

# JOHN DEERE 400 HYDROSTATIC TRACTOR

Service Manual  
SM-2103 (Jun-79)

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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 400 Hydrostatic Tractor.

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.

All sections of this service manual should be carefully studied by the serviceman. Much basic information such as the principles of 4-cycle engine operation, carburetion and ignition have been omitted. Such information can be found in any good library and is recommended reading for the new serviceman before consulting this manual for service procedures.

Emphasis is placed on diagnosing malfunctions, analysis and testing. Diagnosing malfunctions lists possible troubles, their causes and how to correct them. Under specific components these troubles are analyzed to help the serviceman understand what is causing the problem so he can correct it rather than just replace parts and have the same problem keep recurring.

Specifications are found at the end of each Section for easy reference.



**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.**

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

### SI (International System) Units of Measure

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

# Section 10 GENERAL Group 5 TRACTOR IDENTIFICATION

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### TRACTOR SERIAL NUMBER

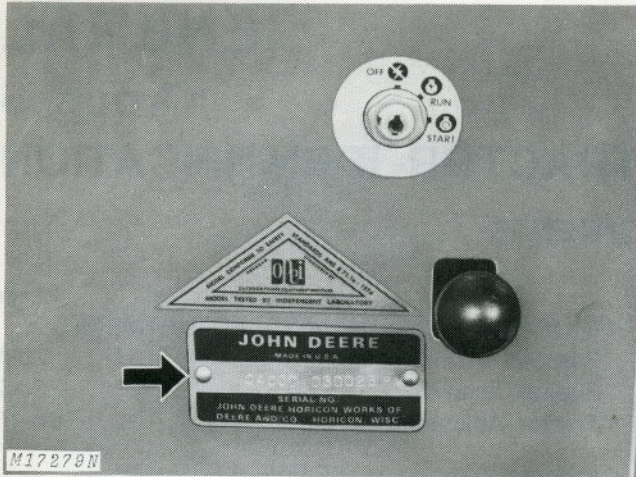


Fig. 1-Tractor Serial Number

The tractor serial number plate is located just below the key switch on the pedestal, Fig. 1.

### ENGINE SERIAL NUMBER



Fig. 2-Engine Serial Number

The engine serial number is located on the right-hand cylinder head shroud, Fig. 2.

### TRANSMISSION SERIAL NUMBER

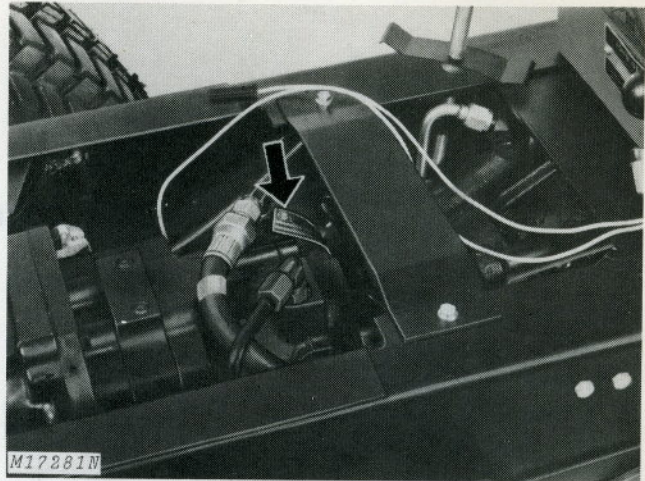


Fig. 3-Transmission Serial Number

The transmission serial number is stamped on a tag attached to the transmission, Fig. 3.

### REAR AXLE SERIAL NUMBER

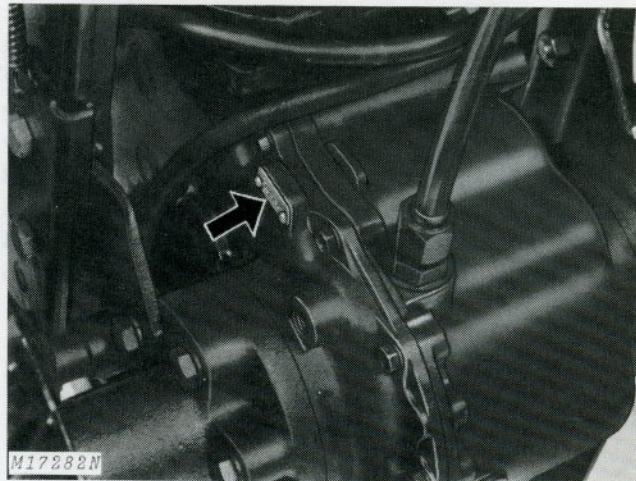


Fig. 4-Rear Axle Serial Number

The rear axle serial number is stamped on a tag attached to the rear axle, Fig. 4.

# Group 10 SPECIFICATIONS

## TRACTOR SPECIFICATIONS

### ENGINE

Manufacturer ..... Kohler  
Model Number ..... K532QS  
Cylinders ..... 2  
Type ..... 4 Cycle-Air Cooled  
Bore ..... 3.375 in. (8.57 cm)  
Stroke ..... 3.000 in. (7.62 cm)  
Displacement ..... 53.7 cu. in. (880.14 cc)  
Horsepower ..... 19.9 (14.726 kw)  
Speeds  
Idle ..... 1700-1900 rpm  
High (No Load) ..... 3400-3500 rpm

### POWER TRAIN

Hydrostatic Transmission ..... Sundstrand  
15 Series (In-line)  
Axle ..... Peerless (2-Speed) Model 2514  
Brakes ..... Individual Rear Wheel (Drum-Type)

### HYDRAULICS

Control Valve ..... 3-Spool (Open Center)  
Outlets ..... 2 Sets (Front)  
Rockshafts ..... Rear & Mid-Mounted  
(Both Operated by One Cylinder)  
Power Steering ..... Standard Equipment

### ELECTRICAL SYSTEM

Battery ..... 12-Volt (BCI Group 22F) (AM31186)  
Ignition ..... Battery-Coil  
Spark Plug ... Prestolite 14-L7B (AT17208)  
AC 45-L (AM1535T)  
Champion H-10 (AM514T)  
\*Resistor-  
Type RH-10 (AM37129)  
Spark Plug Gap ..... 0.035 in. (0.8890 mm)  
Breaker Point Gap ..... 0.020 in. (0.508 mm)  
Charging Capacity ..... 15 Amps

### CAPACITIES

Fuel Tank ..... 4.5 U.S. Gallons (17.034 l)  
Crankcase ..... 6 U.S. Pints (2.838 l)  
Transmission ..... 11 U.S. Pints (5.17 l)

### FUEL AND LUBRICANTS

Fuel ..... Non-Leaded or Regular Grade  
(85 Octane or Higher)  
Crankcase ..... JD Torq-Gard Supreme  
(Summer-Above 32°F) SAE 30 or Equivalent  
(Winter-Below 32°F) SAE 5W-20 or Equivalent

*\*In Canada, compliance with radio interference regulations certified. Replace spark plug with resistor spark plug only.*

*Litho in U.S.A.*

Transmission ..... JD All-Weather Hydrostatic  
Fluid or Equivalent  
Grease Fittings ..... JD Multi-Purpose Lubricant  
or Equivalent

### FILTERS

Engine Oil Filter ..... AM34770  
Engine Air Filter ..... M47494  
Transmission Oil Filter ..... AM35176

### GROUND TRAVEL SPEEDS @ 3400 RPM

Forward (Low) ..... Variable 0.5 to 5.6 mph  
(0.8 to 8.85 km/h)  
Forward (High) ..... Variable .5 to 10.8 mph  
(0.8 to 17.19 km/h)  
Reverse (Low) ..... Variable .5 to 2.1 mph  
(0.8 to 3.22 km/h)  
Reverse (High) ..... Variable .5 to 4.0 mph  
(0.8 to 6.44 km/h)

