

# JOHN DEERE 200, 210, 212 AND 214 LAWN AND GARDEN TRACTORS

Service Manual  
SM-2105 (Oct-76)

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*(All information, illustrations, and specifications contained in this service manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.)*

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## INTRODUCTION

This service manual contains service and maintenance information for the John Deere 200, 210, 212 and 214 Lawn and Garden Tractors.

The manual is divided into sections. Each section pertains to a certain component or operational system of the tractor. The information is divided into groups within each section.

Emphasis is placed on diagnosing malfunctions, analysis and testing. Diagnosing malfunctions includes possible troubles, their causes and how to correct them. Under specific components these troubles are analyzed to help you understand what is causing the problem. In this way, you can eliminate the cause rather than just replace parts and have the same problem keep recurring.

Metric equivalents have been included, where applicable, throughout this service manual.

Specifications and special tools are found in the last group of each section.

This manual can be kept in its own cover or it can be filed in your service manual rack or in your Consumer Products Service Information Binder.

Whenever new or revised pages are provided, insert them into your manual as soon as you receive them. Your service manual will always be up-to-date and be a valuable asset in your service department.



**This safety alert symbol identifies important safety messages in this manual. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.**

# Section 10 GENERAL

## Group 5 TRACTOR IDENTIFICATION

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## SERIAL NUMBERS

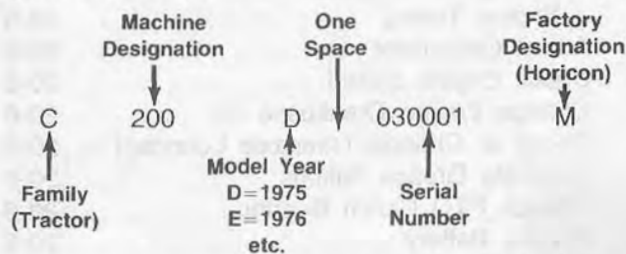
### Tractor



Fig. 1-Tractor Serial Number

The tractor serial number, Fig. 1, is located on the pedestal below the steering wheel.

The first letter indicates the "family of machine"; the next three numbers or letters, the "model or machine designation"; the letter in the fifth position indicates the "model year". This is followed by a space (for computer purposes), and a six-digit serial number and the letter "M" denoting Horicon as the factory of manufacture.



When ordering parts, use only the six-digit serial number. When writing about or filling out warranty claims, use all thirteen numbers, letters and spaces shown on the machine serial number plate.

### Engine



Fig. 2-Engine Serial Number

The engine serial number, Fig. 2, is located on the engine shroud.

### Transaxle

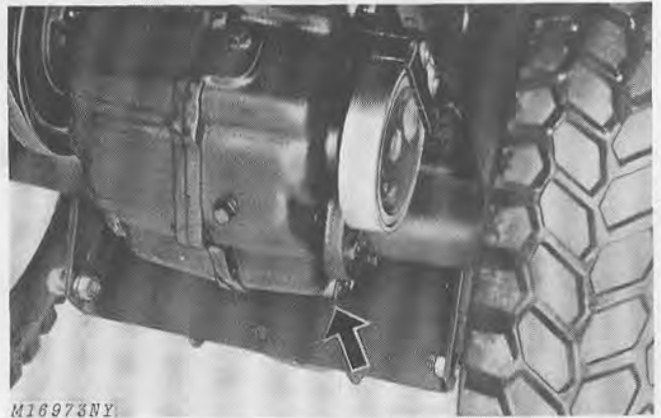


Fig. 3-Transaxle Serial Number

The transaxle serial number, Fig. 3, is located on the transaxle case next to the L.H. axle housing.

## IDENTIFICATION CODES

### Tire Codes

John Deere 200, 210, 212 and 214 Tractors are available with four different combinations of tires as follows:

Tire Code	Size Front	Size Rear	Tread
GT-3	16x6.50-8	23x8.50-12	High-Flotation
GT-4	4.80/4.00-8 -----	----- 23x8.50-12	Studded Traction
GT-5	16x6.50-8	23x10.50-12	High-Flotation
GT-8 Bar Tread	16x6.50-8 or 4.80/4.00-8 -----	----- 23x10.50-12	High-Flotation Traction

**NOTE:** The 200 Tractor is equipped with GT-3 tires as standard equipment. The 210, 212 and 214 Tractors are equipped with GT-5 tires as standard equipment.

## Group 10 SPECIFICATIONS

### ENGINE SPECIFICATIONS

Item	200	210	212	214
Engine Model No. ....	K181QS	K241AQS	K301AQS	K321AQS
Manufacturer .....	Kohler	Kohler	Kohler	Kohler
Cylinders .....	One	One	One	One
Stroke/Cycle .....	Four	Four	Four	Four
Bore .....	2.94 in. (7.46 cm)	3.25 in. (8.25 cm)	3.38 in. (8.58 cm)	3.50 in. (8.89 cm)
Stroke .....	2.75 in. (6.98 cm)	2.88 in. (7.31 cm)	3.25 in. (8.25 cm)	3.25 in. (8.25 cm)
Displacement .....	18.6 cu. in.	23.9 cu. in.	29.1 cu. in.	31.3 cu. in.
Speeds (Fast) No Load	3400 to 3500 rpm	3400 to 3500 rpm	3400 to 3500 rpm	3400 to 3500 rpm
Speeds (Idle) .....	1700 to 1900 rpm	1700 to 1900 rpm	1700 to 1900 rpm	1700 to 1900 rpm
Horsepower* .....	8	10	12	14
Normal Compression ..	110 to 120 psi	110 to 120 psi	110 to 120 psi	110 to 120 psi
Valve Clearance				
Intake (Cold) .....	0.007 in. (0.178 mm)	0.010 in. (0.254 mm)	0.010 in. (0.254 mm)	0.010 in. (0.254 mm)
Exhaust (Cold) .....	0.016 in. (0.406 mm)	0.020 in. (0.508 mm)	0.020 in. (0.508 mm)	0.020 in. (0.508 mm)
Ignition .....	Battery	Battery	Battery	Battery
Spark Plug .....	Champion-J-8 or XJ8 AC-45-M or R-46 Prestolite-14-7 or 14-R8	Champion-H-10 AC-45L Prestolite-14-L7B	Champion-H-10 AC-45L Prestolite-14-L7B	Champion-H-10 AC-45L Prestolite-14-L7B
Spark Plug Gap .....	0.025 in. (0.635 mm)	0.035 in. (0.889 mm)	0.035 in. (0.889 mm)	0.035 in. (0.889 mm)
Breaker Point Gap .....	0.020 in. (0.508 mm)	0.020 in. (0.508 mm)	0.020 in. (0.508 mm)	0.020 in. (0.508 mm)
Charging System .....	Alternator	Alternator	Alternator	Alternator
Starter .....	12-Volt	12-Volt	12-Volt	12-Volt
Air Filter .....	Dry-type	Dry-type	Dry-type	Dry-type

\*The horsepower rating shown is established by the engine manufacturer in accordance with Standard Internal Combustion Engine Institute procedure. It is corrected at 60°F. and 29.22 in. Hg. Barometer and is developed from laboratory test engines equipped with standard air cleaner and muffler.

### BATTERY SPECIFICATIONS

Tractor	Battery
200	John Deere, 12 Volt, (AM30094), BCI Group U1, 135 cold cranking amps at 0°F. (-17°C), 30-minute reserve capacity.
210, 212, 214	John Deere, 12 Volt, (AM31186), BCI Group 22F, 255 cold cranking amps at 0°F. (-17°C), 55-minute reserve capacity.

