JOHN DEERE
AG & TURF DIVISION

Tractor
D100, D110, D120, D130, D140, D150, D160, D170

TM113219 DECEMBER 2011

TECHNICAL MANUAL



JOHN DEERE

North American Version
Litho In U.s.a.

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Manual Description

This technical manual is written for an experienced technician and contains sections that are specifically for this product. It is a part of a total product support program.

The manual is organized so that all the information on a particular system is kept together. The order of grouping is as follows:

- Table of Contents
- Specifications and Information
- Identification Numbers
- Tools and Materials
- Component Location
- Schematics and Harnesses
- Theory of Operation
- Operation and Diagnostics
- Diagnostics
- Tests and Adjustments
- Repair
- Other

Note: Depending on the particular section or system being covered, not all of the above groups may be used.

The bleed tabs for the pages of each section will align with the sections listed on this page. Page numbering is consecutive from the beginning of the Safety section through the last section.

We appreciate your input on this manual. If you find any errors or want to comment on the layout of the manual please contact us.

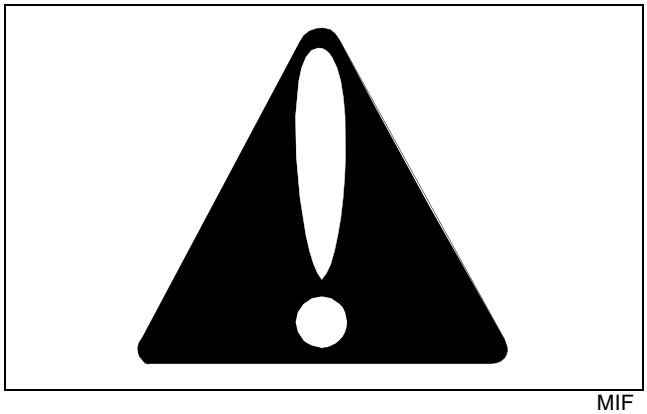
Safety
Specifications and Information
Engine (Single Cylinder)
Engine (V-Twin)
Electrical
Power Train (Gear)
Power Train (Hydrostatic)
Steering
Brakes
Attachments
Miscellaneous

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Safety

Recognize Safety Information



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This is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe servicing practices.

Understand Signal Words

A signal word - DANGER, WARNING, or CAUTION - is used with the safety-alert symbol. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

Special Messages

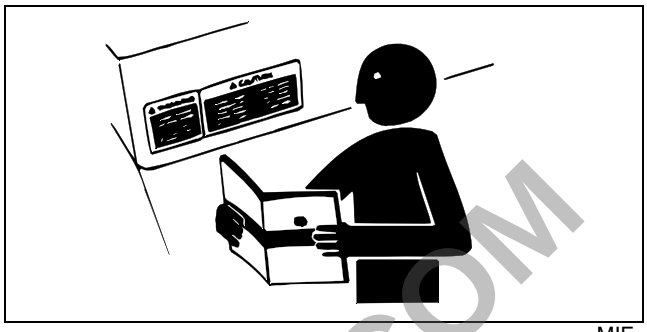
Your manual contains special messages to bring attention to potential safety concerns, machine damage as well as helpful operating and servicing information. Please read all the information carefully to avoid injury and machine damage.

Caution: Avoid Injury! This symbol and text highlight potential hazards or death to the operator or bystanders that may occur if the hazards or procedures are ignored.

Important: Avoid Damage! This text is used to tell the operator of actions or conditions that might result in damage to the machine.

Note: General information is given throughout the manual that may help the operator in the operation or service of the machine.

Replace Safety Signs

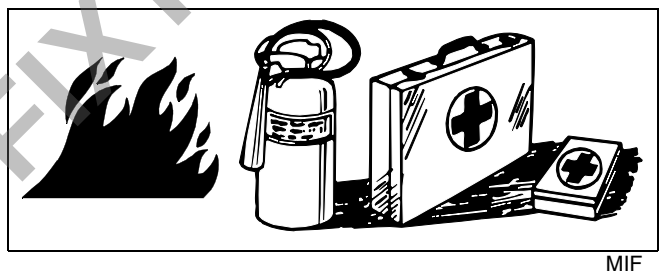


MIF

Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.

