

Walk-Behind Tillers and 5B Sprayer



JOHN DEERE

TECHNICAL MANUAL

Walk-Behind Tillers and 5B Sprayer

TM1233 (01JAN80) English

John Deere
Lawn & Grounds Care Division
TM1233 (01JAN80)

LITHO IN U.S.A.
ENGLISH



WALK-BEHIND TILLERS AND 5B SPRAYER

Technical Manual

TM-1233 (Jan-80)

TABLE OF CONTENTS

SECTION 10 - GENERAL

- Group 5 - Machine Identification
- Group 10 - Specifications
- Group 15 - Fuel and Lubricants

SECTION 20 - TECUMSEH ENGINES

- Group 5 - General Information
- Group 10 - Minor Tune-Up
- Group 15 - Cylinder Head, Valves, and Breather
- Group 20 - Internal Components
- Group 30 - Recoil Starter
- Group 40 - Specifications

SECTION 25 - BRIGGS & STRATTON ENGINES

- Group 5 - General Information
- Group 10 - Minor Tune-Up
- Group 15 - Cylinder Head, Valves, and Breather
- Group 20 - Internal Components
- Group 30 - Recoil Starter
- Group 40 - Specifications

SECTION 30 - TECUMSEH FUEL SYSTEM

- Group 5 - General Information
- Group 10 - Adjustable Float-Type Carburetor
- Group 15 - Air Cleaner

(All information, illustrations, and specifications contained in this technical 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.)

SECTION 35 - BRIGGS & STRATTON FUEL SYSTEM

- Group 5 - General Information
- Group 10 - Vacu-Jet Carburetor with Manual Choke
- Group 15 - Vacu-Jet Carburetor with Choke-A-Matic Choke
- Group 20 - Governor and Carburetor Linkage
- Group 30 - Air Cleaner

SECTION 40 - TECUMSEH ELECTRICAL SYSTEM

- Group 5 - Magneto Ignition System

SECTION 45 - BRIGGS & STRATTON ELECTRICAL SYSTEM

- Group 5 - Magneto Ignition System

SECTION 50 - POWER TRAIN

- Group 5 - 324, 524, and 624 Walk-Behind Tiller Power Train
- Group 10 - 216 Walk-Behind Tiller Power Train
- Group 20 - V-Belt Care and Maintenance

SECTION 60 - MISCELLANEOUS

- Group 10 - 5, 5A, and 5B Sprayer Pumps
- Group 20 - 5, 5A, and 5B Sprayer Spraying Systems

SECTION 70 - SPECIAL SERVICE TOOLS

- Group 5 - Tecumseh Essential Service Tools
- Group 10 - Briggs & Stratton Essential Service Tools
- Group 15 - Convenience Service Tools

Copyright © 1980
DEERE & COMPANY
Moline, Illinois
All rights reserved

INTRODUCTION

This technical manual contains service and maintenance information for the 216, 324, 524, and 624 Walk-Behind Tillers and 5B Sprayer.


The manual is divided into sections. Each section pertains to certain components or operational systems. The information is divided into groups within each section.

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

Emphasis is placed on diagnosing malfunctions, analysis, and testing. Diagnosing malfunctions includes possible problems, their causes, and how to

correct them. Under specific components, these problems 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.

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

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

NOTE: Metric equivalents have been included, where applicable, throughout this technical manual.

Section 10 GENERAL

Group 5 MACHINE IDENTIFICATION

TABLE OF CONTENTS

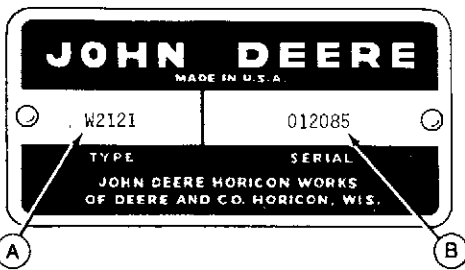
	Page		Page
GROUP 5 - MACHINE IDENTIFICATION		Machine Specifications.....	10-10-2
Machines Covered in This Manual	10-5-2	Walk-Behind Tillers.....	10-10-2
Machine Serial Numbers	10-5-2	5B Sprayer	10-10-2
Engine Serial Numbers	10-5-2	Bolt Torque Chart	10-10-3
		Set Screw Seating Torque Chart.....	10-10-3
GROUP 10 - SPECIFICATIONS		GROUP 15 - FUEL AND LUBRICANTS	
Machine Engine Model Numbers.....	10-10-1	Fuel and Lubricants	10-15-1
Engine Specifications	10-10-1	Grease Fitting Locations	10-15-2

MACHINES COVERED IN THIS MANUAL

Model Number	Description
5B	Sprayer
216	Walk-Behind Tiller
324	Walk-Behind Tiller
524	Walk-Behind Tiller
624	Walk-Behind Tiller

MACHINE SERIAL NUMBERS

Each machine is assigned an individual serial number. The serial number plate is found near the engine base.



M25937

A—Identification Code **B—Serial Number**

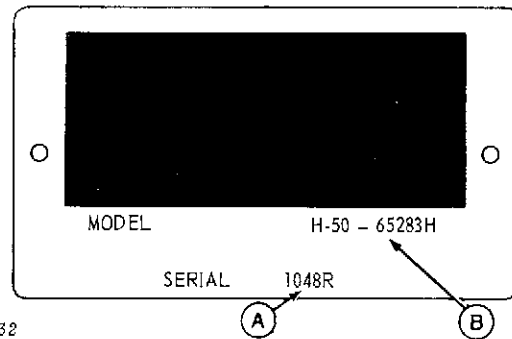
Fig. 1—Machine Serial Number Plate

Fig. 1 shows a typical serial number plate for machines manufactured before 1974.

On machines built after 1973, this number consists of 13 characters (Example: R324D 030001M). The first letter indicates the family of machine; the next three characters indicate the model or machine designation; the letter in the fifth position indicates the model year. This is followed by a space, a six-digit serial number, and an "M" denoting Horicon as the factory of manufacture.

When ordering parts, use only the six-digit serial number. Use all 13 characters when writing about or filling out warranty claims.

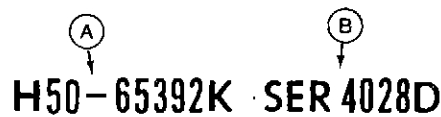
ENGINE SERIAL NUMBERS



M25932

A—Engine Serial Number **B—Engine Model Number**

Fig. 2—Tecumseh Engine Serial Number Plate



M25933

A—Engine Model Number **B—Engine Serial Number**

Fig. 3—Tecumseh Engine Serial Number Stamping

The Tecumseh engine serial number is on a serial number plate, Fig. 2, on the blower housing or crankcase, or on a serial number stamping, Fig. 3, on the blower housing. Use the model and serial number on all warranty claims.

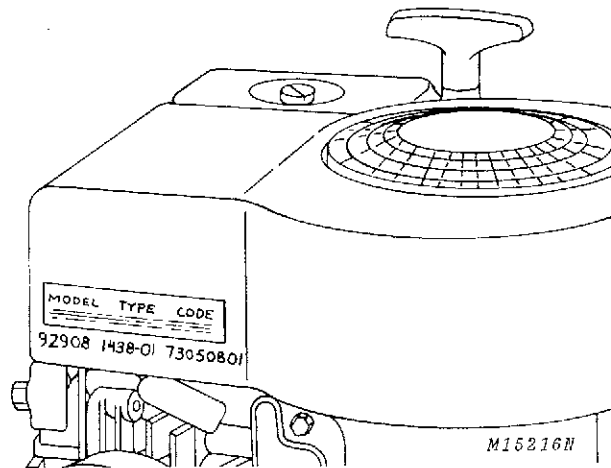


Fig. 4—Briggs & Stratton Engine Identification Number

The Briggs & Stratton engine identification number is stamped below the decal on the blower housing. The stamping gives the model, type, and code numbers. Use the type and code numbers on all warranty claims.

