

**Servicemen's  
Reference  
Book**

**Caterpillar**  
REG. U.S. PAT. OFF.

**D4  
Tractor**

**CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS, U.S.A.**

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## Foreword

IT is the purpose of Caterpillar Tractor Co., to build into its products the capability of a long life of useful work. The records of tens of thousands of users testify to success in the achievement of that purpose. It is natural, however, that length of life and cost of operation and maintenance will vary — top records are the reward of the owners and operators who are diligent and conscientious in the care, operation and maintenance of their machines.

The Operator's Instruction Book, a copy of which is supplied with each machine, tells what to do, and how and when to do it, with regard to the day-to-day lubrication, operation and maintenance of the machine. It is urged that these instructions be studied carefully and reread frequently until the operator is thoroughly familiar with them. By following the instructions, the operator is best assured of obtaining maximum life and performance from his machine and of minimizing the frequency, number and cost of repairs.

Even the best of care will not eliminate the necessity, in course of time, of making minor repairs or complete reconditioning.

Your "Caterpillar" dealer has exceptionally complete facilities for such work. He carries a stock of genuine replacement parts and has in his employ competent factory trained servicemen. For work that cannot be done in the field, dealers have well-equipped shops. Both the shop and the field servicemen have many special tools, designed and developed by "Caterpillar", that make easier and quicker the disassembly and assembly operations.

Though most "Caterpillar" owners prefer to make use of the excellent service and shop facilities of their dealers, some are themselves skilled mechanics or have such mechanics in their employ for reconditioning their equipment. To those owners this book, issued as a guide for "Caterpillar" dealer servicemen, will be of equal value.

The special tools pictured in various operations throughout are among the many which can be purchased from dealers. These tools are illustrated and listed in the Catalog for Service Tools, a copy of which is available on request.

# Table of Contents

	<b>Page</b>
<b>Specifications</b>	3
<b>General Instructions</b>	5
<b>Diesel Engine</b>	
Radiator Removal	13
Oil Cooler Removal	15
Fan Belt Replacement	17
Fan and Water Pump Removal	18
Oil Pan Removal	19
Hood Removal	20
Dash Removal	21
Timing Gear Cover Removal and Installation	22
Diesel Engine Removal and Installation	24
<b>Starting Engine</b>	
Starting Engine Removal and Installation	28
<b>Power Transmission Units</b>	
Flywheel Clutch	34
Transmission	40
Bevel Gear	57
Seat, Fuel Tank and Fenders	66
Steering Clutch Controls	67
Steering Clutches	70
Brakes	75
Final Drive Group	83
<b>Track Roller Frame Group</b>	
Tracks	108
Track Carrier Rollers	120
Track Rollers	122
Front Idler	127
Recoil Springs	132
Equalizer Spring Group	134
Track Roller Frame Assembly	137
Drawbar	138
<b>Attachments</b>	
Nonoscillating Track Roller Frame Support	141
Installing Glass in Steel Cabs	144
<b>Index</b>	149

# SPECIFICATIONS

## POWER TRANSMISSION UNITS

### Flywheel Clutch

Clearance between shaft and sliding collar . . . . .	.026 - .030 -in.
Maximum permissible clearance . . . . .	.050 -in.

### Transmission

Reverse idler gear bearing backlash . . . . .	.006 - .008 -in.
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### Bevel Gear

Bevel gear and pinion backlash (as marked on bevel gear) or . . . . .	.008 - .010 -in.
Bevel gear bearing pre-load . . . . .	Adj. Nut

### Steering Clutch

Clearance between shaft and pressure plate bushing . . . . .	.002 - .004 -in.
Maximum permissible clearance . . . . .	.015 -in.

#### Clutch Springs

##### Outer

Pounds pressure . . . . .	161-178
When compressed to . . . . .	3 <sup>1</sup> / <sub>8</sub> -in.

##### Inner

Pounds pressure . . . . .	123-136
When compressed to . . . . .	2 13/16-in.

Steering clutch, minimum overall width plates and discs . . . . .	3 <sup>1</sup> / <sub>8</sub> -in.
--	------------------------------------

Steering clutch inner drum-to-shaft press fit, tons . . . . .	20
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Steering clutch lever adjustment, free play . . . . .	3-in.
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### Brakes

#### Adjustment

Distance pedal depressed . . . . .	3 to 4-in.
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Turns to back screw off underneath transmission case . . . . .	1 <sup>1</sup> / <sub>2</sub>
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### Final Drive

Flange-to-final-drive pinion press fit, tons . . . . .	15
--	----

Sprocket shaft-to-case press fit, tons . . . . .	20
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Sprocket-to-hub press fit, tons . . . . .	25
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## TRACK ROLLER FRAME GROUP

### Track Roller Frame

Outer bearing clearance.....	.006 - .009 -in.
Maximum permissible clearance outer bearing	.025 -in.
Inner bearing clearance.....	.008 - .010 -in.
Maximum permissible clearance inner bearing	.040 -in.
Minimum thickness of wear strip for front idler	1/4-in.