Handle Fluids Safely - Avoid Fires

Be Prepared For Emergencies



MIF

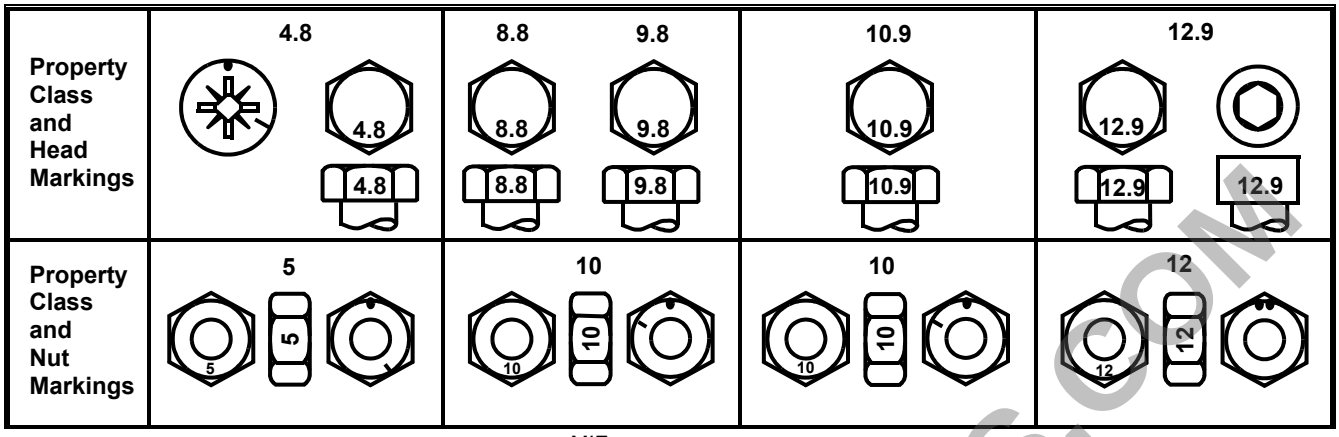
- When you work around fuel, do not smoke or work near heaters or other fire hazards.
- Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.
- Make sure machine is clean of trash, grease, and debris.
- Do not store oily rags; they can ignite and burn spontaneously.
- Be prepared if a fire starts.
- Keep a first aid kit and fire extinguisher handy.
- Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.

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Fastener Torques

Metric Fastener Torque Values



MIF

	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated a		Dry a		Lubricated a		Dry a		Lubricated a		Dry a		Lubricated a		Dry a	
SIZE	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	109
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a ±10% variance factor. Check tightness of fasteners periodically. DO NOT use air powered wrenches.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same grade. Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

When bolt and nut combination fasteners are used, torque values should be applied to the NUT instead of the bolt head.

Tighten toothed or serrated-type lock nuts to the full torque value.

a *“Lubricated” means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. “Dry” means plain or zinc plated (yellow dichromate - Specification JDS117) without any lubrication*.

Reference: JDS - G200.

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Specifications

General Specifications

Specifications:

Manufacturer	Briggs & Stratton
Model Number (D100)	31G777 (M31)
Model Number (D110)	31P677 (M31)
Model Number (D120)	331877 (M33)
Series	Intek™ Single Cylinder
Power Rating Information	http://www.briggsandstratton.com/
Type	Gasoline
Stroke/Cycle	4
Cylinders	1
Valves	Overhead Valves
Displacement (M31)	501 cm^3 (30.59 cu in.)
Bore (M31)	90.48 mm (3.562 in.)
Displacement (M33)	540 cm^3 (32.95 cu in.)
Bore (M33)	94.02 mm (3.702 in.)
Stroke (All Models)	77.78 mm (3.06 in.)
Cooling System	Air Cooled
Lubrication	Pressurized
Crankcase Oil Capacity	1.4 L (1.5 qt)
Air Cleaner	Cartridge
Muffler	Horizontal discharge below frame
Fuel Filter	Replaceable (In-Line Type)
Aspiration	Normal
Alternator	9 amp regulated

Tests and Adjustments Specifications

Valve Clearance:

Low Idle	1750 ± 50 rpm
Low Idle (governed)	2200 ± 300 rpm
High Idle	3350 ± 100 rpm
Spark Plug Gap	0.76 mm (0.030 in.)
Spark Plug Torque	20 N•m (180 lb-in.)
Valve Clearance - Intake	0.08 - 0.13 mm (0.003 - 0.005 in.)
Valve Clearance - Exhaust	0.13 - 0.18 mm (0.005 - 0.007 in.)
Valve Guide Depth	0.12 - 0.15 mm (0.005 - 0.006 in.)
Magneto Air Gap	0.25 - 0.35 mm (0.010 - 0.014 in.)

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Repair Specifications

Cylinder Bore, Pistons and Rings (M31):

Cylinder Bore Maximum Dimension	90.50 mm (3.563 in.)
Cylinder Bore Minimum Dimension	90.48 mm (3.562 in.)
Cylinder Bore Out of Round (maximum)	0.04 mm (0.002 in.)
Piston Pin (Wear Limit	20.29 mm (0.799 in.)
Piston Pin Bore (Wear Limit)	20.35 mm (0.801 in.)

Cylinder Bore, Pistons and Rings (M33):

Cylinder Bore Maximum Dimension	94.06 mm (3.703 in.)
Cylinder Bore Minimum Dimension	94.02 mm (3.702 in.)
Cylinder Bore Out of Round (maximum)	0.04 mm (0.002 in.)
Piston Pin (Wear Limit	20.29 mm (0.799 in.)
Piston Pin Bore (Wear Limit)	20.35 mm (0.801 in.)

Ring End Gap (Wear Limit) Case Iron Bore:

Compression Ring (Top)	0.64 mm (0.025 in.)
Compression Ring (Center)	0.76 mm (0.030 in.)
Oil Ring	0.76 mm (0.030 in.)
Compression and Oil Ring Groove Wear Limit (New Rings Installed)	0.15 mm (0.006 in.)