Group 10 SPECIFICATIONS

MACHINE ENGINE MODEL NUMBERS

Machine	Horsepower	Engine Model No.	Engine Manufacturer
216 Walk-Behind Tiller	2 (1.5 kW)	60102	Briggs & Stratton
324 Walk-Behind Tiller	3.5 (2.6 kW)	H35	Tecumseh
524 Walk-Behind Tiller	5 (3.7 kW)	H50	Tecumseh
624 Walk-Behind Tiller	6 (4.5 kW)	H60	Tecumseh
5B Sprayer			
(Serial No. 5001-80,000)	2.5 (1.9 kW)	80102	Briggs & Stratton
(Serial No. 80,000-)	2 (1.5 kW)	60102	Briggs & Stratton

ENGINE SPECIFICATIONS

	H35	H50	H60	60102	80102
Manufacturer	Tecumseh	Tecumseh	Tecumseh	Briggs & Stratton	Briggs & Stratton
Cylinders	1	1	1	1	1
Strokes/Cycle	4	4	4	4	4
Bore	2-1/2 in. (63.500 mm)	2-5/8 in. (66.675 mm)	2-5/8 in. (66.675 mm)	2-3/8 in. (60.325 mm)	2-3/8 in. (60.325 mm)
Stroke	1-27/32 in. (46.831 mm)	2-1/4 in. (57.150 mm)	2-1/2 in. (63.500 mm)	1-1/2 in. (38.100 mm)	1-3/4 in. (44.450 mm)
Displacement	9.06 cu. in. (149 cm ³)	12.20 cu. in. (200 cm ³)	13.50 cu. in. (221 cm ³)	6.65 cu. in. (109 cm ³)	7.75 cu. in. (127 cm ³)
Compression Release	No	Yes	Yes	----	----

MACHINE SPECIFICATIONS




Walk-Behind Tillers

Item	324	524 and 624	216
STARTING	Recoil	Recoil	Recoil
TILLER DRIVE	V-belt-to-gear case	V-belt-to-gear case	V-belt-to-chain case
TILLING WIDTHS	13 in. (33.0 cm), 18 in. (45.7 cm) 21 in. (53.3 cm), 24 in. (61.0 cm)	13 in. (33.0 cm), 18 in. (45.7 cm) 21 in. (53.3 cm), 24 in. (61.0 cm)	16 in. (40.6 cm)
With Right-Hand Extension	---	29 in. (73.7 cm)	---
With Left-Hand Extension	---	29 in. (73.7 cm)	---
With Both Extensions	---	34 in. (86.4 cm)	26 in. (66.0 cm)
DIMENSIONS			
Tread Width	11 in. (27.9 cm)	11 in. (27.9 cm)	11 in. (27.9 cm)
Height Overall	39 in. (99.1 cm)	39 in. (99.1 cm)	Adjustable
Width Overall	24 in. (61.0 cm)	24 in. (61.0 cm)	16 in. (40.6 cm)
CAPACITIES			
Fuel Tank	2 qts. (1.892 L)	1 gal. (3.785 L)	1 qt. (0.946 L)
Crankcase	21 oz. (approx. 1-1/3 pts.) (0.621 L)	19 oz. (approx. 1-1/4 pts.) (0.562 L)	20 oz. (1-1/4 pts.) (0.591 L)
Gear Case	8 oz. (0.236 L)	8 oz. (0.236 L)	---
Chain Case	---	---	6 oz. (0.177 L)
WEIGHT	101 lbs. (45.8 kg)	115 lbs. (52.16 kg)	76 lbs. (34.5 kg)

5B Sprayer

Item	Specification
STARTING	Recoil
PUMP	(Regular) Gear-type (Extra) Twin piston-type
SPRAYING EQUIPMENT	(Regular) Hand gun, 25 ft. (7.6 m) hose and 4 nozzle tips (Extra) Boom, 7 nozzles and various size nozzles
CAPACITIES	
Spray Tank	20 gallons (75.70 L)
Fuel Tank	1 qt. (0.95 L)
Crankcase	20 oz. (1-1/4 pts.) (0.591 L)

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		U.S. Regular				
Bolt Dia.	U.S. Dec. Equiv.	TORQUE IN FOOT POUNDS			Bolt Head	Nut
1/4	0.250	6 (8.14 N·m)	10 (13.56 N·m)	14 (18.98 N·m)	7/16	7/16
5/16	0.3125	13 (17.63 N·m)	20 (27.12 N·m)	30 (40.68 N·m)	1/2	1/2
3/8	0.375	23 (31.19 N·m)	35 (47.46 N·m)	50 (67.80 N·m)	9/16	9/16
7/16	0.4375	35 (47.46 N·m)	55 (74.58 N·m)	80 (108.48 N·m)	5/8	11/16
1/2	0.500	55 (74.58 N·m)	85 (115.26 N·m)	120 (162.72 N·m)	3/4	3/4
9/16	0.5625	75 (101.70 N·m)	130 (176.28 N·m)	175 (237.30 N·m)	13/16	7/8
5/8	0.625	105 (142.38 N·m)	170 (230.52 N·m)	240 (325.44 N·m)	15/16	15/16
3/4	0.750	185 (250.86 N·m)	300 (406.80 N·m)	425 (576.30 N·m)	1-1/8	1-1/8
7/8	0.875	*160 (216.96 N·m)	445 (616.98 N·m)	685 (928.86 N·m)	1-5/16	1-5/16
1	1.000	250 (339.00 N·m)	670 (908.52 N·m)	1030 (1396.68 N·m)	1-1/2	1-1/2

Multiply readings by 12 for inch-pound values.

* "B" Grade bolts larger than 3/4-inch (19.1 mm) are sometimes formed hot rather than cold, which accounts for the lower recommended torque.

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

SET SCREW SEATING TORQUE CHART

Screw Size	Cup Point	Square Head
Torque in Inch Pounds		
#5	9 (1.02 N·m)	—
#6	9 (1.02 N·m)	—
#8	20 (2.26 N·m)	—
#10	33 (3.73 N·m)	—
1/4	87 (9.83 N·m)	212 (23.96 N·m)
5/16	165 (18.65 N·m)	420 (47.46 N·m)
3/8	290 (32.77 N·m)	830 (93.79 N·m)
7/16	430 (48.59 N·m)	—
1/2	620 (70.06 N·m)	2100 (237.30 N·m)
9/16	620 (70.06 N·m)	—
5/8	1225 (138.43 N·m)	4250 (480.25 N·m)
3/4	2125 (240.13 N·m)	7700 (870.10 N·m)

