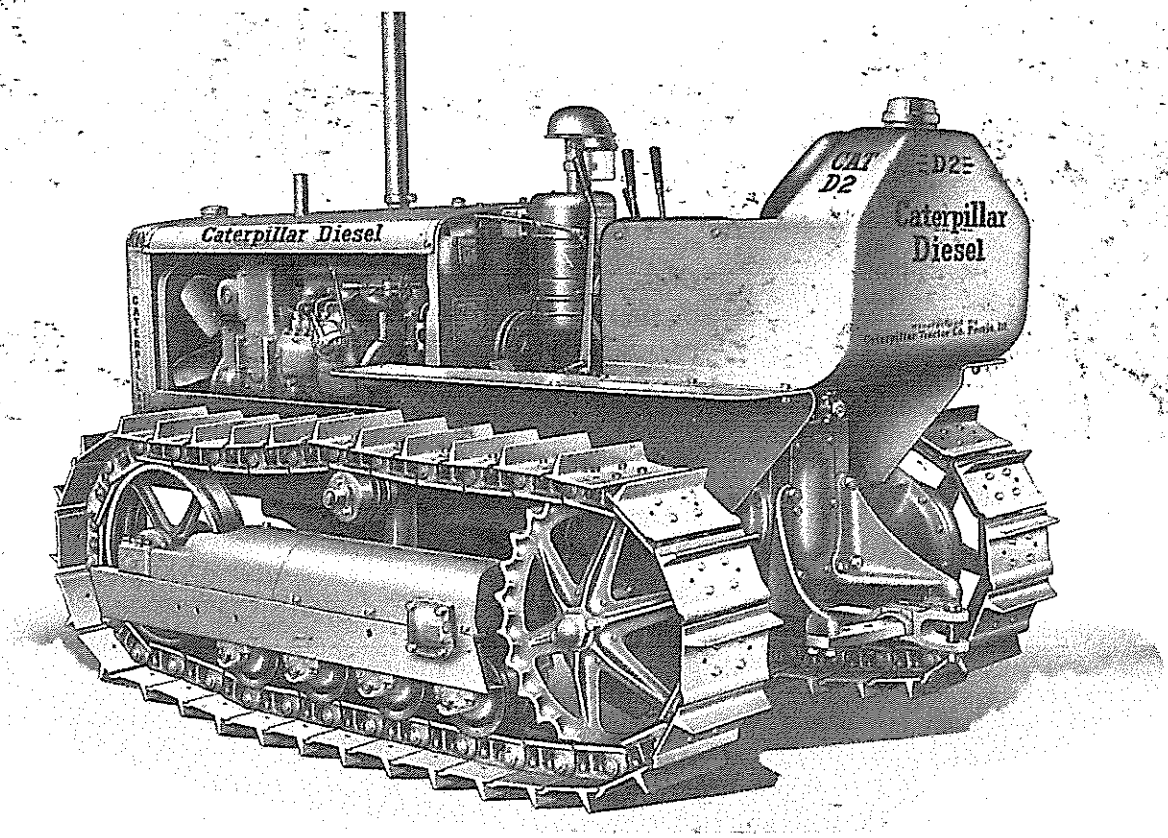
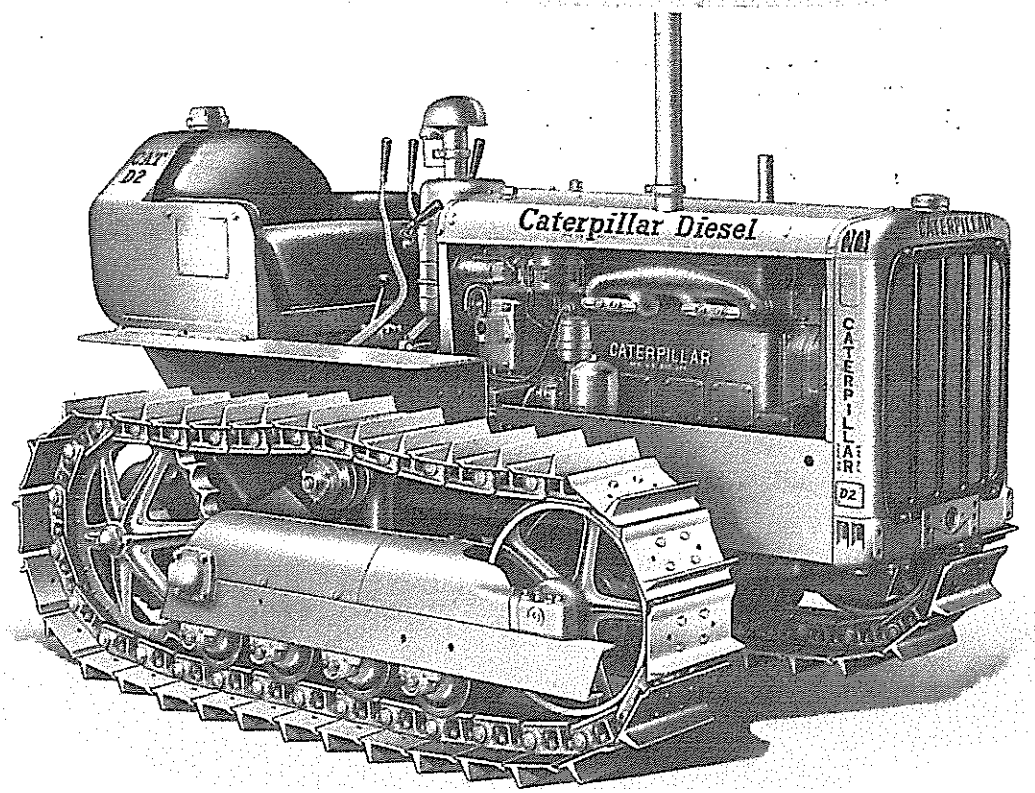
DIESEL TRACTOR

CATERPILLAR D2

48 HP (Flywheel)





SPECIFICATIONS

FLYWHEEL CLUTCH

Clearance between shaft and sliding collar	.025 - .029 -in.
Maximum permissible clearance	.050 -in.

BEVEL GEAR

Bevel gear and pinion backlash	.007 - .009 -in.
Bevel gear bearing pre-load:	
Shims to be removed after end play taken up	.017 in.
Or, torque to rotate without seals	50-60 lb. in.
Bevel gear hub-to-shaft press fit, tons	12

STEERING CLUTCH

Clearance between shaft and pressure plate bushing	.002 - .006 -in.
Maximum permissible clearance	.015 -in.
Clutch Spring	
Outer	
Pounds pressure	147¼-162¾
When compressed to	3 15/32-in.
Inner	
Pounds pressure	113-125
When compressed to	3 7/32-in.
Steering clutch, minimum overall width plates and discs	2 19/32-in.
Steering clutch, inner drum-to-shaft press fit, tons	15
Steering clutch lever adjustment, free play	. 3-in.

BRAKES

Adjustment	
Distance pedal depressed	3 to 4-in.
Turns to back screw off underneath transmission case	1½

FINAL DRIVE

Flange-to-final-drive-pinion press fit, tons	15
Final drive gear-to-shaft press fit, tons	20
Sprocket-to-hub press fit, tons	15

TRACK ROLLER FRAME GROUP

Track Roller Frame

Pivot shaft bearing clearance	.003 - .005 -in.
Pivot shaft bearing clearance, maximum	.015 -in.

Track Rollers

Shaft clearance	.011 - .014 -in.
Maximum permissible shaft clearance	.050 -in.
End clearance	.010 - .028 -in.
Maximum permissible end clearance	.050 -in.

Front Idlers

Shaft clearance	.010 - .013 -in.
Maximum permissible shaft clearance	.050 -in.
End clearance	.010 - .028 -in.
Track adjustment, slack	1½-2-in.
Limit of adjusting track, specified distance	3½-in.
Recoil springs, assembled length	17 1/16-in.

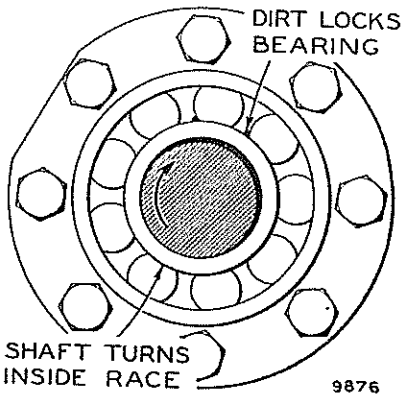
General Instructions

These general instructions will be extremely helpful in following the detailed instructions in the main sections of the book. They should be read and then kept in mind while assembling or disassembling the machine.

KEEP DIRT OUT

The most important single item in preserving the long life of the machine is to keep dirt out of vital working parts. Caterpillar Tractor Co. has taken precautions to safeguard against dirt entering working parts. Enclosed compartments, seals and filters have been provided to keep the supply of air, fuel, and lubricants clean. It is highly important that the effectiveness of these safeguards be maintained. Filters should be replaced or cleaned regularly. Worn seals or broken gaskets should be replaced immediately.

Anti-friction bearings, properly lubricated with clean lubricant, will last indefinitely. Abrasives in the lubricant will cause rapid wear on the extremely hard races and balls or rollers. Dirt in an anti-friction bearing can cause the bearing to lock, with the result that the shaft will turn in the inner race or the outer race will turn within the cage. Dirt and abrasives in lubricants will embed in bushing-type bearings and act like fine sandpaper against the shaft, causing extremely rapid wear.



EFFECT OF DIRT IN BEARING

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Lubricant must be changed at recommended intervals. Use clean containers. Before removing a filler cap, brush away the dirt with the brush provided in the tool kit.

Wear on fuel injection pumps and other parts of the fuel system will be almost negligible if the fuel is perfectly clean.

Operating adjustments have been kept to a minimum on "Caterpillar"-built machines but they are important and should be carefully maintained.

Keep the flywheel clutch in adjustment to avoid slippage and the resulting loss of power and shortened service life of the clutch plates. Correctly adjusted clutch and brakes are essential to good performance.

INSPECT FREQUENTLY AND CORRECT MINOR TROUBLES

A bearing changed in time will save a shaft. An oil leak corrected prevents loss of lubricant and an overheated bearing. A nut tightened in time will prevent the loss or breakage of an associated part.

RECONDITIONING PROCEDURE

This book has been arranged for the disassembly and reconditioning of individual parts of the machine. If the machine is to be disassembled for complete inspection and rebuilding, the following procedure is recommended:

1. Remove sheet metal guards, including hoods and radiator guard and clean the machine thoroughly.
2. Raise the machine and block it securely, front and rear.
3. Separate both tracks.
4. Remove both track roller frame assemblies.
5. Remove radiator.
6. Lift out engine.
7. Remove seat and fuel tank.
8. Remove flywheel clutch.
9. Remove final drive cases.
10. Remove sprockets.
11. Remove steering clutches and bevel gear.
12. Disassemble final drive parts.
13. Disassemble transmission.

Instructions for removing and disassembling these parts are contained in this Reference Book, although not necessarily in the above order.

SAFETY AND WORKMANSHIP SUGGESTIONS

There are certain practices which should be followed in the interest of safety and good workmanship when working around machinery.

Always show proper respect for weight. Do not attempt to lift heavy parts where a hoist should be used. Never leave heavy parts in an unstable position. When raising a machine, make sure that it is blocked securely. Then block it up so that the weight will be supported by the blocks rather than the lifting equipment.

Tools

All service tools should be kept in first class condition. Use the proper tool for the job at hand. Special service tools are available for specific jobs and they should be used when recommended. The use of these tools will save time and prevent damage to parts.

In the following pages puller arrangements are illustrated for separating tightly fitted parts. However, if the machine is being reconditioned in a shop, it may in many cases be easier and faster to use a press. When pulling a bearing or gear from a shaft, always use a centering spacer between the forcing screw and the end of the shaft.

Disassembly

If a part offers unexpected resistance to removal, check carefully to see that all nuts and capscrews have been removed before using force. Possibly some other part is interfering and should be removed first. Parts which are fitted together with tapered splines are always very tight. If they are not tight when disassembled, inspect the tapered splines and discard the part if the splines are worn.

Where shims are used, be sure to remove them all. Tie the shims together and identify them as to their location. Then keep them clean and flat until they are installed.

CLEANING AND INSPECTION

Clean all parts thoroughly after they are removed and inspect them. Be sure all lubricant passages and oil holes are open. Badly worn or damaged parts should not be put back in the machine. Cover all parts to keep them clean until they are installed.

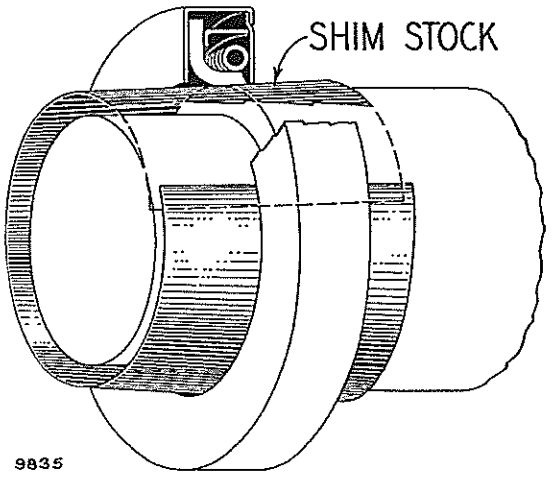
Anti-friction bearings should receive special handling. As soon as a bearing is removed, cover it to keep out dirt and abrasives. Wash bearings in non-inflammable cleaning solution and inspect the races and balls or rollers. Discard the bearings if they are pitted, scored, or burned. If the bearing is serviceable, coat it with light oil and wrap it in clean paper. Do not unwrap new bearings until ready to install them.

ASSEMBLY

Clean the rust preventive compound from all machined surfaces of new parts before installing them. Be sure to install parts in the proper location and position.

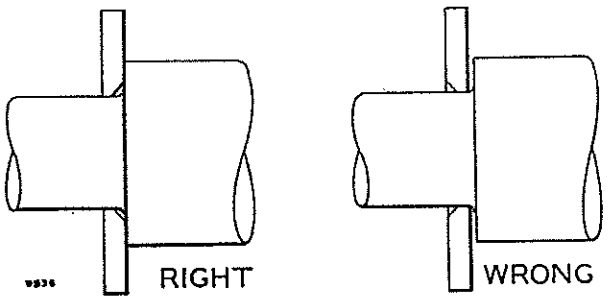
When one part is pressed into another, use white lead or a suitable prepared compound to lubricate the mating surfaces. Tapered parts, however, should be assembled dry. Before assembling parts with tapered splines, be sure the splines are clean, dry and free from burrs. Then press the parts together tightly.

When possible, soak new leather seals in warm oil for a half hour before installing. Install the seal with the wiping edge turned in the direction recommended. Be careful not to cut the leather seal as it is installed or when installing a shaft through the seal. Use shim stock if necessary to protect the seal from shoulders or sharp edges during installation. Packing-type seals should always be renewed if the contacting part is removed.



PROTECTING SEAL DURING INSTALLATION

When installing a bearing, spacer, or washer against a shoulder on a shaft, be sure the chamfered side is toward the shoulder. If the washer is turned in the wrong direction the radius may interfere and prevent the washer from seating against the shoulder.



HOW TO INSTALL SPACER AGAINST SHOULDER ON SHAFT

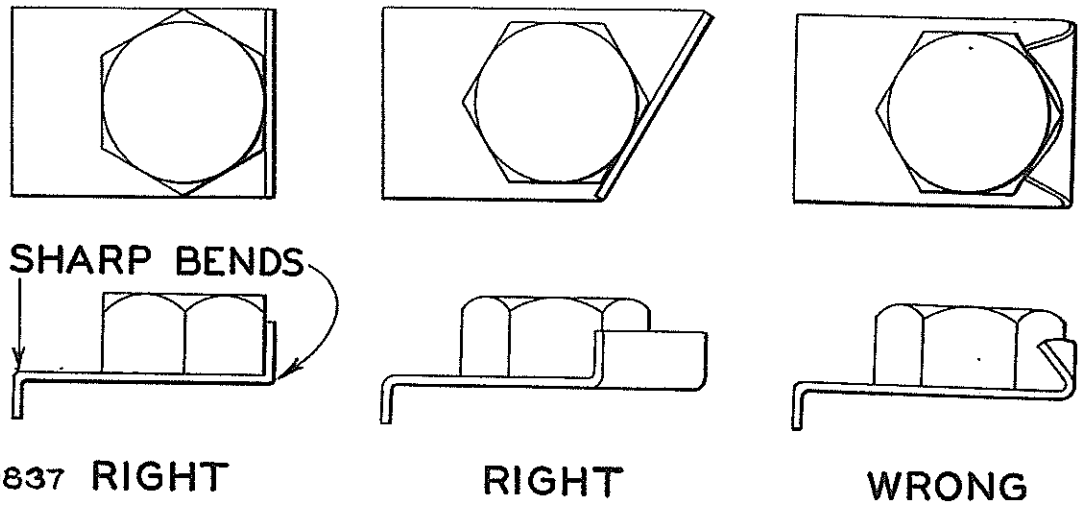
Do not install bushings by driving them in with a hammer. Use a press if possible and be sure to apply the pressure directly in line with the bore. If a bushing must be driven in, use a bushing driver or a bar with a smooth flat end. If the bushing has an oil hole, be sure it is lined up with the oil hole in the part in which it is assembled.

Install gaskets where required and use new ones if necessary. Never use cork or felt gaskets or seals a second time. Be sure the holes in the gaskets correspond with the lubricant passages in the mating parts. If it is necessary to make gaskets, select stock of the proper type and thickness and be sure to cut sufficient holes in the right places. Blank gaskets can cause serious damage.

Use capscrews of the correct length. A capscrew which is too long may "bottom" before the head is tight against the part it is to hold, and in addition the threads may be damaged when the capscrew is removed.

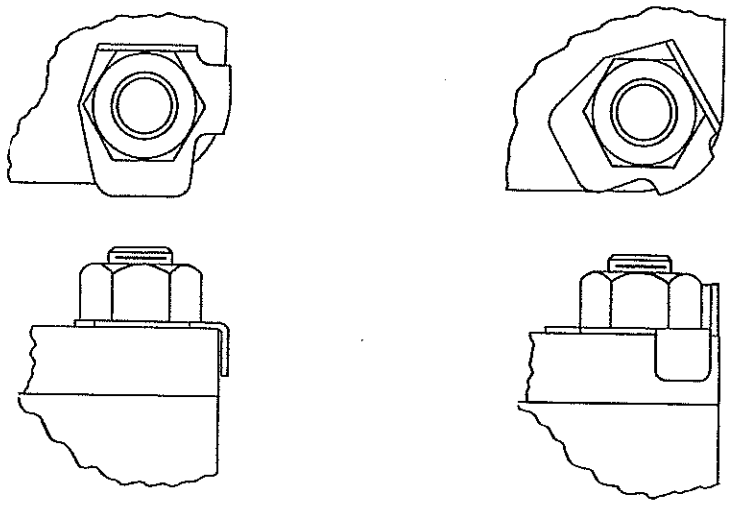
If a capscrew is too short, there will not be enough threads to hold the part securely.

Lockwashers, cotter pins, or flat metal locks should be used to lock each nut and capscrew. Flat metal locks must be installed properly to be effective. Bend one end of the lock sharply around the edge of the part. Bend the other end sharply against one flat surface of the nut or capscrew head. Do not bend the lock against more than one side of the nut.



HOW TO INSTALL FLAT METAL LOCKS

When assembling a machine complete each step in turn. Do not leave one part partially assembled and start assembling some other part. Make all adjustments as recommended. Always check the job after it is completed to see that nothing has been overlooked.

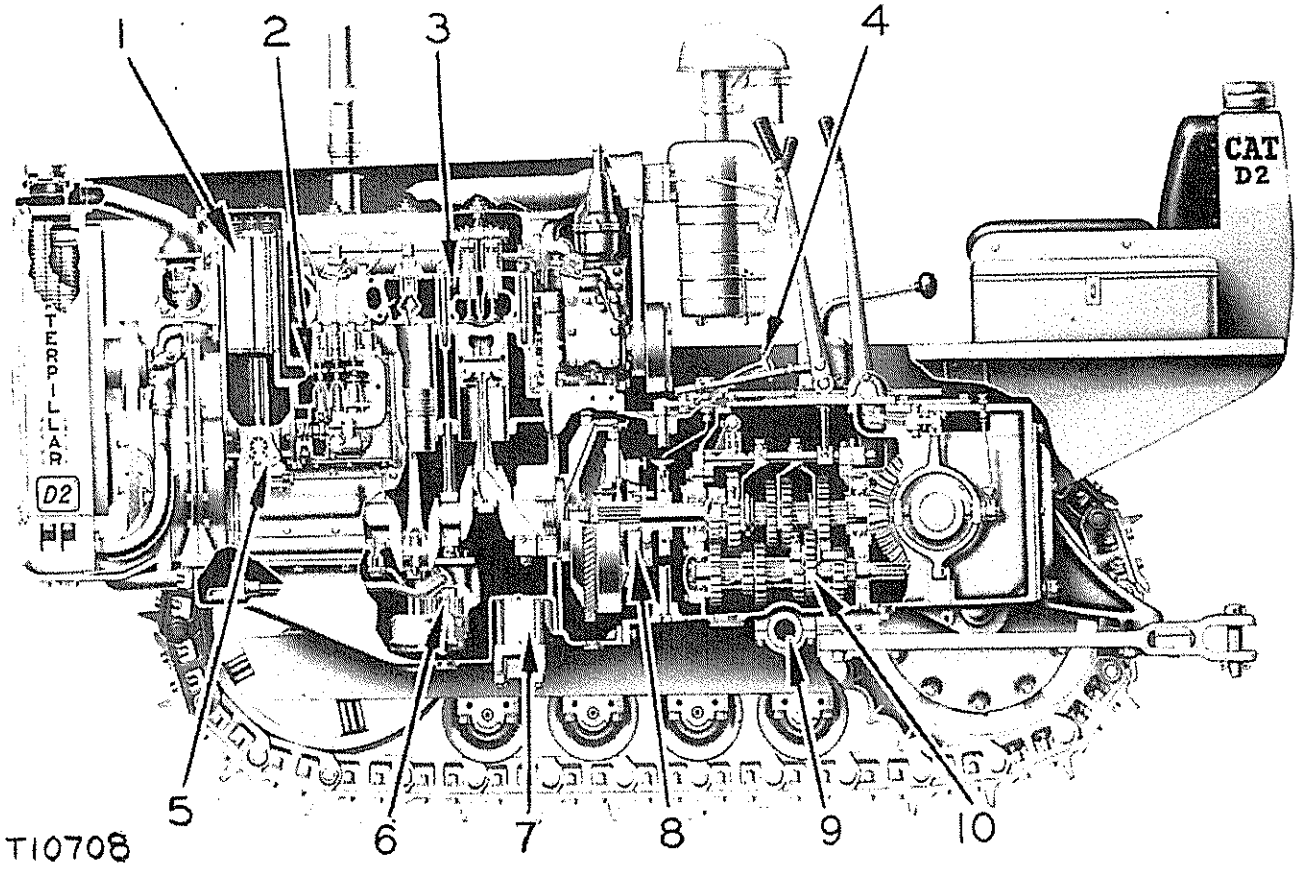


METHOD FOR LOCK POSITIONING AND BENDING

PREPARATION FOR STARTING

After assembling a machine, lubricate it thoroughly. Fill the various compartments with the type and grade of lubricant recommended in the Operator's Instruction Book.

Recheck the various adjustments by operating the machine before returning it to the job.



1. Fuel Filters
2. Fuel Injection Pump Housing
3. Cylinder Head
4. Brake Pedal
5. Fuel Transfer Pump
6. Oil Pump
7. Equalizer Spring
8. Flywheel Clutch
9. Pivot Shaft
10. Lower Transmission Shaft

D2 TRACTOR SIDE VIEW CUTAWAY (LEFT SIDE) (LATER TRACTOR)

DIESEL ENGINE

The engine which powers the D2 Tractor is a 4-cylinder, 4-stroke cycle, valve-in-head, "Caterpillar" Diesel engine. It has a 4" bore in the later or 4U and 5U series tractors and 3¾" bore in the earlier or 3J and 5J series tractors. Reference material concerning each engine will be covered in a separate engine book. However, there are some instructions pertaining to the engine that are specific only to the D2 Tractor and these differences are covered in this book.

Hood and Dash Removal

Remove the Diesel engine exhaust pipe extension.

Take out the capscrews securing the hood to the radiator top tank and to the dash and lift the hood from the tractor.

Disconnect the governor control lever and remove the Diesel engine air cleaner (later tractors).

Disconnect the lines leading to the water temperature gauge and the oil pressure gauge.

Remove the six capscrews securing the two floor plates to the dash. The dash is secured to the fenders by three capscrews on each side. Remove these six capscrews and lift the dash from the tractor.

Radiator Removal

(Later Tractors)

Remove the engine side plates and hood.

Drain the coolant from the radiator.

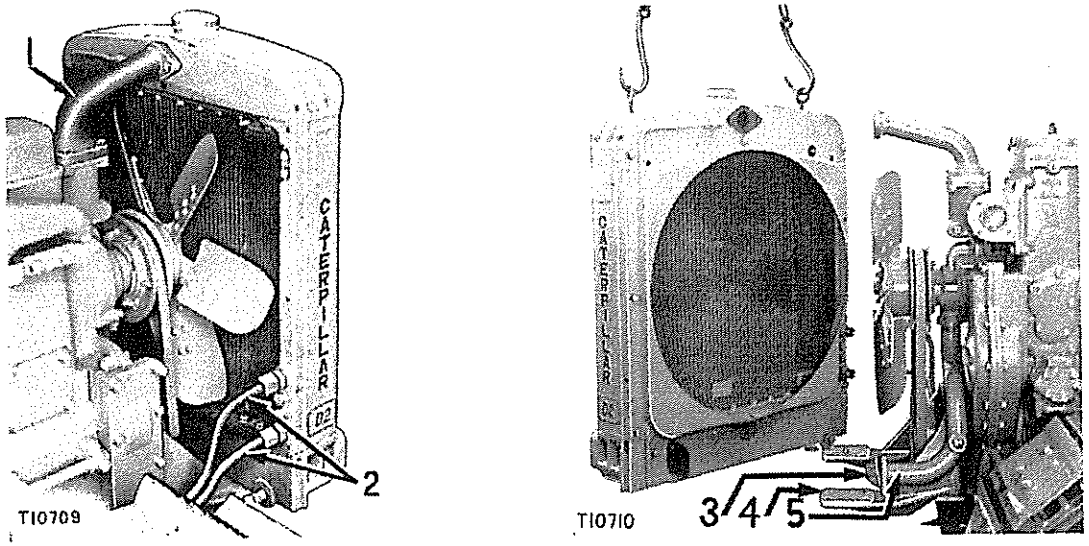
Drain the oil from the oil cooler.

Disconnect the oil cooler tubes **(2)** and the water elbow **(1)**.

Disconnect the elbow **(5)** from the radiator bottom tank.

Remove the capscrews securing the radiator to the support **(4)** and guard **(3)**.

Lift the radiator from the support with a suitable hoist.



REMOVING RADIATOR

1—Water elbow. 2—Oil cooler tubes. 3—Guard. 4—Support. 5—Elbow.

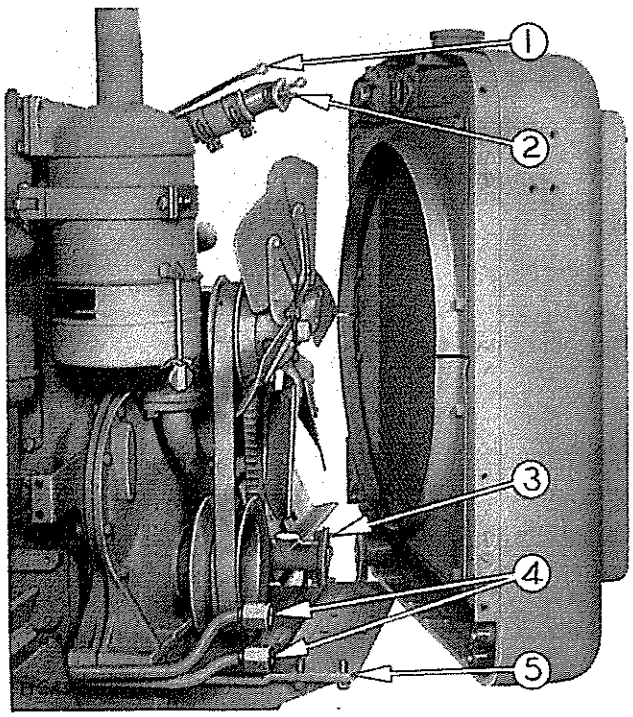
Radiator Removal

(Earlier Tractors)

Remove the hood and engine side plates.

Disconnect the oil cooler tubes **(4)**, the radiator water outlet pipe **(3)** and the water inlet pipe **(2)** from the radiator.

Remove the capscrews **(5)** holding the radiator to its support, disconnect the braces **(1)** and lift off the radiator.



REMOVING RADIATOR

1—Brace. 2—Water inlet pipe. 3—Water outlet pipe. 4—Oil cooler tubes. 5—Capscrew.

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Water Pump Removal
(Later Tractors)

The water pump and fan can be removed as a unit with the radiator in place.

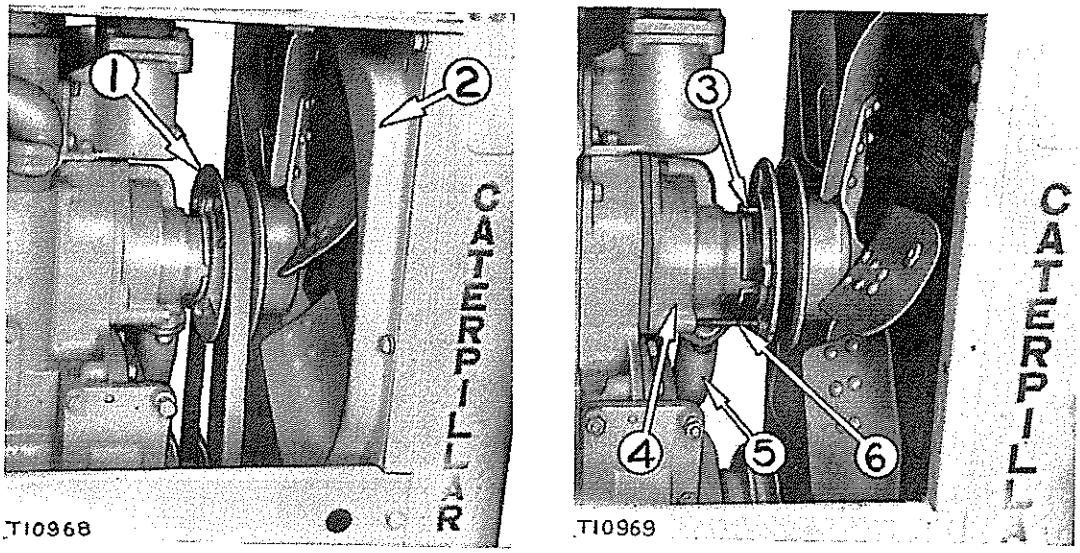
Drain the radiator.

Remove the right fan shield **(2)** from the radiator.

Loosen the fan belt adjusting ring **(1)** and remove the fan belt.

Turn the adjusting ring back up on the hub **(3)** as far as it will go. This will provide enough clearance for the long capscrew **(6)** to clear the timing gear housing.

Remove the capscrews securing the water pipe **(5)** to the bottom of the water pump housing **(4)**.

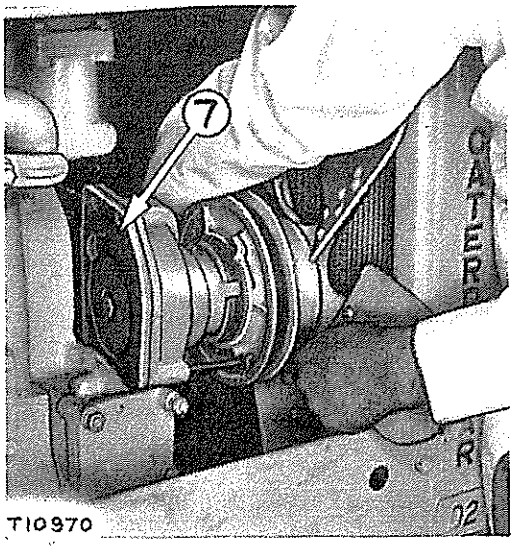


PREPARING TO REMOVE WATER PUMP
1—Fan belt adjusting ring. 2—Right fan shield. 3—Hub. 4—Water pump housing. 5—Water pipe. 6—Long capscrew.

Remove the capscrews securing the water pump assembly to the timing gear housing.

Remove the water pump assembly as a unit.

When replacing the water pump assembly, install a new gasket on each side of the plate **(7)**.



REMOVING WATER PUMP
7—Plate.

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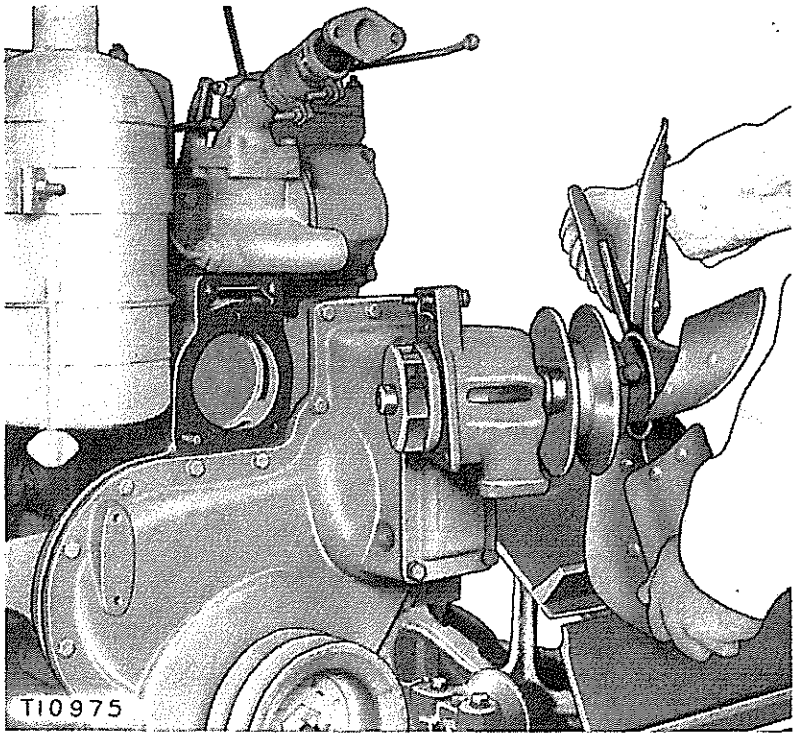
Water Pump Removal
(Earlier Tractors)

Remove the radiator. See the topic, RADIATOR REMOVAL (Earlier Tractors).

Loosen and remove the fan belt.

Remove the capscrews securing the water pipe to the bottom of the water pump housing.



REMOVING WATER PUMP AND FAN AS AN ASSEMBLY

Take out the capscrews holding the fan and water pump assembly to the timing gear housing.

Lift the fan and water pump assembly from the timing gear housing.

Oil Pan Removal

Drain the oil from the crankcase and set the brakes so the tractor will not roll.

Remove the engine side plates and the nuts from the auxiliary spring shackle bolts **(3)**.

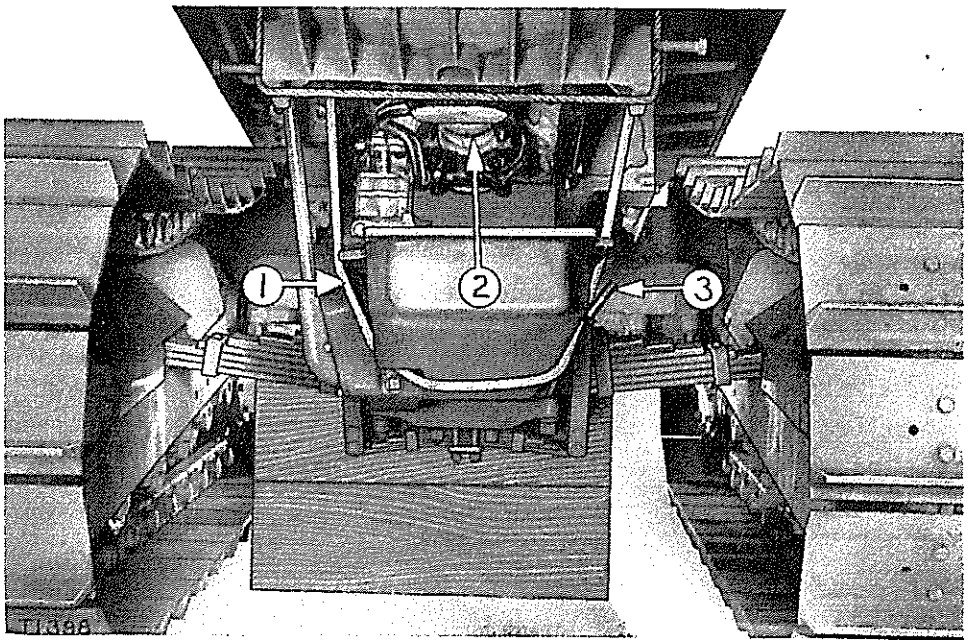
Raise the front end of the tractor until there is approximately ten inches clearance between the lower edge of the cylinder block and the equalizer spring. As a safety precaution, place blocks beneath the flywheel housing as shown.

Fasten a rope **(1)** to either side of the engine and pass it under the oil pan in front of the main sump thus balancing the oil pan to permit easy removal.

Remove the capscrews holding the pan to the cylinder block, timing gear housing and flywheel housing.

Pry the pan from the dowels and lower it until it clears the suction bell **(2)**.

Move the pan forward until it clears the equalizer spring and lower it to the floor.



REMOVING OIL PAN
(Earlier Tractor Illustrated)
1—Rope. 2—Suction bell. 3—Auxiliary spring shackle bolt.

A new gasket should be used when installing the oil pan. A coating of heavy grease or gasket cement on the oil pan will hold the gasket in place during installation.

Gasket cement should not be used on the upper side of the gasket as this will not permit removal of the timing gear cover without damaging the oil pan gasket.

