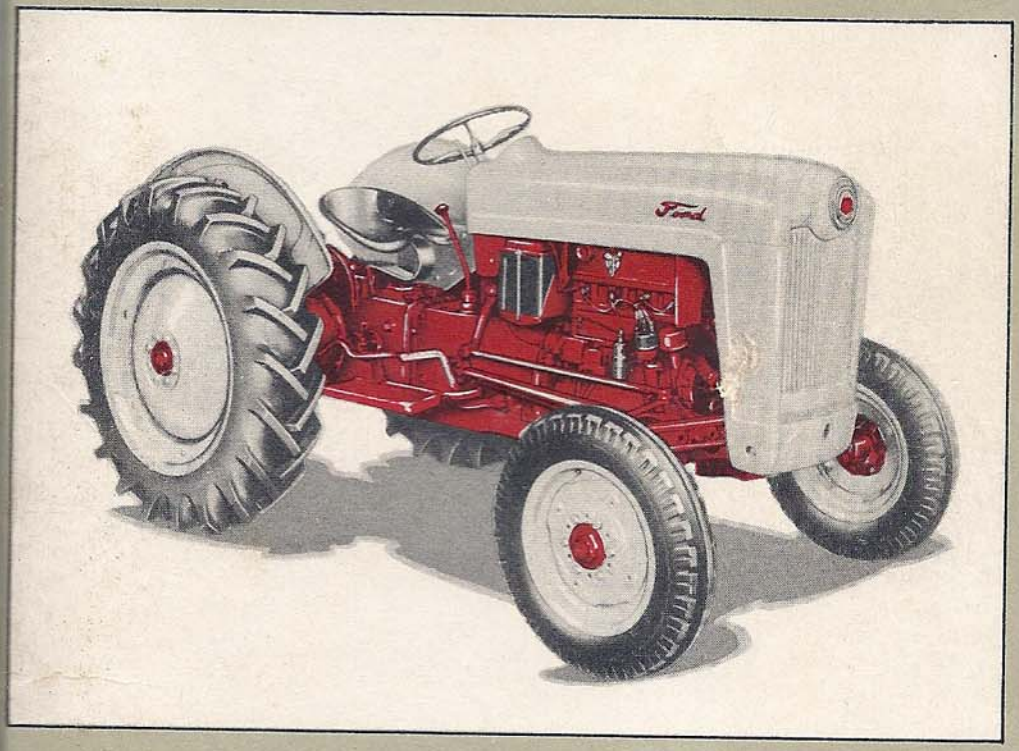
OWNER'S MANUAL



Model NAA

Ford Motor Company

FORD TRACTOR

FORD TRACTOR OWNER'S MANUAL

Model NAA

SECTIONS

LITHO IN U. S. A.

PUBLISHED BY
TRACTOR & INDUSTRIAL ENGINE DIVISION
FORD MOTOR COMPANY
FORM T-400-K 52 SEPT. 1952

INTRODUCTION

This manual contains information on the operation and care of the Model NAA Ford tractor. The section index, on the title page, indicates subjects covered in each section.

The design of this tractor is the result of many years of Ford Motor Company Engineering and Research. Every care has been exercised in the design, selection of materials, and in the building of each tractor so that it will give satisfactory service and operate economically over a long period of time.

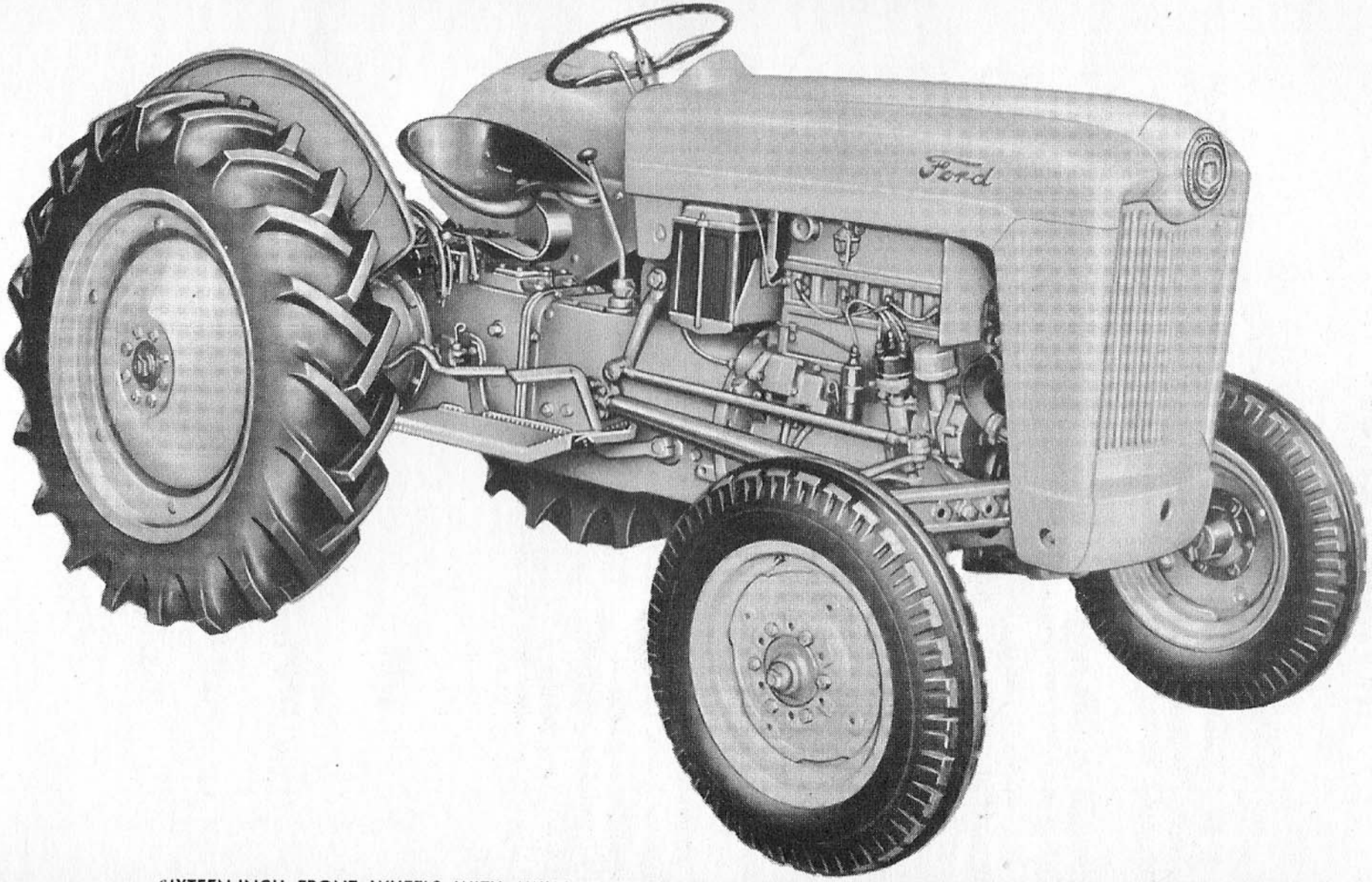
Every tractor is carefully inspected before leaving the factory and also by your dealer prior to delivery. How long or how well your tractor continues to give satisfactory service depends upon the care it receives. Engineering and manufacturing ingenuity can never compensate for tractor abuse in the hands of the operator.

This manual has been prepared to assist you in the daily care and operation of your tractor. It is important to establish regularly scheduled service periods as recommended in this manual. Have your dealer inspect your tractor at least twice yearly. His factory trained technicians, using scientific instruments, are best equipped to render the kind of service it takes to keep your tractor running in top condition.

Tractor & Industrial Engine Division

Ford Motor Company

Dearborn, Michigan



SIXTEEN-INCH FRONT WHEELS WITH MULTI-RIB TIRES, AS ILLUSTRATED, ARE OPTIONAL EQUIPMENT AT EXTRA COST.

Figure 1 NAA Ford Tractor - 3/4 Front View

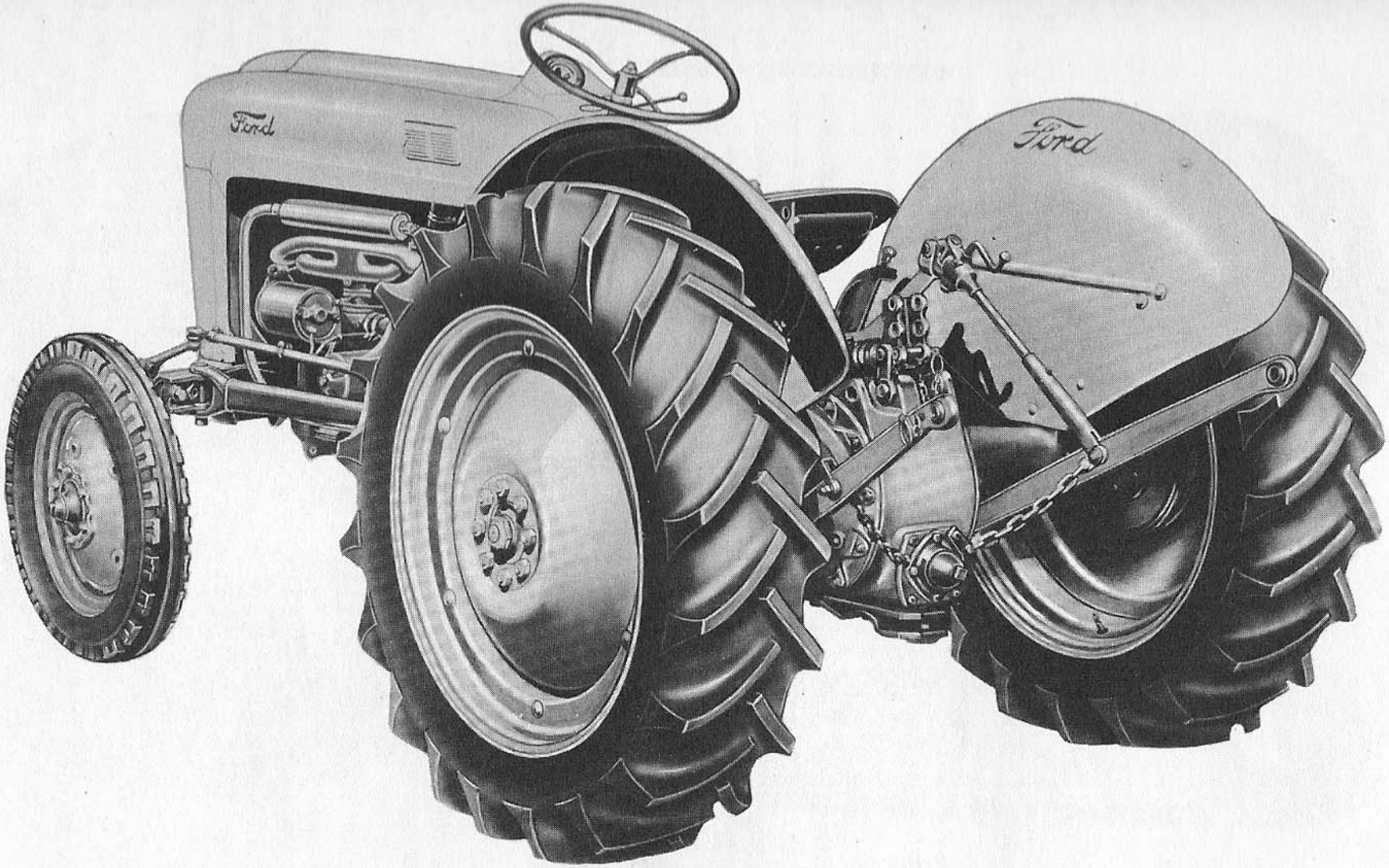


Figure 2 NAA Ford Tractor - 3/4 Rear View

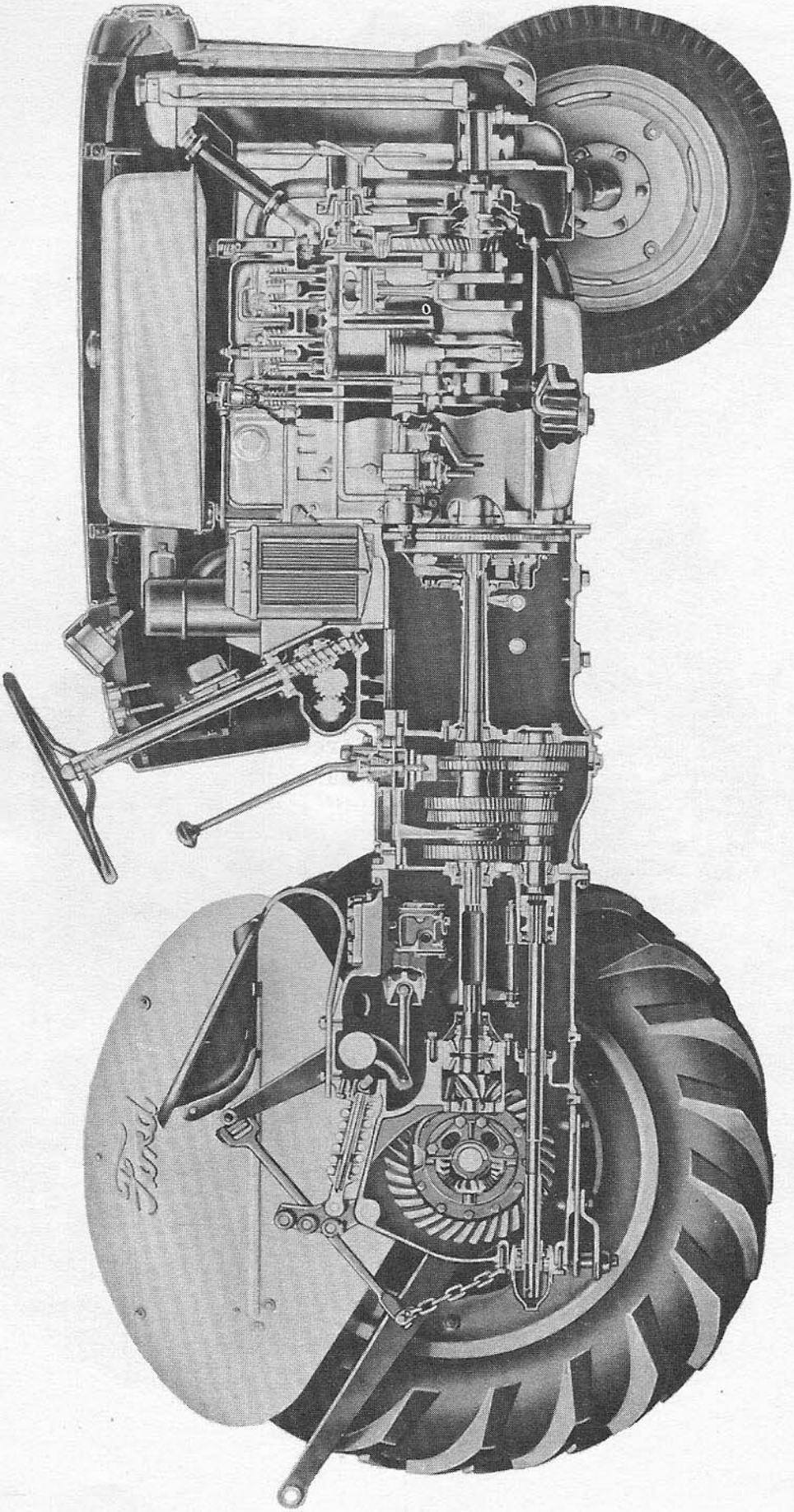


Figure 3 NAA Ford Tractor - Sectional View

GENERAL DESCRIPTION AND SPECIFICATIONS

The Model NAA Ford tractor is of the four wheel type and is powered by an overhead valve four cycle, four cylinder gasoline engine.

The adjustable front axle provides front wheel tread spacings to meet various field crop work conditions. Rear wheel tread is also adjustable by changing the position of the steel disks and the rims.

The conventional heavy duty, single plate, dry disc clutch provides the means of engaging or disengaging the engine power from the transmission.

In various types of field work and under heavy loading conditions, it is necessary to have various engine speeds in relation to tractor speed. This is accomplished by manually selecting the correct reduction gearing in the four forward speed constant mesh type transmission before the tractor is set in motion.

The rear axle is supported by tapered roller bearings at each wheel and is of the semi-floating type. Final drive incorporates heavy duty spiral bevel gears and a four pinion differential. The differential is the mechanism that equalizes power at the rear wheels by permitting one wheel to turn faster or slower than the other.

Each rear wheel is equipped with mechanically operated internal expanding, self energizing type brakes, independently operated.

The hydraulic system incorporates design features that assure dependability and positive control of implements. The externally mounted hydraulic pump is driven by a gear on rear of engine camshaft. This pump keeps the system supplied with oil to assure instant control of implements after setting the selector and touch control levers.

The power take-off lever is located on the left side of the center housing. This is used to engage or disengage the power take-off from the transmission shaft. The power take-off shaft, in turn, provides a drive for implements and a belt pulley is available at extra cost.

A. GENERAL SPECIFICATIONS

Type	4 Wheel general purpose
Wheelbase	73 7/8 inches at 48" tread
Over-all length, front to drawbar	118 7/8 inches
Over-all height	57 1/4 inches
Over-all width, normal tread	64 3/4 inches
Tire size:	
Front-standard	4-19- 4 ply or 4.00 X 19 - 4 ply or 5.50 X 16 - 4 ply extra cost
Rear-standard	10 X 28
Front tread	48 to 76 inches
Rear tread	48 to 76 inches
Ground Clearance:	
Front axle	21 inches
Rear axle	21 inches
Center	13 inches
Turning circle radius (with use of brakes)	
Made by outer front wheel	8 ft. 10 in.
Made by centerline of tractor at rear axle	3 ft. 8 in.
Shipping weight (including oil, water, tires, -less gas)	2550 lbs.
Drawbar height	8 1/2 in. to 34 1/4 in. 18 in. std. setting

B. CAPACITIES - U.S. MEASURE

Fuel Tank	11 gallons total -(1 gallon reserve)
Engine Oil Pan (less filter absorption)	4 qts. with filter add extra qt.
Transmission	5 qts.
Hydraulic lift	8.0 qts.
Differential	7.5 qts.
Cooling system	15 qts.
Oil bath air cleaner	1.3 pints
Belt pulley Assy.	0.9 pints
Tire pressure:	P.S.I.
10-28 4-ply	12
4-19 4-ply	28
5.50-16 4-ply	28

C. ENGINE

Type	4 Cylinder, in-line, overhead valve

C. ENGINE (Con't)

Rated speeds	1500 R. P. M. with P. T. O. driven implements so as to obtain 545 R. P. M. at P. T. O. 1750 R. P. M. without P. T. O. driven implements
Idle speed	450-475 R. P. M.
Cylinder bore	3. 44 in.
Stroke	3. 60 in.
Piston displacement	134 cu. in.
Torque	110 ft. lbs. at 1400 R. P. M. - Engine without accessories
Compression ratio	6. 6 to 1
Sleeves	Centrifugally cast alloy iron, dry type
Piston	Autothermic, cam ground, aluminum alloy
Rings:	
Compression	2 - cast iron - top, chrome plated
Oil	1 - cast iron
Piston pins	Floating
Rod Bearings	Replaceable steel backed inserts
Main Bearings	Replaceable steel backed inserts
Crankshaft	Precision moulded alloy iron, statically & dynamically balanced.
Compression pressure at cranking speed	(sea level) 120-125 P. S. I. at cranking speed (Minimum)

D. IGNITION SYSTEM

Type	Battery
Distributor:	
Firing order	1-2-4-3
Drive	Helical gear off camshaft
Automatic spark advance	Centrifugal
Initial timing (degrees of crankshaft)	8^{O} BTDC at 475 R. P. M.
Maximum advance (degrees of crankshaft)	24^{O}
Distributor breaker cam	4 lobe
Breaker contacts	1 set
Breaker contact spacings	. 024 to . 026
Spark Plugs:	
Type	H-10

D. IGNITION SYSTEM (Con't)

Size	14 mm
Gap	.025 - .028

E. CARBURETOR

Type	Single up-draft
Idle fuel adjustment	1 turn open
Main fuel jet adjustment	1 1/4 turn open
Idle speed adjustment	Screw on throttle shaft

F. GOVERNOR

Type	Variable Speed Centrifugal Fly-ball Mounted Direct to Crankshaft
Governed speed range	800 - 2200 R. P. M. No Load
Maximum governed speed adjustment	Stop clamp on throttle rod

G. COOLING SYSTEM.

Radiator cap	Pressure type
Pressure valve opens	3.5 to 4.5 P. S. I.
Vacuum valve opens	1 P. S. I.
Capacity	15 qts.
Water pump:	
Type	Centrifugal
Drive	V-belt
Coolant flow	20 gal. per minute at 170°F. at 2000 R. P. M.
Fan:	
Type	4 blade unequal spacing pull
Drive	Same belt drives water pump and generator
Thermostat:	
Location	Engine water outlet
Starts to open	157-162 deg. F.
Fully open	177-182 deg. F.

H. ELECTRICAL SYSTEM

Generator:	
Type	2 brush shunt
Drive	V-belt
Rating:	
1650 R. P. M. (hot)	20 amps

H. ELECTRICAL SYSTEM (Con't)

Maximum output	20 amps
Capacity	160 watts
Generator regulator:	
Cutout closing voltage	6.0 - 6.6 volts
Voltage limiter	7.1 - 7.5 volts
Cutout opening current (Reverse)	6 amps. max.
Battery:	
Type	6 volt
Number of plates (per cell)	13
Capacity in ampere hours	80
Terminal grounded	Positive
Starting motor:	
Type	6 volt
Drive	Follow Through Type

I. TRANSMISSION

Type	Constant Mesh
Number of speeds forward	4

Axle Gear Ratio (6.66)	Trans-mission	Total Gear Reduction (Over all)	Speed in M. P. H. 1500 RPM	1750 RPM	2000 RPM
1. Low (first)	11.00 to 1	73.33 to 1	2.68	3.13	3.58
2. Plowing (second)	8.55 to 1	57.04 to 1	3.45	4.02	4.60
3. Cultivating (third)	6.21 to 1	41.45 to 1	4.75	5.54	6.33
4. High (fourth)	2.98 to 1	19.86 to 1	9.9	11.55	13.2
5. Reverse	9.51 to 1	63.39 to 1	3.12	3.64	4.16

J. CLUTCH

Type	Single plate
Release bearing (pre-lubricated)	Ball bearing
Pedal free travel	3/4 inch

K. REAR AXLE

Type	Semi-floating
Ratio	6.66 to 1

L. BRAKES

Type	Internal expanding
Control	Individual mechanical
Adjustment at each wheel	Brake adjusting screw
Brake pedal free play	3/4 inch
Thickness of lining	.187 inch
Width of lining	2.000 inch
Length of lining	12.48 inch
Total brake lining area (two wheels)	99.84 sq. inch

M. STEERING GEAR

Type	Recirculating ball nut
Ratio, turns of steering wheel for total travel of pitman arms at 48 inch wheel tread	2.25
Steering wheel diameter	18 inches

N. HYDRAULIC CONTROL

Type	Servo control
Maximum pressure	1750 - 2000 lbs. per sq. in.
Pump:	
Type	Balanced vane
Drive	Gear on engine camshaft
Capacity:	
Ranges from	.4 to 4.8 G. P. M.
Control	Manual and automatic
Oil supply	2 gals.

O. POWER TAKE-OFF ADAPTER (Extra Cost)

Spline	1-3/8 std.
P. T. O. output speed at 1500 engine R. P. M.	545 R. P. M.

P. BELT PULLEY (Extra Cost)

Pulley speed (2000 engine R. P. M.)	1358 R. P. M.
Belt speed (2000 engine R. P. M.)	3199 ft/min.
Pulley size (standard)	9 in. dia.

OPERATING THE NEW TRACTOR

BEFORE PLACING THE NEW TRACTOR IN OPERATION

Make sure the function of each control and instrument is thoroughly understood before attempting to drive your new tractor. Examine the new tractor carefully before putting it into operation.

COOLING SYSTEM

Remove the radiator filler cap and check the coolant level. In winter this requires an anti-freeze compound added to the coolant in the amount shown in the chart in Section 5, and, in summer, a rust inhibitor in the amount shown on the container.

LUBRICATION

Pull out the crankcase oil level dip stick and compare the oil level with the markings on the stick. Replenish the oil if necessary to bring it to the full mark using the proper grade of oil. Make certain the hydraulic system, rear axle, and transmission are full of the recommended seasonal lubricant. Your tractor is lubricated at the factory and also by the dealer. Each lubrication point should be inspected by the owner before placing it into operation. (See Lubrication Section 10 Figure 67 and 68)

IGNITION SWITCH

The ignition switch is located on the lower left corner of the instrument panel just below the side panel. Turn the key clockwise

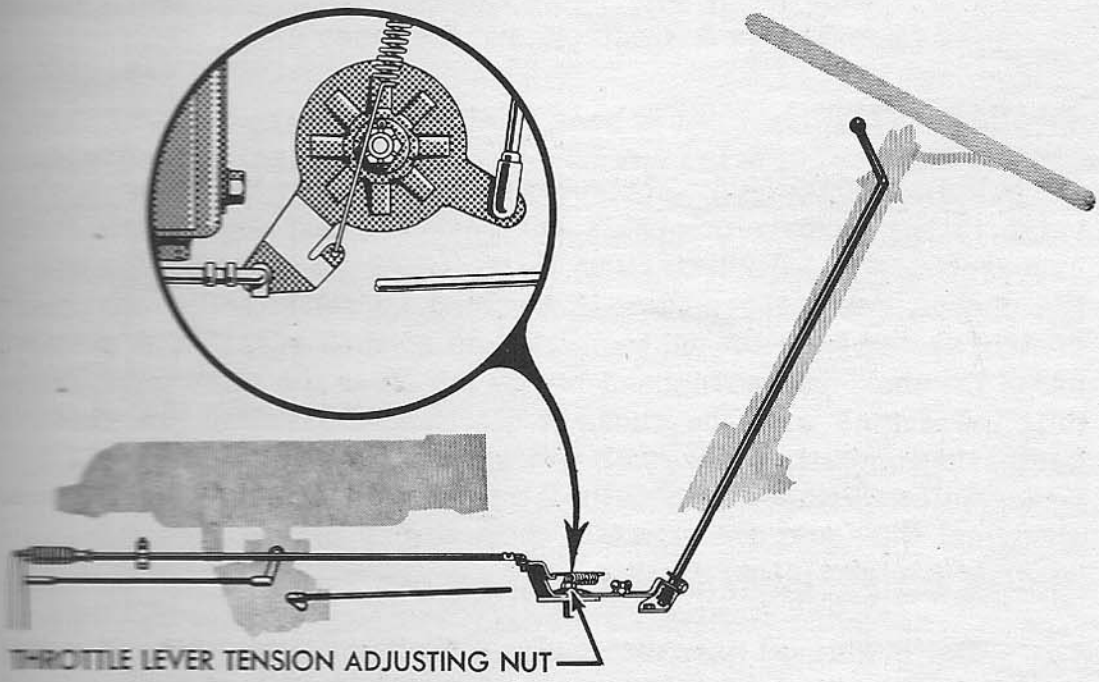


Figure 4 Carburetor Hand Throttle Control

to turn the ignition on and counter-clockwise to turn it off.

THROTTLE CONTROL

The hand throttle control, located below the steering wheel, opens and closes the carburetor throttle valve. Maximum engine speed is controlled by the action of the adjustable centrifugal governor located on the forward end of the crankshaft as shown in Figure 38.

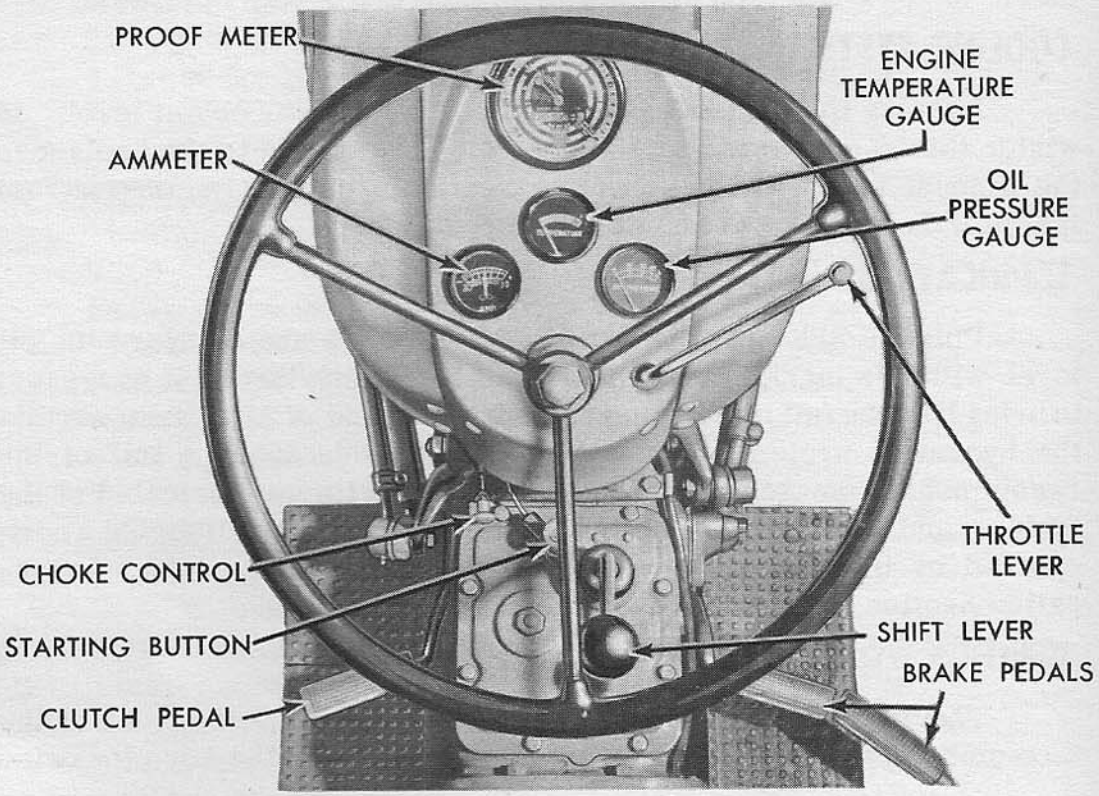


Figure 5 Controls and Instruments

CHOKE CONTROL

Pulling on the choke control rod button closes the choke control valve in the carburetor. This enriches the fuel air mixture in the carburetor. The initial starting of the engine may require the use of the choke. After the engine is warmed up sufficiently, the choke control should be returned to normal as soon as possible. Continued use of the choke wastes fuel and dilutes the oil in the crankcase. Stopping the engine with the choke is detrimental because raw gasoline enters the combustion chamber and washes the oil film from the cylinder walls. Without the benefit of the oil film, engine malfunctioning, abnormal wear and, consequently, short engine life may result.

