WIRING DIAGRAMS

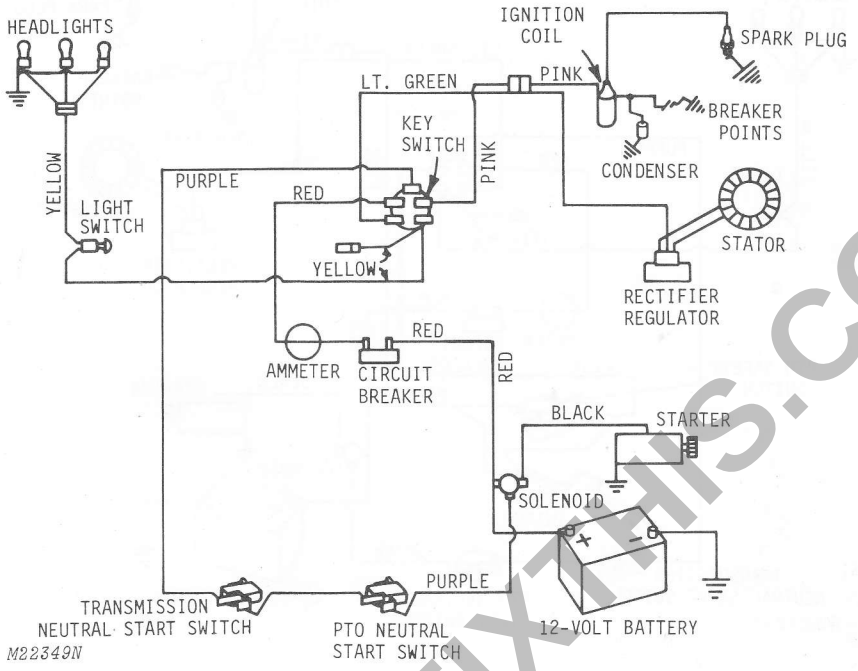


Figure 1-Wiring Diagram For 200, 210, 212 and 214 Tractors (Serial No. 30,001-70,000)

