

Due to a continuous program of research and development, some procedures, specifications and parts may be altered in a constant effort to improve machines.

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6, 6 (61), 6 (62), 9, 9 (91)
and 9 (92) SERIES

CRAWLER TRACTOR
CHASSIS

FORM
ISS-1032B

APRIL, 1967

(Includes Revision No. 1)

INTERNATIONAL CRAWLER TRACTOR CHASSIS
T-6, T-6 (61), TD-6, TD-6 (61), TD-6 (62), T-9, TD-9, TD-9 (91) AND TD-9 (92)

CONTENTS

SECTION 1. GENERAL

2. COOLING SYSTEM
3. ELECTRICAL
4. ENGINE
5. ENGINE CLUTCH
6. TRANSMISSION AND BEVEL GEAR
7. STEERING CLUTCHES AND BRAKES
8. SPROCKET AND SPROCKET DRIVE
9. TRACKS AND TRACK FRAME

CONSTRUCTION EQUIPMENT SERVICE MANUAL

INTRODUCTION



The instructions contained in this service manual are for the information and guidance of servicemen who are responsible for overhauling and repairing any part of International T-6, T-6 (61), TD-6, TD-6 (61), TD-6 (62), T-9, TD-9, TD-9 (91) and TD-9 (92) series crawler tractors.

This manual provides the serviceman with a fast, convenient reference to information on maintenance and repairs, as well as descriptions of the major units and their functions in relation to other components of the tractor.

LUBRICATION

Instruction on the lubrication of each assembly is given in the Lubrication Chart in the operator's manual for the particular tractor. When assembling any parts, always coat all wearing surfaces with the lubricant specified in the chart. Except for such installations as taper pins, etc., which surfaces should be clean and dry, use sufficient quantities of lubricant to prevent any danger of seizing, scoring or excessive wear when the assembly is first operated. Failure to provide "Starting Lubrication" may result in serious damage.

ENGINE

Only instructions for removal and installation of the engine are covered in this manual. For

detailed information on repair and adjustment of the engine and diesel injection pumps, refer to service manuals indicated in the application chart below.

SERVICE TOOLS

When the use of special service equipment will facilitate work, such equipment is mentioned in this manual. Other than this, it is assumed that servicemen will select such tools as are required. Information regarding special tool equipment is given in the "Service Tools" manual, ISS-1002.

SERVICE PARTS

For the correct service parts to be used, always refer to the parts catalog for that particular tractor. The loose-leaf parts catalogs are accurate and are brought up-to-date continually by issuing new pages covering any changes in part numbers.

SERIAL NUMBERS

Engine and chassis serial numbers can be located readily on International tractors. The engine number is stamped on the crankcase where easily visible, and the chassis number is on a name plate attached to the dash.

APPLICATION CHART

TRACTOR MODEL	USES ENGINE	ENGINE SERVICE MANUAL	DIESEL INJECTION PUMP MANUAL
T-6	6 series carbureted	CHS-238	
T-6 (61) 38951 to 39765*	264 series carbureted	CHS-238	
T-6 (61) 39766 and up*	281 series carbureted	CHS-238	
TD-6	6 series diesel	ISS-1035	ISS-1003
TD-6 (61) 38951 to 39973*	264 series diesel	ISS-1035	ISS-1003
TD-6 (61) 39974 and up*	281 series diesel	ISS-1035	ISS-1003
TD-6 (62)	282 series diesel	ISS-1040	ISS-1042
T-9	9 series carbureted	CHS-238	
TD-9	9, 9A series diesel	ISS-1035	ISS-1003
TD-9 (91)	350 series diesel	ISS-1035	ISS-1003
TD-9 (92)	282 series turbo-charged diesel	ISS-1040	ISS-1042

* Serial numbers shown are chassis serial numbers.



GENERAL DATA

	T-6	TD-6	T-6 (61) TD-6 (61) TD-6 (62)	T-9	TD-9	TD-9 (91) TD-9 (92)
*Maximum drawbar horsepower	32.92	33.78	42.3 (TD) 41.5 (T)	42.98	41.31	55.7
Rear power take-off:						
rpm at governed speed . . .	862	862	921.62	933	933	1033.33 (91) 1133.33 (92)
Direction of rotation (look- ing forward at rear) . . .	Clock- wise	Clock- wise	Clock- wise	Clock- wise	Clock- wise	Clock- wise
Spline connection, inches . .	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8	1-3/8
Type of spline connection . .	SAE-6B	SAE-6B	SAE-6B	SAE-6B	SAE-6B	SAE-6B
Belt pulley:						
Diameter, inches	12-1/8	12-1/8	12-1/8	11	11	11
Face, inches.	8-1/2	8-1/2	8-1/2	8-1/2	8-1/2	8-1/2
rpm at rated engine speed. .	811	811	811 (61) 867 (62)	878	878	878 (91) 1067 (92)
Belt speed, feet per minute.	2574	2574	2574 (61) 2496 (62)	2528	2528	2528 (91) 3073 (92)
11 inch.			2751 (62)			3388 (92)
12-1/2 inch . .						
Operating weight (including fuel and water added) (approx.), pounds						
Narrow tread tractor	7155	7505	7900 (T) 8290 (TD)	9815	10130	11135
Wide tread tractor	7567	7920	8105 (T) 8785 (TD)	10270	10711	11650

*Corrected to sea level barometric pressure (29.92 in Hg.) and 60° F., according to standard rating code.



GENERAL DATA - Continued

	T-6	TD-6	T-6 (61) TD-6 (61) TD-6 (62)	T-9	TD-9	TD-9 (91) TD-9 (92)
Tractor dimensions, inches:						
Length	104	104	104 (61) 109 (62)	114	114	114
Width, narrow tread	52-5/8	52-5/8	53 (61) 52 (62)	59	59	59-1/8 (91) 57 (92)
Width, wide tread	62-5/8	62-5/8	63 (61) 62 (62)	75	75	75-1/8 (91) 73 (92)
Height (from base of shoe to top of exhaust pipe extension)	53-1/2	72-3/8	83-25/32 (61) 92-13/16 (62)	58-1/2	79	89-5/16 (91) 98-5/32 (92)
Height (from base of shoe to top of air cleaner)	57-1/2	57-1/2	59-13/32 (T) 57-31/32 (TD) 59-15/16 (62)	63-3/4	63-3/4	66-1/2 (91) 63-3/32 (92)
Tread (center to center of track), narrow tread	40	40	40	44	44	44
Tread (center to center of track), wide tread	50	50	50	60	60	60
Length of track on ground	58-1/4	58-1/4	58-5/8	63-1/16	63-1/16	63-1/16
Area of ground contact (square inches)	1398	1398	1407	1640	1640	1640
Drawbar height (from base of shoe to center of clevis)	12-1/4	12-1/4	12-1/4 (61) 12-13/32 (62)	13-13/16	13-13/16	13-13/16 (91) 14 (92)
Drawbar lateral movement at pin	19-3/4	19-3/4	19-3/4 (61) 20 (62)	19-1/2	19-1/2	19-1/2 (91) 19-3/4 (92)
Ground clearance (from base of shoe at equalizer spring)	8-3/4	8-3/4	8-3/4 (61) 8-15/16 (62)	10-3/16	10-3/16	10-1/8 (91) 10-3/8 (92)
Minimum turning (clearance) radius with regular track shoes, inches:						
Narrow tread	65	65	65	72	72	72
Wide tread	74	74	74	85	85	85

**STANDARD TORQUE DATA FOR NUTS AND BOLTS**

(For special torque data refer to specification paragraph of the pertinent section of this manual.)

Recommended torques, in foot-pounds, for standard application nuts and bolts shown below are applicable, provided:

A. All threads are lubricated with engine oil or chassis grease. (Refer to NOTE.)

B. Joints are rigid; for example, no gaskets or compressible materials are used.



NOTE: Multiply standard assembly torques by the following factors:

- 1) .85 when metallic plated bolts or nuts are used.
- 2) .75 when parkerized bolts or nuts are used.
- 3) .70 when Molykote, white lead or similar mixtures are used as lubricants.
- 4) .90 when hardened surfaces are used under the nut or bolt head.
- 5) 1.20 when Loctite is used for plain bolts and nuts on the threads.
- 6) 1.25 when taper head bolts are used with bolt heads torqued.
- 7) 1.40 when Loctite is used for taper head bolts on the threads with bolt heads torqued.

When re-using bolts and nuts in service, use minimum torque values.

BOLT SIZE	TYPE 2		TYPE 4	
	MIN.	MAX.	MIN.	MAX.
1/4	9	10	12	14
5/16	19	21	27	30
3/8	33	37	45	50
7/16	53	60	75	85
1/2	80	90	115	130
9/16	115	130	160	180
5/8	160	180	220	250
3/4	290	320	400	450
7/8	420	470	650	730
1	630	710	970	1090
1-1/8	850	950	1380	1550
1-1/4	1200	1350	1940	2180
1-1/2	2000	2300	3300	3700
1-3/4	3300	3700	5300	6000
2	5000	5500	8000	9000

BOLT TYPE IDENTIFICATION CHART

IH Type	SAE Grade	DESCRIPTION	BOLT HEAD* MARKING
2	5	WILL HAVE AN IH AND 3 RADIAL LINES Quenched and tempered medium carbon steel	
4	8	WILL HAVE AN IH AND 6 RADIAL LINES Quenched and tempered special carbon or alloy steel	

*The center marking identifies the bolt manufacturer. The IH monogram is currently used. Some bolts may still have a raised dot which previously identified IH bolts.





CONTENTS

Paragraph	Page
1. Description	1
2. Specifications	1
3. Checking Mechanical Problems	1, 2
RADIATOR	
4. Description	2
5. Removal	2, 3
6. Disassembly	3-5
7. Inspection and Repair	5
8. Reassembly	5, 6
9. Installation	6, 7
OUTBOARD FAN AND PULLEY	
10. Description	7
11. Removal	7
12. Disassembly	7, 8
13. Inspection and Repair	9
14. Reassembly	9
15. Installation	9





1. DESCRIPTION

The cooling system used on IH crawler tractor engines is conventional type, except certain tractors have a closed type system. The closed type permits operation at extreme angles without loss of coolant through the overflow pipe, and, also permits operation at higher engine temperatures without boiling. In the closed type the overflow pipe is equipped with a pressure valve which opens at about 4 pounds pressure. For satisfactory operation of a closed cooling system, extra care must be taken that all connections are watertight. In all other respects, the closed cooling system functions the same as the conventional system.

The conventional system functions as follows: the water is stored in the radiator tanks. A positive displacement centrifugal water pump circulates the coolant from the lower radiator tank through the crankcase and cylinder head water jackets, past the thermostats into the

radiator upper tank and down through the cooling area of the radiator core to the lower water tank, where the cycle is repeated. Hose connections provide the joints between the radiator, water pump and water outlet header.

When the engine is started cold, the by-pass type thermostat is closed, preventing circulation of low temperature coolant through the radiator core. The coolant circulates only through the water pump and engine water passages. This circulation during the warm-up period prevents formation of steam pockets. When the engine reaches operating temperature, which is set by thermostat specifications, the coil of the thermostat expands and opens the passage for the coolant to flow from the engine water passages through the radiator and back to the water pump. The temperature of the coolant controls the extent of thermostat opening which, in turn, controls the amount of coolant circulation.

2. SPECIFICATIONS

FAN PULLEY

End Play, inch002-.007

For specifications of cooling system components on the engine, as water pump, fan, etc., see the "Engine Manual," ISS-1035.

3. CHECKING MECHANICAL PROBLEMS

PROBABLE CAUSE

REMEDY

DEFECTIVE COOLING SYSTEM

- | | |
|-----------------------------|-------------------------------|
| 1. Insufficient water | Add water, inspect for leaks. |
| 2. Faulty thermostat | Test. If necessary, replace. |
| 3. Dirty water | Drain and clean system. |

Continued on next page.



3. CHECKING MECHANICAL PROBLEMS - Continued

PROBABLE CAUSE

REMEDY

DEFECTIVE COOLING SYSTEM - Continued

4. Defective connections	Replace swelled, worn or loose hose connections.
5. Radiator defective.	Repair radiator. If necessary, replace.
6. Fan defective.	Inspect fan. If damaged, replace.
7. Defective overflow pressure valve (if equipped)	Replace.
8. Defective water pump	Inspect water pump impeller and shaft. If necessary, replace.
9. Water pump leaks	Service packing gland. Repair or replace pump.
10. Dirty, scaled coolant passages.	Clean and flush passages.
11. Radiator clogged.	Flush out radiator.
12. Fan belt slippage	Check the tension; replace if greasy or worn.

RADIATOR

4. DESCRIPTION

The radiator consists of cast iron upper and lower water tanks, with spacers on each side, and a flat-tube, fin-type core mounted between the tanks. A grille mounted on the front of the radiator protects the core.

5. REMOVAL

STANDARD RADIATOR

1. Drain the cooling system and remove the hood and radiator guard or grille.
2. Disconnect the inlet and outlet pipes from the upper and lower water tanks.
3. 6 AND 9 SERIES ONLY: Disconnect and remove the head lights and head light brush guards, if radiator tank, upper, is so equipped.

NOTE: On crawler tractors TD-6 (61) 38 951 and up, and TD-9 (91) 60 301 and up, TD-6 (62) and TD-9 (92) Series the radiator upper water tanks provide pads for mounting the head light brackets and head light brush guards.

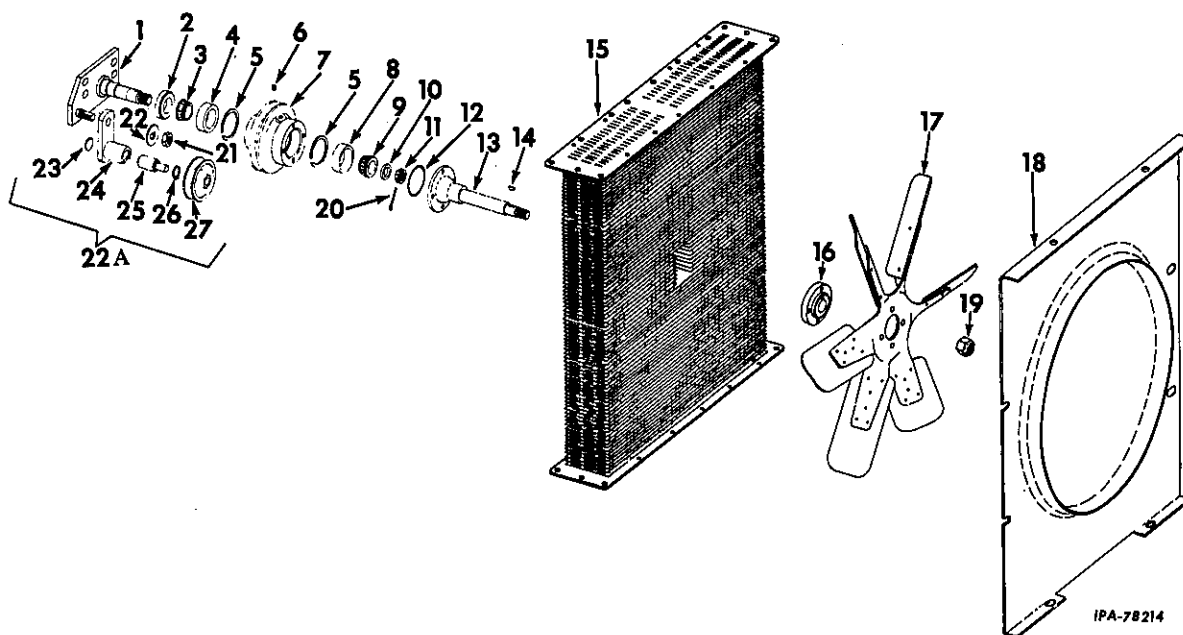
4. Insert a steel bar in the filler neck and locate it in a crosswise, horizontal position. Attach a rope with a lifting hook to the bar and a hoisting device.
5. Remove the mounting cap screws and remove the radiator.

OUTBOARD FAN TYPE RADIATOR (Ref. Nos. Refer to Illust. 1)

1. Drain the cooling system and remove the hood and radiator guard or grille.
2. Disconnect the inlet and outlet pipes from the upper and lower water tanks.
3. Disconnect the wires on the headlights (if the machine is so equipped).
4. Insert a steel bar in the filler neck and locate it in a crosswise, horizontal position. Attach a rope with a lifting hook to the bar and a hoisting device.
5. Remove the radiator mounting cap screws and take up the weight of the radiator with the hoisting device.
6. Remove the cap screws that secure the outboard fan spindle (1) to the thermostat housing. The radiator and fan assembly may be removed at the same time provided care is taken to avoid damaging the radiator core. Hoist the radiator carefully and slowly while supporting the weight of the fan and spindle assembly as much as possible.



RADIATOR



Illust. 1- Outboard Fan, Radiator, Pulley and Shaft Assembly.

- | | |
|--------------------------|-----------------------|
| 1. Outboard fan spindle. | 15. Radiator core. |
| 2. Oil seal. | 16. Fan hub. |
| 3. Bearing cone, inner. | 17. Blower fan. |
| 4. Bearing cup, inner. | 18. Fan shroud. |
| 5. Snap ring. | 19. Fan hub nut. |
| 6. Pipe plug. | 20. Cotter pin. |
| 7. Fan pulley w/plug. | 21. Nut. |
| 8. Bearing cup, outer. | 22. Washer. |
| 9. Bearing cone, outer. | 22A. Idler assembly. |
| 10. Washer. | 23. Expansion plug. |
| 11. Spindle nut. | 24. Adjusting arm. |
| 12. "O" ring. | 25. Bearing. |
| 13. Fan shaft w/flange. | 26. Bearing retainer. |
| 14. Fan hub key. | 27. Idler pulley. |

6. DISASSEMBLY (Refer to Illust. 3)

STANDARD RADIATOR

1. Remove the right and left fan housing sheets (22 and 21), overflow pipe (24) and radiator grille (2).

2. Remove the upper tank (Illust. 2) and at the same time remove the spacers (5 and 23).

Radiators, when so equipped, will have snubbers mounted between the spacers and the core. Unless replacement is necessary, the snubbers need not be disassembled.

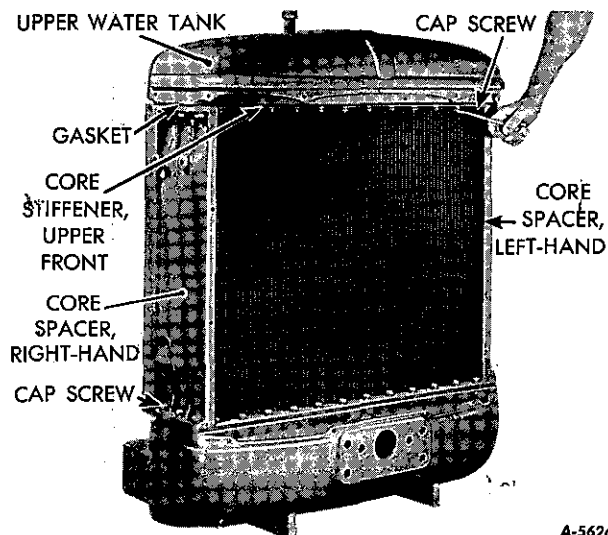
3. Remove the core (6).

Continued on next page.



RADIATOR

6. DISASSEMBLY (Refer to Illust. 3) - Continued



Illust. 2 - Removing Upper Water Tank (6 and 9 Series) (Later Series Similar).

OUTBOARD FAN TYPE RADIATOR (Ref. Nos. Refer to Illust. 1)

1. Remove the fan shroud (18).

2. Loosen and remove the fan hub nut (19). Remove the four screws that secure the fan (17) to the fan hub (16) and remove the fan.

3. Use a standard puller and pull the fan hub (16) from the fan shaft (13). Remove the key (14) from the shaft. Remove the fan pulley and shaft assembly from the radiator assembly.

(Ref. Nos. Refer to Illust. 3)

4. Remove the upper water tank (8) and gasket (7) from the core (6).

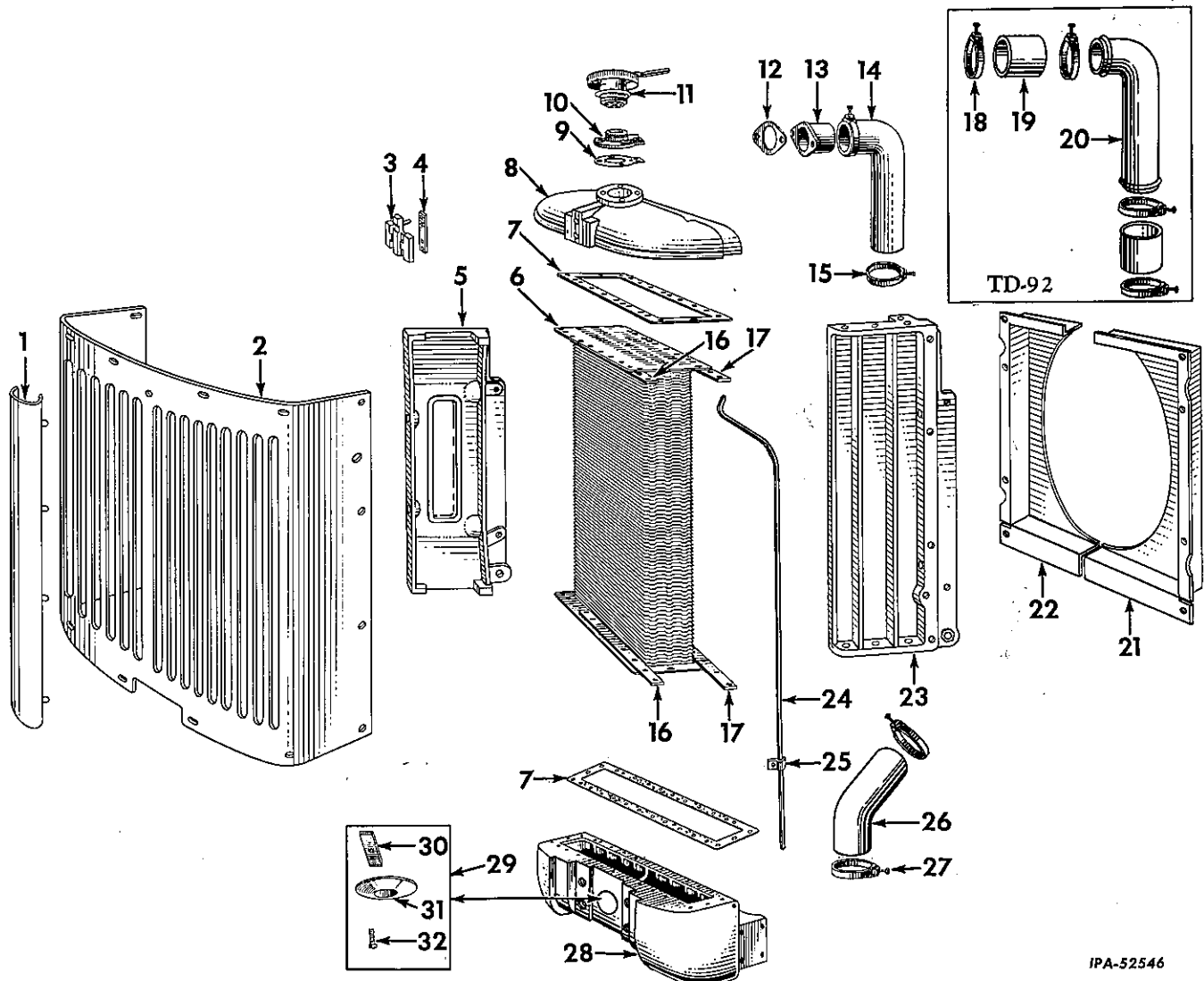
5. Remove the core spacers (5 and 23). Remove the core (6) and lower gasket (7) from the lower water tank (28). The gaskets are not to be re-used.

Legend to Illust. 3

- | | | |
|-----------------------|-----------------------------|-------------------------|
| 1. Moulding. | 12. Flange gasket. | 23. Spacer. |
| 2. Grille. | 13. Inlet pipe flange. | 24. Overflow pipe. |
| 3. Emblem. | 14. Inlet hose (6 (62). | 25. Pipe clip. |
| 4. Support. | 15. Hose clamp (6 (62). | 26. Outlet hose. |
| 5. Core spacer, R.H. | 16. Stiffener, front. | 27. Outlet hose clamp. |
| 6. Core. | 17. Stiffener, rear. | 28. Water tank, lower. |
| 7. Gasket. | 18. Inlet clamp. | 29. Hole cover (6 (62). |
| 8. Water tank, upper. | 19. Hose. | 30. Cover support. |
| 9. Gasket. | 20. Inlet pipe. | 31. Cover. |
| 10. Filler neck base. | 21. Fan housing sheet, L.H. | 32. Screw. |
| 11. Pressure cap. | 22. Fan housing sheet, R.H. | |



RADIATOR



IPA-52546

Illust. 3 - Exploded View of Radiator and Connections (TD-9(92) Shown).

7. INSPECTION AND REPAIR

Flush out the upper and lower water tanks with water. Flush out the core with water under pressure, both inside and outside. If the core is greasy, clean it with steam cleaning equipment. Clean all remaining radiator parts.

Inspect the radiator water tanks for cracks. Examine the fins and tubes of the core for damage. A repair tube is available and it can be installed inside an old tube. Slide the repair tubes inside any tubes that are leaking, and solder each repair tube, at top and bottom to the original tube and to the core. (Refer to Illusts. 4 and 5.)

8. REASSEMBLY (Ref. Nos. Refer to Illust. 3.)

STANDARD RADIATOR

1. Clean the gasket face of the lower tank.
2. Set the lower tank (28) in a flat position, as it normally would be when mounted on the tractor.
3. Lay a new gasket (7) on the gasket face.
4. Set radiator core (6) in place, and be sure that the holes in header line up with those in the tank.

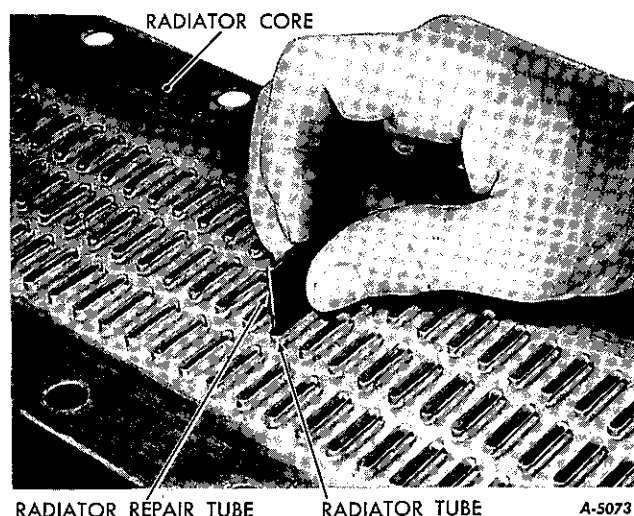
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RADIATOR

8. REASSEMBLY (Ref. Nos. Refer to Illust. 3.)— Continued

STANDARD RADIATOR - Continued



Illust. 4 - Installing Radiator Repair Tube.

5. Lay the core stiffeners (16 and 17) in position on top of bottom header and bolt in place.

6. Try the core spacers (5 and 23) and check for proper fit (core spacers must fit snugly between headers so as not to put a strain on the tubes).

On radiators so equipped, the snubbers will be mounted between the core and core spacers at this point.

7. Install and bolt down core spacers at bottom, but do not draw up tight.

8. Clean the gasket face of the upper tank (8).

9. Lay a new gasket on the core (6).

10. Set the upper tank on the core, being sure not to drop the tank and bend the header or damage the tube ends.

NOTE: The top tank should never be in place unless both core spacers are in position so as to support the tank.

11. Bolt the tank in place, securing the core stiffeners in place under the upper header.

12. Complete by tightening all bolts securely and checking the pressure radiator cap (11), gasket (9) and overflow pipe (24).

13. Install the fan housing sheets (21 and 22).

OUTBOARD FAN TYPE RADIATOR
(Ref. Nos. Refer to Illust. 3)

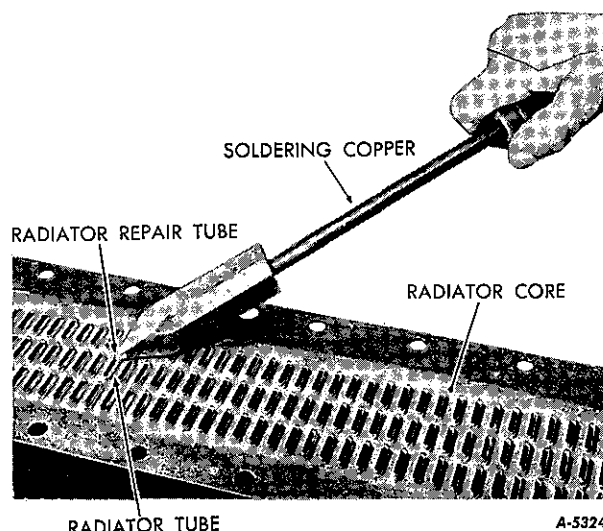
1. Be sure the gasket surface of the lower tank (28) is clean and smooth. Place the tank in a flat position as it normally would be when mounted in the tractor.

2. Place a new gasket (7) on the gasket surface of the lower tank (28).

3. Set the radiator (15, Illust. 1) in place and be sure the holes in the core header line up with those in the lower tank.

4. Assemble the core spacers (5 and 23) and be sure that they fit snugly between the headers with no strain on the tubes.

5. Place a new gasket (7) on the core (6). Be sure the gasket surfaces are clean and smooth. Install the upper water tank (8) and bolt it in place.



Illust. 5 - Soldering Radiator Tube.

9. INSTALLATION

STANDARD RADIATOR

1. Place a steel bar across the inside of the upper tank filler neck, and attach the bar to a hoist with a rope and a hook.

2. Lift the radiator into position and secure it to the side channels with cap screws.



RADIATOR

3. Connect the radiator inlet and outlet pipes to the water tanks, using new gaskets.
4. Fill the cooling system, and then inspect the system for leaks.

OUTBOARD FAN TYPE RADIATOR

NOTE: To avoid possible damage to the radiator during installation, install the fan pulley and shaft after the radiator is installed.

1. Place a short steel bar across the inside of the upper tank filler neck and attach a hook and rope to a hoist.
2. Lift the radiator into position and secure it to the side channels with cap screws.
3. Connect the radiator inlet and outlet pipes to the upper and lower water tanks, using new flange gaskets.

NOTE: For complete information on "OUTBOARD FAN AND PULLEY," refer to Paragraphs 10 through 15 inclusive in this section.

OUTBOARD FAN AND PULLEY

10. DESCRIPTION

The outboard fan is a six headed blower type fan and is mounted on a shaft extending through an opening in the radiator. The fan pulley rotates on tapered roller bearings and is belt driven.

11. REMOVAL (Ref. Nos. Refer to Illust. 1.)

NOTE: It is possible to remove the outboard fan pulley and shaft without first removing the radiator.

1. Remove the fan hub nut (19). Remove the mounting screws and lift the fan from the hub (16).
2. Use a standard three leg puller and pull the fan hub (16) from the fan shaft (13).

NOTE: The fan hub has an interference fit of .002 inch.

3. Remove the mounting cap screws from the fan spindle (1) and remove the fan pulley and shaft assembly from the thermostat housing. (Refer to Illust. 6.)

12. DISASSEMBLY (Ref. Nos. Refer to Illust. 1)

Clean the assembly to remove dirt and grease before proceeding with the steps of disassembly. Also, be prepared to handle the oil that will be released when the fan shaft (13) is removed from the fan pulley (7). The cavity in the pulley will be approximately half full of oil.

1. Remove the four screws that secure the fan shaft (13) to the hub of the pulley (7). Remove the "O" ring (12).
2. Pull the cotter pin (20) from the fan spindle (1) and remove the spindle nut (11).
3. Remove the washer (10) and outer bearing cone (9). Pull the fan spindle (1), oil seal (2) and the bearing cone, inner (3) from the fan pulley (7).

If inspection reveals that the bearings must be replaced, the bearing cups may be pulled with a three jaw puller. The bearing snap rings (5) may be left in the fan pulley (7).

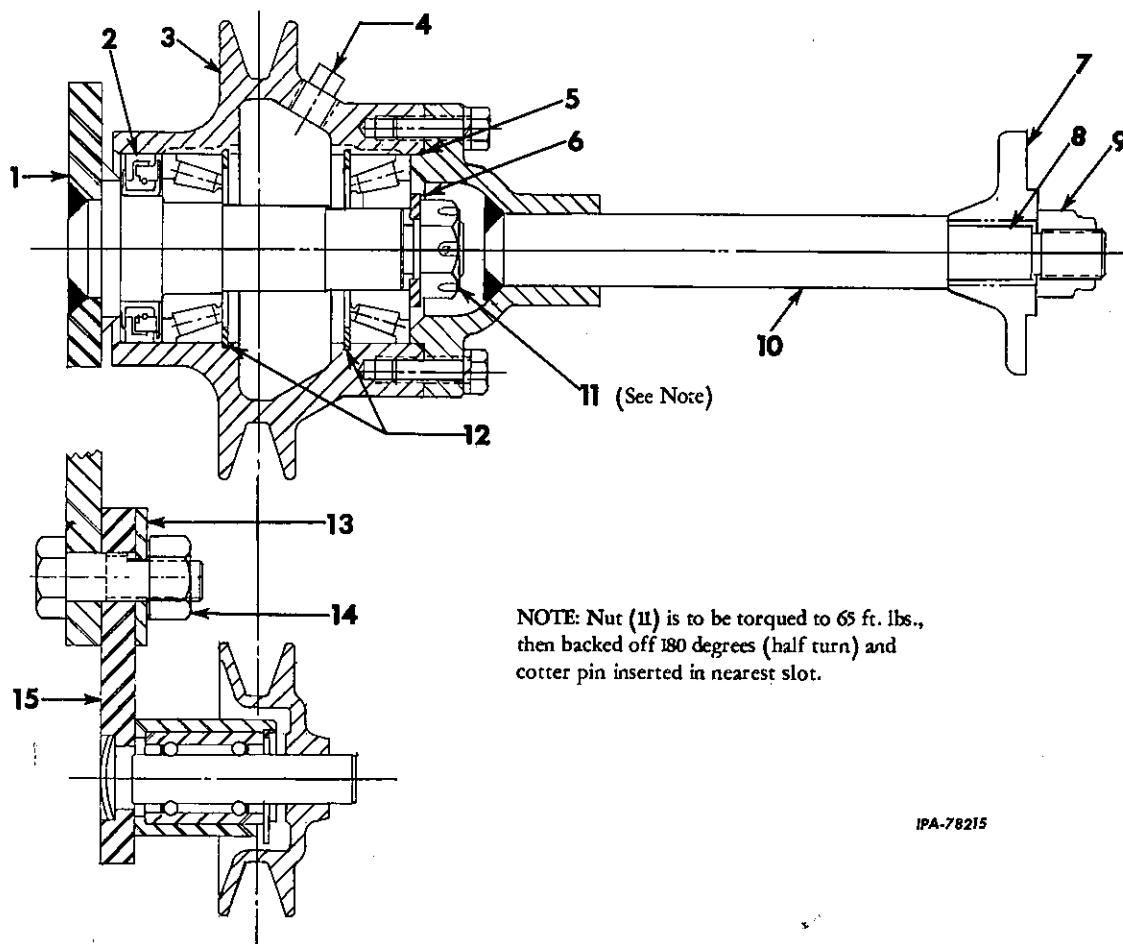
4. If necessary to service the idler bearing (25), remove the expansion plug (23) and press the bearing out and remove the pulley (27). Remove the nut (21) and the adjustable arm may be removed from the fan spindle (1). Remove the fan spindle (1).

Continued on next page.



OUTBOARD FAN AND PULLEY

12. DISASSEMBLY (Ref. Nos. Refer to Illust. 1) — Continued



Illust. 6 Cross Section of Fan Pulley, Shaft and Hub Assembly.

- | | |
|--------------------------|---------------------------------|
| 1. Fan spindle assembly. | 9. Fan hub nut. |
| 2. Oil seal. | 10. Fan flange and shaft. |
| 3. Fan pulley. | 11. Fan spindle nut. |
| 4. Pipe plug. | 12. Bearing retainer snap ring. |
| 5. Flange "O" ring. | 13. Idler adjusting washer. |
| 6. Spindle nut washer. | 14. Idler adjusting nut. |
| 7. Fan hub. | 15. Idler pulley and arm. |
| 8. Fan hub key. | |



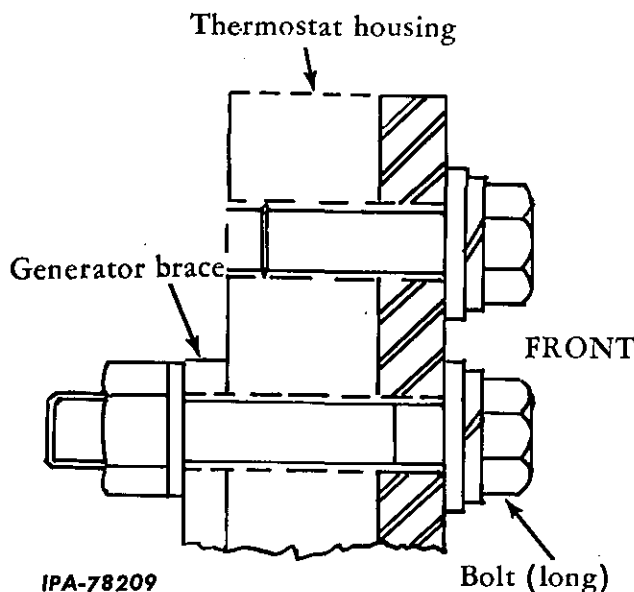
OUTBOARD FAN AND PULLEY

13. INSPECTION AND REPAIR

1. Clean all parts thoroughly in a good solvent and blow dry with clean filtered air.
2. Inspect the hub bearings for excessive wear and replace if necessary. The idler bearing is not repairable and should be replaced as a unit.
3. The tapered roller bearing cups should be free of scratches or ridges as well as the bore in the fan pulley from which they were pressed. Stone out any roughness and replace the bearings if necessary.
4. Inspect the fan pulley for cracks or "chip-out" in the flange area and replace if damaged in this manner.
5. Inspect the fan spindle (1, Illust. 1) for any possible damage in the area occupied by the bearing cups and oil seal. Minor scratches may be stoned out but, if there is any doubt as to its serviceability, replace with a new part.

14. REASSEMBLY (Ref. Nos. Refer to Illust. 1)

1. If it was necessary to replace the idler bearing (25), obtain a new one and press it into the adjustable arm (24). Install the expansion plug (23) and bearing retainer (26). Install the pulley (27).



Illust. 7—Installation Sketch. Refer to "NOTE."

NOTE: Before mounting the fan pulley (3) on the fan spindle (1), install the longer of the four bolts in the bracket. This bolt (Refer to Illust. 7) secures the generator brace also and is too long to install after the pulley is installed on the shaft.

2. Press a new oil seal (2) on the fan spindle (1). Be sure the "oil side," stamped on the seal, is toward the pulley (7) when installed.
3. Place the bearing cone, inner (3) in the fan spindle (1) and slide the spindle into the fan pulley (7). Use engine oil on all parts as installed to provide pre-operational lubrication. Set the assembly in a vertical position with the spindle upward. Place the bearing cone, outer (9) on the spindle. Install the washer (10) and nut (11). Turn the pulley a few revolutions and tighten the nut (11). Refer to Illust. 6, and the "Note". Check the end play of the pulley and compare with "SPECIFICATIONS" in Par. 2 of this Section.

If the bearing cups, inner and outer, were pulled for replacement, press in new cups and install new cones. Then, proceed as above.

4. Install a new "O" ring (12) and attach the fan shaft (13) to the fan pulley (7) with the four screws.

5. Remove the pipe plug (6) from the pulley and fill the cavity half full of oil. The grade of oil will depend upon the seasonal temperatures. Use MPL, SAE 140 above 32 degrees F., SAE 80 from 32 degrees F to -20 degrees F., MIL-L-10324A below -20 degrees F.

15. INSTALLATION (Ref. Nos. Refer to Illust. 1.)

1. Install the shaft key (14). Install the fan pulley and shaft to the thermostat housing and secure with the mounting bolts.
2. Preheat the fan hub (16) so it can be shrink-fitted to the fan shaft (13). The fit of the hub is .000 to .002 inch tight. Align the hub with the shaft key and tap it in place carefully but quickly.
3. Bolt the fan (17) to the hub. Install the nut (19) and tighten securely.





1. GENERAL DESCRIPTION

The electrical system consists of a magneto or distributor and coil, a starting system (if so equipped) a lighting system (if or when supplied) and one or two 6 volt batteries, as required.

MAGNETO IGNITION. The magneto generates its own spark and delivers the impulse to each of the spark plugs at the proper time, as determined by the distributor in accordance with the firing order of the engine. Carbureted engines are equipped with a push-pull type magneto grounding switch. Diesel engines are equipped with a magneto grounding switch located in the intake manifold, which automatically cuts out the ignition when changing over from gasoline starting to diesel operation.

BATTERY IGNITION. This type of ignition has the low voltage supplied by a battery (or batteries) and the high voltage is induced by low voltage surges in the ignition coil. These surges are regulated by the distributor breaker points. The high voltage from the coil enters the center of the cap and rotor. The rotor distributes this voltage through the distributor cap terminals and high tension cables to the proper spark plug which is timed for firing at that instant.

A coil resistor in the manifold switch-to-ignition coil circuit on the 6 (61) and 9 (91) series crawl-

er tractors only, eliminates the possibility of the coil overheating if the engine is operated too long on the gasoline cycle.

Carbureted engines are equipped with a battery (or batteries), distributor, coil, spark plugs and an ignition switch.

Gasoline starting diesel engines are equipped with a battery (or batteries), distributor, coil, spark plugs, ignition switch and an ignition cut-out switch which is located in the intake manifold, and automatically cuts out the ignition when changing over from gasoline starting to diesel operation.

Direct starting diesel engines (282 series) are equipped with batteries, glow plugs, glow plug switch and glow plug meter.

The starting system includes batteries, cranking motor, generator, voltage and current regulators and cut-out relay. The electrical system is basically a single wire, ground return type with one terminal of the battery grounded.

For further description of each component and complete servicing, specifications, etc., refer to the pertinent "Engine Manual."

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C



CONTENTS

Paragraph	Page
DIESEL	
1. Removal	1-3
2. Installation.	3-5
CARBURETED	
3. Removal	5, 6
4. Installation.	6, 7



DIESEL

1. REMOVAL

1. 6 AND 9 SERIES: Remove the exhaust muffler and the gasoline tank filler cap.

6 (61) AND 9 (91) SERIES: Remove the exhaust pipe extension and gasoline tank filler cap; also the air stack cap.

6 (62) AND 9 (92) SERIES: Remove the exhaust pipe extension and the air stack cap.

2. 6, 6 (61), 9 AND 9 (91) SERIES: Turn off the diesel fuel at the tank, and turn off the gasoline at the fuel shut-off valve.

6 (62) AND 9 (92) SERIES: Turn off the diesel fuel at the tank.

3. Remove the cap screws that secure the engine hood to the radiator at the front, and to the dash at the rear. Remove the hood.

4. Drain the cooling system completely.

5. Remove the ground cable from the battery located beneath the seat. Remove the rotor cable from the center of the distributor cap.

6. Disconnect the wires for the headlights. Disconnect the cables from the generator and cranking motor. Tag all wires to facilitate correct installation. Remove the harness from the clips on the engine on side channel and tie out of the way.

6 AND 9 SERIES: The harness and regulator will be removed with the radiator.

6 (61) AND 9 (91) SERIES: The regulator is under the seat and need not be removed.

6 (62) AND 9 (92) SERIES: The regulator is on the dash under the instrument panel and need not be removed.

7. Disconnect the inlet and outlet connections of the radiator to the engine. Remove the gasoline tube from the tank to the carburetor at the sediment bowl on the 6, 6 (61), 9 and 9 (91) series.

6 AND 9 SERIES ONLY: The gasoline tank will be removed with the radiator.

8. Remove the radiator. (Refer to Section 2.)

9. Remove the cotter and disconnect the control rod from the cross shaft on the left side of the engine.

10. 6 AND 9 SERIES: Loosen the air cleaner hose connection at the manifold pipe. Remove the tube from the injection pump air cleaner.

11. Remove the heat indicator plug from the cylinder head, the long cable from the ammeter and oil pressure gauge tubing.

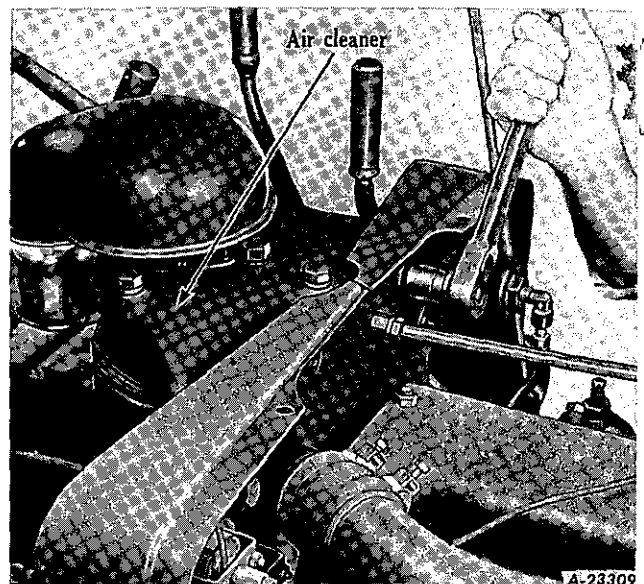
12. 6, 6 (61), 9 AND 9 (91) SERIES ONLY: Disconnect the choke and venturi rods from the starting carburetor.

13. 6, 6 (61), 9 AND 9 (91) SERIES ONLY: Disconnect the diesel fuel supply and return lines at the connectors just forward of the fly-wheel housing.

6 (62) AND 9 (92) SERIES: Disconnect the forward end of the diesel fuel supply lines at the filters and the injection pump. Loosen the supply line clip and move the lines away enough to clear the engine when it is lifted.

14. Tie back the steering control hand levers to provide working space.

6 AND 9 SERIES: Remove the air cleaner. (Refer to the operator's manual.) The governor control hand lever and rod will be removed with the air cleaner. (See Illust. 1 and 2.)



Illust. 1 - Removing Air Cleaner Securing Nuts (6 and 9 Series).

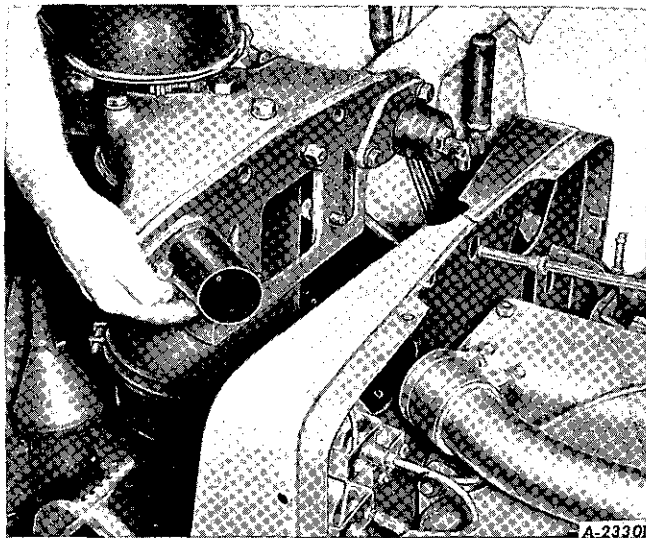
15. Remove the clutch compartment cover from the rear main frame. Remove the clutch hand lever and release shaft.

Continued on next page.



DIESEL

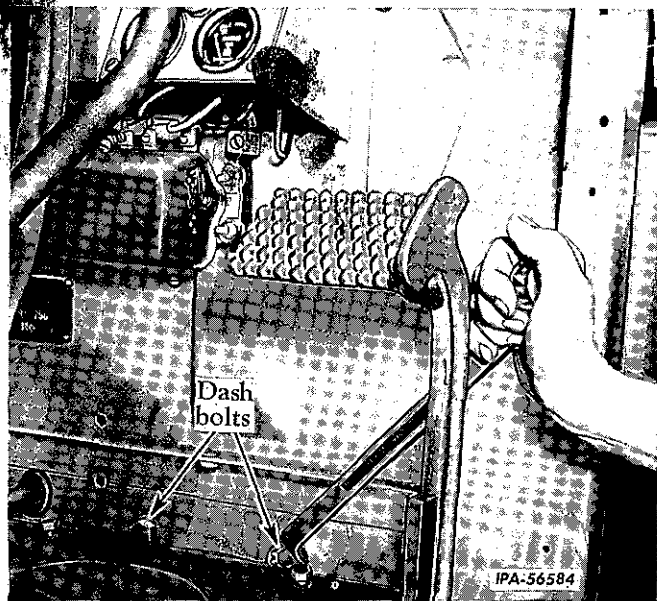
1. REMOVAL - Continued



Illust. 2 - Removing Air Cleaner (6 and 9 Series).

16. Remove the bolts which secure the dash to the engine. (See Illust. 3.)

17. Remove the cranking motor foot button as found on early model tractors. Remove the cranking motor. (Refer to the "Engine Manual", ISS-1035 or ISS-1040.)



Illust. 3 - Removing Bolts which Secure Dash to Rear of Engine (6(62) Series Shown).

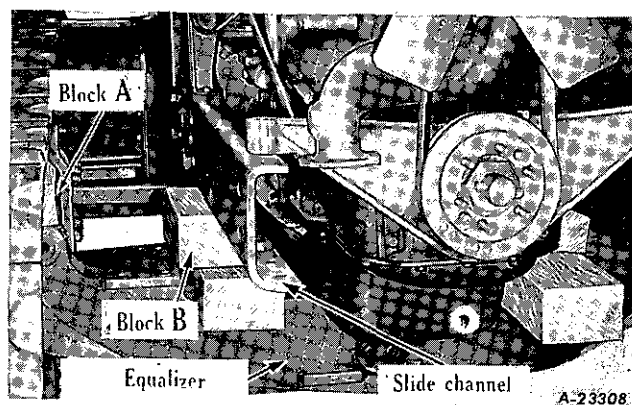
18. 6, 6 (61), 9 AND 9 (91) SERIES ONLY: Disconnect the engine compression release lever rod at the cross shaft bracket.

ISS-1032B (6-64)

19. Remove the crankcase guard, if used.

20. Remove the equalizer spring pivot shaft cap.

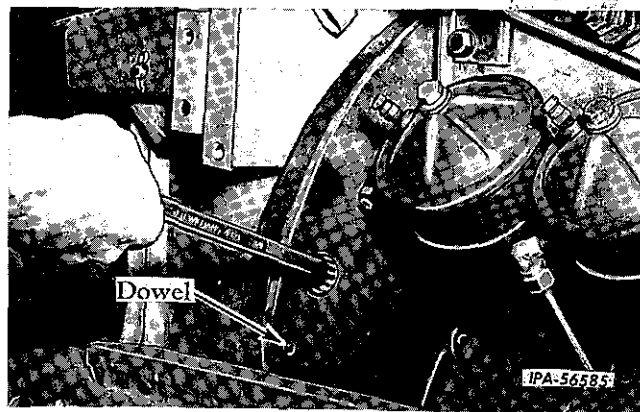
21. Place blocks between the track frame guide plates above the rollers (See "A" in Illust. 4.)



Illust. 4 - Installing Blocks between Track Frame Guide Plates (6 and 9 Series Shown).

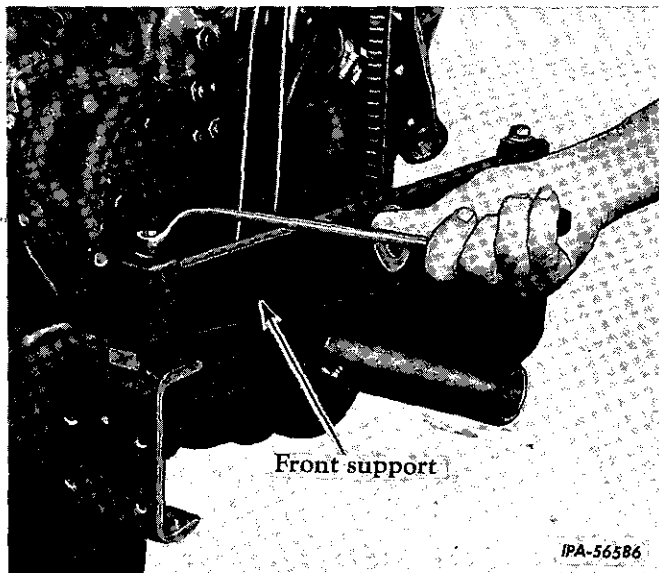
22. Remove the cap screws which secure the rear of the engine to the flywheel housing. (See Illust. 5.)

23. On tractors so equipped, remove the dowels (Illust. 5) which secure the engine rear plate to the flywheel housing, by turning on the nuts. New tractors are equipped with step dowels which do not have to be removed.



Illust. 5 - Removing Cap Screws which Secure Engine to Flywheel Housing (6(62) Series Shown).

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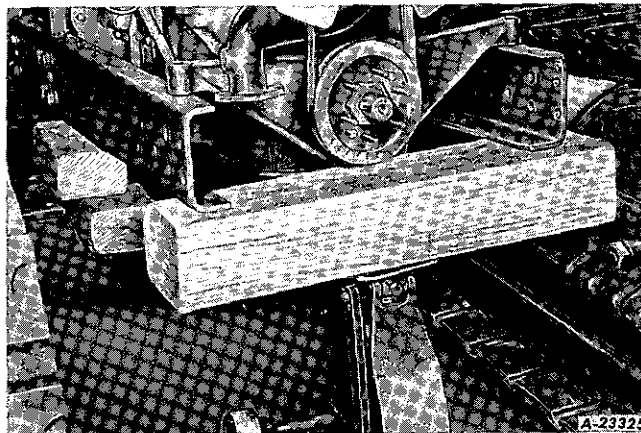
Illust. 6 - Removing Engine Front Mounting Bolt (6(62) Series Shown).

24. Remove the engine front mounting bolts. (See Illust. 6.) Spacers are located at this point.

25. Disconnect the engine clutch coupling by removing three cap screws.

26. Place a jack below the forward ends of the side channels. Position a block between the jack and the side channels. Raise the tractor at its front end. The blocks previously placed between the track frame guide plates will prevent the equalizer from being lifted. Raise the jack sufficiently to give clearance for the bottom of the engine rear plate to pass over the top of the equalizer spring or rigid crossbar. (See Illust. 7) Blocks can also be placed below the side channels and on the equalizer as shown in "B," Illust. 4.

27. Position a sling around the engine and fasten the hook of a hoist to the sling in a position to give an even lift. Hoist the engine and remove the spacers located below the engine front mounts.



Illust. 7 - Jack and Blocks in Position below Side Channels (6 and 9 Shown - others similar).

28. Move the engine forward so that the flywheel will pass evenly through the front frame aperture. Difficulty may be encountered through the flywheel binding against the rim of the aperture in the front frame. It is necessary to bring the engine evenly forward and to eliminate any tilt by adjusting the position of the hook in the sling.

2. INSTALLATION

NOTE: The following procedure is based on the assumption that the engine clutch was removed with the engine.

1. Prepare the engine for hoisting with a sling. Adjust the hook in the sling to support the engine in a level position.

2. Move the engine carefully into position and guide the flywheel through the aperture in the front frame. The front mounting spacers should be put in place.

Continued on next page.



DIESEL

2. INSTALLATION - Continued

3. Lower the engine onto the frame and remove any blocking from the side channels. Lower the jack at the front end of the tractor, and remove the block between the jack and side channels. (See Illust. 4 and 7.)

4. Install the engine front mounting bolts and spacers. (See Illust. 6.)

5. On tractors so equipped, install the dowels (Illust. 5) which secure the engine rear plate to the flywheel housing.

6. Install the cap screws that secure the rear of the engine to the flywheel housing. (See Illust. 5.)

7. Remove the blocks from between the track frame guide plates above the rollers. (See "A" in Illust. 4.)

8. Install the equalizer spring support saddle below the forward end of the drawbar, and install the spring pivot shaft retaining washer. If the tractor is equipped with a rigid crossbar, install the cap screws that secure it to the track frame. Torque all cap screws to specified torque. (Refer to Section 9 for coverage of the "Rigid Crossbar.")

9. Install the crankcase guard, if so equipped.

10. 6, 61, 9 AND 91 SERIES: Connect the compression release lever rod at the cross shaft bracket.

11. Install the cranking motor. (Refer to the "Engine Manual," ISS-1035 or ISS-1040.) Install the cranking motor foot button. (Early model tractors only.)

12. Install the bolts and secure the dash to the engine. (See Illust. 3.)

13. Install the clutch hand lever and release shaft. Install the clutch compartment cover to the rear main frame.

14. Release the steering control hand levers.

6 AND 9 SERIES: Install the air cleaner. (See operator's manual and Illust. 1 and 2.)

15. 6, 6 (61), 9 AND 9 (91) SERIES: Connect the diesel fuel supply and return lines at the connectors just forward of the flywheel housing.

6 (62) AND 9 (92) SERIES: Connect the fuel lines to the injection pump and to the fuel filters.

16. 6, 6 (61), 9 AND 9 (91) SERIES ONLY: Connect the choke and venturi rods to the starting carburetor.

17. Install the heat indicator plug to the cylinder head, the long cable from the ammeter and the oil pressure gauge tubing.

18. 6 AND 9 SERIES: Install the tube to the injection pump air cleaner. Connect the air cleaner hose to the connection at the manifold pipe.

19. Connect the control rod to the cross shaft on the left side of the engine.

20. Install the radiator. (Refer to Section 2.) Connect the inlet and outlet connections of the radiator to the engine.

21. 6, 6 (61), 9 AND 9 (91) SERIES: Install the gasoline tube from the tank to the carburetor at the sediment bowl.

6 AND 9 SERIES: The gasoline tank is attached to the radiator.

22. Install and connect all the cables, wires and harnesses as marked for identification. Connect the generator and cranking motor cables.

6 AND 9 SERIES: The harness and regulator are attached to the radiator.

61 AND 91 SERIES: The regulator is under the seat and was not removed.

6 (62) AND 9 (92) SERIES: The regulator is attached to the dash under the instrument panel and was not removed.

23. Install the hood and secure with cap screws to the radiator at the front, and to the dash at the rear.

24. 6, 6 (61), 9 AND 9 (91) SERIES ONLY: Open the diesel fuel valve at the tank. Open the valve at the gasoline tank.

25. 6 AND 9 SERIES: Install the exhaust muffler and the gasoline tank filler cap.



6 (61) AND 9 (91) SERIES: Install the exhaust pipe extension and gasoline tank filler cap; also the air stack cap.

6 (62) AND 9 (92) SERIES: Install the exhaust pipe extension and the air stack cap.

26. Fill the complete cooling system and check connections for tightness and for leaks.

27. Install the battery ground cable. Install the rotor cable to the center of the distributor cap.

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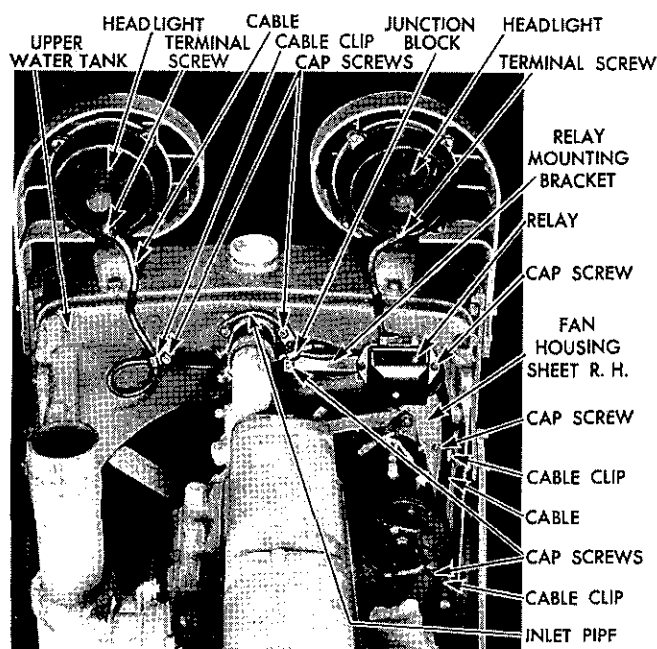
3. REMOVAL

1. Drain the cooling system by opening the cock located below the radiator lower tank. Also open the valve on the side of the engine.

2. Remove the engine hood and side sheets.

3. Remove the crankcase guard, radiator guard and front bumper, if so equipped.

4. Remove the battery ground strap from the battery. Disconnect the cable from the armature (A) terminal on the generator; tag the cable end "A" to facilitate replacement. Disconnect the cable from the field terminal "F" on the generator, and tag it "F." Bend open the cable clips at the top of the generator and at the lower side of the magneto bracket. Pull the cable from behind the generator and magneto. (See Illust. 8.)



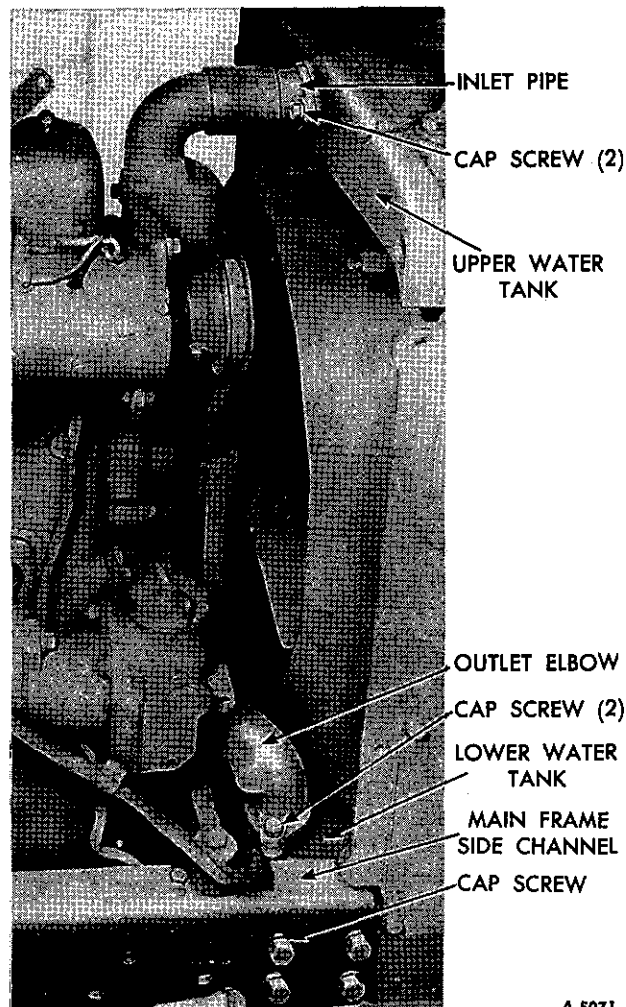
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Illust. 8 - Removing Electrical Connections from Rear of Radiator.

5. Remove the radiator. (See Illust. 9 and 10), and refer to Section 2.)

6. Remove the cap screws with nuts and lock washers which secure the cable harness to the under side of the right main frame side channel. Move the cable to the tracks to avoid fouling during engine removal.

Continued on next page.



A-5071

Illust. 9 - Removing Radiator.



CARBURETED

3. REMOVAL - Continued

7. Disconnect the carburetor choke control rod at the carburetor. (See Illust. 11.) Disconnect the control rod and the oil pressure gauge tubing from the engine and gauge, and remove the tubing.

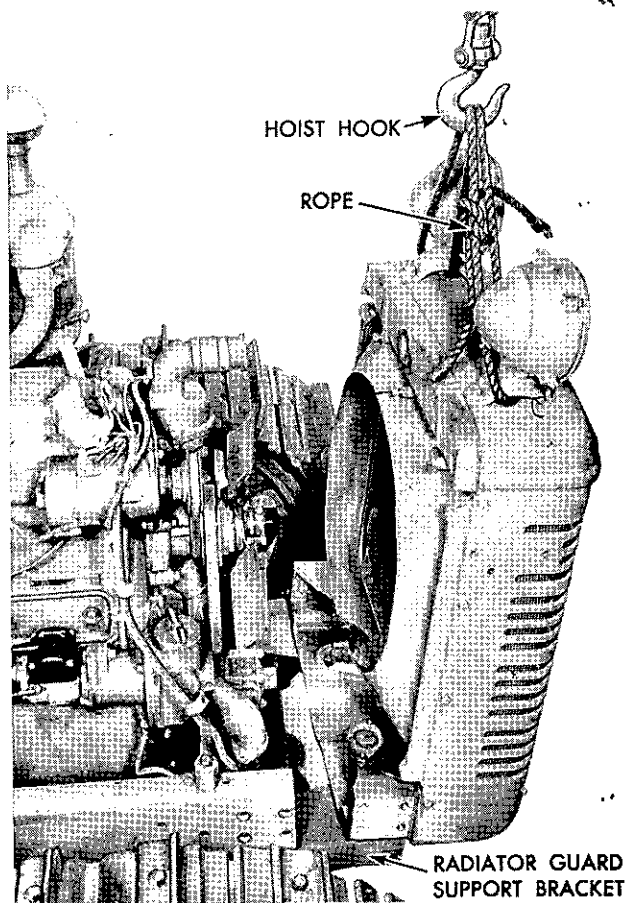
8. Remove the air cleaner pipe from the top of the manifold and from the pipe flange of the carburetor. (See Illust. 11.) Lift the air cleaner pipe, with hose connections and gasket, from the engine. Disconnect the breather pipe from its connection on the side of the cylinder head. Remove the breather tube.

9. Tie back the steering control levers to provide working space. Remove the brake pedal pads.

10. Remove the clutch compartment cover.

11. Remove the cranking motor. (Refer to the pertinent "Engine Manual.")

12. Turn off the gasoline at the tank and remove the fuel lines to the carburetor.



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Illust. 10 - Removing Radiator.

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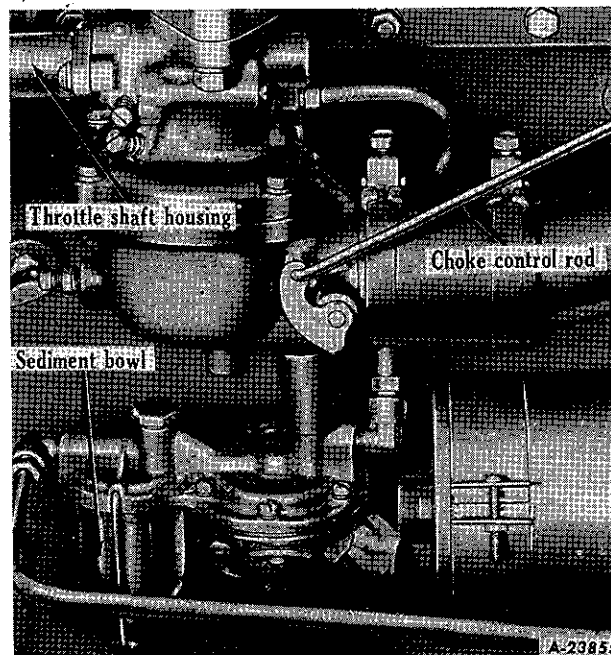
13. Remove the engine clutch. (Refer to Section 5.)

14. Remove the cap screws that secure the engine rear plate to the flywheel housing.

15. Remove the engine front mounting bolts. Shims are located at these points.

16. Arrange blocks to make a reliable stand to receive the engine.

17. Position the sling around the engine and raise it evenly from position. It will be necessary to move the engine forward so that the flywheel will pass evenly through the opening in the housing.



Illust. 11 - Carburetor and Connections (T-6).

4. INSTALLATION

1. Place a sling around the engine and adjust the hook in the sling so as to be able to raise and lower it evenly. Arrange wood blocks as in Par. 2 to receive the engine.

2. With the mounting bolt shims in place, install the engine front mounting bolts.

3. Install the cap screws which secure the engine rear plate to the flywheel housing.

4. Install the engine clutch-if it was removed. (Refer to Section 5.)

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CARBURETED

5. Install the fuel lines to the carburetor and open on the valve.
6. Install the cranking motor. (Refer to the pertinent "Engine Manual.")
7. Replace the clutch compartment cover.
8. Install the brake pedal pads. Untie the steering control levers. Replace the floor plates.
9. Install the breather tube. Connect the breather pipe on the side of the cylinder head. Connect the air cleaner pipe to the manifold and to the pipe flange of the carburetor. (See Illust. 11.)
10. Connect the carburetor choke control rod at the carburetor, and oil pressure gauge tubing to the engine.
11. Secure the cable harness to its proper place on the underside of the right main frame side channel.
12. Install the radiator. (See Illust. 9 and 10 and refer to Section 2.)
13. Install the electrical connections to the generator in reverse order given in paragraph 3, step 4. (See Illust. 8.)
14. Install the front bumper, radiator guard and crankcase guard, - if so equipped.
15. Install the air cleaner (on late models). Install the hood and side sheets. Early models are equipped with air cleaner mounted in front of the operator slightly below hood level. Late model tractors are equipped with under-the-hood type air cleaners.
16. Install the air cleaner cap and exhaust muffler extension pipe. Install the gasoline tank cap.
17. Close the water drain valve on the lower side of the engine and the drain cock on the radiator lower tank. Fill the cooling system and check all connections for possible leaks.





CONTENTS

Paragraph	Page
1. Description	1
2. Specifications	1, 2
3. Checking Mechanical Problems	2
4. Removal	5
5. Disassembly	5, 6
6. Inspection and Repair	7, 8
Removing "Bonded On" Engine Clutch Facings	7, 8
7. Reassembly	8, 9
8. Installation	9
9. Adjustments	9, 10
10. Clutch Alignment	10-15
11. Checking Friction Surfaces	15, 16

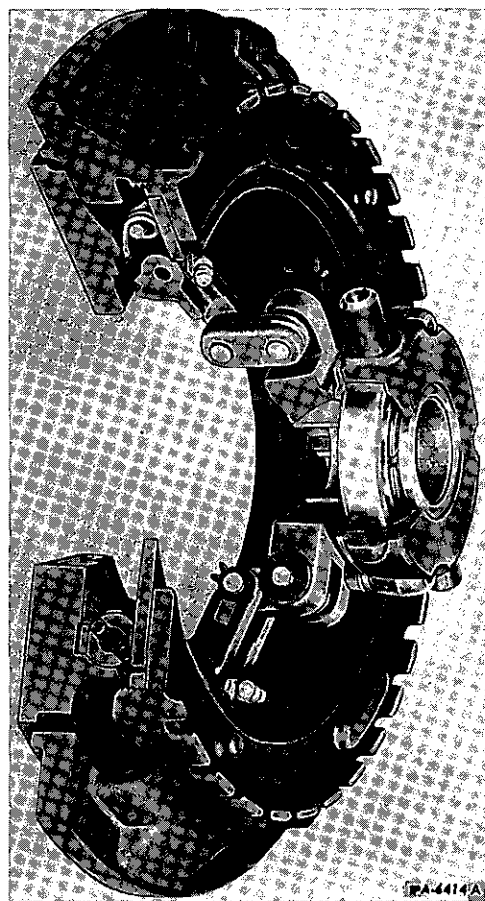


1. DESCRIPTION

The clutch cover, or back plate, is fastened to the engine flywheel. The driving unit of the clutch, consisting of the pressure plate, cams or toggles, release bearing, carrier, etc., is attached to the back plate and turns with it.

The driven unit, which consists of the clutch shaft and driven member, is supported on the pilot and transmission bearings (or clutch shaft outer bearing). This independent assembly revolves as a unit with the driving unit only when the clutch is engaged.

This is a hand-operated, singleplate, over-center clutch with ball-bearing release. The clutch has two rollers in each release cam to prevent wear and binding. The release mechanism has an automatic clutch brake which facilitates the shifting of transmission gears. No adjustment of the clutch brake is necessary.



Illust. 1 - Cutaway View of Clutch Driving Unit (Rockford)
(9(91) Series Shown).

2. SPECIFICATIONS

	6, 6 (61) and 6 (62) Series	9, 9 (91) and 9 (92) Series
Make	Rockford	Rockford
Type	Over-center	Over-center
Size, inches	12	13
Plates used (driven member)	1	1
Facings used: Bendix cerametallic, each side	4	4
Bi-metallic (sintered bronze)	2	2
Semi-metallic	2	2
Feramic	2	2
Allowable out-of-flat in pressure plate, inch . . . . .	.006	.006
Release fork, bushings and bearing carrier:		
Fork slot width, inch . . . . .	.810 - .814	.810 - .814
Bushings: O.D. at flats, inch . . . . .	.804 - .808	.804 - .808
I.D. (fits on carrier trunnion) inch . . . . .	.625 - .627	.625 - .627
Carrier trunnion diameter, inch . . . . .	.620 - .623	.620 - .623
Release sleeve bushings (split type)	2	2
I.D. inch (when pressed into 1.625 - 1.626 sleeve bore).	1.500-1.502	-
I.D. inch (when pressed into 1.875 - 1.876 sleeve bore).	-	1.750-1.752
Clutch shaft (carrier assembly bearing surface) O.D. inch	1.495-1.497	1.745-1.747

Continued on next page.



