SHOP MANUAL

FORD

MODELS 9N (Ford-Ferguson), 2N, 8N

The 9N, 2N and 8N model number designation depicts the year of introduction. The 9N was introduced in 1939 and was the earliest version. The 2N was introduced in 1942 and was the wartime version, with plans made to equip them with steel wheels, a magneto and other changes. Although some early 2N models were produced with steel wheels and no electrical system, most of the changes from the 9N never got into production. The 8N was introduced in 1948 and was in production through 1952.

The original tractor paint colors were as follows: Models 9N and 2N were painted a solid gray. The Model 8N hood, fenders and wheels were painted a lighter color of gray than the 9N and 2N gray; the front axle, engine, chassis, instrument panel and "Ford" script on the hood and fenders were painted red; and the radiator cap and seat were black. The gray paint for the 9N and 2N tractors and the gray and red paint for 8N tractors is available from Ford New Holland tractor dealers.

The tractor serial number is stamped on the left side of the engine block on 9N, 2N and 8N tractors. These Ford tractors do not have separate engine and tractor serial numbers.

TRACTOR SERIAL NUMBERS AND YEARS PRODUCED

Models 9N-9NAN		Models 2N-2NAN		Models 8N-8NAN	
Year	Beginning Serial Number	Year	Beginning Serial Number	Year	Beginning Serial Number
1939	1	1942	99003	1947	1
1940	10234	1943	105375	1948	37908
1941	45976	1944	126538	1949	141370
1942	88888	1945	169982	1950	245637
1943	105412	1946	198731	1951	363593
		1947	258504	1952	442035

INTRODUCTION

This service manual covers all American made FORD Tractors manufactured from 1939 to 1952. This manual can be used by anyone with minimum experience and mechanical ability. Easy to read type, detailed drawings and clear photographs guide you through jobs ranging from simple maintenance to complete overhaul.

Where repairs are practical for the owner/mechanic, complete procedures are given. Where special tools are required and recommended, their designations are provided. Such tools may often be borrowed or rented, or can be purchased from a local Ford New Holland dealer or directly from a tool company such as the Owatonna Tool Co., 436 Eisenhower Dr., Owatonna, Minnesota 55060.

INDEX (By Starting Paragraph)

DUAL DIMENSIONS

This service manual provides specifications in both U.S. Customary and Metric (SI) systems of measurement. The first specification is given in the measuring system perceived by us to be the preferred system when servicing a particular component, while the second specification (given in parenthesis) is the converted measurement. For instance, a specification of 0.011 inch (0.28 mm) would indicate that we feel the preferred measurement in this instance is the U.S. Customary system of measurement and the Metric equivalent of 0.011 inch is 0.28 mm.

CONDENSED SERVICE DATA

	Models 9N, 2N, 8N
GENERAL	
Engine Make	Own
Engine Type	L-Head
Number of Cylinders	4
Bore	3.187 in. (80.96 mm)
Stroke	3.750 in. (95.25 mm)
Displacement	119.7 cu. in. (1.9 L)
Power Rating at Belt Pulley—Maximum	
9N, 2N	23.6 hp (17.6 kW)
8N	27.3 hp (20.4 kW)
Power Rating at Drawbar—Maximum	
9N, 2N	16.3 hp (12.2 kW)
8N	23.2 hp (17.3 kW)
Compression Ratio—Gasoline:	
9N, 2N, Early 8N	6:1
Later 8N	6.5:1
Pistons Removed From	Above
Main Bearings, Number of	3
Main Bearings, Adjustable?	No
Rod Bearings, Adjustable?	No
Cylinder Sleeves, Dry, Wet?	Dry
Production Cylinder Sleeves--	
Material (8N Prior to S.N. 433578, 9N, 2N)	Steel
Material (8N After S.N. 433577)	Cast Iron
Service Cylinder Sleeves--	
Material (All Models)	Cast Iron
Generator Make	Own
Maximum Output	20 Amps
Starter Make	Own
Type	6-Volt
Battery	
Type	6-Volt
Ground Terminal	Positive