Divide readings by 12 for foot-pound values

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


Group 15 FUEL AND LUBRICANTS

FUEL AND LUBRICANTS

Machine	Component	Capacity	Fill With John Deere	Fill With Equivalent	Service Interval
216 Walk-Behind Tiller	Fuel Tank	1 qt. (0.946 L)	.....	See below	.....
	Engine Crankcase	20 oz. (1-1/4 pts.) (0.591 L)	TORQ-GARD SUPREME® SAE 30	SAE 30, Service MS or SC (Detergent-Type)	25 Hours
	Chain Case	6 oz. (0.177 L)	.....	SAE 30	25 Hours
324, 524, and 624 Walk-Behind Tillers	Fuel Tank 324 524 and 624	2 qts. (1.892 L) 1 gal. (3.785 L)	.....	See below	.....
	Engine Crankcase 324 524 and 624	21 oz. (approx. 1-1/3 pts.) (0.621 L) 19 oz. (approx. 1-1/4 pts.) (0.562 L)	TORQ-GARD SUPREME SAE 30	SAE 30, Service MS or SC (Detergent-Type)	25 Hours
	Gear Case	8 oz. (0.236 L)	SAE 90 Gear Lubricant (AM30200)	SAE 90 Gear Lube	Check level seasonally
5B Sprayer	Fuel Tank	1 qt. (0.946 L)	.....	See below	.....
	Engine Crankcase	20 oz. (0.591 L)	TORQ-GARD SUPREME SAE 30	SAE 30 Service MS or SC (Detergent-Type)	25 Hours
	Grease Fittings	.....	Multi-Purpose Lubricant (AT30408)	SAE Multipurpose-Type Grease	10 Hours

Fuel Recommendations

All engines included in this technical manual perform at peak efficiency when the fuel recommendations listed below are followed:

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

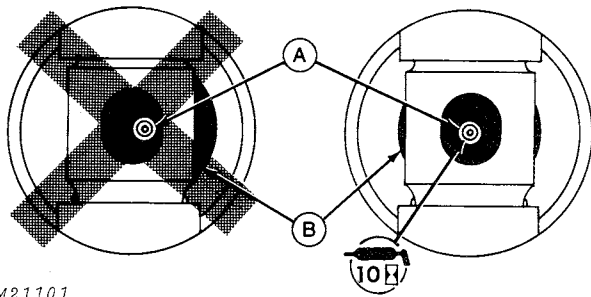
Fill the fuel tank with fresh, clean "regular" grade gasoline having an anti-knock index of 88 or higher. We recommend non-leaded gasoline because it reduces cylinder head deposits. Low-lead or leaded "regular" grades are acceptable if the anti-knock index is 88 or higher.

DO NOT use premium, ethyl, or white gasoline or regular gasoline having an anti-knock index below 88. Never use special additives, such as carburetor cleaners, de-icers, or moisture-removing liquids in your gasoline.

IMPORTANT: Do not mix oil with gasoline.

GREASE FITTING LOCATIONS

5B Sprayer



M21101

A—Grease Fitting

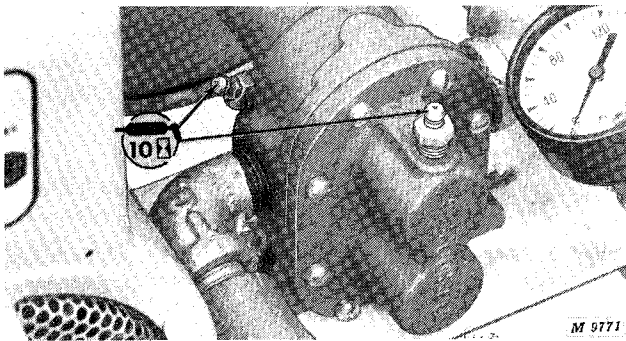
B—Bearing

Fig. 1-Piston Pump Crankshaft Grease Fitting Location

IMPORTANT: The bearings are lubricated at the factory and require no further lubrication. **DO NOT** allow oil to get on the bearings because it may wash out the grease.

NOTE: The crankshaft bearing (B, Fig. 1) must be centered and must not project out on just one side of the connecting rod. Rotate the pump shaft to center the grease fitting (A) for lubrication.

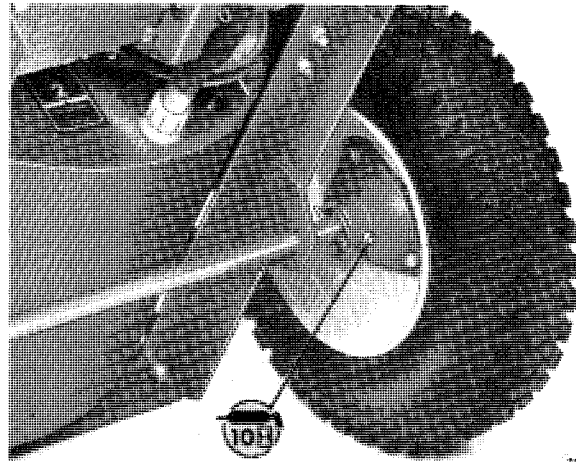
Every 10 hours, inject just enough John Deere Multi-Purpose Lubricant or an equivalent SAE multi-purpose-type grease so it oozes out from the end of the crankshaft bearing (B).



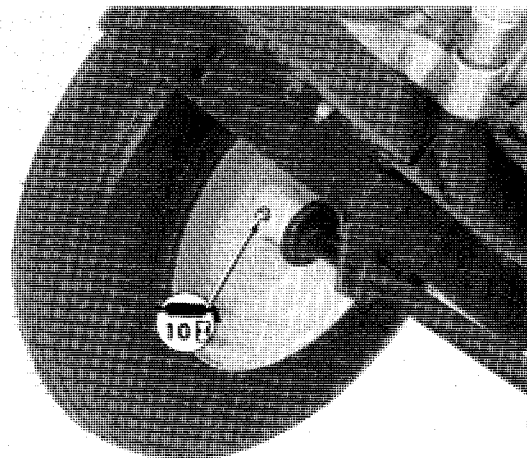
M 9771

Fig. 2-Gear Pump Grease Fitting Location

Lubricate the gear pump with one shot of John Deere Multi-Purpose Lubricant or an equivalent SAE multipurpose-type grease in each grease fitting every 10 hours or once a day when the sprayer is used.



M 9772

Fig. 3-Wheel Grease Fitting Location
(Serial No. 5000-120,070)

M26033Y

Fig. 4-Wheel Grease Fitting Location
(Serial No. 120,071-)

Lubricate the wheels every 10 hours of operation with John Deere Multi-Purpose Lubricant or an equivalent SAE multipurpose-type grease.

Section 20 TECUMSEH ENGINES

Group 5 GENERAL INFORMATION

TABLE OF CONTENTS

	Page		Page
GROUP 5 - GENERAL INFORMATION		GROUP 20 - INTERNAL COMPONENTS	
Description	20-5-3	General Information	20-20-1
Engine Analysis	20-5-4	Removal	20-20-2
Preliminary Engine Checks	20-5-4	Removing Engine	20-20-2
Compression Test	20-5-5	Removing Engine Components	20-20-2
Test Conclusions	20-5-5	Disassembly	20-20-3
Diagnosing Malfunctions	20-5-5	Removing Cylinder Ridge	20-20-3
GROUP 10 - MINOR TUNE-UP		Removing Flywheel	20-20-3
Minor Tune-Up Procedure	20-10-1	Removing Magneto Assembly	20-20-3
GROUP 15 - CYLINDER HEAD, VALVES, AND BREATHER		Removing Cylinder Cover	20-20-4
General Information	20-15-1	Removing Camshaft and Tappets	20-20-4
Disassembly	20-15-2	Removing Crankshaft and Piston	20-20-4
Removing Engine and Components	20-15-2	Removing Governor Rod	20-20-5
Removing Valves	20-15-2	Removing Governor Gear	20-20-5
Inspection and Repair	20-15-3	Removing Piston Rings	20-20-6
Inspecting Cylinder Head	20-15-4	Removing Connecting Rod	20-20-6
Inspecting Breather Assembly	20-15-4	Inspection and Repair	20-20-6
Inspecting Valve Springs	20-15-5	Analyzing Piston Ring Wear	20-20-8
Inspecting Valve Seats	20-15-5	Analyzing Piston Wear	20-20-10
Valve Analysis	20-15-6	Inspecting Piston	20-20-11
Inspecting Valves	20-15-7	Analyzing Crankshaft and Connecting Rod Wear	20-20-12
Reconditioning Valve Guides	20-15-8	Inspecting Crankshaft and Connecting Rod	20-20-13
Reaming Valve Guides	20-15-8	Inspecting Camshaft	20-20-13
Reconditioning Valve Seats	20-15-8	Inspecting Governor Gear and Spool	20-20-14
Lapping Valves	20-15-9	Inspecting Governor Rod	20-20-14
Checking Valve-to-Tappet Clearance	20-15-10	Inspecting Governor Shaft	20-20-14
Assembly	20-15-10	Inspecting Crankshaft and Camshaft Bearings	20-20-15
Installing Valves and Springs	20-15-10	Inspecting and Repairing Block	20-20-16
Installing Breather Assembly	20-15-11	Deglazing Cylinder Bore	20-20-16
Installing Cylinder Head	20-15-12	Boring Cylinder Block	20-20-17
Installing Components	20-15-12		