2. SPECIFICATIONS - Continued.

	6, 6 (61) and 6 (62) Series	9, 9 (91) and 9 (92) Series
Drive lugs and drive slots:		
Drive lug width, inch . . . . .	.612 - .615	.994 - .997 (91)
Drive slot width, inch . . . . .	.625 - .628	1.495-1.500 (92)
Release cams, cam saddles and cam blocks:		
Cam diameter, inch. . . . .	.870 - .872	.870 - .872
Saddle width, inch . . . . .	.875 - .877	.875 - .877
Clearance, inch . . . . .	.003 - .007	.003 - .007
Maximum allowable total wear of cams and saddles, inch	1/16	1/32
Return springs (helical)	-	6 (92)
Free length, inch	-	2-5/32
Test length, inch	-	1-5/8
Test load, pounds	-	48 ± 3 (91)
		75 ± 4 (92)

3. CHECKING MECHANICAL PROBLEMS

PROBABLE CAUSE

CLUTCH DRAGS

REMEDY

1. Improper adjustment Adjust clutch lever free travel.
2. Excessive dirt in clutch assembly Remove clutch and clean. Replace worn parts.
3. Warped or cracked driven member or pressure plate Install new driven member and/or pressure plate.
4. Weak return springs Replace return springs.

CLUTCH SLIPS

1. Improper adjustment of clutch Adjust clutch.
- *2. DIRT OR OIL ON CLUTCH Driven member *Install new facings.
- *3. Clutch driven member glazed or worn *Inspect driven member. Replace if necessary.
- *4. Torn clutch facing *Install new facings.
5. Lack of lubricant in clutch Lubricate clutch. Refer to "Lubrication Chart" in the operator's manual.
6. Worn cam shafts or blocks Replace cam shafts and blocks.

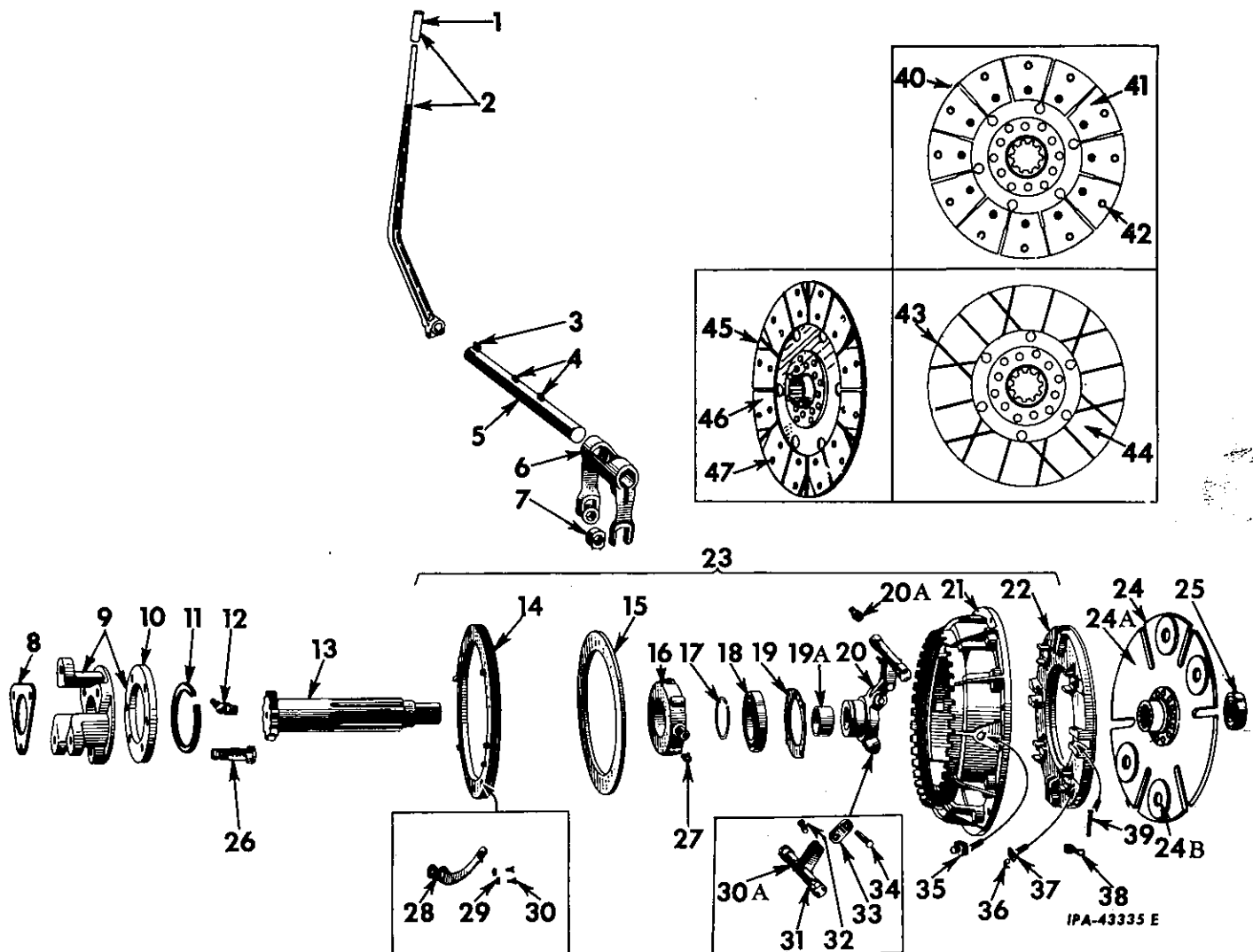
*CLUTCH GRABBING

1. Oil on facings Install new facings.

CLUTCH NOISY

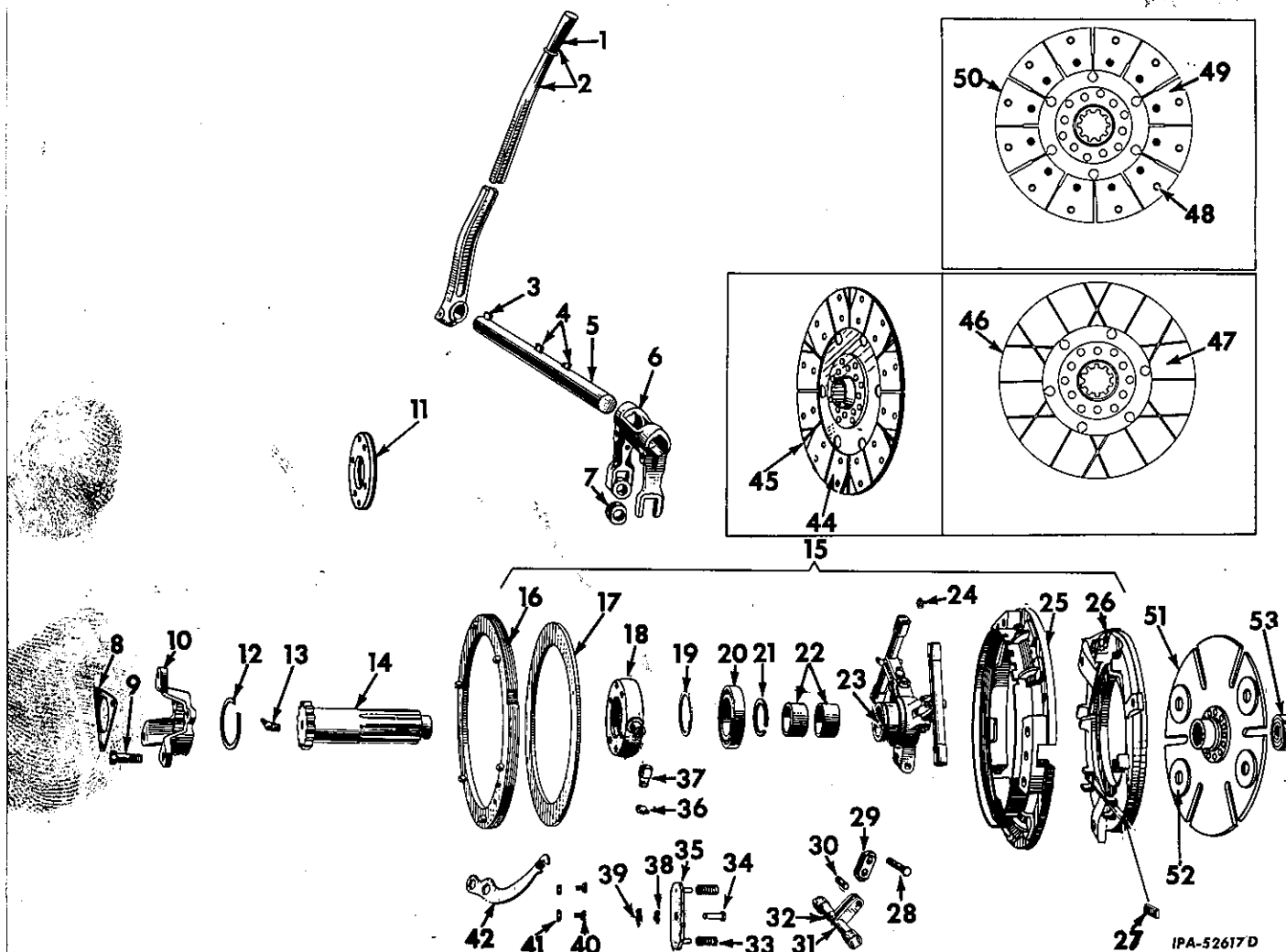
1. Excessive clearance at driving lugs Install new pressure plate.
2. Loose engine mountings Tighten engine mountings.
3. Cracked driven member hub plate Install new driven member and check alignment.
4. Worn splines in hub or clutch shaft Replace the driven member and clutch shaft.
5. Defective pilot or throwout bearing Inspect and replace if not serviceable. Check for lack of lubrication.

* Does not apply to cerametallic clutch facings.



Illustr. 2 - Exploded View of Over-Center Engine Clutch (6(62) Series) (Rockford) (6(61) Series Similar).

- | | | |
|------------------------------|--|---|
| 1. Hand lever handle. | 20A. Lubrication fitting. | 36. Washer. |
| 2. Hand lever. | 21. Back plate. | 37. Camblock. |
| 3. Key. | 22. Pressure plate. | 38. Return spring. |
| 4. Key. | 23. Clutch cover, assembly. | 39. Spring pin. |
| 5. Release shaft. | 24. Driven member. | 40. Driven member w/bi-metallic facing. |
| 6. Release fork. | 24A. Package, field service clutch facing (cerametallic) | 41. Package, field service clutch facing (bi-metallic). |
| 7. Release pin bushing. | 24B. Clutch facing rivet. | 42. Rivet, clutch facing. |
| 8. Shaft end plate. | 25. Pilot bearing. | 43. Member, driven clutch w/semi-metallic facing. |
| 9. Clutch coupling. | 26. Coupling dowel bolt. | 44. Package, field service clutch facing (semi-metallic). |
| 10. Brake facing. | 27. Lubrication fitting. | 45. Driven member. |
| 11. Snap ring. | 28. Adjusting ring lock. | 46. Package, field service clutch facing (feramic). |
| 12. Lubrication fitting. | 29. Hex nut. | 47. Rivet, tubular clutch facing. |
| 13. Clutch shaft. | 30. Lock screw. | |
| 14. Adjusting ring. | 30A. Lubrication fitting. | |
| 15. Adjusting ring plate. | 31. Camshaft. | |
| 16. Release bearing carrier. | 32. Link pin, short. | |
| 17. Snap ring. | 33. Connecting link. | |
| 18. Release bearing. | 34. Link pin, long. | |
| 19. Bearing plate. | 35. Drive stud. | |
| 19A. Bushing. | | |
| 20. Sleeve. | | |



Illust. 3 - Exploded View of Over-Center Clutch, 13", Hand Operated (Rockford) (9(92) Series Shown) (9(91) Series Similar).

- | | | |
|--------------------------|--------------------------|--|
| 1. Handle. | 21. Snap ring. | 41. Nut. |
| 2. Hand lever. | 22. Sleeve bushing. | 42. Adjusting ring lock. |
| 3. Key. | 23. Sleeve. | 43. Tubular rivet. |
| 4. Key. | 24. Lubrication fitting. | 44. Clutch facing (feramic). |
| 5. Release shaft. | 25. Back plate. | 45. Driven member. |
| 6. Release fork. | 26. Pressure plate. | 46. Member, driven clutch w/semi-metallic facing. |
| 7. Release pin bushing. | 27. Camblock. | 47. Package, field service, clutch facing (semi-metallic). |
| 8. End plate. | 28. Link pin, long. | 48. Clutch facing rivets. |
| 9. Dowel bolt. | 29. Connecting link. | 49. Package, field service, clutch facing (bi-metallic). |
| 10. Coupling. | 30. Link pin, short. | 50. Member, driven (clutch w/bi-metallic facing). |
| 11. Facing. | 31. Camshaft. | 51. Member, driven clutch w/cerametallc facing. |
| 12. Snap ring. | 32. Lubrication fitting. | 52. Package, field service clutch facing (cerametallc). |
| 13. Lubrication fitting. | 33. Return spring. | |
| 14. Clutch shaft. | 34. Retaining pin. | |
| 15. Clutch assembly. | 35. Return spring stop. | |
| 16. Adjusting ring. | 36. Lubrication fitting. | |
| 17. Adjusting plate. | 37. Fitting adaptor. | |
| 18. Bearing carrier. | 38. Pin washer. | |
| 19. Snap ring. | 39. "X" washer. | |
| 20. Throw-out bearing. | 40. Ring lock screw. | |

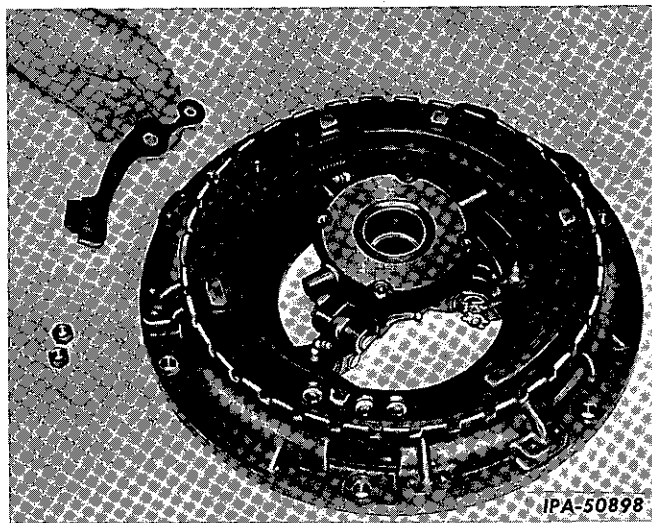


4. REMOVAL (See Illust. 3.)

1. Lock the steering brake pedals forward and tie back the steering clutch levers to give working space. Remove the floor plates and supports.
2. Remove the clutch compartment cover.
3. Engage the clutch and remove the three nuts and bolts from the end plate (8) and the three clutch coupling dowel bolts (9). Release the clutch and rotate to remove the lower dowel bolts. Remove the lubrication fitting (13) to avoid knocking it off when lifting the clutch out. Re-engage the clutch.
4. Remove the release shaft (5), release fork (6) and bushing (7).
5. Remove the six clutch mounting bolts.
6. Slide the clutch shaft (14) back and out of the pilot bearing and lift the clutch out.

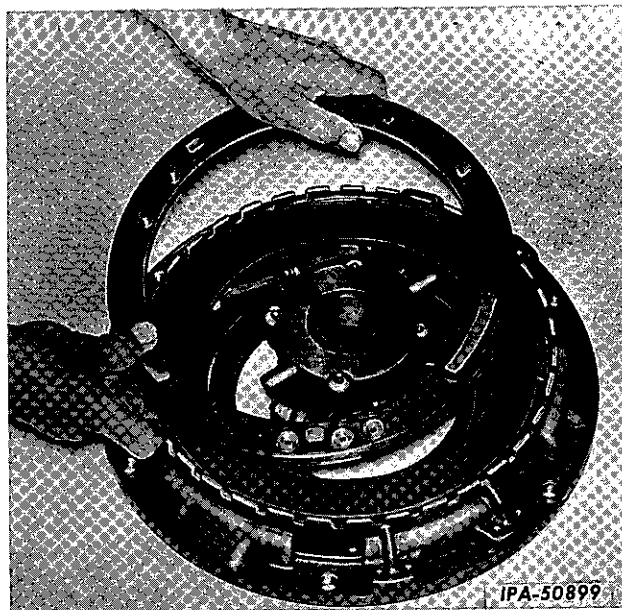
5. DISASSEMBLY (Refer to Illust. 3)

1. Slide the driven member (51) from the clutch shaft (14). Pull out the clutch shaft.
2. Remove the adjusting ring lock (42). See Illust. 4. Turn out the adjusting ring (16) and remove the adjusting ring plate (14). See Illust. 5.

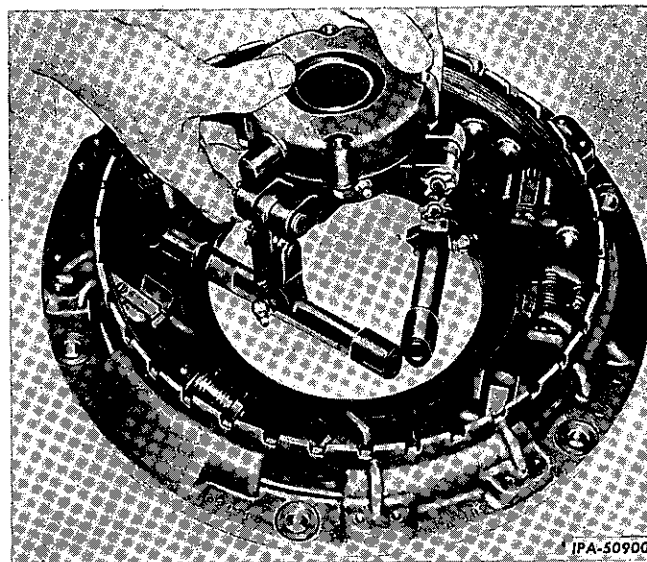


Illust. 4 - Removing the Adjusting Ring Lock.

3. Lift out the sleeve assembly (23). See Illust. 6 and 7.
4. Drive out the connecting link pins, short (33) and long (28) from the connecting link (29) and camshaft (31). See Illust. 12.



Illust. 5 - Removing the Adjusting Ring Plate.

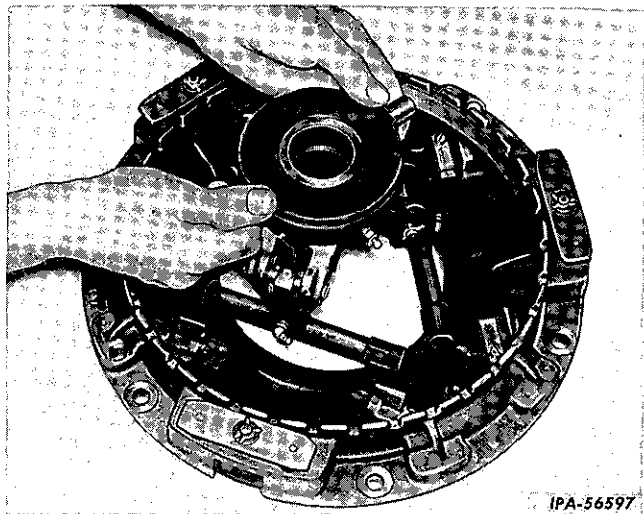


Illust. 6 - Removing the Cams and Sleeve from the Pressure Plate (Not 9(92) Series).

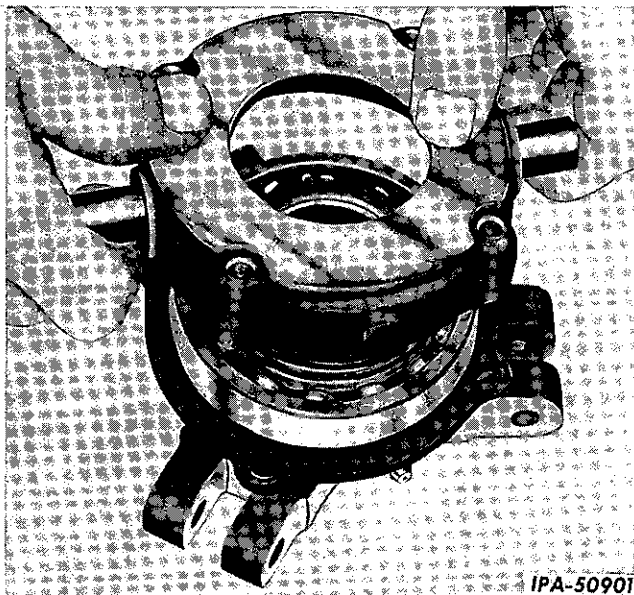
5. 6, 6 (61), 6 (62), 9, 9 (91) SERIES BELOW SERIAL 67 462: Remove the bearing carrier (18). See Illust. 8. By close inspection it can be determined whether or not the bearing (20) or the bushings (22) will need replacement. A snap ring (19) retains the bearing on the sleeve (23). See Illust. 13.



5. DISASSEMBLY - Continued



Illust. 7 - Removing 9(92) Series Cams and Sleeve Assembly.



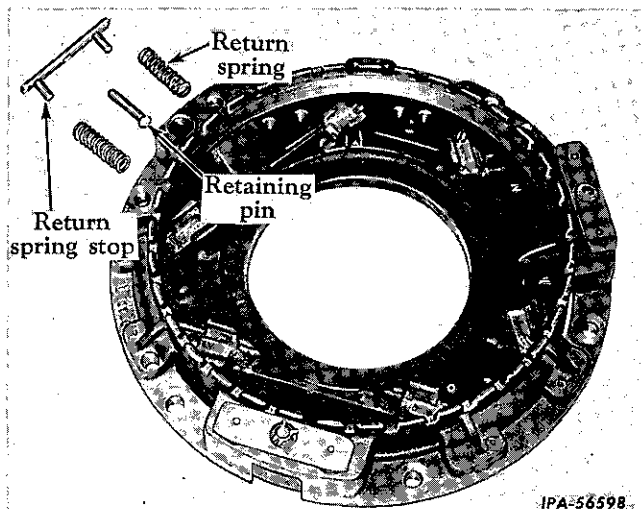
Illust. 8 - Removing the Bearing Carrier (91 series shown - others similar).

9 (91 SERIES), SERIAL 67462 AND UP, AND 9 (92 SERIES): To remove the bearing carrier from the sleeve, remove the snap ring (21). Access to the snap ring can be made through the cut-outs in the carrier. The bearing snap ring can now be removed for inspecting the throw-out bearing.

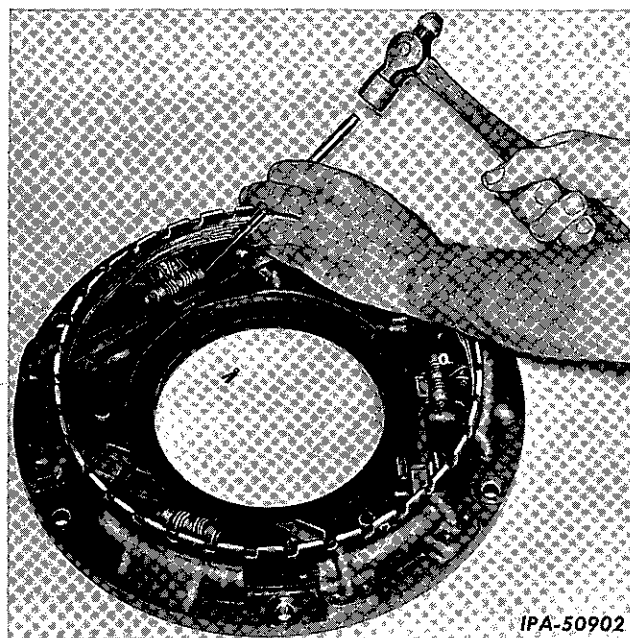
6. T-6, TD-6 (61), 6 (62) SERIES AND T-9, TD-9 (91) SERIES BELOW SERIAL 67462: Remove the three return springs. Pull the cotter pin and drive the spring pin out. See Illust. 10 and 11. Lift the back plate (25) from the pressure plate (26).

TD-9 (91) SERIES, SERIAL 67462 AND UP, AND 9 (92) SERIES: Remove the six helical coil return springs (33). Remove the "X" washers (39) from the retaining pin (34) and the return pin stop (35) will be released. (Refer to Illust. 9.)

CAUTION: Take precautions when removing the "X" washer. The springs are compressed and will fly up when the washer is removed.

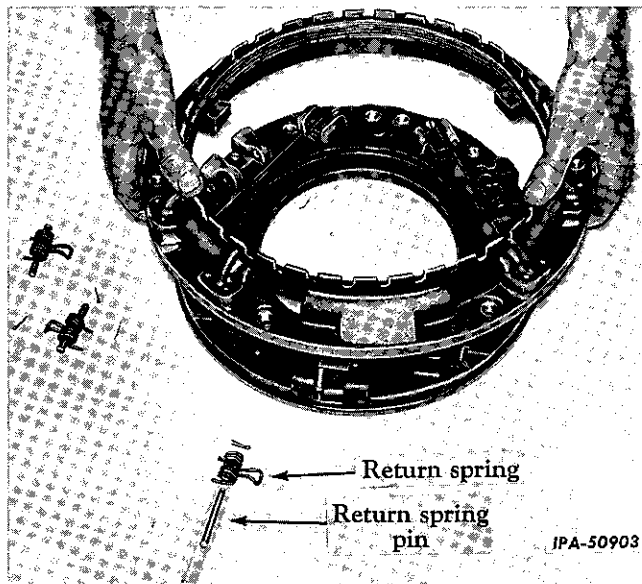


Illust. 9 - Components of the Return Spring Assembly.

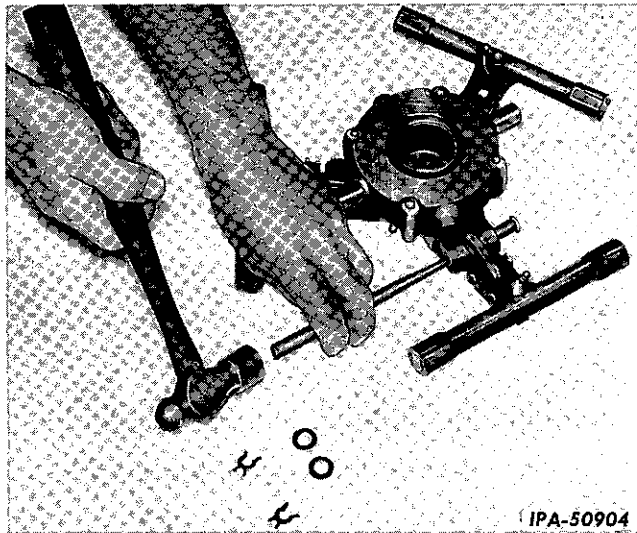


Illust. 10 - Driving Out the Return Spring Pins (91 Series Shown).

Lift the back plate (25) from the pressure plate (26).



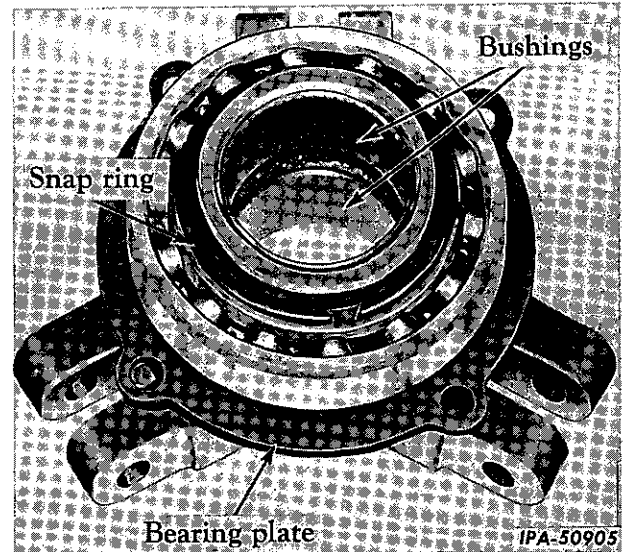
Illust. 11 - Removing the Back Plate from the Pressure Plate (91 Series shown - Others similar).



Illust. 12 - Removing the Connecting Link Pins.

6. INSPECTION AND REPAIR

1. Clean all parts thoroughly when disassembled.
2. Check the splines on the clutch shaft and driven member for burrs or nicks and remove with a stone.
3. Check the condition of the clutch disc facings. If worn to the rivet heads, replace with new, and be certain the rivets are correctly countersunk. (To remove "bonded-on" facings, refer to instructions which follow, under a separate heading).



Illust. 13 - Clutch Cam Sleeve with Bearing.

4. Check the condition of the clutch cams. Lack of proper lubrication may cause excessive wear at the cam rollers and they will drop out when the cam is lifted away from the pressure plate. Replace the cams when necessary. Check the lubrication fittings. Improper adjustment may cause the cams to be too tight and prevent over-center action and cause unnecessary wear.

5. Check the pressure plate for warping. See Illust. 29. Refer to Par. 2 "SPECIFICATIONS."

6. Check the hub of the driven member for excessive wear or cracks. Wear at this point indicates a possible clutch misalignment. Replace if necessary.

Removal of "Bonded-on" Clutch Facings

1. Use a solution of Turco No. 1662, or equivalent, mixed according to directions. Heat to 150° to 200° F. Turco No. 1662 is available through Turco Products, Inc., 75 E. Wacker Dr., Chicago, Ill.

2. Keep complete driven member submerged in the above solution for 12 to 15 hours.

3. After driven member is submerged for 12 to 15 hours, clutch facings can be removed from driven member very easily.

4. Wipe off solution and brush the clutch plate clean with a wire brush after it has dried, to assure that none of the solution is left on.

5. Inspect hub rivets to be sure they are tight, and also check for cracks in plate just outside of flange.

Continued on next page



6. INSPECTION AND REPAIR - Continued

6. Install new facings on plate. Be sure all rivets are properly countersunk.

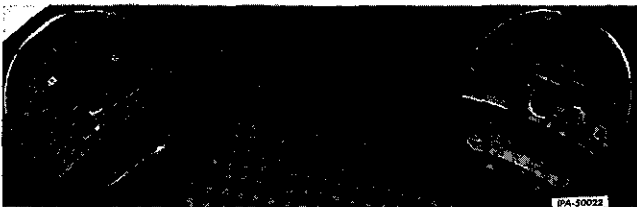
7. Check driven member for warpage the same as described for the pressure plate in par. 11.

Cerametallic Clutch

The cerametallic clutch driven member, because of its aggressiveness and ability to transmit the same torque at lower plate loads, has a tendency to produce "phonographic" type grooving on mating plates. This can occur in a very few hours, depending on clutch operation. Upon inspection of the clutch, if grooves are present, this does not mean that clutch parts should be replaced. Cerametallic material was developed for use in rugged clutch application. It thrives on heat. One indication that the clutch is not performing satisfactorily is the clutch facing not having a blue-black color. This glaze must develop otherwise premature wear of mating surfaces will occur.

The cerametallic clutch has the following characteristics when performing its job:

- (a) Concentric grooving of the mating surfaces is normal.
- (b) Facing glazes to a deep blue-black color which can carry over to mating surfaces.
- (c) Deepest grooves occurring at O.D. and I.D. of driven member sweep.
- (d) Buttons may become egg shaped.
- (e) More aggressive than previous materials.



Illust. 14 - Close-Up View of Cerametallic Buttons on Driven Member.

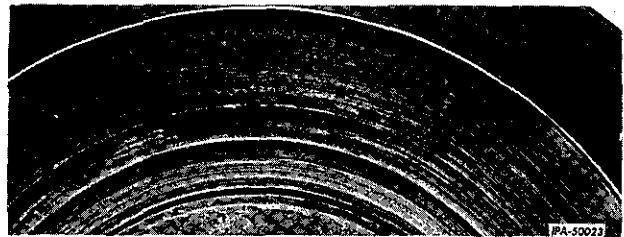
The ceramic buttons, Illust. 14, show a typical normal wear pattern. When the buttons have worn down to the grid, the driven member will then have to be replaced, and the mating surfaces checked to determine their serviceability.

7. REASSEMBLY (Refer to Illust. 3.)

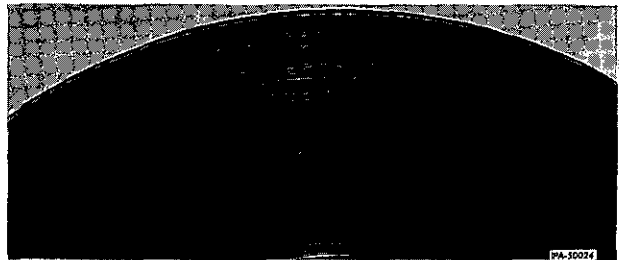
1. Locate the back plate (25) on the pressure plate (26).

2. T-6, TD-6 (61) AND 6 (62) SERIES, T-9, TD-9 (91) SERIES BELOW SERIAL 67462: Install the three return springs and drive the spring pins in place. The head of the pin should face in the direction of rotation. (See Illust. 12).

TD-9 (91) SERIES, SERIAL 67462 AND UP, AND 9 (92) SERIES: Install the six helical coil return springs (33). Secure the spring stop (35) with the retaining pin (34), washer (38) and "X" washer (39).



Illust. 15 - Flywheel Grooving Showing Typical "Phonographic" Type Pattern.



Illust. 16 - Pressure Plate Normal Wear Pattern.

3. Install the bearing plate (if so equipped) and bearing (20) on the sleeve (23) if it has been replaced and press a new bushing or bushings (22) in the sleeve also, if they were removed. The snap ring (19) should be installed to retain the bearing (20).

4. Install the bearing carrier (18). On the 91 series after serial 67462, and the 92 series, a snap ring (21) secures the carrier. With the snap ring loosely in place on the inner side of the bearing, position the carrier on the bearing, press down and install the snap ring. Three cut-outs in the carrier provide access points for removing or installing the snap ring.



5. 6, 6 (61), 6 (62), 9, 9 (91) SERIES BELOW SERIAL 67462: Assemble the connecting links (29) to the camshaft (31), being sure the connecting link pins (30) and (28) face in the direction of clutch rotation (see Illust. 12.) Connect the links to the sleeve, and lock all pins with "X" washers.

9 (91) SERIES ABOVE SERIAL 67462, AND 9 (92) SERIES: Assemble the connecting links (29) to the camshafts (31) using the short pin (30). The headed pin (28) connects the link to the sleeve (23) and the head of the pin should face in the direction of rotation and secured with an "X" washer.

6. Position the sleeve assembly (23) with camshafts on the pressure plate (26). Be sure the cam rollers ride properly in the saddles and on the camblocks, and that the connecting links are vertical, before continuing with the next step.

7. Install the adjusting ring plate (17) and adjusting ring (16). Block up the sleeve assembly with a wood cube (4" x 4"). Turn the adjusting ring in until it picks up the weight of the sleeve and at this point the over-center action can be felt. Install the adjusting ring lock (42) and tighten the two hex nuts.

8. Install the clutch shaft (14) in the coupling (10) and install the snap ring (12) in the coupling ring groove. The driven member (51) can now be installed.

NOTE: The clutch must be in the engaged position when ready for installation.

8. INSTALLATION (Refer to Illust. 3)

1. Install a new pilot bearing in the flywheel face if the old one is no longer serviceable.

2. Lower the clutch into the clutch compartment using a chain hoist. Slide the clutch shaft into the pilot bearing. After aligning the holes of the backplate with those in the flywheel, install the six clutch mounting bolts.

3. Set the release fork (6) into position, so that the bushings (7) align with the pins of the carrier (18). The lubrication fitting should be at the top.

4. Slide the release shaft (5) through the side of the main frame and through the fork (6). The keys (3) and (4) should be inserted into the shaft prior to driving the shaft through the fork and then on into and through the main frame at the opposite side.

5. Assemble the clutch hand lever (2) to the end of the shaft (5). Install the locking cap screw in the handle and the two screws in the release fork (6). Be sure the fork is centered over the carrier (18).

6. Mesh the teeth of the clutch shaft with the grooves in the coupling. Then, rotate and align the dowel bolt holes. Secure with three dowel bolts (9). Be sure the grease fitting (13) can be reached and install the end plate (8) with three cap screws.

7. Adjust the clutch as outlined in Par. 9, "ADJUSTMENTS."

8. Install the clutch compartment cover. Install the floor plates and supports. Release the steering brake pedals and steering clutch levers.

9. 6 AND 9 SERIES: Install the air cleaner to the dash.

6, (61), 6 (62), 9 (91) AND 9 (92) SERIES: Install the air cleaner under the hood.

9. ADJUSTMENTS

1. Remove the clutch inspection cover.

2. With the clutch disengaged and the clutch brake engaged, slowly crank the engine until the adjusting ring lock appears.

3. Disengage the lock and rotate the adjusting ring until the hand lever pull at handle is 60 to 65 pounds for bi-metallic or semi-metallic clutch facings and 40 to 45 pounds for sintered metal or cermetallic type facings. Transmission shift lock mechanism, if used, should be disconnected from the clutch hand lever during adjustment.

4. Engage the adjusting ring lock and tighten the lock bolts.

Continued on next page.



9. ADJUSTMENTS - Continued

5. Start the engine and check to see that the driven member is free with the clutch disengaged.

6. Reassemble the transmission shift lock mechanism to the clutch hand lever.

7. Replace the clutch inspection cover.

NOTE: For satisfactory clutch operation, do not adjust the clutch so tightly that the over-center action is not easily obtained. If little or no pressure is required to engage the clutch by hand, further adjustment as outlined above is necessary. When correct adjustment has been obtained - when a considerable but not excessive pressure can be felt when the operating hand lever is pulled back - tighten the lock. Should adjustment as made above cause the cams to be tight and prevent over-center action, back off the adjusting ring one notch (counterclockwise).

10. CLUTCH ALIGNMENT

Necessity for Proper Alignment

The clutch shaft, between the pilot bearing and the transmission bearing, is in effect an extension of the crankshaft, and it should always be in perfect alignment with the crankshaft. In other words, an imaginary line extending through the axis of the crankshaft could be continued through the axis of the clutch shaft if the clutch is in proper alignment.

With all rotating clutch parts thus assembled around a common axis, it is obvious that to operate satisfactorily they must rotate concentrically and that anything which would cause parts to rotate eccentrically, such as wear on the pilot bearing and/or clutch bearing, would impair the efficiency of these parts and probably in time cause serious damage. Consequently, when adjusting or assembling the clutch, be alert to evidences of misalignment and do whatever is necessary to correct that condition before the efficiency of the clutch is impaired and expensive replacement of parts becomes necessary.

Evidences and Causes of Misalignment

The most common evidence of engine clutch misalignment is wear on the clutch shaft

splines and corresponding wear in the clutch disc hubs. Other evidences are distorted or broken clutch discs, uneven wear on facings, and a "dragging" clutch.

The most common cause of such conditions is wear on the clutch pilot bearing and transmission bearing. Other causes, all attributable to carelessness in assembling, include a loosely bolted flywheel, a flywheel assembled at an improper angle to the crankshaft (because of burrs, dirt, etc.) causing it to run out of true, a loosely bolted flywheel housing, and a flywheel housing assembled at an improper angle to the crankcase (because of burrs, etc.). Still other causes, attributable to rough handling, accidents, etc., include distortion of the flywheel housing.

Service Procedure

Normally the replacement of a worn clutch pilot bearing and transmission bearing will restore clutch alignment. In case of chronic clutch difficulty however, a thorough check should be made of all factors affecting the alignment of the clutch. The principal factors to be checked are as follows:

- (a) Concentricity of the pilot bearing bore and the crankshaft.
- (b) Flywheel perpendicularity to the crankshaft.
- (c) Alignment of the engine with the transmission:
 1. Along parallel planes.
 2. Horizontally and vertically.

NOTE: These checks must always be made in the order given. The detailed procedure for each is as follows:

Concentricity of the Pilot Bearing Bore and the Crankshaft (Illust. 17).

CAUTION: Before starting this check, make sure the flywheel housing is securely bolted to the engine, and the flywheel is securely attached (bolted) or fitted (press fit) to the crankshaft.

To check the concentricity of the pilot bearing bore and crankshaft, remove the bearing and attach a dial indicator to the flywheel housing



or tractor frame, placing the point of the indicator against the pilot bearing bore as indicated in the illustration. Revolve the flywheel and note any variation. Permissible variation is 0.006 inch. Variation in excess of 0.006 inch (which condition is extremely rare) indicates need for rebushing the bore or replacing the part in which the bore is located.

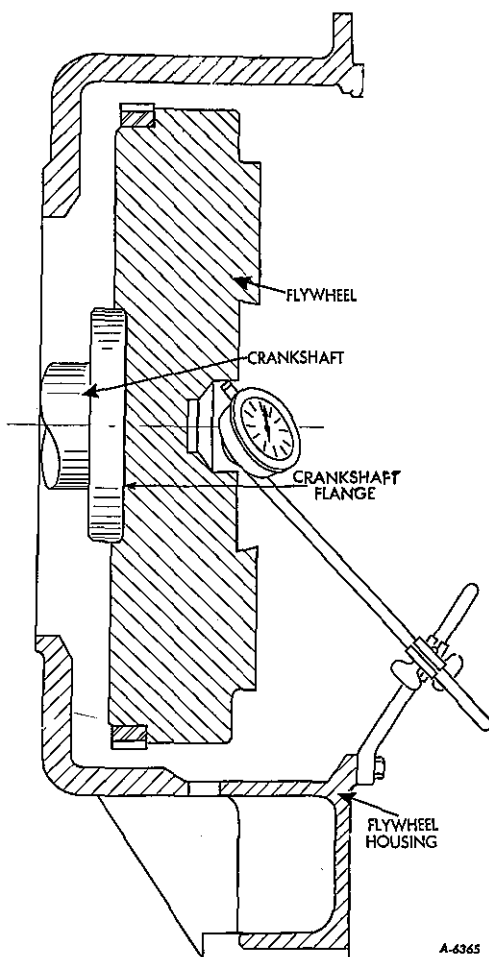
Flywheel Perpendicularity to Crankshaft (Illust. 18).

To check the perpendicularity of the flywheel to the crankshaft, attach a dial indicator to the flywheel housing, placing the point against the

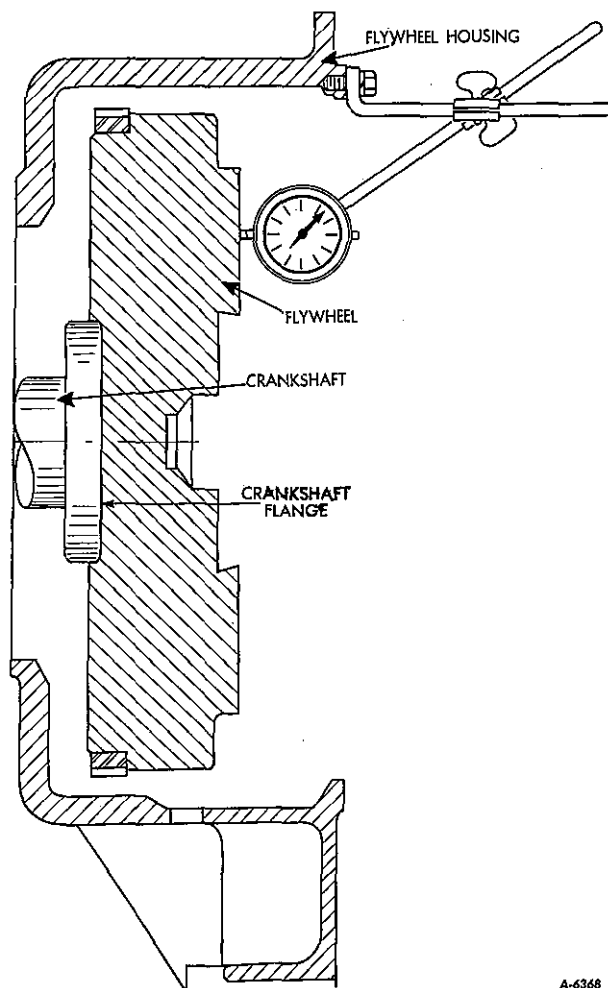
friction surface of the flywheel as indicated in the illustration. Revolve the engine flywheel one revolution and note the variation on the dial. Variation should not exceed 0.006 inch.

If excessive variation is noted, remove the flywheel and clean well between the flywheel and the crankshaft flange. Reassemble the flywheel to the crankshaft, drawing the attaching cap screws up evenly and tightly, and re-check. If the surfaces have been thoroughly cleaned, the test should be satisfactory.

continued on next page



Illust. 17 - Showing position of dial indicator when checking concentricity of pilot bearing bore and crankshaft.



Illust. 18 - Showing position of dial indicator when checking perpendicularity of flywheel to crankshaft.



10. CLUTCH ALIGNMENT - Continued

Alignment of the Engine with the Transmission

(a) Along parallel planes

(b) Horizontally and vertically

When checking the alignment of the engine to the transmission, a series of indicator readings must be taken on the face and also O.D. of the transmission driving flange coupling.

The flange side face readings, taken at 3, 6, 9 and 12 o'clock positions, serve to indicate the parallel condition of the crankshaft axis to the transmission drive shaft center line.

The flange O.D. readings, also taken at 3, 6, 9 and 12 o'clock positions, serve to indicate the horizontal and vertical relations of the crankshaft center line to the transmission shaft center line.

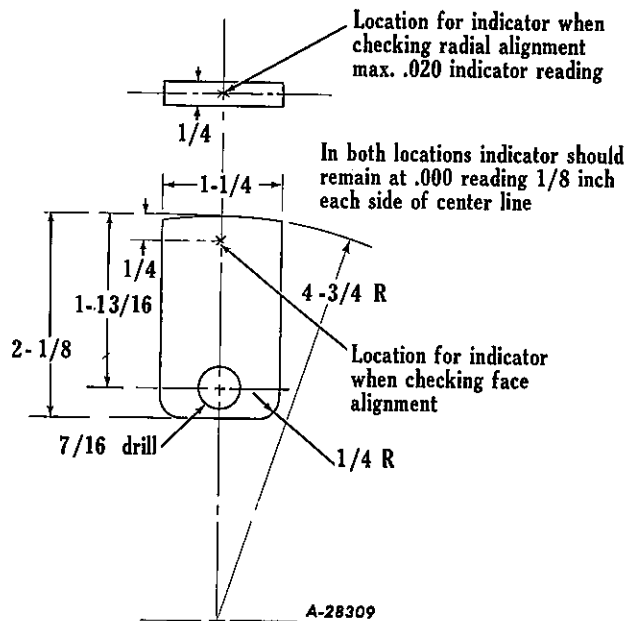
Maximum tolerances of these checks are as follows:

Side face readings - .001" per inch of the diameter of the circle in which the indicator rotates.

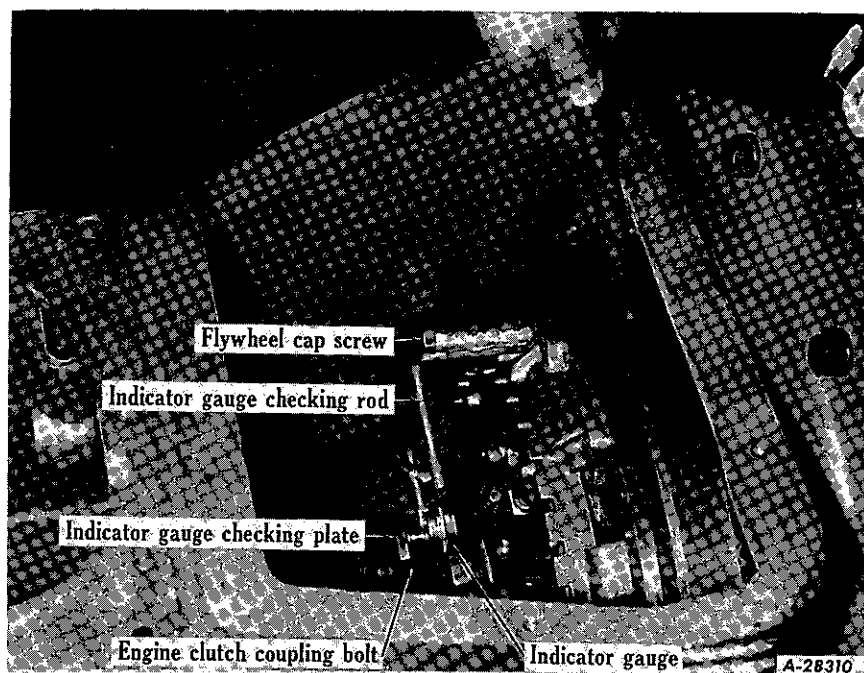
O.D. readings - .010" eccentricity of center lines, or .020" indicator reading.

Preparatory Steps for Taking Readings

NOTE: Before you make any checks, be sure to ground the magneto (if used) to prevent accidental starting.



Illustr. 19 - Checking Plate Used on all 6 and 9 Series.



Illustr. 20 - Prying Flywheel Back. Indicator Gauge stem set on Checking Plate in 12 o'clock Position.



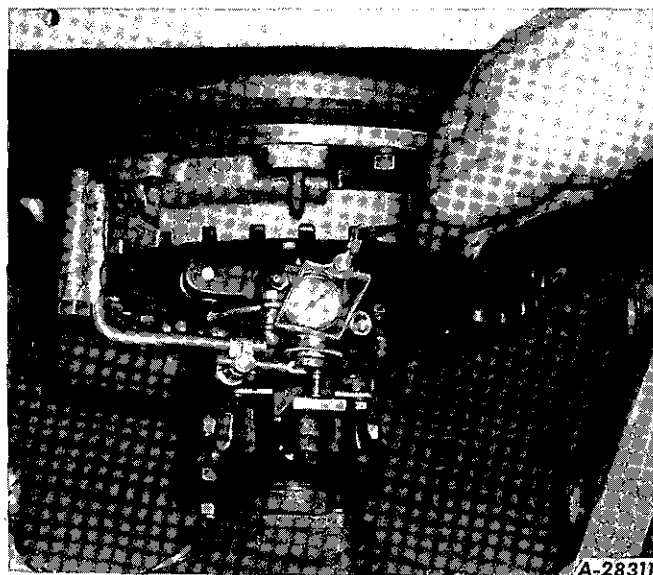
It is suggested that specially designed rigid checking rods be made for each model, as shown in Illust. 24 and 25. (This is mandatory, as insufficiently supported rods will deflect when the flywheel is rotated and cause errors in indicator readings.)

It is also necessary that a gauge indicator plate (Illust. 19) be made to facilitate checks made on all 6 and 9 series crawler tractors.

CHECKING FOR PARALLEL PLANE

1. Clamp the indicator checking rod to one of the flywheel clutch plate cap screw holes. Attach the gauge indicator plate to the engine clutch coupling (Illust. 20, 21 and 22). The first check is to indicate the transmission driving flange side face for parallel plane.
2. Mount the indicator to the rod which is bolted to the flywheel (Illust. 20).
3. Adjust the indicator so that the stem is perpendicular to the gauge plate as shown in Illust. 20 and 21.

NOTE: The flywheel must be pried to the rear to eliminate end play error in the setting of the indicator.

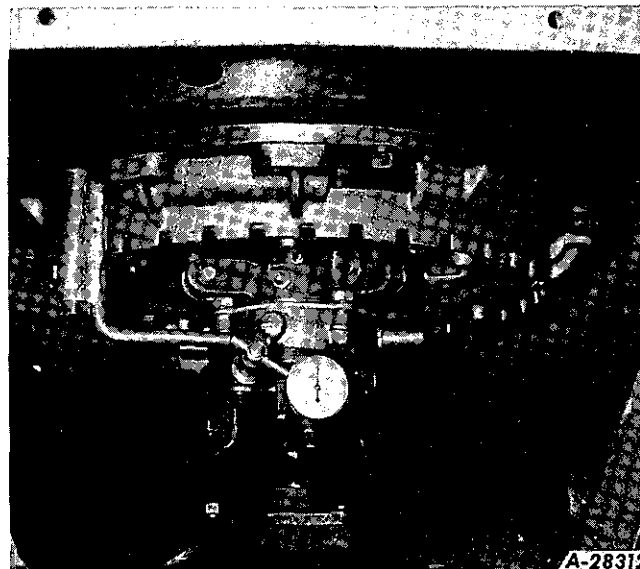


Illust. 21 - Indicator gauge stem set on face of checking plate in 12 o'clock position showing use of mirror in taking reading.

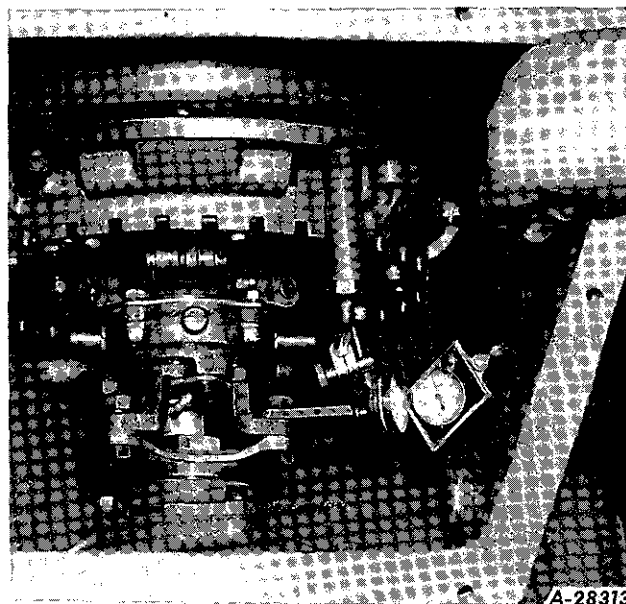
4. With the engine clutch engaged, the flywheel pried back, and the indicator set at zero reading in the 12 o'clock position (top) (Illust. 21 and 22), rotate the flywheel to position the indicator at 9 o'clock position, pry back the fly-

wheel again for elimination of end play error and note the indicator reading. Following this procedure, position the indicator (by rotating the flywheel) to 6 o'clock, 3 o'clock, and back to 12 o'clock, prying back the flywheel each time, before noting the reading of the indicator.

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Illust. 22 - Indicator gauge stem set on flange O.D. of checking plate in 12 o'clock position

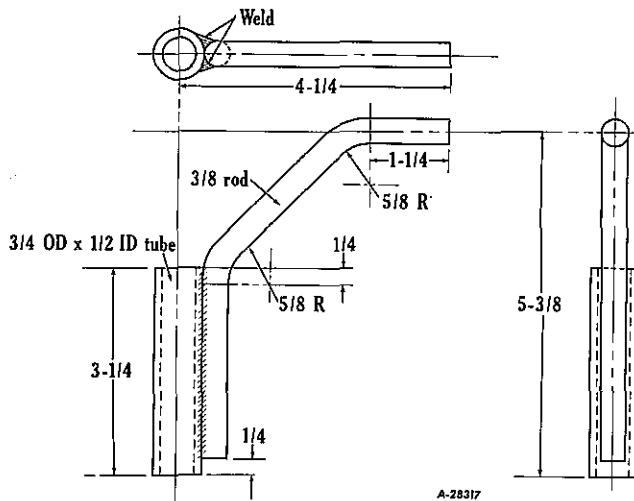


Illust. 23 - Indicator gauge stem set at flange O.D. of checking plate in 3 o'clock position.

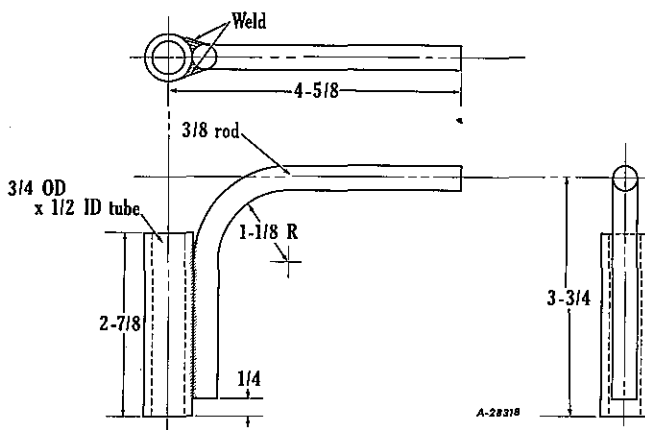


10. CLUTCH ALIGNMENT - Continued

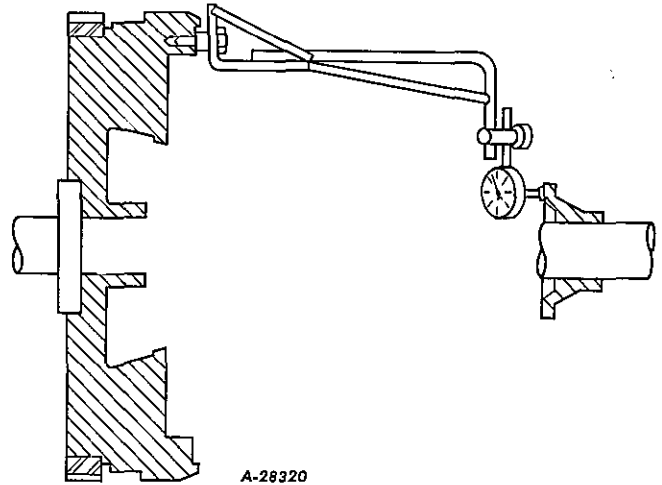
5. Tolerance of indicator reading should not exceed .001" per inch of the diameter of the circle in which the indicator rotates. For example, if the dimensional difference of location of the indicator from 12 o'clock or top position, to 6 o'clock or bottom position, is 6 inches, then the indicator reading should not exceed .006".



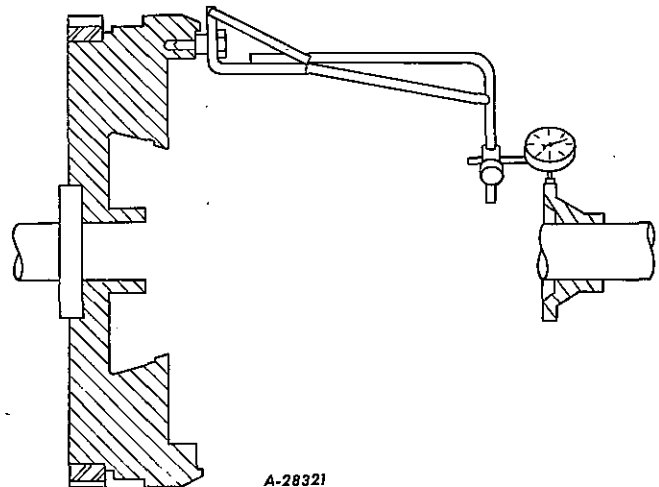
Illustr. 24 - Type of Checking Rod Used for 6 Series Crawler Tractors.



Illustr. 25 - Type of Checking Rod Used for 9 Series Crawler Tractors.



Illustr. 26 - Showing position of the indicator gauge stem on the flange side face when checking the parallel condition of the crankshaft axis to the transmission drive shaft center line. This check can be made either with the engine clutch and clutch coupling assembled or without the engine clutch and clutch coupling, as shown here.



Illustr. 27 - Showing the position of the indicator gauge stem on the flange O.D. when checking the horizontal and vertical relations of the crankshaft center line to the transmission drive shaft center line. This check can be made either with the engine clutch and engine clutch coupling assembled or without engine clutch and engine clutch coupling, as shown here.



CORRECTION FOR PARALLEL PLANE

1. Remove the cap screws from the front engine support. Add or remove an equal amount of shims from under both legs of the support, depending on the location of the high and low reading of the indicator to the vertical line.
2. Shift the front of the engine to either side, depending on the horizontal line reading.
3. Securely tighten the front engine support cap screws.

CHECKING FOR HORIZONTAL AND VERTICAL CENTER LINES

1. To check the horizontal and vertical relation of the crankshaft center line with the transmission shaft center line, the procedure is identical with that of the parallel check described above, except that the indicator is placed on the top of the gauge plate. (Illust. 22 and 23.)
2. The readings observed in the horizontal and vertical positions of the indicator when the flywheel is rotated through the 9 o'clock, 6 o'clock, 3 o'clock and 12 o'clock positions should not exceed .010" eccentricity, or .020" indicator reading.

CORRECTION FOR HORIZONTAL AND VERTICAL CENTER LINES

1. Remove the two rear engine dowel bolts and loosen all cap screws, which hold the rear engine support to the main frame, enough to allow the engine to be shifted.
2. Move the rear portion of the engine into correct alignment, by raising or lowering with a jack, or by shifting to either side with a bar.
3. Assuming that the face has been checked for parallel plane and is square, equal shims to the amount of the engine shift (up or down) must be added or removed from each side of the front engine support, depending on whether the engine is raised or lowered.
4. Tighten the cap screws of the rear engine support.
5. Recheck both the face and O.D. to assure correct alignment. Repeat correction adjustments if necessary until within tolerances of .020" on the O.D., and .001" per inch of diameter of the circle in which the indicator rotates.

6. Ream the dowel holes to secure a good drive fit and insert oversize dowels.

11. METHODS OF CHECKING FRICTION SURFACES

To be effective, contact between friction surfaces must be as nearly complete as possible. To assure maximum contact in the case of metal surfaces, they are usually finish-ground by the manufacturer rather than merely machined. To assure maximum contact in the case of faced surfaces, great care is exercised by manufacturers to avoid any unevenness which would reduce the total contact area. Likewise, when removing and inspecting a clutch, examine the contact surfaces carefully for ridges, scores, and grooves which would reduce the contact area, and be sure that such irregularities have been corrected before reassembling the clutch.

The friction surfaces which must be kept in good order include:

- (a) Flywheel
- (b) Pressure plate
- (c) Driven member

Flywheel (Illust. 28)

It is good practice, whenever removing a single-plate clutch from a flywheel having a friction surface, to wash and clean the flywheel thoroughly before inspecting the friction surface for ridges, scores, grooves, heat cracks, and burned spots caused by overheating, projecting rivets, etc.

If the friction surface shows no noticeable damage, it can be assumed that it is in good condition.

If, however, any of the above mentioned evidences of damage are present, the friction surface should be checked with a straightedge in order to locate and mark the high spots. Place the straightedge across the flywheel and note whether it contacts the surface evenly and firmly all the way across. Make this test at different points and in different positions all around the flywheel friction surface and try to insert a 0.006 inch feeler gauge inside of any high spots noted. If the 0.006 inch feeler gauge can be inserted at any inside point, the flywheel should be removed and ground down, if grinding equipment is available. Otherwise, it should be mounted in a lathe, and dressed

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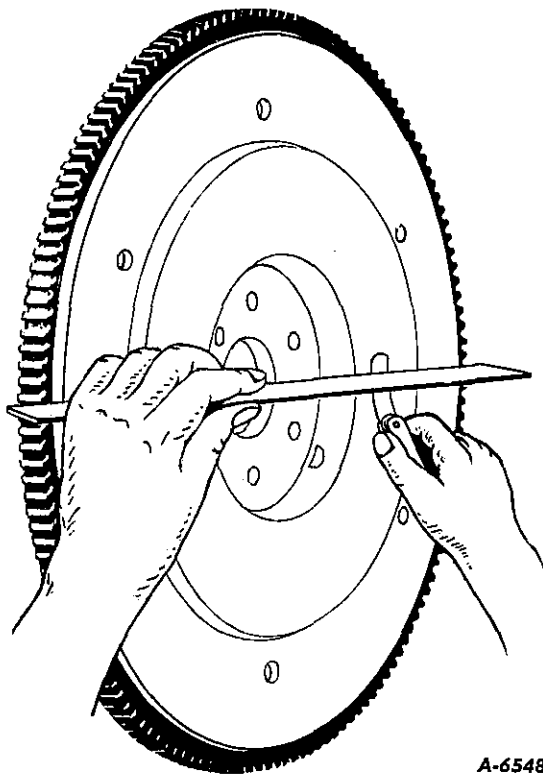
11. METHODS OF CHECKING FRICTION SURFACES -Continued

down over the friction surface with emery cloth. Start with a coarse cloth and finish with a fine cloth. If the surface is extremely rough, it should first be cut down with a lathe tool, then smoothed with the emery cloth.

Pressure Plate (Illust. 29)

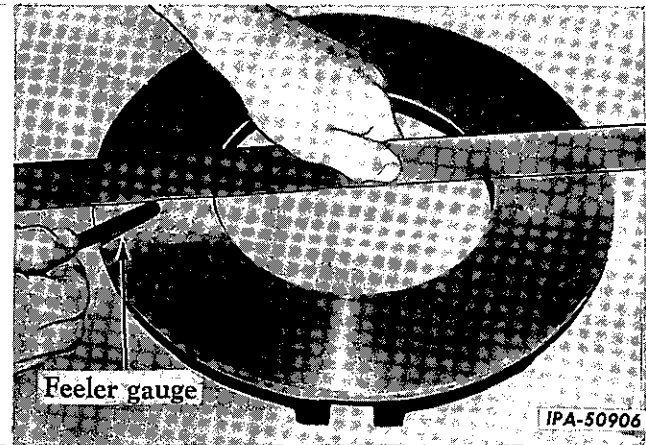
Every evidence of damage which may be present on a flywheel friction surface, as previously discussed, may also be present on a pressure plate, plus one additional -- warpage. The pressure plate, having less mass than the flywheel, will sometimes warp as the result of continued overheating.

Check the pressure plate for high spots and warpage in the manner prescribed for checking the flywheel friction surface, including the use of a 0.006 inch feeler gauge to measure the high spots and the degree of warpage. (Refer to Illust. 29.)



Illust. 28 - Using Straightedge to Check Flywheel for Surface Unevenness.

If the inside measurement of high spots or warpage exceeds the 0.006 inch tolerance, the pressure plate should be dressed down with emery cloth in the manner prescribed for the flywheel. If damage is severe, it is always advisable to replace the pressure plate.



Illust. 29 - Using Straightedge to Check Pressure Plate for Warpage.

Driven Member

The main considerations when checking a driven member of the faced type are: (a) whether the facing is free of grease, (b) whether the facing is smooth and even all around, (c) whether the facing is held tightly to the disc all around, with all rivets properly countersunk, and (d) whether the facing has been worn to the point where it should be replaced.

If (a) the facing is not free of grease, it should be replaced. Experience has demonstrated the futility of washing or burning saturated clutch facings in order to remove the grease.

Likewise, if the facing has buckled and (b) is no longer smooth and even all around, or if, because of loose rivets or torn rivet holes, the facing (c) is not held tightly to the disc, it should be replaced.

If neither of the two conditions is present but the facing is found to be (d) worn down and there is imminent danger of the rivets contacting and scoring the mating surface, the facing should be replaced.

CAUTION: Be sure all rivets in a new facing are properly countersunk.

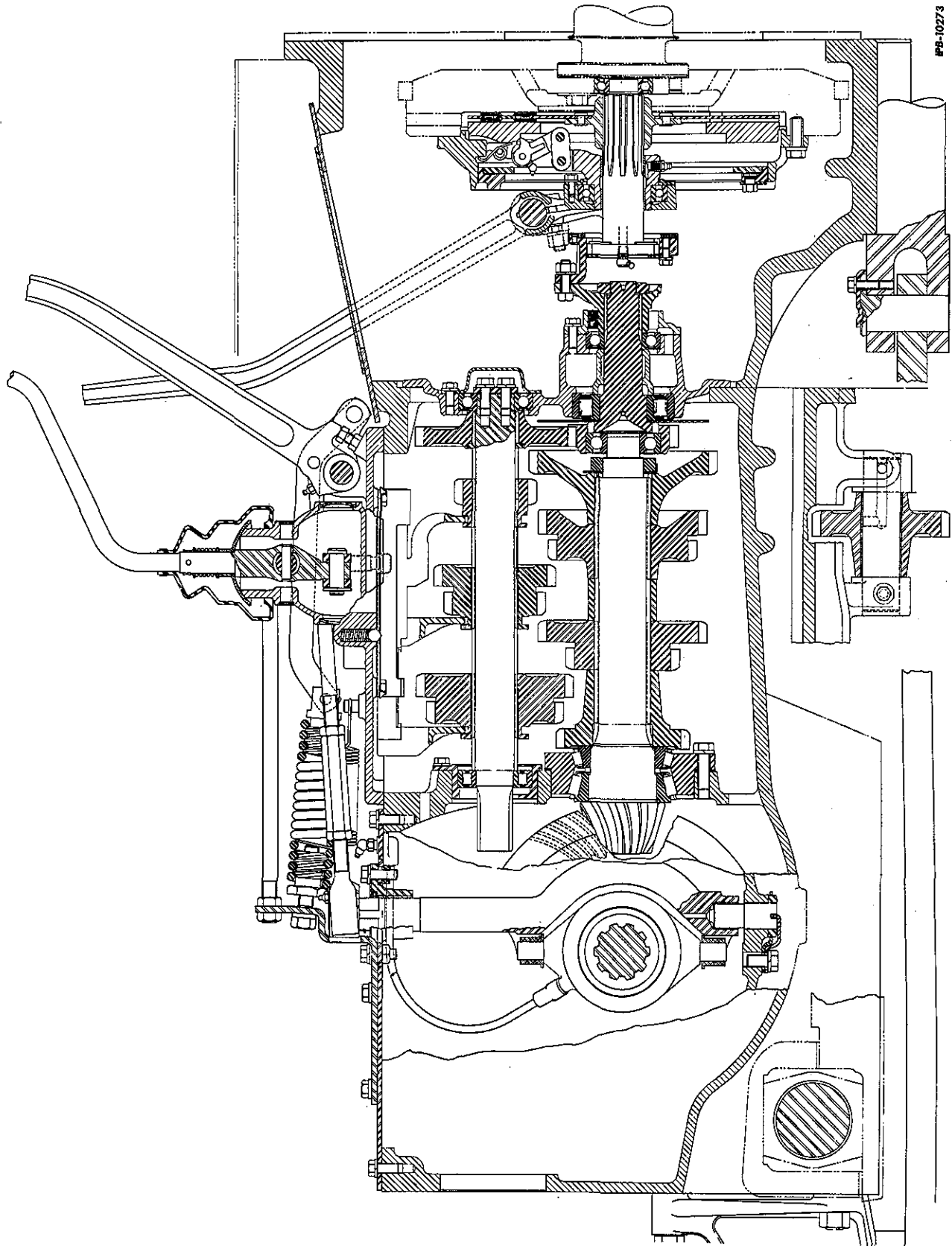
CONTENTS

Paragraph	Page
TRANSMISSION	
1. Description	3, 4
2. Specifications	4 - 6
3. Checking Mechanical Problems	6, 7
4. Maintenance	7
5. Preparation for Removal and Disassembly	7, 8
6. Removal and Disassembly	8 - 12
7. Inspection and Repair	13 - 15
8. Reassembly and Installation	15 - 17
BEVEL GEAR	
9. Description	18
10. Checking Mechanical Problems	18, 19
11. Maintenance	19
12. Removal and Disassembly	19 - 21
13. Inspection and Repair	21
14. Reassembly and Installation	22 - 24
15. Adjustment (Screw Type Bevel Gear Adjusters)	25 - 27
16. Adjustment (Shim Type Bevel Gear Adjusters)	28, 29





TRANSMISSION

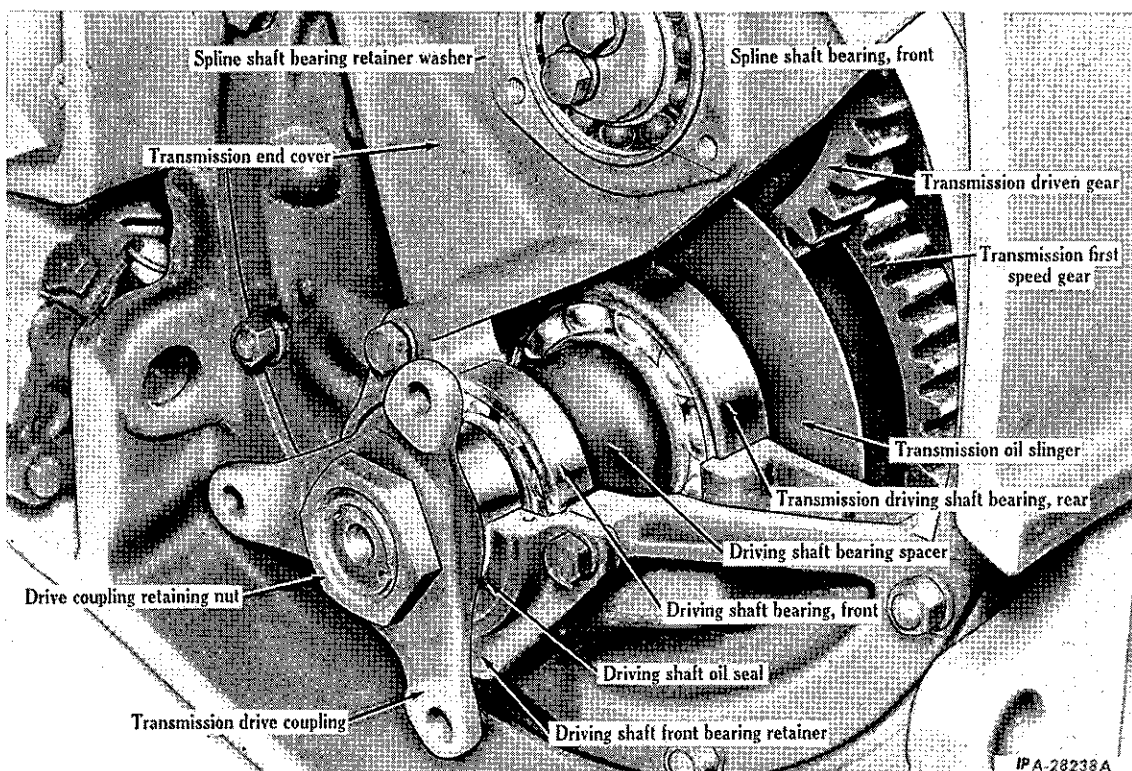


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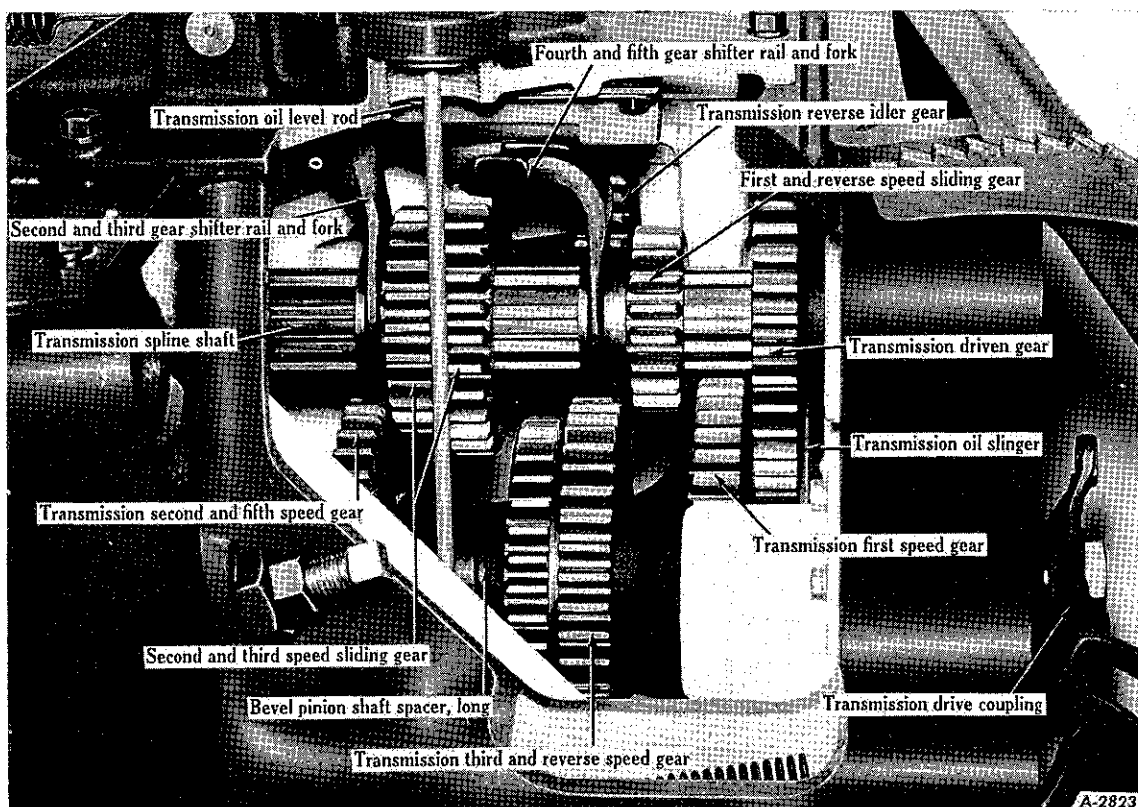
Illust. 1 - Schematic Drawing of TD-9(91) Engine Clutch, Transmission and Bevel Gear (9(92) Series Similar).