Valves:

Valve Guide (Wear Limit)	6.09 mm (0.240 in.)
Valve Seat Width	0.79 - 1.98 mm (0.031 - 0.078 in.)
Valve Margin (Minimum)	0.40 mm (0.016 in.)
Valve Face Angle	45°
Valve Seat Narrowing Angle	30°

Connecting Rod and Crankshaft:

Connecting Rod Crankpin (Wear Limit)	38.15 mm (1.502 in.)
Connecting Rod Piston Pin Bearing (Wear Limit)	20.37 mm (0.802 in.)
Crankshaft PTO Journal (Wear Limit)	41.20 mm (1.622 in.)
Crankshaft Magneto Journal (Wear Limit)	34.95 mm (1.376 in.)
Crankshaft Crankpin Journal (Wear Limit)	38.02 mm (1.497 in.)
Crankshaft Eccentric Journal (Wear Limit)	55.93 mm (2.202 in.)
PTO Bearing (Wear Limit)	41.37 mm (1.629 in.)
Magneto Bearing (Wear Limit)	35.13 mm (1.383 in.)
Crankshaft End Play	0.05 - 0.58 mm (0.002 - 0.023 in.)
Cam Gear PTO Journal (Wear Limit)	12.65 mm (0.498 in.)
Cam Gear Magneto Journal (Wear Limit)	12.65 mm (0.498 in.)
Cam Lobe (Wear Limit)	30.07 mm (1.184 in.)
Cam Gear Bearing (Wear Limit)	12.80 mm (0.504 in.)
Compression Release Lobe	0.25 mm (0.010 in.)

Counterweight:

Crankshaft Eccentric Journal (Wear Limit)	55.93 mm (2.202 in.)
Counterweight Link Bearing (Wear Limit)	56.13 mm (2.210 in.)

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Special or Essential Tools

Special or Required Tools

Tool Name	Tool No.	Tool Use
Pulse Tachometer, or Digital Tachometer	JT07270 JT05719	Governor, and governed and low idle adjustments.
Cylinder Leak Tester	JTO3502	Cylinder leakdown test.
Vacuum Gauge Bar Fitting Line and Plug	JT03503 JT05703 JT05699 and 8741-F66	Crankcase vacuum test.
Briggs & Stratton Flywheel Tool	B&S Tool No. 19203	Remove flywheel.

Note: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).

Other Materials

Other Material

Part No.	Part Name	Part Use
PM37418 LOCTITE 242	Thread Lock and Sealer (Medium Strength)	Apply to threads of throttle and choke plate screws
PM37397 LOCTITE 592	Thread Sealant (General Purpose) with TEFLON	Apply to threads of pipe plugs.
TY24416	Multipurpose Lithium Grease	Apply to engine crankshaft and lube oil seals
TY26181	John Deere NEVER-SEEZ™ Lubricant	Apply to crankshaft end
	SCOTCH-BRIGHT™ Abrasive Sheets/ Pads	Clean cylinder head.
	Valve Guide Cleaner	Clean valve guides.
	Stanisol or Kerosene	Finish ream valve guide.
	Prussian Blue Compound	Check valve seat contact.
	Zinc Oxide/Wood Alcohol	Check block for cracks.
	Mineral Spirits	Clean electric starter armature.

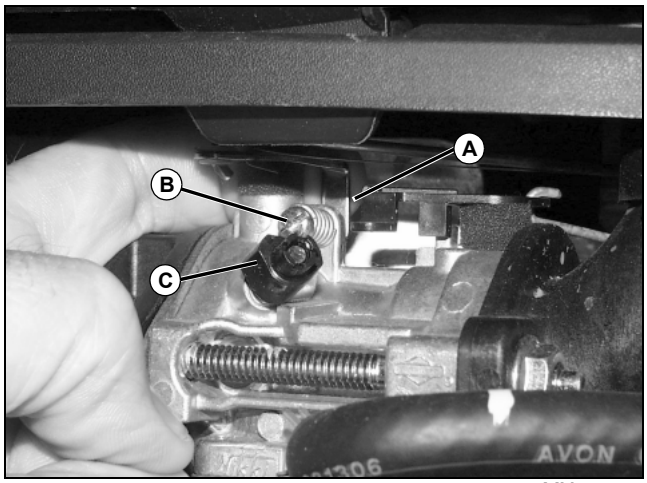
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Procedure:

1. Start engine. Run at 1/2 throttle for 5 minutes to bring engine to operating temperature.

2. Move throttle to SLOW.



MX38042

Caution: Avoid Injury! Touching hot surfaces can burn skin. The engine, components, and fluids will be hot if the engine has been running. Keep hands and body away from hot surfaces when servicing or working near the engine and components. Allow engine to cool.