	Models 9N, 2N, 8N
Tire Size—Standard	
Front	4-19 4-ply
Rear:	
9N (Early)	8-32 4-ply
9N (Late)-2N-8N	10-28 4-ply
Transmission	
Type	Constant Mesh
Forward Speeds (9N, 2N)	3
Forward Speeds (8N)	4
Hydraulic Pump	
Type	Scotch Yoke Piston
Capacity @ 2000 Engine Rpm	2.85 Gal./min. (10.8 L/min.)
TUNE-UP	
Firing Order	1-2-4-3
Valve Tappet Gap (Cold)	
Inlet	0.010-0.012 in. (0.26-0.30 mm)
Exhaust	0.014-0.016 in. (0.36-0.40 mm)
Valve Face Angle	
Inlet and Exhaust	45°
Valve Seat Angle	
Inlet and Exhaust	45°
Ignition Distributor Make	Own
Distributor Model	
8N Prior to S.N. 263844, 9N, 2N	9N12100
8N After S.N. 263843	8N12127
Breaker Point Gap	
Angle Mounted Distributor	
No. 8N12127	0.025 in. (0.63 mm)
Face Mounted Distributor	
No. 9N12000	0.015 in. (0.38 mm)
Retarded Timing	
8N Prior to S.N. 263844, 9N, 2N	TDC
8N After S.N. 263843	4° BTDC
Advanced Timing	
8N Prior to S.N. 263844, 9N, 2N	25° BTDC
Advanced Timing	
8N After S.N. 263843	17° BTDC

	Models 9N, 2N, 8N
TUNE-UP (Cont.)	
Flywheel Timing Mark Indicating:	
Retarded Timing (8N Prior to S.N. 263844, 9N, 2N)	None
Retarded Timing (8N After S.N. 263843)	4° Line
Advanced Timing (8N Prior to S.N. 263844, 9N, 2N)	None
Advanced Timing (8N After S.N. 263843)	17° Line
Distributor Governor Advance Curve	See Text
Spark Plug	
Make	Champion
Plug Model for Gasoline	H10
Electrode Gap	0.025-0.028 in. (0.64-0.71 mm)
Carburetor	
Make	Marvel-Schebler
Carburetor Model	See Text
Carburetor Float Setting	9/32 in. (7 mm)
Carburetor Initial Adjustment	
Idle Adjustment Needle	1 Turn Open
Main Jet Adjustment Needle	1 Turn Open
Engine Low Idle RPM	400
Engine High Idle RPM	2200
Belt Pulley RPM @ 2000 Engine RPM	1358
Pto RPM @ 1500 Engine RPM	545
Compression Pressure @ Cranking Speed Minimum	90 psi (620 kPa)
SIZES—CLEARANCES	
Crankshaft Journal Diameter	2.248-2.249 in. (57.10-57.12 mm)
Crankpin Diameter	2.094 in. (53.18 mm)
Camshaft Journal Diameter	1.797 in. (45.64 mm)
Piston Pin Diameter	0.7501-0.7504 in. (19.05-19.06 mm)
Valve Stem Diameter	
One-Piece Valve Guide	0.341-0.342 in. (8.66 mm)
Two-Piece Valve Guide	0.3105-0.3115 in. (7.89-7.91 mm)
Cam Follower (Push Rod) Diameter	0.9995 in. (25.38 mm)
Compression Ring Width	0.093 in. (2.36 mm)
Oil Ring Width	0.187 in. (4.75 mm)
Main Bearings Running Clearance	0.001-0.003 in. (0.025-0.076 mm)
Rod Bearings Running Clearance	0.001-0.0035 in. (0.025-0.089 mm)
Piston Skirt Clearance	
Steel Pistons	0.0025-0.004 in. (0.064-0.101 mm)
Aluminum Pistons	0.0015-0.0025 in. (0.038-0.063 mm)
Camshaft Bearing Clearance	0.001-0.002 in. (0.025-0.050 mm)
Cam Follower (Push Rod) Running Clearance	0.0004-0.001 in. (0.010-0.025 mm)
Crankshaft End Play	0.002-0.006 in. (0.05-0.15 mm)
CAPACITIES	
Cooling System	3 Gallons (11.3 L)
Crankcase Oil (With Filter Change)	6 Quarts (5.6 L)
Fuel Tank	
Standard	9 Gallons (34 L)
Reserve	1 Gallon (3.8 L)
Transmission, Differential & Hydraulic System	5 Gallons (18.9 L)
Belt Pulley Housing	1/3 Quart (0.3 L)