TRANSMISSION



Illust. 2 - Cutaway View of 9 Series Transmission Drive Coupling.



Illust. 3 - Cutaway View of 9 Series Transmission.



TRANSMISSION

1. DESCRIPTION

Power from the engine is transmitted to the power train by means of an engine clutch. The clutch coupling drives the transmission, which in turn supplies power to the drive bevel gear at the selected gear ratio.

The transmission and the bevel gear are housed in the rear main frame. The transmission is the selective spur gear type. It has five forward speeds and one reverse speed, all controlled by one lever, as standard equipment on all 6 and 9 series crawler tractors.

6 and 9 Series Crawler Tractors

6 Series Serial Below 38553

9 Series Serial Below 58451

Spur gears are mounted on three shafts: the upper spline shaft, the bevel pinion shaft, and the reverse idler shaft.

The spline shaft revolves on ball bearings suspended in bearing cages. The bevel pinion shaft rotates on ball bearings and is shimmed for end clearance setting between the bevel pinion and the bevel gear. The shims are situated between the bevel pinion shaft rear bearing cage and the main frame.

The reverse idler gear rotates on bushings on a stationary-mounted shaft located on the side of the transmission compartment of the main frame. The front end of the bevel pinion shaft is supported by a ball bearing situated inside the driving gear and shaft. This driving gear and shaft is suspended at the rear end by a roller bearing and at the front end by a ball bearing. The driving gear and shaft is situated in the end cover.

Adjustment of the bevel gear for backlash is handled by the addition or removal of shims between the hub of the bevel gear and the spacer.

6, 6(61), 6(62), 9, 9(91) and 9(92) Series Crawler Tractors

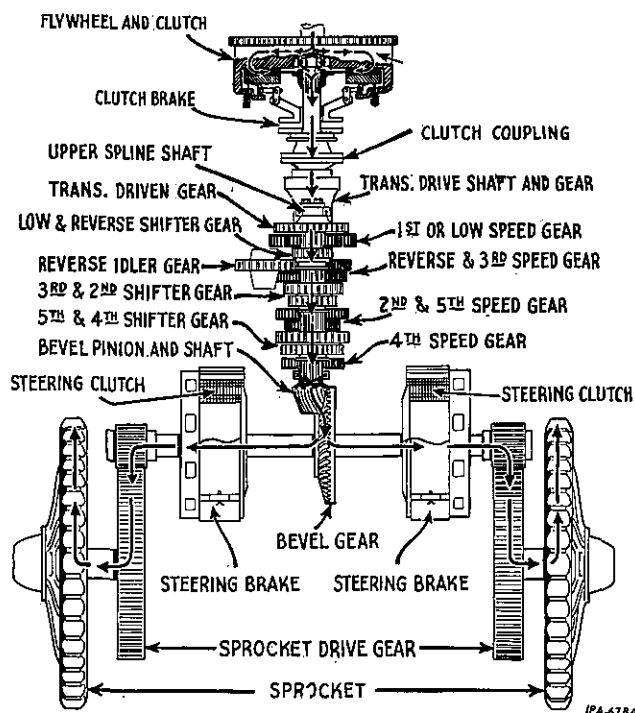
6 Series Serial 38553 and up

9 Series Serial 58451 and up

The spline shaft revolves on ball bearings at the front end, and on roller bearings at the rear. A roller aligning shoulder is machined in the inner race for the rear bearing. The bevel gear and pinion are spiral.

Adjustment of the bevel gear bearing and bevel gear is by means of a screw thread bearing adjuster.

The reverse idler gear rotates on bushings on a stationary-mounted shaft located on the side of the transmission compartment of the main frame. The bevel gear is mounted to a gear hub with dowel bolts, and is supported by tapered roller bearings. The bevel pinion shaft is supported at the rear with a double-row tapered roller bearing, and a straight roller bearing at the front end on all 6 series (a single-row ball bearing at the front end on all the 9 series) located inside the driving gear and shaft. This driving gear and shaft is supported at the rear by a straight roller bearing.



Illustr. 4 - Line of Power from Engine to Tracks.

Gear Shifter Mechanism

The rear of the main frame, which houses the transmission and the bevel gear assemblies, is covered by a main frame cover and by the gear shifter housing. The forks of the gear shifter mechanism respond to the movement of the shifting lever. In this way, different speed gears are selected. The shifter forks fit into the recesses provided on each sliding gear. The sliding gear will then move in the direction of the selected drive gear.

continued on next page



TRANSMISSION

1. DESCRIPTION - Continued

Line of Power Bevel Gear. (See Illust. 4)

The line of power from the engine to the tracks is through the flywheel and the engine clutch to

the transmission and bevel gear. The power is distributed to both sides of the tractor through the steering clutches to the sprocket drive gear, sprocket and track chain on each side of the tractor.

2. SPECIFICATIONS

	T-6	TD-6	T-6 (61) TD-6 (61) TD-6 (62)	T-9	TD-9	TD-9 (91) TD-9 (92)
Make	IH	IH	IH	IH	IH	IH
Type	Selective spur gear	Selective spur gear	Selective spur gear	Selective spur gear	Selective spur gear	Selective spur gear
Number of forward speeds	5	5	5	5	5	5
Number of reverse speeds	1	1	1	1	1	1
Traveling speeds (at governed engine speed) - m.p.h.						
1st gear	1.5	1.5	1.6	1.5	1.5	1.6
2nd gear	2.2	2.2	2.3	2.2	2.2	2.4
3rd gear	3.1	3.1	3.3	3.0	3.0	3.3
4th gear	3.8	3.8	4.0	3.9	3.9	4.1
5th gear	5.4	5.4	5.7	5.3	5.3	5.7
Reverse gear	1.7	1.7	1.8	1.7	1.7	1.8
Bearings - type						
Spline shaft						
Front	*Single row ball	*Single row ball	*Single row ball	*Single row ball	*Single row ball	*Single row ball
Rear	*Single row ball	*Single row ball	Roller	*Single row ball	*Single row ball	Roller
Bevel pinion shaft						
Front	Roller	Roller	Roller	Single row ball	Single row ball	Roller
Rear	Single row ball	Single row ball	Double taper roller	Single row ball	Single row ball	Double taper roller

* Shielded



TRANSMISSION AND BEVEL GEAR

Section 6

Page 5

TRANSMISSION

	T-6	TD-6	T-6(61) TD-6(61)	T-9	TD-9	TD-9 (91) TD-9 (92)
Driving shaft and gear Front	*Single row ball	*Single row ball	*Single row ball	*Single row ball	*Single row ball	*Single row ball
Rear	*Single row ball	*Single row ball	Roller	*Single row ball	*Single row ball	Roller
Bushings, reverse idler Inside diam. - inches . (in assembly)	1.503 - 1.505	1.503 - 1.505	1.503 - 1.505	1.565 - 1.567	1.565 - 1.567	1.565 - 1.567

* Shielded

SPECIAL TORQUES (Foot Pounds) All threads to be lubricated with SAE-30 engine oil.

Bevel pinion shaft lock nut, all 6 series . . 400 - 450 All 9 series 500 - 550

Transmission drive coupling
retaining nut all 6 series . . 95 - 105 All 9 series 135 - 145

All 6 and 9 Series crawler tractors

TRACTOR	SERIAL NUMBER	END CLEARANCE	METHOD	BACKLASH
T and TD-6	Below TDBK-10323	.625 gauge	Use gauge between hub of gear and end of pinion	.010 to .012
T and TD-6	TDBK-10323 to 38950	See Note	Use gauge between hub of gear and end of pinion	.010 to .012
T-6 (61) TD-6 (61) TD-6 (62) T and TD-9	T-61 - 501 and up TDBK-38951 and up TD-62 - 501 and up Below TDCB-16825	See Note .625 gauge	Use gauge between hub of gear and end of pinion Use gauge between hub of gear and end of pinion	See Note .010 to .012
T and TD-9	TDCB-16825 to 60300	See Note	Use gauge between hub of gear and end of pinion	.010 to .012
TD-9 (91) TD-9 (92)	TDCB-60301 and up TD-92 - 501 and up	See Note	Use gauge between hub of gear and end of pinion	See Note

NOTE: The drive bevel gears are marked on the bevel gear with decimal figures (stamped or etched) showing the distance from the gear end of the bevel pinion to the ground surface on the drive bevel gear hub. Where matched sets of gears are furnished, figures designating the mating gears are found on the gear end of the bevel pinion shaft and the back side of the bevel gear. Matched numbers should correspond. All matched sets of gears are run in and checked for a high point. This point is marked on the teeth of the bevel pinion and bevel gear with white lead. These points should coincide before the gear setting is taken.



TRANSMISSION

3. CHECKING MECHANICAL PROBLEMS

GEARS HARD TO SHIFT

- | | |
|---|---|
| 1. Oil in transmission too heavy | Drain and fill with recommended oil. (Refer to Par. 2, "SPECIFICATIONS.") |
| 2. Gear shifter forks and shifter rails out of alignment or damaged | Inspect shifter forks and rails; if necessary, replace. |
| 3. Worn shifting controls | Repair, or install new parts. |
| 4. Damaged transmission parts | Inspect; replace damaged parts. |

GEARS CLASH

- | | |
|---|--------------------------------------|
| 1. Engine clutch fails to engage - or drags | Refer to "ENGINE CLUTCH," Section 5. |
| 2. Damaged transmission parts | Inspect; replace worn parts. |

GEARS NOT IN FULL MESH
WHEN IN OPERATION

- | | |
|---|--|
| 1. Shifter forks and rails worn excessively | Replace with new parts. |
| 2. Shifter forks and rails bent | Repair, or install new parts. |
| 3. Worn or broken bearings | Inspect and replace with new bearings. |

GEARS SLIP OUT OF MESH

- | | |
|---|---|
| 1. Gears not fully engaged | Inspect shifter rails and forks. Move shifting lever to extremes and note movement. |
| 2. Damaged transmission parts | Remove transmission and repair damaged parts. |

NOISE IN TRANSMISSION

- | | |
|--|--|
| 1. Bearings worn | Install new bearings. |
| 2. Pinion shaft worn or twisted | Install new pinion and bevel gear. |
| 3. Foreign material in lubricating oil | Drain and flush, and refill with a clean, proper lubricant. |
| 4. Broken or damaged transmission case | Repair, or install new main frame. |
| 5. Gears very badly worn | Replace with new gears. |
| 6. Bevel gear and bevel pinion not properly adjusted | Adjust to proper clearance. (Refer to Par. 15 or 16 "ADJUSTMENT.") |



TRANSMISSION

TRANSMISSION OVERHEATS

1. Improper or insufficient lubrication Use recommended lubricant and fill to proper level.
2. Excessive friction in transmission parts Inspect transmission; check clearances and freedom of movement on splines.

GEARS DO NOT SHIFT

1. Engine clutch drags Refer to "ENGINE CLUTCH," Section 5.
2. Gears stuck on spline shaft Remove spline shaft; remove burrs and scored metal. Check freedom of movement of gear on the spline. If excessively worn, replace gear and spline.
3. Shifter forks and poppets not properly assembled, or broken poppet springs Remove housing; inspect and replace broken or damaged parts.

LUBRICANT LEAKAGE

1. Lubricant leaks past transmission drive shaft oil seal Remove; inspect and, if necessary, install new seal.
2. Lubricant leaks past transmission end cover gasket Remove end cover and install new gasket.

4. MAINTENANCE

The transmission requires little maintenance other than visual inspection. Care should be taken immediately to correct any evidence of oil leakage. Also, the oil level should be watched closely, and the specified lubricant used, since lubrication is very important in maintaining the transmission.

5. PREPARATION FOR REMOVAL AND DISASSEMBLY OF TRANSMISSION

1. Remove the seat cushion and battery covers.
2. Remove the batteries, the battery cables and support, and any electrical wiring attached to the seat side sheets or fender side sheets.
NOTE: Mark all cables as disconnected.

3. Drain the fuel tank and disconnect the fuel line. Remove the bolts that hold the fender side sheets to the seat side sheet, main frame, dash and clutch cover. Remove the bolts from the fuel tank support. Lift out the fuel tank, seat and fenders as a unit. Either hoist the tank out or slide it out from the rear.

4. Remove all hardware holding down the main frame cover. Disconnect all the electrical wiring.

Principal Steps in Preparation for Removal and Disassembly of the Transmission

1. Remove the seat cushion and battery covers.
2. Remove the battery cables and the battery support.
3. Remove the seat and the fuel tank.
4. Disconnect all wiring, and loosen all hardware holding down the main frame cover.
5. Drain the oil from the transmission.
6. Remove the steering clutch levers.
7. Remove the steering clutch release levers.
8. Remove the shifter lever housing.
9. Remove the main frame cover.
10. Remove the engine clutch cover.
11. Remove the engine clutch.

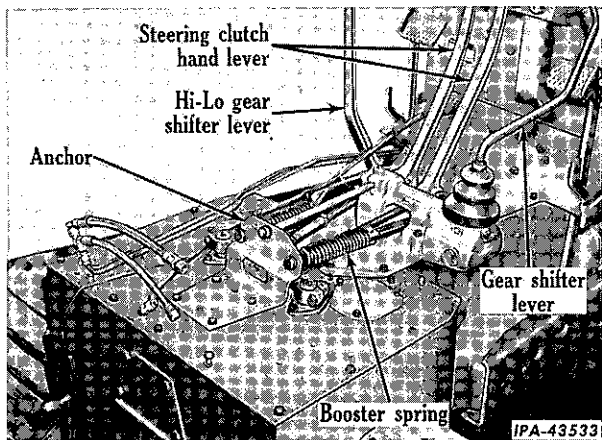
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TRANSMISSION

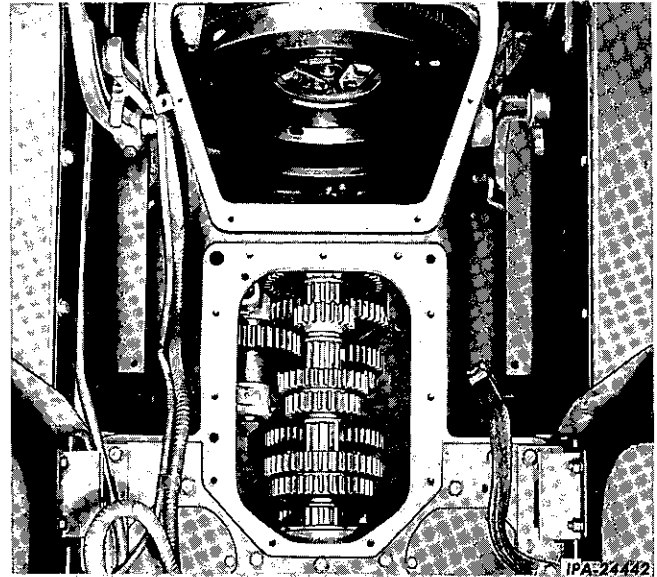
NOTE: It is advisable to label each of the disconnected wires to avoid the possibility of confusion and wasted time when reassembly takes place.

5. Remove the steering clutch grease tubes. Remove the small inspection covers in the main frame cover. Then remove the cap screws holding the grease tubes to the main frame. The grease tubes will slip down into the main frame.
6. Drain the oil from the transmission after the tractor has been operated and the lubricant is warm. Remove the drain plug and when the oil has drained, install the drain plug.
7. Remove the steering clutch levers by first removing the return springs. Loosen the set screws in the steering clutch lever support on the gear shifter housing. Push out the hand lever shaft. Lift up the levers, push out the eye pins, and remove the levers. Remove the hand lever booster springs on the 61, 62, 91 and 92 series crawler tractors by removing the spring adjuster bolts.



Illustr. 5 - TD-9(91) with Seat, Fenders and Fuel Tank Removed (61 Series Similar).

8. Remove the steering clutch release levers by loosening or removing the cap screw in the release lever and removing the steering clutch release lever. It may be necessary to pry the release lever off the steering clutch release shaft and fork.
9. Remove the shifter lever housing. Force the dowel pin out of the housing by running a nut down the threaded end of the dowel. The housing, shifter lever and shifter rails will come out as a unit.



Illustr. 6 - Showing Transmission Installed with Engine Clutch Removed.

10. Remove the main frame cover. Remove the two dowels by running a nut down the threaded end of the dowel. These dowels locate the cover on the main frame. When the dowels are removed, the cover may be lifted out of position.
11. Remove the engine clutch cover by removing the cap screws holding the clutch cover to the clutch compartment of the main frame.
12. Remove the engine clutch. Refer to "ENGINE CLUTCH," Section 5.

NOTE: Since the transmission assembly cannot be removed as a unit, the actual removal is described in Par. 6, "REMOVAL AND DISASSEMBLY."

6. REMOVAL AND DISASSEMBLY

Principal Steps in Removal and Disassembly of the Transmission

1. Remove the spline shaft bearing retainer, front.
2. Remove the end cover.
3. Remove the spline shaft and its gear assembly.



TRANSMISSION

4. Remove the bevel pinion shaft.
5. Remove the reverse idler gear.
6. Remove the driven gear from the spline shaft.
7. Remove all gears from the spline shaft.
8. Remove the transmission spline shaft bearing.
9. Remove the bevel pinion shaft bearing, front.
10. Remove the bevel pinion shaft lock nut.
11. Remove all gears from the bevel pinion shaft.
12. Remove the bevel pinion shaft bearing, rear.
13. Remove the transmission coupling.
14. Remove the transmission drive shaft oil seal.
15. Remove the transmission drive shaft.
16. Remove the drive shaft inner bearing.
17. Remove the transmission drive shaft bearing, front.
18. Remove the bushings from the reverse idler gear.
19. Remove the shifter rail guide.
20. Remove the gear shift lever.

(Ref. Nos. of Parts Apply to Illust. 7.)

1. Remove the spline shaft bearing retainer, front (49) by removing the cap screws. Slip off the retainer gasket (48). Remove the cap screws from the bearing retainer washer (47) which will allow removal of the washer.

2. Remove the end cover. Remove the cap screws from the end cover (45) and use the same cap screws as puller screws in the holes provided. Run the puller screws in evenly; the cover will be loosened and can be removed easily. Then, the end cover gasket (43) can be removed. The driving shaft and gear (64) will come off with the end cover.

3. Remove the spline shaft (40) and the gear assembly on it through the engine clutch end of the transmission compartment. It first will be necessary to remove the cap screws from the bearing cage (33) at the rear of the spline shaft.

4. 6 AND 9 SERIES: Remove the bevel pinion shaft. It will be necessary to remove the cap screws holding the bevel pinion and shaft bearing cage, rear, to the main frame. Then the bevel pinion and shaft (51) with the entire assembly on it can be removed through the front end of the transmission compartment.

6 (61), 6 (62), 9 (91) AND 9 (92) SERIES: Remove the cap screws holding the bevel pinion and shaft rear bearing (55) to the main frame. The entire bevel pinion and shaft assembly can then be removed through the front end of the transmission compartment.

(Ref. Nos. of Parts Apply to Illust. 7.)

5. Remove the reverse idler gear. To free the reverse idler gear (39), remove the cotter pin and nut from the reverse idler gear shaft bolt (32) and withdraw the bolt. Push out the reverse idler gear shaft (31) and lift out the idler gear.

6. Remove the driven gear (42) from the spline shaft (40) simultaneously freeing the split collar (41). Remove the split collar.

7. Remove all gears from the spline shaft.

8. Remove the transmission spline shaft bearing, rear. First position the shaft (40) in an arbor press with two pieces of wood under the bearing (34); then lower the press ram to contact the spline shaft, and press the shaft out of the bearing.

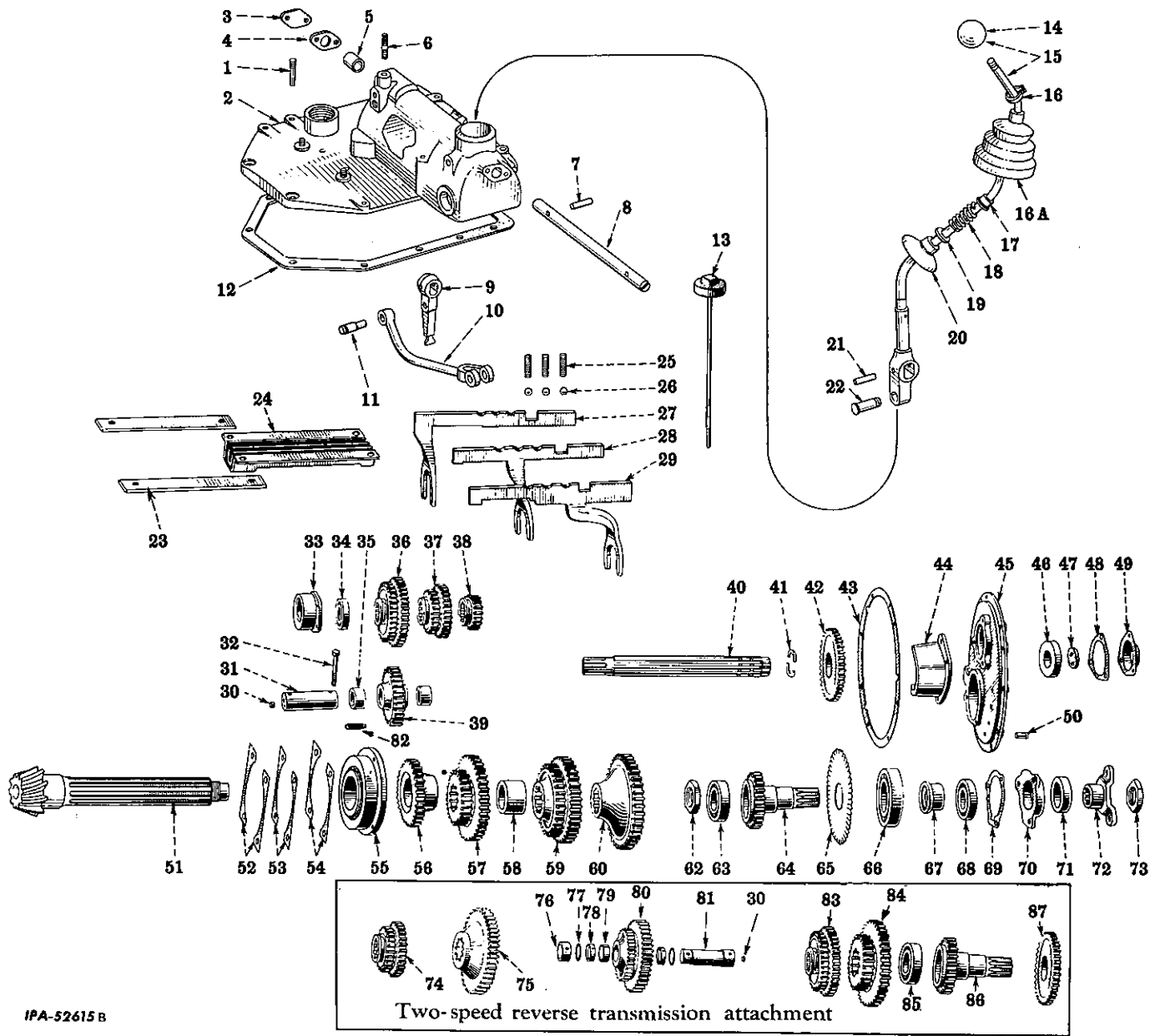
9. Remove the bevel pinion shaft bearing, front, (63) from the bevel pinion shaft. First position the bevel pinion shaft (51) in a press.

Carefully block up the bevel pinion shaft bearing, front, (63) and press the shaft out of the bearing.

10. Remove the bevel pinion shaft lock nut. Unlock the bevel pinion shaft lock washer, if so equipped, and unscrew and remove the lock nut (62).

11. 6 AND 9 SERIES: Remove all gears from the bevel pinion shaft.

Continued on page 12.



IPA-52615 B

Illust. 7 - Exploded View of Crawler Tractor Transmission.

Reference List for Illust. 7.

REF. NO.	DESCRIPTION	REF. NO.	DESCRIPTION	REF. NO.	DESCRIPTION
1.	Gear shifter housing to main frame dowel.	29.	Low and reverse gear shifter rail and fork.	60.	First speed gear.
2.	Gear shifter housing.	30.	Reverse idler gear shaft plug.	62.	Bevel pinion shaft lock nut.
3.	Gear shift lever shaft end cover.	31.	Reverse idler gear shaft.	63.	Bevel pinion shaft front bearing.
4.	Gear shift lever shaft end cover gasket.	32.	Reverse idler gear shaft bolt.	64.	Driving shaft and gear.
5.	Shifter lever shaft bushing.	33.	Spline shaft rear bearing cage.	65.	Oil slinger.
6.	Platform stud.	34.	Spline shaft rear bearing.	66.	Driving shaft rear bearing.
7.	Gear shift hand lever upper pin.	35.	Reverse idler gear bushing.	67.	Driving shaft rear bearing spacer.
8.	Gear shift lever upper shaft.	36.	Fourth and fifth speed sliding gear.	68.	Driving shaft front bearing.
9.	Gear shift lever, with pin.	37.	Second and third speed sliding gear.	69.	Front bearing retainer gasket.
10.	Gear shift lever lower shaft.	38.	First and reverse speed sliding gear.	70.	Driving shaft front bearing retainer.
11.	Gear shift lever lower pin.	39.	Reverse idler gear.	71.	Driving shaft oil seal.
12.	Gear shifter housing gasket.	40.	Spline shaft.	72.	Transmission drive coupling.
13.	Transmission oil level rod.	41.	Driven gear split collar	73.	Drive coupling retaining nut.
14.	Gear shift hand lever ball.	42.	Driven gear.	74.	Second and high reverse sliding gear. *
15.	Gear shift hand lever.	43.	End cover gasket.	75.	High and low reverse idler gear. *
16.	Gear shift hand lever boot clamp.	44.	End cover oil pocket.	76.	Reverse idler gear shaft sleeve. *
16A.	Gear shift hand lever boot.	45.	End cover.	77.	High and low reverse idler snap ring. *
17.	Gear shift hand lever swivel shield spring upper stop.	46.	Spline shaft front bearing.	78.	High and low reverse idler gear bearing. *
18.	Gear shift hand lever swivel shield spring.	47.	Spline shaft front bearing retainer washer.	79.	High and low reverse idler gear spacer. *
19.	Gear shift hand lever swivel shield spring lower stop.	48.	Spline shaft front bearing retainer gasket.	80.	High and low reverse idler gear. *
20.	Gear shift hand lever swivel shield.	49.	Spline shaft front bearing retainer.	81.	Reverse idler gear shaft. *
21.	Gear shift hand lever upper pin.	50.	End cover dowel pin.	82.	Reverse idler oil strainer.
22.	Gear shift hand lever lower pin.	51.	Bevel pinion and shaft.	83.	Third and fourth speed sliding gear. * (9 (92) series only.)
23.	Gear shifter rail guide support bolt lock.	52.	Bevel pinion and shaft bearing cage shim (heavy).	84.	Second and fourth speed gear. * (9 (92) series only.)
24.	Gear shifter rail guide.	53.	Bevel pinion and shaft bearing cage shim (medium).	85.	Bevel pinion shaft front bearing. * (9 (92) series only.)
25.	Gear shifter rail poppet spring.	54.	Bevel pinion and shaft bearing cage shim (light).	86.	Driving shaft. * (9 (92) series only.)
26.	Gear shifter rail poppet.	55.	Bevel pinion and shaft rear bearing.	87.	Driven gear. * (9 (92) series only.)
27.	Fourth and fifth gear shifter rail and fork.	56.	Fourth speed gear.		
28.	Second and third gear shifter rail and fork.	57.	Second and fifth speed gear.		
		58.	Bevel pinion shaft spacer.		
		59.	Third and reverse speed gear.		

* For tractors equipped with "Two speed reverse transmission attachment."



TRANSMISSION

6. REMOVAL AND DISASSEMBLY - Continued

6 (61) AFTER SERIAL 41229, 9 (91) AFTER SERIAL 66832 AND ALL 6 (62) AND 9 (92) SERIES: The bevel pinion shaft gears are all press fit and will have to be heated to be pressed off. A torch can be used to heat the hub of the gears. Care must be taken that the heat is uniform all around the hub and kept away from the gear bores and the shaft. Temperatures exceeding 400°F should be avoided or the hardness may be lost.

NOTE: Do not press the gears off without properly heating them or damage will result to the gears and shaft.

12. 6 AND 9 SERIES: Remove the bevel pinion shaft bearing, rear. Remove the snap ring from the bearing cage and press the cage off the bevel pinion shaft bearing, rear. Then press the bearing off the bevel pinion shaft (51).

6 (61), 6 (62), 9 (91) and 9 (92) SERIES: Press the bevel pinion shaft bearing, rear (55) (flanged, double taper) from the shaft. The shims (52, 53 and 54) may be kept and re-installed if the same bevel gear and bevel pinion also are to be installed.

13. On tractors with new type transmission drive shaft, unstack and remove the transmission drive coupling nut (73). Remove the drive coupling (72). On tractors with old type transmission drive shaft, unlock the transmission drive coupling retainer screw lock, then remove the drive coupling retainer screw. Remove the drive coupling.

NOTE: When disassembling the transmission drive coupling (72) from the shaft (64) it may be necessary to use a puller. Since lack of space prohibits the use of a puller in the tractor, remove the transmission end cover (45) from the tractor with the coupling and shaft attached.

14. Remove the transmission drive shaft oil seal. Remove the hardware securing the drive shaft front bearing retainer (70). The retainer will then come off, as will the retainer gasket (69). Then remove the oil seal (71) from the bearing retainer (70).

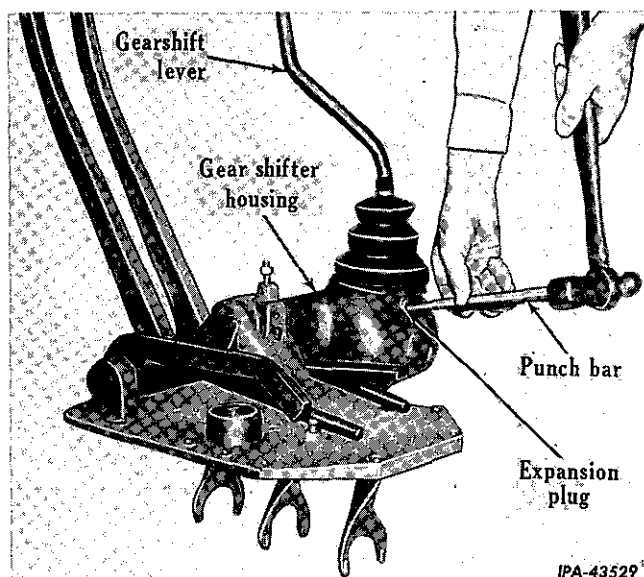
15. Remove the transmission driving shaft by using a press to remove the driving shaft and gear (64) from the end cover (45). The transmission driving shaft bearing, front, (68) will remain in the end cover (45).

16. Remove the transmission driving shaft rear bearing. Pull the rear bearing (66) from the driving shaft (64) and free the transmission oil slinger (65).

17. Remove the transmission driving shaft bearing, front, by positioning the end cover (45) in a press, lowering the press ram to contact the driving shaft bearing, front, (68) and pressing the bearing from the end cover.

If the spline shaft front ball bearing (46) needs replacement, it may be pressed from the end cover (45).

18. Remove the bushings from the reverse idler gear. Position the idler gear (39) in a press; set up a suitable adapter and lower the ram to press the idler gear bushing (35) from the reverse idler gear.



Illust. 8 - Removing Expansion Plug and Swivel Shaft (91 Series Shown).

19. Remove the shifter rail guide assembly. Remove the cap screws holding the gear shifter rail guide (24) to the gear shifter housing (2). With the rail guide (24) removed, shifter forks (27, 28 and 29) may be removed. Also, the shifter rail poppet ball (26) and the poppet ball spring (25) may be removed.

20. Remove the gear shift lever after the two expansion plugs have been removed and the small swivel shaft, has been driven out. On the 6 (61), 6 (62), 9 (91) and 9 (92) series, remove the hand lever upper pin (21) and lower pin (22). (See Illust. 8.) The gear shift lever may then be lifted from its position in the shifter housing.



TRANSMISSION

7. INSPECTION AND REPAIR

1. After the entire transmission has been removed and disassembled completely, wash all parts in a good cleaning solvent. Take care to remove any foreign matter on the gears, shafts, bushings or bearings. After the parts have

been thoroughly cleaned, dry them with compressed air. Wash all bearings particularly well, and clean and flush the transmission case. Be sure the oil strainer in the reverse idler gear shaft is clean and in serviceable condition.

2. Inspect all parts for scores, cracks, chipping and excessive wear in accordance with the following chart:

INSPECTION

REMEDY

BEARINGS

- | | |
|---|---|
| 1. Inspect for cracks, scores, and general wear | Replace if necessary. Soak in oil, wrap and cover until ready for assembly. |
|---|---|

BUSHINGS

- | | |
|--|---|
| 1. Inspect reverse idler gear bushings for wear and damage | Install new bushings if necessary. Keep clean until reassembly. |
| 2. Inspect power take-off bushing for wear | Replace if necessary. |

OIL SEALS

- | | |
|--|---|
| 1. Inspect for damaged or excessively worn areas | Replace if necessary. The seal must be installed with the lip facing the inside of the housing. |
|--|---|

GEARS

- | | |
|--|---|
| 1. Inspect the gears for wear, and chipped or broken teeth | Replace the gears that are worn excessively or that are damaged. |
| 2. Inspect the splines for snugness in fit | Replace gear if spline fit is excessively loose. |
| 3. Inspect splines for burrs | If the burrs are slight, they may be smoothed down with a stone. If badly burred, replace the gear. |

BEVEL PINION AND SHAFT

- | | |
|---|---|
| 1. Inspect for scores, cracks and excessive wear at the pinion gear | Install a new shaft if cracks or excessive wear is in evidence. Refer to "NOTE" that opens Par. 8, "REASSEMBLY," pertaining to replacement. |
|---|---|

SPLINE SHAFT

- | | |
|--|--|
| 1. Inspect spline shaft for cracks, wear, galling and chipping | If the spline shaft indicates extreme wear, galling, cracks or chipping, replace the spline shaft. |
|--|--|

Continued on next page.



TRANSMISSION

7. INSPECTION AND REPAIR - Continued

INSPECTION

REMEDY

SHIFTER RAILS AND FORKS

- | | |
|--|---|
| 1. Note the condition of the notches in the shifter rails | If they are worn to the extent that the transmission will not stay in gear, the shifter rails must be replaced. |
| 2. Inspect the shifter forks for wear or damage | Replace shifter fork and rail if required. |
| 3. Inspect the condition of the gear shifter rail poppet balls and springs | If they are damaged or badly worn, they must be replaced. |

Pinion Shaft Rear Bearing.

Since the bearings, spacer and cage assembly (55) are furnished as a matched unit, definite procedure for adjustment of the double tapered roller bearings, due to normal wear, must be followed.

1. Place the complete bearing assembly on a flat surface (surface plate).
2. Place a weight (20 lbs. minimum) on top of bearing assembly, as shown in Illust. 9. (This will keep roller in alignment.)
3. Rotate the cup (A) a minimum of four revolutions in each direction.
4. With spacer (B) in place, set the dial indicator at zero. Check at three different points.

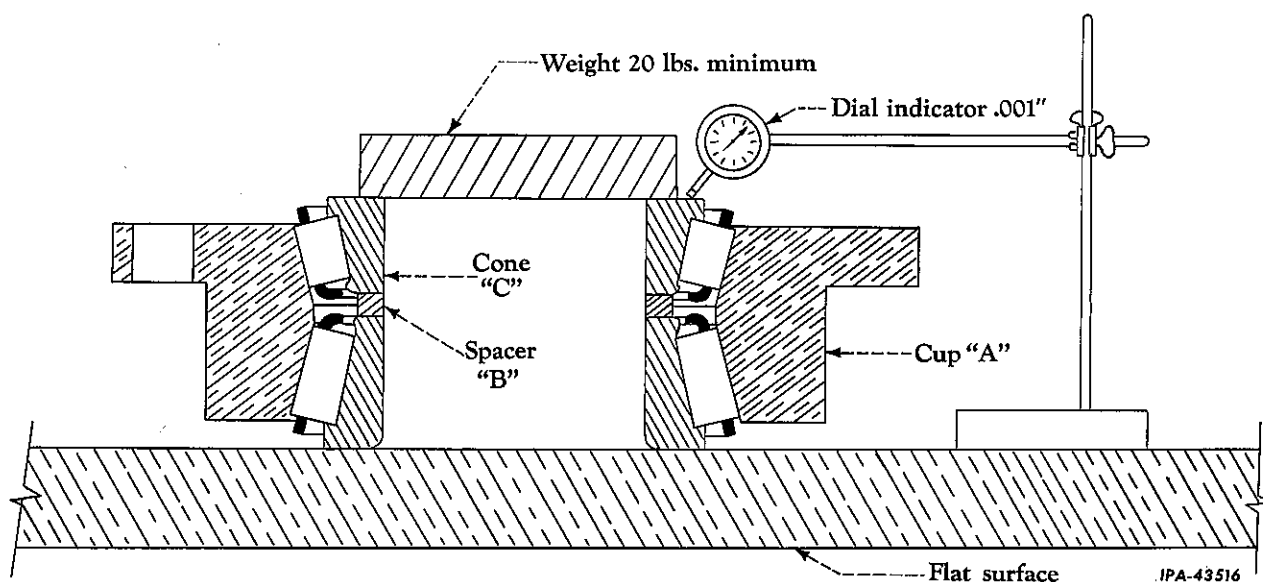
5. Slide dial indicator off cone (C) carefully. (Do not upset indicator setting.)

6. Remove weight, cone (C) and spacer (B). Then replace cone (C) and weight. (Do not replace spacer (B).)

7. Repeat rotation of cup (A) and slide dial indicator on cone (C). Be careful to get an accurate reading from dial indicator. Check at three different points.

8. Factory end play specification in a new bearing assembly for the TD-6 is $.006 \pm .001$ inch, and for the TD-9 is $.007 \pm .001$ inch.

If the reading on dial indicator shows a greater drop than the maximum factory set end play,



Illust. 9 - Adjustment of Tapered Roller Bearings.



TRANSMISSION

grinding or lapping of spacer is necessary. The amount to be ground off the spacer is the difference between the indicator reading and the factory set end play.

A bearing assembly that is heavily pitted or scored should not be salvaged.

8. REASSEMBLY AND INSTALLATION

(Ref. Nos. of Parts Apply to Illust. 7.)

NOTE: The bevel pinions and drive bevel gears are available individually for service. However, a new gear may be used with an old pinion, or vice versa, only if the used gear or pinion is in good condition. On the "6" series crawler tractors, the drive bevel gears and bevel pinions are also available in matched sets. Whenever it is possible, it is recommended that a matched set be installed.

For adjusting the end clearance and backlash, refer to Par. 15 or 16.

1. Install the reverse idler gear (39) between the two supports on the main frame with the larger hub to the rear of the tractor. Then push the reverse idler shaft (31) in place. Note that the shaft bolt hole is in an off-center position so that the reverse idler gear shaft bolt (32) can be inserted through the shaft and support in only one way. Install the nut securely and slip the cotter pin through the bolt.

Continued on next page.

PRINCIPAL STEPS IN REASSEMBLY AND INSTALLATION OF THE TRANSMISSION

REASSEMBLY

1. Install the reverse idler gear.
2. Install the bevel pinion shaft rear bearing cage.
3. Install all gears on the bevel pinion shaft.
4. Install the pinion shaft lock nut and bearing.

5. Install the spline shaft rear bearing and cage.
6. Install all spline shaft gears.
7. Install the split collar and driven gear.
8. Install the inner bearing and the oil slinger on the driven gear.
9. Install the driving shaft, spacer and bearing into the front cover.
10. Install the oil seal and retainer.
11. Install the transmission drive coupling.
12. Install the shifter rails.
13. Install the shifter lever.

INSTALLATION

14. Install the bevel pinion shaft.
15. Install the spline shaft.
16. Install the end cover.
17. Install the spline shaft bearing and retainer.
18. Install the engine clutch.
19. Install the main frame cover.
20. Install the gear shifter housing.
21. Install the steering clutch release levers.
22. Install the steering clutch levers.
23. Install the steering clutch grease tubes.
24. Fill the transmission.
25. Connect all secondary wiring.
26. Install the seat and fuel tank.
27. Install the batteries, battery covers and seat cushion.



TRANSMISSION

8. REASSEMBLY AND INSTALLATION - Continued

(Ref. Nos. of Parts Apply to Illust. 7.)

2. 6 AND 9 SERIES ONLY: Install the bevel pinion and shaft rear bearing cage onto the bevel pinion and shaft bearing, rear. Then place the snap ring onto the cage and press the assembly onto the bevel pinion shaft (51).

6 (61), 6 (62), 9 (91) AND 9 (92) SERIES ONLY: Press the rear cone of the bevel pinion shaft rear bearing (55) on the bevel pinion shaft, being sure it seats firmly against the shoulder of the pinion gear. Install the bearing outer race and spacer over the rear cone. Press the front cone on the shaft, seating it firmly against the spacer.

3. Assemble the gears on the bevel pinion shaft in the sequence shown below.

NOTE: With the exception of the machines listed below, the gears on the bevel pinion shaft are a tight press fit. Before the gears can be pressed on they must be heated to 380-400°F for one hour. Avoid heating the gears over 400°F or the hardness may be lost. Press each gear down as far as it will go and hold the pressure on the gear until it cools enough to shrink tightly on the shaft. After all the gears are installed, press the complete assembly of gears with 50 tons of pressure. Check to see that there is no gap between any of the gears or spacers.

The following machines do not require heating and pressing on gears, provided they are equipped with original bevel pinion shaft:

All 6 and 9 series tractors
T and TD-61-41228 and below
T and TD-91-66831 and below

Install the fourth speed gear (56) on the pinion shaft (51) with the shorter hub toward bearing. The 6 (61), 6 (62), 9 (91) and 9 (92) series fourth speed gear has no short hub, so the gear end will be toward bearing. No short spacer is needed as is found on the 6 and 9 series. Place the bevel pinion shaft spacer, short, on the shaft. Place second and fifth speed gears (57) on the shaft with smaller gear toward pinion. Slide the bevel pinion shaft spacer, long (58), onto the pinion shaft. Position third and reverse speed gears (59) on the shaft with smaller gear toward pinion. Install first speed gear (60) with the long hub toward pinion.

4. Slip the pinion shaft lock nut lock washer (61), if used, on the pinion shaft next to the first speed gear (60). Then place the pinion shaft lock nut (62) on the shaft, tighten to the torque specified in Par. 2-and lock. The security type lock nut (if so equipped) should screw onto the shaft with a drag of 20 to 30 ft-lbs. If it spins on freely or binds too much, it will not lock itself properly; remove the nut and start it over again. After torquing the nut, press the pinion shaft front bearing (63) on the shaft.

9 (92) SERIES: When installing the new front roller bearing on the pinion shaft, the inner race of the bearing is to be pressed in place against the threaded shoulder on the bevel pinion shaft. The inner and outer race may be lubricated with a light coat of transmission oil to aid in assembly.

5. Press the transmission spline shaft bearing, rear (34), on the rear end of the spline shaft (40). Then place the spline shaft bearing cage, rear (33), on the bearing.

6. Install all spline shaft gears. After closely inspecting the spline shaft and the inside splines in each sliding gear, install the fourth and fifth speed sliding gears (36), the second and third speed sliding gears (37), and the first and reverse sliding gears (38) on the spline shaft. When all gears are assembled on the spline shaft, the shifter fork recesses, or collars, should be toward the rear of the spline shaft.

7. Install the driven gear split collar (41) in the groove on the spline shaft (40) and slip the driven gear (42) on the shaft with the longer hub toward the front end of the shaft. The driven gear will hold the split collar in place.

8. Install the oil slinger (65) on the driving shaft and gear (64). Then position the driving shaft rear bearing (66) on the driving shaft and gear and press into place.

9. Install the driving shaft, assembled, spacer and front bearing into the front cover. Position the driving shaft, oil slinger, and bearing, in the end cover, and press into place. Slide on the driving shaft bearing spacer (67) with the flare toward the rear. Then install the driving shaft bearing, front (68), by pressing into the front of the end cover (45).

If the spline shaft front ball bearing (46) was pressed from the end cover (45), press the bearing in being sure the shielded side is toward the rear of the tractor. The shield is to prevent dirt from entering the bearing.

10. Install oil seal and retainer. Position the driving shaft front bearing retainer (70) beneath the ram of an arbor press resting on the flange. Then place the driving shaft oil seal (71) with the lips downward, and press the seal into the retainer. Then assemble the gasket (69), retainer (70), and bolt into position.

NOTE: Apply a coat of "Never-Seez" No. 999 617 R1 to the splines when assembling the coupling (72) to the shaft (64). It may be necessary to press these parts together, in which case the drive shaft and coupling should be assembled to and installed with the end cover (45).

11. Install the transmission drive coupling (72). On tractors with new type transmission drive shaft, install drive coupling nut (73) and stake it. On tractors with old type transmission drive shaft, slip the retainer screw lock on the retainer screw and tighten. Lock the screw into position.



TRANSMISSION

12. Install shifter rails. Turn the gear shifter housing (2) upside down and install the shifter rail poppet ball springs (25) and the shifter rail poppet balls (26) in holes provided for them. Then install shifter rails (27), (28) and (29) in the shifter rail guides (24) so the proper shifter forks engage the proper sliding gears. Secure the rail guides to the shifter housing with cap screws.

NOTE: The square notches in the shifter rails should line up when properly installed.

13. 6 AND 9 SERIES ONLY: Install the shifting lever by placing the gear shifter lever swivel shaft in the gearshift lever (15) and insert the lever (15) in the housing (2). Drive in the small swivel shaft and the expansion plugs.

6 (61), 6 (62), 9 (91) AND 9 (92) ONLY: Install the gearshift hand lever. Attach the hand lever lower shift (10) to the gearshift hand lever (15) with the lever lower pin (22). Lower the gearshift hand lever in place in the gear shifter housing (2). Attach the lower lever shaft (10) to the lower lever (9) with the lever pin (11) andpeen the end to secure it. Push the gearshift lever upper shaft (8) through the shaft hole in the housing, engaging the elongated hole in the gearshift hand lever (15) and gearshift lever (9). Locate the pin holes and drive the hand lever upper roll pins (7) and (21) in place.

14. Install the bevel pinion and shaft. Lift the assembled bevel pinion and shaft into position and install the bearing cage or bearing into the main frame. If the pinion and bevel gear were not replaced by new ones, the same number of shims may be used between the bearing cage and the main frame. Then replace and tighten the cap screws holding the bearing or bearing cage to the main frame.

NOTE: Refer to Par. 15 or 16 for adjustment of the pinion and bevel gear.

15. Install the spline shaft. Place the spline shaft bearing cage (33) with the spline shaft assembly in the main frame. Run in the cap screws and secure the bearing cage (33) to the main frame.

16. Install the end cover completely reassembled. Place the assembled end cover (45) and end cover gasket (43) in position. Line up the bevel pinion shaft bearing, front (63), with the driving shaft and gear (64) and set the end cover in position. Align the dowels and tap them into position. Then install the cap screws, lock washers and nuts on the studs, and tighten them.

17. Drive the spline shaft bearing, front (46) onto the spline shaft (40) with the shielded side

towards the rear of the tractor, and secure it with cap screws and lock washers. Then place the spline shaft front bearing retainer (49) and the gasket (48) in position, and install and tighten the cap screws.

18. Install the engine clutch. (Refer to "ENGINE CLUTCH," Section 5.)

19. Install the main frame cover. Clean the main frame compartments before installing the main frame cover. Then place the cover into position. Tap in the dowels and secure with cap screws and lock washers.

20. Install the gear shifter housing. First install the gasket (12) in the main frame, then align the sliding gear shifting collars to receive the shifter forks, and lower the housing. Align the dowel holes and drive in the dowels. Secure the housing with cap screws.

21. Install the steering clutch release levers. Position the steering clutch release levers to hold the linkage reasonably snug. Fit the release lever over the release fork and tap the lever onto the fork.

NOTE: After installation is complete, refer to "STEERING CLUTCHES AND BRAKES," Section 7 for adjustments.

22. Install the steering clutch levers. Line up the steering clutch levers with the eye pins. Then position the levers in the housing and install the hand lever shaft. Tighten the set screws on the steering clutch lever support on the gear shifter housing. Install the return springs. Install the hand lever booster springs.

23. Install the steering clutch grease tubes. This may be done through the small inspection cover openings. Bolt the grease tubes to the main frame cover; then secure the inspection covers.

24. Fill the transmission case. Refer to the operator's manual for specifications. Fill the case, with the proper lubricant, to the proper level.

25. Connect all electrical wiring to the proper terminals, as marked, before disassembly.

26. Install the fuel tank, seat and fenders as a unit into position and secure with cap screws. Connect the fuel lines, and fill the fuel tank with a recommended grade of fuel.

27. Install the batteries, battery covers and seat. Connect all cables to the proper terminals as marked during disassembly. Then install the battery covers and the seat cushion.



BEVEL GEAR

9. DESCRIPTION

The drive bevel gear is situated in the main frame to the rear of the transmission compartment. The drive bevel gear transmits the power from the transmission to the sprocket drives through the steering clutches. It also changes the direction of the line of power and it provides a definite, set, gear reduction.

The drive bevel gear is lubricated by the same oil that lubricates the transmission.

The hub of the bevel gear is mounted on two ball bearings (later models have roller bearings), and it is connected on each side to the steering clutches.

Shims are provided between the bevel pinion shaft rear bearing cage and the main frame

for the purpose of establishing proper end clearance. They are used to adjust the bevel gear and bevel pinion for end clearance. The bevel gear has a shimming provision for setting backlash between the bevel pinion and the bevel gear. These shims will be found between the drive bevel gear and the drive bevel gear spacer.

Later model tractors are equipped with bevel gear bearing adjusters and adjuster locking screws, instead of shims.

On older model tractors a set screw projects through the side of the drive bevel gear compartment. It contacts the drive bevel gear momentarily when the gear is subjected to shock loads.

For adjusting the end clearance and backlash, refer to Par. 15 or 16.

10. CHECKING MECHANICAL PROBLEMS

PROBABLE CAUSE

REMEDY

EXCESSIVE BACKLASH

- | | |
|---|--|
| 1. Improper adjustment of bevel gear and pinion | Adjust bevel gear and pinion in accordance with specifications. |
| 2. Loose transmission drive coupling | Remove engine clutch and inspect coupling for condition. Tighten if found in loosened condition. |

GEARS NOISY

- | | |
|---|---|
| 1. Improper or insufficient lubricant | Use proper lubricant; fill to proper level. |
| 2. Improper adjustment of pinion and bevel gear | Adjust pinion and bevel gear in accordance with specifications. |

LUBRICANT LEAKAGE

- | | |
|--|---|
| 1. Faulty oil seal in bevel gear compartment . | Determine if the leak is coming from the sprocket drive or bevel gear compartment. If bevel gear compartment indicates leakage, remove steering clutches and replace oil seal and gasket at bevel gear hub. |
|--|---|



2. Lubricant leaks at drain

If sprocket drive leaks, refer to "SPROCKET DRIVE," Section 8.
Tighten drain plug or replace plug if damaged.

TRACTOR WILL NOT MOVE

1. Pinion shaft sheared

Replace bevel pinion shaft.*

2. Bevel gear broken

Replace bevel gear.*

* Inspect mating part for damage and replace both when necessary. On "6" series crawler tractors it is recommended that a matched set be installed whenever possible.

11. MAINTENANCE

The bevel gear requires no maintenance other than extreme care during installation of a new bevel gear and bevel pinion. The backlash and end clearance should be set precisely. There will be little general maintenance other than checking the lubricating oil in the transmission case which also fills the bevel gear compartment, at intervals of 100 hours of operation.

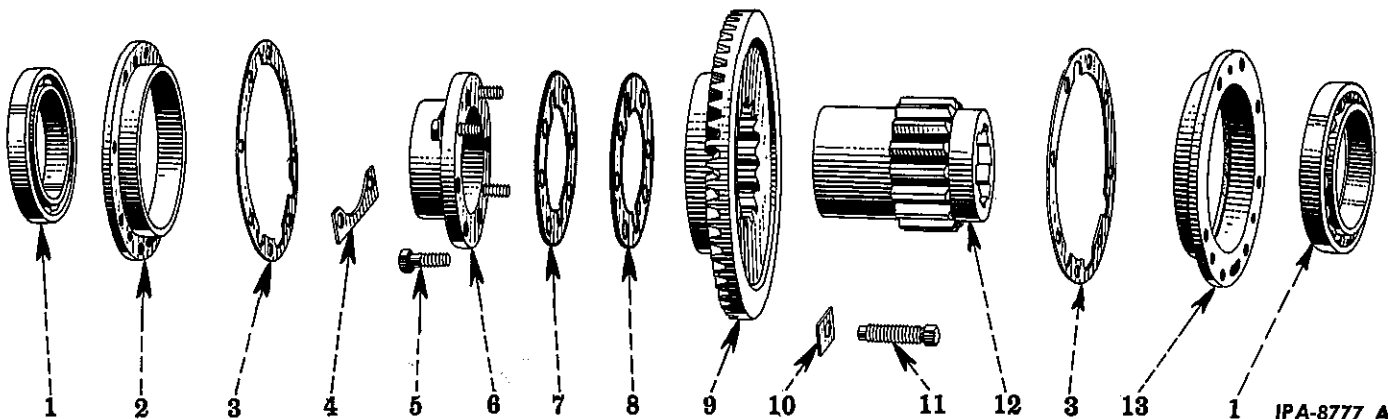
After 100 hours of operation, the oil level should be checked. After 1,000 hours of operation, the lubricating oil should be changed.

NOTE: If the lubricating oil has been thinned for winter use, change it to proper grade when warm weather begins. (Refer to operator's manual.)

12. REMOVAL AND DISASSEMBLY

PRINCIPAL STEPS IN REMOVAL AND DISASSEMBLY OF THE BEVEL GEAR

1. Remove the fuel tank and connections.
2. Remove the main frame cover.
3. Remove the steering clutches and brakes.
4. Remove the drive bevel gear bearing cage. (RH, 6 and 9 series.)
5. Remove drive bevel gear bearing cage. (LH, 6 and 9 series.)
6. Remove drive bevel gear hub and drive bevel gear.



Illust. 10 - Exploded View of Bevel Gear and Related Parts (6 and 9 Series) (TD-6, TDBK-37202 to 38552; TD-9, TDCB-55130 to 58450).



TRANSMISSION AND BEVEL GEAR

BEVEL GEAR

Legend for Illust. 10.

Ref. No.	DESCRIPTION	Ref. No.	DESCRIPTION
1.	Drive bevel gear bearing.	8.	Drive bevel gear shim (light).
2.	Drive bevel gear bearing cage, left.	9.	Drive bevel gear.
3.	Drive bevel gear bearing cage gasket.	10.	Deflection set screw lock.
4.	Drive bevel gear dowel bolt lock.	11.	Drive bevel gear deflection set screw.
5.	Drive bevel gear dowel bolt.	12.	Drive bevel gear hub.
6.	Drive bevel gear spacer.	13.	Drive bevel gear bearing cage, right.
7.	Drive bevel gear shim (heavy).		

12. REMOVAL AND DISASSEMBLY - Continued

Preparation for Removal

1. Remove fuel tank and connections. Refer to "STEERING CLUTCHES AND BRAKES," Section 7.

2. Remove main frame cover. Refer to "STEERING CLUTCHES AND BRAKES," Section 7.

3. Remove steering clutches and brakes. Refer to "STEERING CLUTCHES AND BRAKES," Section 7.

(See Illust. 11.)

4. Remove the right bearing cage. The bearing adjuster (1), shaft coupling oil seal (2), adjuster nut lock (3) and bearing adjuster ring (4) will have been removed with the steering clutches and brakes. Install puller screws in bearing cage (5), running them in evenly until the bearing cage is free from the main frame. Remove adjuster sealing ring (7). Press bearing cup (8) out of the bearing cage (5). The gasket (6) will usually come off with the bearing cage.

5. Remove the left bearing cage. Follow the same procedure as outlined in step 4.

6. Remove the right bearing cone (9) by removing the six nuts and six dowel bolts (12) securing the bevel gear (10) to bevel gear hub (11). Pusher holes are provided in the hub for three screws used to force the ring gear against the right bearing (9). By running the screws in evenly, the bearing will be forced off the hub.

7. Lift the bevel gear (10) out of the compartment.

8. Remove the drive bevel gear hub (11) from the compartment. Use a bearing puller to remove the left bearing cone (9).

To separate the adjuster (1) from the adjuster ring (4), remove the adjuster nut lock (3) and screw out the adjuster. The shaft coupling oil seal (2) will remain in the bearing adjuster and need not be removed except for replacement.

Bevel Gear Removal (6 and 9 Series)

(TD-6, 38552 and below.)

(TD-9, 58450 and below.)

(See Illust. 10.)

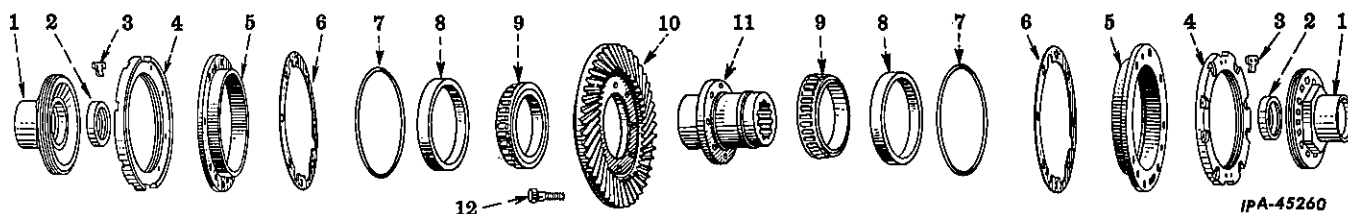
1. Remove the right bearing cage. First remove the drive bevel gear dowel bolts (5) holding the drive bevel gear spacer (6) to the bevel gear (9), and back out the deflection set screw (11). Then install three puller cap screws in the right bearing cage (13). Run in these cap screws evenly until the right bearing cage (13) is free from the main frame. The bearing (1) may then be pressed out of the bearing cage. The gasket (3) usually will come off with the bearing cage.

2. Remove the left bearing cage by wedging a piece of wood between the drive bevel gear (9) and the main frame to keep the bevel gear from drifting to the left. Install puller cap screws in the left bearing cage (2) and run them in evenly until the left bearing cage (2) is free from the main frame. The bearing (1) may be removed from the hub. The bevel gear bearing cage gasket (3) will usually stick to the bearing cage. The drive bevel gear shims (7) and (8) can be removed when the left bearing cage is loosened or removed.

3. Remove the drive bevel gear hub spacer and the drive bevel gear. This may be done after the left and right bevel gear bearing cages have been removed from the main frame. Slide the drive bevel gear spacer (6) and drive bevel gear hub (12) out the left side of the main frame. Then the drive bevel gear (9) may be lifted from the compartment.



BEVEL GEAR



Illustr. 11 - Exploded View of Bevel Gear and Related Parts TD-6(61), 6(62) and TD-9(91), 9(92) Series.

REF. NO.	DESCRIPTION	REF. NO.	DESCRIPTION
1	Bearing adjuster.	7	Bearing adjuster sealing ring.
2	Shaft coupling oil seal.	8	Bearing cup.
3	Bearing adjuster nut lock.	9	Bearing cone.
4	Bearing adjuster ring.	10	Drive bevel gear.
5	Bearing cage.	11	Drive bevel gear hub.
6	Bearing cage gasket.	12	Bevel gear dowel bolt.

13. INSPECTION AND REPAIR

1. Clean all parts thoroughly with dry-cleaning solvent, and dry off with compressed air.
2. Examine the drive bevel gear for cracks, chipping, broken teeth and excessive damage. If necessary, replace the bevel gear. Refer to the "NOTE" that opens par. 8 of this section regarding replacement.
3. Examine all bearings. Place them in dry-cleaning solvent and clean thoroughly. Blow out the bearings, directing air pressure across the bearing, blowing out all traces of the old

lubricant. Avoid spinning the bearings with the air stream. Inspect balls and races, cups, rollers and cones carefully for chipping, cracks, or worn spots to determine their fitness for future use. If bearings are damaged, replace with new ones; otherwise, repack with proper grease or lubricant and wrap in paper until ready for reassembly.

4. Inspect all other parts for cracks, chips or severe wear. Replace if necessary.

NOTE: When installing a new bevel gear hub or dowel bolts on tractors equipped with screw type bevel gear adjusters, refer to the following chart, and ream the dowel bolt holes in the hub to proper size. The dowel section of the new dowel bolt has been increased .002 inch.

Machine*	Hub	When used w/bolt	Ream	When used w/bolt	Ream
"6" Series	271 755 R1	274 075 R1	.4990/.5005	274 075 R2	.5005/.5025
"9" Series	271 853 R1	274 075 R1	.4990/.5005	274 075 R2	.5005/.5025



BEVEL GEAR

14. REASSEMBLY AND INSTALLATION

6 and 9 Series

Principal Steps in Reassembly and Installation
of the Bevel Gear

1. Install the drive bevel gear bearing into the bearing cage.
2. Install the bevel gear bearing cage and the steering clutch bearing cap.
3. Install the bevel gear bearing on the drive bevel gear hub.
4. Install the bevel gear, shims, hub and bevel gear spacer.
5. Install the bevel gear bearing cage.
6. Install the steering clutch coupling and the steering clutch bearing cap.
7. Install the deflection set screw.

1. Install the drive bevel gear bearing into the drive bevel gear bearing cage.

Place the right bevel gear bearing cage in a press so the flange of the bearing cage is up off the bed of the press. Place the bearing on the bearing cage so the extended lip of the inner race is downward or toward the bed of the press. Lower the ram and press the bearing into position.

2. Install the bevel gear bearing cage and the steering clutch bearing cap. Shellac a new gasket to the right bevel gear bearing cage. Locate the bearing cage in the main frame and drive the cage into position. Then reassemble the right steering clutch bearing cage cap and secure with several cap screws.

NOTE: Attaching the steering clutch bearing cap is only a temporary installation that is necessary when driving the hub into the bearing. The bearing cap will later be removed to install the steering clutch coupling.

3. Install the bevel gear bearing on the bevel gear spacer. Slide the bevel gear spacer on the bevel gear hub. Position the hub and the spacer in an arbor press with the spacer upward, away from the bed of the press. Position the bevel gear bearing on the spacer, and press it into position.

NOTE: Install the bevel gear bearing on the spacer with the extended lip of the inner race facing away from the spacer.

4. Install the bevel gear, the shims, the bevel gear hub, and the bevel gear spacer. Position the bevel gear on the right side of the bevel gear compartment in the main frame. Remove the spacer from the bevel gear hub. Insert the bevel gear hub through the bevel gear from the left steering clutch compartment, and drive the hub into the right bevel gear bearing. Slide the spacer on the hub, and insert the original shims between the spacer and the hub of the bevel gear. Attach the spacer to the bevel gear having the cap screw locks on the cap screws, but do not bend the locks over the cap screws at this time, since it may be necessary to remove or add shims.

5. Install the bevel gear bearing cage. First shellac a new gasket to the bearing cage, left, and drive the bearing cage onto the bearing and into the main frame.

NOTE: The shims should be between the bearing cages, both left and right, and the main frame.

Then assemble the bearing cage cap to the right side of the tractor.

6. Install the steering clutch coupling and the steering clutch bearing cap. Install the steering clutch coupling in the left side of the bevel gear. Then install the steering clutch bearing cap and secure with cap screws. Remove the bearing cap, right. Install the steering clutch coupling, right. Install the right steering clutch bearing cap.

7. Install the bevel gear deflection screw. Note that the drive bevel gear deflection set screw lock and jam nut are on the deflection set screw. Screw the set screw into the right side of the main frame. Adjustment is covered in Par. 15.

NOTE: Tighten the cap screws holding the drive bevel gear hub to the drive bevel gear with the proper torque. (See "SPECIFICATIONS," Par. 2.) On units so equipped, torque the self-locking cap screws that hold the bevel gear spacer to the bevel gear.

Adapters are available for use with a torque wrench for tightening the drive bevel gear dowel bolts. These adapters (Part number 1 020 378



BEVEL GEAR

R1) when used with a torque wrench, will assure proper torque. Refer to "Service Tools" manual, ISS-1002.

6 (61), 6 (62), 9 (91) and 9 (92) Series

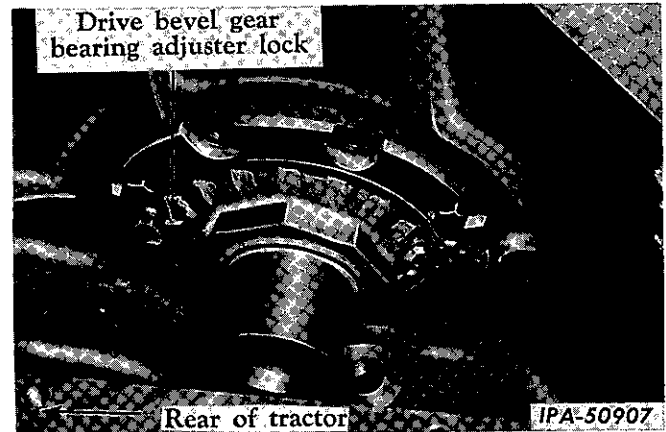
PRINCIPAL STEPS IN REASSEMBLY AND INSTALLATION OF THE BEVEL GEAR

1. Install the bearing cups into the drive bevel gear bearing cages.
2. Install bearing cone to the long end of drive bevel gear hub.
3. Install drive bevel gear to the gear hub.
4. Install bearing cone to the right end of drive bevel gear hub.
5. Install the bearing cage and cup assemblies to the main frame.
6. Assemble the ring type adjuster and clutch shaft coupling.
7. Install the assembled adjuster and coupling to the steering clutch shafts before installing the steering clutches.

NOTE: At any time the drive bevel gear bearing adjuster locks have been removed and then re-installed, be sure that they are installed in the tapped holes provided to the rear of the bearings (toward rear of tractor).

Illustration 12 shows drive bevel gear bearing adjuster lock installed properly.

Interference will be encountered with the steering clutch release fork if they are installed in the tapped holes to the front of the bearings (toward front of tractor).



Illust. 12 - Showing Adjuster Lock Properly Installed.

(Reference numbers refer to Illust. 11.)

1. Install the drive bevel gear bearing cups (8) into the bearing cages (5).

Place either bearing cage (5) in a press so that the flange side will be up off the bed of the press. Place cup (8) over the cage opening to position small ID of taper toward the press ram. Press the cup into cage until flush with the flanged surface.

2. Install either bearing cone (9) to the long end of the gear hub (11). Refer to the following NOTE regarding preheating the bearing cones.

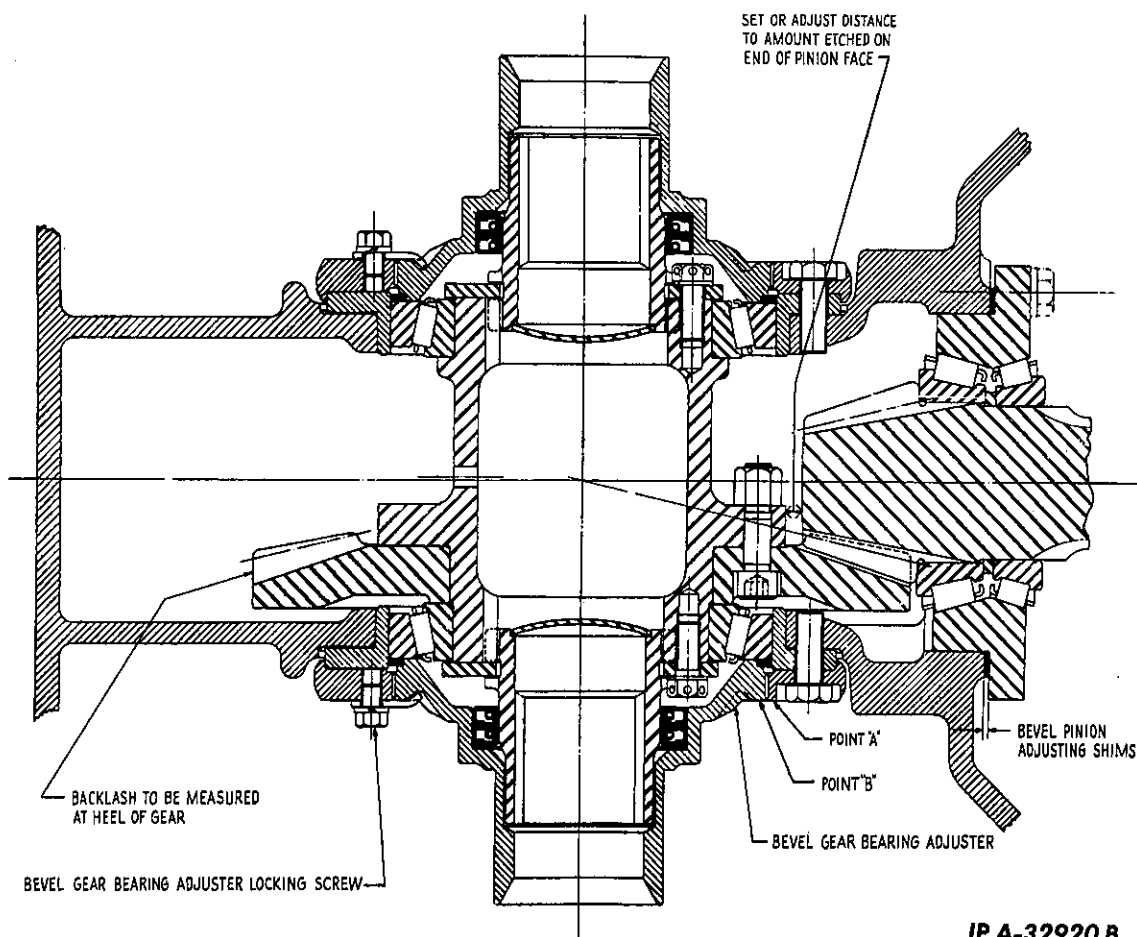
Set the preheated bearing cone on the hub so the taper slopes toward the left end of the hub when cone is installed. Tap the cone lightly with a soft hammer until seated against the shoulder of hub.