**Thanks very much for your reading,  
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manual**

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### TRACTOR SPECIFICATIONS

Item	200	210, 212, 214
<b>CAPACITIES</b>		
Fuel Tank .....	3-1/2 U.S. Gallons (13.25 l)	3-1/2 U.S. Gallons (13.25 l)
Crankcase .....	2-1/2 U.S. Pints (1.18 l)	3 U.S. Pints (1.42 l)
Transaxle.....	3-1/2 U.S. Pints (1.65 l)	3-1/2 U.S. Pints (1.65 l)
Hydraulic System (Optional) .....	.....	2 U.S. Pints (0.94 l)
<b>TRANSMISSION</b>		
Type .....	Transaxle	Transaxle
Gear Selections.....	4 forward - 1 reverse	4 forward - 1 reverse
<b>TRAVEL SPEEDS -@3400 rpm</b>		
1st Gear (Variable).....	0.3 to 0.9 mph (.6 to 1.6 kms/hr)	0.3 to 0.9 mph (.6 to 1.6 kms/hr)
2nd Gear (Variable).....	1.0 to 2.7 mph (2.1 to 4.6 kms/hr)	1.0 to 2.7 mph (2.1 to 4.6 kms/hr)
3rd Gear (Variable) .....	1.8 to 4.7 mph (3.8 to 8.0 kms/hr)	1.8 to 4.7 mph (3.8 to 8.0 kms/hr)
4th Gear (Variable) .....	2.6 to 7.0 mph (5.5 to 11.9 kms/hr)	2.6 to 7.0 mph (5.5 to 11.9 kms/hr)
Reverse (Variable) .....	1.4 to 3.7 mph (2.4 to 5.3 kms/hr)	1.4 to 3.7 mph (2.4 to 5.3 kms/hr)
<b>DIMENSIONS</b>		
Wheelbase .....	46 in. (1.168 m)	46 in. (1.168 m)
Overall Length .....	67-1/2 in. (1.715 m)	67-1/2 in. (1.715 m)
Overall Height .....	42 in. (1.067 m)	42 in. (1.067 m)
Overall Width (maximum) ..	41-1/2 in. (1.054 m)	41-1/2 in. (1.054 m)
<b>WHEEL TREAD</b>		
Front.....	31 in. (78.74 cm)	31 in. (78.74 cm)
Rear (GT-3 Tires).....	27 in. or 33 in. (68.58 cm or 83.82 cm)	27 in. or 33 in. (68.58 cm or 83.82 cm)
(GT-5 Tires) .....	28-1/2 in. or 31 in. (72.39 cm or 78.74 cm)	28-1/2 in. or 31 in. (72.39 cm or 78.74 cm)
<b>BRAKES</b>		
Type .....	Band, pedal-operated	Band, pedal-operated
Parking.....	Hand-lock foot brake	Hand-lock foot brake
<b>CLUTCH</b> .....		
	V-belt system	V-belt system
<b>PTO CLUTCH</b> .....		
	Manual	Manual
<b>STEERING</b> .....		
	Enclosed gear	Enclosed gear
<b>LIFT*</b> .....		
	Manual, Electric	Manual, Electric, Hydraulic
<b>SHIPPING WEIGHT</b> .....		
	691 lbs. (313 kg)	759 lbs. (344 kg)

\*Electric and Hydraulic Lifts are dealer installed options.

### TIRE SPECIFICATIONS

Tire Code	Location	Size	Tubeless	Ply-Rating	Tread	Tire Inflation Pressure
GT-3	Front	16x6.50-8	Yes*	2	High-Flotation	6 to 16 psi (41 to 110 kPa)
	Rear	23x8.50-12	Yes*	2		5 to 10 psi (34 to 69 kPa)
GT-4	Front	4.80/4.00-8	No	4	Studded Traction	12 to 40 psi (82 to 276 kPa)
	Rear	23x8.50-12	Yes*	2		5 to 10 psi (34 to 69 kPa)
GT-5	Front	16x6.50-8	Yes*	2	High-Flotation	6 to 16 psi (41 to 110 kPa)
	Rear	23x10.50-12	Yes*	2		5 to 10 psi (34 to 69 kPa)
GT-8 Bar Tread	Front**	16x6.50-8	Yes*	2	High-Flotation Traction	6 to 16 psi (41 to 110 kPa)
	Rear	23x10.5-12	Yes*	2		5 to 10 psi (34 to 69 kPa)




\*Tubes Available for service. See your parts catalog.

\*\*Use 4.80/4.00-8 front tires with front-end loaders.

### REAR WHEEL WEIGHT BOLT SIZE CHART

Tire/Wheel Option	Wheel Position	No. of Weights	Bolt Size
GT-3 or GT-4	Narrow	1	1/2 x 5-1/2
GT-3 or GT-4	Narrow	2	1/2x7-1/2
GT-3 or GT-4	Wide	1	1/2x5-1/2
GT-3 or GT-4	Wide	2	1/2x7-1/2
GT-5	Narrow	1	1/2x5-1/2
GT-5	Narrow	2	1/2x8
GT-5	Wide	1	1/2x5-1/2
GT-5 or GT-8	Wide	2	1/2x7-1/2

### BOLT TORQUE CHART

Grade of Bolt		SAE-2	SAE-5	SAE-8	Socket or Wrench Size	
Min. Tensile Strength		64,000 PSI	105,000 PSI	150,000 PSI		
Grade Marking on Bolt						
U.S. Standard		TORQUE IN FOOT POUNDS			U.S. Regular	
Bolt Dia.	U.S. Dec. Equiv.				Bolt Head	Nut
1/4	.250	6	10	14	7/16	7/16
5/16	.3125	13	20	30	1/2	1/2
3/8	.375	23	35	50	9/16	9/16
7/16	.4375	35	55	80	5/8	11/16
1/2	.500	55	85	120	3/4	3/4
9/16	.5625	75	130	175	13/16	7/8
5/8	.625	105	170	240	15/16	15/16
3/4	.750	185	300	425	1-1/8	1-1/8
7/8	.875	*160	445	685	1-5/16	1-5/16
1	1.000	250	670	1030	1-1/2	1-1/2

Multiply Readings by 12 for inch pound values.

\*"B" Grade bolts larger than 3/4-inch are sometimes formed hot rather than cold which accounts for the lower recommended torque.

NOTE: Allow a tolerance of plus or minus 10% on all torques given in this chart.

### SET SCREW SEATING TORQUE CHART

Screw Size	Torque in Inch Pounds	
	Cup Point	Square Head
#5	9	—
#6	9	—
#8	20	—
#10	33	—
1/4	87	212
5/16	165	420
3/8	290	830
7/16	430	—
1/2	620	2100
9/16	620	—
5/8	1225	4250
3/4	2125	7700

Divide Readings by 12 for foot pound values

NOTE: Allow a tolerance of plus or minus 10% on all torques given in this chart.

## Group 15 FUEL AND LUBRICANTS

### FUEL

Always use fresh, clean "regular grade or non-leaded" gasoline having an octane rating of 85 or higher. We recommend non-leaded gasoline because it reduces cylinder head deposits.

Do not use premium, ethyl or white gasoline. Never use special additives such as carburetor cleaners, de-icers, or moisture-removing liquids in your gasoline.