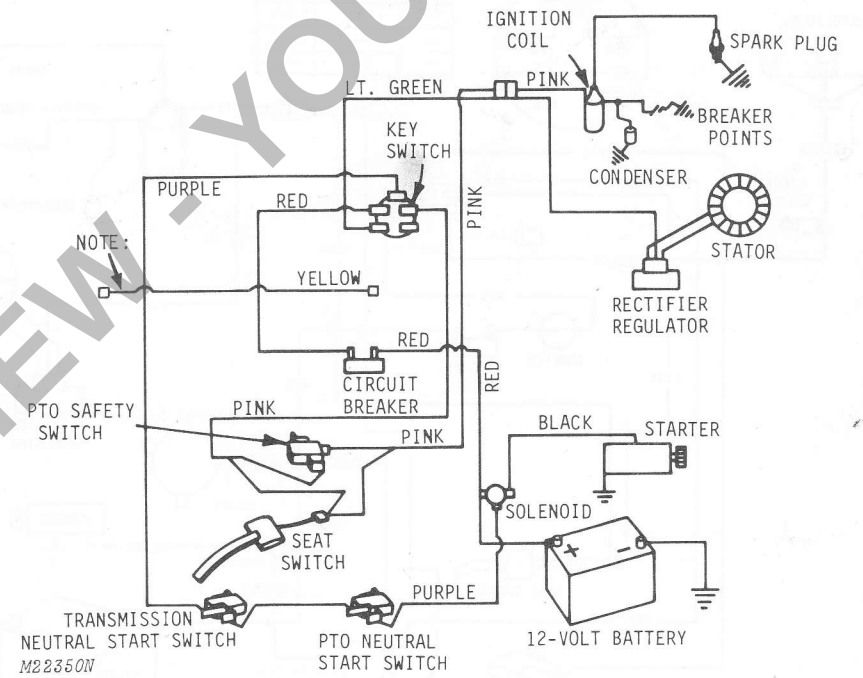


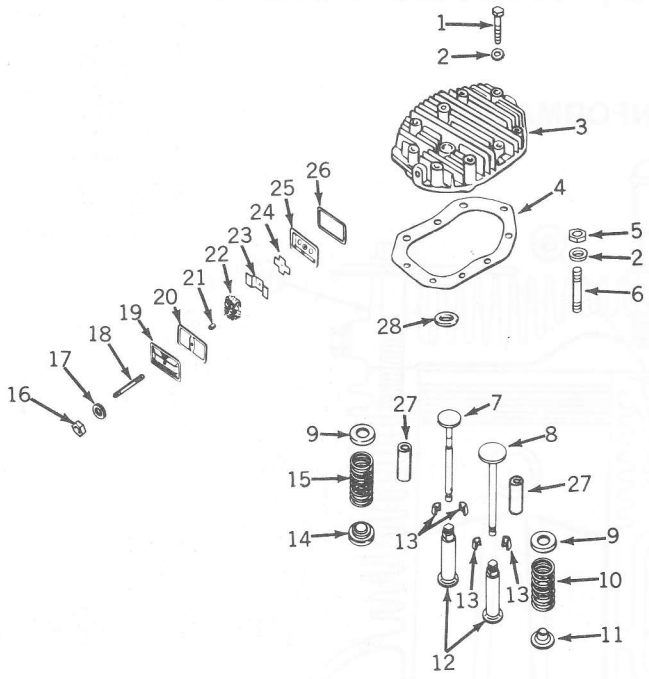
Figure 2-Wiring Diagram For 208 Tractor

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DISASSEMBLY



1—Cap Screw
2—Washer
3—Cylinder Head
4—Head Gasket
5—Hex. Nut
6—Stud
7—Exhaust Valve
8—Intake Valve
9—Upper Spring Retainer
10—Intake Valve Spring
11—Lower Spring Retainer
12—Tappet
13—Valve Keeper
14—Exhaust Valve Rotator
15—Exhaust Valve Spring
16—Hex. Nut
17—Lock Washer
18—Stud
19—Cover
20—Outer Gasket
21—Seal
22—Filter
23—Baffle
24—Reed
25—Breather Plate Assembly
26—Inner Gasket
27—Valve Guides
28—Exhaust Valve Insert

Fig. 2-Exploded View of Cylinder Head, Valves, and Breather (210 and 212 Tractors Illustrated)

Disassembling Engine

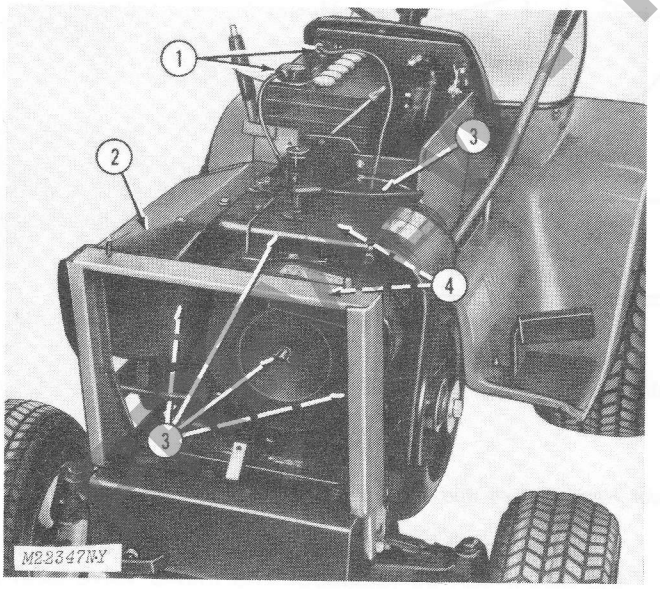


Fig. 3-Disassembling Engine (210 Tractor Illustrated)

NOTE: It is not necessary to remove the engine to service the cylinder head, valves or breather.

On 200, 210, 212, 214 and 216 Tractors, remove the hood, grille and side panels to provide access to the engine.

On 208 Tractors, remove grille and hood support with hood to provide access to the engine.