3. Hold throttle closed so that tab (A) is against idle speed screw (B). Turn idle speed screw (B) to obtain 1750 rpm.

4. Adjust idle mixture screw (C) slowly until best idle is obtained.

5. Check rpms and re adjust if necessary.

Specification:

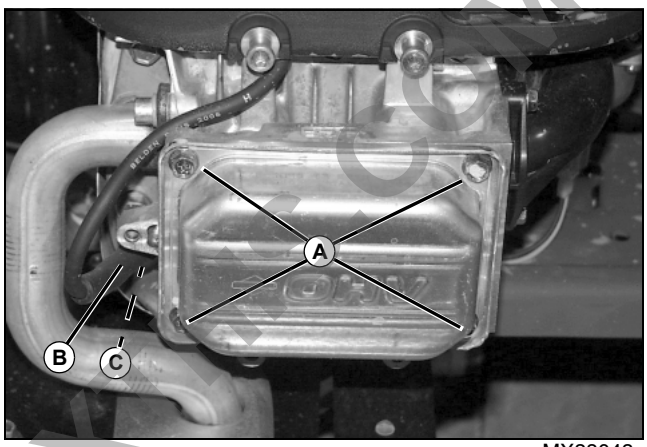
Carburetor Low Idle Speed . . . . . .1750 ± 50 rpm

Valve Clearance Adjustment

Note: Correct position of crankshaft is necessary to eliminate interference by the compression release mechanism when adjusting valve clearance.

Procedure:

1. Park machine safely and allow engine to cool.

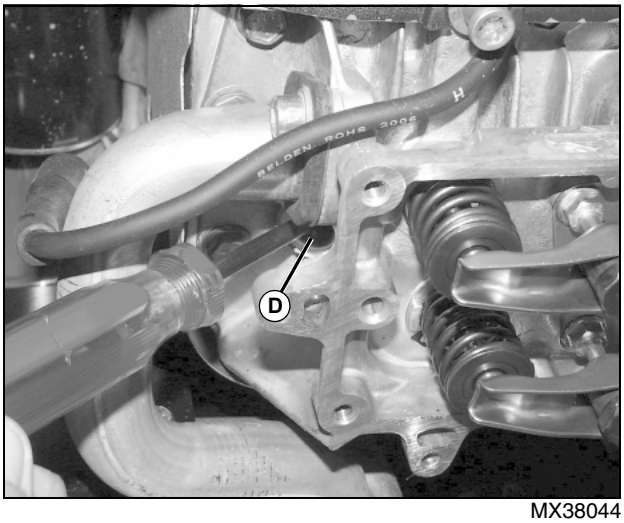


MX38043

2. Remove four bolts and valve cover (A).

3. Disconnect spark plug wire (B) and remove spark plug (C).

4. Place thumb or finger over spark plug hole and turn crankshaft (clockwise viewed from top, counter clockwise viewed from bottom) until air pressure is felt in spark plug hole (engine is on compression stroke).



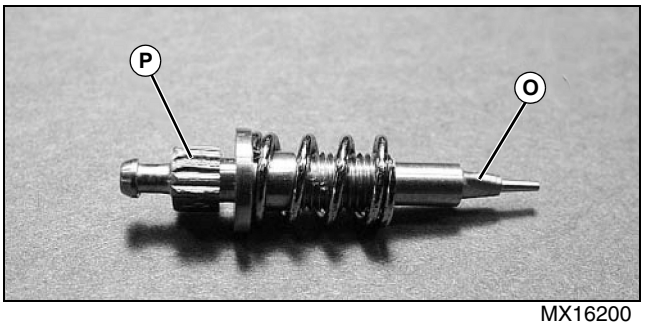
MX38044

5. Insert a screwdriver through the spark plug opening (D). Slowly continue to turn the crankshaft until the piston has pushed the screwdriver to the top of it's stroke and has started to move down again approximately **6.35 mm (0.25 in.)**.

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- Remove the limiter, being careful not to turn the pilot screw at this time.
- Turn the pilot screw clockwise and count the number of turns until screw is gently seated in the pilot passage. Record the number of turns needed to close the screw.
- Turn out the pilot screw to replace it with a new one.



MX16200

14.Inspect the tapered portion (O) of the pilot screw (P) for wear or damage.

- If the pilot screw is worn or damaged on the taper portion of it, replace it.
- Check the spring for a weakened condition; replace it, if necessary.

15.Install the new pilot screw until the screw is gently seated. Then open the screw the same number of turns as recorded prior to removal.

- Align the limiter with the mark on the carburetor body to install, taking care not to turn the pilot screw.

Carburetor Inspection

Important: Avoid Damage! A clean fuel system is necessary in order to maintain proper operation of the engine. Gummy or dirty fuel tanks and carburetors should be cleaned in carburetor cleaner. Do not soak rubber, neoprene or plastic parts in cleaner.

Procedure:

1. Clean the carburetor body and metal carburetor parts in carburetor cleaner to remove any gummy material or dirt. DO NOT soak rubber, neoprene or plastic parts in cleaner.