NOTE: Preheat the bearing cones or inner races. Before installing, both bearing cones (9) should be preheated to not over 250 degrees F in oil, oven, or infra-red lamp. Adjustment should not be made until the cones are solidly against their respective shoulders and have cooled to room temperature.

Continued on page 25

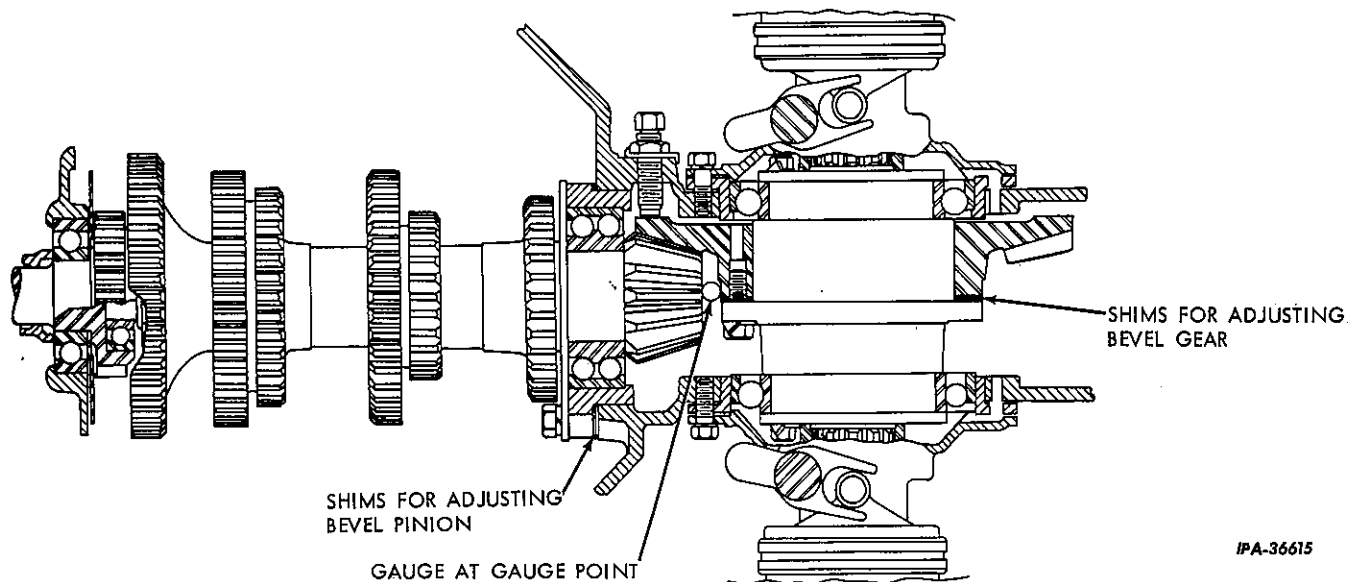


BEVEL GEAR



IP A-32920 B

Illust. 13.



IPA-36615

Illust. 14.



BEVEL GEAR

14. REASSEMBLY AND INSTALLATION - Continued

3. Install the drive bevel gear (10) to the gear hub (11) in the rear compartment. Refer to NOTE in Par. 2 "SPECIFICATIONS" if a new gear is being installed.

Place the gear hub (11) into the drive compartment so that the long end of the hub, with cone installed, can be inserted into the left side wall opening. Lower the drive bevel gear (10) into the drive compartment to mesh with the right side of the pinion bevel gear. While holding the drive bevel gear in this position, insert the short end of gear hub through the gear to line up the bolt holes in gear and the flange on hub, refer to Illust. 13. Install six new dowel bolts (12) to the gear and hub by passing them through the opening in main frame from the steering clutch side.

NOTE: Do not re-use the drive bevel gear dowel bolts. The head of the bolt may have been weakened or damaged at some previous torquing operation. Always use NEW bolts to avoid the possibility of premature failure.

Lubricate the threads with SAE-30 engine oil, install the nuts to the dowel bolts and tighten to 130-145 foot pounds torque. To prevent bolts from turning, insert a 3/8 inch Allen wrench through the side wall opening to engage the bolt head.

4. Install the other bearing cone (9) to the right or gear end of the hub. Refer to NOTE regarding preheating bearing cones.

Block up the bevel drive gear and hub from the bottom to support the assembly so that the hub centers in the side wall openings. Place props between the left side wall and the hub flange to wedge the drive gear against the right side wall, also to prevent the gear and hub from sliding to the left during bearing cone installation.

Place the preheated bearing cone through the right side wall opening and onto the hub so that the taper slopes toward the hub right end when installed. Tap slightly with a soft hammer until the cone bottoms against the hub shoulder.

5. Install the bearing cage and cup assemblies to the main frame.

Install a gasket (6) over the shoulder of each bearing cage (5). Position the bearing cages into the main frame openings to line up the bolt holes and be sure that the lip of cup will override the bearing rollers. Tap lightly with a soft hammer to get them started. Then, temporarily install the adjusting ring to the bearing cage and main frame with three cap screws evenly spaced to draw both bearing cages into

the openings evenly, Illust. 12. Do not install the nut lock (3). Remove the temporary puller screws and the adjuster assembly. Install seal ring (7) into the bearing bore of the bearing cages against the bearing cup and the OD of the cage bore.

TD-6 (61 AND 62) ONLY: It is often necessary to soak the cork sealing ring in hot water or oil, then stretch the ring to fit the bearing area and stay in position during steering clutch assembly, without the use of adhesive compounds.

6. Assemble the ring type adjuster and clutch shaft coupling. Pre-lubricate and install a new oil seal (2) to the inner recess of both bearing adjusters (1). Position each oil seal so the flat metal surface will be toward the bevel gear hub when the adjuster is installed. Turn the adjuster ring (4) onto the bearing adjuster until the ring surface with bolt head recesses is flush with the adjuster edge, Illust. 12. Do not install the nut lock (3) at this time.

7. Install the assembled adjuster and the shaft coupling to the steering clutch shaft before installing the steering clutches in their respective compartments.

Insert the clutch shaft coupling into the adjuster (1) passing the coupling through the oil seal (2) installed in the adjuster until the coupling shoulder is against the oil seal. Position the adjuster and coupling onto the clutch shaft to engage the splines, and push the assembly onto the clutch shaft as far as it will go. Install the steering clutch, refer to "STEERING CLUTCHES AND BRAKES."

15. ADJUSTMENT (Screw Type Bevel Gear Adjusters)

To provide maximum life and quiet operation, the drive bevel gear and bevel pinion must be properly adjusted, whether in matched sets or individually. This adjustment normally involves three operations: pre-loading the drive bevel gear bearings, setting the cone center, and setting the gears for proper backlash.

PRELOADING THE BEARINGS

1. (Without pinion or steering clutches installed.) Install the bevel gear, hub, bearings, cages, adjuster rings and adjusters in their respective positions. All rubber rings should be lubricated before assembly. In order to assure free meshed gears when the pinion is installed, set the outer face of the right hand bearing adjuster (next to gear) flush with the outer face of the adjuster ring for the 6 series, and 1/8 inch above the outer face of the adjuster ring (points "A" and "B," Illust. 13) for the 9 series. Insert the adapter for inch-pound

Continued on next page.



BEVEL GEAR

15. ADJUSTMENT (Screw Type Bevel Gear Adjusters) - Continued

torque wrench in the female spline on the left hand side of the drive bevel gear hub, install the left hand bearing adjuster and tighten to obtain a preload of 25 to 30 inch-pounds of drag while the bevel gear is being rotated approximately ten times to properly seat the bearings. Drag can be measured with an inch-pound torque wrench in the adapter inserted in the female spline in either end of the drive bevel gear hub. If more convenient, drag can be measured with a spring scale and length of cord wrapped around any known diameter. To convert spring scale reading to inch-pound drag, multiply spring scale reading by one-half the known diameter in inches. Line up a notch in the bearing adjuster to the center of the two tapped holes in the adjuster ring for the drive bevel gear bearing adjuster lock. Always tighten the adjusters clockwise to line up the notches for the lock.

2. (With steering clutches and pinion installed.) Release the steering clutch or clutches, not removed from the assembly, with compression tools. Place the transmission in neutral position. Adjust the left hand bearing adjuster to obtain .002 - .004 inch end clearance in the bearing assembly. The end clearance can be detected with a dial indicator and the use of a pry bar. When .002 - .004 inch end clearance is obtained, measure the amount of drag on the bevel gear assembly and tighten the left hand bearing adjuster to obtain an increase of 25 to 30 inch-pounds over the initial measured drag while the gear is being rotated properly seat the bearings. If the original bearings are to be reinstalled, the preload torque should be 12 to 15 inch-pounds instead of 25 to 30 inch-pounds. Line up a notch in the bearing adjusters to the center of the two tapped holes in the adjuster ring for the drive bevel gear bearing adjuster lock. Always tighten the adjusters clockwise to line up the notches for the lock.

IMPORTANT: When making the cone setting or back lash adjustment, hold the pinion shaft forward using a pry bar or heavy duty screw driver.

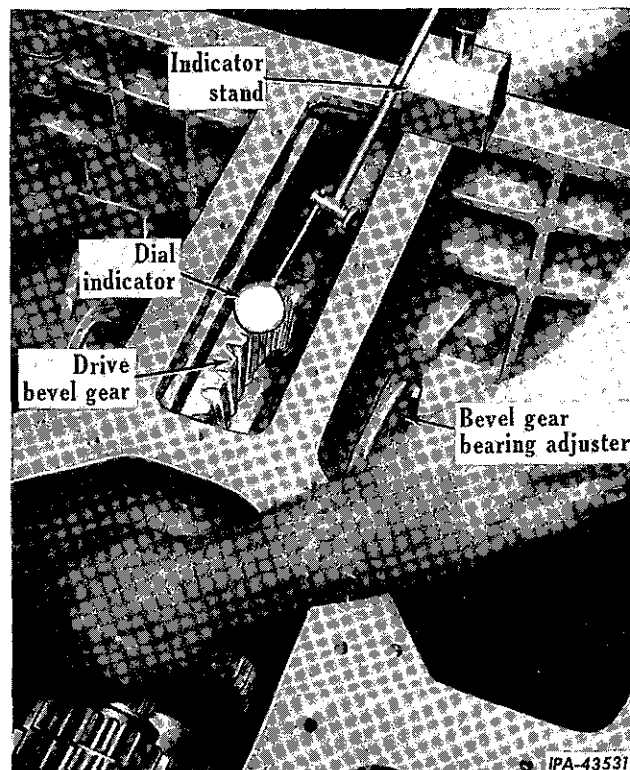
Cone Setting Adjustment

3. Install the bevel pinion shaft assembly and the remaining components of transmission, being sure that all parts are properly seated, and that the nut at the front end of the shaft is tight and locked. Use approximately .080 inch shim pack behind the flange of the bevel pinion shaft rear bearing cage. Rotate the pinion shaft at least ten revolutions. Tighten the bearing cage in place and measure with cone-setting gage between the end of the pinion and the hub of the bevel gear. Add or deduct the necessary

shims to obtain the required gage dimension for proper gear cone setting (Refer to "SPECIFICATIONS", Par. 2). To adjust size of shim pack, remove rear bearing cage cap screws and move the pinion shaft assembly forward to release shim pack behind the bearing cage flange. Be sure the bearing cage and the nut at front end of pinion shaft are tight when final check is made.

Back lash Adjustment. (Refer to Illust. 14 and 15)

4. Alternately loosen one and tighten the other bearing adjuster to move the bevel gear assembly sideways until the required backlash is obtained. (Refer to "SPECIFICATIONS", Par. 2.) Be sure that both adjusters are moved the same number of notches so as not to disturb the preload on the bearing as set up in step 1 or 2. Install the drive bevel gear bearing adjuster locks (Illust. 12), so that the settings cannot be accidentally disturbed when the adjuster ring and adjuster are removed for installation of the



Illust. 15 - Adjusting the Backlash of Bevel Pinion and Bevel Gear (TD-9 (91) Shown.)



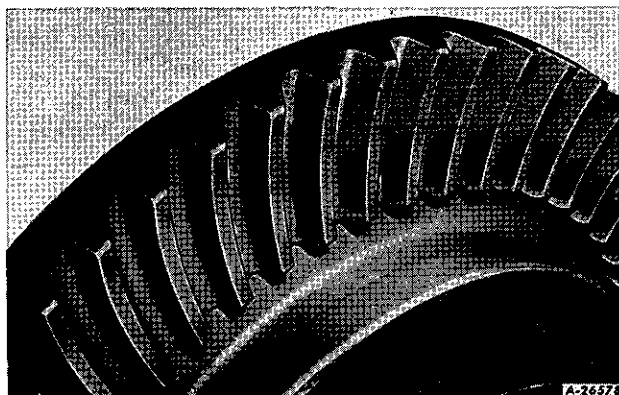
BEVEL GEAR

drive pinion shafts and steering clutches. During assembly of the steering clutches, and before final assembly of the drive bevel gear bearing adjuster and ring, be sure to properly install the sealing rings into the bearing bore of the bevel gear bearing cage against the outer cap of the bearing and OD of the cage bore.

TD-6 (61 AND 62) ONLY: It is often necessary to soak the cork sealing ring in hot water or oil, then stretch to fit the bearing area and stay in position during assembly without the use of adhesive compounds.

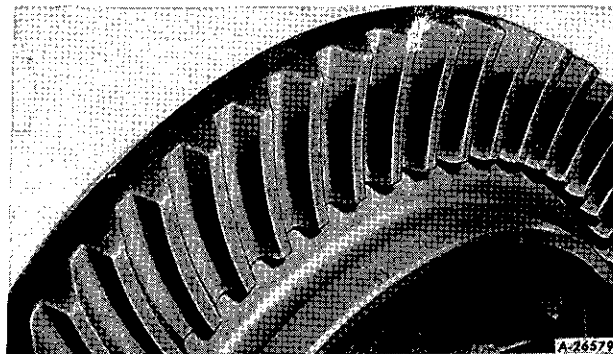
NOTE: The drive bevel gear bearing adjuster lock, Illust. 12, on both sides, must be positioned toward the rear of tractor, or otherwise they will interfere with the steering clutch release fork operation. Whenever the adjuster locks are removed they must be reinstalled to the tapped holes provided in the adjusting ring that are at the rear of the bearings, not the two holes at the front.

5. The required bearing preload, gear cone setting, and backlash should now be correctly set. To check tooth contact, apply red lead to the pinion and turn against the gear to indicate the tooth bearing. The resultant patterns should appear as shown in Illust. 16. If these patterns are not closely approximated, recheck the settings. Also refer to Illust. 17 and 18.



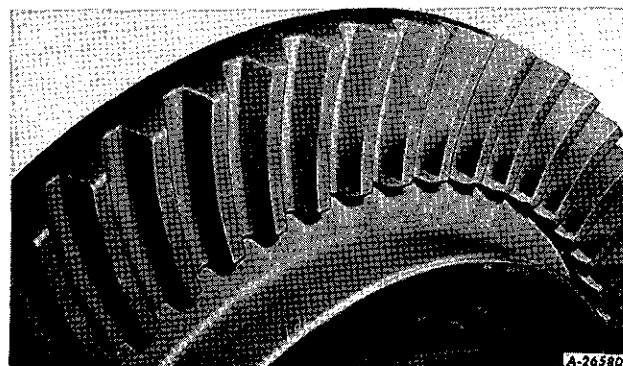
Illust. 16 - Preferred Tooth Bearing of Spiral Drive Bevel Gear.

Illust. 16 illustrates the tooth bearing that is preferred when gears are not under load. Both the pinion and drive bevel gear should have similar tooth bearing when the gears are properly adjusted.



Illust. 17 - Illustrating Tooth Bearing of Spiral Drive Bevel Gear Caused by Setting Pinion Too Far In.

Illust. 17 illustrates the result of setting the pinion too far in. To correct this bearing, move the pinion out, and recheck the backlash.



Illust. 18 - Illustrating Tooth Bearing of Spiral Drive Bevel Gear Caused by Setting Pinion Too Far Out.

Illust. 18, illustrates the result of setting the pinion too far out. To correct this bearing, move the pinion in and recheck the backlash.

Matched Sets of Gears Recommended
(“6” Series Crawler Tractors)

It is recommended that matched sets of bevel pinion and drive bevel gears be used but, in cases where this is not possible, unmatched sets may be used, providing both gears are in good condition.



BEVEL GEAR

16. ADJUSTMENT (Shim Type Bevel Gear Adjusters)

To provide maximum life and quiet operation, the bevel gear and pinion must be properly adjusted, whether in matched sets or individually.

This adjustment normally involves two operations: setting the cone center, and setting the gears for proper backlash.

Install the pinion and drive bevel gear, using the original shims. Tighten all bearing cage cap screws.

Cone Center Adjustment (Matched Sets)

1. Measure the distance between the end of the bevel pinion and the machined surface of the drive bevel gear hub.

While the importance of absolute tightness of the bevel pinion shaft front bearing retaining nut is generally realized, the need for firm tightening of the front bearing retainer, as well as the front end cover, is important. Both affect the position of the pinion shaft and should not be neglected between measurements of cone distance.

2. The difference between the measured distance and the figure etched on the bevel pinion gear is the thickness of shims to be added or removed.

3. Make backlash adjustments as described below.

4. Obtain both contact patterns, also described below. If the preceding steps have been carefully followed, correct tooth patterns will result. If the patterns are not correct, a mistake has been made, and it is necessary to repeat the procedure until proper tooth contact patterns are obtained.

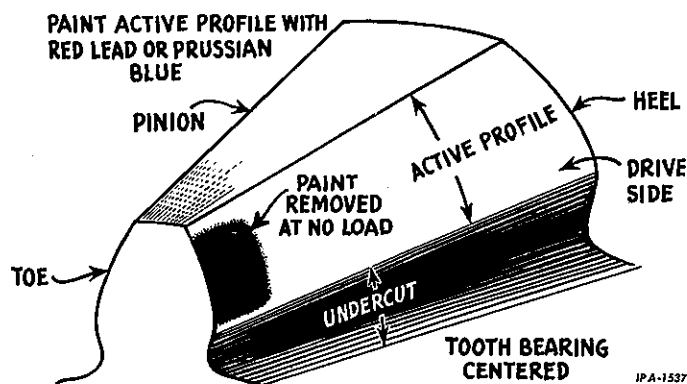
Cone Center Adjustment (Unmatched Sets)

1. Obtain tentative number of shims required as outlined in steps 1 and 2 under matched gear procedure to equal tentative cone distance shown in "SPECIFICATIONS", par. 2.

2. Make backlash adjustments.

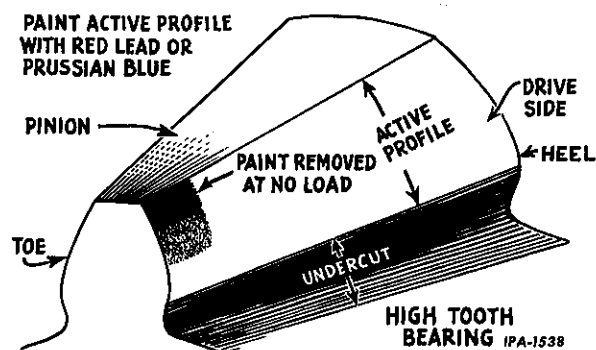
3. Obtain tooth contact patterns. In all likelihood, correct patterns will not result, since the number of shims must be determined by trial and error.

4. Follow instructions given under Illust. 19 and 20 for condition most nearly describing tooth pattern actually obtained. Add or remove shims until correct tooth patterns result with proper backlash adjustment.



Illust. 19 - Preferred Tooth Bearing.

Illust. 19 illustrates the pinion tooth bearing of straight bevel gears that is correctly centered on the active profile, at the toe, when the gears are not under load. This setting should assure that the gears will operate quietly. Both the pinion and bevel gear should have similar tooth bearing when properly set.

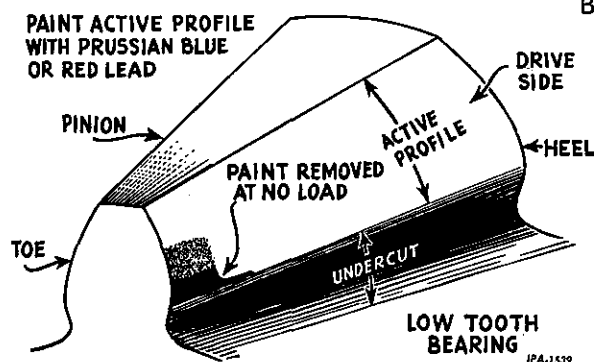


Illust. 20 - Pinion Set Too Far In.

Illust. 20 illustrates the result of setting the pinion of straight bevel gears too far in. It is a high tooth bearing on the pinion (no load). It is also a toe bearing, but it is not properly centered. To correct this bearing, move the pinion out; then, if necessary, move the drive gear in for proper backlash.



BEVEL GEAR



Illust. 21 - Pinion Set Too Far Out.

Illust. 21 illustrates the result of setting the pinion of straight bevel gears too far out. It is a low tooth bearing on the pinion (no load). It is also a toe bearing, but it is not properly centered. To correct this bearing, move the pinion in; then, if necessary, move the drive gear out for proper backlash.

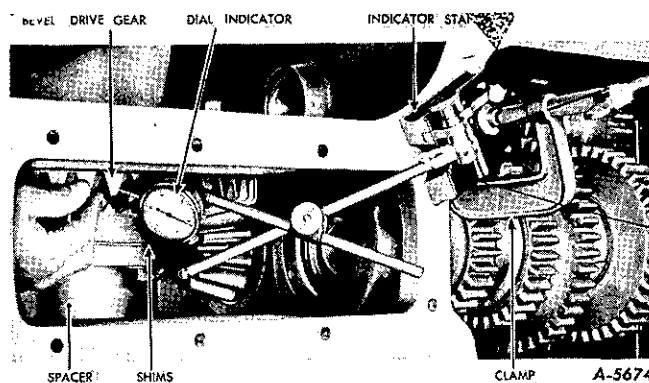
Backlash Adjustment.

1. Before measuring the backlash, force the bevel gear carrier assembly away from the bevel pinion. Measure the backlash between the bevel pinion and the drive bevel gear with a dial indicator gauge at four different points on the drive bevel gear. (Refer to Illust. 22.)

A true dial indicator reading of backlash present cannot be obtained unless the same conditions are established as when the complete assembly, including steering clutches, were in place.

After the bevel gear hub with gear, shims, bearings and cages with gaskets between cages and main frame are in place, force the right bearing up tight against the shoulder on hub by installing one steering clutch shaft coupling retainer to the hub. (The coupling itself need not be in place.) The right bearing cage cap should be mounted with gasket. The bevel gear bolts must be torqued to at least one-half of torque, after each change of shims for each series of backlash readings taken at four points, as is customary. When the backlash has been satisfactorily determined, the bolts should be torqued and secured.

2. Add or remove shims as necessary to equal the difference between the measured backlash at the average point and the figure etched on the bevel gear. (Refer to "SPECIFICATIONS", par. 2.)



Illust. 22 - Adjusting Backlash of Bevel Pinion and Bevel Gear.

To adjust the pinion on the 6 and 9 series crawler tractors, add or remove shims from between the bevel pinion shaft rear bearing cage and the main frame.

To adjust the drive bevel gear, add or remove shims from between the drive bevel gear hub and the drive bevel gear.

After the bevel pinion and drive bevel gear have been adjusted in the above manner, coat the contact area of the bevel gear teeth with red lead or prussian blue. Revolve the gears, using the pinion as the driver. Compare tooth contact with Illust. 19 (for straight bevel gears). If results are similar to Illust. 19, no further adjustment is necessary. If results are not similar to Illust. 19, correct the adjustment by following instructions below the illustration (Illust. 20 and 21) which compares with the test pattern. Check backlash after every bevel pinion adjustment.

Deflection Set Screw Adjustment

If transmission is so equipped, run the deflection screw in until it contacts the drive bevel gear, then back it out one quarter (1/4) turn. Lock the set screw.

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CONTENTS

Paragraph	Page
1. Description	1
2. Specifications	2,3
3. Maintenance	3
4. Checking Mechanical Problems	4,5

STEERING BRAKES

5. Removal	5,6
6. Relining Steering Brake Bands	6,7
7. Reassembly and Installation	7
8. Adjustment	7-10

STEERING CLUTCHES

9. Removal	11-15
10. Disassembly	16,17
11. Inspection and Repair	17
12. Reassembly	17,18
13. Installation	18
14. Adjustment	19





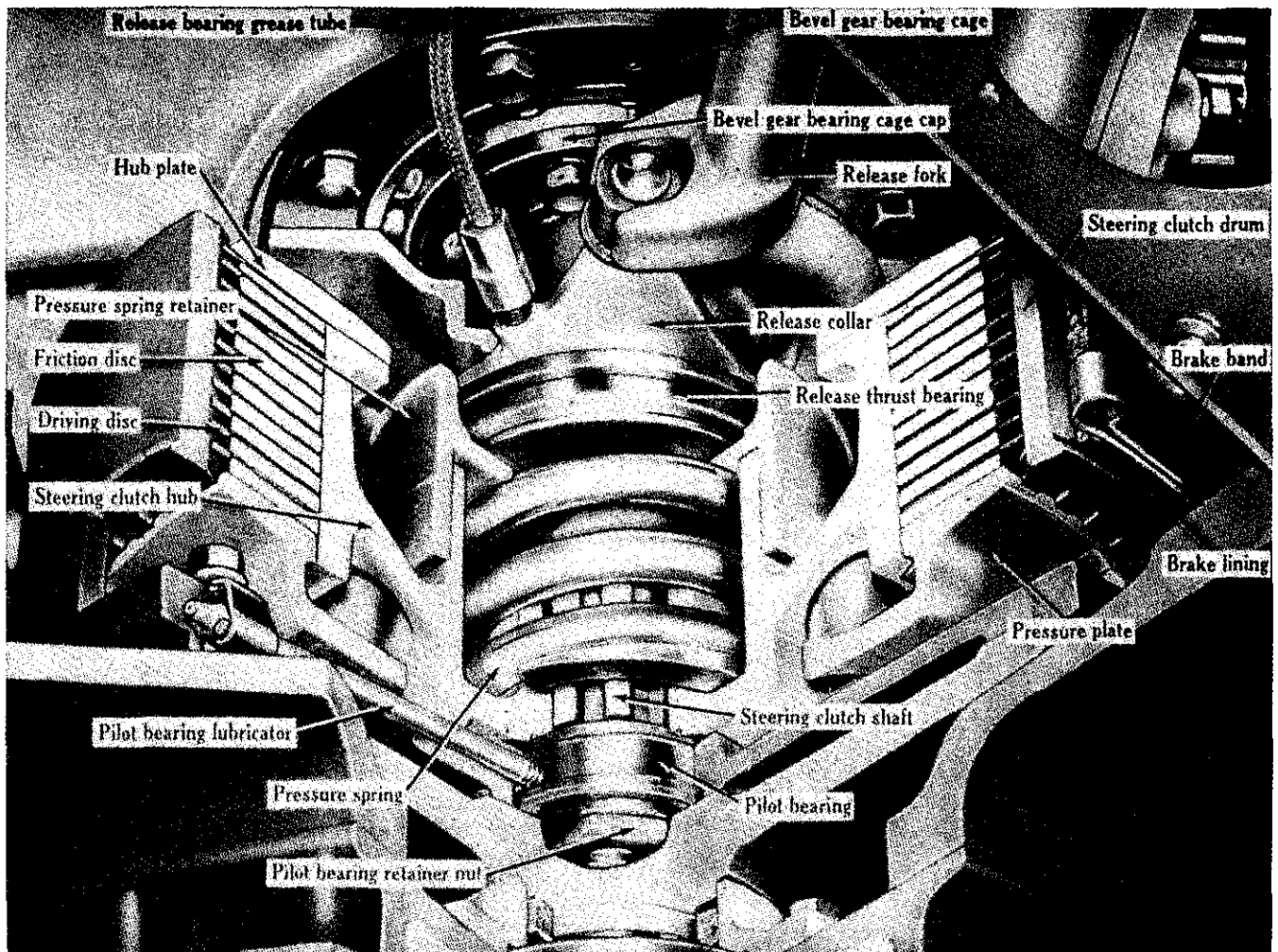
I. DESCRIPTION

Steering clutches of the multiple dry disc, spring-loaded type are located one in each side of the drive bevel gear compartment at the rear of the main frame. The steering clutches are controlled manually by levers directly in front of the operator. Each clutch consists of metal drive discs with teeth on the outside and composition friction discs with teeth on the inside. The discs are held compressed by a heavy coil spring. A release fork connected to the steering levers in front of the operator compresses the coil spring to allow the friction discs to rotate between the driving discs when the steering clutch is disengaged. The release collar is equipped with a ball type thrust bearing.

The function of the steering clutches is to dis-

engage the flow of power to one track, for the purpose of steering the tractor. When one track is disengaged, the other track will continue traveling and the tractor will turn on the disengaged track.

A steering brake is provided for each steering clutch. Its purpose is to stop the clutch drum from rotating after the steering clutch has been disengaged. This locks one track and forms a pivot point for short turns. Brakes also may be used for parking purposes. Pedals for each brake are adjustable to suit the operator. Each pedal may be locked in holding position. The brakes are simple and very accessible and are of external contracting type, contracting on the steering clutch drums. Brake bands may be relined after removing them from convenient holes in the bottom of the main frame.



Illust. 1 - Cutaway View of Steering Clutch.

A-28230 A



2. SPECIFICATIONS

STEERING CLUTCHES

Type . . . Multiple dry disc, spring loaded

Number 2

Location Each side of bevel gear, on
sprocket drive pinion shaft

	Bi-Metallic	Not Bi-Metallic
Nominal diameter (6) 10-7/8 in.	10-7/8 in.	10-7/8 in.
(9) 14-1/8 in.	14-1/8 in.	14-1/8 in.
Number of driving discs (6)	12	11
(9)	11	10
Number of friction discs (6)	13	12
(9)	12	11
Outside diameter friction discs . (6) 10-7/8 in.	10-7/8 in.	10-7/8 in.
(9) 14-1/8 in.	14-1/8 in.	14-1/8 in.
Inside diameter friction discs . (6) 7-1/4 in.	7-11/16 in.	7-11/16 in.
(9) 10-7/16 in.	11 in.	11 in.
Maximum warp before replacing discs . . . . .	.005 in.	0.005 in.
Number of friction surfaces, each clutch (6)	24	22
(9)	22	20
Total friction area, each clutch (6)	1115.1 sq. in.	1022.2 sq.in.
(9)	1356.6 sq. in.	1233.3 sq.in.
Pressure spring Free length (6)	5-19/64 ± 1/8 in.	5-19/64 ± 1/8 in.
(9)	4-29/32 ± 3/16 in.	4-29/32 ± 3/16 in.
Test length (6)	3-19/32 in.	3-19/32 in.
(9)	3-3/16 in.	3-3/16 in.
Test load (6)	1425-1725 lb.	1425-1725 lb.
(9)	1750-2120 lb.	1750-2120 lb.
Steering clutch release lever return spring Free length	6-7/16 in.	6-7/16 in.
Test length	8-3/8 in.	8-3/8 in.
Test load	18 to 22 lb.	18 to 22 lb.

Steering clutch hand lever booster spring

Free length 6-11/32 in.

Test length 6-7/8 in.

Test load 450 to 550 lb.

Control mechanism

Type of system Mechanical

How actuated Hand levers

STEERING BRAKES

Type External contracting bands

Number 2

Location On each steering clutch drum

Brake drum diameter (6) 12-1/8 in.

(9) 15-3/4 in.

Brake lining (not floating pivot type)

Width (6) 2-1/4 in.

(9) 2-3/8 in.

Thickness . . . (6) 1/4 in.

(9) 1/4 in.

Number of linings, each brake (6) 3

(9) 3

Total friction area, each brake (6) 71 sq. in.

(9) 99 sq. in.

Brake lining (floating pivot type)

Width (6) 2-1/2 in.

(9) 2-3/4 in.

Thickness . . . (6) 3/8 in.

(9) 3/8 in.

Number of linings, each brake (6) 8

(9) 8

Total friction area, each brake (6) 78 sq. in.

(9) 117 sq. in.

Control mechanism

Type of system Mechanical

How actuated Individual pedals

Provision for parking . . . Ratchet and pawl on each pedal

Free pedal travel 3 in.

Clearance between steering clutch drum and band opposite set screw 1/64 in.

Steering brake band
release spring

Free length $3-3/16 \pm 1/32$ in.
Test length $2-1/4$ in.
Test load 13.5 to 16.5 lb.

Steering brake band
anchor spring (not
floating pivot type)

Free length $2-1/16 \pm 1/32$ in.
Test length $1-1/2$ in.
Test load 18 to 22 lb.

Steering brake band
anchor spring (floating
pivot type)

Free length $3-1/4$ in.
Test length $2-1/2$ in.
Test load 35 lb.

Steering brake rod
return spring (not
floating pivot type)

Free length $10 \pm 1/32$ in.
Test length $16-5/8$ in.
Test load 58.5 to 71.5 lb.

Steering brake rod
return spring (floating
pivot type)

Free length 10 in.
Test length $16-5/8$ in.
Test load 64.9 lb.

SPECIAL TORQUES * In Foot Pounds

Steering clutch pilot bearing
retaining nut 180 - 220
Steering clutch support
bearing nut 280 - 320

*All threads to be lubricated with SAE-30
engine oil.

3. MAINTENANCE

1. When operating the tractor in water or under very wet conditions, or under extremely dusty conditions, water or dust may enter the steering clutch compartments through the holes in the drain plugs. To avoid this, replace the drain plugs (if used) with solid pipe plugs. Remove the solid plugs after every 60 hours of operation to allow any accumulation of water or oil to drain out.

2. If the steering clutches start to slip, measure the free movement of the steering clutch levers. If the free movement is less than the amount given in Par. 14, adjustment is necessary.



4. CHECKING MECHANICAL PROBLEMS

PROBABLE CAUSE

REMEDY

TRACTOR DOES NOT MOVE

- | | |
|--|--|
| 1. Steering brakes locked | Release the steering brake pedals from the latching pawls. |
| 2. Engine clutch faulty | Refer to "ENGINE CLUTCH," Section 5 of this manual. |
| 3. Transmission faulty | Refer to "TRANSMISSION AND BEVEL GEAR," Section 6 of this manual. |
| 4. Steering clutches slip - incorrect adjustment | Adjust to correct specifications or remove and repair the steering clutches. |

TRACTOR MOVES WITH BRAKES LOCKED (Brakes do not hold)

- | | |
|--|---|
| 1. Brake lining worn | Install new lining. |
| 2. Improper brake adjustment | Adjust steering brakes. |
| 3. Oil on brake lining | Wash brake linings, or if badly oil-soaked, install new lining. |
| 4. Brake band broken | Install new brake band. |
| 5. Broken linkage | Install new linkage parts. |

TRACTOR DOES NOT TURN (Steering clutch does not disengage)

- | | |
|--|---|
| 1. Improper operation of steering clutch lever | Pull steering clutch hand lever all the way back. |
| 2. Improper adjustment | Properly adjust controls. |
| 3. Steering clutch faulty | Remove and repair steering clutches. |

TRACTOR WILL NOT MAKE SHORT (PIVOT) TURN

- | | |
|---|---|
| 1. Steering clutch does not disengage | See "Tractor Does Not Turn." |
| 2. Steering brake will not hold | Adjust brake and controls, or replace brake if necessary. |

TRACTOR MOVES BUT CREEPS TO ONE SIDE

- | | |
|--|--|
| 1. Track or track frame faulty | Inspect track frames for parallel alignment. Correct or replace parts as necessary. |
| 2. Steering brake drags | Remove steering brake inspection cover and hand feel the steering brake band. If band is hot, the brake is dragging. Adjust brake. |
| 3. Steering clutch slips | Adjust steering clutch and if clutch is faulty remove and repair. |

TRACTOR LOSES PULLING POWER

- | | |
|-------------------------------------|---|
| 1. Steering brakes drag | Remove inspection cover and hand feel the steering brake bands. If bands are hot, brakes are dragging. Adjust brakes. |
| 2. Steering clutches slip | Adjust steering clutches. If clutches are faulty, remove and repair. |
| 3. Engine clutch slips | Refer to "ENGINE CLUTCH," Section 5 of this manual. |



PROBABLE CAUSE

REMEDY

STEERING CLUTCHES OVERHEAT

- | | |
|--|---|
| 1. Improper use of steering brakes | Steering brakes should never be applied unless steering clutches are completely disengaged. |
| 2. Steering brakes drag. | Remove inspection cover and hand feel the steering brake bands. If bands are hot, brakes are dragging. Adjust brakes. |
| 3. Steering clutches slip | Adjust steering clutches. If clutches are faulty, remove and repair. |

STEERING BRAKES OVERHEAT

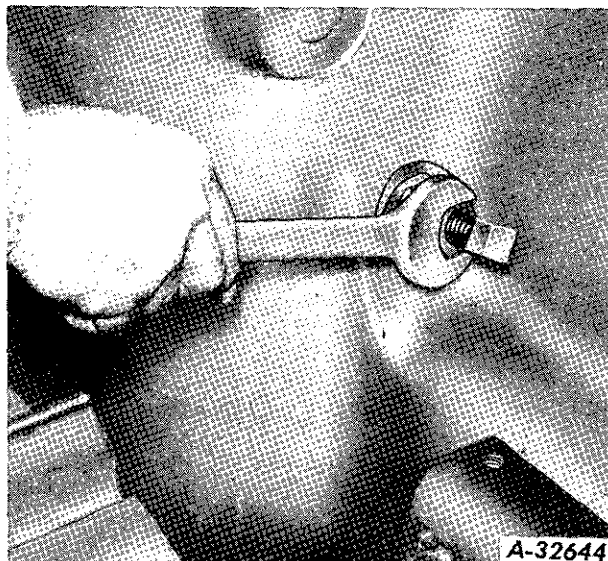
- | | |
|---------------------------------------|---|
| 1. Brakes adjusted too tight. | Adjust brakes to proper clearances. |
| 2. Steering clutch does not disengage | |
| a. Improper adjustment. | a. Adjust steering clutch. |
| b. Warped discs. | b. Replace warped discs. |
| 3. Oil on brake lining | Wash or replace lining. |
| 4. Binding in brake controls. | Free controls and lubricate with light oil. |

STEERING BRAKES

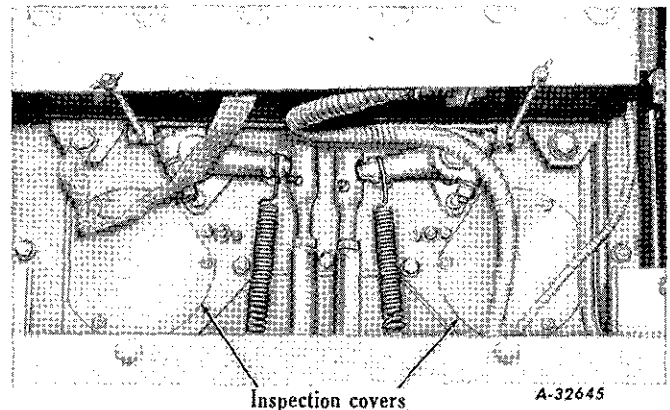
5. REMOVAL

T-6, TD-6 and TD-9 Series (Ref. Nos. Refer to Illust. 7)

- | | |
|--|--|
| 1. Remove the steering brake band set screw (19). See Illust. 2. | 3. Remove the cotter pin and joint pin that connects the front band to the center band. Also remove the anchor spring from the anchor in the rear main frame. |
| 2. Remove the inspection covers from the top and bottom of the rear main frame. See Illust. 3 and 4. The seat cushion should be removed. | 4. Remove the cotter pin and joint pin (31) that connects the pivot lever (33) to the brake linkage. |
| | 5. Remove the pivot shaft retainer cap screw (35) and work the shaft (34) with a screwdriver to the inside of the frame, until the shaft is free of the pivot lever. This has to be done from the under side of the tractor. |



Illust. 2 - Backing Out Steering Brake Band Set Screw.



Illust. 3 - Steering Brake Inspection Covers.

Continued on next page.

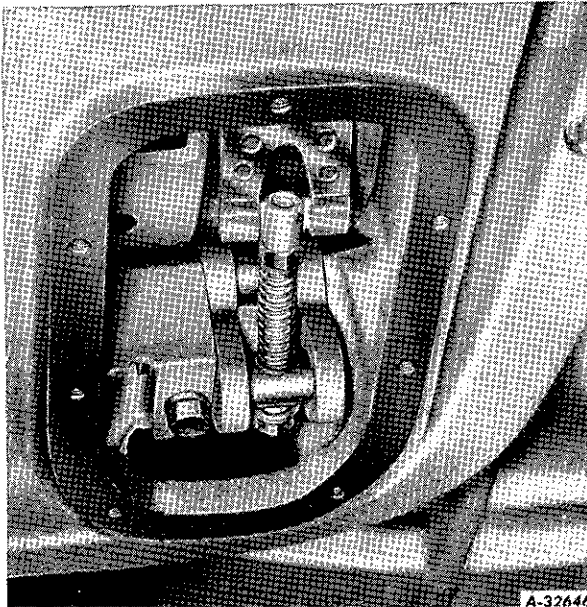


STEERING BRAKES

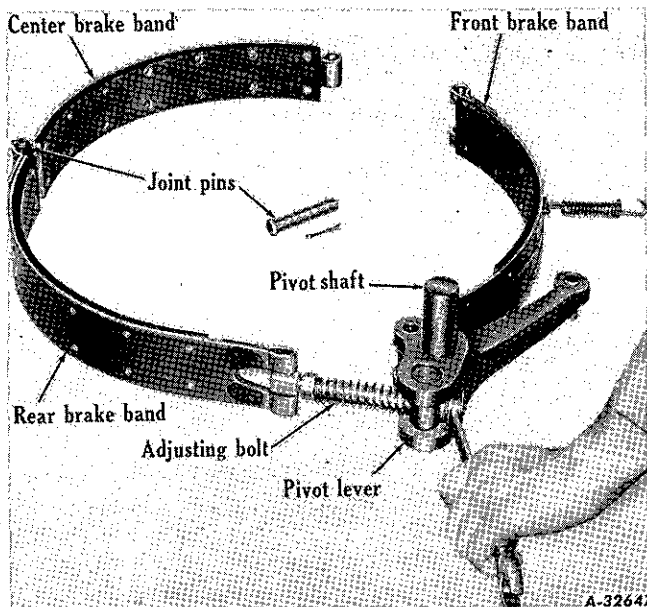
5. REMOVAL - Continued

T-6, TD-6 and TD-9 Series - Continued

6. Remove the brake bands (1, 3 and 4) and pivot lever (33) through the bottom inspection opening. See Illust. 4.



Illust. 4 - Bottom Inspection Cover Removed.



Illust. 5 - Removing Brake Adjusting Bolt (TD-9 Shown).

7. Remove cotter pins and joint pins (2 and 9) that hold the front band to the pivot lever (33) and the center band (1) to the rear band (4). Remove the adjusting bolt (36) that holds the rear band (4) to the pivot lever (33). See Illust. 5.

ISS-1032B (6-64)

6(61), 6(62), 9(91) and 9(92) Series (Ref. Nos. Refer to Illust. 8)

1. Remove the top inspection covers (Illust. 3) and the bottom inspection cover (Illust. 4) from the main frame.

2. Loosen the lock nut (Illust. 2) and turn back the brake band set screw, to relieve the spring tension. Reach through the top cover opening and unhook the anchor spring (4).

3. Loosen and unhook the turnbuckle (25) by removing the eye end pins (21) and (28).

On the old T-61 and TD-6 (61) only: Unhook the return spring (7) when removing the clevis pin to free the steering brake pivot lever. Remove cotter pin and brake rod end pin (17) to disconnect pivot lever (18) from the brake rod (16).

3. Loosen and unhook the turnbuckle (25) by removing the eye end pins (21) and (28). Remove cotter pin and brake rod end pin (17) to disconnect pivot lever (18) from the brake rod (16).

4. Remove the pipe plug from the main frame to gain access to the brake pivot shaft. Remove the set screw which secures the pivot shaft (19). With a drift, drive the pivot shaft toward the inside of the frame until the shaft is free of the pivot lever (18). The welch plug will fall out as the shaft is driven out.

5. Rotate and push the front brake band forward and down for access to the brake band pivot lever joint pin (23). Pull the cotter pin and remove the joint pin (23).

6. Rotate the band forward and downward until the front band clears through the bottom inspection hole; with a manual assist to the rear shoe, slightly angle the front shoe outward and lower the rear shoe out of the hole.

NOTE: This slight angle is necessary because of the inner contour of the main frame at this point.

7. Remove the cotter pin and joint pin (2).

6. RELINING STEERING BRAKE BANDS

1. Remove and disassemble the steering brakes as described in Par. 5.

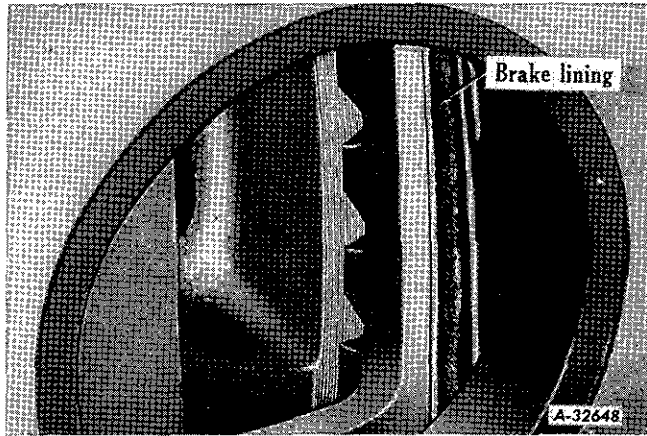
2. Punch out the rivets which hold the lining to the bands and remove the lining. Scrape all traces of the old lining from the bands. Wash the bands in dry-cleaning solvent. Rivet the new linings to the brake bands.

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STEERING BRAKES

3. Assemble and install the brakes as described in Par. 7.



Illust. 6 - Inspection of Steering Brake.

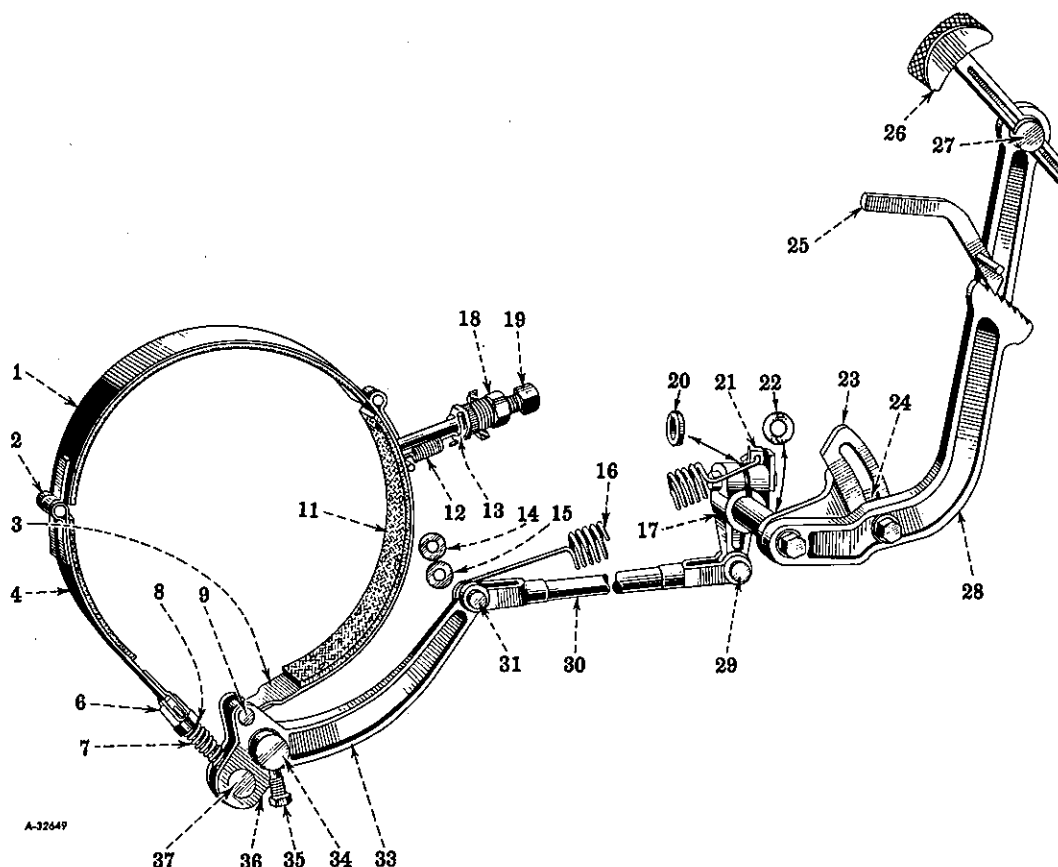
7. REASSEMBLY AND INSTALLATION (Ref. Nos. Refer to Illust. 7)

1. Connect the center and rear brake bands (1 and 4) with the joint pins (2), and the front band (3) to the pivot lever (33). See Illust. 5.
 2. Slide the center and rear brake bands (1 and 4) around the rear of the drum while sliding the front brake band (3) and pivot lever (33) up and around the front of the brake drum.
 3. With a screwdriver, work the pivot shaft (34) through the pivot lever (33) and install the stud (35). Install the pin (29) and rod yoke (30) and lever pin (31).
 4. Hook the return spring (16) to the anchor (21).
 5. Connect the front and center brake bands (1 and 3) with the joint pin (2) and secure with a cotter pin.
 6. Install the set screw (19) and adjust the steering brakes as described in Par. 8 following.
 7. Replace the inspection covers to the top and bottom of the rear main frame. Replace the seat cushion.
- 8. ADJUSTMENT**
- (See Illust. 9)
-
- 6 and 9 Series
1. Remove the two platforms.
 2. Loosen the brake pedal adjusting lock bolt "A", which holds the brake pedal to the pedal shaft and adjuster. Access to this bolt is through a hole in the main frame side channel (Illust. 10).
 3. The adjuster is notched on the inside and contacts a notched adjuster lock "J". With the lock bolt loosened sufficiently, tap the adjuster "B" down several notches with a bar. Check the free pedal movement and when a three inch movement has been obtained, tighten the adjusting lock bolt "A".
- When adjustment can no longer be made in the above manner, proceed as follows:
1. Loosen the adjusting lock bolt "A".
 2. Pull the adjuster "B" up as far as possible.
 3. Loosen the jam nut "K" and turn the set screw "C" in until the brake band contacts the drum, then back off 1/4 turn. Tighten jam nut "K".
 4. Remove the steering brake inspection cover from the bottom side of the main frame.
 5. Loosen the lock nut "D" and turn the adjusting bolt "E" until the clearance between the brake band lining and the drum at that point is 1/64 inch.
 6. Secure the adjusting bolt "E" by tightening the lock nut "D" against the rear section of the brake band.
 7. Replace the steering clutch and the steering brake inspection covers.
 8. Adjust the brake pedal as described previously to give three inches free movement.
- (6(61), 6(62), 9(91) and 9(92) Series). - (Illust. 10 and 11).
- Measure the free travel of the brake pedal. (Refer to Illust. 11). If the free movement is more than three inches, adjust the brake by the following procedure:
1. Remove the steering brake inspection cover (Illust. 11) from the bottom side of the main frame.
 2. Loosen lock nut "A" and turn the turnbuckle until the brake lining contacts the clutch drum for its full length. This contact will have taken place when the turnbuckle becomes harder to turn.

Continued on page 9.



STEERING BRAKES

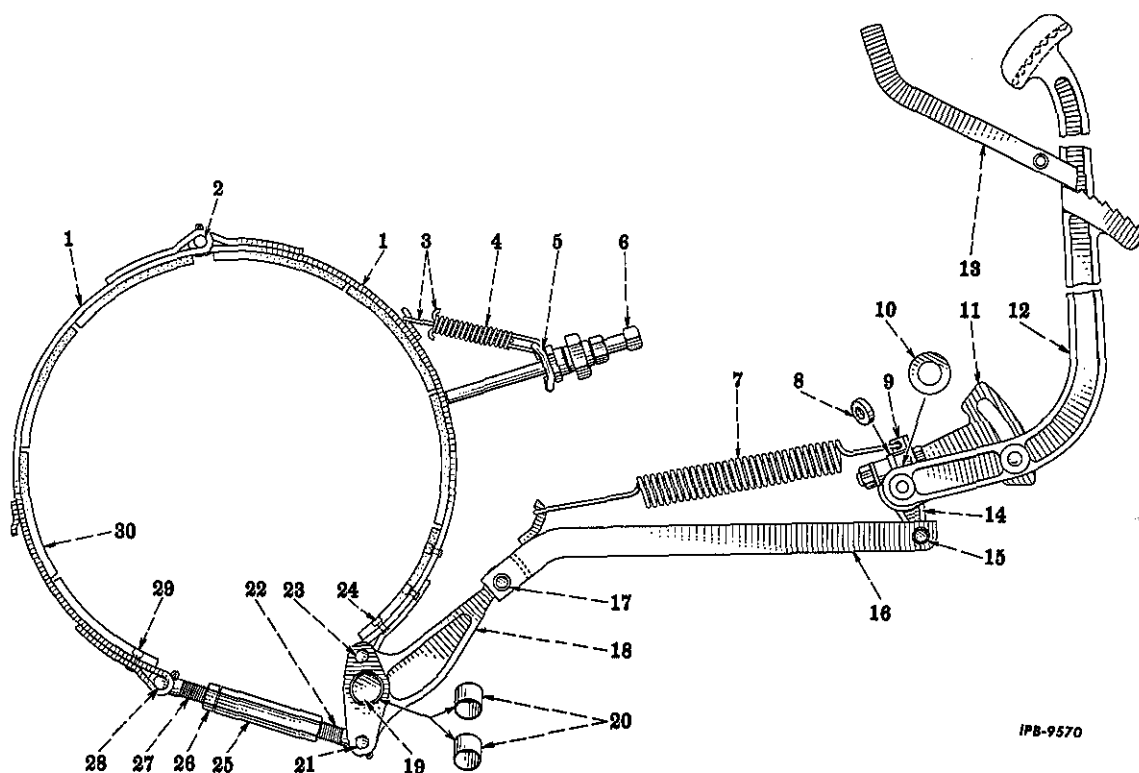


Illust. 7 - Component Parts of Steering Brake Assembly. (6 and 9 Series.)

- | | |
|-------------------------------|------------------------------------|
| 1. Center brake band. | 20. Lever key. |
| 2. Joint pin. | 21. Rod return spring anchor. |
| 3. Front brake band. | 22. Pedal shaft dirt seal. |
| 4. Rear brake band. | 23. Pedal shaft and adjuster. |
| 6. Adjusting bolt spacer. | 24. Pedal adjuster lock collar. |
| 7. Release spring. | 25. Ratchet pawl. |
| 8. Release spring washer. | 26. Pedal pad. |
| 9. Pivot joint pin. | 27. Pedal pad swivel. |
| 11. Brake band lining. | 28. Brake pedal. |
| 12. Anchor spring. | 29. Rod end pin, long. |
| 13. Anchor spring hook. | 30. Brake rod. |
| 14. Rod return spring washer. | 31. Rod end pin, short. |
| 15. Rod return spring spacer. | 33. Pivot lever. |
| 16. Rod return spring. | 34. Pivot shaft. |
| 17. Brake lever. | 35. Pivot shaft stud. |
| 18. Anchor spring anchor. | 36. Brake band adjusting bolt. |
| 19. Band set screw. | 37. Brake band adjusting bolt pin. |



STEERING BRAKES



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Illustr. 8 - Component Parts of Steering Brake Assembly (9(91) and 9(92) Series).

- | | |
|-------------------------------------|---|
| 1. Steering brake band. | 16. Brake rod. |
| 2. Brake band joint pin. | 17. Brake rod end pin. |
| 3. Brake band anchor spring hook. | 18. Brake pivot lever. |
| 4. Brake band anchor spring. | 19. Brake pivot shaft. |
| 5. Brake return spring anchor. | 20. Brake pivot lever bushing. |
| 6. Brake band set screw. | 21. Brake band turnbuckle eye pin, short. |
| 7. Brake rod return spring. | 22. Brake band turnbuckle eye. |
| 8. Brake lever key. | 23. Brake band pivot joint pin. |
| 9. Brake rod return spring anchor. | 24. Brake band rivet, short. |
| 10. Brake pedal shaft dirt seal. | 25. Brake band turnbuckle. |
| 11. Brake pedal shaft and adjuster. | 26. Brake band turnbuckle eye nut. |
| 12. Brake band. | 27. Brake band turnbuckle eye. |
| 13. Brake ratchet pawl. | 28. Brake band turnbuckle eye pin, long. |
| 14. Brake lever. | 29. Brake band rivet, long. |
| 15. Brake rod end pin. | 30. Brake band lining. |

8. ADJUSTMENT - Continued

(6(61), 6(62), 9(91) and 9(92) Series) - Continued

3. Loosen the lock nut "B" and turn the set screw clockwise until the brake lining contacts the clutch drum. Turn the set screw counter-clockwise one-third turn, and tighten lock nut "B." This adjustment can be made from outside the tractor. (Illustr. 2 and 10).

4. Back turnbuckle off one and one-half turns. Test pedal for three inch movement. If less than three inches, back off until a three inch movement is acquired. Tighten lock nut "A."

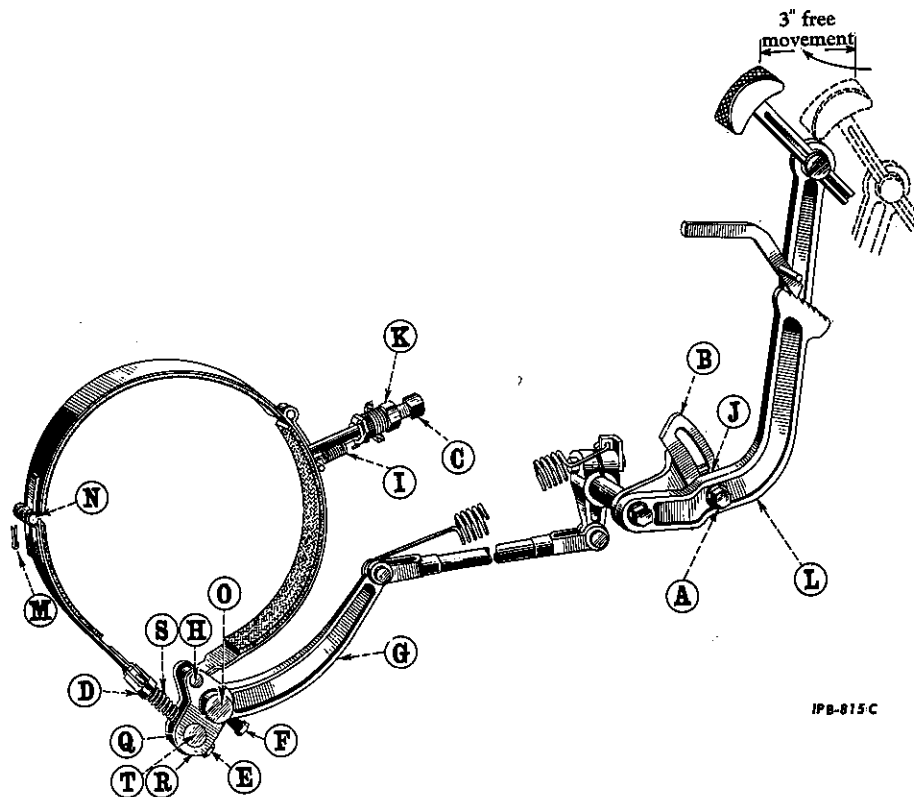
5. Install steering brake inspection cover.



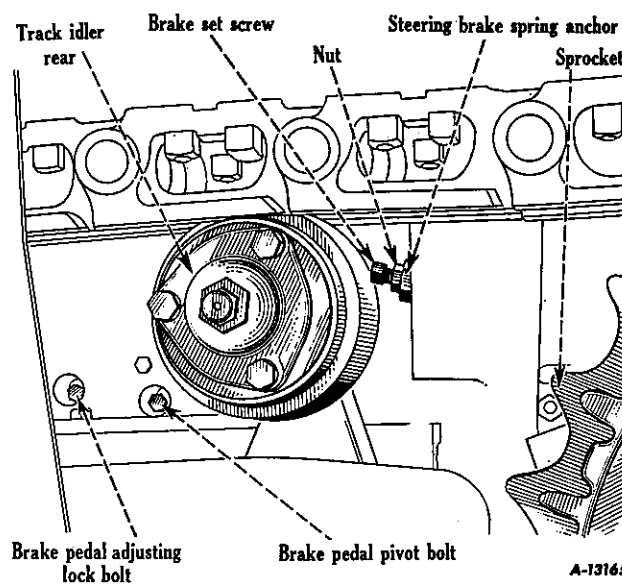
STEERING BRAKES

8. ADJUSTMENT - Continued

(6(61), 6(62), 9(91) and 9(92) Series) - Continued



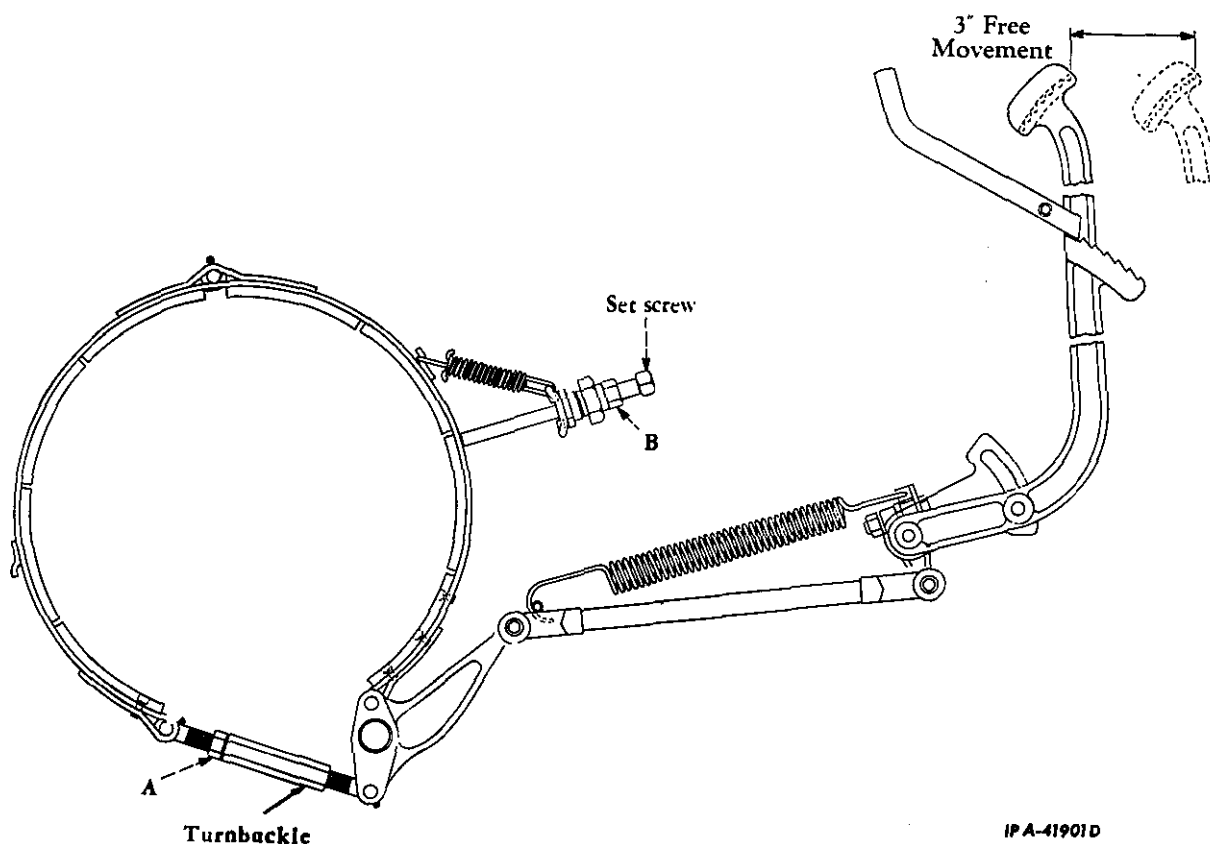
Illust. 9 - Steering Brakes Adjustment (6 and 9 Series).



Illust. 10 - External Points for Adjusting Steering Brake.



STEERING BRAKES

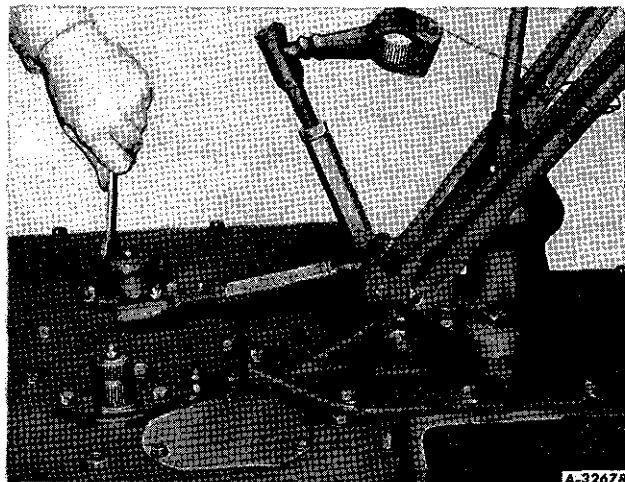


Illust. 11 - Steering Brake Adjustment (6(61), 6(62), 9(91) and 9(92) Series).

STEERING CLUTCHES

9. REMOVAL

1. Drain the transmission oil.



Illust. 12 - Removing Clutch Controls.

2. Remove the seat frame, fenders, fuel tank, and battery box (if used), being sure to disconnect the fuel lines and electric wiring.

3. Remove the steering clutch controls from the release forks. (Illust. 12.)

4. Remove the main frame cover.

NOTE: Keep the bevel gear compartment covered to prevent dirt and other objects from falling into the compartment.

5. Remove steering brake band set screw (Illust. 2).

6. 6 AND 9 SERIES: Remove cotter pins and joint pins that connect the center brake band to the front and rear brake bands. Remove center brake band.

Continued on next page.



STEERING CLUTCHES

9. REMOVAL - Continued

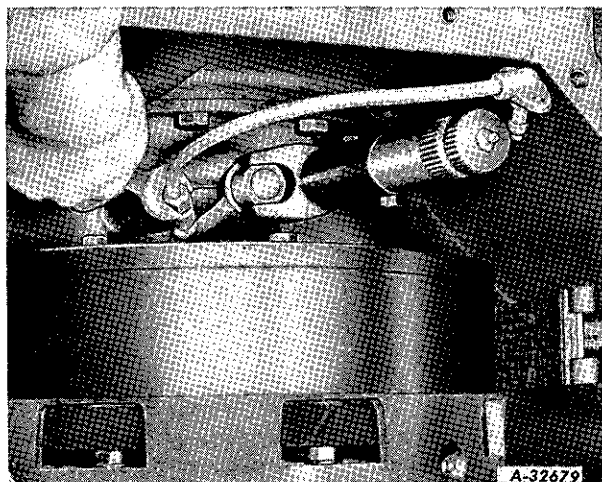
TD-6 (61), 6 (62), 9 (91) AND 9 (92) SERIES ONLY: To remove the steering clutches, it will be necessary to remove the steering brakes. Follow the instructions given in Par. 5, "REMOVAL."

7. Remove the anchor spring from its anchor in the main frame.

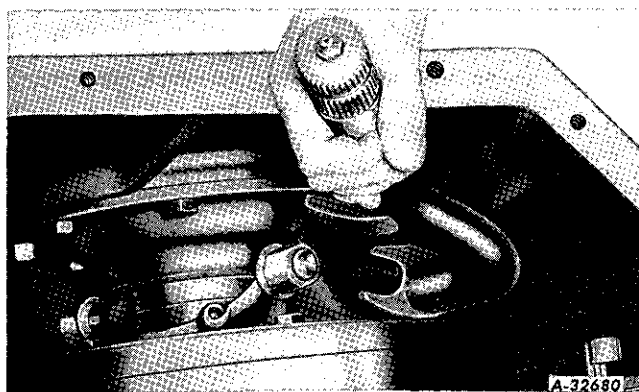
8. Tie the front steering brake band to the main frame, so that it does not get in the way when removing the steering clutch assembly. Refer to Illust. 13.

NOTE: If the steering brakes need new linings, they may be removed now or after the steering clutch has been removed.

9. Remove the steering clutch release bearing grease tube. (Illust. 13.)



Illust. 13 - Removing Release Bearing Grease Tube.



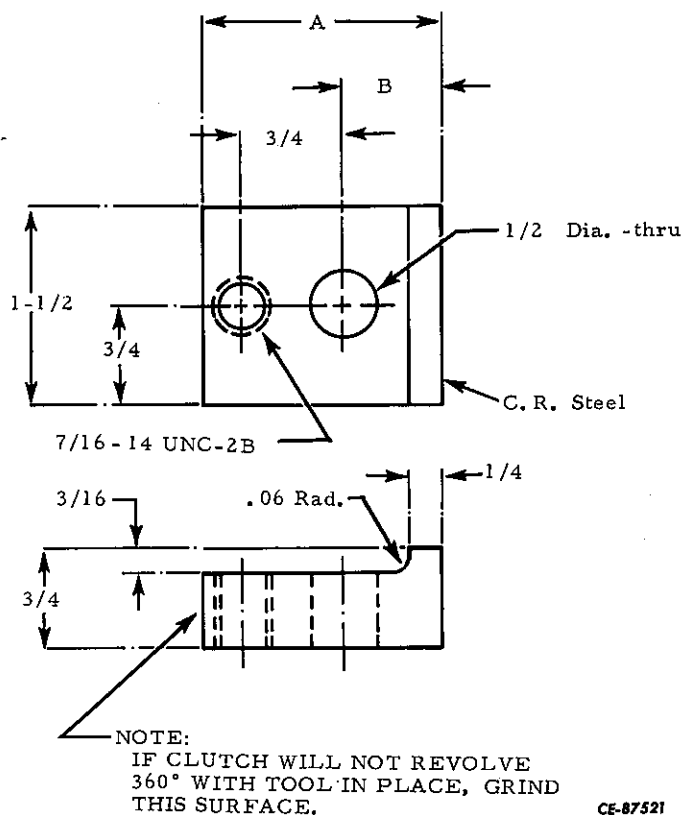
Illust. 14 - Removing Release Fork.

10. Loosen the release fork pivot and remove the release fork as shown in Illust. 14.

11. Remove the release fork bushings.

12. Fabricate three compressor angle tools as shown in Illust. 15 (refer to following table for "A" and "B" dimensions). This tool is used to compress the clutch spring enough to allow removal of the coupling retainer cap screws. On the 6 SERIES machines bolt the tools to the three 7/16" NC tapped holes in the clutch hub plate. On the 9 SERIES machines remove three alternate bolts securing the hub plate to the hub and secure the tools to the hub using 7/16" NC x 1-1/2" cap screws. The tools must be installed so the tool lip is bearing against the spring retainer. A cap screw must be installed in the threaded hole of the tool to adjust the tool angle as the spring is being compressed.

See Illust. 15	A	B
6 SERIES	1-13/16"	3/4"
9 SERIES	2-11/16"	1-5/8"

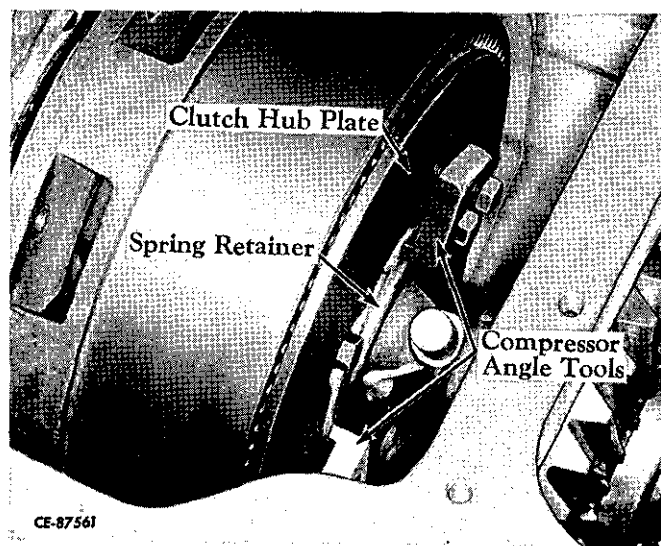


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Illust. 15 - Dimensions of Compressor Angle Tool (3 Req'd.).



