illust. 16).



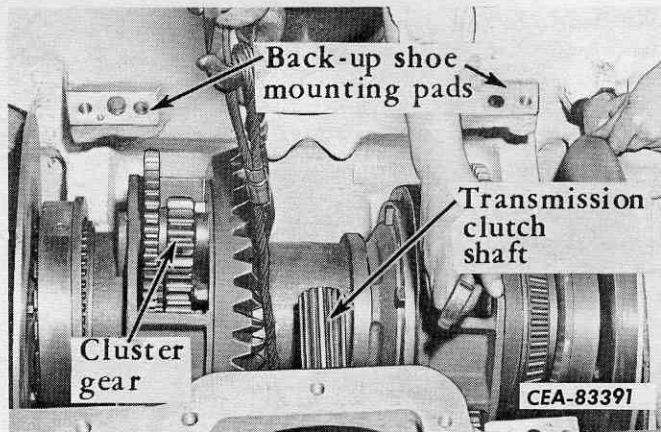
Illust. 16
Removing the Carrier Bearing Cap.

41. Remove the cap screws and lock washers securing the carrier bearing cap at each end of the planetary assembly (Illust. 16). Lift the bearing caps straight up and off the three dowels, one at end and one at the center of each bearing cap.

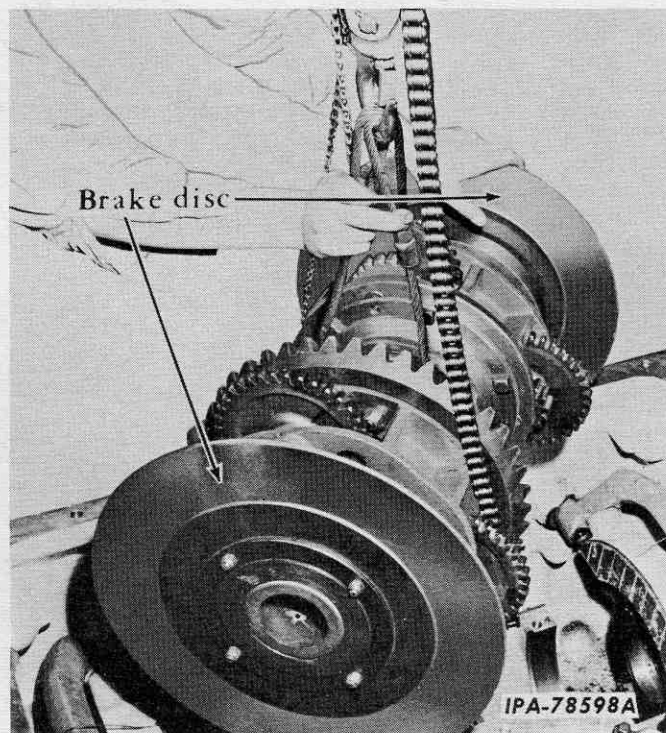
NOTE: If shims are used under the caps, they must be attached to the caps to facilitate proper installation. The caps are stamped "LH" and "RH." If these markings have become obliterated they must be marked to assure installation in the same location.

42. Remove the adjusting nut lock (21, Illust. 21) on the right hand side and, using a special spanner wrench 1 020 455 R91, turn out the adjusting nut (20, Illust. 21) to allow the planetary assembly to be moved over to the right. This will prevent the drive bevel gear from binding on the transmission pinion gear as the assembly is lifted from the frame. Attach a sling to the center of the bevel gear carrier so that it can be rotated. Turn one cluster gear to the top (Illust. 17). Roll the brake discs to the inside and secure "C" clamps or vise grip pliers to the discs. Attach a wire or rope to the "C" clamps or pliers to hold the discs inward.

43. Hoist the steering planetary assembly from the rear main frame. As the assembly clears the end of the transmission clutch shaft, roll the assembly to clear the back-up



Illust. 17
Rotating Planetary to Position Cluster Gear.



Illust. 18
Removing the Steering Planetary Assembly.

shoe mounting pads at the rear of the frame (Illust. 17 and 18).

44. After the assembly is out of the frame, remove the brake disc and the bearing cage (19) with adjusting nut (20) and bearing cup (18)



STEERING PLANETARY

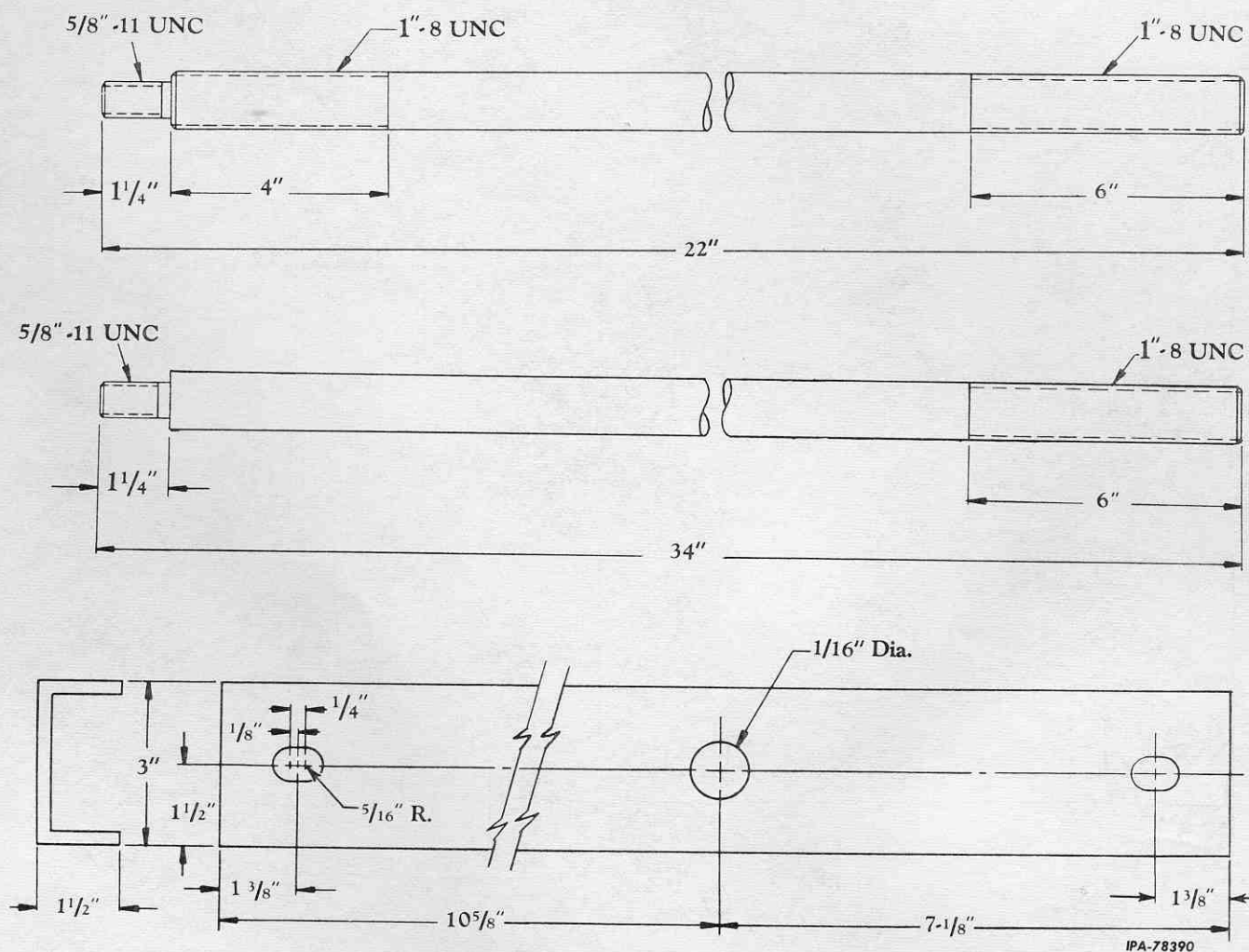
from each end of the planetary (Illust. 21). Keep these parts located or marked for right and left sides to assure the same parts will operate together as before. Do not remove the adjusting nut from the bearing cage.

45. Place the planetary assembly on a bench and remove the hoist. The assembly should be placed on end so it is resting on the planet gear carrier attached to the bevel gear.

46. If it is necessary to remove the brake forks, the fork support pivot pins (26, Illust.

28) installed through the front and rear walls of the rear main frame must be removed. Refer to Illust. 19 for constructing puller screws and a support bar for removing the fork pins. Remove the pivot pin retaining snap ring (27, Illust. 28) from the main frame bores. Thoroughly clean and oil the threads in the tapped hole of each pin to provide a free turning fit for the puller screw. Remove the

(Continued on next page)



Illust. 19
Detailed Parts for Removing and Installing Brake Fork Pins.



STEERING PLANETARY

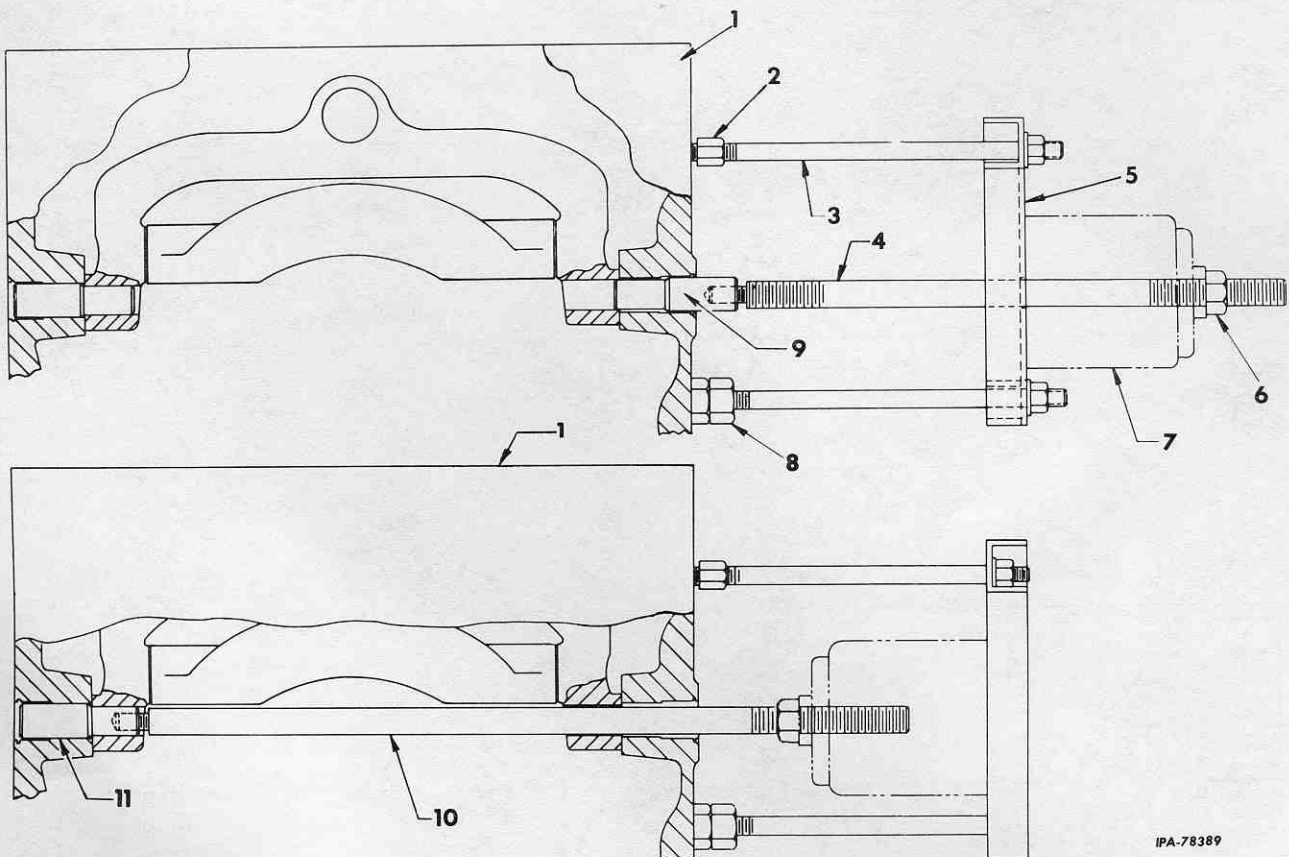
4. REMOVAL - Continued

rear pins with a hydraulic ram as shown in Illust. 20. With the rear pins removed, insert the front pin puller screw through the rear frame and into the threads of the front pin until it bottoms in the pin. Using a hydraulic ram as shown in Illust. 20, press the pin out the front of the frame.

NOTE: Support each brake fork before completely removing the fork pins.

NOTE: Some machines have front fork pins that are not threaded to receive a puller screw for this type of removal. Whenever these pins are removed, they should be replaced with a pin that is threaded at each end. On these machines it may be necessary to remove the transmission to facilitate removal of the front pins.

47. Remove the brake shoes from the forks by removing the pivot pins with a slide hammer and adapter.



IPA-78389

Illust. 20
Brake Fork Pin Removing Tool Assembled.

1. Main frame.
2. Adapter (OTC-M-20).
3. Leg (OTC-930D).
4. Puller screw.

5. Support bar.
6. Nut.
7. Hydraulic ram.
8. Adapter (OTC-932).

9. Rear fork pin.
10. Puller screw.
11. Front fork pin.



STEERING PLANETARY

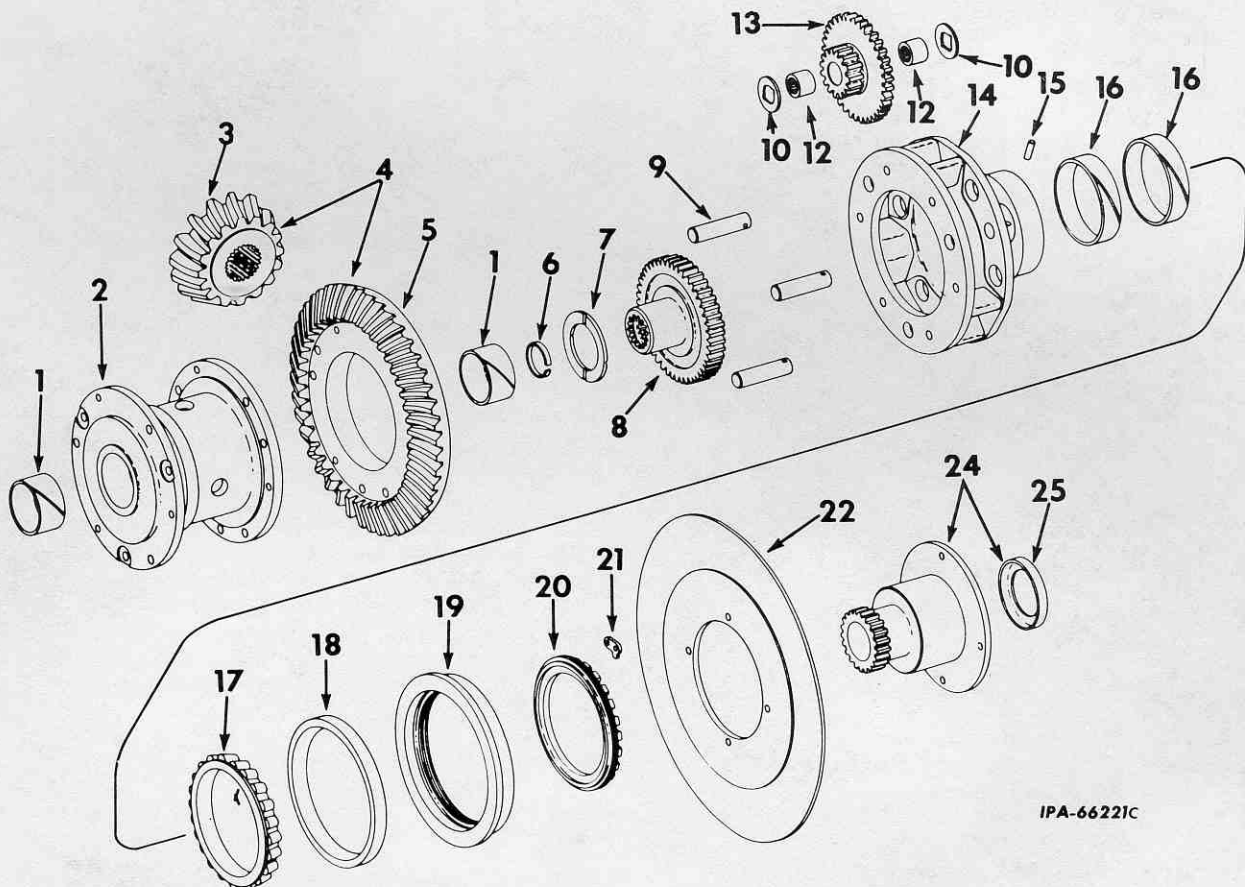
5. DISASSEMBLY

(Ref. Nos. Refer to Illust. 21.)

The instructions which follow are for the disassembly of the left side of the steering planetary. The procedure for both sides is the same except for the drive bevel gear.

1. The word "TOP" is cast (raised letters) into the center of the bevel gear carrier. This marking should be aligned with the word "TOP" stamped on the planet gear carriers and the bevel gear and must be used for aligning parts in reassembly. If equipped with a bevel gear

(Continued on next page)



IPA-66221C

Illust. 21
Steering Planetary (Exploded).

- | | |
|--|---------------------------------------|
| 1. Bushing. | 13. Planet gear cluster. |
| 2. Bevel gear carrier. | 14. Planet gear carrier. |
| 3. Transmission pinion. | 15. Planet gear shaft pin. |
| 4. Matched set, pinion and bevel gear. | 16. Bushings. |
| 5. Bevel gear. | 17. Taper roller bearing cone. |
| 6. Snap ring. | 18. Taper roller bearing cup. |
| 7. Thrust washer. | 19. Bearing cage. |
| 8. Sprocket drive pinion shaft gear. | 20. Bevel gear carrier adjusting nut. |
| 9. Planet gear shaft. | 21. Adjusting nut lock. |
| 10. Steel thrust washers. | 22. Brake disc. |
| 12. Planet gear needle bearings. | 24. Sun gear and ring assembly. |
| | 25. Oil collector ring. |



STEERING SYSTEM

Section 8

Page 18

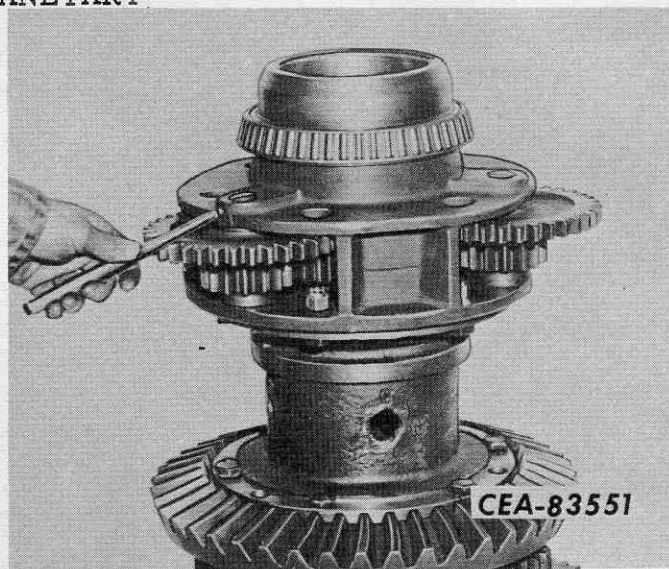
STEERING PLANETARY

5. DISASSEMBLY - Continued

(Ref. Nos. Refer to Illust. 21)

carrier with four cored holes (later carriers have only one cored hole) it is possible that two "TOP" markings will be found. When this is the case, the hand stamped "TOP" should be in line with the markings on the bevel gear and planet gear carriers and the cast "TOP" (raised letters) must be disregarded (Illust. 22).