Oil Cooler Removal

(Later Tractors)

Remove the plates from each side of the engine.

Drain the radiator.

Vent and drain the oil cooler.

Remove the radiator front guard.

Remove the capscrews securing the elbow **(1)** to the top tank **(3)**.

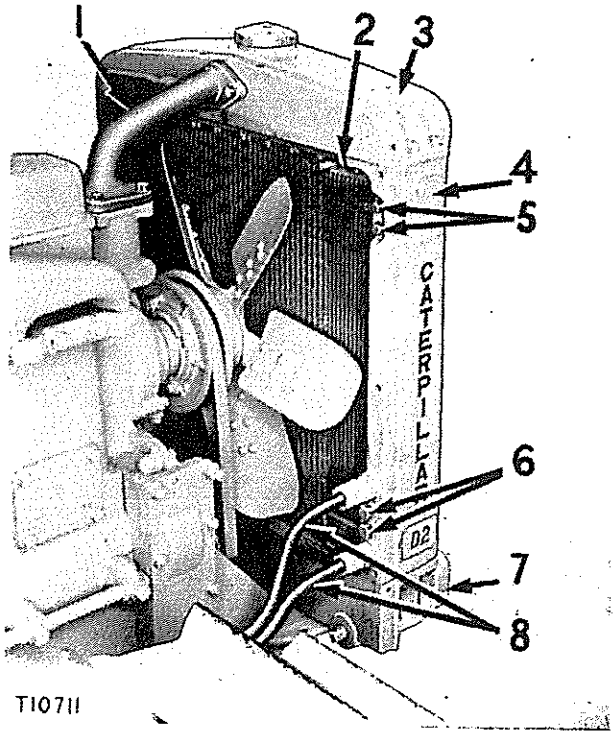
Remove the right and left shield from the radiator.

Remove the capscrews securing the right side plate **(4)** to the top tank.

Disconnect the oil tubes **(8)**.

Remove the capscrews **(5)** and **(6)**.

Remove the capscrews securing the side plate to the bottom tank **(7)**.



PREPARING TO REMOVE OIL COOLER CORE
(Hood Removed For Better Illustration)

1—Elbow. 2—Capscrew. 3—Top tank. 4—Right side plate. 5—Capscrews. 6—Capscrews. 7—Bottom tank. 8—Oil cooler tubes.

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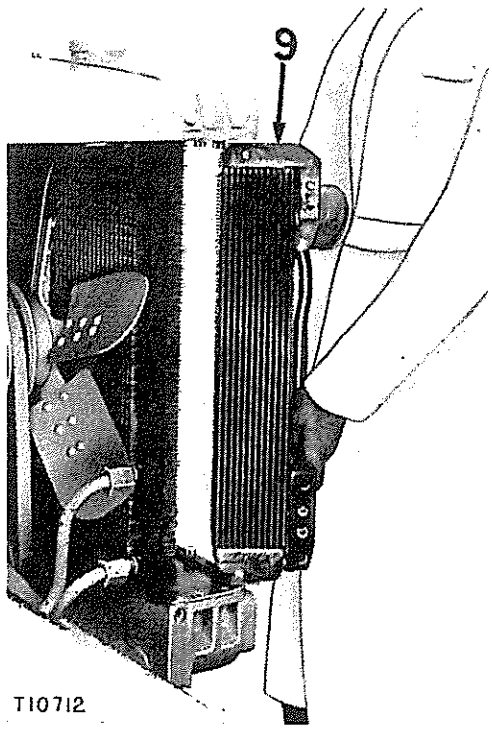
REMOVING OIL COOLER
9—Oil cooler.



Loosen all capscrews securing the top tank to the radiator core and remove the side plate **(4)**.

It is necessary to remove capscrew **(2)** to permit removal of the oil cooler.

Remove the capscrew securing the oil cooler core **(9)** to the bottom tank and remove the core.

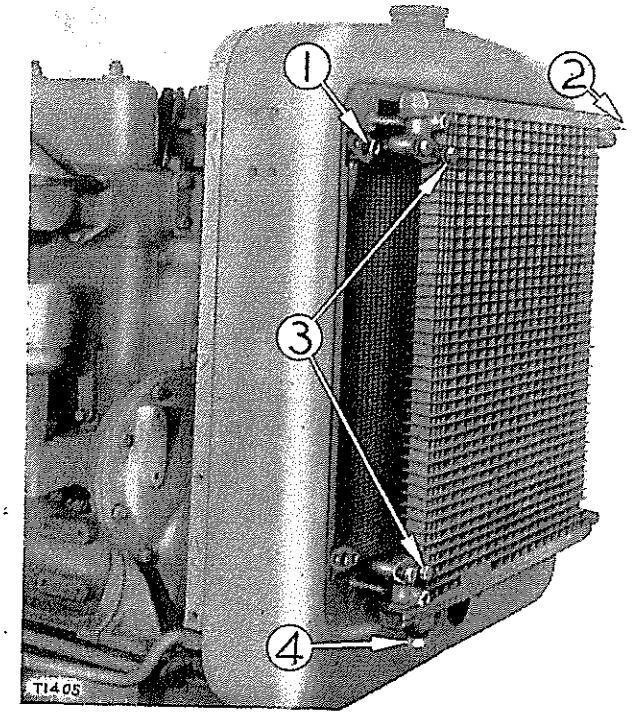
Oil Cooler Removal
(Earlier Tractors)

Drain the oil cooler by loosening the air vent **(2)** at the top and removing the drain plug **(4)** at the bottom of the oil cooler.

Take off the radiator guard. Remove the capscrews **(3)** holding the upper and lower connections to the oil cooler.

Do not drop the small copper gasket **(1)** at each connection.

Slide the oil cooler forward until it is free of the studs.



REMOVING OIL COOLER
1—Copper gasket. 2—Air vent. 3—Capscrews. 4—Drain plug.

Timing Gear Cover Removal
(Later Tractors)

Remove the radiator. See the topic, RADIATOR REMOVAL (Later Tractors).

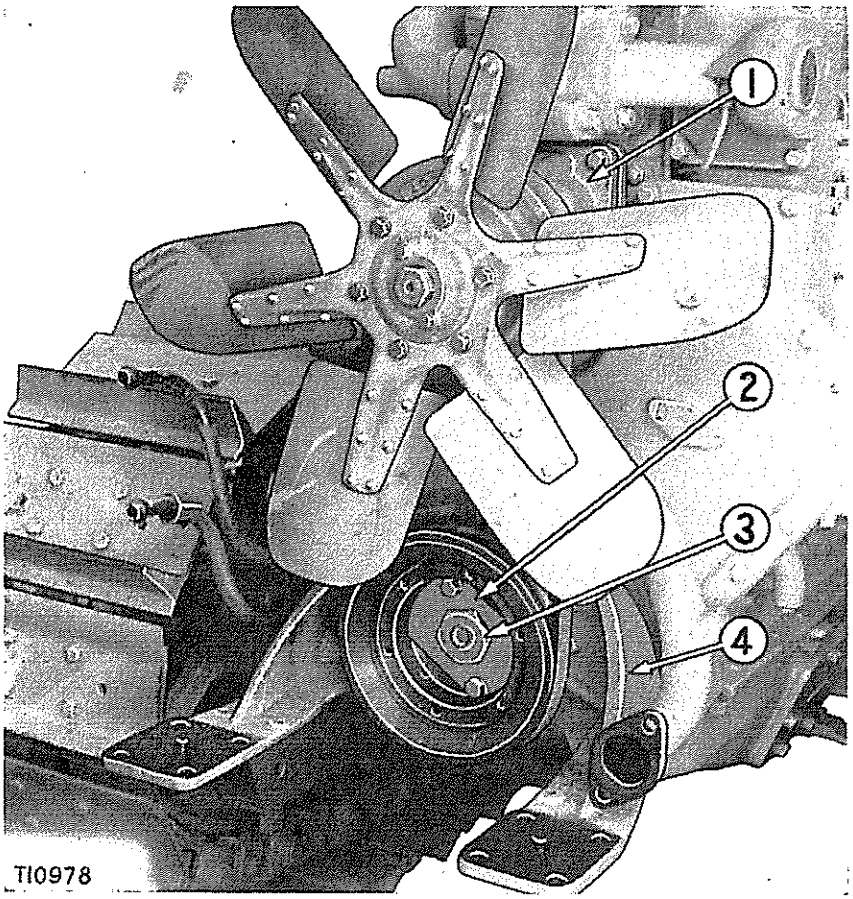
Take off the fan belt and remove the fan and water pump **(1)** as a unit.

Remove the guard located under the bracket **(4)**.

Take out the capscrews securing the lock plate **(2)** and remove the lock plate and screw **(3)**.

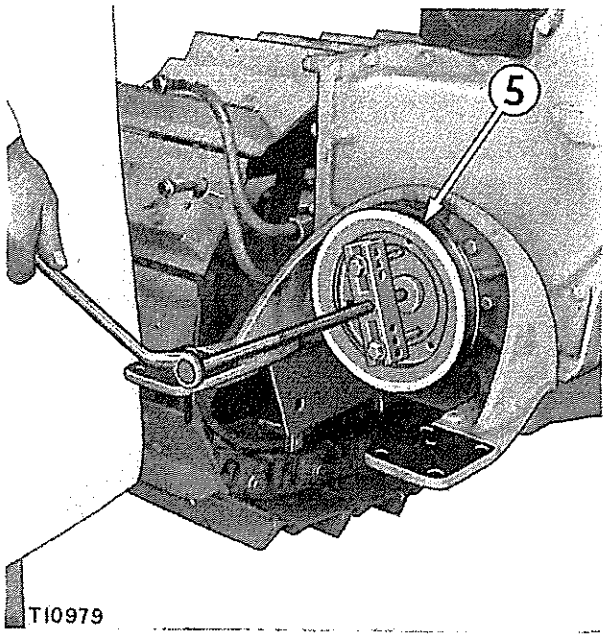
Pull the crankshaft pulley **(5)** using the 5F7465 Puller and two $^{3}/_{8}$"-16 (NC) capscrews 6" long.

Protect the end of the crankshaft with an 8B7560 Step Plate.



PREPARING TO REMOVE THE TIMING GEAR COVER
1—Fan and water pump. 2—Lock plate. 3—Screw. 4—Bracket.

Remove the radiator support bracket **(4)** from the timing gear cover **(6)** by removing the capscrews.



PULLING CRANKSHAFT PULLEY

5—Crankshaft pulley.

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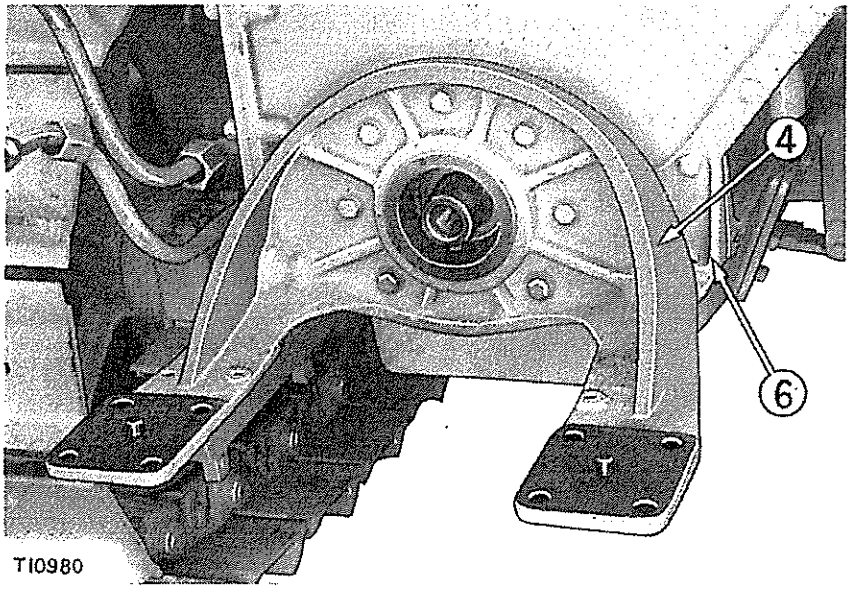


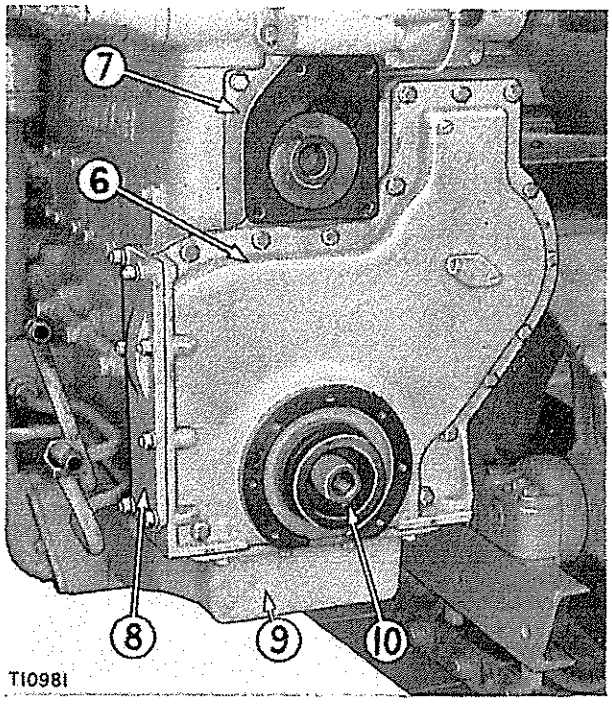
REMOVING RADIATOR SUPPORT BRACKET
4—Bracket. 6—Timing gear cover.

Remove the key **(10)** from the crankshaft.

Loosen the capscrews along each side of the pan. This will prevent damaging the oil pan gasket. Remove the capscrews across the front of the oil pan **(9)**.

Remove the plate **(8)** from the timing gear cover **(6)** and the timing gear housing **(7)**.

Remove the capscrews and bolts securing the timing gear cover to the timing gear housing and remove the cover.



TIMING GEAR COVER REMOVAL
6—Timing gear cover. 7—Timing gear housing. 8—Plate. 9—Oil pan. 10—Key.

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Timing Gear Cover Removal
(Earlier Tractors)

Remove the radiator. See the topic, RADIATOR REMOVAL (Earlier Tractors).

Take off the fan belt and remove the fan and water pump group.

Loosen the capscrews along each side of the oil pan. This will prevent damaging the oil pan gasket. Remove those across the front end of the oil pan.

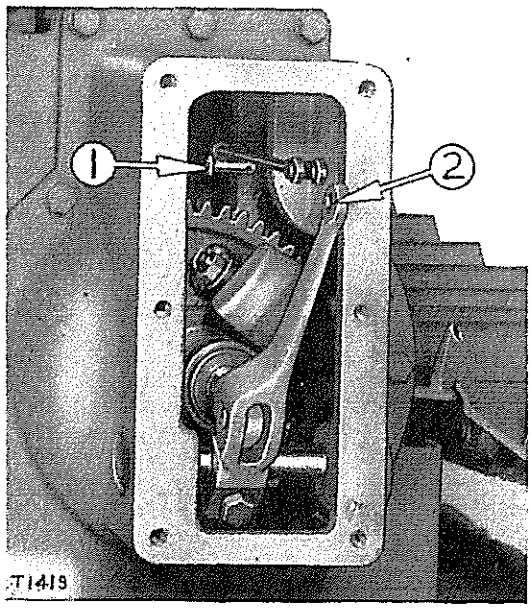
Remove the crankjaw (left-hand thread) using the T766 Socket Wrench.

Pull the fan drive pulley using the 5F7465 Puller and two 3/8"-16 (NC) capscrews 6 inches long.

Use a centering spacer between the forcing screw and the end of the crankshaft to prevent damaging the crankshaft.

Remove the key from the crankshaft.

Remove the governor cover from the timing gear cover, pull out the pin **(1)** and slide the bushing **(2)** out of the lever.



DISCONNECTING GOVERNOR LEVER
1—Pin. 2—Bushing.

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Remove the capscrews holding the timing gear housing.

Pry the cover forward until it is free of the dowel pins and slide it off the crankshaft.

Replace the crankshaft seal if it is worn or damaged using the 7B918 Driver.

Removing Diesel Engine
(Later Tractors)

Close the main fuel line valve at the tank, drain the fuel filter housing and disconnect the fuel line at the transfer pump.

Remove the hood and dash. See the topic, HOOD AND DASH REMOVAL. Remove the engine side plates.

Remove the capscrews securing the fenders to the flywheel housing.

Remove the floor plates and disconnect the steering brake pedal return springs from the flywheel housing.

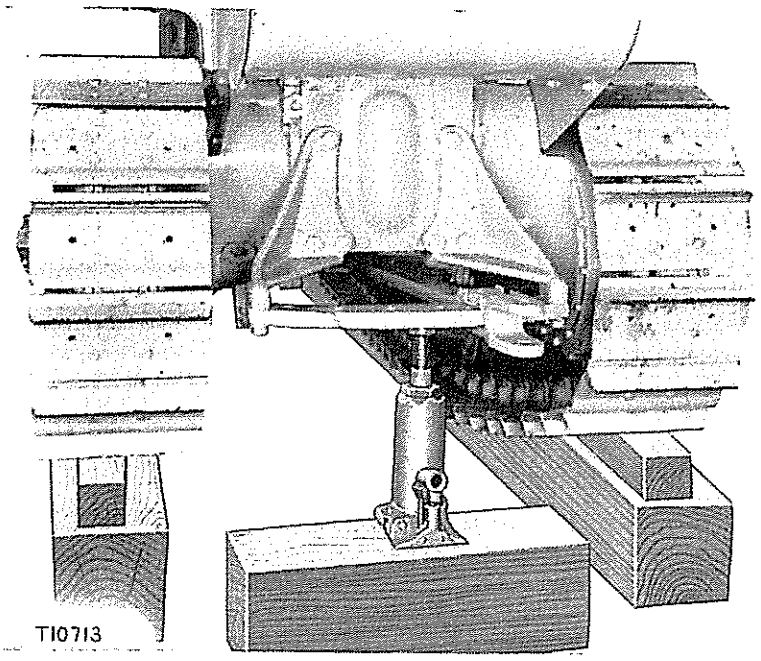
The engine should be removed in a level position to prevent damage to the flywheel clutch drive plate.

Raise the rear of the tractor and block under the tracks until the tracks are approximately 12 inches from the floor. This will permit clearance of the flywheel housing by the equalizer spring.

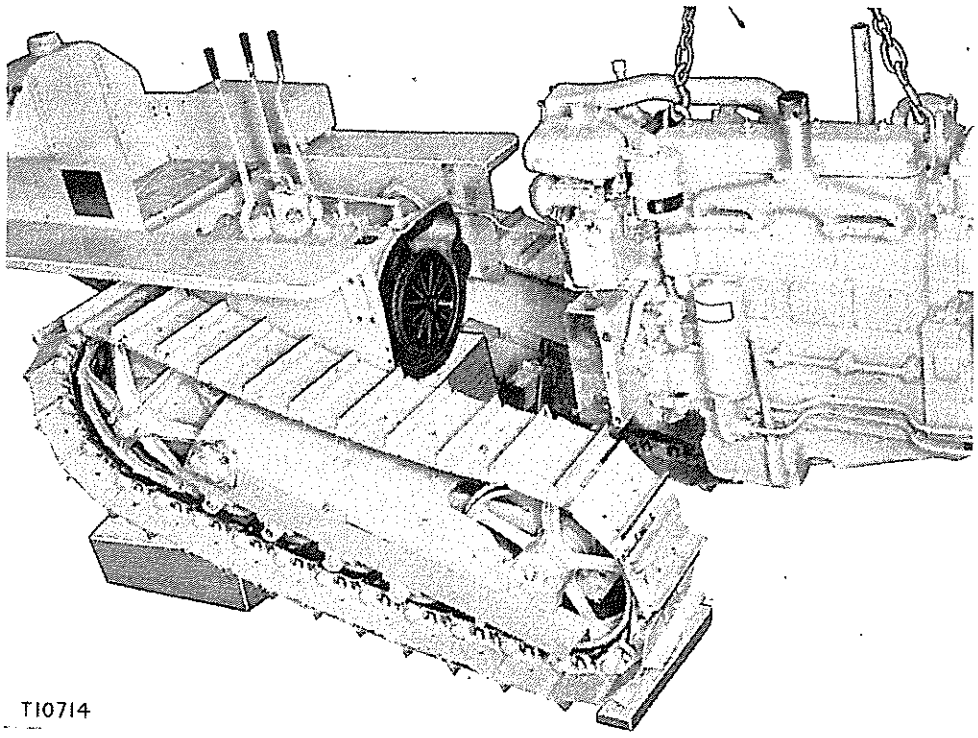
Block the front of the track to prevent the tractor from rolling forward.

Remove the two nuts securing the equalizer spring to the oil pan and engine block.

Raise the front of the engine up until it is level, and block under the drawbar and transmission case to prevent tipping when the engine is removed.



BLOCKING REAR OF TRACTOR FOR ENGINE REMOVAL



TI0714

REMOVING ENGINE FROM TRACTOR

Attach the 4F5159 Rear Lifting Eye and the 4F5158 Front Lifting Eye as shown and support the engine with a suitable hoist.

The engine can be supported with slings for removal; however, if slings are used, place blocks between the sling and engine around critical parts that might be damaged.

Place the transmission in neutral.

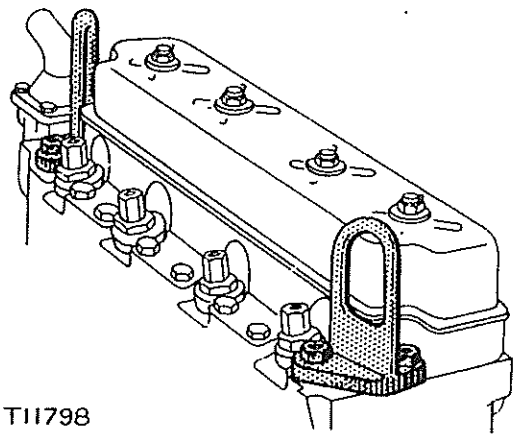
Engage the flywheel clutch to hold the clutch parts centered.

Remove the capscrews securing the flywheel housing to the transmission case and clutch housing.

Free the engine by moving it straight forward until the flywheel clutch shaft clears the pilot bearing in the flywheel.

LIFTING EYES

◆



TI1798

Removing Diesel Engine
(Earlier Tractors)

Close the main fuel line valve at the tank, drain the fuel filter housing and disconnect the fuel line at the transfer pump.

It is advisable to remove the equalizer spring so that the engine can be removed in a level position. See the topic, EQUALIZER SPRING REMOVAL (Earlier Tractors).

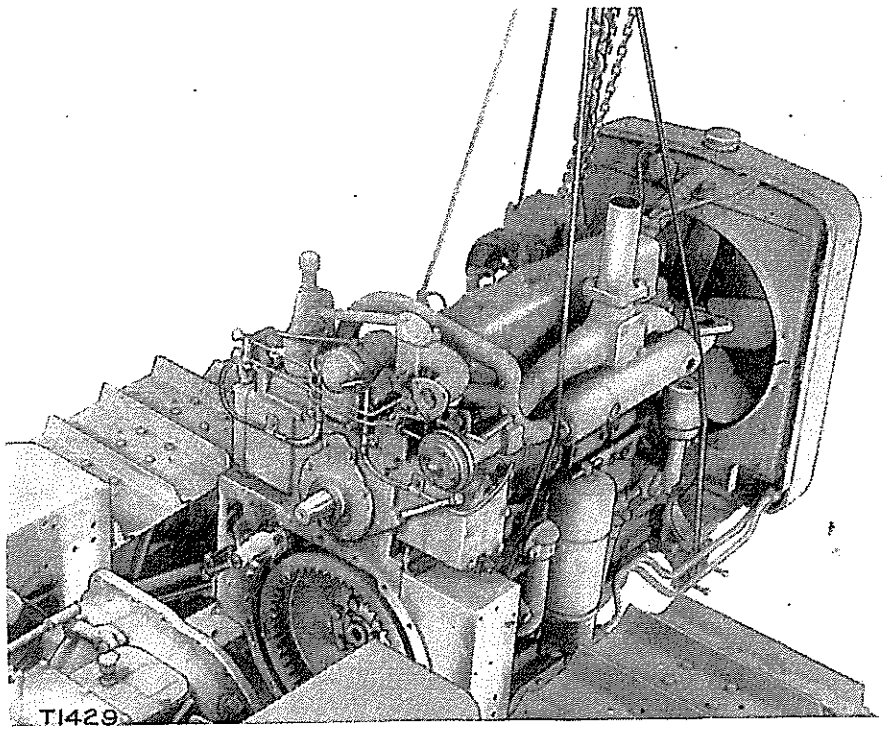
Block under the drawbar and the front of the transmission case to prevent the assembly tipping as the engine is removed.

Remove the hood and dash, the starting engine flywheel and the capscrews that hold the fenders to the flywheel housing.

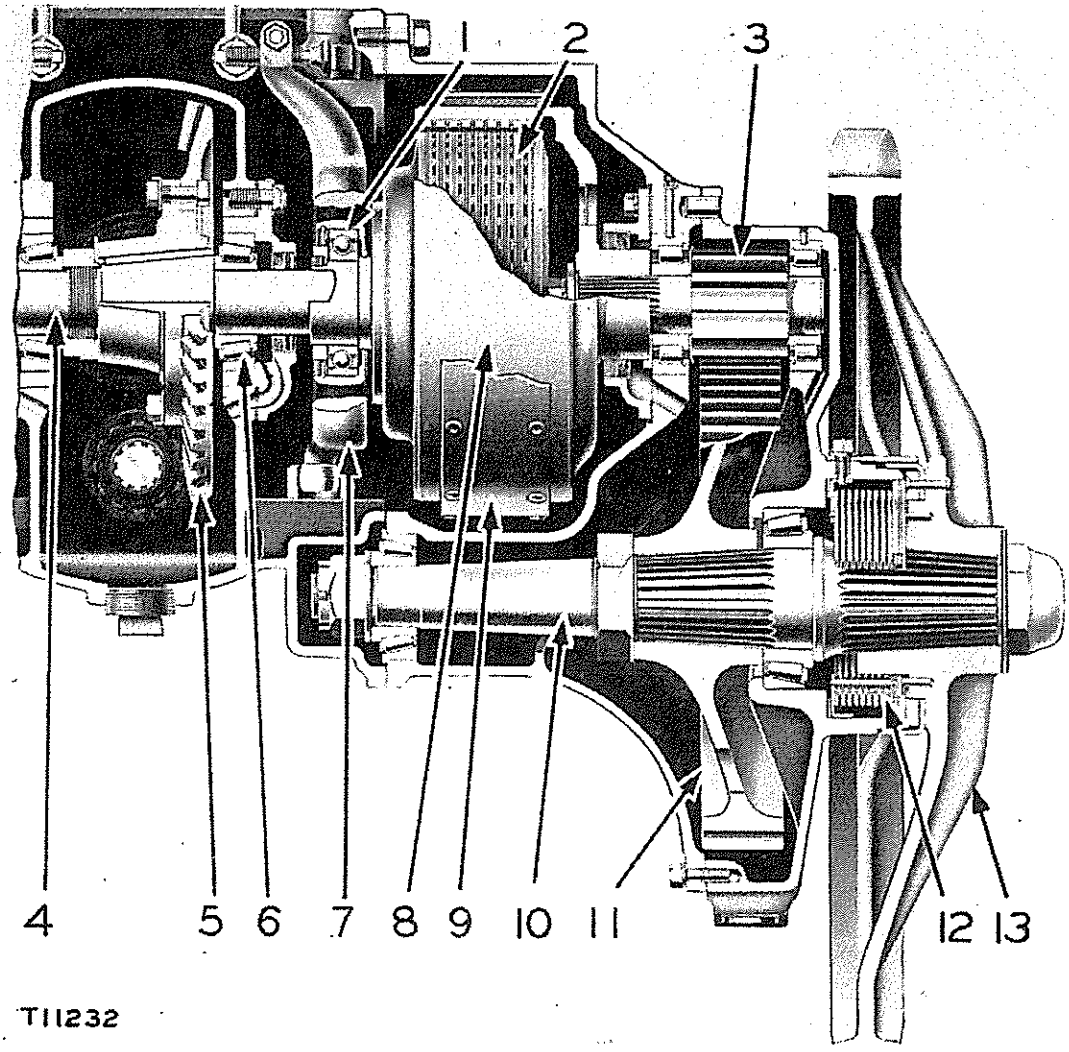
Adjust cables or chains to hold the engine in a level position and locate them so that any point of bearing will be against a solid part of the engine.

Remove the capscrews holding the Diesel engine to the transmission case.

Pull the engine straight forward until the flywheel clutch shaft is free of the pilot bearing in the flywheel.

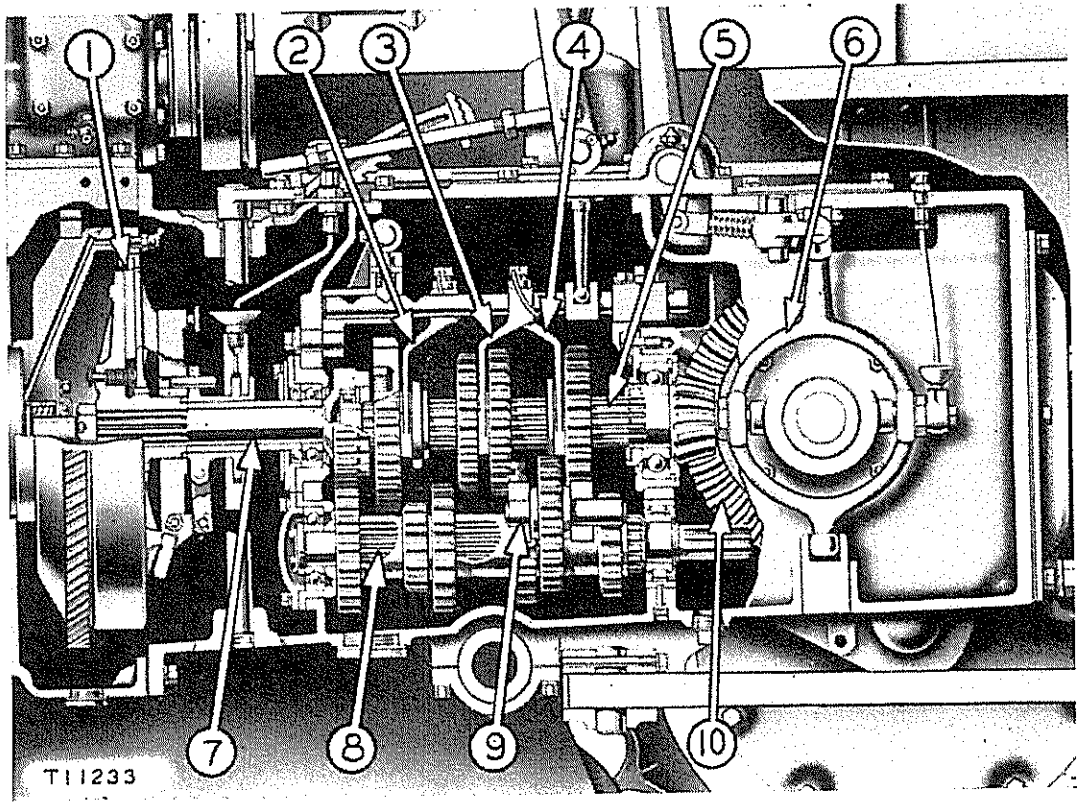


REMOVING DIESEL ENGINE



STEERING CLUTCH AND FINAL DRIVE MECHANISM

1. Steering Clutch Release Bearing
2. Steering Clutch Plates
3. Final Drive Pinion
4. Bevel Gear and Steering Clutch Shaft
5. Bevel Gear
6. Bevel Gear Bearing
7. Release Yoke
8. Brake Drum
9. Brake Band
10. Sprocket Shaft
11. Final Drive Gear
12. Bellows Seal
13. Sprocket



D2 POWER TRANSMISSION UNITS CUTAWAY VIEW, LEFT SIDE

1. Flywheel Clutch
2. 1st and 5th Gear Shifter Fork
3. 3rd and 4th Gear Shifter Fork
4. 2nd and Reverse Gear Shifter Fork
5. Pinion Shaft
6. Steering Clutch Release Yoke
7. Clutch Shaft
8. Lower Transmission Shaft
9. Reverse Idler Shaft
10. Bevel Gear

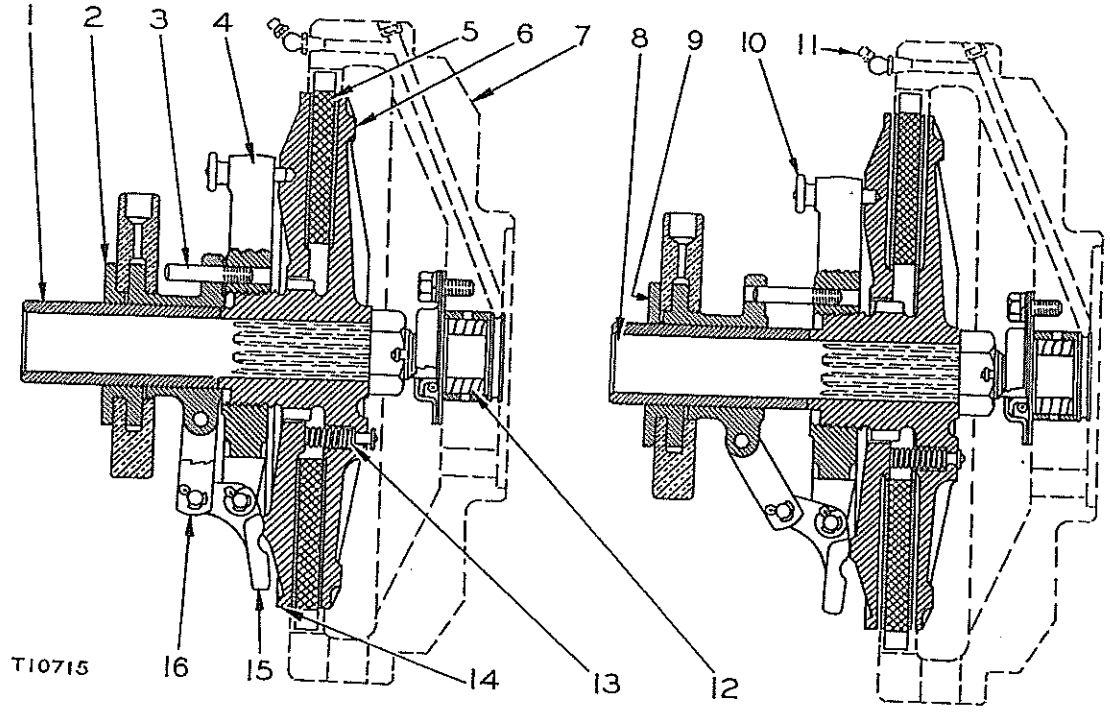
POWER TRANSMISSION UNITS

Flywheel Clutch

The flywheel clutch and flywheel are enclosed in a separate compartment in the front portion of the transmission case and the clutch is accessible through the small opening at the top of the transmission compartment for lubrication, adjustment and minor reconditioning.

OPERATION

The flywheel clutch driving plate **(5)** is connected to the flywheel **(7)** by means of external teeth on the clutch drive plate and internal teeth in the flywheel. The front pressure plate **(6)** has the pressure plate hub integral with it and is splined to the clutch shaft **(8)**. The clutch shaft is supported in front by the pilot bearing **(12)** located in the flywheel. The drive pinion **(17)** is integral with the splined clutch shaft which is supported in the transmission case. The rear pressure plate **(14)** has internal teeth which mate with the external teeth on the hub of the front pressure plate **(6)**. The adjusting collar **(4)** is threaded onto the front pressure plate hub. The cams **(15)** and links **(16)** connect the adjusting collar to the sliding collar **(2)**.



FLYWHEEL CLUTCH

ENGAGED DISENGAGED

1—Spacer. 2—Sliding collar. 3—Pin. 4—Adjusting collar. 5—Drive plate. 6—Front pressure plate. 7—Flywheel. 8—Clutch shaft. 9—Machined face for clutch brake. 10—Lock pin. 11—Grease fitting for pilot bearing. 12—Pilot bearing. 13—Spring. 14—Rear pressure plate. 15—Cam. 16—Link.

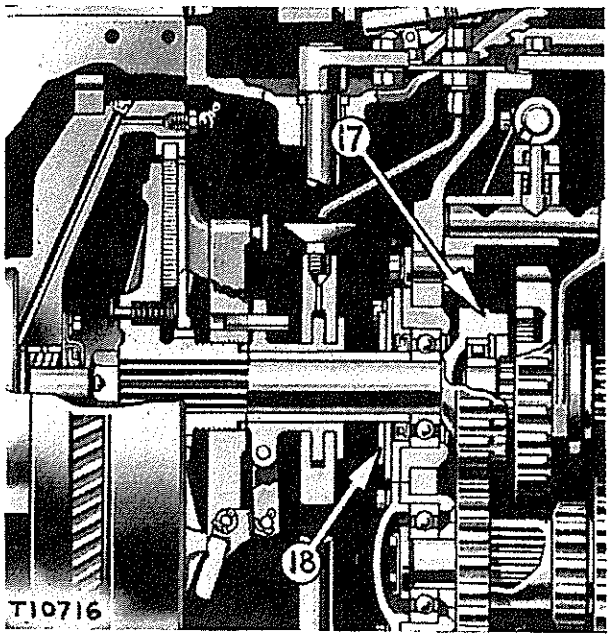
When the clutch is engaged, the sliding collar **(2)** is moved forward, the outer ends of links **(16)** are moved out forcing the cams **(15)** against the rear pressure plate. This is commonly called an over-center clutch.

The rear pressure plate compresses the drive plate against the front pressure plate. When the driving plate is compressed between the two pressure plates, the turning effort of the engine is transmitted to the transmission. The clutch automatically stays engaged when the linkage snaps over-center.

When the clutch is disengaged, the springs **(13)** force the two pressure plates apart and hold them in that position. A brake is provided to bring the rotating clutch to a stop quickly when the clutch is disengaged. This makes it possible to shift gears without clashing them. The rear face **(9)** of the sliding collar **(2)** is machined. As the sliding collar moves back along the spacer **(1)**, the machined face contacts the clutch brake facing **(18)** which is fastened to the transmission case. The pin **(3)** acts as a guide to keep the sliding collar **(2)** and the adjusting collar **(7)** aligned with each other.