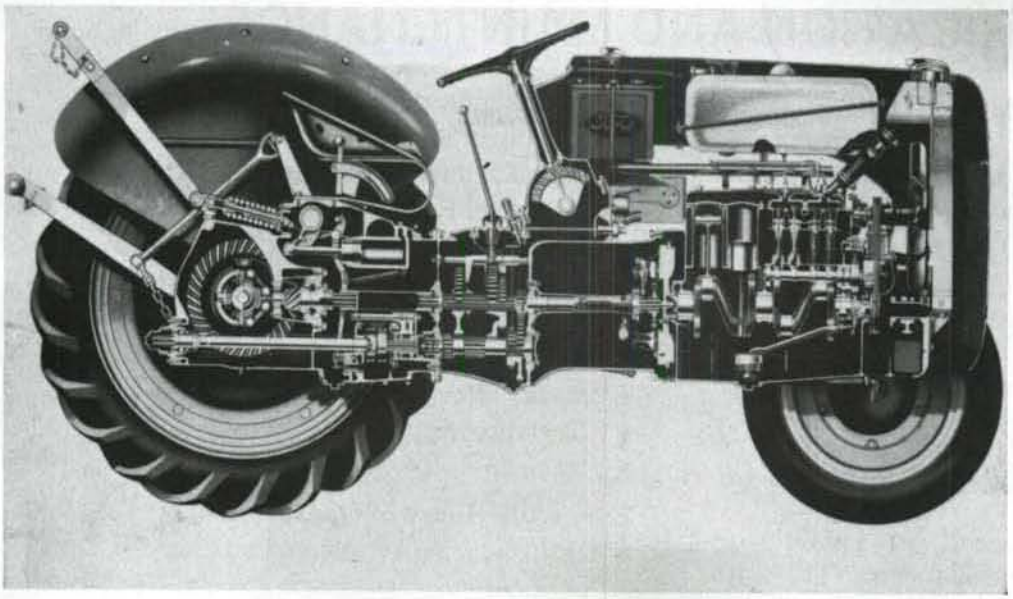

Fig. 1—MODELS 9N AND 2N

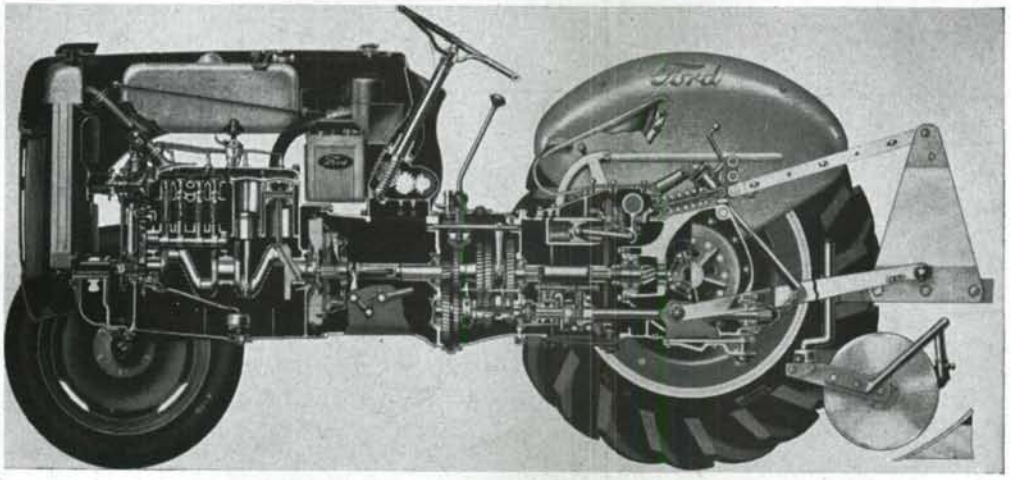

Fig. 2—MODEL 8N

LUBRICATION AND MAINTENANCE

SCHEDULED MAINTENANCE

1. Scheduled maintenance tasks and checks should be performed at certain time or hourly intervals as outlined below. The item numbers in parenthesis refer to Fig. FO1.

Daily or Every 10 Hours of Operation

- Lubricate steering drag links (2 and 19) with grease.
- Lubricate steering spindles (4) with grease.
- Clean the air cleaner oil cup (6) and refill with engine oil. (May require attention more often under extreme conditions.)
- Lubricate the clutch linkage (7) with grease.
- Clean the oil filler tube breather cap (12) with solvent.
- Lubricate distributor oil cup (14) with a few drops of oil.
- Check engine coolant level.
- Check engine oil level on dipstick (16).
- Check hydraulic system oil level (21).
- Lubricate hitch lift arms (23) with grease.
- Check fuel tank sediment bowl and drain water and sediment if necessary.

Weekly or Every 50 Hours of Operation

- Check belt pulley (24) oil level and add SAE 90 EP gear lubricant if necessary.
- Check battery electrolyte level.
- Check tire air pressure.
- Check fan belt tension.

Every 100 Hours of Operation

- Change engine oil (25) and oil filter (5). See Note 1.

Every 200 Hours of Operation

- Lubricate generator rear bearing (1) with engine oil.