**IMPORTANT: Do not mix oil with gasoline.**

**IMPORTANT: Do not permit dirt or other foreign matter to enter the fuel system. This could cause hard starting, poor performance and engine damage. Always use clean gasoline storage cans and funnels.**

### LUBRICANTS

#### Engine Crankcase

John Deere Torq-Gard Supreme engine oil is recommended because of its superior lubricating qualities. If a different brand of oil is used, it must conform to one of the following specifications.

SPI Service CD/SE, CD/SD, CC/SD or SD MIL-L-46152 or MIL-L-2104C\*.

*\*As further assurance of quality, the oil should be identified as suitable for API Service Designation SD.*

**IMPORTANT: Never put additives in the crankcase oil.**

Depending on the expected prevailing temperature for the fill period, use oil of viscosity shown in the following chart.

Air Temperature	John Deere Torq-Gard Supreme Oil	Other Oils	
		Single Viscosity Oil	Multi-Viscosity Oil
Above 32°F	SAE 30	SAE 30	Not recommended
-10° to 32°F -23.3°C to 0°C	SAE 10W-20	SAE 10W	SAE 10W-30
Below -10°F -23.3°C	SAE 5W-20*	SAE 5W*	SAE 5W-20*

*\*Some increase in oil consumption may be expected when SAE 5W-20 or SAE 5W oils are used. Check oil level more frequently.*

#### Transaxle

John Deere AM30200 Transmission Lubricant or SAE 90 Gear Lubricant. Also an equivalent SCL Multipurpose-Type Gear Oil.

#### Tractor Grease Fittings

John Deere Multipurpose Lubricant SAE (Seasonal Grade) or equivalent Multipurpose-Type Grease.

#### Hydraulic System (Optional Equipment)

John Deere All-Weather Hydrostatic Fluid or an equivalent Type "F" Automotive Automatic Transmission Fluid.

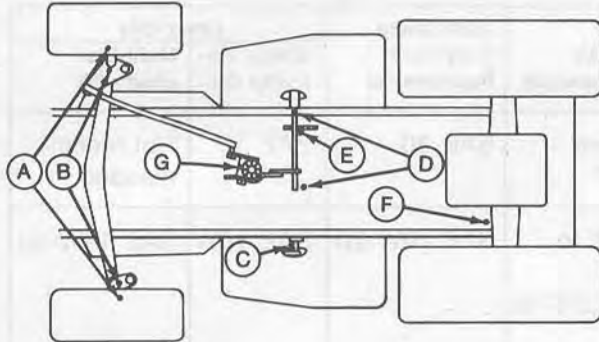
### CAPACITIES

Fuel Tank	3-1/2 U.S. gallons (13.25 l)
Crankcase:	2-1/2 U.S. pints (1.18 l)
200, 212, 214	3 U.S. pints (1.42 l)
Transaxle	3-1/2 U.S. pints (1.65 l)
Hydraulic System (optional equip.)	2 U.S. pints (0.94 l)

## SERVICE INTERVALS

### Lubricating Grease Fittings

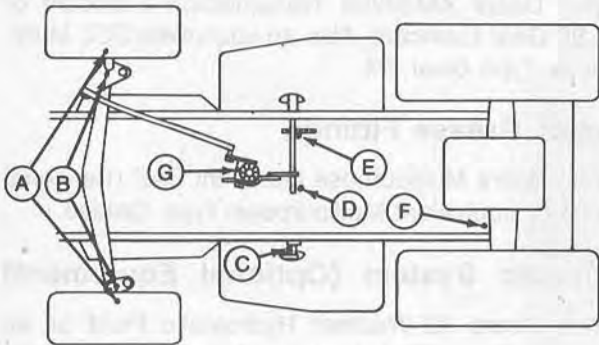
Grease tractor grease fittings in Spring and Fall Season. Tractor grease fitting locations are as follows:



M14459N

- |                       |                      |
|-----------------------|----------------------|
| A—Front Wheel Hubs    | E—Primary Lift Shaft |
| B—Front Axle Spindles | F—Rear Brake Shaft   |
| C—Brake Pedal Shaft   | G—Steering Gear*     |
| D—Clutch Pedal Shaft  |                      |

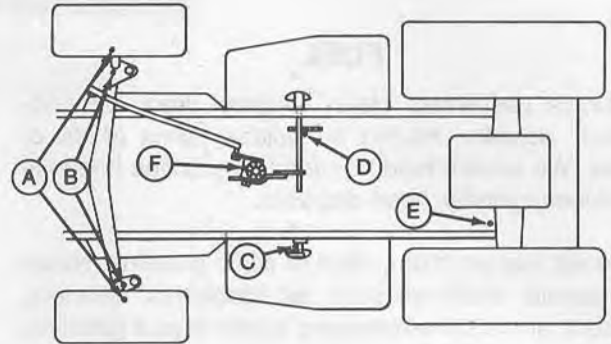
Fig. 1-Grease Fitting Locations (Serial No. 30,001-55,000)



M14460N

- |                       |                      |
|-----------------------|----------------------|
| A—Front Wheel Hubs    | E—Primary Lift Shaft |
| B—Front Axle Spindles | F—Rear Brake Shaft   |
| C—Brake Pedal Shaft   | G—Steering Gear*     |
| D—Clutch Pedal Shaft  |                      |

Fig. 2-Grease Fitting Locations (Serial No. 55,001-70,000)



M14461N

- |                       |                      |
|-----------------------|----------------------|
| A—Front Wheel Hubs    | D—Primary Lift Shaft |
| B—Front Axle Spindles | E—Rear Brake Shaft   |
| C—Brake Pedal Shaft   | F—Steering Gear*     |

Fig. 3-Grease Fitting Locations (Serial No. 70,001- )

**\*IMPORTANT:** Do not overlubricate steering column fitting. Only 3 to 4 strokes with a hand grease gun are necessary. Do not use a high-pressure grease gun on this fitting.

## Changing Engine Crankcase Oil

Change crankcase oil after the first 2 hours of operation and every 25 hours of operation thereafter.

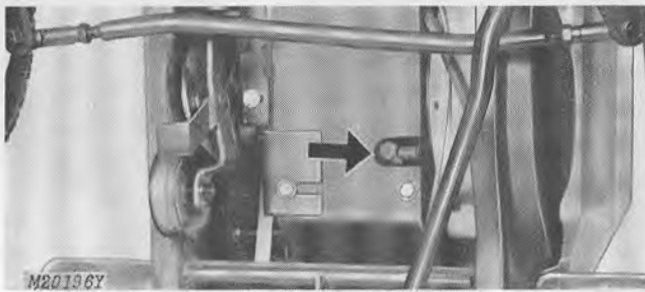


Fig. 4-Draining Crankcase Oil

**NOTE:** For convenience, a suitable length of 5/8-inch (15.88 mm) garden hose or plastic tubing may be installed on the drain valve to allow oil to drain.

Open oil drain valve Fig. 4 and allow oil to drain into a container.