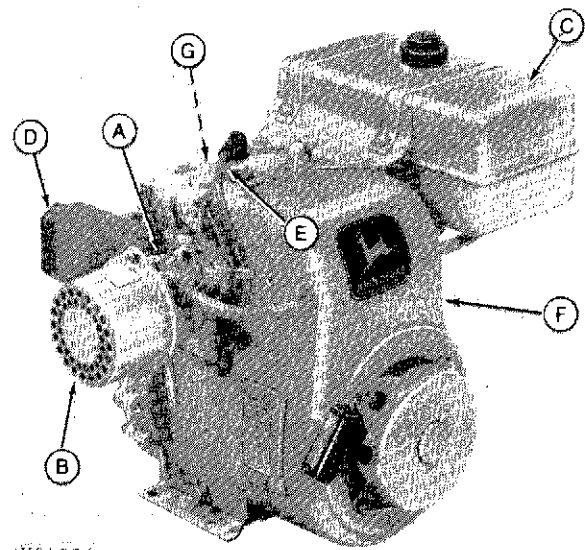
	Page		Page
Assembly	20-20-18	Installing Governor Linkage	20-20-24
Replacing Oil Seals	20-20-18	Adjusting Governor Lever	20-20-25
Assembling Connecting Rod and Piston	20-20-18	Installation	20-20-25
Checking Piston Ring End Gap	20-20-19	Installing Engine	20-20-25
Installing Rings on Piston	20-20-19	Adjusting Throttle Cable	20-20-25
Installing Crankshaft	20-20-20		
Installing Connecting Rod and Piston	20-20-20	GROUP 30 - RECOIL STARTER	
Attaching Connecting Rod to Crankshaft	20-20-20	Principle of Operation	20-30-1
Installing Camshaft and Tappets	20-20-21	Disassembly	20-30-1
Installing Governor Rod and Lever ...	20-20-21	Inspection and Repair	20-30-2
Installing Governor Shaft	20-20-22	Assembly	20-30-3
Installing Governor Gear and Spool ..	20-20-22		
Installing Cylinder Cover	20-20-23	GROUP 40 - SPECIFICATIONS	
Installing Magneto Assembly	20-20-23	General Specifications	20-40-1
Installing Flywheel	20-20-23	Tune-Up Specifications	20-40-1
Installing Cylinder Head	20-20-24	Internal Specifications	20-40-2
Installing Carburetor, Air Cleaner, and Muffler	20-20-24	Torque Specifications	20-40-4

DESCRIPTION

The 324, 524, and 624 Walk-Behind Tillers are equipped with 4-stroke, L-head, single-cylinder Tecumseh engines. These air-cooled, aluminum-alloy engines have a horizontal crankshaft.

The chart below lists machine-engine application and gives the horsepower rating.

Machine	Tecumseh Engine Model No.	Horsepower
324 Walk-Behind Tiller	H35	3-1/2 (2.6 kW)
524 Walk-Behind Tiller	H50	5 (3.7 kW)
624 Walk-Behind Tiller	H60	6 (4.5 kW)



- A—Carburetor
- B—Air Cleaner
- C—Fuel Tank
- D—Muffler
- E—Spark Plug Wire
- F—Blower Housing
- G—Cylinder Head

Fig. 1-Tecumseh Horizontal Crankshaft Engine

ENGINE ANALYSIS

Preliminary Engine Checks

A complete diagnosis of engine malfunctions appears on pages 20-5-5 through 20-5-8. However, the majority of engine trouble reports are of a minor nonchronic nature and are usually due to electrical or fuel system difficulties.

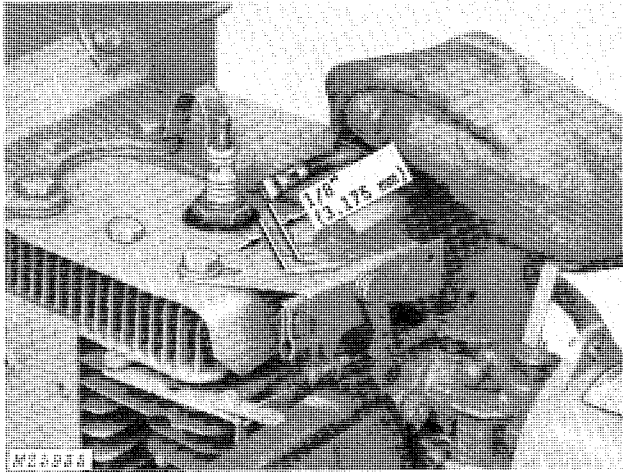


Fig. 2-Checking Spark

Check spark, Fig. 2, whenever engine will not start.

Remove ignition cable from spark plug, and slide spark plug cover back on cable to expose connector. Hold connector approximately 1/8 inch (3.175 mm) away from metal base of spark plug while cranking engine.

If there is good spark between the connector and the spark plug, the ignition points, coil, and condenser are probably in good condition.

Remove and inspect spark plug. Clean, regap to 0.030 inch (0.762 mm), and install in engine. Replace spark plug if electrodes are badly worn.

If there is no spark or a very weak spark, refer to Section 40, Group 5, for ignition system information.

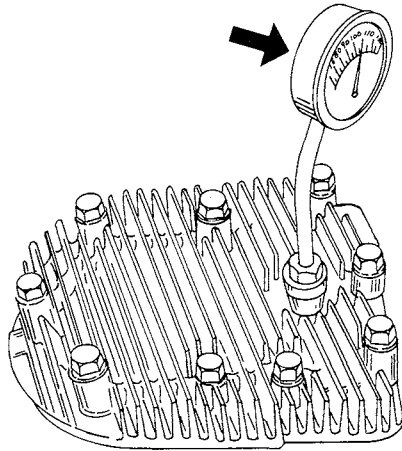
If engine still fails to start, check the fuel system from the tank to the carburetor to be certain gas is getting to the carburetor. Check carburetor adjusting needle settings and make certain choke and throttle controls are working properly. Refer to Section 30.

Also check to see if air cleaner is clogged. Replace if necessary.

If the engine still will not start, or starts but does not run properly, make the compression test (page 20-5-5), and refer to "Diagnosing Malfunctions" (pages 20-5-5 through 20-5-8).

Compression Test

If engine operates, a cylinder compression test is recommended before engine disassembly to detect and isolate possible engine malfunctions. This test is especially beneficial when an engine is losing power or running erratically and fuel system and ignition system adjustments do not correct the problem.



