

Product: TRACK LOADER
Model: 977K TRACK LOADER 48J
Configuration: 977L TRAXCAVATOR 48J00586-01058 (MACHINE)

Disassembly and Assembly 3306 VEHICULAR ENGINE FOR 977L TRACK-TYPE LOADER

Media Number -SEN7773-00

Publication Date -01/03/1978

Date Updated -12/10/2001

Camshaft

SMCS - 1210-11; 1210-12

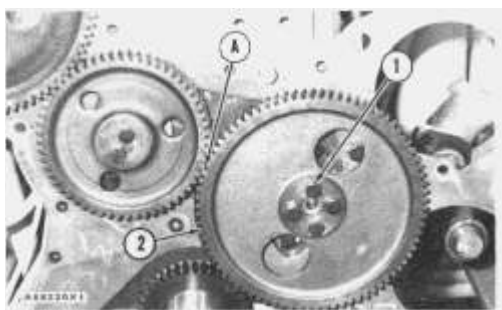
Remove Camshaft

start by:

a) remove valve lifters

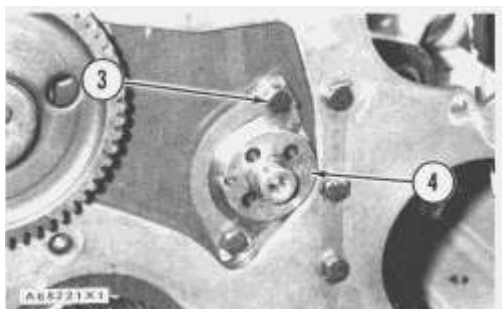
b) remove timing gear cover

1. Turn the crankshaft until the "C" mark on the crankshaft gear is in alignment with the "C" mark on the camshaft gear.



NOTE: To keep the engine timing correct during removal and installation of the camshaft, put a mark on the teeth of the idler gear and the camshaft gear at location (A).

2. Remove bolts (1) and remove camshaft gear (2).



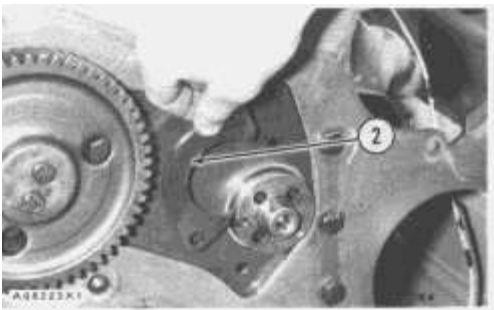
3. Remove bolts, lock and washer (3). Remove camshaft (4).

Install Camshaft

1. Put clean SAE 30 oil on the lobes and bearing journals of the camshaft.



2. Install camshaft (1) in the block.



3. Install washer (2), lock and bolts that hold the camshaft in place.



4. Put the camshaft gear (3) in position on the camshaft so the "C" mark on the camshaft gear is in alignment with the "C" mark on the crankshaft gear. Install the bolts that hold the camshaft gear in place.

NOTE: The drive gear will fit on the camshaft one way only. If necessary, turn the camshaft to make alignment of the holes of the drive gear and the camshaft.

end by:

a) install timing gear cover

b) install valve lifters

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Timing Gears And Plate

SMCS - 1162-11; 1162; 1206-12; 1206

Remove Timing Gears And Plate

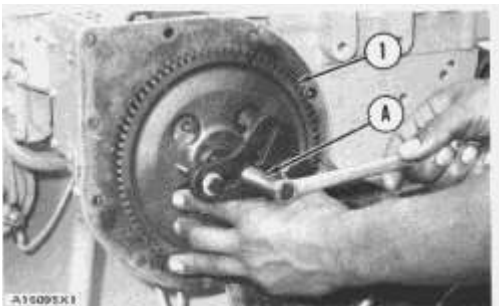
	Tools Needed	A	B	C
8S2264	Fuller Group	1		
8B7560	Step Plate	1		
5B6579	Bolt (3/8"-24 NF x 5 1/2 in. long)	2		
5M2894	Flat Washer 3/8 in.	2		
1P510	Driver Group		1	
2M849	Flat Washer 1/2 in.			2

start by:

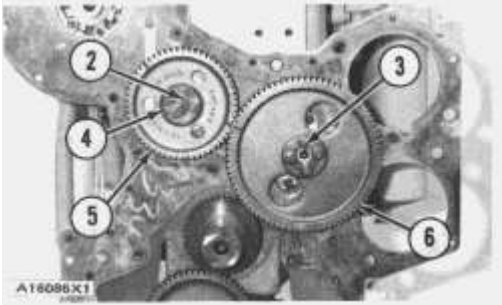
a) remove timing gear cover

1. Put the engine in correct timing. See REMOVE FUEL INJECTION PUMP HOUSING AND GOVERNOR for this procedure.

2. Remove the bolt and washer that hold gear (1) and install tooling (C) on the end of the bolt. Install and tighten the bolt, washer and tooling (C) to hold the sleeve on the end of the fuel injection pump camshaft.