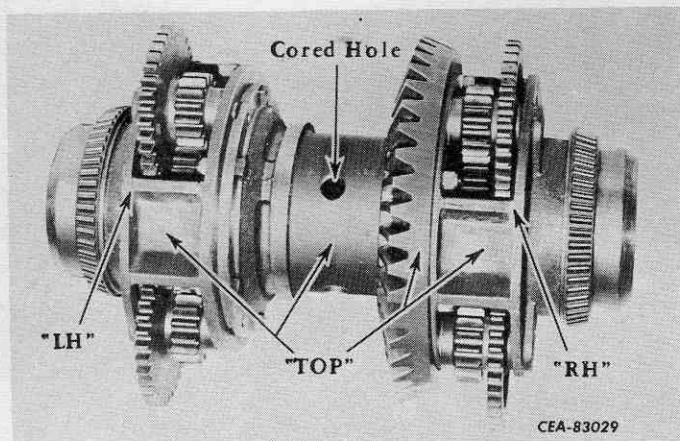
NOTE: If a component is found with no marking, it is a replacement part that was not marked after the line reaming operation. It must be marked "TOP" in line with its mating parts before disassembly.



Illust. 23
Removing the Planet Gear Shaft Roll Pin.

4. Remove the two remaining gear clusters from the carrier in the same manner described in steps 2 and 3.

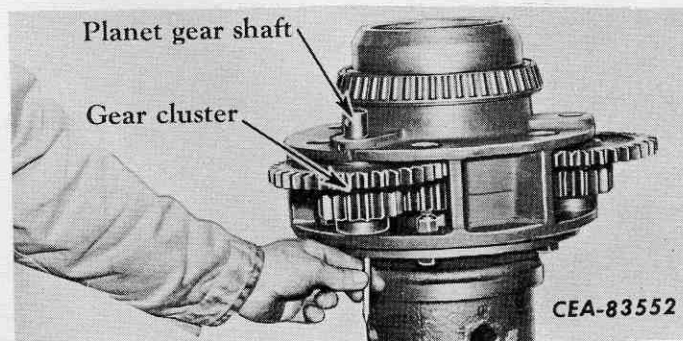
5. The planet gear carrier (LH) is secured to the bevel gear carrier (2) with three regular cap screws and nuts and three dowel bolts and nuts. Remove the mounting hardware and lift the planet gear carrier from the bevel gear carrier. Drive the dowel bolts out the bottom of the planet gear carrier (Illust. 25).



Illust. 22
Location of Carrier and Bevel Gear Aligning Marks.

2. To remove the planet gear cluster (13), drive the roll pin (15) securing the shaft (9) to the planet gear carrier into the shaft (9) until it is clear of the carrier (Illust. 23). The roll pin should be removed from the shaft after disassembly and discarded. Always use a new roll pin.

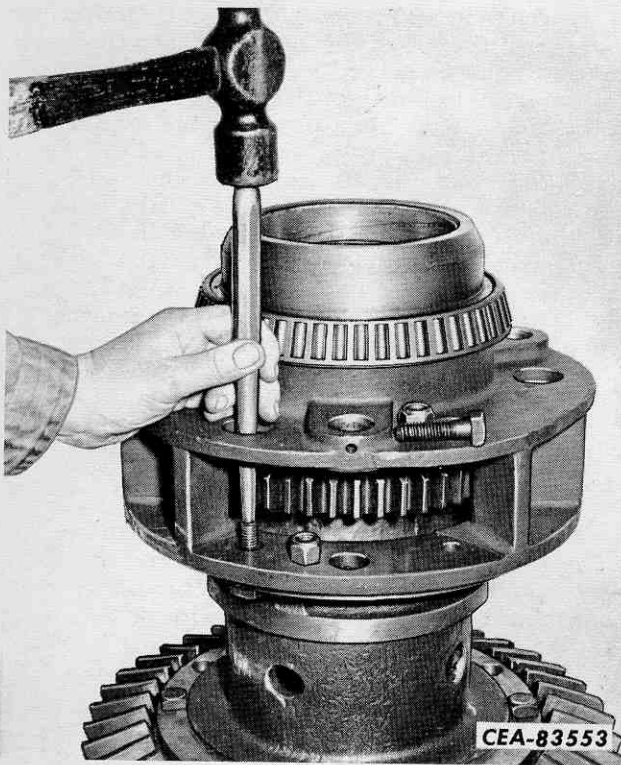
3. Using a short punch and hammer, drive the shaft (9) from the gear cluster and carrier. Slide the gear cluster to the outside. Then place one hand under the gear as it is removed from the carrier as the thrust washer (10) and the bearings (12) are free to drop out (Illust. 24). On earlier units, there is a bronze thrust washer used next to each of the steel washers (10).



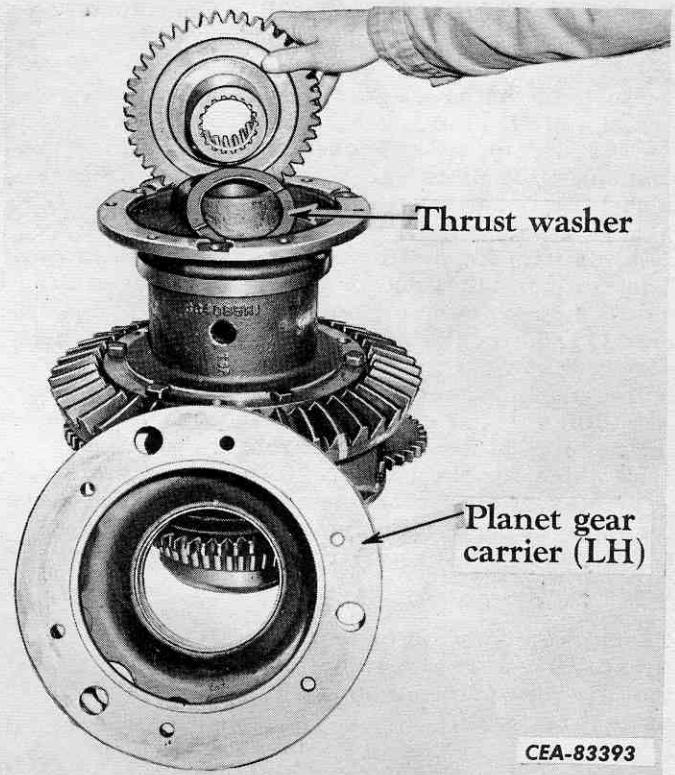
Illust. 24
Removing the Planet Gear Shaft.



STEERING PLANETARY



Illust. 25
Driving Out the Planet Gear Carrier
Dowel Bolt.



Illust. 26
Removing the Sprocket Drive Pinion
Shaft Gear.

NOTE: The planet gear carrier (RH) is secured to the bevel gear and bevel gear carrier with six dowel bolts and nuts.

6. Lift the sprocket drive pinion shaft gear (sun gear) (8) from the bushing in the bevel gear carrier. Remove the thrust washer (7) (Illust. 26).

7. If bushing (1 and 16) or bearing (17 and 18) replacement is necessary, refer to Par. 6, "INSPECTION AND REPAIR" for servicing.

6. INSPECTION AND REPAIR

Clean all parts in solvent and dry thoroughly. Inspect for excessive wear or damage as outlined. Refer to Par. 2, "SPECIFICATIONS," for the sizes of the new parts. After inspection, if parts are serviceable, lubricate them with clean oil of the type specified for normal lubrication.

(Continued on next page)



STEERING PLANETARY

6. INSPECTION AND REPAIR - Continued

1. Inspect the bevel gear, large and small sun gears and all planet gear clusters for excessive wear and chipped or broken teeth. Examine the transmission pinion gear for the same defects. If the small sun gear (24) or the brake disc (22) needs replacing, the new part must be line reamed with its mating part before installation. The sun gear (24) and brake disc (22) used for service have four bolt holes drilled to proper size (11/32 inch), but not reamed. Secure the disc and sun gear with two of the matching holes and line ream the remaining two 11/32 inch holes to .3730-.3740 inch using the matching reamed holes in the old mating part as pilot holes for the reamer. Line ream the other two holes in the same manner. Secure the parts together with the four cap screws and nuts inserting the cap screws from the sun gear side (Illust. 21).

Check the condition of the oil collector ring (25, Illust. 21). If replacement is necessary, press the new ring into the sun gear (hollow end first) until it bottoms.

2. Inspect the planet gear cluster shafts, roller bearings and thrust washers for excessive wear. Replace parts as necessary. If either the bronze or steel planet gear cluster thrust washer used on earlier units is found unserviceable, they must both be discarded and replaced by one new thicker thrust washer (10, Illust. 21). Refer to Par. 2, "SPECIFICATIONS" for dimension of new thrust washer.

3. Inspect the bevel gear carrier (2) and both planet gear carriers (14) for cracks or other damage. If replacement of a planet gear carrier or bevel gear carrier is necessary, refer to the following pre-assembly procedure (Illust. 21).

A new carrier must be line reamed with the mating part before installation. Service planet or bevel gear carriers have three dowel bolt holes drilled to the proper size (0.437 inch), but not reamed. The 0.531 inch drilled holes do not require reaming.

REPLACING BEVEL GEAR CARRIER:

A. CARRIER WITH ONE CORED HOLE: Position the carrier against its mating part with the word "TOP" on both parts in alignment. Then secure parts and line ream as described under "SIDE ADJUSTMENT TO BEVEL GEAR" and "SIDE AWAY FROM BEVEL GEAR."

B. CARRIER WITH FOUR CORED HOLES: Disregard the word "TOP" cast into the center of the carrier. Perform the following steps outlined under "SIDE ADJACENT TO BEVEL GEAR." Then position the planet gear carrier on the opposite side of the bevel gear carrier so the three reamed holes in the planet gear carrier align with the three 0.437 inch drilled holes in the bevel gear carrier. Secure parts and line ream as described under "SIDE AWAY FROM BEVEL GEAR." After the reaming operations, check if the word "TOP" cast into the bevel gear carrier is aligned with that on the mating parts. If not, stamp the work "TOP" in this position (Illust. 22).

REPLACING PLANET GEAR CARRIER:

A. CARRIER MARKED "TOP": Position the carrier against its mating part with the word "TOP" on both parts in alignment. Then secure parts and line ream as described under "SIDE ADJACENT TO BEVEL GEAR" or "SIDE AWAY FROM BEVEL GEAR."

NOTE: If carrier is to be used on the side away from the bevel gear, and the mating carrier has more than one "TOP" marking, be sure to align the marking to be used in reassembly. (Illust. 22.)

B. CARRIER NOT MARKED "TOP": If the carrier is to be used on the side adjacent to the bevel gear, secure parts and line ream as described under "SIDE ADJACENT TO BEVEL GEAR." If the carrier is to be used on the side away from the bevel gear, position the carrier on the bevel gear carrier so the three 0.437 inch drilled holes align with the three reamed holes in the bevel gear carrier. Then secure and line ream as described under "SIDE AWAY FROM BEVEL GEAR." After the reaming operation, stamp the word "TOP" on the planet gear carrier in line with that on the mating part. (Illust. 22.) If carrier is used on side away from the bevel gear, and the mating carrier has more than one "TOP" marking, be sure to stamp the planet gear carrier to align with the marking to be used in reassembly.

SIDE AWAY FROM BEVEL GEAR: Insert the three short standard bolts through the alternate three matching 0.531 inch bolt holes and secure the carriers with the standard hex nuts. Line ream the three 0.437 inch drilled holes to 0.4985 - 0.5000 inch using the matching reamed dowel bolt holes in the old mating part as



STEERING PLANETARY

pilot holes for the reamer. If the planet gear carrier was the replacement part, stamp it "LH" for future reference (Illust. 22). Separate the carriers.

SIDE ADJACENT TO BEVEL GEAR: Secure the bevel gear to the carrier being replaced using the three short standard bolts (mounting bolts used on opposite side of bevel gear carrier) and standard hex nuts. These bolts are to be inserted through three of the bevel gear 0.500 - 0.502 inch holes that match at alternate intervals with three of the 0.531 inch holes in the replacement part. Line ream the three drilled 0.437 inch dowel bolt holes to 0.4985 - 0.5000 inch using the three remaining 0.500 - 0.502 inch opposing holes in the bevel gear as pilot holes for the reamer. If the planet gear carrier was the replacement part, stamp it "RH" for future reference (Illust. 22). Separate the bevel gear from the carrier.

NOTE: The dowel bolt holes in the planet and bevel gear carriers on the bevel gear side of the tractor are located at alternate intervals to provide a staggered snug and loose fit for the six dowel bolts when installed through the bevel gear carrier, bevel gear and planet gear carrier in assembly.

4. Inspect the bushing (1) in the bore of the bevel gear carrier hub and the thrust washer (7) used between the hub and the large sun gear. (Illust. 21.) Replace parts as necessary. If necessary to replace the bushing, press the old bushing from the bore. Apply "LOCTITE" (Grade C) to the OD of the new bushing and install the new bushing flush with the chamfer edge of the carrier bore.

5. Inspect the large sun gear splined bore and the snap ring near the end of the bore. The sun gear spline and sprocket drive pinion shaft splined end should make a sliding fit. Remove any roughness with a fine stone or emery cloth. Replace the snap ring if cracked or broken.

6. Inspect the two bushings in the bore of the planet gear carrier hub and the tapered roller bearing on the hub. If necessary to replace the bushings, press out the old bushings. Apply "LOCTITE" (Grade C) to the new bushing OD and install the new bushings flush with the chamfer edge at both ends of the bore to allow a space between the bushings so as not to obstruct the oil passage in the sun gear hub.

7. If necessary to replace the tapered roller bearing cone on the outside of the planet carrier hub, press off the old cone. Press on a new bearing cone to butt against the shoulder so the bearing tapers toward the end of the hub.

Before removing the old bearing cup and the adjusting nut from the cage, mark the position of the nut in the cage. Remove the nut and tap the bearing cup from the cage. Then install the nut in the cage in its original position. Tap the new bearing cup into the cage (small diameter of the taper down) until it bottoms on the adjusting nut (Illust. 27). Installing the bearing cup in this manner is necessary to provide clearance for planetary installation and seating of the bearing cage in the main frame bore.



Illust. 27
Installing a New Planetary Bearing Cup.

8. Inspect the brake linings on the stationary back-up and movable fork shoes. If the linings are excessively worn down to the depth of the radial grooves, they should be replaced. To reline the movable shoes, it will be necessary to remove the brake fork from the rear main frame. (Refer to "REMOVAL," Par. 4, in this section.)

(Continued on next page)



STEERING PLANETARY

6. INSPECTION AND REPAIR - Continued

New linings are to be riveted to the movable brake shoes and back-up shoes. Follow the instructions that are included in the brake lining field service package.

Steering Planetary Brake Linkage
(Ref. Nos. Refer to Illust. 28)

9. Inspect the brake operating linkage, installed in the rear main frame cover for excessive wear or sloppy fits and for oil leakage at the brake outer levers (8). Remove the parts from the cover and replace when required, as follows:

(a) BRAKE FORK PUSH ROD BELL-CRANKS (13): Remove the cover from the raised box on the main frame cover and lift out the spring (15) from between the bellcranks (13). Disengage the two push rods (12) from the sockets of the bellcranks (13) and levers (11). Remove the cap screw (6, Illust. 11) and shaft retaining washer at the rear of the housing on top of the cover. Pry out each bellcrank shaft (17) and remove the needle bearing (16), bearing races (16A) and the bellcrank (13) with fork push rod (21) attached. Earlier machines use a thrust washer instead of the needle bearing and bearing races at the rear of the bellcrank. Check the bellcrank bushings (14), shaft spring (15)

and bearings (16) or thrust washers for excessive wear or damage. Install new "O" ring (18) in the shaft groove.

Examine the end of the push rods (12) and the rod sockets in the bellcranks (13) and inner levers (11). These should be round and smooth to provide free movement of the pins.

NOTE: If the bellcrank thrust washer used on earlier machines is unserviceable, it must be replaced with a new needle bearing (16) and two bearing races (16A). When installing a bearing on these machines, the later type bellcrank must be installed or the old bellcrank (if reuseable) can be reworked by removing .100" of material from the end of the bellcrank hub at the thrust washer face.

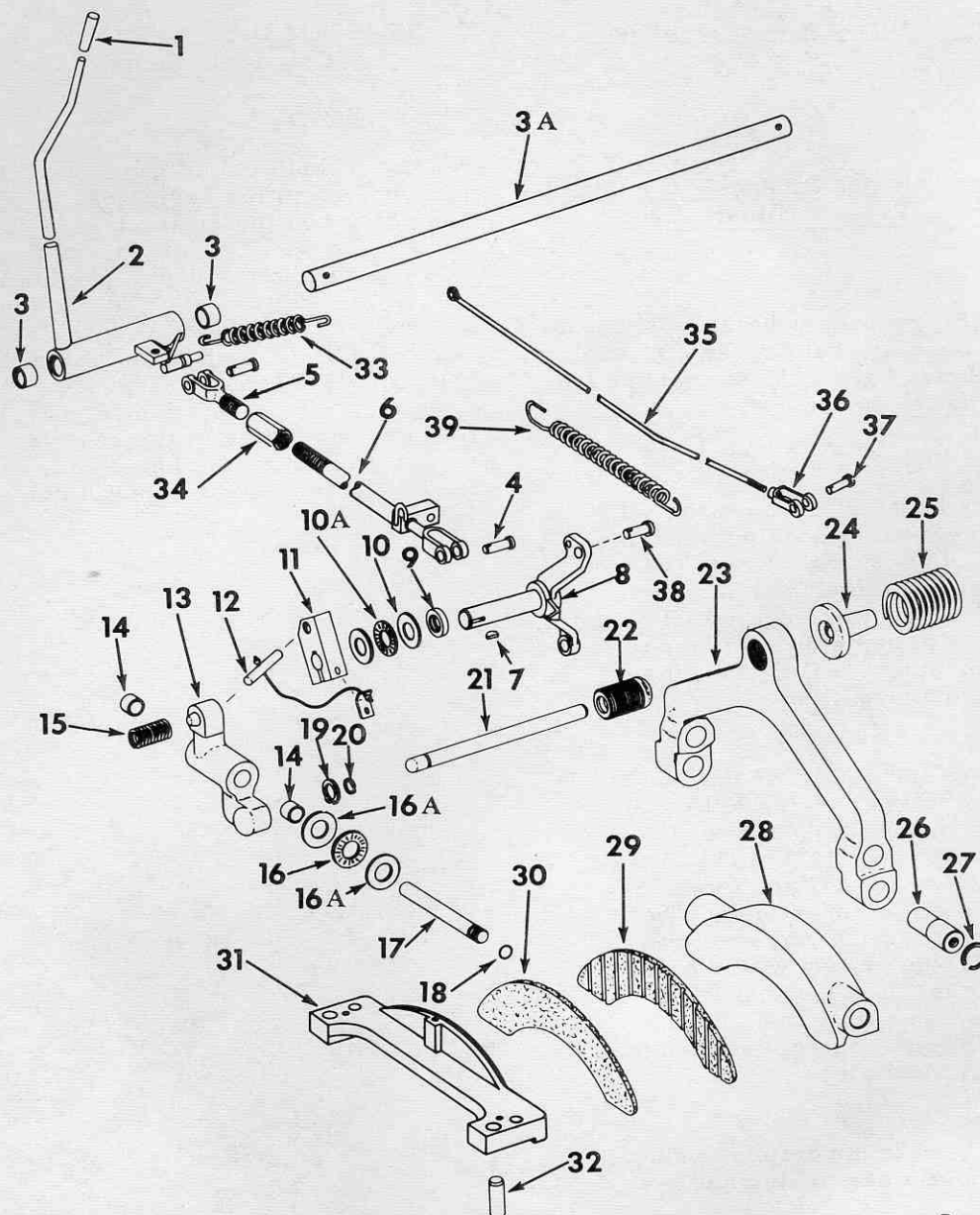
Reassemble the fork push rod (21) to the bellcrank bottom socket, if it was removed, and install the retaining snap ring (19). Pass the fork push rod through the support bracket underneath the main frame cover positioning the bellcrank (13) in the upper housing. Install the thrust washer or bearing (16) with two bearing races (16A), bellcrank shafts, with new "O" rings (18), and lock the shafts in position. Position the ends of the push rod assembly (12) in the sockets of the bellcranks (13) and levers (11). Install the spring (15) between the two bellcranks. However, postpone this reassembly until

Legend for Illust. 28

- | | |
|-------------------------------|---|
| 1. Steering lever handle. | 19. Bellcrank snap ring. |
| 2. Steering hand lever. | 20. Push rod snap ring. |
| 3. Lever shaft bushings. | 21. Fork push rod. |
| 3A. Hand lever shaft. | 22. Brake adjusting screw. |
| 4. Rod end pin. | 23. Brake fork. |
| 5. Brake pull rod (short). | 24. Pressure spring retainer. |
| 6. Brake pull rod (long). | 25. Brake pressure spring. |
| 7. Key. | 26. Brake fork and shoe pivot pins. |
| 8. Outer lever and shaft. | 27. Pivot pin retaining snap ring. |
| 9. Oil seal. | 28. Movable brake shoe. |
| 10. Needle bearing race. | 29. Movable brake shoe lining. |
| 10A. Needle bearing. | 30. Back-up shoe lining. |
| 11. Push rod lever. | 31. Stationary or back-up shoe. |
| 12. Bellcrank push rod. | 32. Dowel pin. |
| 13. Bellcrank. | 33. Hand lever return spring. |
| 14. Bellcrank bushings. | 34. Pull rod turnbuckle. |
| 15. Bellcrank return spring. | 35. Steering booster valve operating rod. |
| 16. Bellcrank needle bearing. | 36. Rod clevis. |
| 16A. Needle bearing race. | 37. Clevis pin. |
| 17. Bellcrank shaft. | 38. Booster pivot front pin. |
| 18. Shaft "O" ring. | 39. Booster piston return spring. |



STEERING PLANETARY



IPA-67460 D

Illust. 28
Steering Planetary Brake and Linkage (Exploded).

after outer lever (8) and seal (9) inspection and repair. (Refer to "b" following.)