### DIMENSIONS

Wheelbase ..... 52 in. (132.08 cm)  
Over-All Length ..... 76 in. (193.04 cm)  
Over-All Height ..... 46 in. (116.84 cm)  
Over-All Width (Max.) ..... 49 in. (124.46 cm)  
Tread  
Front ..... 35 in. (88.90 cm)  
Rear (Wheels In) ..... 32 in. (81.28 cm)  
Rear (Wheels Out) ..... 37 in. (93.98 cm)

### TIRES

Standard  
Front ..... 18x8.50-8 High-Flotation  
Rear (GT-12) ..... 26x12.00-12 High-Flotation  
Accessory (Field Installed)  
Rear (GT-14) ..... 26x12.00-12 Traction Tire  
Tire Pressure\*  
Front (Std. Tire) ... 6 to 16 psi (41 to 110 kPa)  
Rear ..... 5 to 10 psi (34 to 69 kPa)

### WEIGHT

Curb ..... 975 lbs. (442.25 kg)

*\*Inflation will vary with attachment used.*

## TORQUE CHARTS

### Bolt Torque Chart

AVERAGE TIGHTENING TORQUE FOR BOLTS  
(BASED ON 85% OF YIELD)

BOLT SIZE	A17B			A17D			A17F		
	lb-in	lb-ft	Nm	lb-in	lb-ft	Nm	lb-in	lb-ft	Nm
1/4	72	6	8	120	10	13.5	168	14	19
5/16	156	13	17.6	240	20	27	360	30	40.7
3/8	276	23	31.2	420	35	47.5	600	50	67.8
7/16	420	35	47.5	660	55	74.6	960	80	108.5
1/2	660	55	74.6	1020	85	115.2	1440	120	162.7
9/16	900	75	101.7	1560	130	176.3	2100	175	237.3
5/8	1260	105	142.4	2040	170	230.5	2880	240	325.4
3/4	2220	185	250.8	3600	300	406.7	5100	425	576.2
7/8	1920	160	216.9	5340	445	603.3	8220	685	928.7
1	3000	250	339	8040	670	908.4	12360	1030	1396.5
1-1/8	3960	330	447.4	10920	910	1233.8	17520	1460	1979.5
1-1/4	5760	480	650.8	15000	1250	1694.8	24720	2060	2793

B grade bolts larger than 3/4 are sometimes formed hot rather than cold, which accounts for the lower mean tightening torque.

### Set Screw Seating Torque Charts

Screw Size	Seating Torque	
	Inch-Pounds	Newton Meters (Nm)
#5	9	1.0
#6	9	1.0
#8	20	2.3
#10	33	3.7
1/4	87	9.8
5/16	165	18.6
3/8	290	32.8
7/16	430	48.6
1/2	620	70.1
9/16	620	70.1
5/8	1225	138.4
3/4	2125	240.1

# Group 15 FUEL AND LUBRICANTS

## FUEL

The engine included in this service manual performs at peak efficiency when the below-listed fuel recommendations are followed:

**CAUTION:** Do not fill gas tank when engine is running or hot. Do not smoke when filling gas tank.

Wipe dust and dirt from around filler cap before removing it. Place cap in a clean area.

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

Fill the gas tank with fresh, clean "regular" grade gasoline having an octane rating of 85 or higher. We recommend non-leaded gasoline because it reduces cylinder head deposits. Low-lead or leaded "regular" grades are acceptable if the octane rating is 85 or higher.

DO NOT use premium, ethyl or white gasoline or regular gasoline having an octane rating below 85. Never use special additives such as carburetor cleaners, de-icers, or moisture-removing liquids in your gasoline.

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

## LUBRICANTS

Effective use of lubricating oils and greases is perhaps the most important step toward low upkeep cost, long tractor life, and satisfactory service. Use only lubricants specified in this section. Apply them at intervals and according to the instructions in the lubrication and periodic service section.

### Engine Lubricating Oils

We recommend John Deere Torq-Gard Supreme engine oil for use in the engine crankcase. Torq-Gard Supreme provides superior lubrication under all conditions. NEVER PUT ADDITIVES IN THE CRANKCASE. Torq-Gard Supreme oil was formulated to provide all the protection the engine needs. Additives could reduce this protection rather than help it.

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JOHN DEERE TORQ-GARD SUPREME ENGINE OIL			
Air Temperature-Season	Oil Viscosity	1/2-pint (0.2365-1) "pop-top" can (6 per carton)	1-quart 0.9463 l) can
Summer Above 32°F (0°C)	SAE 30	AR63979	AR63218
Winter Below 32°F (0° C)	SAE 5W-20*	AR63980	AR63228

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

If oil other than Torq-Gard Supreme is used, it must conform to the following specifications.

API Service CD/SE, CD/SD or SD  
MIL-L-46152  
MIL-L-2104C\*

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

Transmission ..... John Deere All-Weather Hydrostatic Fluid

Tractor Grease Fittings ..... John Deere Multipurpose Lubricant SAE (Seasonal Grade) Multipurpose-Type Grease

### CAPACITIES

Fuel Tank .....	4.5 U.S. gal. (17.034 l)
Crankcase .....	6 U.S. pt. (2.838 l)
	(with filter - 7 U.S. pt. (3.308 l))
Transmission.....	Approx. 11 U.S. pt. (5.17 l)

### SERVICE INTERVALS

Crankcase (Oil Change)	
Break-in .....	First 5 hours
Regular .....	Every 50 hours
Dusty Conditions.....	Every 8 hours
Transmission	
Filter Change .....	100 hours
Fluid Change .....	500 hours
Tractor Grease Fittings .....	Spring and Fall

### CHECKING ENGINE CRANKCASE OIL LEVEL

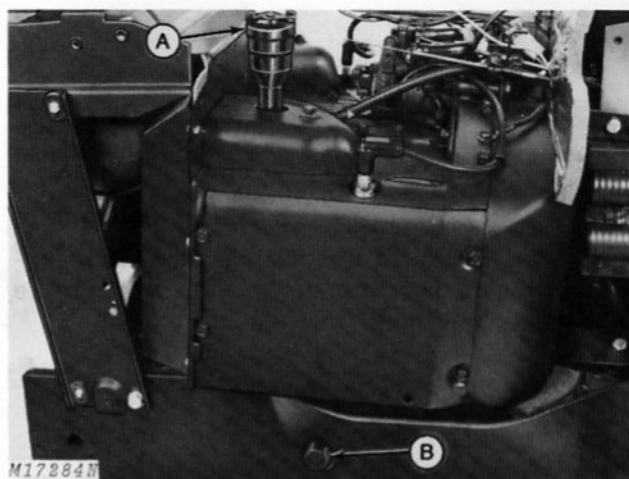


A—Dipstick B—Safe Range

Fig. 1-Checking Crankcase Oil Level

- Park tractor on a level surface.
- Stop engine and raise hood.
- Wipe dust and dirt from around dipstick (A).
- Remove dipstick (A), Fig. 1.
- Check that oil level is within the safe range (B) on the dipstick when the dipstick is installed all the way.

### CHANGING ENGINE CRANKCASE OIL



A—Dipstick B—Drain Cap or Drain Valve

Fig. 2-Changing Crankcase Oil

- Park tractor on a level surface.
- Stop engine and raise hood.
- Remove dipstick (A), Fig. 2.
- On 400 Tractors (Serial No. 30001-55000), remove drain cap (B). Drain oil into a container. Replace drain cap after all oil is drained.

On 400 Tractors (Serial No. 55001 and Up) turn drain valve (B) counterclockwise and drain oil into a container. Turn drain valve clockwise until snug after oil has drained.