The clutch is adjusted by pulling out the lock pin **(10)** and rotating the adjusting collar **(4)** clockwise to tighten and counterclockwise to loosen the clutch adjustment. The correct adjustment is obtained when with a reasonably hard pull on the lever, a distinct snap is felt as the linkage snaps over-center into the engaged position.

The pilot bearing **(12)** is lubricated through the fitting **(11)**.



FLYWHEEL CLUTCH
17—Drive pinion (integral with clutch shaft). 18—Clutch brake facing.

REMOVAL

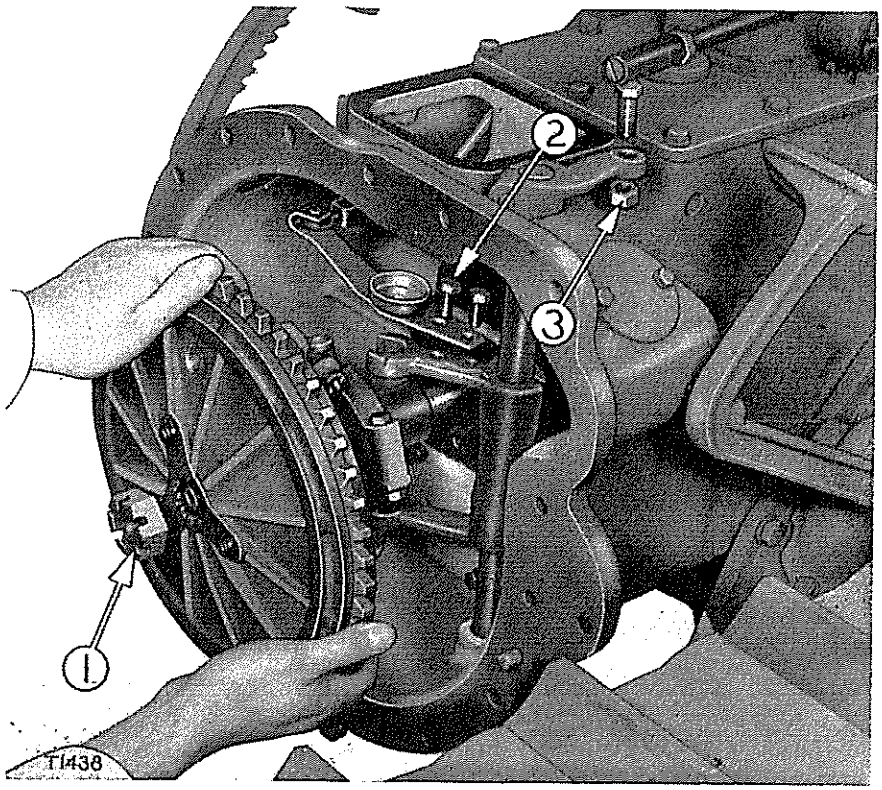
Remove the Diesel engine. See the topic, REMOVING DIESEL ENGINE.

Remove the nut **(3)** and separate the clutch control rod from the lever.

Remove the capscrews **(2)** holding the extension lever to the clutch control yoke.

Remove the nut **(1)** from the end of the clutch shaft.

Remove the flywheel clutch assembly as shown.



CLUTCH REMOVAL
1—Nut. 2—Capscrew. 3—Nut.

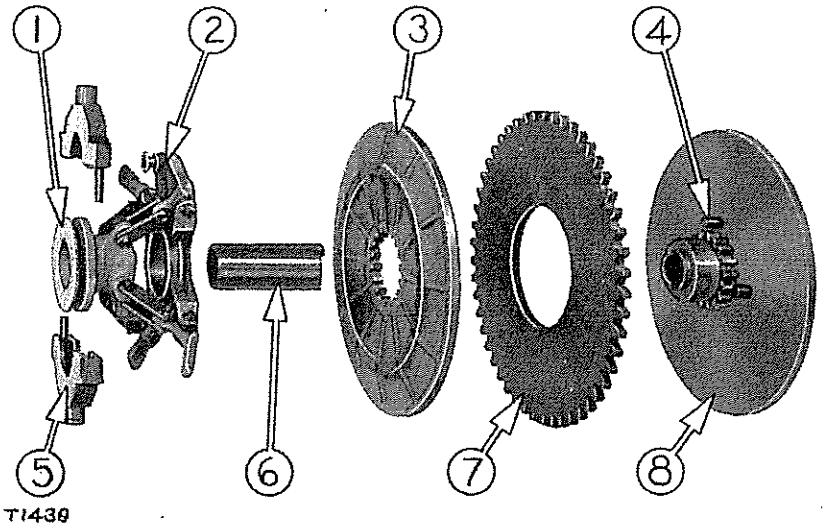
DISASSEMBLY

Pull out the lock pin and remove the adjusting collar **(2)** from the pressure plate **(8)** by unscrewing the collar to the left or counterclockwise until it is free.

Lift off the collars **(1)** and **(2)**, spacer **(6)**, pressure plate **(3)** and driving disc **(7)**.

Replace the pressure plates if they are scored or cracked.

If the springs and pins **(4)** do not keep the pressure plates separated when the clutch is disengaged, remove the pins by driving them through the front pressure plate.



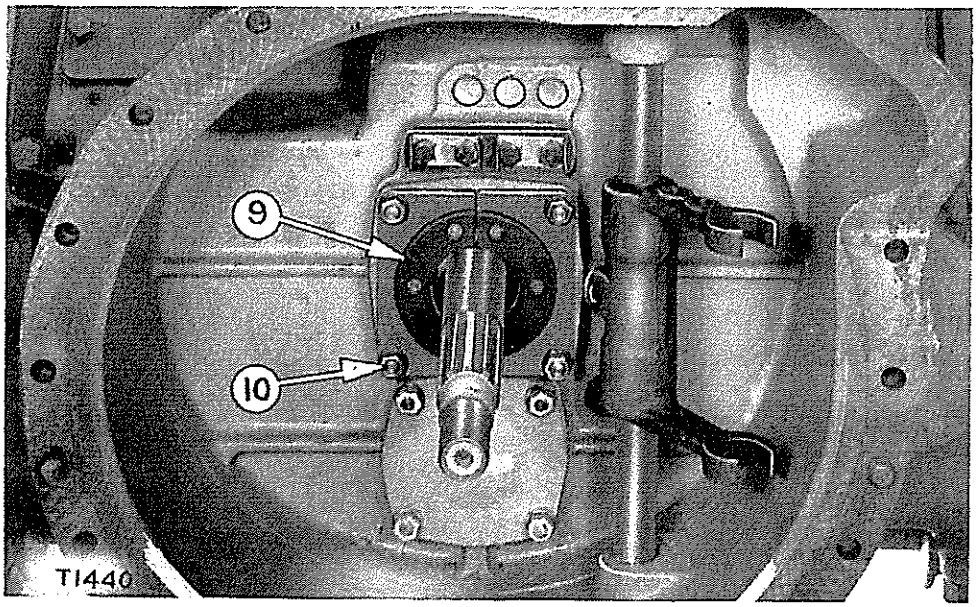
DISASSEMBLING CLUTCH
1—Sliding collar. 2—Adjusting collar. 3—Pressure plate. 4—Spring and pin. 5—Release collar assembly. 6—Spacer. 7—Driving disc. 8—Pressure plate.

Replace the pins and springs.

Remove the nuts and locks from the release collar assembly **(5)** and pull each half from the collar.

If the cams, pin holes in the links or pins are worn, they should be replaced.

Replace both halves of the flywheel clutch brake lining **(9)** if they are worn or glazed.



FLYWHEEL CLUTCH BRAKE LINING
9—Brake lining. 10—Nut.

The plates to which the lining is attached can be taken off after the nuts **(10)** are removed.

CLUTCH PILOT BEARING

Remove the three capscrews securing the outer retainer **(1)** to the flywheel.

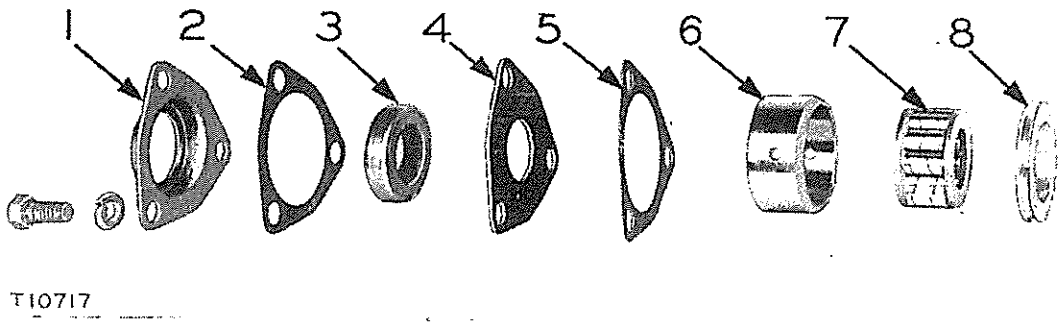
Take off the gasket **(2)** and remove the seal **(3)**. When installing the seal **(3)**, the lip should face the roller assembly **(7)**.

Remove the inner retainer **(4)** and gasket **(5)**.

Slide out the roller assembly **(7)**. Take out the outer race **(6)** and replace if damaged.

Remove the spacer **(8)**.

The inner race is located on the clutch shaft and should be replaced if worn or damaged.



CLUTCH PILOT BEARING
1—Outer retainer. 2—Gasket. 3—Seal. 4—Inner retainer. 5—Gasket. 6—Outer race. 7—Roller assembly. 8—Spacer.

ASSEMBLY AND ADJUSTMENT

Assembly

When assembling the clutch, prevent any lubricant from coming in contact with the pressure plates or driving disc as this will cause glazing of the surfaces.

Lubricate the pilot bearing and the sliding collar.

Adjustment

After the flywheel clutch is assembled and installed, it should be adjusted so that a reasonably hard pull on the lever will engage the clutch with a distinct snap.

Transmission

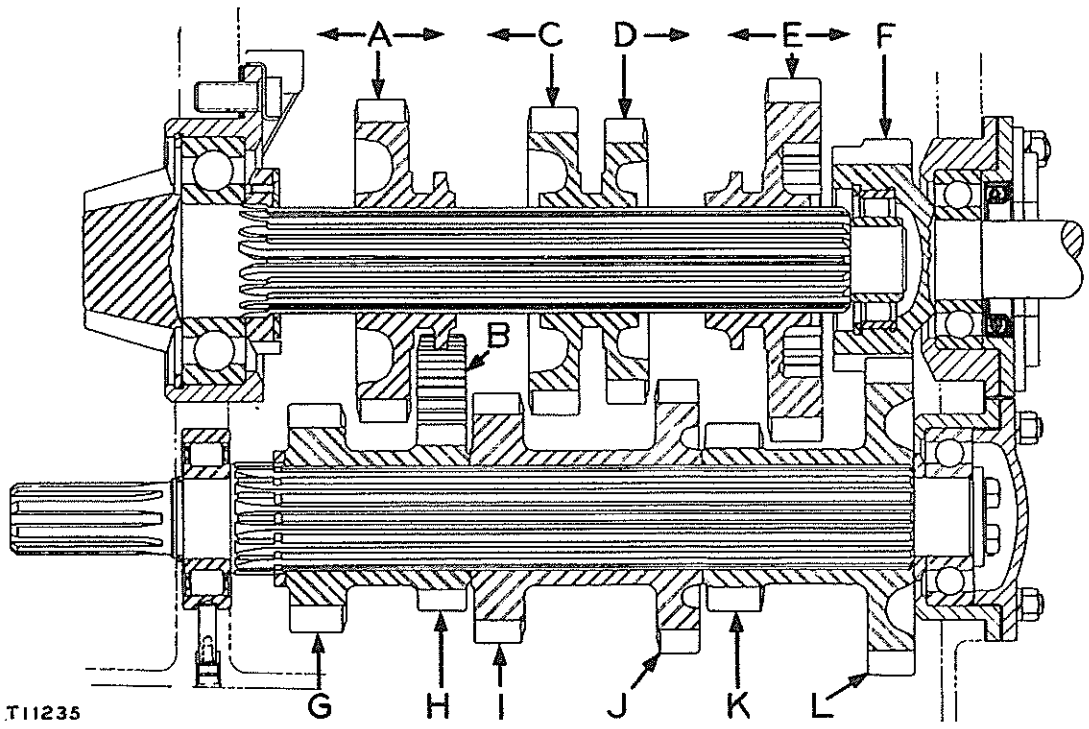
The transmission has five speeds forward and one speed in reverse. The speed change gears are located in the center compartment of the transmission case.

A locking device actuated by the flywheel clutch lever locks the sliding gears in position when the flywheel clutch is engaged.

The bevel gear is located in the rear compartment of the transmission case.

The various speeds are accomplished by combinations of positions of three sets of sliding gears as shown. Gears A, C-D and E are the sliding gears which operate on the splined pinion shaft. Gears G-H, I-J and K-L are splined to the lower shaft. Gear B is the reverse idler gear and turns on a separate shaft. Gear B is always in mesh with gear H.

The front of the pinion shaft is piloted in the clutch shaft and turns independently of the clutch shaft except when 5th speed is being used. When 5th speed is desired, gear E is moved forward over gear F which locks the two shafts together forming a direct drive.



TRANSMISSION GEAR ARRANGEMENT

1st	F-L	K-E	
2nd	F-L	G-A	
3rd	F-L	I-C	
4th	F-L	J-D	
5th	F-E		
Reverse	F-L	H-B	B-A

TRANSMISSION GEAR ARRANGEMENT

DISASSEMBLY

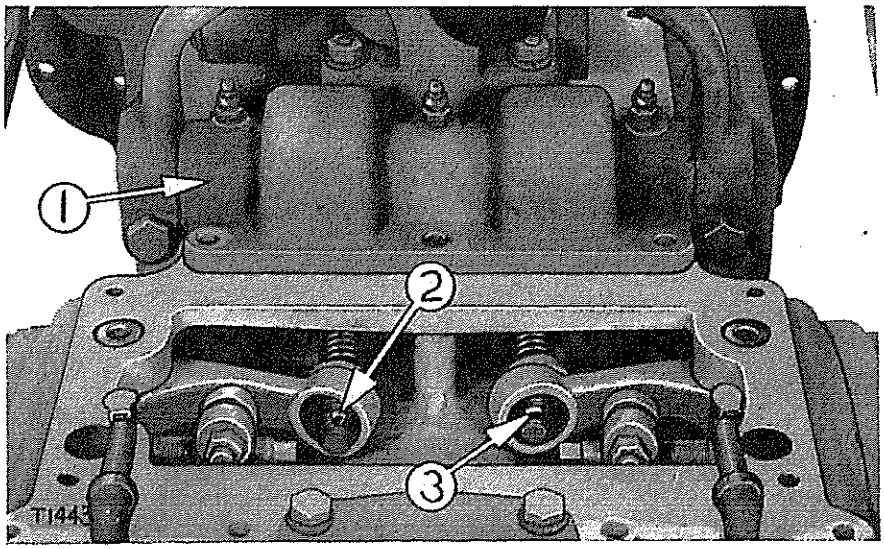
Removing Transmission Covers

Remove the seat, fenders and fuel tank. See the topic, SEAT, FENDERS AND FUEL TANK.

Remove the inspection plate behind the transmission cover.

Pull out the cotter pins **(2)** and **(3)** and unscrew the nuts from the steering clutch control rods.

After removing the cotter pins and nuts from the steering clutch control rods, replace the cotter pins **(2)** and **(3)**. This will prevent the washers and springs on the control rods from dropping into the steering clutch compartments when the transmission cover **(1)** is lifted off.



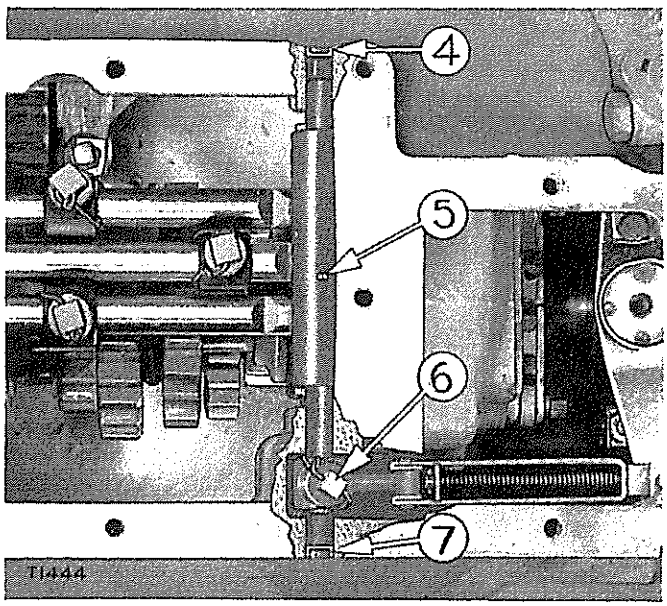
PREPARING TO REMOVE TRANSMISSION COVER
1—Transmission cover. 2—Cotter pin. 3—Cotter pin.

Removing Interlock Mechanism

Reach into the flywheel clutch compartment and remove the setscrew **(6)**. Drive out the taper pin **(5)**.

Drive on the plug **(7)** until it drops into the flywheel clutch housing. Remove the plug and drive on the end of the interlock shaft until the plug **(4)** and the shaft come out of the case.

Take out the interlock lever and the sleeve.

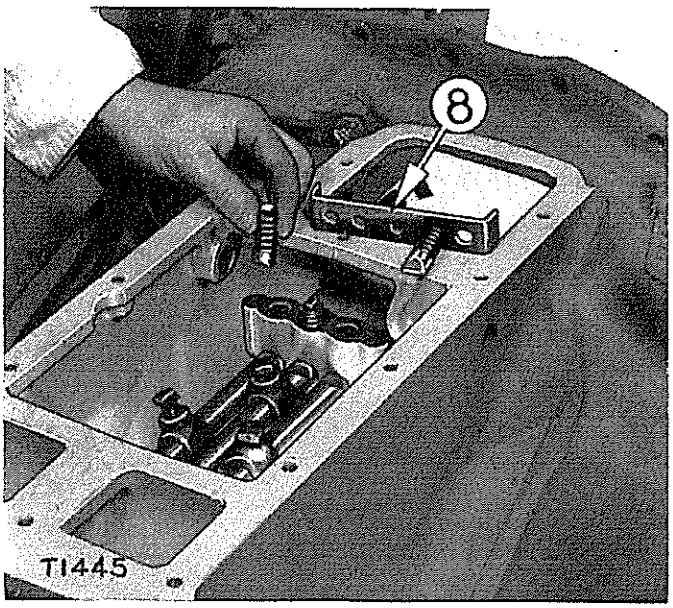


REMOVING INTERLOCK SHAFT

4—Plug. 5—Taper pin. 6—Setscrew. 7—Plug.

◆

Remove the retainer **(8)** and lift out the springs and plungers.



REMOVING RETAINER AND PLUNGER

8—Retainer.

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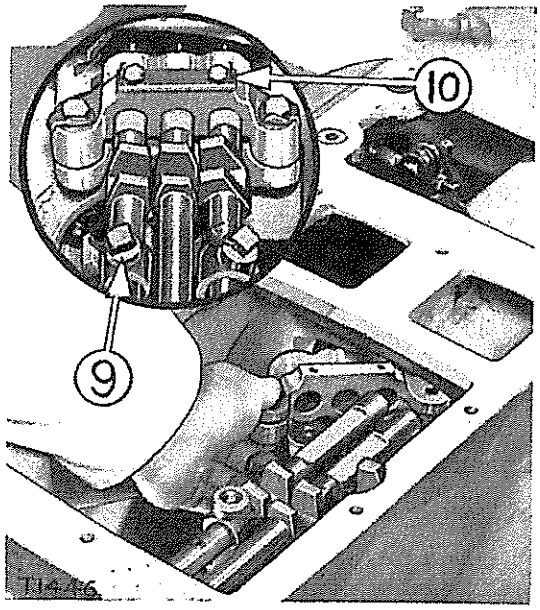
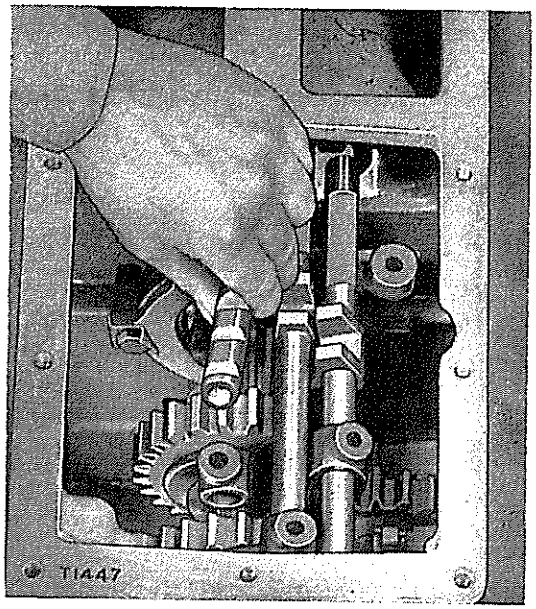
Removing Shifter Shaft Group

Remove the setscrews **(9)** holding the shifter forks to the shifter shafts and take the stop **(10)** off the top of the rear bracket.



REMOVING REAR BRACKET
9—Setscrew. 10—Stop.



LIFTING SHIFTER SHAFTS OUT OF CASE

Push the shifter shafts forward. Slide the rear bracket off the ends of the shifter shafts and remove.

Slide the shifter shafts back out of the front bracket and the forks and lift them out of the case.

Lift the shifter forks off the gears and out of the case.

REMOVING FRONT BRACKET
11—Capscrew.

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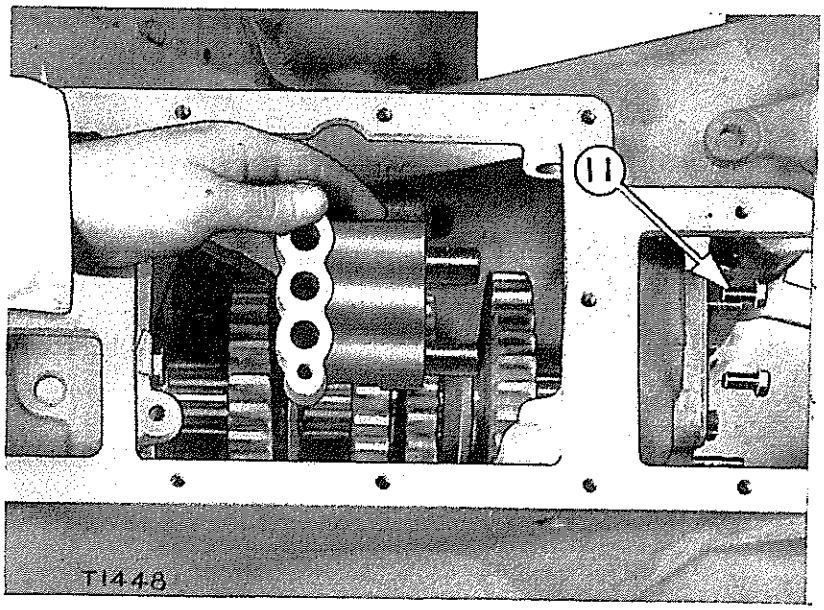
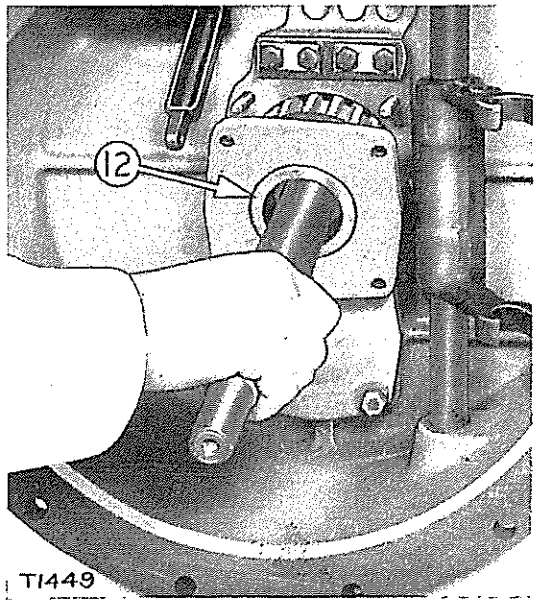


Remove the capscrews **(11)**.

Pull the bracket back until it is free from the wall of the case and lift it out.

Removing Flywheel Clutch Shaft

Remove the flywheel clutch. See the removal instructions under the topic, FLYWHEEL CLUTCH.



REMOVING FLYWHEEL CLUTCH SHAFT
12—Seal.

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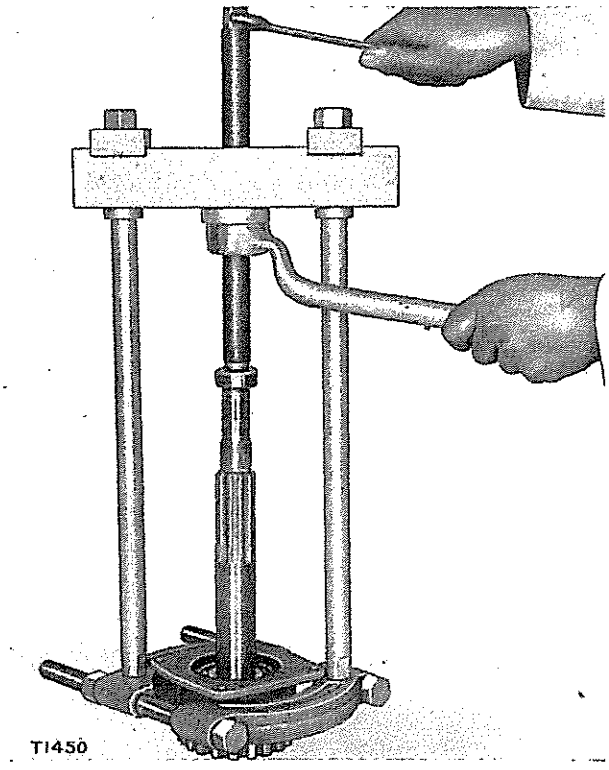


PULLING BEARING AND CAGE FROM CLUTCH SHAFT

◆

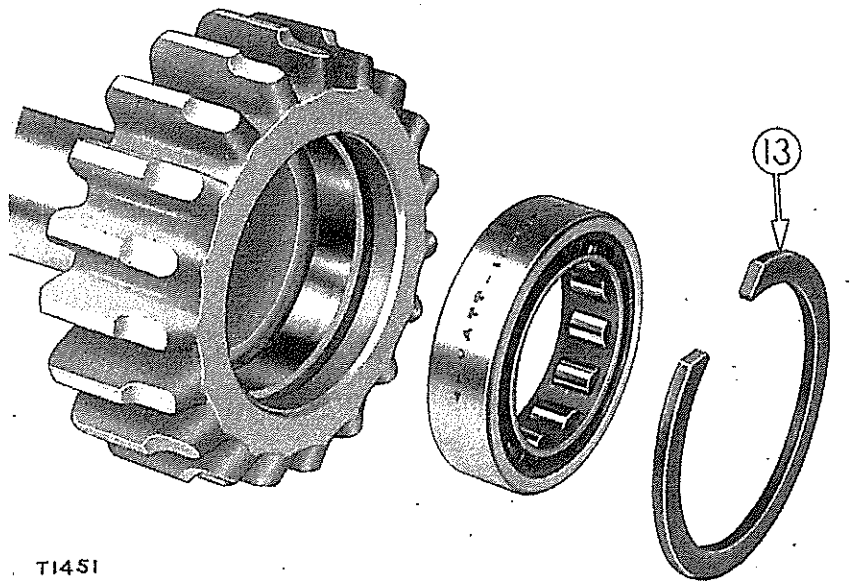
Remove the nuts and lockwashers and pull out the flywheel clutch shaft and bearing cage as an assembly.

The lip-type seal **(12)** should be replaced if necessary. The lip faces the transmission.

Pull the bearing and cage from the clutch shaft using the 8B7548 Push Puller, 8B7549 Legs, 8B7551 Bearing Pulling Attachment and the L1774 Centering Spacer.

Press the bearing from the cage.

Pry out the snap ring **(13)** and pull the pinion shaft pilot bearing out of the gear.



SNAP RING AND PILOT BEARING REMOVED FROM CLUTCH SHAFT
13—Snap ring.

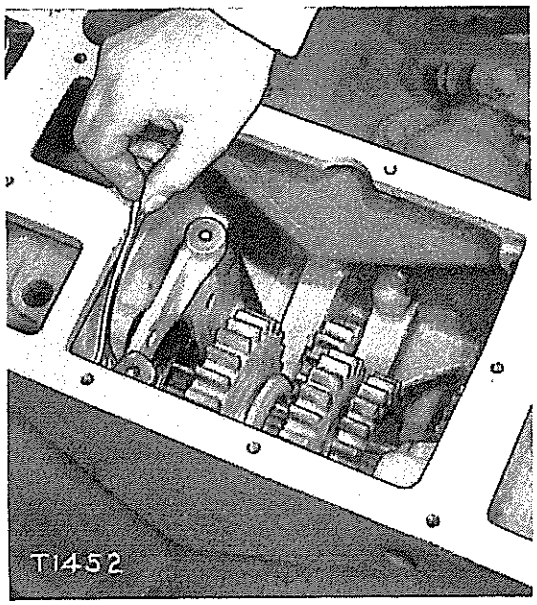
Removing Bevel Pinion Shaft Group

Remove the capscrews and locks securing the pinion bearing cage to the rear wall of the transmission compartment.

Pull the pinion shaft forward and lift out the semi-circular shims.

Keep the shims flat and clean.

Continue to pull the pinion forward until it clears the rear wall of the compartment and lift the entire group out of the compartment. Do not drop the gears since they can slip off easily and be damaged.



REMOVING SHIMS LOCATED BEHIND PINION SHAFT BEARING CAGE

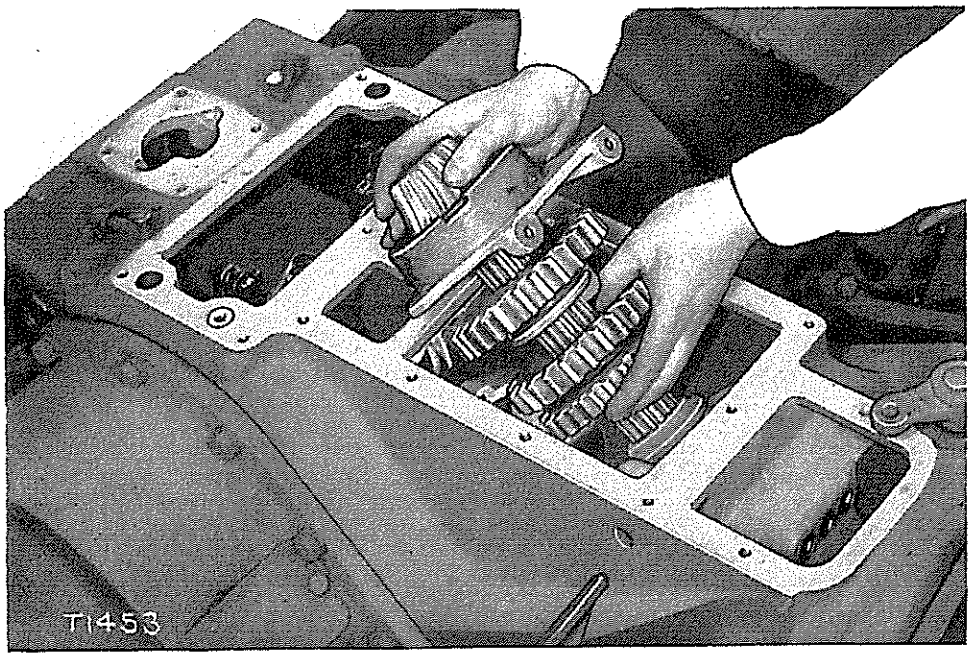
◆

Slide the gears off the shaft.

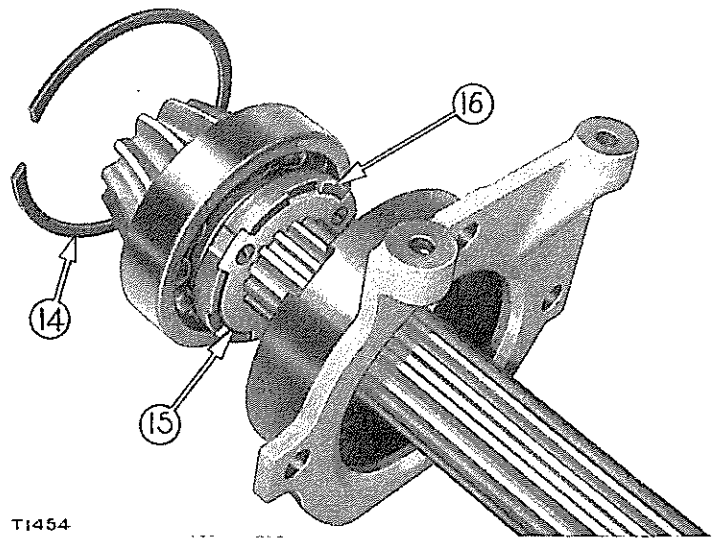
Remove the snap ring **(14)** from the bearing cage and slide the cage off the bearing.

Take out the screws and slide the lock **(15)** off the shaft.

Remove the bearing retaining nut **(16)**.



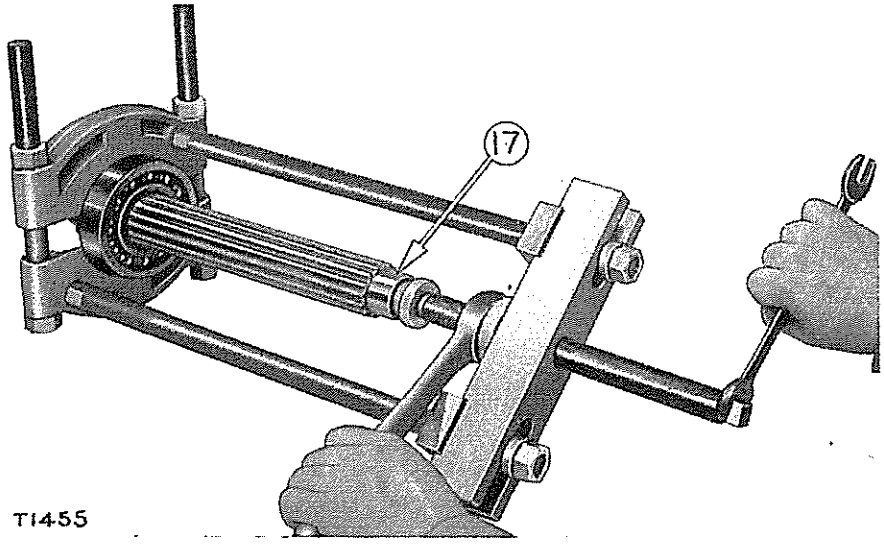
REMOVING BEVEL PINION SHAFT GROUP



REMOVING CAGE AND BEARING
14—Snap ring. 15—Lock. 16—Retaining nut.

Pull the bearing from the shaft using the following tools: 8B7548 Push Puller, 8B7549 Legs, 8B7551 Bearing Pulling Attachment and the L1774 Centering Spacer.

Replace the pinion shaft pilot bearing race **(17)** if it is worn or damaged.



PULLING PINION BEARING
17—Pilot bearing race.

Removing Lower Transmission Shaft Group and Reverse Idler

Remove the nuts holding the bearing cage cover **(18)** to the front wall of the transmission compartment.

BEARING CAGE COVER

18—Cover.

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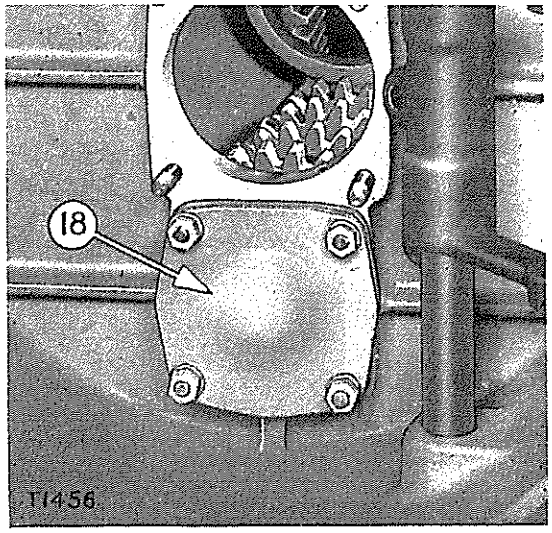
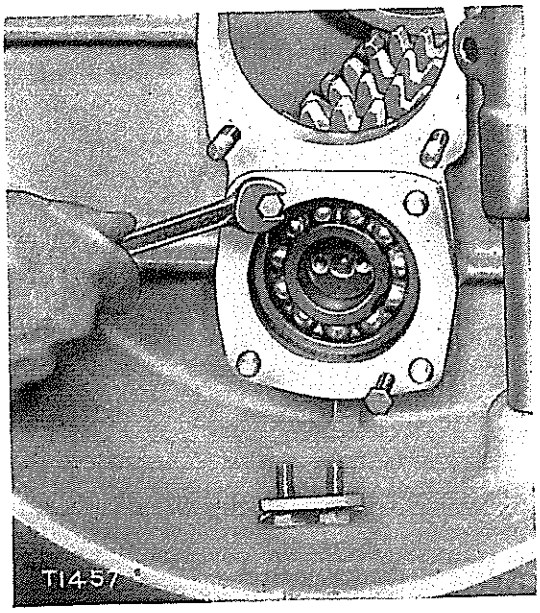


Remove the retaining washer from the end of the shaft and pull the bearing cage and bearing off the end of the shaft using two 1/4"-20 (NC) capscrews.

Remove the cover from the bevel gear compartment.

Slide the transmission shaft into the bevel gear compartment and remove the gears as the shaft is withdrawn.