(b) OUTER LEVER (8) AND OIL SEAL (9):
Remove the cap screw on the inner lever
(11) and remove the push rod assembly (12).

The inner lever is keyed to the shaft of the
outer lever and should be carefully pryed
off. Remove the key (7), needle bearing
(10A) and bearing races (10): then, pull the

(Continued on next page)



STEERING PLANETARY

6. INSPECTION AND REPAIR - Continued

Steering Planetary Brake Linkage - Continued
(Ref. Nos. Refer to Illust. 28)

outer lever (8) from the housing. Check the lever shaft, bushing, bearing and oil seal. Earlier machines have a thrust washer instead of the needle bearing on the shaft assembly (8).

To replace the bushing, remove the oil seal in the outer end of housing bore and press out the old bushing. Press the new bushing in from the outer end until it is flush with the bore inner edge. Install the oil seal (side with name and number to the outside), using a new seal if the old seal leaked or was damaged.

Install the outer lever (8). Place the Thrust washer or the bearing (10A) with bearing races (10) on the outer lever and key the inner lever (11) to the shaft so that the ends of key (7) are flush with both sides of the inner lever. Secure the clip of the push rod assembly (12) to the inner lever (11) with the cap screw. Push the outer lever inward and tighten the cap screw to clamp the inner lever to the outer lever shaft, allowing a slight end play.

(c) Check the hand lever return spring (33) for excessive wear or damage.

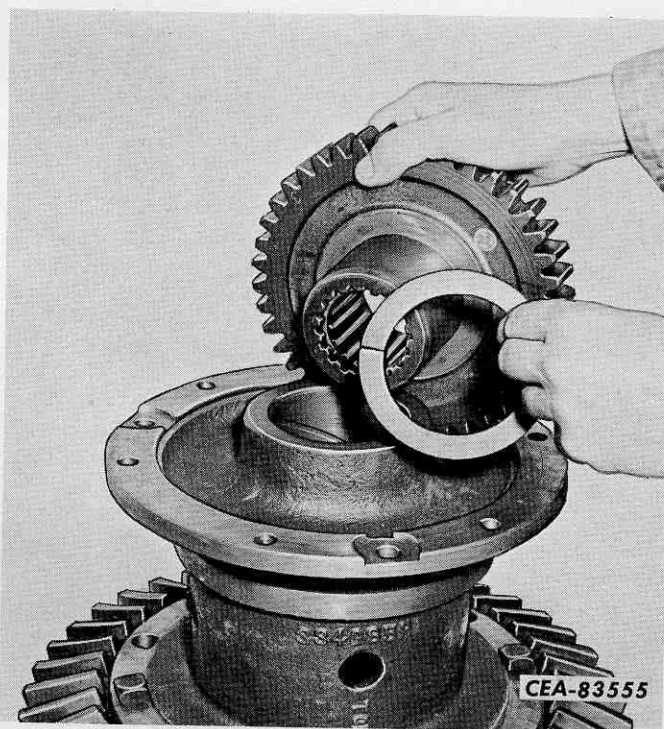
(d) Check the brake pressure springs (25). (Refer to Par. 2, "SPECIFICATIONS.") To remove the springs from the cover, take out the spring compressor bolt from both sides of the cover (Illust. 3). Reinstall the spring, retainer (24) and compressor bolt with flat washer to both sides of the cover. Compress the springs to provide spaces (C and D, Illust. 3) for the brake forks when installing the cover to the main frame.

7. REASSEMBLY

(Ref. Nos. Refer to Illust. 21)

NOTE: If both planet gear carriers (14) were removed from the bevel gear carrier (2), reassemble and install the left hand planet gear carrier first, as it makes dowel bolt installation easier without bevel gear interference.

1. Coat the bushings (1) in the bevel gear carrier (2) and both sides of the thrust washer (7) with MPG (MIL-G-10924B). Be sure the snap ring (6) is installed in the groove around the interior spline of the gear (8). Place the thrust washer on the bevel gear carrier and insert the pinion shaft gear into the carrier (Illust. 29).



Illust. 29
Installing the Sprocket Drive Pinion Shaft
Gear and Thrust
Washer.



STEERING PLANETARY

NOTE: To assure proper assembly when installing the bevel gear and planet gear carriers to the bevel gear carrier, the word "TOP" on all parts must be in alignment. On bevel gear carriers with four cored holes having two "TOP" markings, be sure to use the hand stamped marking and not the cast marking (raised letters). In addition, the planet gear carriers are stamped "RH" and "LH" to avoid interchanging them. These parts are dowel bolted to each other and the dowel bolt holes were line reamed during assembly at the factory. They must be reassembled in the same position or the dowel bolts will not fit properly.

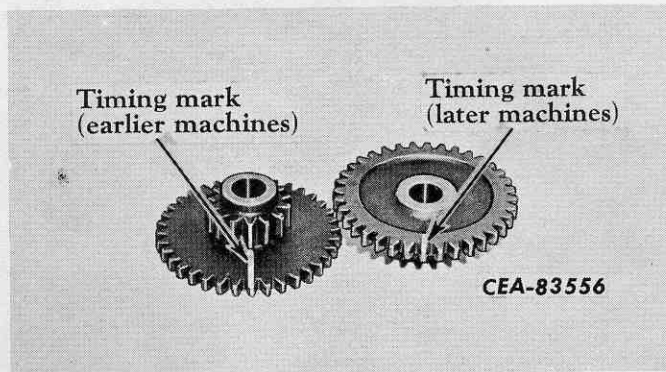
2. Place the "LH" planet gear carrier on the bevel gear carrier (side away from bevel gear) and secure with the three regular cap screws, three dowel bolts and six nut. All bolt heads are to face the bevel gear. Refer to Par. 2, "SPECIFICATIONS" for the proper torque.

NOTE: The "RH" planet gear carrier and bevel gear are secured to the other end of the carrier (2) with six dowel bolts.

Install the six long dowel bolts through the assembly from the tooth side of the bevel gear. The dowel bolts, while alternately making a snug and a free fit in the bolt holes around the bevel gear carrier, are arranged to provide a free and a snug fit in the opposite bolt holes of the planet carrier.

3. The planet gear clusters (13) have a timing mark on one tooth of the large gear (small gear if the clusters on earlier machines) to facilitate proper installation in the carrier. Locate this mark on the large gear and mark the same tooth on the opposite side. On earlier machines, mark a line out to the tooth in the large gear that is in line with the mark on the small gear first (Illust. 30). This is necessary as this is the side that will be visible during assembly.

4. Position the gear cluster with bearings (12) installed on the outer diameter of the planet gear carrier so that the small gear is nearest the bevel gear carrier (2) and the timing mark is aligned with the planet gear shaft pin hole in the carrier (Illust. 31). Place one thrust washer (10) between the gear cluster hub and the carrier on each end of the gear cluster. If

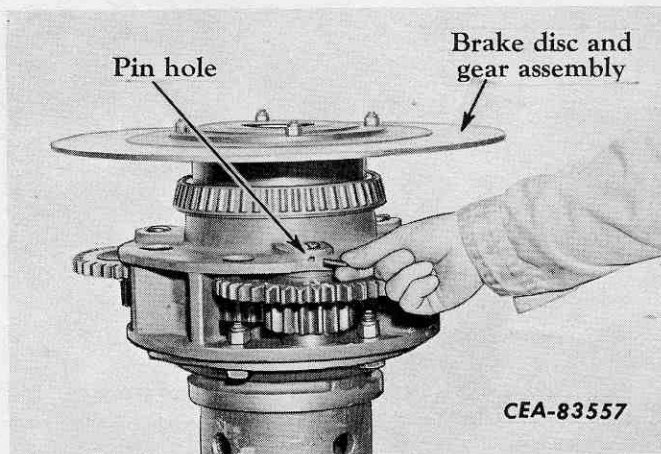


Illust. 30
Planet Gear Cluster Timing Marks.

the bronze and thin steel thrust washers used on earlier machines are being reinstalled, place one of each between the gear cluster hub and the carrier on each end of the gear cluster with the steel washer next to the gear hubs. Position the complete assembly in the carrier.

5. Use a round tool to center the gear and thrust washers with the shaft bore in the carrier before installing the planet gear shaft (9). Tap the shaft into the carrier and gear cluster, aligning the pin holes in the shaft and carrier. If necessary, the slot in the end of the shaft can be used to align the pin holes. Do not install the roll pin (15) at this time.

(Continued on next page)



Illust. 31
Positioning the Planet Gear
Shaft Roll Pin.



STEERING PLANETARY

7. REASSEMBLY - Continued

(Ref. Nos. Refer to Illust. 21)

6. Install the other two planet gear clusters in the same manner described in steps 3, 4 and 5.

NOTE: All the planet gear clusters are installed with the smaller gear toward the bevel gear carrier (2) and the timing mark aligned with planet gear shaft pin hole in the carrier (14).

7. Place the brake disc and gear assembly (Illust. 31) in position. The gear should mesh with the three planet gear clusters without binding. If a bind occurs, recheck the timing procedure by removing and reinstalling the three planet gear clusters.

8. After the correct installation of the planet gear clusters has been obtained, secure each of the planet gear shafts with a new roll pin (15) (Illust. 31). Drive the roll pin into the carrier and shaft until it is flush with the carrier. Remove the brake disc and gear assembly from the carrier.

9. Coat the bushings (16) in the planet gear carrier bore with MPG (MIL-G-10924B).

8. INSTALLATION

1. Attach a sling to the center of the bevel gear carrier (so it can be rotated) and hoist the assembly up. Place the bearing cage (19) (with bearing cup (18) and adjusting nut (20) installed) in position on the bearing cone (17) (installed on the planet carrier hub) at each end of the assembly. (Illust. 21.)

2. Install the brake disc and gear assembly (23) (with the oil collector ring (25) installed) through the planet carrier hub on each end of the assembly meshing the sun gear with the large gear on each of the three planet gear clusters (13) (Illust. 21).

NOTE: Use "C" clamps or vise grip pliers as was done in removal to hold the brake discs inward.

3. Lower the steering planetary unit into the rear main frame with the bevel gear located on the right hand side. Turn the bearing cages to position the dowel pin hole at the top. While lowering the unit, tilt the left end down and forward to engage the bevel gear and pinion teeth. Lower the high end while turning the bevel gear forward to bring both gears into mesh. When the gears are meshed, relieve the hoist strain on the carrier unit to set the lower section of the bearing cages onto the shoulder of the bearing cradles. Do not remove the hoist sling until after the bearing caps are bolted into position. Remove the vise grip pliers or "C" clamps.

4. If bearing cap shims are used, the same thickness of shims that were removed must be installed on the cap surface of the main frame. If a new bearing cap is being installed, perform the following steps:

(a) With the bearing cage in place, put lead pellets on the cap surface of the main frame. Assemble the cap and torque the cap retaining bolts until the cap and top of bearing cage contact each other. Remove the cap and measure the thickness of the lead. Add the thickness of the rear and front lead pellets; then divide by two. The result is the shim pack thickness for each side of the cap.

NOTE: Since the smallest shim is 0.003 inch, select the right number of shims so the resulting fit between the cage and cap will be 0.001 inch tight to 0.004 inch loose.

(b) Press the dowel pin in the middle of the cap so that 0.20 inch of the dowel pin is protruding out of the cap. Press the dowel pins in the ends of the cap so that 0.30 inch of the dowel pin is protruding out of the cap. Peen casting at top of dowel holes for securing the end dowel pins only.

(c) Stamp "LH" or "RH" as required on the cap for future identification.

5. Install the bearing cap over the bearing cage assembly at both planet gear carrier ends aligning the middle dowel pin in the cap with

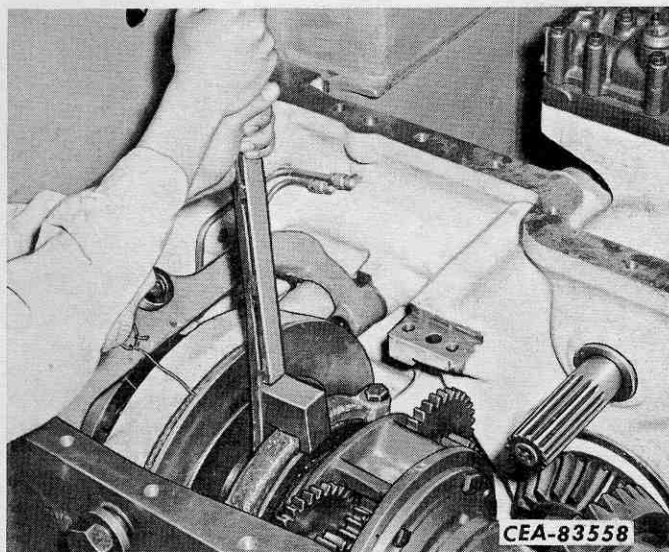


STEERING PLANETARY

the hole in the cage as the bearing cap recess butts against the bearing cage shoulder. The carrier unit can be shifted left or right if necessary, with a slight strain on the hoist, to line up the other dowel pins in the bearing cap with the dowel holes in the ends of the bearing cradle. When the dowel pins match the three holes, tap the bearing cap down, torque the cap bolts from 5 to 10 ft-lbs. and rap the bearing caps while rotating the assembly to be sure the caps seat squarely. Do not apply full torque to the cap bolts at this time. Remove the hoist sling.

6. The steering planetary assembly must be located in the rear frame so there is excessive backlash between the bevel gear and pinion. This is accomplished by loosening the right hand adjusting nut (20, Illust. 21) and tightening the left hand adjusting nut on an equal amount using the special spanner wrench. (Illust. 32.) Rotate the assembly regularly while setting this excessive backlash (approximately three times specified backlash).

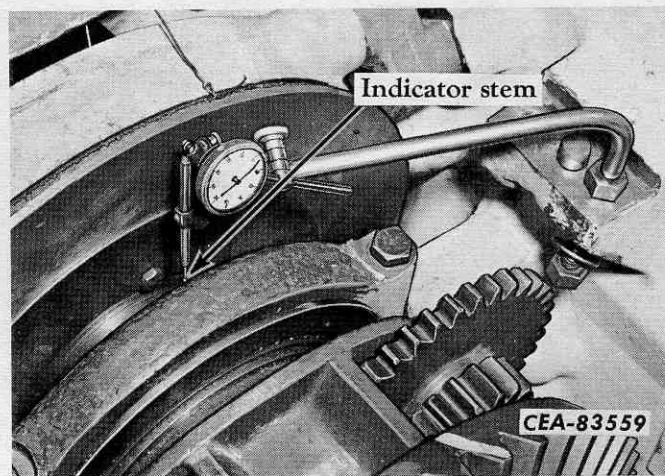
7. Next, tighten the adjusting nut in each bearing cage to a heavy bearing pre-load. Rotate assembly and rap bearing caps to assure that the shoulder on the bearing cage is seated against the bearing cap.



Illust. 32
Tightening the Left Hand Adjusting Nut.

8. Torque the retaining bolts in the cap on the side adjacent to the bevel gear to 90 ft-lbs.

9. Back off on the adjusting nut on the side opposite the bevel gear and pry the assembly to the left side with a pry bar until the bearings rotate freely. Place a dial indicator on any surface of the rear main frame so its stem is against the outer machined face at the top of the bearing cage adjacent to the bevel gear. Set the indicator at zero.



Illust. 33
Dial Indicator Set-up For Obtaining
Bearing Pre-load.

10. Tighten the adjusting nut opposite the bevel gear until the indicator reads 0.002 - 0.003 inch which is the outward deflection of the top of the bearing cage adjacent to the bevel gear. It is important that the assembly is rotated while the nut is tightened to obtain this deflection reading.

11. Tighten the retaining bolts in the bearing cage cap opposite the bevel gear to 90 ft-lbs.

12. Position the dial indicator on any machined surface of the rear main frame so its pointer will rest against the machined surface of the bevel gear carrier (Illust. 34). Rotate the assembly one complete revolution and note the total deflection of the indicator hand from high to low. Maximum permissible run-out is not

(Continued on next page)

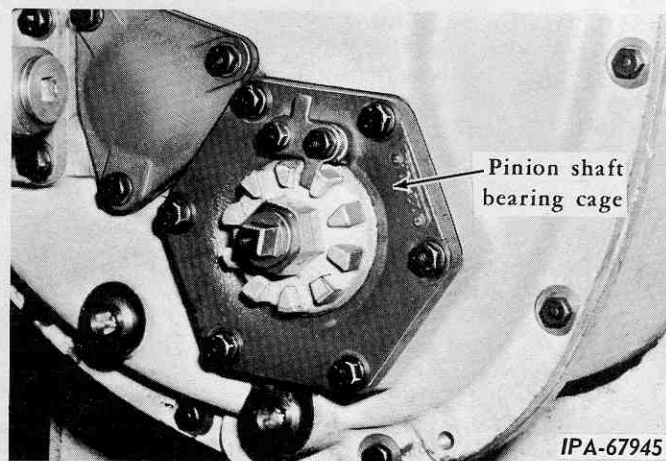


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8. INSTALLATION - Continued

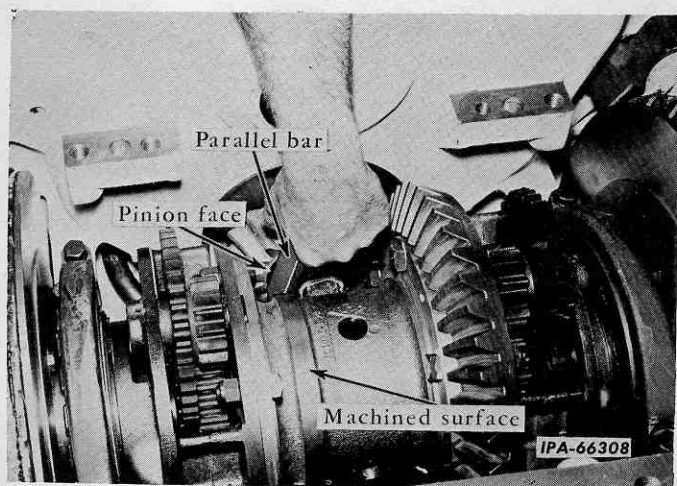
to exceed 0.010 inch total indicator reading. Rotate the assembly further and watch the indicator. When the pointer shows one-half of total deflection, cease rotating and paint-mark this point. It will be the mark used to set up the pinion end clearance.