ENGINE OIL PRESSURE GAUGE

The engine oil pressure gauge indicates oil pressure reaching the bearings, but does not show the amount of oil in the crankcase. Oil in the crankcase can become dangerously low and still show pres-

sure on the gauge. After the engine has reached normal operating temperature, the oil pressure gauge should read at least 40 pounds pressure at 1500 revolutions per minute, and not less than 8 to 10 pounds at engine idle speeds (450 R.P.M). Oil is thick when cold, therefore, oil pressure will be higher than normal when the engine is cold. As engine speed increases, the oil pressure will increase until the regulator valve opens, and decreases when engine speed is decreased. Periodic visual checks of the oil pressure gauge should become habitual when operating your tractor, so that you know whether the lubricating system is operating satisfactorily.

ENGINE TEMPERATURE GAUGE

The temperature gauge is for the protection of the engine. When the pointer registers in the green block, the engine temperature is normal. Operating the engine with the temperature gauge pointer in the red block is dangerous because the engine is running in an overheated condition. Operating the engine in the orange block is also detrimental to engine life, because it is operating too cold. For further information on the temperature gauge refer to Section 5.

AMMETER

The ammeter indicates whether the current is flowing into or out of the battery. The ammeter will register a low charge rate when the battery is fully charged, and show a high charge rate when the battery is in need of charging. The amount of current entering the battery is controlled by the action of the generator regulator. If the ammeter registers discharge when the engine is running at normal speed, either the generator, regulator, or ammeter are at fault and your dealer should be consulted to correct the trouble.

FUEL SHUT-OFF VALVE

The fuel shut-off valve is located at the right rear under side of the fuel tank adjacent to the battery. The valve is turned to the right (clockwise) to shut off the fuel supply to the carburetor. Opening the valve two turns allows the main fuel supply to flow to the carburetor. One gallon of fuel, called the reserve supply, cannot be used with the valve in this position. Turning the valve to full open position (counter-clockwise) permits the reserve supply to flow to the carburetor.

STARTING THE ENGINE

Every day before initially starting the engine, the crankcase and hydraulic system oil levels should be checked on their respective dip sticks, and the oil supply replenished if necessary. Check the level of the coolant in the radiator. Adjust the hand throttle so that the engine will run at approximately 600 R.P.M. Move the shift lever to be sure it is in the neutral position, then turn the ignition on by turning the key clockwise. A safety feature incorporated in the tractor's starting button makes it impossible to depress the starter button

unless the shift lever is in the neutral position. Just before pressing the starting button, disengage the clutch by pressing down on the clutch pedal. Starting the engine without disengaging the clutch, places unnecessary current load on the battery and starting motor and therefore should never be practiced. (See Figure 6)

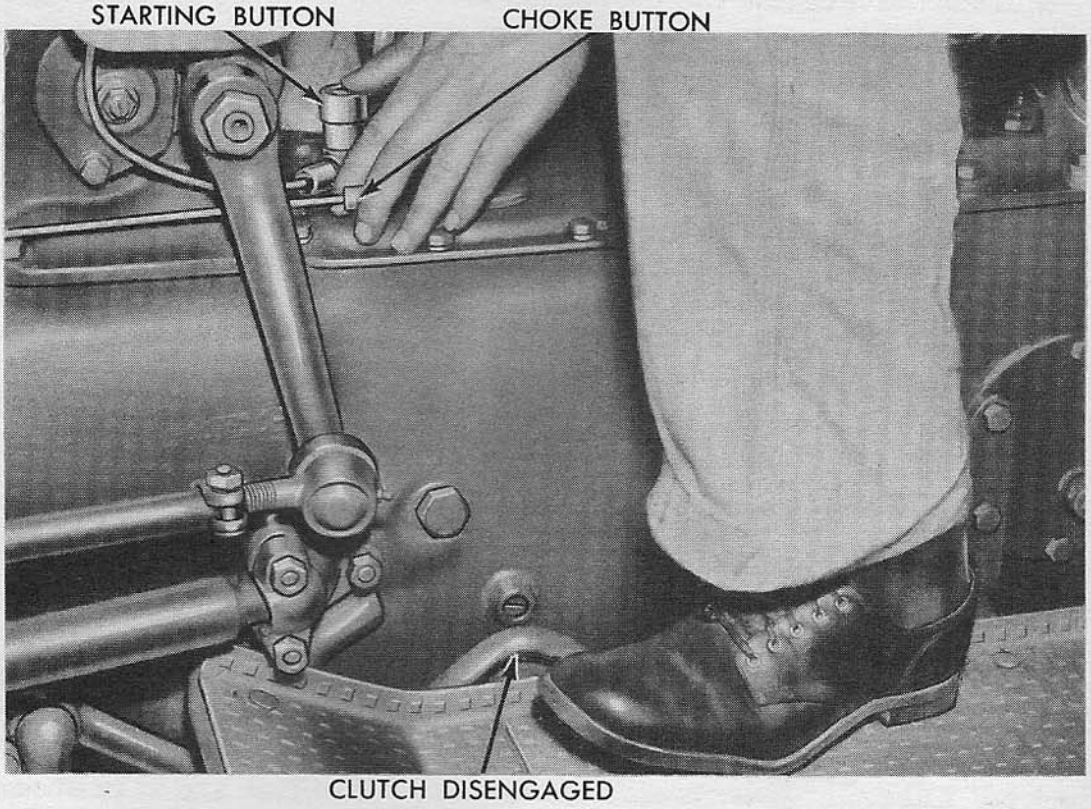


Figure 6 Use of Starter Button, Choke and Clutch Pedal

The initial starting of the engine may require the use of the spring loaded choke to enrich the fuel air mixture in the carburetor. In very cold weather hold the throttle open 1/3 of the way. This is accomplished by pulling out the choke rod button with the fingers as the starting button is pressed with the left thumb. The moment the engine starts, release the starting button and alter the position of the choke button. After the engine will operate smoothly, discontinue the use of the choke. Immediately after the engine starts, glance at the oil pressure and ammeter gauges to make sure these units are functioning satisfactorily. Run the engine without over-speeding it (1000 RPM) until it is thoroughly warmed up before placing it under load. Normal operating temperature occurs when the temperature gauge pointer registers in the green block.

WARMING UP THE ENGINE AND HYDRAULIC PUMP

After an engine is stopped, then stands for some time before restarting, the friction surfaces lose most of the lubricating oil. When

the oil is cold it is thick, and before moving parts can be lubricated freely, the oil must reach a temperature that permits it to flow freely. Overspeeding the engine before oil reaches normal temperature may cause excessive engine wear due to insufficient lubrication. Always warm the engine up gradually. It only takes a few minutes to warm up the engine and hydraulic pump in cool weather and this practice will extend the service life of the engine.

When operating the tractor in sub-zero temperatures it may be necessary to install a cover over the front of the radiator before normal operating temperatures can be obtained. This is very important because, if the engine runs continuously cold, oil sludging, which is almost as detrimental to normal engine life as overheating, will occur. This same condition can be caused by intermittent operation for short periods or allowing the engine to operate at idling speeds for an excessive length of time. Operations of this sort will not allow the engine to reach proper operating temperature and should be avoided, particularly in cold weather.

STOPPING THE ENGINE

Before stopping the engine, release the load by disengaging the clutch and placing the transmission gear shift lever in neutral position. To stop the engine turn the ignition key off (counter-clockwise). If, for some reason, the engine has been running in an overheated condition, it is advisable not to stop it immediately. Under these conditions run the engine at a fast idle speed for several minutes to allow the valves to cool. Suddenly stopping an overheated engine lets cold air circulate around the valves in open position. An open valve cannot dissipate heat into the valve seat, therefore, sudden cooling may produce valve warpage with subsequent sticking of the valve when the engine is restarted. If, due to overheating, the engine continues to run after the ignition switch is turned off, immediately turn the switch on again and run the engine until it is sufficiently cooled to stop. In an emergency, the engine can be stopped by turning the fuel valve, located on the right under side of the fuel tank, to the off-position (clockwise). Never stop the engine by using the choke. This practice is detrimental to normal service life of the engine because raw gasoline entering the combustion chamber washes lubricant from the cylinder walls. Under these conditions, when the engine is restarted the piston rings will operate for a few moments on dry cylinder walls.

CLUTCH PEDAL

The function of the clutch is to engage or disengage the engine power from the transmission. The clutch pedal, located on the left side of the transmission housing, must be depressed with the left foot to disengage the transmission from the engine before shifting from neutral position into any gear, and released slowly with a simultaneous

increase in engine speed so that the tractor will not start under a shock load. Operating the tractor with the foot on the clutch pedal causes premature wear of the clutch lining and, therefore, should be avoided. Always disengage the clutch when starting the engine, or when shifting gears.

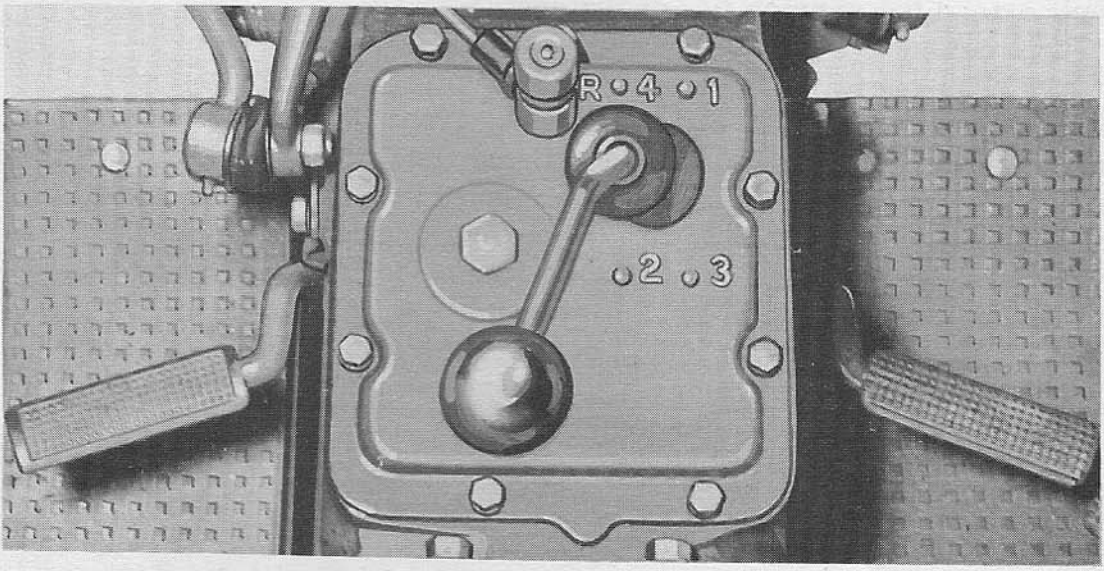


Figure 7 NAA Ford Tractor - Shift Positions

SHIFTING GEARS

The gear shift lever is conveniently located so that the correct gear ratio can be selected to suit various operating conditions. Operating the tractor in the wrong gear overloads the engine. The correct gear ratio for the particular work being done should be selected before the tractor is set in motion. Shifting from one gear ratio to another should never be attempted after the tractor is in motion, because it may damage the transmission. The five gear shift positions are located on the transmission cover plate. By selecting the correct gear ratio for a particular field operation, the operator can save fuel and also minimize engine wear. Tractors operating in low gear with a light load and high engine speed are wasting fuel. "Lugging" is a term applied to a condition of excessive engine load for a selected gear and throttle setting. Lugging the engine increases the wear.

	Speed at 1500 R.P.M.	Tractor speeds in M.P.H.
1st for heavy work	2.68	
2nd for plowing	3.45	" " " "
3rd for cultivating	4.75	" " " "
4th for light work	9.90	" " " "

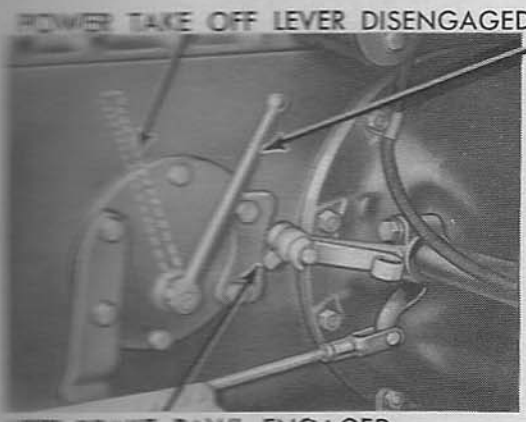


Figure 8 Power take-off Lever in Engaged Position

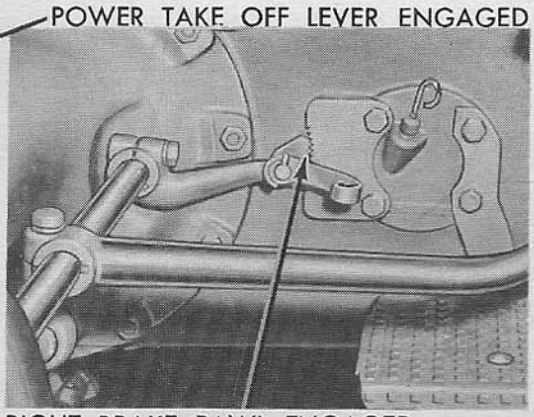


Figure 9 Brake Pawl Engaged

BRAKES

Foot operated, self energizing mechanical brakes are provided at each rear wheel for stopping the tractor and to assist the driver in making short turns. Simultaneously apply both brakes by depressing the two pedals with the right foot to stop the tractor. Apply the right brake in making a short turn to the right and the left brake to turn short to the left. Always set the brakes before leaving the tractor. Move the brake pawl lever forward to engage the right brake and toward the rear of the tractor to engage the left brake before depressing the brake pedal. Reverse this operation to disengage the brakes. (See Figure 8 and 9)

POWER TAKE-OFF LEVER

The power take-off lever, located on the left side of the center housing, engages or disengages the power take-off shaft from the transmission. (See Figure 8) In the position shown in Figure 8, the power take-off is engaged, (See Power Take-Off Operation). Always depress the clutch pedal when engaging or disengaging the power take-off while the engine is running. If the power take-off is not being used it should be disengaged.

HYDRAULIC CONTROL

Both constant draft control and implement position control are incorporated in the Ford hydraulic system. A selection of either of the two systems is made by the small selector lever under the driver's seat.

Refer to Section 8 for a more detailed discussion of how the Hydraulic Control System operates.

TOUCH CONTROL LEVER

The large lever to the right of the driver's seat is called the

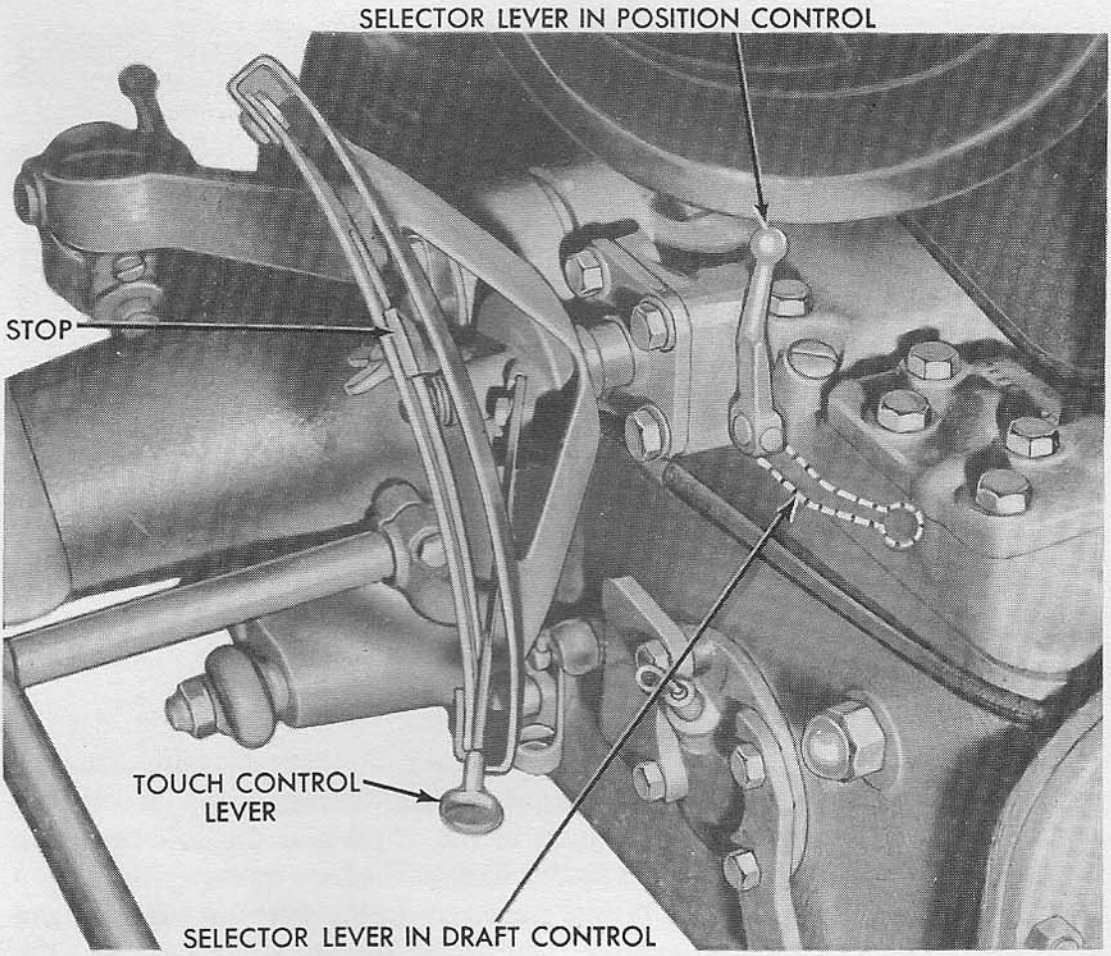


Figure 10 Hydraulic Control Levers

touch control lever. It is the master control lever of the hydraulic system. The function of the touch control lever is to regulate the depth of the implement in the ground. An adjustable stop incorporated on the quadrant provides the means of returning the implement to the same depth if temporary lever position changes are made. (See Figure 10)

CONSTANT DRAFT AND POSITION CONTROL LEVER

Under constant draft control, the selector lever is in horizontal position. In this position the implement drawn by the tractor operates at a depth selected by the touch control lever as long as the soil is uniform. The draft of the implement automatically repositions the implement as needed. When operating the tractor in position control, the selector lever is placed in vertical position as shown in Figure 10. In this position the hydraulic system operates under manual control, thereby providing a fixed position of the implement in respect to the tractor irrespective of draft.

LEVELING CRANK

The leveling crank, (Figure 11), located to the right of the driver in back of the tractor seat, raises or lowers the right lower link. The

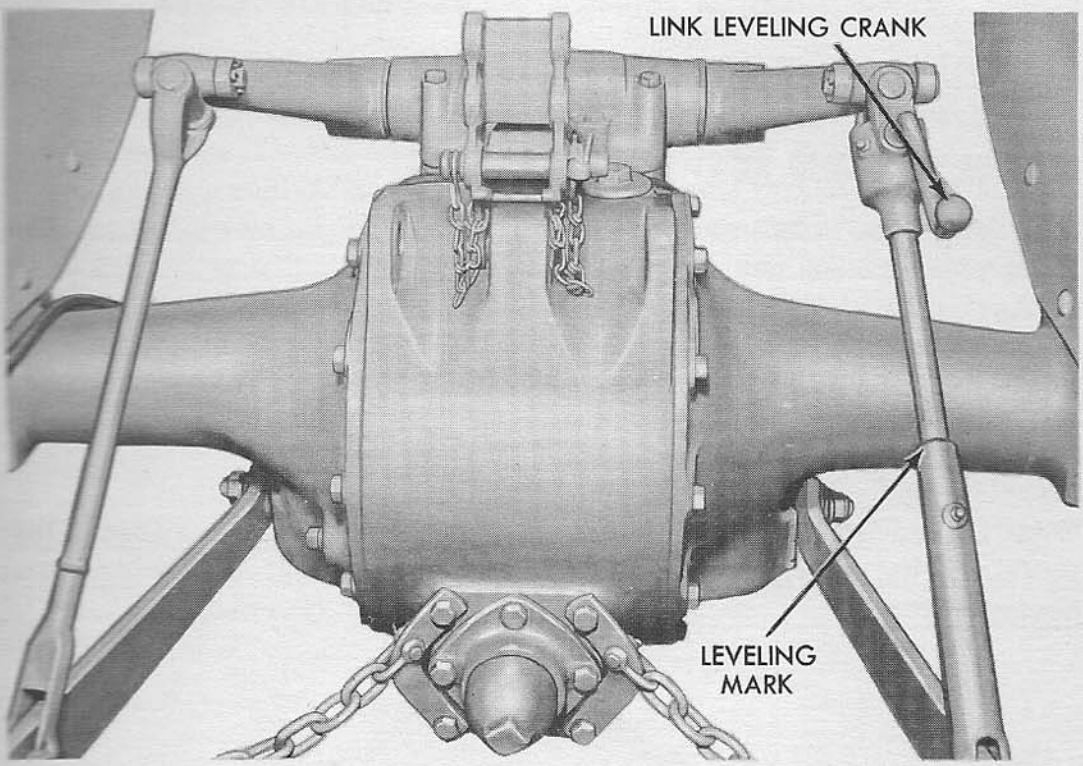


Figure 11 Link Leveling Crank

two lower links are level when the groove on the shaft is just visible above the fork.

DRAWBAR STAYS

Drawbar stays should by used to support the drawbar when using pull type implements. When the drawbar stays are being used, the lower links should not be raised with the hydraulic control as such action may damage the drawbar stays.

The safety chain, attached to the right drawbar stay, should be installed on the quadrant to lock the hydraulic touch control lever at the bottom of the quadrant.

SWINGING DRAWBAR (EXTRA-COST)

A swinging drawbar may be used on many drawbar loads. To turn the tractor when the swinging drawbar is used is easier because the moment arm (leverage) of the load force resisting the turning effort is reduced.

POWER TAKE-OFF OPERATION

The power take-off is used to transfer the engine power directly through the transmission to the driven elements on mounted and drawn implements, and the belt pulley. Release the load on the power take-off by depressing the clutch, then disengage the power take-off shifting lever before shifting the transmission gears. Figure 8 shows the

power take-off lever in both the engaged and disengaged positions.

The conversion table for power take-off speeds is illustrated in Figure 18.

POWER TAKE-OFF ADAPTER (EXTRA-COST)

A power take-off adapter is available as extra cost equipment from your tractor dealer. This adapter meets the American Society of Agricultural Engineers' (A. S. A. E.) specifications for a standard tractor hitch. Any implement built to these standards may be hitched to the Ford tractor with this power take-off adapter. The power take-off safety shield is also built to A. S. A. E. standards. The power take-off safety shield is attached to the adapter unit.

WARNING: Placing the power take-off in operation without first installing the safety shield is extremely dangerous. This shield was designed for your protection and should always be used.

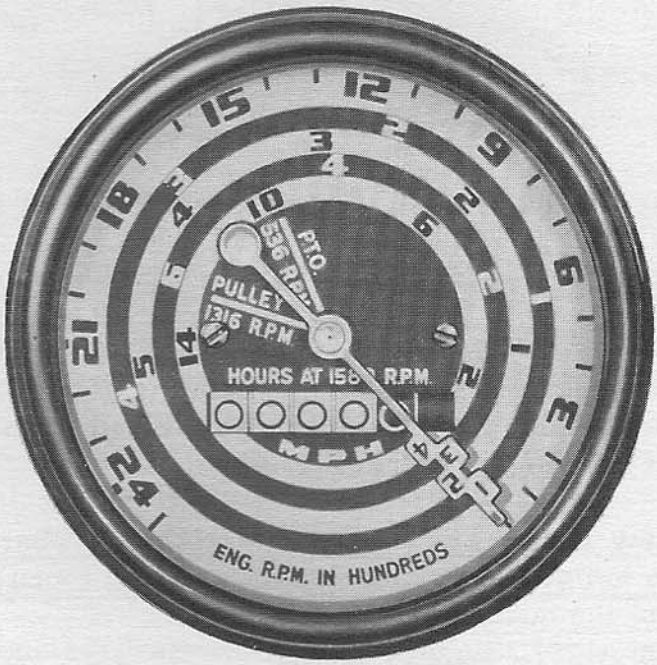


Figure 12 Model NAA Ford Tractor Proof-Meter

READING THE PROOF-METER

The Proof-meter on the instrument panel of the tractor provides the visual means of determining whether the tractor is operating satisfactorily. It also takes the guess work out of telling when it is time to service the tractor.

The Proof-meter indicates engine revolutions per minute (R.P.M), tractor ground speed in the various forward gears, power take-off

speed, belt pulley speed, and the number of hours the tractor has worked.

The Proof-meter is actually five instruments in one. To present a clear picture of its various functions, and to show how helpful it can be in maintaining the good performance that was built into the tractor, each separate function of the Proof-meter is described in the following paragraphs.

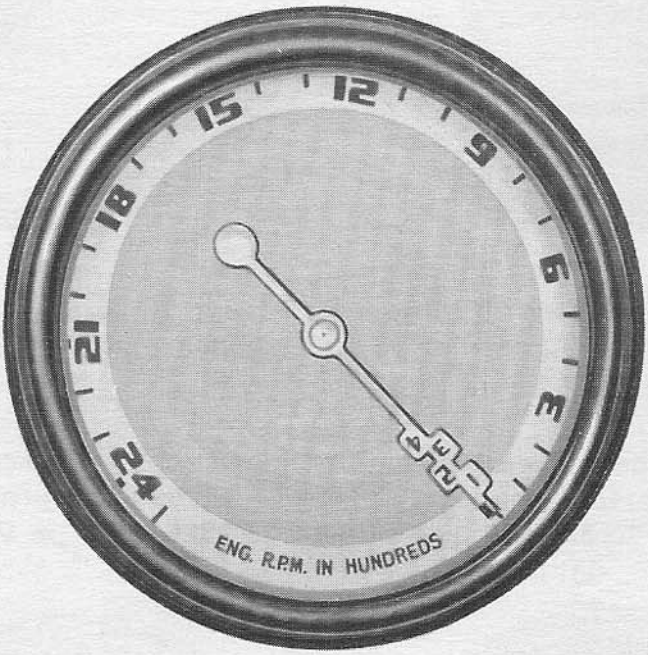


Figure 13 Engine R.P.M. in the Hundreds Ring of the Proof-Meter

Engine R.P.M. in hundreds are shown in the outer band of the Proof-meter by the long dial hand as it swings from 0 to 24. (See Figure 13)

Miles per hour ground speed of the tractor is indicated by the long dial hand and depends upon the transmission gear being used. The gear ratio selected corresponds to the four rings marked first, second, third, and fourth. Tractor ground speed has a direct bearing on implement performance and life. Each implement is designed to perform best at a given speed. This speed is usually specified by the manufacturer. (See Figure 14)

The A. S. A. E. standard for power take-off speed is 536 R.P.M. Most power take-off implements are designed to operate at this speed. (See Figure 15)

Many stationary implements are operated by belt pulley drive.

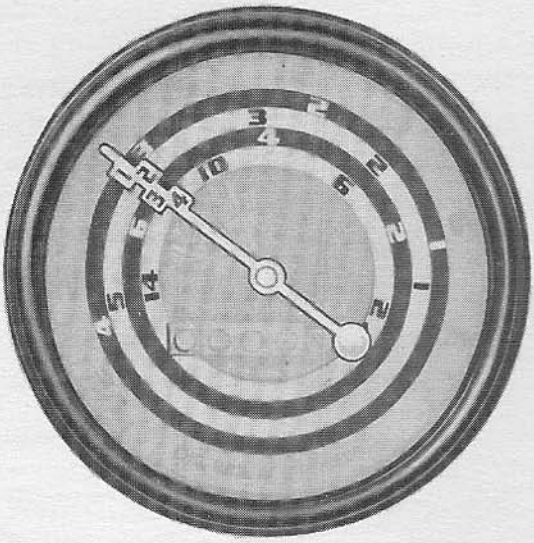


Figure 14 Illustrates Tractor Ground Speed According to Gear Ratio Selected

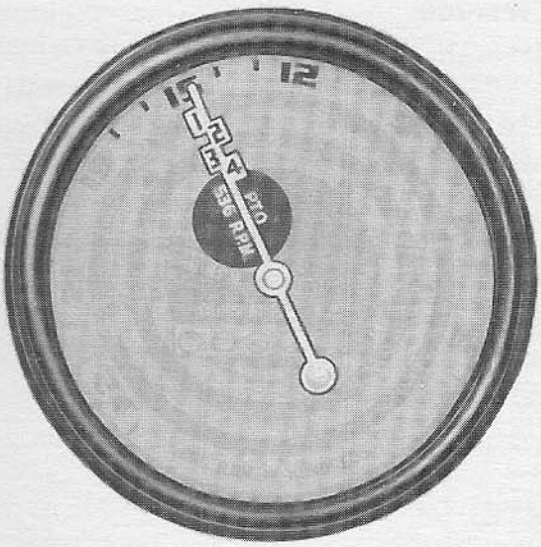


Figure 15 Illustrates Recommended Power Take-off Speed

Operating at the correct belt pulley speed results in better and safer implement performance. The A. S. A. E. standard for belt pulley speed is 3000 to 3200 ft. per minute or 1316 R.P.M. on Proof-meter.