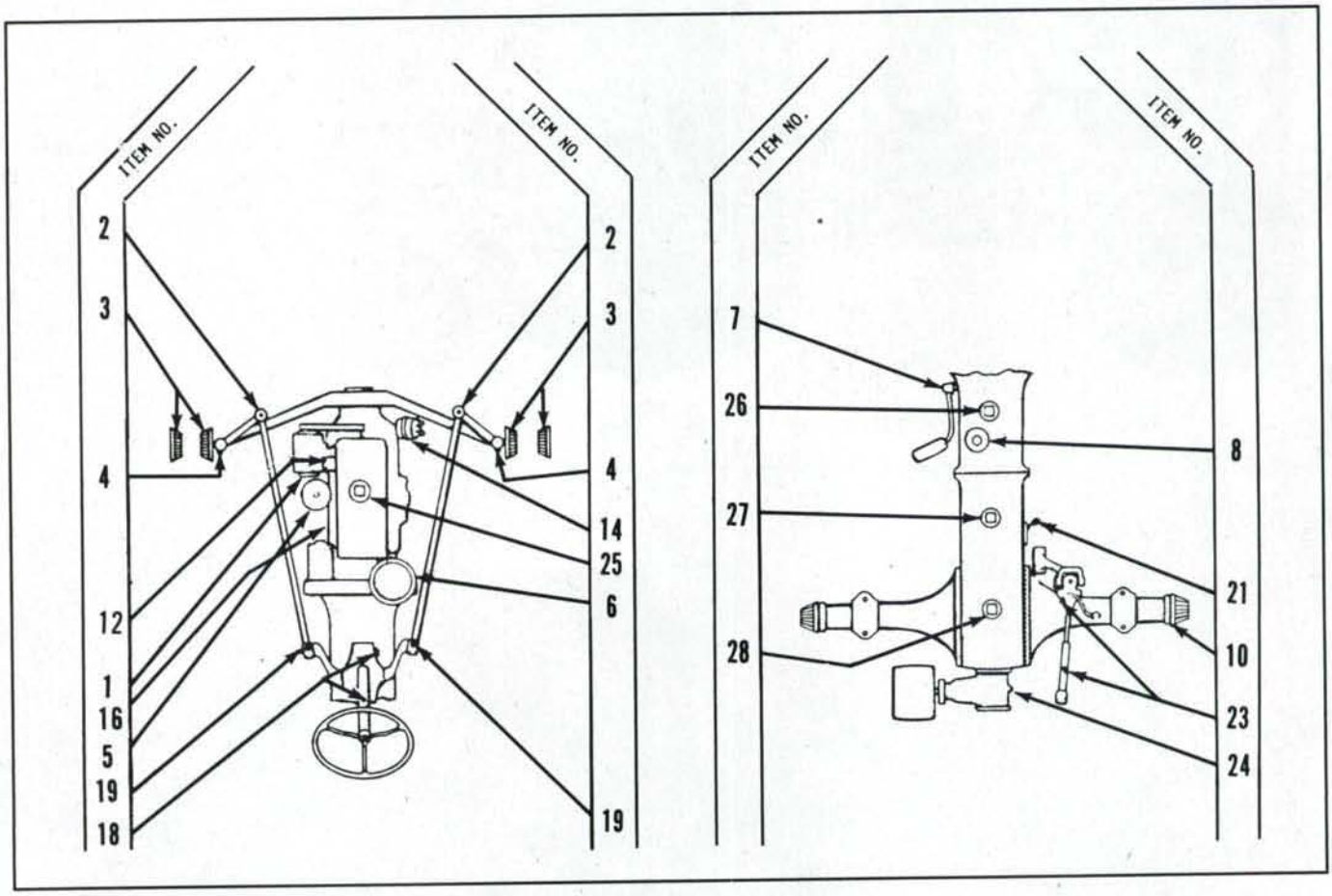

Fig. FO1—Lubrication chart.

1. Generator
2. Ball joint
3. Front wheel bearings
4. Spindle
5. Oil filter
6. Air cleaner
7. Clutch pedal
8. Oil filler plug
10. Rear wheel bearing
12. Crankcase breather
14. Distributor
16. Engine oil dipstick
18. Steering gear
19. Pitman arm
21. Transmission oil dipstick
23. Lift arms
25. Engine oil drain plug
26. Drain plug
27. Drain plug
28. Drain plug

- Clean distributor cam (14) and apply new lubricant to cam.
- Check steering gear (18) oil level and add SAE 90 EP gear lubricant if necessary. Fill to top of filler plug opening in side of steering gear housing.