13. Check the transmission bevel pinion end clearance as follows: Using adjustable parallels or a gauge bar, measure the distance between the machined boss on the end of the pinion and the machined surface of the bevel gear carrier at the paint mark (Illust. 34). This measurement should agree with the end gap figure marked on the end of the pinion.



IPA-67945

Illust. 35
Transmission Front Cover.

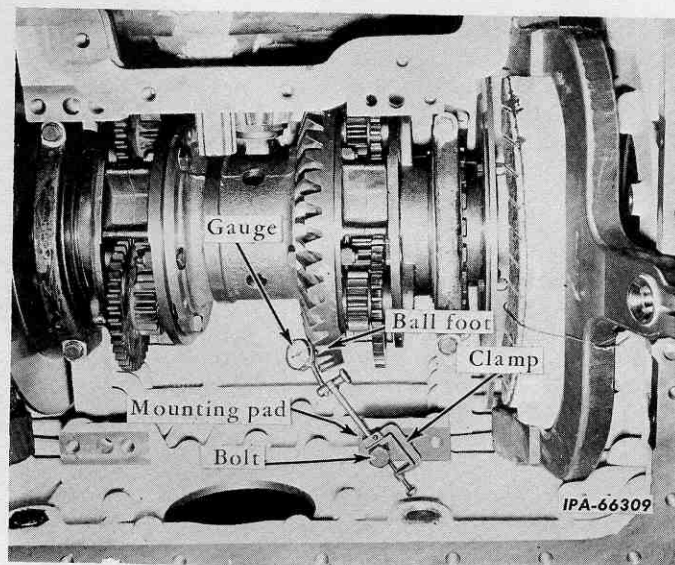


IPA-66308

Illust. 34
Measuring Pinion End Clearance.

If the setting does not agree, the pinion must be moved in or out as required. To adjust the pinion, remove the cap screws and washers securing the pinion shaft bearing cage to the transmission front cover (Illust. 35). Add shims between the bearing cage flange and transmission cover to move the pinion away from the bevel gear carrier or remove shims from the bearing cage to move the pinion toward the carrier. When the correct end clearance is reached, secure the bearing cage to the front cover. Be sure the bearing cage is tight when making the final check.

14. Check the backlash between the bevel gear and pinion with the dial indicator (Illust. 36) as follows. Position the dial indicator on the right rear mounting pad and adjust the arm so the indicator pointer will rest on one of the bevel gear teeth. Turn the bevel gear toward the rear to the limit of its movement. Set the indicator pointer to touch the top surface of the tooth and set the indicator at zero.



IPA-66309

Illust. 36
Checking Bevel Gear Backlash.



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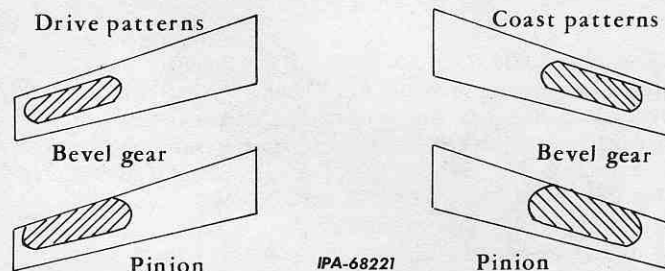
Insert a pry bar behind the transmission pinion to hold the pinion positively locked and move the bevel gear forward within the limits of its free play. Note the indicator reading. Repeat this check at four equidistant points on the bevel gear and adjust for the minimum backlash at the tightest point. The dial indicator deflection average should agree with the backlash figure marked on the bevel gear rim. (A 0.002 inch plus or minus tolerance of the required backlash dimension marked on the rim of the bevel gear is acceptable as a final backlash setting.)

Adjust the bevel gear for the proper backlash by loosening the bearing cap retaining bolts and moving the planetary assembly left to decrease and right to increase the backlash. Loosen one adjusting nut, (20, Illust. 21) and tighten the opposite adjusting nut, one notch at a time, to move the bevel gear in the direction required. Both nuts must be moved equal amounts to maintain the 0.002 - 0.003 inch bearing setting obtained previously. Rotate the assembly and rap the bearing caps while tightening the adjusting nut. With each adjustment, rotate the bevel gear several times; then check the backlash obtained by moving the bevel within its free limit as described previously. When the proper backlash is obtained, torque the bearing cage cap bolts to 90 ft-lbs. and install and secure the nut locks (21, Illust. 21).

NOTE: Should the holes for the nut locks fail to coincide, always tighten the adjusting nuts to fit the nut locks, never loosen them.

15. The proper backlash, pinion end clearance and bearing settings should now be correctly set. To check this, coat both sides of the transmission pinion teeth with red lead or prussian blue. Turn the pinion by hand in the normal direction of rotation. Compare the tooth contact with the drive patterns shown in Illust. 37.

Next, rotate the steering planetary by hand so the pinion and bevel gear rotate in the same direction as when checking the drive pattern. Compare the tooth contact on the reverse sides of the teeth with the coast patterns shown in Illust. 37.



Illust. 37
Preferred No Load Tooth Bearing.

16. If the tooth patterns obtained are not similar to those shown in Illust. 37, recheck the settings. When satisfactory adjustments are obtained, check to be sure the adjusting nut locks (21, Illust. 21) are installed and secure.

17. If removed, install the brake forks into the rear main frame with the brake shoes linings and adjusting screws facing inward (Illust. 2). Support the brake fork to align the mounting holes with the openings in the rear frame until the fork pins are installed. Position the front fork pin in the rear frame counterbore. Insert the puller screw through the rear pin opening in the frame and thread it into the front pin until it bottoms. Using a hydraulic ram as shown in Illust. 38, pull the front pin into the frame until the snap ring groove appears and install the snap ring. Install and secure the opposite pin in the same manner. Install the rear pins in the frame as shown in Illust. 38 until the snap ring groove appears and install the snap rings.

NOTE: On machines where it may have been necessary to remove the transmission, install the front fork pins until the snap rings can be installed in their grooves in the rear main frame. Install the transmission.

18. Install the pivot brakes and sprocket drive pinion shaft through both sides of the tractor. Refer to "INSTALLATION" under "PIVOT BRAKES" in this section.

(Continued on page 31)



STEERING PLANETARY

8. INSTALLATION - Continued

TD-15 (SERIES B) ONLY: If only the sprocket drive pinion shaft was removed and the pivot brakes and sprocket drive carrier remained attached to the rear frame, refer to section 9, "SPROCKET AND SPROCKET DRIVE" under "SPROCKET DRIVE PINION" for installing the sprocket drive components. Install the pinion shaft using a back and forth motion, keeping some inward pressure to allow the pivot brake discs to pick up the shaft splines.

19. Remove the wire securing the brake shoes (28) to the brake forks (23) (Illust. 28).

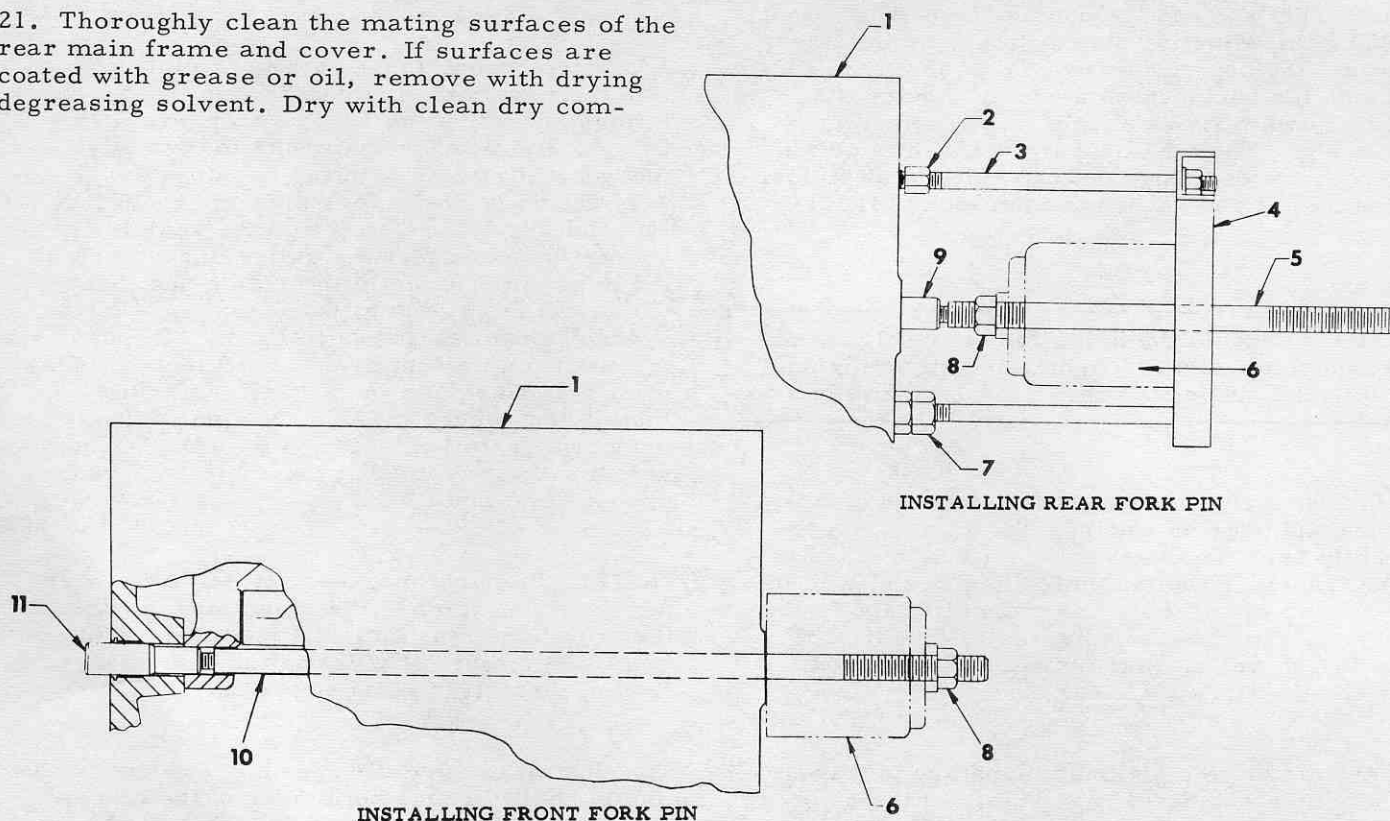
20. Install the brake stationary back-up shoes fitting the dowel pins into each mounting pad dowel hole. Use the mounting cap screws to draw the shoes down evenly onto the pads and tighten all eight cap screws to anchor the shoes to the pads.

21. Thoroughly clean the mating surfaces of the rear main frame and cover. If surfaces are coated with grease or oil, remove with drying degreasing solvent. Dry with clean dry com-

pressed air or lint free wiper. Spread an even coat of "LOCTITE" plastic gasket on one of the mating surfaces.

22. Hook a wire around each of the pivot brake cable yokes (3, Illust. 15) and when the rear main frame cover is in position, thread the wire through the cable opening in the cover. Remove the inspection cover (Illust. 39) on the left hand side of the cover. This opening will be used to thread the brake cable and also for seating the cable later in installation. On later units, the LH and RH inspection covers are located farther back on the rear main frame cover.

23. Attach a hoist to the eyebolts in the main frame cover that were used for removal. Be sure the set screw in the front, RH side of the cover is backed out sufficiently to prevent interference. Move the brake forks outward in an upright position to provide clearance for the push rods and spring retainers in the cover.



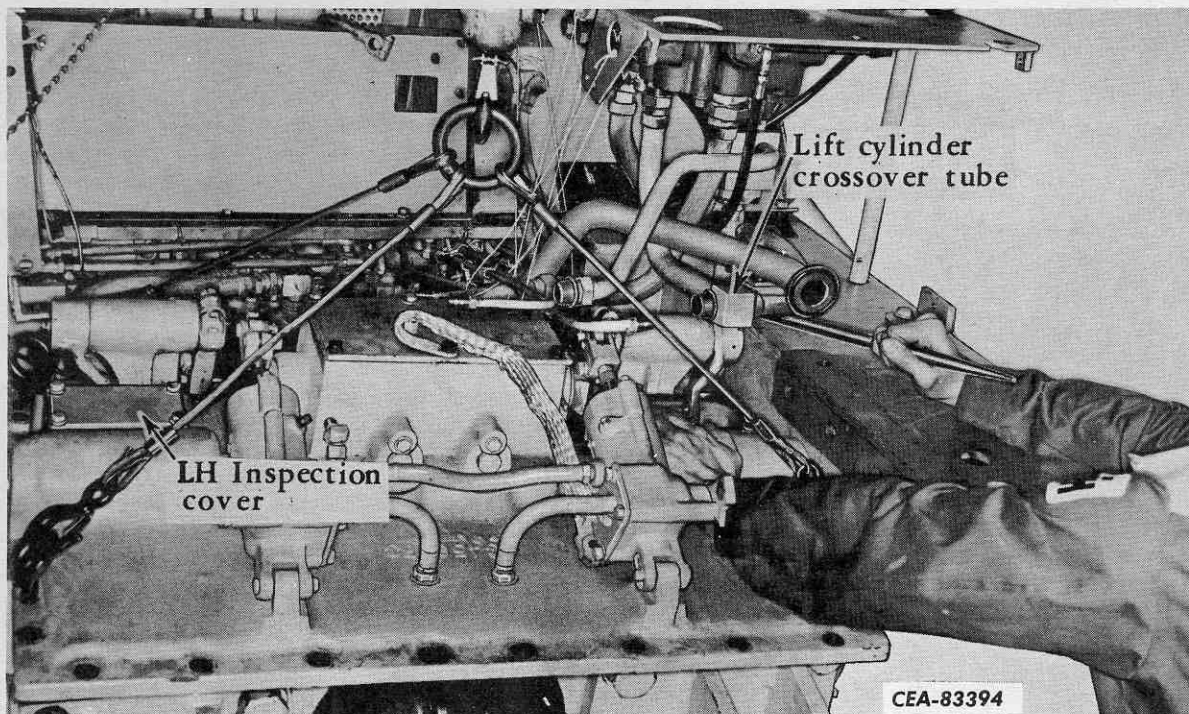
Illust. 38
Installing Brake Fork Pins.

- | | | | |
|------------------------|-------------------|-----------------------|---------------------|
| 1. Main frame. | 4. Support bar. | 7. Adapter (OTC-932). | 10. Puller screw. |
| 2. Adapter (OTC M-20). | 5. Puller screw. | 8. Nut. | 11. Front fork pin. |
| 3. Leg (OTC 930 D). | 6. Hydraulic ram. | 9. Rear fork pin. | |

IPA-78393



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Illust. 39
Installing the Rear Main Frame Cover.

Lower the cover into position over the rear frame being careful the steering lever pull rods (5, Illust. 15) do not bind and the brake forks do not hang up on the push rods or spring retainers. On loader machines, it will also be necessary to pry the lift cylinder crossover tube up to allow the cover to clear the top of the RH brake fork (Illust. 39). Continue to lower the cover to match the dowel pins and holes. Use a soft faced hammer to start the dowel pins, then seat the cover by tightening the mounting cap screws evenly. Remove the hoist and eyebolts. Install the three set screws in the cover.

24. Remove the compression bolt and washer holding the brake spring compressed on each side of the cover. As the compression bolt is being removed, reach in through the rear power take-off opening in the rear of the rear main frame and check that the push rod (21) enters the adjusting screw (22) as the brake spring moves the fork in that direction. (Illust. 28.) Also move the push rod back and

forth as the adjusting screw contacts the rod. With the compression bolt removed there should be some movement of rod.

25. MODEL 175 LOADER ONLY: Secure the lift cylinder crossover tube (Illust. 39) to the right hand fender with the bracket, cap screws and lockwashers. Secure the other end of the crossover tube to the valve. Install and secure the vertical circuit relief valve to the control valve.

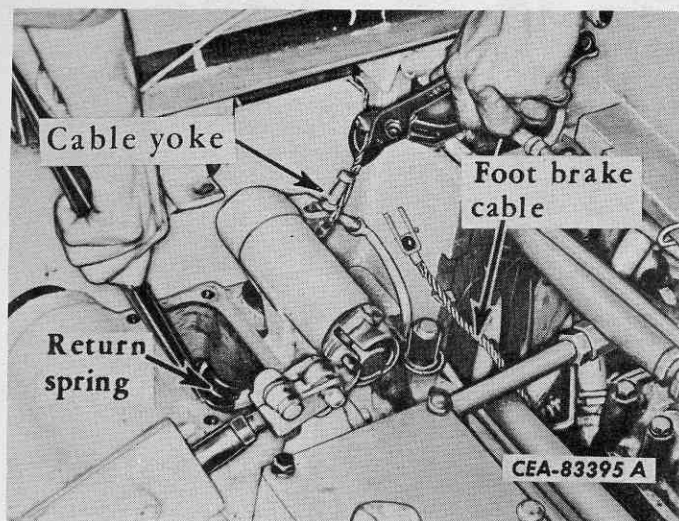
26. Install the pivot brake actuating cable to both sides of the rear main frame cover. Insert a heel bar through the inspection cover opening under the brake return spring retainer to align the spring with the cable opening in the cover. Grab the wire (secured to the cable yoke previously) with a pair of pliers, and in one motion, pry up with the heel bar and pull on the wire to seat the cable in the cover (Illust. 40). Remove the wire from the cable yoke. Do not secure yoke to bellcrank.

(Continued on next page)



STEERING PLANETARY

8. INSTALLATION - Continued



Illust. 40
Installing the Pivot Brake Actuating Cable.

Install the rubber boot (Illust. 15) using a pair of pliers. First maneuver the boot down over the cable yoke until the top of the boot can be inserted in the groove around the bottom of the yoke. Then pull the boot all around the flange protruding from the rear main frame cover.

27. Install and secure the foot brake cable (Illust. 40) and pulleys.

A. MOVABLE PULLEY SIDE (Illust. 14): Position the support (3) on the stud (2). Wrap the cable around the pulley (5) and place the pulley, support and cable assembly inside the yoke of the pull rod (1). Move the complete assembly to the front of the tractor until clearance is obtained to insert the pulley shaft (4) from the underside of the yoke. Be sure the snap ring is installed in the groove in the bottom of the pulley shaft and push the shaft up through the complete assembly. Install the upper snap ring in the pulley shaft to secure the assembly. Secure the support (3) to its stud with the snap ring. Secure the cable to the bellcrank with the end pin and cotter so the head of the pin is toward the outside of the tractor.

B. IDLER PULLEY SIDE: Place the pulley on the stud protruding from the cover and

secure the pulley to the stud with the spacer and snap ring. Wrap the cable around the pulley and secure the cable to the bellcrank with the end pin and cotter. The head of the pin must face the outside of the tractor.

28. Secure the pivot brake cable to the bellcrank on each side of the cover with the end pin and cotter.

29. Connect the vent tube (7) or (11) to the rear main frame cover. Secure the fuel tube clamp (8) or (12) to the cover with the cap screw and lock washer. On loader machines, install the clamp (4) or (10) (Illust. 13 or 13A).