### Track Rollers

Shaft clearance .....	.005 - .009 -in.
Maximum permissible shaft clearance .....	.050 -in.
End clearance .....	.010 - .028 -in.
Maximum permissible end clearance .....	.050 -in.

### Track Carrier Rollers

Shaft clearance .....	.003 - .005 -in.
Maximum permissible shaft clearance .....	.025 -in.
End clearance .....	.015 - .033 -in.
Maximum permissible end clearance.....	.050 -in.
End of shaft to face of bracket.....	6 7/16-in.

### Front Idlers

Shaft clearance .....	.005 - .009 -in.
Maximum permissible shaft clearance.....	.040 -in.
End clearance .....	.010 - .028 -in.
Recoil spring, assembled length.....	18 1/4-in.
Track adjustment, slack.....	1 1/2-2-in.
Limit of adjusting track, specified distance.....	4-in.

## General Instructions

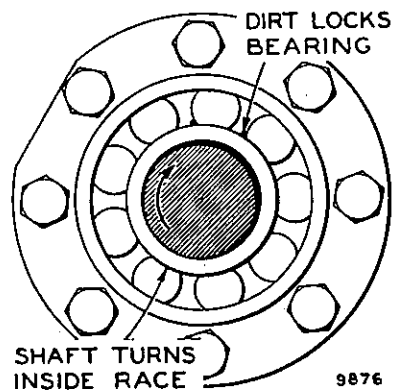
These general instructions will be extremely helpful in following the detailed instructions in the main sections of the book. They should be read and then kept in mind while assembling or disassembling the machine.

### 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



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.

Utmost care must also be exercised in keeping the hydraulic equipment and lubricant passages clean during reconditioning. Foreign material carelessly introduced into these parts can cause serious trouble.

## MAINTAIN ADJUSTMENTS

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 and steering clutches in adjustment to avoid slippage and the resulting loss of power and shortened life of the clutch plates. Correctly adjusted steering clutches and brakes are essential to good performance. Keep the fan belts adjusted to the proper tension to obtain maximum belt life and proper cooling.

The tracks must also be kept adjusted to the tension best suited to the particular terrain or type of material on which the machine is operating.

If the tracks are too tight, the front idlers and final drive parts will be overstressed. If the tracks are too loose, more rapid wear will result between the track pins and bushings and the tracks are more likely to be thrown off. However, when operating in loose material which may pick up and clog the tracks, a fairly loose adjustment may be desirable. Experience will show when it is necessary to change the adjustment from normal.

## 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 hood, radiator guard and floor plates, and clean the machine thoroughly.
2. Separate both tracks.
3. Raise the machine and block it securely, front and rear.
4. Remove both track roller frame assemblies.
5. Remove radiator, and fan assembly.
6. Remove starting engine air cleaner, carburetor and manifold assembly.



7. Remove Diesel engine air cleaner, dash and manifolds.
8. Lift out the engine.
9. Remove seat and fuel tank.
10. Remove flywheel clutch and transmission.
11. Remove steering clutches and bevel gear.
12. Disassemble and remove final drive parts.

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 reinstalled.

## 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.

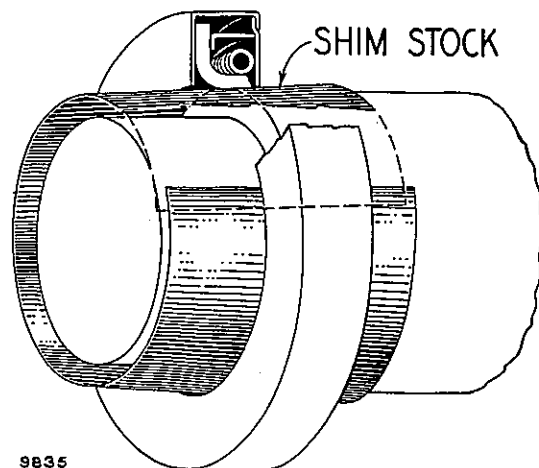
Anti-friction bearings should receive special handling. As soon as a bearing is removed, cover it to keep out dirt and abrasives. Wash bearings in non-inflammable cleaning solution and inspect the races and balls or rollers. Discard the bearings if they are pitted, scored, or burned. If the bearing is 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 rawhide 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.