**IMPORTANT: Do not tighten drain valve too tight with a wrench. Otherwise drain valve will be damaged.**

Fill crankcase with oil of the proper viscosity through dipstick opening. See chart, page 10-15-1. Fill crankcase until oil level is within safe range on dipstick (see inset, Fig. 1), (6 U.S. pints [2.838 l] without filter; 7 U.S. pints [3.308 l] with filter). Do not overfill crankcase.

**IMPORTANT: Check dipstick reading before pouring in the last 1/2 pint (0.2366 l). Fill only to "SAFE" range on dipstick, (B, Fig. 1). Overfilling can cause engine over-heating, resulting in loss of power and permanent engine damage.**

Replace dipstick in oil fill tube.

### CHANGING ENGINE OIL FILTER

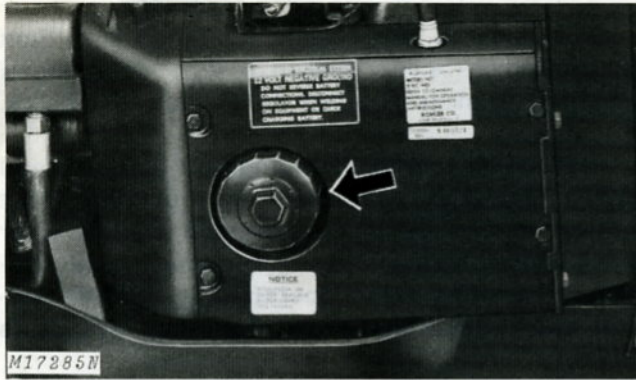


Fig. 3-Changing Engine Oil Filter

Drain engine crankcase oil, see Fig. 2.

Remove tractor right-hand side panel.

Turn filter, Fig. 3, counterclockwise to remove it. Discard old filter.

Clean the filter adaptor. Apply a thin film of clean oil on the sealing ring of the new filter. Turn new filter clockwise to install it.

**IMPORTANT:** The oil filter has a by-pass valve which allows the oil to circulate should the filter become plugged. Use only the correct John Deere filter for replacement.

Use a box end wrench and exert light pressure to seal filter. Do not over-tighten. Over-tightening filter may damage filter sealing ring.

Replace drain cap or tighten drain valve and fill crankcase with oil of the proper viscosity, Fig. 2.

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### CHECKING TRANSMISSION FLUID LEVEL

400 Tractors (Serial No. 30,001-70,000)

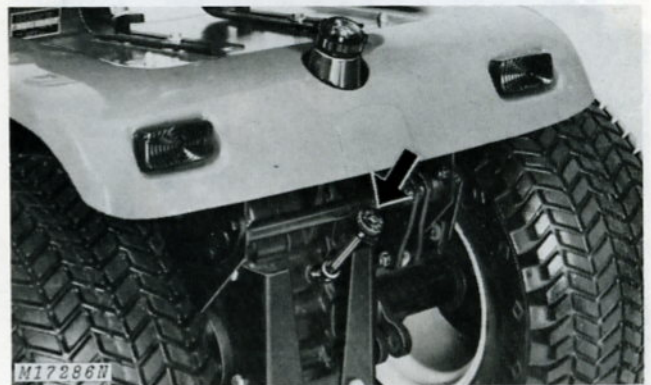
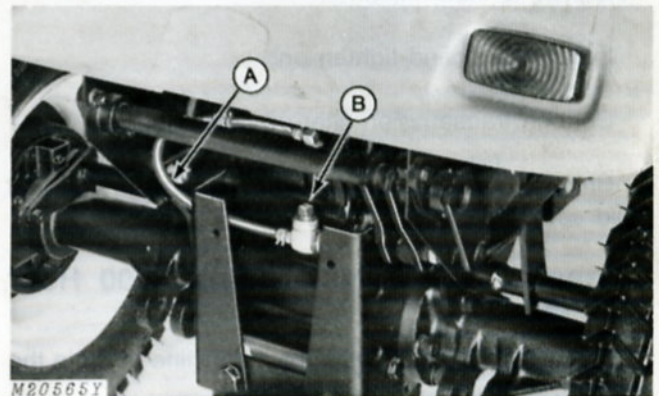


Fig. 4-Checking Transmission Fluid Level  
(Serial No. 30,001-70,000)

**NOTE:** To check transmission fluid level, park tractor on a level surface, leave engine running at idle, place hydrostatic control lever in "neutral" position and set parking brake.

Remove dipstick, Fig. 4. Check that transmission fluid level is at midpoint of "SAFE" range on dipstick.

400 Tractors (Serial No. 70,001- )



A—Fluid Level

B—Fill Plug

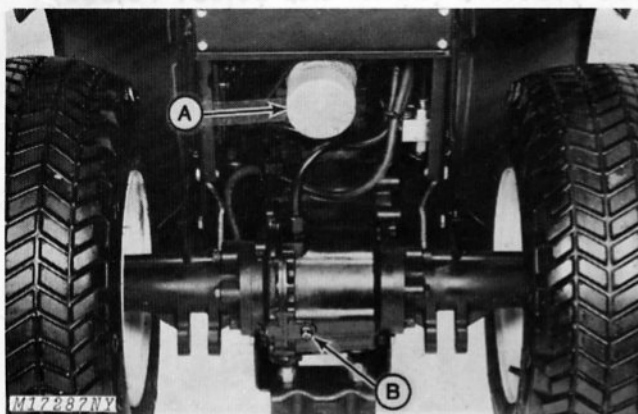
Fig. 5-Checking Transmission Fluid  
(Serial No. 70,001- )

Park tractor on a level surface. Place hydrostatic control lever in "neutral" position and set parking brake. Leave tractor engine running at idle speed.

When required, remove fill plug (B) Fig. 5, and add John Deere All-Weather Hydrostatic Fluid or an equivalent Type "F" Automotive Automatic Transmission Fluid. Add only enough to bring fluid up to level (A) on sight tube.

**IMPORTANT:** Do not overfill.

## CHANGING TRANSMISSION FLUID AND FILTER



A—Filter

B—Drain Plug

Fig. 6-Changing Transmission Fluid and Filter

### Changing Transmission Filter (100 Hour Intervals)

Remove and discard old filter (A), Fig. 6.

Moisten rubber gasket on new filter with clean transmission fluid. Fill filter with clean transmission fluid prior to installation.

Install filter, hand-tighten only.

Change transmission filter as shown above.

Check transmission fluid level, Fig. 4 or 5, and add fluid as necessary.

### Changing Transmission Fluid (500 Hour Intervals)

Park tractor on a slightly upward incline to drain the system.

Remove transmission dipstick.

Remove drain plug (B), Fig. 6. Drain all fluid into a container.

Change transmission filter as shown above.

Fill hydrostatic system with John Deere All-Weather Hydrostatic Fluid or equivalent type "F" Automotive Automatic Transmission Fluid as follows:

### Filling Transmission With Fluid 400 Tractors (Serial No. 30,001-70,000)

To fill, pour in only 4 quarts (3.80 l) of fluid. Start engine and check fluid level on dipstick. Add fluid until level is to the midpoint of the "SAFE" range on dipstick.

**IMPORTANT:** After changing fluid and filter and before operating hydrostatic control lever, start engine and move inner hydraulic control lever back and forth several times. Observe that lift system is operating before operating hydrostatic control lever. This insures that the entire system is filled.

### 400 Tractors (Serial No. 70,001- )

To fill, add fluid until visible in sight tube. Start engine and check fluid level. Add only enough fluid to bring fluid up to level (A), Fig. 5, page 10-15-3, on sight tube.

**IMPORTANT:** After changing fluid and filter and before operating hydrostatic control lever, start engine and move inner hydraulic control lever back and forth several times. Observe that lift system is operating before operating hydrostatic control lever. This insures that the entire system is filled. Do not overfill.