30. Install a new power take-off gasket and the power take-off cover to the rear of the rear main frame.

31. Apply Permatex No. 3 to the inspection cover side of the cover gaskets and install the new gaskets and inspection covers on the rear main frame cover.

32. Secure the brake pull rods (long) (5) to the outer levers (6) with the end pin and cotter. If necessary, pull back on the steering levers and depress the brake pedal to position the bracket (4) on the pull rod behind the pick-up lever (7) and horizontal with the rear main frame cover (Illust. 15).

33. Insert the steering booster operating rod (4, Illust. 13) or (2, Illust. 13A) through the opening below the fuel tank at the rear of the machine. Connect the rod to the pin at the bottom of the steering lever and secure with the cotter. Connect the other end of the operating rod to the lever in the steering booster with the end pin and cotter. Install the other booster operating rod in the same manner.

34. Connect the pressure filter-to-booster inlet hose (9) at the tee connection (1) or (3). Secure the hose clamp (7) or (10) to the inspection cover with the cap screw and lock washer (Illust. 13 or 13A).

35. UNITS WITH EXTERNAL PIPING: Connect the sprocket drive rear vent tubes (2) at the front tube connection (5) on each side of the cover. Secure the vent tube clamp to the frame on each side of the machine with the cap screw and lock washer. Secure each of the clamps (1) to the inspection cover with the cap screw and lock washer. (Illust. 13.)

UNITS WITH INTERNAL PIPING: Install and secure the oil tube (5, Illust. 13A) to the rear main frame cover and to the transmission main pressure regulating valve.



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36. Connect the booster springs (6, Illust. 13) or (3, Illust. 13A) to the hooks on the seat platform support bar. Do not connect the other end of the springs to the outer levers at this time. Connection of the springs will be performed when adjusting the brakes.
37. Position the RH seat side sheet and secure to the seat front support and the control valve top and front covers with the cap screws, lockwashers, flat washers and nuts.
38. MODEL 175 LOADER ONLY: Secure the crossover tube (2) to the lift cylinder hose (3) (head end) with the clamp halves. Be sure the sealing ring in the hose is in place and in good condition. Secure the bracket (4) to the frame with the cap screws, lockwashers, flat washers and nuts (Illust. 12).
39. MODEL 175 LOADER ONLY: Position the lift cylinder crossover tube in the bracket (4) and secure to the cylinder hose (1) (rod end) with the clamp halves. Be sure the sealing ring in the hose is in place and in good condition. Secure the crossover tube to the bracket (4) with the two cap screws, lockwashers, flat washers and nuts (Illust. 12). Secure the other end of the two crossover tubes at the connections (1 and 2, Illust. 11).
40. Connect the scarifier front oil tubes (if equipped) at the hydraulic control valve (Illust. 11).
41. Attach a hoist to the fuel tank and hydraulic oil tank as was done in removal and install the assembly on the fenders of the rear frame. The assembly must be kept as level as possible to fit the mounting brackets of the tank support between the fenders. Secure the tank support to the rear frame with the cap screws, flat washers and nuts (Illust. 10).
- Remove the hoist and cables. Install the two mounting cap screws in the top cover on the hydraulic oil tank.
42. Secure the rear light and clamps to the mounting bracket on the fuel tank with the lockwasher and nuts. Thread the electrical wire through the spring clips and connect to the rear light.
43. Secure the seat side sheets to the front of the fuel tank with the cap screws, lockwashers and flat washers.
44. Position the vent tube (4) through the openings in the fender and control valve top cover (1) and connect the tube to the valve on the hydraulic oil tank. Secure the tube clamp (6) to the oil tank bracket with the cap screw, lockwasher and nut. Secure the control valve top cover (1) to the oil tank bracket with the two cap screws, lockwashers, flat washers and nuts (Illust. 9).
45. Be sure the sealing ring in the equipment pump inlet tube (2) is in place and in good condition. Secure the tube to the hydraulic oil tank with the clamp halves. Position the control valve return tube (3) and secure to the control valve and hydraulic oil tank (Illust. 9).
46. Connect the rear main frame and the sprocket drive vent tubes. Position the tubes in the spring clips on the front of the fuel tank (Illust. 8 or 8A).
47. Connect the fuel tank outlet tube (4) and return tube (5) at the bottom of the fuel tank (Illust. 11).
48. Position the brake pedal operating lever in the opening of the seat front support and engage the lever with the brake pedal pawl. Place the two lever guides and flat washers between the seat side sheet and operating lever and working through the valve side cover opening, secure the guides to the seat side sheet with the lockwashers and nuts.
49. UNITS EQUIPPED WITH SCARIFIER: Place the rear cover (5) in position and secure loosely with a mounting bolt on each side of the rear frame. Connect the hoses (3) to the front tubing. Then remove the mounting bolts and allow the cover (5) to lay down over the hoses (3) (Illust. 5). Final installation of the rear cover and securing of the oil tubing clamp (2, Illust. 5) to the rear cover will be done in adjusting of the brakes.
50. Installation of the rear cover (5, Illust. 5), control valve side cover, platforms, battery brackets, batteries and seat frame will be performed when adjusting the brakes and in the sequence outlined.
51. Open the fuel shut-off valve (1, Illust. 5) and check line connections up to the fuel filters for leakage.

(Continued on next page)



STEERING PLANETARY

8. INSTALLATION - Continued

52. Be sure the drain plug in the underside of the rear main frame is installed and tight. Fill the rear main frame with the lubricant and to the level described in the operator's manual. Install the oil level dip stick.

53. Fill the hydraulic oil tank to the oil level mark with the lubricant described in the pertinent operator's or instruction manual.


54. Perform the major adjustment as described in Par. 9, "STEERING PLANETARY BRAKE AND PIVOT BRAKE ADJUSTMENTS." Be sure to follow the caution described at the beginning of Par. 9.

55. Install the track chain (refer to section 10, "TRACKS AND TRACK FRAME" for installation). Install the sprocket cock shield (if equipped).

56. Operate the unit and vent the equipment hydraulic system as described in the pertinent operator's or instruction manual. Refill system as necessary. Recheck the level in the rear main frame and add lubricant as necessary. Check for proper functioning of the brakes in actual operation.

9. STEERING PLANETARY BRAKE AND PIVOT BRAKE ADJUSTMENTS

(Ref. Nos. Refer to Illust. 42)

 **CAUTION:** The following adjustments must be performed with the engine stopped unless otherwise stated. **POWER SHIFT ONLY:** Whenever it is necessary to have the engine running, be sure the transmission gear selector lever is locked in the neutral position with the safety lever and that the hi-lo shift lever is in neutral.

NOTE: Before performing adjustments, remove all dirt accumulation from the main frame cover. Excessive dirt pack-up could cause binding of external brake linkage.

Adjust the pivot brakes when the steering levers can be pulled against the seat with the engine running or when the brake pedal bottoms. Refer to "Pivot Brake Adjustment."

Adjust the steering planetary brakes when they slip or the tractor creeps to one side. Refer to "Steering Planetary Brake Adjustment."

Adjust the steering lever linkage when the levers are hard to pull or they stick in the disengaged position. Refer to "Steering Lever Linkage Adjustment."

The preceding adjustments compensate for normal wear only. If brake linkage has been disconnected or removed, the procedure under "Planetary Brake and Pivot Brake Major Adjustment" must be followed.

NOTE: After adjustment of the brakes have been performed, the unit must be checked out in actual operation for proper functioning.

Pivot Brake Adjustment

1. Loosen the lock nut (8) and turn the adjusting screw (9) until the hand lever can be pulled to dimension "E" (following table) (measure from the top edge of the front seat support) without bowing the lever. Tighten the lock nut (8).

NOTE: The lock nut (8) and adjusting screw (9) can be reached from the side of the unit. When adjusting the right hand side of the unit, it will be necessary to remove the hydraulic control valve cover to gain access to the adjusting screw.

See Illust. 42	L-175P, TD-15BP, TD-15BG, TD-15BGA Below 8230	L-175BP, L-175P, TD-15BP, TD-15BG, TD-15BGA 8230 and Up
E	1-3/4 inches	2-1/4 inches
F	1-1/4 to 1-1/2 inches	1-3/4 to 2 inches



STEERING PLANETARY

2. Start and run the engine at low idle.

3. Pull back on steering levers. The adjusted lever travel "E" (obtained in step 1) should reduce to dimension shown as "F" in table following step 1. If necessary, adjust screw (9) until dimension "F" is obtained with the engine running. Tighten the lock nut (8). Stop the engine.

4. Depress the foot pedal and check for free travel (8-3/4 to 9-1/4 inches). If the proper free travel is not obtained, it may be due to binding of linkage or the adjustment procedure was not performed correctly.

NOTE: If the proper foot pedal free travel was not obtained, recheck adjustments performed in steps 1 through 3. Then check the pedal linkage only if the free travel is still incorrect.

5. Checking pedal linkage. With the foot pedal back against its stop, check that the bellcrank (C) is against the stop (D) or (G) or can be pushed against the stop. If the bellcrank will not rest against the stop, proceed as follows:

(a) Remove the quick disconnect platform and the right hand platform.

(b) Remove the cotter and rod end pin (12). Push the bellcrank against the stop (D) or (G).

(c) Loosen the lock nut (14) and turn the clevis (13) as required to reconnect it to the foot pedal without disturbing the position of the pedal or bellcrank (C).

(d) Secure the clevis to the pedal with the end pin and cotter.

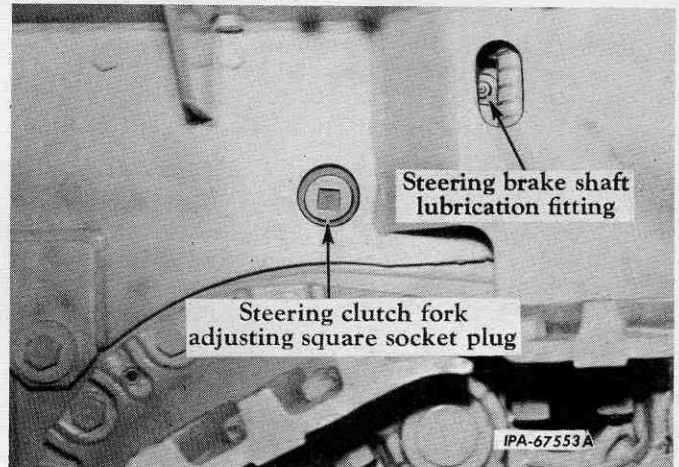
(e) Install the platforms.

6. Install the hydraulic control valve side cover on the right hand side of the unit.

Steering Planetary Brake Adjustment
(Units without Rear Mounted Equipment)

1. Insert a bar through one of the openings in the apron type cover located below the fuel tank at the rear of the main frame and pry against the booster clevis (25) to assure that the booster piston is fully extended. This must be done with the planetary brakes engaged (hand levers in forward position).

2. Remove the P.T.O. cover from the rear of the main frame. Remove the 1-1/2 inch square socket pipe plug from the main frame cover to gain access to the brake adjusting screw. Access to this plug is provided in the front frame as shown in Illust. 41.



Illust. 41
Steering Planetary Brake Adjusting Screw Plug.
(TD-15 SERIES B shown, Model 175
Loader Similar.)

3. Reach in through the P.T.O. cover opening and check for movement of the brake fork push rod (21, Illust. 28). If movement exists, insert a 1/2 inch drive extension through the access hole in the side of the main frame cover and turn the adjusting screw (21) clockwise until the push rod becomes snug. Then turn the adjusting screw counterclockwise 1/2 turn. This should provide approximately a 1/32 inch end play on the push rod. If the brake fork push rod was tight, turn the adjusting screw (21) counterclockwise until the rod is loose. Then turn the adjusting screw clockwise until the rod becomes snug; back off 1/2 turn to obtain the 1/32 inch end play.

4. Repeat adjustment procedure on the other side of the unit.

5. Install the pipe plugs (Illust. 41). Install the P.T.O. cover using a new gasket.

(Continued on next page)



STEERING PLANETARY

9. STEERING PLANETARY BRAKE AND PIVOT BRAKE ADJUSTMENTS - Continued

(Ref. Nos. Refer to Illust. 42)

Steering Planetary Brake Adjustment (Units with Rear Mounted Equipment)

NOTE: If the rear power take-off cover can be removed, follow the preceding adjustment procedure under "Units without Rear Mounted Equipment." It is the preferred method of adjustment and must be used whenever practical.

NOTE: Before this adjustment procedure can be performed, it is very important that the engine speeds be checked to be sure it is in proper adjustment. (Refer to "ENGINE IDLE ADJUSTMENTS" in section 4, "ENGINE.")

1. Insert a bar through one of the openings in the apron type cover located below the fuel tank at the rear of the main frame and pry against the booster clevis (25) to assure that the booster piston is fully extended. This must be done with the planetary breaker engaged (hand levers in forward position).

2. Apply the foot brake pedal and lock.

3. POWER SHIFT UNITS ONLY: Remove the quick disconnect platform so the "U" joint can be seen.

4. Remove the 1-1/2 inch square socket pipe plug (Illust. 41) from the main frame cover to gain access to the brake adjusting screw (21) on the side of the unit to be adjusted.

◆ CAUTION: USE AN EXTENSION LONG ENOUGH TO AVOID ANY CONTACT WITH THE TRACK WHEN MAKING THE FOLLOWING ADJUSTMENTS.

5. Insert a 1/2 inch drive extension into the adjusting screw (21). MANUAL SHIFT ONLY: Turn the screw clockwise three turns.

6. Start the engine. Move the engine speed control lever up to the third notch above low idle (approximately 1050 rpm).

7. Pull back the steering lever (on the side not being adjusted) to full pivot position. Leave the hand lever on the side being adjusted in the engaged position (forward).

8. Place the transmission in gear and adjust the brake as follows:

POWER SHIFT: Move the gear selector lever to "FORWARD 2" and the "HI-LO" lever to "HI." Turn the drive extension (previously installed) clockwise until the "U" joint starts to rotate. Then slowly turn the extension counterclockwise until the "U" joint stops; continue to turn counterclockwise for an additional 1-1/2 turns.

MANUAL SHIFT: Disengage the clutch and move the gear selector lever to 2nd speed and the forward and reverse lever to FORWARD (F). Slowly engage the clutch. If the engine lugs down, disengage the clutch and turn the extension (previously installed) clockwise another 1/2 turn. Repeat this operation, until the engine does not lug down with the clutch engaged. Slowly turn the extension counterclockwise until the engine starts to lug down. Then continue to turn the extension counterclockwise an additional four turns.

9. Remove the drive extension and install the pipe plug (Illust. 41).

10. Place the transmission in neutral and stop the engine. POWER SHIFT UNITS ONLY: Lock the selector lever in neutral with the safety lever.

11. Repeat adjustment procedure on the other side of the unit.

12. POWER SHIFT UNITS ONLY: Install the quick disconnect platform.

Steering Lever Linkage Adjustment

◆ CAUTION: LOCK THE GEAR SELECTOR LEVER IN "NEUTRAL" AND PLACE THE "HI-LO" LEVER IN NEUTRAL (N) BEFORE PERFORMING THE FOLLOWING STEPS.

1. Start the engine and operate at low idle.

2. Pull back on the steering hand levers. If the hand lever pull is hard or a short catch is felt, disconnect the operating rod (4) at the booster and shorten the rod by turning the clevis (22) one turn at a time until lever travel is smooth. If the hand lever hangs up when released, lengthen the rod (4) until it returns freely. When the adjustment is completed and the rod (4) is connected and secured, the booster timing marks (Insert B, Illust. 42) will not necessarily be aligned.

3. Stop the engine.

(Continued on page 38)



STEERING SYSTEM

Section 8

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STEERING PLANETARY

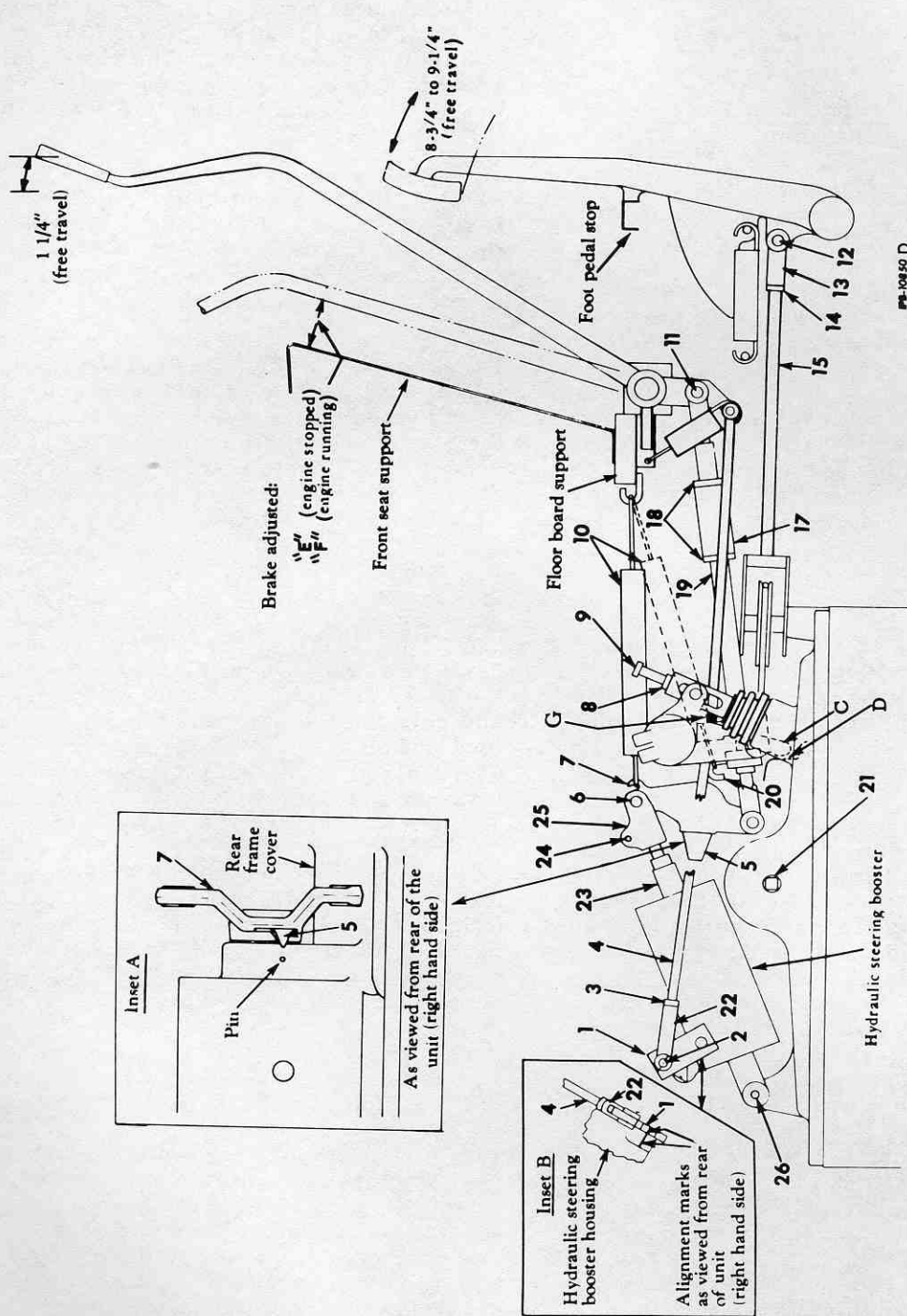


FIG. 100 50 D

Illust. 42

Pivot Brake and Steering Planetary Brake Adjustment.