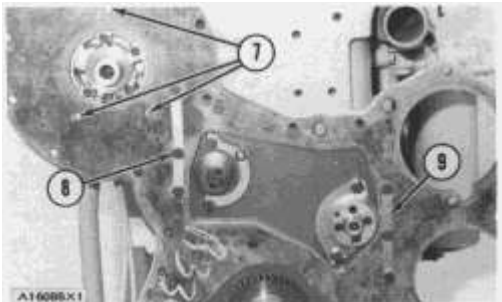
3. Install tooling (A) on gear (1) and tighten the center bolt of tooling (A) until gear (1) is loosened. Remove tooling (B), the bolt, washers and gear (1).



4. Remove bolts (2), plate (4) and the idler gear (5). Remove bolts (3) and the washers to remove gear (6) from the camshaft.



5. Inspect the bearing in idler gear (5) for wear or damage. If a replacement of the bearing is needed, use tool group (B) to remove it from the gear as shown.

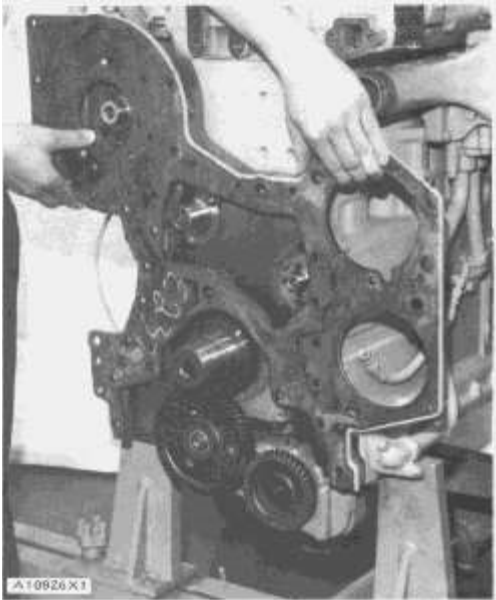


6. Remove the nuts and washers that hold the fuel injection pump housing to studs (7).

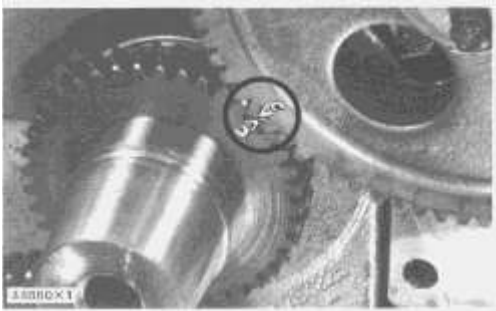
7. Remove the six bolts (8) and locks (9) that hold the timing gear plate to the cylinder block. Remove the timing gear plate and gasket from the engine.

Install Timing Gears And Plate

Tools Needed		A	B
5P3520	Spanner Wrench	1	
5P8675	Handle	1	
1P510	Driver Group		1



1. Install the timing gear plate and gasket. Install the two locks and six bolts.
2. Install the three nuts and washers that hold the fuel injection pump housing to the timing gear plate.



3. Install the camshaft drive gear. Make sure the "C" mark on the crankshaft gear is in alignment with the "C" mark on the camshaft drive gear. Install the four washers and bolts.
4. Use tool (B) to install the bearing in the idler gear.



5. Install idler gear (2). Install plate (3) and bolts (1).
6. Put the fuel injection pump drive gear in position on the fuel system. Install the bolt and washer that holds it finger tight only.