M25936

Fig. 3-Testing Engine Compression

Make a compression test as follows:

1. Run engine until warm.
2. Disconnect all drives to engine.
3. Set choke and throttle valve in wide open position.
4. Remove air cleaner.
5. Remove spark plug and insert compression gauge, Fig. 3.
6. Crank engine as fast as possible to obtain an accurate test. Repeat to insure accuracy.

NOTE: On some engines equipped with compression release camshaft, it may be necessary to crank in reverse rotation to obtain an accurate test. However, in most cases, rapid cranking in the normal rotation will give an accurate reading.

Test Conclusions

An engine in top operating condition should have pressures of 90 to 100 psi (620.6 to 689.5 kPa). If compression pressures drop below 70 psi (492.7 kPa), it is usually the result of the following:

1. Leaking cylinder head gasket.
2. Warped cylinder head.
3. Worn piston rings.
4. Worn cylinder bore.
5. Damaged piston.
6. Burned or warped valves.
7. Improper valve clearance.
8. Broken valve springs.

To determine whether the rings or the valves are at fault, pour about 1 tablespoon of heavy oil into the spark plug hole. Crank the engine several revolutions to spread the oil, and then repeat the compression test.

The oil will temporarily seal leakage around the piston rings. If the same approximate compression reading is obtained, the rings are satisfactory and leakage can be attributed to valves, cylinder head, or a damaged piston. If the compression has increased considerably over the original readings, there is leakage past the rings.

DIAGNOSING MALFUNCTIONS

Engine Will Not Start

Fuel tank empty.

Fuel line clogged.

Choke and throttle controls broken or not properly adjusted.

Carburetor mixture needles not properly adjusted.

Dirt or water in fuel system.

Carburetor float not properly adjusted or float valve leaking.

Air cleaner element restricted.

Spark plug defective.

Faulty coil and condenser.

DIAGNOSING MALFUNCTIONS—Continued**Engine Will Not Start—Continued**

- Breaker points worn, pitted, or out of adjustment.
- Ignition out of time.
- Electrical connections loose or shorted.

Engine Starts Hard

- Fuel line restricted.
- Choke and throttle controls not properly adjusted.
- Carburetor mixture needles not properly adjusted.
- Dirt or water in fuel system.
- Carburetor float not properly adjusted or float valve leaking.
- Carburetor or intake manifold leaking at gaskets.
- Carburetor body and throttle shaft worn.
- Air cleaner element restricted.
- Spark plug worn or fouled.
- Breaker points worn, pitted, or out of adjustment.
- Ignition out of time.
- Low engine compression:
 - Leaking head gasket.
 - Worn cylinder bore or rings.
 - Leaking valves.
 - Wrong valve clearance.

Engine Starts But Fails to Keep Running

- Fuel line restricted.
- Fuel tank vent restricted.
- Carburetor mixture needles not properly adjusted.
- Carburetor float not properly adjusted or float valve leaking.
- Choke and throttle controls not properly adjusted.
- Loose ignition system connections.
- Faulty condenser.
- Excessive engine load.

Engine Misses Under Load

- Spark plug fouled, pitted, or gapped incorrectly.
- High-speed mixture needle not properly adjusted.
- Incorrect spark plug.
- Breaker points worn, pitted, or out of adjustment.
- Ignition out of time.
- Dirt or water in fuel system.
- Stale fuel.
- Faulty condenser.

Engine Runs But Misses

High tension wire loose from spark plug or coil.
Breaker points worn, pitted, or out of adjustment.
Spark plug fouled, pitted, or gapped incorrectly.
Incorrect spark plug.
Loose electrical connections.
Carburetor float not properly adjusted or float valve leaking.
Dirt or water in fuel system.
Wrong valve clearance.
Faulty coil.
Faulty condenser.

Engine Will Not Idle

Idle speed too low.
Idle mixture needle not properly adjusted.
Dirt or water in fuel system.
Spark plug fouled, pitted, or gapped incorrectly.
Ignition out of time.
Low engine compression:
 Leaking head gasket.
 Worn cylinder bore or rings.
 Leaking valves.
 Wrong valve clearance.

Engine Misses When Advancing Throttle

Cold engine.
Carburetor mixture needles not properly adjusted.
Ignition out of time.
Spark plug fouled, pitted, or gapped incorrectly.
Breaker points worn, pitted, or out of adjustment.

Engine Loses Power

Crankcase low on oil.
Engine overheating.
Excessive engine load.
Air cleaner element restricted.
Dirt or water in fuel system.
Carburetor mixture needles not properly adjusted.
Spark plug fouled, pitted, or gapped incorrectly.
Too much oil in crankcase.
Low engine compression:
 Leaking head gasket.
 Worn cylinder bore or rings.
 Leaking valves.
 Wrong valve clearance.

Engine Overheats

Dirty or plugged shrouding and engine fins.
Flywheel fins broken off.
Carburetor mixture needles not properly adjusted.
Too much oil in crankcase.
Crankcase low on oil.
Excessive engine load.
Ignition out of time.

Engine Knocks

Ignition out of time.
Stale fuel.
Excessive carbon deposits in engine.
Excessive engine load.
Engine overheating.

DIAGNOSING MALFUNCTIONS—Continued**Engine Backfires**

Carburetor mixture needles not properly adjusted (lean mixture).
 Loose carburetor or intake manifold.
 Loose cylinder head or leaking head gasket.
 Burned or sticking intake valve.
 Ignition out of time.

Engine Low On Power At Full Throttle

Restricted air cleaner element or fuel line.
 Restricted exhaust.
 Clogged breather assembly.
 Spark plug fouled, pitted, or gapped incorrectly.
 Incorrect spark plug.
 Breaker points worn, pitted, or out of adjustment.
 Faulty ignition coil and/or condenser.
 High-speed mixture needle not properly adjusted.
 Carburetor float level incorrect.
 Choke partially closed.
 Governor malfunctioning.
 Governor linkage not properly adjusted.

Low Engine Compression

Leaking head gasket.
 Worn cylinder bore or rings.
 Leaking valves.
 Wrong valve clearance.

Engine Does Not Maintain Constant Speed (Surges)

Carburetor mixture needles not properly adjusted.
 Governor linkage not properly adjusted.

Governor malfunctioning.

Breaker points worn, pitted, or out of adjustment.
 Dirt or water in fuel system.

Engine Uses Excessive Amount of Oil

Clogged breather assembly.
 Breather not assembled properly.
 Drain holes in breather box plugged.
 Worn or broken piston rings.
 Worn cylinder bore.
 Clogged oil holes in piston.
 Worn valve stems and/or valve guides.
 Worn connecting rod journal bearing.
 Incorrect oil viscosity.
 Leakage at gaskets.

Engine Runs Erratically

Dirt or water in fuel system.
 Carburetor mixture needles not properly adjusted.
 Idle speed too low.
 Spark plug fouled, pitted, or gapped incorrectly.
 Poor compression.
 Carburetor or intake manifold leaking at gaskets.
 Carburetor body and throttle shaft worn.
 Fuel tank vent restricted.
 Governor linkage not properly adjusted.
 Governor malfunctioning.

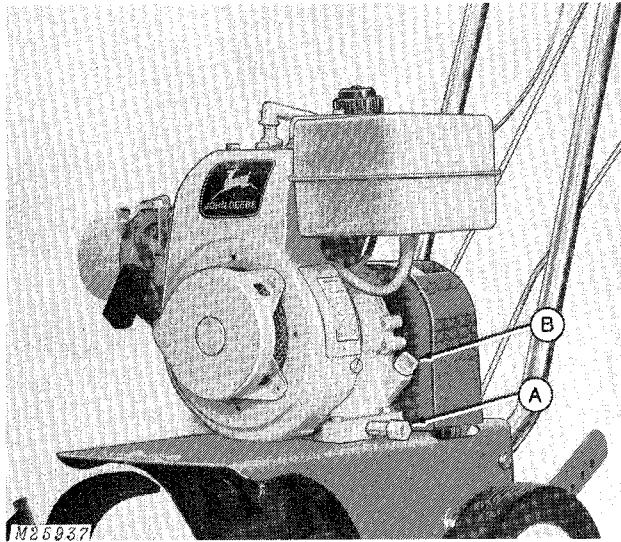
Gasoline in Crankcase

Carburetor float not properly adjusted or float valve leaking.
 Worn float valve and/or seat.