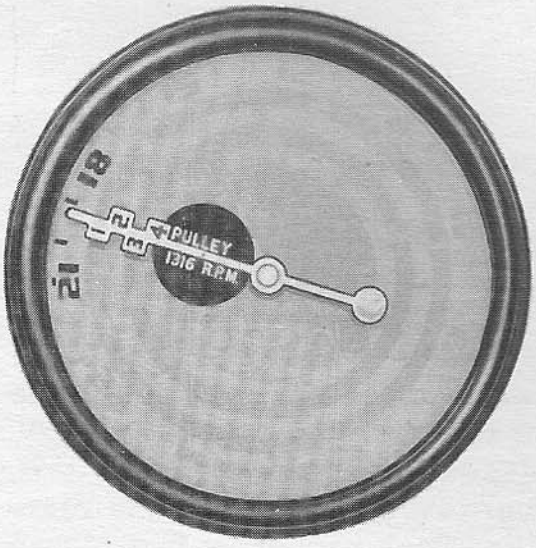


Figure 16 A. S. A. E. Standard Belt Pulley Speed

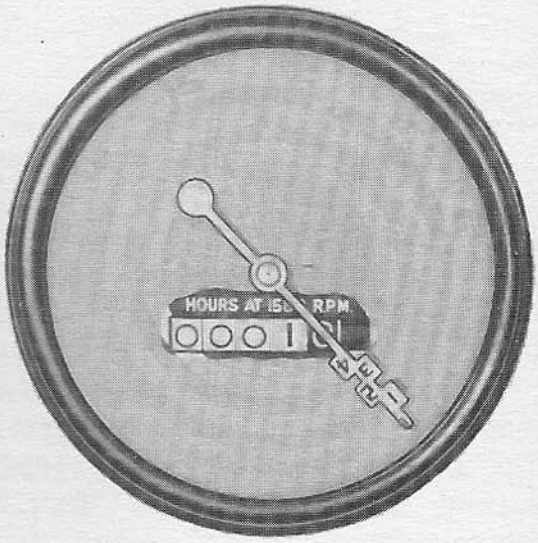


Figure 17 Illustrates Hours of Engine Operation

Some belt driven machines do not meet A. S. A. E. standards. Such machines should be operated at the speed recommended by the manufacturer. This is accomplished by selecting the proper size of driven pulley as follows:

Multiply the diameter of the tractor pulley (9" on the NAA Ford tractor) by the number of revolutions it makes per minute. Divide this product by the number of revolutions the driven machine should operate per minute. This will give the diameter of the driven pulley in inches.

P. T. O. Speed (R. P. M.)	Engine Speed (R. P. M. Approximately)
520	1430
530	1460
540	1485
550	1515
560	1540
570	1570
580	1595
590	1625
600	1650
610	1680
620	1705
630	1735
640	1760
650	1790
660	1825

Figure 18 Power Take-Off Conversion Table

The following is a sample problem:

A belt driven machine is to be operated at 2700 R.P.M. Using the standard Ford tractor belt pulley, what size driven pulley should be used on the machine? Drive pulley diameter X Drive pulley R.P.M. ÷ Recommended RPM of driven machine = diameter of driven pulley.

$$9 \times 1316 \div 2700 = 4.4"$$

Thus, a 4 1/2 inch pulley would be required. When the resulting driven pulley size is in fractions, select the nearest half-inch.

The A. S. A. E. has standardized the belt speeds on farm tractors at 3100 feet per minute (plus or minus 100 feet per minute.) With the standard 9 inch belt pulley on the Ford tractor, this standard belt speed is obtained with a belt pulley speed of 1316 R.P.M. (See Figure 19)

Pulley Speed (R. P. M.)	Engine Speed (R. P. M. Approximately)
1060	1565
1080	1595
1100	1625
1120	1650
1140	1680
1160	1710
1180	1740
1200	1770
1220	1800
1240	1830
1260	1860
1280	1890
1300	1920
1316	1940
1320	1950
1340	1975
1356	2000

Figure 19 Belt Pulley Conversion Table

The hour meter portion of the Proof-meter, shown in Figure 17, represents the hours of engine operation. One hour shown on the hour meter represents one clock hour of tractor operation at 1580 engine R.P.M. Engine speeds below 1580 revolutions accumulate hours slower than clock hours. Engine speeds in excess of 1580 R.P.M. register faster than clock hours.

Hours of tractor operation compared with the Lubrication Chart provide accuracy in telling when it is time to service the tractor. More accurate records of crop costs are also possible.

The following chart provides a comparison between the miles driven on a 1952 model Ford V-8 Fordor sedan, equipped with a stan-

Tractor Hours	Car Miles
50	1466
100	2932
200	5864

Figure 20 Comparison of Tractor Hours and Car Miles

dard transmission against hours of engine operation on a Model NAA Ford tractor.

SAFETY

The Ford tractor embodies all the safety features consistent with good performance. Safety features alone, however, will not prevent accidents caused by carelessness. In the interest of safety we are listing some of the accident preventitive measures that should be carefully read and put into practice before driving your tractor.

Always shut off the engine before refueling the tractor.

When setting the tractor in motion, engage the clutch slowly.

Never run the engine of the tractor in a closed garage. Carbon Monoxide fumes, expelled from the exhaust system, are very dangerous and cannot be detected because they are odorless.

Keep the tractor in gear going down hill.

Never take off or put on the belt while the belt pulley is in motion, and never wear loose clothing when operating the belt pulley or power take-off.

To avoid shock from static electricity, always ground the tractor when using the belt pulley by placing a chain or other suitable steel object from the tractor frame to the ground.

Always use the safety shield when operaing the power take-off.

Reduce speed on turns, hills, or rough ground for safe operation.

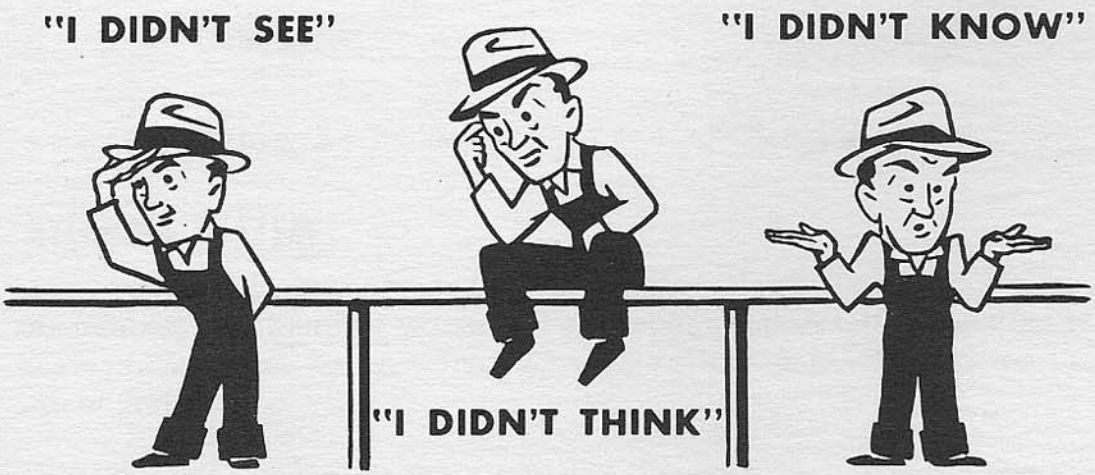


Figure 21 Three Common Causes of Accidents

Always pull from the drawbar. Pulling from the top link or rear axle is dangerous.

If the front end tends to raise, do not operate the tractor until improper loading is corrected.

If the rear wheels are frozen to the ground, it is possible to upset the tractor by rotating it around the rear axle. If the tractor is frozen to the ground it should be backed up to free the wheels. If this is not possible, remove the ice under the wheels manually or with salt, before attempting to set the tractor in forward motion.

WHEELS, TIRES, AND BRAKES

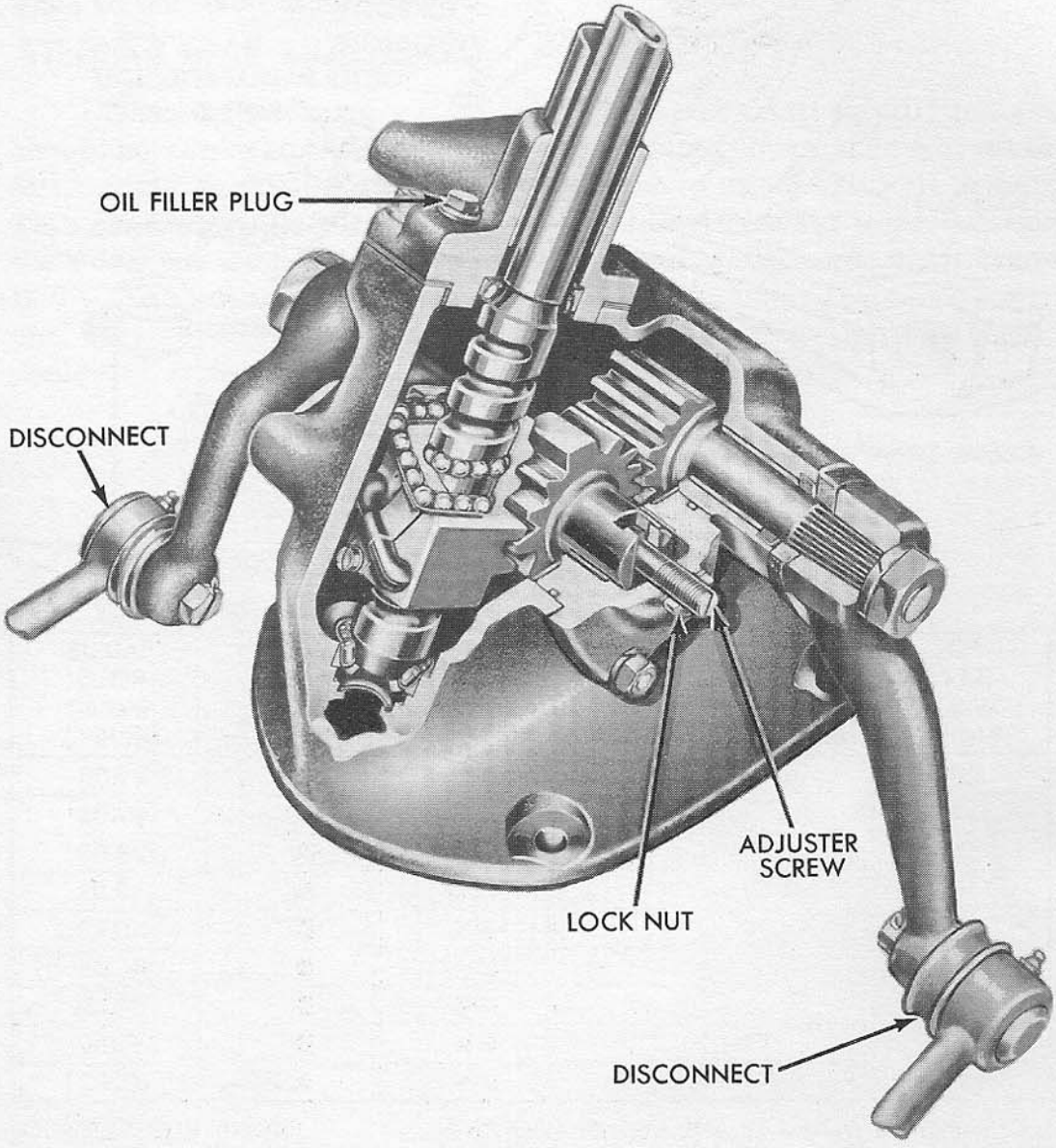
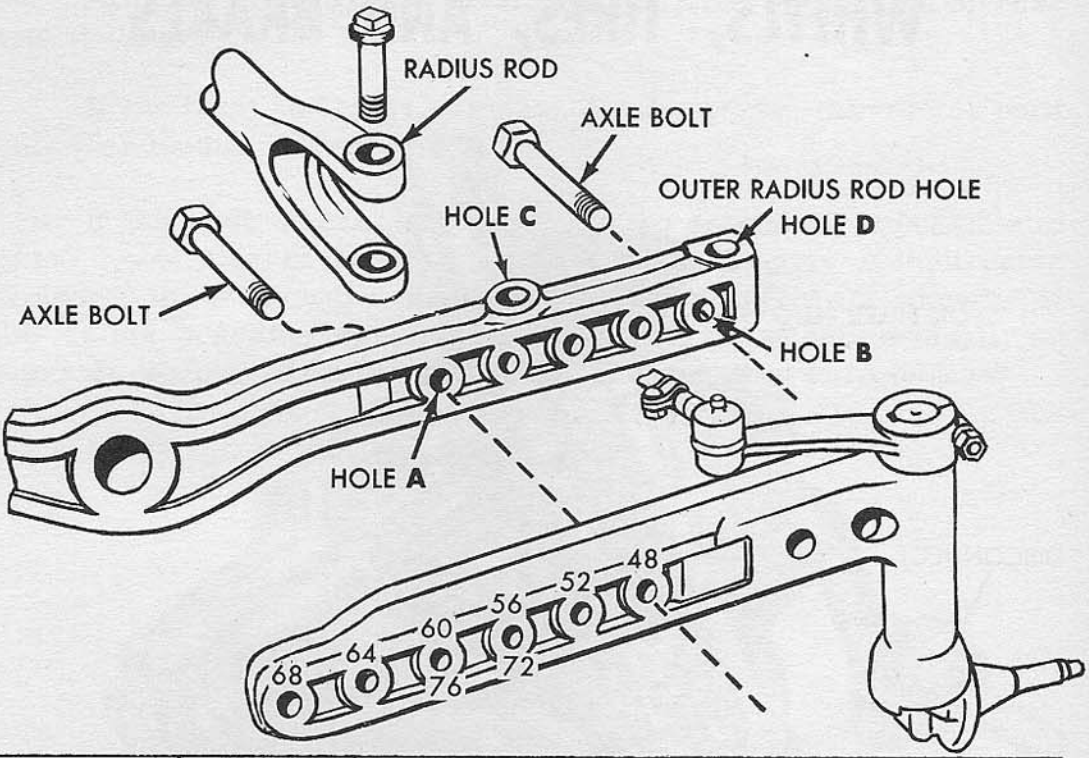


Figure 22 Sectional View of NAA Steering Gear

STEERING SYSTEM

The steering gear used on Model NAA Ford tractor is the re-circulating ball bearing worm and nut type. Anti-friction steering is achieved by steel balls which serve as rolling contacts between the worm and nut.

Rotation of the steering tube shaft moves the ball nut along the worm. The right hand steering sector engages the rack on the ball nut, and is thereby rotated through an arc by the movement of the



FOR TREAD WIDTH (INCHES)	LINE UP HOLE **A** AND HOLE NO.	LINE UP HOLE **B** AND HOLE NO.	SPACE BOLTS APART (INCHES)	SET RADIUS ROD TO HOLE	RADIUS RODS SPREAD (INCHES)
48*	48		6⅜	**C**	29.08
52	52		8½	**C**	29.08
56	56		8½	**C**	29.08
60	60		6⅜	**D**	40.82
64	64		8½	**D**	40.82
68	68		8½	**D**	40.82
72		72	6⅜	**D**	40.82
76		76	4¼	**D**	40.82
80†		72	6⅜	**D**	40.82

* OBTAINABLE WITH 4-19 AND 4.00-19 TIRES ONLY.
† REVERSE WHEELS ON AXLE HUBS.

NOTE: ADJUST DRAG LINKS—SEE FRONT WHEEL TOE-IN

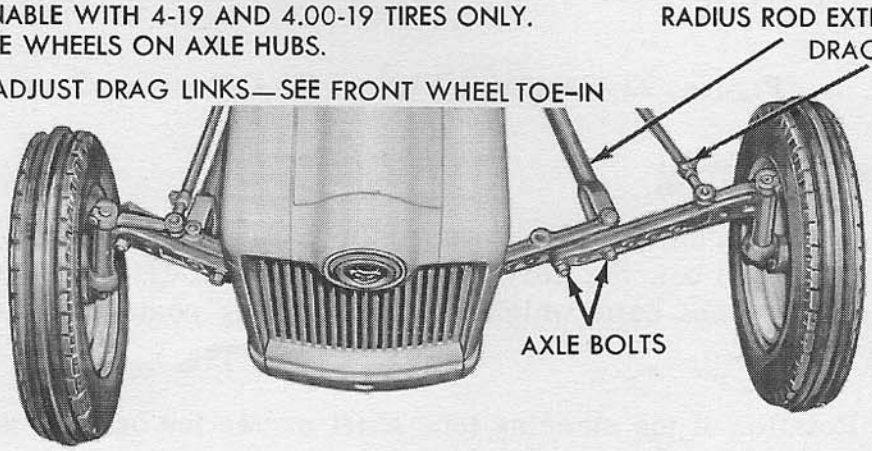


Figure 23 Front Wheel Tread Adjustments

ball nut. The left sector engages the right sector and rotates the same number of degrees in the opposite direction. The pitman arms transfer the motion of the sector to the spindle arms through the drag links to the front wheels.

STEERING GEAR ADJUSTMENT

When the wheels are in the straight ahead position, all backlash should be removed. If the wheels are turned to the extreme right or left, slight backlash will be present, due to the gear tooth design. This characteristic permits a backlash adjustment for wear between the worm nut teeth and the sector gears in the much used center position without causing binding or tightness in the sector gears and worm nut. Any adjustments necessary should be performed by your tractor dealer.

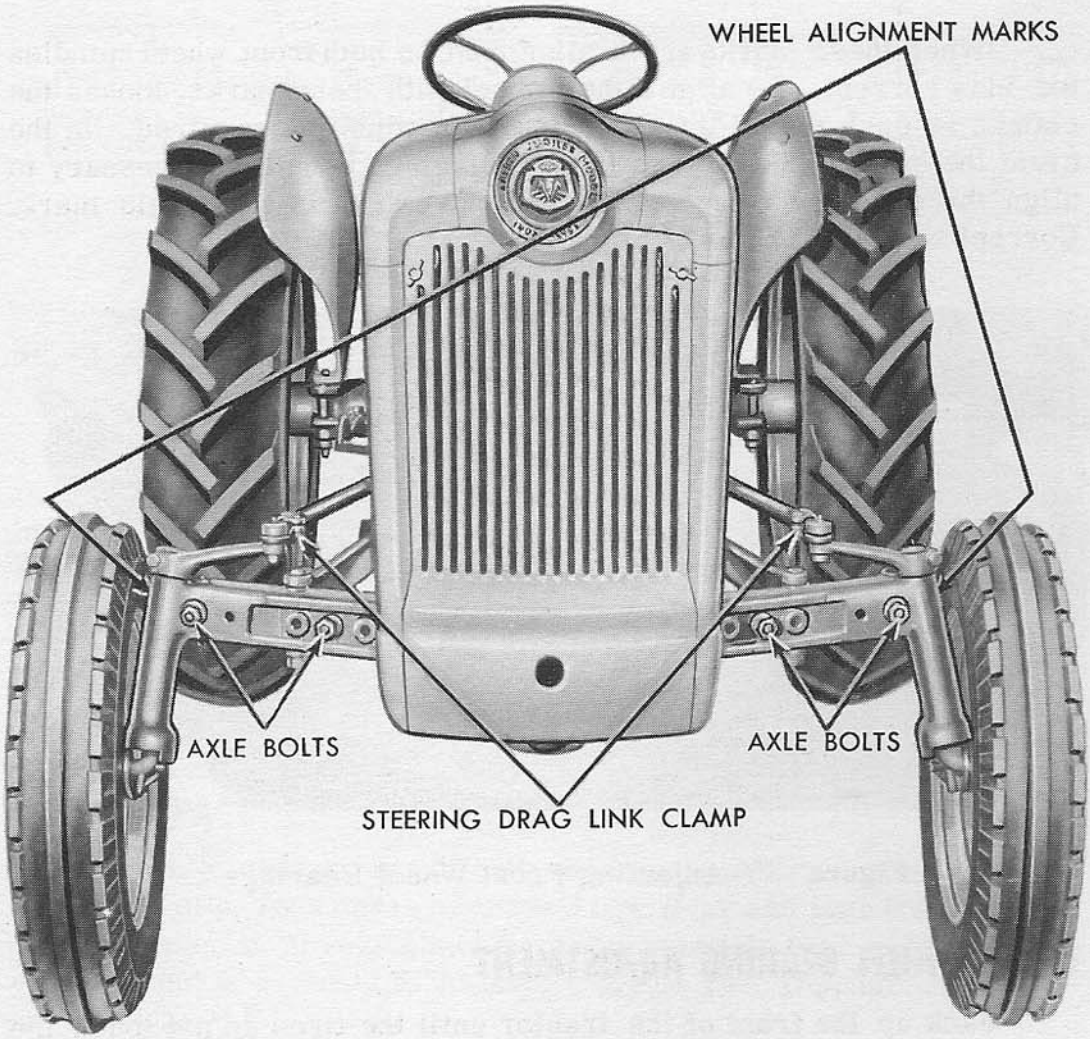


Figure 24 Front Wheel Toe-In Adjustment

FRONT WHEEL TREAD ADJUSTMENT

The front wheels are adjustable from 48 to 76 inches in 4 inch

spacings. The 48 to 76 inch spacings are obtained by jacking up the front end of the tractor and removing the bolts holding the three sections of the axle, and moving the front wheels apart until the desired tread is obtained. Always leave one or more open holes between the bolts. (Figure 23). It is possible to obtain front wheel spacing wider than 76 inches by reversing the wheels.

FRONT WHEEL TOE-IN

Front wheel toe-in is the difference in distance between the front and rear of the wheels, the front being closer together than the rear.

Toe-in is set at the factory with precision equipment, then the spindle and spindle arm are chisel marked at the point shown in Figure 24.

When these marks are in alignment on both front wheel spindles toe-in is correct. To align either wheel with these marks, loosen the clamps at each end of the drag link then adjust as required. In the event the spindle should ever need replacing, it will be necessary to align the wheels as the replacement part will not carry this mark. Correct toe-in is 1/8 to 1/2 inch.

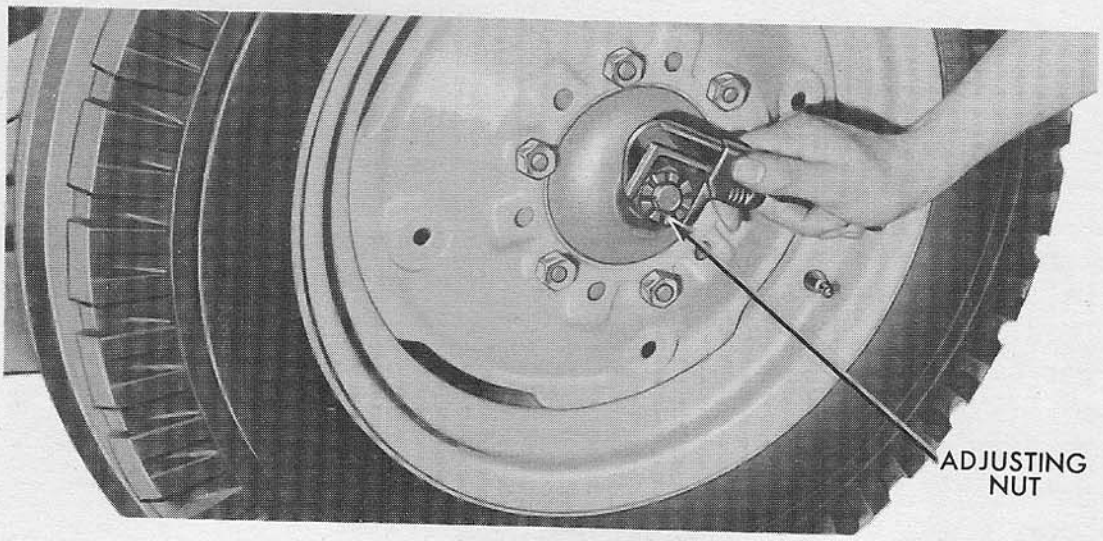


Figure 25 Adjusting Front Wheel Bearings

FRONT WHEEL BEARING ADJUSTMENT

Jack up the front of the tractor until the tires do not touch the floor. Remove the hub cap. Remove the cotter pin from the adjusting nut, and turn the nut until tight; then back off nut until wheel is just free to turn. Reinstall the cotter pin and hub cap. (Figure 25) See Lubrication Section for proper grade of wheel bearing lubricant.

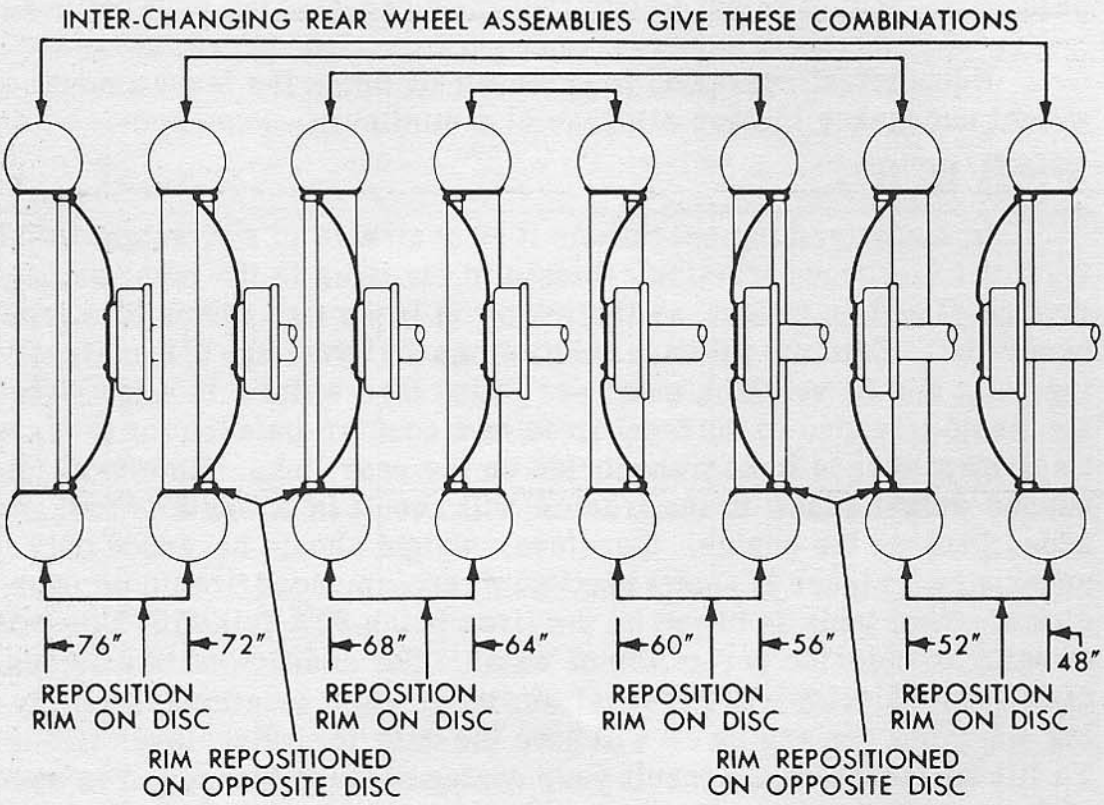


Figure 26 Rear Wheel Tread Adjustments

REAR WHEEL TREAD ADJUSTMENT

The rear wheels are adjustable from 48 to 76 inches tread in 4 inch spacings. Tread width settings are made by changing the position of the steel discs and the rims. The tread is widened by installing wheel discs and rims in any of the four positions shown in Figure 26. To make the change from 52 inch tread to 72 inch tread, it is only necessary to change the wheels from one side of the tractor to the other. Other wheel changes are similar as shown in Figure 26.

NOTE: In making tread adjustments, the arrow on the side wall of the tire must always point in the direction of the rotation of the wheel during forward travel, thus assuring proper cleaning of the tire tread.

TIRE SLIPPAGE

When a tractor pulls a load, there is measurable tire slippage. Excessive slippage causes additional tire wear and fuel consumption. For example, if 10 rear wheel revolutions should have given 120 feet of travel but is reduced to 90 feet, there is 25% slippage.

Measure slippage by first counting rear wheel revolutions required to travel 100 feet at no load. Drive the tractor, under load, the same number of wheel revolutions. The difference in distance traveled, in feet, in the two runs is the per cent of slippage. Slippage in excess of 12% causes excessive tire wear. Reduce excessive

slippage by adding weight to the tractor or reducing the drawbar load.

Economical operation is achieved by using the least amount of weight necessary to keep slippage at a minimum.

WHEEL WEIGHT

In many farming operations it is desirable to add weight to the tractor to increase traction. Liquid in the tires is the most popular method of adding weight, as the weight is in the tire where it is most beneficial. Calcium chloride solution has the advantage of a low freezing point and of weighing more per gallon than water. In a few cases the liquid is added to the front tires as a counter-balance for a heavy implement that is to be transported on the rear links. However, unneeded weight added to the tractor will result in a waste of fuel and added load on the engine, therefore, weight should be added only if necessary. Figure 27 shows maximum recommended tire liquid capacities. This table is based on the tires being 90% full with 5 pounds of calcium chloride per gallon of water. The addition of this amount of calcium chloride will prevent freezing in most locations. Multiplying the table figures by .8 will give the data for valve level filling. To fill tires 90% full, consult your dealer because this requires special equipment.

Size of Tire	MAXIMUM CALCIUM CHLORIDE SOLUTION CAPACITIES		
	Calcium Chloride, Lbs.	Gals. Water	Weight of Solution
10-28 4-ply	116	23	310 lbs.
6.00-16 4-ply	30	6	80 lbs.
6.00-16 6-ply	30	6	80 lbs.
6.00-16 8-ply	30	6	80 lbs.
4.00-19 4-ply	15	3	40 lbs.
5.50-16 4-ply	25	5	65 lbs.

Figure 27 Maximum Recommended Tire Fluid Capacities

TIRES

Before a tire is removed, drain the calcium chloride solution, if any, from the tire into a barrel. This solution can be reused when the tire is replaced.

Tractors often require added weight to reduce tire slippage. The added weight, together with the weight of the mounted implement and tractor, should not exceed the table of recommended weight to be

carried by the tires. Figure 28 lists the maximum recommended weight that can be carried without overloading the tires.