### LUBRICATING GREASE FITTINGS

Lubricate grease fittings, Figs. 7, 8, 9, and 10, using a John Deere Pisto-Luber or hand grease gun. Wipe fittings clean before and after lubrication.

See chart below for grease fitting locations.

Qty.	Location
2	Brake Pedal Shaft (Fig. 7)
2	Front Wheel Hubs (Fig. 8)
2	Front Axle Spindles (Fig. 8)
1	Hydraulic Lift Lever Shaft on 400 Tractor (Serial No. 30,001-80,000) (Fig. 9)
1	Steering Column (Fig. 10)
1	PTO Clutch Lever Shaft (Fig. 10)

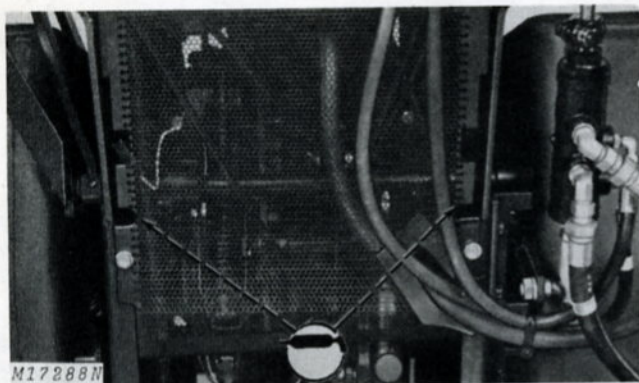


Fig. 7-Lubricating Brake Pedal Shaft

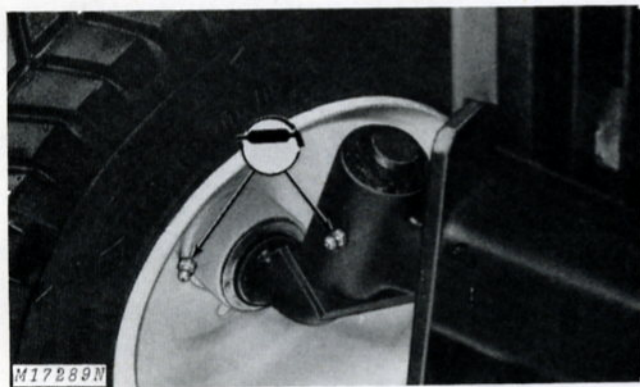


Fig. 8-Lubricating Front Wheel Hubs and Axle Spindles

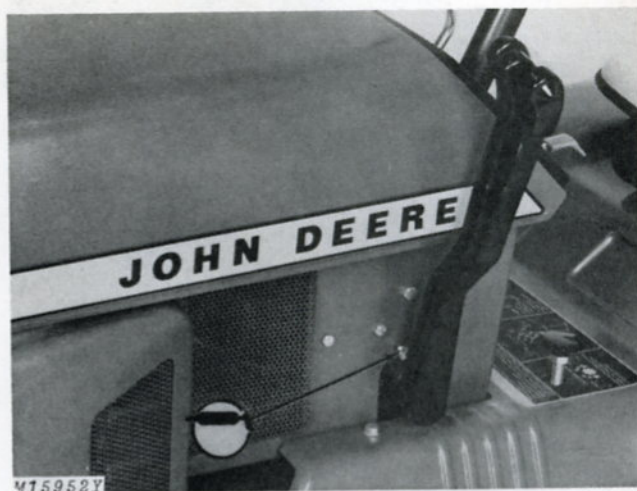


Fig. 9-Lubricating Hydraulic Lift Lever Shaft on 400 Tractor (Serial No. 30,001-80,000)

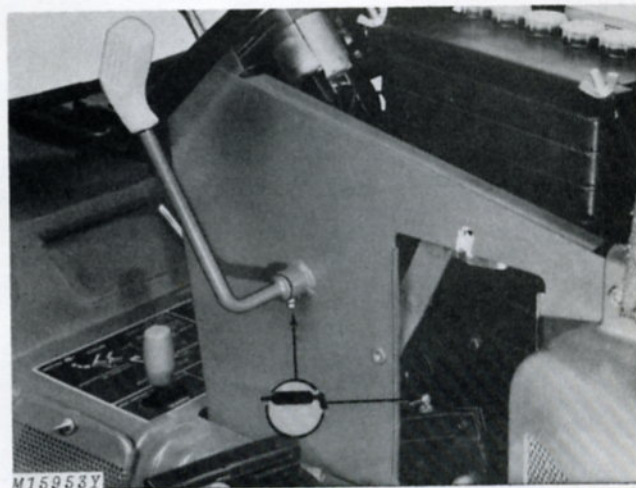


Fig. 10-Lubricating Steering Column and PTO Clutch Lever SHAFT

**NOTE:** Do not lubricate steering column unless the assembly was repaired. Steering column is lubricated at factory and does not require periodic lubrication. Remove right-hand access panel to lubricate steering column, Fig. 10.

## Group 20 TUNE-UP AND ADJUSTMENTS

### PURPOSE OF INSTRUCTIONS

This group is intended to provide a service procedure for tractors that are running well. Minor repairs and adjustments made in an orderly fashion will improve the efficiency and operation of the tractor.

#### Engine Tune-up

Engine tune-up involves checking, servicing and adjusting engine components—including the ignition system, air intake system, fuel and lubrication systems.

Perform engine tune-up in the following order:\*

1. Clean air intake and engine.
2. Check valve-to-tappet clearance (cold).
3. Check compression.
4. Check and adjust breaker points.
5. Check spark plug.
6. Check and adjust timing.
7. Service crankcase breather.
8. Adjust carburetor.
9. Adjust governor linkage.
10. Service air cleaner.
11. Check and adjust engine oil pressure.
12. Adjust PTO.
13. Clean and check battery.
14. Change oil and filter.

\*Engine tune-up procedures are shown starting on page 10-20-2.

#### Tractor Adjustment

Tractor adjustments are made to assure that engine horsepower will be utilized in the most efficient manner. A thorough visual inspection of the complete tractor, as you make the adjustments, will help in determining any extra service required on the tractor.

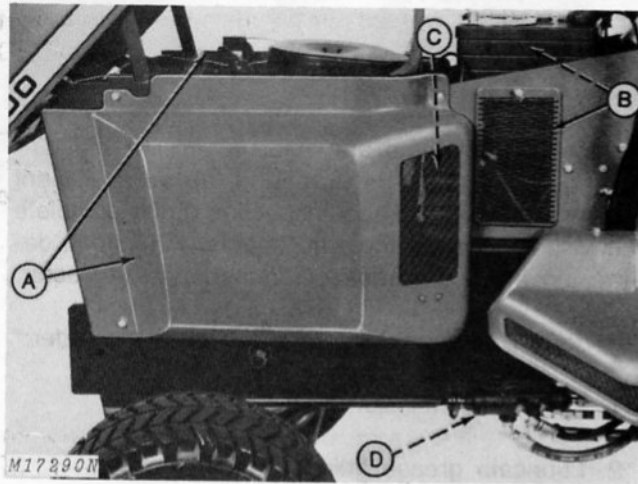
Perform tractor adjustment in the following order:\*

1. Check transmission fluid.
2. Lubricate grease fittings.
3. Check brake adjustment.
4. Adjust hydrostatic linkage.
5. Adjust steering.
6. Test hydraulic system.
7. Check wiring.
8. Check belts and equipment.
9. Check tire pressure.

\*Tractor adjustment procedures are shown starting on page 10-20-13.