Yearly or Every 600 Hours of Operation

- Tune-up the engine.
- Clean and repack front wheel bearings (3).
- Remove and clean carburetor air cleaner housing and filter element (6). See Note 2.
- Drain transmission, differential and hydraulic system oil and refill with new oil.
- Drain and flush cooling system. Refill with new coolant.

Every 1800 Hours of Operation

- Clean and repack rear wheel bearings (10).

NOTE 1 – If tractor is operated under any of the following conditions, change the engine oil and oil filter more frequently:
a. Extremely hot or cold temperatures
b. Sustained heavy loads
c. Extended low speed operation
d. Extremely dusty conditions

NOTE 2 – Under severe dust condition, remove and clean the carburetor air cleaner assembly every 100 hours of operation.

LUBRICATION

Engine Oil Change Periods

2. The frequency of oil changes depends upon the severity of operation. Under normal operation conditions, engine oil should be changed every 100 hours of operation. Under extreme conditions (dusty, high temperature and heavy loads), oil should be changed more frequently.

The oil should be changed every 50 hours when operating the tractor in below freezing temperatures. Intermittent engine operation and idling should be kept to a minimum in cold weather to avoid dilution of the oil. Low temperature operation promotes sludging which can plug oil passages and cause the formation of corrosive acids which result in rapid engine wear. Run the engine until the oil is at normal operating temperature prior to draining the oil. Remove the drain plug and allow the oil to drain for at least 10 minutes.

The oil filter element, located in filter canister on left side of the engine (Fig. FO2), should be changed at the same time as the oil. Always use new gaskets when reinstalling the filter canister and tighten retaining bolt to 20-25 ft.-lbs. (27-34 N•m) torque. Do not overtighten as canister may be distorted, resulting in oil leakage.

Crankcase oil capacity is 6 quarts (5.7 L) with a filter change. Select a good quality oil with SAE viscosity grade suitable for the ambient temperature. In the summer, consider the highest expected temperature. In the winter, the oil must be thin enough to permit easy starting.

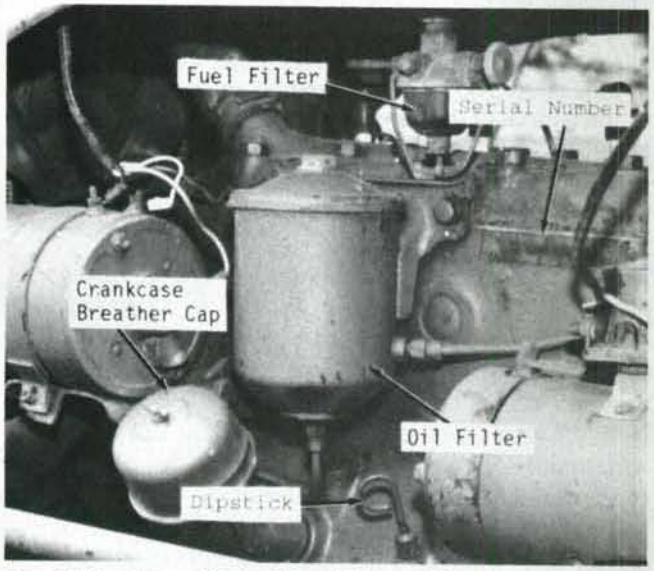

Fig. FO2—View of left side of 8N engine.

Transmission, Differential and Hydraulic Oil

3. On 9N, 2N and 8N tractors, the transmission and differential housings serve as a common sump for the lubricating and hydraulic system fluid. The fluid level is checked by removing the level check plug located on the lower right side of the transmission housing on some early models, or by a dipstick located in the inspection plate on right side of differential housing on later models (Fig. FO3).

On all models, the lubricating and hydraulic fluid should be changed every 600 hours of operation or

Fig. FO3—A dipstick, located in inspection cover, is used to check transmission oil level.

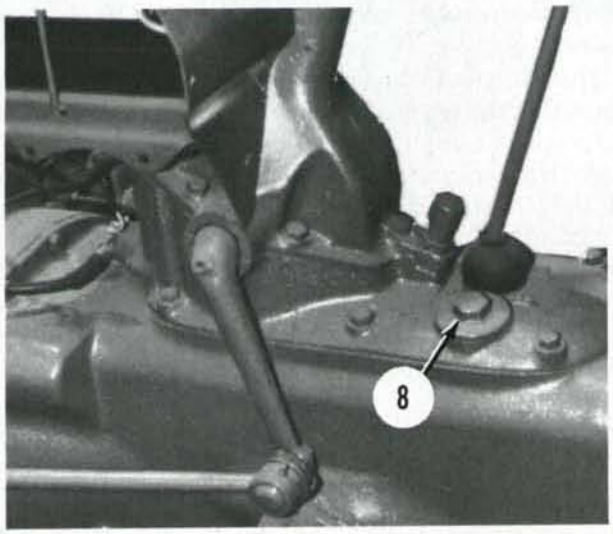

Fig. FO4—Transmission oil filler plug (8) is located on the transmission cover (9N shown).