1. Disconnect battery cables, negative cable first, Fig. 3.

2. On 200, 210, 212, 214 and 216 Tractors, remove shroud covering muffler.

3. Remove engine shrouding, coil, carburetor, governor linkage and muffler.

4. Remove cylinder head, breather assembly and valves.

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SPECIFICATIONS—Continued

Item	200 Tractor-K181QS Engine 208 Tractor-K181S Engine	210 Tractor K241AQS Engine	212 Tractor K301AQS Engine	214, 216 Tractor K321AQS, K341AQS Engine	Wear Tolerance
Valve spring compressed (exhaust)	18 to 22 lbs. at 1-5/16 in. length (8.16 to 9.98 kg at 49.21 mm length)	43 to 49 lbs. at 1-5/16 in. length (19.50 to 22.23 kg at 49.21 mm length)	43 to 49 lbs. at 1-5/16 in. length (19.50 to 22.23 kg at 49.21 mm length)	43 to 49 lbs. at 1-5/16 in. length (19.50 to 22.23 kg at 49.21 mm length)	—
Valve spring free length (intake)	1-3/4 in. (44.45 mm)	1-13/16 in. (46.04 mm)	1-13/16 in. (46.04 mm)	1-13/16 in. (46.04 mm)	—
Valve spring free length (exhaust)	1-3/4 in. (44.45 mm)	1-7/8 in. (47.63 mm)	1-7/8 in. (47.63 mm)	1-7/8 in. (47.63 mm)	—
Governor bushing-to-governor cross shaft clearance	0.0005 to 0.0020 in. (0.0127 to 0.0508 mm)	0.001 to 0.0025 in. (0.0254 to 0.0635 mm)	0.001 to 0.0025 in. (0.0254 to 0.0635 mm)	0.001 to 0.0025 in. (0.0254 to 0.0635 mm)	—
Governor gear-to-governor shaft	0.0005 to 0.0020 in. (0.0127 to 0.0508 mm)	0.0005 to 0.0020 in. (0.0127 to 0.0508 mm)	0.0005 to 0.0020 in. (0.0127 to 0.0508 mm)	0.0005 to 0.0020 in. (0.0127 to 0.0508 mm)	—
Ball bearing-to-cylinder block (interference)	0.0014 to 0.0029 in. (0.0355 to 0.0736 mm)	0.0006 to 0.0022 in. (0.0152 to 0.0558 mm)	0.0006 to 0.0022 in. (0.0152 to 0.0558 mm)	0.0006 to 0.0022 in. (0.0152 to 0.0558 mm)	—
Ball bearing-to-bearing plate (interference)	0.0014 to 0.0029 in. (0.0355 to 0.0736 mm)	0.0012 to 0.0028 in. (0.0304 to 0.0711 mm)	0.0012 to 0.0028 in. (0.0304 to 0.0711 mm)	0.0012 to 0.0028 in. (0.0304 to 0.0711 mm)	—
Ball bearing-to-crankshaft (interference too loose)	0.0002 to 0.0005 in. (0.0050 to 0.0127 mm)	0.0004 to 0.0005 in. (0.0101 to 0.0127 mm)	0.0004 to 0.0005 in. (0.0101 to 0.0127 mm)	0.0004 to 0.0005 in. (0.0101 to 0.0127 mm)	—

TORQUES FOR HARDWARE

Location	Torque	
	200 and 208 Tractor	210, 212, 214, 216 Tractors
Cylinder head bolts	15-20 ft-lbs (20 to 27 N·m)	25-30 ft-lbs (34 to 41 N·m)
Connecting rod cap screws	200 in-lbs (22.6 N·m)	300 in-lbs (34 N·m)
Flywheel nut	45-55 ft-lbs (68 to 75 N·m)	50-60 ft-lbs (68 to 81 N·m)
Spark plug (cold)	18-22 ft-lbs (24 to 30 N·m)	18-22 ft-lbs (24 to 30 N·m)

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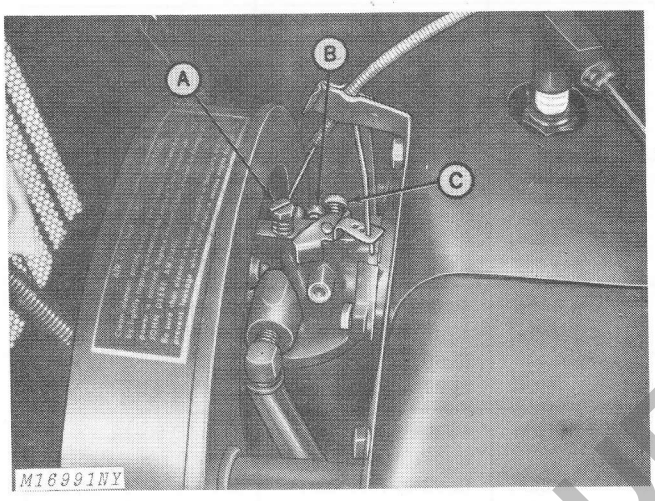
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7. Adjust Carburetor