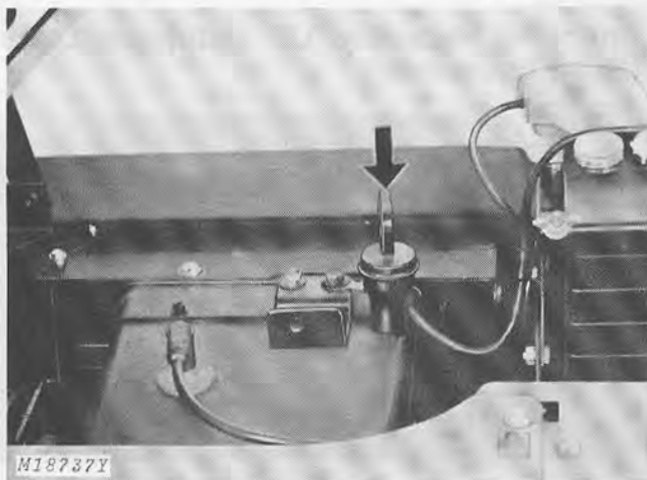
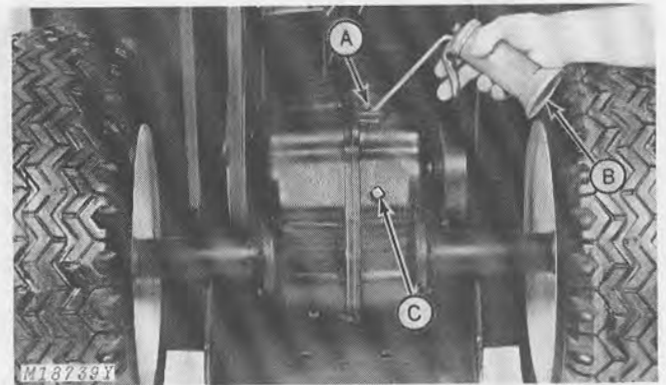


Fig. 5-Filling Crankcase

Close oil drain valve. Fill crankcase with oil of the proper viscosity to "F" mark on dipstick Fig. 5 (see page 10-15-1 for crankcase capacity).

## Changing Transaxle Lubricant



A—Oil Level Filler Hole      C—Drain Plug  
B—Pressure Oil Can

Fig. 6-Changing Transaxle Lubricant

Change transaxle lubricant every 2 years or 500 hours of operation. Remove transaxle drain plug (C) and drain oil. Wipe plug clean and replace it in transaxle.

Remove plug from filler hole (A) and fill transaxle with 3-1/2 U.S. pints (1.65 l) of AM30200 Transmission Lubricant, SAE 90 Gear Lubricant or an equivalent SCL Multipurpose Gear Oil.

## Repacking PTO Clutch Bearing

Repack PTO clutch bearing, each spring and fall.

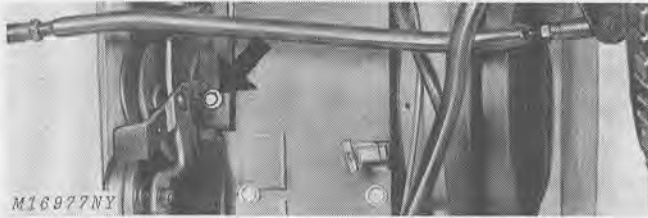


Fig. 7-PTO Clutch Brake Cap Screw

Using a 1/2-inch socket wrench with extension, loosen PTO clutch brake cap screw, Fig. 7, only enough to permit removal of PTO clutch assembly.

Pivot clutch arm clip upward and slide clutch arm to the rear to remove clutch arm from sheave hub.

Slide PTO assembly off the shaft. Check condition of clutch and brake linings. Replace linings as necessary. Use solvent to remove old grease from bearing.

Dry bearing thoroughly and repack it with John Deere High-Temperature grease (AT30408) or its equivalent.

Install PTO assembly on shaft and replace clutch arm. Lock in place with clip.

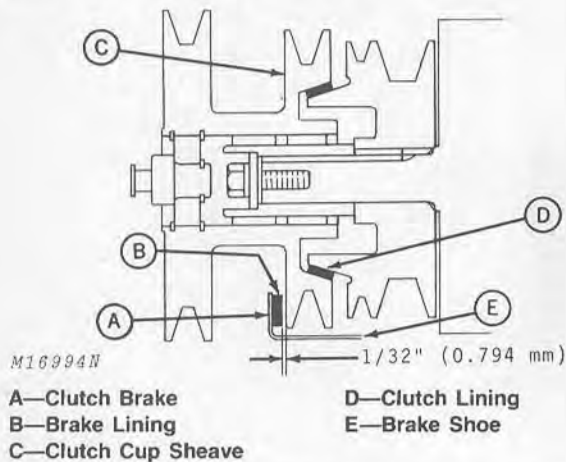


Fig. 8-Adjusting Clearance Between Brake and Sheave

Engage PTO clutch lever (up position). Check distance between the clutch brake (A) and clutch cup sheave (C) for 1/32-inch (0.794 mm) clearance, Fig. 8.

If adjustment is required, use a 1/2-inch socket with extension. Loosen clutch brake cap screw, Fig. 7. Slide brake shoe in slotted hole until proper adjustment is obtained. Tighten cap screw.

## Lubricating Integral Hitch Grease Fitting (Extra Equipment)

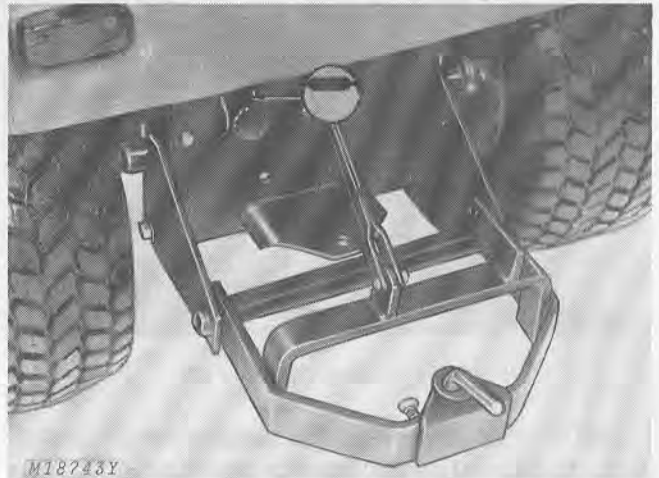


Figure 9-Integral Hitch (Extra Equipment)

If the tractor is equipped with an integral hitch (extra equipment) lubricate the rear lift pivot, Figure 9.

## Checking Hydraulic Lift Lubricant Level (Extra Equipment)

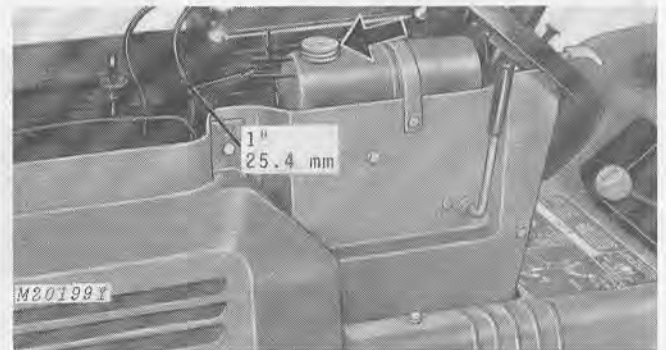


Figure 10

Once a week or every 50 hours of operation, check hydraulic fluid level. Park the tractor on a level surface, shut off engine, and set parking brake.

Remove reservoir cap (arrow). The hydraulic fluid level should be within 1 inch (25.4 mm) from top of reservoir. If hydraulic fluid is required, use John Deere All-Weather Hydrostatic Fluid or an equivalent Type "F" automatic transmission fluid.