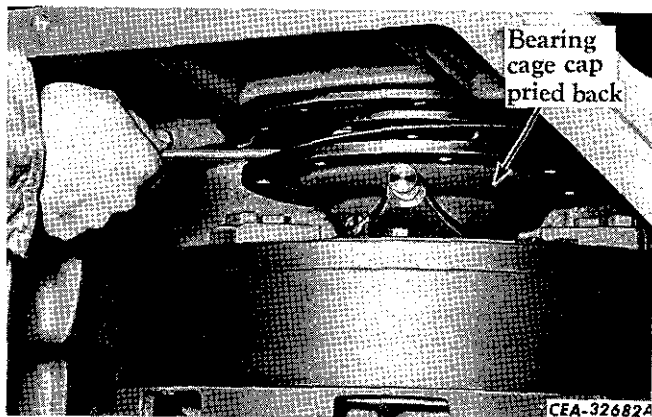
STEERING CLUTCHES



Illustr. 15A - Compressor Angle Tool Installed.

13. TD-6 (61), 6 (62), 9 (91) and 9 (92) SERIES: Remove the eight bolts securing the bearing adjuster ring and bearing cage to the main frame. Turn the bevel gear for access to the bottom bolts. Pry the adjuster ring and adjuster assembly away from the bearing cage toward the clutch to expose the coupling retainer cap screws.

TD-6 and TD-9: Remove the four cap screws and nuts from the bevel gear bearing cage cap. Turn the bevel gear for access to all the bolts. Pry the cap from the bearing cage toward the clutch to expose the coupling cap screws (Illustr. 16).

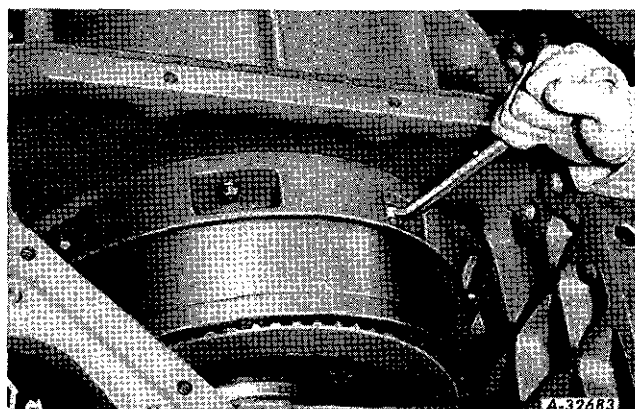


Illustr. 16 - Removing Coupling.

14. Remove the cap screws (18) securing the coupling retainer (17). Turn the bevel gear for access to the bottom bolts. Remove the split halves of the retainer and pry the coupling (16) towards the clutch until the splined end is free of the drive bevel gear hub (Illustr. 20).

15. Mark the drum and the flange of the sprocket drive pinion shaft to facilitate replacement. The cap screws are not all evenly spaced around the drum, so the drum can go on in only one way.

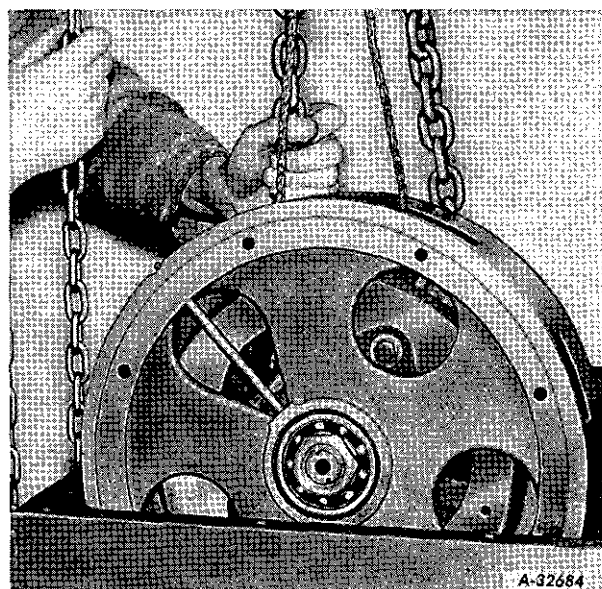
16. Remove the cap screws which hold the drum to the pinion shaft flange (Illustr. 17). Turn the drum with a long bar inserted in the drum openings.



Illustr. 17 - Removing Drum from Pinion Flange.

◆ CAUTION: Unless the tractor has been jacked up, it will move slightly as the drum is rotated.

17. Place a sling through the openings in the drum. Attach a lifting device to the sling and lift the clutch out of the compartment (Illustr. 18.)

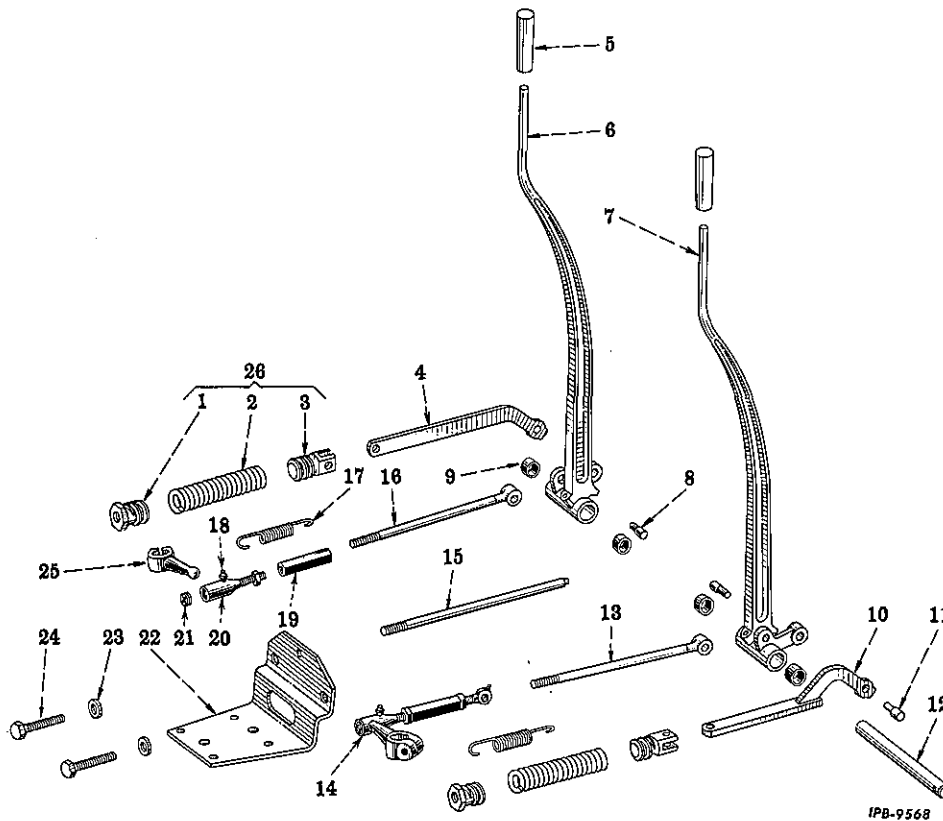


Illustr. 18 - Lifting Out Steering Clutch.



STEERING CLUTCHES

9. REMOVAL - Continued

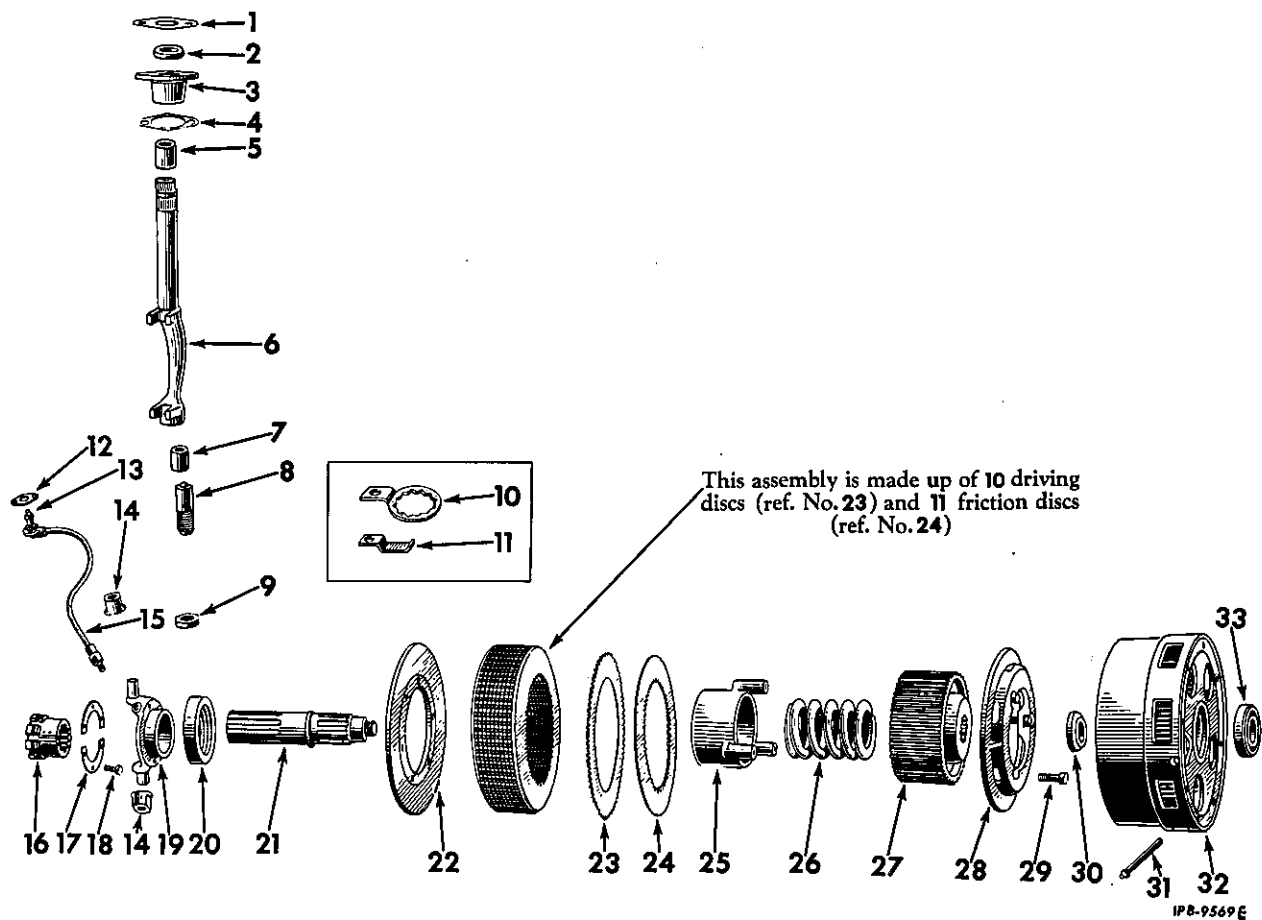


Illust. 19 - Exploded View of Steering Clutch Controls (9(91) and 9(92) Series Shown).

- | | |
|--|--|
| 1. Booster spring adjuster nut. | 14. Turnbuckle socket, R.H. |
| 2. Booster spring. | 15. Booster spring anchor brace. |
| 3. Booster spring yoke. | 16. Turnbuckle eye, L.H. |
| 4. Booster spring link, L.H. | 17. Release lever return spring. |
| 5. Hand lever handle. | 18. Turnbuckle socket lubrication fitting. |
| 6. Hand lever, assembly L.H. | 19. Turnbuckle. |
| 7. Hand lever, assembly R.H. | 20. Turnbuckle socket, L.H. |
| 8. Turnbuckle eye pin. | 21. Turnbuckle socket plug. |
| 9. Hand lever bushing. | 22. Booster spring anchor. |
| 10. Hand lever booster spring link, R.H. | 23. Booster spring adjuster bolt washer. |
| 11. Booster link pin, front. | 24. Booster spring adjuster bolt. |
| 12. Hand lever shaft. | 25. Release lever. |
| 13. Turnbuckle eye, R.H. | 26. Hand lever booster spring. |



STEERING CLUTCHES



Illustr. 20 - Exploded View of Steering Clutch Mechanism (9(91) and 9(92) Series Shown). (6(61) and 6(62) Series Similar).

- | | | |
|---|--|--|
| 1. Release shaft bearing felt retainer. | 10. Release fork pivot lock nut lock. | 22. Hub plate. |
| 2. Release shaft bearing felt. | 11. Release fork pivot lock. | 23. Driving disc. |
| 3. Release shaft bearing with bushing. | 12. Gasket. | 24. Friction disc. |
| 4. Retainer. | 13. Release bearing lubrication fitting. | 25. Pressure spring retainer. |
| 5. Release shaft bearing with bushing. | 14. Release pin bushing. | 26. Pressure spring. |
| 6. Release fork with bushing. | 15. Release bearing grease tube. | 27. Hub. |
| 7. Release fork pivot bushing. | 16. Shaft coupling. | 28. Pressure plate. |
| 8. Release fork pivot. | 17. Shaft coupling retainer. | 29. Pressure plate dowel bolt. |
| 9. Release fork pivot lock nut. | 18. Shaft coupling retainer bolt. | 30. Pilot bearing spacer. |
| | 19. Release collar. | 31. Pilot bearing lubrication fitting. |
| | 20. Release thrust bearing. | 32. Drum. |
| | 21. Shaft. | 33. Pilot bearing. |



STEERING CLUTCHES

10. DISASSEMBLY (Ref. Nos. Refer to Illust. 20)

1. Remove the coupling, adjusting ring and adjuster assembly, and the release collar from the clutch shaft (Illust. 21). A shaft coupling oil seal is installed inside the adjuster and this oil seal should be replaced if lubricant leaks into the clutch compartment.

2. Remove the compressor angle tools (Illust. 15) used in removal of the steering clutches.

3. Remove the steering clutch shaft (21) and pilot bearing (33) by removing the bearing retainer stake nut. Drive the shaft out of the drum (Illust. 22).

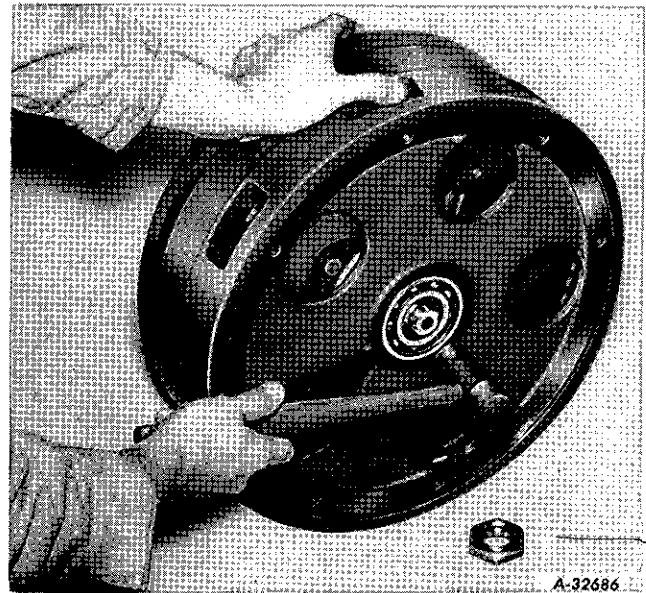
4. Remove the drum (32) from the disc assembly and remove the pilot bearing (33) from the drum. Remove the pilot bearing spacer (30).

5. Screw three 1/2 inch bolts into the pressure plate until they bear against the hub (Illust. 23). This will relieve the spring pressure for removal of the hub plate (22).

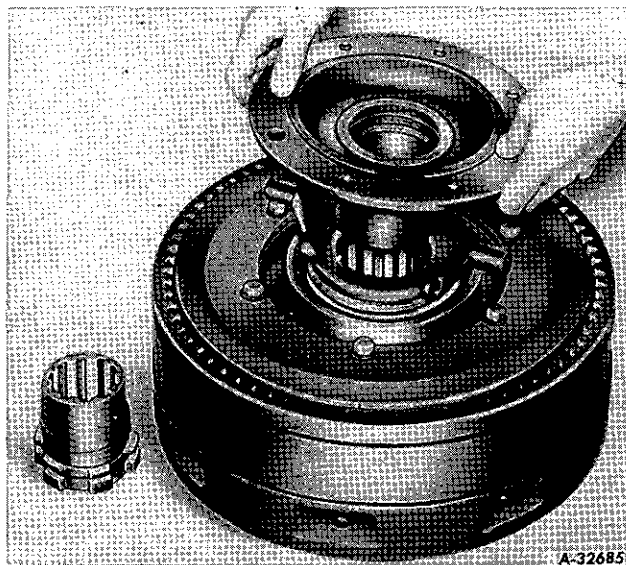
6. Take out the cap screws which hold the plate to the hub and remove the plate (Illust. 24). Lift the clutch discs (23 and 24) from the hub. It may be necessary to tap or pry the discs out.

7. Place the hub (27) and spring retainer (25) in an arbor press and apply pressure on the spring retainer. Remove the three bolts from

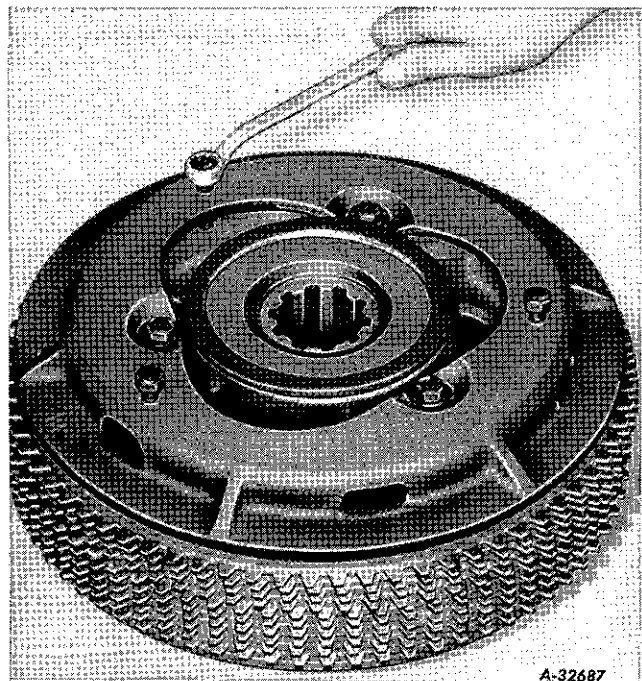
the pressure plate (28) which were used to compress the spring, and the three dowel screws which hold the pressure plate to the retainer (Illust. 25). Release the arbor press gradually until spring (26) is fully extended, then lift off pressure plate, hub (27), spring (26) and retainer (25).



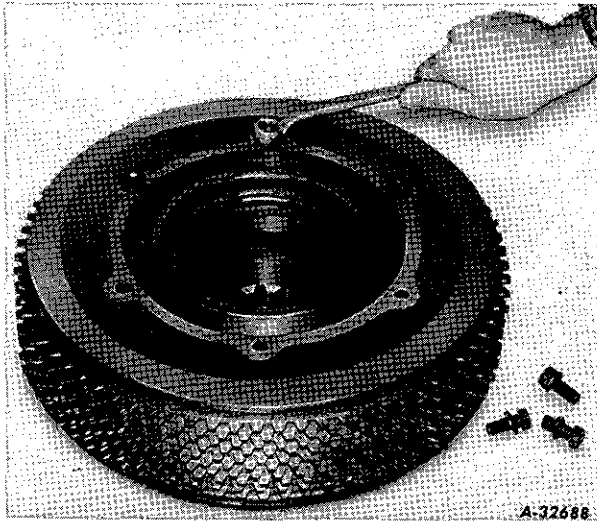
Illust. 22 - Removing Clutch Shaft.



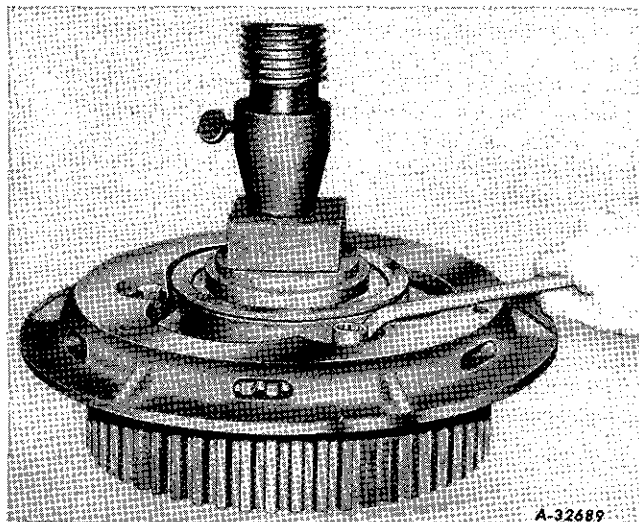
Illust. 21 - Removing Shaft Coupling and Bearing Adjuster Assembly.



Illust. 23 - Compressing Pressure Spring.



Illustr. 24 - Removing Hub Plate.



Illustr. 25 - Removing Retainer Screws.

11. INSPECTION AND REPAIR

1. **BEARINGS:** The release thrust bearing and lower release fork bearing can be inspected without removing them from the release collar and release fork. If all bearings, including the pilot bearing and upper release fork bearing, are in good condition, thoroughly grease them and cover them until ready for assembly.

2. **DRUM AND HUB:** Check the surface of the drum for scoring. A scored drum can be

placed in a lathe and turned down not to exceed 0.015 inch. If it does not clean up, replace with a serviceable drum. Check the teeth inside of the drum and outside of the hub for wear. Movement of the clutch disc may develop notches in the teeth. Replace either the drum or the hub if the teeth are worn excessively. Small burrs can be removed with a stone. The outside of the hub and the inside of the spring retainer must be smooth.

3. **DISCS:** Place the discs one at a time on a surface plate or under a straightedge to check for warping. If a 0.005 inch feeler gauge can be inserted between the disc and surface plate or straightedge, replace the discs. If disc teeth are damaged, replace the discs.

4. **PRESSURE SPRING:** Replace the spring if it is cracked or broken, or if it does not come up to specifications given in Par. 2.

5. **OIL SEAL:** Inspect the oil seal in the bearing cap, or in the bearing adjuster for the later machines. If the seal is mutilated or oil has been leaking into the clutch compartment, replace with an oil-soaked seal placed so that the leather lip of the seal faces toward the coupling. The coupling can be used to drive in the seal. Inspect the oil seal in the upper release bearing cage and replace if necessary, with the lip facing toward the bearing.

6. Inspect all parts for wear and damage and replace if necessary.

12. REASSEMBLY (Ref. Nos. Refer to Illustr. 20)

1. Install the steering clutch spring (26) by placing the spring in the retainer (25), and the hub (27), and pressure plate (28) on top of the spring. Then arrange the pressure plate on the hub so that the prongs of the retainer are centered in the holes of the hub. Place the unit in an arbor press and compress the spring (Illustr. 25). Install the dowel bolts (29) and lock washers in the tapped holes in the pressure plate (28) to hold the spring compressed. Remove the unit from the arbor press.

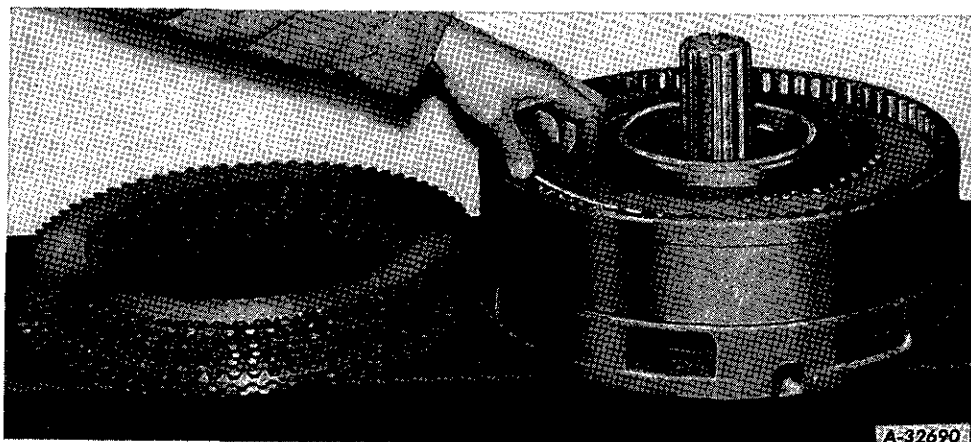
2. Install the steering clutch shaft (21) and drum (32) by inserting the shaft into the hub, and rest the unit on the splined end of the shaft. Tap the pilot bearing (33) into the drum from inside with the shielded side of the bearing toward the inside of the drum. Place the spacer (30) on the shaft, with the flat side down, and lift the drum and pilot bearing onto the pressure plate (28). Tap the pilot bearing (33) onto the end of the shaft and secure with the stake nut.

Continued on next page.



STEERING CLUTCHES

12. REASSEMBLY - Continued



Illust. 26 - Installing Clutch Discs.

3. Place the discs (23 and 24) in position over the hub. The first disc installed must have the teeth inside; the balance of the discs should alternate with teeth on the outside and inside (Illust. 26). Install the hub plate (22) and attach to the hub (27). On the 9 SERIES machines attach the hub plate to the hub with three alternate mounting bolts. The remaining three mounting holes must be used to attach the compressor angle tools during installation.

4. 6 AND 9 SERIES: Slide the release collar with bearing on the cage cap so the lubricator hole will face the rear of the tractor when the clutch is installed. Coat the finished surface of the cage cap with oil before sliding on the collar. Slide the cage cap onto the clutch shaft and insert the coupling and oil seal on the shaft. Place a new bearing cage cap gasket in position on the main frame (Illust. 21). The clutch is now ready for installation.

6 (61), 6 (62), 9 (91) AND 9 (92). Place the release collar with bearing over the clutch shaft so the lubricator hole will face the rear of tractor when the clutch is installed. Apply a film of oil to the finished surface of the bearing adjuster before sliding into the collar. Slide the assembled bearing adjuster onto the clutch shaft and insert the coupling onto the shaft to engage the splines. (Illust. 21.)

Be sure to install the compressor angle tools so the steering clutch assembly will be in condition for installation. Remove the tools after the clutches are installed (Refer to Illust. 15 and 15A.)

13. INSTALLATION

1. Place a sling through two openings in the drum (Illust. 18). Lift the clutch into position in the main frame and line up the match marks made in removal. All cap screws cannot be

installed if the drum is not in the correct position. Install the cap screws and lock washers which hold the drum to the shaft flange. Turn the drum with a long bar to install all of the cap screws.

2. Turn the drive bevel gear to align the coupling (16) and bevel gear hub spline and to gain access to all the coupling retainer (17) mounting holes. Pry the coupling into the bevel gear hub. Install and secure the retainer halves with the cap screws (18) and lockwire (Illust. 20).

3. TD-6 AND TD-9: Move the bearing cage cap into position and secure with the four cap screws and nuts. Turn the bevel gear for access to all the mounting holes. Remove the compressor angle tools (Illust. 15A). On the TD-9 machines install the three remaining hub plate mounting bolts.

TD-6 (61), 6 (62), 9 (91) AND 9 (92) SERIES: Slide the adjuster ring and adjuster assembly against the bearing cage to position the adjuster nut lock toward the rear of the tractor (see NOTE) and align the bolt holes in the adjuster ring and bearing cage. Secure the adjuster ring and bearing cage to the main frame with the eight mounting bolts. Turn the bevel gear for access to all the bolt holes. Remove the compressor angle tools (Illust. 15A). On 9 SERIES machines install the three remaining hub plate mounting bolts. Refer to "ADJUSTMENT" paragraph, Section 6 "TRANSMISSION AND BEVEL GEAR."

NOTE: The drive bevel gear bearing adjuster lock, on both sides, must be positioned toward the rear of tractor, otherwise they will interfere with the steering clutch release fork operation. Whenever the adjuster locks are removed they must be reinstalled to the tapped holes provided in the adjusting ring that are at the rear of the bearings, not the two holes at the front.



STEERING CLUTCHES

4. Install the release fork bushings to the release collar and put the fork in place on the pivot. Adjust the pivot for equal space above and below release bushings. Fork should turn freely before and after tightening pivot.

5. 6 AND 9 SERIES: Connect the steering brake bands with the joint pin. Install the release thrust bearing grease tube in the collar. Install the main frame cover.

6 (61), 6 (62), 9 (91) AND 9 (92) SERIES: Install steering brakes (see Par. 5 and reverse the procedure for removal.)

6. Replace the seat frame, fenders, fuel tank, and battery box (if used) being sure to connect the fuel lines and electric wiring.

7. Fill the transmission with lubricating oil.

8. Adjust the steering clutch levers as described in Par. 14.

9. Operate the tractor and try both steering clutches and brakes.

14. ADJUSTMENT: (See Illust. 27 and 28)

1. Loosen the lock nuts "A" and turn the turnbuckle "B" several turns to shorten the linkage. Then tighten the lock nuts "A" against the turnbuckle "B".

2. Check to see if the free movement of the clutch lever is between two and four inches.

NOTE: When the free travel of the clutch levers is reduced to 2 inches, adjustment should be made. MAXIMUM HANDLE LEVER PULL TO BE 35 POUNDS on the 6 Series; 45 POUNDS on the 9 Series.

3. When adjustment can no longer be made by means of shortening the operating linkage, proceed as follows: Remove the release spring "C." Loosen the lock nuts "A" and turn the turnbuckle "B" to lengthen the linkage as much as possible. Remove the release lever cap screw "D" and pry the release lever "D" off the splined release shaft "G." Turn the right hand release lever counterclockwise (the left hand release lever clockwise) slightly, and replace the release lever "E" on the splined shaft "G." Replace the spring "C" and shorten the linkage until the free movement of four inches is obtained.

4. When the desired free movement of the lever is obtained, replace, and tighten the release lever cap screw "D" and tighten the lock nuts "A" against the turnbuckle.

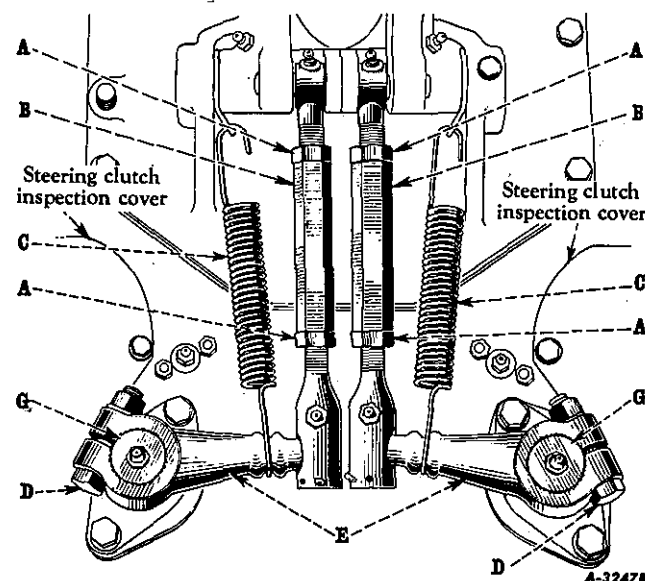
For Tractors Equipped with Hand Lever Booster Spring.

Pull the hand levers all the way back and tighten the booster spring adjusting bolts until the

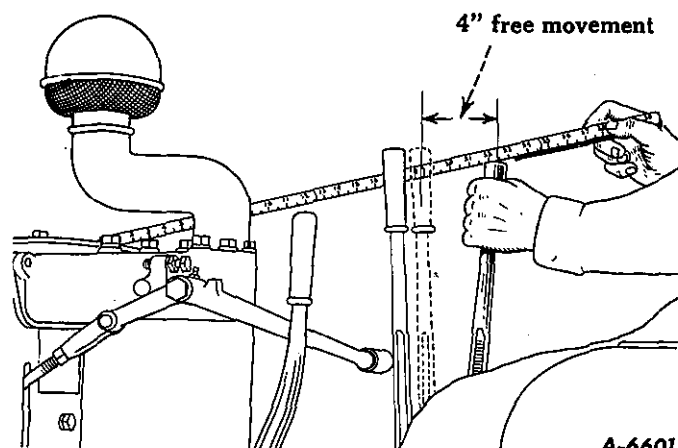
levers remain in this position. Then, loosen the adjusting bolts until the levers move forward to an over-center position. Readjust if necessary until this action is obtained. When the steering clutch hand levers can be pulled back with a minimum of effort and return to a fully engaged over-center position when released, correct adjustment is obtained.

If the levers remain in a partially disengaged position, undue wear of steering clutch discs will result. To prevent excessive wear, both clutch levers must strike the floor board stop when the seat is in the rear position.

5. Subsequent intermediate adjustments can be made by shortening the linkage as described.



Illust. 27 - Steering Clutch Adjustment.



Illust. 28 - Measuring Free Movement of Steering Clutch Levers.





CONTENTS

Paragraph	Page
1. Description.	1
2. Specifications	2
3. Checking Mechanical Problems	2, 3
SPROCKET	
4. Removal.	3, 4
5. Inspection and Repair.	4, 5
6. Installation.	5-8
SPROCKET DRIVE	
7. Removal and Disassembly (Regular Tread).	8-10
8. Removal and Disassembly (Wide Tread).	10-12
9. Inspection and Repair.	13, 14
10. Reassembly and Installation (Regular Tread)	14, 15
11. Reassembly and Installation (Wide Tread).	15, 16
12. Pivot Shaft Replacement	16





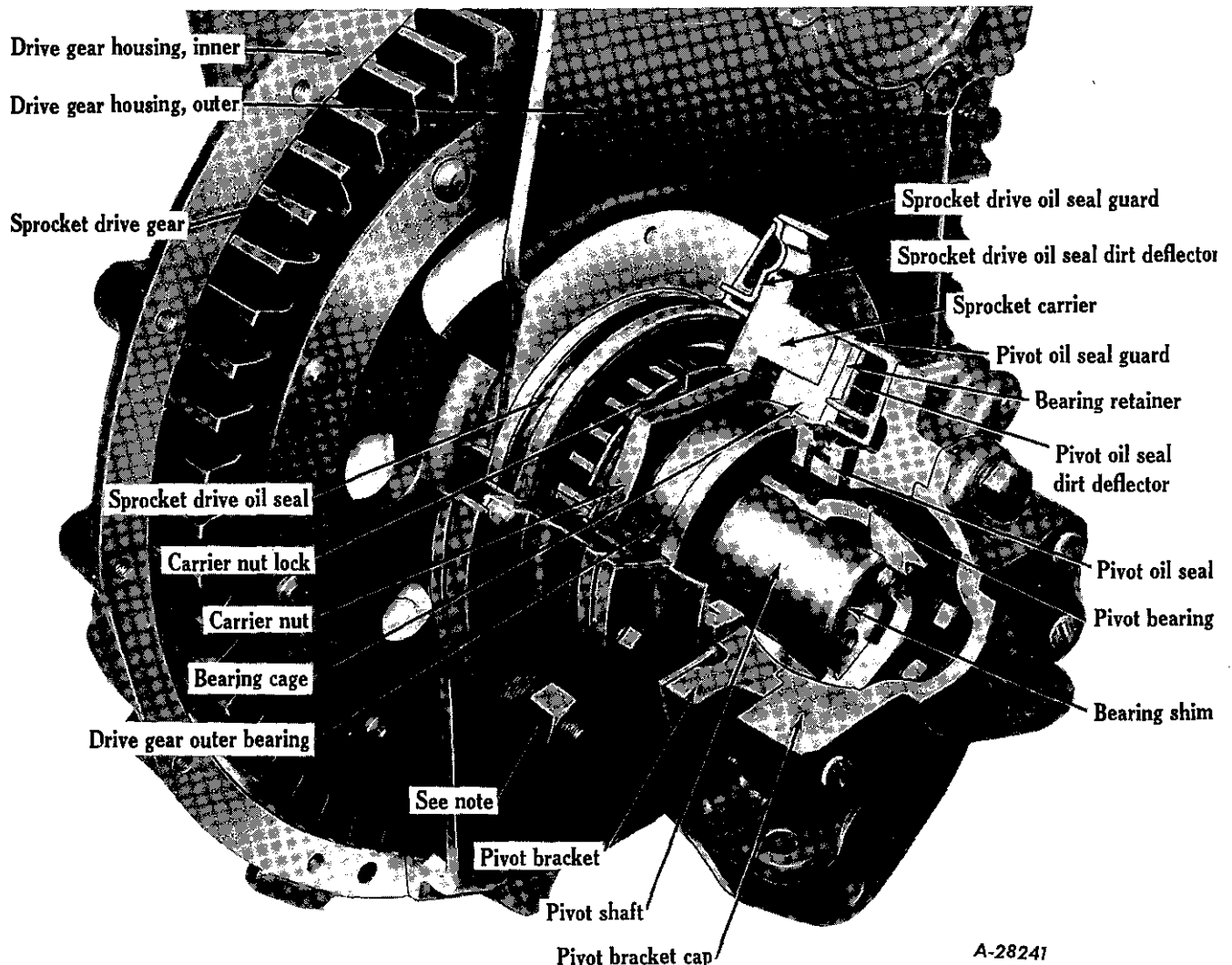
1. DESCRIPTION

The sprocket and sprocket drive assembly consists of a set of spur gears located in separate gear cases, one on each side at the rear of the tractor. Engine power is transmitted from the bevel drive gear through the steering clutches to the sprocket drives. The sprockets, which are attached to the sprocket drive gears, transmit power to the tracks.

Each sprocket drive consists mainly of a sprocket drive pinion, driven by a splined shaft (extending from the steering clutch), and a large sprocket drive gear (driven by the pinion) which, in turn, drives the sprocket. The

sprocket drives are completely enclosed in a gasket sealed compartment between the sprocket drive inner housing (or the sprocket drive carrier, on wide tread tractors) and the sprocket drive outer housing. The bearings are sealed with labyrinth bracket seals and two self adjusting, floating, diaphragm type seals.

The hub or sprocket carrier of each sprocket is splined to the hub of the sprocket drive gear and rotates on a ball bearing pressed on the track frame pivot shaft. Sprockets are reversible; they can be removed from their carriers, reversed, and placed on the same side of the tractor again. This makes it possible to use both sides of the sprocket teeth.



Illust. 1 - Cutaway View of Sprocket Drive.

NOTE: The sprocket is not shown above; if it were shown, it would be assembled under the nut indicated, against the sprocket carrier.

A-28247



2. SPECIFICATIONS

	"6" Series (61 and 62)	"9" Series (91 and 92)
Number of teeth:		
Sprocket	25	27
Sprocket drive pinion	12	12
Sprocket drive gear	51	57
Output reduction	4.25 to 1	4.75 to 1
Tooth thickness at pitch circle (inches):		
Sprocket drive pinion . . . . .	.5164 - .5189	.5947 - .5972
Sprocket drive gear . . . . .	.3134 - .3158	.3610 - .3635
Backlash (inches) . . . . .	.013 - .018	.015 - .020
Bearings:		
Sprocket drive pinion shaft, inner	roller	- - - -
Sprocket drive pinion shaft, outer	roller	- - - -
Sprocket drive pinion, inner	- - - -	ball
Sprocket drive pinion, outer	- - - -	ball
Steering clutch support (wide tread)	ball	ball
Sprocket drive gear, inner	roller	roller
Sprocket drive gear, outer	ball	ball
SPECIAL TORQUES * (Foot Pounds)		
Sprocket drive gear carrier nut	630-700	630 - 700
Sprocket drive pinion bearing nuts	50 - 60	- - - -
Sprocket drive pinion inner bearing nut	175-200	- - - -
Sprocket drive pinion bearing retainer cap screws	- - - -	56 - 63
Sprocket drive pinion shaft bearing nuts (wide tread)	280-320	280 - 320
Sprocket carrier (hub) bolt nuts	125-140	170 - 190
Pivot bracket bolts, top	130-145	250 - 290
Pivot bracket bolts, side	250-290	280 - 320

* All threads to be lubricated with SAE-30 engine oil.

3. CHECKING MECHANICAL PROBLEMS

PROBABLE CAUSE

REMEDY

SPROCKET DRIVES OVERHEATING

- | | |
|--|--|
| 1. Improper or insufficient lubrication. | Use proper grade and amount of lubricant.
Check for leaks. |
| 2. Bearing seizure | Remove the sprocket drive and inspect for
damaged bearings. Replace if necessary. |

SPROCKET DRIVE GEAR NOISY

- | | |
|---|---|
| 1. Misaligned or damaged gears | Inspect the gears and replace if necessary. |
| 2. Improper, dirty or insufficient lubricant. . . | Use proper grade and amount of lubricant. |

LUBRICANT LEAKAGE

- | | |
|-------------------------------|---|
| 1. Faulty gasket. | Oil leaks may occur at sprocket drive gear
cover gasket or at other gaskets. Replace
gaskets. |
| 2. Faulty oil seals | Replace oil seals. |



PROBABLE CAUSE

REMEDY

EXCESSIVE BACKLASH

1. Sprocket drive or pinion shaft worn or damaged. Replace worn or damaged parts.

EXCESSIVE WEAR ON SPROCKETS

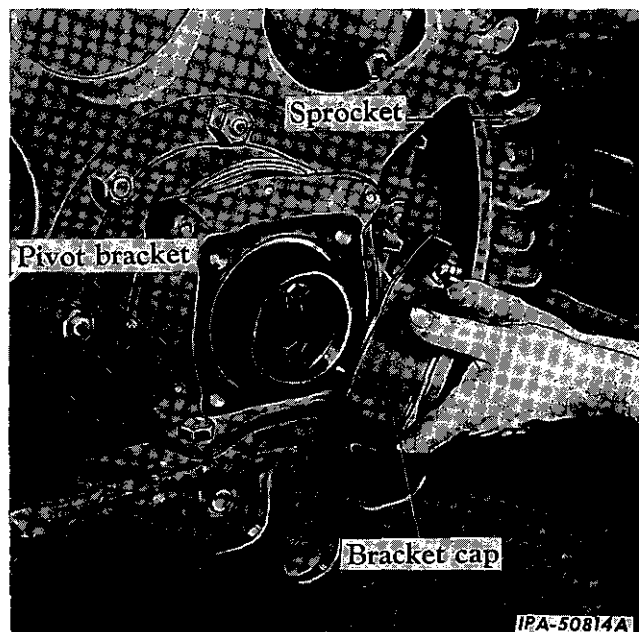
1. Tracks run too loosely Adjust the tracks. (See Section 9.)
2. Tracks worn excessively. Install new tracks. (See Section 9.)
3. Track frame out of alignment or damaged. . Repair, or install new track frame. (See Section 9.)

SPROCKET

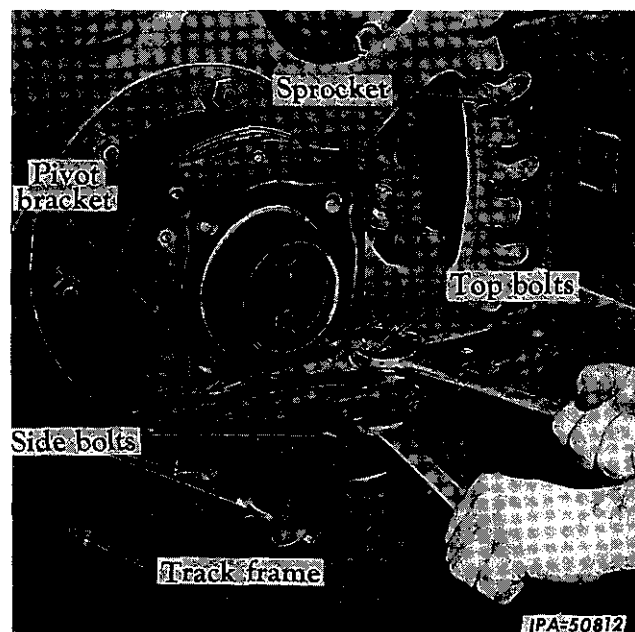
4. REMOVAL

1. Take off the track chain, but do not remove it from under the tractor. Refer to "TRACKS AND TRACK FRAME," Section 9.
2. Disconnect the diagonal brace from the pivot shaft but not from the track frame. Refer to "TRACKS AND TRACK FRAME," Section 9.
3. Remove the sprocket shield and the pivot bracket cap and gasket. (Illust. 2.)
4. Disconnect the pivot bracket from the track frame by removing the top and side bolts, (Illust. 3) and lay the track frame clear.
5. Raise the rear of tractor high enough so that the sprocket will clear the track frame. Block the tractor securely.
6. Remove the cap screws securing the pivot bearing to the pivot shaft, (Illust. 4). Remove the pivot bracket assembly together with the pivot bearing, (Illust. 5). Remove the oil seal should it remain on pivot shaft.
7. Remove the nuts and washers which secure the sprocket to the sprocket carrier or hub.
- 6). If necessary, break the sprocket loose

continued on next page



Illust. 2 - Removing Pivot Bracket Cap.



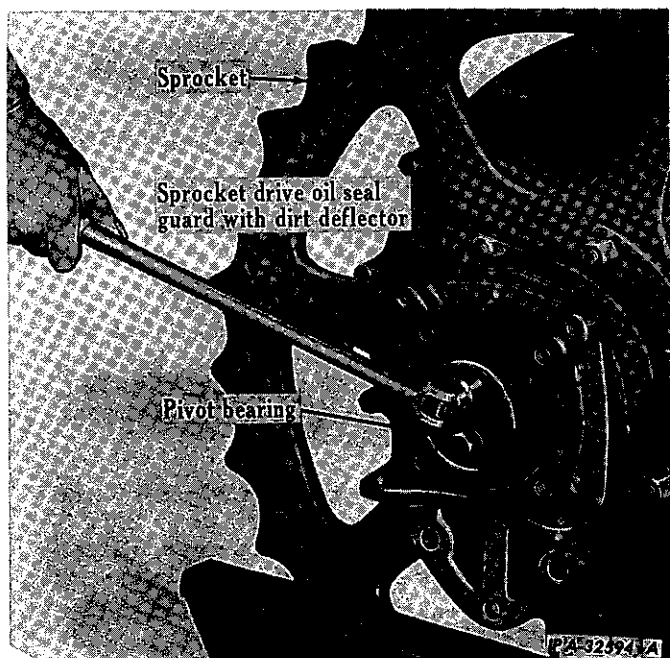
Illust. 3 - Removing Pivot Bracket.



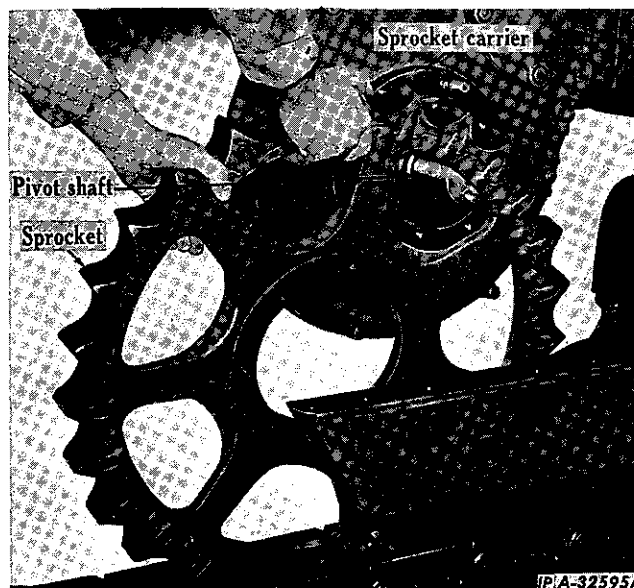
SPROCKET

4. REMOVAL - Continued

from the carrier with a sledge hammer or a large three-jaw puller.



Illust. 4 - Removing Pivot Bearing.



Illust. 6 - Removing Sprocket.

5. INSPECTION AND REPAIR

SPROCKET: Examine the sprocket for wear. Excessive wear is indicated if the sprocket jumps the track chain when the track adjustment is correct. A worn sprocket (if worn on one side of the teeth only) may be reversed and reinstalled on the same side of the tractor.

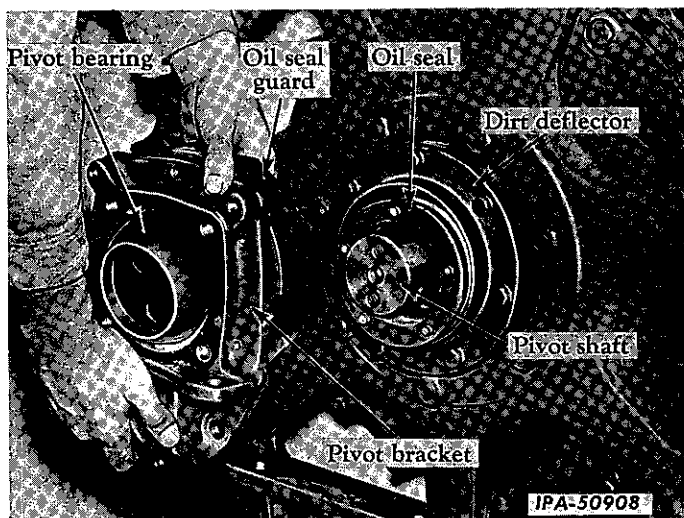
Pivot Bracket Assembly

1. Remove the pivot bearing from the pivot bracket, and the oil seal from the inner side of the pivot bracket if the oil seal remained in the bracket during bracket removal. Remove the shims from inside the pivot bearing and keep them for use in reassembly.

2. Clean and inspect the pivot bearing surfaces of the bracket, cap and bearing for scoring; cracks, or excessive wear. (Illust. 7.) Clean the grease fitting and passage through the bracket cap to assure dirt free lubrication. Replace parts as necessary.

3. Clean and inspect the inner or oil seal guard side of the pivot bracket. (Illust. 8.) See that the oil seal peg holes are thoroughly clean to assure even seating of the oil seal.

4. Examine the diaphragm type oil seal to be sure that it is fit for service. The diaphragm must be free of cracks or general deterioration. The sealing washer should protrude from the seal to prevent metal to metal contact with the bearing retainer. The friction or sealing surface of this washer should be free of glaze and high spots for good sealing. Compress the

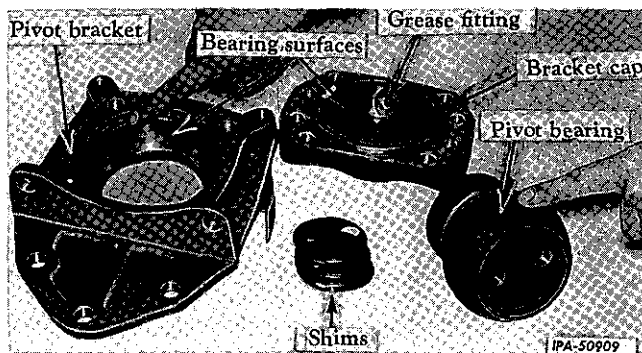


Illust. 5 - Removing Pivot Bracket Assembly.

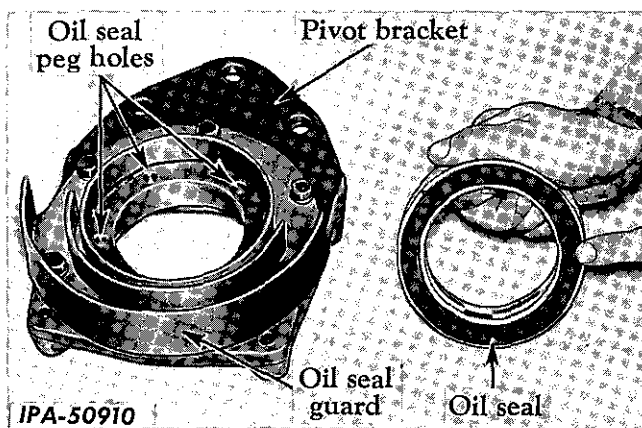


SPROCKET

seal to make sure that the inner springs expand it evenly to its free width and that no springs are broken. Replace the entire oil seal with a new one if examination indicates any part not fit for service.



Illust. 7 - Pivot Bracket Assembly (Outer Side).

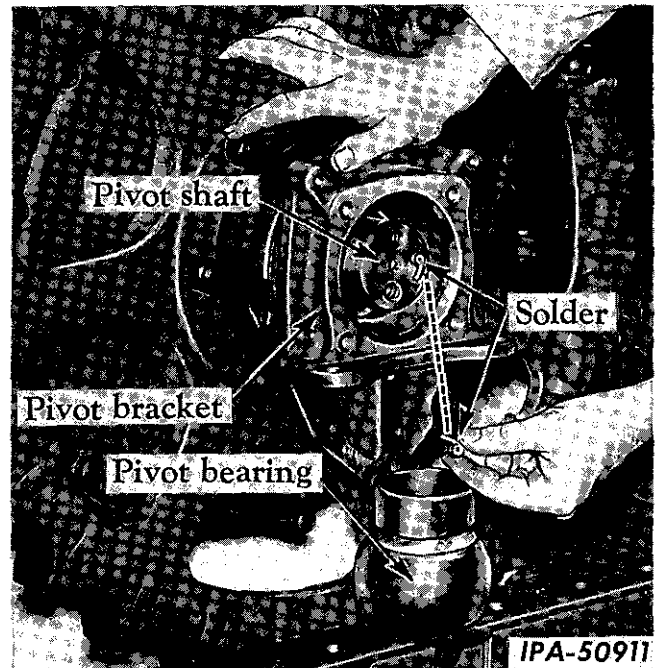


Illust. 8 - Pivot Bracket Assembly (Inner Side).

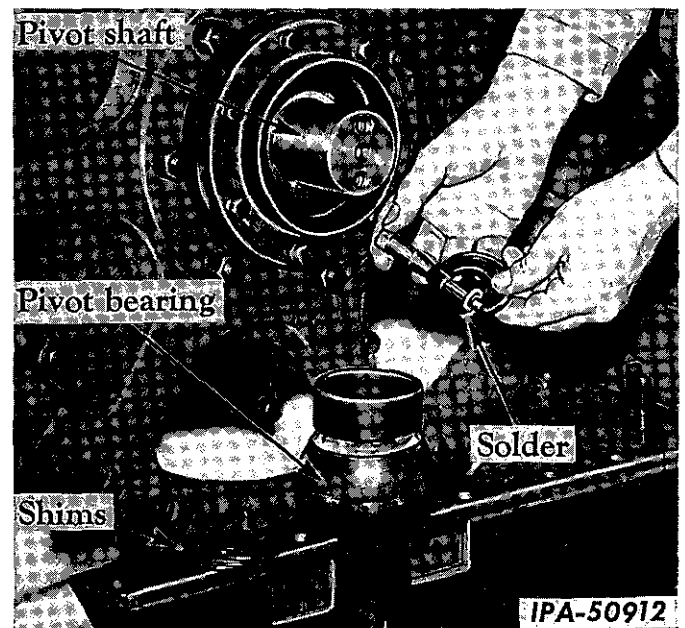
6. INSTALLATION

1. Lift the sprocket into position, lining up the holes in the sprocket with the cap screws projecting from the sprocket carrier or hub. Fasten the sprocket to the carrier with nuts and lock washers. Torque the nuts as given in Par. 2, "SPECIFICATIONS."

2. Assemble a new gasket (57, Illust. 11 or 58, Illust. 12) to the peg side of oil seal (56 or 57). Dip the sealing washer surface in oil, and insert the peg side of the seal into the pivot bracket (59 or 60), so that the pegs set in the holes of bracket, and place the pivot bracket complete with the oil seal guard and oil seal onto the pivot shaft.



Illust. 9 - Install Measuring Material.

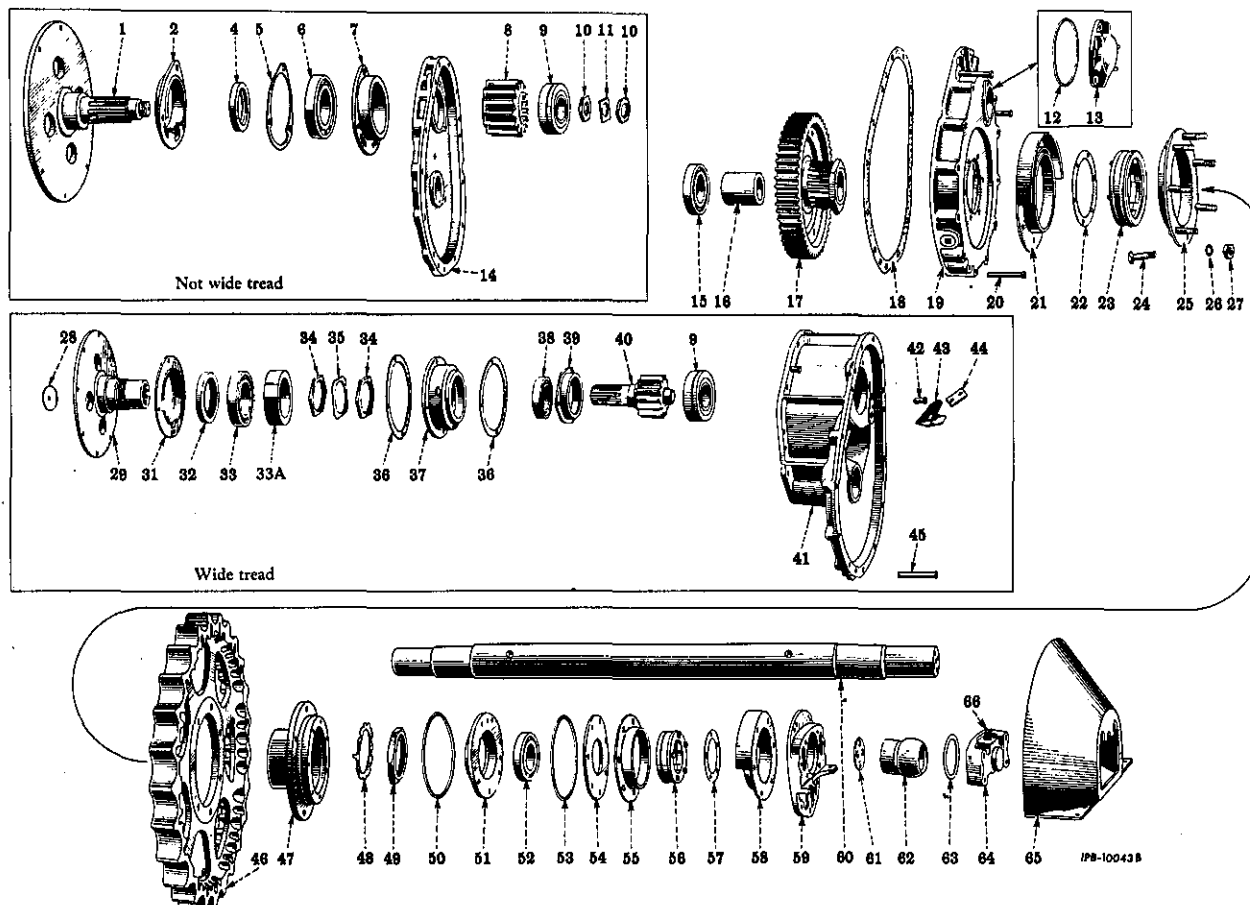


Illust. 10 - Measuring for Shim Thickness.

continued on page 8



SPROCKET



Illust. 11 - Exploded View of Sprocket and Sprocket Drive (6, 6(61) and 6(62) Series).

- | | | | |
|--------------------------------|---|---|------------------------------------|
| 1. Pinion shaft. | 17. Drive gear. | 34. Retainer nut. | 49. Nut. |
| 2. Bearing retainer. | 18. Gasket. | 35. Nut lock. | 50. "O" ring (outer). |
| 4. Oil seal. | 19. Outer housing. | 36. Gasket. | 51. Bearing cage. |
| 5. Gasket. | 20. Dowel pin. | 37. Bearing cage. | 52. Drive gear outer ball bearing. |
| *6. Pinion inner bearing. | 21. Oil seal guard. | *38. Pinion inner bearing. | 53. "O" ring (inner). |
| 7. Bearing cage. | 22. Gasket. | 39. Bearing cage. | 54. Bearing retainer. |
| 8. Sprocket drive pinion. | 23. Oil seal. | 40. Sprocket drive pinion. | 55. Dirt deflector. |
| *9. Pinion outer bearing. | 24. Bolt. | 41. Sprocket drive carrier. | 56. Oil seal. |
| 10. Retainer nut. | 25. Dirt deflector. | 42. Upper dowel pin. | 57. Gasket. |
| 11. Nut lock. | 26. Lock washer. | 43. Steering clutch support bearing oil trough. | 58. Oil seal guard. |
| 12. Cap "O" ring. | 27. Nut. | 44. Trough lock. | 59. Pivot bracket. |
| 13. Outer bearing cap. | 28. Expansion plug. | 45. Lower dowel pin. | 60. Pivot shaft. |
| 14. Inner housing. | 29. Pinion shaft. | 46. Sprocket. | 61. Bearing shim. |
| *15. Drive gear inner bearing. | 30. Bearing retainer. | 47. Sprocket carrier. | 62. Pivot bearing. |
| 16. Bearing spacer. | 31. Oil seal. | 48. Nut lock. | 63. Gasket. |
| | 32. Steering clutch support ball bearing. | | 64. Bracket cap. |
| | 33A. Bearing nut spacer (62 only). | | 65. Sprocket shield. |
| | | | 66. Pivot lubricator. |

*Ball bearings used in older "6" series. Latest 6, 6 (61) and 6 (62) series use separable straight roller type bearings. Replace bearings, when necessary, with the same type found in the assembly. DO NOT SUBSTITUTE.

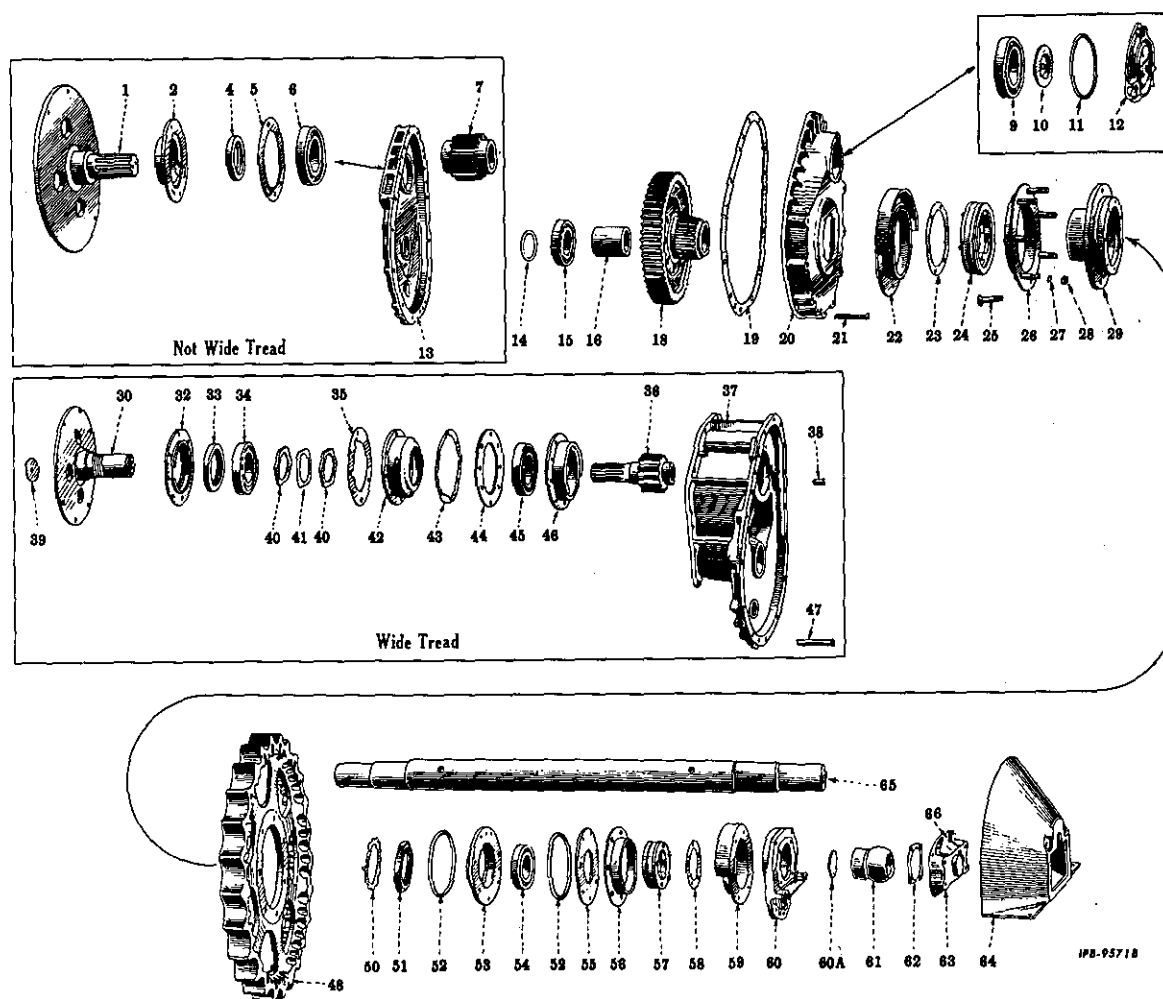


SPROCKET AND SPROCKET DRIVE

Section 8

Page 7

SPROCKET



Illustr. 12 - Exploded View of Sprocket and Sprocket Drive (9, 9(91) and 9(92) Series).

- | | | | |
|-------------------------------|---|--------------------------------|------------------------------------|
| 1. Pinion shaft. | 16. Bearing spacer. | 35. Gasket. | 51. Nut. |
| 2. Bearing retainer. | 18. Drive gear. | 36. Sprocket drive pinion. | 52. "O" ring. |
| 3. Felt washer. | 19. Gasket. | 37. Sprocket drive carrier. | 53. Bearing cage. |
| 4. Oil seal. | 20. Outer housing. | 38. Upper dowel pin. | 54. Drive gear outer ball bearing. |
| 5. Gasket. | 21. Lower dowel pin. | 39. Expansion plug. | 55. Bearing retainer. |
| 6. Pinion inner ball bearing. | 22. Oil seal guard. | 40. Bearing nut. | 56. Dirt deflector. |
| 7. Sprocket drive pinion. | 23. Snap-on gasket. | 41. Nut lock. | 57. Oil seal. |
| 8. Upper dowel pin. | 24. Oil seal. | 42. Bearing cage. | 58. Snap-on gasket. |
| 9. Pinion outer ball bearing. | 25. Bolt. | 43. Gasket. | 59. Oil seal guard. |
| 10. Bearing retainer. | 26. Dirt deflector. | 44. Bearing retainer. | 60. Pivot bracket. |
| 11. Cap "O" ring. | 27. Lock washer. | 45. Pinion inner ball bearing. | 60A. Bearing shim. |
| 12. Outer bearing cap. | 28. Nut. | 46. Bearing cage. | 61. Pinion bearing. |
| 13. Inner housing. | 29. Sprocket carrier. | 47. Lower dowel pin. | 62. Gasket. |
| 14. Oil seal ring. | 30. Pinion shaft. | 48. Sprocket. | 63. Bracket cap. |
| 15. Drive gear inner bearing. | 32. Bearing retainer. | 50. Nut lock. | 64. Sprocket shield. |
| | 33. Oil seal. | | 65. Pivot shaft. |
| | 34. Steering clutch support ball bearing. | | 66. Pivot lubricator. |



SPROCKET

6. INSTALLATION - Continued

3. Install the pivot bearing (61 or 62) (less the shims) and tighten the pivot bearing cap screws to final specified torque as required per diameter and type of cap screw. (Refer to "STANDARD TORQUE DATA" in Section 1.) This will take up the clearance between the bearings and the spacer.

4. Remove the pivot bearing and place a ball of molding clay, putty, or solder (about 1/4 inch round) on the pivot shaft (Illust. 9). Install the pivot bearing and torque the cap screws to 50 foot pounds.

5. Remove the pivot bearing and carefully remove the compressed material from the pivot shaft. Measure the thickness with a micrometer. This measurement, less .013 to .018 inch, represents the thickness in shims to be installed to properly pre-load the pivot bearing.

6. Install the shims and torque the cap screws to final specified torque as required per diameter and type of cap screw. (Refer to "STANDARD TORQUE DATA" in Section 1.)

7. Lower the tractor onto the tracks and assemble the track frame to the pivot bracket. Secure the pivot bracket to the track frame with the top and side bolts. Tighten the bolts to the torques shown under Par. 2, "SPECIFICATIONS."

8. Install the pivot bracket cap with a new gasket.

9. Connect the diagonal brace to the pivot shaft, being sure the correct bearing clearance is maintained. Refer to Section 9, "TRACKS AND TRACK FRAME."

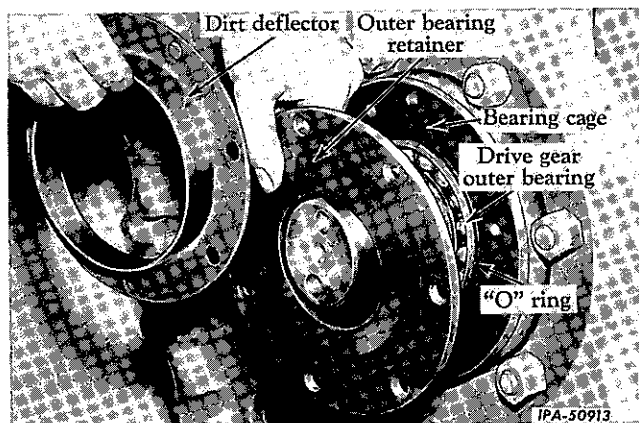
10. Install and adjust the track chain. Refer to Section 9, "TRACKS AND TRACK FRAME."

SPROCKET DRIVE

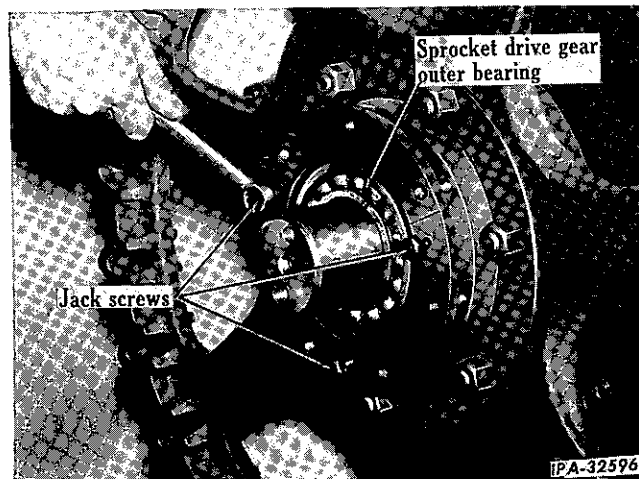
7. REMOVAL AND DISASSEMBLY

Regular Tread

1. Remove the sprocket as outlined in Par. 4.
2. Drain the lubricant from the sprocket drive.
3. Remove the pivot oil seal dirt deflector and the drive gear outer bearing retainer (Illust. 13), by removing the seven cap screws that secure them and the outer bearing cage to the sprocket carrier.
4. Pull the drive gear outer bearing and cage by installing jack screws in the flange of the cage (Illust. 14), and draw up on them evenly. If necessary to replace the bearing, it can be pulled or driven from the cage. It is not necessary to remove the "O" ring around the outer circumference of the bearing unless the bearing is to be removed.
5. Straighten the lips of the nut lock and remove the sprocket drive gear carrier nut, using special socket wrench SE-1184-1, (Illust. 15). Refer to "Service Tools" manual ISS-1002.
6. Remove the sprocket carrier from the drive gear carrier splines (Illust. 16).
7. Remove the pinion outer bearing cap and seal ring (Illust. 15).



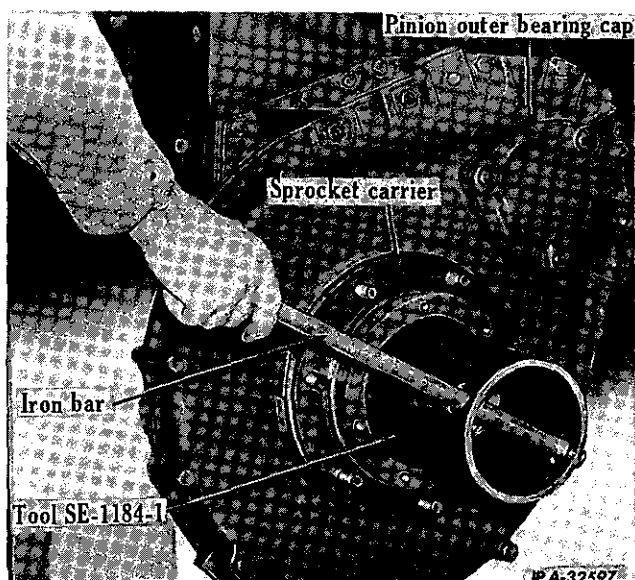
Illust. 13 - Removing Dirt Deflector and Outer Bearing Retainer.



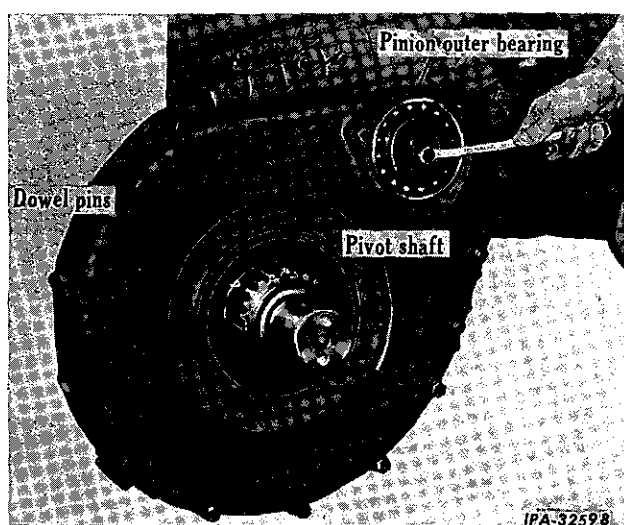
Illust. 14 - Removing Outer Bearing and Cage.