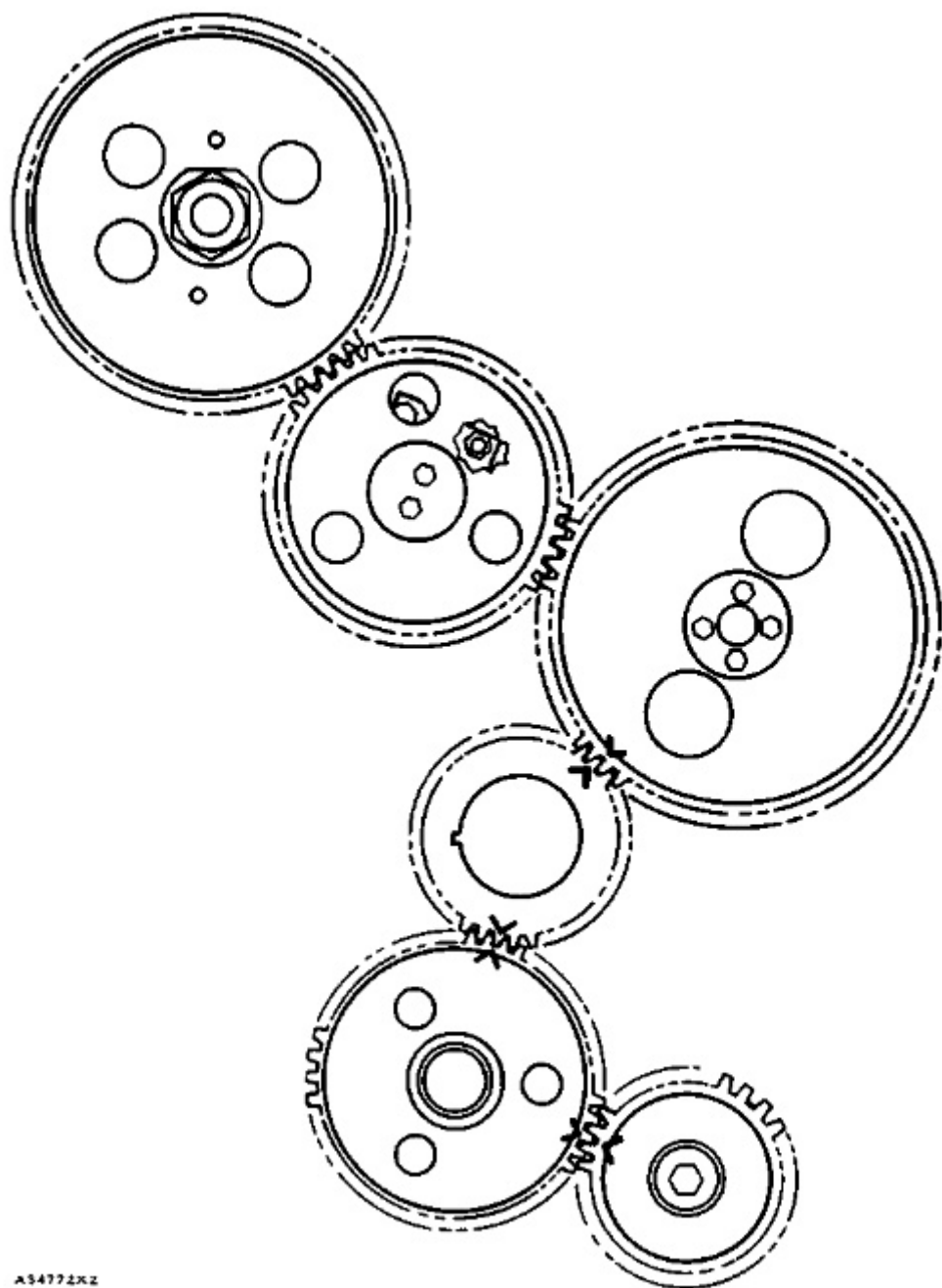


TYPICAL EXAMPLE

7. Install tooling (A) in the holes of the fuel injection pump drive gear as shown. Put a torque of approximately 50 lb.ft. (70 N·m) on the pump drive gear in a clockwise direction (as seen from the front of the engine). With the clockwise torque on the pump drive gear tighten the bolt to a torque of 110 ± 5 lb.ft. (149 ± 7 N·m).

end by:

a) install timing gear cover



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Engine And Torque Converter

SMCS - 1003-11; 1003-12

Remove Engine And Torque Converter

start by:

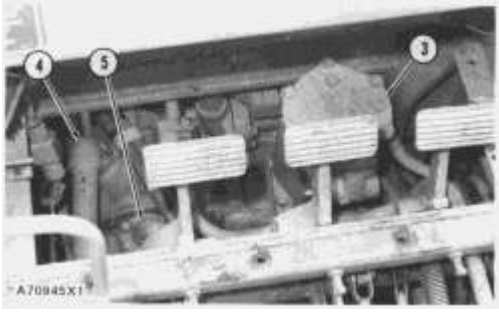
- a) remove radiator and radiator guard
- b) remove rear crankcase guards *
- c) remove universal joint *
- d) remove air cleaner assembly

*These operations are in the POWER TRAIN DISASSEMBLY AND ASSEMBLY section.

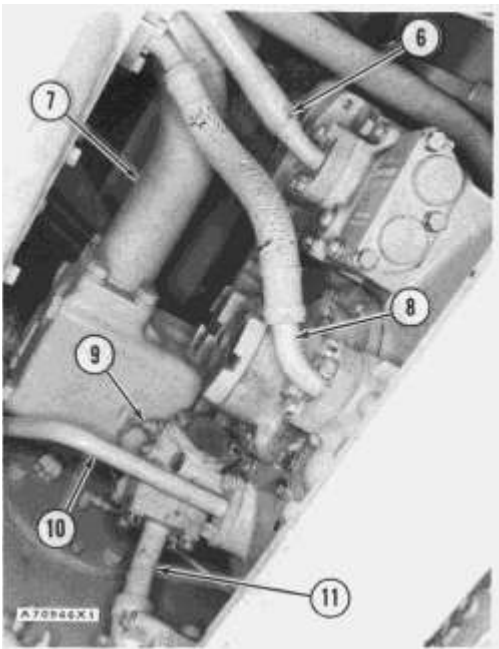
1. Drain the oil from the engine.
2. Drain oil from the torque converter.
3. Drain the oil from the hydraulic tank.
4. Turn the valve for the fuel supply to the "OFF" position.



5. Remove plate assemblies (1) and floor plates (2).

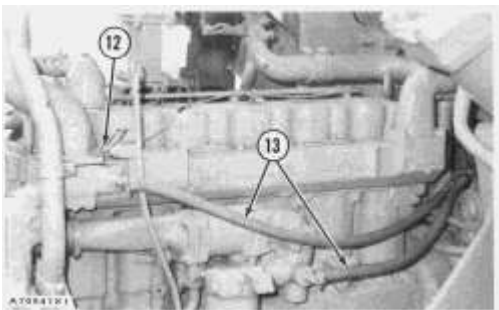


6. Remove transmission and torque converter filter housing (3). Remove tube assembly (4). Disconnect hose assembly (5) from the top of the hydraulic pump. Disconnect the clip that holds the torque converter oil temperature sensing line to the torque converter.