## Group 20 TUNE-UP AND ADJUSTMENTS

### PURPOSE OF TUNE-UP AND ADJUSTMENTS

Generally, the customer complaint will reveal which system or component requires checking. However, when dealing with the entire tractor, it is recommended that the step-by-step procedures outlined on the following pages be used.

### VISUAL INSPECTION

Much can be learned about the general condition of the tractor by a thorough visual inspection. For convenience, remove the side panels and hood.

Check the engine, transaxle and hydraulic system (if so equipped) for evidence of oil leakage.

Inspect battery for excessive corrosion, cracked case, proper installation and cable connections. Note general condition of wiring harness. Be sure the harness is not oil-soaked and that it is not frayed or damaged.

### ENGINE TUNE-UP

Engine tune-up is making minor repairs and adjustments in an orderly sequence to improve the overall efficiency and operation of the engine.

Tune-up includes checking, adjusting and servicing the electrical, ignition, air intake, fuel and lubrication systems.

### TRACTOR ADJUSTMENTS

Adjusting tractor components insures that engine horsepower will be utilized in the most efficient manner.

Adjustments to be made on the tractor include: Checking or changing transaxle lubricant, lubricating grease fittings, checking PTO clutch and brake, tractor brakes, belts and equipment.

### TUNE-UP GUIDE

The following guide offers an orderly sequence for servicing a tractor that has been running well.

Also use this guide to explain to your customers what a tune-up includes. Be sure to obtain customer permission before performing these services.

1. Clean Engine Shrouds and Cooling Fins
2. Clean or Replace Air Filter Element
3. Clean Fuel Strainer
4. Check and Clean Engine Crankcase Breather
5. Check Spark Plug Gap
6. Check Ignition Breaker Points and Engine Timing
7. Adjust Carburetor
8. Check Engine Speed
9. Change Engine Crankcase Oil
10. Check or Change Transaxle Lubricant
11. Lubricate Grease Fittings
12. Repack PTO Clutch Bearing
13. Service Battery
14. Check Tire Pressure
15. Check Operation and Condition of:
  - (A) Lights
  - (B) Lift System
  - (C) Steering
  - (D) Brakes (PTO Clutch and Tractor)
  - (E) Belts and Equipment

## TUNE-UP AND ADJUSTMENTS

### 1. Clean Engine Shrouds and Cooling Fins

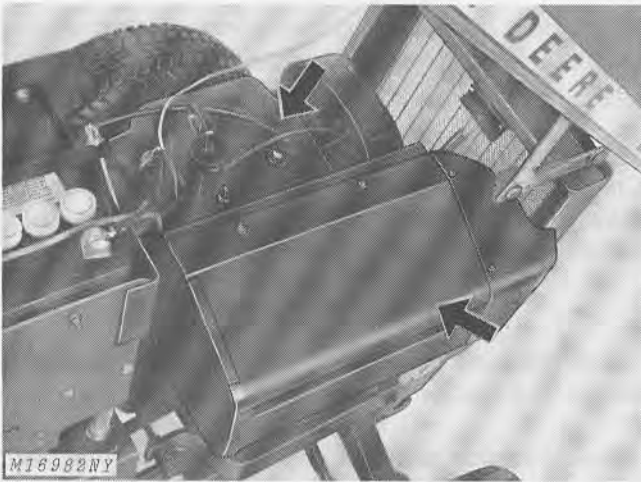


Fig. 1-Engine Shrouds

Remove engine shrouds, Fig. 1. Blow out cooling fins with compressed air. Be sure all dirt and debris are removed from the engine.

### 2. Clean or Replace Air Filter Element

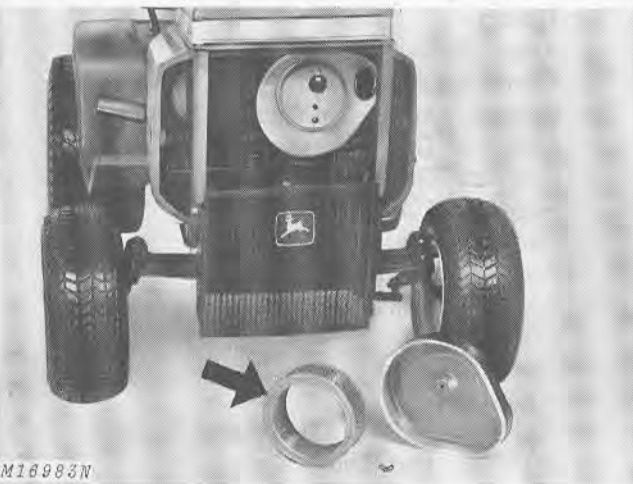


Fig. 2-Air Filter Element

Remove the air filter element, Fig. 2. Tap the filter lightly against a flat surface and brush out dust. Do not clean filter with a liquid cleaner or compressed air.

Replace filter if it is bent, crushed, damaged or extremely dirty.

### 3. Clean Fuel Strainer

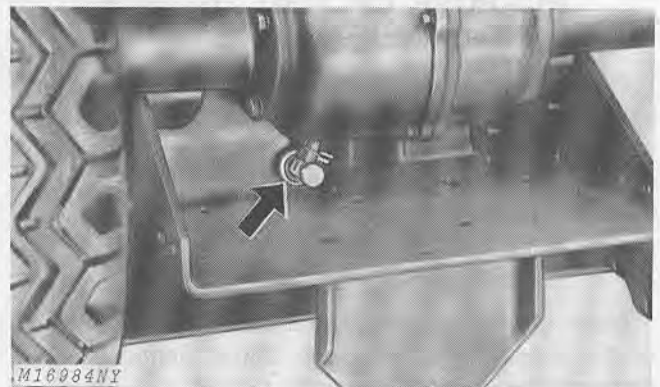


Fig. 3-Fuel Shut-Off Valve

Close the fuel shut-off valve, under fuel tank, Fig. 3. Disconnect hose from valve. Attach a 12-inch length of 1/4-inch hose and drain fuel tank into a clean container.

Remove hose from valve. Unscrew shut-off valve with strainer from fuel tank. Thoroughly clean all particles from strainer.

Install shut-off valve and strainer assembly. Close the valve, connect the hose, and fill fuel tank.

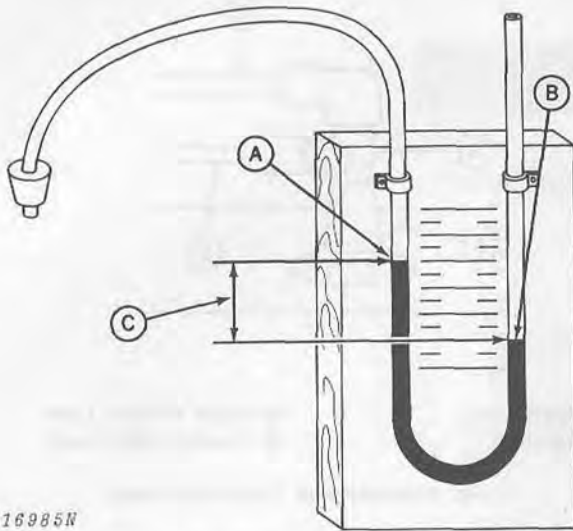
### 4. Check and Clean Engine Crankcase Breather

A clogged crankcase breather can cause positive pressure to build up in the crankcase.

Check crankcase vacuum with a U-tube water manometer.

An engine in good condition and operating at normal temperatures will show a 5 to 10-inch water column on the manometer.