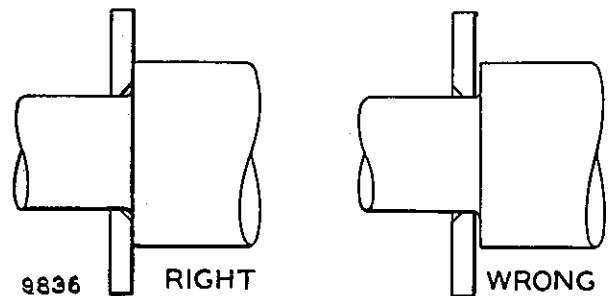
PROTECTING SEAL DURING  
INSTALLATION



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.

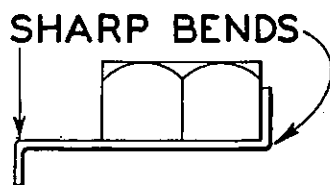
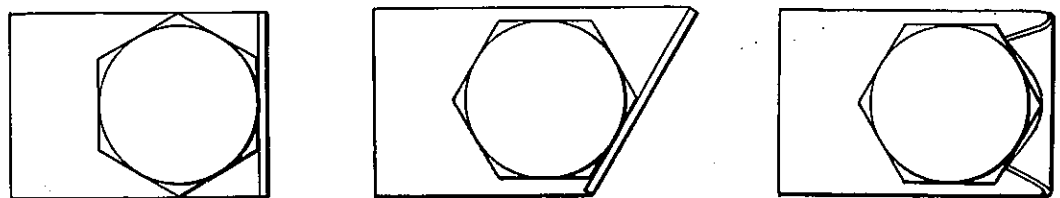
Do not install bushings by driving them in with a hammer. Use a press if possible and be sure to apply the pressure directly in line with the bore. If a bushing must be driven in, use a bushing driver or a bar with a smooth flat end. If the bushing has an oil hole, be sure it is lined up with the oil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

**HOW TO INSTALL SPACER  
AGAINST SHOULDER  
ON SHAFT**

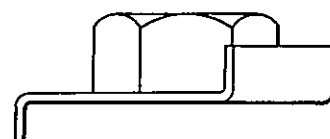


Install gaskets where required and use new ones if necessary. Never use cork or felt gaskets or seals a second time. Be sure the holes in the gaskets correspond with the lubricant passages in the mating parts. If it is necessary to make gaskets, select stock of the proper type and thickness and be sure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

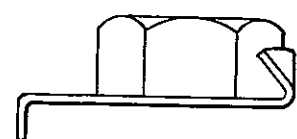
Use capscrews of the correct length. A capscrew which is too long may "bottom" before the head is tight against the part it is to hold, and in addition the threads may be damaged when the capscrew is removed.



**9837 RIGHT**



**RIGHT**

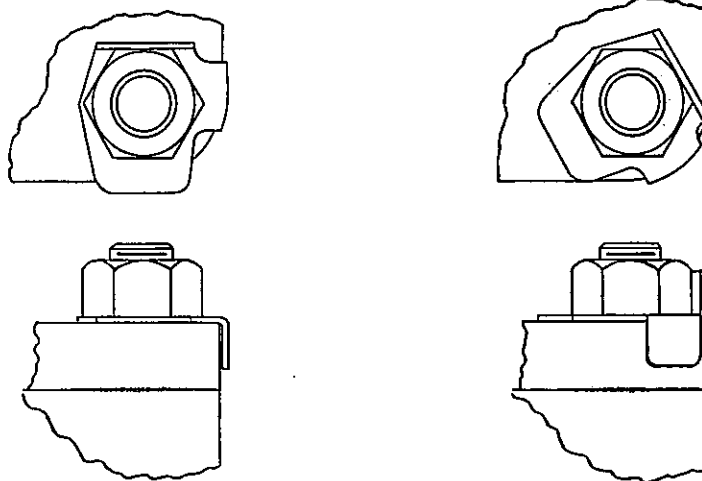


**WRONG**

**HOW TO INSTALL FLAT METAL LOCKS**

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.