- | | | | | |
|--|-------------------------------------|---|---|------------------------------|
| 1. Hydraulic steering
booster valve
operating lever. | 5. Pointer. | 11. Release rod end pin. | 17. Turnbuckle. | 22. Clevis. |
| 2. Rod end pin. | 6. Hydraulic booster
clevis pin. | 12. Rod end pin. | 18. Lock nut. | 23. Booster piston. |
| 3. Lock nut. | 7. Bellcrank. | 13. Brake pulley pull
rod yoke clevis. | 19. Release rod. | 24. Lock screw. |
| 4. Steering booster
valve operating rod. | 8. Lock nut. | 14. Lock nut. | 20. Hook. | 25. Booster clevis. |
| | 9. Adjusting screw. | 15. Brake pulley pull
rod yoke. | 21. Steering planetary
brake adjusting
screw. | 26. Booster mounting
pin. |
| | 10. Spring. | | | |



STEERING PLANETARY

9. STEERING PLANETARY BRAKE AND PIVOT BRAKE ADJUSTMENTS - Continued

(Ref. Nos. Refer to Illust. 42)

Planetary Brake and Pivot Brake Major Adjustment

NOTE: The following adjustment is for the right side of the unit. Adjustment is the same for the left side.

1. Remove the bottom seat cushion. Remove the cap screws and washers securing the seat frame to the seat side sheets. Remove the seat frame.

2. Disconnect battery cables. Remove the battery support top bracket. Mark batteries to assure installation in the same location and remove the batteries. Remove the battery bottom bracket.

3. Remove the quick disconnect platform and the right hand platform.

4. Remove the hydraulic control valve side cover (on RH fender). Remove the rear cover (5, Illust. 5). If equipped with a scarifier, the tube clamp (2, Illust. 5) must first be disconnected and then the rear cover positioned over the hydraulic hoses.

5. Remove the cotter and end pin (11) but leave the release rod (19) connected to the bellcrank (7). Remove the cotter and end pin (6) securing the booster to the bellcrank. Temporarily disconnect booster spring (10) from bellcrank and attach it to the hook on the release rod (19).

6. Remove the 1-1/2 inch square socket pipe plug from the right hand side of the main frame cover to gain access to the brake shoe adjusting screw (21). Access to the plug is provided in the front frame below the fender (Illust. 41).

7. Insert a 1/2 inch drive extension in the end of the adjusting screw (21) and turn the screw until the pointer (5) on the bellcrank (7) is aligned with the pin on the rear frame cover (refer to Insert A, Illust. 42). Be sure release rod (19) is free to move and not binding at the front end as this adjustment is being performed. Install the 1-1/2 inch pipe plug.

8. Pull the booster piston (23) out until it is fully extended. Measure the distance from the center of the booster mounting pin (26) to the

center of the mounting pin opening in the clevis (25). This distance must be 13-1/2 inches. If adjustment is necessary, loosen the clevis lock screw (24) and turn the clevis (25) until this distance is obtained with the piston fully extended. Tighten the lock screw (24). Secure the booster to the bellcrank (7) with the end pin (6) and cotter.

9. Position the front of the release rod (19) so it will not bind and reconnect the spring (10) to the upper end of the bellcrank (7). The pointer (5) will now move up from the pin on the rear frame cover (refer to Insert "A," Illust. 42).

10. Loosen the lock nuts (18) and turn the turnbuckle (17) until the pin (11) enters the rod and hand lever hub freely. Secure the pin (11) with the cotter. Continue adjusting the turnbuckle until 1-1/4 inches of free travel is measured at the top of the hand lever as shown in Illust. 42. Tighten the lock nuts (18).

11. Check to be sure that the alignment mark on the lever (1) is aligned with the alignment mark on the booster housing (refer to Insert "B," Illust. 42). If the marks are not aligned, disconnect the clevis (22) at the lever. Move the lever (1) until the alignment marks coincide and hold the lever in this position. Loosen the lock nut on the clevis (22) and turn the clevis as required to line up the mounting holes in the lever and clevis. Secure with the end pin (2) and cotter. Tighten the lock nut (3).

12. Loosen the lock nut (8) and turn the adjusting screw (9) until the hand lever can be pulled to dimension "E" (measured from the top edge of the front seat support) without bowing the lever. Tighten the lock nut (8). (Refer to table under "Pivot Brake Adjustment" for dimension "E.")

13. Repeat steps 5 through 12 for adjustment on the left side of unit.

14. Secure the battery bottom bracket to the seat support bar with the two cap screws, flat washers and lock washers. Secure the rear of the bracket to the seat side sheets with the two cap screws, lock washers and nuts. The rear mounting cap screw on the LH side also holds a clip for the rear light cable.

15. Install the batteries in their original location using the markings made in removal. Install and secure the battery support top bracket. Connect the battery cables.



STEERING PLANETARY

16. Secure the seat frame to the seat side sheets with the four cap screws and lock washers. Install the seat bottom cushion.

17. Start and run the engine at low idle. Pull back on the steering levers. The adjusted lever travel "E" (obtained in step 12) should reduce to dimension shown as "F" in the table under "Pivot Brake Adjustment." If necessary, adjust screw (9) until dimension "F" is obtained with the engine running. Tighten lock nut (8). Stop the engine.

18. Depress the foot pedal and check for free travel (8-3/4 to 9-1/4 inches). If the proper free travel is not obtained, it may be due to binding of linkage or the adjustment procedure was not performed correctly. Recheck adjustment procedure. If pedal free travel is still incorrect, check pedal linkage as described in the following step.

19. Checking pedal linkage. With the foot pedal back against its stop, check that the bellcrank (C) is against the stop (D) or (G) or can be pushed against the stop. If the bellcrank will not rest against the stop, proceed as follows:

(a) Remove the cotter and rod end pin (12). Push the bellcrank against the stop (D) or (G).

(b) Loosen the lock nut (14) and turn the clevis (13) as required to reconnect it to the foot pedal without disturbing the position of the pedal or bellcrank (C).

(c) Secure the clevis to the pedal with the end pin and cotter.

20. Check the movement of the steering levers as described under "Steering Lever Linkage Adjustment."

21. Secure the rear cover (5, Illust. 5) to the rear frame and full tank support with the cap screws, lock washers and nuts. If equipped with a scarifier, secure the hydraulic oil tube clamp (2, Illust. 5) to the rear cover with the cap screw, lock washer and nut. Install the hydraulic control valve side cover on the right hand side of the unit.

22. Install the quick disconnect platform and the right hand platform.

PIVOT BRAKES

10. REMOVAL

NOTE: Remove all dirt accumulation from the main frame cover. Excessive dirt pack-up could cause binding of external brake linkage and result in premature brake failure.

The pivot brake assemblies on both sides of the tractor are the same; therefore, all parts are interchangeable. The removal, disassembly, inspection, repair and reassembly procedures are also the same for both sides.

1. Remove the sprocket rock shield (if equipped). Disconnect the track chain and clear it from the sprocket. It is not necessary to remove the track chain from under the track frame.

2. Drain the rear main frame by removing the plug in the underside of the frame.

3. To facilitate removal and installation of the pivot brake actuating cable (3, Illust. 15), the seat frame, batteries and battery support brackets must be removed. When disconnecting the pivot brake cable on the right hand

side of the unit, the brake pawl operating lever and guides (Illust. 7) must be removed and the seat side sheet moved out of the way. (Refer to Par. 4, "REMOVAL" under "STEERING PLANETARY" for the removal procedure of these components.)

4. Remove the cotter and end pin securing the pivot brake actuating cable (3) to the bellcrank (1). Using a pair of pliers or other suitable tool, pull the rubber boot from the cable. Push the cable (3) down into the rear frame cover (Illust. 15).

5. Remove the inspection cover located behind the pivot brake actuating cable. It will be necessary to work through this opening to feed the cable into the rear frame cover upon installation. If working on the right hand side of earlier units with the rear frame oil level dipstick mounted in the inspection cover, the dipstick will first have to be removed.

NOTE: A pry bar or large screwdriver can also be used through this opening to aid in pushing the cable into the rear frame if it cannot be done by hand.

(Continued on next page)



PIVOT BRAKES

10. REMOVAL - Continued

6. MODEL 175 LOADER ONLY: Remove the track frame coupling link. Remove the cap screws, washers and link pin locks securing the link pins to the coupling at the track frame and at the bottom of the sprocket drive carrier cover. Tap out the link pins to remove the coupling link. (Illust. 43.)



Illust. 43
Track Frame Coupling Link.
(Model 175 Loader Only)

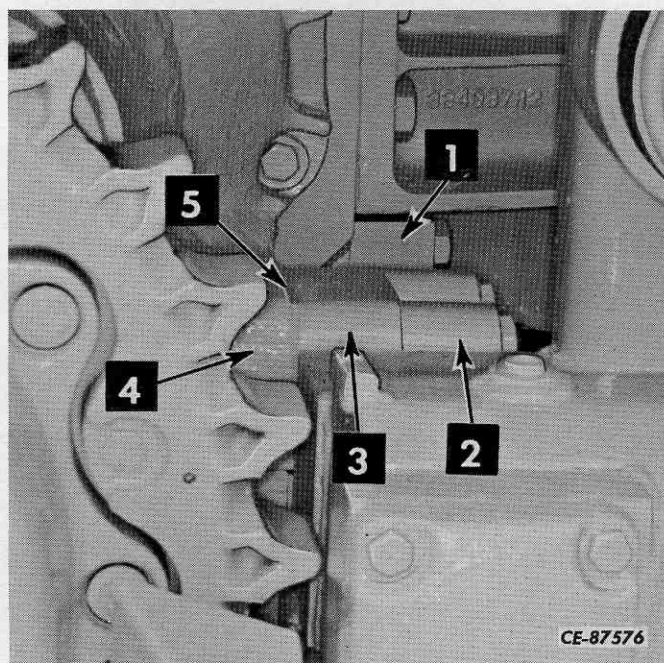
TD-15 (SERIES B) TRACTOR ONLY: Remove the outer cap securing the track frame pivot shaft to the sprocket drive carrier. Loosen the mounting bolts on the inner cap on each side of the tractor. Pry forward slightly on the pivot shaft to remove the shims between the spacer and sprocket drive carrier (Illust. 44). The spacer should be worked free of the carrier when the sprocket drive assembly is removed from the unit. Keep the shims together with the spacer and outer cap to facilitate reassembly.

7. Jack up the rear of the unit until the sprocket clears the track chains.

8. To remove the sprocket drive assembly as a unit, a lifting hook and adapter should be made as shown in Illust. 45 and 46.

9. Remove the cap screws and nuts securing the sprocket drive carrier to the rear main frame. Remove two of the sprocket drive carrier cover mounting bolts and use two bolts (three inches in length) to secure the adapter (Illust. 45) to the cover. Secure a short cable to the top holes of the adapter and attach the lifting hook (Illust. 46) and hoist (Illust. 47).

Turn in the three hexagon-socket set screws provided in the sprocket drive carrier until pry bars can be inserted to pry the assembly from the studs and dowel. Pull the assembly straight away from the frame until the pinion shaft clears the frame. On the TD-15 (SERIES B), the pivot shaft spacer (Illust. 44) should be worked free of the carrier as the assembly is being removed.

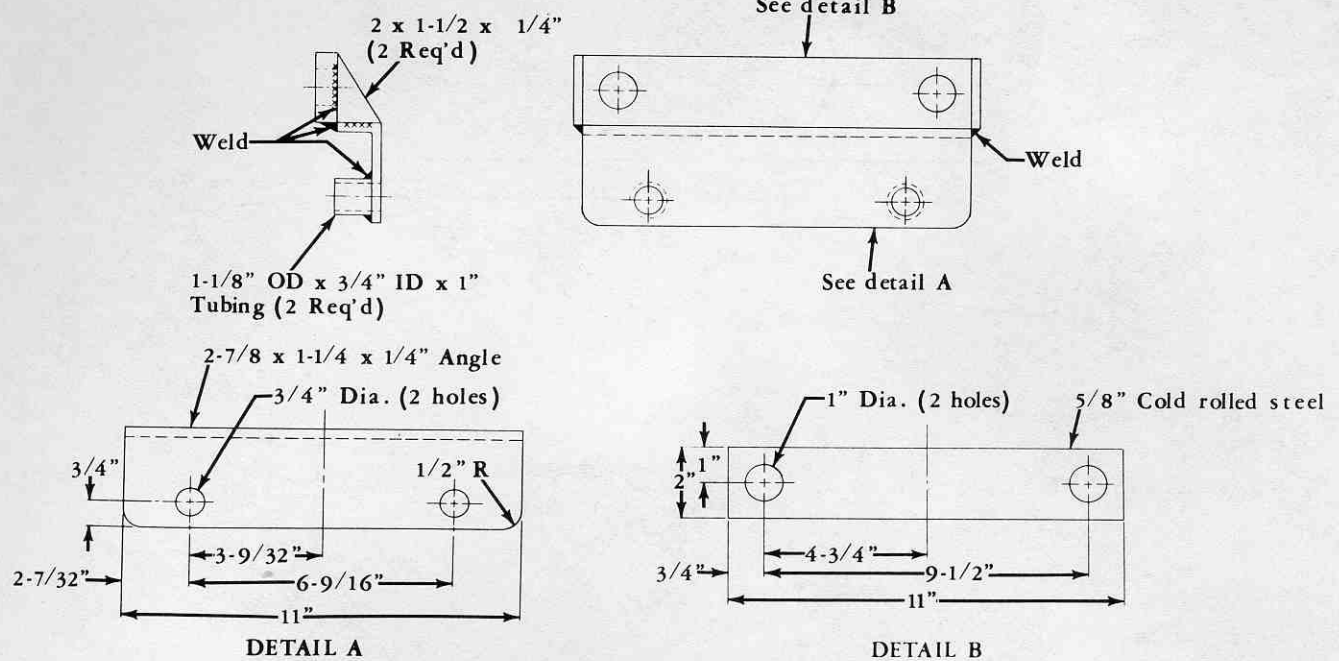


Illust. 44
Pivot Shaft Mounting Caps.
(TD-15 SERIES B Only)

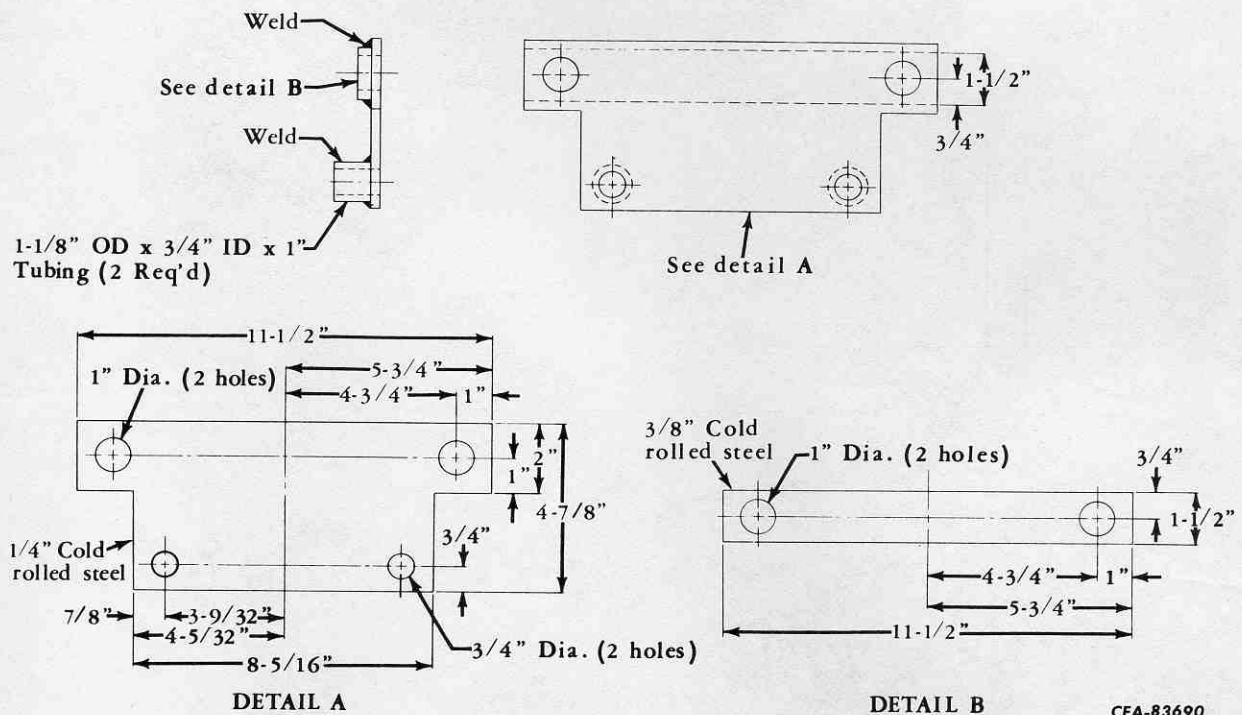
- | | |
|---------------|----------------------------|
| 1. Inner cap. | 4. Sprocket drive carrier. |
| 2. Outer cap. | 5. Shims. |
| 3. Spacer. | |



PIVOT BRAKES



TD-15 (SERIES B) Lifting Adapter



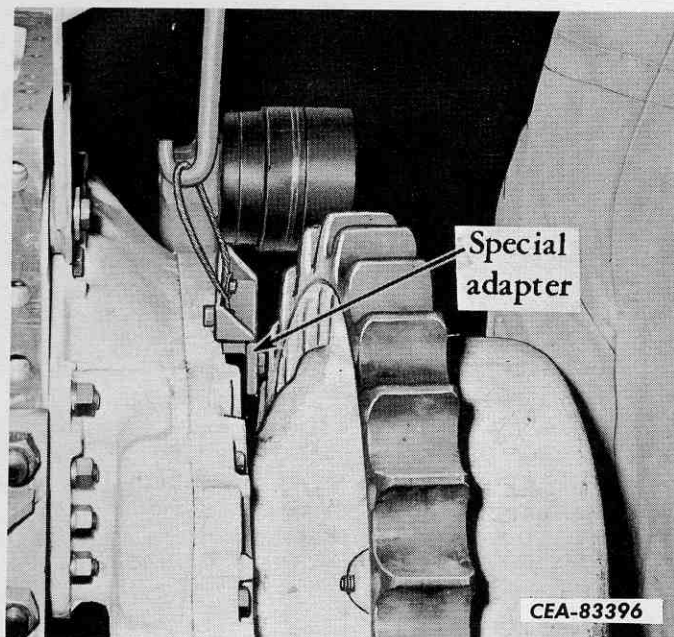
CEA-83690

Model 175 Loader Lifting Adapter

Illust. 45
Detailed Parts for Sprocket Drive Lifting Hook Adapter Shown in Illust. 47.



PIVOT BRAKES

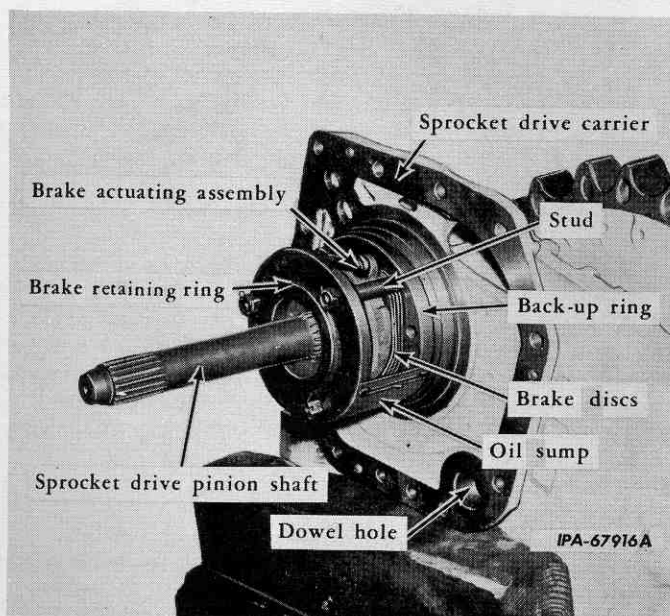


Illust. 47

Installing Sprocket Drive Special Lifting Hook and Adapter (TD-15 (SERIES B) Shown, Model 175 Loader Similar.)