An engine in good condition and operating at normal engine temperatures will show a 5 to 10-inch water column of vacuum or negative pressure on the manometer, (see Fig. 4).



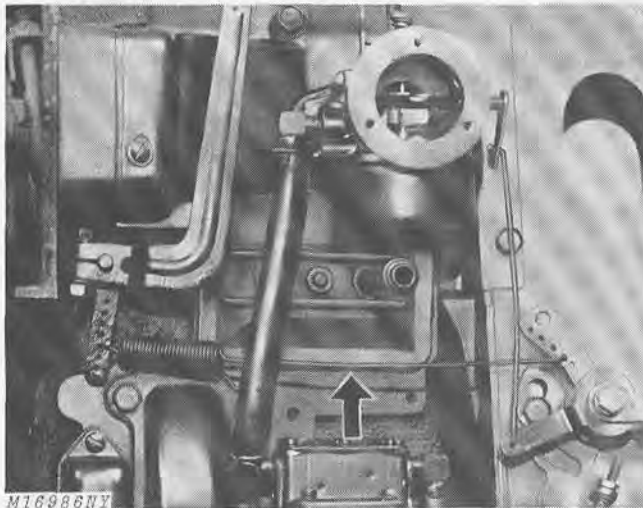
M16985R

A—Negative Pressure                      B—Positive Pressure  
C—Difference Between Columns

Fig. 4-U-Tube Water Manometer

When using manometer, Fig. 4, place stopper into oil fill hole (other end open to atmosphere) and measure difference between columns (C).

If water column is higher in tube connected to engine, vacuum or negative pressure (A) is indicated. If the higher column is on the atmospheric side of manometer, positive pressure (B) is present.



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Fig. 5-Engine Crankcase Breather

Disassemble breather assembly, Fig. 5, and clean it thoroughly. Reinstall breather assembly and recheck pressure.

## 5. Check Spark Plug Gap

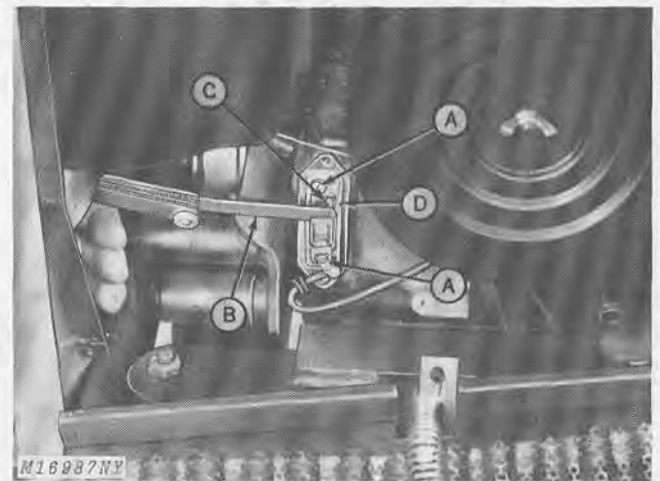
Remove spark plug, check condition and reset gap, page 10-10-1.

Good operating conditions are indicated if plug has light gray or tan appearance. A dead white appearance could indicate overheating. A black (carbon) appearance may indicate an "over-rich" fuel mixture, clogged air cleaner or improper carburetor adjustment.

Do not service a plug in poor condition. Install a new plug and torque it to 18 to 22 ft-lbs (24 to 30 Nm). See page 10-10-1.

## 6. Check Ignition Breaker Points and Engine Timing

Replace badly burned or pitted breaker points. If points are oxidized, rub a piece of coarse cloth across the surfaces. Clean dirty or oily points with a cloth, but make sure no particles of lint are left between the surfaces.



M16987NY

A—Retaining Screws                      C—Locking Screw  
B—Feeler Gauge                          D—V-Slot

Fig. 6-Replacing and Adjusting Points

To replace points, remove retaining screws (A), Fig. 6. Be sure lock washers are in place when installing new points.

To adjust breaker points, rotate engine until "T" mark on flywheel lines up with indicator, Fig. 8. Use feeler gauge (B, Fig. 6) to measure gap for 0.020-inch (0.508 mm) clearance when points are fully open.

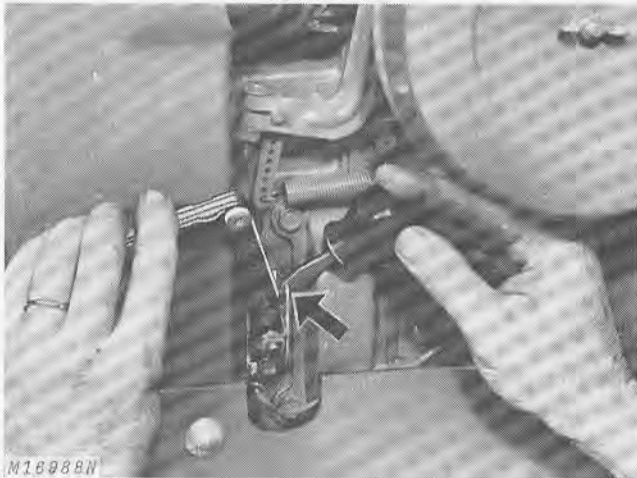
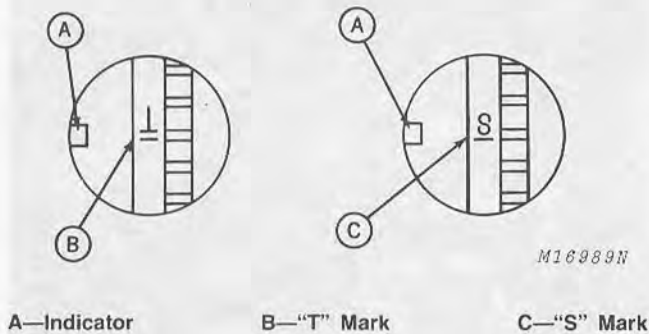


Fig. 7-Adjusting Points

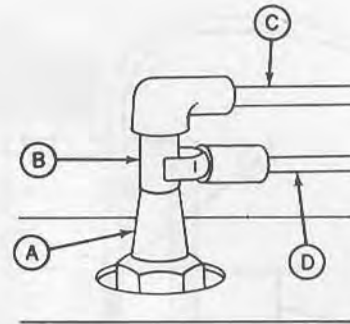
If necessary, loosen locking screw (C, Fig. 6) and move screwdriver in V-slot, Fig. 7, until gap is 0.020-inch (0.508 mm). Gap setting can vary from 0.018 to 0.022-inch (0.457 to 0.588 mm) to achieve smoothest running. Tighten locking screw securely after adjusting gap.



A—Indicator      B—"T" Mark      C—"S" Mark

Fig. 8-Timing Sight Hole

The timing sight hole is in the engine blower housing. Two timing marks are stamped on the flywheel. The "T" mark (B) indicates top dead center (TDC) and the "S" mark (C) indicates the spark point. Line under the timing marks should line up with the indicator (A), Fig. 8.



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A—Spark Plug      C—High Tension Lead  
B—Adapter      D—Timing Light Lead

Fig. 9-Adapter and Timing Light Lead

Remove high tension lead (C) at spark plug (A). Install a spark plug adapter (B) and re-connect high tension lead (C). Connect one timing light lead (D) to the spark plug adapter, Fig. 9.

Connect second timing light lead to the positive battery terminal. See timing light instructions for battery size, wiring, etc.

Connect third timing light lead to ground.