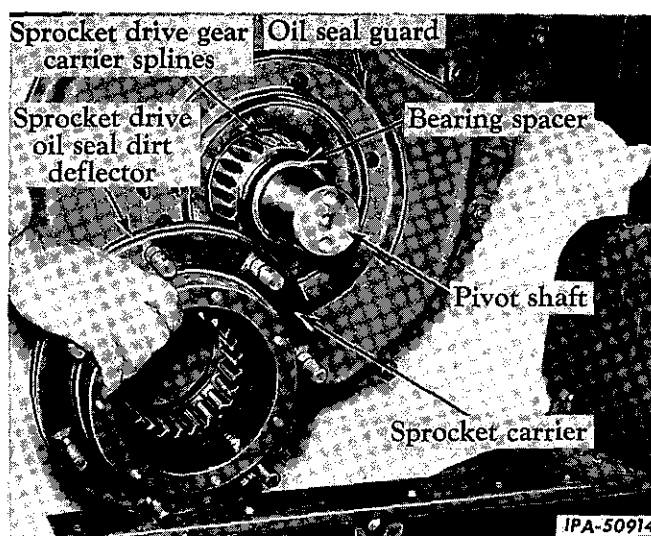
SPROCKET DRIVE



Illust. 15 - Removing Sprocket Carrier Nut.



Illust. 17 - Removing Pinion Outer Bearing Washer ("9" Series).



Illust. 16 - Removing Sprocket Carrier.



Illust. 18 - Removing Sprocket Drive Gear Outer Housing ("9" Series).

8. 6, 6(61) and 6 (62) SERIES: Straighten the lips of nut lock, and remove the lock nut and the outer bearing retaining nut from the end of sprocket drive pinion shaft (1, Illust. 11).

9. 9 (91) AND 9 (92) SERIES: Remove the two cap screws, lock washers and the outer bearing retainer (Illust. 17).

9. Remove all the cap screws and nuts securing the outer housing to the inner housing and,

using three jack screws, separate the housings. The housings are aligned with dowel pins, therefore the jack screws must be tightened down evenly. Slide and lift the outer housing away from the inner housing (Illust. 18).

continued on next page



SPROCKET DRIVE

7. REMOVAL AND DISASSEMBLY - Continued

Regular Tread - Continued

10. Remove the sprocket drive gear and pinion (Illust. 19), and slide the bearing spacer (16, Illust. 11 or 12) off the pivot shaft. On tractors equipped with roller bearings, first remove the inner race of the pinion outer bearing from the end of pinion shaft then, simply pull the drive gear and pinion away from the inner housing to separate the inner bearing races. Tractors having ball bearings require a puller to remove the drive gear with inner bearing from the pivot shaft, and again to pull the pinion shoulder from the inner bearing until the pinion is free to slide off the pinion shaft spline. The older "6" Series have a pinion roller type outer bearing, but a pinion inner ball bearing that requires a puller to remove the pinion.

NOTE: If necessary to remove the roller bearing outer race (late 6 and 6 (61) and 6 (62) series) or the ball bearing (early 6 and 9, 9 (91) and 9 (92) series) from the drive gear, tap out with the aid of a drift punch inserted through the three holes around the hub or gear carrier spline.

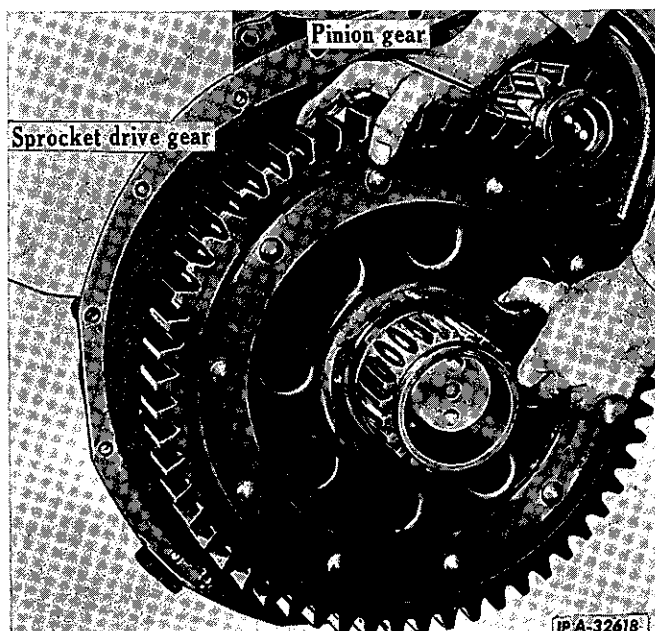
11. To remove the sprocket drive inner housing, first remove the steering brake inspection cover from the under side of the main frame, and place a jack under the steering clutch to support the weight of the clutch. Then remove the cap screws and nuts that secure the inner housing to the main frame. Pry the inner housing away from the main frame a little at a time and evenly to prevent binding around the pinion shaft and the pivot shaft. The pinion inner bearing assembly remains with inner housing during removal.

12. Remove the cap screws that secure pinion inner bearing retainer to the inner housing, and remove the retainer (2), oil seal (4), gasket (5), bearing (6) and bearing cage (7), Illust. 11, or the same parts covered by references (2 to 5, Illust. 12). If necessary to remove bearing (6) from 9, 9 (91) and 9 (92) series, it must be pressed from the bore of inner housing.

13. If the pinion shaft is to be removed, it will be necessary to remove the steering clutch. Refer to "STEERING CLUTCHES AND BRAKES," Section 7.

14. After the steering clutch has been removed, the pinion shaft can be removed through the steering clutch chamber, similar to Illust. 23, for the wide tread. The bearing assembly for regular tread remains attached to the inner

housing and is disassembled as outlined in above step 12.



Illust. 19 - Removing Sprocket Drive Gear (9 Series shown).

8. REMOVAL AND DISASSEMBLY

Wide Tread

Removal of the sprocket drive for wide tread tractors is the same as for the regular tread as outlined in the preceeding paragraph 7, up to and including step 7, then proceed as follows:

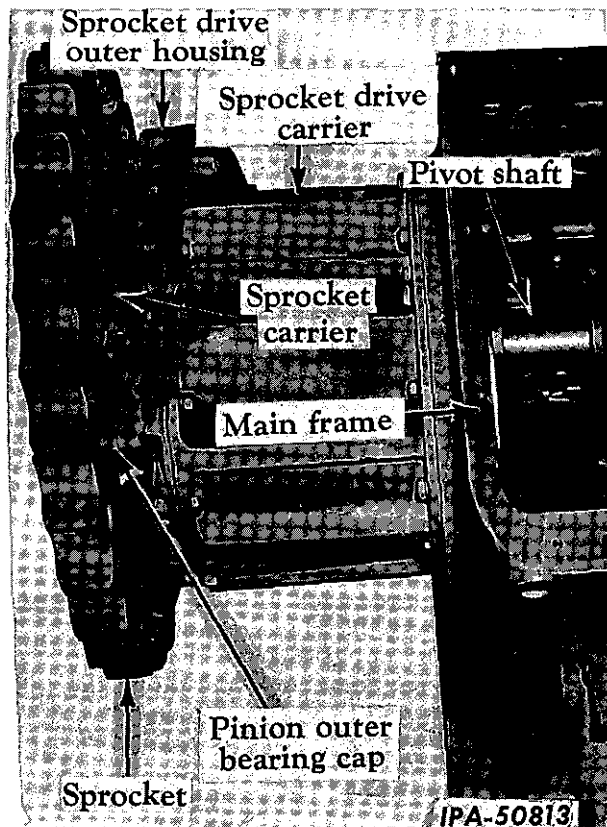
1. 6 SERIES: Straighten the lips of nut lock and remove the lock nut and the outer bearing retaining nut from the threaded end of the sprocket drive pinion (40, Illust. 11).

9 SERIES: Remove the two cap screws and lock washers (Illust. 17), securing the outer bearing retainer (10) to the end of the sprocket drive pinion (36, Illust. 12), and remove the outer bearing retainer.

2. Remove all cap screws and nuts securing the outer housing (19, Illust. 11; 20, Illust. 12) to the sprocket drive carrier (41 or 37, Illust. 11 or 12), see Illust. 20. Use three jack screws to separate the outer housing from the sprocket drive carrier. These two sections are aligned with dowel pins, therefore the jack screws must be tightened down evenly. Slide and lift the outer housing away from the sprocket drive carrier similar to Illust. 18.



SPROCKET DRIVE



Illust. 20 - Sprocket and Sprocket Drive Carrier (Wide Tread).

3. Remove the sprocket drive gear (Illust. 19), and slide the bearing spacer (16, Illust. 11 or 12), off the pivot shaft.

LATER 6 AND 6 (61) SERIES are equipped with drive gear roller type inner bearings. Simply pull the drive gear away from the sprocket drive carrier to separate the inner and outer races, and remove the drive gear with outer race from the pivot shaft.

6 (62) SERIES: The drive gear is equipped with straight roller type inner bearings. Pull the drive gear away from the sprocket drive carrier (41) to separate the inner and outer races, and remove the drive gear with outer race from the pivot shaft, Illust. 19. If necessary to remove the outer race of the roller bearing from the bore of drive gear (17), weld a bead around the inner surface of the race and this will shrink the race enough for removal.

9, 9 (91), 9 (92) AND OLDER 6 SERIES are equipped with drive gear inner ball bearings. The use of a puller is required to remove the

inner ball bearing with the drive gear from the pivot shaft.

If necessary to remove the outer race of roller bearing 6, 6 (61) or the ball bearing 9 (91), 9 (92) and old 6 series from the drive gear, tap out with the aid of a drift punch inserted through the three holes around the hub of gear carrier spline.

4. Remove the sprocket drive pinion shown in Illust. 19, (40, Illust. 11 or 36, Illust. 12).

OLDER 6 SERIES: Before attempting to remove the pinion it will be necessary to remove the sprocket drive carrier from the main frame to gain access of the pinion inner bearing retaining nuts. This also applies for pinion inner ball bearing removal. Refer to Steps 5 and 6 for sprocket drive carrier removal.

LATER 6 and 6 (61) SERIES are equipped with pinion roller type inner bearings. Simply pull the pinion away from the sprocket drive carrier to separate the inner race from the outer race, also the pinion and pinion shaft splines. The outer race will remain in its bearing cage attached to the inside of the sprocket drive carrier. If necessary, the outer race can be pulled outward from the bearing cage. However, if the sprocket drive carrier is to be removed, the outer race may be tapped out of the bearing cage at this time, or pressed out if the bearing cage is removed from the inside of sprocket drive carrier.

6 (62) SERIES: Remove the sprocket drive pinion (40). The outer bearing (9) and inner bearing (38) are both straight roller type. Pull the pinion away from the sprocket drive carrier (41). The inner races of both bearings will stay with the pinion and can be removed with a puller if necessary.

The outer race of the inner bearing will remain in the bearing cage (39), attached to the inside of the sprocket drive carrier.

9, 9 (91) AND 9 (92) SERIES: The pinion may be pried or pulled from the inner ball bearing. The inner ball bearing will remain in its bearing cage which is secured to the inside of the sprocket drive carrier. If bearing replacement is necessary, the sprocket drive carrier must be removed to gain access to the retainer cap screws. Refer to Steps 5 and 6 for sprocket drive carrier removal.

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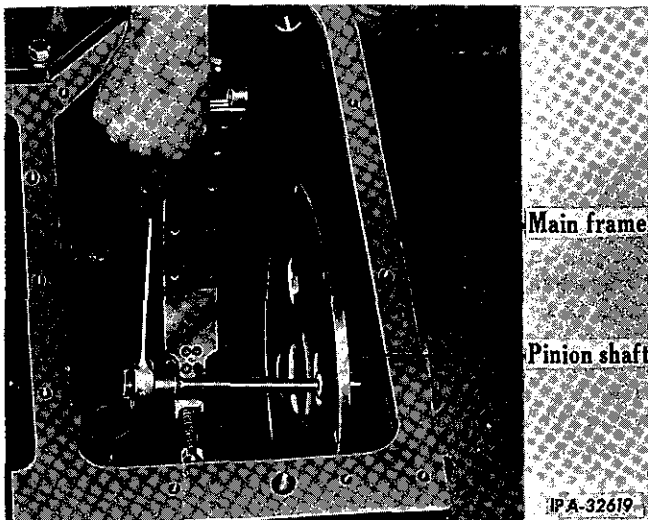


SPROCKET DRIVE

8. REMOVAL AND DISASSEMBLY

Wide Tread - Continued

5. Further disassembly of the sprocket drive, before removing the sprocket drive carrier and/or the pinion shaft, requires the removal of the steering clutch. Refer to "STEERING CLUTCHES AND BRAKES," Section 7. With the steering clutch removed, remove the cap screws securing the steering clutch support bearing retainer and bearing cage to the sprocket drive carrier (Illust. 21). Rotate the pinion shaft flange to make the lower cap screws accessible.



Illust. 21 - Removing Steering Clutch Support Bearing Cage Cap Screws (Wide Tread).

6. 6, 6 (61), 9, 9 (91) AND 9 (92) SERIES: Remove the nuts and cap screws securing the sprocket drive carrier to the main frame. Be sure to remove the cap screws between the webs on the inside of the carrier. Use jack screws to separate the sprocket drive carrier from the main frame or pry the carrier away from main frame, as may be the case, and move the carrier, carefully straight off the pivot shaft to prevent binding (Illust. 22).

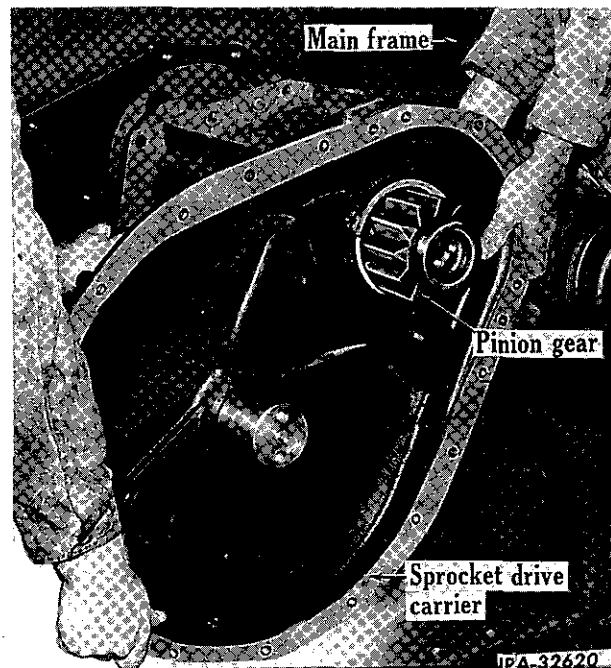
6 (62) SERIES: Remove the sprocket drive carrier (41) from the main frame as outlined in the following Steps A to D, to have access to the steering clutch support bearing assembly, Illust. 23.

(a) Remove the outer race of pinion gear inner bearing (38) from the bearing cage (39), using a bearing puller for this purpose.

(b) Insert a wrench through the opening in bearing cage (39) and remove all the cap screws and lock washers securing the bearing cage to the inner wall of the sprocket drive carrier. Tap the bearing cage from the bore and lower the bearing cage to the bottom of the sprocket drive carrier.

(c) Insert a drift or screwdriver through the opening and bend back the lug or nut lock (35). Then remove the retainer nuts (34) from the pinion shaft (29) with a 3-1/2-inch socket head wrench. Remove the spacer (33A) from the end of pinion shaft (29).

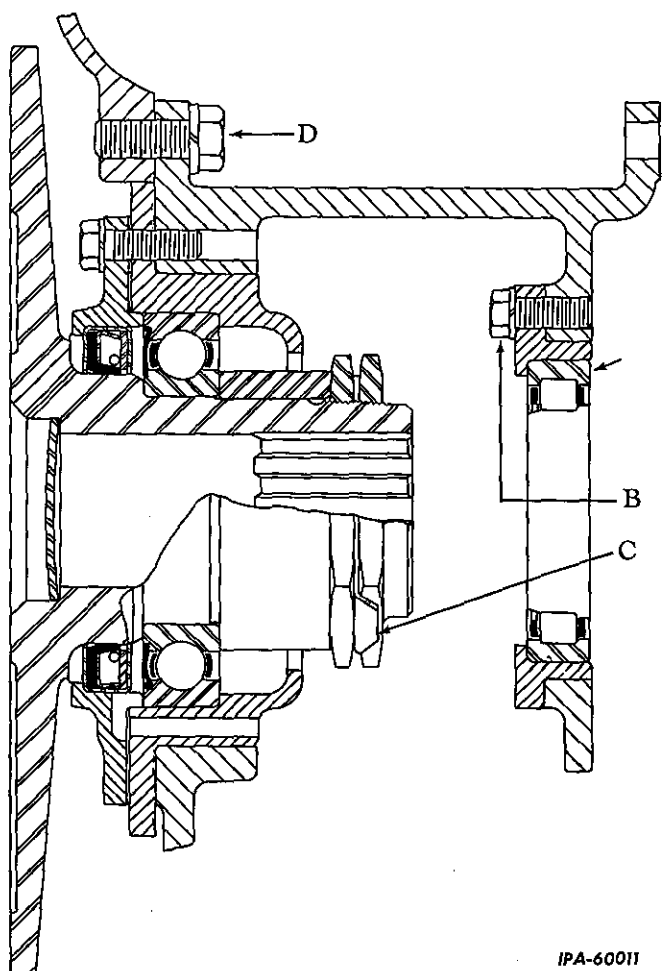
(d) Remove the nuts and cap screws securing the sprocket drive carrier (41) to the main frame. Be sure to remove the cap screws between the webs on the inside of the carrier. Use jack screws to separate the sprocket drive carrier from the main frame or pry the carrier away from main frame, as may be the case, and move the carrier and the steering clutch support bearing assembly, carefully straight off the pivot shaft to prevent binding.



Illust. 22 - Removing Sprocket Drive Carrier (Wide Tread).



SPROCKET DRIVE



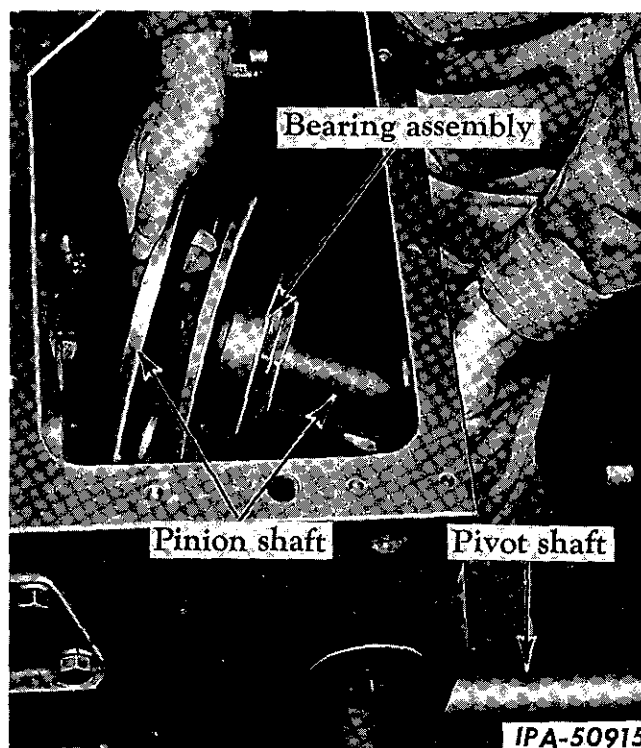
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Illust. 23 - Steering Clutch Pinion Shaft and Support Bearing Assembly Sectional View TD-6 (62) Series (Wide Tread).

7. 6, 6 (61), 9, 9 (91) AND 9 (92) SERIES: The pinion inner bearing assembly can be removed from the inside of the sprocket drive carrier by removing the cap screws that secure the bearing cage to the carrier. On the older "6" Series the pinion is removed with the inner bearing assembly through the inside of the carrier. To remove this pinion from the bearing assembly, straighten the lips of nut lock, remove the lock nut, and bearing retaining nut, then press or pull the pinion from the bearing assembly.

6 (62) SERIES: Remove and disassemble the steering clutch support bearing assembly from the sprocket drive carrier. Remove the cap

screws securing the bearing retainer and bearing cage (31 and 32) to the drive carrier (41). Remove the bearing retainer (31) with oil seal (32), and the gasket (36) from the bearing cage (37). Separate the bearing cage (37) with ball bearing (33), from the drive carrier. Remove the pinion gear inner bearing cage (39) lying loose in the bottom of the drive carrier housing.



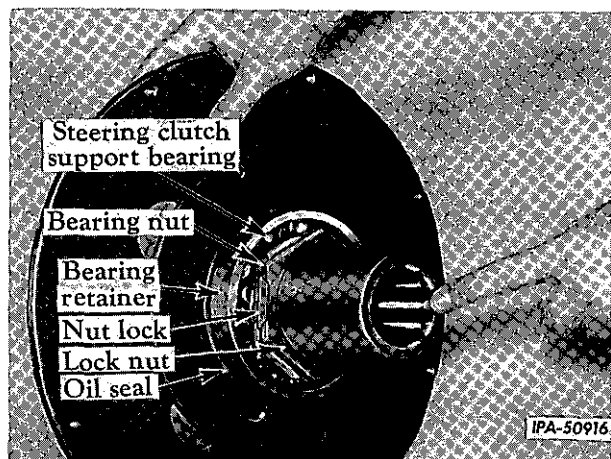
Illust. 24 - Removing Pinion Shaft and Bearing Assembly (Wide Tread).

8. Remove the pinion shaft and the steering clutch support bearing assembly through the steering clutch compartment (Illust. 24).

9. To disassemble the pinion shaft (Illust. 25) pry off the bearing cage and remove the gasket. Straighten the lips of nut lock, remove the lock nut and the bearing nut. Remove the bearing and bearing retainer with oil seal, from the pinion shaft. Pull the oil seal from bearing retainer.



SPROCKET DRIVE



Illust. 25 - Disassembling Pinion Shaft Bearing Assembly (Wide Tread).

9. INSPECTION AND REPAIR

1. Inspect the oil seal for the pinion shaft assembly (Illust. 24), and if worn, press in a new oil soaked seal so the lips will face the bearing. Replace the bearing if necessary. Reassemble the bearing assembly to the inner housing for regular tread, but onto the pinion shaft for the wide tread. Refer to Par. 10 and 11.

2. Inspect the sprocket teeth for excessive wear which will cause the sprocket to jump the track chain even with proper track tension. If the teeth are worn on one side only, the sprocket may be reversed to place the unworn side of the teeth to the track chain bushings.

3. Inspect the bearings for scores, cracks, checks, wear and looseness in their cages or supports. Replace those that are not fit for further use. Oil those that are in serviceable condition and wrap or cover them until ready for assembly.

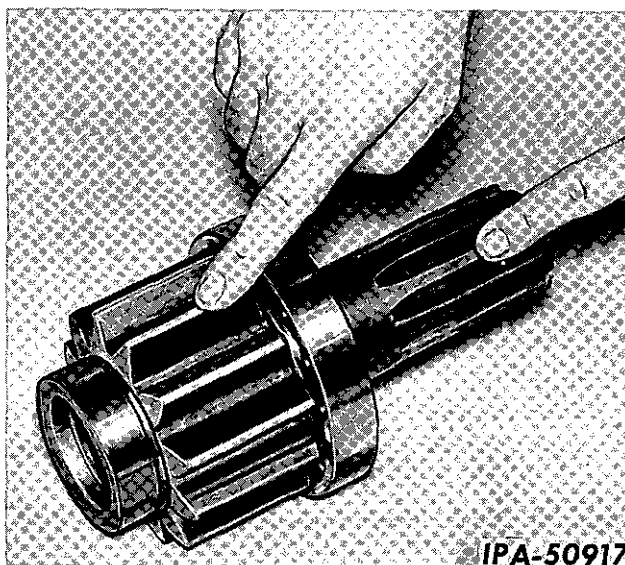
4. Inspect bearing surfaces of pivot bracket, cap, and pivot bearing for scoring, cracks, or excessive wear, also the oil seal, Illust. 7 and 8. Replace parts as necessary.

5. Inspect the sprocket drive gear and pinion gear for worn, chipped, or broken teeth or splines (Illust. 26). If one side of the teeth is worn, the pinion and gear can be installed on the opposite side of the tractor, providing the correct backlash can be maintained. Refer to Par. 2, "SPECIFICATIONS."

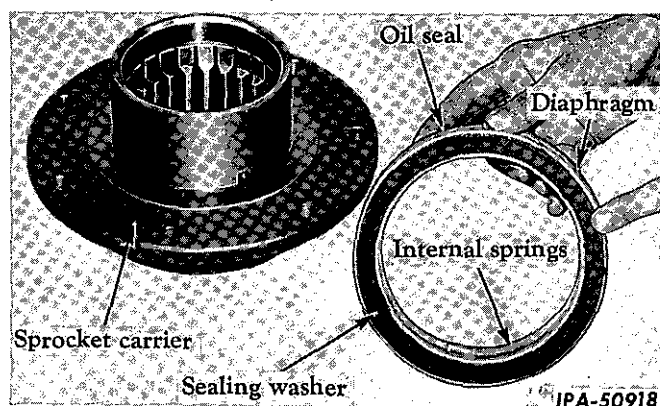
6. Inspect the sprocket carrier (Illust. 16), for worn splines. Replace all bent or damaged oil seal guards and dirt deflectors.

7. Replace all "O" rings and gaskets with new ones.

8. Inspect the track frame pivot oil seal (56 or 57, Illust. 11 or 12) and sprocket carrier oil seal (22 or 23). Both of these seals are diaphragm type (Illust. 27). The diaphragm must be free of cracks, holes or general deterioration. The sealing washer should protrude from the seal to prevent metal to metal contact with the bearing retainer. The friction or sealing



Illust. 26 - Inspecting Pinion Teeth and Splines (Wide Tread Shown).



Illust. 27 - Inspecting Diaphragm Type Oil Seals.



SPROCKET DRIVE

surface of this washer should be free of glaze and high spots for good sealing. Compress the seal to be sure that the internal springs expand it evenly to its free width and that no springs are broken. Replace the entire oil seal with a new one if examination indicates any part not fit for service.

10. REASSEMBLY AND INSTALLATION

Regular Tread

NOTE: Use all new oil seals, gaskets and oil seal rings in the reassembly. Also, on the old "6" SERIES, if the inner housing was removed, install a new "O" ring seal on the pivot shaft next to the main frame (Illust. 28), before installing the inner housing to the main frame.

1. If the pinion shaft was removed, insert the pinion shaft into position through the steering clutch compartment and install the steering clutch and brake as outlined in Section 7. Use a jack through the bottom opening in the main frame to support the weight of the clutch, also to help center the pinion shaft in the bore of main frame to facilitate the installation of the inner housing to the main frame.

2. Reassemble the parts of the pinion inner bearing in the reverse order of their disassembly, and install assembly to the inner housing. (Refer to Illust. 11, parts 2 through 7; or Illust. 12, parts 2 through 6.) Install a new oil soaked seal (4) in the bearing retainer so that the lip side of the seal faces outward toward the bearing.

NOTE: On the 6, 6(61) AND 6 (62) SERIES having roller bearings, install the outer race of the pinion inner bearing into the bearing cage so that the identification groove around the outer race will be toward the flange side of bearing cage when installed. Drive or press in the outer race until it is flush with the bearing cage surface opposite the flange.

On the older 6 SERIES, press the pinion inner bearing into the bearing cage until it is flush with the cage surface opposite the flange side.

On 9, 9 (91) AND 9 (92) SERIES, press the pinion inner bearing into the bore of inner housing until it is flush with the pinion side of the housing.

3. Install the inner housing to the main frame. See that the pinion inner bearing retainer (2) fits evenly around the shoulder of the pinion shaft. Drive the inner housing against the main frame and secure with nuts and cap screws.

4. Install the inner bearing (15) into the sprocket drive gear. 6, 6 (61) AND 6 (62) SERIES with roller bearings, install the outer race into the drive gear so that the identification groove will be TOWARD the tractor; install the inner race on the pivot shaft to butt against the inner housing.

9, 9 (91) AND 9 (92) SERIES with roller bearings, install the outer race in the sprocket drive gear so that the identification groove will be AWAY FROM the tractor; install the inner race on the pivot shaft so as to butt against the inner housing.

5. Install the sprocket drive gear onto the pivot shaft and add the bearing spacer (16) to help align the bearing with the pivot shaft during the final installation when seating against the inner housing.

6. Install the pinion onto the pinion shaft to engage the splines and to mesh the teeth with the sprocket drive gear. However, before installing the pinion on the 6, 6(61) and 6(62) SERIES, drive the inner race of the pinion inner roller bearing into position on the pinion shaft. Place the pinion on the pinion shaft, then drive the inner race of the pinion outer roller bearing onto the end of pinion shaft. The bevel edge of the inner race should face away from the pinion to receive the outer race when the outer housing is installed.

On the 9, 9(91), 9(92) and old 6 SERIES, drive in the pinion to seat the shoulder into the ball bearing previously installed in the inner housing.

7. Install the pinion outer bearing in the outer housing.

6 (61) AND 6 (62) SERIES: Drive the outer race into the bore of the outer housing. The identification groove around the outer race should be toward the bearing cap, when the race is installed.

OLDER 6 SERIES: Install the outer race into the bore of the outer housing, using the two piece ring retainers to hold it in position.

9, 9(91) AND 9(92) SERIES: Press the pinion outer ball bearing into the outer housing until it is seated in the bore.

8. Install the outer housing with a new gasket in place, by passing it over the pivot shaft and, aligning the pinion outer bearing with the pinion, drive the housing evenly to seat the pinion

Continued on next page.



SPROCKET DRIVE

10. REASSEMBLY AND INSTALLATION - Continued

Regular Tread - Continued

outer ball bearing on the shoulder of the pinion for the 9, 9 (91) AND 9 (92) SERIES. Roller type bearings should assemble easily, providing the outer housing is forced into position evenly to prevent binding. Secure the outer housing to the inner housing with nuts and cap screws.

9, 6, 6 (61) AND 6 (62) SERIES: Install the pinion outer bearing retainer nut on the pinion shaft and tighten the nut to specified torque. (Refer to Par. 2, "SPECIFICATIONS.") Use a new nut lock, run on the lock nut and tighten, then bend the lips of nut lock against both nuts. Also install the "O" ring and bearing cap.

9, 9 (91) AND 9 (92) SERIES: Install the pinion outer bearing retainer washer and secure with two lock washers and cap screws. Tighten the cap screws to specified torque. (Refer to Par. 2, "SPECIFICATIONS.") Install the "O" ring and outer bearing cap.

10. Place a new gasket on the peg side of oil seal 22 or 23, Illust. 11 or 12). Dip the surface of sealing washer in oil and install the oil seal by inserting the pegs into the holes in the outer housing. Attach the oil seal guard to the outer housing with lock washers and cap screws.

11. Install the sprocket carrier (with dirt deflector attached) to the drive gear carrier, using care when passing the sprocket carrier hub through the diaphragm type oil seal installed to the outer housing. Tap the carrier with a soft hammer to seat it properly. Add the nut lock and nut to the drive gear carrier threads, and using a special socket wrench SE-1184-1 (Illust. 15), tighten the nut to specified torque. (Refer to Par. 2, "SPECIFICATIONS.") Bend the lips of the nut lock against the nut.

12. Install the drive gear outer bearing and cage against the sprocket carrier. Be sure the "O" ring is in place around the bearing, if bearing was removed from the cage. Install the drive gear outer bearing retainer and pivot oil seal dirt deflector over the bearing cage and secure all three to the sprocket carrier with lock washers and cap screws.

NOTE: If the sprocket was removed from the sprocket carrier during disassembly, install the sprocket to the sprocket carrier before attaching the pivot oil seal dirt deflector.

13. Complete the installation of the remaining parts, from and including the pivot oil seal (56 or 57) to the sprocket shield (65 or 64, Illust. 11 or 12), as outlined under Par. 6, "SPROCKET INSTALLATION."

14. Refill the sprocket drive with the recommended grade and quantity of lubricant. (Refer to the Operator's Manual.)

11. REASSEMBLY AND INSTALLATION

Wide Tread

6, 6 (61), 9, 9 (91) AND 9 (92) SERIES: The installation procedure for the wide tread tractors is the same as that for the regular tread outlined in the preceeding Par. 10, except for the reassembly and installation of the pinion shaft, pinion, and the sprocket drive carrier, Illust. 11 or 12. To install the carrier assembly, proceed as follows:

1. Reassemble the steering clutch support bearing parts to the pinion shaft in the reverse order of their disassembly (Illust. 25). (Refer to parts 29 to 34, Illust. 11, or parts 30 to 41, Illust. 12.) Install a new oil soaked seal (32 or 33) in the bearing retainer so that the lip side of the seal faces outward toward the bearing.

Tighten the bearing nuts (34, Illust. 11 or 40, Illust. 12) to specified torque (refer to Par. 2, "SPECIFICATIONS") and bend the lips of nut lock to lock both nuts. The use of a new nut lock is recommended.

6 (62) SERIES ONLY (Illust. 11): Install the steering clutch bearing support assembly to the sprocket drive carrier. Press ball bearing (33) into bearing cage (37). Install the cage into the bore of drive so the oil passage in the cage is at the bottom when the bolt holes are aligned. Place a new gasket (36) on the bearing cage. Install the bearing retainer (31) to match the slot with the oil passage in the bearing cage, and secure the assembly to the drive carrier with the cap screws and lock washers.

2. NOT 6 (62) SERIES: Install the pinion inner bearing (38 or 45) into bearing cage (39 or 46). Pass the assembly through the larger upper bore in sprocket drive carrier for installation in the smaller opposite bore. Secure the flange of the bearing cage to the inside of the outer wall with lock washers and cap screws. See NOTE, as the procedure varies.



SPROCKET DRIVE

Page 17

NOTE: 61 AND LATER 6 SERIES with roller bearings. Install the outer race into the bearing cage to seat against the shoulder. The identification groove around the race should be toward the flange side of cage. Then install the assembly to the carrier as above.

OLDER 6 SERIES with ball bearings. Press the bearing into the bearing cage to seat against the shoulder. Then press the bearing assembly onto the splined end of pinion so bearing cage flange is toward the spline. Then install the pinion and bearing assembly as above, but use a new gasket between the bearing cage and the carrier if a gasket was removed during disassembly.

9 (91) AND 9 (92) SERIES: Press the bearing into the bearing cage to seat against the shoulder. Press the bearing assembly onto the splined end of pinion so the bearing cage flange is toward the spline. Then install the pinion and bearing assembly as above; using a new gasket between the bearing cage and the carrier if a gasket was removed during disassembly. Add bearing retainer (44, Illust. 12) and secure the retainer (44) with the bearing cage flange to the carrier as above.

6 (62) SERIES ONLY (Illust. 11): Install the sprocket drive carrier to the main frame, but first insert the bearing cage (39) only, into its bore in the inner wall to keep it in position during the installation of the sprocket drive carrier. Raise the drive carrier (41) and pass it over the pivot shaft (60), then the assembled bearing support onto the pinion shaft (29). Use the bearing cage flange OD to pilot the drive carrier into position against the main frame. Install the cap screws, nuts and lock washers and tighten evenly to draw up and secure the drive carrier to the main frame.

3. 6, 6(61), 9, 9(91) AND 9(92) SERIES (Illust. 12): Press the bearing cage (37 or 42), with gasket, into the sprocket drive carrier, be sure that the oil hole in the cage will be at the bottom and that the cap screw holes line up.

6 (62) SERIES ONLY (Illust. 11): Arrange to suspend the bearing cage (39) inside the drive carrier within reach of the opening when the

bearing cage is removed from its bore. Remove the bearing cage (39) from its bore, insert spacer (33A) through the opening and onto the pinion shaft (29). Install bearing retainer nut (34) through the opening and onto the pinion shaft, then tighten to the special torque shown in Par. 2, "SPECIFICATIONS." Install a new nut lock (35) and jam nut (34) and bend the lug to lock into position.

4. 6, 6(61) 9, 9(91) AND 9(92) SERIES: Position the sprocket drive carrier on the pivot shaft, align the cap screw holes and force the carrier against the main frame. Install the attaching bolts and nuts, tightening them evenly. Be sure to install the cap screws between the webs on the inside of the carrier.

6 (62) SERIES ONLY (Illust. 11): Raise the bearing cage (39) and pull it into its bore. Install the cap screws and lock washers to secure the bearing cage to the inner wall of the sprocket drive carrier.

5. 6, 6(61), 9, (91) AND 9(92) SERIES: Install the pinion shaft assembly through the steering clutch compartment with a new gasket (35 or 36) in position. See that the oil passage of the bearing retainer is at the bottom to line up with oil hole in bearing cage when the cap screw holes are aligned. Push the pinion shaft in to engage the splines of the pinion previously installed as outlined in step 2 for the "9" and older "6" SERIES. Drive the pinion shaft, using a soft hammer around the flange bore, to start the bearing into the bearing cage positioned in the carrier. The attaching cap screws may be used to pull the assemblies together. Refer to Illust. 24 for removal. Install and tighten the cap screws evenly through the access holes in the pinion shaft flange.

6 (62) SERIES ONLY (Illust. 11): Install roller bearing outer race (38) until it bottoms on shoulder of the bearing cage (39). The identification groove around the race should be toward the flange side of the cage.

6. 6, 6(61), 9, 9(91) AND 9(92) SERIES: Reinstall the steering clutch and brake. (Refer to Section 7.)

Continued on Next Page



SPROCKET DRIVE

11. REASSEMBLY AND INSTALLATION-Wide Tread-Continued

6 (62) SERIES ONLY (Illust. 11): Install the sprocket drive pinion (40) with bearing inner races (38 and 9) installed at each side of pinion gear. If new bearings are required the inner races should be pressed on each shoulder of the pinion gear so the bevel surface of the races face away from the gear teeth. Insert the splined shaft of the pinion gear (40) through the outer race of inner bearing (38) to engage the splines of pinion shaft (29).

7. 6, 6(61), 9, 9(91) AND 9(92) SERIES: Complete the installation of the pinion, pinion outer bearing, outer housing and sprocket assembly as outlined under "Regular Tread."

6 (62) SERIES ONLY (Illust. 11): If a new pinion gear outer bearing (9) is required, press the outer race into the bore of outer housing (10) so the identification groove around the race will be at the cap end. Install new "O" ring (12) and the bearing cap (13) to the outer housing.

The following steps 8 through 16 for 6 (62) series (Illust. 11):

8. Install drive gear (17) on the pivot shaft (60). If the inner bearing (15) was removed, install a new outer race in the gear so the identification groove around the race is toward the tractor. Press the bearing outer race into the gear hub and a new bearing race on the pivot shaft to butt against the main frame.

9. Pass the bearing spacer (16) over the pivot shaft and into the long hub of the drive gear until the spacer bottoms against the bearing in the short hub.

10. Install a new gasket (18) onto the sprocket drive carrier (41). Install the outer housing (19) on the sprocket drive carrier to align with the dowel pins. Install all cap screws, nuts and lock washers, and tighten alternately to draw the sections together evenly.

11. Place a new gasket (22) on the pin side of oil seal (23). Dip the surface of sealing washer in oil and install the oil seal by inserting the pins into the holes of the sprocket drive carrier. Attach the oil seal guard (21) to the carrier with lock washers and cap screws, if it was removed.

12. Install the sprocket carrier (47), with the dirt deflector (25) and all bolts (24) assembled, to the long hub side, to engage the splines of drive gear (17). Install the nut lock (48) and carrier nut (49) on the hub of drive gear (17). Tighten the nut to the required torque shown in Par. 2, "SPECIFICATIONS" and bend the lugs on nut lock.

13. Press ball bearing (52) into bearing cage (51) until seated against the shoulder, if it was removed. Install "O" ring (50) to the groove around the bearing cage, and "O" ring (53) into the recess in bearing cage around the edge of installed bearing (52). Pass this bearing assembly over the pivot shaft, insert the cage into sprocket carrier (47) and the bearing onto the pivot shaft shoulder as far as possible without forcing.

14. Install bearing retainer (54), recess toward the outer bearing, and dirt deflector (55) over the pivot shaft and against the bearing cage (51). Line up the bolt holes, install the lock washers and cap screws. Alternately tighten the cap screws to draw up the assembly evenly to the sprocket carrier hub (47).

15. Install the sprocket (46) onto the bolts extending through the hub of the sprocket carrier, add the external tooth washers and nuts. Tighten the hub bolt nuts to the torque shown in Par. 2, "SPECIFICATIONS."

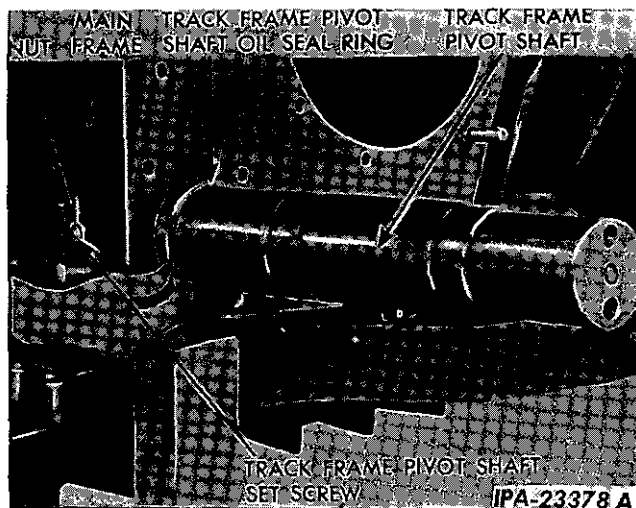
16. Complete the installation of the remaining parts as outlined under Par. 6, "SPROCKET INSTALLATION."



12. PIVOT SHAFT REPLACEMENT

The pivot shaft is pressed through the main frame and supports the sprocket drive gears and the rear end of the track frames (Illust. 28). The shaft is positioned and held from turning by set screws and lock nuts at the rear of the main frame.

If necessary to replace, the shaft must be pulled out of the main frame. This requires a complete disassembly of both sprocket drives. The pivot shaft can be removed or installed most easily with pivot shaft removing and installing set, number Y-3100-C6 for all "6" SERIES or Y-3100-D for all "9" SERIES Crawler Tractors. Refer to "SERVICE TOOLS" manual, ISS-1002 for descriptions and instructions for the use of this tool.



Illust. 28 - Pivot Shaft Replacement

C

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CONTENTS

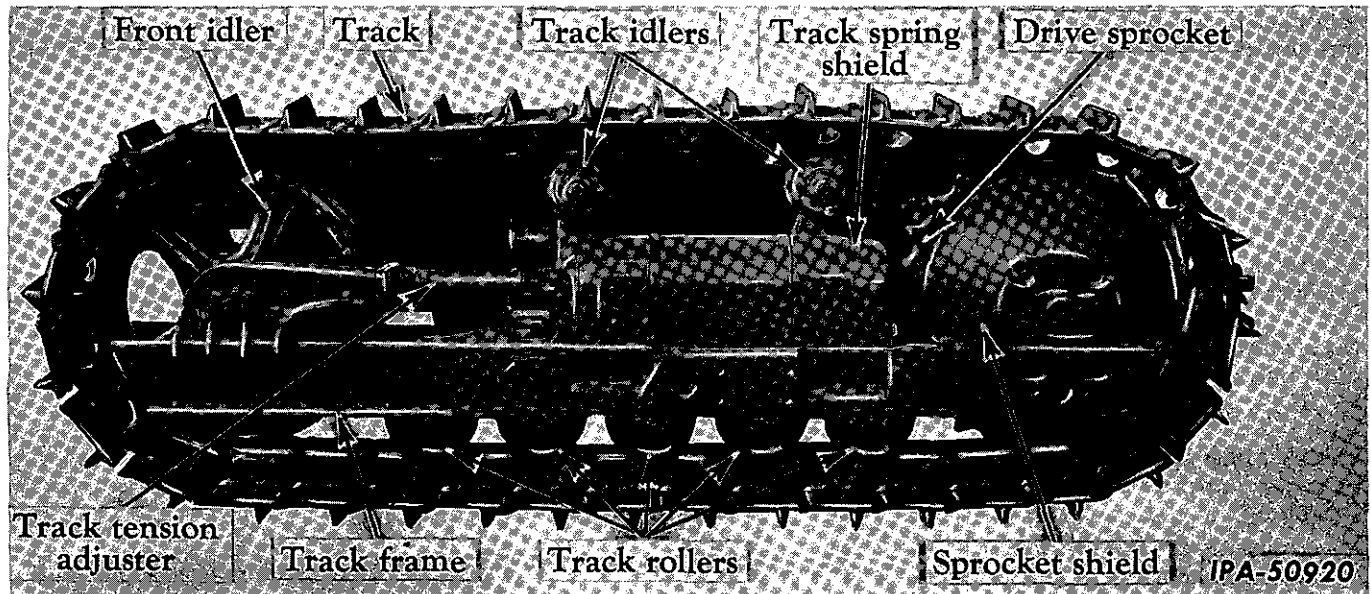
Paragraph	Page	Paragraph	Page
1. Description	1	33. Inspection and Repair	29
2. Specifications	1-3	34. Installation	29,30
3. Checking Mechanical Problems	4,5		
4. Maintenance	6		
TRACK CHAINS			
5. Description	6	35. Description	30
6. Maintenance	6,7	36. Removal	30
7. Removal	7,8	37. Disassembly	30,31
8. Track Chain Repair	8-10	38. Inspection and Repair	31
9. Reconditioning Track Shoe Grousers by Manual Arc Welding	10	39. Reassembly	31
10. Installation	10-12	40. Installation	31
FRONT IDLERS			
11. Description	13		
12. Maintenance	13		
13. Removal	13,14		
14. Disassembly: 6 and 9 Series w/lip type seal	14		
6 (61), 6 (62) Series w/lip type seal, and 9 (91), 9 (92) Series w/Serial No. 4830 and below	14,15		
15. Inspection and Repair	16		
16. Reassembly	16-18		
17. Installation	19		
TRACK IDLERS			
18. Description	18		
19. Removal and Disassembly	19,20		
20. Inspection and Repair	20		
21. Reassembly and Installation	20		
TRACK ROLLERS			
22. Description	21		
23. Maintenance	21		
24. Removal	21,22		
25. Disassembly	22,23		
26. Inspection and Repair	23		
27. Replacement of Oil Seal Face	23,24		
28. Reassembly	24,25		
29. Installation of Oil Seals (Face Type and Rotary)	25-28		
30. Installation	28		
TRACK SPRINGS AND RETAINERS			
31. Description	29		
32. Removal	29		
EQUALIZER SPRING ASSEMBLY			
35. Description	30		
36. Removal	30		
37. Disassembly	30,31		
38. Inspection and Repair	31		
39. Reassembly	31		
40. Installation	31		
RIGID CROSSBAR			
41. Description	32		
42. Removal	32		
43. Installation	32,33		
TRACK FRAMES			
44. Description	33		
45. Maintenance	33		
46. Removal	34		
47. Inspection and Repair	34		
48. Installation	34,35		
TRACK FRAME ALIGNMENT			
49. Description	35,36		
50. Preparation for Alignment Check	36,37		
51. Vertical Alignment	37,38		
52. Alignment of Sprocket between Track Roller Flanges	38		
53. Toe-in or Toe-out	39		
54. Front Idler Alignment	39,40		
TRACK FRAME DIAGONAL BRACE			
55. Description	40		
56. Removal	40,41		
57. Inspection and Repair	41		
58. Installation	41,42		
TRACK FRAME GUIDES			
59. Description	42		
60. Maintenance	42		
61. Removal	42		
62. Disassembly	42		
63. Inspection and Repair	42		
64. Reassembly	42		
65. Installation	42		



**1. DESCRIPTION**

The front idler, track idlers and track rollers are attached to heavy welded steel channel track frames. Each track is free to oscillate vertically independent of the other track. The tracks pivot from ball-and-socket joints on the ends of the pivot shaft; this feature prevents leverage strains on the pivot shaft due to any slight lateral movement of the track frame.

An equalizer spring, which carries the front end weight of the tractor, makes contact with the track frame; and roller type stabilizers maintain track spacing (the rollers are attached to the main frame side channels and the guides are attached to the top of the track frames). Heavy steel diagonal braces, bearing-mounted at the center of the pivot shaft, keep the track frame in an upright position, but allow vertical oscillation.



Illust. 1 - Tracks and Track Frame Assembly (TD-9(91) Shown).

2. SPECIFICATIONS

	T-6 and TD-6	T-6 (61), TD-6 (61) and TD-6 (62)	T-9 and TD-9	TD-9 (91) TD-9 (92)
Track link pin diameter (straight bore chain)-inches.	1.246-1.250	-----	1.371-1.375	-----
Track link pin diameter (counterbored interlocking chain) - inches	1.246-1.250	1.246-1.250	1.371-1.375	1.371-1.375
Track link bushing (straight bore chain)				
OD - inches	1.7995-1.8035	-----	2.049-2.053	-----
ID - inches	1.255-1.264		1.380-1.390	
Track link bushing (counterbored interlocking chain)				
OD - inches	1.7995-1.8035	1.7995-1.8035	2.049-2.053	2.049-2.053
ID - inches	1.255-1.264	1.255-1.264	1.380-1.390	1.380-1.390

continued on next page



2. SPECIFICATIONS - Continued

	T-6 and TD-6	T-6 (61), TD-6 (61) and TD-6 (62)	T-9 and TD-9	TD-9 (91) TD-9 (92)
Master link pin diameter (straight bore chain) - inches	1.2345-1.2360	-----	1.3595-1.3610	-----
Master link pin diameter (counterbored interlock- ing chain) - inches	1.2345-1.2360	1.2345-1.2360	1.3595-1.3610	1.3595-1.3610
Master link bushing (counterbored interlock- ing chain)				
OD - inches	1.7995-1.8035	1.7995-1.8035	2.049-2.053	2.049-2.053
ID - inches	1.255-1.264	1.255-1.264	1.380-1.390	1.380-1.390
Maximum permissible track pin wear - inches	3/32 ** 1/16 ***	3/32 ** 1/16 ***	3/32 ** 1/16 ***	3/32 ** 1/16 ***
Maximum permissible track pin bushing wear				
ID - inches	3/32 ** 1/16 ***	3/32 ** 1/16 ***	3/32 ** 1/16 ***	3/32 ** 1/16 ***
Track pitch length (distance between centers of pins) - inches	6	6	6-1/2	6-1/2
Maximum permissible pitch length - inches	6-3/16 ** 6-1/8 *** 75 - 85	6-3/16 ** 6-1/8 *** 75 - 85	6-11/16 ** 6-5/8 *** 115 - 130	6-11/16 ** 6-5/8 *** 115 - 130
⊗ Track shoe bolt torque (ft.lbs.)				
Front idler shaft diameter - inches				
Old type	2.499-2.500	-----	2.624-2.625	-----
New type	2.624-2.625	2.624-2.625	3.124-3.125	3.124-3.125
Front idler bore diameter - inches				
Old type	2.665-2.667	-----	2.790-2.792	-----
New type	2.790-2.792	2.790-2.792	3.290-3.292	3.290-3.292
Front idler bushing *ID - inches				
Old type	2.501-2.503	-----	2.626-2.628	-----
New type	2.626-2.628	2.626-2.628	3.126-3.128	3.126-3.128
Front idler diametral clearance - inches				
Old type . . . . .	.001-.004	-----	.001-.004	-----
New type . . . . .	.001-.004	.001-.004	.001-.004	.001-.004
Front idler thrust washer thickness - inches				
Old type . . . . .	.083-.087	-----	.083-.087	-----
New type . . . . .	.083-.087	.083-.087	.083-.087	.083-.087

* Reamed size after assembly in bore.

⊗ Threads lubricated with engine oil or chassis grease.

** When operating in average material.

*** When operating in rock.

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2. SPECIFICATIONS - Continued

	T-6 and TD-6	T-6 (61), TD-6 (61) and TD-6 (62)	T-9 and TD-9	TD-9 (91) TD-9 (92)
**Front idler rolling				
diameter - inches				
Regular - old type	19-7/8	-----	23-1/2	-----
new type	20-3/8	-----	24	-----
Large - old type.	20-3/4	-----	24-1/2	-----
new type.	21-5/8	21-5/8	25-3/8	25-3/8
Front idler roller bearing preload, foot-pounds	-----	-----	-----	5 --8 (9 (92)*
Track idler shaft diameter - inches	1.730-1.732	1.730-1.732	1.730-1.732	1.730-1.732
Track idler bore diameter - inches	1.740-1.742	1.740-1.742	1.740-1.742	1.740-1.742
Track idler thrust washer thickness - inches . . . . .	.230 - .240	.230 -.240	.230-.240	.230-.240
Track roller shaft diameter - inches	2.495-2.497	2.495-2.497	2.620-2.622	2.620-2.622
Track roller bore diameter - inches	2.665-2.667	2.665-2.667	2.790-2.792	2.790-2.792
Track roller bushings inside diameter (assembled) - inches	2.500-2.504	2.500-2.504	2.625-2.629	2.625-2.629
Track roller end clearance - inches	.016-.048	.016-.048	.012-.044	.012-.044
Track roller thrust washer thickness (Standard) inches	.083-.085	.083-.085	.083-.085	.083-.085
(Oversize) inches	.100-.105	.100-.105	.100-.105	.100-.105
**Track roller rolling				
diameter - inches.	6-7/8	6-7/8	7-3/8	7-3/8
Track roller diametral clearance - inches . . . . .	.003-.009	.003-.009	.003-.009	.003-.009
***Track springs				
Free length - inches . . .	17-15/16 to 18-7/16	-----	24-13/16 to 25-5/16	-----
Test length - inches . . .	16	-----	22-3/8	-----
Test load - pounds (per spring).	4024-4918	-----	6525-7975	-----
****Track springs				
Free length - inches . . .	18-19/32 to 19-15/32	18-19/32 to 19-15/32	24-51/64 to 25-43/64	24-51/64 to 25-43/64
Test length - inches . . .	16	16	22-3/8	22-3/8
Test load - pounds (per spring).	6030-7370	6030-7370	7371-9009	7371-9009
© Drawbar guide nut foot-pounds	-----	-----	180-220	180-220

*Serial No. 4831 and up.

**Rolling diameter is diameter at point of contact with track chain.

***6 Series TDBK-501 to 38390; 9 Series TDCB-501 to 58052.

****6 Series TDBK-38391 and up; 9 Series TDCB-58053 and up.

© Threads lubricated with SAE-30 engine oil.



3. CHECKING MECHANICAL PROBLEMS

PROBABLE CAUSE

REMEDY

TRACTOR CREEPS TO ONE SIDE

- | | |
|---|---|
| 1. Steering brake drags. | Refer to "STEERING CLUTCHES AND BRAKES,"
Section 7. |
| 2. Steering clutch slipping. | Refer to "STEERING CLUTCHES AND BRAKES,"
Section 7. |
| 3. Track chain loose on one side. | Adjust track chain tension (refer to Par. 6,
"MAINTENANCE.") |
| 4. Track spring broken or adjusting rod
misaligned | Remove track spring assembly and check
alignment. Replace parts as necessary.
Check the spring specifications against
those given in Par. 2. |
| 5. Track frame misaligned | Refer to "TRACK FRAME MISALIGNED." |

TRACK SHOES LOOSE

- | | |
|--|---|
| 1. Insufficient torque on shoe bolts | Apply torque as specified in Par. 2, "SPECI-
FICATIONS." |
|--|---|

TRACK CHAIN LOOSE

- | | |
|--|---|
| 1. Track tension incorrect. | Adjust tension. (Refer to Par. 6, "MAINTEN-
ANCE.") |
| 2. Sprocket worn | Inspect sprocket teeth for wear. Reverse or
replace as necessary. (Refer to "SPROCKET
AND SPROCKET DRIVE," Section 8.) |
| 3. Track springs broken | From underneath tractor, inspect track springs
for breakage. If none apparent, remove
spring and check its free length and test
length for evidence of weakness. (Refer to
Par. 2, "SPECIFICATIONS.") |
| 4. Track links or bushings worn or broken. | Inspect track links and bushings for wear or
damage. Replace sections of the track
chain as necessary. |

TRACK CHAIN COMES OFF DURING OPERATION

- | | |
|--|--|
| 1. Rocks interfering with assembly function | Clean all rocks and packed dirt from the
chains, sprockets and idlers. |
| 2. Track chain loose. | Adjust track chain tension. (Refer to Par. 6,
"MAINTENANCE.") |
| 3. Front idler misaligned through structural
shock. | Correct misalignment if possible as outlined
in Par. 52, otherwise replace parts. |
| 4. Front idler misaligned due to excessive
wear or distortion of front idler guides | Adjust for wear or replace guides. |
| 5. Front idler worn | Inspect front idler for free rotation and wear.
Replace idler if necessary. |
| 6. Track frame misaligned | Refer to "TRACK FRAME MISALIGNED." |
| 7. Worn sprocket teeth | Reverse or replace sprockets. (Refer to
"SPROCKET AND SPROCKET DRIVE,"
Section 8.) |

TRACK ROLLERS DO NOT TURN

- | | |
|---------------------------------------|--|
| 1. Insufficient lubrication | Lubricate as frequently as directed in the
operator's manual. |
|---------------------------------------|--|



PROBABLE CAUSE

REMEDY

TRACK ROLLERS DO NOT TURN - Continued

- | | |
|--|--|
| 2. Bushings or bearings seized | Remove faulty roller and replace bushing or bearing. Lubricate thoroughly as directed. |
| 3. Packed dirt between roller and track frame. | Remove the packed dirt. |

TRACK IDLERS DO NOT TURN

- | | |
|--|--|
| 1. Insufficient lubrication | Lubricate as directed in the operator's manual. |
| 2. Dirt packed tight against idler | Remove packed dirt. |
| 3. Internal seizure on shaft | Remove the idler and inspect parts. Thoroughly clean and replace parts if necessary. |

FRONT IDLER DOES NOT TURN

- | | |
|--|---|
| 1. Insufficient lubrication | Lubricate as directed in the operator's manual. |
| 2. Dirt packed around idler | Remove dirt. |
| 3. Bushing or bearing seized | Remove the front idler and replace part if necessary. |

LUBRICANT LEAKAGE

- | | |
|---|---|
| 1. Failure of sealing through wear on seals and gaskets | Remove parts affected and replace seals and gaskets with new. |
|---|---|

EXCESSIVE TRACK WEAR

- | | |
|---------------------------------------|--|
| 1. Track rollers do not turn. | Refer to "TRACK ROLLERS DO NOT TURN." |
| 2. Track idlers do not turn | Refer to "TRACK IDLERS DO NOT TURN." |
| 3. Front idler does not turn. | Refer to "FRONT IDLER DOES NOT TURN." |
| 4. Improper track tension | Adjust track tension. (Refer to Par. 6, "MAINTENANCE.") |
| 5. Front idler misaligned | Refer to 3 and 4 under "TRACK CHAIN COMES OFF DURING OPERATION." |
| 6. Damaged sprocket | Replace as necessary. |
| 7. Track frame misaligned | Refer to "TRACK FRAME MISALIGNED." |

EXCESSIVE OR UNEVEN WEAR OF TRACK ROLLERS,
TRACK IDLERS, FRONT IDLER AND SPROCKET

- | | |
|--------------------------------------|--|
| 1. Track tension incorrect | Adjust track chain tension. (Refer to Par. 6, "MAINTENANCE.") |
| 2. Front idler misaligned | Refer to 3 and 4 under "TRACK CHAIN COMES OFF DURING OPERATION." |
| 3. Track frame misaligned | Refer to "TRACK FRAME MISALIGNED." |

TRACK FRAME MISALIGNED

- | | |
|---|--|
| 1. Bent diagonal brace, track frame guide, or track frame | Correct misalignment if possible by straightening parts or by shimming as outlined in "TRACK FRAME ALIGNMENT;" otherwise replaced parts. |
|---|--|

FRONT END OF TRACTOR TOO LOW

- | | |
|--|--|
| 1. Broken equalizer spring leafs. | Dismantle spring and replace broken leafs. |
| 2. Excessively fatigued or set equalizer spring assembly | Replace. |



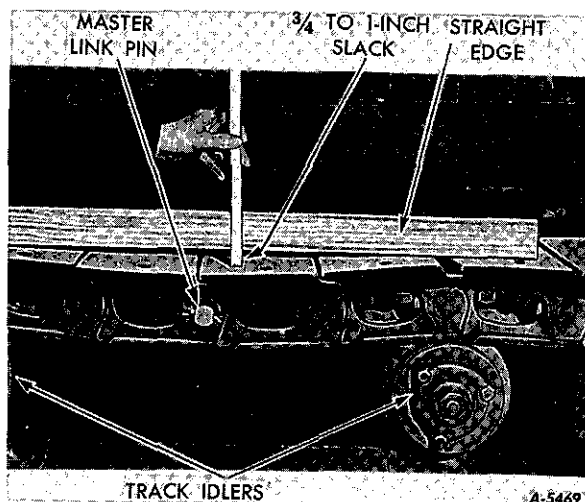
4. MAINTENANCE

1. **LUBRICATION.** The various units of the track frame assembly must be lubricated at the regular intervals and with the correct grade of lubricant as shown in the lubrication chart of the operator's manual.

2. **TRACKS.** Inspect the tension of the track chain, and tighten if necessary. (Refer to Par. 6, "MAINTENANCE.") On a new or rebuilt track chain, after every eight hours of operation, inspect the track shoe bolts and tighten if necessary to maintain the proper torque as specified in Par. 2, "SPECIFICATIONS." After several such tightenings, the bolts will take a "set" and remain tight.

3. Inspect the front idler, track idlers, and track rollers for wear, and replace if necessary. The track must be removed and the side

of the track lifted up to inspect these parts properly.



Illust. 2 - Checking Slack in Track Chain.

TRACK CHAINS

5. DESCRIPTION

The track chains consist of drop-forged, heat-treated, steel links which are held together by bushings and pins to form a continuous chain. The bushings and pins are a pressed fit in the links, with the pins pivoting inside the bushings. The left and right track chains are interchangeable. These track chains are easily removed, and each chain has a master pin identified by a lock wire (Illust. 4). The old type straight chain has one master link and a master pin. The new type interlocking chain (Illust. 7) has both left and right master links plus a master link pin and a master link bushing. The track shoes are attached to the track links by cap screws and nuts. Keys on the track shoes fit into milled slots on the links, thus assuring a secure fastening.

6. MAINTENANCE

The track links have only one wearing surface which contacts the track rollers, front idler and track idler. However, it usually becomes necessary to replace pins and bushings before the links wear out and it is a matter of judgment then, whether the links are good enough to justify a new set of pins and bushings. Only the wear on the outside of the bushings is visible. Wear on the pins and interior of the

bushings is indicated by track "stretch", (forward adjustment of the front idler).

The amount of wear can be determined by measuring the pitch length of the track (distance between centers of pins) under tension and comparing it with the new and maximum allowable pitch lengths listed in Par. 2, "SPECIFICATIONS."

Contributing wear of the sprocket must also be considered in conjunction with track chain wear. Wear of the sprocket teeth decreases the pitch length of the sprocket, while wear of pins and bushings increases the pitch length of the track. The result is that the pitch lengths of the sprocket and track become more and more out of phase, and the bushings ride higher on the sprocket teeth, with eventual spinning of the sprocket. Combined wear of sprocket and track should never be allowed to reach this point as spinning of the sprocket may cause serious breakage.

Whenever track chains are rebuilt, or new ones installed, the sprockets should also be replaced or interchanged to present the better side of the teeth to the bushings. Never should one link be removed to bring a "stretched" track again within range of the adjusting screw. A track worn badly enough to take up the length of one link, will be so far out of pitch that the increased wear on the sprocket will far more



TRACK CHAINS

than off set the saving obtained by the small addition to the life of the track chain.

1. **CHECKING TRACK TENSION.** This can be accomplished by placing a wooden block, approximately one foot in height, under the foremost track shoe lug. Drive the tractor forward until the track just starts to climb the block; then apply and lock the steering brakes, and stop the engine. With floor jacks placed under the front and rear of the track chain, all the slack in the track chain can be forced up until it is midway between the two track idlers. Place a long straightedge on top of the track shoes so that each end of the straightedge rests on the track over the track idlers. With a ruler, measure the clearance between the bottom of the straightedge and the top of the track shoe cleat nearest to the midway point between the two track idlers (Illust. 2). This clearance should be $3/4$ to 1 inch. On tractors equipped with only one track idler, the sag between the track idler and front idler should be $1-1/4$ - $1-1/2$ inch. If the clearance is more or less than this measurement, the track tension should be adjusted.

2. **Adjusting Track Tension**
(6 and 9 Series)

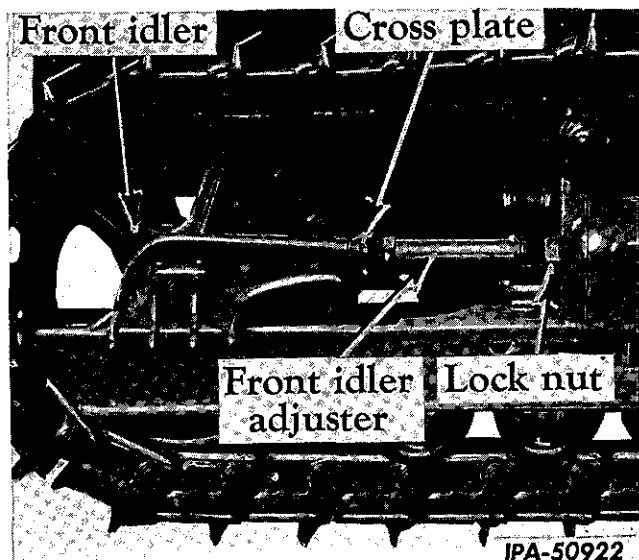
- a. Remove the two cap screws and lock washers which secure the front end of the front idler adjuster to the front idler guide cross plate. Also loosen the locking cap screw, nut and lock washer which clamps the front idler adjuster in the front track spring retainer.

6(61), 6(62), 9(91) and 9(92) Series (See Illust. 3)

Remove the two cap screws at the front of the track spring adjuster. Loosen the jam nut and run it forward on the adjuster.

- b. **ALL UNITS:** With an adjustable wrench, or an openhead wrench applied to the hexagonal surface of the front idler adjuster clockwise as viewed from the rear of the tractor. This pushes the front idler forward, tightening the track chain tension at the same time. Turning the adjuster counterclockwise will loosen the track chain tension.
- c. **6 AND 9 SERIES:** After correct adjustment has been obtained, replace the cap screws and lock washers which secure the adjuster to the front idler cross plate, tighten the locking cap screw nut at the front track spring retainer.

6 (61), 6 (62), 9 (91) and 9 (92) SERIES: After the correct adjustment has been obtained, install the cap screws in the idler adjuster and tighten the lock nut.

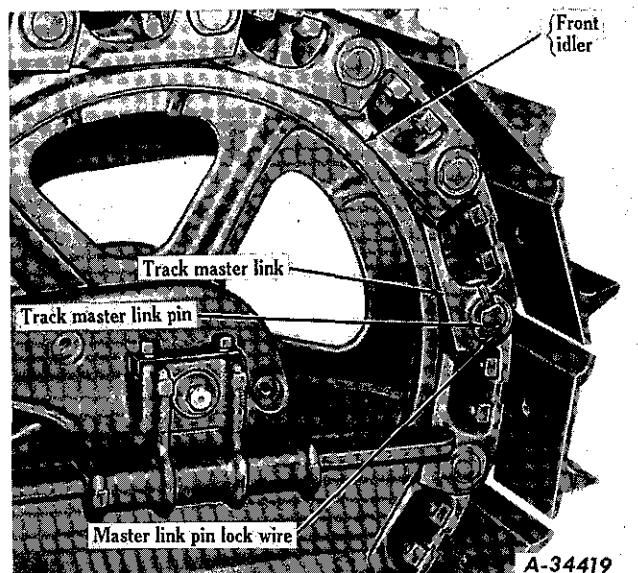


Illust. 3 - Track Chain Tension Adjustment.

7. **REMOVAL**

1. Drive the tractor forward on level ground until the master link pin (identified by a lock wire) is in front of the front idler (Illust. 4).

continued on next page



Illust. 4 - Locating the Master Link Pin.



TRACK CHAINS

7. REMOVAL - Continued

2. Loosen the track tension as previously described (Par. 6 (2)) by turning the adjuster counterclockwise.

3. Take out the lock wire from the master link pin. Using a heavy punch bar and sledge, drive out the master link pin as shown in Illust. 5.

4. Back the tractor until it is at the end of the track chain. Put a plank flush against the rear of the track when the track chain is flat on the ground. Back the tractor off the track chain and onto the plank as shown in Illust. 6. The plank should be approximately the same thickness as the track chain and yet narrow enough to fit between the track roller shields, and long enough for the entire tractor to rest upon it.

NOTE: If the old track chain is to be removed and replaced with a complete new chain, remove the old chain as described above and place the new chain on the ground ahead of the tractor, with the open link end flush with and against the front of the old chain.

8. TRACK CHAIN REPAIR

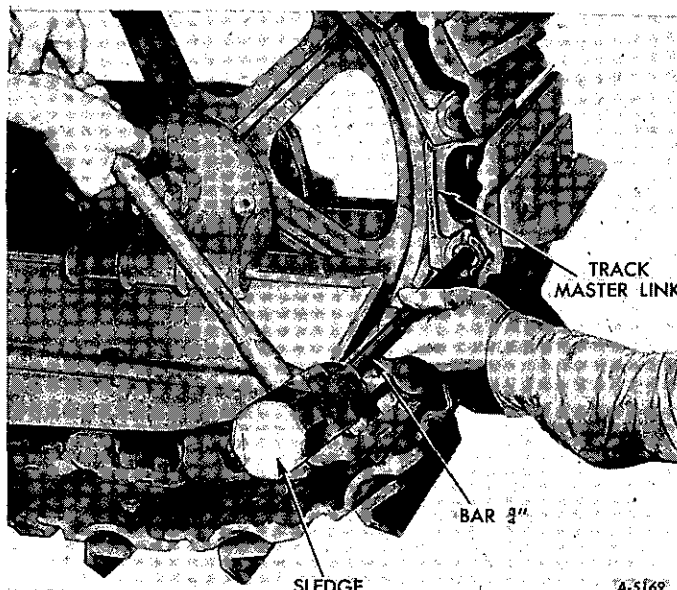
To repair or replace worn track pins, bushings or links, a hydraulic track press will be necessary. The operation and procedure instructions for each track press will vary, so that specific disassembly instructions will be found with the manufacturers operational instructions. For further information regarding the hydraulic track press, refer to "SERVICE TOOL" manual, ISS-1002.

Interlocking Type Chain

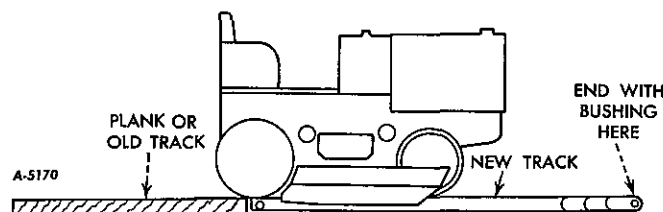
1. To replace a damaged section of track, remove the track shoes, and cut out the damaged section with a cutting torch. Remove the end links as outlined in the following step:

Rebuild the section onto the track by pressing individual standard links, link pins and bushings with a hydraulic track press. When joining track sections together, master links, master link bushings, and a master link pin can be used in the coupling link; or, the section can be joined as outlined in step 2.

CAUTION: When assembling the track chain, maintain .010 to .045 inch clearance between track links.



Illust. 5 - Removing the Master Link Pin.



Illust. 6 - Driving the Tractor onto the Track Chain.

2. To replace an individual link that is damaged, remove the track from the tractor. After the track is free and extended flat, remove three or four of the track shoes adjacent to the damaged part.

Cut the pins and bushings of the damaged link with a torch. The cuts should be made as close to the inside faces of the inner links as possible (Illust. 8) to provide sufficient clearance between the links for the removal of the remaining pin and bushing sections.

CAUTION: Be careful not to damage the inner faces of the links when cutting the bushings and pins.

The pieces of the pins and bushings remaining in the links must now be securely welded together at the cuts. See Illust. 8. It is important that the welds be strong enough to



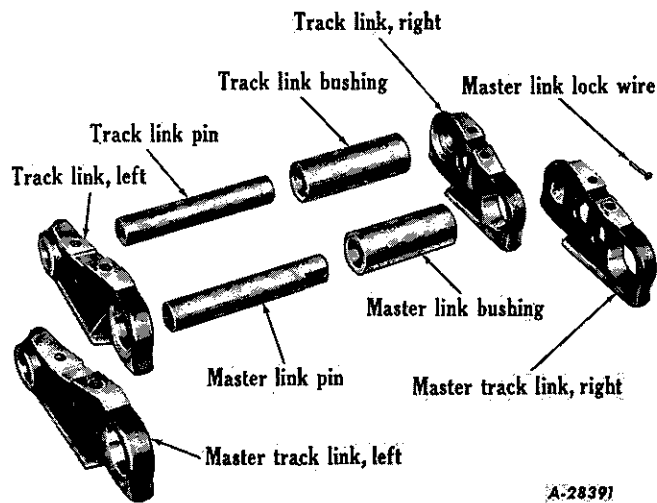
TRACK CHAINS

carry the bushing out with the pin. Press each of the pin and bushing assemblies (welded) out of the links.

An aligning pin can be made from a track pin which has been ground down to a slightly smaller diameter than the regular pin. It is

used to align the two ends of the track links prior to inserting the new pin.