Tire Size	Inflation Pressure	Maximum Lbs. Tire Load Per Wheel
Rear:		
10-28 4-ply	12	1575
10-28 4-ply	14 max.	1720
Front:		
4-19 4-ply	20	470
4-19 4-ply	24	525
4-19 4-ply	26	550
4-19 4-ply	28	575
4-19 4-ply	32	625
4-19 4-ply	36	670
4-19 4-ply	40	710
4-19 4-ply	44 max.	750
5.50-16 4-ply	20	655
5.50-16 4-ply	24	725
5.50-16 4-ply	28	795
5.50-16 4-ply	32	860
6.00-16 4-ply	20	750
6.00-16 4-ply	24	835
6.00-16 4-ply	26	875
6.00-16 4-ply	28 max.	915
6.00-16 6-ply	20	750
6.00-16 6-ply	24	853
6.00-16 6-ply	28	915
6.00-16 6-ply	32	990
6.00-16 6-ply	36	1065
6.00-16 6-ply	40	1130
6.00-16 6-ply	44 max.	1200
6.00-16 8-ply	56	1370
6.00-16 8-ply	60 max.	1430

Figure 28 Maximum Recommended Tire Loads

TIRE REMOVAL

Remove the wheel from the hub. Deflate the tube completely. Press the valve through the valve hole in the rim. Loosen both beads from the rim edges, using tire iron and heavy mallet.

In case of rear tires sticking to the rim, it may be necessary to jack up the front end of the tractor, slide the rear wheel under a

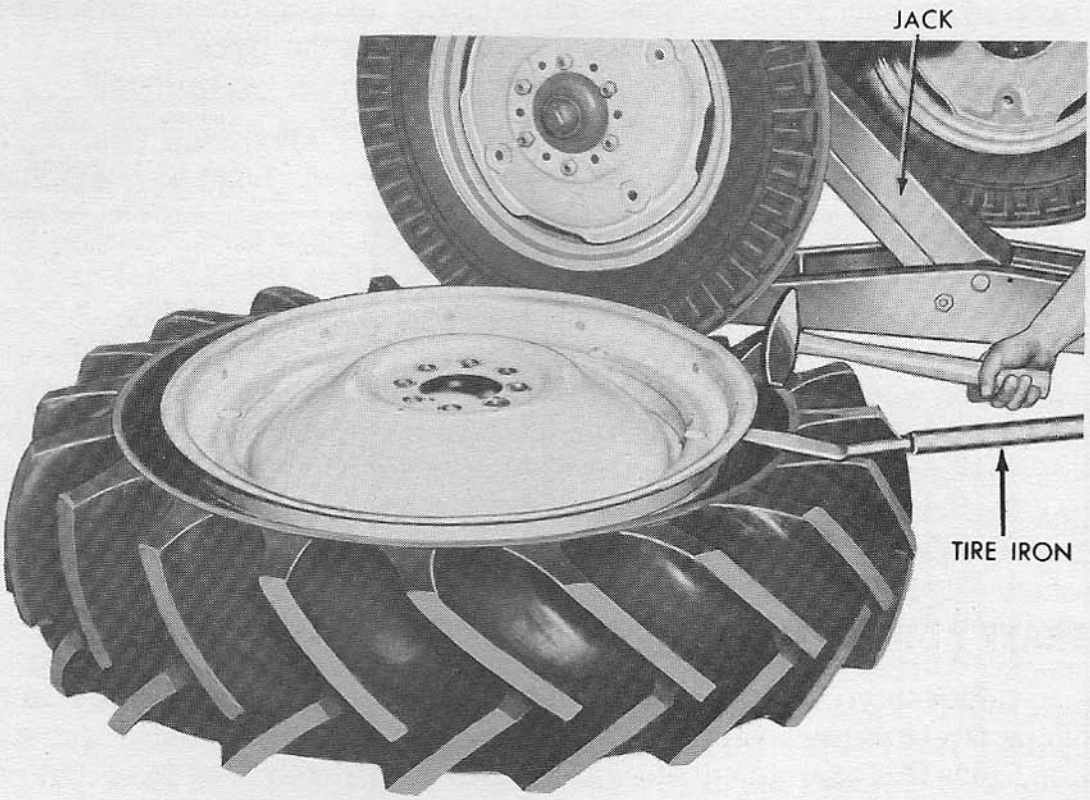


Figure 29 Loosening Tire Bead From Edge of Rim

front wheel, and let the tractor down on the tire. Stand on the tire, with feet about 15 inches apart, opposite the valve, and force the bead off the bead seat into the drop center of the rim.
CAUTION: Care should be taken that the soft rubber tip on the inner edge of the tire bead is not damaged by the tire iron as such damage will have a tendency to chafe the inner tube.

Insert two tire irons about 8 inches apart between the bead and the rim flange, near the valve. Pry a short length of bead over the flange. Leave one tire iron in position, and follow around the rim with the other iron to remove the remainder of the bead. Remove the inner tube.

Turn the rear wheel over and block up the disc until the tire is clear off the floor (Figure 30). Pry the tire off the rim, starting with a small section and following around the wheel.

INSTALLING TIRES

Place the wheel and rim in a flat position. Inflate the inner tube until it is barely rounded out. Install the tube in the tire.
NOTE: It is advisable to coat the inside and outside of the tire beads with soft soap and water solution. This will assist in moving the bead over the edge of the rim and will also protect the inner edge of the bead.

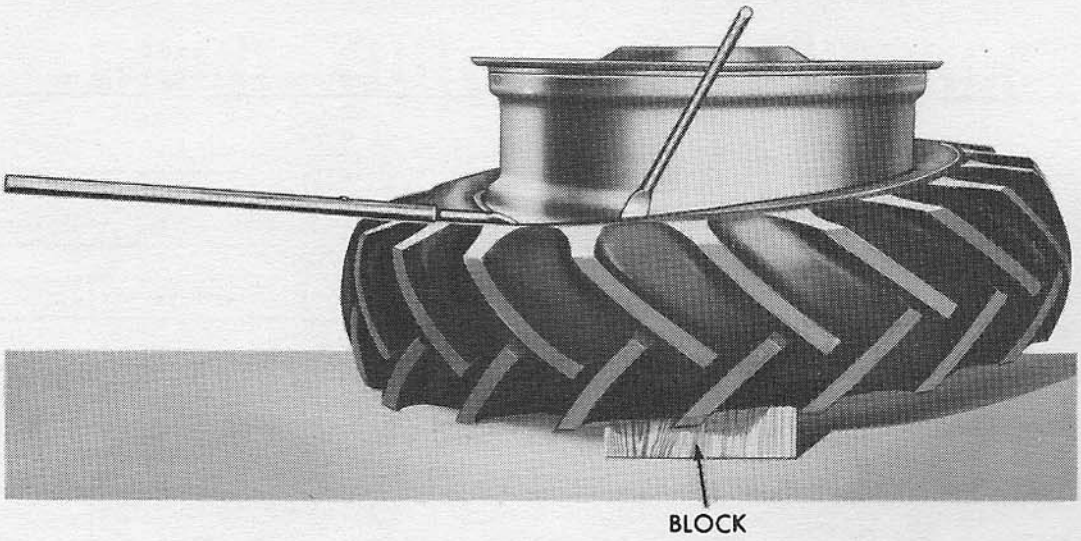


Figure 30 Wheel in Position to Pry Rim Out of Tire

BRAKE ADJUSTMENT

Jack the tractor up until both rear wheels are free. Remove the brake adjustment cover. With the brake pedal in the released position, turn the adjustment clockwise until the brake drags (See Figure 31 & 32). Back off the adjustment until the wheel turns with a very slight brake drag. Shorten or lengthen the left brake tie rod by using the clevis, until both brake pedals are in line with both brakes engaged. During the first hour of operation, after the brakes have been adjusted, feel the drums occasionally to be sure that they are remaining cool. If the drums are hot, readjust as outlined above.

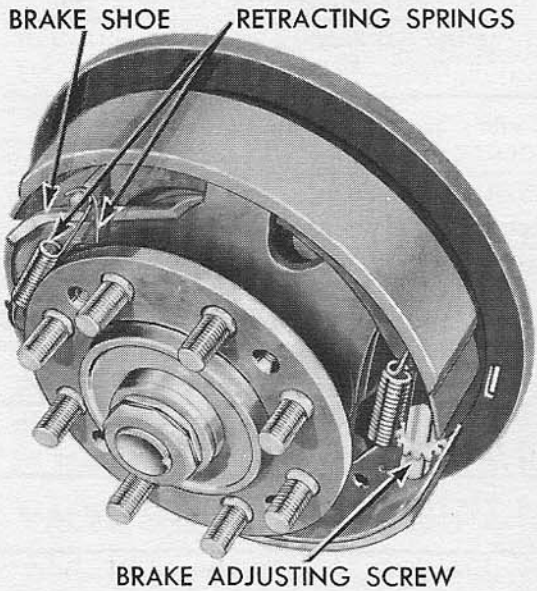


Figure 31 Brake Assembly with Brake Drum Removed

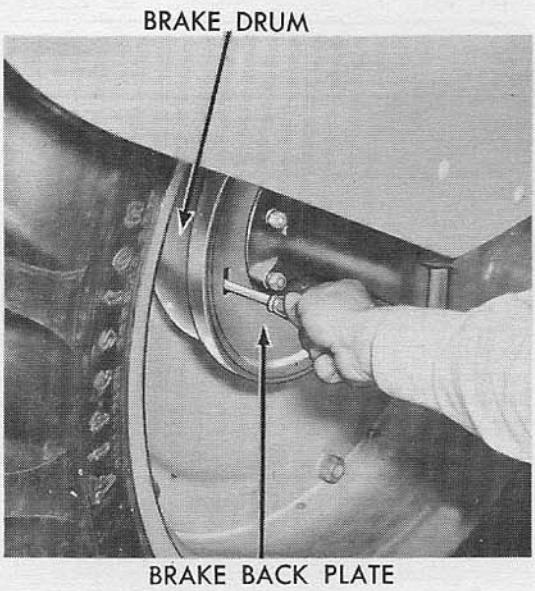


Figure 32 Method of Adjusting Brakes

ENGINE, CLUTCH, AND GOVERNOR

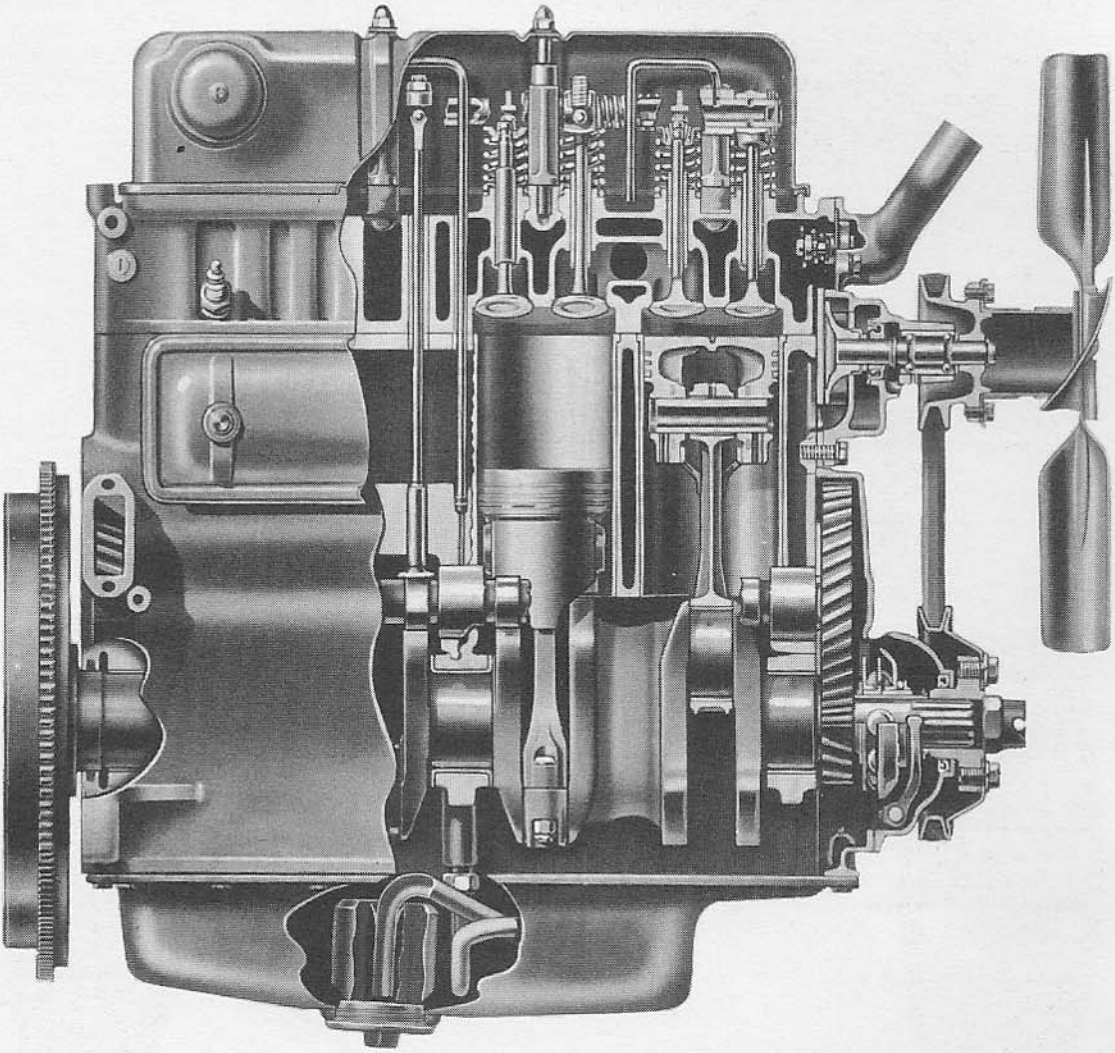


Figure 33 Sectional View of Engine

HOOD REMOVAL

Remove the four cap screws which secure the side panels to each side of the instrument panel. If head lights are used, disconnect the wires at the connector inside the hood panel. Remove the cap screws on each side that retain the hood to the front axle support. Remove the carburetor air intake screen connection from the left side panel, then remove the hood as shown in Figure 34. Removal of the hood is not necessary to make tappet adjustments.

VALVE CLEARANCE ADJUSTMENT

One of the factors governing good engine performance is correct valve operation, and this cannot be obtained unless correct valve tappet clearances are maintained. When tappet clearances are too small, the valves cannot close on their seat, and valves that do not seat properly will soon burn through at the edges. Too little clearance is also a contributing factor in valve warpage. When the clearances

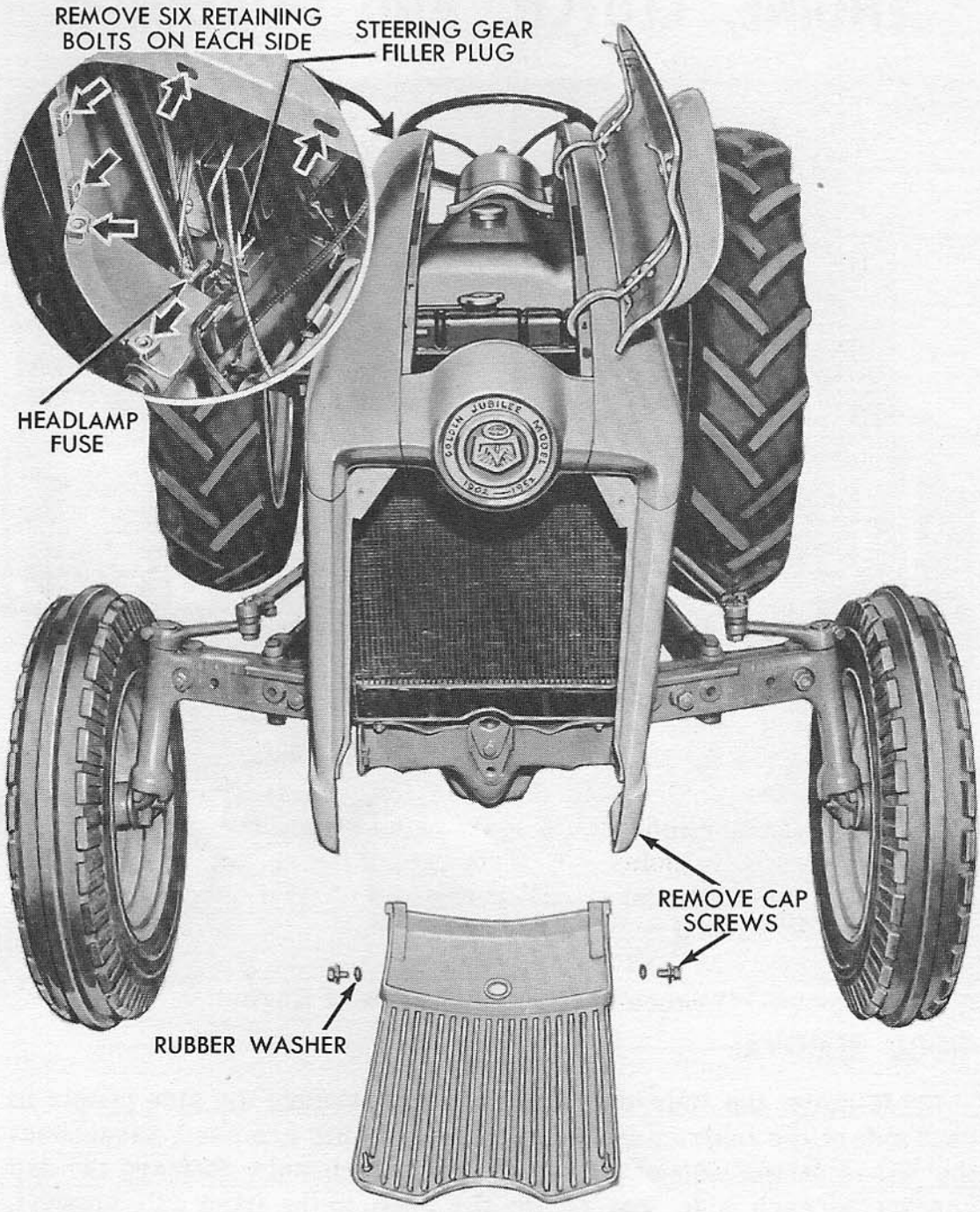


Figure 34 Method of Removing Hood

are too great, a portion of the cam-ramp is not in use. This condition causes valves to open and close with terrific impact, causing abnormal stress on the valve train, and greatly increases the possibility of valve breakage, particularly at high engine speeds. The valves are not open long enough either to get sufficient fuel into the combustion chamber or to exhaust all of the burned gases.

On a new tractor, correct clearances are established before

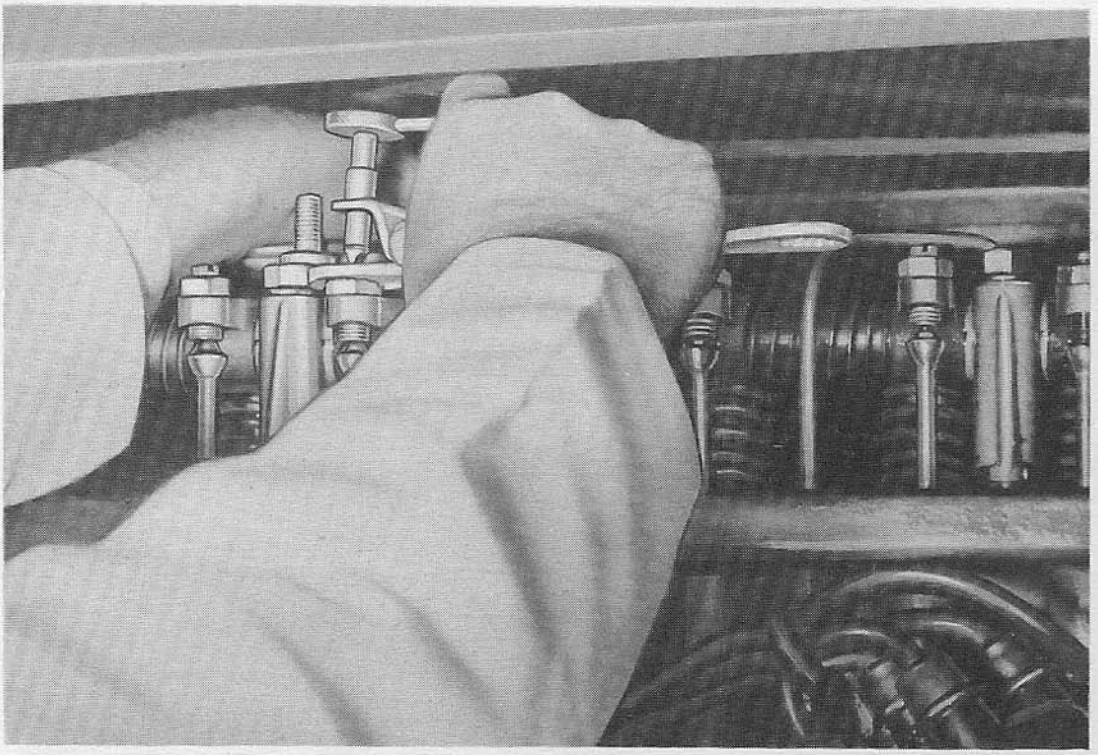


Figure 35 Adjusting Clearance Valve Stem to Rocker Arm

the engine leaves the factory. So that you may obtain the maximum performance the engine was designed for, we recommend having valve tappet clearance checked at least twice yearly or whenever they become excessively noisy. Before attempting to set valve tappet clearances, run the engine until it reaches normal operating temperature. After normal temperature is reached, stop the engine, shut off the fuel supply at the fuel bowl, and remove the glass bowl. Remove the two rocker shaft cover retaining nuts; then remove the cover.

In order to specify a uniform method of checking valve clearance on the tractor, the following chart is suggested:

Valves Open	Valves to be Checked
#1 Exhaust & 3 Intake	#2 Intake & 4 Exhaust
#1 Intake & 2 Exhaust	#3 Exhaust & 4 Intake
#2 Intake & 4 Exhaust	#1 Exhaust & 3 Intake
#3 Exhaust & 4 Intake	#1 Intake & 2 Exhaust

A worn rocker arm tip will have a depression which makes it impossible to obtain an accurate valve tappet setting, therefore, worn rocker arms must be replaced. Never attempt to turn the adjusting screw until the lock nut has been loosened, and always make certain the lock nut is secure after adjustment. The combination adjustment tool used in Figure 35 simplifies this adjustment and is obtainable

from your dealer. The correct valve tappet clearance is .014 to .016 inch.

VALVE GRINDING

One of the factors involving good engine performance is absolute sealing of the combustion chamber by the valves and rings against compression losses. Valves and valve seats of modern engines are so hard that it is impossible to obtain a satisfactory valve reconditioning job by the outmoded method of hand grinding.

This job takes modern high speed grinding equipment in the hands of a skilled technician. If hand grinding is attempted and the valve does not seat 100% after grinding, even a small leak will eventually cause valve failure. The action of the exhaust gases leaking past the valve is like that of a cutting torch flame which will cause the metal to soon burn away. A good valve job is so important to good engine performance that we recommend having your dealer perform this work whenever it becomes necessary.

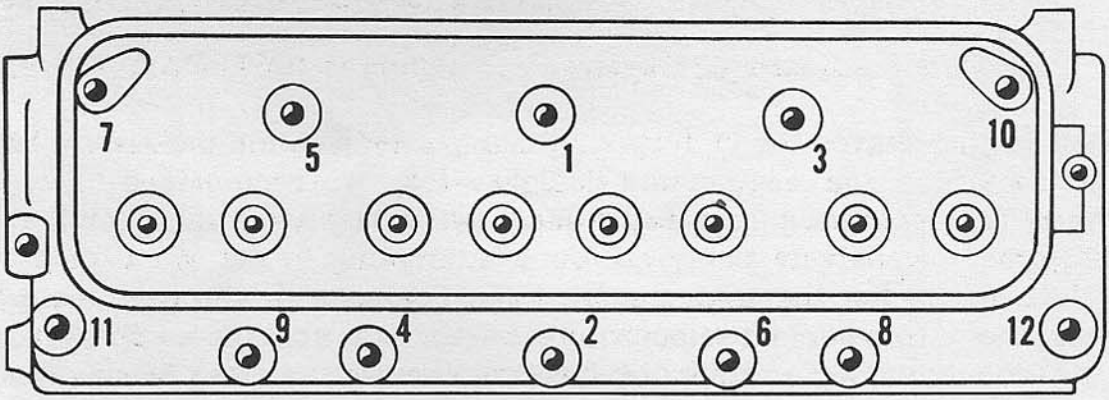


Figure 36 Cylinder Head Tightening Sequence

TIGHTENING CYLINDER HEAD NUTS

Even tightening of the cylinder head is very important so that an air tight seal is obtained between the water passages in the cylinder head and block. To provide a uniform seal, a torque indicating wrench must be used. Using an ordinary hand wrench for this purpose will result in overtightening of some cap screws and undertightening of others. Overtightening may cause distortion of the cylinder head and bores, and undertightening may result in a blown or leaky cylinder head gasket. (See Figure 36)

CLUTCH ADJUSTMENT

The only adjustment necessary for proper operation is the free travel of the clutch pedal. Free travel is the distance the clutch pedal can be pushed down before resistance is met.

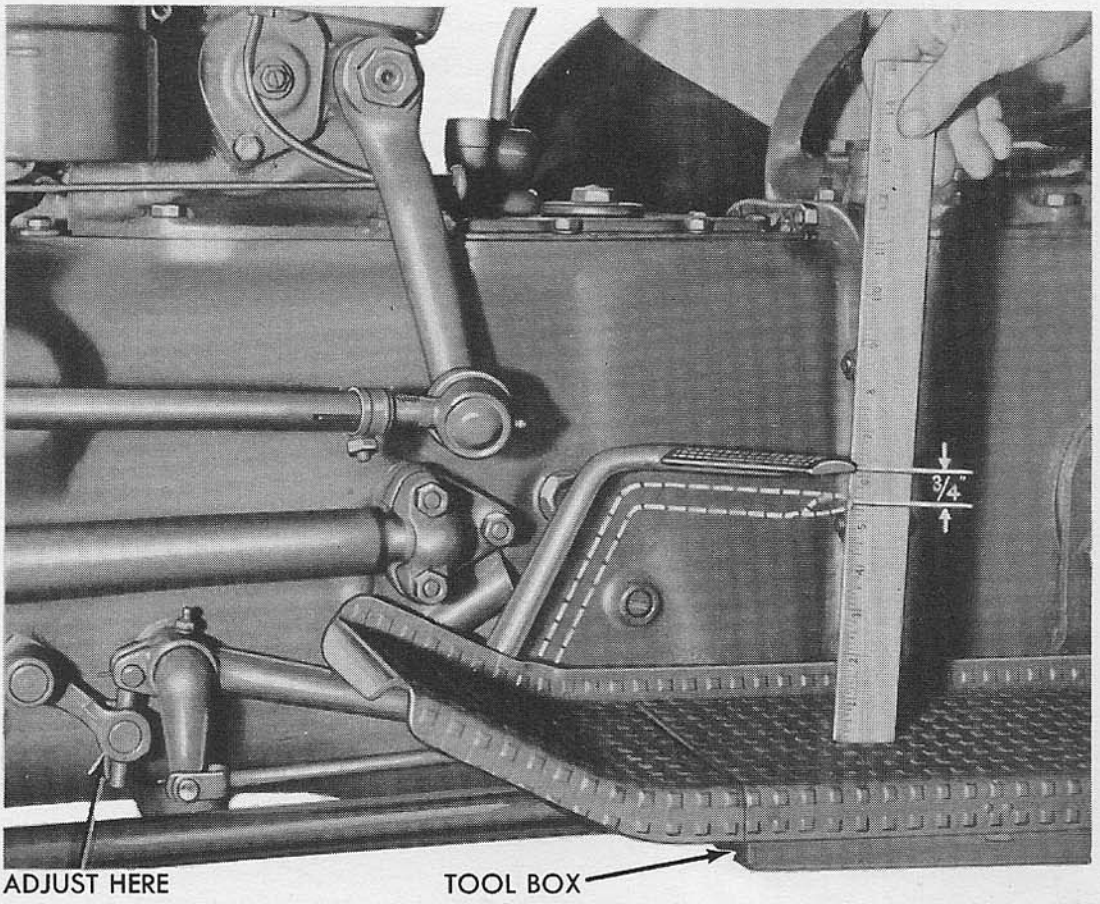


Figure 37 Clutch Pedal Free Travel Adjustment

To adjust the clutch, remove the clevis pin as shown in Figure 37 and turn the eye bolt counterclockwise to decrease pedal travel. Turn the bolt clockwise to increase pedal travel. Correct free pedal travel is 3/4 of an inch measured at the pedal.

ENGINE SPEED CONTROL GOVERNOR

The governor used on the Model NAA Ford tractor is a centrifugal, variable speed control type and is mounted on the front of the engine crankshaft directly behind the crankshaft pulley.

Moving the carburetor hand throttle to the lower position opens the carburetor throttle valve and also applies tension on the throttle rod spring attached to the governor speed control lever. Governor action is controlled by six steel balls sandwiched between a concave and a flat race, located inside the governor housing. (See Figure 38)

As engine speed increases, centrifugal force moves these balls toward the perimeter of the races. This action forces the concave race to move away from the flat race which, in turn, moves the governor arm toward the closed carburetor throttle position until a balance between spring tension and governor action causes engine speed to

remain constant.

Maximum engine speed is controlled by the adjustable stop on the throttle rod shown in Figure 38.