Group 10 MINOR TUNE-UP

MINOR TUNE-UP PROCEDURE

1. Change Oil



A—Drain Cap

B—Fill Plug

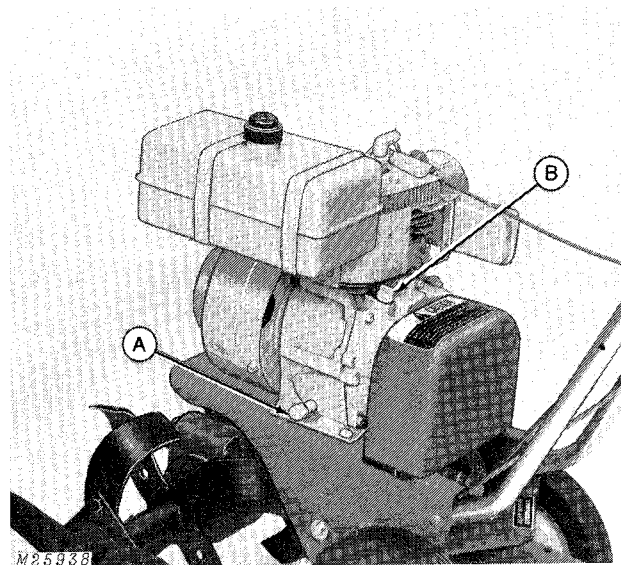
Fig. 1-Changing Oil - 324 Tiller

1. Remove drain cap (A, Fig. 1 or 2) and fill plug (B), drain oil, and replace drain cap.

IMPORTANT: Be sure engine is level when checking oil level.

NOTE: The capacity of the 324 Tiller crankcase is 21 ounces (approximately 1-1/3 pints) (0.62 L). The capacity of the 524 and 624 Tiller crankcases is 19 ounces (approximately 1-1/4 pints) (0.56 L).

2. Fill crankcase with John Deere TORQ-GARD SUPREME® (SAE 30) engine oil or an equivalent SAE 30 (Service MS or SC detergent-type) engine oil (see page 10-15-1). In the 324 Tiller, the oil level should be to the top of the fill plug hole. In the 524 and 624 Tillers, the oil level should be to the top of the "safe" range or "FULL" mark on the dipstick. Replace fill plug (B).

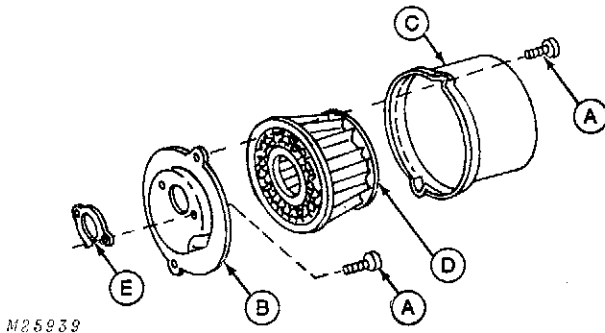


A—Drain Cap

B—Fill Plug

Fig. 2-Changing Oil - 524 and 624 Tillers

2. Remove and Clean Air Cleaner



M25939
 A—Screw (4 used) D—Air Cleaner Element
 B—Air Cleaner Bracket E—Gasket
 C—Air Cleaner Body

Fig. 3-Air Cleaner Components

1. Loosen screws (A, Fig. 3) in bracket (B) and turn body (C) counterclockwise slightly to remove.

IMPORTANT: Never run engine with air cleaner removed. Do not dip element (D) in a liquid cleaner nor use high pressure air to clean element.

2. To clean element (D), tap it on a solid surface to remove dust. Brush rest of dust from element. Wipe dust from inside of body (C).

3. Replace element (D) if bent, crushed, or otherwise damaged.

4. Install body (C) on bracket (B) and tighten screws (A).

3. Remove Blower Housing

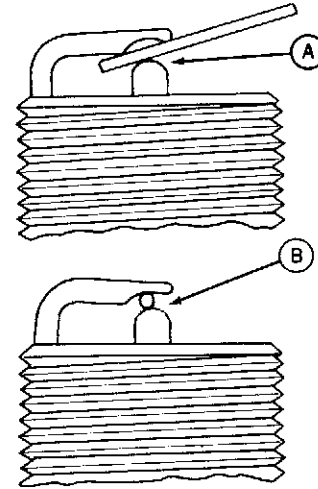
1. Remove head cap screws, blower housing, baffle, and fuel tank mount.

2. Inspect rope, rewind assembly, and starter clutch for wear or damage.

4. Clean Engine

Remove dirt and chaff from cylinder head and engine block cooling fins. Clean engine block.

5. Remove Spark Plug and Check Gap



M18502W

A—Incorrect

B—Correct

Fig. 4-Checking Spark Plug Gap

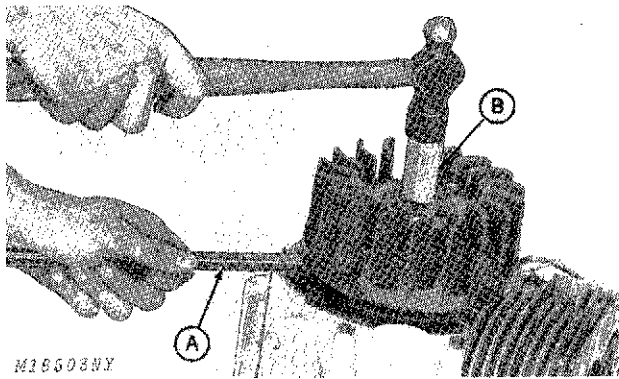
1. Remove, inspect, and clean spark plug.

2. Use a round wire-type feeler gauge to check for 0.030-inch (0.76 mm) gap, Fig. 4. Bend only the outer electrode when setting gap.

3. If electrodes have burned short or are pitted, replace spark plug.

4. Install and tighten spark plug to 15 to 20 ft-lbs (20.34 to 27.12 N·m) torque.

6. Remove Flywheel



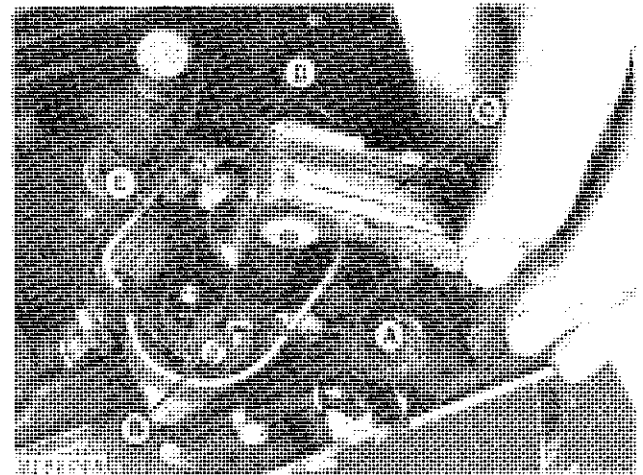
A—Pry Bar

B—Flywheel Knock-Off Tool

Fig. 5-Removing Flywheel

1. Break flywheel nut loose with a long handle nut spinner and a flywheel wrench.
2. Remove nut, washer, starter cup, and flywheel screen.
3. Remove flywheel, using a flywheel knock-off tool (B, Fig. 5) and pry bar (A). Be careful not to lose flywheel key.