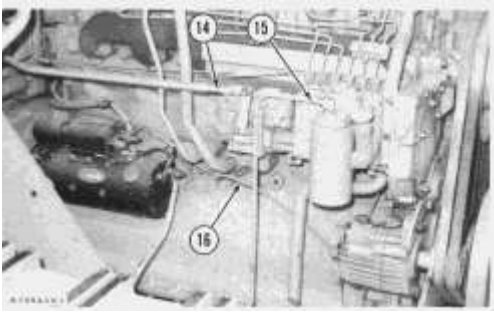


VIEW FROM UNDER MACHINE

7. Disconnect tube assembly (7) from the hydraulic pump. Disconnect hose assembly (6) from the torque converter inlet relief valve. Disconnect hose assembly (8) from the scavenge pump. Disconnect tube assembly (10) from the torque converter. Remove torque converter oil temperature sensing bulb (9) from the torque converter outlet relief valve. Remove tube assembly (11).



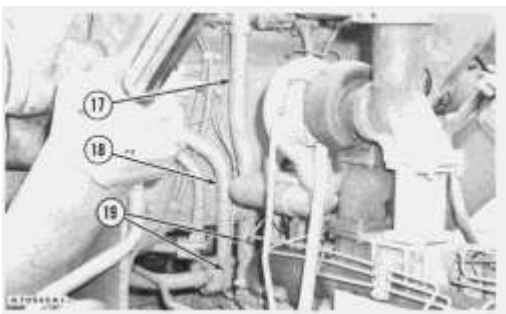
8. Disconnect two heater hoses (13) and remove water temperature sensing bulb (12).



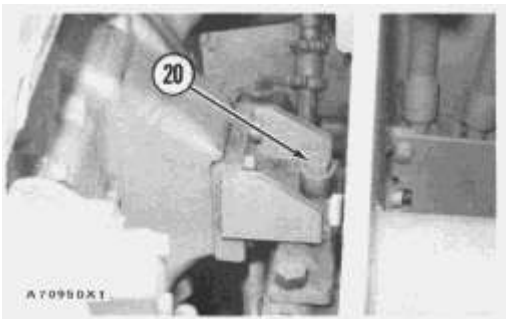
9. Disconnect governor control rod (14) from lever. Disconnect fuel line (15) from fuel filter base.

NOTE: Put a mark on all wires before they are removed or disconnected for installation purpose.

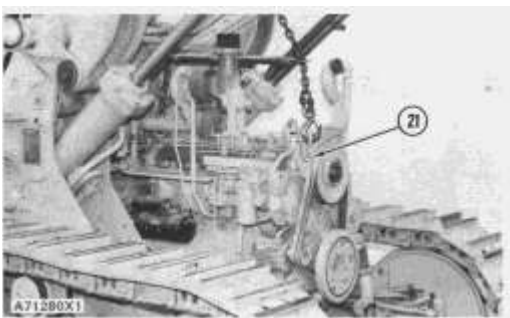
10. Disconnect wiring harness (16) from the electric starting motor, alternator and glow plug wiring harness.



11. Disconnect two small tubes (19). Remove tube assemblies (17) and (18) and swivel joints.

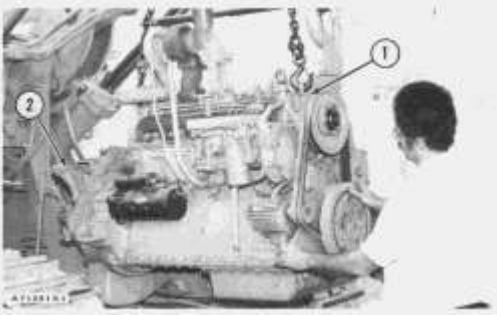


12. Fasten a hoist to the engine. Remove bolt (20) from rear support on each side. Remove two bolts and nuts from front support.



13. Remove the engine (21) and torque converter from the machine. Weight of the engine and torque converter is 3000 lb. (1350 kg).

Install Engine And Torque Converter

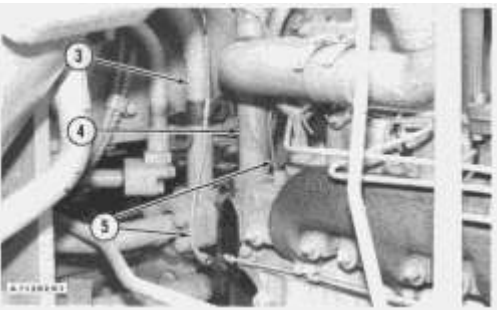


1. Fasten a hoist to engine (1) and torque converter (2). Put the engine and torque converter in position on the frame of the machine.

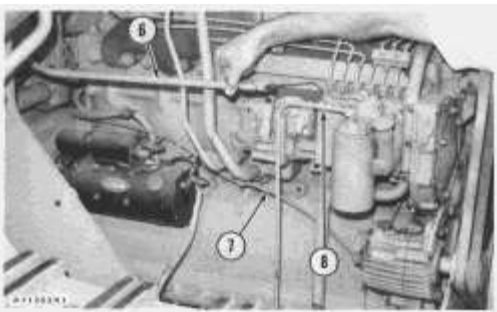
NOTICE

Do not cause damage to any tubes, hoses or wires when the engine is put in position.

2. Install the rear support bolts. Tighten them to a torque of 200 ± 25 lb.ft. (270 ± 35 N·m). Install the front support bolts and nuts.