PULLING CAGE AND BEARING FROM SHAFT

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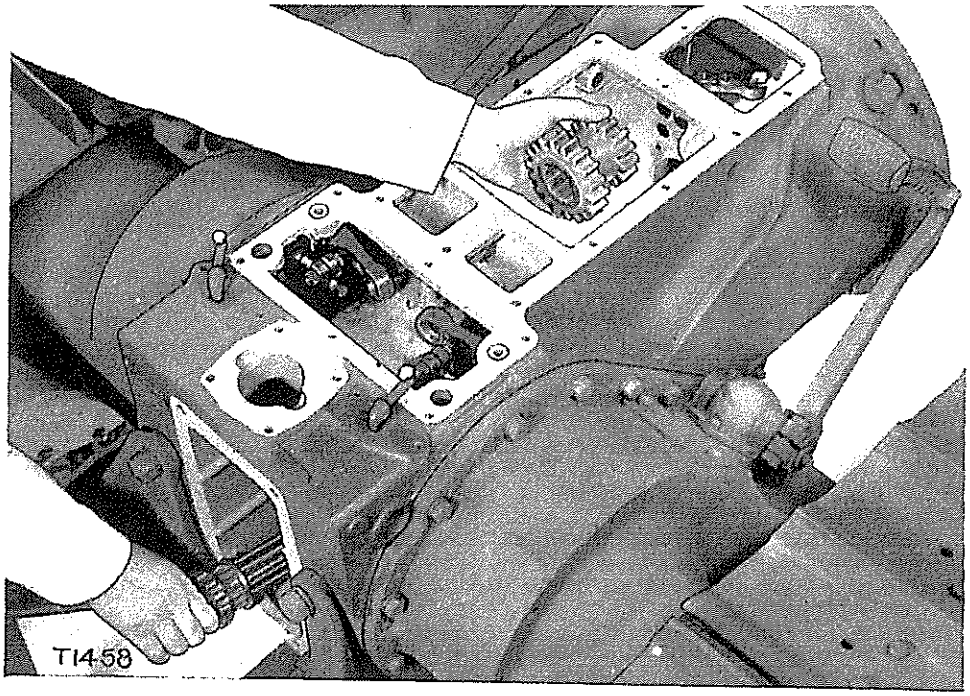

LIFTING GEARS OUT OF CASE WHEN SHAFT IS WITHDRAWN

Remove the snap ring and pull the bearing using the following tools: 8B7548 Push Puller, 8B7551 Bearing Pulling Attachment and the L1774 Centering Spacer.

PULLING BEARING

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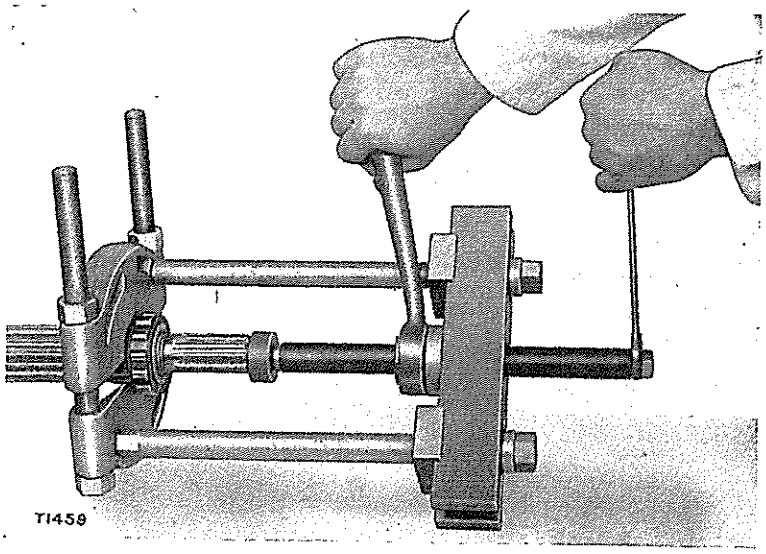
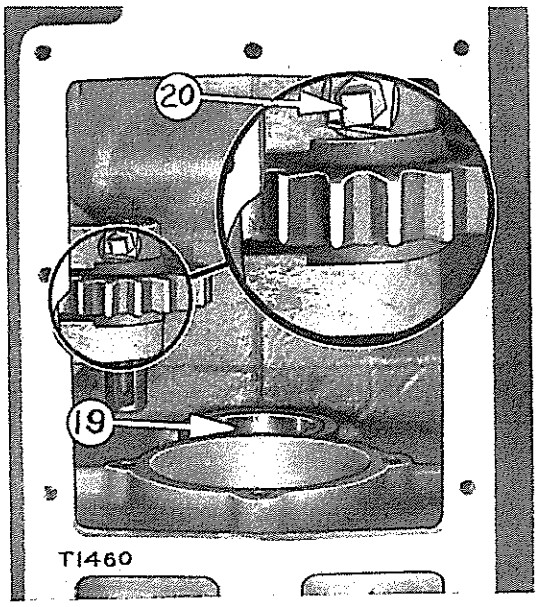
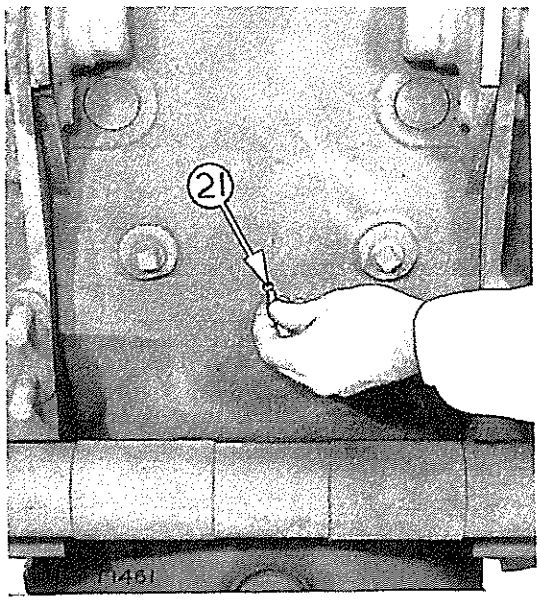


Remove two core plugs and pull out the dowel **(21)**, which is located in the bottom of the transmission case, before removing the outer race **(19)**. A 10-32 (NF) screw can be inserted into the dowel if necessary for pulling.

Loosen the lock nut and take out the setscrew **(20)**.



LOWER SHAFT REAR BEARING RACE AND REVERSE IDLER
19—Outer race. 20—Setscrew.



REMOVING DOWEL
21—Dowel.

Slide the shaft forward out of the bracket and remove the idler gear as the shaft is withdrawn.

Slide the roller bearing assembly out of the gear.

ASSEMBLY

Installing Reverse Idler Gear

When installing the reverse idler gear, the rounded ends of the teeth should be toward the rear of the transmission case.

Align the setscrew hole in the shaft with the hole in the bracket before inserting the setscrew.

Installing Bearing Race in Transmission Case

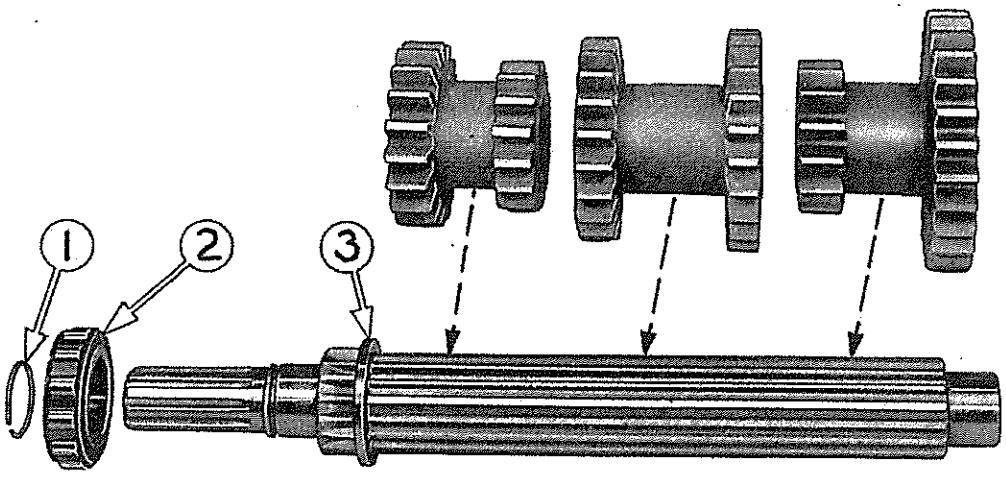
Align the dowel hole in the bearing race and the transmission case before driving in the bearing. After driving in the bearing, insert the dowel and drive in the core plugs.

Installing Lower Transmission Shaft Group

Heat the bearing **(2)** in clean oil and slide it onto the end of the shaft.

Install the snap ring **(1)**.

Slip the spacer **(3)** on the shaft and insert the shaft through the bevel gear compartment into the bearing race. As the shaft enters the transmission compartment, slip the gears onto the shaft in the correct order as illustrated.



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LOWER SHAFT GROUP IN CORRECT RELATIVE POSITION
1—Snap ring. 2—Bearing. 3—Spacer.

Install the front bearing, cage and cover.

Installing Bevel Pinion Shaft Group

Heat the pinion bearing in clean oil and press it on the shaft until the bearing is seated against the pinion.

Install the pinion bearing retaining nut, lock and screws.

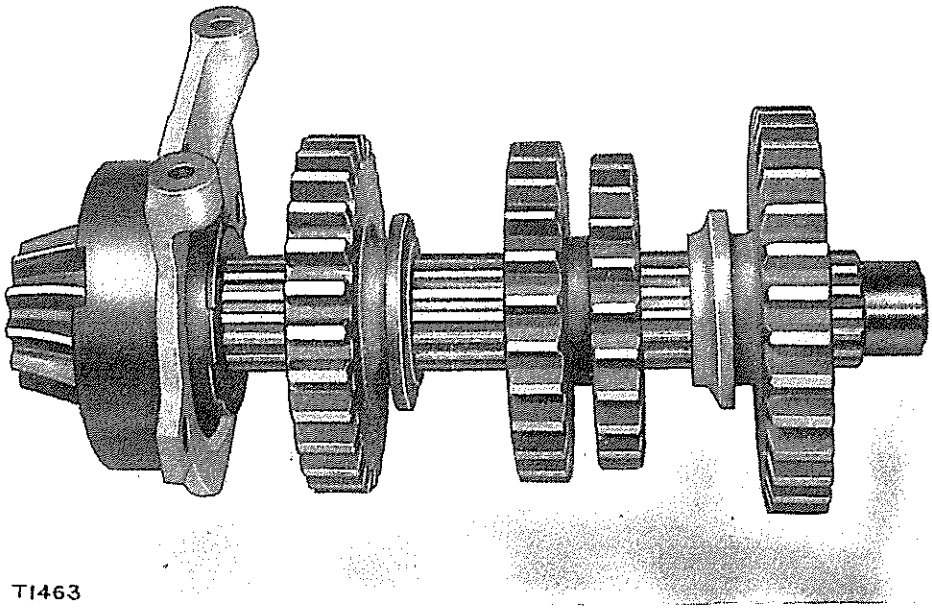
Stake the screws securely using a center punch and install the bearing cage and snap ring.

Slide the top transmission gears on the shaft in the order illustrated, and lower the group into place in the transmission compartment.

Insert the shims between the bevel pinion bearing cage and the rear wall of the transmission compartment before installing the capscrews.

NOTE

If neither the bevel shaft, bevel gear nor case have been replaced, use the same shims that were removed. If replacements have been made, see the topic, BEVEL GEAR AND PINION SETTING.



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BEVEL PINION SHAFT GROUP READY TO INSTALL IN CASE

Installing Flywheel Clutch Shaft

Install the pilot bearing in the clutch shaft and insert the snap ring.

Press the bearing cage on the shaft.

Replace the lip-type seal if necessary. The lip faces the transmission case.

Install the nuts and lockwashers securing the bearing cage to the transmission case.

Bevel Gear

REMOVAL

Remove the seat, fenders and fuel tank. See the topic, SEAT, FENDERS AND FUEL TANK.

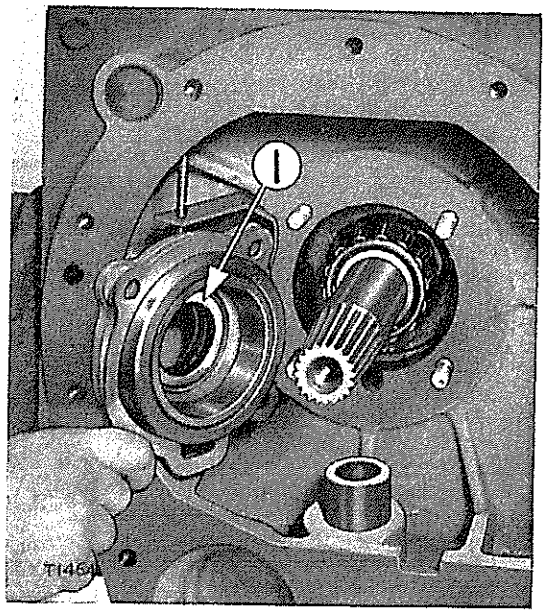
Remove both final drive housings. See the topic, REMOVAL OF FINAL DRIVE CASE.

Remove both steering clutch inner drum groups and the steering clutch release yokes. See the topic, STEERING CLUTCHES AND BRAKES.

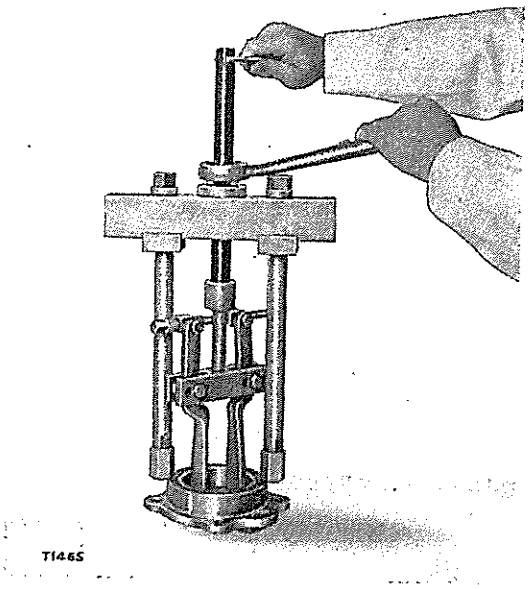
Take off the rear cover on the transmission case and unlock and loosen the nuts securing the bevel gear to the shaft.

Remove the bearing cages on both sides of the bevel gear.

Keep the shims clean and flat and with their respective cages.



BEVEL GEAR BEARING CAGE
1—Seal.

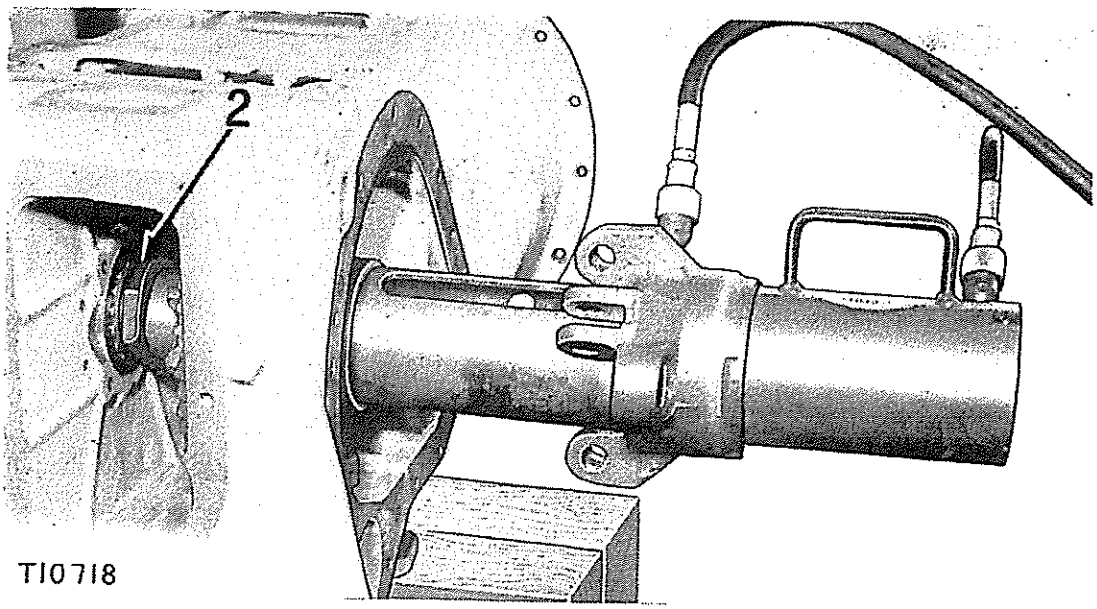


PULLING BEARING RACE

Examine the seal **(1)** and, if necessary, replace it with the lip toward the bevel gear bearing.

The bearing race can be pulled out of the cage using the 8B7548 Push Puller, 8B7553 Adapters and the 8B7554 Bearing Cup Pulling Attachment.

Loosen the bevel gear retaining nut **(2)**.



PULLING BEVEL GEAR SHAFT
2—Nut.

Pull the shaft out of the gear with the following puller arrangement:

6F25 Service Press	5F9888 Adapter Coupling
5F9897 Sleeve	5F9892 Pin

5F9881 Adapter

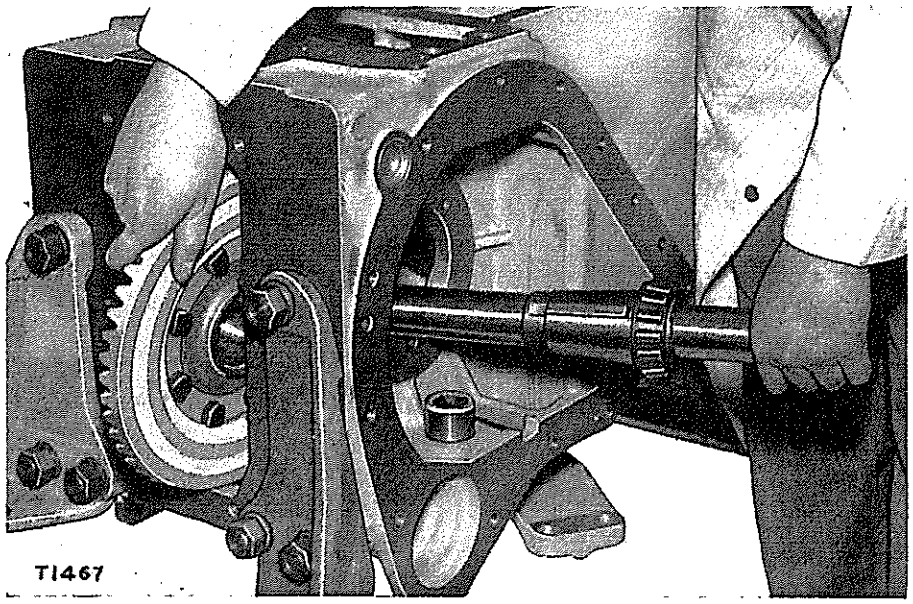
NOTE

It is impossible to completely remove the retainer nut **(2)** before starting to pull the shaft. This nut must be backed off as the shaft is pulled.

The left bevel gear bearing will be forced from the shaft as the shaft is pulled.

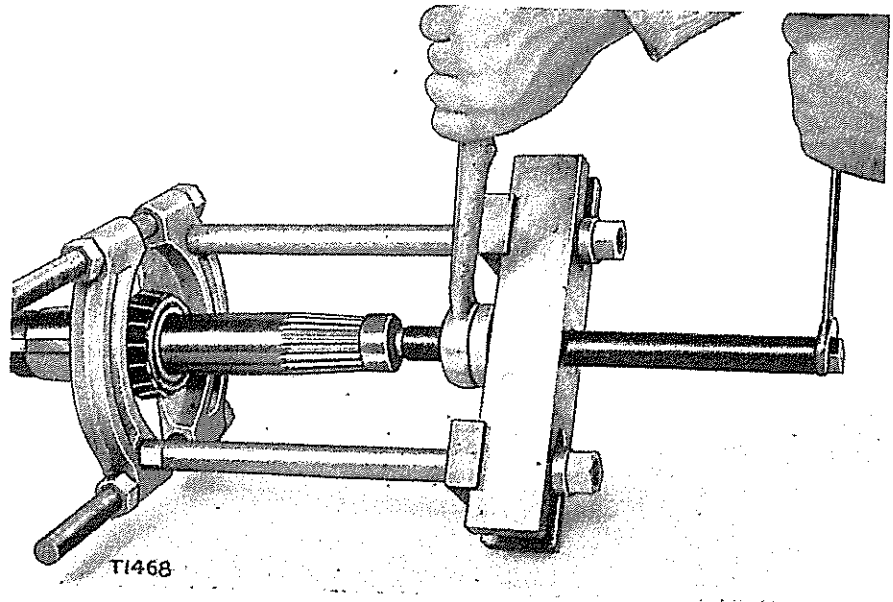
When the shaft has been pulled out of the bevel gear, lift the bevel gear out of the case.

Take out the bolts and remove the bevel gear from the hub.



REMOVING BEVEL GEAR AND SHAFT

Pull the right bevel gear bearing from the shaft using the 8B7548 Push Puller and the 8B7551 Bearing Pulling Attachment.



PULLING RIGHT BEVEL GEAR SHAFT BEARING

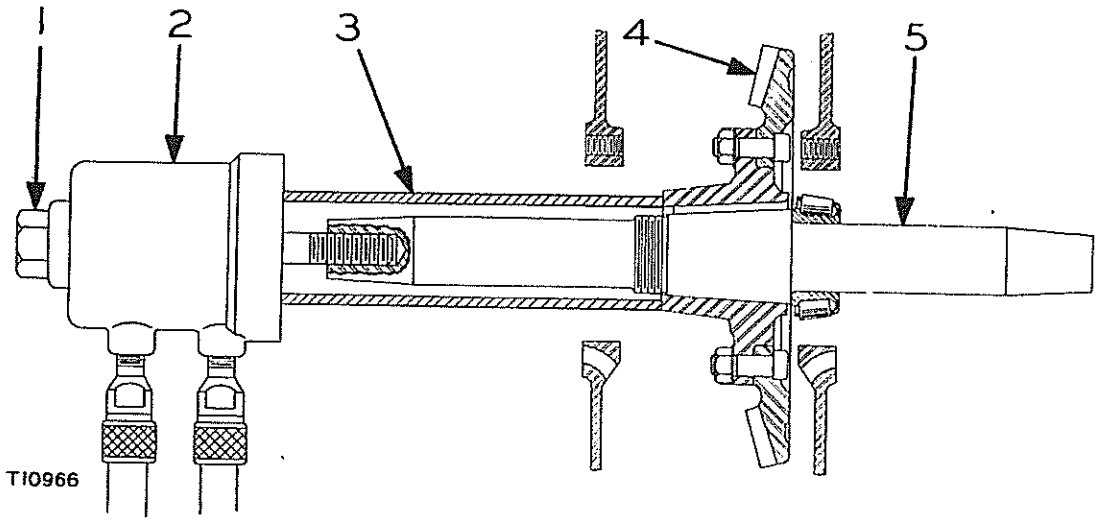
INSTALLATION

The tapers on the bevel gear shaft **(5)** and in the bevel gear hub should be clean and free from burrs.

Place the bevel gear assembly in its compartment. Insert the bevel gear shaft through the bearing cage bore and into the hub of the gear.

The bevel gear **(4)** can be pressed into place on the bevel gear shaft **(5)** using the 6F25 Service Press, 7F9540 Hydraulic Puller **(2)**, a 9" piece of 2¼" ID tube **(3)** and a 4F925 Capscrew **(1)** which is ¾"-16 (NF), 8" long.

Press the bevel gear hub on the shaft using 12 tons pressure.



INSTALLING BEVEL GEAR
1—4F925 Capscrew. 2—7F9540 Hydraulic Puller. 3—Tube (9"long—2¼" ID).
4—Bevel gear. 5—Bevel gear shaft.

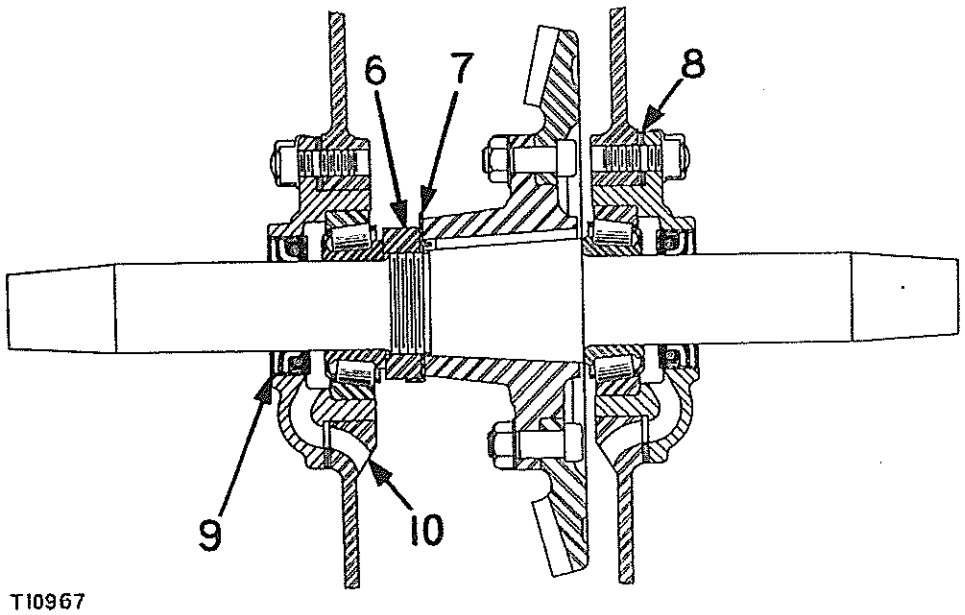
The bevel gear hub can also be pulled in place using a wrench on nut **(6)**. If a wrench is used, it is necessary to use a torque of 700-750 pound feet to pull the gear in place. Use a four-foot pipe extension on the wrench.

Install the lock **(7)** and nut **(6)**. Press the oil seals **(9)** into the bearing cages with the lip of seals toward the bevel gear compartment.

The transmission should be in place before adjusting the bevel gear bearings so an approximate adjustment for backlash can be made at the same time. Install sufficient shims with the left bearing cage to allow a slight amount of backlash between the bevel gear and pinion and pull the cage tight against the shims. Install the right bearing cage without shims **(8)** and tighten the capscrews evenly, just tight enough to eliminate the end play of the bevel gear shaft **(5)**. Use a thickness gauge to determine the clearance between the bearing cage flange and the wall. Be sure this clearance is the same all around the cage.

When permanently installing the cages, be sure that the oil drain holes **(10)** in each cage are aligned with the holes in the case.

Remove the cage and install the shims with a total thickness of .017" less than the clearance determined by the thickness gauge. Again install the cage and securely tighten the capscrews. This will place a pre-load on the bearings and prevent the bevel gear shaft from shifting when the tractor is operated under load.



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ASSEMBLY AND ADJUSTMENT OF BEVEL GEAR GROUP
6—Nut. 7—Lock. 8—Shims. 9—Oil seal. 10—Oil drain hole.

Another method of determining the correct bevel gear bearing pre-load is as follows:

Before assembling the oil seals **(9)**, rotate the bevel gear shaft several times. Pre-load the bearings so that a torque of 50 to 60 pound inches is required to rotate the bevel gear shaft.

To do this requires the removal of approximately .017" shims after shaft end clearance has been taken up.

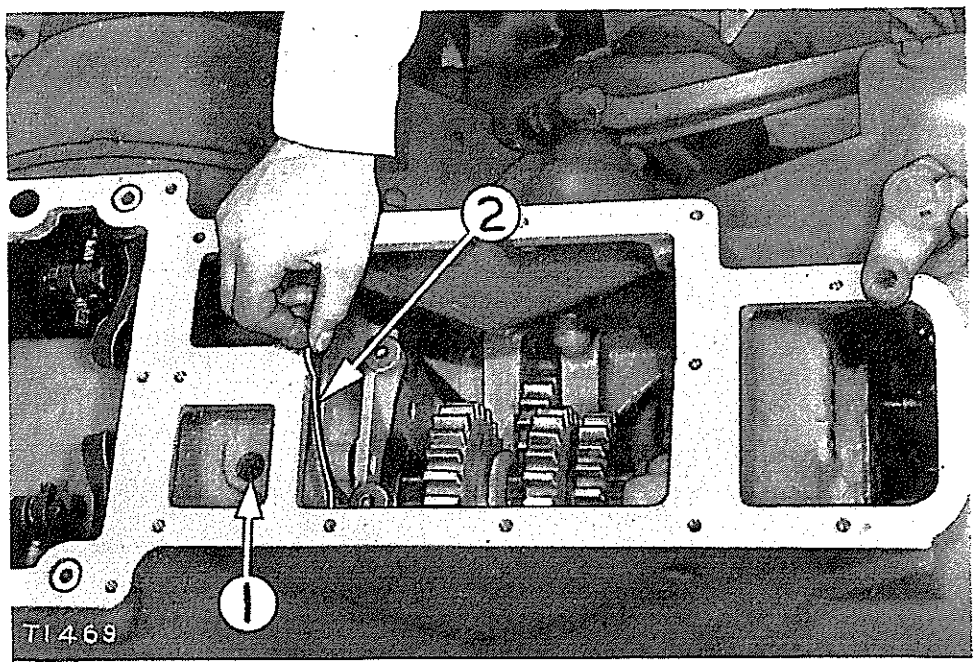
BEVEL GEAR AND PINION SETTING

The bevel gear and pinion must be adjusted to the proper location to obtain the correct tooth contact.

Shims are provided between the pinion bearing cage flange and the rear wall of the transmission case so the pinion can be moved toward or away from the centerline of the bevel gear shaft.

Other shims are located between the bevel gear bearing cages and the outer walls of the bevel gear compartment to permit moving the bevel gear toward or away from the centerline of the pinion shaft, thereby changing the backlash.

Moving either the gear or the pinion affects both backlash and tooth contact so the two must be adjusted at the same time.



BEVEL GEAR AND PINION SETTING
1—Inspection opening. 2—Shims.

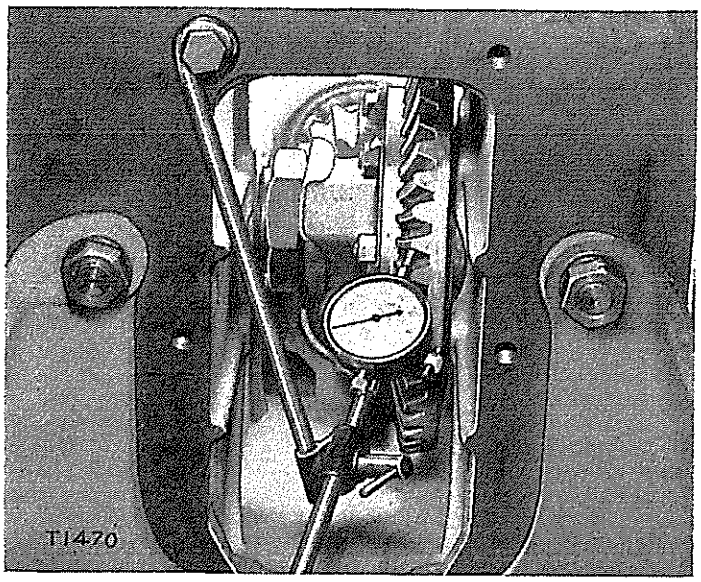
The correct amount of backlash for each bevel gear is sometimes marked on the outside diameter of the gear. If not marked, adjust the backlash to .007"-.009".

The mating of the bevel gear and pinion can be checked through the inspection opening in the top of the bevel gear compartment. This opening which is approximately 1 inch in diameter is closed by an expansion plug.

Remove the expansion plug from the inspection opening **(1)** at the top of the bevel gear compartment to check the mating of the bevel gear and pinion.

The backlash is adjusted by moving shims from one bearing cage to the other.

Use a dial indicator with the finger on one of the bevel gear teeth and check in several positions.



CHECKING BACKLASH

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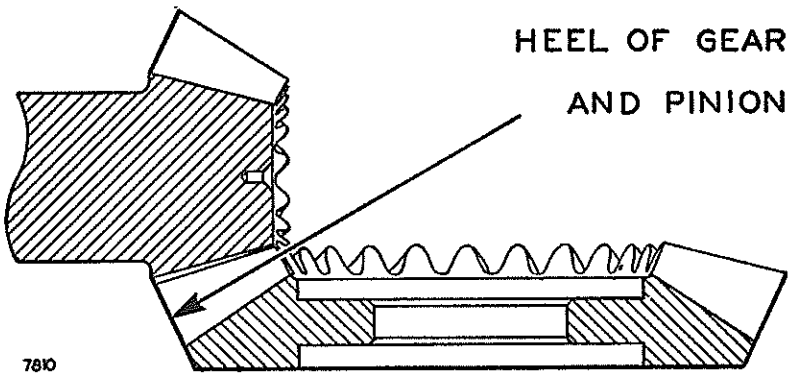
Use sufficient shims **(2)** between the pinion bearing cage flange and the rear wall of the transmission case to align the heel ends of the bevel gear and pinion teeth.

Bevel Pinion Location

If the bevel pinion is re-installed in the same transmission case, use the same shims back of the bearing cage flange at the rear end of the pinion shaft that were removed when the transmission was disassembled. The shims are semi-circular, making it unnecessary to remove the cage to add or remove shims. The pinion can be located by observing the tooth contact pattern made by the pinion teeth on the gear teeth.

Determine the tooth contact pattern in the following manner:

1. Install the transmission and use sufficient shims between the pinion bearing cage and the transmission case to align the heel ends of the bevel gear and pinion. This will place the pinion in nearly the correct relationship with the bevel gear. Adding shims will move the pinion away from the center line of the bevel gear shaft. Removing shims will move the pinion closer to the center line of the bevel gear shaft.



ALIGNING BEVEL GEAR AND PINION

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2. Adjust the bevel gear backlash as described in the topic, BEVEL GEAR AND PINION SETTING.

3. Brush Prussian blue pigment or red lead sparingly on the bevel gear teeth. When the pinion is rotated, the red lead is squeezed away by the contact of the teeth, leaving bare areas the exact size, shape and location of the contacts. Sharper impressions may be obtained by applying a small amount of resistance to the bevel gear while rotating the pinion. When making adjustments, check the drive side of the bevel gear teeth. The reverse or coast side contact should be automatically correct when the drive side is correct.

With adjustments properly made, the correct tooth contact shown in Figure 1 will be secured. The area of contact starts near the toe of the gear and extends about 80 per cent of the tooth length. This adjustment results in a quiet running bevel gear and pinion set, which because the load is distributed over the teeth within the proper area, will give maximum service life.

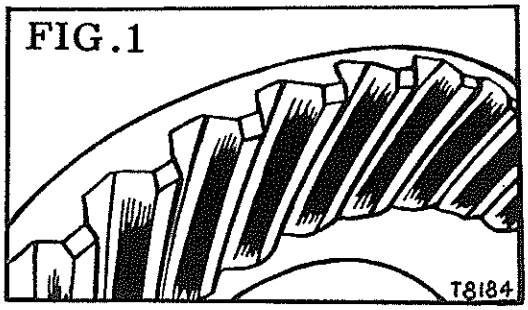

FIG. 1
PROPER TOOTH CONTACT PATTERN

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A high, narrow tooth contact as shown in Figure 2 is not desirable. If gears are allowed to operate with an adjustment of this kind, noise, galling and rolling over of the top edges of the teeth will result. To obtain correct contact, move the pinion toward the bevel gear to lower contact area to the proper location. This adjustment will decrease the backlash between the pinion and bevel gear teeth, which may be corrected by moving the bevel gear away from the pinion.

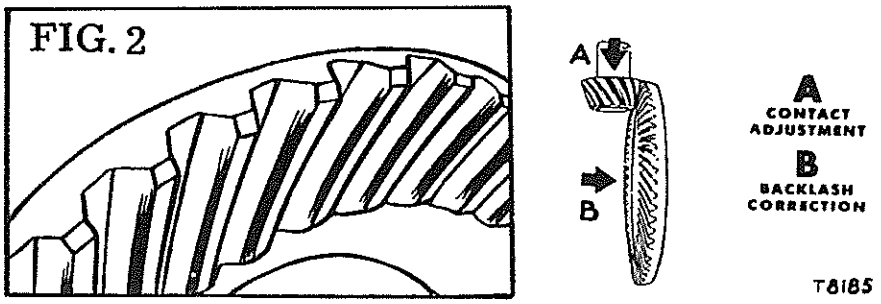


FIG. 2 HIGH NARROW CONTACT

A low narrow contact as shown in Figure 3 will result in galling, noise and grooving of the teeth. To correct this, move the pinion away from the bevel gear to raise the contact area and the bevel gear toward the pinion to correct the backlash.

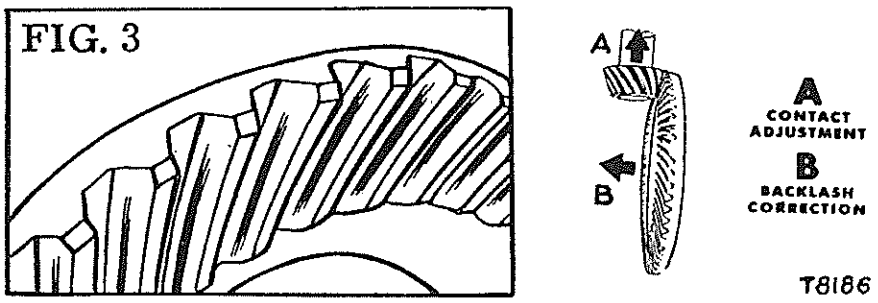


FIG. 3 LOW NARROW CONTACT

A short toe contact as shown in Figure 4 will result in chipping at the tooth edges and excessive wear due to the small tooth contact area. To obtain the correct contact, move the bevel gear away from the pinion. This will increase the lengthwise contact and move the contact toward the heel of the tooth. Then move the pinion toward the bevel gear to obtain the correct backlash.

A short heel contact as in Figure 5 may cause chipping of the teeth, excessive wear and noise. To correct this, move the bevel gear toward the pinion to increase the lengthwise contact and also move the contact area toward the toe. Move the pinion away from the bevel gear to correct the backlash.