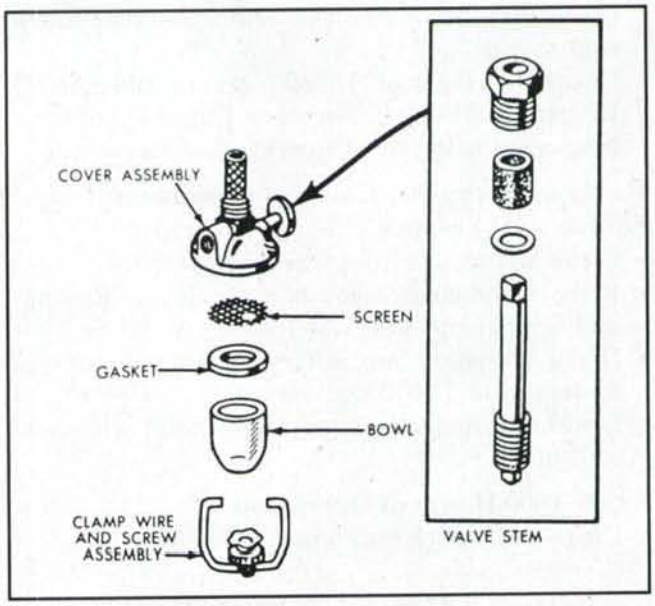

Fig. FO5—Exploded view of fuel shut-off valve and sediment bowl assembly.

once a year, whichever comes first. Refer to Fig. FO1 for location of drain plugs (26, 27 and 28) and to Fig. FO4 for location of filler plug (8). The fluid should be warm when it is drained, and all drain plugs should be removed on those models which have a common housing.

Fluid capacity is approximately 5 gallons (19 L) on 9N, 2N, and 8N tractors. The recommended fluid for use in all models is Ford M2C 134-D hydraulic fluid. It is also permissible to use extreme pressure gear lubricant in the transmission, differential and hydraulic system. Use SAE 90 EP gear oil if air temperature will be above 32° F (0° C) and SAE 80 EP gear oil if air temperature will be below 32° F (0° C).

MAINTENANCE PROCEDURES

Crankcase Ventilation

4. The engine crankcase is vented to the atmosphere to remove water vapor, gasoline vapor and blowby products which can cause deterioration of the oil and the corrosion of engine components. The crankcase is vented through the oil filler tube breather cap (Fig. FO2). If the crankcase ventilation system becomes restricted, the pressure in the crankcase will rise above normal. Higher than normal crankcase pressure may result in abnormal oil consumption and external oil leakage at the crankshaft seals.

The oil filler cap should be cleaned in suitable solvent after every 10 hours of operation.

Fuel System

5. To clean the fuel tank sediment bowl (Fig. FO5), turn fuel shut-off valve clockwise to closed position. Loosen sediment bowl retaining nut, move retaining wire clamp sideways and remove the bowl. Clean the bowl with a clean cloth. Remove and clean the screen located in the bowl cover.

A strainer screen, attached to the top of sediment bowl cover, is located inside the fuel tank. In order to clean this screen it is first necessary to drain the fuel from the tank, then remove the cover assembly from the bottom of fuel tank.

A fuel strainer screen is also located in the fuel inlet elbow of the carburetor. The screen should be removed and cleaned periodically. The screen should also be cleaned if there is an unusually large accumulation of sediment in the fuel sediment bowl, or if there is an indication that not enough fuel is reaching the carburetor.

NOTE: If an excessive amount of dirt or water quickly accumulates in the sediment bowl, the fuel tank should be removed, drained and cleaned. Also, the source of the contamination must be found and corrected.