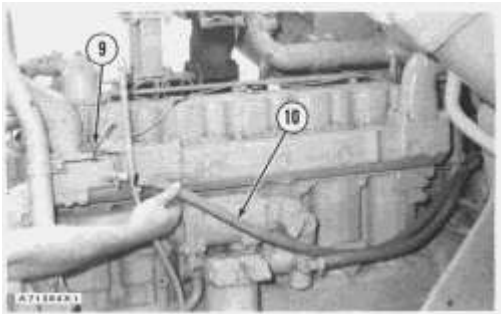


3. Install tube assemblies (3) and (4) and swivel joints. Connect two small tubes (5).



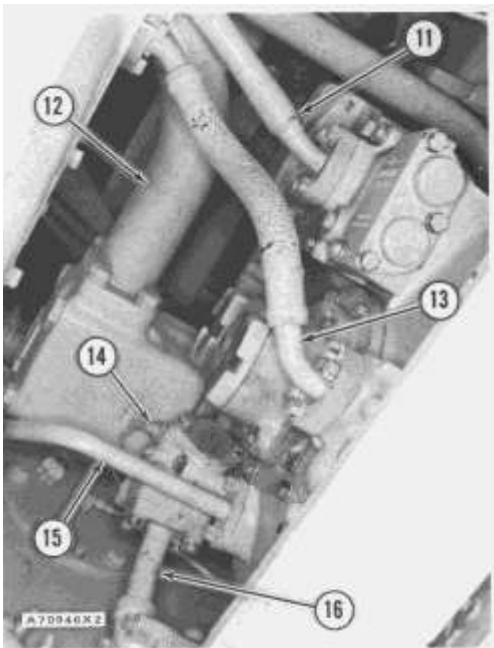
4. Connect wiring harness (7) to the electric starting motor, alternator and glow plug wiring harness.
5. Connect fuel line (8) to the fuel filter base.

6. Connect governor control rod (6) to lever.

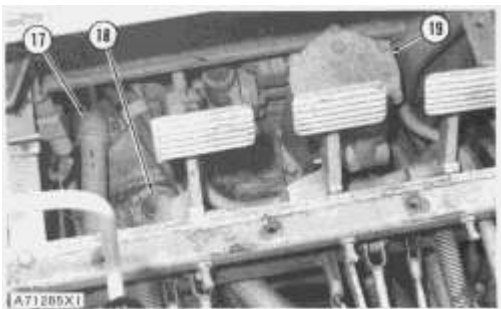


7. Install water temperature sensing bulb (9).

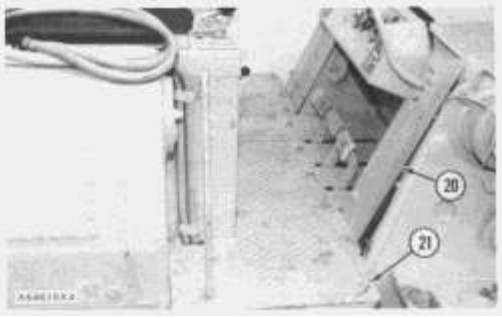
8. Connect two heater hoses (10).



9. Connect tube assembly (12) to the hydraulic pump. Connect hose assembly (11) to the torque converter inlet relief valve. Connect hose assembly (13) to the scavenge pump. Connect tube assembly (15) to the torque converter. Install torque converter oil temperature sensing bulb (14) to the torque converter outlet relief valve. Install tube assembly (16).



10. Install transmission and torque converter filter housing (19). Install tube assembly (17) to the torque converter and magnetic screen. Connect hose assembly (18) to the top of the hydraulic pump. Connect the clip that holds the torque converter oil temperature sensing line to the torque converter.



- 11.** Install floor plates (21) and plate assemblies (20).
- 12.** Turn the valve for the fuel supply to the "ON" position.
- 13.** Fill the engine with oil to the correct level. See LUBRICATION AND MAINTENANCE GUIDE.
- 14.** Fill the transmission and bevel gear case with oil to the correct level. See LUBRICATION AND MAINTENANCE GUIDE.
- 15.** Fill the hydraulic tank with oil to the correct level. See LUBRICATION AND MAINTENANCE GUIDE.

end by:

- a)** install universal joint *
- b)** install rear crankcase guards *
- c)** install radiator and radiator guard
- d)** install air cleaner assembly

*These operations are in the POWER TRAIN DISASSEMBLY AND ASSEMBLY section.

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Flywheel

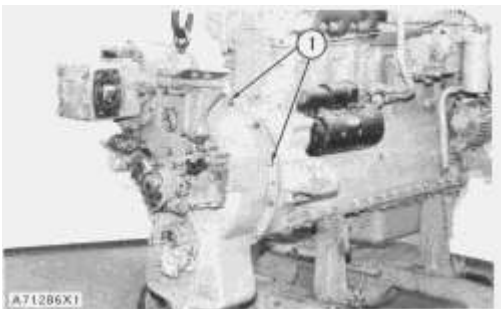
SMCS - 1156-11; 1156-12

Remove Flywheel

	Tools Needed	A
FT120	Lifting Bracket	1

start by:

a remove engine and torque converter



1. Install a 5/8"-11 NC forged eyebolt to the torque converter. Fasten a hoist and remove ten bolts (1) that hold the torque converter to the flywheel housing.



2. Install two 3/8"-16 NC forcing screws. Turn the forcing screws evenly until the torque converter is free of the flywheel housing. Remove torque converter (2). Weight of the torque converter is 450 lb. (204 kg).