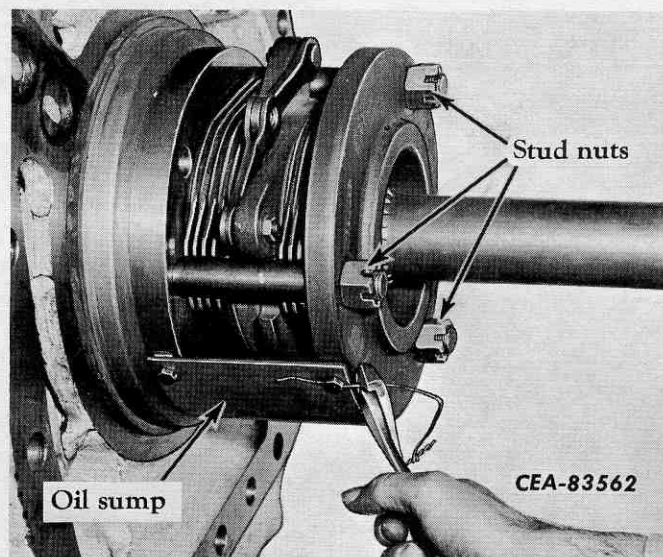
11. DISASSEMBLY

1. Support the sprocket drive assembly as shown in Illust. 48.
2. Disconnect the pivot brake actuating cable from the links of the brake actuating assembly.



Illust. 48

Pivot Brake Assembly.

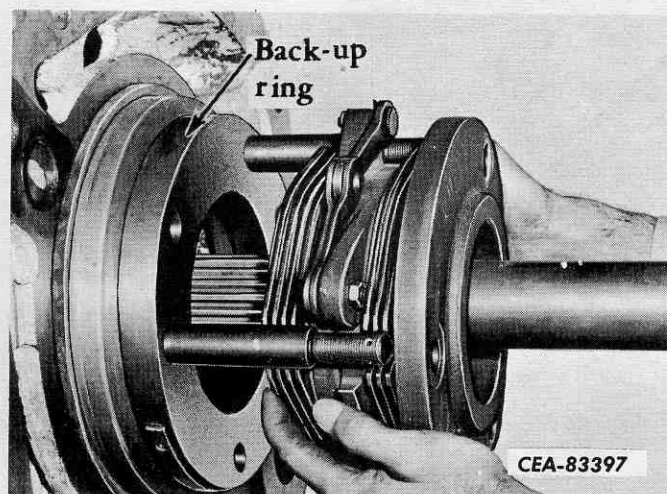


Illust. 49

Removing the Lockwire from the Oil Sump Mounting Cap Screws.

3. Remove the lockwire, cap screws and washers securing the oil sump and gaskets to the bottom of the brake retaining and back-up rings and remove the sump and gaskets (Illust. 49).
4. Remove the cotter pins and nuts from the three brake studs (Illust. 49).
5. Remove the brake retaining ring, discs and actuating assembly from the studs and off the end of the pinion shaft (Illust. 50).

(Continued on next page)



Illust. 50

Removing the Brake Disc Assembly from the Pinion Shaft.

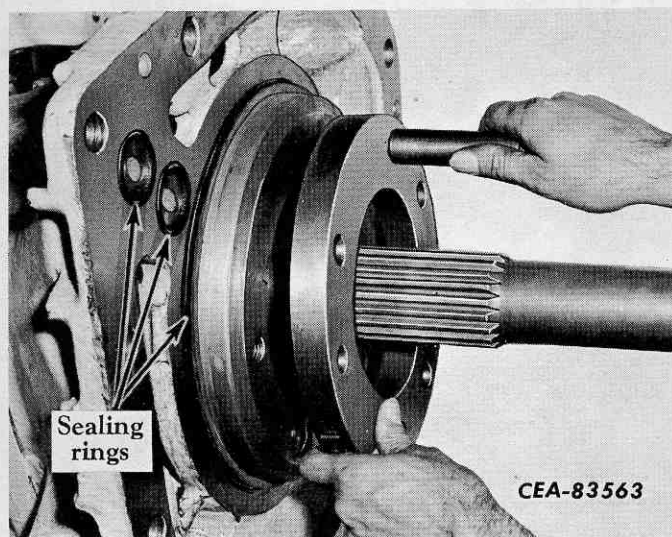


PIVOT BRAKES

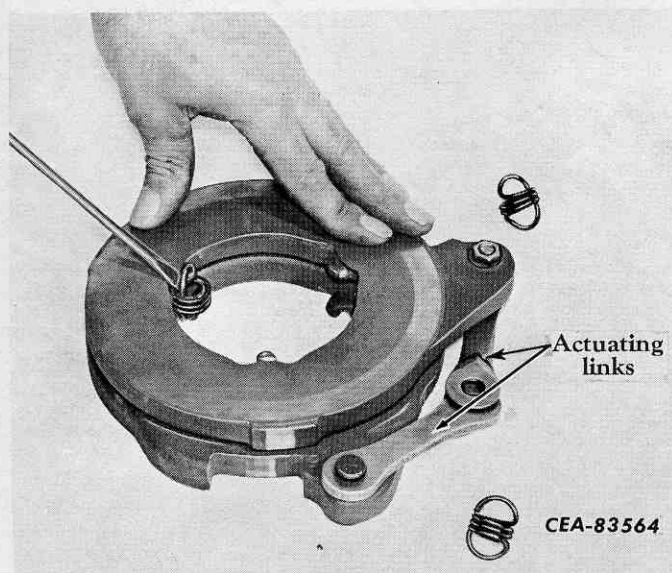
11. DISASSEMBLY - Continued

NOTE: Some brake assemblies are equipped with stud spacers. If so equipped, discard the spacers.

6. If necessary, the brake back-up ring can be removed from the carrier by loosening the three studs with a stud puller. Remove the studs and back-up ring (Illust. 51).



Illust. 51
Removing the Back-up Ring.



Illust. 52
Removing the Brake Extension Springs.

7. Pry the three extension springs from the ear lugs of the actuating discs using a screwdriver (Illust. 52). Separate the discs and remove the five steel balls.

8. If it is necessary to remove the actuating link (Illust. 52) from the disc, unstake and remove the nut and stud.

12. INSPECTION AND REPAIR

1. Inspect the middle and intermediate discs for distortion and excessive wear at the braking surface. If a wear pattern is established on either or both sides of an intermediate disc and the original disc thickness is reduced below the minimum dimension shown in Par. 2, "SPECIFICATIONS," the disc should be replaced with a new one.

The braking surface on both sides of the middle discs are grooved to allow oil to squeeze out when the brakes are applied. All these groovings should be cleaned thoroughly. If the discs or disc hub splines are excessively worn, replace the disc with a new one.

NOTE: The pressure required to obtain a given braking action will increase as braking surface wear progresses. This is due to the changing leverage of the actuating links as their angular relationship to each other decreases.

2. The outer face of the brake back-up ring and the inner surface of the brake retainer ring serve as stationary braking surfaces and must be inspected for excessive scratches or pitting. If these cannot be cleared up with emery cloth, replace the grooved or pitted parts.

3. Perform the same inspection and servicing operations, as in Step 2 preceding, on the brake surfaces of the actuator disc assembly.

4. Check each actuator disc ramp for wear that may prevent the ball from rolling smoothly up the ramp. If any corrosion is found, polish the ramp with emery cloth. Inspect the steel balls and, if they are out-of-round or too rough to be polished with emery cloth, replace them with new balls.

5. Inspect the extension springs for excessive wear at the attaching loops or loss of tension needed to hold the actuating disc firmly against the balls. Refer to Par. 2, "SPECIFICATIONS."



PIVOT BRAKES

6. Check the actuating links, studs, brake rod yoke and yoke pin for wear, and replace worn parts with new.

7. Inspect the brake actuating cable assembly removed from the rear main frame cover.

(a) Remove the snap ring installed below the spring retainer and disassemble the spring guide. Check the brake cable return spring. Refer to Par. 2, "SPECIFICATIONS."

(b) Remove the "O" rings, from the grooves in the cable guide, and the dirt seal installed in the cover upper recess.

(c) Thoroughly clean all parts including the interior of the cover opening. Install a new dirt seal and new "O" rings, reassemble the spring and install the snap ring.

8. Check the brake pedal action. New bushings are required if excessive looseness causes pedal wobble. If a binding movement exists, it may be possible to eliminate it by lubricating at the grease fitting in the pedal hub.

Remove the brake pedal to install the new bushings as follows:

(a) Remove the center and right front floor plates.

(b) Disconnect the brake rod yoke from the bottom of the pedal and unhook the pedal return spring. Check spring tension. Refer to Par. 2, "SPECIFICATIONS."

(c) Drive out the pedal shaft retaining pin installed through the side of pedal bracket arm and remove the shaft.

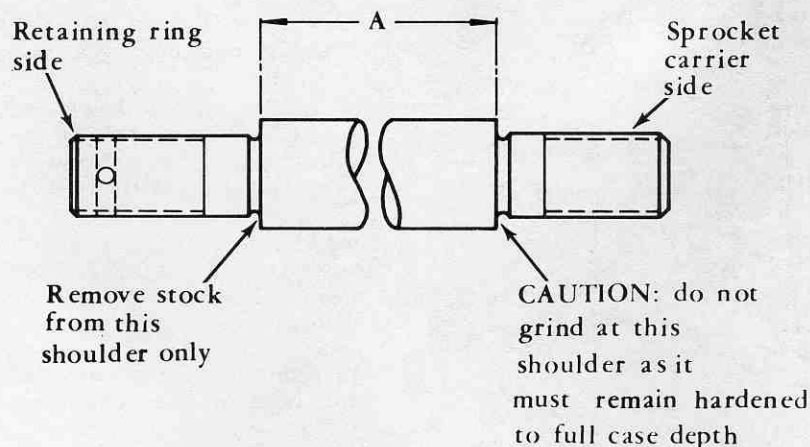
(d) Press out both bushings installed in the pedal bore.

(e) Press in new bushings until each is flush with the outer edges to allow space between the bushings for lubrication.

(f) Reinstall the brake pedal, linkage and floor plates.

9. Check length (A, Illust. 53) of the pivot brake studs. If the dimension obtained is 3.023 to 3.028 inches, the studs must be removed and this length reduced to 3.006 to 3.011 inches to provide the proper brake disc clearance. Be sure to remove stock from the retaining ring end of the stud (Illust. 53). Install the studs so they are shouldered against the back-up ring. Refer to Par. 2, "SPECIFICATIONS" for the proper torque.

NOTE: Instead of grinding the stud an alternate method is to add an additional intermediate (steel) disc between the brake retaining ring (Illust. 48) and the outer lined disc upon reassembly of the pivot brake discs.



CEA-83662

Illust. 53
Pivot Brake Stud Modification.



PIVOT BRAKES

13. REASSEMBLY

1. If the actuating links (Illust. 52) were removed, assemble the two actuating links on the ramp side of the actuating discs with the link stud nuts on the friction side. Tighten and stake the nuts in place.

2. Place the five steel balls in the ramps of one actuating disc, place the other actuating disc over it and secure them together with the three extension springs. (Illust. 52.)

3. If the brake back-up ring was removed, secure it into position against the sprocket drive carrier with the three studs. Refer to Par. 2, "SPECIFICATIONS" for the proper torque. Be sure the studs are shouldered against the back-up ring.

4. Install nine of the brake discs on each side of the actuating disc assembly as follows (Illust. 54):

NOTE: Before installing the retaining ring step (d) be sure to assemble the additional steel (intermediate) disc to the studs (if necessary) (refer to Par. 12, "INSPECTION AND REPAIR.")

(a) Start with an internally splined middle disc next to the back-up ring. The next disc

is a non-splined intermediate disc to fit the studs. Alternately install discs (five middle and four intermediate).

(b) Position the actuating disc assembly on the studs with the links toward the top as shown in Illust. 54.

(c) Install the remaining nine brake discs in the same manner as the first nine (step a).

NOTE: When installing the brake discs, be sure they are positioned so the holes are staggered. After the discs are in position, the holes should not line up.

(d) Install the brake disc retaining ring and lock nuts to the studs (stud threads oiled) and tighten the stud nuts to the torque specified in Par. 2, "SPECIFICATIONS." Back off the nuts to the nearest cotter pin hole and install the cotter pin.

5. Insert a feeler gauge between the retaining ring and the outer splined disc (steel disc, if additional disc was used) to determine the clearance of the brake discs between the retaining ring and the back-up ring. This clearance must be 0.050 to 0.119 of an inch. If the instructions under "INSPECTION AND REPAIR" were followed, this clearance should be obtained. If the addition of a steel disc did not bring the clearance within the specified limit, either grind the brake studs (refer to "INSPECTION AND REPAIR") or install new brake studs to obtain studs with the correct shoulder length. If this does not bring the clearance within the limit specified, install different brake discs (due to manufacturing tolerances) to obtain the proper clearance.

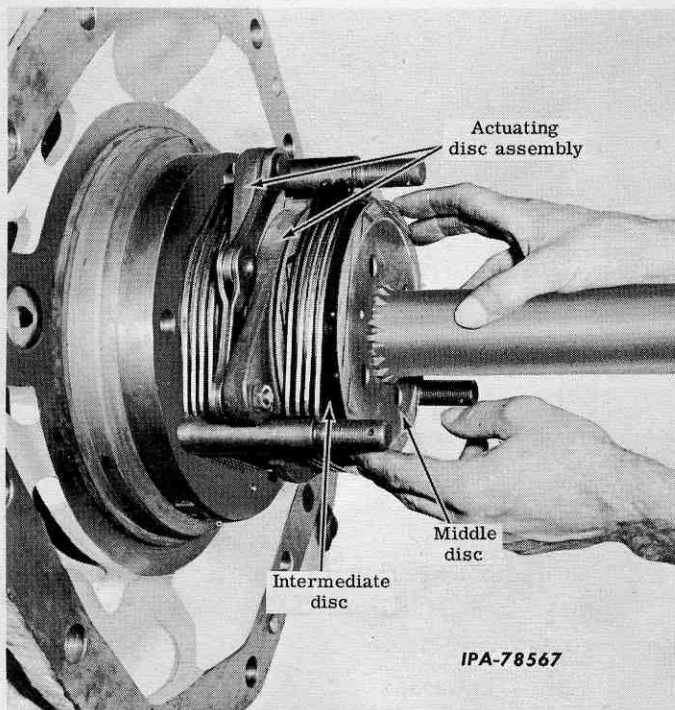
6. Install the sealing ring around the shoulder of the sprocket drive carrier (Illust. 51).

7. Install new gaskets and the brake oil sump to the bottom of the back-up and retaining rings with the cap screws and washers. Secure with new lockwire (Illust. 49).

NOTE: If the brake studs were changed or modified, the six slotted holes in the oil sump will have to be slightly widened for mounting.

8. Connect the pivot brake actuating cable to the links on the actuating discs.

NOTE: If it was necessary to modify the brake assembly to obtain the correct brake disc clearance, the brake assembly on the opposite side of the unit must be removed and the clearance checked.



Illust. 54
Installing the Brake Discs.



PIVOT BRAKES

14. INSTALLATION

NOTE: Be sure the three hexagon-socket set screws in the sprocket drive carrier have been turned back into place.

1. Apply Permatex No. 3 on the sprocket drive vent and the pivot brake cooling port sealing rings and install the sealing rings in the rear of the carrier (Illust. 51).

2. Attach a wire to the end of the pivot brake actuating cable to be used for guiding the cable into position during sprocket drive assembly and for final installation of the cable in the rear frame cover.

3. Sling the assembly with the special lifting hook and adapter as was done in removal and move the assembly toward the rear main frame until two long guide bolts can be started in the frame. Install the guide bolts into the bolt openings at the top of the carrier. Use a pry bar between the track chain and sprocket planet carrier to align the assembly with the studs. Tighten the guide bolts until the carrier is on the studs and then pry the carrier against the frame. If the spline on the inner end of the pinion shaft does not enter the sun gear in the steering planetary, turn the sprocket while prying the assembly into position.

NOTE: As the sprocket drive assembly is positioned against the frame, guide the pivot brake actuating cable into the opening in the side of the frame until the wire installed on the end of the cable can be reached through the inspection cover opening in the rear frame cover. On the TD-15 (SERIES B) tractor, the pivot shaft spacer (Illust. 44) must also be positioned between the pivot shaft and sprocket carrier at this time.

4. Install the nuts on the studs. Remove the two guide bolts and install the regular bolts. Torque the nuts and bolts to the amount specified in Par. 2, "SPECIFICATIONS."

5. Remove the jack from under the tractor.

6. MODEL 175 LOADER ONLY: Install the track frame coupling link (Illust. 43). Place the link in position and secure to the track frame coupling and sprocket drive carrier cover with the link pins. Install the link pin locks and secure with cap screws and washers.

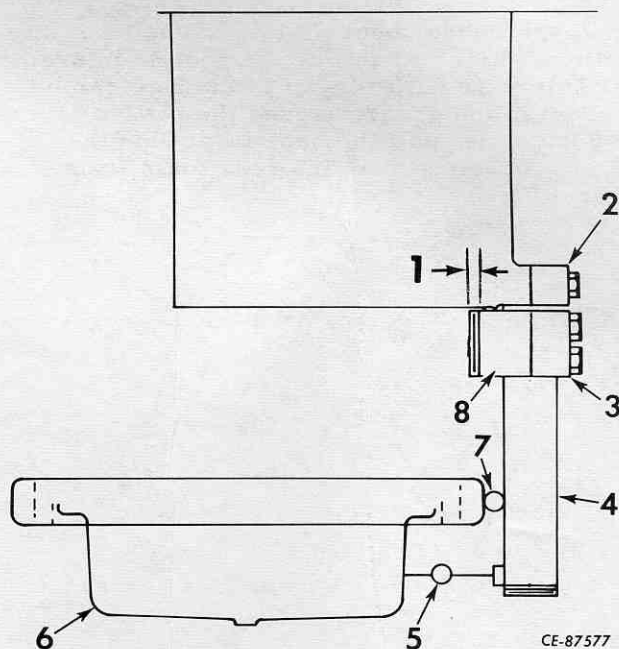
TD-15 (SERIES B) ONLY: Install the same amount of shims that were removed between the sprocket carrier and spacer. To provide clearance for installing shims, the bolts securing the pivot shaft inner cap on each side of the tractor must be loosened (Illust. 44).

Pry the pivot shaft spacer forward until the gap between the carrier and spacer is great enough to install the original shim pack. Install the outer pivot shaft cap and bolts. Tighten the bolts of the outer cap and two inner caps.

NOTE: If a new sprocket drive carrier outer pivot shaft cap or pivot shaft spacer is installed, or if the number of shims (5, Illust. 44) previously used is unknown and must be determined, proceed as follows (Refer to Illust. 54A):

Be sure the pivot shaft inner cap (2) on each side of the main frame is fully torqued. Install a dial indicator (5) with a magnetic base on the rear of the pivot shaft and place the indicator pointer against the planet gear carrier (6). Set the indicator at zero. Using a prybar (7) between the pivot shaft (4) and the sprocket teeth, deflect the shaft until the indicator reads approximately minus .015" (pointer rotation

(Continued on next page)



Illust. 54A
Pivot Shaft Shimming Drawing.

- | | |
|-----------------|-------------------------|
| 1. Shim pack. | 5. Dial indicator. |
| 2. Inner cap. | 6. Planet gear carrier. |
| 3. Outer cap. | 7. Prybar. |
| 4. Pivot shaft. | 8. Spacer. |



PIVOT BRAKES

14. INSTALLATION - Continued

counterclockwise). At this time, measure the distance between the spacer (8) and the sprocket drive carrier with a feeler gauge (both at top and bottom of spacer). This is the amount of shims (1) to be used. Install the shims and remove the prybar (do not disturb the dial indicator). Secure the outer cap (3) using full torque and note the indicator reading. Reading obtained must be zero to minus .006". If necessary, remove the outer cap and add or remove shims as needed to obtain this reading with the outer cap fully torqued.