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

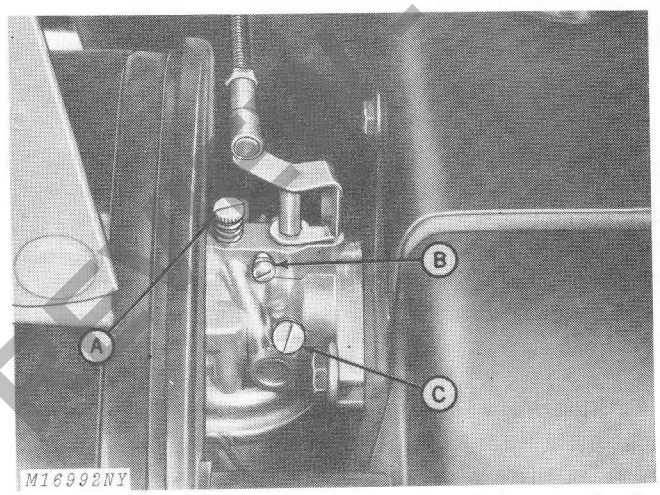
Idle adjustment and high-speed adjustment must be made at the same time as each affects the other.

Adjust carburetor as follows:



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

Fig. 10-200 and 208 Tractor Carburetor



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

Fig. 11-210, 212, 214 and 216 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

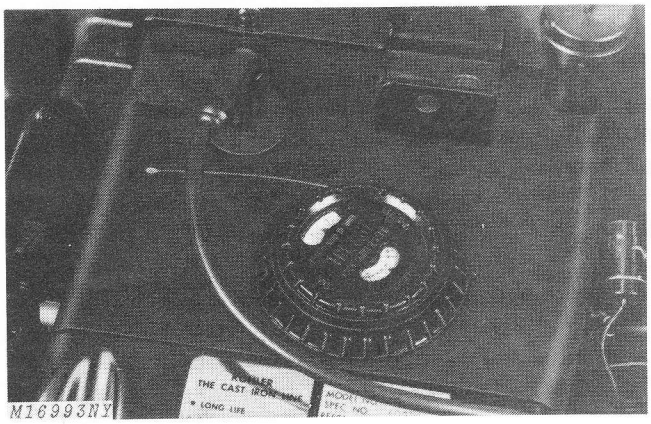


Fig. 12-Checking Engine Speed With Vibration Tachometer

A vibration tachometer, Fig. 12, can be used 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.

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DIAGNOSING AND TESTING

PROBLEM	TEST SEQUENCE
1. Engine cranks but does not start.	Problem in ignition System (See Group 15).
2. Engine cranks a short time only.	A. Test battery. Page 40-10-7 B. Check connections. C. Test starter. Page 40-10-10
3. Engine cranks slowly.	A. Test battery. Page 40-10-7 B. Check connections. C. Test starter. Page 40-10-10
4. Engine does not crank.	A. Test battery. Page 40-10-7 B. Check connections. C. Test starter. Page 40-10-10 D. Test solenoid. Page 40-10-10 E. Test neutral-start safety switches. Page 40-10-8 and 40-10-9 F. Test ignition switch. Page 40-10-8

Cranking System Tests

A. Test Battery

1. Check battery specific gravity, page 40-10-7.
   If battery is good, proceed to next test.
   If discharged, charge battery.
   If battery is in poor condition, replace battery.
2. Check battery voltage, page 40-10-7.
   If good, proceed to next test.
   If poor, replace battery.

B. Check Connections

1. Check all connections for looseness, corrosion, or breaks.

C. Test Starter

1. Connect battery directly to starter. If starter cranks engine, proceed to test solenoid, neutral-start safety switches and ignition switch. If starter does not crank engine, remove starter from tractor and test as instructed on page 40-10-10.
   If starter engages but does not crank engine:
   Check if PTO is engaged with load on PTO attachment.
   Check for engine resistance such as seized piston, binding connecting rod, crankshaft bearings, or bushings. If engine and PTO turn freely, remove starter and check it for:
   Dirty or gummed armature.
   Shorted or grounded armature, page 40-10-10.
   Misaligned start motor.