## ENGINE TUNE-UP

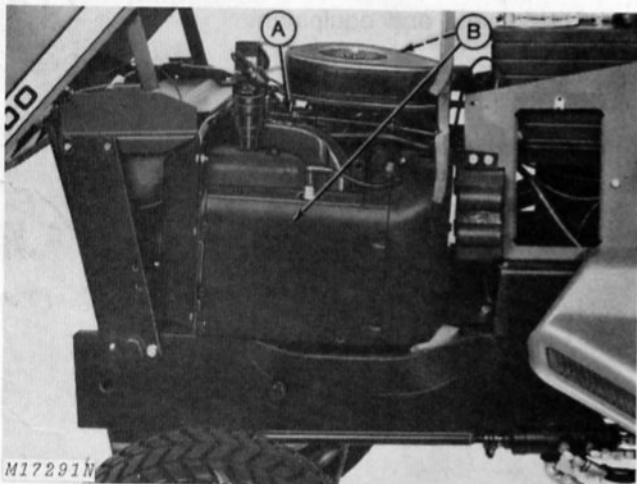
### 1. Clean Air Intake and Engine



A—Side Panel  
B—Pedestal Screens  
C—Oil Cooler  
D—Bottom Screen

Fig. 1-Cleaning Air Intake

- Remove side panels (A), Fig. 1.
- Remove pedestal screens (B).
- Clean oil cooler (C) with a soft brush.
- Clean bottom screen (D).



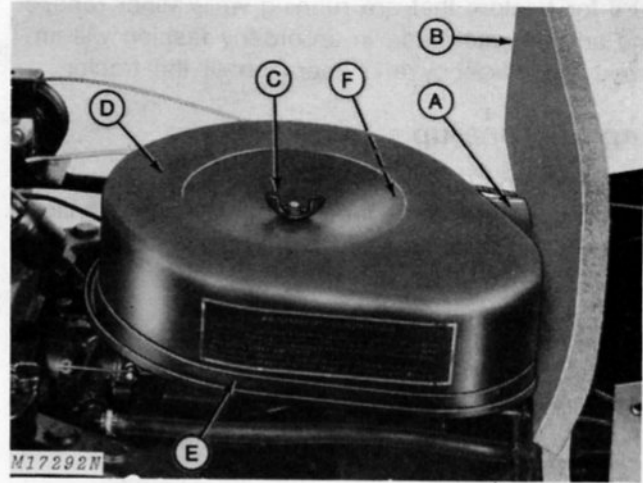
A—Engine  
B—Cylinder Head Shrouds

Fig. 2-Cleaning Engine

- Clean outside of engine (A), Fig. 2.
- Remove cylinder head shrouds (B).
- Clean area of engine enclosed by shrouding.
- Reinstall cylinder head shrouds (B).

*NOTE: Air cleaner should be removed to perform the rest of the engine tune-up until it is serviced and reinstalled, Step 10.*

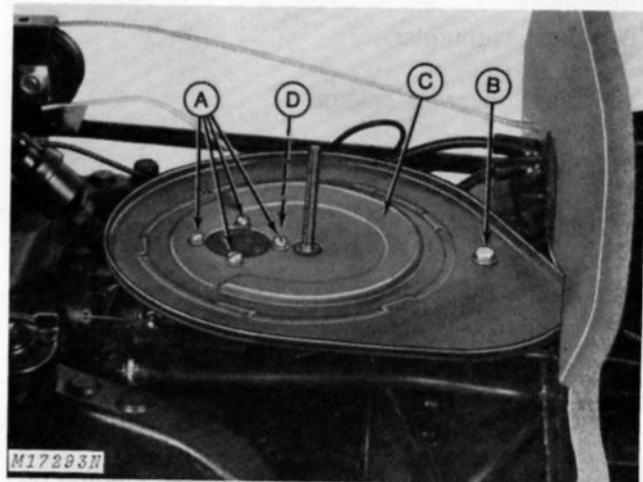
#### 400 Tractor (Serial No. 30,001-80,000)



A—Intake Hose  
B—Heat Shield  
C—Wing Nut  
D—Air Cleaner Cover  
E—Seal  
F—Element

Fig. 3-Removing Air Cleaner Element

- Remove intake hose (A) from air cleaner cover (D), Fig. 3.
- Remove wing nut (C), air cleaner cover (D), seal (E), and element (F).
- Remove intake hose (A) from heat shield (B).

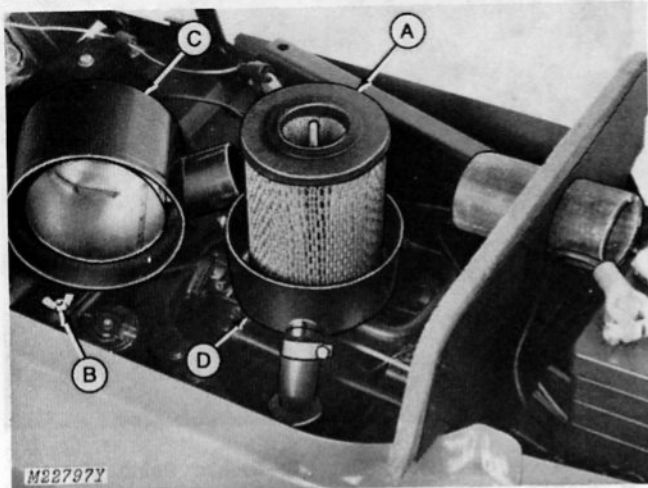


A—Slotted Screws and Washers  
B—Cap Screw and Lock Washer  
C—Base  
D—Gasket

Fig. 4-Removing Air Cleaner Base

- Remove four slotted screws and washers (A), Fig. 4.
- Remove cap screw and washer (B).
- Remove base (C) and gasket (D).

400 Tractor (Serial No. 80,001- )



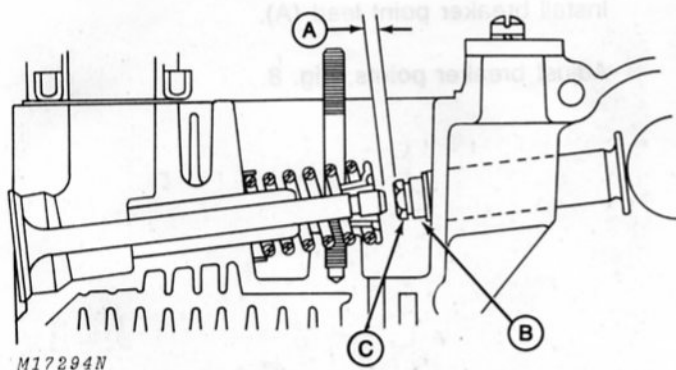
A—Air Filter Element  
B—Wing Nut  
C—Cover  
D—Air Cleaner Base

Fig. 5-Removing Air Cleaner

Remove wing nut (B), cover (C), air filter element (A), and air cleaner base (D), Fig. 5.

## 2. Check Valve-to-Tappet Clearance

*NOTE: Valve-to-tappet clearance must be checked when engine is cold. If engine is warm, check valve-to-tappet clearance after tune-up procedure is completed and engine has cooled.*



A—Valve-to-Tappet Clearance  
B—Flat Area of Tappet  
C—Adjusting Screw

Fig. 6-Checking Valve-to-Tappet Clearance

Remove valve covers and gaskets (not illustrated).

Rotate engine by hand in direction of normal rotation until No. 1 piston (left-hand) is top-dead-center on compression stroke. Both valves will be closed in this position.

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Measure valve-to-tappet clearance (A) on No. 1 cylinder with a flat feeler gauge, Fig. 6.

Intake valve-to-tappet clearance should be 0.008 to 0.010 inch (0.20 to 0.25 mm). Exhaust valve-to-tappet clearance should be 0.017 to 0.020 inch (0.43 to 0.50 mm).