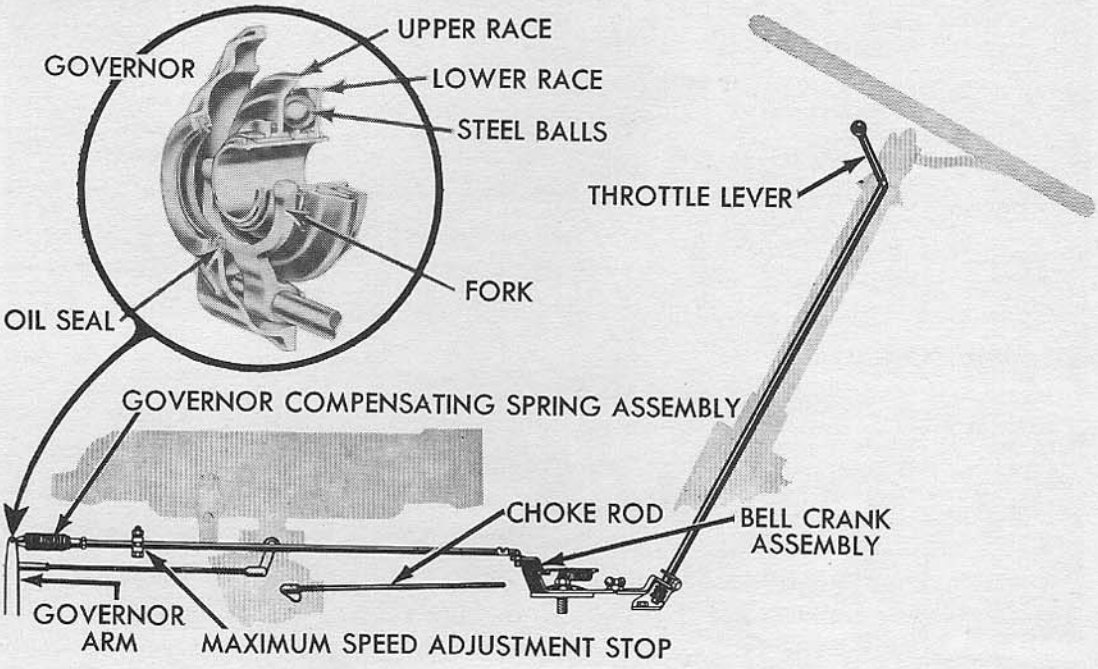


Figure 38 Governor and Control Linkage Schematic

SETTING GOVERNOR ENGINE SPEED

Before attempting to set the engine governed speed, make certain the governor lever and carburetor throttle lever are both in full open position. This can be checked by removing the throttle rod at the carburetor, and holding the throttle lever in open position as pulling force is applied to the throttle rod connected to the governor speed control arm. If the throttle rod connector will not slip over the ball on the carburetor throttle valve arm without moving the arm, the linkage must be adjusted.

Linkage is adjusted by loosening the clevis lock nut, so that the rod length can be altered by turning the rod as required.

Governed engine speed must always be set under no load conditions. After the engine has been warmed up, set the idle speed at 450 to 500 revolutions per minute. Open the hand throttle to the wide open position. If the Proof-meter registers 2200 revolutions per minute, the governor is properly set.

To set the recommended maximum speed of 2200 revolutions per minute, first loosen the governor speed stop nut. Then open

the hand throttle until the Proof-meter registers 2200 revolutions per minute. Secure the maximum speed stop against the throttle rod guide bracket by tightening the lock nut.

MAINTAINING HAND THROTTLE LEVER POSITION

After the tractor has been in service and normal linkage wear occurs, the hand throttle lever may creep toward closed position when driving the tractor over rough ground.

The fixed position of this lever is controlled by the tension applied by the spider spring washer on the bell crank as shown in Figure 4. This tension can be increased by removing the cotter pin in the castellated nut and turning the nut clockwise until the desired tension is obtained. After adjustment, re-install the cotter pin.

ENGINE TUNE-UP

Engine tune-up procedure is intended to restore the engine to normal operating condition providing excessive wear has not occurred. It is one of the most important maintenance services in that it determines whether or not the engine will perform with maximum economy and efficiency. Your dealer is best equipped to perform this service. His trained technicians, using modern scientific instruments will perform the following tests, then report to you the repairs or services necessary to obtain the performance that was designed into your tractor.

ENGINE TUNE-UP OPERATIONS

Cylinder Head Cap Screws are tightened to 65 to 70 ft. lbs. using a torque wrench.

Tappet Adjustment is made using the tappet adjusting wrench.

Cylinder Compression Test is made with a compression gauge and will determine whether there is compression leakage due to worn piston rings, burned or warped valves, or damaged gaskets.

Spark Plugs are inspected for chipped or broken porcelain, or burned electrodes. If satisfactory, they are reset at .025" - .028" gap and installed with new gaskets.

Battery condition is checked with a hydrometer or other accepted method, and battery cables are checked for worn insulation and damaged connectors.

Distributor internal condition is determined by inspection for cracked cap, cracked rotor, and pitted or burned breaker points. The condenser is checked for capacity on a condenser tester. The centrifugal advance characteristics are checked on a distributor stroboscope.

Ignition timing is accurately adjusted by use of a timing light.

Manifold Vacuum is checked with a vacuum gauge. It determines whether there are leaks in the fuel induction system. This check may also verify the conditions indicated by the compression test.

Carburetor is cleaned and adjusted.

Air Cleaner is cleaned and filled with oil.

COOLING SYSTEM

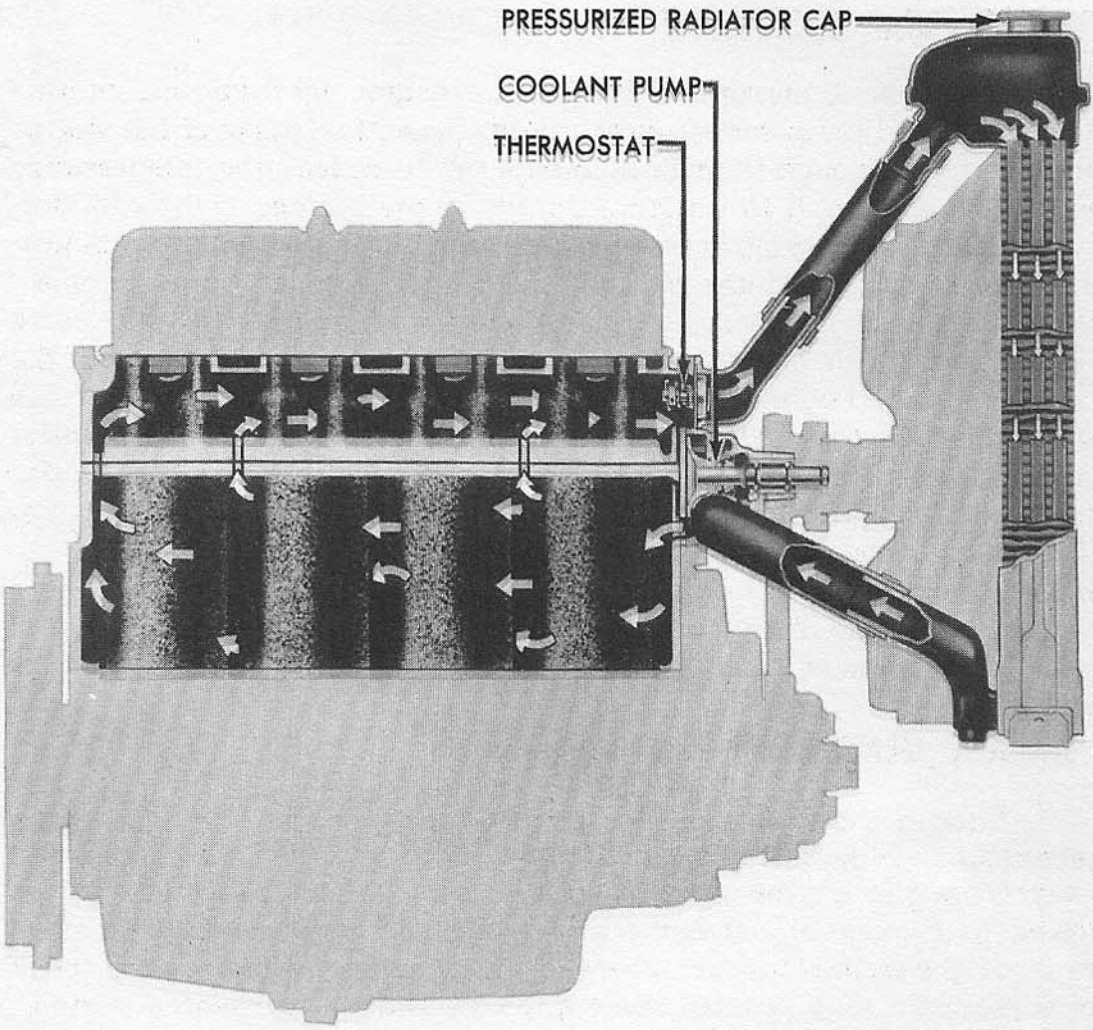


Figure 39 NAA Ford Tractor Engine Cooling System

COOLING SYSTEM

The cooling system used on Model NAA Ford tractor is the pressure type. This simply means that more heat is required to make the radiator liquid boil than if the solution were not under pressure.

RADIATOR PRESSURE CAP

The radiator of this system is sealed with a pressure cap. Inside the cap are two valves, the larger one is called the pressure valve, and the smaller one, the vacuum valve. When the coolant boils, pressure in the system forces the pressure valve open, allowing the coolant to escape through the overflow pipe. When pressure in the system becomes lower than atmospheric pressure the vacuum valve

opens until the pressure in the system and the atmospheric pressure are approximately equalized. The cap and gasket must provide an absolutely air tight seal at all times. The radiator hose will collapse if the vacuum valve becomes inoperative.

WATER PUMP OPERATION

Waste heat is removed from the engine by liquid circulating through the hollow passages surrounding the hottest parts of the engine. Air is drawn through the radiator by a fan to reduce the temperature of the coolant as it flows from the top to the bottom of the radiator. A centrifugal type pump draws solution from the bottom of the radiator, and forces it around the cylinders from the front to the rear of the block as shown in Figure 39. Transfer ports permit the coolant to circulate through cored passages into the cylinder head to cool the valve ports and combustion chambers, before being expelled into the top of the radiator. A thermostat, located in the cylinder head outlet casting, controls the outlet temperature of the solution. A bypass in the thermostat directs the liquid back to the pump where it is re-circulated through the engine until normal engine operating temperature is reached. The only service required on the water pump is a periodical check of the fan belt for tightness. If the pump should ever leak, it must be disassembled and new seals installed by your dealer.

FAN AND GENERATOR BELT ADJUSTMENT

Loosen the two generator pivot bolts located at the base of the generator and the belt tension adjusting bolt nut. Move the generator away from the engine until a 1/2 inch belt deflection is obtained as shown in Figure 40. Overtightening the belt may cause premature wear of the generator armature shaft bearings, whereas too loose an adjustment may result in belt slippage and an overheated engine.

TEMPERATURE GAUGE

The temperature gauge thermal unit (See Figure 41) is installed in the cylinder head and is connected to the gauge on the instrument panel by a tube. Frequent readings of the temperature gauge should become habitual while operating the tractor so that the engine will never run in an overcooled or overheated condition. The temperature gauge dial is divided into three blocks, colored orange, green, and red. If the pointer on the face of the temperature gauge dial registers in the orange block, the engine is operating at too low a temperature. Operating the engine in this condition results in an excessive accumulation of sludge being formed in the engine, which is detrimental to normal engine life. Overcooling also results in waste of fuel, loss of power, rapid wear, and corrosion of parts. Normal engine temperature is indicated when the pointer registers in the green block. If the temperature gauge should ever register in the red block, the engine should be stopped and the cause of overheating investigated and corrected.

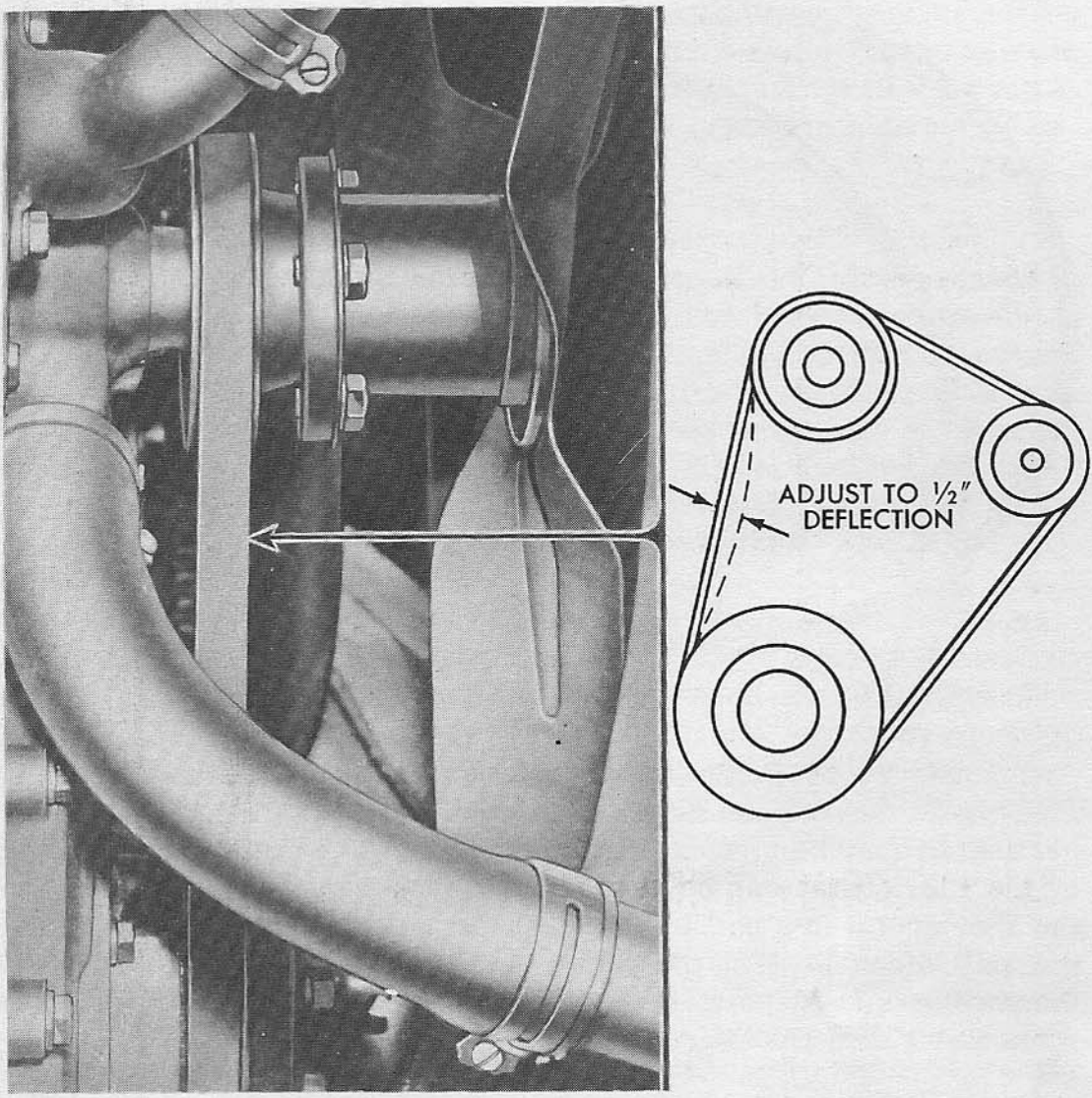


Figure 40 Adjusting Fan and Generator Belt Tension

THERMOSTAT CHECKING AND REPLACEMENT

The thermostat is installed in the cooling system of the tractor to control the heat leaving the engine so that normal engine operating temperatures can be maintained under variable climatic conditions. Automatic operation of the thermostat regulates the temperature within the cooling system design limits by controlling the flow of the coolant through the radiator. When the engine is cold, the thermostat valve is closed and the coolant recirculates through the engine. As the coolant warms up, the thermostat is gradually opened and is fully open when normal operating temperature is reached. Generally, thermostats give little trouble, but it is good maintenance practice to occasionally check the heat range at which it opens. This is especially important if the engine has been operating in either a cold or overheated condition. If the engine has been running continuously cold, the thermostat may be stuck in open position, or if it has been over-

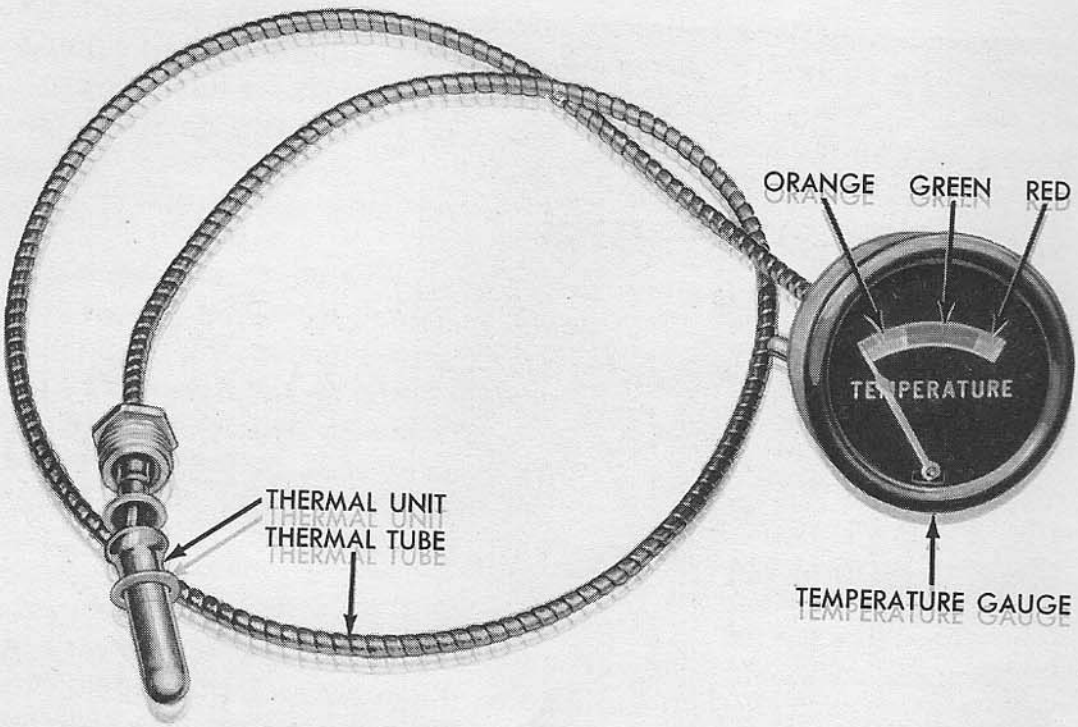


Figure 41 Engine Temperature Gauge and Thermal Unit

heating, it may be stuck in closed position. The opening and closing of the thermostat can be checked by suspending a thermometer and the thermostat in a pail of water so that neither touches the sides of the pail, then heating the water until the thermostat opens. The thermostat should start to open at 157 to 162 degrees and be fully opened at 177 to 182 degrees.

Thermostat location is in the cylinder head outlet casting. To remove, loosen the bottom hose clamp, remove the hose, then remove the coolant outlet casting from the cylinder head. When replacing the thermostat, make certain it is installed with the by-metal spiral of the thermostat facing toward the engine head.

CLEANING THE COOLING SYSTEM

To prevent the excessive formation of corrosion and rust scales in the cooling system, we recommend having the system cleaned and flushed at least twice yearly. Have your dealer disconnect the inlet and outlet water lines at the radiator and reverse flush the radiator and engine separately with a flushing gun made especially for this purpose. Remove the thermostat before reverse flushing or damage to this unit may result. If you live in a locality where the water contains lime or alkali deposits, this operation should not be overlooked. After the system has been thoroughly cleaned, always use a rust inhibitor in the water. A rust inhibitor is not necessary in the system while using anti-freeze, as an inhibitor is contained in most anti-freeze solutions. If the system is excessively contaminated, we

recommend using Ford Radiator Cleaner according to the instructions printed on the container. Externally clean the radiator fins to remove any accumulation of chaff or other foreign material. If this operation is done with an air hose, the air should be applied in a direction opposite to the normal air flow.

DRAINING THE COOLING SYSTEM

Each spring and fall the cooling system of the tractor should be drained and flushed. The thermostat should be removed prior to the flushing operation and reinstalled after the flushing operation is completed, then treated with a seasonal solution of anti-freeze or rust inhibitor. The cooling system may be drained by opening the petcock at the bottom of the radiator and the drain cock on the left side of the cylinder block.

LIME OR ALKALI WATER CONDITIONER

If you live in a locality that has lime or alkali in the water, rain or distilled water should be used for a coolant. Deposits caused by lime or alkali water quickly build up on the cylinder walls and coolant passages in the head, and, in time, will cause engine overheating that may eventually result in a cracked block or head. If water containing lime or alkali must be used, add a water softener, purchased from a reputable company, in the amount shown on the container.

COOLING SYSTEM PROTECTION

If the air temperature in your locality falls below the freezing mark of 32°F., anti-freeze must be added to the cooling system of your tractor. Alcohol is not recommended to protect the cooling system from freezing because it starts to boil at about 170°F., and during heavy duty operation the tractor may operate at temperatures above this figure. Certain types of anti-freeze have been known to contain contaminants that are injurious to engines. As a protective measure, we recommend purchasing anti-freeze from your Ford tractor dealer. Use ethylene glycol if the permanent type anti-freeze is desired. Before using anti-freeze in the system, be sure all water connections and cylinder head cap screws are tight. This is particularly important if permanent type anti-freeze is to be used. If anti-freeze is unnecessary in your locality, the cooling system should be treated with a rust and corrosion inhibitor.

WARNING: Anti-freeze solutions containing calcium chloride must never be used because they will quickly corrode the cooling system.

ANTI-FREEZE CHARTS

The following charts provide the means of determining the amount of anti-freeze required to protect the tractor cooling system at various temperatures against freezing. Capacity of system is 15 quarts.

Temperature	Ethylene Glycol
20°F.	6 pts.
10°F.	8 pts.
0°F.	11 pts.
-10°F.	12 pts.
-20°F.	14 pts.
-30°F.	15 pts.

Figure 42 United States Anti-freeze Chart

Temperature	Ethylene Glycol
20°F.	5 1/4 pts.
10°F.	7 pts.
0°F.	9 3/4 pts.
-10°F	10 1/4 pts.
-20°F.	12 pts.
-30°F.	12 1/2 pts.

Figure 43 British Imperial Anti-freeze Chart

ELECTRICAL SYSTEM

BATTERY

The battery is an electro-chemical device used to convert chemical energy into electrical energy. Its primary function is to store energy for starting the engine. After the engine starts, the generator supplies electrical current for the system.

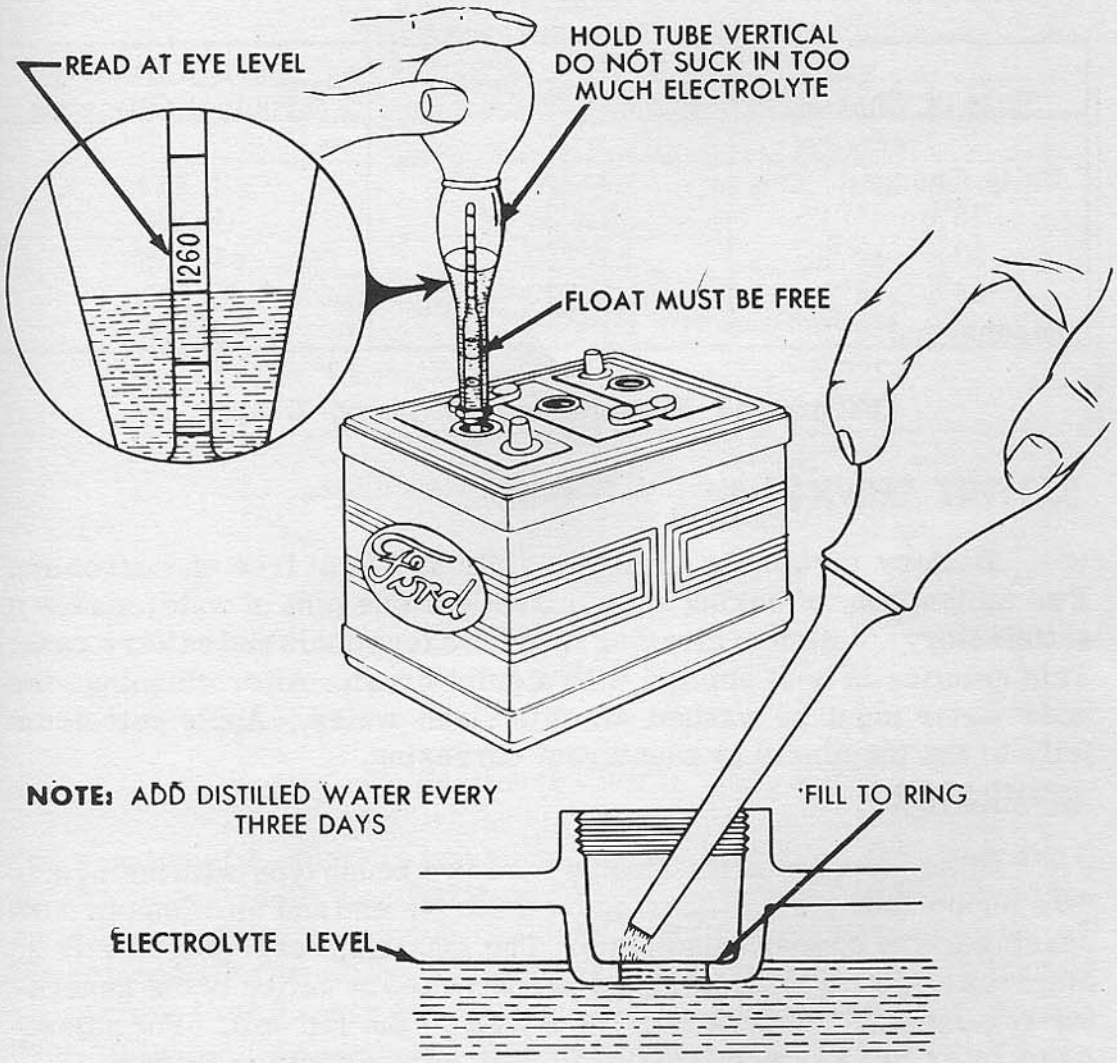


Figure 44 Checking Battery Electrolyte

CHECKING BATTERY ELECTROLYTE

At least once each week cover the cells up to the ring with distilled water or clean rain water. This is best done with a syringe. The specific gravity indicates state of battery charge, and is measured with a hydrometer. Reading directions are supplied by the hydrometer manufacturer. Rapid loss of the battery water is an indica-

tion of an overcharged battery and its cause should be corrected. A difference in reading of 20% to 25% between cells also indicates battery trouble. The temperature at which a battery will freeze depends on its state of charge and specific gravity. Keep the battery fully charged at all times.

A battery that is used in a tropical climate where freezing rarely occurs is provided with a milder strength acid which gives it a different specific gravity value than that used in cold climates. This is shown in the right column of Figure 45.

State of Charge	Specific Gravity Temperate Climates	Specific Gravity Tropical Climates
Fully Charged	1.280	1.225
75%	1.230	1.180
50%	1.180	1.135
25%	1.130	1.090
Discharged	1.080	1.040

Figure 45 Battery State of Charge Chart

BATTERY SERVICE

Battery terminals should be tight and kept free of corrosion. Two tablespoons of baking soda mixed with one pint of water makes a satisfactory solution of cleaning corroded terminals and battery case. This solution is best applied with a paint brush. After cleaning, the soda water must be washed off with clean water. Apply petroleum jelly to the terminals to counteract corrosion.

GENERATOR

The generator is the shunt wound, two brush type with the armature supported by a ball bearing on the drive end and an oiless bronze bearing in the opposite end plate. The maximum charging rate is 20 amperes at 1650 engine R.P.M. and is controlled by action of the generator regulator. The generator is driven by the fan belt. For adjustment refer to "Fan and Generator Belt Adjustment" in Section 5.

STARTING MOTOR

Pressing the starting button provides automatic meshing of the starting motor drive pinion with the flywheel gear and automatic release when the engine starts. Do not press the starter button when the engine is running as damage to the flywheel gear and starter drive pinion may result.

DISTRIBUTOR

The distributor used on the Model NAA Ford tractor engine pro-

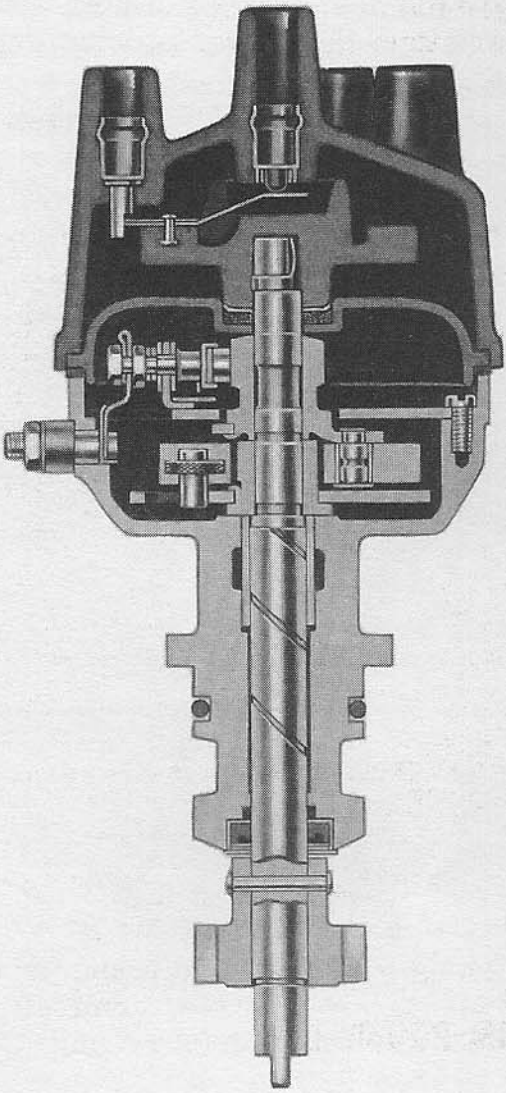


Figure 46 Sectional View of Distributor

vides automatic spark advance which is controlled by centrifugal weights mounted in the distributor base. It is angle mounted on the right hand side of the engine and driven by helical gears directly off the camshaft. One of the functions of the distributor is to interrupt the current flow through the ignition coil, thus causing the coil to produce voltage high enough to jump the gap at the spark plugs at the desired instant during the compression stroke. It also distributes this current through the distributor rotor, the terminal housing and the spark plug wires to the spark plugs in proper firing order. As engine speed increases, spark must occur earlier at the spark plugs. This is necessary to allow the fuel air mixture sufficient time to ignite. The centrifugal weights incorporated in the distributor, advance the breaker cam to give a predetermined variation in spark advance for different engine speeds. An accurate measurement of spark timing at any given engine R.P.M. can only be accurately determined on the engine by the use of a timing light.