7. Adjust Breaker Point Gap



A—Breaker Points

D—Lubricating Wick

B—Adjusting Screw

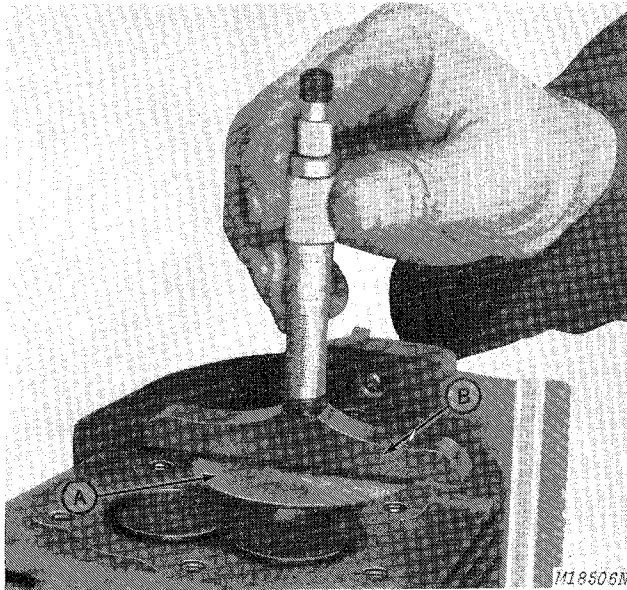
E—Rubbing Block

C—Feeler Gauge

Fig. 6-Adjusting Breaker Point Gap

1. Remove breaker point cover.
2. Turn crankshaft in direction of normal rotation until breaker point cam opens the points to the widest position.
3. Insert a 0.020-inch (0.508 mm) feeler gauge (C, Fig. 6) between breaker points (A), and check for light contact with gauge.
4. To adjust, loosen adjusting screw (B), adjust for light contact with gauge (C), and tighten adjusting screw. Recheck gap because tightening screw can change gap.
5. Install a new lubricating wick (D) if old wick is hard and dry. A fresh wick prevents accelerated wear to rubbing block (E) and cam.

8. Remove Cylinder Head and Time Engine



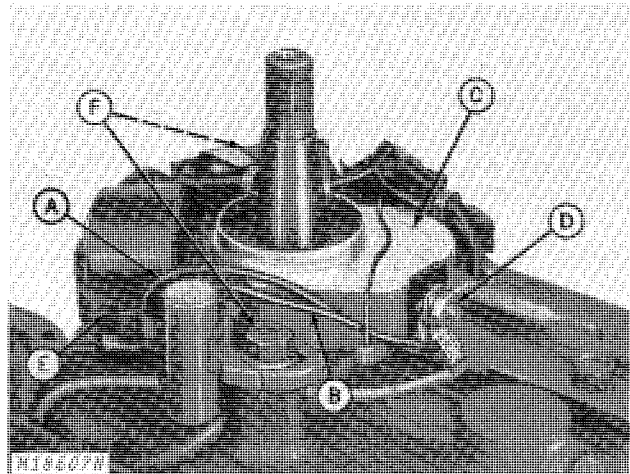
A—Piston B—Micrometer

Fig. 7-Measuring Top-Dead-Center

1. Remove cylinder head and discard gasket.
 2. Position a micrometer (B, Fig. 7) above piston (A). Rotate crankshaft back and forth slightly to locate piston's highest travel on top-dead-center (TDC).
 3. With TDC located, measure distance from top of block to top of piston. Note reading on micrometer.
- NOTE: If the micrometer shown is not available, a pocket rule can be used to measure before top-dead-center (BTDC).*
4. Rotate crankshaft slightly in opposite direction of normal rotation. Add the BTDC measurement (see chart below) to the micrometer reading for TDC, and lock the micrometer at this point.

Engine Model	BTDC Dimension
H35	0.030 to 0.040 in. (0.762 to 1.016 mm)
H50, H60	0.085 to 0.095 in. (2.159 to 2.413 mm)

5. With micrometer (B) in position over piston (A), rotate piston in direction of normal rotation until piston touches micrometer.



A—Stator Lead D—Point Terminal
 B—Condenser Lead E—Stator
 C—Breaker Point Cover F—Cap Screws

Fig. 8-Timing Engine

6. Remove stator lead (A, Fig. 8), condenser lead (B), and magneto stop lead from point terminal (D), and connect a test light between terminal and ground.
7. Loosen cap screws (F) and rotate stator (E) slowly until points just open and light goes out.
8. Hold stator (E) in this position, and tighten cap screws (F) firmly.
9. Reinstall leads (A and B) and breaker point cover (C).

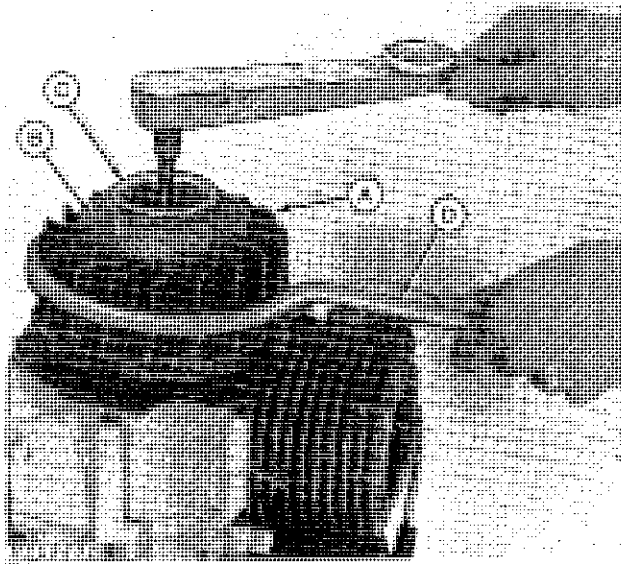
Thank you very much for your reading. Please Click Here. Then Get COMPLETE MANUAL. NO WAITING



NOTE:

If there is no response to click on the link above, please download the PDF document first and then click on it.

9. Install Flywheel



A—Flywheel
B—Screen
C—Cup
D—Flywheel Tool

Fig. 9—Installing Flywheel

1. Position flywheel key in crankshaft, and install flywheel (A, Fig. 9), screen (B), cup (C), washer, and nut.

2. Using a flywheel tool (D) to keep flywheel from turning, tighten retaining nut to 360 to 400 in-lbs (40.68 to 45.20 N·m) torque.

10. Install Cylinder Head and Blower Housing

IMPORTANT: Install new head gasket dry. Do not use Permatex or other sealant on gasket.

1. Install new head gasket and position cylinder head.

2. Install blower housing, baffle, and fuel tank mount.

3. Install and tighten head cap screws to 100 in-lbs (11.30 N·m) torque in sequence shown in Fig. 10. Then increase torque to 140 to 200 in-lbs (15.83 to 22.60 N·m) in 20-in-lb (2.26 N·m) steps.