17617 **RIGHT**

**WRONG**

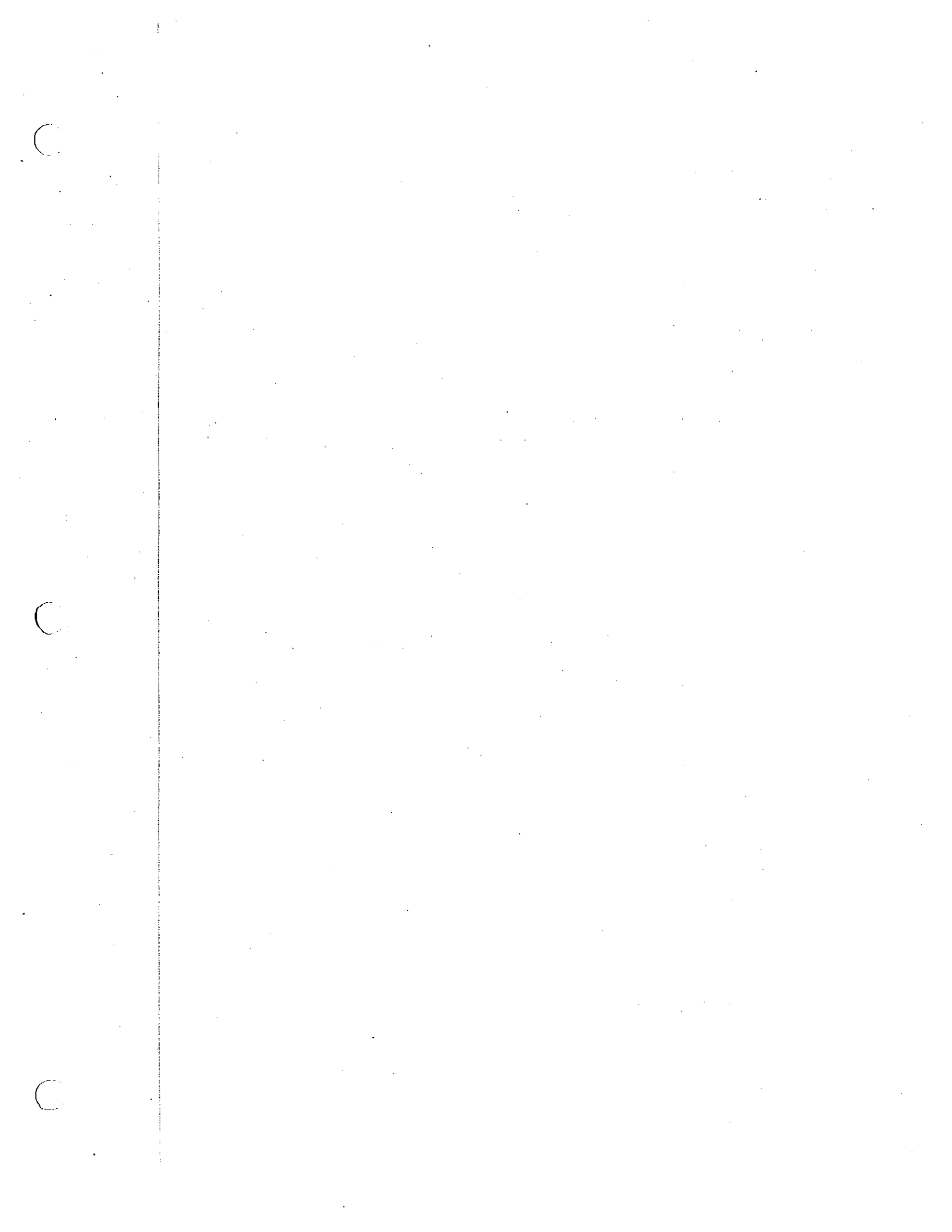
#### **METHOD FOR LOCK POSITIONING AND BENDING**