D. Test Solenoid

Connect battery directly to solenoid page 40-10-8. If solenoid energizes, test neutral-start safety switches. If solenoid fails to energize, replace solenoid.

E. Test Neutral-Start Safety Switches

Test Transmission Neutral-Start Safety Switch

Attach test light to the terminals, page 40-10-8 or 40-10-9.
Place the shift lever in neutral position.
If test light lights, test neutral-start PTO safety switch.
If test light does not light on tractors below Serial No. 190,001, adjust switch as explained on page 40-10-8. If test light does not light after adjustment, replace switch.

Test PTO Neutral-Start Safety Switch

Attach test light to terminals on switch page 40-10-8 or 40-10-9. Place PTO lever or switch in disengaged position.
If test light lights, test ignition switch.
If test light does not light on tractors below Serial No. 190,001, adjust switch as explained on page 40-10-8. If test light does not light after adjustment, replace switch.

F. Test Ignition Switch

Check for continuity between terminals with the switch placed in each of three positions as explained on page 40-10-8.

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Group 10
SPECIFICATIONS

ENGINE SPECIFICATIONS

Item	200	208	210
Engine Model No.	K181QS	K181S	K241AQS
Manufacturer	Kohler	Kohler	Kohler
Cylinders	One	One	One
Stroke/Cycle	Four	Four	Four
Bore	2.94 in. (74.6 mm)	2.94 in. (74.6 mm)	3.25 in. (82.5 mm)
Stroke	2.75 in. (69.8 mm)	2.75 in. (69.8 mm)	2.88 in. (73.1 mm)
Displacement	18.6 cu. in.	18.6 cu. in.	23.9 cu. in.
Speeds (Fast) No Load	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
Horsepower*	8	8	10
Normal Compression	110 to 120 psi	110 to 120 psi	110 to 120 psi
Valve Clearance			
Intake (Cold)	0.007 in. (0.178 mm)	0.007 in. (0.178 mm)	0.010 in. (0.254 mm)
Exhaust (Cold)	0.016 in. (0.406 mm)	0.016 in. (0.406 mm)	0.020 in. (0.508 mm)
Ignition	Battery	Battery	Battery
Spark Plug**	Champion-J-8 or XJ8 AC-45-M or R-46 Prestolite-14-7 or 14-R8	Champion-RJ8	Champion-H-10 AC-45L Prestolite-14-L7B
Spark Plug Gap	0.025 in. (0.635 mm)	0.025 in. (0.635 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)
Charging System	Alternator	Alternator	Alternator
Starter	12-Volt	12-Volt	12-Volt
Air Filter	Dry-type	Dry-type	Dry-type

Item	212	214	216
Engine Model No.	K301AQS	K321AQS	K341AQS
Manufacturer	Kohler	Kohler	Kohler
Cylinders	One	One	One
Stroke/Cycle	Four	Four	Four
Bore	3.38 in. (85.8 mm)	3.50 in. (88.9 mm)	3.75 in. (95.2 mm)
Stroke	3.25 in. (82.5 mm)	3.25 in. (82.5 mm)	3.25 in. (82.5 mm)
Displacement	29.1 cu. in.	31.3 cu. in.	35.9 cu. in.
Speeds (Fast) No Load	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
Horsepower*	12	14	16
Normal Compression	110 to 120 psi	110 to 120 psi	110 to 120 psi
Valve Clearance			
Intake (Cold)	0.010 in. (0.254 mm)	0.010 in. (0.254 mm)	0.010 in. (0.254 mm)
Exhaust (Cold)	0.020 in. (0.508 mm)	0.020 in. (0.508 mm)	0.020 in. (0.508 mm)
Ignition	Battery	Battery	Battery
Spark Plug**	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	0.035 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)
Charging System	Alternator	Alternator	Alternator
Starter	12-Volt	12-Volt	12-Volt
Air Filter	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.*

***In Canada, compliance with radio interference regulations certified. Replace spark plug with resistor-type spark plug only. Use Champion RJ8 for 200 and 208 Tractors. Use Champion RH10 for 210, 212, 214 and 216 Tractors.*

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BATTERY SPECIFICATIONS

Tractor	Battery
200, 208	John Deere, 12 Volt, (AM30094), BCI Group U1, 135 cold cranking amps at 0°F (−17°C), 30-minute reserve capacity.
210, 212, 214, 216	John Deere, 12 Volt, (AM31186), BCI Group 22F, 255 cold cranking amps at 0°F (−17°C), 55-minute reserve capcaity.