The ignition system must, at all times, deliver a correctly timed and strong spark to each cylinder to obtain maximum performance from the engine.

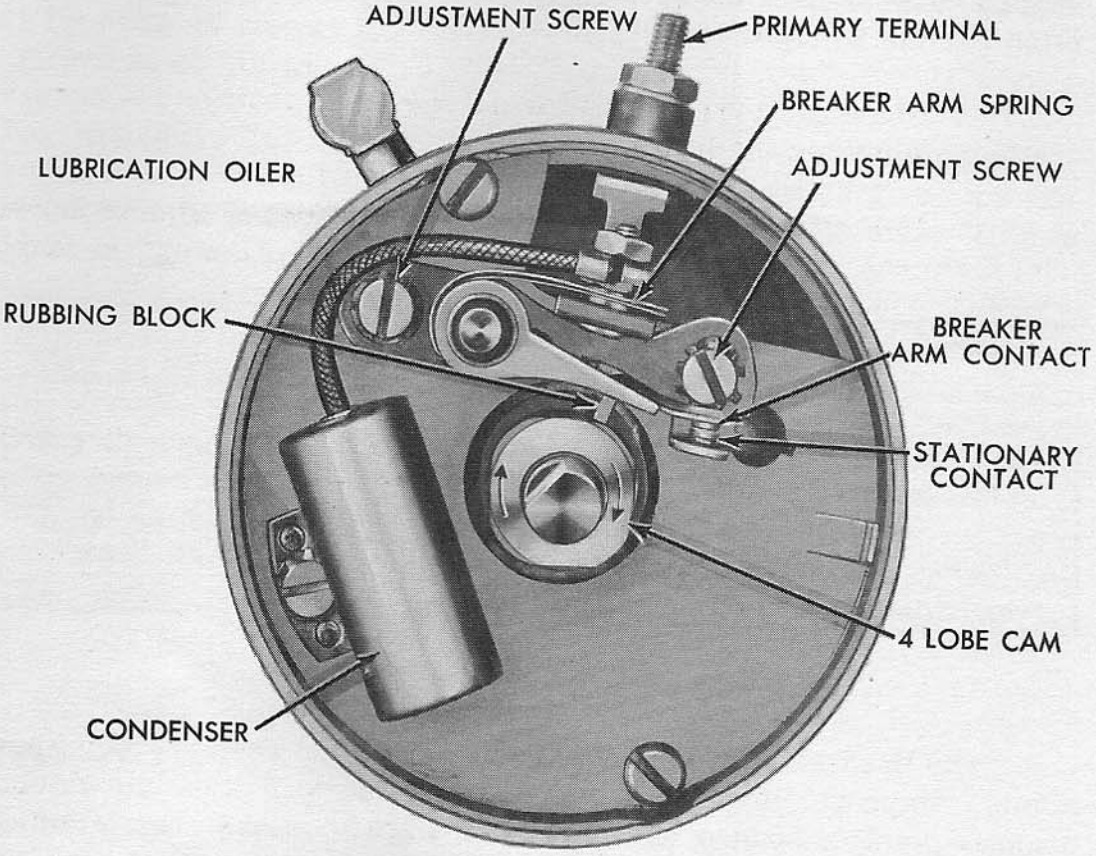


Figure 47 Model NAA Distributor

REMOVING IGNITION POINTS

Disconnect the electrical lead from the coil. Release the distributor cap clips and lift the cap off. Remove dust shield assembly.

Remove the breaker contact spring screw and washer (Figure 47). Remove the two screws and lock washers that secure the breaker contacts to the plate assembly, and lift out the breaker contacts.

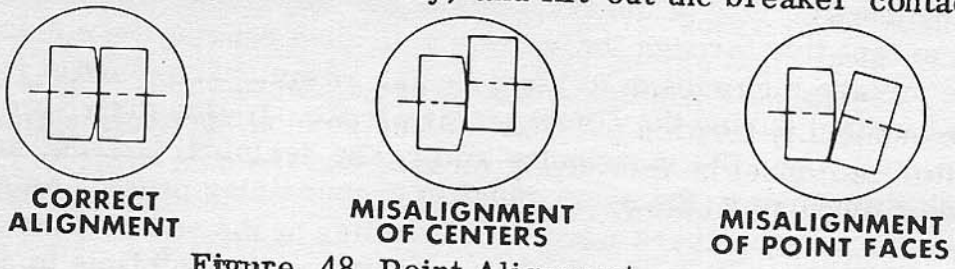


Figure 48 Point Alignment

INSTALLING AND ADJUSTING IGNITION POINTS

Ignition timing should be checked each time the ignition points are adjusted or replaced. When the contact points are closed they

must be parallel. If points need aligning, use wrench, No. 12150-A, which is made especially for this purpose. Breaker points that are not properly aligned cause excessive heating of the contact points which results in rapid burning or wear.

Install the ignition points in normal operating position and secure lightly by adjusting the lock screws.

Attach the condenser and primary circuit leads to distributor point terminal. Rotate the cam until rubbing block of the breaker arm is at high point of the cam. Make sure the screws are loose enough to allow adjustment.

Insert adjusting blade of the distributor adjusting wrench, No. 12150-A, in the adjustment opening and turn in the proper direction to obtain an air gap of .024" to .026". Use a round wire gauge to check the air gap.
CAUTION: Be sure to wipe the gauge with a clean cloth before inserting it between the points.

Tighten the screws and recheck the air gap.

The breaker arm tension should be checked when replacing new points. Improper breaker arm spring tension will cause the moving breaker point to bounce and results in erratic spark control which commonly causes the engine to misfire at high speeds. Breaker arm tension is 17 to 20 ounces, measured from the inner edge of point contact surface and at right angles to same.

Reassemble distributor.

OPERATIONAL COMPLAINTS

If excessive point pitting exists, check for correct contact spacing .024" to .026", check all of the connections for tightness, test the condenser on a condenser tester, check the condenser lead for frayed strands.

Never use an emery cloth to dress contact points. Use a stone made especially for this purpose. After stoning, the points and distributor cam must be thoroughly cleaned and the cam must be lubricated as suggested below.

Contacts must be set properly. Points set too closely burn and pit rapidly. Points with too wide a gap cause weak spark at high engine R.P.M.

Do not use a feeler gauge on points that have been in use, since roughness of points makes it impossible to set the gap correctly. Use

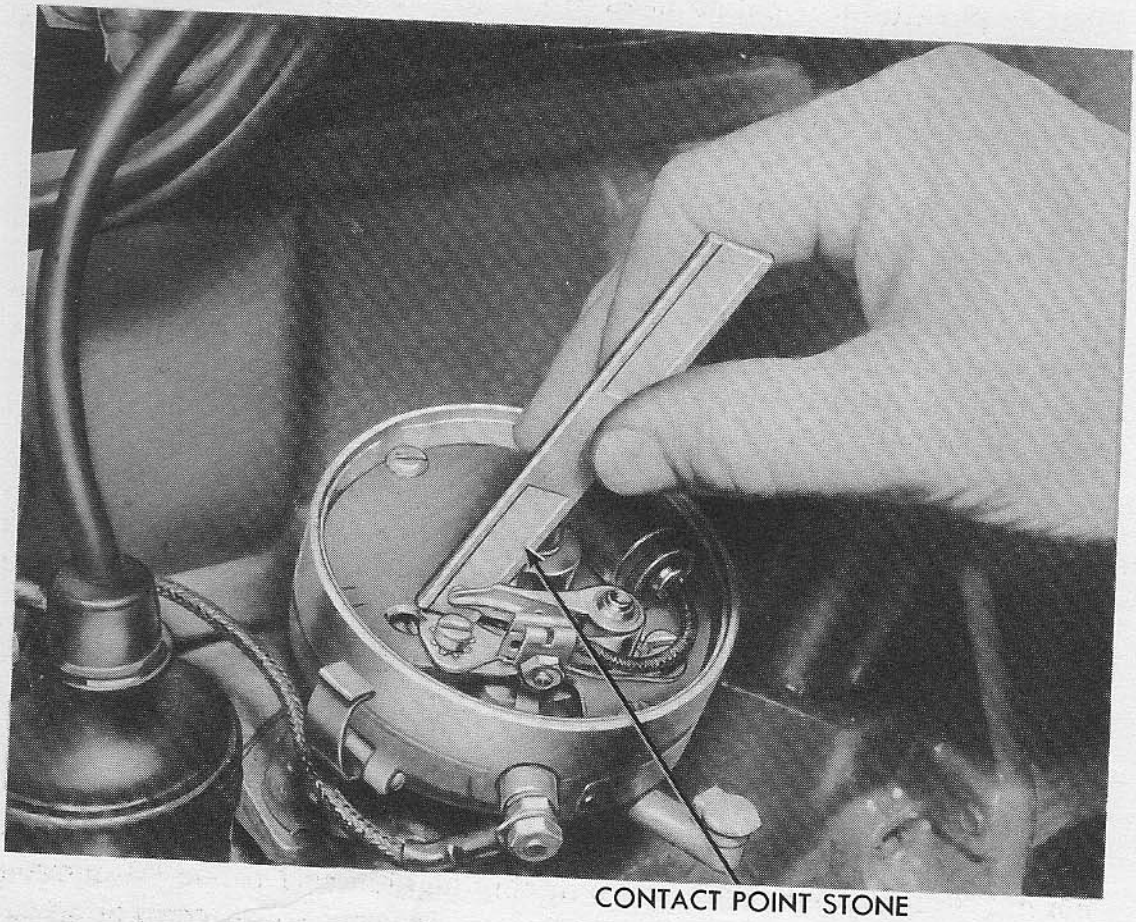


Figure 49 Stoning Distributor Contact Points to Remove Small Pits

a dial indicator or point wire gauge instead of the thickness gauge.

Oxidized points may be caused by high resistance or loose connections in the condenser circuit, or oil on the contact surfaces. Replace the distributor cap and rotor if they show evidence of carbonized paths.

Clean and lubricate the cam with a light film of Ford M-4601-A lubricant in accordance with instructions in the lubrication chart. Do not over lubricate, because oil reaching the contact points causes rapid burning of the points.

SETTING BASIC IGNITION TIMING

Be sure gear shifting lever is in neutral position and ignition switch is off before attempting to check ignition timing.

Remove distributor cap and spark plug from number one cylinder.

Hold a finger over the spark plug hole as the engine is cranked.

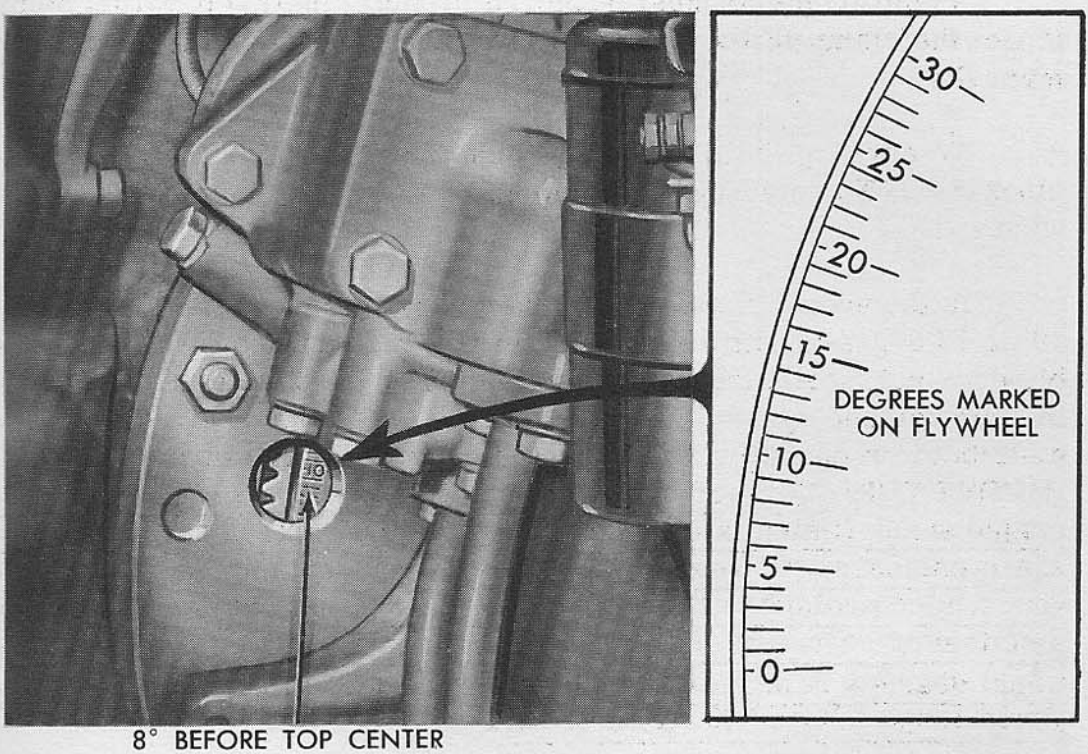


Figure 50 Basic Ignition Timing

Observe the distributor rotor closely while it revolves, then mark its exact location on the distributor body the moment compression blows by thumb.

Press the starting button again until the rotor is almost in alignment with the rotor location mark placed on the distributor housing and compression is felt at the number one spark plug hole. Stop with the rotor in this position.

Remove the timing hole cover on the flywheel housing. Observe the location of 8^{O} before top dead center on the flywheel in relation to the timing mark on the housing. If 8 degrees before top dead center marking does not align with the pointer, insert a screwdriver in the hole until it contacts the flywheel starting gear teeth. Turn the flywheel by applying leverage on the screwdriver until 8 degrees before top dead center marking on the flywheel does align with the timing mark.

When the 8 degrees before top dead center marking on the flywheel aligns with the mark, the number one piston is 8 degrees before top dead center position and is on the compression stroke ready to fire. In this position the ignition contact points should just begin to separate and the rotor must point to the number one spark plug wire. This is the basic ignition timing setting for idle speed (450 R.P.M) only.

If ignition points must be moved to obtain their separation point, loosen the clamp screw on the distributor body and turn the distributor manually.

To advance ignition timing, turn the distributor body counter-clockwise. To retard ignition timing, turn the distributor body clockwise.

In the event that the distributor body must be turned more than 10 or 12 degrees, lift the distributor vertically until the shaft assembly does not mesh, then turn the distributor rotor so that it points to the number one spark plug wire location. Position and reinstall the distributor in operating position and tighten the clamp screw securely. IMPORTANT: Correct basic engine timing does not indicate that engine spark timing is correct throughout the various speed ranges. After engine speed reaches 500 revolutions per minute, spark advance is controlled by the centrifugal advance mechanism built in the distributor. The use of an accurate timing light directed on the flywheel degrees is necessary to determine whether the centrifugal advance range (above 500 RPM) is correct.

Engine RPM.	0 to 450	1200	2000
Corresponding Spark Advance Crankshaft Degrees (B. T. C.)	8°	17 1/2° to 19 1/2°	29° to 31°

Figure 51 Distributor Centrifugal Advance Chart

SETTING IGNITION TIMING WITH TIMING LIGHT

Clip secondary lead of light to number one spark plug and leave the spark plug wire on the spark plug.

Connect primary positive lead (RED) of light to ground. Connect primary negative lead (BLACK) to "Battery" terminal of ignition coil.

Start engine and run at idle speed.

Direct timing light onto flywheel through opening in bell housing and note timing marks as light flashes.

Timing should be 8° before top dead center at idle speed (450 RPM).

When timing is at 8° before top dead center, tighten the distributor body clamp screw securely, then recheck the timing again with the timing light.

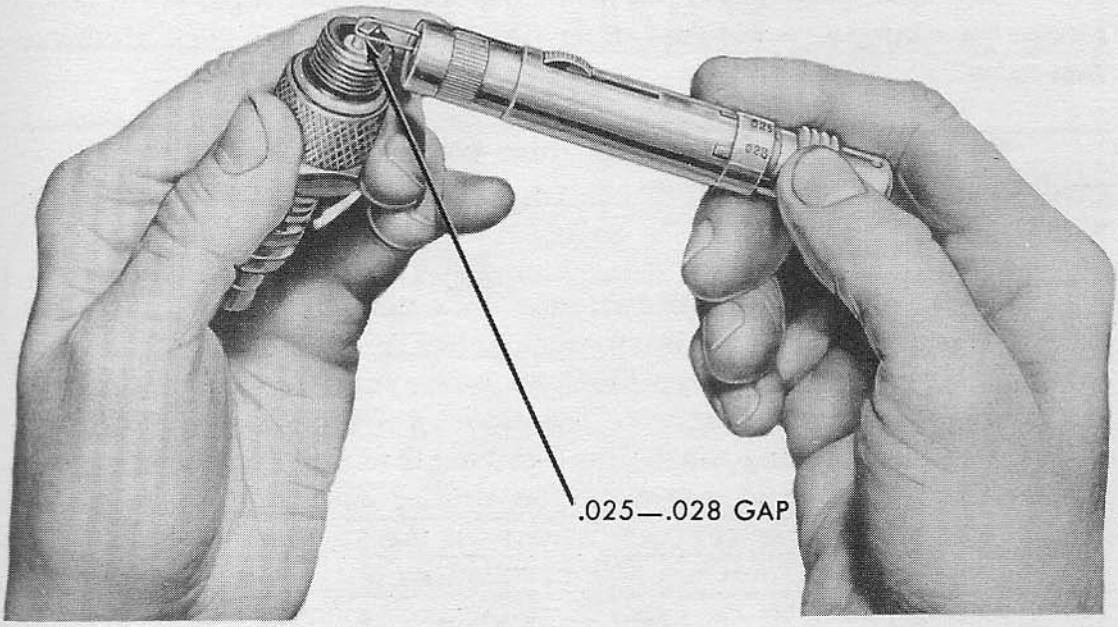


Figure 52 Checking Spark Plug Gap

SPARK PLUGS

Under normal operating conditions, the spark plugs should be removed, cleaned, and inspected every 250 hours.

Spark plugs may become fouled with carbon by leaky or stuck valves, overrich carburetion, gaps that are set too close, or oil in the combustion chamber due to worn cylinders and valve guides.

Spark plugs should be cleaned and tested with equipment made especially for this purpose. Some spark plugs may appear to be serviceable yet leak under compression pressure. This causes the plug to overheat and also results in loss of engine power. Discard plugs with badly pitted or cracked insulators. Spark plug wires can be kept free of oil and dirt by occasionally wiping them with a clean cloth.

Always use a round wire gauge to check the air gap as a feeler gauge will not measure the depression generally burned in the electrodes. Correct air gap is .025 to .028 inch.

H-10 heat range plugs, or equivalent, are engineered to give the best operating results and should always be used when installing new plugs. Size of the spark plug is 14 mm.

FUEL SYSTEM

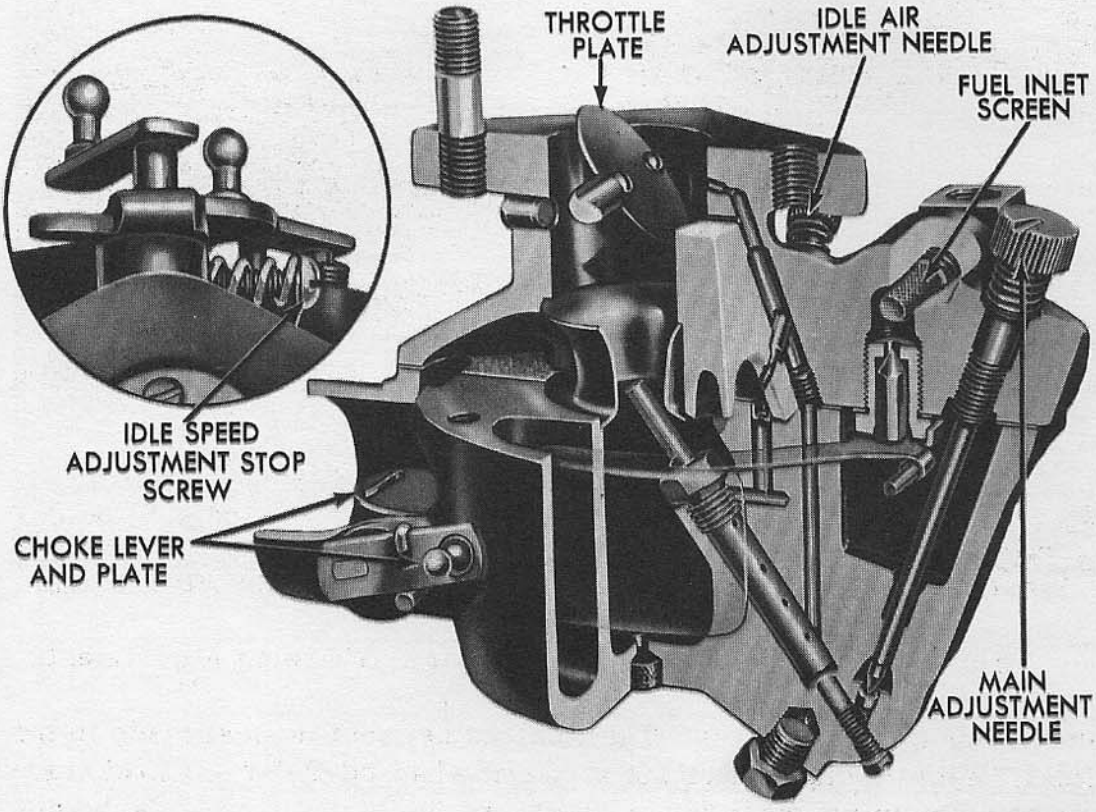


Figure 53 Sectional View Model NAA Carburetor

CARBURETOR ADJUSTMENT

Three adjustments on the carburetor are necessary. These are the main adjustment needle, idle speed adjustment stop screw, and idle adjustment needle. (See Figure 54). Before attempting to adjust the carburetor, the engine must always be at normal operating temperature as shown by the engine temperature gauge. With the hand throttle in closed position, set the engine idle speed at 450-500 R.P.M. This speed is determined by observing the engine R.P.M. on the Proof-meter. On a new engine not yet broken in this R.P.M. may have to be set slightly higher so that the engine does not stall at idle speeds. The idle speed adjustment stop screw is located on the engine side of the carburetor. For the initial setting before the engine is started, the idle adjustment needle should be turned in (clockwise) until it just seats, then backed off approximately one turn.

Start the engine and turn the idle adjustment needle in (clockwise) until the engine begins to roll from too rich a mixture, then back the needle off until the engine runs smoothly.

The initial setting for the main adjusting needle is 1 1/4 turns

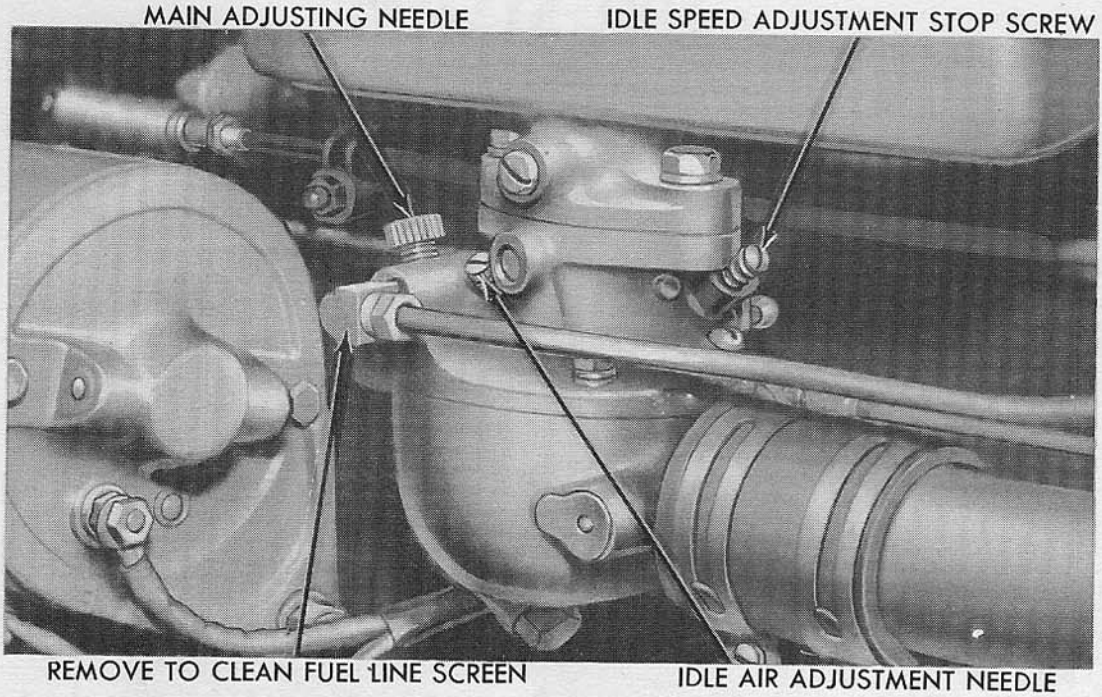


Figure 54 Model NAA Ford Tractor Carburetor Adjustments

open (counter-clockwise). The final adjustment is best made in the field. With the engine running at governed speed under full load, turn the adjustment needle in (clockwise) until the engine power just begins to drop off, then turn the screw out (counter-clockwise) until the power picks up and the engine runs smoothly.

CARBURETOR AIR CLEANER

The tractor is equipped with an oil bath type air cleaner. Its function is to prevent the entry of dirt into the carburetor and engine. Air is drawn through the left side panel screen into the air cleaner and directed into the oil in the cleaner cup, then through the filtering element into the carburetor. Heavy particles of dirt remain in the cup. Minute particles not retained in the cup are screened out by the filter element inside the air cleaner body. When oil in the cup becomes thick and gritty, the air cleaner is restricted and is not filtering out the dirt before it enters the carburetor. The average internal combustion engine uses about 10,000 gallons of air to every gallon of fuel. If this enormous amount of air is dirty when it enters the combustion chamber, it will quickly cut cylinder bores and piston rings, thus ruining the engine's performance and oil economy in a very short time. Servicing the air cleaner regularly is one of the most important maintenance operations to be performed in order to prolong engine life. See lubrication instructions (Section 10) for proper servicing of air cleaner.

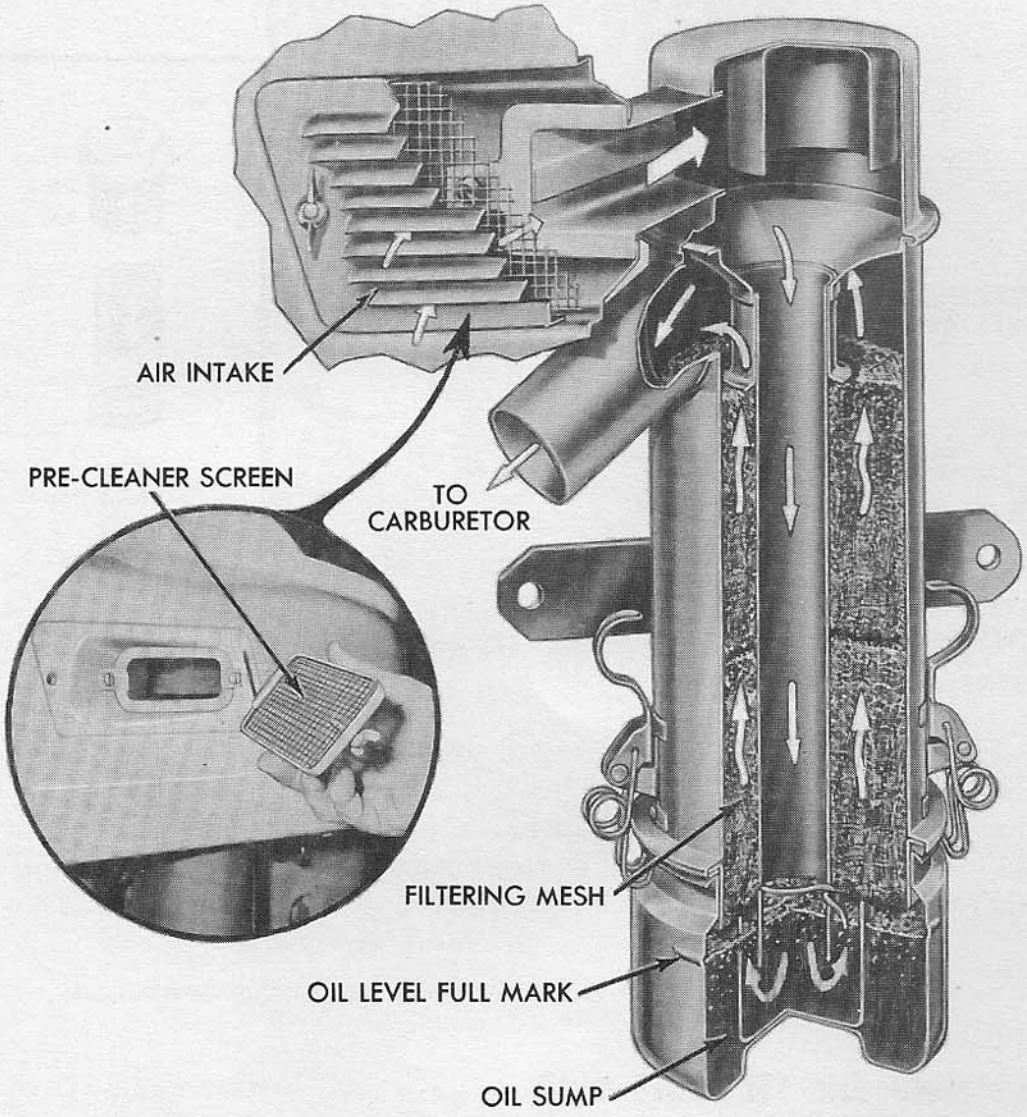


Figure 55 Sectional View of Carburetor Air Cleaner System

FUEL TANK SERVICE

The use of clean fuel will minimize fuel system failures. At the end of each day of operation, refill the fuel tank. This removes moisture laden air from the tank and thereby reduces the condensation of water. This is extremely important in freezing weather.