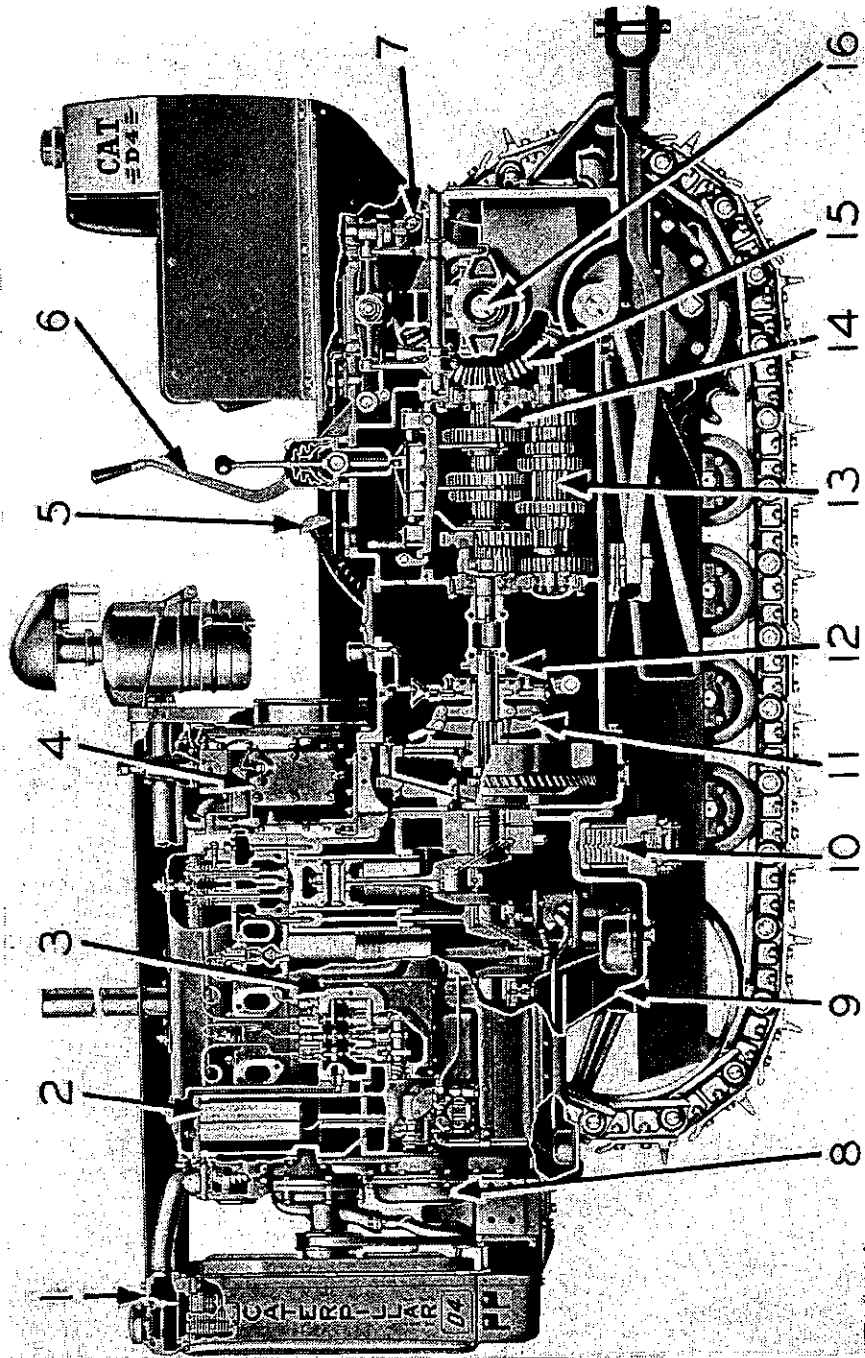
When assembling a machine complete each step in turn. Do not leave one part partially assembled and start assembling some other part. Make all adjustments as recommended. Always check the job after it is completed to see that nothing has been overlooked.

#### **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. Radiator
2. Fuel Filter Element
3. Fuel Injection Pump Housing
4. Starting Engine
5. Brake Pedal
6. Steering Clutch Lever
7. Steering Clutch Booster Spring
8. Timing Gear Cover
9. Diesel Engine Oil Pan
10. Equalizer Spring
11. Flywheel Clutch Adjusting Collar
12. Flywheel Clutch Brake
13. Transmission Lower Shaft
14. Transmission Pinion Shaft
15. Bevel Gear
16. Steering Clutch and Bevel Gear Shaft

D4 TRACTOR CUTAWAY VIEW (Later Tractor)

T11718

# DIESEL ENGINE

The engine which powers the D4 Tractor is a 4-cylinder, 4-stroke cycle, valve-in-head, "Caterpillar" Diesel engine. It has a 4½" bore in later or 6U and 7U series tractors and a 4¼" bore in earlier or 4G, 7J, 2T and 5T series tractors.

Reference material concerning the engines is covered in separate books. However, there are some instructions pertaining to the engine that apply only to the D4 Tractor and these differences are covered in this book.

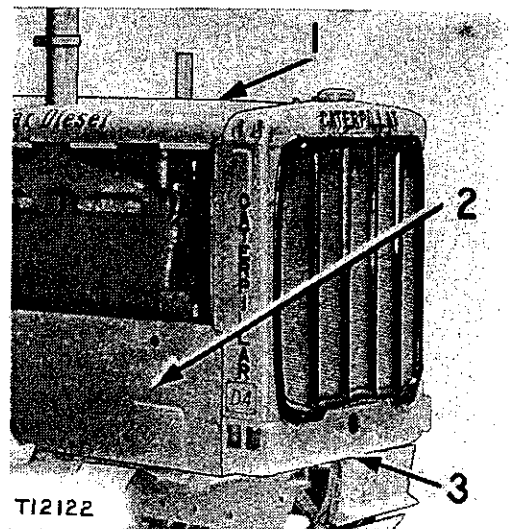
## Radiator Removal

(Later Tractors)

1. Drain the cooling system.
2. Remove the hood (1). See the topic, HOOD REMOVAL.
3. Remove the side plates (2).
4. Remove the cover from the bottom of the radiator (3).