3. Loosen the nine bolts that hold flywheel to the crankshaft.



4. Remove two bolts and install two 5/8"-18 NF guide bolts. Install tool (A) and remove the other bolts. Remove flywheel (3). Weight of the flywheel is 65 lb. (29 kg).



5. Remove gear (4) from the flywheel.

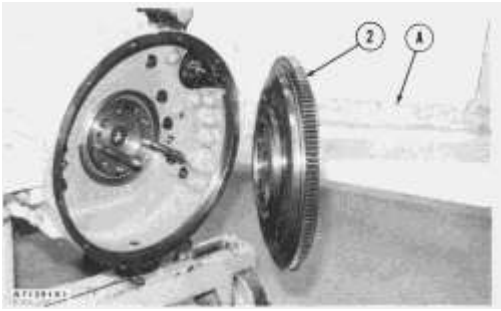
Install Flywheel

Tools Needed		A
FT120	Lifting Bracket	1

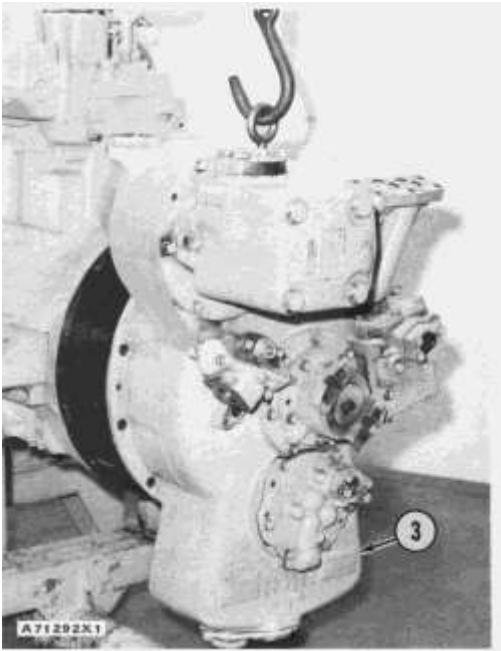


1. Heat the ring gear to a maximum temperature of 600°F (316°C). Install ring gear (1) to the flywheel.

2. Install two 5/8"-18 NF guide bolts to the flange of the crankshaft.



3. Use tool (A) and put flywheel (2) in position. Install the nine bolts that hold the flywheel to the crankshaft.



4. Fasten a hoist to torque converter (3) and put it in position.

NOTE: Check the O-ring seal for damage. If the seal has damage, use a new part for replacement.

5. Install the ten bolts that hold the torque converter to the flywheel housing.

end by:

a) install engine and torque converter

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Crankshaft Rear Seal And Wear Sleeve

SMCS - 1161-11; 1161-12

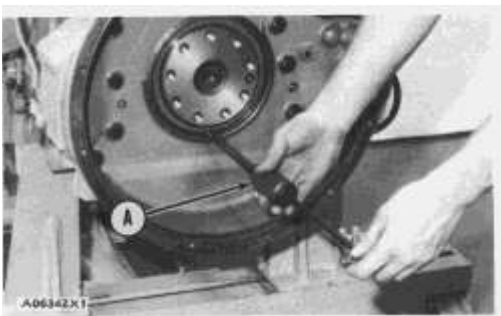
Remove Crankshaft Rear Seal And Wear Sleeve

Tools Needed		A	B	C
1P3075	Puller Assembly	1		
5P7312	Distorter		1	
5P7313	Ring			1

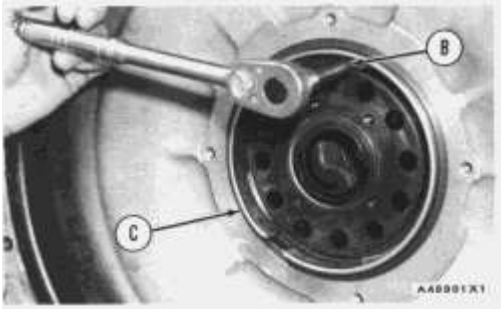
start by:

a) remove flywheel

NOTE: When a replacement of the rear seal is made, a replacement of the wear sleeve is to be made also.