Remove and replace the damaged link or links. Assemble the two loose, right and left, track links using a master bushing. (Illust. 9.) Assemble a master bushing also into the links attached to the track. (Illust. 9.) Place the master bushing spacers into the counterbore of the links. (Illust. 9.) Place the bushing and links assembly onto the track and insert the aligning pin to hold the track link alignment while the new pin is pressed into position (see Illust. 12). Use the aligning pin again when joining the two ends of the track.

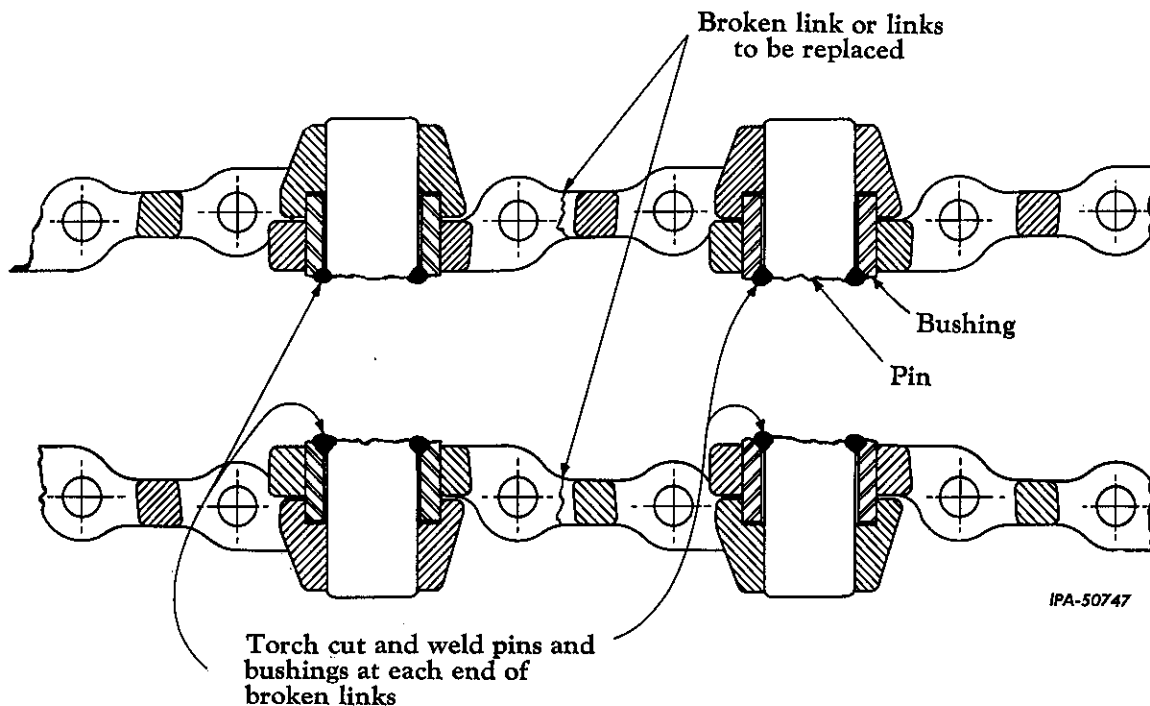


Illust. 7 - Exploded View at the Track Link Assembly on Interlocking Type Chain.

Rotating the Track Pins and Bushings

As internal and external wear on track pins and bushings develop, the tracks actually get longer and the separation between the parting edges of the links become greater. This gradual wear, in time, produces excessive stretch idler in the track assembly and requires that the idler be adjusted forward to maintain the proper track tension. Improperly adjusted tracks, either too tight or too loose, affect the rates of wear on all track parts, such as pins, bushings, links, etc.

continued on next page



Illust. 8 - Removal of Damaged Links.



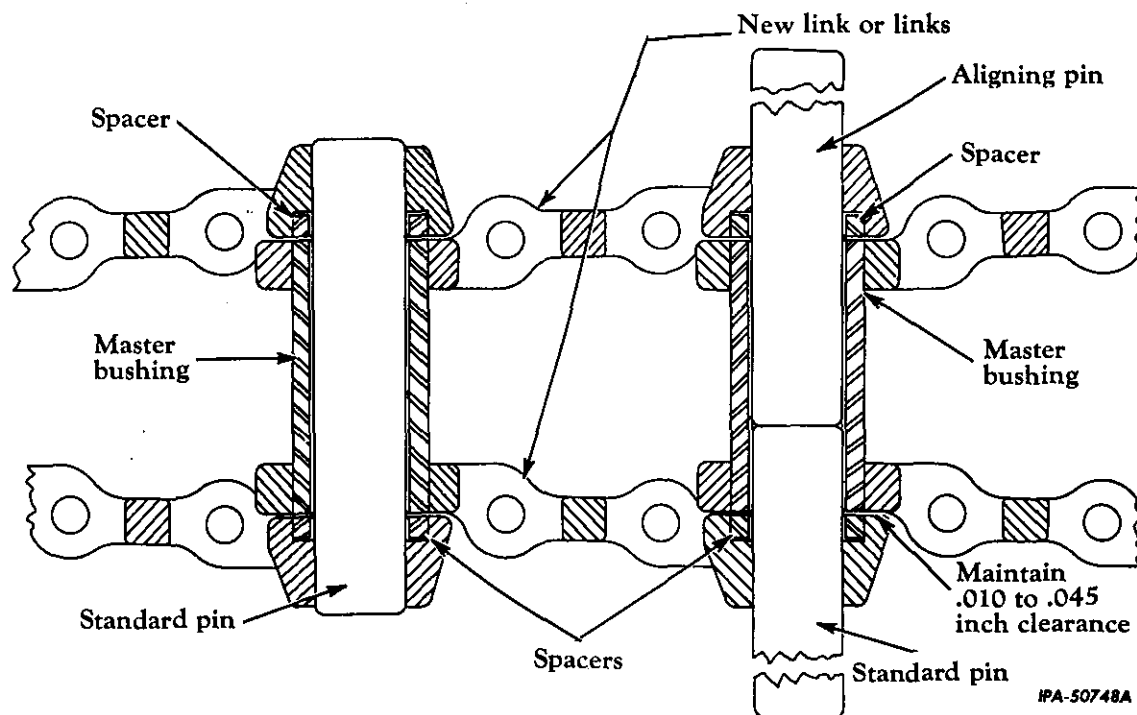
8. TRACK CHAIN REPAIR - Continued

Rotating the Track Pins and Bushings - Continued

Since wear occurs on one side of the link pins and bushing (Illust. 9), the track pins and bushings can be reversed to obtain additional service from the track. To do this, remove the row of bolts from the track on the adapter side. Leave all bolts intact on the ram side, but

10. INSTALLATION

1. Place the track in position against the plank. The end with the bushing should be in the same position as that shown in Illust. 6. If the track is installed reversed from this position, severe wear of the sprocket teeth and track link bushings will result.



Illust. 9 - Assembly of New Links.

check the bolts for looseness. Press out all the track pins and bushings. Turn the bushings 180 degrees (1/2 turn), and then reinstall them. By doing this, the unworn surface of each pin is operating against the unworn surface in its bushing and the unworn outside surface of the bushing which contacts the sprocket. Install all track shoe bolts and nuts, tightening them to the torque specified in Par. 2, "SPECIFICATIONS."

9. RECONDITIONING TRACK SHOE GROUSERS BY MANUAL ARC WELDING

When the wear of track shoe grousers reaches a point called the "Permissible Wear Limit," it should then be decided whether a set of new shoes is to be installed, or whether the old ones are in good enough condition to be rebuilt by welding a mill-rolled, specially shaped grouser bar to the worn grousers.

2. Drive the tractor forward on the track until the sprocket is slightly ahead of the rear end of the track.

3. Place a crowbar through the master link bushing hole. Pull the track up around the sprocket and forward over the track idlers and the front idler as the tractor is driven forward (Illust. 11).

4. Position a block (8 to 10 inches high) under the cleat of the shoe on the last link of the track (Illust. 12). This will hold the track against the front idler.

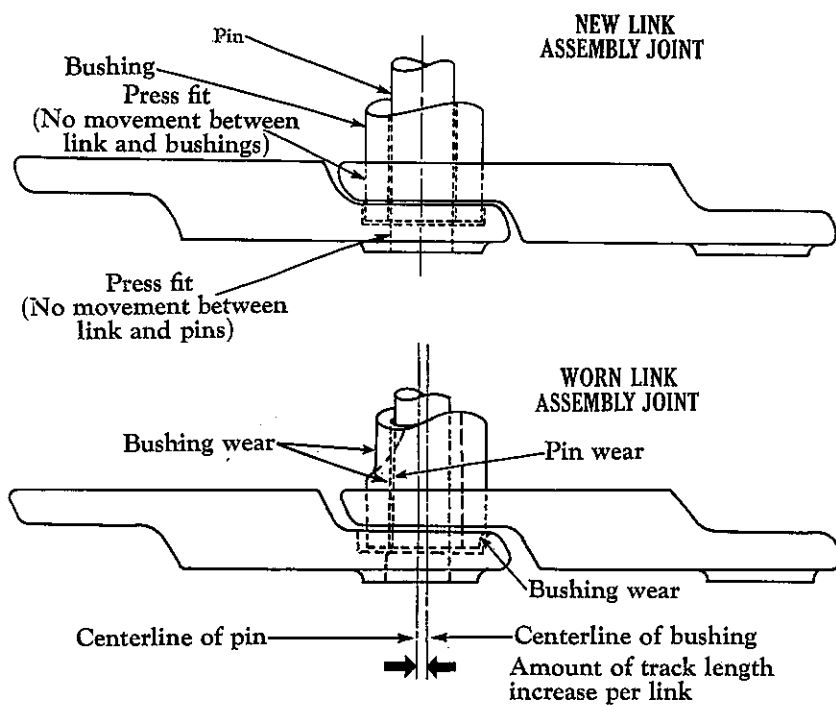
5. Engage the engine clutch and apply just enough power in the forward speed to take the slack out of the bottom part of the track. Then install the master pin into place, and secure it with a lock wire (Illust. 12).



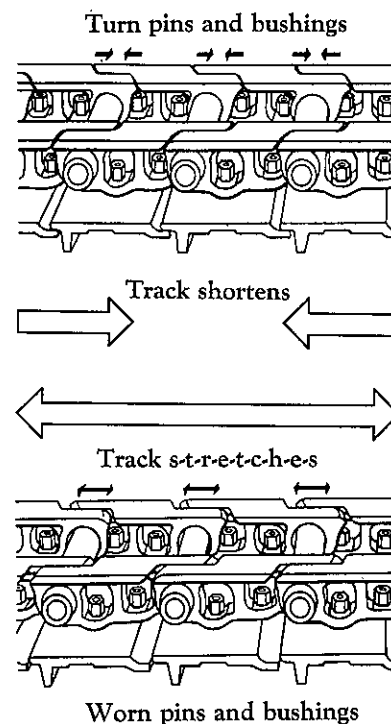
TRACK CHAINS

6. Install the track roller rock shield into position at the base of the track frame, and secure with cap screws and lock washers.

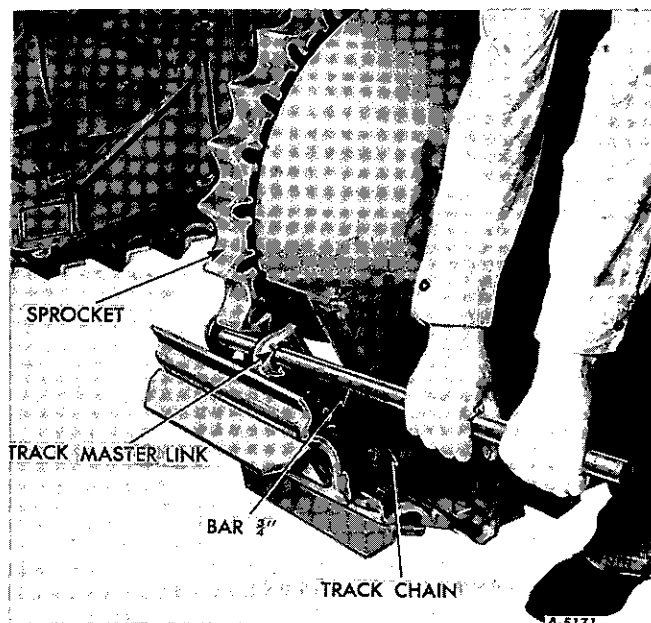
7. Adjust the track chain tension. (Refer to Par. 6.)



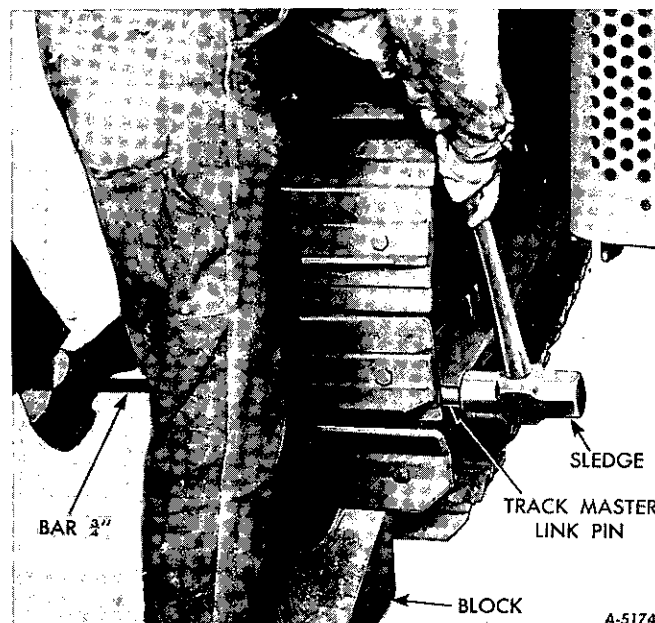
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Illust. 10 - Showing Effects of Track Pin and Bushing Wear.



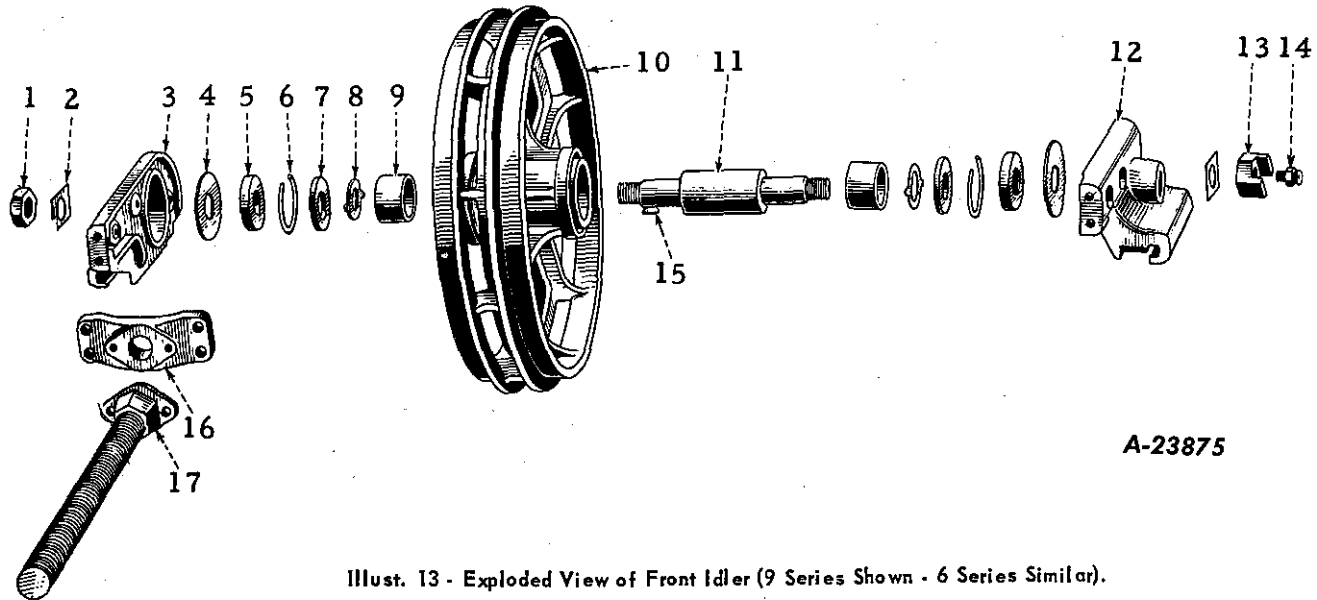
Illust. 11 - Lifting the Track Chain onto the Sprocket.



Illust. 12 - Installing the Master Link Pin.



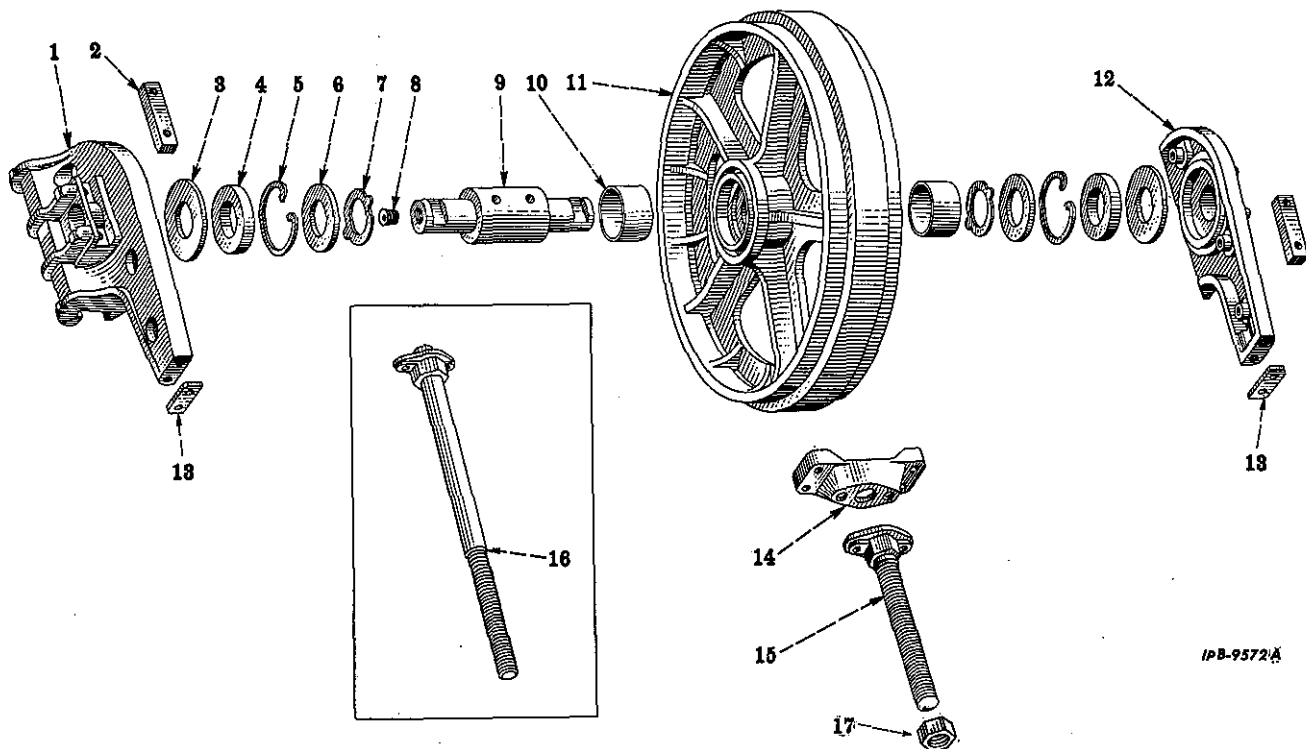
FRONT IDLERS



A-23875

Illustr. 13 - Exploded View of Front Idler (9 Series Shown - 6 Series Similar).

- | | | | |
|-----------------|-------------------|------------------|--------------------------|
| 1. Inner nut. | 6. Snap ring. | 10. Front idler. | 14. Lubrication fitting. |
| 2. Nut lock. | 7. Retainer. | 11. Shaft. | 15. Key. |
| 3. Inner guide. | 8. Thrust washer. | 12. Outer guide. | 16. Cross plate. |
| 4. Felt washer. | 9. Bushing | 13. Outer nut. | 17. Adjuster. |
| 5. Oil seal. | | | |

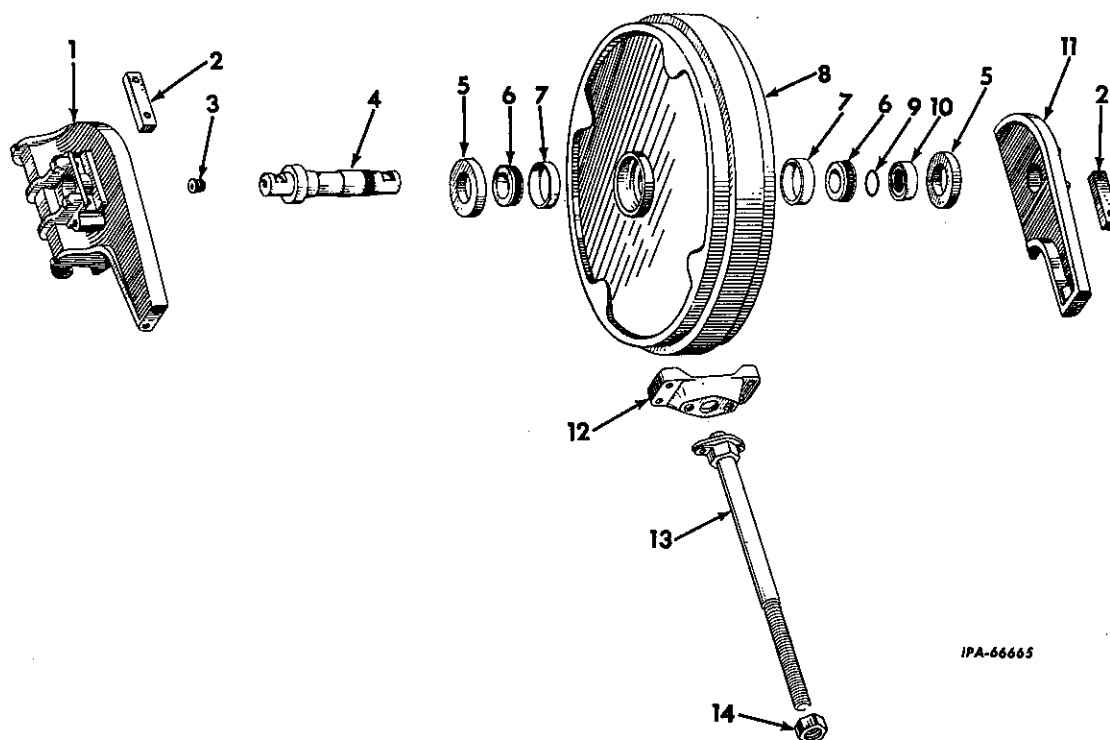


Illustr. 14 - Exploded View of Front Idler (6(61), 6(62), 9(91) and 9(92) Shown). (TD-92, 501-4830)

- | | | | |
|-----------------------|----------------------|--------------------|----------------------------------|
| 1. L.H. guide. | 6. Idler retainer. | 10. Idler bushing. | 15. Idler adjuster. |
| 2. Idler shaft clamp. | 7. Thrust washer. | 11. Front idler. | 16. Idler adjuster (attachment). |
| 3. Felt washer. | 8. Lubrication plug. | 12. R.H. guide. | 17. Adjuster lock nut. |
| 4. Oil seal. | | 13. Spacer. | |
| 5. Snap ring. | 9. Idler shaft. | 14. Cross plate. | |



FRONT IDLERS



Illust. 15 - Exploded View of Front Idler (92 Series - 4831 and up).

- | | |
|-------------------------|---------------------------|
| 1. Idler guide, L.H. | 8. Front idler. |
| 2. Shaft clamp. | 9. "O" ring. |
| 3. Lubrication plug. | 10. Adjusting nut. |
| 4. Shaft. | 11. Idler guide, R.H. |
| 5. Oil seal. | 12. Cross plate. |
| 6. Roller bearing cone. | 13. Adjuster. |
| 7. Roller bearing cup. | 14. Adjuster locking nut. |

11. DESCRIPTION

The front idlers for the track chains are slide-mounted to the front of the track frames. Their purpose is twofold. First, to provide a freely rotating guided support at the front of the tractor for the track chain. Second, to prevent damage to the track mechanism. Under shock conditions, the front idlers recoil through their slide mountings and direct connection to the track springs.

12. MAINTENANCE

1. Lubricate the front idlers as described in the "Lubrications Charts" section of the operator's manual.
2. The front idlers should rotate freely, and must be mounted exactly parallel to the track frame. If the front idler sticks when the trac-

tor is moving, or the tractor tends to creep to one side (the front idler may be slightly cocked), the front idler should be removed and inspected for worn parts. Inspect the front idlers for excessive lubricant leakage since such condition would indicate poor seals and result in damage to bearings and to the idler shaft.

13. REMOVAL

1. Remove the track chain as previously described but do not remove the chain from under the tractor. (Refer to Par. 7, "REMOVAL.")
2. Remove the cap screws and lock washers which secure the front idler adjuster to the cross plate at the rear of the front idler. (See Illust. 3.)

Continued on next page.



FRONT IDLERS

13. REMOVAL - Continued

3. Drive the slide-mounted front idler evenly off the front end of the track frame. If the front idler is stuck, clean off any paint that may be on the track frame. Use a heavy sledge and crowbar. Be sure to slide the front idler off straight. If it cocks on the track frame, it will be difficult to remove. (See Illust. 16.)

14. DISASSEMBLY

6 and 9 Series With Lip Type Seal

(Ref. Nos. Refer to Illust. 13.)

1. Bend back the nut locks (2) and run out the nuts (1 and 13). Remove the lubrication fitting (14) before removing the nut (13).

2. Remove the four cap screws and lock washers that secure the cross plate (16) to the guides (3 and 12).

3. Remove the inner and outer guides (3 and 12), and remove the key (15) from the shaft (11). Lift out the felt washers (4), and pry out the oil seals (5). After the snap rings (6) have been removed, the retainers (7) and thrust washers (8) are free for removal. Pull the shaft (11) from the front idler.

6(61), 6(62) Series With Lip Type Seal, and 9(91) and 9(92) Series With Serial Number 4830 and Below

(Ref. Nos. Refer to Illust. 14.)

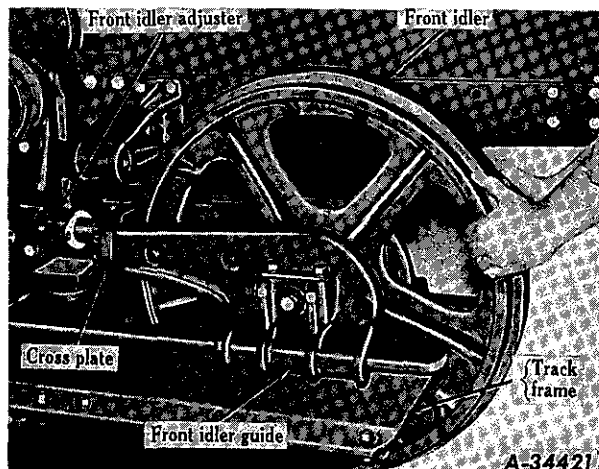
1. Remove the lubrication fitting or plug (8) from the idler shaft.

2. Remove the four cap screws and lock washers that secure the cross plate (14) to the front idler guides (1 and 12). (Also refer to Illust. 17.)

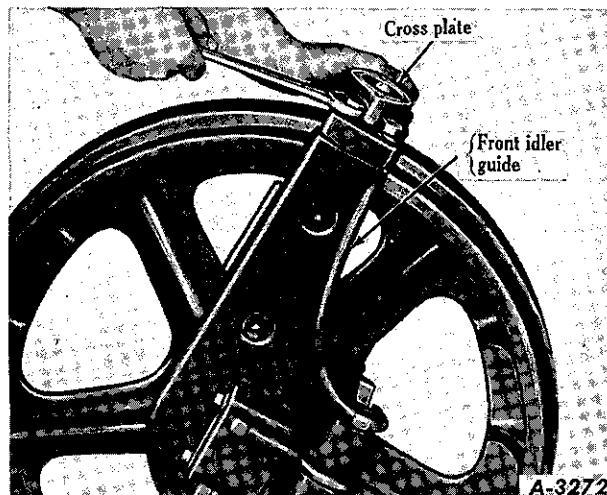
3. Remove two cap screws and lock washers that secure the front idler shaft clamps (2) to the front idler guides. Lift out the clamps and remove the guides (Illust. 18.)

4. Remove the felt washers (3) from the front idler guides. (Also see Illust. 19.) Remove the oil seals (4). After the snap rings (5) have been removed, the retainers (6) and thrust washers (7) are free for removal. (Refer to Illust. 20.)

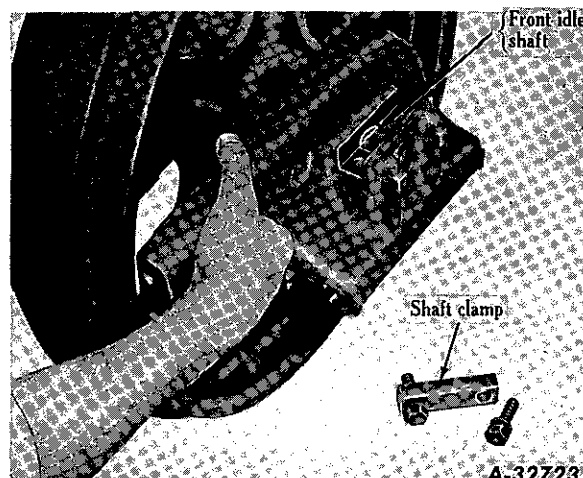
5. Pull the front idler shaft 9 from the front idler. Do not press bushings (10) from the idler unless replacement is necessary. (Refer to Par. 15, "INSPECTION AND REPAIR.")



Illust. 16 - Removing Front Idler (TD-9 Shown).

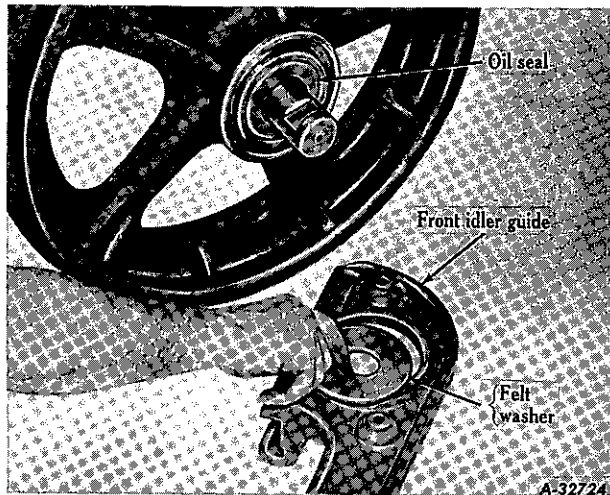


Illust. 17 - Removing Front Idler Guide Cross Plate ("9" Series Shown - "6" Series Similar).

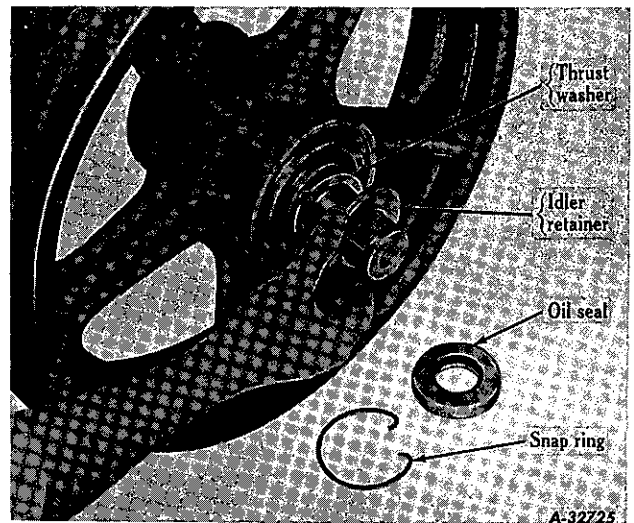


Illust. 18 - Removing New Type Front Idler Guides.

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Illust. 19 - Removing Front Idler Felt Washers and Oil Seals.



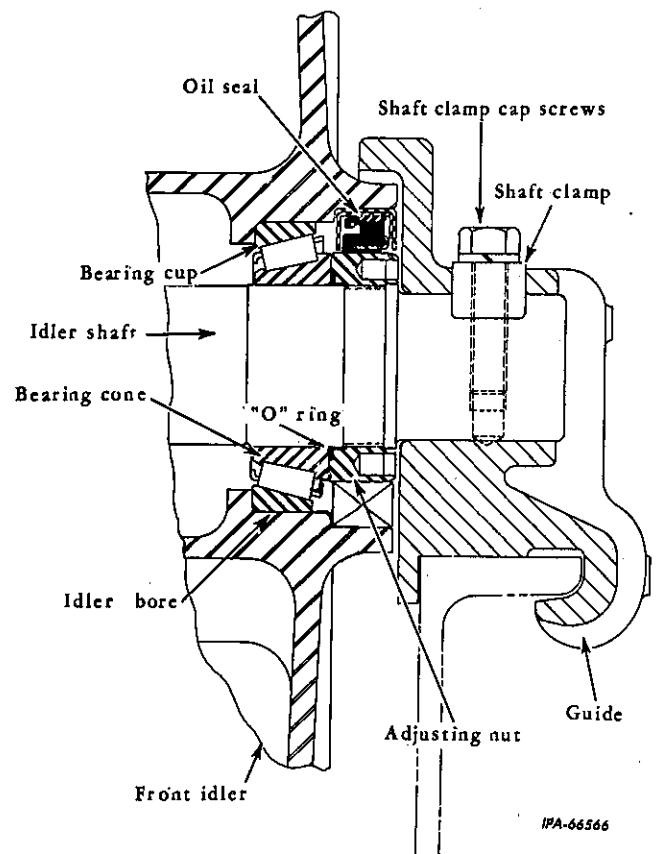
Illust. 20 - Removing Retainer and Thrust Washer - New Type Front Idler.

9 (92) Series With Serial Number 4831 and Above
(Ref. Nos. Refer to Illust. 15)

1. Remove the lubrication plug (3) from the front idler shaft (4). Refer to Illust. 21.
2. Remove the cap screws and lock washers that secure the cross plate (12) to the front idler guides (1 and 11).
3. Remove the cap screws and lock washers that secure the front idler shaft clamps (2) to the front idler guides. Lift out the clamps and remove the guides.
4. Remove the bearing adjusting nut (10) and the "O" ring (9) from the shaft (4).
5. Remove the inner oil seal (5) but do not try to save it; to remove it will render it unfit for further service.
6. Tap the end of the shaft (4) with a soft hammer and remove the inner bearing cone (6) as it becomes loose on the shaft. The outer oil seal and bearing cone will be removed as the shaft is tapped out.

NOTE: If the seal is a "leaker," it can be replaced without removing the shaft and bearings; just dig the seal out and press a new one in its place. However, many times the leaking seal is only part of the problem and upon further investigation it is found necessary to replace other parts as well.

7. The bearing cups may be removed if it is necessary to replace the bearings. Refer to "Inspection and Repair", Par. 15.



Illust. 21 - Detail of Bearing Assembly (Inboard Side).



FRONT IDLERS

15. INSPECTION AND REPAIR

1. Wash all parts thoroughly, using a dry-cleaning solvent, and dry with compressed air. Clean out lubricant passages in the idler shaft. Wash the tapered roller bearings, of idlers so equipped, soak in oil and wrap until ready for reassembly. Clean and flush out the hub of the front idler.

2. The dimensions of new idlers, idler shafts, bushings and thrust washers are listed in Par. 2, "SPECIFICATIONS." If excessive wear has taken place at any of these points, replace as required.

3. Service bushings, reamed to size, are available for service. If front idler bushings or idler carrier bushings require replacement, press them out and install new ones. When replacing bushings, they should be pressed into the idler or idler carrier, beveled edge first, until they are flush with the bore.

4. Inspect thrust washers for proper thickness, scoring, warping or damage of any kind, and replace if necessary.

5. Replace all oil seals with new seals before reassembly; as they are invariably damaged upon removal. Replace all felt washers and "O" rings.

6. Inspect the front idler guides for distortion, excessive wear, cracks or damage. The greatest wear will take place in the channel of the guide.

7. Inspect the tapered roller bearings on new type idlers for cracks or excessive wear. Check for scoring which would indicate turning of the bearing in its bore or on the shaft. Replace parts as necessary.

8. Inspect front idler for cracks. Check the rolling diameter (point of contact with track chain) and the sides of the center ridge for extreme wear.

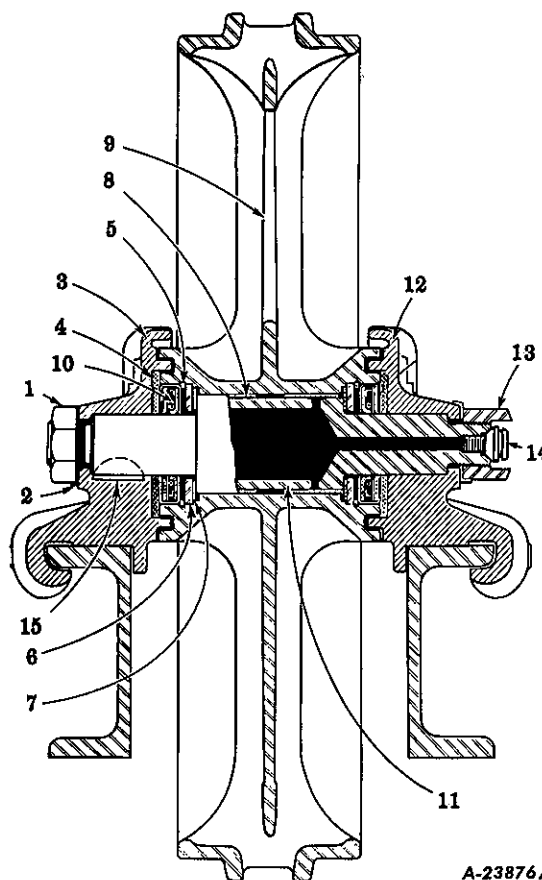
16. REASSEMBLY

6 and 9 Series With Lip Type Seal
(Ref. Nos. Refer to Illust. 22)

1. Install the idler shaft (11) into the idler. After placing the thrust washers (7) and retainers (6) in position, insert the snap rings (5).

2. Prior to the installation of new oil seals, inspect the shaft for burrs that may tear the seal. Soak the oil seals in SAE-10W motor oil

at a temperature of 160° F. for approximately fifteen minutes. Allow the seal to cool. Do not prolong the hot soaking and do not have the oil temperature in excess of the 160° specified.



Illust. 22 - Cross Section of Old Type Front Idler.

- | | |
|-------------------|--------------------------|
| 1. Inner nut. | 9. Front idler. |
| 2. Nut lock. | 10. Oil seal. |
| 3. Inner guide. | 11. Shaft. |
| 4. Felt washer. | 12. Outer guide. |
| 5. Snap ring. | 13. Outer nut. |
| 6. Retainer. | 14. Lubrication fitting. |
| 7. Thrust washer. | 15. Key. |
| 8. Bushing. | |

3. Install the oil seals (10) with the lips facing outward. Assemble the felt washers (4) in the inner and outer guides.

4. ON OLD TYPE IDLERS: Install the key (15) in the idler shaft, then install the guides (3 and 12) on the shaft. Secure the cross plate to the guides with cap screws and lock washers. Install the nut locks (2) and the inner and outer nuts (1 and 13) on the shaft. Be sure to install



FRONT IDLERS

the counterbored nut (13) on the outer end of the shaft (end with the lubrication fitting).

Bend one side of the locks over the nuts and the other side over the guides. Install the lubrication fitting (14).

5. ON NEW TYPE IDLERS: Install the guides (1 and 12, Illust. 14) on the shaft. Install the front idler shaft clamps (2, Illust. 14) so that they engage the slots on the idler shaft, and secure each with two cap screws and lock washers.

**6 (61), 6 (62) Series With Lip Type Seal and 9 (91),
9 (92) Series With Serial Number 4830 and Below**

When assembling the cross plate, be sure if the hole for the adjuster is offset, that the offset side is installed upwards to maintain proper alignment.

9 (92) Series With Serial Number 4831 and Above

(Ref. Nos. Refer to Illust. 15)

1. Press the two bearing cups (7) in the idler bores if it was found necessary to replace the bearings. Be sure the large diameter of the taper in the cup is facing out.
2. Set the shaft (4) in a press with the threaded end up and install the bearing cone (6) with the small diameter of the taper up, until it bottoms on the shoulder of the shaft.
3. Install the lubricating plug (3) in the end of the shaft.
4. Insert the shaft (4) into the hub of the idler (8) and install the inner bearing cone (6) on the shaft so the small diameter of the taper is facing toward the idler bore. Install the "O" ring (9) against the bearing cone.
5. Install the nut (10) and alternately tighten the nut and rotate the shaft until a torque of 250 foot-pounds is applied to the nut. Then, loosen the nut and again alternately rotate the shaft and tighten the nut until the bearing preload is within the specifications shown in Par. 2, "SPECIFICATIONS". In checking the tension required to turn the front idler shaft, place a torque wrench in the plug in the end of the shaft and turn. Upon establishing the correct preload, stake the nut.
6. Install the oil seals (5). Be sure the "oil side" (stamped on the seal) is installed toward the hub of the idler.

7. Install the left and right hand guides (1 and 11) in their respective positions and place the shaft clamps (2) in the flat portion of the shaft. Install the cap screws and lock washers. Tighten the cap screws securely.

8. Install the crossplate to the guides and secure with four cap screws and lock washers.

9. Lubricate the front idler as described in the operator's manual.

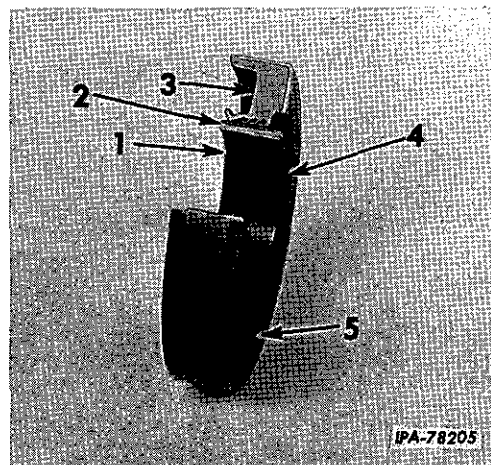
6, 6 (61) and 6 (62) Series With Rotary Type Seal

(Ref. Nos. Refer to Illust. 14)

1. Install the idler shaft (9) into the idler. Place the thrust washers (7) and retainers (6) in position and insert the snap rings (5).

2. Before installing the new oil seal, be sure the idler shaft is clean and free of burrs.

The seal consists of two major components: the rotating member and the stationary member (Illust. 23). The felt washer (3) will not be used with the rotary seal and should be discarded. Remove the seal from the package and leave the packing grease on the seal.



Illust. 23 - Cut-Away View of Front Idler Oil Seal (Rotary).

1. Largest inside diameter.
2. Stationary member.
3. Rotating and sealing member.
4. Smallest inside diameter.
5. Dirt side.

NOTE: The metal side of the seal is stamped "Dirt Side" and should be installed facing outward.

Continued on next page.



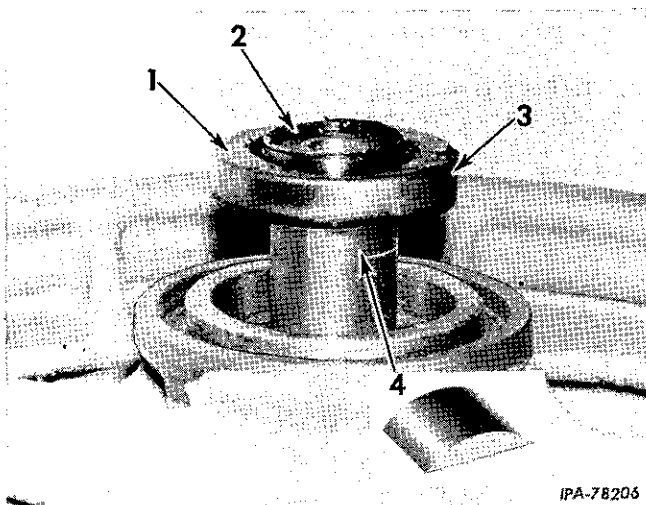
FRONT IDLERS

16. REASSEMBLY—Continued

6, 6 (61) and 6 (62) Series With Rotary Type Seal—Cont.

3. Position the seal assembly on the front idler shaft (9). (See "NOTE" above.) As an added assurance the seal is being installed correctly, check the fact that the largest inside diameter is installed on the shaft first (Illust. 24.)

4. To make sure the seal is not damaged when pressing it down on the shaft, a tool such as shown in Illust. 25 can be made to fit into the slot in the shaft. This tool will prevent shearing of the seal as it passes over the slot.



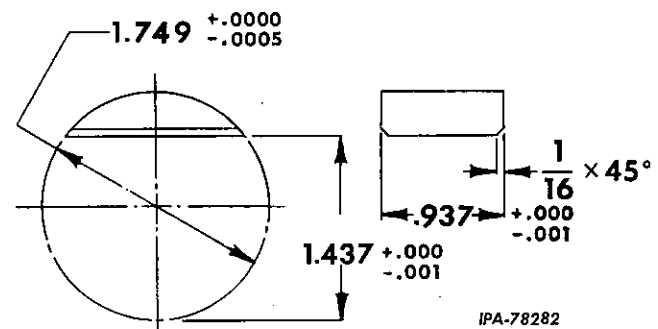
Illust. 24 - Installing Seal Assembly.

Legend for Illust. 24

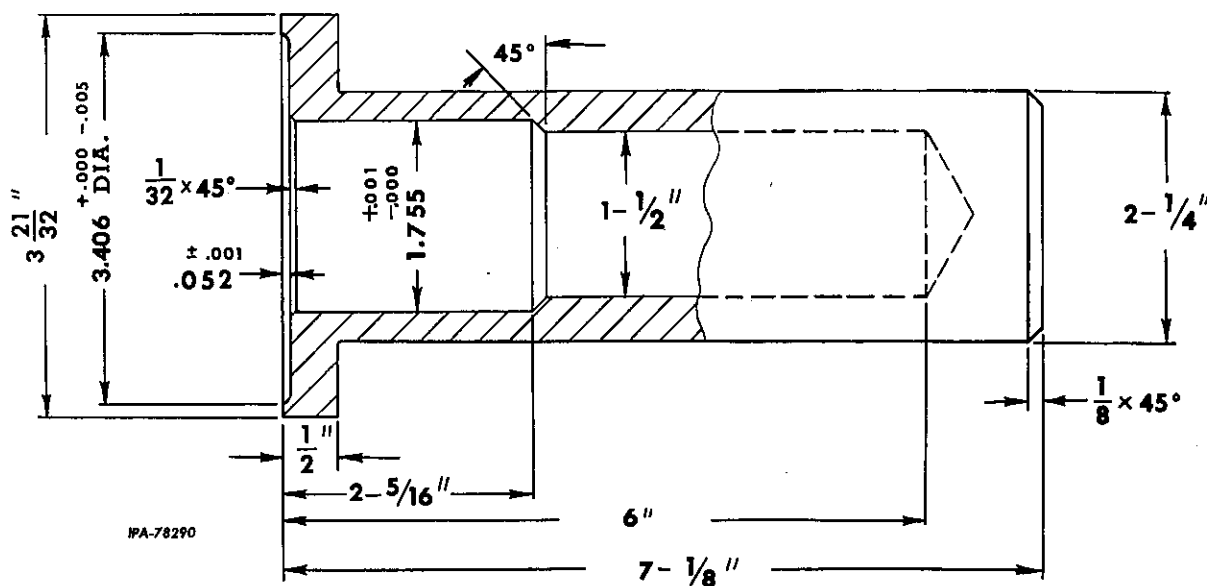
1. Rotating member. 3. Seal assembly.
2. Stationary member. 4. Tool.

5. It is very important that the seal is pressed down evenly on the shaft. To accomplish this, a tool such as the one shown in Illust. 26 can be made for pressing the seal assembly into the front idler correctly.

6. Install the guides (1 and 12) on the shaft (9). Install the front idler shaft clamps (2) in the slots in the shaft and secure them with cap screws and lock washers.



Illust. 25 - Special Tool For Slot In Idler Shaft.



Illust. 26 - Special Tool For Pressing Front Idler Oil Seal In Front Idler.



FRONT IDLERS

17. INSTALLATION

1. Roll the front idler assembly onto the track chain, and slide the idler guides evenly onto the track frame side channels until the cross plate at the rear of the idler can be made to contact

2. Install the front idler adjuster to the cross-plate and tighten the cap screws securely.

3. Lift the track into place and proceed as outlined in Par. 10, "INSTALLATION."

TRACK IDLERS

18. DESCRIPTION

The upper section of each track chain, between the sprocket and front idler, is supported by freely rotating idlers which are mounted on brackets on the track spring retainers. The track idlers revolve on polished steel shafts which are locked into the mounting brackets by cap screws. The idlers are protected from dirt and grit by felt washers (early models) and spring loaded oil seals (unitized) with the lips facing away from the track idler (later models).

19. REMOVAL AND DISASSEMBLY

1. Release the track tension. (Refer to Par. 6, "MAINTENANCE.")

2. Position a jack on top of the track spring housing. With a block of wood on the jack seat, raise the track until it is clear of the track idler.

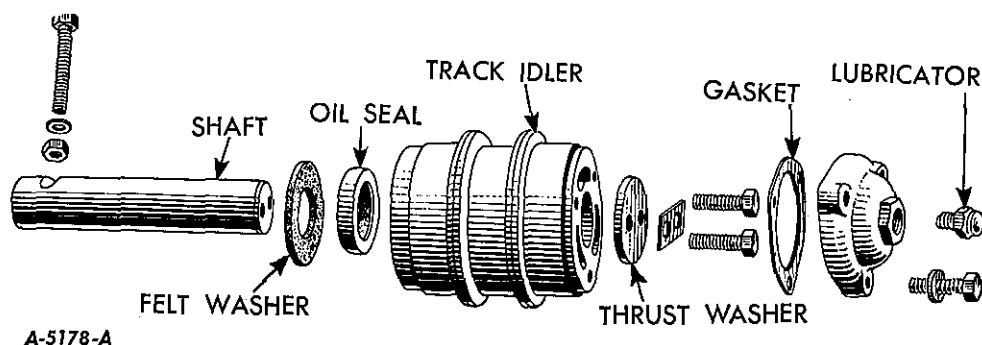
3. Remove the cap screws and lock washers which secure the track idler cap to the idler,

and remove the cap and gasket (Illust. 27). If the idler turns, place a block under one of the cap screws.

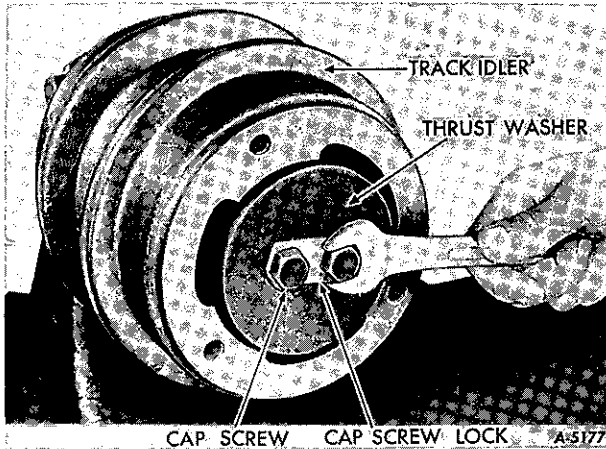
4. With a screwdriver or similar tool, bend back the corners of the cap screw locks (if so equipped) and remove the cap screws which secure the thrust washer to the track idler shaft (Illust. 28).

5. Remove the oil seal from inside the idler, and the felt washer from the mounting bracket. If necessary, the idler shaft can be removed from the bracket by releasing the clamping cap screw and pulling the shaft from position (Illust. 29).

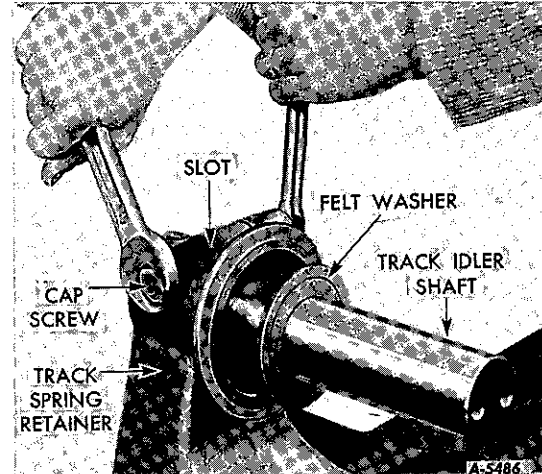
6. Remove the oil seal if it is defective. Seals that have been removed should not be salvaged. Always install new seals.



Illust. 27 - Exploded View of Track Idler. (6, 6 (61), 6 (62), 9, 9 (91)).



Illust. 28-Removing the Idler Thrust Washer. (Not 92 Series)



Illust. 29- Removing the Track Idler Shaft. (Not 92 Series)

20. INSPECTION AND REPAIR

1. Clean all parts thoroughly including the inside of the track idler. Blow dry with compressed air.
2. Inspect parts for damage and wear. Replace parts as necessary. Replace the oil seals, felt washers and gaskets with new. Dimensions for track idler shafts and idler bores are given in Par. 2, "SPECIFICATIONS."

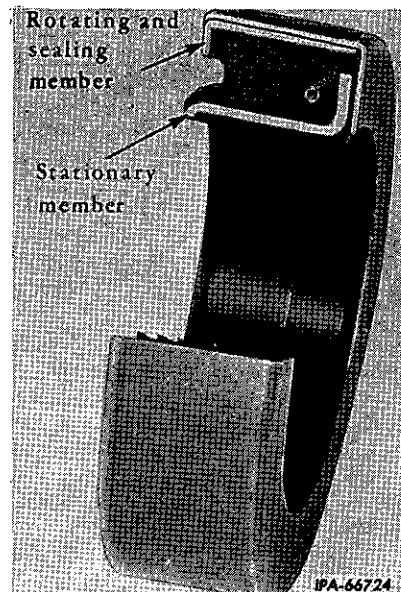
21. REASSEMBLY AND INSTALLATION

1. Install the track idler shaft to the bracket and lock in place with the clamp screw and nut (Illust. 29).
2. Install a new oil seal in the idler with the lips facing away from the idler.

On idlers with old lip type seals, place a new oil seal in clean SAE-10W motor oil at a temperature of 160°F, for fifteen minutes. Do not have the oil hotter and do not soak the seal longer than the prescribed time; allow the seal to cool. Press the seal into the idler with the lips facing away from the idler. Place a new oil-soaked felt washer on the idler shaft.

On idlers originally equipped with Unitized seals, wipe the shaft clean and lubricate the shaft with a light film of SAE-10W engine oil. Install the new seal with the side marked "oil side" toward the idler shell. Use a seal driver and be sure the seal is bottomed in the idler bore. (Refer to Illust. 30.)

3. Slide the track idler with oil seal toward the track spring retainer on the idler shaft. Install the thrust washer on the end of the idler shaft (Illust. 28).



Illust. 30 - Cutaway Showing Details of Unitized Seal.

NOTE: On tractors equipped with vented track idlers, be sure to install the thrust washer so the 3/8 inch hole is at the top.

4. 92 Series: Install the idler on the shaft, first being sure the bore of the idler is clean. Install the thrust plate with the 3/8 inch hole at the bottom. This is the lubrication hole and must be in this position to mate with the shaft lubrication hole. Tighten the two cap screws to standard torque.

5. Install the idler cap and a new cap gasket. Tighten the three cap screws securely. Install the lubricating pipe plug.

Before putting the tractor in operation, lubricate the idlers as described in the Operator's Manual.

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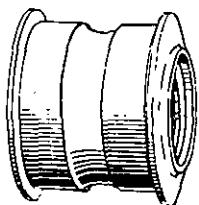
TRACK ROLLERS

22. DESCRIPTION

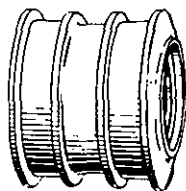
Track rollers are attached to the underside of the track frame and carry the weight of the tractor. The rollers are heat-treated steel forgings and they rotate around bushings. The shafts have a flange at the center against which thrust washers rest.

The rollers are equipped with seals that maintain a leakproof and dirtproof seal. Rollers are gravity lubricated at low speeds and pressure lubricated at higher speeds.

Track rollers are single and double flange types and should be installed as described under Illust. 31 starting at the front of the tractor.



Single flange



Double flange

IPA-78210

Illust. 31 - Track Rollers (See Chart).

Type of Track Frame	ROLLER LOCATION (Starting at Front of Tractor)				
	1	2	3	4	5
All Series					
4 Roller	S	D	D	S	
5 Roller*	S	D	S	D	S

*Oscillating and rigid.

23. MAINTENANCE

1. Lubricate the track rollers as instructed in the Operator's Manual.

2. At regular intervals, inspect the track rollers for traces of leakage, which indicates faulty or worn oil seals. Check the tightness of the track roller bracket cap screws.

24. REMOVAL

1. Release the tension in the track chain. (Refer to Par. 6, "MAINTENANCE.")

2. Remove the track roller shield (if equipped). (Illust. 32.)

3. Back the rear of the tractor on a six-inch high wooden block so that the block is centered under the sprocket. Place a jack under the equalizer spring assembly on the side from which the roller is to be removed. Place a steel plate between the jacks and the rigid bars or equalizer bar to prevent any damage to the parts. Run the jacks up until there is sufficient clearance between the track frame and track chain to permit removal of the roller.

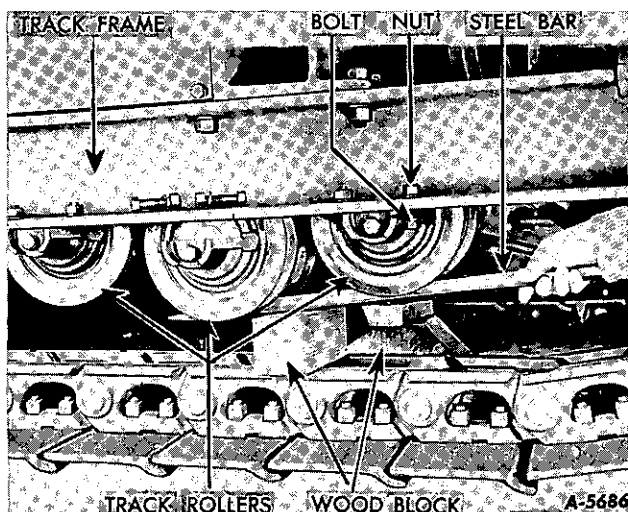
4. Remove the cap screws securing the track roller shaft brackets to the underside of the track frame and remove the roller. A tap with a soft hammer will usually free the roller if it tends to stick in the frame. (Illust. 33.)



Illust. 32 - Removing the Track Roller Shield.



TRACK ROLLERS



Illust. 33 - Removing the Track Roller.

25. DISASSEMBLY (Ref. Nos. Refer to Illust. 34.)

1. Remove the brackets (1) from each end of the track roller shaft (10).

2. Remove the felt washers from the brackets (1) on all of those that are so equipped. On later 62 and 92 series with increased capacity rollers, remove the backup gasket (2) and oil seal (3) from the brackets.

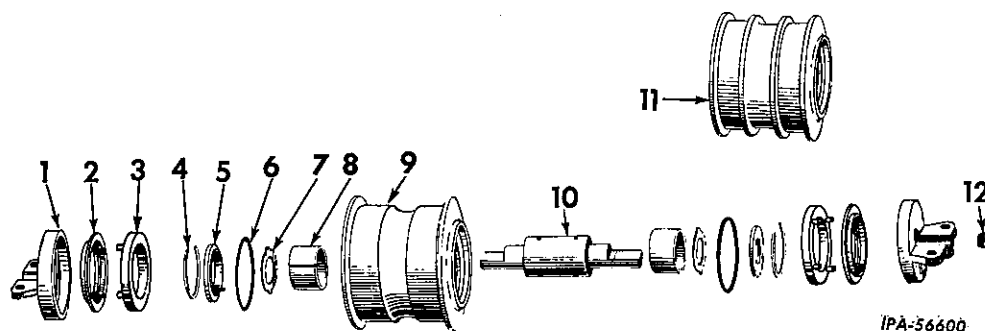
3. If the roller is equipped with a lip-type seal, pry the seal out of the bore in the roller.

When the roller is equipped with a face type seal, four dowels properly locate the oil seal in the bracket; remove the oil seal.

When the roller is equipped with rotary type seals, remove the seal in any practical way but, do not try to re-use it for it will no doubt be damaged.

4. Remove the snap rings (4) from the grooves inside the track roller. Remove the retainers (5) and thrust washers (7). (Refer to Illust. 35.) From the 62 and 92 Series, also remove the "O" ring (6).

5. Push the shaft (10) out of the roller (9). If the roller bushings (8) are to be replaced, press them out of the roller. If a new roller is to be installed, also install new bushings.



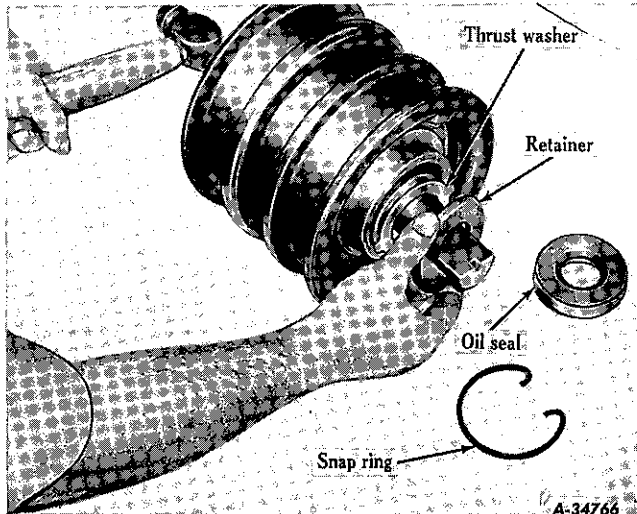
Illust. 34 - Exploded View of the Track Roller (6(62) Series Shown).

1. Shaft bracket.
2. Back-up gasket.
3. Oil seal.
4. Retainer snap ring.
5. Retainer.
6. "O" ring.

7. Thrust washer.
8. Roller bushing.
9. Track roller (single flange).
10. Track roller shaft.
11. Track roller (double flange).
12. Lubrication plug.



5. Push the shaft (10) out of the roller (9). If the roller bushings (8) are to be replaced, press them out of the roller. If a new roller is to be installed, also install new bushings.



Illust. 35 - Removing Track Roller Retainer and Thrust Washer (6(61) and 9(91) Series).

26. INSPECTION AND REPAIR

Clean all parts with a solvent and dry with compressed air. Be sure that all oil passages are open and clean.

2. Inspect parts for wear and damage. Replace parts if necessary. Install new seals before re-assembly, as they are invariably damaged upon removal. Also install new felt washers and gaskets on rollers so equipped.

3. Check the thrust washers. If they are worn beyond the limits given in Par. 2, "SPECIFICATIONS," replace with new washers of the thickness necessary to maintain proper end clearance.

4. Inspect the shaft for burrs or corrosion. Burrs on the end of the shaft must be filed or ground smooth. To prevent any damage to the new oil seal when installing it, use crocus cloth or fine steel wool to remove corrosion, but do not reduce the diameter of the shaft below minimum specifications. Refer to Par. 2, "SPECIFICATIONS."

27. REPLACEMENT OF OIL SEAL FACE (Face Type Seal)

1. Pry worn leather face from top of seal. If the adhesive used in cementing the original face still remains, this must be removed to provide

a flat seat for the new face. Adhesive removal may sometimes be difficult, but may be accomplished by scraping with a flat, sharp-edged instrument. Where extreme cases are encountered, a light application of a blow torch to the adhesive, followed by more scraping, is advisable. When use of a blow torch is necessary, the seal should stand in a shallow pan filled with water to the level of the top casting. This is done for protection of rubber diaphragm against damage due to excessive heat. The recess should be wiped clean of all dirt and grease with a rag soaked with a solvent.

NOTE: Minnesota Mining and Manufacturing Company EC-847 adhesive is recommended for cementing new leather sealing washers.

2. Apply a thin, even coat of adhesive to the rough side of the new leather seal face, and also to the joining surface of the oil seal. When brushing, use a stiff, short-bristled brush, and make as few passes as possible with the adhesive. Coating both surfaces is generally recommended because it gives greater strength and permits a longer exposed time during handling. Allow adhesive to dry to a tacky stage where it will adhere but not transfer to the finger when touched lightly.

3. Fit the new leather seal face into the recess with the rough side of the face contacting the adhesive. Place a plate large enough to cover the leather washer on top of the face, and compress the assembly to the approximate operating height. For best results, leave in compressed state for twenty-four hours to assure complete adhesion.

Continued on next page.



Illust. 36 - Face Type Seal.



TRACK ROLLERS

**27. REPLACEMENT OF OIL SEAL FACE
(Face Type Seal) - Continued**

4. When assembling the rubber back-up gasket, be sure the side of the gasket with the recess is facing the anchor plate as shown in Illust. 36. (No adhesive is used on the rubber back-up gasket.)

28. REASSEMBLY (Ref. Nos. Refer to Illust. 34)

1. Press new bushings (8) into the track roller (9 or 11), if they were removed or replaced. Observe the dimensions given in "SPECIFICATIONS," Par. 2.

2. Tap the thrust washers (7) into the roller. Install the retainer (5) and "O" ring (6) if it was so equipped. (Later retainers did not need an "O" ring in the assembly.) Install the snap ring (4).

3. Early 6 (62) and 9 (92) Series: Install the backup gasket (2) on the oil seals (3) and position them in the brackets (1).

6 (61) AND 9 (91) SERIES: Install new felt washers in the brackets, and new sealing washers in the roller.

6 AND 9 SERIES: Install new felt washers, outer and center, in the bracket, and new sealing washers in the roller.

Rollers that are equipped with lip type seals, install with the lips facing out. Refer to Par. 29 for installation of face type seals.

Rollers that are equipped with rotary heavy duty oil seals, refer to Par. 30 for installation procedure.

4. Install the shaft (10) in the roller. Screw the lubrication pipe plug (12) in the end of the shaft.

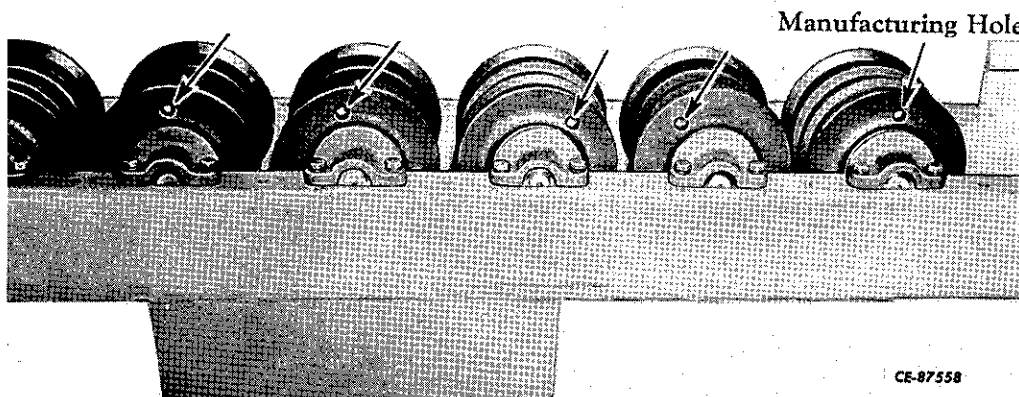
NOTE: There are two holes in one side of the track roller shell that are used for manufacturing purposes. Check for these holes (Illust. 36A) in the rollers already installed in the track frame. When assembling a track roller, the shaft must be inserted into the roller shell so when the roller assembly is installed, these holes in the roller shell will be facing in the same direction as those in position in the track frame. The holes in all the rollers must be facing one single direction either to the inside or the outside of the tractor in order to maintain proper roller alignment.

5. Invert the roller and support it on the flange of the roller. Install the thrust washer, retainer and snap ring.

6. Check the track roller shaft end clearance. Be sure it does not exceed the specified clearance listed in Par. 2 "SPECIFICATIONS." If the end clearance exceeds its limit, oversize thrust washers are available to bring the end clearance within specifications.

7. A flat sealing ring is available for use in the counterbore of the roller body behind the oil seal. (Refer to Illust. 39.) This sealing ring will prevent any oil leakage from around the outside of the oil seal due to the possible scratching of the roller bore during oil seal removal.

8. After installing the oil seals (Refer to Par. 29), install the brackets (1) on each end of the track roller shaft (10).

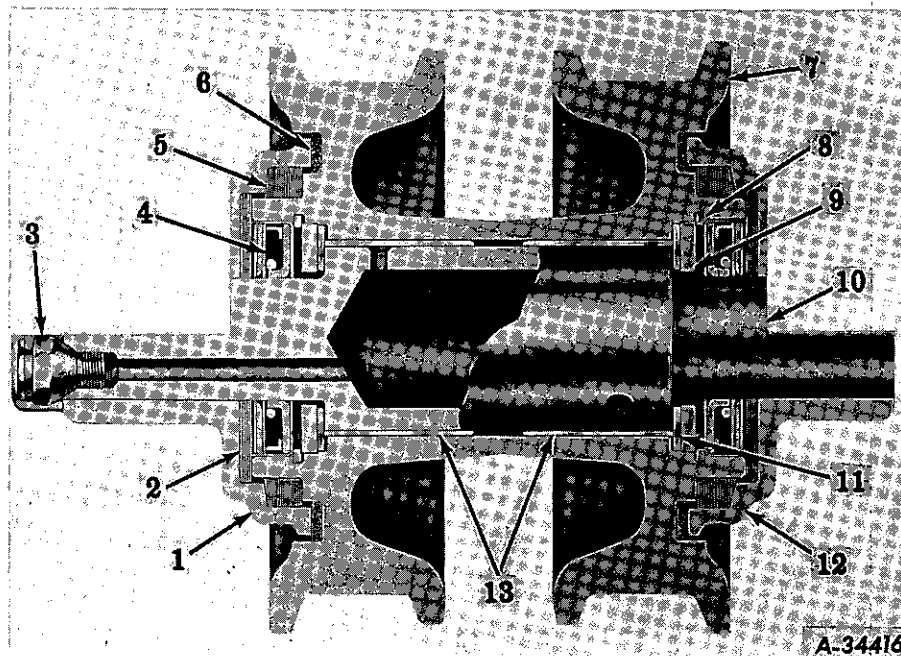


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Illust. 36A - Rollers Properly Installed in Track Frame.

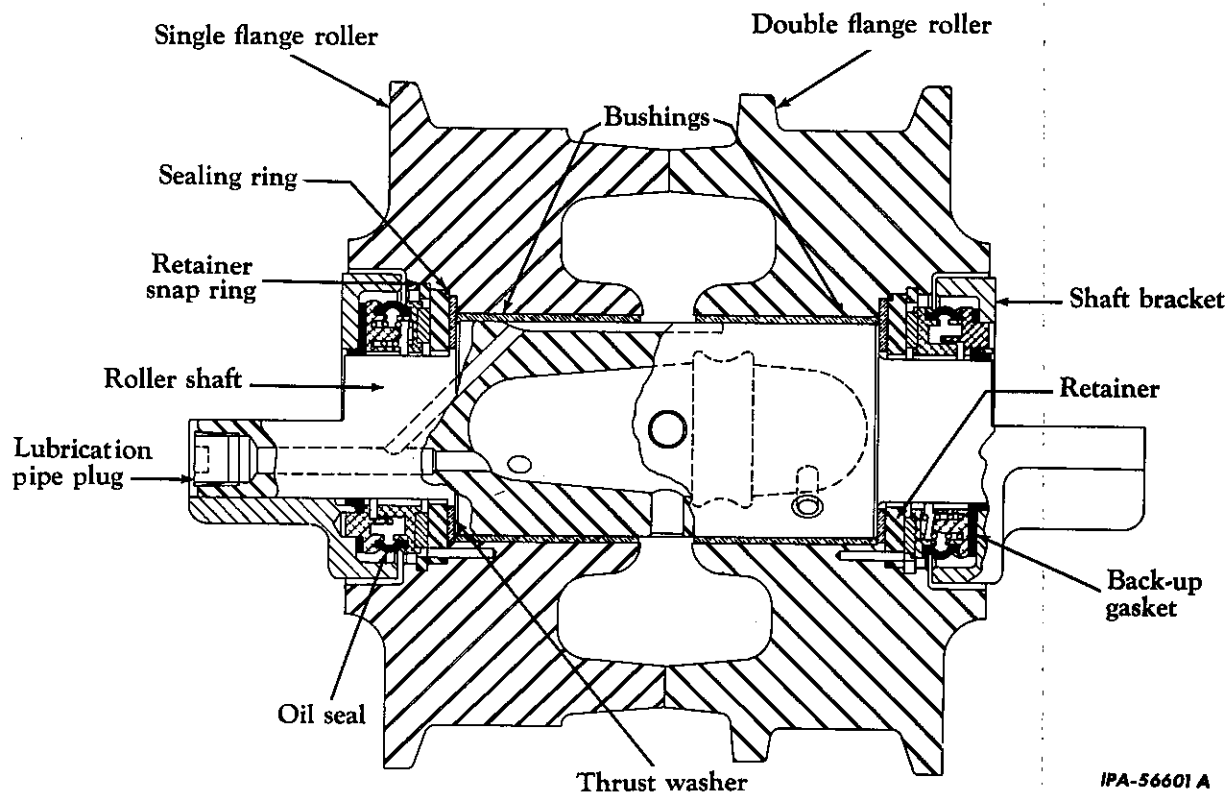


TRACK ROLLERS



Illust. 37 - Cross Section of Track Roller with Lip Type Oil Seal.