If the fuel sediment bulb quickly accumulates an excessive amount of dirt after cleaning, the fuel tank should be drained and thoroughly cleaned. Draining may be done by turning the valve to closed position, removing the fuel bowl glass, then removing the valve from the tank. The fuel tank capacity is eleven gallons. One gallon is the reserve supply. Turn the fuel valve to full open position to use the reserve supply.

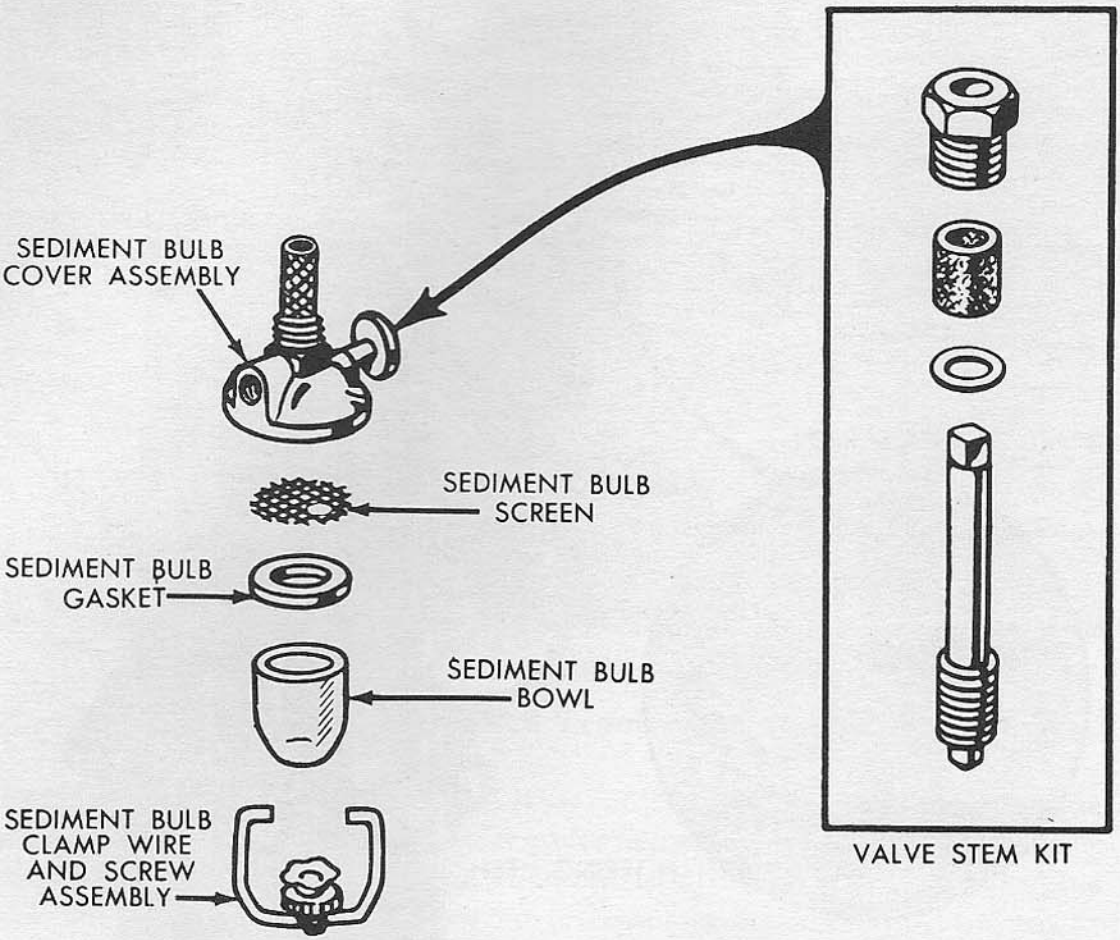


Figure 56 Sediment Bulb Detail In Assembly Sequence

CLEANING THE SEDIMENT BULB

Turn the fuel valve clockwise to off position. Loosen the fuel bowl retaining nut and move the bowl retaining clamp sideways until the bowl can be removed. Remove and clean the disc screen located in the upper half of the filter, and clean the bowl with a clean cloth (See Figure 56).

HYDRAULIC SYSTEM

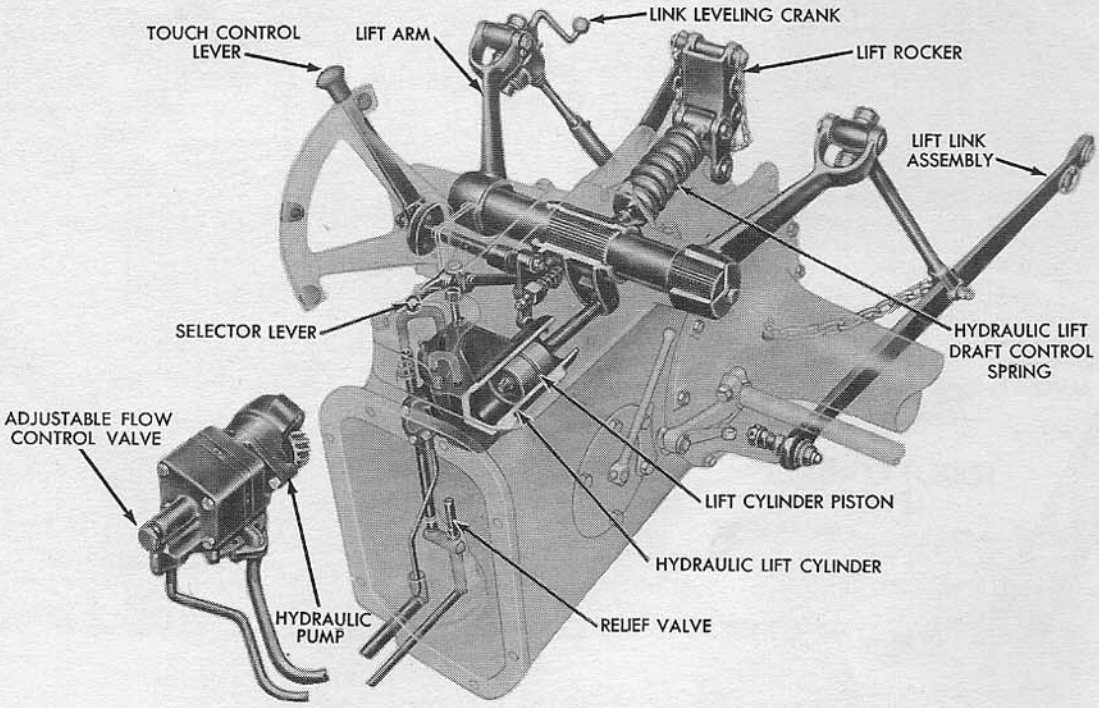


Figure 57 Sectional View of Hydraulic Lift

GENERAL DESCRIPTION

The hydraulic system of the Model NAA Ford tractor provides hydraulic power for raising and lowering various types of farm implements. Power is supplied by an engine-mounted, gear-driven, vane-type rotary pump.

The hydraulic system is composed of two major units, namely; the hydraulic pump and the lift cover assembly. The hydraulic system controls are mounted on the lift cover assembly and on the pump.

HYDRAULIC CONTROLS

Constant draft (automatic) and position (manual) control are the two types of control incorporated in the Model NAA Ford tractor hy-

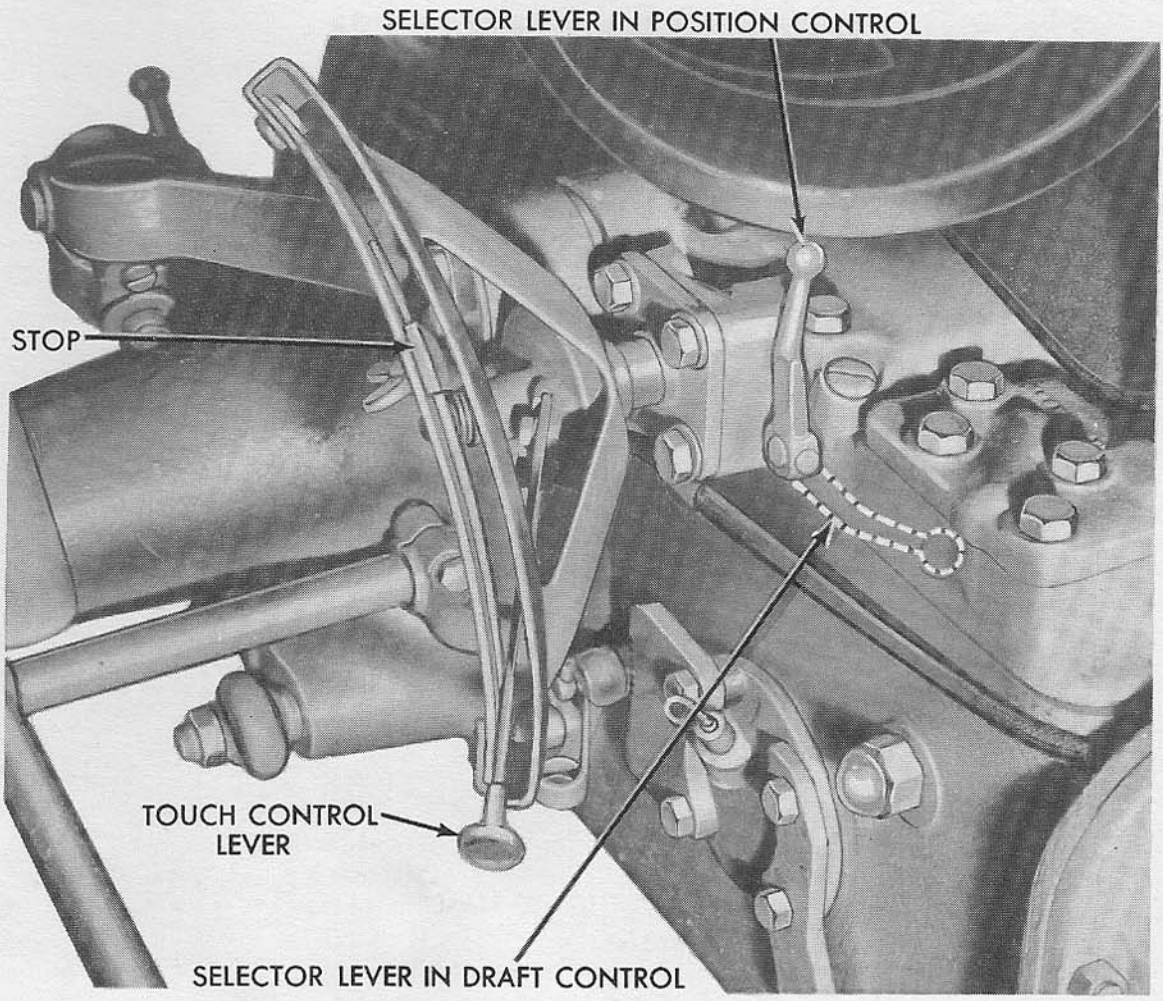


Figure 58 Hydraulic Control Levers

draulic system. Either control can be used by moving the selector lever to the desired position. Type of implement and soil conditions are the deciding factors in selecting what control to use.

TOUCH CONTROL LEVER

The large lever to the right of the driver's seat is called the touch control lever. It is the master control lever of the hydraulic system. The function of the touch control lever is to regulate the depth of the implement in the ground. Once the proper depth or draft of the implement has been determined and the adjustable stop on the touch control quadrant set, the implement will always return to the same setting each time the touch control lever is lowered against the stop.

OPERATING TRACTOR IN POSITION CONTROL (Manual Control)

The selector control lever is located on the right side of the hydraulic control cover under the seat. When the selector lever has been moved into the vertical position, as shown in Figure 58, the hydraulic system is set to operate in position control.

Position control means that the operator can work the implement at a predetermined depth. By this control the operator is able to set the implement to the desired depth of operation, and maintain this position by setting the adjustable stop on the quadrant and returning the lever to this stop during or after any cycling of the controls.

OPERATING TRACTOR IN CONSTANT DRAFT (Automatic Control)

When the selector control lever is moved to the horizontal position as outlined in Figure 58 the hydraulic system is operating in draft control. Under constant draft control the hydraulic system automatically maintains constant draft on the tractor by compensating for variations in soil conditions.

Draft control allows the operator to utilize the tractor to the utmost when in heavy duty operation. If the implement should encounter increased draft because of change of soil or contour of the ground, the hydraulic system responds to raise the implement to decrease the draft and simultaneously shift weight to the rear wheels of the tractor to improve traction. This action is almost instantaneous and allows the operator to continue under conditions that would stall or cause wheel spin in a tractor not equipped with draft control.

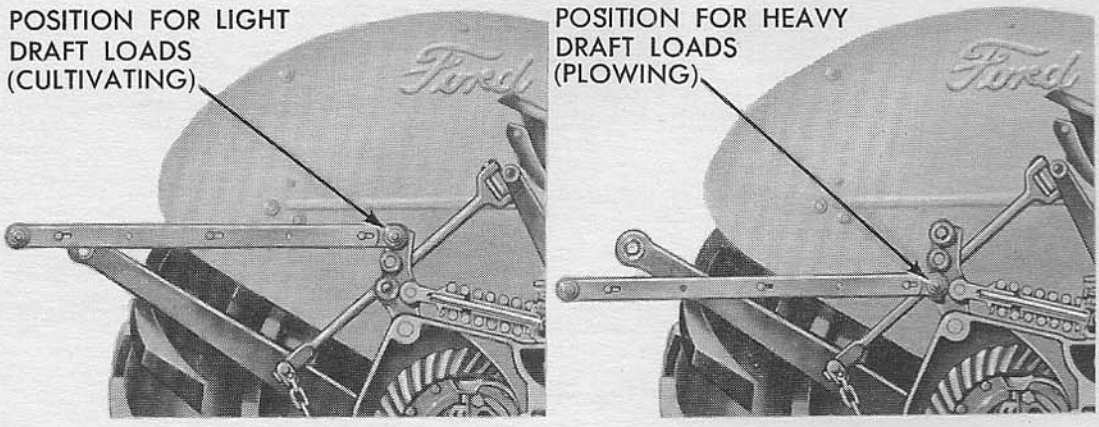


Figure 59 Position of Top Link for Light and Heavy Draft

The tractor is provided with a rocker arm with three holes for more sensitive operation. The top link can be selectively inserted in any one. When the top link is in the second or top most hole, increased leverage assists in compressing the master control spring so that a lighter force is amplified to actuate the controls of the hydraulic system.

This provides the operator with a wide range of draft, for light and heavy draft implement applications.

HYDRAULIC CONTROL ADJUSTMENTS

The hydraulic system has been adjusted at the factory and no

further internal adjustments are required.

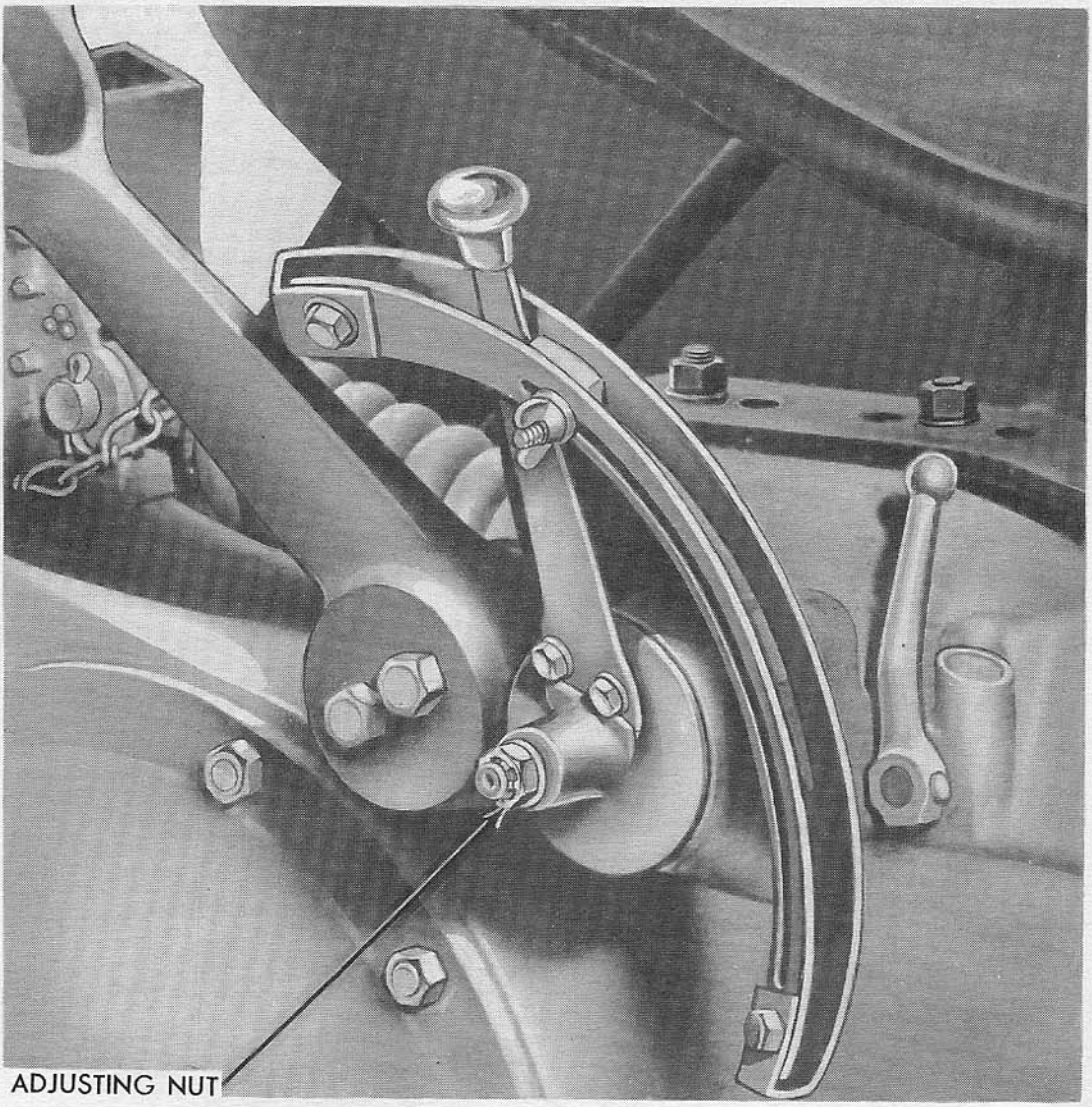


Figure 60 Adjusting Nut, Touch Control Lever

ADJUSTING THE TOUCH CONTROL LEVER

Tighten or loosen the nut on the end of the hydraulic lift control lever (Figure 60) shaft so that it takes a pull of 4 to 5 pounds to move the lever.

ADJUSTABLE FLOW CONTROL VALVE

Turning the control valve on the end of the pump in (clockwise) increases the flow with which hydraulic oil is pumped to the lift cylinder. Turning the same adjustment out (counter clockwise) decreases the flow with which oil is pumped to the lift cylinder.

CAUTION: When using the plow and most agricultural implements the hydraulic speed control adjustment should be turned out (counter clockwise) otherwise rough operation might result.

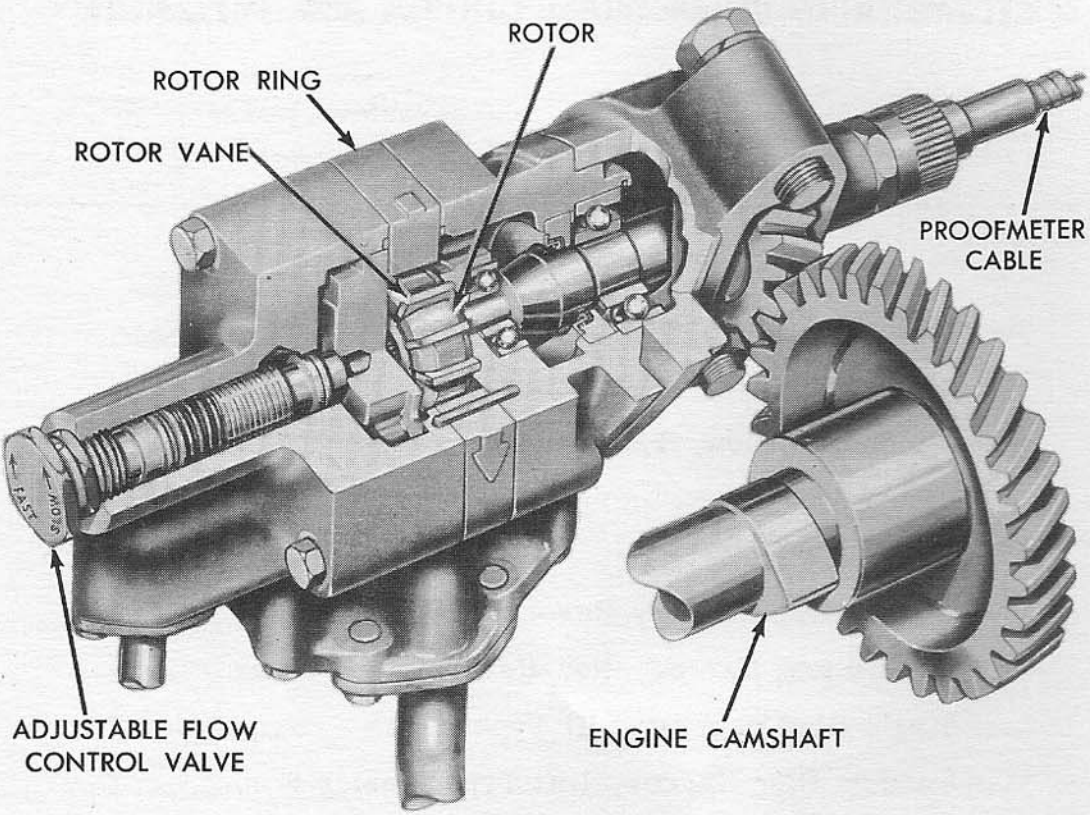


Figure 61 Model NAA Ford Tractor Hydraulic System Pump

In using auxiliary equipment such as loaders, remote cylinders or both, it is recommended that the valve be turned in (clockwise) to obtain maximum operating speed.

RECOMMENDED USE OF DRAFT CONTROL AND IMPLEMENT

Implement
SOIL BREAKING & FITTING
Moldboard Plow, Single Bottom
Moldboard Plow, Two Bottom
Moldboard Plow, Three Bottom
Two Way Plow
Disc Plow
Bush & Bog Harrow, Reversible
Bush & Bog Harrow, Non-Reversible
Single Disc Harrow, Lift Type
Tandem Disc Harrow, Lift Type, Series F
Tandem Disc Harrow, Pull Type, Series F
Field Cultivator
Sub soiler
Taylor Disc Tiller, 10-64
Spring Tooth Harrow
Krause Plow

NOTE:

When attaching any implement that utilizes the three point hook-up, it is recommended that implement position control be used for better control of the lift arms in the attaching process.

POSITION CONTROL WHEN OPERATING DEARBORN IMPLEMENTS

General Recommended Setting for Average Conditions		Exceptions
Draft Control	*	Implement Position Control
Draft Control	*	Implement Position Control
Draft Control	*	Implement Position Control
Draft Control	*	Implement Position Control
Draft Control	*	Implement Position Control
Draft Control	**	Implement Position Control
Draft Control	**	Implement Position Control
Draft Control	**	Implement Position Control
Draft Control	**	Implement Position Control
Either Draft Control or Implement Position Control		
Draft Control		
Draft Control		
Draft Control		
Draft Control	***	Implement Position Control
Draft Control	**	Implement Position Control

NOTE:

* Where field topography is smooth and soil texture changes, implement position control can be used; however, draft control is usually used.

** Draft control is recommended in most conditions. Sometimes implement position control is used if the field topography is smooth or for special operating conditions but has no particular advantage.

*** Depth determined in relation to the runners on the ground. Most often used in draft control but is, in reality, a pull behind implement.

Implement

PLANTING & CULTIVATING

Corn Planter, (Check row, Drill and Hill Drop)

Cotton and Corn Planter (Runner and Shovel Type)

Grain Drill

Lime & Fertilizer Spreader

Kelly Planter Attachment on Cultivator or Buster Frame

Middlebuster

Row Crop Cultivator

HARVESTING

Side Mounted Mower

Rear Mounted Mower

Combine

Corn Harvester & Corn Picker

Side Delivery Rake, Pull Type

INDUSTRIAL

Manure Spreader

Universal Frame

All Purpose Blade

Utility Blade

Loaders

a. Standard

b. Heavy Duty
c. Industrial
d. Rear Mounted

Scoop

Wagon

General Recommended Setting for Average Conditions	Exceptions
Draft Control	
Draft Control	
Fixed Drawbar	
Fixed Drawbar	
Draft Control	Implement Position Control (in light soil conditions)
Draft Control	
Either Draft Control or Implement Position Control	
Implement Position Control	
Implement Position Control	
Fixed Drawbar	
Fixed Drawbar	
Implement Position Control	
Fixed Drawbar	
Implement Position Control	
Either Implement Position Control or Draft Control	
Either Implement Position Control or Draft Control	
Either Implement Position Control or Draft Control	
Not Affected	
Not Affected	
Implement Position Control	
Draft Control	
Fixed Drawbar	

Implement

Post Hole Digger

Cordwood Saw

Rear End Crane

Road Maintainer

TRACTOR AND ACCESSORIES

Tractor Jack

General Recommended Setting for Average Conditions	Exceptions
Implement Position Control	
Either Implement Position Control or Draft Control	
Implement Position Control	
Not Affected	
Implement Position Control	

TROUBLE SHOOTING

STARTER FAILS TO OPERATE

A. Low or discharged battery
B. Loose or broken battery cables
C. Starter solenoid contacts burned or pitted
D. Starter drive fails to operate
E. Dirty armature commutator or badly worn brushes
F. Short in windings of starting motor

ENGINE CRANKS BUT FAILS TO START

A. No spark at spark plugs
Note: Remove wire from spark plug. Grip the wire by the insulation and hold it 3/8 of an inch from the base of plug, turn ignition on, push starter button down to determine if spark jumps from wire to base of plug.
B. Spark plugs dirty or improper gap
C. Improper distributor timing
D. Lack of compression
E. Gasoline not reaching combustion chamber

ENGINE OPERATES BUT KNOCKS OR LACKS POWER

A. Excessive carbon deposits
B. Improper distributor timing
C. Spark plugs dirty, wrong gap, or wrong type
D. Poor or weak spark
E. Carburetor setting incorrect
F. Engine overheating

G. Governor not working properly
H. Valve burnt, sticking, or needs adjustment
I. Poor compression
J. Air cleaner clogged
K. Clutch slipping
L. Restricted exhaust system

NO OIL PRESSURE OR USES TOO MUCH OIL

A. Defective oil gauge
B. Insufficient oil
C. Defective oil lines
D. Oil pump not working
E. Worn bearings
F. Crankcase breather clogged
G. Worn pistons and rings
H. External oil leak

STARTER FAILS TO OPERATE

A. Recharge or replace battery
B. Tighten or replace cable
C. Replace solenoid switch
D. Repair or see your dealer's service man
E. Repair, replace, or see your dealer's service man
F. See your dealer's service man

ENGINE CRANKS BUT FAILS TO START

A. Check battery, coil, and distributor, or see your dealer's service man

B. Clean and regap or replace
C. Retime or see your dealer's service man
D. See your dealer's service man
E. Check gasoline supply. Check flow of gasoline from fuel tank through line or see your dealer's service man

ENGINE OPERATES BUT KNOCKS OR LACKS POWER

A. See your dealer's service man
B. Retime or see your dealer's service man
C. Clean and regap or replace
D. Check coil or see your dealer's service man
E. Adjust or see your dealer's service man
F. Check coolant level, thermostat, fan belt, water pump, deposits caused by lime or alkali water, too lean carburetor mixture, incorrect ignition timing, or see your dealer's service man
G. Adjust governor, free linkage, or see your dealer's service man
H. See your dealer's service man
I. See your dealer's service man
J. Clean thoroughly and fill cup to level with clean oil
K. Adjust linkage, or see your dealer's service man
L. Examine tail pipe for restriction

NO OIL PRESSURE OR USES TOO MUCH OIL

A. Replace gauge or see your dealer's service man
B. Add correct amount of oil (See Section 10)
C. Replace or see your dealer's service man
D. See your dealer's service man
E. See your dealer's service man
F. Clean thoroughly and coat lightly with clean engine oil
G. See your dealer's service man
H. Correct or see your dealer's service man

USING TOO MUCH FUEL

A. Fuel mixture too rich

B. Fuel leaks
C. Choke pulled out
D. Engine overloaded
E. Poor compression
F. Faulty ignition
G. Air cleaner clogged

BRAKES

A. Do not hold
B. Uneven or drag
C. Do not release

TRANSMISSION AND POWER TAKE-OFF

A. Gears clashing
B. Power take-off does not operate
C. Parts damaged due to foreign material

HYDRAULIC SYSTEM

A. Lift will not operate

B. Oil leak
C. Lift operates too slowly
D. Lift operates too rapidly
E. Pump makes abnormal amount of noise

STEERING

A. Tractor pulls to one side
B. Difficult steering

WHEELS AND TIRES

A. Rear wheel slippage
B. Uneven tire wear

USING TOO MUCH FUEL

A. Check for too much oil in air cleaner, adjust carburetor, or see your dealer's service man
B. Correct or see your dealer's service man
C. Push choke in
D. Reduce load on engine
E. See your dealer's service man
F. Check circuit or see your dealer's service man
G. Clean thoroughly and fill cup to level with clean oil

BRAKES

A. Adjust or see your dealer's service man
B. Adjust
C. Check linkage or see your dealer's service man

TRANSMISSION AND POWER TAKE-OFF

A. Stop tractor before shifting gears
B. Check P. T. O. lever on left side for engaged position
C. Thoroughly clean assemblies and replace parts or see your dealer's service man