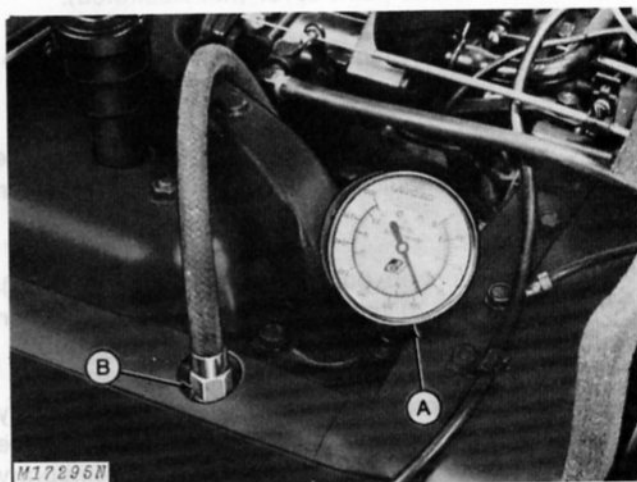
To adjust, hold flat area of tappet (B) with an open-end wrench. Turn adjusting screw (C) with an open-end wrench into or out of tappet until proper clearance is reached.

Repeat procedure for No. 2 (right-hand) piston.

Reinstall valve covers and gaskets.

## 3. Check Compression

*NOTE: Compression should be checked while engine is warm. Run engine for several minutes at full throttle. Shut engine off. Remove both spark plugs. Do not reinstall spark plugs until you have checked compression, breaker points and spark plug.*



A—Compression Gauge  
B—Spark Plug Hole

Fig. 7-Testing Compression

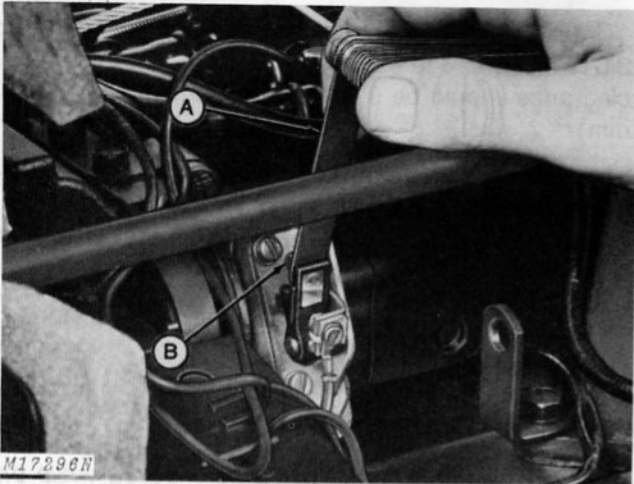
Set throttle and choke in wide-open position.

Check each cylinder several times.

Place JDM-59 compression gauge (A), Fig. 7, in spark plug hole (B). Hold key switch in "START" position for several seconds and observe the compression gauge reading.

Consistent readings of 110 to 120 psi indicate good compression. Low readings indicate a blown head gasket, warped cylinder head, worn piston rings, leaky valves, incorrect valve-to-tappet clearance or piston damage.

#### 4. Check and Adjust Breaker Points



A—Flat Feeler Gauge B—Gap Adjusting Screw

Fig. 8-Checking and Adjusting Breaker Point Gap

Remove breaker point cover (not illustrated).

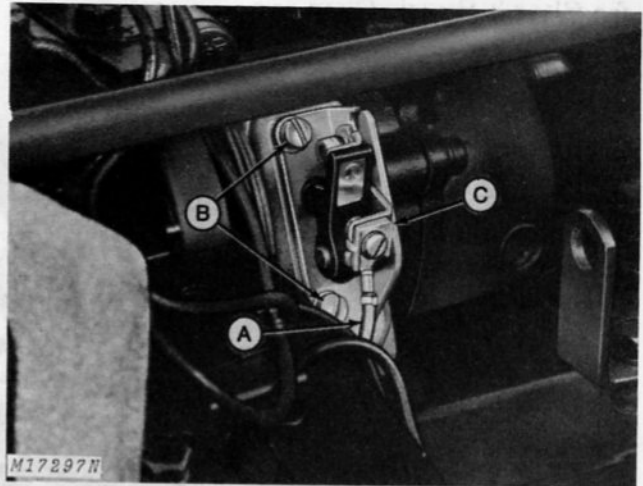
Rotate flywheel manually in direction of normal rotation until points are fully open.

Measure breaker point gap with a flat feeler gauge (A), Fig. 8. Gap should be 0.020 inch (0.508 mm) when fully open.

To adjust, loosen point gap adjusting screw (B). Adjust gap to 0.020 inch (0.508 mm). Securely tighten gap adjusting screw (B).

Check condition of breaker points. Replace badly burned or pitted breaker points, Fig. 9. If points have been dressed down with a point file as a temporary field fix, replace the points. If points are oxidized, rub a piece of coarse cloth across surfaces. Clean dirty or oily points with cloth, but make sure no particles of lint are left between surfaces.

Install breaker point cover. Make sure seal on breaker point lead is seated in breaker point cover when installed.



A—Breaker Point Lead B—Slotted Screw and Lock Washer C—Breaker Point Assembly

Fig. 9-Replacing Breaker Points

Disconnect breaker point lead (A), Fig. 9.

Remove two slotted screws and lock washers (B).

Remove breaker point assembly (C).

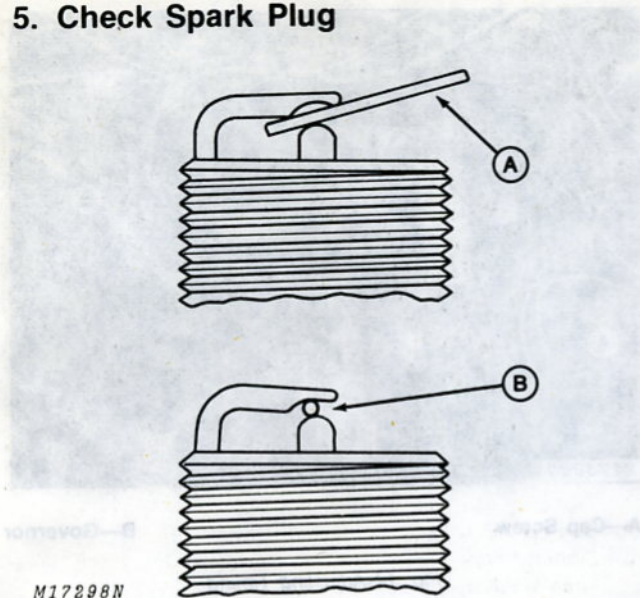
Install new breaker point assembly (C).

Install two slotted screws and lock washers (B). Tighten screws.

Install breaker point lead (A).

Adjust breaker points, Fig. 8.

## 5. Check Spark Plug



A—Flat Feeler Gauge

B—Wire Gauge

Fig. 10—Checking Spark Plug Gap

Analyze spark plug (refer to "Spark Plug Analysis" in Section 40).

Replace spark plug if necessary.

Regap plug to 0.035-inch (0.889 mm). Bend only the outer electrode when setting gap. A wire gauge (B) should be used, because a plain, flat feeler gauge (A) cannot accurately measure the true width of the spark plug gap, Fig. 10.

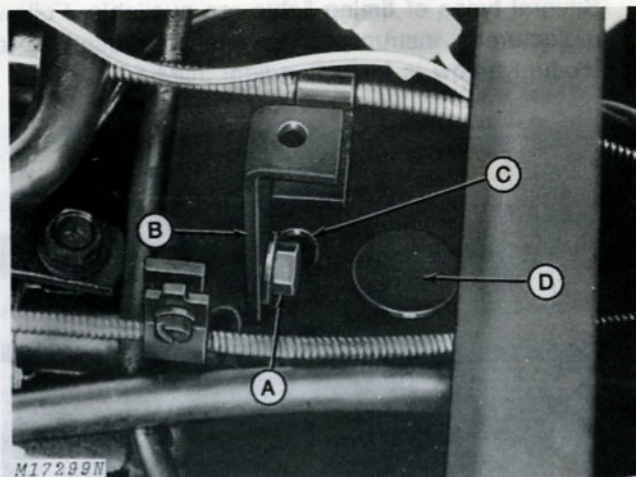
Always use a new spark plug gasket when replacing spark plug.