Carburetor Air Cleaner

6. An oil bath type air cleaner is used on all models (6—Fig. FO6). Air is drawn into the air cleaner and directed downward toward the oil in the cup attached to the bottom of the air cleaner body, then upward through the filtering element into the carburetor. Heavy particles of dirt are trapped by the oil in the cup, smaller particles not retained in the oil cup are screened out by the filter element in the air cleaner body. If the oil in the cup becomes thick and gritty, the air cleaner filter element will become restricted and cause a drop in the volume of air reaching the engine,

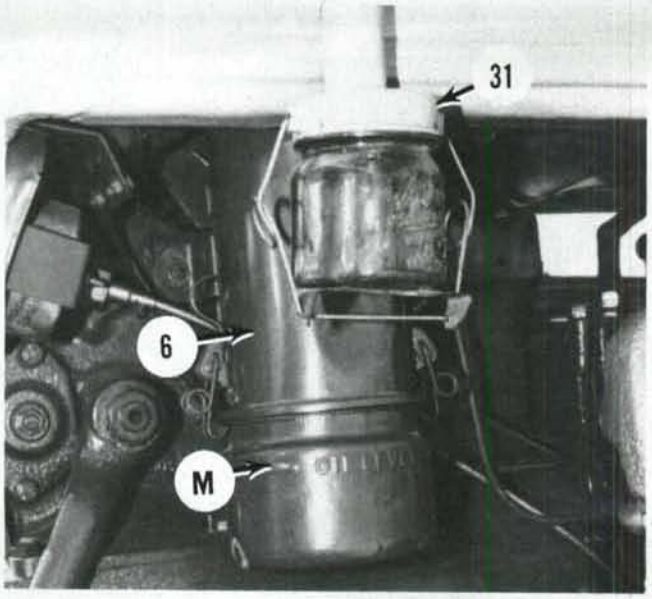

Fig. FO6—Air cleaner (6) is mounted on right side of tractor on all models. Air cleaner cup should be filled with clean engine oil to oil level mark (M).

resulting in loss of power and excessive fuel consumption.

The air intake on 9N and 2N tractors is beneath the hood and subjected to a sort of "dust trap" which has been corrected by most operators with the addition of an "Air Cleaner Extension" which raises the air intake above the hood. The air cleaner extension was available as a dealer option.

On the 8N tractor, a screened breather entrance is located on the outside of the right rear corner of the hood. A centrifugal type (Cyclone) attachment (31—Fig. FO6) was made available for 8N tractors which whirled the incoming air and collected the dry dust in a glass container where it could be emptied as the container became full.

The air cleaner cup should be removed and inspected every ten hours of operation, or more often under extremely dusty conditions. If oil in the cup is dirty, clean the cup and refill with fresh engine oil (same viscosity as used in engine crankcase) to the full mark (M—Fig. FO6) indicated on the cup.

Every 600 hours of operation, or more often under dusty conditions, remove the complete air cleaner from the tractor and wash the air cleaner body and filter element with a suitable solvent. Dry the filter element, then coat with light weight engine oil. Refill the oil cup to proper level with engine oil and reinstall the air cleaner assembly.

Failure to properly maintain the air cleaner will result in poor engine performance and premature wear of the engine.

Cooling System

7. A pressure-type cooling system is used on 2N and 8N models, which means that more heat is required to make the coolant boil than if the system were not under pressure. The radiator is sealed with a cap that contains a pressure valve and a vacuum valve.

The pressure valve in the radiator cap maintains cooling system pressure at 3.5 to 4.5 psi (24-31 kPa), raising the boiling point of the coolant many degrees. As the coolant heats, it expands, raising the pressure in the system. The vacuum valve in the cap admits displaced air when the engine is shut off, preventing damage to the system. When the system is operating properly, the air in the upper tank expands and contracts protecting the system from damage.

CAUTION: The radiator cap should never be removed when the engine is hot. However, if this is unavoidable, cover the cap with a thick cloth or wear heavy leather gloves. Slowly turn the cap counterclockwise against the first stop (about ¼ turn). Let all pressure (hot coolant and steam) escape, then depress the cap and turn counterclockwise to remove. If the cap is removed too soon, scalding coolant may escape and cause a serious burn.

The coolant level should be checked at the beginning of the day when the engine is cold. Maintain the coolant level slightly below the bottom of the radiator filler neck to allow for expansion of the coolant when it reaches normal operating temperature.

Check the condition of the coolant. If it is dirty or rusty, drain the radiator and cylinder block and remove the thermostat. Clean and reverse flush the radiator and engine block, and refill with fresh coolant.

It is recommended that a mixture of clean water and ethylene glycol antifreeze be used as a coolant in summer as well as winter. Ethylene glycol antifreeze not only protects the coolant from freezing in cold weather, it also increases the coolant boiling point above that of plain water to reduce coolant loss during operation in hot weather. Ethylene glycol antifreeze also contains additives to inhibit the formation of corrosion and rust in the cooling system. Capacity of cooling system is 12 quarts (11.3 L) for 9N, 2N and 8N models.