1. Remove the crankshaft rear seal with tool (A).

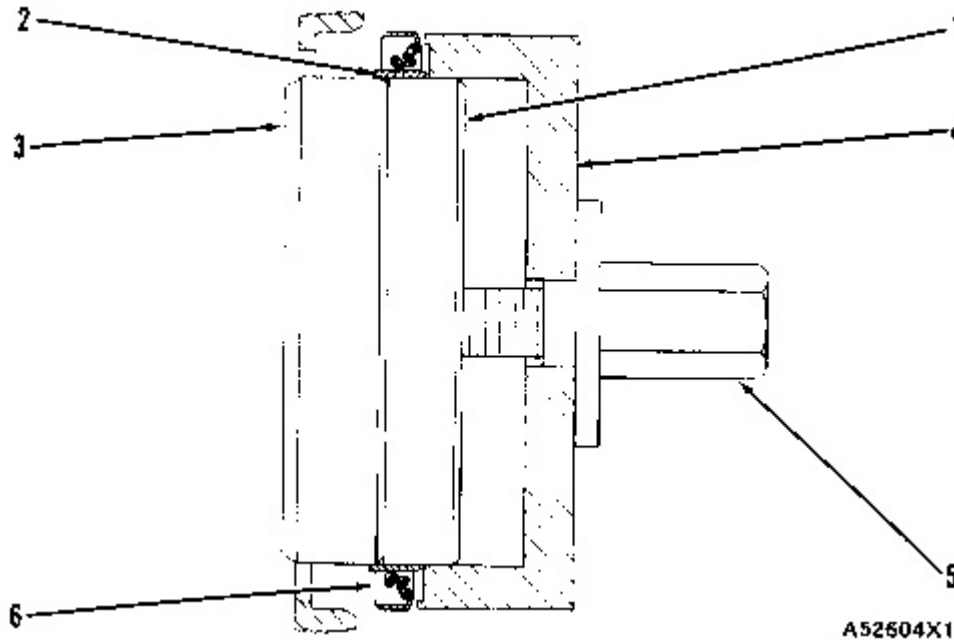


2. Install tool (C) in the rear seal bore.
3. Install tool (B) between tool (C) and the wear sleeve. Turn tool (B) until the edge of the tool makes a flat place (crease) in the wear sleeve. Do this in two or more places until the wear sleeve is loose.
4. Remove tool (C) and the wear sleeve by hand.

Install Crankshaft Rear Seal And Wear Sleeve

Tools Needed		A
9S8871	Locator	1
9S8858	Nut	1
9S8890	Bolt	3
5P7298	Installer	1

1. Install the crankshaft rear seal and wear sleeve with tooling (A) as follows:



- a) Put locator (1) in position on the crankshaft and install the three bolts that hold it in place.

b) Put clean engine oil on the seal lip of seal (6) and on the outside diameter of wear sleeve (2).

c) Install seal (6) on wear sleeve (2) from the end of the wear sleeve that has the bevel on the outside diameter. Make sure the lip of the seal is toward the inside of the engine and the bevel that is on the outside diameter of the wear sleeve is toward the outside of the engine when installed.

d) Use 8M8060 Quick Cure Primer to clean the outside diameter of the crankshaft flange (3) and the inside diameter of wear sleeve (2).

e) Put 9S3265 Retaining Compound on the outside diameter of crankshaft flange (3) and the inside diameter of wear sleeve (2).

NOTE: Make sure the lip of the seal is toward the inside of the engine and the outside diameter bevel of the wear sleeve is toward the outside of the engine.

f) Put wear sleeve (2) with seal (6) on locator (1). Put installer (4) on locator (1) and install nut (5). Put lubrication on the face of the washer and the nut.

g) Tighten nut (5) until installer (4) comes in contact with locator (1).

h) Remove tooling (A) and check the wear sleeve and seal for correct installation.

end by:

a) install flywheel

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Flywheel Housing

SMCS - 1157-11

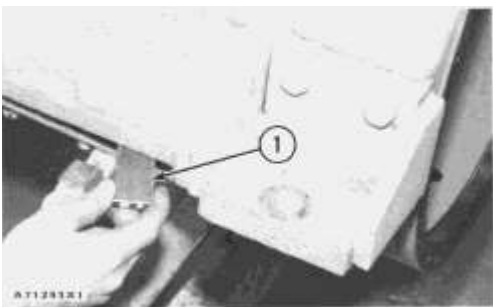
Remove Flywheel Housing

	Tools Needed	A
FT120	Lifting Bracket	1

start by:

- a) remove flywheel
- b) remove starter

1. Remove the bolts that hold the oil pan plate to the flywheel housing. Loosen the bolts that hold the oil pan plate to the cylinder block.



2. Fasten a hoist to the engine. Lift the engine and install shims (1) on each side of the engine between the cylinder block and the oil pan plate.



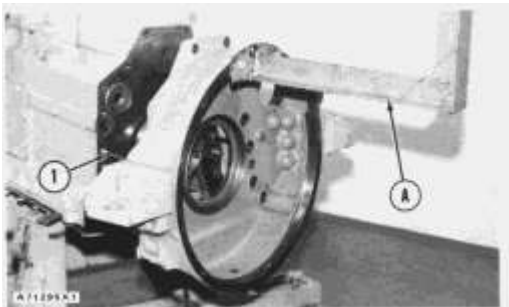
3. Install tool (A) to the flywheel housing. Remove the thirteen bolts that hold the flywheel housing to the cylinder block.

4. Remove flywheel housing (2). The weight of the flywheel housing is 110 lb. (50 kg).

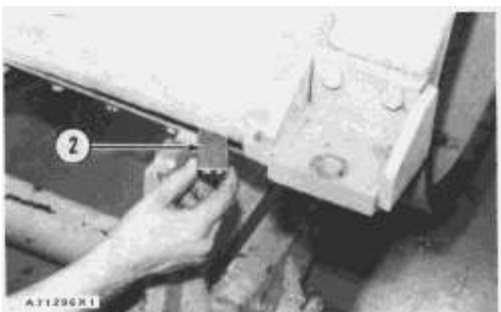
Install Flywheel Housing

Tools Needed		A
FT120	Lifting Bracket	1

1. Clean the old gasket from the surfaces of the cylinder block and flywheel housing that make contact with each other. Install a new gasket on the cylinder block.



2. Install two 1/2"-13 NC guide bolts (1) in the cylinder block as shown. Install tooling (A) on the flywheel housing. Fasten a hoist and put the flywheel housing in position on the guide bolts. Install all but two bolts in the flywheel housing. Remove tooling (A) and the guide bolts. Install the other two bolts.