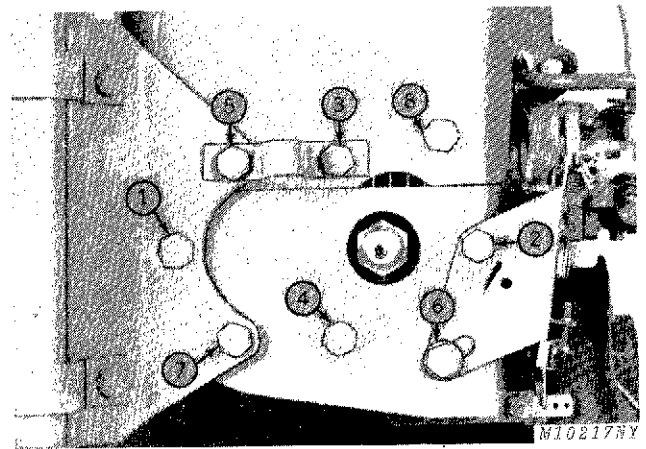
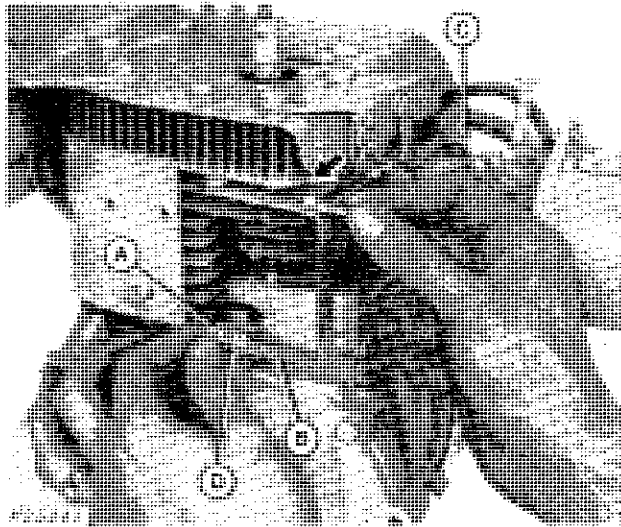


Fig. 10—Cylinder Head Cap Screw Tightening Sequence

11. Check Machine

Examine drive belts, controls, etc. for wear and damage. A damaged or incorrectly adjusted driven component or control will affect the carburetor adjustment.

12. Check Governor Linkage

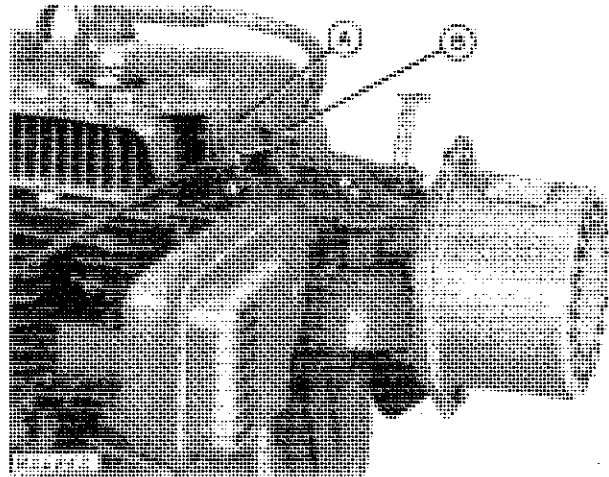


A—Governor Clamp C—Throttle
B—Governor Lever D—Screw

Fig. 11-Adjusting Governor Linkage

1. Rotate governor clamp (A, Fig. 11) and governor lever (B) in direction shown to fully open throttle (C).
2. Tighten screw (D).

13. Check Throttle Adjustment

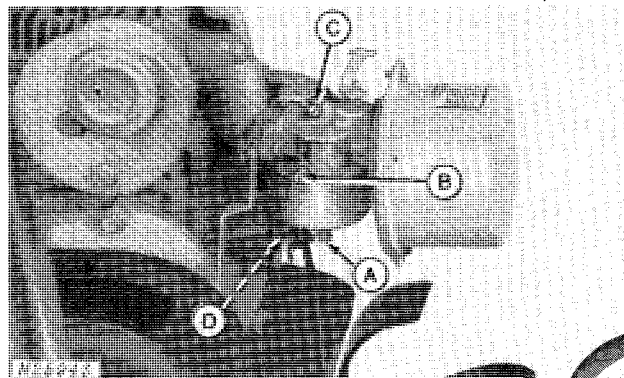


A—Cable Clamp B—Control Lever

Fig. 12-Adjusting Throttle Cable

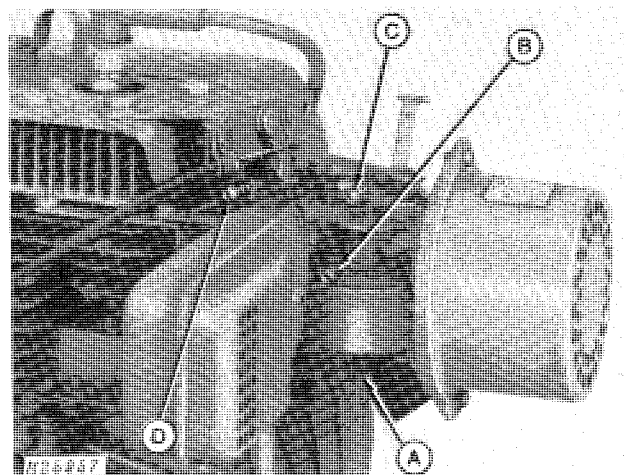
1. Loosen throttle cable clamp (A, Fig. 12).
2. Move cable control to "FAST" position.
3. Move control lever (B) to wide open position and tighten cable clamp (A).

14. Adjust Carburetor



A—High-Speed Mixture Needle
 B—Idle Mixture Needle
 C—Idle Stop Screw
 D—High-Speed Adjustment Screw

Fig. 13-Adjusting Carburetor - 324 Tiller



A—High-Speed Mixture Needle
 B—Idle Mixture Needle
 C—Idle Stop Screw
 D—High-Speed Adjustment Screw

Fig. 14-Adjusting Carburetor - 524 and 624 Tillers

Preliminary Adjustment

IMPORTANT: Tighten high-speed mixture needle (A, Fig. 13 or Fig. 14) and idle mixture needle (B) finger-tight only. Too much pressure will damage needle and seat.

1. Turn high-speed mixture needle (A) in until seated. Then turn it back 1 turn.
2. Turn idle mixture needle (B) in until seated. Then turn it back 1 turn.
3. Turn idle stop screw (C) in until it contacts throttle lever. Then turn it in 1 additional turn.

Final Adjustment

1. Start engine and move throttle control to the "FAST" position. Allow engine to warm up.
2. Turn high-speed mixture needle (A, Fig. 13 or Fig. 14) 1/8 turn at a time, forward and backward, until engine runs smoothly at wide open throttle. Keep screw position slightly on the rich side.
3. Move throttle control to the "SLOW" position, and turn idle mixture needle (B) 1/8 turn at a time, forward and backward, until engine idles smoothly.

NOTE: Use a vibration tachometer to check engine speed.

4. Set idle speed at 1400 to 1600 rpm by adjusting idle stop screw (C). Repeat Step 3 if necessary.
5. Raise throttle control quickly to check for uniform acceleration. If engine misses, gas-air mixture is too lean. Turn high-speed mixture needle (A) out until positive acceleration is obtained. If there is excessive smoke, mixture is too rich. Readjust idle mixture needle (B) until a good balance is achieved and engine idles smoothly.

High-Speed Adjustment

The high-speed setting is made at the factory and will not normally require adjustment. If this adjustment is necessary, proceed as follows:

NOTE: Use a vibration tachometer to check engine speed.

1. Set engine speed at 3600 to 3900 rpm.
2. Turn high-speed adjustment screw (D, Fig. 13 or Fig. 14) counterclockwise to increase speed and clockwise to decrease speed.
3. Move throttle cable in clamp slightly to compensate for adjustments made.