If the temperature does not fall below the freezing point, plain water can be used in the cooling system; however, the cooling system should be treated with rust and corrosion inhibitor. If the water supply contains lime or alkali, it is recommended that distilled water or rain water be used for a coolant. Deposits caused by lime or alkali water will quickly build up on the engine coolant passages which will eventually result in overheating and possible engine damage.

Fan Belt Tension

8. The fan belt tension is adjusted by changing the position of the generator. See Fig. FO7. The belt tension is correct when the belt can be deflected ½ inch (13 mm) with moderate thumb pressure.

NOTE: The belt should be cool when tension is adjusted.

A new belt will stretch slightly during the first few hours of operation. When a new fan belt is installed, operate the engine for about two hours to "run in" the belt. Stop the engine then check and adjust the tension if necessary.

Do not overtighten the fan belt as premature wear of the generator and water pump bearings may result. If belt tension is too loose, belt slippage may occur, resulting in an overheated engine and low generator output.

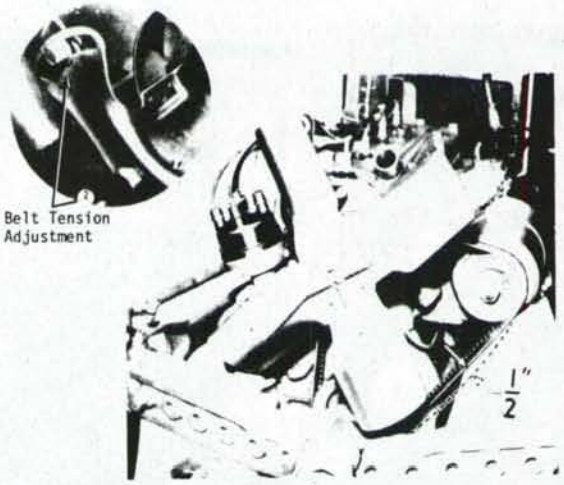

Fig. FO7—Change position of generator to adjust fan belt tension.

FRONT AXLE

TREAD WIDTH AND TOE-IN

9. ADJUSTMENT. The front axle is constructed in three sections and may be adjusted to vary the tread width from 48 inches (122 cm) to 76 inches (193 cm). See Figs. FO8 and FO9. Be sure to leave one or more open holes between the bolts attaching the axle extension to axle center member when changing the tread width. Note that the 76-inch (193 cm) tread width spacing is obtained by setting the axle for 68-inch (173 cm) tread and reversing the front wheels.

The rear wheel tread width settings can be adjusted to match the front tread width by changing the position of the steel discs and wheel rims. The rear tread width can be varied from 48 inches (122 cm) to 76 inches (193 cm) by installing wheel disks in either a convex or concave position and/or by installing rims on the disks in any of four different locations as shown in Fig. FO10.

NOTE: When making rear wheel tread width adjustments, be sure that arrow on the sidewall of the

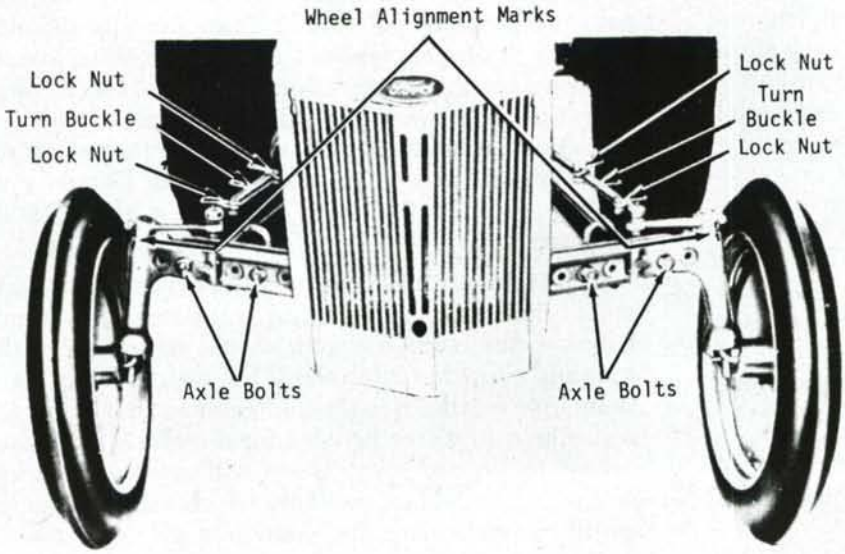

Fig. FO8—Front axle as used on 8N tractors. Note hole spacing of tread adjusting bolts.