3. Cut the bottom of the gasket even with the flywheel housing and cylinder block. Put 5H2471 Gasket Cement on the bottom of the gasket where the gasket makes contact with the gasket for the oil pan plate. Remove shims (2) from each side of the engine. Tighten all of the oil pan bolts. Install the bolts that hold the oil pan plate to the flywheel housing.

end by:

a) install starting motor

b) install flywheel

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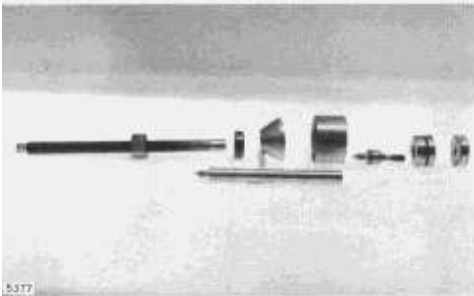
Date Updated -12/10/2001

Camshaft Bearings

SMCS - 1211-11; 1211-12

Remove Camshaft Bearings

	Tools Needed	A
8S2241	Camshaft Bearing Tool Group	1
8H684	Ratchet Box Wrench	1

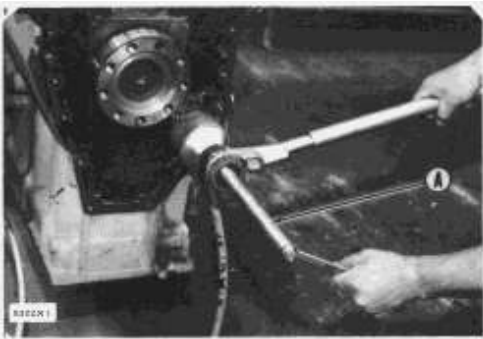


start by:

- a) remove oil pan plate
 - b) remove timing gears and plate
 - c) remove flywheel housing
 - d) remove camshaft
1. Remove the camshaft bearings with tooling (A).

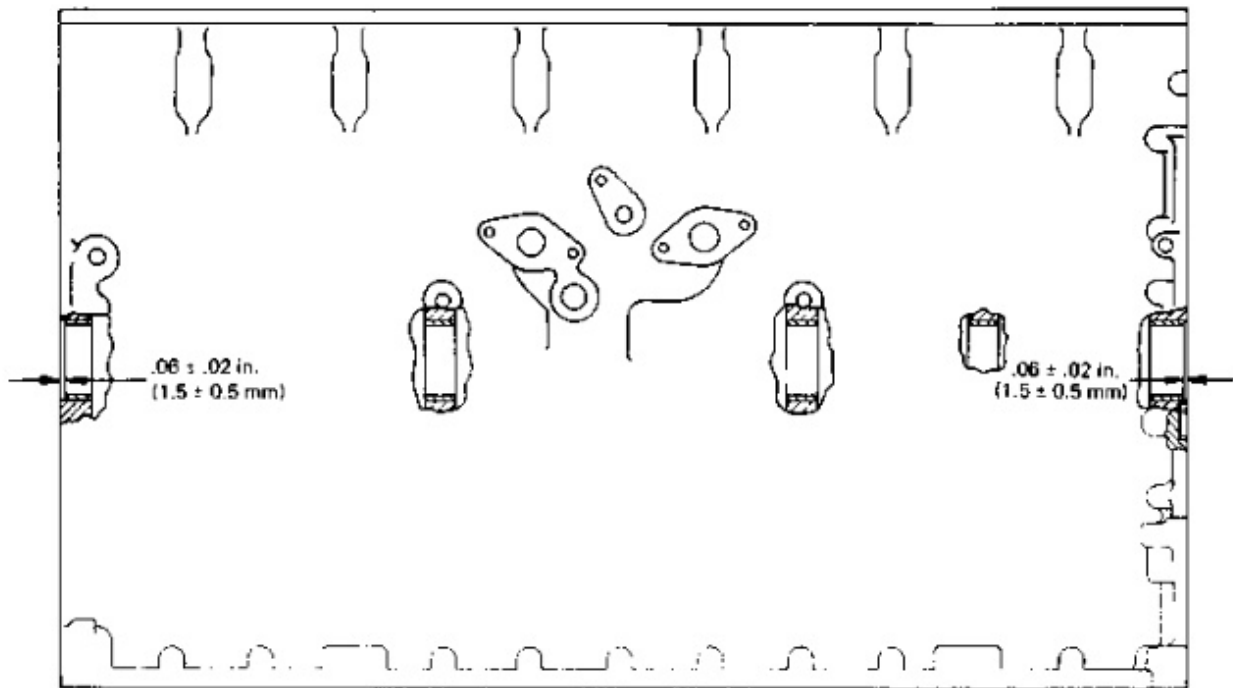
Install Camshaft Bearings

Tools Needed		A
8S2241	Camshaft Bearing Tool Group	1
8H684	Ratchet Box Wrench	1



1. Install the camshaft bearings in the cylinder block with tooling (A).

NOTE: Install all bearings with oil hole in bearing in alignment with oil hole in cylinder block.



A31973X1

2. The front and rear bearings are to be .06 in. (1.5 mm) inside the ends of the cylinder block after installation.

end by:

- a) install camshaft
- b) install flywheel housing
- c) install timing gears and plate
- d) install oil pan plate

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