2. Check moving parts for wear, nicks and burrs. Replace if worn or damaged.

3. Check float for leaks or damage. Replace if damaged or leaking.

4. Carefully blow through all passages with dry, compressed air.

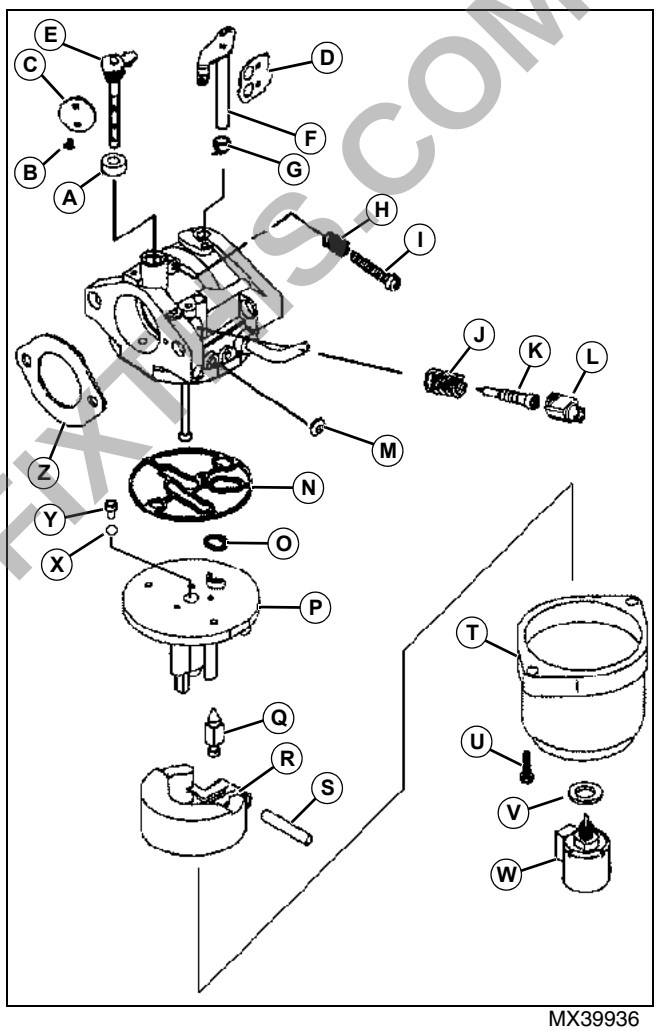
5. Inspect idle mixture needle for bent or grooved point. Replace if grooved or bent.

Carburetor Assembly

Important: Avoid Damage! When assembling the carburetor use new seals and gaskets.

Note: A high altitude jet is available.

Procedure:



MX39936

A- Shaft Seal
B- Screw
C- Throttle Valve Plate
D- Throttle Shaft
E- Choke Valve Plate
F- Choke Shaft
G- Shaft Seal
H- Spring
I- Idle Speed Screw
J- Spring
K- Idle Needle Valve
L- Limiter Cap
M- Plug

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W1 Front Main Wire Harness Color Codes - D140/160/170

Size/No./Color	Wire Connection Points
0.5 100 Blk	C10 (S1), Splice #2
0.5 105 Blk	C12 (Y1), Splice #2
0.8 110 Blk	Splice #2, C11
0.8 115 Blk	Splice #2, C03 (Not used on D140)
0.5 120 Blk	Splice #2, C05
1.0 125 Blk	Splice #2, C15
1.0 200 Red	C08 (F1), C10 (S1)
1.0 201 Red	C09, C08 (F1)
1.0 220 Red/Blk	C08 (F1), C07
0.8 401 Yel	C10 (S1), C03 (Not used on D140)
0.5 402 Yel	C13 (K1), C07
0.5 405 Wht	C10 (S1), C01 (P1)
0.8 410 Yel/Wht	C01 (P1), C13 (K1)
0.5 451 Yel/Wht	C10 (S1), C07
0.8 500 Yel	C10 (S1), C14 (S2)
0.8 501 Yel	C14 (S2), C11
0.8 502 Yel	C01 (P1), C14 (S2)
0.5 700 Pur	C10 (S1), C14 (S2)
0.5 705 Pur/Wht	C14 (S2), C04 (S3)
0.5 710 Pur	C04 (S3), C06 (Y1)
0.5 940 Wht	Splice #1, C07
0.5 941 Wht	Splice #1, C10 (S1)
0.5 942 Wht	Splice #1, C04 (S3)
0.5 943 Wht	Splice #1, C14 (S2)
0.5 945 Wht/Blk	C04 (S3), C11
0.5 949 Wht/Blk	C13 (K1), C14 (S2)
0.5 951 Blk/Wht	C13 (K1), C11
0.5 952 Wht/Blk	C13 (K1), C02 (S4)
0.5 953 Blk/Wht	C13 (K1), C13 (K1)
0.5 954 Blk	Splice #2, C02 (S4)
0.5 957 Wht	C13 (K1), C11
0.5 960 Yel/Wht	C10 (S1), C05