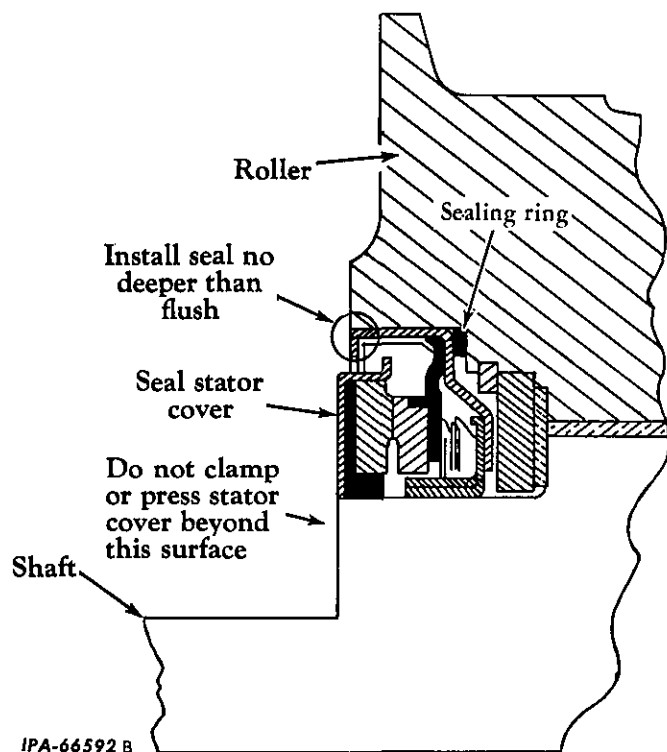
- | | | | | |
|-------------------------|---------------------------|------------------|--------------------|---------------|
| 1. Outer bracket. | 4. Oil seal. | 7. Track roller. | 10. Shaft. | 13. Bushings. |
| 2. Felt washer, outer. | 5. Felt washer, center. | 8. Snap ring. | 11. Thrust washer. | |
| 3. Lubrication fitting. | 6. Sealing washer, inner. | 9. Retainer. | 12. Inner bracket. | |



Illust. 38 - Cross Section of Track Roller with Face Type Oil Seal (Increased Capacity).



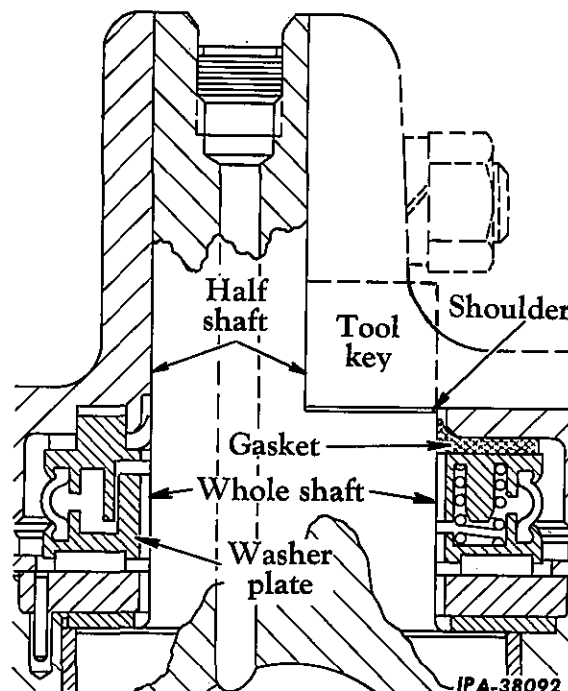
TRACK ROLLERS



IPA-66592 B

Illust. 39 - Proper Position of Oil Seal.

align the drive pins and the holes in the shaft bracket. Do this on both sides of the roller.



IPA-38092

Illust. 40 - Seal and Gasket Installed in Compressed Position.

29. INSTALLATION OF OIL SEALS

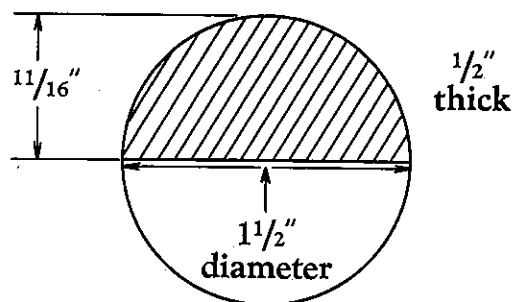
Face Type

Caution should be taken in the assembly of face type track roller seals. If the oil seal rubber gasket is not assembled to the whole shaft as shown in Illust. 40, distortion and extrusion of the gasket will occur and premature leakage will follow.

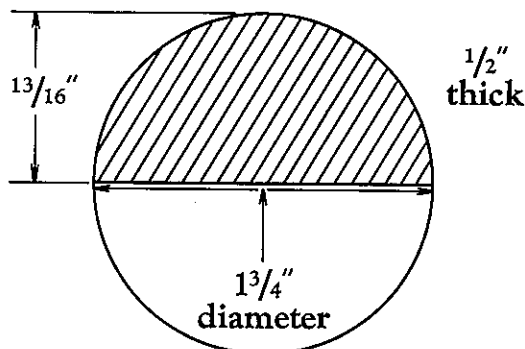
The proper method of installation is as follows:

1. Make a tool similar to a Woodruff key, using the dimensions for either the 6 or 9 tractor shaft as shown in Illust. 41.
2. Place the key as shown in Illust. 40. Oil the leather face of the seal, half shaft, key and the inside diameter of the rubber gasket.
3. Assemble the seal and gasket over the half shaft and key and onto the whole shaft (Illust. 40).
4. Snug the gasket inside diameter up against the pin side of the seal gently with the finger tips, without compressing the seal.
5. Slide the shaft bracket over the half shaft and up against the gasket; at the same time

ISS-1032B (Rev. No. 1, 3-67)



T-6 and TD-6



T-9 and TD-9 IPA-38093

Illust. 41 - Dimensions of Tool Key.



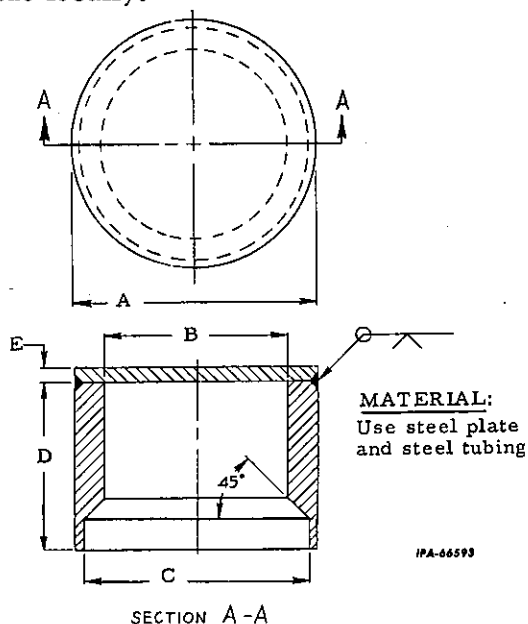
6. Using "C" clamps, compress the seals to operating height; that is, until the machined face of the bracket is flush with the whole shaft. Remove the key extension.

NOTE: Once the gasket is properly riding on the solid whole shaft -- do not let it back off. If the gasket becomes jammed, remove the gasket and seal and start over as before. Do not try to position it by shoving against the edge of the gasket with a screw driver. Doing this will damage the gasket and cause the seal to leak.

Rotary Type

6 (61), 6 (62), 9 (91) and 9 (92) Series

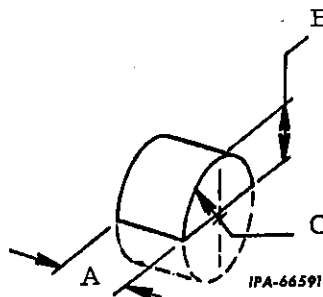
NOTE: Do not attempt to tap the seal into place or it may become cocked and damaged. A special driving tool will insure an even press when installing the new seals. Illust. 42 provides the dimensions for an efficient tool which can be made locally.



Illust. 42 - Oil Seal Driver.

Series	A	B	C	D	E
6	3-3/4"	3"	3-9/32"	2-/34"	1/4"
9	4-1/4"	3-1/2"	3-11/16"	2-3/4"	1/4"

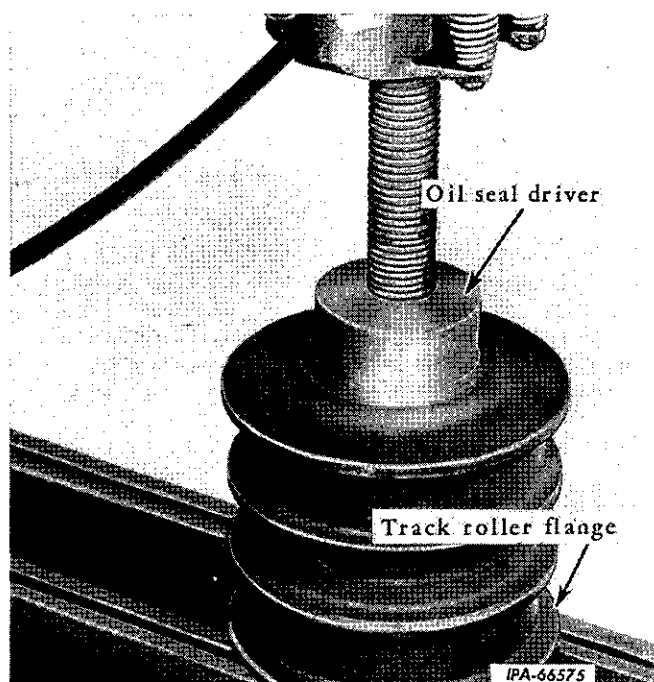
1. To prevent the possibility of the inner portion of the oil seal driver or the rubber sealing ring of the oil seal from hanging up on the stepped section of the roller shaft when installing the seal, construct a simple half moon wooden or metal block to fit on the roller shaft. (Refer to Illust. 43 for instructions.)



Illust. 43 - Installing Block.

Series	A	B	C
6	1"	21/32"	3/4" Radius
9	1"	13/16"	7/8" Radius

2. Place the track roller on an arbor or hydraulic press so the ROLLER FLANGE IS SUPPORTED AND NOT THE SHAFT. (Illust. 44.)



Illust. 44 - Pressing the Seal Into the Roller.

3. Place the installing block (Illust. 43) on the shaft. Coat the installing block and the exposed end of the shaft with a light coat of roller lubricant.

4. When a NEW oil seal is installed in a NEW track roller; coat the O.D. of the seal with a light coat of No. 3 Permatex and the rubber

Continued on next page.

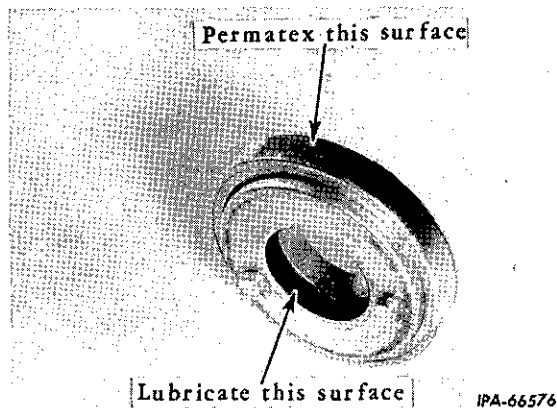


TRACK ROLLERS

29. INSTALLATION OF OIL SEALS -Continued

Rotary Type - Continued

sealing area with roller lubricant. (Refer to Illust. 45 and see NOTE).



Illust. 45 - Track Roller Oil Seal.

When installing a new oil seal as a replacement, DO NOT use Permatex on the oil seal but install a new oil seal sealing ring (Illust. 39) in the seal bore. This will prevent oil leakage at the oil seal due to possible scoring of the seal bore in the roller when removing the original seal.

Before installing the new oil seal sealing ring and oil seal, subtract the depth of the track roller oil seal bore from the thickness of the oil seal and oil seal sealing ring to determine the amount of squeeze on the new oil seal sealing ring. This squeeze should be .010 inch to .020 inch when the seal is pressed into the track roller.

NOTE: The suggested method of applying Permatex to a seal is by first spreading a thin coat of the compound on a flat hard surface; then roll the seal over the coated surface and sufficient Permatex will be picked up. Remove any excess compound after the seal is installed.

5. Position the new oil seal onto the installing block and shaft with the dowel pins facing up. Place the oil seal driver (Illust. 42) over the shaft and onto the seal and press the seal evenly into the roller (Illust. 44).

NOTE: When pressing the seal into the roller be sure the outside diameter of the seal is installed no deeper than flush with the roller bore (Illust. 39).

NOTE: When installing the second seal, extreme care must be taken to be sure the roller assembly is not supported by the first seal.

ISS-1032B (Rev. No. 1, 3-67)

THE ROLLER ASSEMBLY MUST BE SUPPORTED ON THE PRESS BY THE ROLLER FLANGES ONLY. (Refer to Illust. 44).

6. Invert the roller on the press.

7. Install the second seal, following Steps 2 through 5.

8. When assembling the rollers, extreme care should be taken to have the stator cover of the seal flush with the end of the half shaft (Illust. 39). The stator cover must also be tight against the stator and gasket. Any independent movement of the stator cover is an indication that the stator is not properly positioned. If the stator is pushed too far onto the shaft, the condition can be corrected by piping a bucket lubricator directly to the track roller shaft or TEMPORARILY installing a button type fitting and CAREFULLY pumping lubricant into the roller. This will allow the pressure built up within the roller to force the stator and gasket into its intended position. If this method is used, extreme care must be taken to prevent excessive pressure build up. A pressure gauge must be included in the lube line. Ten to 20 psi should be adequate to move the stator. The pressure build up must not exceed 50 psi. THIS METHOD IS TO BE USED ONLY AS AN EMERGENCY MEASURE DURING INITIAL ASSEMBLY AND MUST NOT BE USED AT NORMAL LUBRICATION INTERVALS.

30. INSTALLATION

1. Place the track rollers in position under the track frame with the lubrication plugs to the outside.

NOTE: When installing the track roller onto the tractor, do not clamp or press the stator cover of the oil seal beyond the half flat of the roller shaft (Illust. 39).

2. Install the shaft brackets and secure with cap screws and washers to the track frame.

NOTE: When installing the shaft brackets, tighten the forward cap screw just enough to bring the bracket in contact with the bottom of the track frame. Tighten the second cap screw to full torque and then return to the forward cap screw and apply full torque. Refer to the standard torque chart in Section 1, "GENERAL.

3. Remove the jacks and install the track roller shield (if equipped).

4. Adjust the track tension as described in Par. 6, "MAINTENANCE." Lubricate the track rollers as described in the Operator's Manual.



TRACK SPRINGS AND RETAINERS

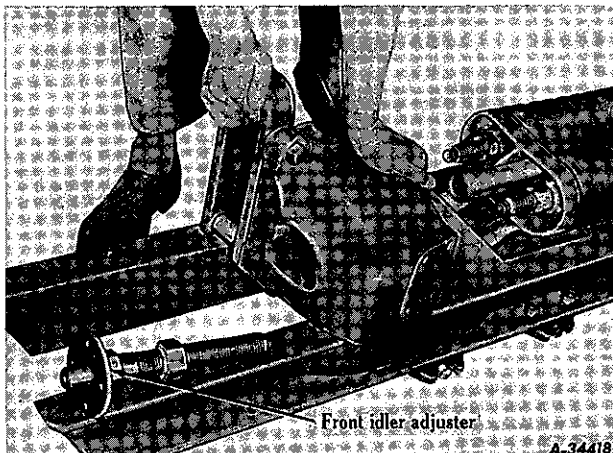
31. DESCRIPTION

Two heavy coil springs are provided for the tension release mechanism for each of the two front idlers. They permit the front idlers to recoil under shock, but exert no tension on the track in normal operating position. The springs are mounted on the adjusting rods held in the rear track spring retainers. At the front ends, the springs and rods are secured by the front spring retainers into the track spring guides.

Front idler adjusters, mounted in the front spring retainer and secured to each front idler, provide means of adjusting the track chain tension.

32. REMOVAL

1. Remove the track chain. (Refer to Par. 7.)
2. Remove the front idler. (Refer to Par. 13.)
3. Remove the track spring guard (3, Illust. 47). Remove the front idler adjuster.
4. ALL SERIES: Remove the track spring guide (Illust. 46.)
5. Remove the cotter pins and nuts from the track spring adjusting rods. Loosen both nuts uniformly to release the spring pressure on each rod until the nuts are off the rods.



Illust. 46 - Removing Track Spring Guide (TD-6 Shown).

6. Remove the retainer (5, Illust. 47) and the track springs (4). Remove the nuts and lock washers which hold the track spring adjusting rods (1) to the rear of the rear track spring retainer (2) and remove the rods. Remove the retainer from the track frame.

33. INSPECTION AND REPAIR

1. Clean all parts thoroughly with steam-cleaning equipment.
2. Check for cracks or breakages in the front track spring retainer, springs and adjusting rods, and replace them if necessary.

34. INSTALLATION (Illust. 47)

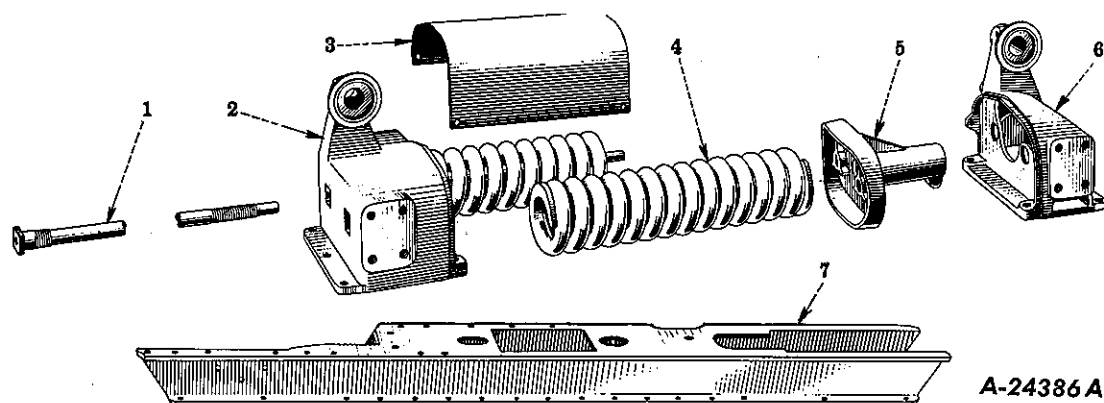
1. Install the track spring adjusting rods (1) through the rear track spring retainer (2), and secure in position with the lock washers and nuts.
2. Attach the rear track spring retainer (2) to the track frame.
3. Place springs (4) and front spring retainer (5) on the rods.
4. Install the nuts on the ends of the rods and tighten the nuts, keeping the tension uniform on the two springs. Turn the nuts and compress the springs until the cotter pin slots in the nuts line up with the holes in the rods; then install the cotter pins.
5. Install the track spring guide (6) on the track frame.

NOTE: Lubricate the front idler adjusting rod threads with Never-Seez prior to reassembly.

6. Install the front idler adjuster and turn it into the front track spring retainer to almost the limits of the threads. Install the track spring guard.
7. Install the front idler. (Refer to Par. 17.)
8. Install the track frame. (Refer to Par. 48.)



34. INSTALLATION - Continued



Illust. 47 - Exploded View of the Track Springs (T-9 and TD-9 Shown - Others Similar).

- | | | |
|-------------------------|--------------------------|-----------------------|
| 1 Adjusting rod. | 4 Track spring. | 6 Track spring guide. |
| 2 Rear spring retainer. | 5 Front spring retainer. | 7 Track frame. |
| 3 Track spring guard. | | |

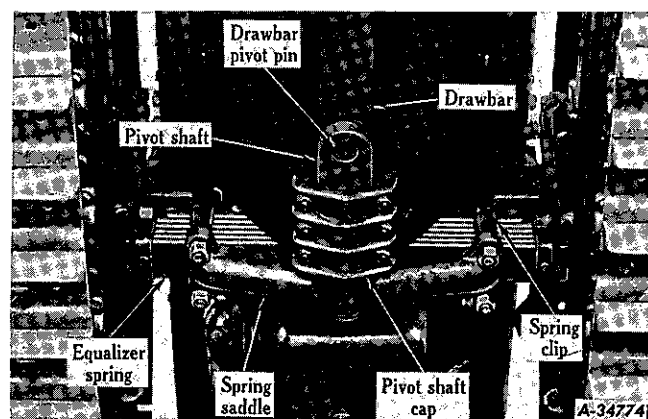
EQUALIZER SPRING ASSEMBLY

35. DESCRIPTION

The equalizer spring consists of pivot-mounted leaves designed to cushion the main frame from shock and strain (Illust. 48). The ends of the spring ride on hardened pads inserted in the track frame.

36. REMOVAL (Illust. 48 and 49)

1. Jack up the front end of the tractor. Remove the crankcase guard (if tractor is so equipped).
2. Disconnect the drawbar by removing the pivot pin, that attaches it to the equalizer spring pivot shaft. Move the drawbar to one side.
3. Remove the pivot shaft cap (15) from the main frame. Remove the retaining washer (7) from the front of the pivot shaft (14) and pull the shaft from the equalizer spring saddle (12).
4. Slide the equalizer spring (9) to one side so that the opposite side is free of the track frame. Then pull it forward to remove it.



Illust. 48 - Equalizer Spring.

37. DISASSEMBLY (Illust. 49)

1. Remove the spring clip nuts (13), and separate the spring clips (1) and the spring saddle (12) from the spring leaves.



TRACKS AND TRACK FRAME

EQUALIZER SPRING ASSEMBLY

Section 9
Page 31

2. If necessary for replacement, the bushings (10) can be pressed out of the spring saddle.

3. To disassemble the spring leaves, remove the center bolt (2). This frees the top leaf only. To replace any of the other leaves, the binding straps must be cut. (Refer to paragraph 38.)

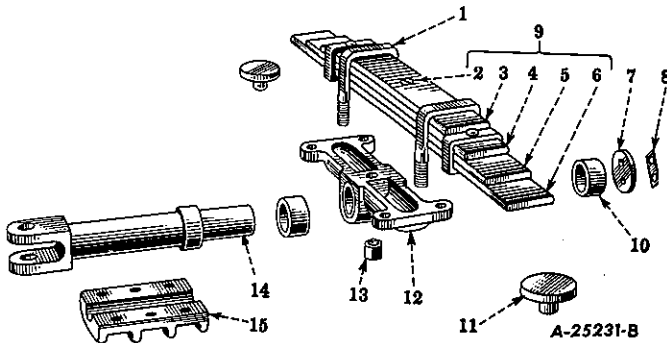
38. INSPECTION AND REPAIR

1. Steam clean all of the parts.

2. Inspect the leaves for weakness and set. Examine the saddle for damage. Replace parts as necessary.

3. When replacing single equalizer spring leaves, take care to prevent the possibility of weld spatter coming in contact with any portions of the spring. These flying weld particles may fuse to the leaves. Recent tests have revealed that these fused weld particles weaken the spring leaves and in some cases result in premature spring failures. To avoid weakening the spring during welding, follow these instructions:

- (a) Insert a shield, such as asbestos paper, copper plate, etc., between the spring clip and the main spring leaf to prevent welding the clip to the leaf.



Illust. 49 - Equalizer Spring Assembly (T-6, TD-6, 61 and 62 Series Shown).

Legend for Illust. 49

1 Spring clip.	9 Equalizer spring.
2 Center bolt.	10 Saddle bushing.
3 Spring leaf, No. 4.	11 Spring guide pad.
4 Spring leaf, No. 3.	12 Spring saddle.
5 Spring leaf, No. 2.	13 Spring clip nut.
6 Spring leaf, No. 1.	14 Equalizer spring pivot shaft.
7 Retaining washer.	15 Pivot shaft cap lock.
8 Retaining washer lock.	

- (b) Cover surfaces of the spring leaves that are exposed to any falling particles of weld with protective shields to prevent weld particles fusing to the spring leaf surfaces.

39. REASSEMBLY (Ref. Nos. Refer to Illust. 49)

1. If they were removed, press new bushings (10) in the spring saddle (12).
2. Assemble the spring clips (1) and the saddle (12) to the equalizer spring and secure with spring clip nuts (13).

40. INSTALLATION (Illust. 48 and 49)

1. Place the equalizer spring in position so that it is resting on the spring guide pads (11).
2. Insert the equalizer spring pivot shaft in the spring saddle and secure the pivot shaft to the main frame with the pivot shaft cap.
3. Install the retaining washer on the end of the equalizer spring pivot shaft and secure with two cap screws and lock.
4. Connect the drawbar to the equalizer spring pivot shaft with the pivot pin.
5. Install the crankcase guard (if tractor is so equipped).



41. DESCRIPTION

On crawler tractors that are equipped with a rigid extended track frame, a rigid crossbar replaces the equalizer spring and supplies added stability to the tractor. It helps keep both tracks level and on the ground, in operations which otherwise might tilt or turn the tractor over because of the load being applied on one side of the tractor and not on the other.

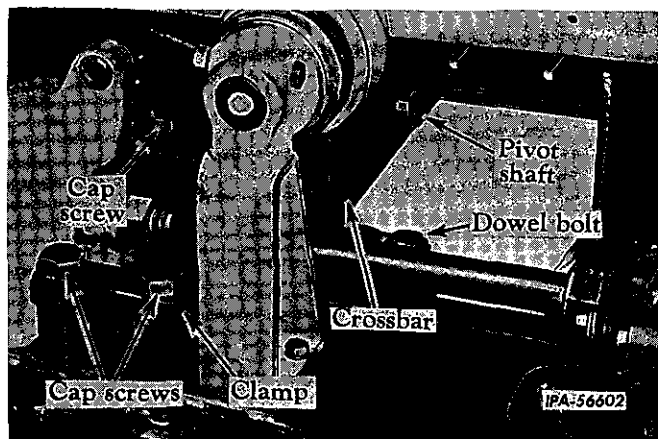
The crossbar is supported at both ends on the track frames and secured with cap screws. A pivot shaft secured to the main frame, supports the crossbar at its midpoint.

Maximum rigidity is obtained by using shims between the crossbar and the side channels. The shims are attached to the crossbar with cap screws.

42. REMOVAL

NOTE: The procedures that follow do not cover the removal (or installation) of equipment mounted to the tractor. It will be necessary however, to either remove or loosen such equipment that might interfere with the removal or installation of tractor parts or assemblies.

1. Disconnect the drawbar by removing the pivot pin that attaches it to the crossbar pivot shaft.
2. Jack up the front of the tractor and remove the crankcase guard. Lower the tractor.
3. Remove the crossbar pivot shaft cap (15, Illust. 49) from the main frame. Pull the crossbar pivot shaft out of the crossbar.
4. Remove the track chain from one side of the tractor. (Refer to Par. 7.)
5. Remove the cap screws and dowel bolts that secure the crossbar to the track frames. (Refer to Illust. 50.) It will not be necessary to remove the shims from the crossbar.
6. Support the weight of the crossbar at each end with a suitable hoist until the track frame to be removed has been set aside.
7. Remove the track frame. (Refer to Par. 46.) Remove both track idlers. This will facilitate the removal of the track frame off the end of the crossbar.
8. Move the crossbar away from its position on the track frame and onto a dolly. Remove it from under the tractor.



Illust. 50 - Rigid Crossbar Installed.

43. INSTALLATION

The thickness in shims required for maximum rigidity was determined when the crossbar was originally installed. No correction will be necessary as long as the original shims are being used.

A method by which the required amount of shims can be determined will be found at the end of the installation procedure.

1. Set the rigid crossbar on a dolly and move it under the tractor. With suitable lifting device, raise the crossbar into position on the one track frame.
2. Install the track frame. (Refer to Par. 48, steps 1 through 4.) Be sure to keep the crossbar in proper alignment while the track frame is being secured. The hoisting device can be removed from the crossbar before the tractor is lowered.
3. Install the two clamps, four cap screws and two dowel bolts that secure the crossbar to each track frame, but do not torque the bolts or cap screws (Illust. 50).
4. Install the crossbar pivot shaft (14, Illust. 49) in the crossbar. Install the pivot shaft cap (15) and six cap screws. Draw up the cap screws evenly and tighten to specified torque.

If the crossbar shim thickness is to be measured, do not torque the cap screws.

Tighten the bolts and cap screws securing the crossbar to the track frame to specified torque.



5. If the crossbar shim thickness must be determined, proceed as follows:

If the same shims are being used in their proper position, disregard step (a).

(a) Measure the gap between the side channel and the crossbar shim mounting pad on each side of the tractor. If these measurements are not the same, add the two measurements together and divide by two. This will be the proper thickness of shims required for each side.

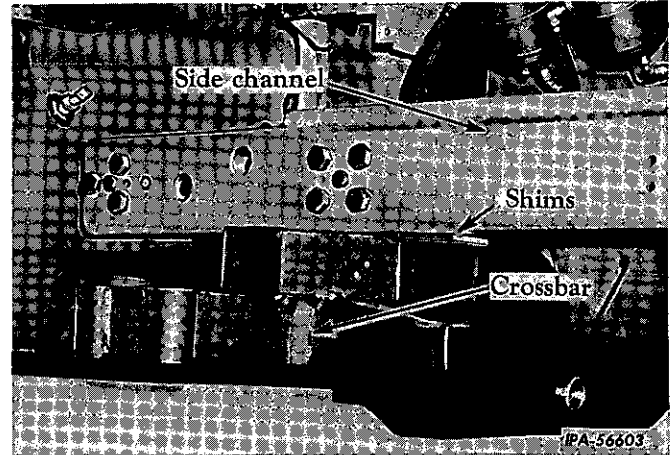
EXAMPLE: Measured gap on left side, $1/2$ -inch; right side, $5/8$ -inch. $1/2$ -inch plus $5/8$ -inch divided by 2 equals $9/16$ -inch, the thickness of shims to be added on each side of the crossbar.

(b) Install the shims of equal thickness to each side of the tractor and secure them with cap screws (Illust. 51).

(c) Tighten the crossbar pivot shaft cap bolts. If the calculations were made correctly, a rigid installation, as required, can be expected.

6. Jack up the front of the tractor and install the crankcase guard. Tighten all cap screws. Lower the tractor.

7. Install the crawbar to the crossbar pivot shaft and secure it with the pivot pin.



Illust. 51 - Location of Shims

8. Install the track idler and tighten the cap screws.

9. Install the track chain. (Refer to Par. 10.)

10. Adjust the track tension. (Refer to Par. 6.)

11. Check the track frame alignment as outlined in this section.

TRACK FRAMES

44. DESCRIPTION

The track frames are constructed of two channels which are welded together with a plate in between (7, Illust. 47). The track frames on 6 series tractors after TDBK-37270 and the 9 series after TDCB-55127 have reinforced side channels. The tractors have finished pads for mounting the track frame pivot bracket, track spring retainer-rear and, track frame and track spring guide, larger mounting bolts for the pivot bracket and the track spring retainer rear, plus increased diameter track spring adjusting rods.

The frames are pivot-mounted to the track frame pivot brackets at the rear of the tractor. Diagonal braces are bolted, and later tractors, also doweled, to the track frame and mounted on bearings at the center of the pivot shaft, maintaining correct track frame alignment and allowing vertical oscillation of the track frame.

Roller type guides at the front of the track frame, control the up-and-down movement and also help to maintain correct track alignment.

The track frames carry the weight of the tractor through the track rollers attached to the bottom of the frames. In addition, the track frames mount the front idlers, the track idlers which carry the top half of the track, and the track springs for absorbing shocks when the tracks strike any obstructions. The tracks travel around the track frames and sprockets located at the rear of the tractor.

45. MAINTENANCE

At regular intervals, examine the bolts and nuts that attach the track frames to the tractor to see if they are secure.



TRACK FRAMES

46. REMOVAL

1. Remove the track chain. (Refer to Par. 7.)

2. TRACTORS EQUIPPED WITH A RIGID CROSSBAR: Remove the bolts that secure the crossbar to the track frame.

3. Jack up the side of the tractor from which the track frame is being removed and block it securely.

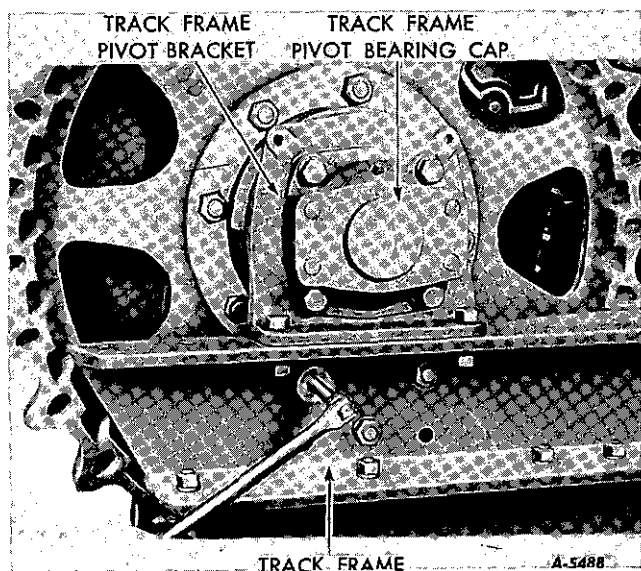
4. Remove the sprocket shield from the track frame. Remove the cap screws that hold the rear of the track frame to the pivot bracket (Illust. 52). Be sure to save the shims, if any that were used for track frame alignment purposes.

5. Remove the track frame guide. (Refer to Par. 61.)

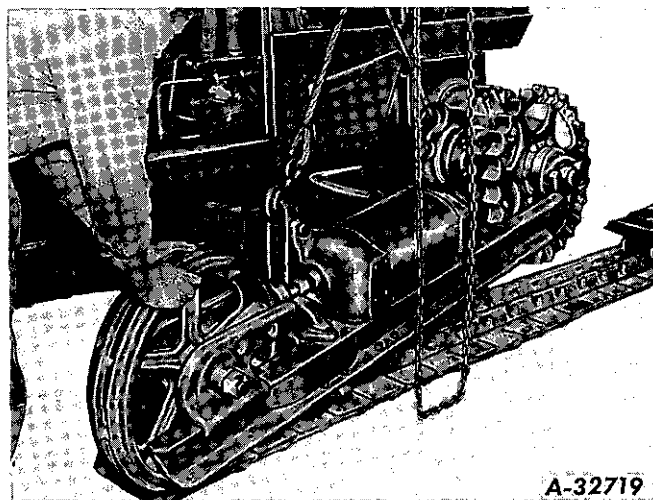
6. Remove the four bolts which secure the diagonal brace to the clamp at the center of the pivot shaft (Illust. 72). Note the thickness of shims and the position from which they were removed, since they must be replaced the same way.

7. 6, 6 (61), 9, 9 (91) SERIES: Using a sling and lifting device, remove the track frame with the rollers, track springs, front idler and track idlers as a unit (Illust. 53).

8. 6 (62) AND 9 (92) SERIES: Same as step 7 except the track idlers will have been removed.



Illust. 52 - Removing the Track Frame Pivot Bracket from the Track Frame.



Illust. 53 - Removing the Track Frame (TD-6 Shown).

47. INSPECTION AND REPAIR

1. If necessary to disassemble the track frame, refer to pertinent paragraph in this section.

2. Clean all parts thoroughly with steam-cleaning equipment.

3. Inspect all parts for damage, and replace parts if necessary.

4. Inspect the track frame for twisting or bending and, if badly bent, replace the frame. When the track frame is assembled on the tractor, check for track frame misalignment and correct, if necessary, as outlined in this section.

48. INSTALLATION

1. Whenever the track frame is installed or if excessive chain and roller scuffing is encountered, the alignment of the track rollers in the track frame must be checked as follows:

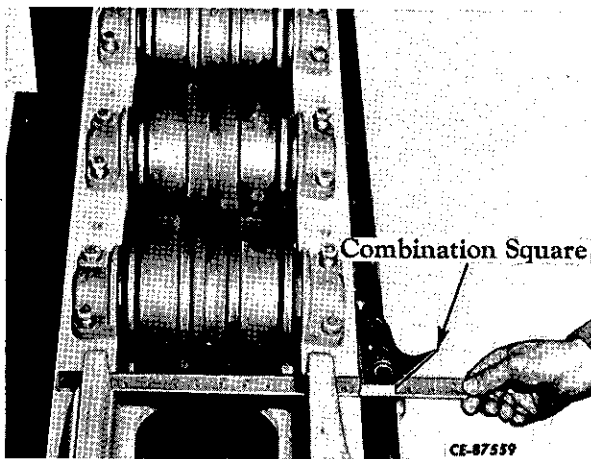
NOTE: If track rollers are not square with the centerline of track frame, rollers may be shifted by loosening the track roller shaft brackets as there is approximately 1/16 of an inch end play between mounting holes in brackets and mounting bolt. In extreme cases, the bolt holes in bracket can be elongated to obtain squareness of roller. When alignment of the bracket is achieved, the open part of the elongated hole must be filled in to prevent the bracket from again moving out of alignment. This can be done by welding and then filing out the hole on the relocated center.

(a) With the track frame in an upside down position, place a combination square



along side the frame and roller flanges to check if rollers are square with centerline of track frame (Illust. 53A). If the square does not fit between rollers, remove all but one end roller and check each roller as it is installed.

(b) Place a straightedge along the inside of rollers and check if the roller flanges are parallel to the straightedge (Illust. 53B). Roller flanges must be parallel to straightedge within 1/32 of an inch.



Illust. 53A - Checking Squareness of Rollers in Relationship to Centerline of Track Frame.

2. With a sling and lifting device, place the track frame in position next to the side of the tractor. Lower the tractor onto the frame, and attach the rear of the frame to the track frame pivot bracket (Illust. 52). If any track frame aligning shims were removed, install the same thickness of shims between the vertical surfaces of the track frame and track frame pivot bracket.

3. Install the track frame guide. (Refer to Par. 65.)



Illust. 53B - Checking Roller Flanges for Parallelism.

4. Secure the track frame diagonal brace to the diagonal brace clamp (Illust. 72), being sure to install the same thickness of standard diagonal brace clamp shims and frame aligning shims, if any, as were removed. Check for proper clearance between the diagonal brace and the diagonal brace bearing (Illust. 73). (Refer to Par. 58.)

5. **TRACTORS EQUIPPED WITH A RIGID CROSSBAR:** Install the bolts that secure the crossbar to the track frame and tighten to specified torque.

6. Install the track. (Refer to Par. 10.)

7. Adjust the track tension. (Refer to Par. 6.)

8. Check track frame alignment as outlined in this section.



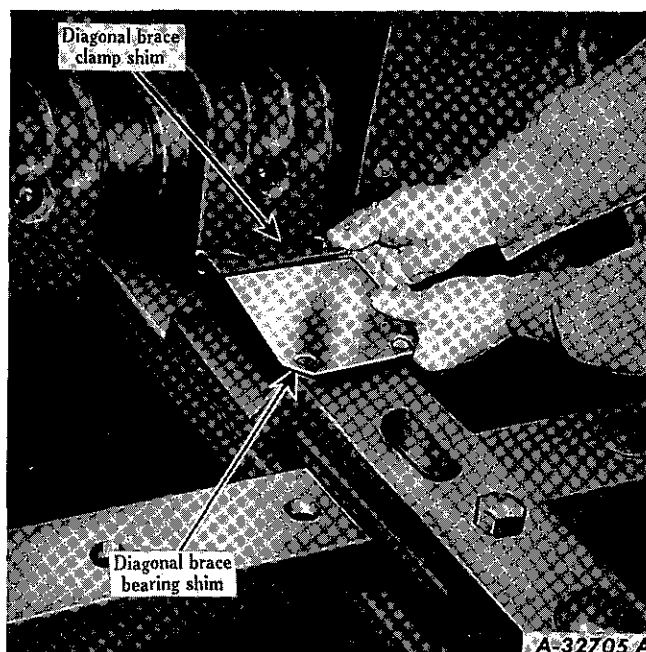
TRACK FRAME ALIGNMENT

49. DESCRIPTION

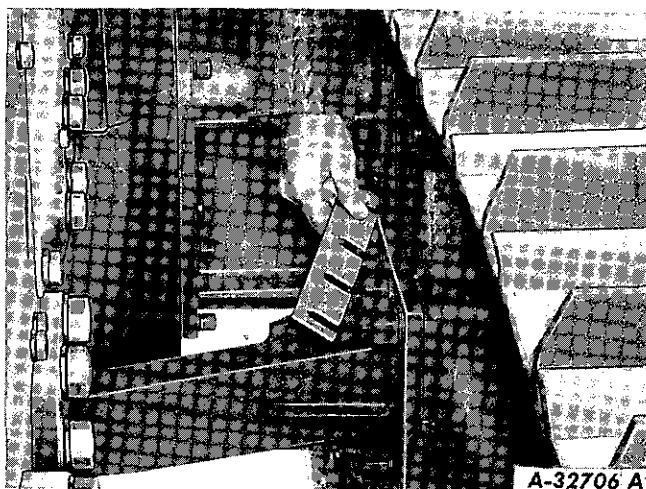
(See "Track Frame Alignment Diagram", Illust. 69)

Before adjusting track frame alignment, the track frame itself must be straight. If the track frame is bent, warped or twisted, it must be removed and straightened, or a new track frame installed. Shims are available for performing each of the adjustments below on the series crawler tractors T-6, TD-6, T-9 and TD-9. Alignment of the track frames is controlled in three ways, by the diagonal braces, track frame pivot brackets and track frame guides as follows:

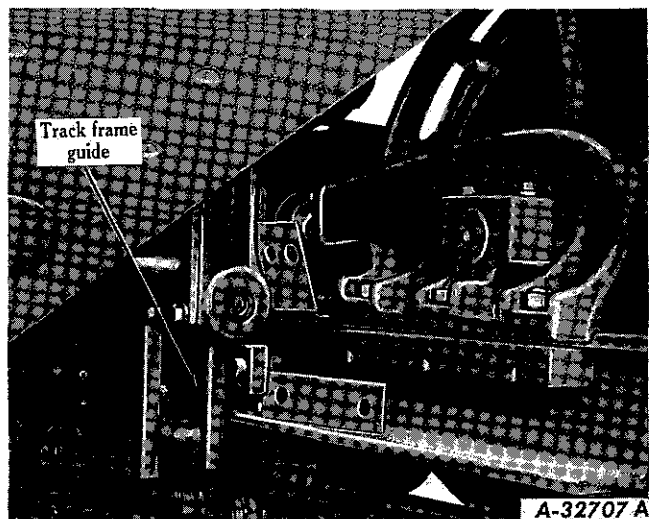
1. The diagonal braces control the vertical position of the track frames. They also indirectly affect the alignment of the sprocket with the rear track roller when shimming to adjust vertical tilt of the track frame. The vertical position is adjustable by shimming between the diagonal brace and bearing at the pivot shaft (Illust. 54), or by machining off the diagonal brace at this point. It is also adjustable at the other end of the diagonal brace by shimming between the rear track spring retainer and the top or bottom of the diagonal brace flange (Illust. 55).
2. The relation between the center of the sprocket and the center of the rear track roller is controlled partially by the vertical tilt of the track frame. (Step (1) above.) Further adjustment can be obtained by shimming between the track frame pivot bracket and the track frame (Illust. 57), or by machining off the face of the track frame pivot bracket.
3. Toe-in or toe-out of the track frame is controlled by the track frame guide. This can be adjusted by the addition of shims between the guide and the track frame (Illust. 56) or by machining off the mounting face of the guide.



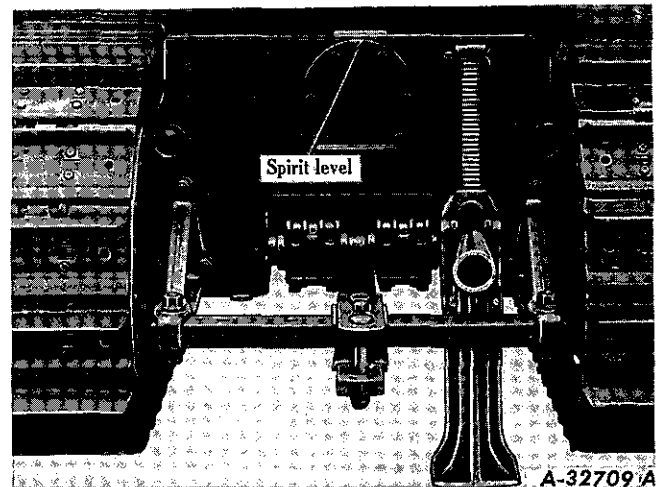
Illust. 54 - Diagonal Brace Bearing Shims.



Illust. 55 - Diagonal Brace Flange Shim.



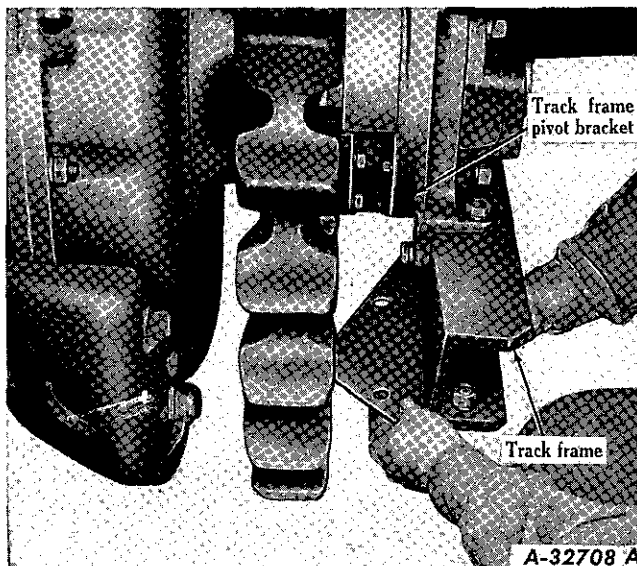
Illustr. 56 - Track Frame Guide Shims.



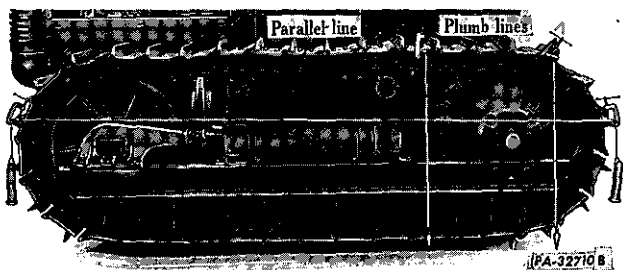
Illustr. 58 - Leveling the Main Frame.

50. PREPARATION FOR ALIGNMENT CHECK

1. With clean tracks and rollers, set the tractor on a flat area, preferably concrete.
2. Operate the tractor back and forth several times to settle clearances. Place a spirit level across the back of the main frame to check level from sprocket to sprocket (Illustr. 58). Use a jack to level the main frame if necessary.
3. Make all checks and align one track frame at a time. Clamp two wood pieces to the track shoes as shown in Illustr. 59. Suspend a plumb bob from each of the wood pieces so that both lines (preferably linen fish line) are equal distances from the main frame machined surface which hold the sprocket drive carrier.
4. Run a linen fish line parallel to the tractor so that it just touches both plumb lines. Be careful not to move the plumb lines with the parallel line. Measure the distance from the machined surface of the main frame from points as indicated in Illustr. 60 and 61 to the vertical plumb lines. This establishes a true parallel with the main frame and is the basis for measurement to determine toe-in or toe-out.
5. Mark the center line of the sprocket on one of the sprocket teeth at approximately the same height as the parallel line. Mark the center line of the front idler on the rim in the same manner.



Illustr. 57 - Track Frame Pivot Bracket Shim.

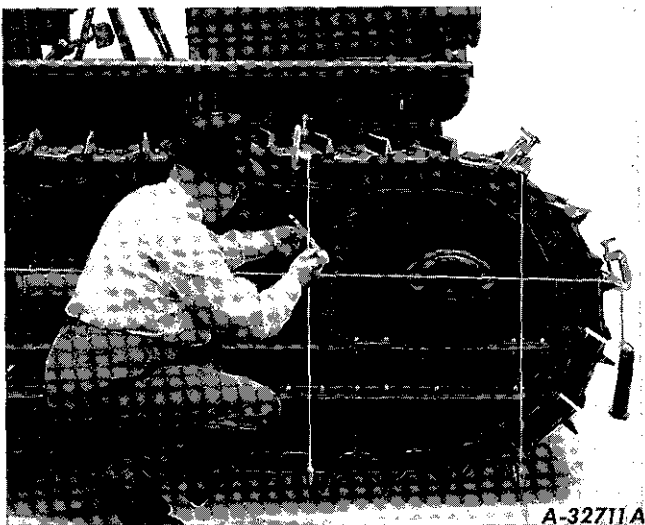


Illust. 59 - Horizontal and Plumb Lines Set for Establishing Parallel.

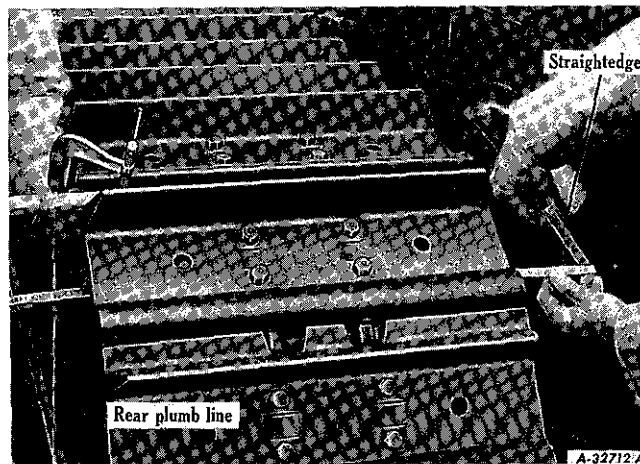
51. VERTICAL ALIGNMENT

1. Move the rear plumb line to the center of the front idler as shown in Illust. 62. Measure the distance from the outside edge of the front idler rim to the plumb line at the bottom (Illust. 63) and at the top (Illust. 64), being sure the plumb line is at the center of the idler. Comparison of the two measurements will determine if the track frame is vertically misaligned.

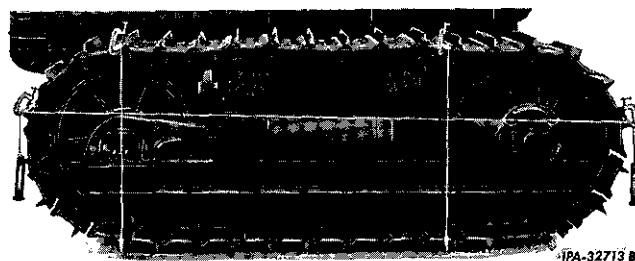
2. If the top of the front idler tips outward, correct by adding shims between the diagonal brace and diagonal brace bearing (Illust. 54).



Illust. 60 - Checking Parallelism of Horizontal Line and Main Frame.



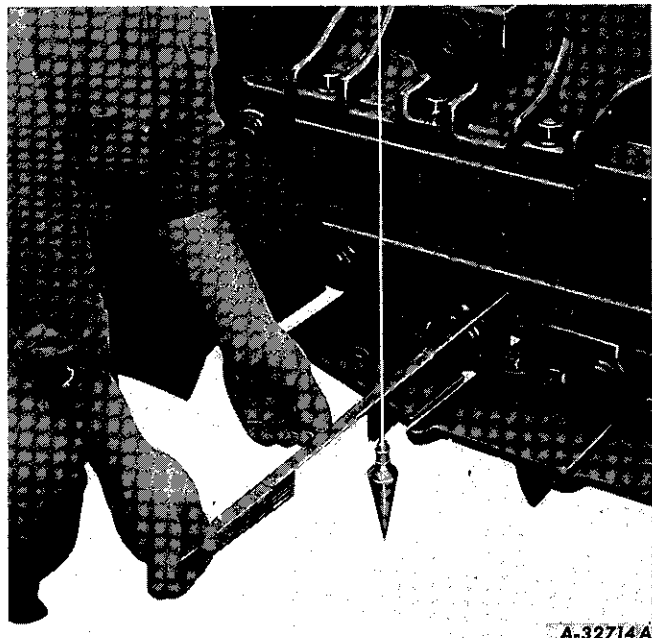
Illust. 61 - Checking Parallelism of Horizontal Line and Main Frame.



Illust. 62 - Plumb Lines Set for Checking Vertical Alignment of Track Frame.

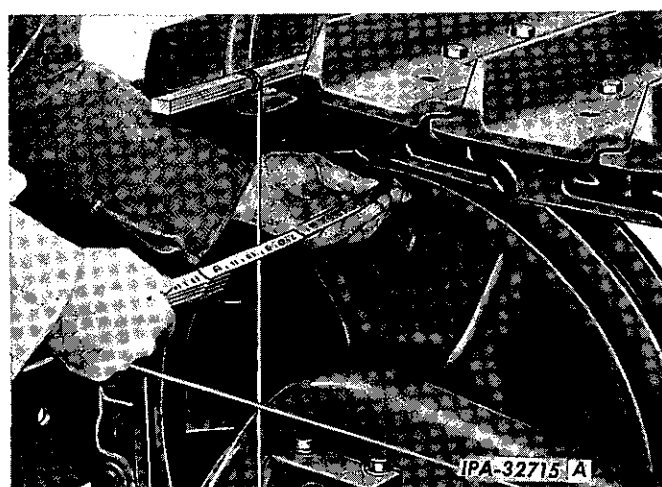
NOTE: An equal thickness of diagonal brace clamp shims must be installed under the inner end of the clamp to keep the bearing clearance parallel (Par. 58). If unable to obtain the necessary amount of vertical tilt with a limit of 5/16 inch thickness of shims at the diagonal brace bearing, then insert shims between the bottom of the diagonal brace mounting flange and rear track spring retainer (Illust. 55).

3. If the top of the front idler tips inward, correct by machining material from the finished face of the diagonal brace at the bearing, and/or adding shims between the top of the diagonal brace mounting flange and rear track spring retainer (Illust. 55). The only other alternative is to install a new diagonal brace.



Illustr. 63 - Vertical Alignment Check at Bottom of Front Idler.

3. If the bracket requires shimming or machining, it may be necessary to elongate the top holes of the bracket to facilitate installation of the top bolts.



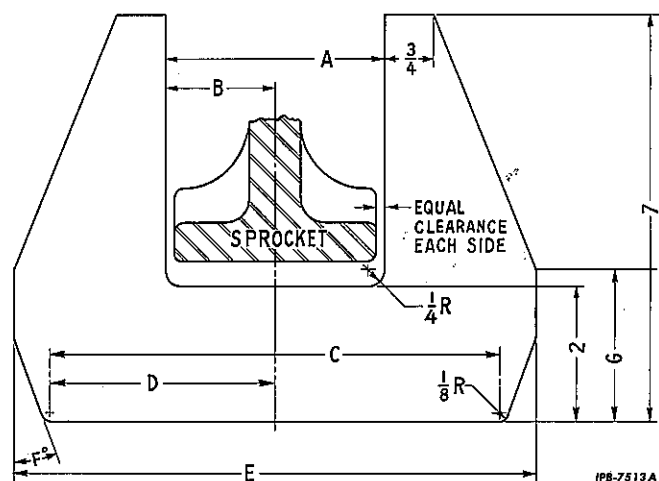
Illustr. 64 - Vertical Alignment Check at Top of Front Idler.

52. ALIGNMENT OF SPROCKET BETWEEN TRACK ROLLER FLANGES

1. To determine alignment of the sprocket between the flanges of the rear track roller, use a template of suitable material constructed as shown in Illustr. 65.

2. Vertical alignment of the track frame (Par. 51) will usually automatically center the sprocket between the flanges of the rear track roller. However, if further adjustment is necessary, add shims between the track frame pivot bracket and track frame (Illustr. 57) or machine material off the finished face of the bracket.

Model	A	B	C	D	E	F	G
6	2 1/2	1 1/4	5 5/32	2 37/64	6 3/8	20°	2 1/4
9	2 5/8	1 5/16	5 21/32	2 53/64	6 3/4	20°	1 7/8



Illustr. 65 - Template for Checking Alignment of Sprocket and Rear Track Roller.

**53. TOE-IN OR TOE-OUT**

1. To check for toe-in or toe-out, measure the distance from the center line of the front idler and sprocket to the horizontal line (Illust. 66 and 67), and compare the two measurements. If the measurement at the front idler is greater, the track frame toes-in. If the measurement at the sprocket is greater, the track frame toes-out.

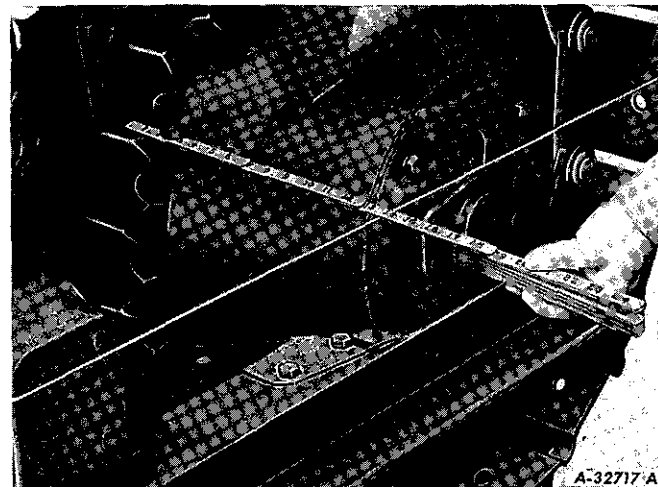
2. Correct toe-in by installing shims between the track frame guide and the track frame assembly (Illust. 56).

3. Correct toe-out by machining off the vertical mounting face of the track frame guide.

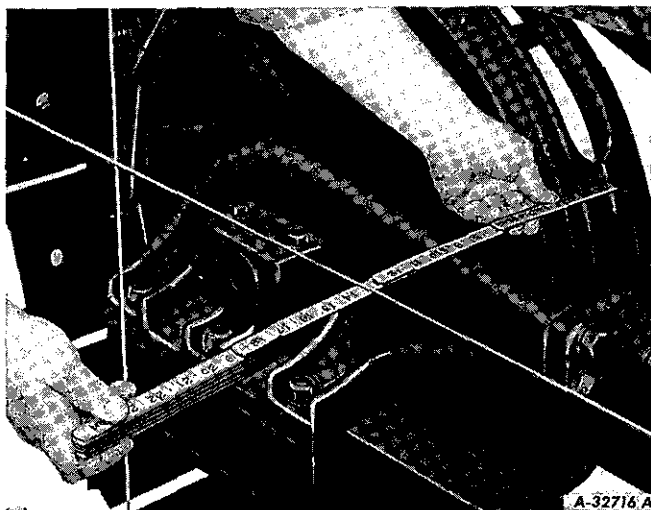
54. FRONT IDLER ALIGNMENT

To check for toe-in or toe-out of front idler in relation to track frame (not to be confused with toe-in or toe-out of track frame), measure the distance from the front edge of the idler to the horizontal line and also from the rear edge of the idler to the horizontal line. If the idler toes-out, add shims between the cross plate and the outer front idler guide (Illust. 66). If the idler toes-in, add shims between the cross plate and inner guide.

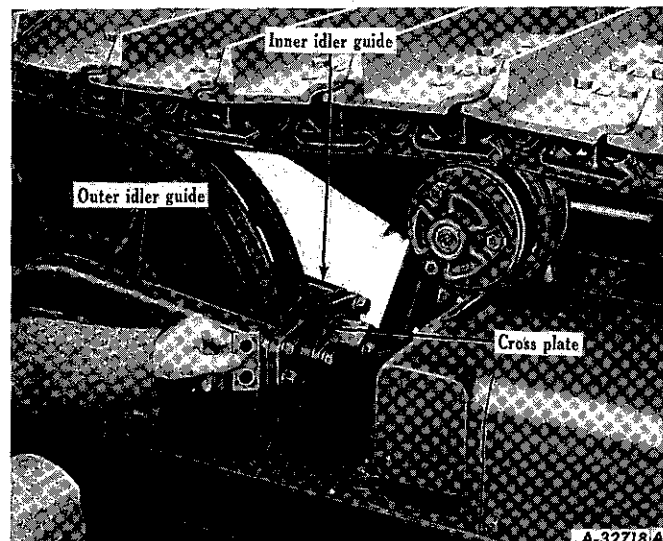
NOTE: After track frame alignment is completed, operate the tractor and inspect visually; then recheck all alignment points and readjust if necessary.



Illust. 67 Measuring Distance from Center of Sprocket to Horizontal Line (Toe-in or Toe-out).



Illust. 66 Measuring Distance from Center of Front Idler to Horizontal Line (Toe-in or Toe-out).



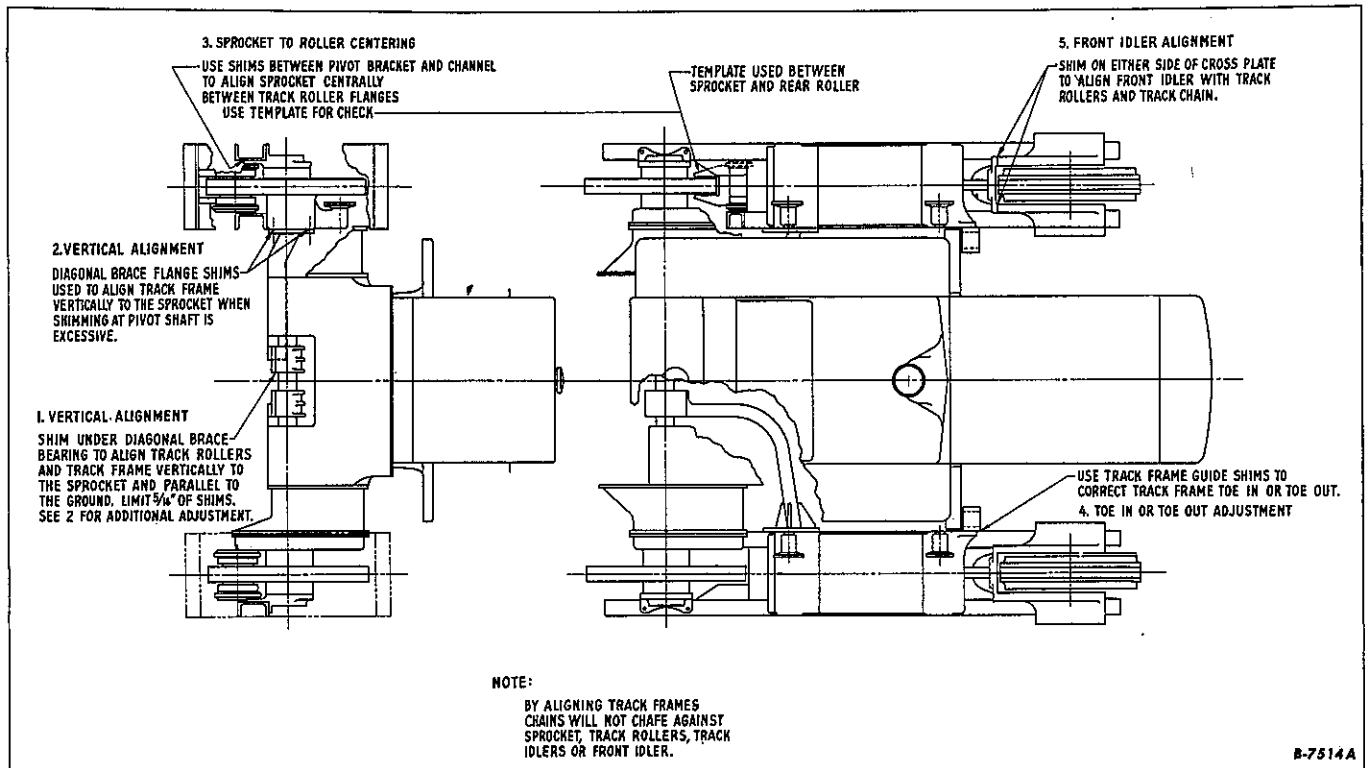
Illust. 68 - Front Idler Alignment Shim.



TRACKS AND TRACK FRAME

TRACK FRAME ALIGNMENT

Section 9
Page 41



Illust. 69 - Track Frame Alignment Diagram.

TRACK FRAME DIAGONAL BRACES

55. DESCRIPTION

The diagonal braces keep the tracks in vertical alignment and extend from fixed positions on the track frame to a pivot bearing near the center of the pivot shaft.

56. REMOVAL

1. Remove the stud nuts (9, Illust. 70) which secure the diagonal brace to the rear track spring retainer on the track frame.
2. Remove the cap screws which secure the clamp to the diagonal brace (Illust. 72). When removing the clamp, note the amount of shims

and the positions from which they were removed, as they must be reassembled in the same manner.

3. Pull the diagonal brace off the studs in the rear track spring retainer. The dowel pins will come out at the same time. The diagonal braces on later model tractors are line reamed with the track spring retainer, and use headless dowel pins retained by socket head set screws (Illust. 71),

4. Remove the nuts and cap screws and remove the diagonal brace bearing (5, Illust. 70) from the pivot shaft. Remove the felts (3) from the bearing.

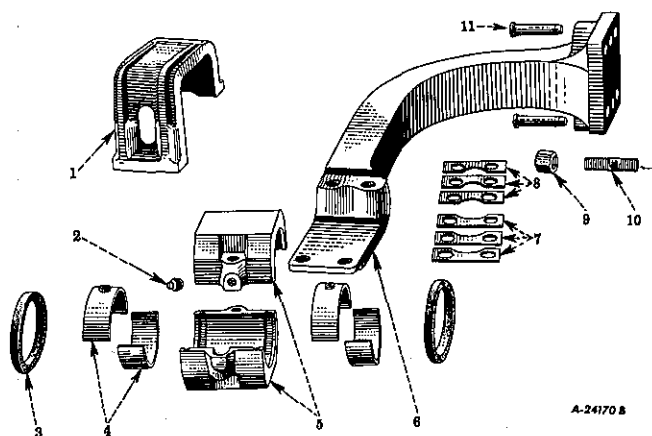
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TRACKS AND TRACK FRAME
TRACK FRAME DIAGONAL BRACES



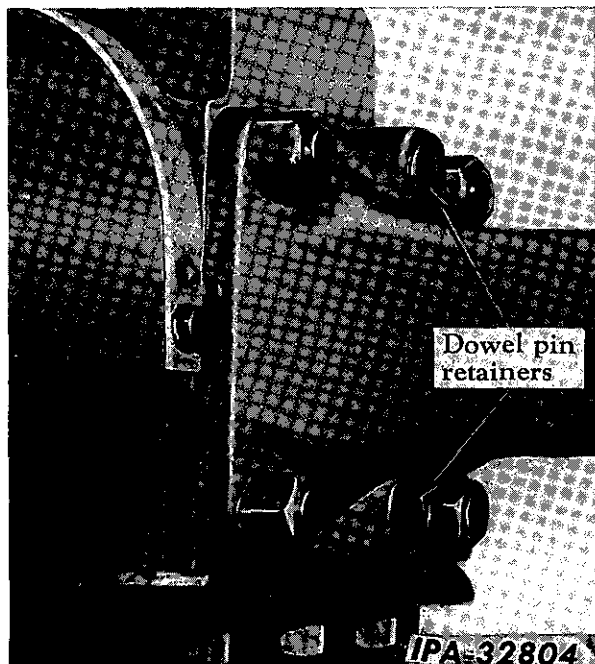
*Boise and Houston
West Western Eq
Arnold Machinery*

Jerry Anderton 343-7993

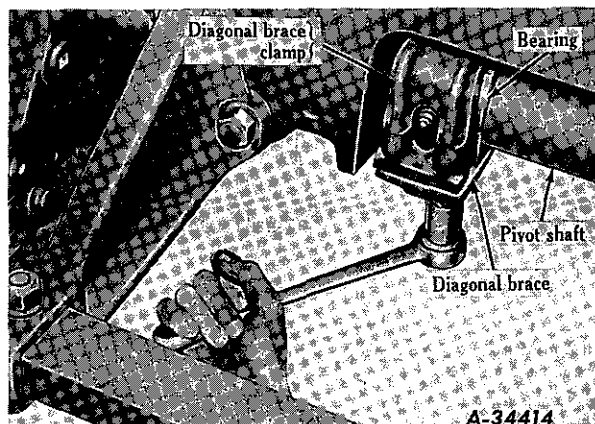


Illust. 70 - Exploded View of Diagonal Brace (T-6 and TD-6 Shown - Others Similar).

- | | |
|--------------------------|------------------------|
| 1. Diagonal brace clamp. | 7. Clamp shims, outer. |
| 2. Lubricator. | 8. Clamp shims, inner. |
| 3. Bearing felt. | 9. Stud nut. |
| 4. Bearing bushing. | 10. Stud. |
| 5. Bearing. | 11. Dowel pin. |
| 6. Diagonal brace. | |



Illust. 71 - Diagonal Brace Mounting with Dowels Retained by Socket Head Set Screws.



Illust. 72 - Removing the Diagonal Brace Clamp.

57. INSPECTION AND REPAIR

1. Clean parts with steam-cleaning equipment.
2. Inspect parts for damage and replace as necessary. Replace felts with new felts. If worn excessively, replace the diagonal brace bearing bushing (4, Illust. 70).

58. INSTALLATION

NOTE: If installing a new or repaired diagonal brace, any track frame aligning shims previously used with the old diagonal brace must be disregarded and a new track frame alignment check made as outlined in this section.

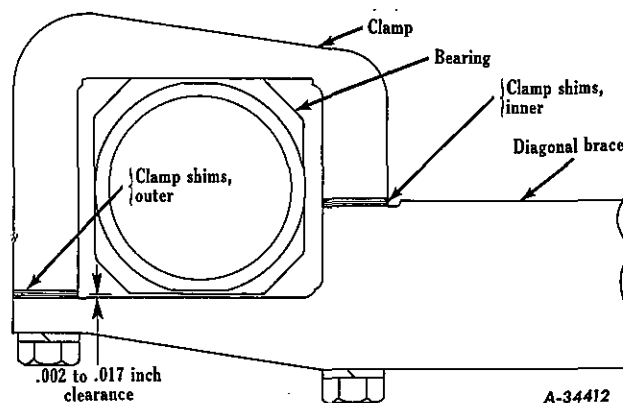
1. Install new felts (3, Illust. 70) in the grooves of the diagonal brace bearing (5).
2. Position the bearing on the pivot shaft and install cap screws, nuts and lock washers.
3. Install the diagonal brace on the studs (10) in the rear track spring retainer and secure with stud nuts (9).
4. Install the clamp (1) over the diagonal brace bearing. Place the same amount of clamp shims (7 and 8), and any track frame aligning shims which were removed, between the clamp and diagonal brace. Secure the clamp to the brace with cap screws and lock washers (Illust. 72).



TRACK FRAME DIAGONAL BRACES

5. If a new diagonal brace, clamp or bearing was installed, check with a feeler gauge for .002 to .017 inch clearance between the diagonal brace and the bearing, as shown in Illust. 73. If clearance is not right, add or remove an equal number of inner and outer clamp shims until correct clearance is obtained.

NOTE: When track frame aligning shims are used between the diagonal brace and the bearing, an equal thickness of shims must be installed under the inner end of the clamp only, to keep the bearing clearance parallel.



Illust. 73 -- Diagonal Brace Bearing Clearance.

TRACK FRAME GUIDES

59. DESCRIPTION

The track frame guides maintain the track spacing and allow the track frames to oscillate vertically. Guide rollers operate within the guides. The rollers are attached to the roller brackets which are attached to the main side channels. The guides are attached to the track frame.

60. MAINTENANCE

Lubricate the guide rollers as described in the "Lubrication Charts" section of the operator's manual.

61. REMOVAL

1. Remove the nuts and cap screws which hold the guide roller, with bracket, to the main frame side channel.
2. Remove the guide roller bracket with roller.
3. Remove the cap screws which secure the guide to the track frame, and remove the guide and track frame aligning shims, if any.

62. DISASSEMBLY

1. Bend back the retainer lock and remove the cap screws which hold the retaining washer to the roller bracket shaft.
2. Remove the lock, retaining washer and roller. ("6" series tractors do not have retaining washer locks.)

63. INSPECTION AND REPAIR

1. Clean all parts of this assembly with cleaning solvent. Be sure that oil passages of the roller shaft are open.
2. Inspect all parts for damage and wear. Replace parts if necessary.

64. REASSEMBLY

1. Place the roller on the roller bracket shaft and install the retaining washer and lock.
2. Secure the retaining washer to the shaft with cap screws. Bend up the lock to prevent the cap screws from loosening. ("6" series tractors do not have retaining washer locks.)

65. INSTALLATION

1. Secure the track roller guide and track frame aligning shims, if any, to the track frame with cap screws.

NOTE: If a new guide, guide roller, roller bracket or bracket brace is being installed, omit any track frame aligning shims that were previously used at the guide and recheck track frame alignment as outlined in this section.

2. Place the guide bracket with roller in position. Secure the bracket to the main frame side channel with cap screws and nuts.