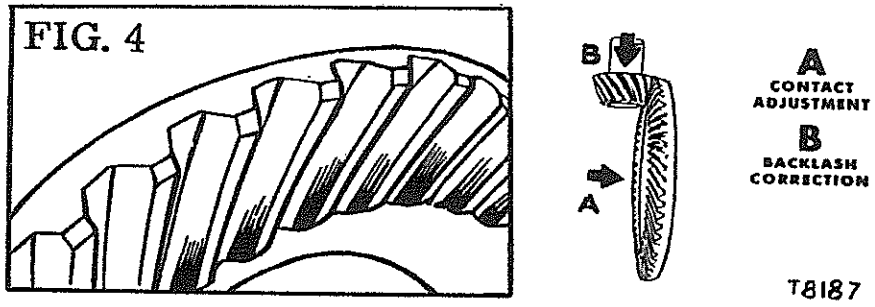


FIG. 4 SHORT TOE CONTACT

Several adjustments of both the pinion and bevel gear may be necessary before correct tooth contact and backlash are secured.

Always remember that the backlash will also affect the tooth contact pattern. Therefore, be sure the backlash is properly adjusted before checking the adjustment of the pinion.

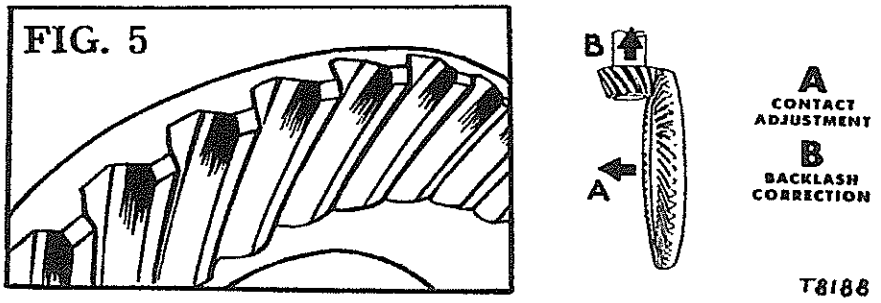


FIG. 5 SHORT HEEL CONTACT

Seat, Fenders and Fuel Tank

REMOVAL

Take out the bottom seat cushion and remove the two floor plates.

Shut off the fuel at the valve and disconnect the fuel line.

Remove the clip securing the fuel line to the left fender.

Disconnect the pin securing the bar to the right brake pedal.

Remove the capscrews securing the fenders to the dash. Take out the capscrews securing the fenders to the flywheel housing and the transmission case.

Lift off the seat, fenders and fuel tank as a unit.

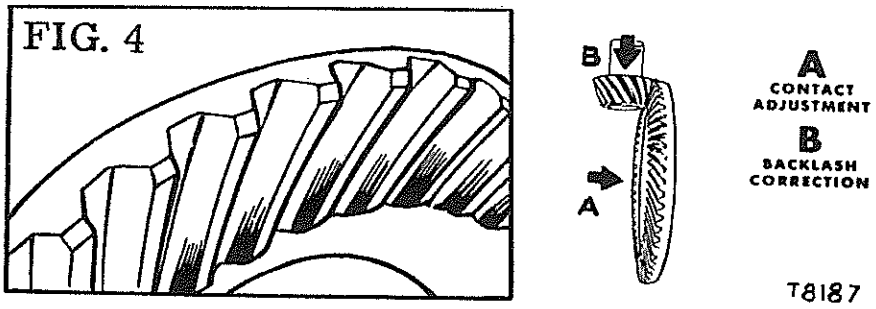


FIG. 4 SHORT TOE CONTACT

Several adjustments of both the pinion and bevel gear may be necessary before correct tooth contact and backlash are secured.

Always remember that the backlash will also affect the tooth contact pattern. Therefore, be sure the backlash is properly adjusted before checking the adjustment of the pinion.

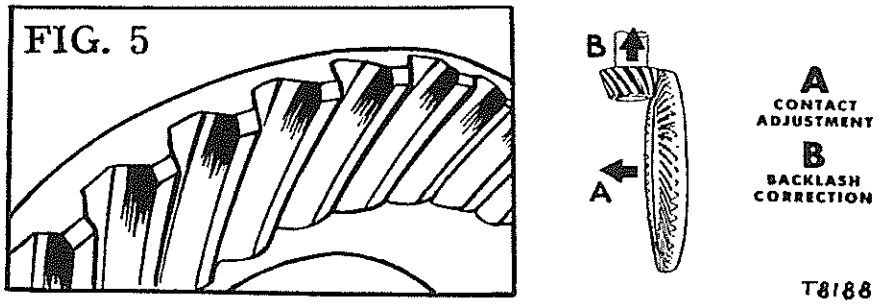


FIG. 5 SHORT HEEL CONTACT

Seat, Fenders and Fuel Tank

REMOVAL

Take out the bottom seat cushion and remove the two floor plates.

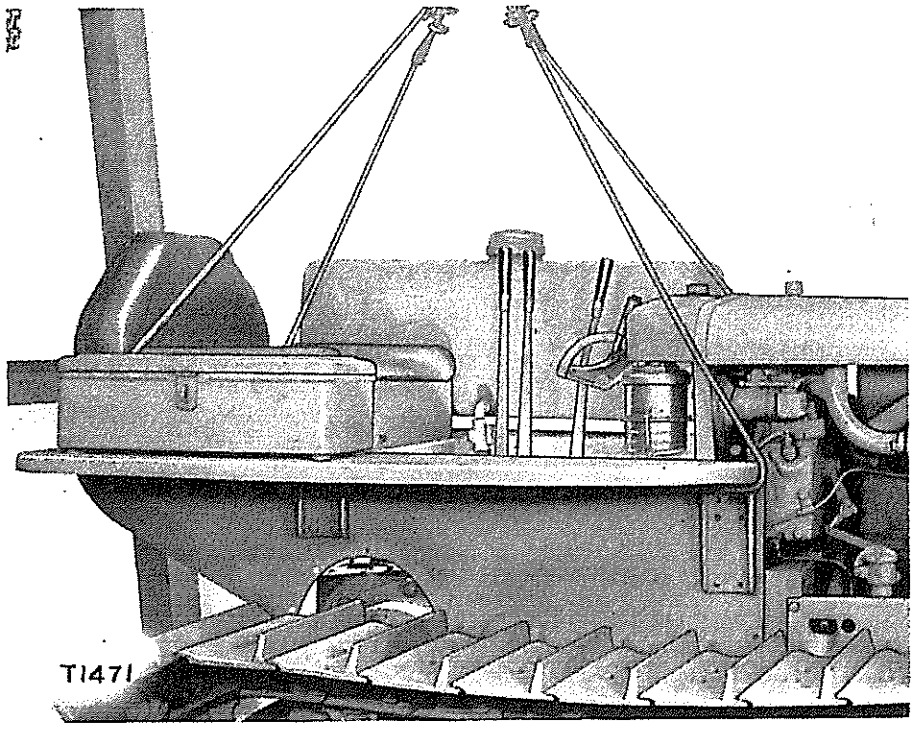
Shut off the fuel at the valve and disconnect the fuel line.

Remove the clip securing the fuel line to the left fender.

Disconnect the pin securing the bar to the right brake pedal.

Remove the capscrews securing the fenders to the dash. Take out the capscrews securing the fenders to the flywheel housing and the transmission case.

Lift off the seat, fenders and fuel tank as a unit.



REMOVING SEAT, FENDERS AND FUEL TANK AS A UNIT
(Earlier Tractor Illustrated, Later Tractor, Same Principle)

Steering Clutches and Brakes

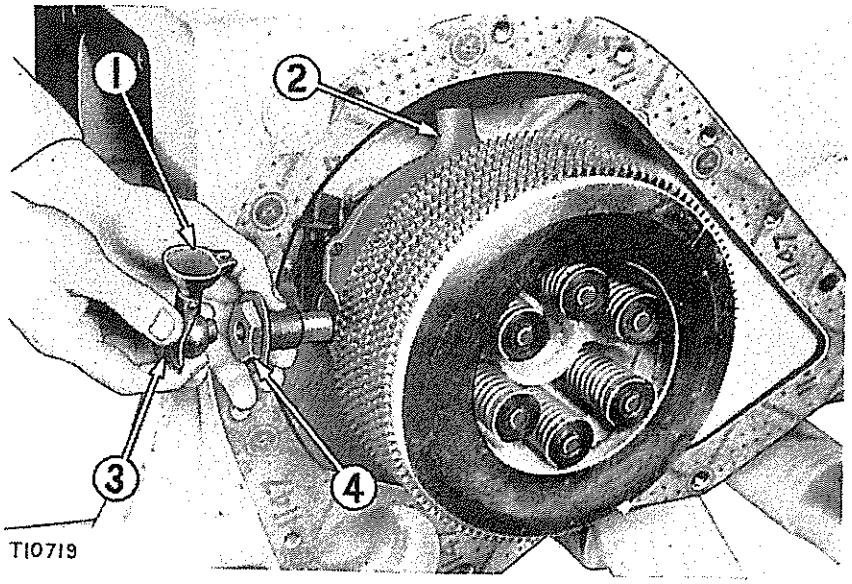
The steering clutches and brakes are located in compartments in the final drive cases. These clutches are of the dry, multiple disc type, and are held in engagement by springs.

Two separate brakes are used to supplement the action of the steering clutches or to stop the tractor. Each pedal operates a self-energizing brake band on the steering clutch outer drum. The right brake has a hand-operated lock to set the brake in a locked position.

REMOVING STEERING CLUTCH AND BRAKE ASSEMBLY

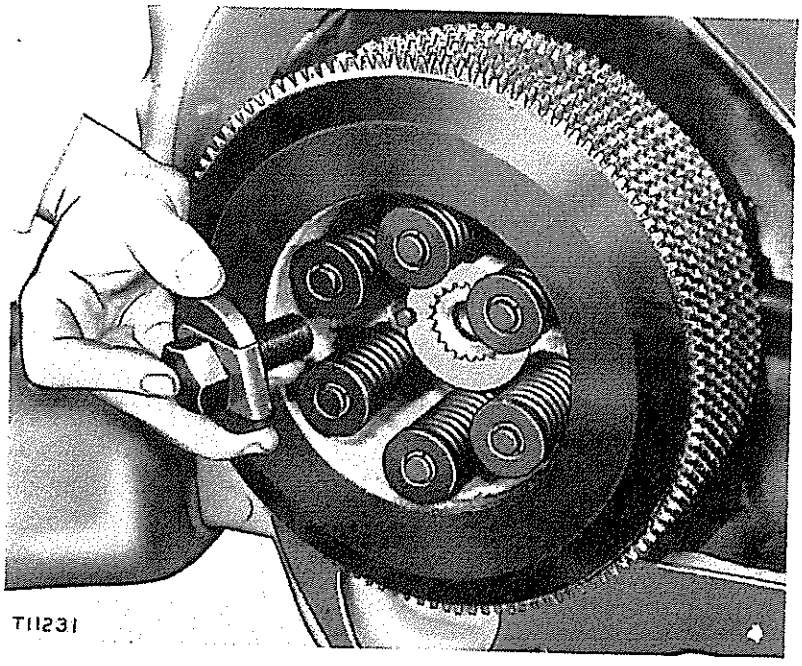
Before removing the steering clutches and brake assemblies, it is necessary to remove the final drive cases. See the topic, REMOVAL OF FINAL DRIVE CASE. However, the steering clutches and brake assemblies can be worked on without removing the sprocket. The entire sprocket and final drive case can be removed as a unit.

Remove the screw **(3)**, cup **(1)** and screw **(4)**. The screw **(4)** secures the steering clutch release yoke **(2)** to the release bearing.



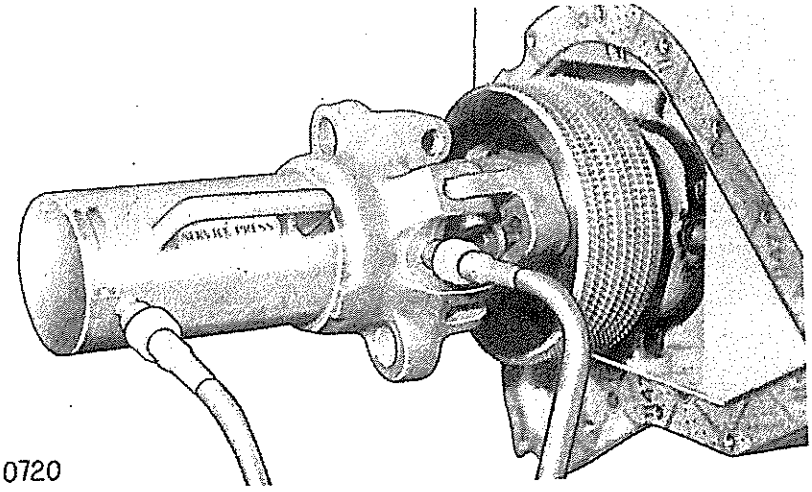
PREPARING TO REMOVE STEERING CLUTCH
1—Cup. 2—Steering clutch release yoke. 3—Screw. 4—Screw.

Loosen the steering clutch inner drum retaining capscrew and washer and back the capscrew out about 1/8" to press against.



REMOVING STEERING CLUTCH RETAINING CAPSCREW AND WASHER

Pull the clutch assembly from the splined bevel gear shaft using the 6F25 Service Press, 6F6703 Adapter and two 1/2"-13 (NC) capscrews, 5 inches long.



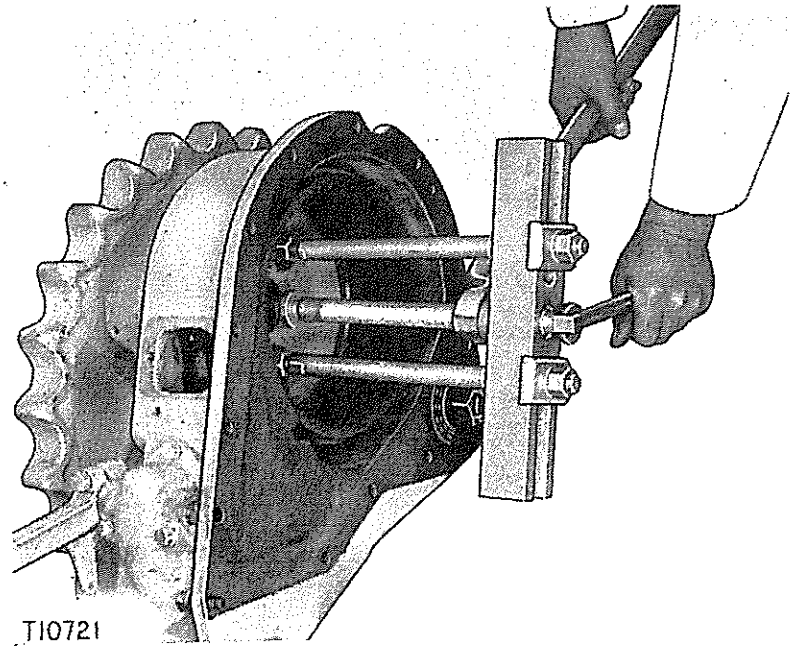
REMOVING STEERING CLUTCH INNER DRUM

The steering clutch outer drum is pressed on the tapered splines and secured by a retaining nut.

Remove the nut, lock and washer.

Replace the nut before attempting to pull the drum, this will protect the threads on the pinion shaft.

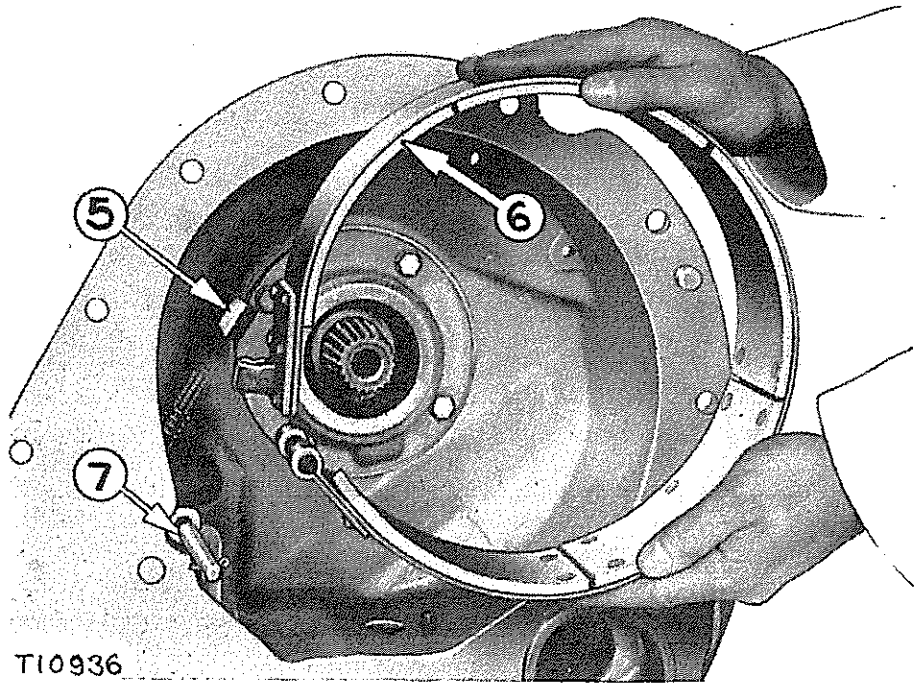
Pull the drum using the 8B7548 Puller, two 8B7559 Adapters and the 8B7560 Step Plate.



REMOVING STEERING CLUTCH OUTER DRUM

The brake band **(6)** can be removed by removing the adjusting nut **(5)** and pulling out the anchor pin **(7)**.

New brake lining should be installed if appreciable wear is present. When installing new lining make sure the rivets are tight.



REMOVING BRAKE BAND
5—Adjusting nut. 6—Brake band. 7—Anchor pin.

DISASSEMBLY

Compress the clutch springs using a 1B4332 Nut, 1B4645 Spacer, 5F5096 Plate, 5F5098 Shim, S2364 Bolt and the 3456A Plate.

Remove the locks **(1)** and retainers **(2)**.

Turn the clutch over, lift off the pressure plate **(9)** and slide the discs off the drum **(4)**.

COMPRESSING STEERING CLUTCH SPRINGS

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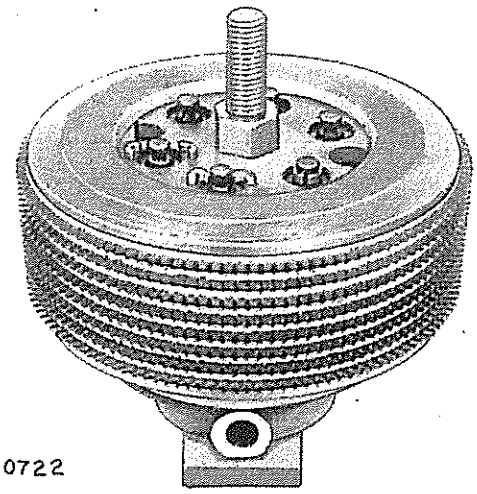

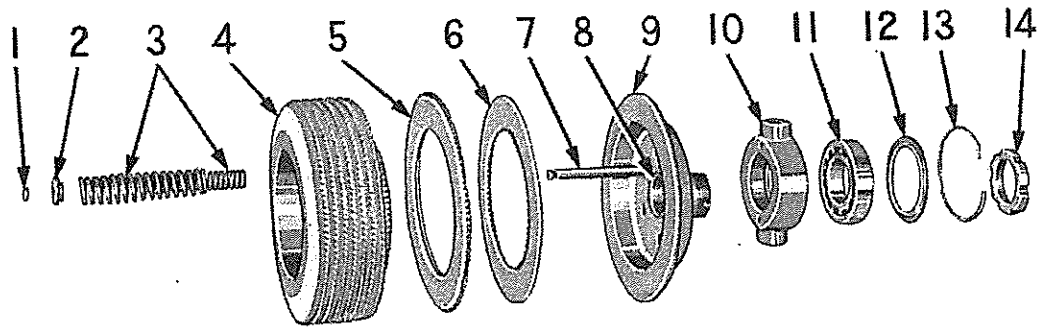

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STEERING CLUTCH DISASSEMBLED

1—Locks. 2—Retainer. 3—Springs. 4—Inner drum. 5—Lined disc. 6—Unlined disc. 7—Spring stud. 8—Pressure plate bushing. 9—Pressure plate. 10—Release bearing cage. 11—Release bearing. 12—Washer. 13—Snap ring. 14—Nut.

There are eight unlined discs **(6)**, which have internal teeth and are driven by the inner drum **(4)**. The eight lined discs **(5)** have external teeth. They are faced and the external teeth mate with internal teeth in the outer drum. The force of the springs **(3)** holds the discs together as a unit, and power is transmitted from the bevel gear shaft through the steering clutches to the sprockets.

When the steering clutch is released, the clutch discs are allowed to separate and no longer act as a complete unit.

Remove the two setscrews locking the nut **(14)** on the pressure plate **(9)** with a 4B9820 Wrench.

Remove the nut and pull the bearing cage from the pressure plate **(9)** with an 8B7546 Puller and the 8B7560 Step Plate.

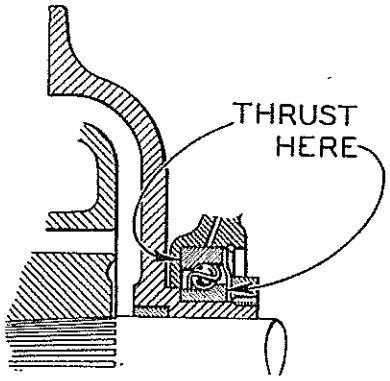
After the snap ring **(13)** and washer **(12)** are removed, press or drive the bearing **(11)** out of the cage using a punch in the two holes in the back of the bearing cage and applying pressure first through one hole and then the other. If the bearing is damaged, install a new one.

The spring studs **(7)** can be removed from the pressure plate if necessary.

The bushing **(8)** in the pressure plate should be replaced if worn or damaged.

ASSEMBLY

Assemble the release bearing. The side of the bearing marked "Thrust Here" should be toward the retaining nut if marked on the inner race when it is assembled in the release bearing cage.



POSITION OF RELEASE BEARING
(Left Side)

◆

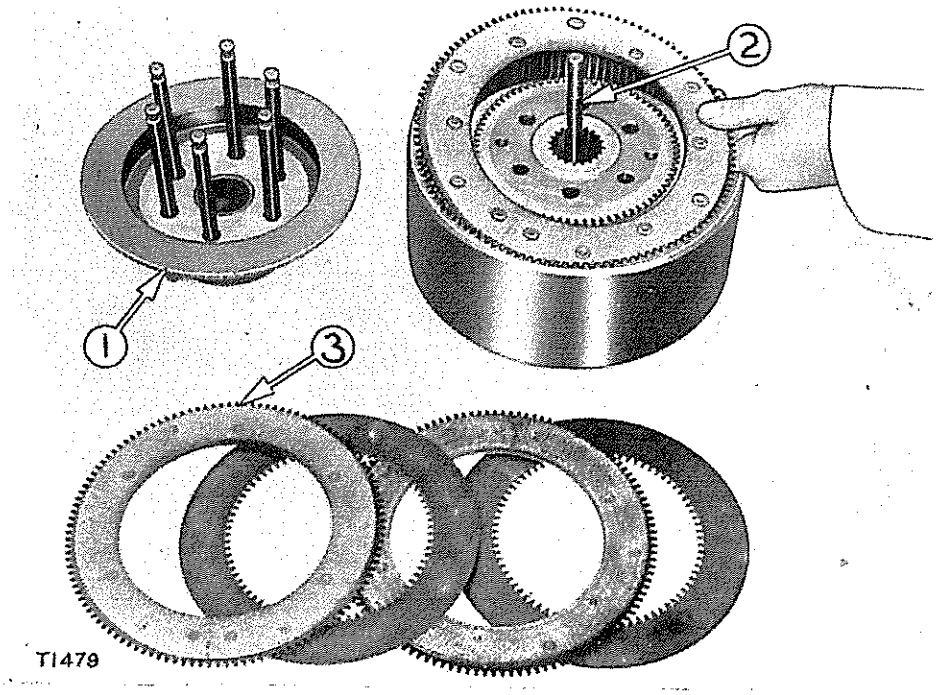
If the words "Thrust Here" are marked on the outer race, the marked side must be toward the pressure plate.

Install the washer, snap ring and retaining nut.

Install the two setscrews securing the nut to the pressure plate and peen the metal over the setscrews to prevent them from working loose.

Scored or badly worn plates or discs should be replaced. If the overall thickness of the plates and discs of one steering clutch is less than 2 19/32", the lined discs should be replaced.

Place three 3/8" nuts down in the outer drum to act as temporary spacers between it and the inner drum to keep the first lined disc from going beyond the splines in the outer drum.



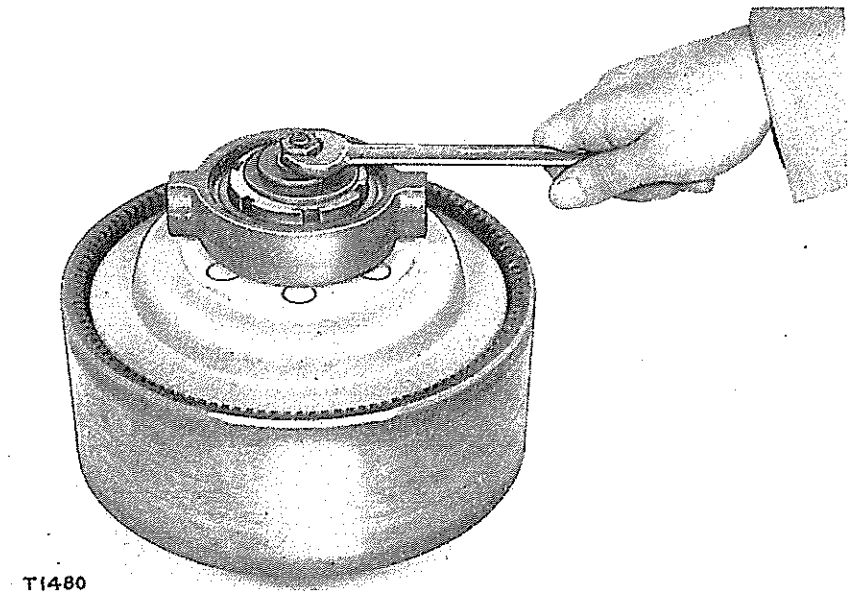
INSTALLING STEERING CLUTCH DISCS
1—Pressure plate. 2—Bolt. 3—Lined disc.

Place an eight-inch bolt **(2)** and a large washer through the center of the inner drum and place the drum in the outer drum to assure proper alignment of the teeth of the lined discs. Make sure the two drums are concentric with each other.

Beginning with a lined disc **(3)** against the flange of the inner drum, alternate the remaining lined and unlined discs as they are dropped in place.

Place the pressure plate **(1)** and spring studs in place and install a large washer and nut on the bolt.

Tighten the nut securely. This will grip the discs tightly and prevent them from slipping out of alignment.



ALIGNING CLUTCH DISCS

Turn the clutch assembly over, lift off the outer drum and install the clutch springs, retainers and locks by using the 5F5096 Plate under a press. Remove the temporary clamp bolt.

INSTALLATION

Install the steering clutch inner drum assembly and connect the steering clutch yokes.

Install the brake band in the final drive case.

Install the steering clutch outer drum in the final drive case and install the final drive case.

Attach the pivot shaft cap to the final drive case and connect the drawbar bracket.

Steering Clutch Adjustment

Remove the inspection plate in front of the seat and loosen the clamp bolt.

Adjust the screw until there is three inches of free motion at the top of the steering clutch release levers.

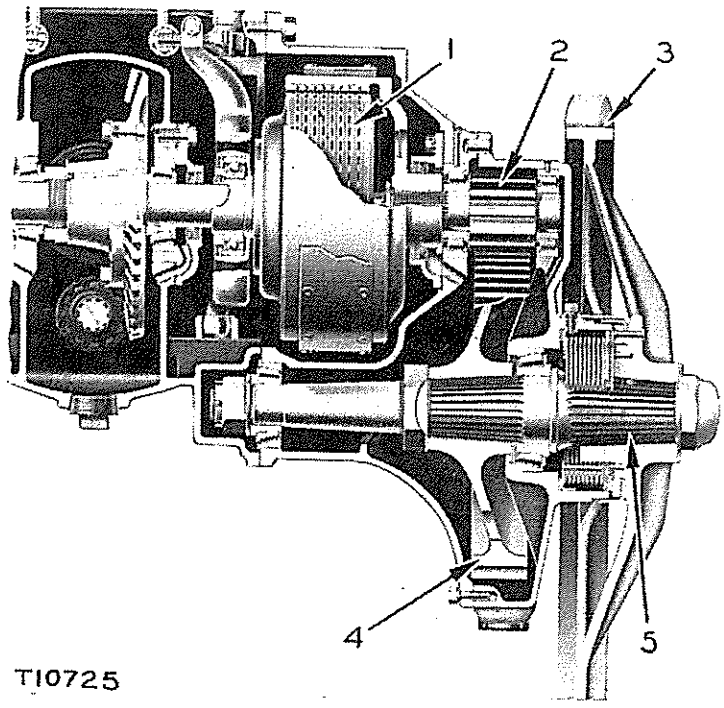
Brake Adjustment

Remove the small cover at the front of the final drive case and tighten the adjusting nut until the pedal can be depressed three to four inches.

Final Drive Group

The final drive group consists principally of a pinion **(2)**, final drive gear **(4)**, sprocket shaft **(5)** and a sprocket **(3)** which transmits the power from the steering clutch **(1)** to the track.

Various parts and assemblies must be removed to gain access to the gears and bearings inside the final drive case.

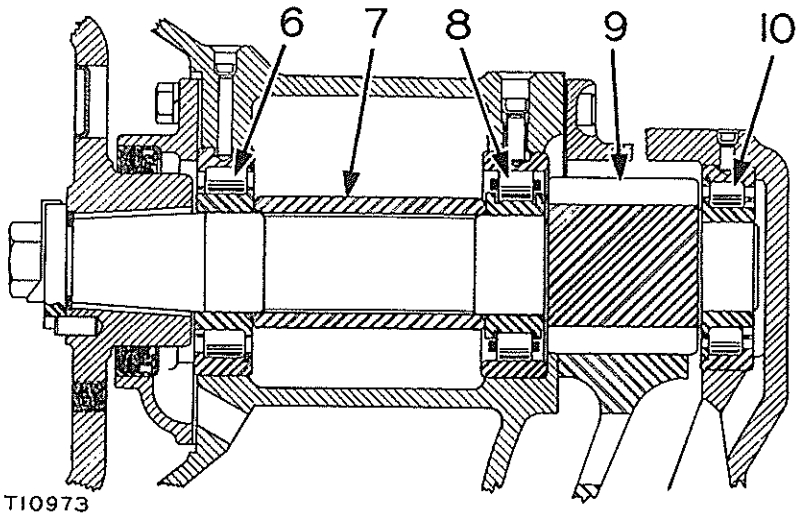


CUTAWAY VIEW OF FINAL DRIVE GROUP
1—Steering clutch. 2—Pinion. 3—Sprocket. 4—Final drive gear. 5—Sprocket shaft.

These parts should be removed in the order described in the following disassembly procedure. It is not necessary, however, to disassemble the various assemblies except to inspect or replace parts thereof.

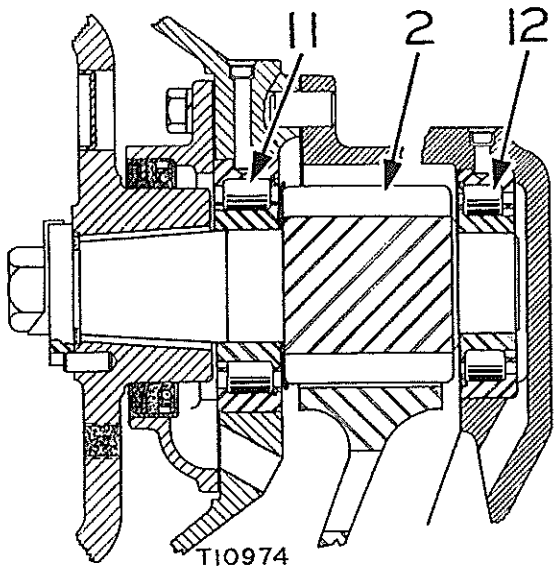
The 50-inch gauge tractor has a longer pinion shaft **(9)** than the pinion shaft **(2)** used in the 40-inch gauge tractor.

The pinion shaft **(9)** is supported by three bearings **(6)**, **(8)** and **(10)** and has a spacer **(7)**.



PINION SHAFT (50-INCH GAUGE TRACTOR)
6—Bearing. 7—Spacer. 8—Bearing. 9—Pinion shaft. 10—Bearing.

The pinion shaft **(2)** is supported by two bearings **(11)** and **(12)**.



PINION SHAFT (40-INCH GAUGE TRACTOR)
2—Pinion shaft. 11—Bearing. 12—Bearing.

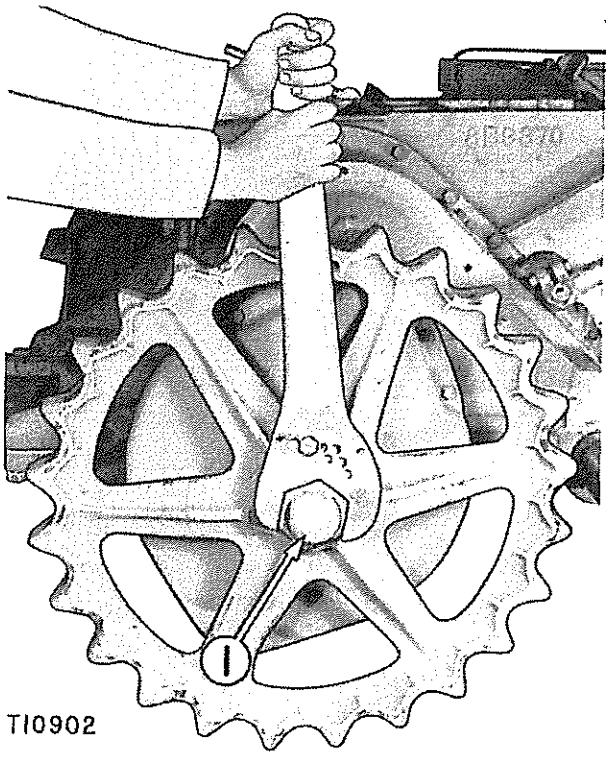
All of the illustrations used for removal, disassembly and assembly show the 40-inch gauge tractor.

Sprocket Removal

Separate the track and lay out. See the topic, SEPARATING TRACK.

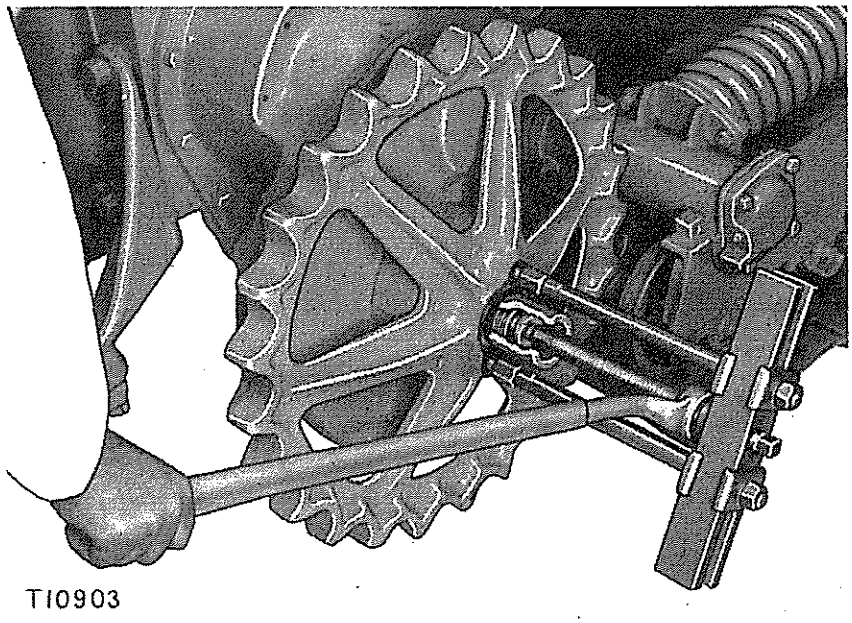
Remove the capscrews holding the lock around nut **(1)** and remove the lock.

Remove the nut **(1)** with the 8F2239 Wrench.



REMOVING SPROCKET RETAINING NUT
1—Nut.

Pull the sprocket with the 8B7548 Push Puller, two 8B7556 Adapters and 8B7560 Step Plate. Screw 5F9880 Adapter onto the shaft just enough to prevent the sprocket from jumping off the shaft when it breaks loose.



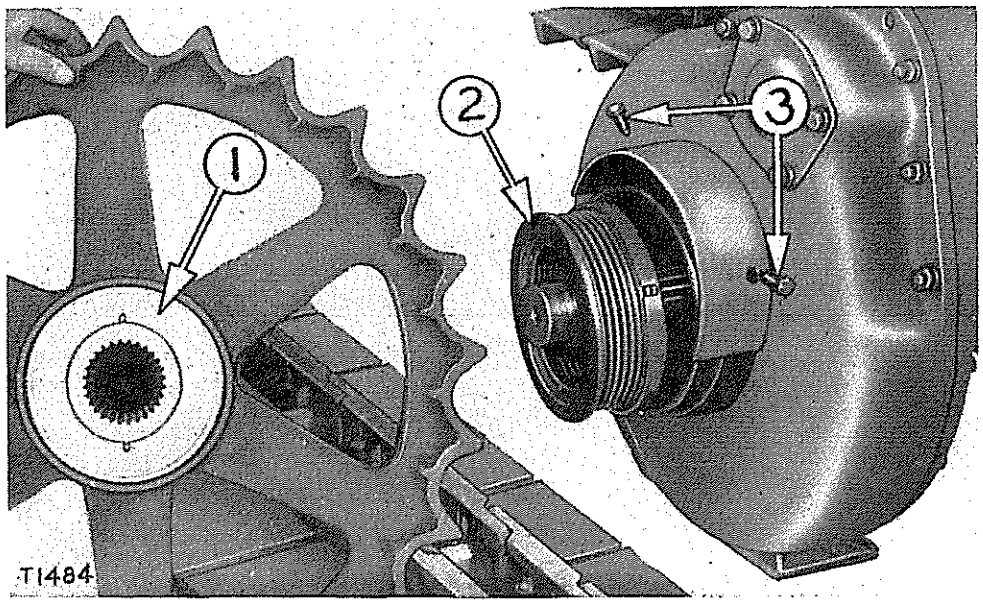
PULLING SPROCKET

Bellows Seal Removal

After pulling the sprocket from the final drive shaft, remove the capscrews **(3)** which secure the dust guard and prevent the bellows seal from rotating.