TRACTOR SPECIFICATIONS

Item	200, 208	210, 212, 214, 216
CAPACITIES		
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)	**(S.N. 30001-95261) 3 U.S. Pts. (1.42 L) ***(S.N. 95262 and up) 4 U.S. Pints (1.89 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)
TRANSMISSION		
Type	Transaxle	Transaxle
Gear Selections	4 forward - 1 reverse	4 forward - 1 reverse
TRAVEL SPEEDS - @ 3400 rpm		
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)
DIMENSIONS		
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. (10.54 m)	41-1/2 in. (1.054 m)
WHEEL TREAD		
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)
BRAKES		
Type	Band, pedal-operated	Band, pedal-operated
Parking	Hand-lock foot brake	Hand-lock foot brake
CLUTCH	V-belt system	V-belt system
PTO CLUTCH	Manual	Manual
STEERING	Enclosed gear	Enclosed gear
LIFT*	Manual, Electric	Manual, Electric, Hydraulic
SHIPPING WEIGHT	200 Tractor - 691 lbs. (313 kg) 208 Tractor - 673 lbs. (305 kg)	759 lbs. (344 kg)

**Electric and Hydraulic Lifts are dealer installed options.*
***Aluminum Pan*
****Steel Pan*

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DIAGNOSING AND TESTING

Problem	Test Sequence	Page
1. Engine Will Not Start	A. Make a visual check of components, wiring and connections	40-15-4
	B. Test spark plug	40-15-5
	If No Spark: C. Test safety switches	40-15-5 and 40-15-6
	D. Test ignition switch	40-15-6
	E. Check points and timing	40-15-6
	F. Test condenser	40-15-9
	G. Test coil	40-15-9
	If Weak Spark: E. Check points and timing	40-15-6
	F. Test condenser	40-15-9
	G. Test coil	40-15-9
	If Strong Spark: E. Check points and timing	40-15-6
2. Engine Hard Starting	A. Make a visual check of components, wiring and connections	40-15-4
	B. Test spark plug	40-15-5 and 40-15-6
	If Weak Spark: E. Check points and timing	40-15-6
	F. Test condenser	40-15-9
	G. Test coil	40-15-9
	If Strong Spark: E. Check points and timing	40-15-6
3. Engine Misfires or Lack of Power	A. Make a visual check of components, wiring and connections	40-15-4
	B. Test spark plug	40-15-5 and 40-15-6
	E. Check points and timing	40-15-6
	F. Test condenser	40-15-9
	G. Test coil	40-15-9
4. Engine Overheats or Engine Knocks	A. Make a visual check of components, wiring and connections	40-15-4
	B. Test spark plug	40-15-5 and 40-15-6
	E. Check points and timing	40-15-6
5. Engine Starts But Will Not Continue to Run	A. Make a visual check of components, wiring and connections	40-15-4
	B. Test spark plug	40-15-5 and 40-15-6
	If Weak Spark: E. Check points and timing	40-15-6
	F. Test condenser	40-15-9
	G. Test coil	40-15-9
	If Strong Spark: C. Test safety switches	40-15-5 and 40-15-6
	D. Test ignition switch	40-15-6
	E. Check points and timing	40-15-6

A. Make a Visual Check of Components and Wiring

Make a visual check of the ignition circuit to find broken leads, broken or loose connections, corroded connections, possible cracks or broken components.

B. Test Spark Plug

Remove ignition cable from spark plug and install adaptor, Fig. 6, or an ordinary paper clip. Hold adaptor approximately 1/8 inch (3.18 mm) away from spark plug terminal while cranking engine.

If there is no spark at the plug terminal, hold the high-tension lead at the steel base of the plug while cranking engine. If a spark jumps here, the plug is bad and should be cleaned or replaced.

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