Install both spark plugs. Torque spark plugs to 22 ft-lbs. (29.83 Nm).

Connect spark plug wire to each plug.

## 6. Check and Adjust Timing

**NOTE:** Some engines were built with a timing sight hole that was too small. Enlarge the small hole as shown, Fig. 11.



A—Cap Screw and Lock Washer  
B—Throttle Cable Bracket

C—Small Hole  
D—Expansion Plug

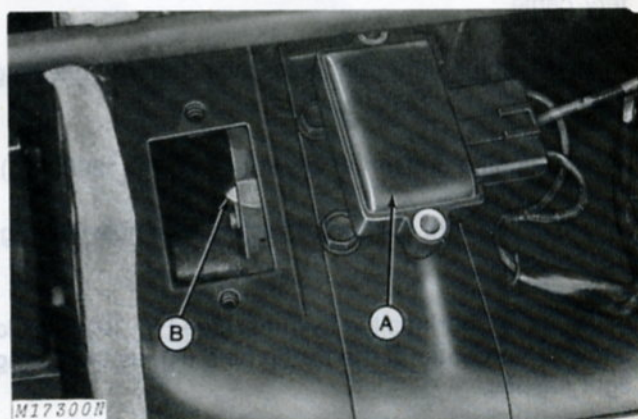
Fig. 11—Drilling Timing Sight Hole

Remove cap screw and lock washer (A), Fig. 11.

Move throttle cable bracket (B) out of way, but do not stretch cable.

Enlarge small hole (C) with a 3/8-inch drill bit. Remove shavings from engine.

Remove expansion plug (D).



A—Rectifier-Regulator

B—SP Timing Mark

Fig. 12—Chalking Timing Mark

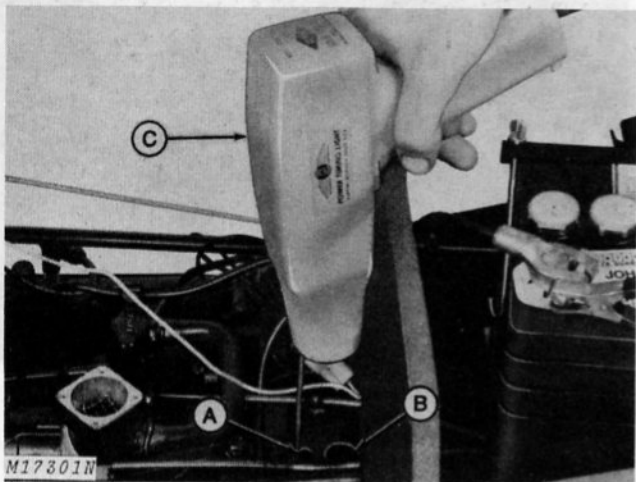
Remove rectifier-regulator (A), Fig. 12.

Rotate flywheel manually until "SP" timing mark (B) is visible.

Chalk the top of the projection between "S" and "P."

Reinstall rectifier-regulator (A). Make sure rectifier-regulator and all connections are tight.

Several types of timing lights are available. Follow manufacturer's instructions for the type used. The procedure below is for timing light JDM-60.



A—Timing Hole  
B—Timing Light Hole  
C—JDM-60 Timing Light

Fig. 13-Checking Timing

Connect red timing light lead to positive (+) battery cable.

Connect black timing light lead to negative (-) battery cable.

Install timing light connector over either spark plug wire.

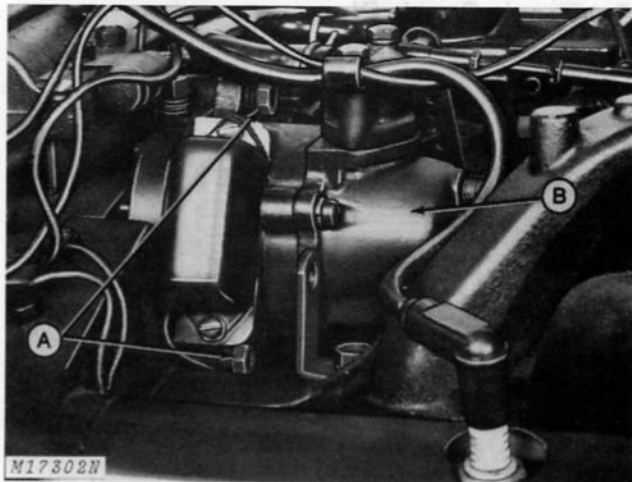
Start engine and run at idle speed (1700-1900 rpm).

Aim timing light (C) through timing light hole (B), Fig. 13.

The chalk mark on the flywheel (see Fig. 12), should show in the center of the timing hole (A), as the timing light flashes.

If timing is off, adjust as shown in Fig. 14.

Disconnect timing light from battery and spark plug wire.



A—Cap Screw  
B—Governor

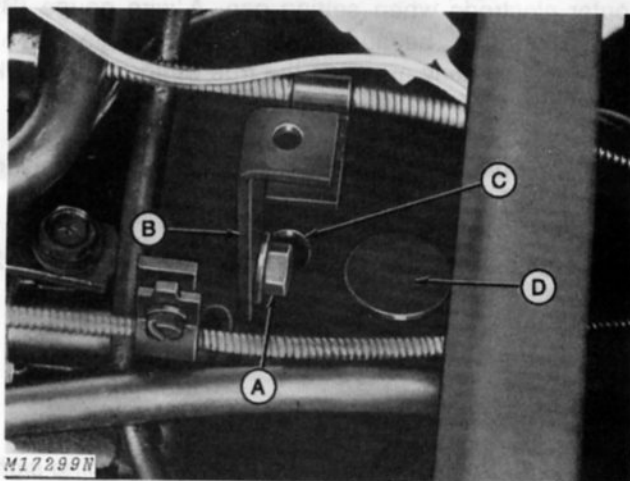
Fig. 14-Adjusting Timing

Loosen two cap screws (A), Fig. 14.

Rotate governor (B) clockwise or counterclockwise until chalk mark is centered in timing hole as the timing light flashes.

Tighten two cap screws (A).

Recheck timing, Fig. 13, after cap screws have been tightened.



A—Cap Screw and Lock Washer  
B—Throttle Cable Bracket  
C—Small Hole  
D—Expansion Plug

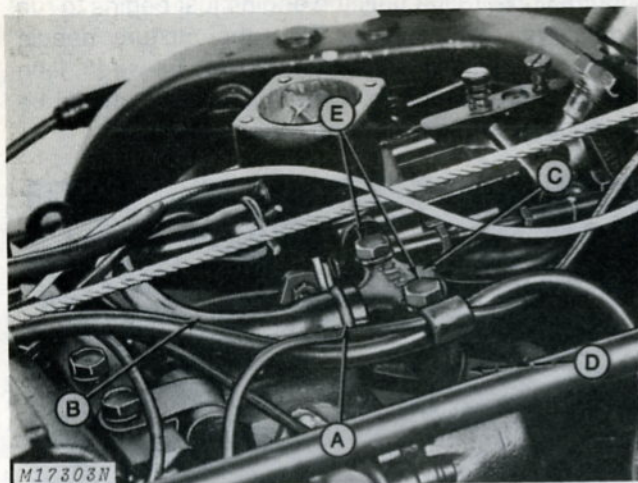
Fig. 15-Installing Throttle Cable Bracket

Install expansion plug (D), Fig. 15.

Move throttle cable bracket (B) into correct position.