Lift out the bellows seal **(2)**.

The washer **(1)** on the inside of the sprocket can be turned over to provide a new wearing surface.



REMOVING BELLOWS SEAL
1—Washer. 2—Bellows seal. 3—Capscrews.

Removal of Final Drive Case

Separate the track and lay it out flat.

Remove the cap **(2)** which secures the final drive case **(1)** to the pivot shaft **(3)**.

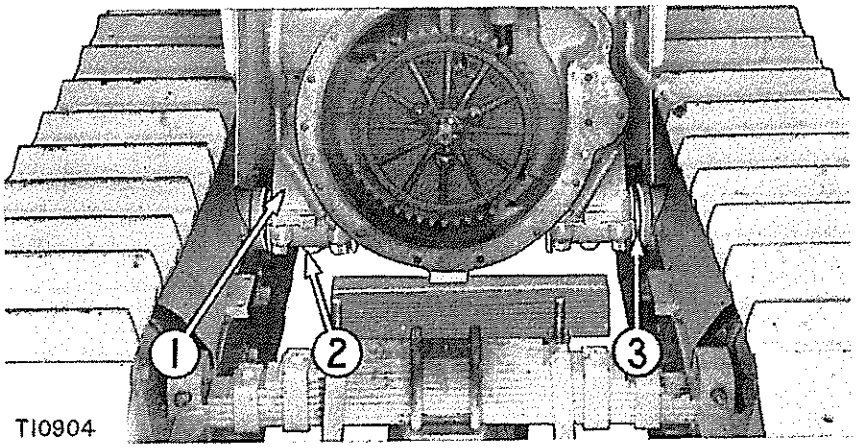
Remove the drawbar and drawbar bracket from the underside of the tractor. See the topic, DRAWBAR.

Remove the track roller frame. See the topic, TRACK ROLLER FRAME.

Raise the transmission case high enough to clear the pivot shaft and roll the track roller frame forward.

Raise the rear of the tractor to raise the sprockets off the track and place blocks under the transmission case.

Pull the sprocket. See the topic, SPROCKET REMOVAL.

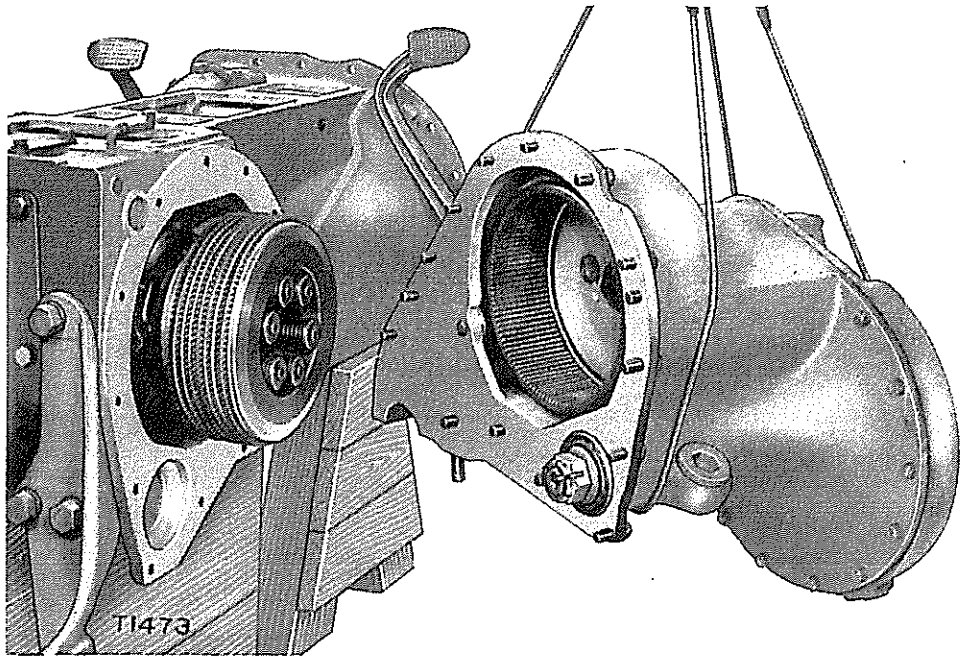


PREPARING TO REMOVE FINAL DRIVE CASE
(Engine removed for better illustration)
1—Final drive case. 2—Cap. 3—Pivot shaft.

Place cables around the final drive case and adjust in such a manner as to hold the final drive case in a level position.

Remove the capscrews securing the final drive case to the transmission case.

Pry the final drive case off the dowels and pull it away from the transmission case.



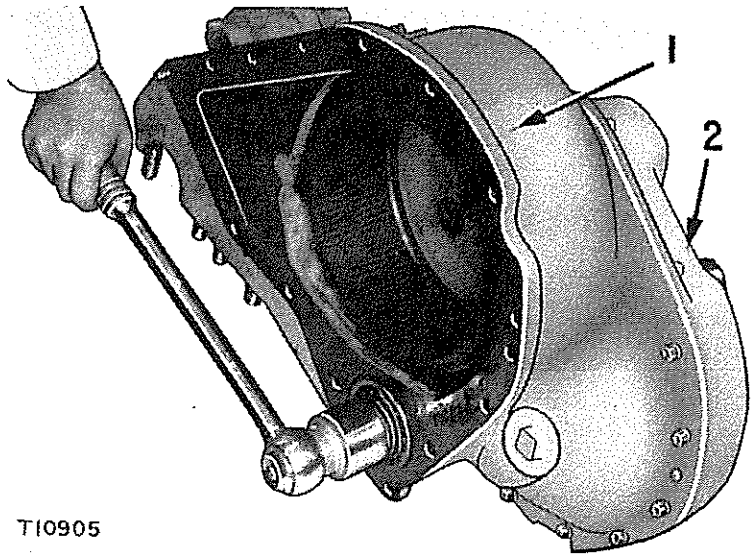
REMOVING FINAL DRIVE CASE

Final Drive Case Disassembly

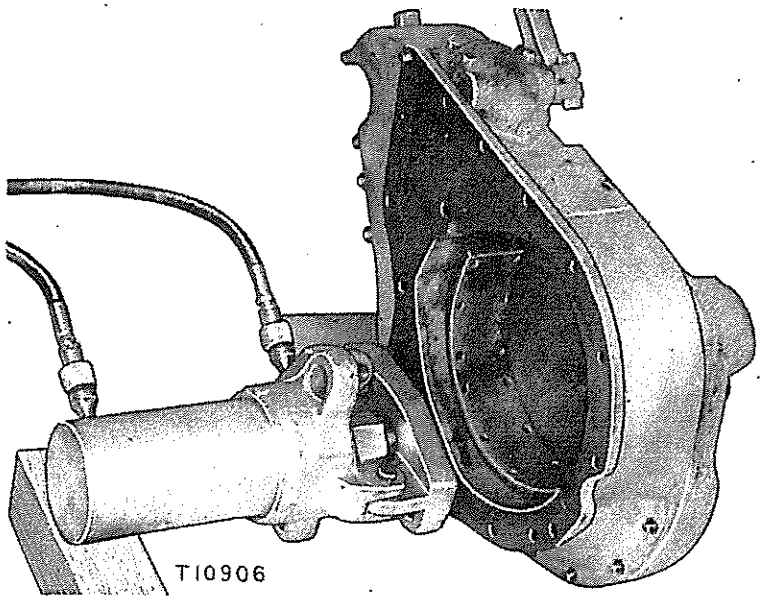
Remove the retaining nut from the inner end of the sprocket shaft.

Remove the steering clutch outer drum. See the topic, REMOVING STEERING CLUTCH AND BRAKE ASSEMBLY.

Remove the nuts and lockwashers securing the final drive cover assembly **(2)** to the final drive case assembly **(1)**.



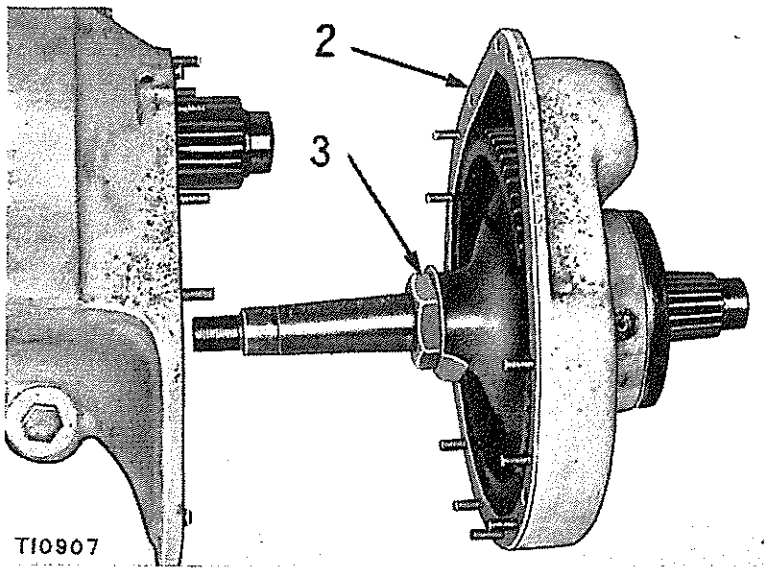
REMOVING RETAINING NUT FROM SPROCKET SHAFT
1—Final drive case assembly. 2—Final drive cover assembly.



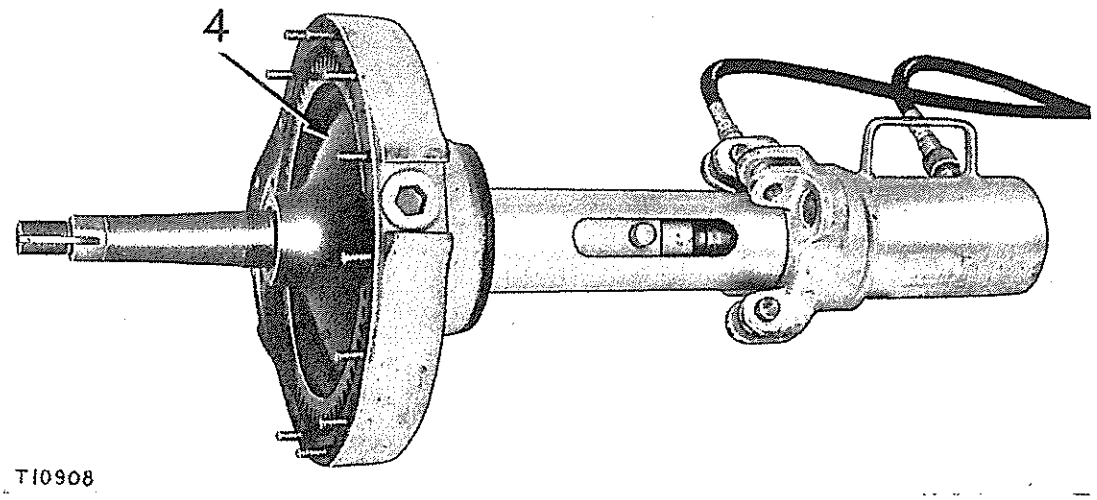
PRESSING FINAL DRIVE COVER ASSEMBLY FROM FINAL DRIVE CASE ASSEMBLY

Press the cover assembly from the case assembly by pressing on the sprocket shaft using the 6F25 Service Press, 6F6703 Adapter and two ½"-13 (NC) bolts, 4 inches long with two 1F7958 nuts.

The final drive gear can be removed from the final drive cover assembly **(2)** after removing the nut **(3)**.



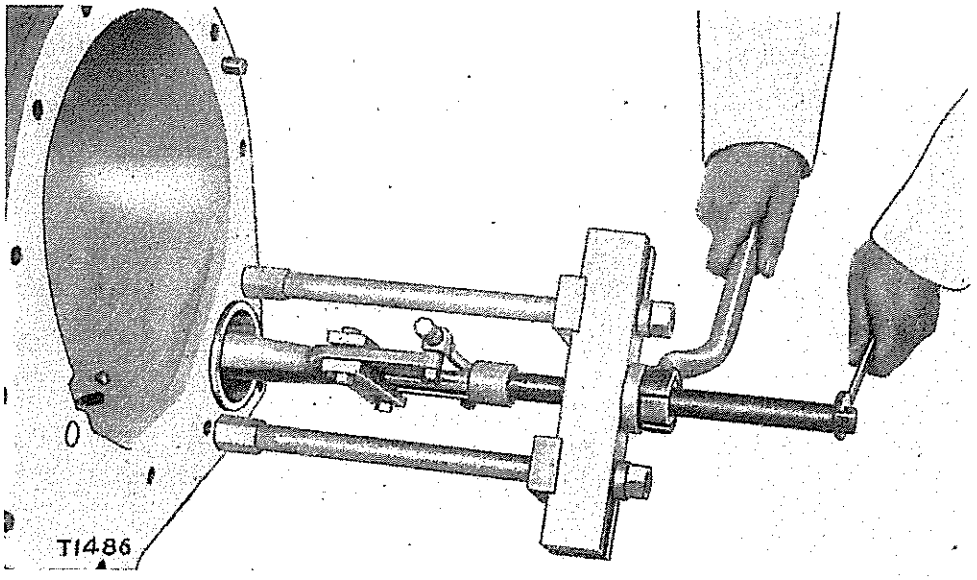
PREPARING TO REMOVE FINAL DRIVE GEAR
2—Final drive cover assembly. 3—Nut.



PULLING FINAL DRIVE GEAR
4—Final drive gear.

Pull the final drive gear **(4)** using the 6F25 Service Press, 5F9888 Adapter, 5F9892 Pin, 5F9897 Sleeve and 5F9880 Adapter.

The inner bearing can be pulled from the final drive case with an 8B7548 Push Puller, 8B7553 Adapter and the 8B7554 Attachment.

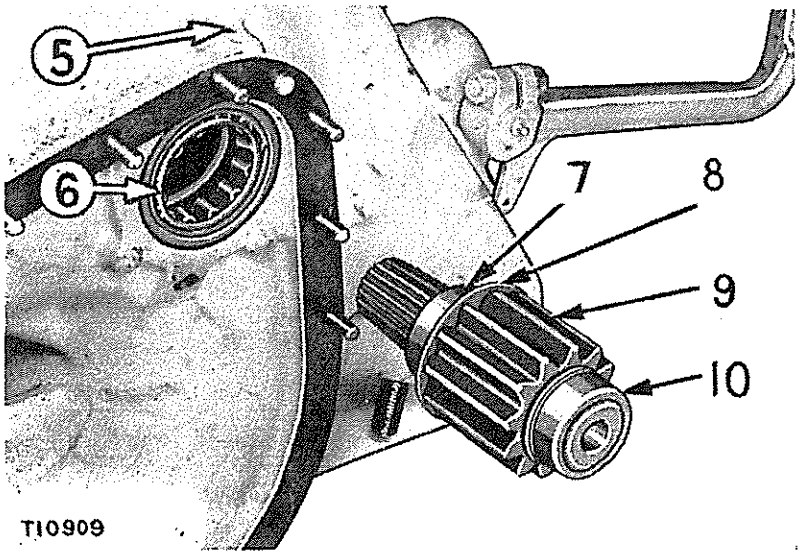


PULLING INNER BEARING RACE

Remove the final drive pinion **(9)** from the final drive housing.

The inner bearing **(6)** can be pulled after removing the plug and dowel from the hole **(5)**.

The bearing races **(7)** and **(10)** and the deflector **(8)** can be removed if the races are damaged and need replacing.



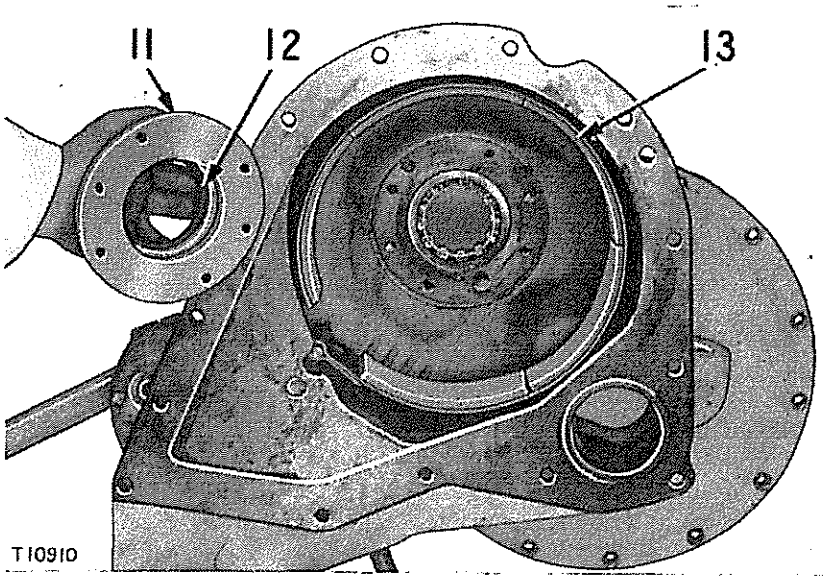
REMOVING FINAL DRIVE PINION
5—Hole where plug and dowel are located. 6—Bearing. 7—Bearing race. 8—Deflector. 9—Final drive pinion. 10—Bearing race.

Remove the retainer **(11)**. The seal **(12)** can be removed if necessary. When replacing the seal **(12)**, install it with the lip towards the final drive pinion.

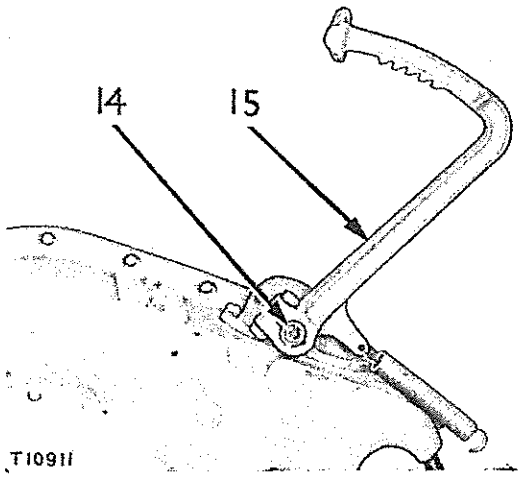
Remove the brake band **(13)**. See the topic, REMOVING STEERING CLUTCH AND BRAKE ASSEMBLY.

Remove the brake pedal **(15)** from the shaft **(14)**.

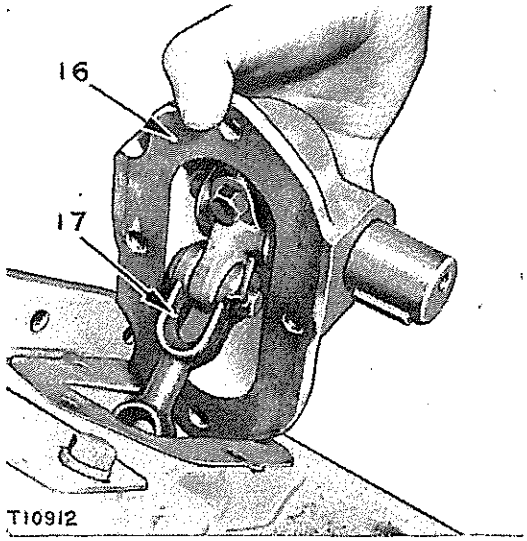
Disconnect the linkage **(17)** inside of the final drive housing.



REMOVING SEAL
11—Retainer. 12—Lip-type seal. 13—Brake band.



PREPARING TO REMOVE BRAKE PEDAL
14—Shaft. 15—Brake pedal.



REMOVING BEARING ASSEMBLY
16—Bearing assembly. 17—Linkage.

Remove the capscrews securing the bearing assembly **(16)** to the final drive housing and remove the assembly.

Assembly of Final Drive Case

Turn the roller assembly **(4)** so that the thrust flange on the outer bearing race, the side opposite the roller retainer ring, will be toward the steering clutch and press it into the final drive case **(1)**.

Press the seal **(2)** into the retainer **(3)** with the lip of the seal toward the final drive pinion **(5)**.

Install the retainer.

If the bearing races **(7)** and **(8)** have been removed, press them onto the final drive pinion so that the flanges of the races are toward the pinion teeth.

Slide the pinion **(5)** into the final drive case.

Install the brake band and connect it to the actuating linkage.

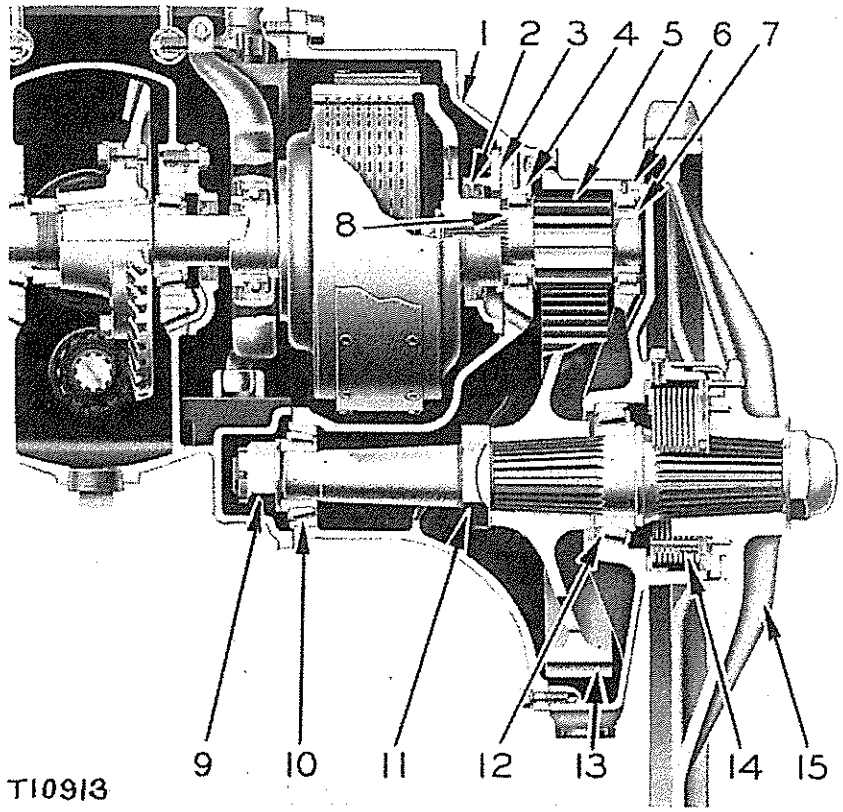
Install the steering clutch outer drum and secure in place.

Heat the roller bearing assembly **(12)** in oil and press on the shaft.

Place the shaft in the final drive cover **(6)**.

Install the gear **(13)** and lock. Tap on the hub as the nut **(11)** is tightened. This will seat the gear securely on the shaft.

Place the final drive cover **(6)**, gear **(13)** and shaft in place against the final drive case **(1)**.



FINAL DRIVE ASSEMBLY

1—Final drive case. 2—Seal. 3—Retainer. 4—Roller bearing assembly. 5—Final drive pinion. 6—Final drive cover. 7—Bearing race. 8—Bearing race. 9—Nut. 10—Bearing. 11—Nut. 12—Roller bearing assembly. 13—Final drive gear. 14—Bellows seal. 15—Sprocket.

Insert and tighten the capscrews and nuts holding the cover to the case.

Install the bearing **(10)** and tighten the nut **(9)** until all end clearance is removed from the shaft.

Install the final drive case on the transmission case.

Do not release the steering clutches while installing the housing.

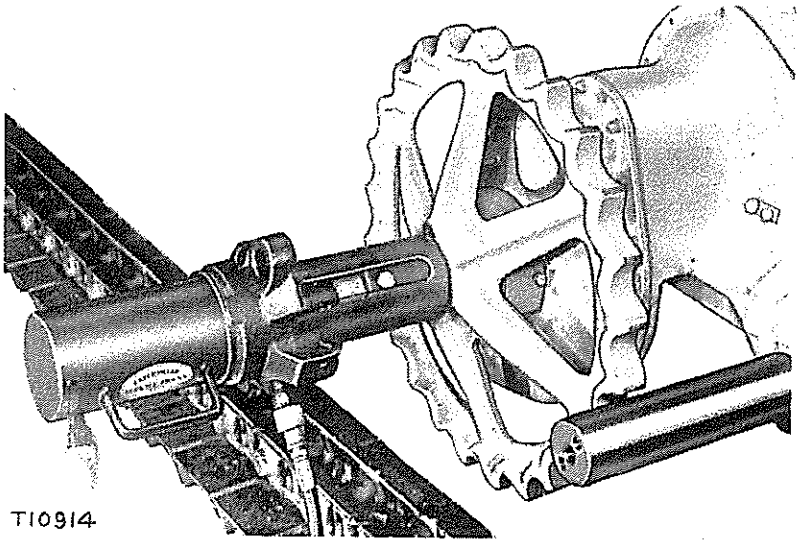
Install the pivot shaft cap and connect the drawbar under the tractor.

Install the bellows seal **(14)** and sprocket **(15)**. See the covering topics.

Sprocket Installation

Install the bellows seal in the case. Use gasket cement on the gasket that contacts the case and grease on the seal that contacts the washer on the sprocket.

Install the dust guard. The capscrews securing the dust guard must enter the holes in the bellows seal to prevent it from rotating.



INSTALLING SPROCKET

Check the splines in the sprocket and on the end of the shaft to see that they are clean, dry and free from burrs.

Install the sprocket and press it in place using the 6F25 Service Press, 5F9888 Adapter Coupler, 5F9892 Pin, 5F9880 Adapter and the 7F6068 Pusher. Press it on using 15 tons pressure.

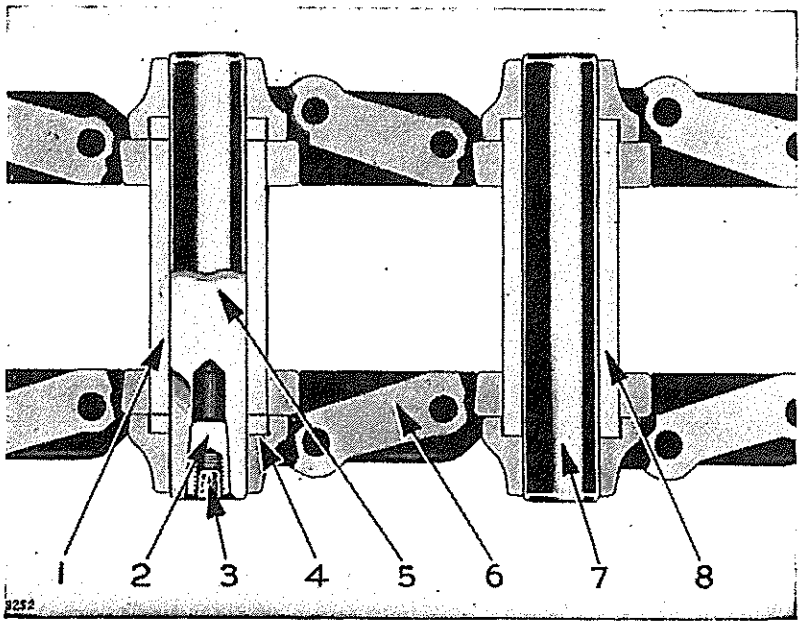
Install the gasket and retaining nut. Install the lock and the two cap-screws securing the nut in place.

TRACK AND ROLLER FRAME GROUP

The track roller frame assembly provides a mounting for the track rollers, front idlers, recoil springs and equalizer spring. The weight of the tractor is carried through the frame to the track rollers. Proper alignment of track roller frames is maintained by the pivot shaft, which is fastened to the rear end of the track roller frames, and to the final drive cases. This construction allows each track roller frame to operate independently, and to move up and down relative to one another by pivoting at the pivot shaft.

Tracks

The track link assembly consists of links, pins and bushings. As shown, each link **(6)** overlaps the preceding link thus forming a continuous chain. Each link is counterbored in the overlapped portion to provide a tight, well sealed joint to reduce the entrance of abrasives. The bushings **(8)** are all alike except the master bushing **(1)** which is shorter for assembly purposes. With the master bushing, collars **(4)** are inserted in the counterbored space. The pins **(7)** are alike except the master pin **(5)** which is taper reamed and split at each end. This construction permits the tapered plug **(2)** to be driven into the master pin to hold the pin in position in the links on earlier tractors. The cork **(3)** protects the threads in the plug.



TRACK PIN AND BUSHING CUTAWAY VIEW

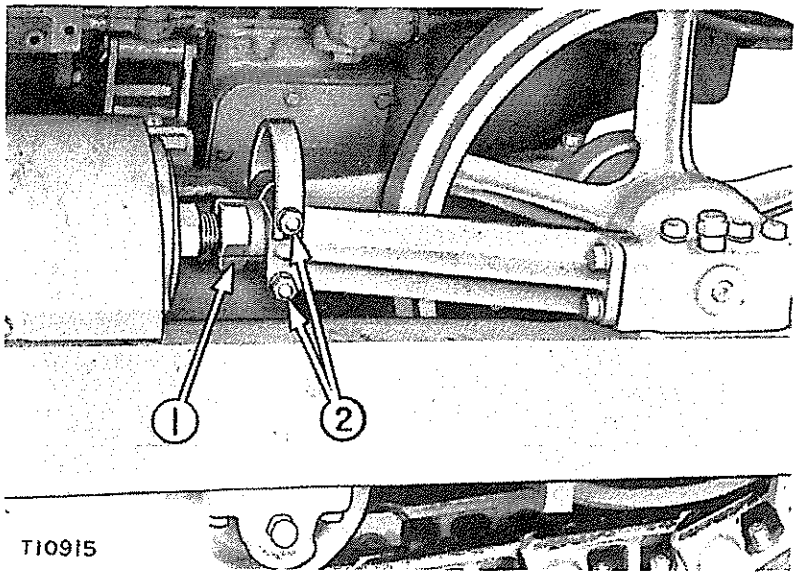
1—Master bushing. 2—Tapered plug. 3—Cork. 4—Collars. 5—Master pin (Earlier Tractors). 6—Link. 7—Pins. 8—Bushings.

On later tractors, the master pin is split on each end, drilled through and taper reamed near each end. The pin takes two tapered plugs, one large plug and one small plug. See the topic, SEPARATING TRACKS.

SEPARATING TRACKS

Remove the guard over the track adjusting nut **(1)** and loosen the track screw locking bolts **(2)**.

Loosen the track adjustment.



PREPARING TO SEPARATE THE TRACK
1—Adjusting nut. 2—Locking bolts.

Move the tractor until the master pin is in front of the front idler and place a block about 12 inches high under the track shoe grouser below the master pin.

Move the tractor ahead so the slack in the track will be on top. Set the brake so the slack will remain in the top part of the track.

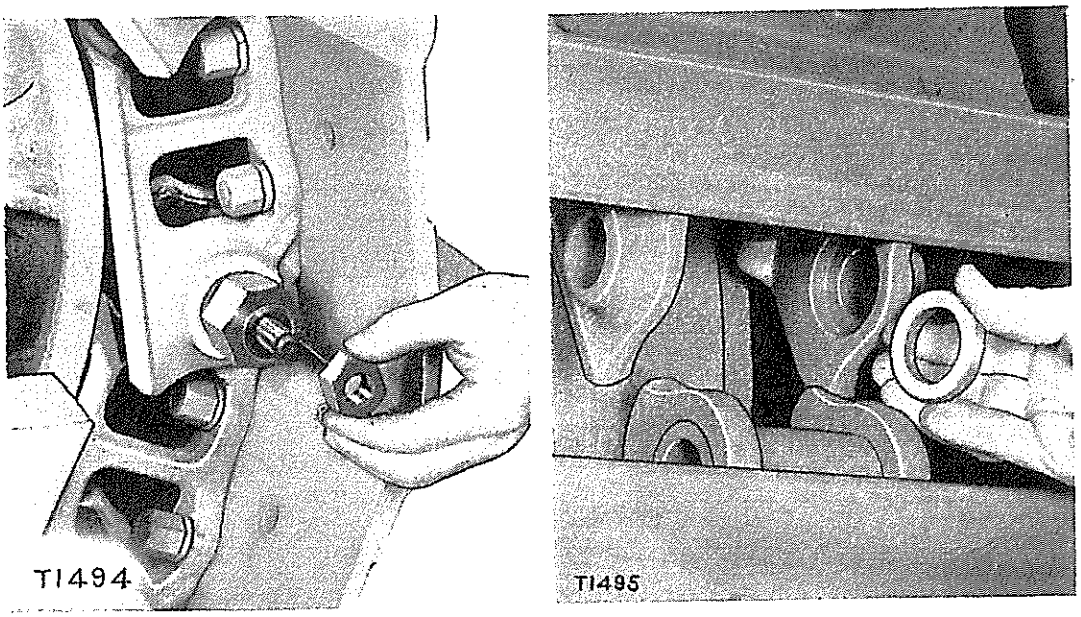
Master Pin Removal and Installation (Earlier Tractors)

Remove the corks from the master pin plugs and pull the plugs from both ends of the pin, using a 2B2108 Sleeve, 3B1027 Screw and a 3B1028 Nut.

Drive out the master pin, using a suitable driver inserted in the plug hole of the master pin. Avoid damaging the tapered bore in the master pin.

Remove the collars.

Install the master pin in the reverse order, cleaning the tapered plugs and the mating surfaces in the master pin thoroughly.

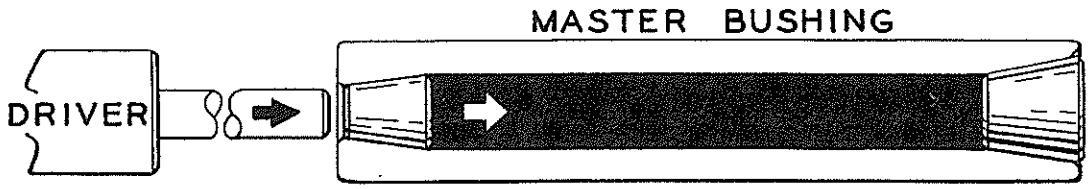


REMOVING MASTER PIN PLUG AND BUSHING COLLAR
(Earlier Tractors)

Master Pin Removal and Installation (Later Tractors)

After the preliminary steps described in the topic, SEPARATING TRACKS, have been taken, the 1H338 Driver can be used to drive the tapered plugs from the master pin and the master pin from location in one operation. The driving is done from the small tapered plug end of the master pin.

Remove the collars.

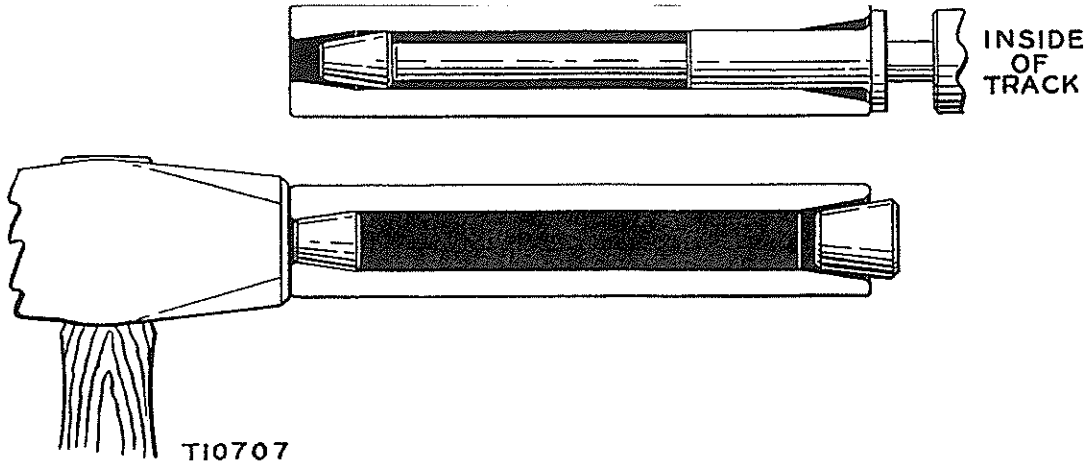


REMOVING TAPERED PLUGS AND MASTER PIN

To install the master pin, place the bushing collars in position and drive the master pin in from the outside of the track with the small taper bore facing outward.

NOTE

The master pin may have had either tapered bore facing outward at the time of removal but this installation procedure is suggested to provide for easier future removal of the master pin.



DRIVING IN PLUGS
(Showing method of backing master pin with sledge.)

Insert a small tapered plug from the inside of the track and, using the 1H339 Pilot and the 1H338 Driver, sledge the small plug in place.

Remove the driver and pilot and sledge the large plug into position.

NOTE

It may be necessary to "back up" or 'buck" the master pin with another sledge when driving in either, or both, taper plugs. Otherwise the master pin may be driven out of location or the tapered plugs may not be properly seated.

REPLACING TRACK

Back the tractor until the sprocket is just ahead of the rear end of the track.

Insert a bar into the last link and aid the track to climb over the sprocket and front idler, as the tractor is driven forward slowly.

With a block under the first shoe, bring the track almost to where it joins.