Rotate engine by hand until "S" mark is visible through timing sight hole. Chalk "S" line for easy reading.

Start and run engine at 1700 to 1900 rpm idle speed. The timing light should flash as "S" mark lines up with indicator in timing sight hole.

If timing is off, loosen locking screw and adjust points as shown in Fig. 7 until the "S" mark lines up with indicator in timing sight hole.

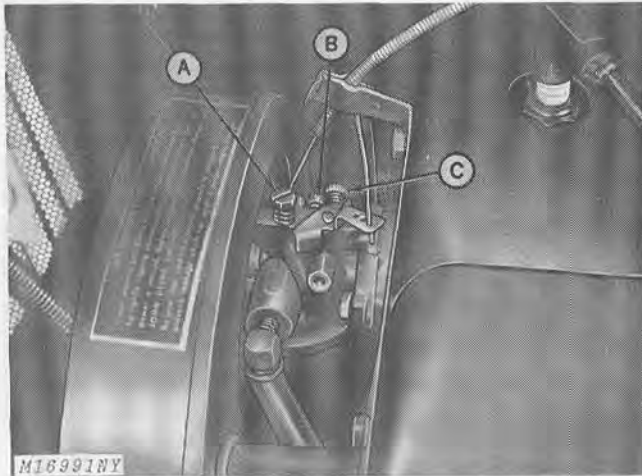
Retighten locking screw before replacing breaker point cover.

## 7. Adjust Carburetor

**⚠ CAUTION: Prevent burns. Do not touch engine shrouds or muffler shield if engine has been running.**

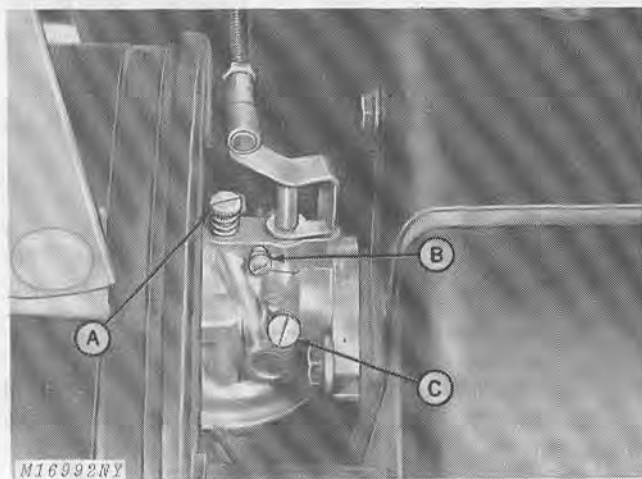
Idle adjustment and high-speed adjustment must be made at the same time as each affects the other.

Adjust carburetor as follows:



A—High-Speed Mixture Needle  
B—Idle Speed Screw  
C—Idle Mixture Needle

Fig. 10-200 Tractor Carburetor



A—High-Speed Mixture Needle  
B—Idle Speed Screw  
C—Idle Mixture Needle

Fig. 11-210, 212 and 214 Tractor Carburetor

1. Turn high-speed mixture needle (A), Figs. 10 or 11, clockwise until lightly seated. Close finger-tight only. Then open 1-1/2 turns.

2. Turn idle mixture needle (C) clockwise until lightly seated. Close finger-tight only. Then open 2 complete turns.

3. Start engine and raise throttle lever on dash panel to "FAST" position. Allow engine to warm up.

4. Turn high-speed mixture needle (A) 1/8 turn each time, clockwise or counterclockwise, until engine runs smoothly at full throttle (3400 to 3500 rpm).

5. Move throttle lever to "SLOW" position and turn idle mixture needle (C) 1/8 turn each time, clockwise or counterclockwise, until engine runs smoothly (1700 to 1900 rpm).

6. Advance throttle lever quickly to check for uniform acceleration. If engine misses, fuel-air mixture is too lean. Turn high-speed mixture needle (A) counterclockwise until positive acceleration can be obtained.

7. If excessive exhaust smoke is noticed, mixture is too rich. Readjust idle mixture needle (C), until engine idles smoothly at 1700 to 1900 rpm.

## 8. Check Engine Speed



Fig. 12-Checking Engine Speed With Vibration Tachometer

Use a vibration tachometer, Fig. 12, to check engine for a slow idle speed of 1700 to 1900 rpm and a full throttle speed of 3400 to 3500 rpm.

If carburetor adjustments do not give correct engine speed, adjust governor linkage. See Section 30, Group 10.

## 9. Change Engine Crankcase Oil

Refer to page 10-15-3.

## 10. Check or Change Transaxle Lubricant

Refer to page 10-15-3. Lubricant level should be level with the filler hole.

## 11. Lubricate Grease Fittings

Refer to page 10-15-2.

## 12. Repack PTO Clutch Bearing

Refer to page 10-15-4.

## 13. Service Battery

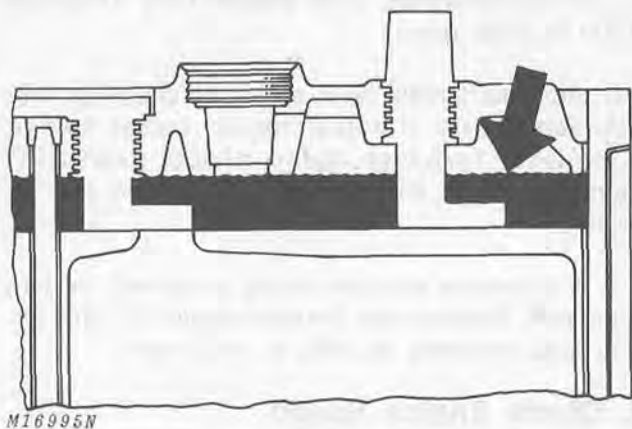


Fig. 13-Battery Electrolyte Level

Check electrolyte level of each cell. Cells should be completely covered. If necessary, fill each cell with distilled water to top of split ledge in the filler tube, Fig. 13.

To clean battery remove battery cables (negative cable, first). Use a wire brush to remove corrosion around battery terminals.

Use a solution of one part baking soda to four parts water to clean battery terminals and cables. Do not allow solution to enter battery cells.

Wash entire battery case, platform and hold-down parts with clear water and wipe dry.

Coat battery terminals with petroleum jelly and connect battery cables (positive cable, first). Be sure both cables are tight.

Charge battery as necessary.

**CAUTION:** Hydrogen and oxygen gases in the battery are very explosive. Keep open sparks or flames away from battery at all times, especially when charging the battery. Do not smoke around a charged battery. Keep vent holes in cell caps open.

## 14. Check Tire Pressure

Inflate tires as shown in chart below.

Use high readings for heavy front loads such as loaders; mid-range readings for blades and snow throwers and low readings for normal lawn use.

TIRE INFLATION PRESSURES		
Tire	Front	Rear
High-Flotation Tires (GT-3 Tractor)	16 x 6.50-8 6 to 16 psi (28.7 to 76.6 bar)	23 x 8.50-12 5 to 10 psi (23.9 to 47.8 bar)
Traction Tires (GT-4 Tractor)	4.80 x 4.00-8 12 to 40 psi (57.4 to 191.5)	23 x 8.50-12 5 to 10 psi (23.9 to 47.8 bar)
High-Flotation Tires	16 x 6.50-8 6 to 16 psi (28.7 to 76.6 bar)	23 x 10.50-12 5 to 10 psi (23.9 to 47.8 bar)
Traction Tires (GT-8 Tractor)	16 x 6.50-8 6 to 16 psi (28.7 to 76.6 bar)	23 x 10.50-12 5 to 10 psi (23.9 to 47.8 bar)

## 15. Check Operation and Condition of:

**A. Lights** - Replace bulbs or wiring as necessary.

**B. Lift System** - Check manual, electric or hydraulic lift for proper function. Once a week or every 50 hours of operation check hydraulic fluid level. Hydraulic fluid level should be within 1 inch (25.4 mm) from top of reservoir. Use John Deere All Weather Hydrostatic Fluid or an equivalent Type "F" Automatic Transmission Fluid.