### RADIATOR REMOVAL

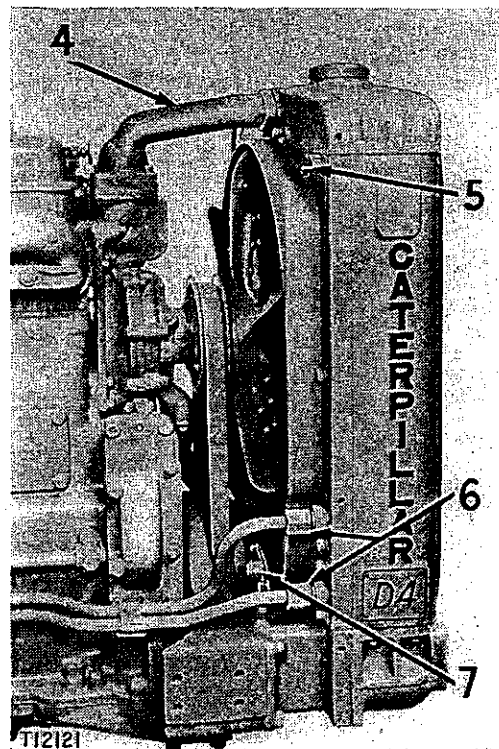
1—Hood. 2—Side plate.  
3—Radiator.



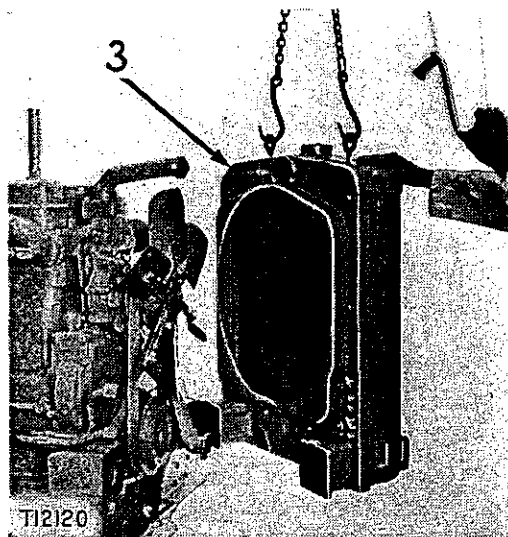
5. Drain the oil from the oil cooler by removing the drain plug from the oil filter base.
6. Open the vent (5) and disconnect the oil lines (6).
7. Remove the capscrews holding the upper water elbow (4) and the pipe (7) to the radiator.

### DISCONNECTING RADIATOR

- 4—Upper water elbow. 5—Vent.  
6—Oil lines. 7—Pipe.



8. Attach a suitable hoist to the radiator (3), then remove the cap-screws which secure the radiator to the front support and lift the radiator as shown.



### LIFTING RADIATOR

- 3—Radiator.



## Radiator Removal (Earlier Tractors)

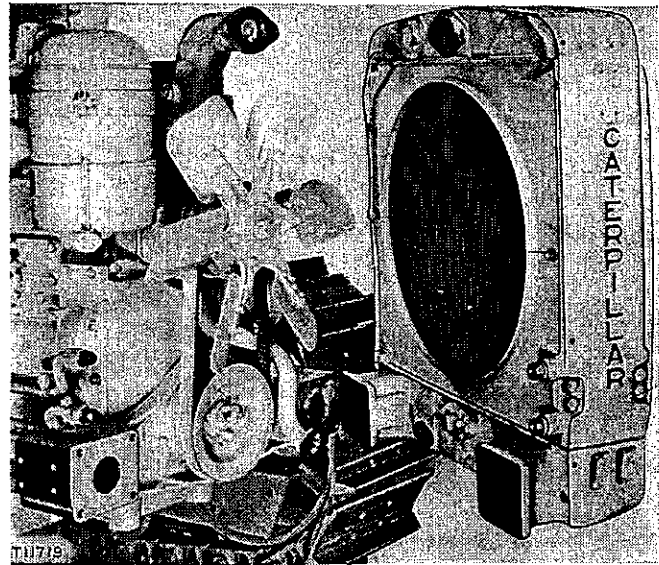
Remove the engine hood and side plates.

Disconnect the oil cooler tubes and the upper and lower water pipe connection to the radiator.



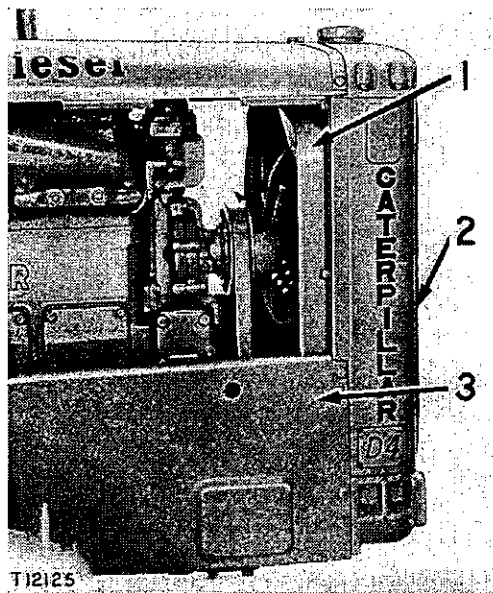
Take out the capscrews that hold the radiator assembly to the radiator support and remove the radiator and oil cooler assembly as shown.