HYDRAULIC SYSTEM

A. Check oil level and for broken connections or see your dealer's service man
B. Correct or see your dealer's service man
C. Check hydraulic speed control adjustment
D. Check hydraulic speed control adjustment
E. Check for bubbles (cavitation) in hydraulic oil system, broken line, loose connections or see your dealer's service man

STEERING

A. Check for brakes dragging
B. Check oil level in steering housing, check front wheel toe-in

WHEELS AND TIRES

A. Add weight, check for too much tire pressure, or worn tires
B. Check toe-in adjustment

LUBRICATION AND STORAGE

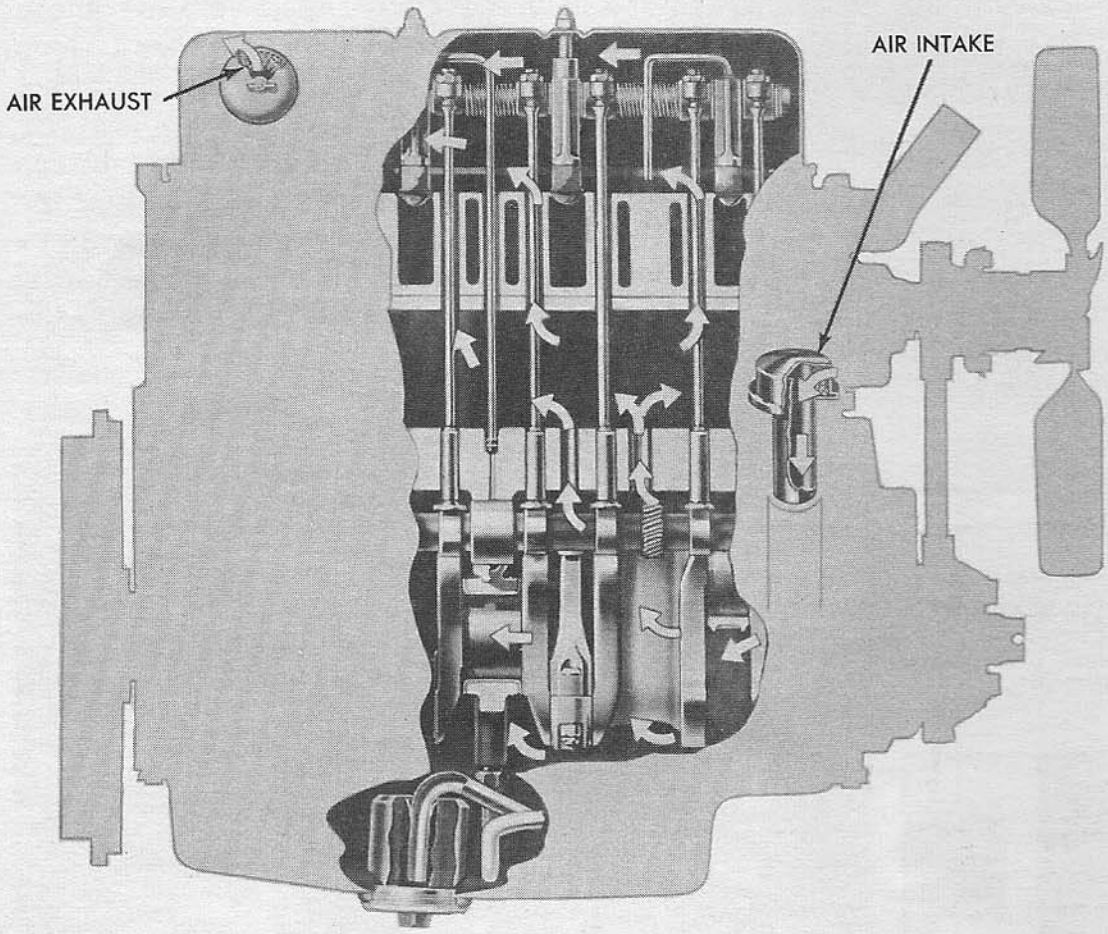


Figure 62 Crankcase Ventilating System

The tractor will be subjected to a variety of operating conditions. Therefore, it is extremely important to use lubricants that will protect all moving parts. Lubrication is the enemy of wear, and effective lubrication plays an important part in obtaining normal service life from the tractor. To obtain effective lubrication, the correct lubricant must be used at the correct place at the correct time. A good lubricant must function for a long time without an appreciable change in its physical or chemical characteristics. All lubricants do not give these results, therefore, we recommend using only the best grades available, that are made by reputable suppliers. Changing the engine crankcase oil is necessary at regular intervals because it becomes diluted and contaminated during normal use. Extended use of the same oil results in excessive wear and corrosion to engine parts. The hours between lubrication application as shown on the lubrication chart are for average operating conditions. More frequent applica-

tions are necessary when operating under extremes of temperature and dust.

CRANKCASE VENTILATION

The engine crankcase and valve cover are ventilated to remove water vapor, gasoline vapor, and other blowby products, and to help prevent the accumulation of materials resulting from oil deterioration.

Clean air is taken into the engine through the oil filler tube cap and expelled through a filter port located on the right rear side of the engine valve cover. Whenever the ventilating system becomes restricted pressure in the crankcase is raised above normal, resulting in possible abnormal oil consumption and external oil leakage at the mating surfaces of the oil pan and block or seals.

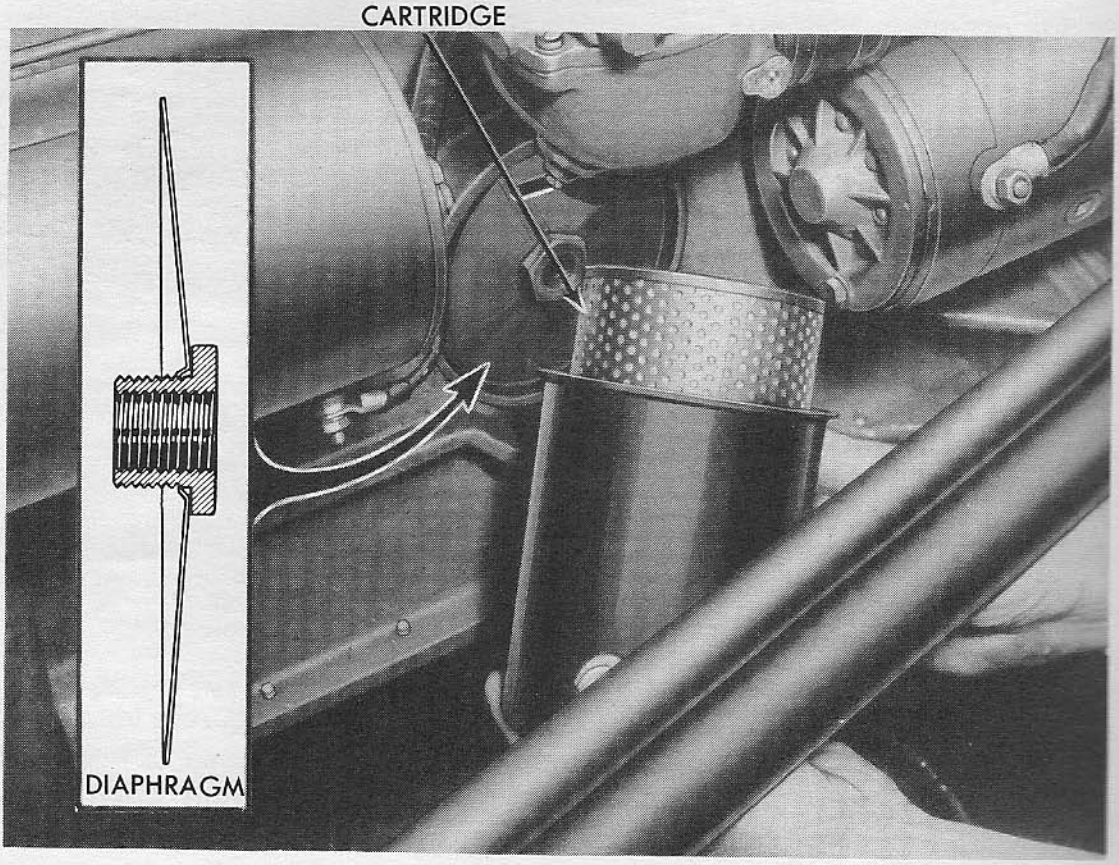
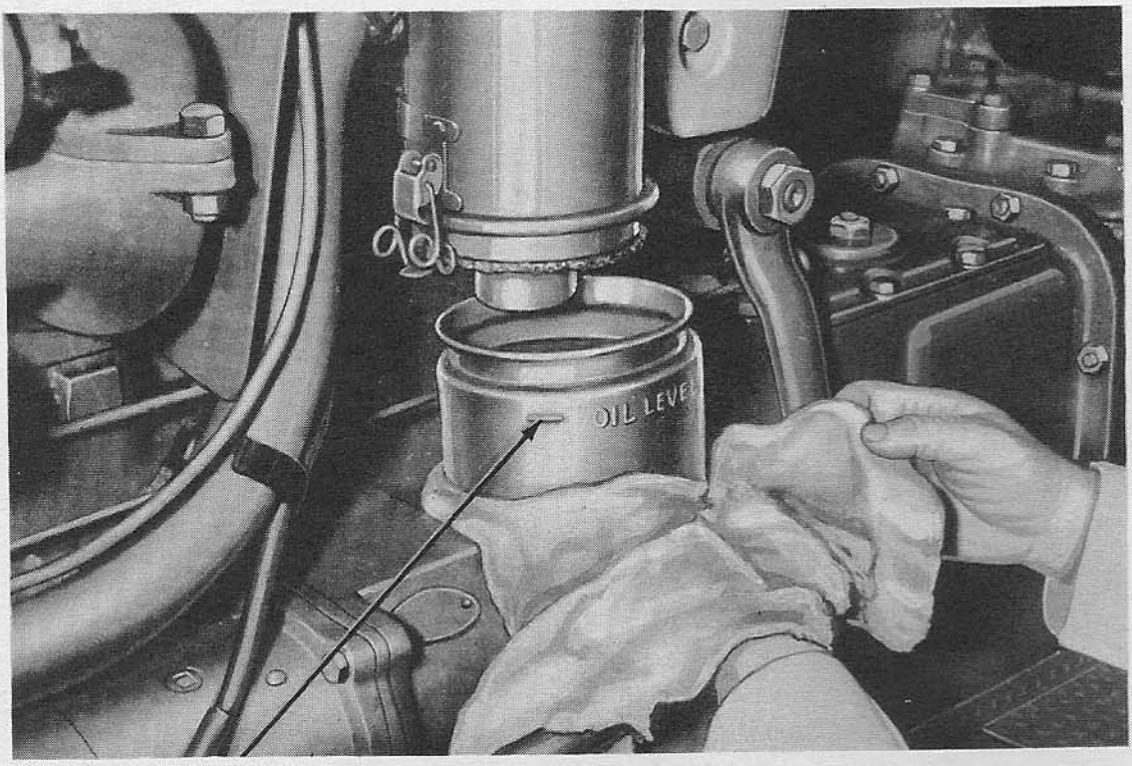


Figure 63 Oil Filter Cartridge Replacement

OIL FILTER

A replaceable element type, full flow oil filter is used on the tractor engine. The purpose of this filter is to remove dirt and contaminants from the oil before it is allowed to circulate through the system and cause premature wear of moving parts. Always use new gaskets when changing filter elements and tighten the center bolt 20 to 25 foot

pounds torque. Overtightening may crush the housing and result in leakage.



OIL LEVEL FULL MARK

Figure 64 Checking Air Cleaner Cup Oil Level

CARBURETOR AIR CLEANER

Inspect the air cleaner cup every 10 hours. If oil in the cup is in a thick condition or dirt is evident, remove the cup, clean and refill. The cup is full when the oil registers with the raised bead on the cup. Cup capacity is approximately one pint. At least once every six months remove the air cleaner and filtering element inside the air filter body from the tractor and wash in a cleaning solvent. The air intake screen, located on the left side of the tractor hood, must be removed and cleaned regularly. A restricted air cleaner causes a rich air-fuel mixture resulting in excessive fuel consumption.

OIL CHANGE PERIODS

Under normal operating conditions, engine oil should be changed every 100 hours. The frequency of oil changes depends upon the severity of the operation. Under extreme conditions, oil should be changed more frequently than is shown on the lubrication chart. Oil should be changed every 50 hours when operating the tractor in below freezing temperatures. Intermittent engine operation and idling time should be kept to a minimum in cold weather to prevent dilution of oil. Low temperature operation promotes sludging, which in some respects is as

detrimental to normal engine life as high temperature operation.

ENGINE OIL DIPSTICK

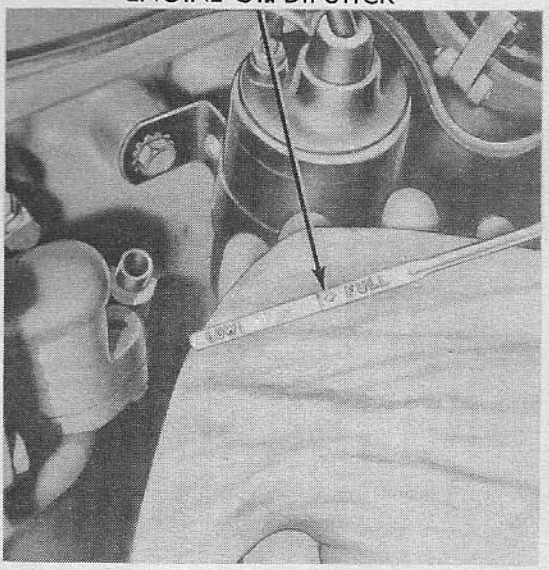


Figure 65 Crankcase Oil Level Dip Stick

CHECK HYDRAULIC OIL LEVEL WITH ALL CYLINDERS EXTENDED

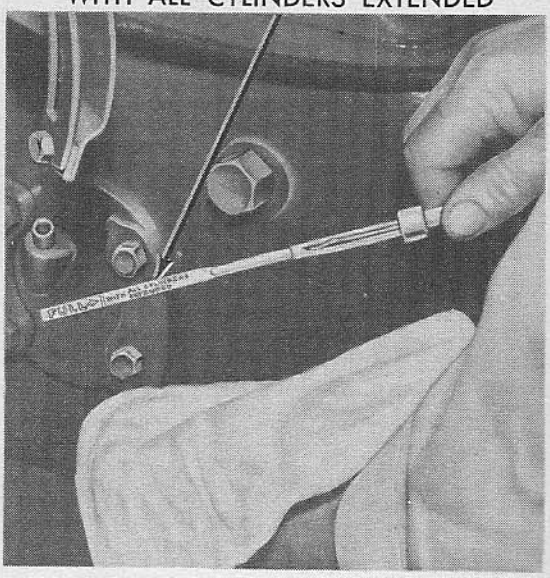


Figure 66 Hydraulic Oil Level Dip Stick

CRANKCASE OIL LEVEL DIP STICK

The crankcase oil level is determined by withdrawing the dip stick from the crankcase on the right side of the engine. Always wipe the dip stick with a clean cloth, then reinsert it to visually compare the oil level in the crankcase with the markings on the dip stick. Never use the engine oil pressure gauge as the means of determining when the oil is low because gauge pressure has no bearing on the amount of oil in the engine crankcase. The oil supply can become dangerously low and still show pressure on the gauge.

HYDRAULIC SYSTEM OIL

The hydraulic system of the tractor must be kept clean at all times. Even minute particles of dirt mixed with the oil may result in premature wear of the pump and other units of the system.

Inspect the hydraulic system oil level daily by comparing the oil level with the markings on the dip stick. Note: Be sure all cylinders are extended when checking the level. Prior to removing the filler plug, clean the surrounding area. When fueling the hydraulic system with the recommended oil, always strain the oil through a fine mesh strainer.

PREPARING THE TRACTOR FOR STORAGE

Tractors which are used only seasonally should be protected while in storage. The following operations are suggested:

Block clutch in released position to keep clutch disc from seizing to pressure plate.

Drain and refill transmission, differential and hydraulic system with clean oil.

Drain and refill engine crankcase with engine preservative oil to prevent internal corrosion. Leading oil companies merchandise oils made especially for this purpose.

Lubricate the tractor as outlined in the lubrication chart.

Drain the fuel tank and sediment bowl, then run the engine until the gasoline supply in the carburetor is exhausted.

Remove the spark plugs and pour 3 ounces of engine preservative oil into each cylinder. Turn the engine several revolutions with the starter, replace the plugs. This will coat the combustion chamber with an oil film.

Remove the battery and be sure it is fully charged before placing it in storage in a warm place.

Place blocking under the tractor axles to remove the weight from the tires.

Drain the cooling system to prevent possible damage from freezing by opening the drain cock at the bottom of the radiator and on the left side of the engine block.

REMOVING THE TRACTOR FROM STORAGE

Tractors which have been placed in storage should be completely serviced before putting into use.

Inflate the tires to recommended pressure, and remove the blocking from under the tractor axles.

Fill cooling system. Use corrosion inhibitor in warm weather, anti-freeze in winter.

Fill gasoline tank with fuel.

Check oil level in crankcase, rear end, transmission, and air

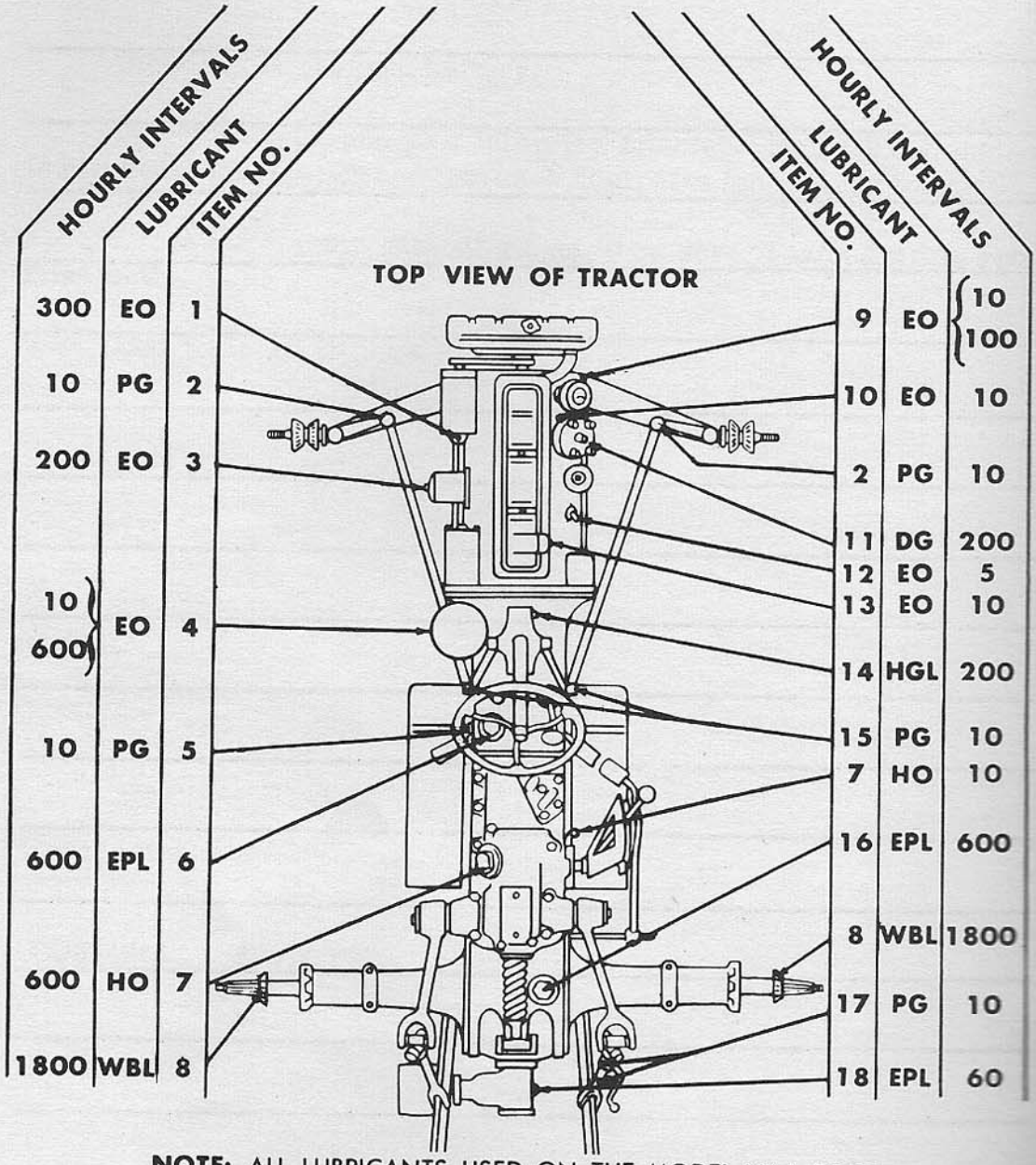
cleaner.

Install fully charged battery.

Start the engine and let it idle a few minutes. Be sure the engine is receiving lubrication and that each control is functioning correctly.

Drive the tractor without a load to be sure it is operating satisfactorily.

Lubricate all fittings.



NOTE: ALL LUBRICANTS USED ON THE MODEL NAA FORD TRACTOR SHOULD CONFORM TO FORD M SPECIFICATIONS

SYMBOLS	SPECIFICATIONS
EO—ENGINE OIL	M-4710-20-30 AND M-4711A, RUST PREVENTIVE M-4834A OR C
PG—PRESSURE GUN GREASE	M-538
WBL—WHEEL BEARING LUBRICANT	M-4702
EPL—EXTREME PRESSURE LUBRICANT	M-568D OR E
HGL—HYPOID GEAR LUBRICANT	M-4642D OR E
DG—DISTRIBUTOR GREASE	M-4601A
HO—HYDRAULIC OIL	M-4864A OR C

Figure 67 Top View of Lubrication Chart

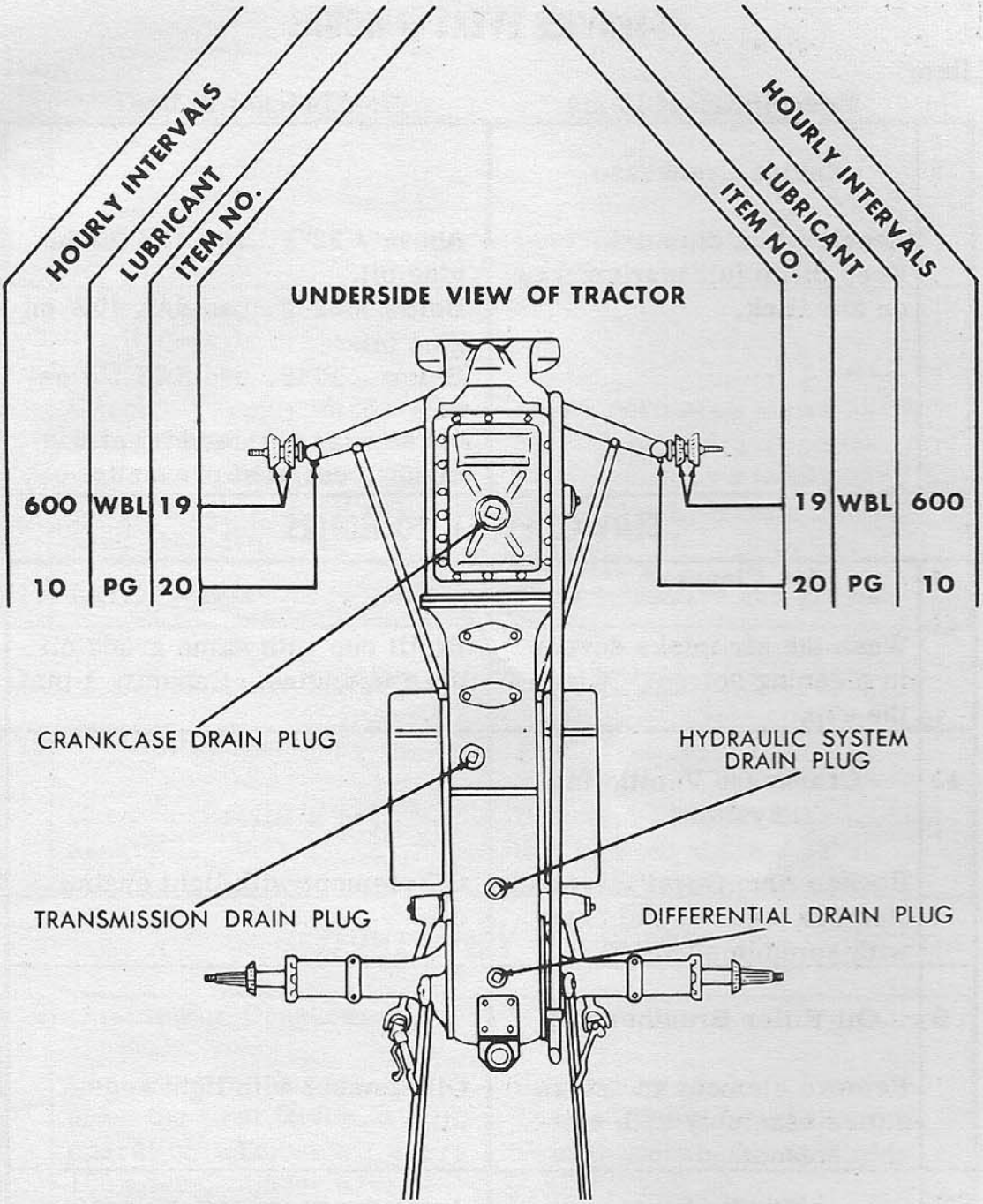


Figure 68 Bottom View of Lubrication Chart

SERVICE EVERY 5 HOURS

Item No	Description of Items	Lubricant to Use
12	Engine Crankcase Check oil on dip stick. Keep oil to full mark shown on dip stick.	Above $\neq$ 32°F. use SAE 20 engine oil. Below $\neq$ 32°F. use SAE 10W engine oil. Below - 10°F. use SAE 5W engine oil. For storage or intermittent winter use, use rust preventive oil.

SERVICE EVERY 10 HOURS

4	Air Cleaner* Wash the air intake screen in cleaning solvent. Clean the cup.	Refill cup with same grade oil used in engine. Capacity 1 pint.
13	Crankcase Ventilating System* Rocker Arm Cover Breather Remove element and clean with suitable solvent.	Oil element with light engine oil.
9	Oil Filler Breather Cap Remove element and clean entire assembly with suitable solvent.	Oil element with light engine oil.
20	Spindle Pins	Apply pressure gun grease.
2	Steering Drag Link Point	Apply pressure gun grease.
15	Steering Joint	Apply pressure gun grease.
5	Clutch Pedal	Apply pressure gun grease.

*When operating under extremes of temperatures and dust conditions, these points should be serviced at least every 5 hours or oftener, if necessary.

SERVICE EVERY 10 HOURS

Item No	Description of Items	Lubricant to Use
10	Distributor Oil cup	Lubricate with a few drops of seasonal engine oil.
7	Hydraulic System Check oil supply on dip stick daily. Dip stick located on right side of tractor. Keep to full mark with all cylinders extended	At temperatures above 32°F. use A type hydraulic oil. At temperatures below 32°F. use C type hydraulic oil.
17	Leveling Box	Apply pressure gun grease.

SERVICE EVERY 60 HOURS

18	Pulley Assembly Check and refill if necessary.	Use mild EP gear oil. Use SAE 90 above ≠ 32°F. Use SAE 80 below ≠ 32°F.

SERVICE EVERY 100 HOURS

9	Engine Crankcase Change oil in new tractor after the first 50 hours of operation - thereafter every 100 hours. Under severe operating conditions, change oil more often. Dry engine capacity including oil filter- 5 quarts. Refill crankcase - 4 quarts plus 1 quart if filter cartridge is replaced.	Use engine oil. Temps. above ≠ 90°F. - SAE 30 Temps. between ≠ 32°F. and ≠ 90°F. SAE 20 Temps. between ≠ 10°F. and ≠ 32°F. - SAE 20W Temps. between ≠ 10°F. and - 10°F. - SAE 10W Temps. below - 10°F. - SAE 5W

SERVICE EVERY 200 HOURS

Item No	Description of Items	Lubricant to Use
3	Oil Filter Replace filter cartridge with every other engine oil change.	Add 1 quart engine oil for absorption by new cartridge.
14	Steering Check steering gear case oil level at plug and add lubricant as required.	Use hypoid gear lubricant SAE 90 in the summer and SAE 80 in the winter.
11	Distributor Remove cap and dust shield, wipe cam clean.	Lubricate with Ford distributor grease.

SERVICE EVERY 300 HOURS

1	Generator Oil rear bearing	Engine oil.

SERVICE EVERY 600 HOURS

19	Front Wheel Bearings Clean thoroughly using a suitable solvent.	Repack with high grade short fibre grease. Lubricate spindle shaft before installing bearing.
4	Carburetor Air Cleaner Remove complete assembly, thoroughly clean with suitable solvent. Under severe dust conditions, clean every 100 hours.	Refill cup with same grade oil used in engine crankcase - Capacity 1 3 Pints.

SERVICE EVERY 600 HOURS

Item No	Description of Items	Lubricant to Use
6	Transmission Change oil in new tractor after first 50 hours of operation - thereafter every 600 hours. 600 hours maximum. Capacity 5 quarts Pour oil through strainer to fill.	Use extreme pressure lubricant, Use SAE 90 above $\neq$ 32°F. - summer. Use SAE 80 below $\neq$ 32°F. - winter.
7	Hydraulic System Change oil in new tractor after first 50 hours of operation - thereafter every 600 hours. Check level with dip stick - Capacity 8 quarts.	At temperatures above 32°F. use A type hydraulic oil. At temperatures below 32°F. use C type hydraulic oil.
16	Rear Axle Differential Change oil in new tractor after first 50 hours of operation - thereafter every 600 hours. Capacity 8 quarts. Pour oil through strainer to fill.	Use extreme pressure gear oil. Use SAE 90 at temperatures above $\neq$ 32°F. - summer. Use SAE 80 at temperatures below - 32°F. - winter.

SERVICE EVERY 1800 HOURS

8	Rear Wheel Bearings Clean thoroughly using a suitable solvent.	Repack with high grade short fibre grease.