W2 Rear Main Wire Harness Color Codes - D140/160/170

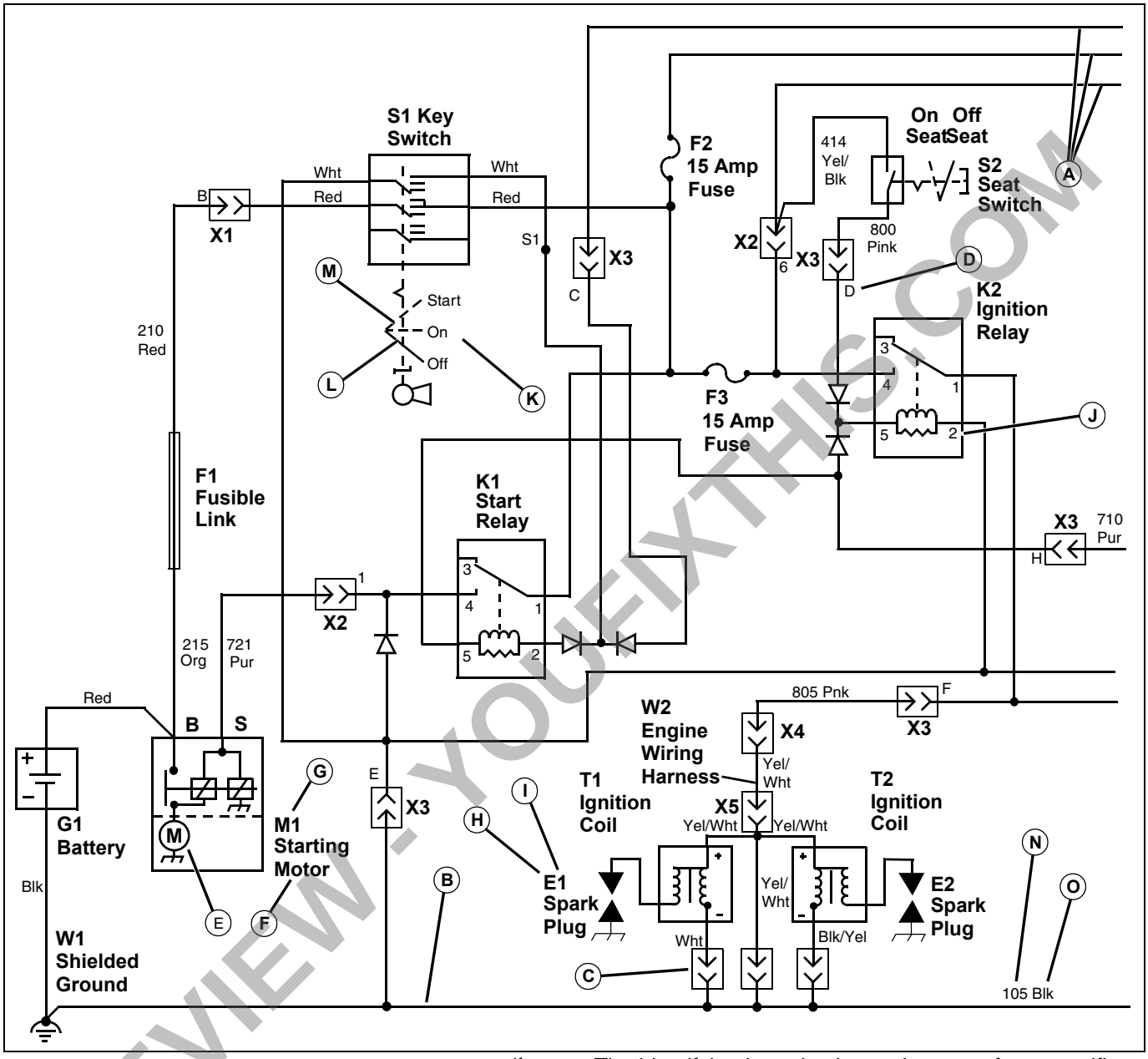
Size/No./Color	Wire Connection Points
0.5 110 Blk	C03, C04 (Y3)
0.5 111 Blk	C01 (S5), C01 (S5)
0.8 120 Blk	C02 (S6), C04 (Y3)
0.5 130 Blk	C01 (S5), C02 (S6)
0.8 501 Yel	C03, C04 (Y3)
0.5 945 Wht/Blk	C03, C01 (S5)
0.5 951 Blk/Wht	C01 (S5), C03
0.5 957 Wht	C02 (S6), C03

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General Information

Reading Electrical Schematics



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The schematic is made up of individual circuits laid out in a sequence of related functions. It is formatted with all power wires (A) across the top and all ground wires (B) across the bottom. Current flow is generally from top to bottom through each circuit and component. All components are shown in the off position. The diagram does not list connector (C) information unless needed to avoid confusion. If the connector is shown, the number next to it is the terminal pin location (D) in the connector.

Each component is shown by a symbol (E), its name (F), and an identification code (G). The identification code contains a device identifying letter (H) and number (I).

The identifying letter is always the same for a specific component, but the identifying numbers are numbered consecutively from upper left to lower right. The terminal designation (J) is placed directly inside or outside the symbol next to the connecting wire path. Switch positions (K) are also placed directly inside or outside the symbol. The solid line (L) shows the position the switch is currently in and dash lines (M) represent other switch positions.

The circuit number (N) and wire color (O) of the wires are shown directly next to the wire path.

The same component name and identification code are used consistently on all diagrams in this section. Components can be easily cross-referenced.

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Specifications

Electrical

Battery:

Voltage	12 VDC
Battery Type	BCI Group U1

Ignition:

Spark Plug	Champion RC12YC
Spark Plug Gap	0.76 mm (0.030 in.)
Spark Plug Torque	20 N•m (180 lb-in.)
Ignition Module Air gap	0.2 - 0.3 mm (0.008 - 0.012 in.)