### REMOVING RADIATOR

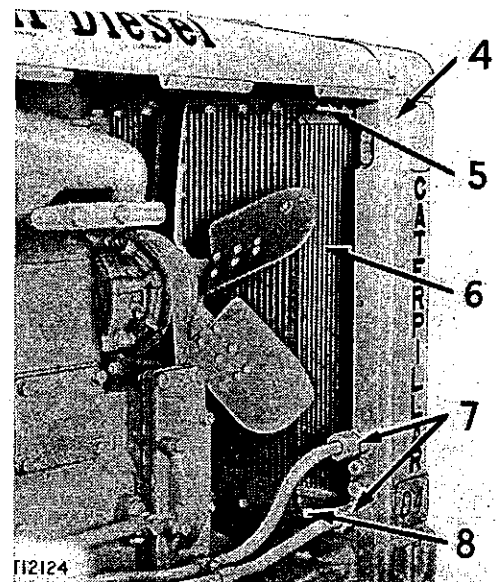


## Oil Cooler Removal (Later Tractors)

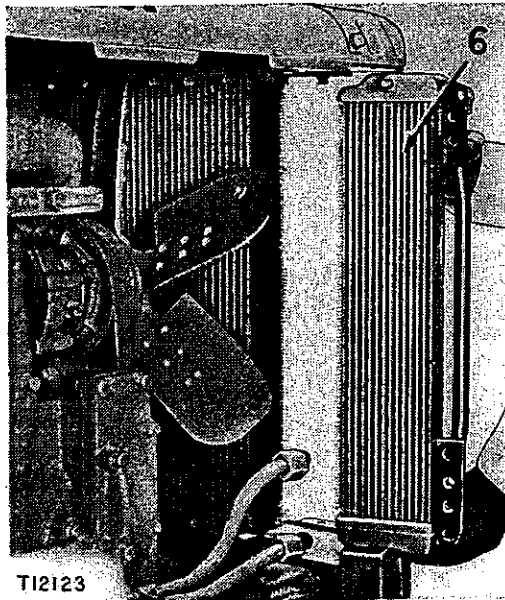
1. Remove the plate (3).
2. Remove the fan shield (1) and the radiator guard (2).
3. Drain the oil from the oil cooler (6) by removing the drain plug from the oil filter base and opening the vent (5).



**OIL COOLER REMOVAL**  
1—Fan shield. 2—Radiator guard.  
3—Plate.



**OIL COOLER DISCONNECTION**  
4—Side plate. 5—Vent. 6—Oil cooler.  
7—Oil lines. 8—Capscrew.



## REMOVING OIL COOLER

6—Oil cooler.

4. Disconnect the oil lines (7).
5. Remove all the capscrews that secure the radiator side plate (4) to the radiator top and bottom tanks and to the oil cooler (6) and remove the plate.
6. Remove the capscrews (8) which secure the oil cooler to the radiator bottom tank.
7. Remove the oil cooler as illustrated.

## Oil Cooler Removal (Earlier Tractors)

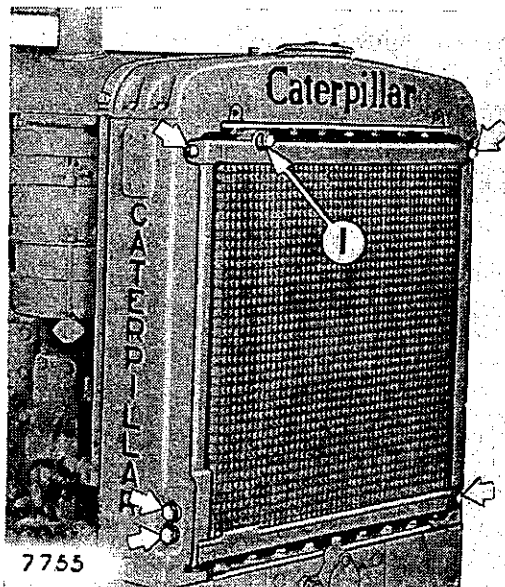
The oil cooler is located just ahead of the water radiator and can be removed separately or as a unit with the radiator assembly.

Remove the screen guard assembly. Drain the oil from the oil cooler by loosening the vent plug (1) and removing the drain plug in the bottom of the oil filter.

Remove the capscrews shown by the arrows and lift out the oil cooler.