7. Working through the inspection cover opening in the rear main frame cover, thread the wire on the end of the pivot brake actuating cable through the cable opening in the cover. Insert a heel bar through the inspection cover opening and under the brake return spring retainer to align the spring with the cable opening in the cover. Grab the wire on the end of the cable with a pair of pliers and in one motion, pry up with the heel bar and pull on the wire to seat the cable in the cover (Illust. 40). Remove the wire from the cable yoke. Secure the cable to the bellcrank with the end pin and cotter.

Install the rubber boot (Illust. 15) using a pair of pliers. First maneuver the boot down over the cable yoke until the top of the boot can be inserted in the groove around the bottom of the yoke. Then pull the boot all around the flange protruding from the rear main frame cover.

8. Install the batteries, battery support brackets and the seat frame. If the pivot brake on the right hand side of the unit was removed, the seat side sheet, brake pawl operating lever (Illust. 7) and lever guides must also be installed.

9. Install the inspection cover using a new gasket. Apply Permatex No. 3 to the inspection cover side of the cover gasket.

10. Be sure the drain plug in the underside of the rear main frame is installed and tight. Fill the rear main frame with the lubricant and to the level described in the operator's manual. Install the oil level dip stick.

11. Install the track chain (refer to section 10, "TRACKS AND TRACK FRAME.")

12. Install the sprocket rock shield (if equipped).

13. Start the engine and check for leakage. Operate the unit and check brake operation. If the brakes do not function properly, they must be adjusted. (Refer to Par. 9, "STEERING PLANETARY BRAKE AND PIVOT BRAKE ADJUSTMENTS.")

14. After the engine is up to operating temperature, recheck the oil level in the rear main frame and add if necessary. Check the level in the sprocket drive as described in the operator's manual.



STEERING BOOSTERS

15. REMOVAL

(Ref. Nos. Refer to Illust. 55)

NOTE: Disconnected hydraulic lines should be properly capped with the correct size plastic cap. If caps are not available, tape or clean rubber corks may be used. Hydraulic openings must NEVER be plugged with rags. This practice could easily introduce dirt or lint into critical hydraulic components.

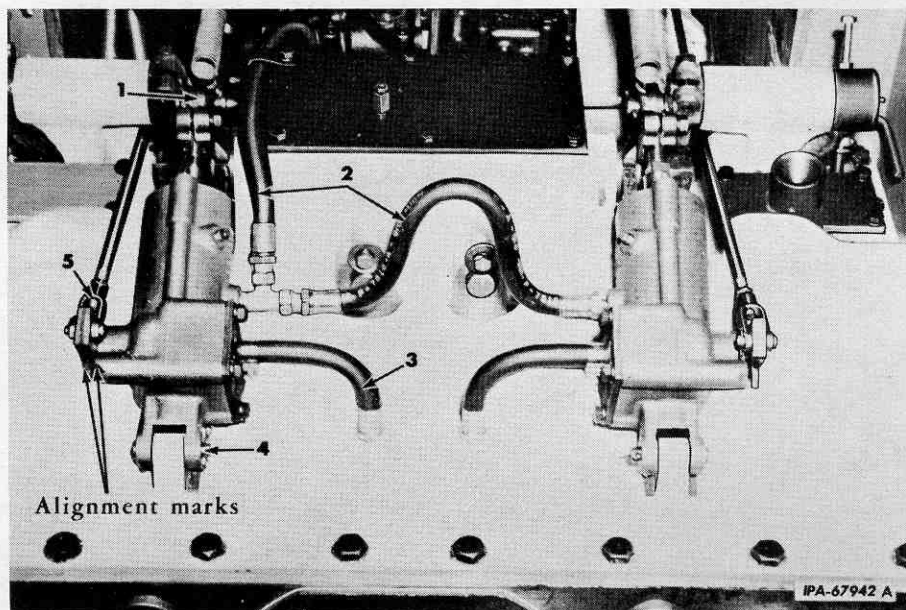
1. Remove the apron type cover at the rear of the unit directly below the fuel tank for access to the steering boosters. If equipped with a scarifier, allow the cover to lay down over the hydraulic hoses.

2. Disconnect the pressure lines (2) at the booster housing. Loosen the hose clamp and pull the drain hose (3) from the booster housing cover.

3. Disconnect the booster valve operating rod clevis (5) at the booster valve fork lever.

4. Unhook the booster piston return spring from the bellcrank push rod lever (1) and attach it to the hook on the pull rod connected at the lower end of the lever (1). This must be done before removing the booster mounting pins to keep the bellcrank push rod (12, Illust. 28) located below the rear frame cover from slipping free of its assembled position.

5. Remove the cotter and the pin (4) from the rear of the booster. Disconnect the booster at the front from the bellcrank push rod lever (1). Remove the booster assembly from the main frame cover.



Illust. 55

Hydraulic Steering Booster Assembly. (Power Shift Unit Shown, Gear Drive Similar.)

1. Push rod bellcrank outer lever.
2. Booster pressure hoses.

3. Booster drain hose.
4. Mounting pin.
5. Booster valve operating rod clevis.

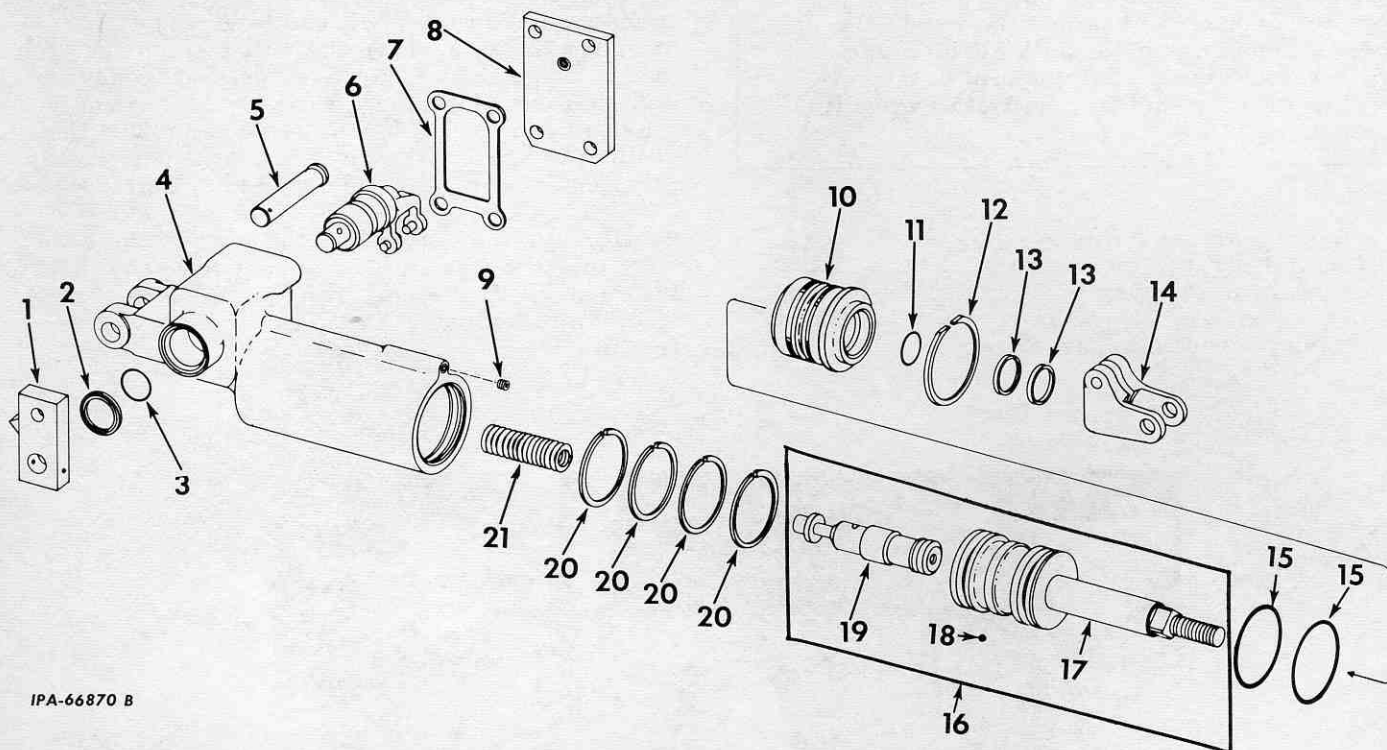


STEERING BOOSTERS

16. DISASSEMBLY

(Ref. Nos. Refer to Illust. 56)

1. Remove the clevis (14) from the piston (17).
2. Using a suitable tool, remove the snap ring (12) from its groove in the housing (4).



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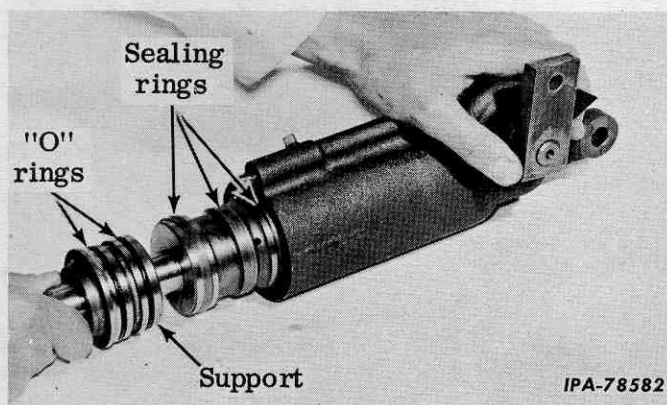
Illust. 56
Exploded View of Hydraulic Steering Booster.

- | | | |
|-------------------------|--------------------------------|--------------------------------|
| 1. Fork lever. | 8. Housing cover. | 15. Support "O" rings. |
| 2. Fork seal and wiper. | 9. Plug. | 16. Piston and valve assembly. |
| 3. Fork "O" ring. | 10. Support. | 17. Piston. |
| 4. Housing. | 11. Piston rod "O" ring. | 18. Piston ball. |
| 5. Mounting pin. | 12. Snap ring. | 19. Valve. |
| 6. Operating fork. | 13. Piston rod seal and wiper. | 20. Sealing rings. |
| 7. Cover gasket. | 14. Clevis. | 21. Valve return spring. |



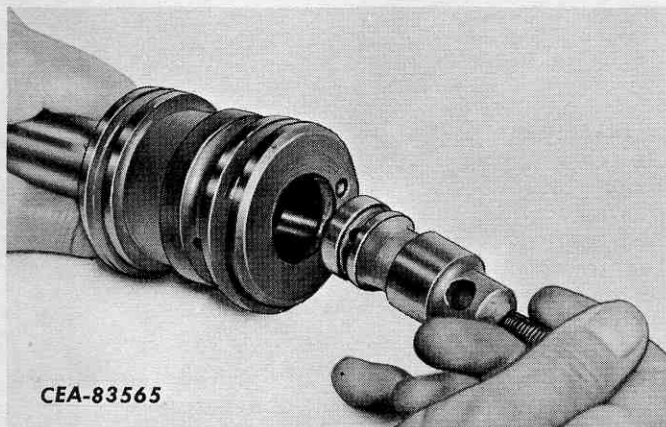
STEERING BOOSTERS

3. Hold the rear of the housing and slowly pull the piston (17) and support (10) from the housing. Use care that the valve (19) does not fall free of the piston and become damaged (Illust. 57). Carefully slide the support from the piston rod.



Illust. 57
Removing the Piston and
Support Assembly.

4. Remove the valve (19) which usually comes out with the piston (Illust. 58). If the valve remained in the housing, move the lever (1) to the rear and remove the valve. Remove the return spring (21) from the housing.



Illust. 58
Removing the Spool Valve
from the Piston.

5. Remove the roll pin securing the lever (1) to the operating fork (6) and tap the lever from the fork shaft (Illust. 59).

6. Remove the housing cover (8) and discard the cover gasket (7). Tap the operating fork from the housing.

17. INSPECTION AND REPAIR

1. Wash all parts in cleaning solvent and dry with compressed air. Remove the plug (9, Illust. 56) from the housing and flush out the oil passages to be sure they are clean and free of foreign particles. Install the plug.

2. Flush out the oil passages in the valve and in the piston. Be sure the two balls (18), Illust. 56) are in place in the piston.

3. Replace all "O" rings with new. It is also recommended that the seal and wiper in the booster housing and in the piston support be replaced whenever the booster assembly is disassembled.

4. Inspect parts for burrs or signs of excessive wear. The spool valve must slide freely in the piston bore. Temporarily install the piston sealing rings (20, Illust. 56) in the piston housing and check their gap (refer to Par. 2, "SPECIFICATIONS" for dimensions of new parts).

5. Inspect the valve return spring for damage. Test the spring for proper tension. Refer to Par. 2, "SPECIFICATIONS."

18. REASSEMBLY

(Ref. Nos. Refer to Illust. 56)

NOTE: Coat all "O" rings with Dow Corning No. 55 pneumatic grease or its equivalent. Coat piston sealing rings with the same hydraulic oil as used in the hydraulic system.

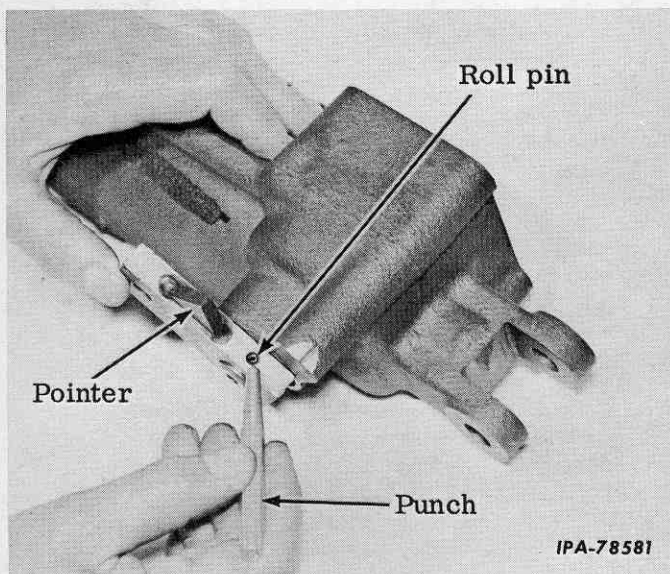
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STEERING BOOSTERS

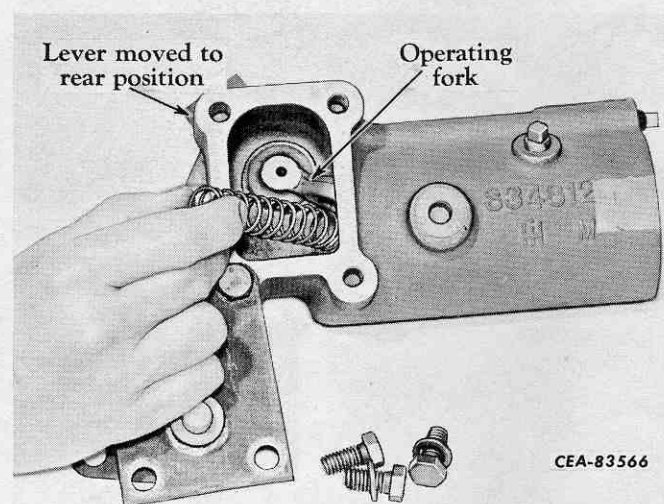
18. REASSEMBLY - Continued
(Ref. Nos. Refer to Illust. 56)

1. Install the new seal and wiper (2) until the side with the number stamped on it bottoms in the housing counterbore.
2. Place a new "O" ring (3) on the operating fork (6) and install into the housing until it bottoms. Tap the lever (1) on the operating fork (pointer to the rear) and secure with the roll pin. (Illust. 59.)



Illust. 59
Fork Lever Roll Pin Installed.

5. Install the four sealing rings (20) on the piston so the ring end gaps are staggered. Insert the valve (19) in the bore of the piston (Illust. 58).
6. Move the lever (1) to the rear to position the operating fork up in the housing for cleaning the valve stem when the piston assembly is installed. Working through the side opening, install the return spring (21) in the counterbore in the rear of the housing (Illust. 60).



Illust. 60
Installing the Spool Valve Return Spring.

3. Install a new "O" ring (11) in the groove provided in the support (10). Install the two seal and wiper assemblies (13) in the front of the support. Install the first one (end with number stamped on it facing out) until it bottoms in the support counterbore. Then install the second one (end with number down) until it bottoms. Install the two new "O" rings (15) in the grooves provided on the outside diameter of the support.

4. Position the support on the booster piston rod so that the seal and wiper assemblies are toward the threaded end of the rod.

7. Install the piston and valve assembly (16) into the housing using light taps on the rod end of the piston. There is a tapered edge on the housing to feed the piston sealing rings into the bore. Be careful not to damage the sealing rings or support "O" rings (15) as they enter the housing.

As the piston is bottomed in the housing, check to see that the valve enters the return spring (21) and that the pins on the operating fork (6) are in front of the valve shoulder (piston side of the valve stem flange). In order for the valve to operate, the fork must move the valve to the rear.



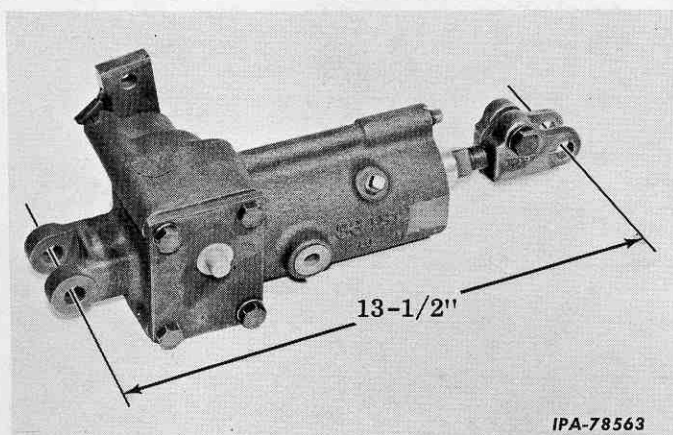
STEERING BOOSTERS

8. Secure the support in the housing with the snap ring (12).

9. Move the lever (1) in each direction several times to be sure that no binding exists and that the valve and return spring are working properly. Install a new cover gasket and secure the cover (8) to the housing.

10. Install the clevis (14) on the piston rod but do not tighten the mounting screw.

11. Pull the piston out as far as possible and measure the distance between the center of the mounting hole in the rear of the booster housing to the center of the pin hole in the forward end of the clevis (14). Adjust clevis (14) until this measurement is 13-1/2 inches. (Illust. 61.) Tighten the clevis cap screw.



Illust. 61

Steering Booster Assembly Properly Adjusted.

19. INSTALLATION

(Ref. Nos. Refer to Illust. 55)

1. Position the booster assembly on the main frame cover and secure the rear of the booster housing to the cover with the mounting pin (4) and cotter.

2. Secure the front of the booster to the outer lever (1).

3. After the booster assembly is securely fastened to the rear main frame cover and push rod lever (1), unhook the booster piston return spring from the brake pull rod and connect it to the lever (1).

4. Connect the operating rod clevis (5) to the fork lever on the booster housing.

5. Be sure the marks on the booster housing and on the valve fork lever are aligned (Illust. 55). If they are not, disconnect clevis (5) from the lever. Loosen the jam nut on the rod and turn clevis (5) to the left or right as necessary so that the marks will align when the clevis (5) is connected. Connect the clevis and secure.

6. Connect the pressure hoses (2). Connect the drain hose (3) and secure to the booster housing cover with the clamp.

7. Install the apron type cover at the rear of the tractor.

8. Start the engine and operate the steering levers. If levers are hard to work or tractor creeps to the left or right, follow the pertinent adjustment of the steering planetary brakes as described in Par. 9, "STEERING PLANETARY BRAKE AND PIVOT BRAKE ADJUSTMENTS."

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SERVICE BULLETIN REFERENCE

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