Starting Motor:

Type	Inertia Drive
Starting motor amp draw (on machine)	90 - 100 amps
Starting motor no-load amp draw (free running)	35 amps (maximum)

Stator - D100/110/120/130/140:

Size	8 amp
Regulated Amperage (Minimum) at High Idle	3 - 8 amps
Unregulated Voltage (Minimum) at High Idle	40 volts AC

Stator - D150/160/170:

Size	14 amp
Regulated Amperage (Minimum) at High Idle	3 - 14amp
Unregulated Voltage (Minimum) at High Idle	30 volts AC

Electric PTO Clutch - D140/150/160/170:

Resistance	3.7 ohms
Current Draw	3.25 amps

Lighting:

Headlights	GE 1156 or equivalent

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Test and Adjustments

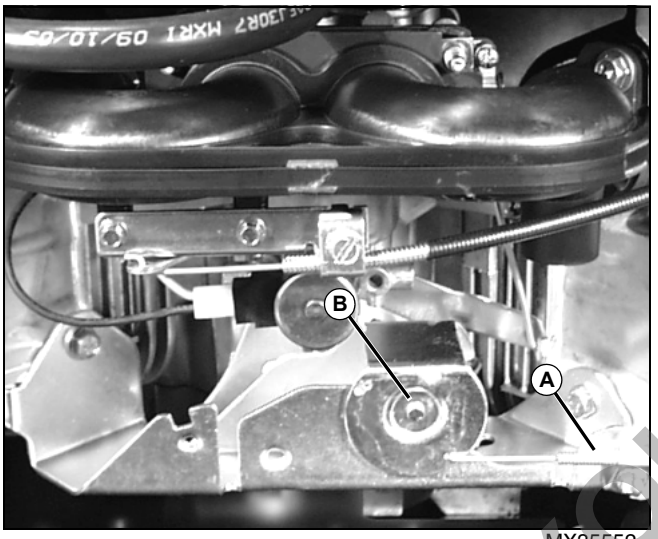
Throttle Cable Adjustment

Reason:

To make sure the throttle cable moves the throttle through its full range of movement.

Procedure:

1. Move throttle lever to FAST position (detent).
2. Loosen throttle cable clamp.



MX35552

3. Move throttle cable (A) until governor control swivel (B) is at end of travel.
4. Tighten throttle cable clamp to specification.

Specification:

Throttle Cable Clamp . . . . . 3 N•m (25 lb-in.)

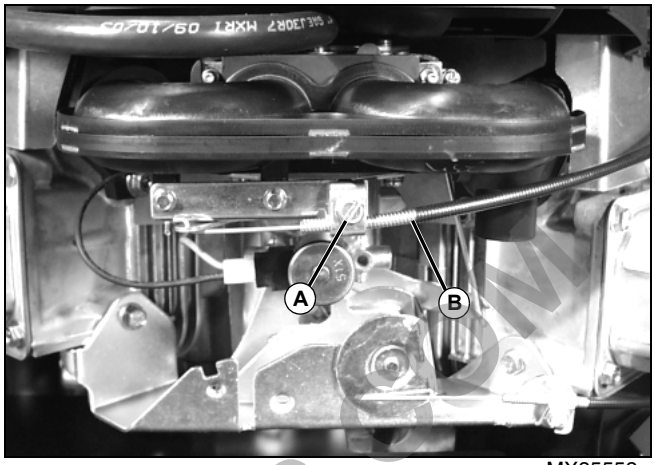
Choke Cable Adjustment

Reason:

To make sure the choke cable moves the choke through its full range of movement.

Procedure:

1. Place choke lever in the full OFF position (detent).



MX35553

2. Loosen choke cable clamp (A).
3. Move choke cable (B) until choke is fully closed.
4. Tighten choke cable clamp to specification.
5. Move lever through full range of motion. Make sure choke is opens and closes completely. Readjust if necessary.

Specification:

Choke Cable Clamp . . . . . 3 N•m (25 lb-in.)

Throttle/Choke Cable Adjustment

Reason:

To ensure that the combined throttle/choke cable moves both throttle and choke through their full range of movement.

Equipment:

- 2.90mm (0.115) Diameter Rivet M67899

Procedure:

1. Park machine safely. See “Park Machine Safely” in the Safety section.
2. Move throttle lever up into the Choke position, then back down to the Full throttle position (in the detent).

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Will Not Move Forward or Reverse

Test Conditions:

- Machine parked on level surface.
- Key switch off.
- Park brake unlocked.
- Transaxle in neutral.

Symptom: Machine Will Not Move Forward or Reverse

Problem	Cause - Solution
1. Is the freewheeling lever disengaged?	a. Yes - Go to next step. b. No - Disengage freewheeling lever.
2. Is the park brake locked?	a. Yes - Unlock park brake. b. No - Go to next step.
3. Is the traction belt worn, frayed, glazed or stretched?	a. Yes - Replace traction belt. See “Traction Drive Belt Removal and Installation - D140, 150, 160 and 170” on page 261. b. No - Go to next step.
4. Is the traction belt properly tensioned?	a. Yes - Go to next step. b. No - Check belt tensioning spring and belt. Replace worn/damaged/missing parts.
5. Hydrostatic transaxle oil to full mark?	a. Yes - Go to next step. b. No - Fill reservoir to correct level with specified oil.
6. Is the brake linkage properly adjusted?	a. Yes - Go to next step. b. No - Adjust brake linkage.
7. Are the brake rod and lever damaged or binding?	a. Yes - Eliminate binding, replace damaged components. b. No - Go to next step.
8. Does the forward/reverse pedal linkage move freely?	a. Yes - Go to next step. b. No - Eliminate binding, replace faulty or damaged components.
9. Are the control arm and spring pin intact and present?	a. Yes - Go to next step. b. No - Replace control arm and/or spring pin.
10. Are the engine and transaxle drive sheaves intact, and are the keys or keyways damaged?	a. Yes - Replace sheaves or keys. b. No - Go to next step.