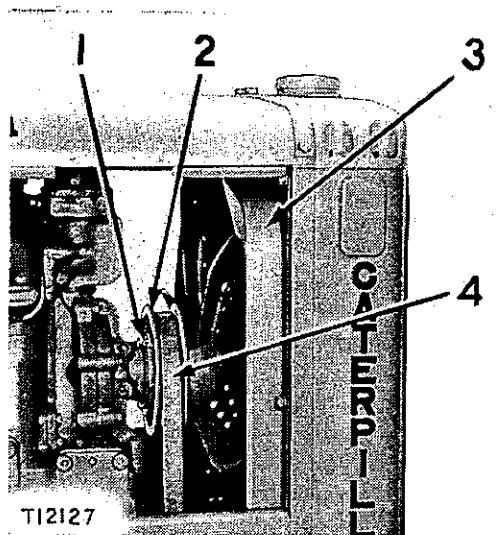
## OIL COOLER

1—Vent plug.

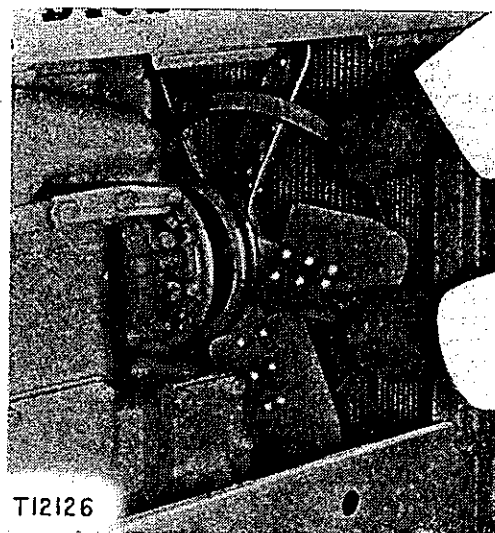


## Fan Belt Replacement

1. To facilitate the removal of the fan belt (4) remove the fan shield (3).
2. Remove the capscrew and lock (1) and turn the pulley ring (2) in a counterclockwise direction completely loosening the fan belt.
3. Remove the belt from the crankshaft pulley.
4. By placing the belt between the two fan blades and the radiator and rotating the fan, the belt can be removed or installed as shown.
5. Install and tighten the belt until there is 1" slack.



PREPARING TO REMOVE FAN BELT  
1—Lock. 2—Pulley ring. 3—Shield.  
4—Fan belt.



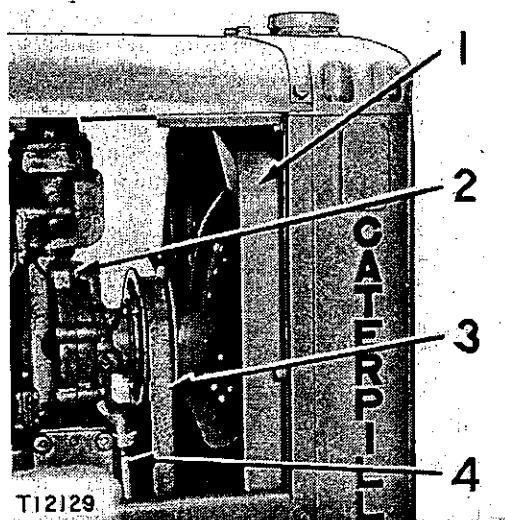
REPLACING FAN BELT

6. Install and tighten the lock in the adjusting ring (2).
7. Install the shield (3).

## Fan and Water Pump Removal (Later Tractors)

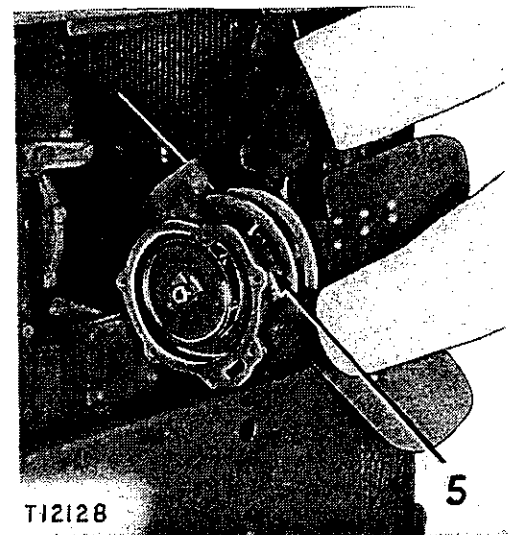
The water pump and fan assembly can be removed from the right side of the tractor.

1. Drain the cooling system.
2. Remove the shield (1).
3. Remove the fan belt (3). See the topic, FAN BELT REPLACEMENT.
4. Disconnect the inlet pipe (4) from the water pump.
5. Remove all the capscrews (2) that secure the water pump to the water temperature regulator housing.
6. Lift the water pump and fan assembly (5) out the right side as shown.



**PREPARING TO REMOVE FAN AND WATER PUMP ASSEMBLY**

1—Shield. 2—Capscrew. 3—Fan belt.  
4—Inlet pipe.



**REMOVING FAN AND WATER PUMP ASSEMBLY**

5—Fan and water pump assembly.