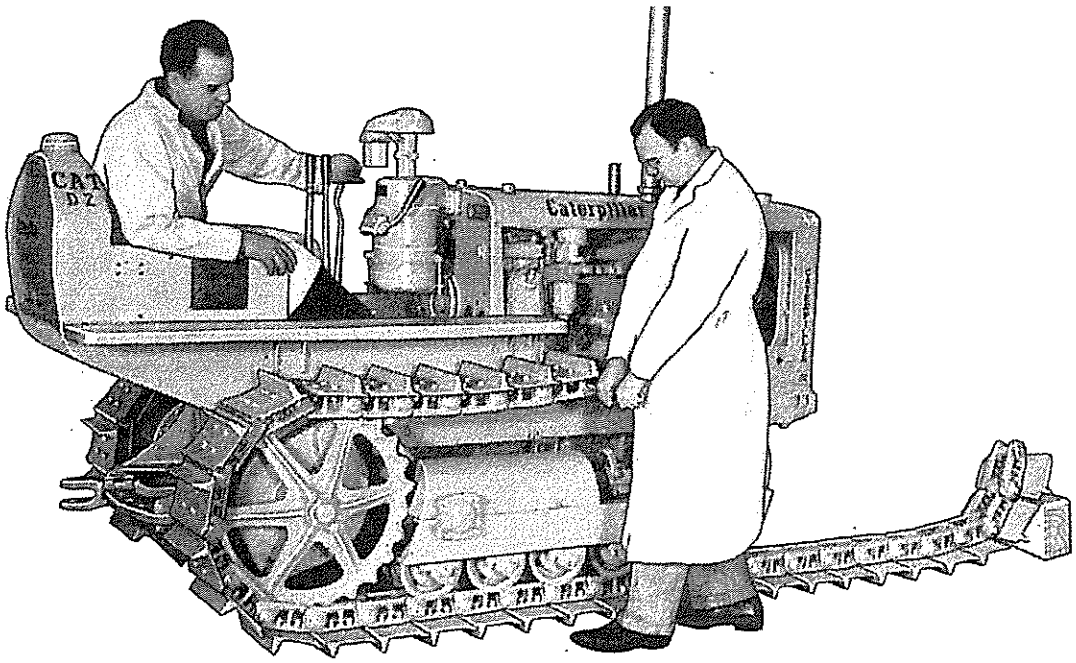
Insert the collars and drive ahead until the links join and the master pin holes line up.

Replace the master pins according to the covering topics.

Adjust the tracks.

WARNING

In the interest of personal safety, always hold the bar as shown.



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REPLACING TRACK

Tighten the bolts that prevent the adjusting screw from turning and install the dirt guards.

TRACK LINKS

A damaged track link not adjacent to the master pin can be replaced without disassembling the track.

Remove the shoe from the track links in question.

Press out the pins at both ends of the track link.

Cut the broken link in two, and cut a 5/8" section out of the bushing with a torch.

Remove the cut link **(A)** and bushing **(B)**, the rest of the link **(C)** and then the other link **(E)** and the remaining part of the bushing **(D)**.

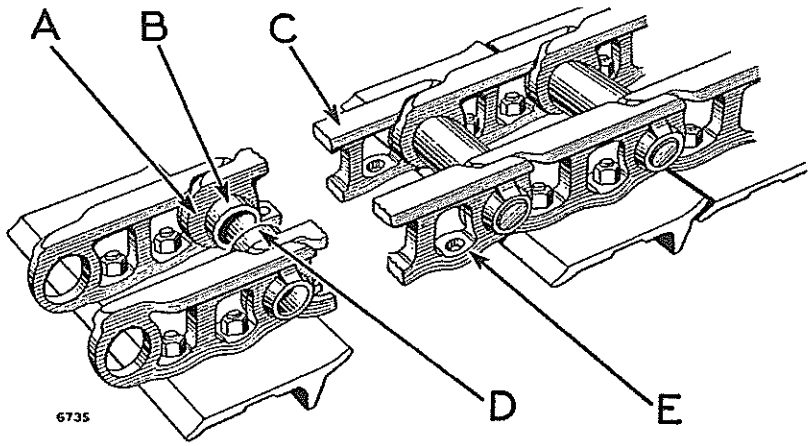
Press two new links on the track, because of the possibility of uneven wear.

Install a standard track pin in the overlapping part of the new links.

Install a master bushing at the other end.

Install collars in the counterbore and use a master pin to connect the track sections.

Install the master pin plugs.



REPLACING DAMAGED TRACK LINK
A—Cut link. B—Bushing. C—Cut link. D—Bushing. E—Link.

TRACK PINS AND BUSHINGS

To obtain maximum life of track pins and bushings the wear on the outer diameter of the bushing should not exceed 1/8" before turning. To turn pins and bushings, they should be pressed out, rotated 180° and reinstalled to obtain new contact surfaces.

Disassembly

There are two types of presses for track reconditioning:

1. Heavy duty power press.
2. Portable hand press.

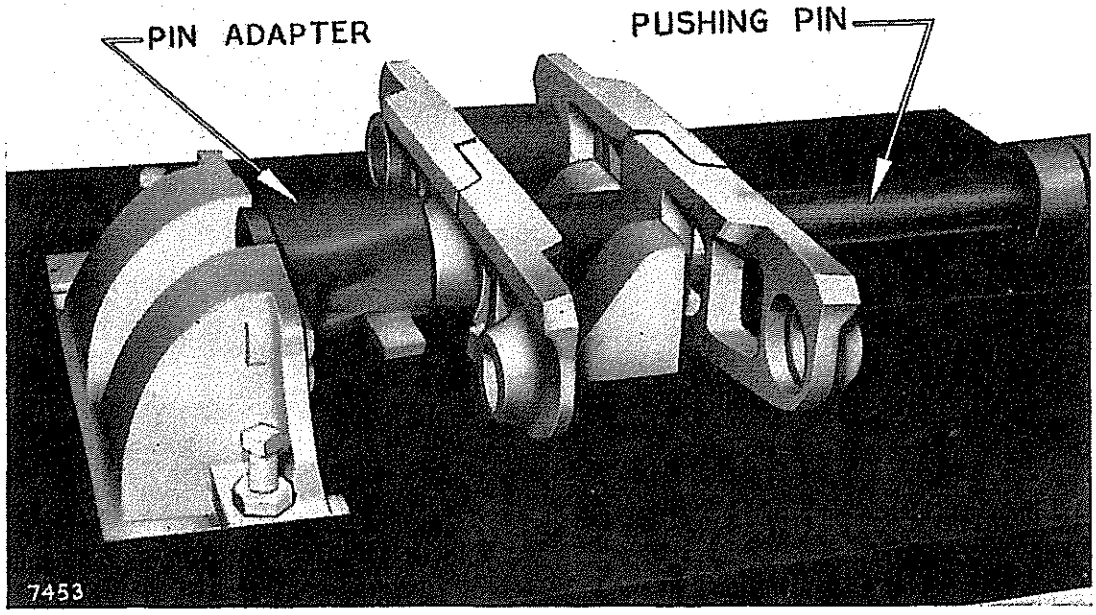


FIGURE 1

These illustrations show the use of a heavy duty power press.

Press out the track pins using a pin adapter and pushing pin (Fig. 1).

Press the bushing out of one link using the jaws and bushing pusher (Fig. 2). Turn the links around and then press the bushing out of the other link.

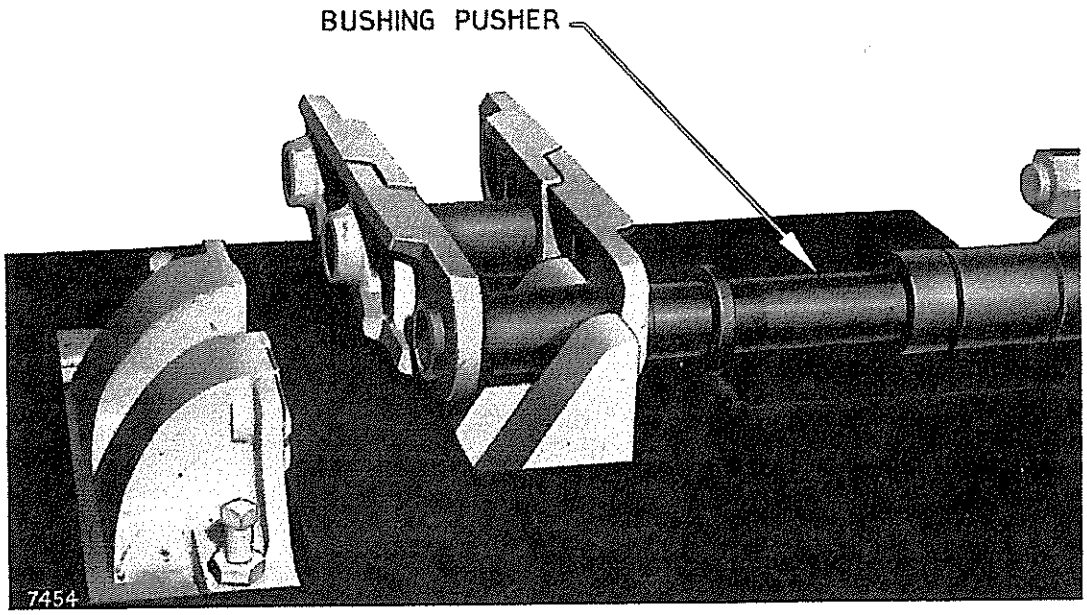


FIGURE 2

Assembly

Press the bushing in place using a bushing adapter, bushing assembly pin and bushing collar (Fig. 3).

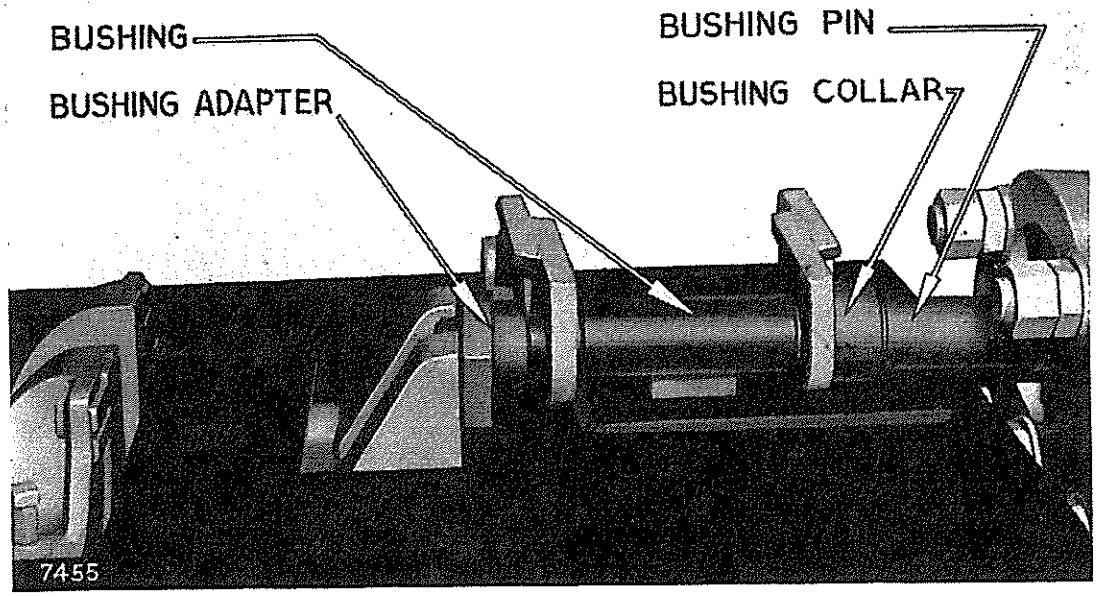


FIGURE 3

Place one of the next links in position with the counterbore of the link on the bushing previously installed. With the pilot pin in place, press the bushing into position using the bushing adapter, bushing assembly pin and bushing collar (Fig. 4).

After the bushings are pressed into position, press in the track pins.

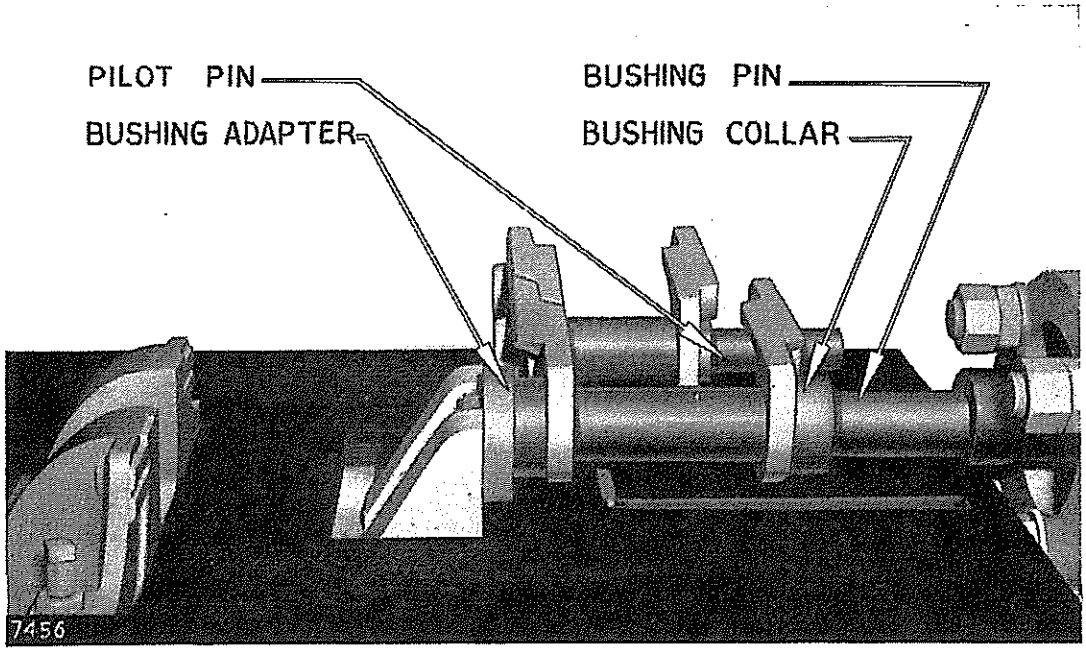


FIGURE 4

USING THE 6F25 SERVICE PRESS

The following illustrations show the use of the 6F25 "Caterpillar" Service Press for track work.

Pin Removal

Screw the two tension rods **(9)** evenly into the holes provided in the cylinder head **(10)**.

Assemble the yoke **(3)** onto the tension rods after first assembling the nuts **(5)** on the tension rods.

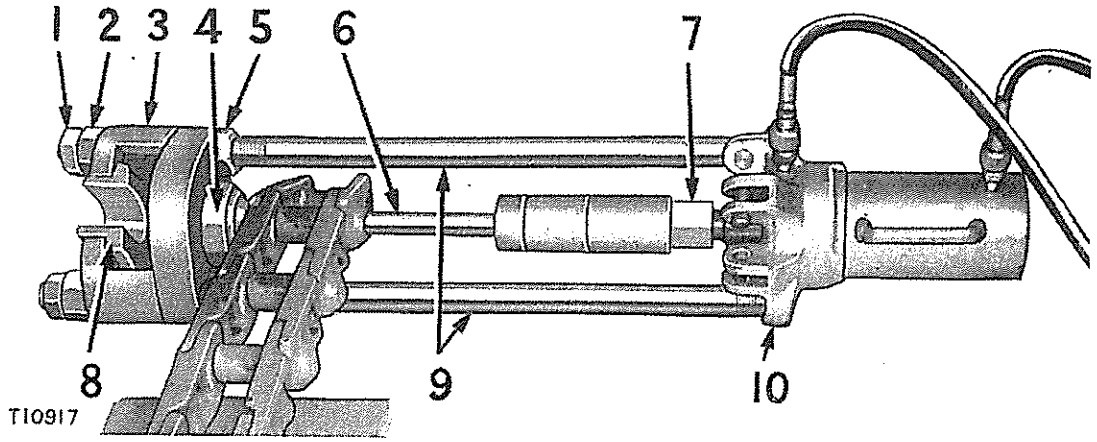
Install the nuts **(2)** and **(1)**.

Install the yoke adapter **(8)** and secure with two capscrews.

Install the ram cap adapter **(7)** on the ram of the service press.

Place the adapter **(4)** in the hole of the yoke **(3)**.

Place the track link against the adapter with the boss of the link inserted in the recess in the adapter.



PIN REMOVAL

1—5F9431 Nut. 2—5F9432 Nut. 3—5F9427 Yoke. 4—5F9439 Pin and Bushing Adapter. 5—5F9431 Nut. 6—5F9443 Pilot Pin and Pusher. 7—5F9438 Ram Cap Adapter. 8—5F9428 Yoke Adapter. 9—5F9429 Tension Rods. 10—Cylinder head.

Place the pin pusher **(6)** against the track pin and with the necessary ram caps (short, long or both) between the pin pusher and the ram cap adapter, force the pin out.

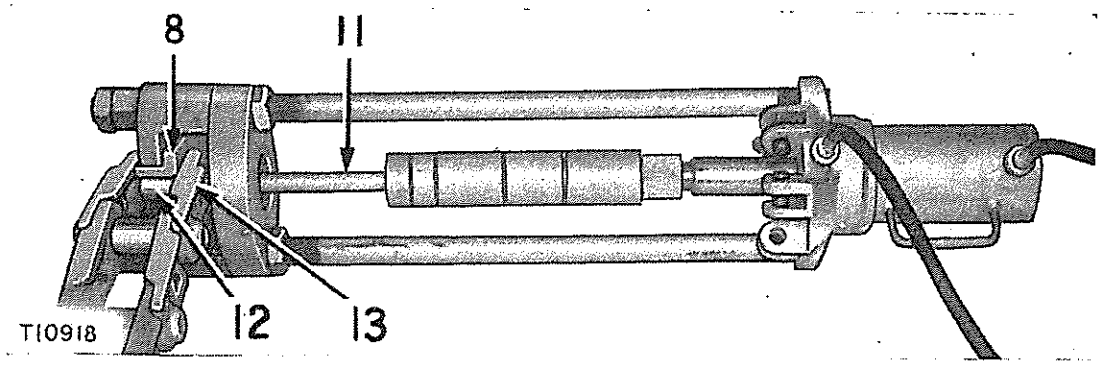
Pin Installation

The track pin is installed in the reverse order of removal with one exception, which is that the track pin and necessary ram caps are used in place of the pin pusher.

Bushing Removal

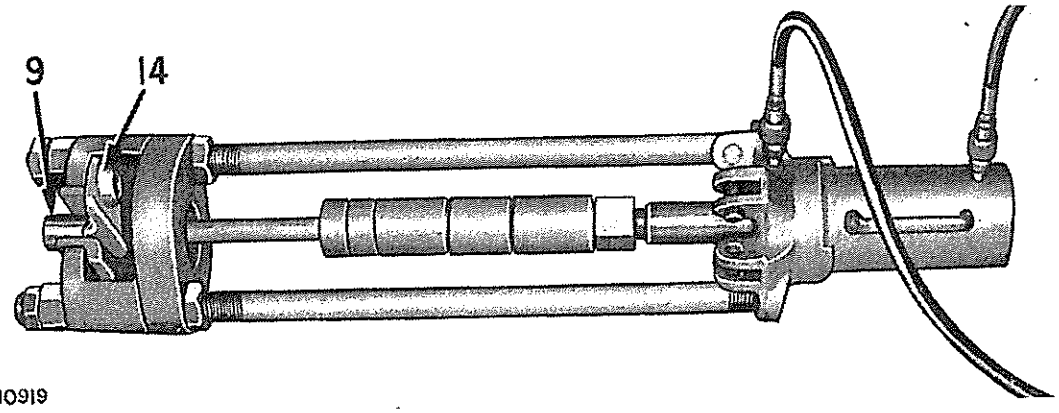
The track pins must be removed from both ends of the track link as outlined in the covering topic.

Place the track bushing **(12)** in the slot of the yoke adapter **(8)** as shown.



REMOVING LINK FROM BUSHING

8—5F9428 Yoke Adapter. 11—5F9442 Bushing Pusher. 12—Bushing. 13—Link.



T10919

REMOVING BUSHING
9—Bushing. 14—Link.

Insert the short end of the bushing pusher **(11)** through the yoke and into the bushing.

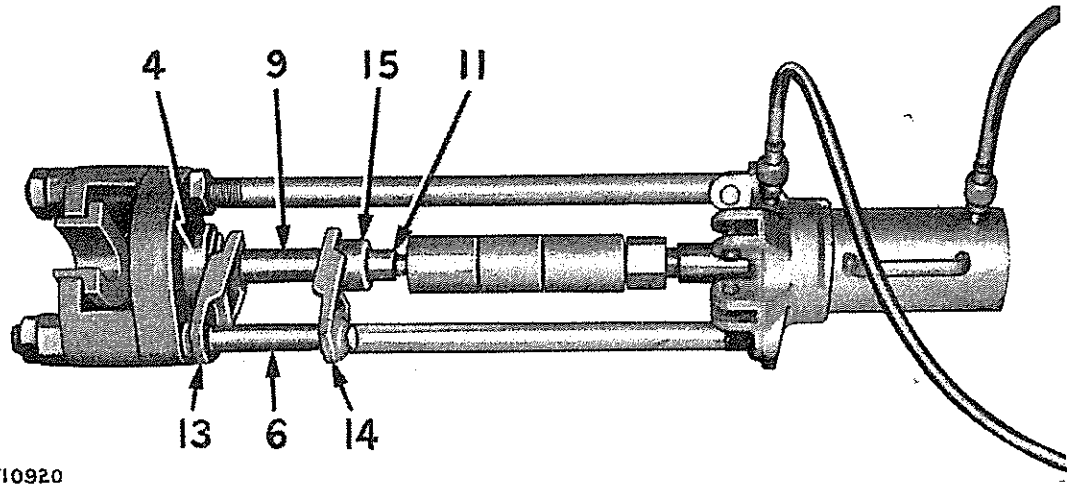
Fill this space between the pusher and the ram cap adapter with the necessary ram caps and force the bushing **(12)** out of the link **(13)**.

Turn the bushing **(9)** end for end and remove the bushing from the other link **(14)** in the same manner.

Bushing Installation

Place the assembly collar **(15)** over the long end of the bushing pusher **(11)** and insert the long end of the pusher through the link **(14)**, bushing **(9)** and the other link **(13)** and into the adapter **(4)**.

Insert the pin pusher **(6)** in the other end of the links to align the holes.



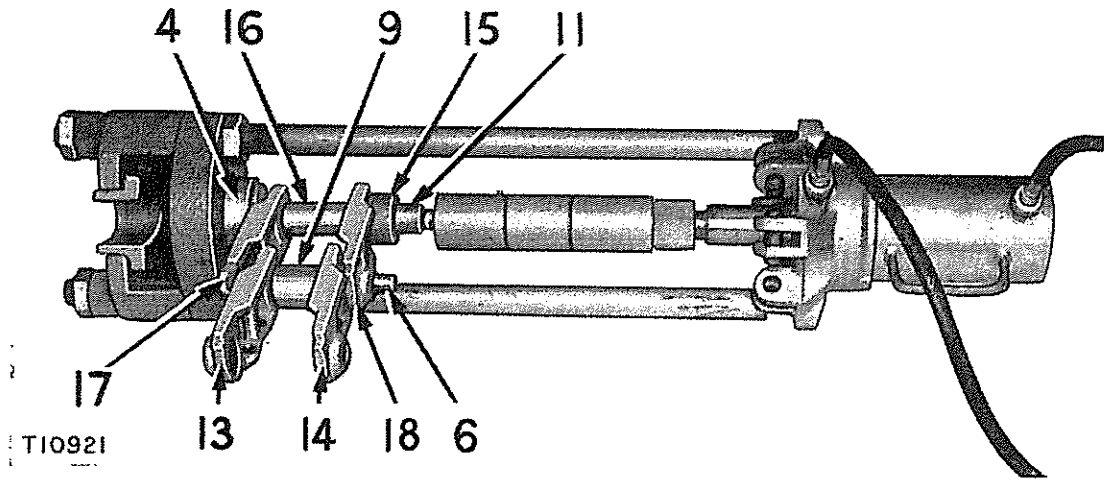
T10920

BUSHING INSTALLATION
4—5F9439 Pin and Bushing Adapter. 6—5F9443 Pilot Pin and Pusher. 9—Bushing. 11—5F9442 Bushing Pusher. 13—Link. 14—Link. 15—5F9441 Assembly Collar.

Fill in the space between the ram and bushing pusher with ram caps and press both links on the bushing in one operation.

To continue the assembly of the track place the links **(17)** and **(18)** over the ends on the previously assembled links **(13)** and **(14)** and install the pin pusher **(6)** through the link **(18)** and bushing **(9)** and link **(17)** and continue assembling by installing track links on bushing **(16)**.

After the links and bushings are assembled, install the track pins as outlined in the covering topic.



TRACK LINK AND BUSHING ASSEMBLY

4—5F9439 Pin and Bushing Adapter. 6—5F9443 Pilot Pin and Pusher. 9—Bushing. 11—5F9442 Bushing Pusher. 13—Link. 14—Link. 15—5F9441 Assembly Collar. 16—Bushing. 17—Link. 18—Link.

The 5F9427 Yoke **(3)** can be used as shown (Fig. 1). This method requires fewer ram caps to work on the track.

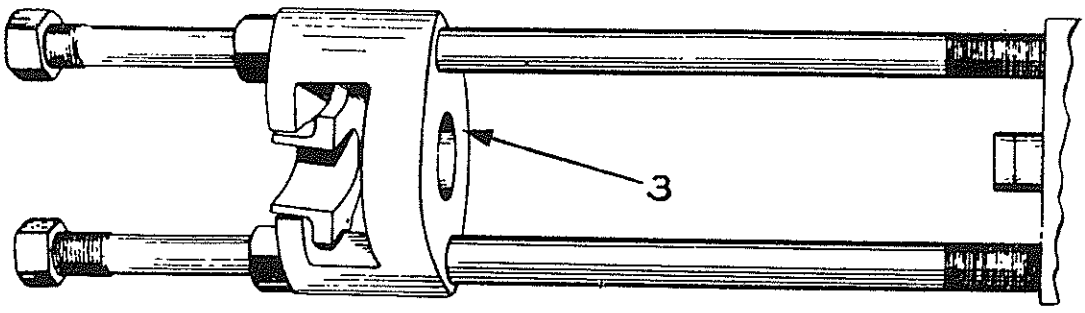


FIG. 1

POSITIONING YOKE

3—5F9427 Yoke.

Track Rollers

The track rollers support the tractor and distribute its weight along the length of the track.

Four track rollers, two single and two double flange, are used on each track roller frame.

They are arranged with a single flange roller at the front and rear positions and two double flange rollers in the middle positions.

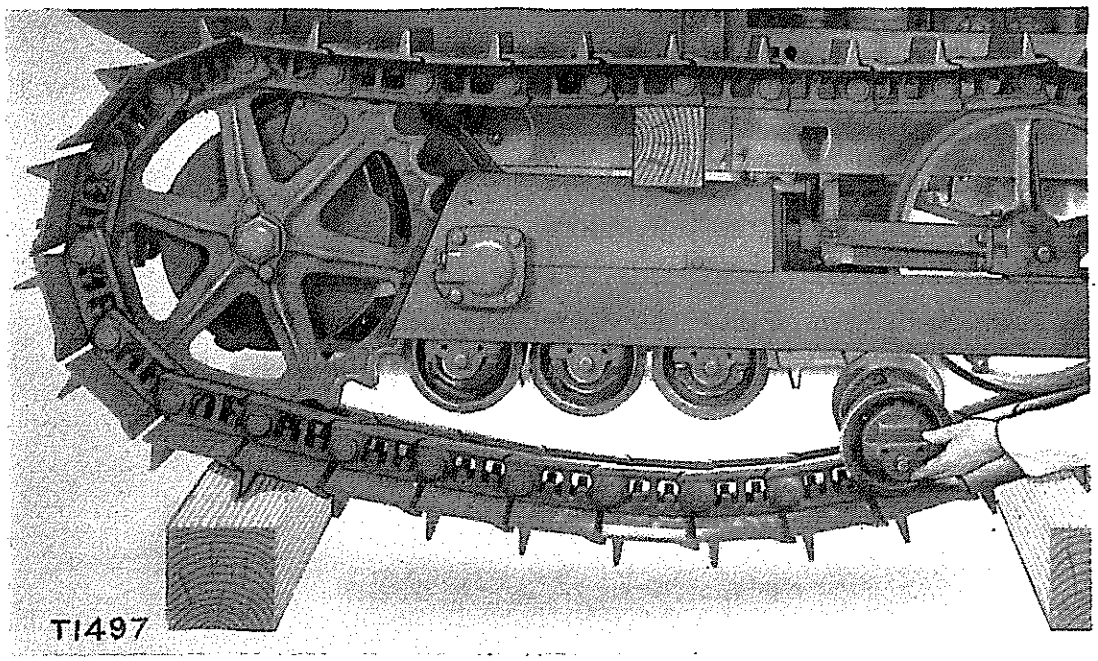
REMOVAL

Remove the track roller and front idler yoke guards.

Loosen the track adjusting screw as much as possible, place a block approximately twelve inches high in front of the track and drive the tractor forward onto the block.

Place a similar block at the rear of the track and a six inch block on top of the recoil spring guide.

Back the tractor up on the block until all of the slack is at the bottom of the track.



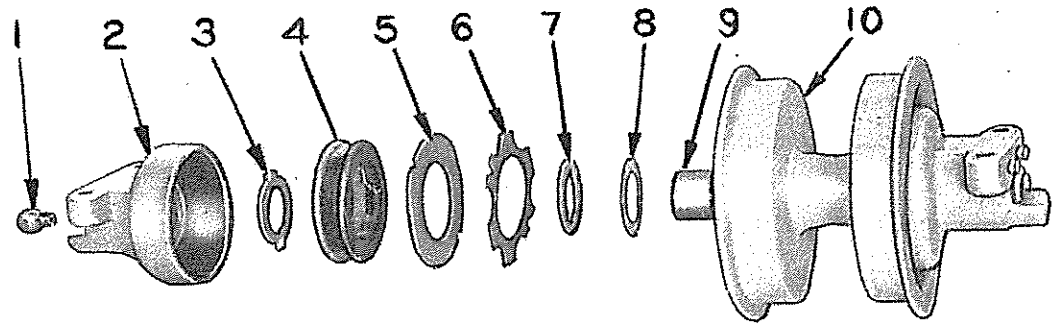
REMOVING OR INSTALLING TRACK ROLLERS

If the tractor is first blocked in the rear and then run forward, the slack will be forced to the top of the track rather than the bottom as desired.

Any or all of the track rollers can now be removed by removing the capscrews securing them to the frame.

With the roller **(10)** removed, slide the end collar **(2)** off the shaft **(9)**.

Remove the grease fitting **(1)** from the end collar. The bushings in the end collars can be pulled out and replaced if necessary.

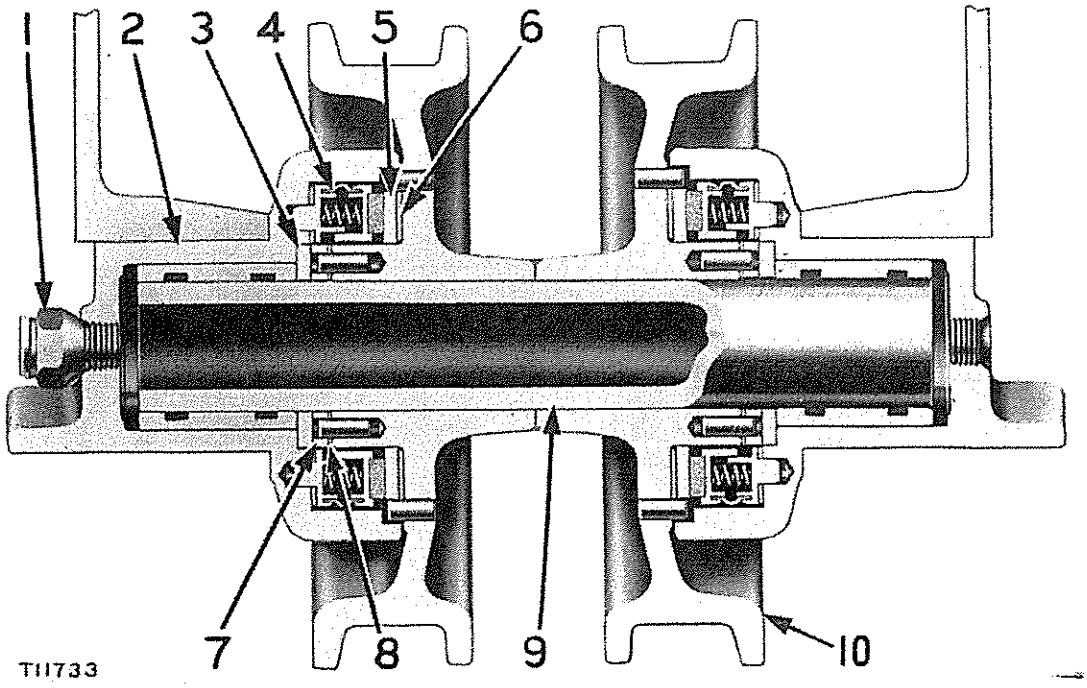


T10922

TRACK ROLLER ASSEMBLY
(Later Tractors)

1—Fitting. 2—End collar. 3—Thrust washer. 4—Bellows seal. 5—Plate. 6—Gasket. 7—Washer. 8—Shims. 9—Shaft. 10—Track roller.

Take out the bellows seal **(4)** and thrust washer **(3)**. Replace the bellows seal if necessary. The bellows seal has four dowels that must be aligned with four dowel holes in the end collar.



T11733

TRACK ROLLER CUTAWAY VIEW

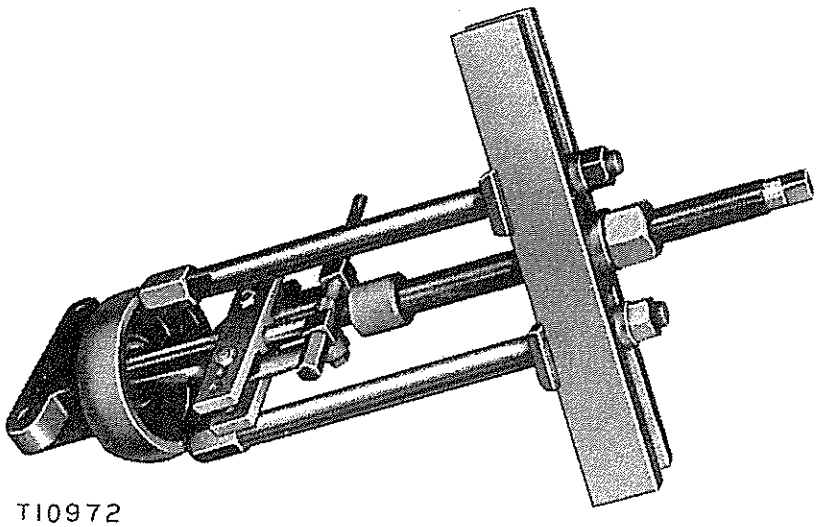
1—Fitting. 2—End collar. 3—Thrust washer. 4—Bellows seal. 5—Plate. 6—Gasket. 7—Washer. 8—Shims. 9—Shaft. 10—Track roller.

Remove the plate **(5)**, gasket **(6)**, washer **(7)** and shims **(8)**.

Press the shaft **(9)** from the track roller **(10)** if worn or damaged.

Effective with 4U188 and 5U120, the bushing in the end collar **(2)** was shortened.

The bushings can be pulled using the 8B7548 Push Puller, 8B7553 Adapter and the 8B7554 Bearing Cup Pulling Attachment as shown.



T10972

PULLING END COLLAR BUSHING

Use white lead when pressing a new bushing into an end collar.

Press the bushing in 1/32" beyond the inside edge of the end collar.

Install enough shims **(8)** to maintain the track roller end clearance between .010" and .028".

Slide the end collars on the track roller shaft.

DISASSEMBLY AND ASSEMBLY (EARLIER TRACTORS)

With the roller **(4)** removed, slide the end collars **(1)** off the shaft.

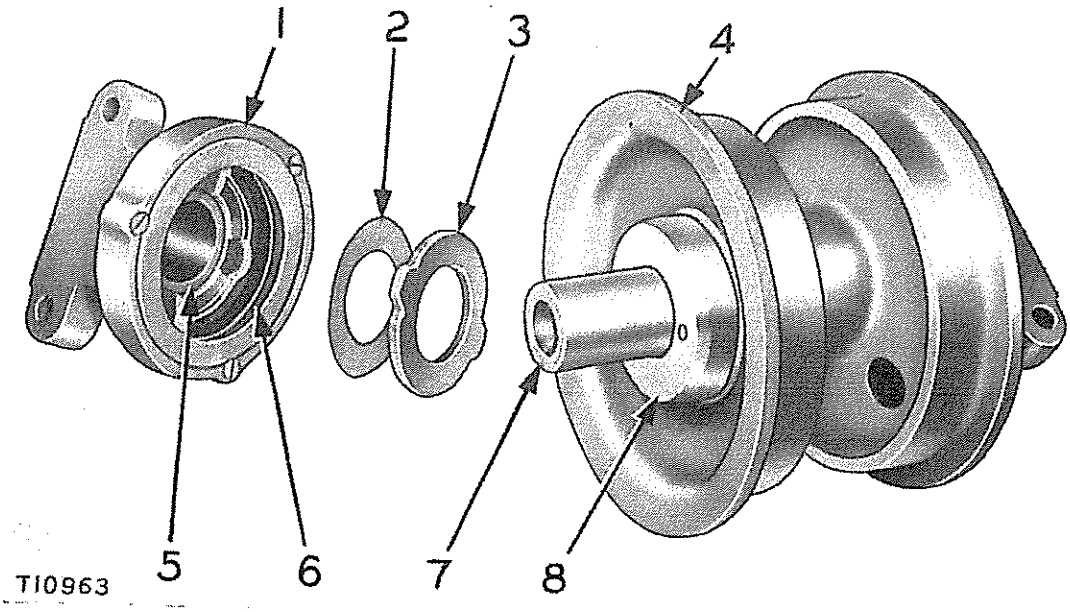
Remove the shim **(2)** and washer **(3)** from each end collar.

Remove the screws holding the seal **(6)** in each end collar and replace the seal if worn or damaged.

The bushing **(5)** can be pressed from the end collar and a new one installed.

The cups **(8)** on the sides of the roller can be replaced.

Press the shaft **(7)** from the track roller **(4)** if it is excessively worn or damaged.



TRACK ROLLER ASSEMBLY
(Earlier Tractors)
1—End collar. 2—Shims. 3—Washer. 4—Track roller. 5—Bushing. 6—Seal. 7—Shaft. 8—Cup.

Use white lead when pressing a new bushing **(5)** into the end collar, and press it 1/32" beyond the outside edge of the collar.

Soak the seals **(6)** in warm oil for approximately ½ hour before installing. This will soften the leather.

Install enough shims **(2)** to maintain the track roller end clearance between .010" and .028" to reduce lubricant leakage.

Slide the end collar onto the shaft.