Install cap screw and lock washer (A).

## 7. Service Crankshaft Breather



A—Clamp      C—Breather Housing      E—Cap Screw and Lock Washer  
B—Hose      D—Gasket

Fig. 16-Removing Crankcase Breather

Loosen clamp (A), Fig. 16. Remove hose (B) from crankcase breather housing (C).

Remove two cap screws and lock washers (E).

Remove breather housing (C) and gasket (D).

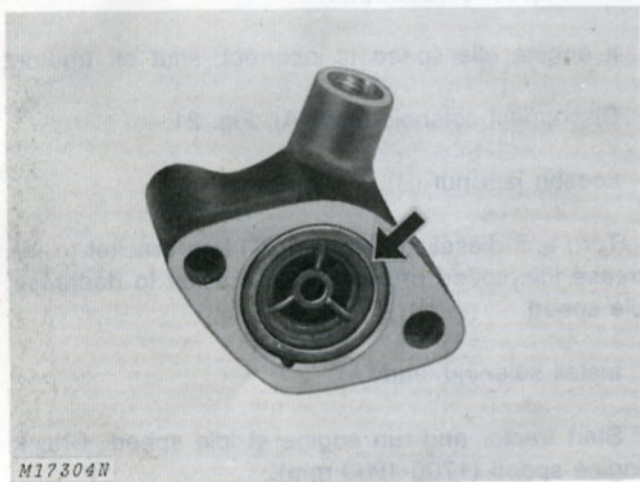
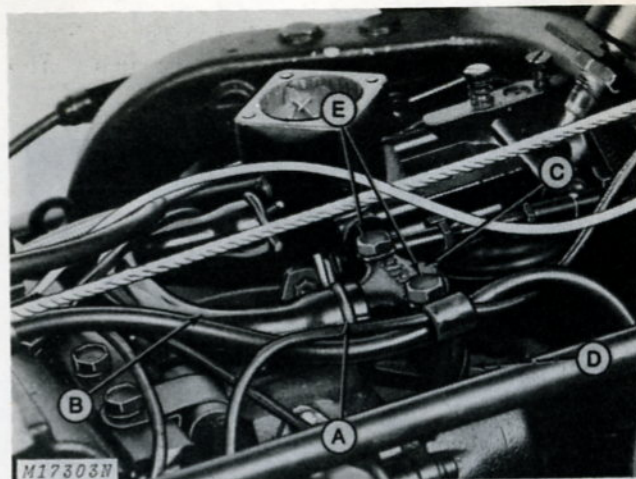


Fig. 17-Inspecting Crankcase Breather Valve

If breather valve, Fig. 17, is stuck, it can be cleaned with solvent to remove dirt and grime. If solvent does not release valve, pry the valve out of housing. Press new valve into housing until it is flush with housing.

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A—Clamp      C—Breather Housing      E—Cap Screw and Lock Washer  
B—Hose      D—Gasket

Fig. 18-Installing Crankcase Breather

Install gasket (D) and breather housing (C), Fig. 18.

Install two cap screws and lock washers (E). Tighten cap screws.

Install hose (B) on breather housing (C).

Secure hose with clamp (A).



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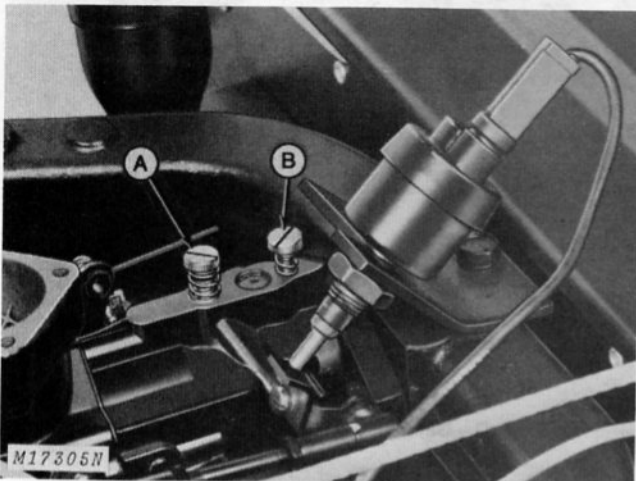
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## 8. Adjust Carburetor

### Initial Adjustment



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

Fig. 19-Initial Adjustment

Close high-speed mixture needle (A), Fig. 19, finger-tight; then, open 2 full turns. Close idle mixture needle (B) finger-tight; then, open 1-1/4 turns. This initial adjustment will permit the engine to be started and warmed-up before making final adjustment.

### Final Adjustment

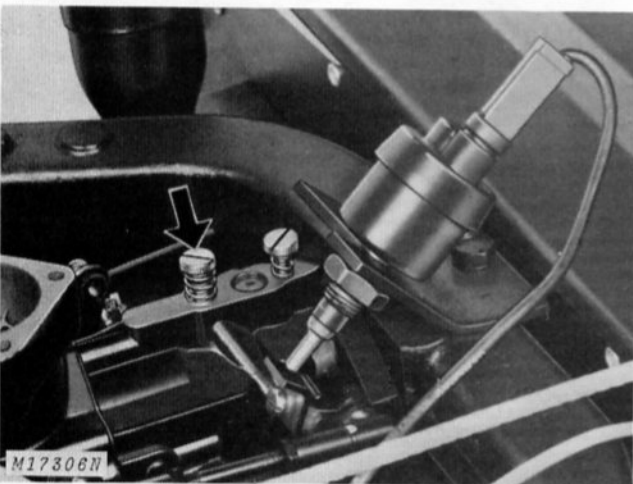


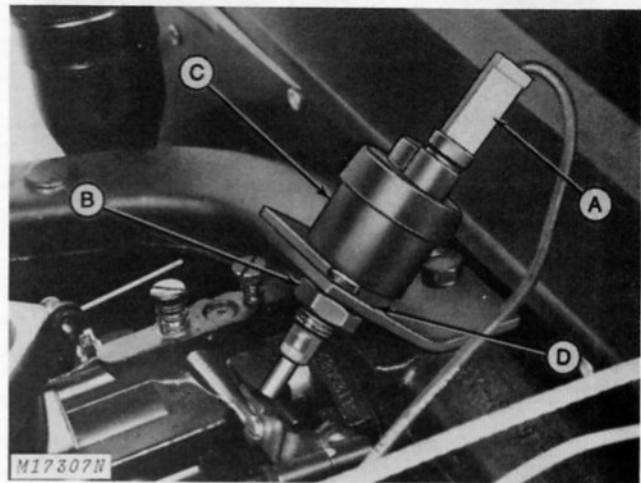
Fig. 20-Adjusting High Speed

Run engine with throttle lever in "FAST" position (3400 to 3500 rpm). Allow engine to warm up.

Turn high-speed mixture needle, Fig. 20, closed until engine starts to lose speed (lean mixture). Note position of the mixture needle.

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Slowly turn mixture needle open past the point of smoothest operation until the engine just begins to run rough (over-rich mixture). Turn the mixture needle closed until it is positioned half-way between lean mixture and over-rich mixture. This mixture should be rich enough for best performance under load.



A—Solenoid Lead      C—Anti-Dieseling Solenoid  
B—Jam Nut      D—Bracket

Fig. 21-Adjusting Anti-Dieseling Solenoid

Check engine idle speed with a tachometer. It should be 1700-1900 rpm.

If engine idle speed is incorrect, shut off tractor.

Disconnect solenoid lead (A), Fig. 21.

Loosen jam nut (B).

Turn anti-dieseling solenoid (C) into bracket to increase idle speed or away from bracket to decrease idle speed.

Install solenoid lead (A).

Start tractor and run engine at idle speed. Check engine speed (1700-1900 rpm).

Repeat procedure if necessary until idle speed is correct.

Tighten jam nut (B).

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