**C. Steering** - Refer to Section 70 for steering gear adjustment if required.

**D. Brakes (PTO Clutch and Tractor)** - PTO Brake adjustment was covered under Item 12-"Repack PTO Clutch Bearing." For tractor brake adjustments (if required) refer to Section 50.

**E. Belts and Equipment** - Clean belts by wiping them with a clean cloth. Do not use solvents. Solvents will soften the material and cause belts to grab.

# Section 20

# ENGINE

## Group 5

## GENERAL INFORMATION AND DIAGNOSIS

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## DESCRIPTION

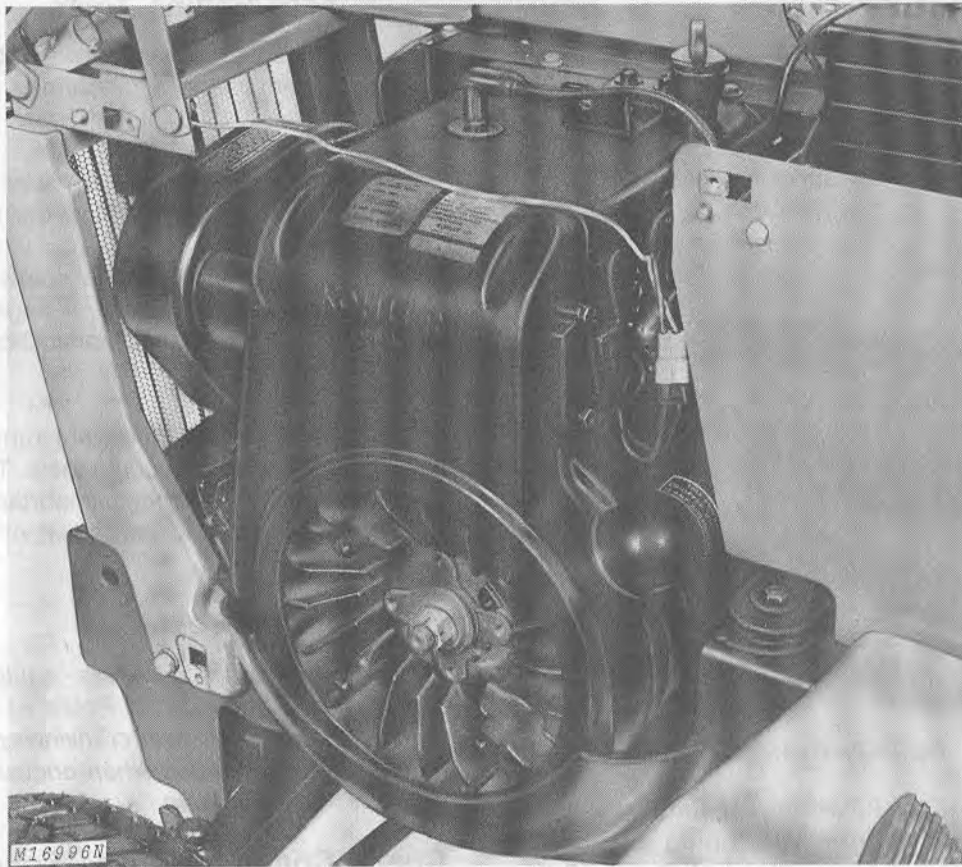


Fig. 1-Kohler Engine

Kohler engines, Fig. 1, are used in the 200 Series Tractors. The tractors with their respective engines are as follows:

- 200 Tractor - K181QS - 8hp
- 210 Tractor - K241AQS - 10hp
- 212 Tractor - K301AQS - 12hp
- 214 Tractor - K341AQS - 14hp

Each of the four-cycle, L-head, single-cylinder, internal combustion engines has a cast-iron block with a large bore and short stroke.

These air-cooled engines feature anti-friction ball bearings, oil bath lubrication, internal flyweight governors, an alternator charging system and battery-coil ignition.

## ENGINE ANALYSIS

### Preliminary Engine Checks

The majority of engine problems are usually due to electrical or fuel system difficulties. Make the following checks and tests to isolate the engine problem. Refer to "Diagnosing Malfunctions" if the following checks and tests do not solve the problem.

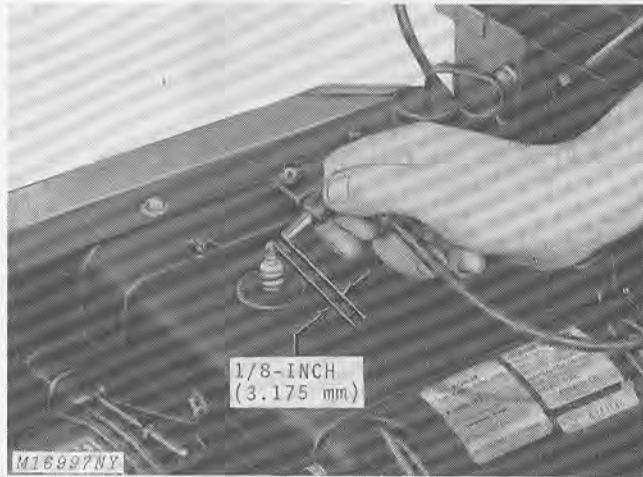


Fig. 2-Checking Spark

Check spark, Fig. 2, whenever engine will not start. Remove cable from spark plug and install adapter. Hold adapter approximately 1/8-inch (3.175 mm) away from spark plug terminal while cranking engine.

No spark or a weak spark between the adapter and spark plug terminal indicates trouble in the electrical system.

Check the battery, spark plug and all electrical connections. If these are in good condition, the trouble is probably with the breaker points or condenser.

Clean or replace points and adjust gap. If breaker points are burned, replace points and condenser.

### Preliminary Engine Tests

If a good spark exists between the adapter and spark plug terminal, the problem is in the fuel system.

Check fuel tank and lines. Be sure shut-off valve is open and that fuel is reaching the carburetor.

Connect spark plug wire to spark plug and crank engine. Choke as necessary. If engine still does not start, refer to "Diagnosing Malfunctions" to check for internal difficulties.

If engine starts but does not run properly, make the compression and vacuum tests. The compression and vacuum tests are very important when the engine runs erratically, loses power, or uses an excessive amount of oil.

### Compression Test

*NOTE: Kohler engines are equipped with ACR (Automatic Compression Release). ACR relieves compression during lower cranking speeds. The ACR mechanism disengages when engine speed reaches approximately 650 rpm.*

### Check Compression as Follows:

1. Depress brake pedal and set parking brake.
2. Check crankcase for proper oil level. Add oil if necessary.
3. Disengage all tractor drives. Run engine until warm, then stop the engine.
4. Remove spark plug and air filter. Removing the air filter gives a more accurate test.
5. Set throttle and choke in wide open positions by raising throttle lever and pulling out the choke knob.