Front Idler

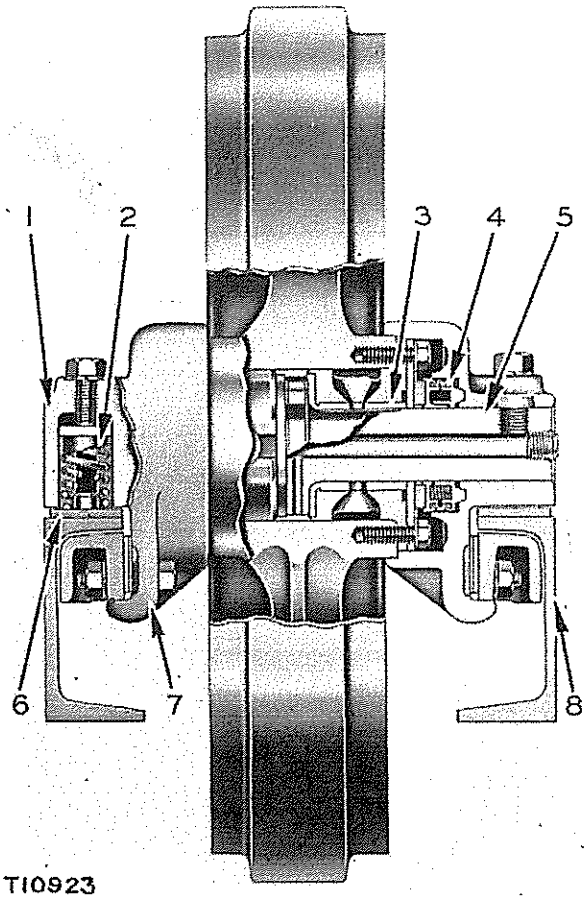
The front idler guides the track into position in front of the track rollers.

Each front idler rotates on a hardened shaft **(5)** and center thrust bronze bushings **(3)**.

Bellows type seals **(4)** keep lubricant in and dirt out.

The idler is mounted in two outer bearings **(1)** and end collars **(7)** which slide against recoil spring pressure, back and forth on the track roller frame **(8)**.

The end collars slide on hardened wear strips **(6)** against which they are held by rubber-covered springs **(2)**.



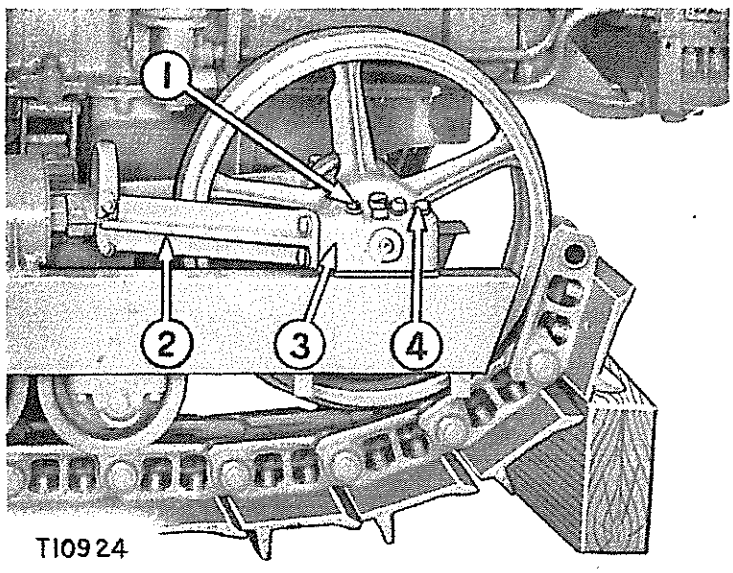
FRONT IDLER
CUTAWAY VIEW

1—Outer bearing. 2—Rubber covered springs. 3—Thrust bushings. 4—Bellows type seal. 5—Shaft. 6—Wear strip. 7—End collar. 8—Track roller frame.

◆

REMOVAL (LATER TRACTORS)

Separate the track and lay out. See the topic, SEPARATING TRACK.



PREPARING TO REMOVE FRONT IDLER
(Later Tractors)

1—Capscrew. 2—Idler arm. 3—End collar bearing. 4—Capscrew.

Remove the capscrews securing the idler arms **(2)** to the end collar bearings **(3)**.

Loosen the two capscrews **(1)** and **(4)** in each bearing to relieve the pressure on the springs.

Pull the idler forward and off the track roller frame.

DISASSEMBLY (LATER TRACTORS)

Remove the fitting **(8)** from the bearing collar assembly **(7)**.

Take out the bolts securing the guide **(14)** to the bearing collar assembly and remove the guide and shims **(13)**.

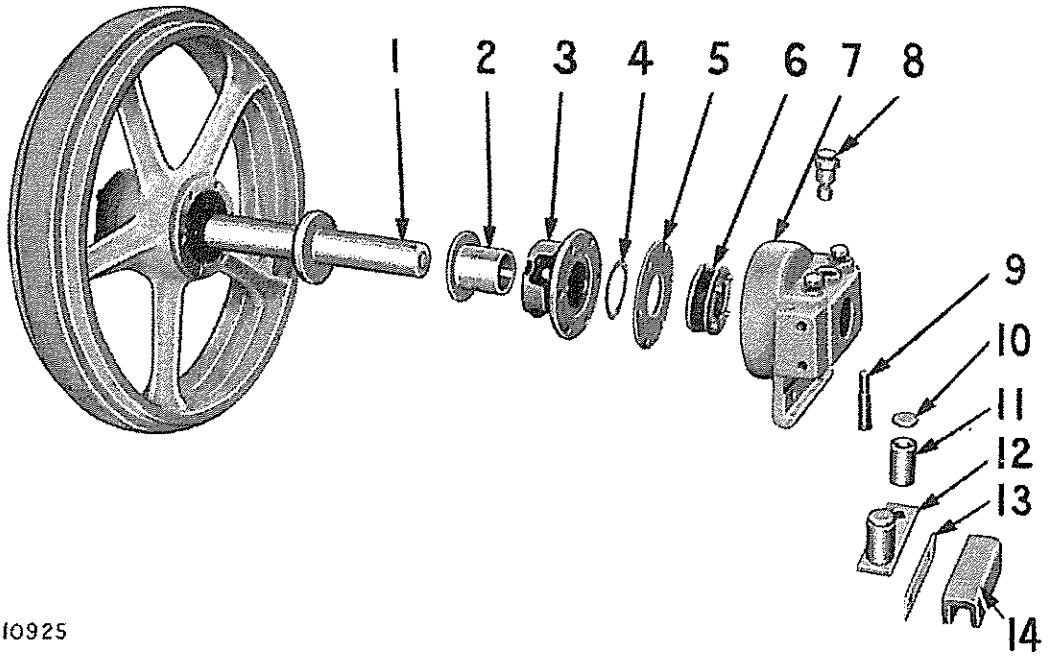
Remove the wear plate **(12)**, rubber-covered springs **(11)** and discs **(10)**.

Remove the nut and drive out the tapered pin **(9)**.

Slide the bearing collar assembly off the shaft **(1)**.

Remove the bellows type seal **(6)** from the bearing collar assembly.

Remove the capscrews securing the plate **(5)** and bushing cage **(3)** to the front idler.



DISASSEMBLING FRONT IDLER
(Later Tractors)

1—Shaft. 2—Bushing. 3—Bushing cage. 4—Seal. 5—Plate. 6—Bellows type seal. 7—Bearing collar assembly. 8—Fitting. 9—Tapered pin. 10—Disc. 11—Rubber-covered spring. 12—Wear plate. 13—Shims. 14—Guide.

Remove the bearing collar assembly from the back side of the front idler and remove the shaft **(1)**.

Remove the seal **(4)** from the bushing cage and press out the bushing **(2)**.

ASSEMBLY (LATER TRACTORS)

Press the bushing **(2)** into the bushing cage **(3)**, aligning the holes in the bushing with the holes in the cage.

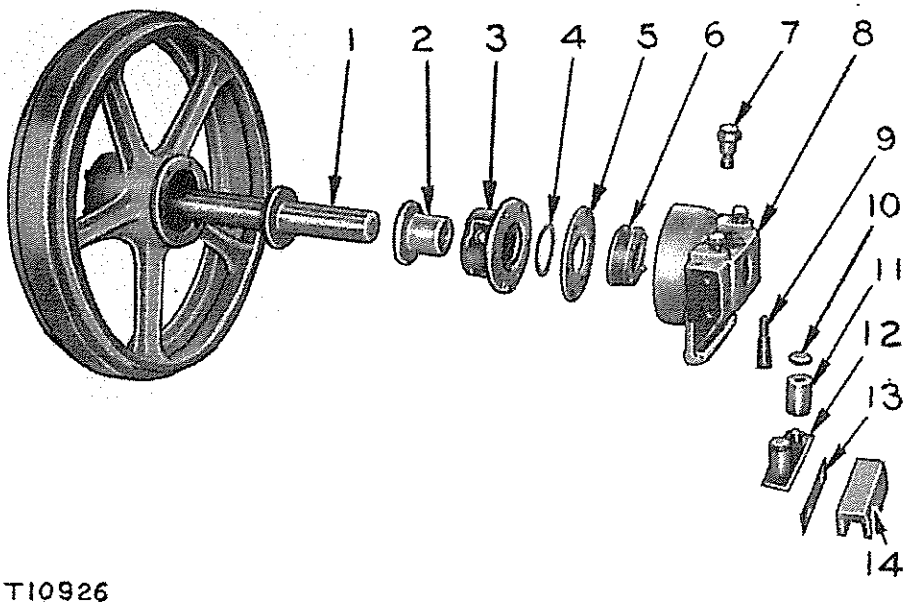
Install the shaft **(1)** in the front idler and replace the bearing collar assembly on the opposite side.

Install the bushing cage over the shaft, replace the seal **(4)** and install the plate **(5)**. If the plate is worn or rough, it may be turned over to provide a new bearing surface. It should be replaced if both sides are worn or rough.

Replace the bellows seal **(6)** in the bearing collar assembly **(8)** and place the bearing collar assembly over the shaft, aligning the notch in the shaft with the tapered hole in the end collar assembly.

Install the tapered pin **(9)** and tighten.

Install the discs **(10)**, rubber-covered springs **(11)** and wear plate **(12)**.



ASSEMBLING FRONT IDLER
(Later Tractors)

1—Shaft. 2—Bushing. 3—Bushing cage. 4—Seal. 5—Plate. 6—Bellows seal. 7—Fitting. 8—Bearing collar assembly. 9—Tapered pin. 10—Disc. 11—Rubber-covered spring. 12—Wear plate. 13—Shims. 14—Guide.

The shims **(13)** are for the purpose of centering the idler in the track roller frame so that it will guide the track between the flanges of the track rollers.

Examine the flanges on the first track roller back of the idler to determine if the idler needs to be shifted. If the track has been bearing heavily against the outside flange of the roller, the idler should be moved toward the opposite side of the track.

This is accomplished by moving shims **(13)** from one side of the idler to the other.

Install the guide **(14)** and bolt in place.

Install the fitting **(7)**.

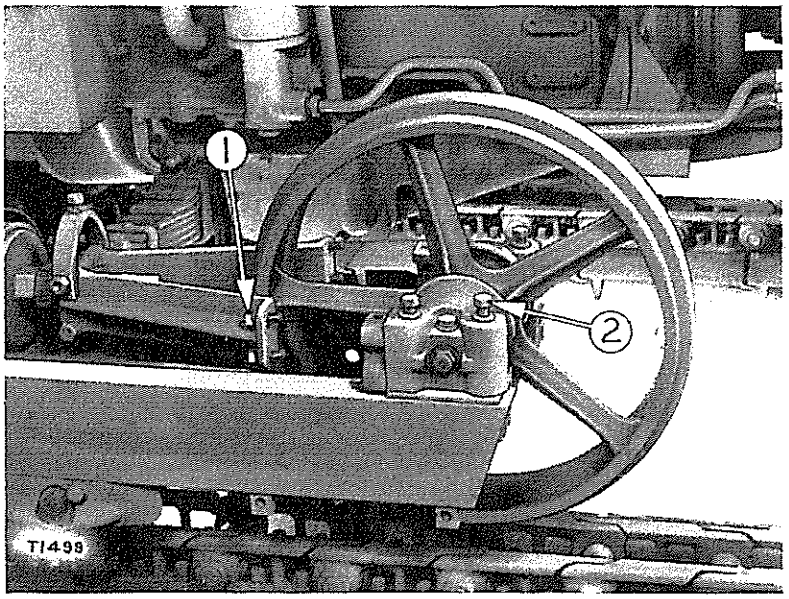
REMOVAL (EARLIER TRACTORS)

Separate the track and lay out. See the topic, SEPARATING TRACK.

Remove the capscrews **(1)** which hold the idler arms to the end collar bearings.

Loosen the two capscrews **(2)** in each bearing to relieve the pressure on the springs.

Pull the idler forward off the track roller frame.



FRONT IDLER REMOVAL
(Earlier Tractors)
1—Capscrew. 2—Capscrew.

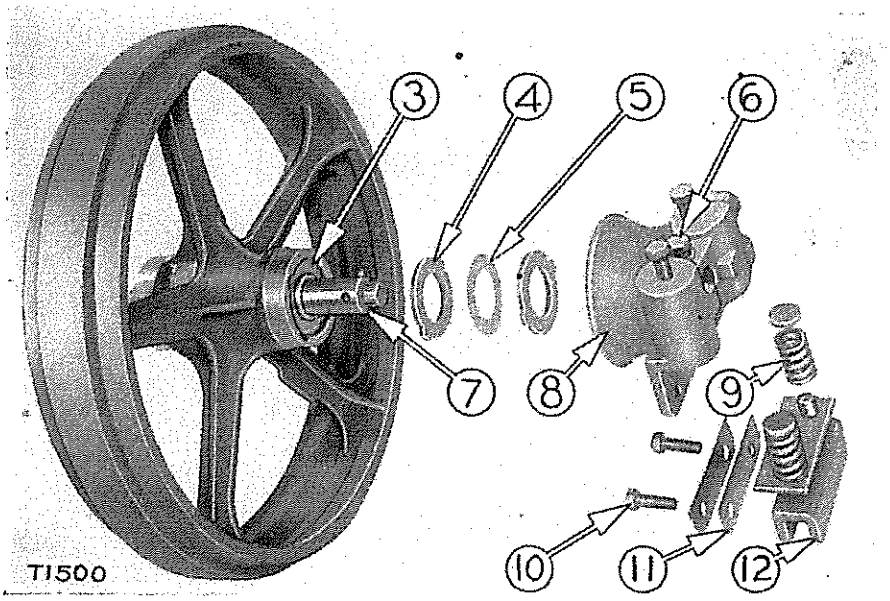
Loosen the setscrew **(6)** holding the bearing **(8)** to the shaft and slide the bearing off the shaft.

Remove the nuts and bolts **(10)** securing the guide **(12)** and the shims **(11)**, attached to the bottom of the bearing.

The wear plate and springs **(9)** will slide out after the guide is removed.

Remove the washers **(4)** and shims **(5)** from the shaft and slide the shaft **(7)** from the idler.

Press the bushings **(3)** and spacers from the idler.



FRONT IDLER BEARING ASSEMBLY
(Earlier Tractors)
3—Bushing. 4—Washer. 5—Shims. 6—Setscrew. 7—Shaft. 8—Bearing. 9—Spring. 10—Bolt. 11—Shim. 12—Guide.

When assembling, press the bushings into the idler with the spacer at the center of the idler and install the shaft. Insert enough shims **(5)** to establish a minimum of end play.

Install the bearing **(8)** and align the hole in the idler shaft with the setscrew in the end collar and tighten the setscrew securely.

Slide the idler assembly on the track roller frame and attach the arms.

The shims **(11)** are for the purpose of centering the idler in the track roller frame so that it will guide the track between the flanges of the track rollers.

Examine the flanges on the first track roller back of the idler to determine if the idler needs to be shifted.

If the track has been bearing heavily against the outside flange of the roller, the idler should be moved toward the opposite track.

This is accomplished by moving shims **(11)** from the bearing at the inner end of the idler hub to the outer bearing.

As the guide **(12)** wears, it is advisable to add shims (equal to the wear) to prevent excessive side movement of the whole idler group.

Equalizer Spring Group

The equalizer spring supports the front end of the tractor and transfers the weight to the track roller frames.

The auxiliary spring holds the equalizer spring in the spring saddle of the bottom and permits the equalizer spring to oscillate when the track roller frames pivot at the pivot shaft.

AUXILIARY SPRING

Place a jack under the end of the auxiliary spring and raise it high enough to remove the load from the retainer pin in the shackle.

Remove the cotter pin and drive the retainer pin out, remove the jack and remove the retainer pin from the other shackle.

Slide the spring assembly out. To replace individual leaves, cut the clips and remove the U-bolts and plate.

EQUALIZER SPRING (LATER TRACTORS)

As a safety precaution set the brakes to prevent the tractor from moving.

Remove the engine side plates and the nuts from the shackle bolts **(1)**.

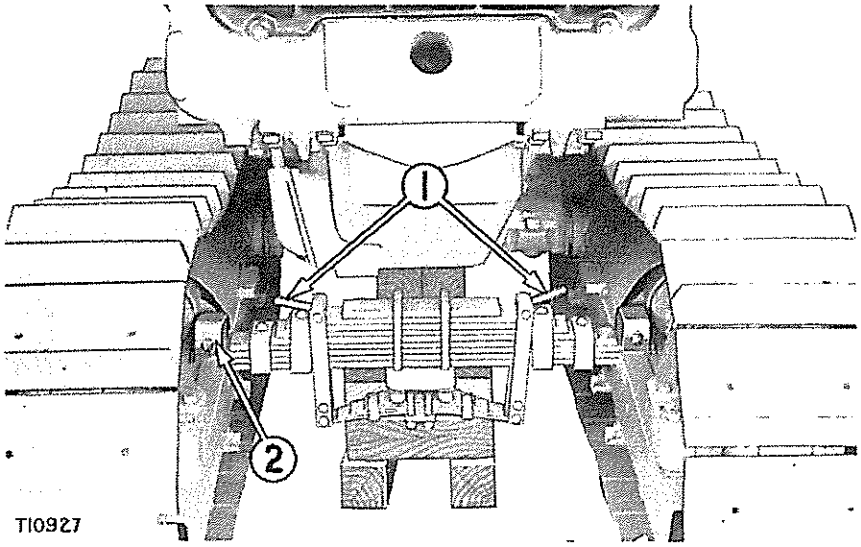
Remove both track adjusting nut guards and both recoil spring guards. It is necessary to remove the recoil spring guards in order to remove the bolt and roller in each track roller bracket. It is necessary to remove both of the recoil spring guide assemblies in order to slide the bolts out.

Remove the bolt and roller from each of the track roller frame brackets **(2)** at each end of the equalizer spring.

Raise the front of the tractor approximately sixteen inches and block securely.

Raise one of the tracks as shown until the equalizer spring can slide out of the track roller frame brackets.

Remove the spring assembly from under the tractor.

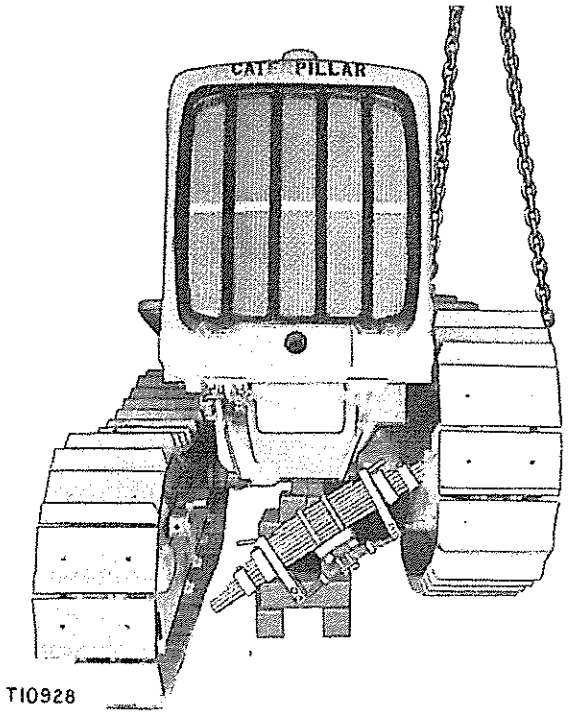


PREPARING TO REMOVE EQUALIZER SPRING
(Later Tractors)
1—Shackle bolts. 2—Track roller frame bracket.

Individual leaves can be replaced by removing the U-bolts, plate and auxiliary spring assembly and cutting the clips.

When installing the equalizer spring, slide the end of the spring into the track roller frame bracket of the side that is suspended.

Insert the other end in the opposite bracket and lower the raised track until the spring slides into position.



REMOVING EQUALIZER SPRING
(Later Tractors)

◆

Replace the rollers, bolts, recoil spring guides, recoil spring guards and the track adjusting nut guards.

Install the shackle nut bolts and the engine side plates.

EQUALIZER SPRING (EARLIER TRACTORS)

As a safety precaution, set the brakes to prevent the tractor from moving.

Remove the engine side plates and the nuts from the shackle bolts **(1)**.

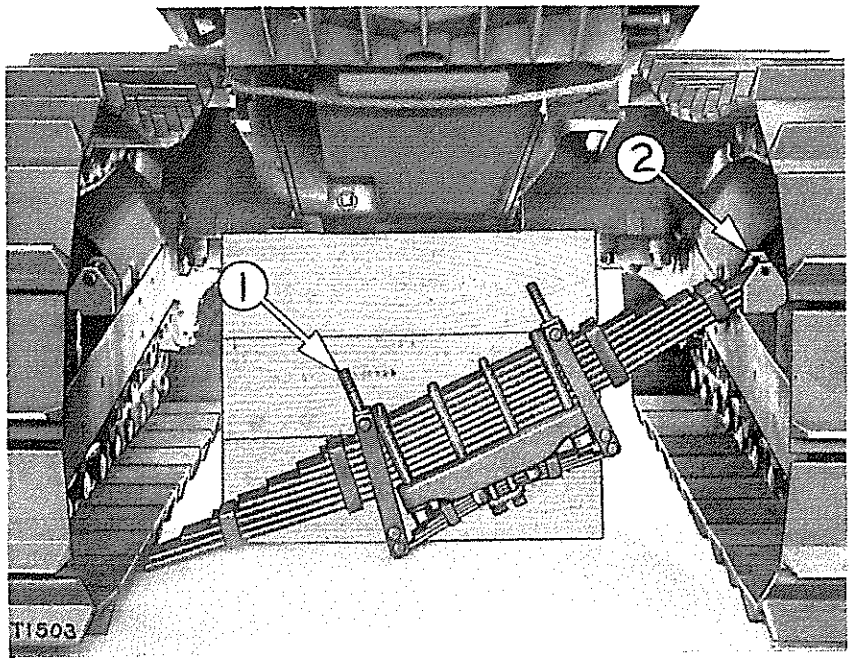
Remove either front idler guard and remove the nut, bolt and sleeve holding the equalizer spring in the bracket **(2)** of the track roller frame.

Raise the front end of the tractor until there is 10 inches clearance between the top of the equalizer spring and the lower edge of the oil pan.

As a safety precaution, place blocks beneath the flywheel housing.

Raise the end of the equalizer spring that is free in the bracket, and slide it sideways until the end of the spring comes out of the bracket on the other track roller frame.

Remove the spring assembly from under the tractor.



EQUALIZER SPRING REPLACEMENT
(Earlier Tractors)
1—Shackle bolt. 2—Track roller frame bracket.

Individual leaves can be replaced by cutting the clips, removing the U-bolts and plate after having removed the auxiliary spring assembly from the equalizer spring assembly.

Recoil Spring

The recoil springs are compressed and held to a definite length by the recoil spring bolt. Normally, the pressure of the recoil spring is not exerted against the track. However, should rocks or other obstructions get between the tracks and rollers, idler or sprocket, the springs will recoil still farther to avoid overstressing the track.

The recoil spring may be removed without separating the track providing the bolt is not broken.

REMOVAL AND DISASSEMBLY

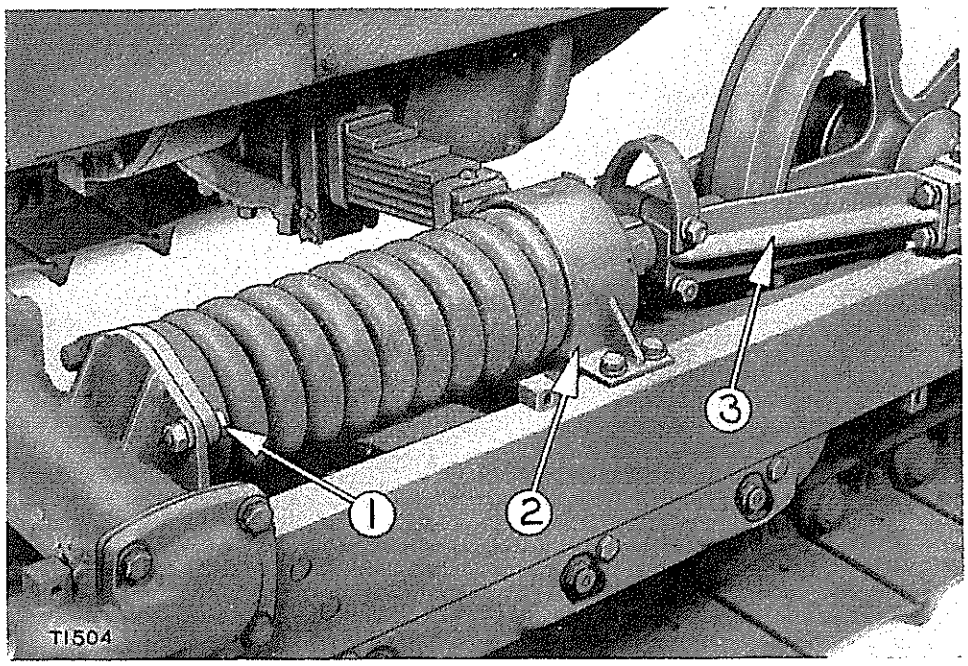
Remove the guards from the idler yoke and recoil spring and loosen the track as much as possible.

Remove the outside idler yoke arm **(3)** and the recoil spring guide **(2)**.

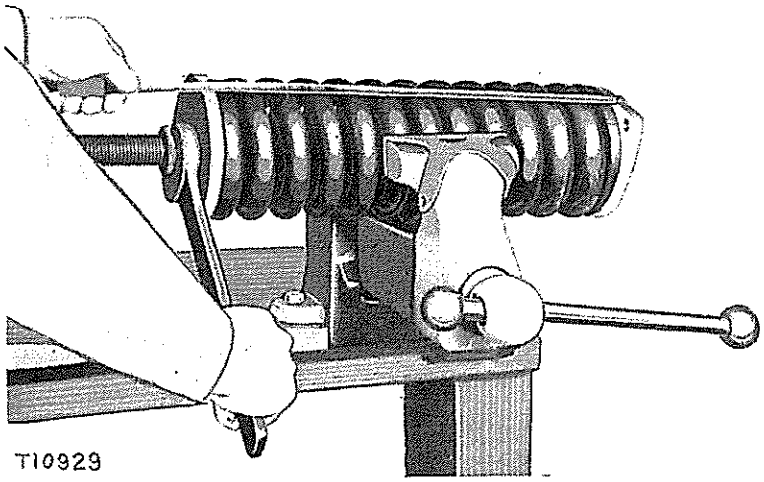
Remove the bolts **(1)** holding the recoil spring seat to the bracket on the track roller frame and lift out the recoil spring.

Remove the track adjusting nut.

Remove the nut and disassemble the plate, spring, seat and bolt.



REMOVING RECOIL SPRING ASSEMBLY
1—Bolt. 2—Recoil spring guide. 3—Idler yoke arm.



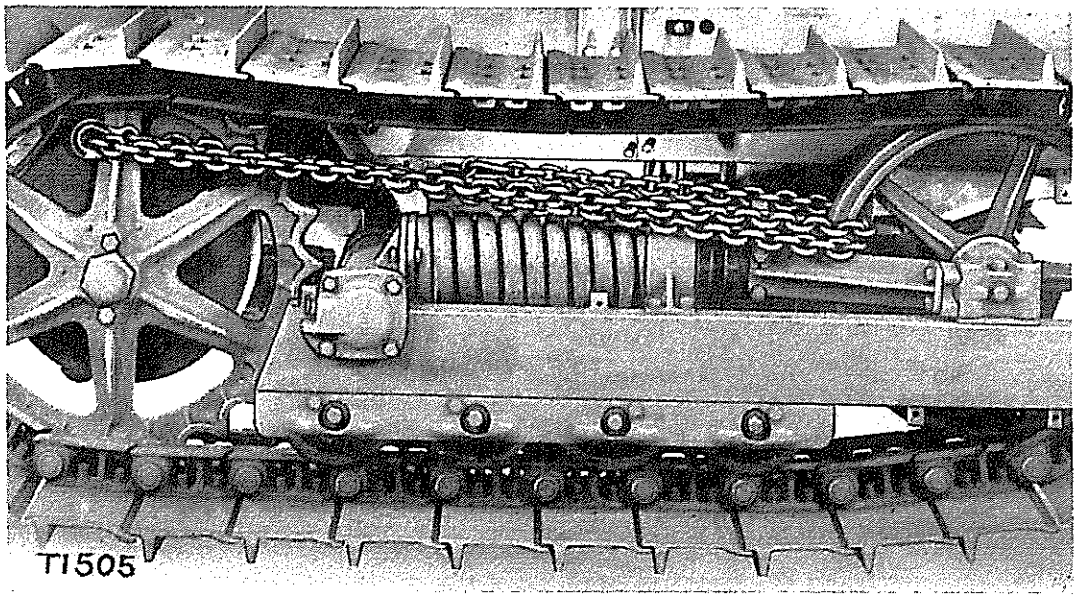
COMPRESSING RECOIL SPRING BOLT

When assembling the spring, compress it to 17 1/16 inches, excluding guides, and install.

RECOIL SPRING BOLT

Should a recoil spring bolt break, all of the spring tension will be exerted against the track and it will be necessary to relieve this tension before the track can be separated.

The tension can be relieved in the following manner. Move the tractor forward until the master pin is in front of the idler and remove the guards from the idler yoke and the recoil spring.



REMOVING BROKEN RECOIL SPRING BOLT

Loosen the track adjustment as much as possible and place a heavy chain around the front idler and the drive sprocket as shown.

Back up the tractor to compress the recoil spring.

Remove the master pin and separate the track.

Drive the tractor forward and remove the chain.

CAUTION

Do not completely compress the spring or damage may result to the final drive and idler parts.

Remove the recoil spring and replace the bolt. See the covering topic.

Compress the spring and install.

Track Roller Frame Removal as an Assembly

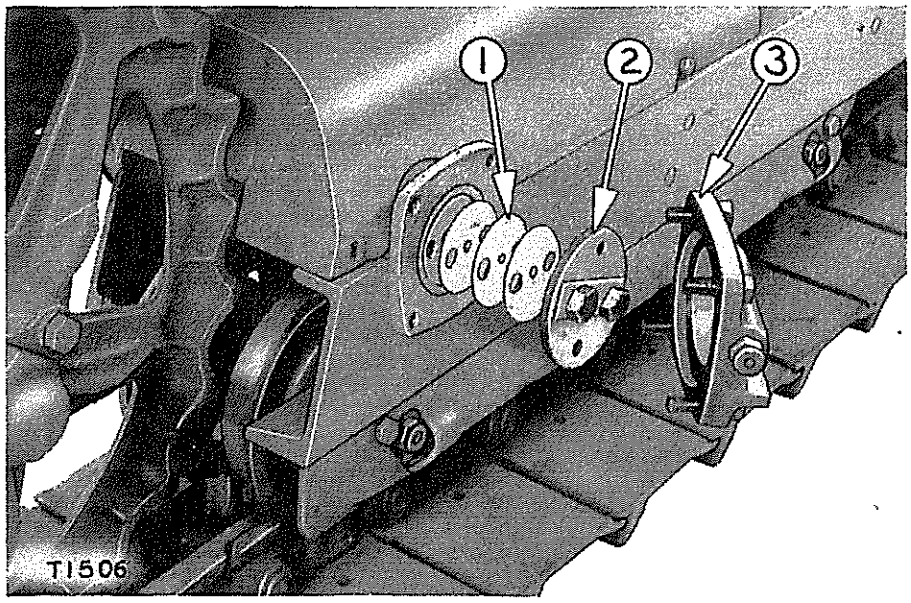
Separate the track as outlined in the topic, SEPARATING TRACK.

Block up the front and rear of the tractor.

Remove the cap **(3)**, thrust washer **(2)** and shims **(1)**.

The shims **(1)** assist in aligning the track roller frame with the sprocket.

Remove the rear track roller on later tractors. This will facilitate sliding the track roller frame from the pivot shaft.



PREPARING TO REMOVE TRACK ROLLER FRAME ASSEMBLY
(Earlier Tractor Illustrated)
1—Shims. 2—Thrust washer. 3—Cap.

Attach a suitable hoist to the track roller frame assembly and remove the assembly.

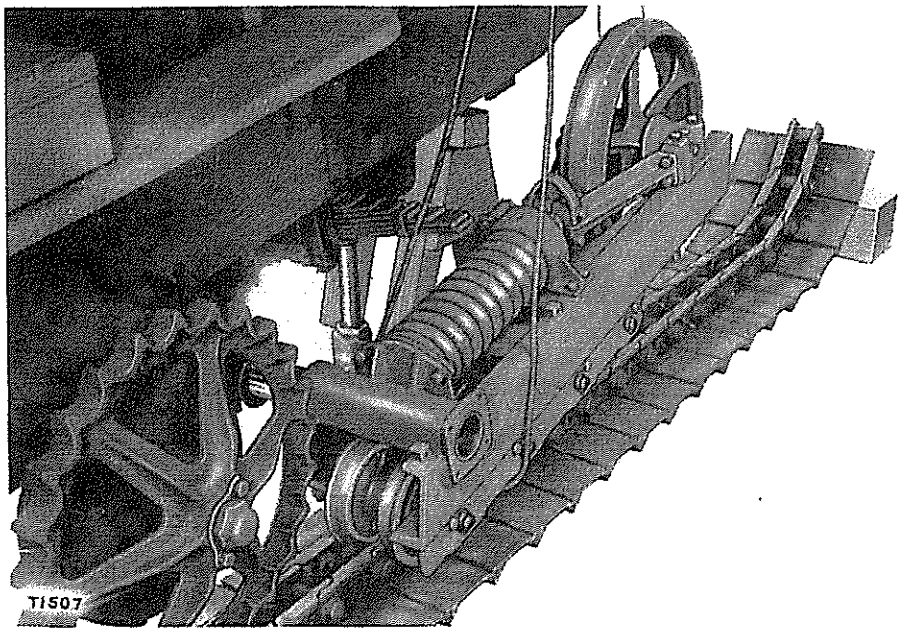
TRACK ROLLER FRAME INSTALLATION

Inspect the bushings in the pivot shaft housing. They should be replaced if the clearance exceeds .015".

The seal in the inner end of the pivot shaft housing should be replaced if worn or damaged.

Install the seal with the lip facing out of the housing.

Use shim stock to protect the seal as the track roller frame is installed.



INSTALLING TRACK ROLLER FRAME
(Earlier Tractor Illustrated)

Replace the rear track roller. The shims previously removed are used to align the track roller frame with the sprocket. The track roller frame will move out when shims are added and will move in when shims are removed. Install the thrust washer, lock and capscrews. Install the cover.

Drawbar

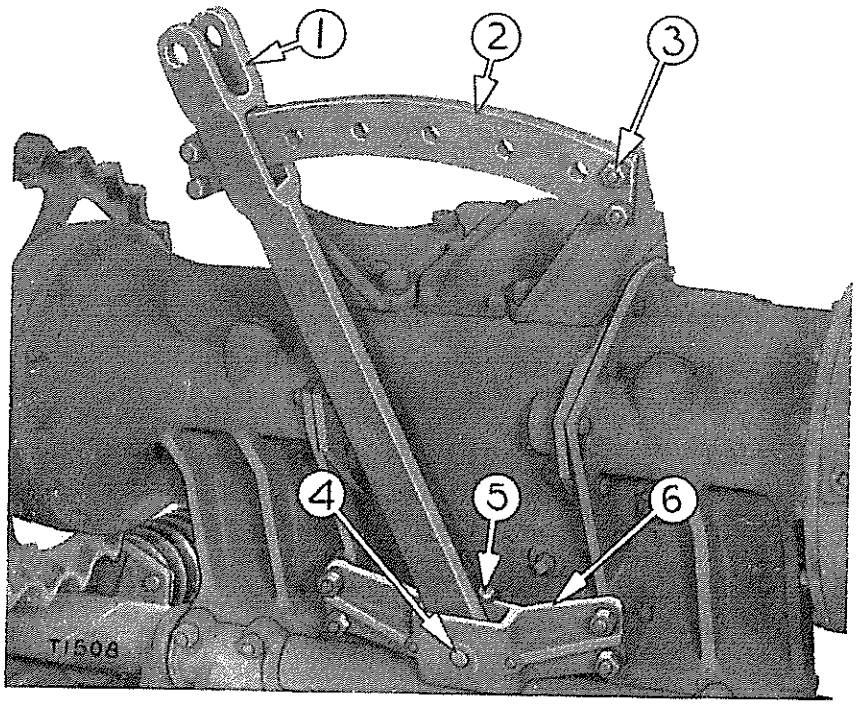
The forward end of the drawbar is attached by a pivot pin and bracket to the under side of the final drive housings. The rear end, supported by a plate, allows the drawbar to swing freely or to be pinned in any one of five positions.

Support the drawbar **(1)** and remove the bracket **(6)** from the final drive cases.

Remove the nuts **(3)** holding the plate **(2)** to the braces, lower the drawbar assembly and remove the plate **(2)**.

Remove the capscrews **(5)** and pull out the pin **(4)** to separate the drawbar from the bracket.

The shoe between the drawbar and plate, takes the wear when the drawbar is free to swing. If worn thin, replace the shoe.



DRAWBAR REMOVAL
1—Drawbar. 2—Plate. 3—Nut. 4—Pin. 5—Capscrew. 6—Bracket.