Symptom: Machine Will Not Move Forward or Reverse

Problem	Cause - Solution
11. Idler arm assembly pivots freely, no wear in bearing?	a. Yes - Go to next step. b. No - Lubricate and/or replace assembly.
12. Belt idler assembly tension spring maintains tension on belt?	a. Yes - Go to next step. b. No - Replace tensioning spring.
13. Freewheel linkage components move freely and are not damaged?	a. Yes - Go to next step. b. No - Eliminate binding and/or replace damaged components.

Machine Moves In One Direction Only

Test Conditions:

- Machine parked on level surface.
- Key switch off.
- Park brake unlocked.
- Transaxle in neutral.

Symptom: Machine Moves In One Direction Only

Problem	Cause - Solution
1. Is the forward/reverse pedal linkage properly adjusted?	a. Yes - Go to next step. b. No - Adjust linkage.
2. Does the forward/reverse pedal linkage move freely?	a. Yes - Go to next step. b. No - Eliminate binding, replace faulty or damaged components.
3. Is the control arm free of damage?	a. Yes - Go to next step. b. No - Replace control arm and/or spring pin.

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INDEX

A

Alternative Lubricants 13
Attachments
  42 Inch Deck
    Engagement 307
    Idlers and Sheaves 305
    Spindle - Cross Section 306
  48 Inch Deck
    Idlers and Sheaves 309
    Spindle - Cross Section 310
  54 Inch Deck
    Components 311
    Idlers and Sheaves 312
    Spindle - Cross Section 313
  Deck Lift Assembly 302
  Deck Lift Components 303
  Diagnostics
    Mower Deck Troubleshooting Chart 315
    Mower Drive Check 314
  Repair 320
    Spindles Disassembly
      54 Inch Deck 327
  Specifications
    Special or Essential Tools 301
  Tests and Adjustments 316
Avoid Harmful Asbestos Dust 4
Axle Removal and Installation, Front 280

B

Battery
  Charge 196
  Load Test 197
  Specifications 116
  Voltage and Specific Gravity Tests 195
Battery Safety 2
Blades
  Balancing 321
  Removal and Installation 321
  Sharpening 321
Brake
  Pedal Assembly Removal and Installation
    Hydrostatic Transaxle 295
Brake Pedal Removal and Installation
  Gear Transaxle 290
Brakes
  Adjustment
    Gear Transaxle 289
    Hydrostatic Transaxle 289
  Assembly Removal and Installation
    Gear Transaxle 293
  Component Location 286
  Linkage Removal and Installation
    Gear Transaxle 290
    Hydrostatic Transaxle 294
  Mower Deck Blade Brake (42 Inch Deck) 320
  Repair 290
  Specifications 285
  System Operation
    Gear Power Train 220
    Hydrostatic Power Train 248
  Tests and Adjustments 288
Break-in engine oil
  4-cycle gasoline 12
Briggs & Stratton Engine (Single Cylinder)
  Air Cleaner Service 29
  Balancer System Removal & Installation 51
  Breather Valve Service 35
  Cam Gear Bearing Inspection 53
  Carburetor Assembly 33
  Carburetor Disassembly 31
  Carburetor Inspection 33
  Carburetor Removal & Installation 30
  Connecting Rod Inspection 45
  Crankshaft & Cam Gear Installation 52
  Crankshaft & Cam Gear Removal 49
  Cylinder Bore
    Cleaning 47
    Honing 47
    Inspection 47
    Resizing 48
  Cylinder Head
    Inspection and Repair 40
    Removal & Installation 38
  Diagnostics 21
  Engine Installation 37
  Engine Removal 36
  Flywheel Removal and Installation 48
  Governor Removal & Installation 42
  Magnet to Bearing Inspection 52
  PTO Bearing Removal & Installation 53
  Piston Inspection 44
  Piston, Rings & Rod Removal and Installation 43
  Repair Specifications 18
  Specifications 17
  Starting Motor Assembly 56
  Starting Motor Disassembly 54
  Starting Motor Pinion Gear Replacement 58
  Starting Motor Removal & Installation 54
  Tests and Adjustments
    Crankcase Vacuum 27
    Cylinder Leakdown Test 27
    Fuel Shutoff Solenoid 22
    Governor Dynamic Adjustment 23
    Governor Idle Adjustment 24
    Governor Static Adjustment 23
    Ignition Armature Air Gap 26
    Low Idle Carburetor 24
    Throttle Cable Adjustment 22
    Valve Clearance 25
  Tests and Adjustments Specifications 17
  Torque Specifications 19
  Upper Blower Housing Removal & Installation 29

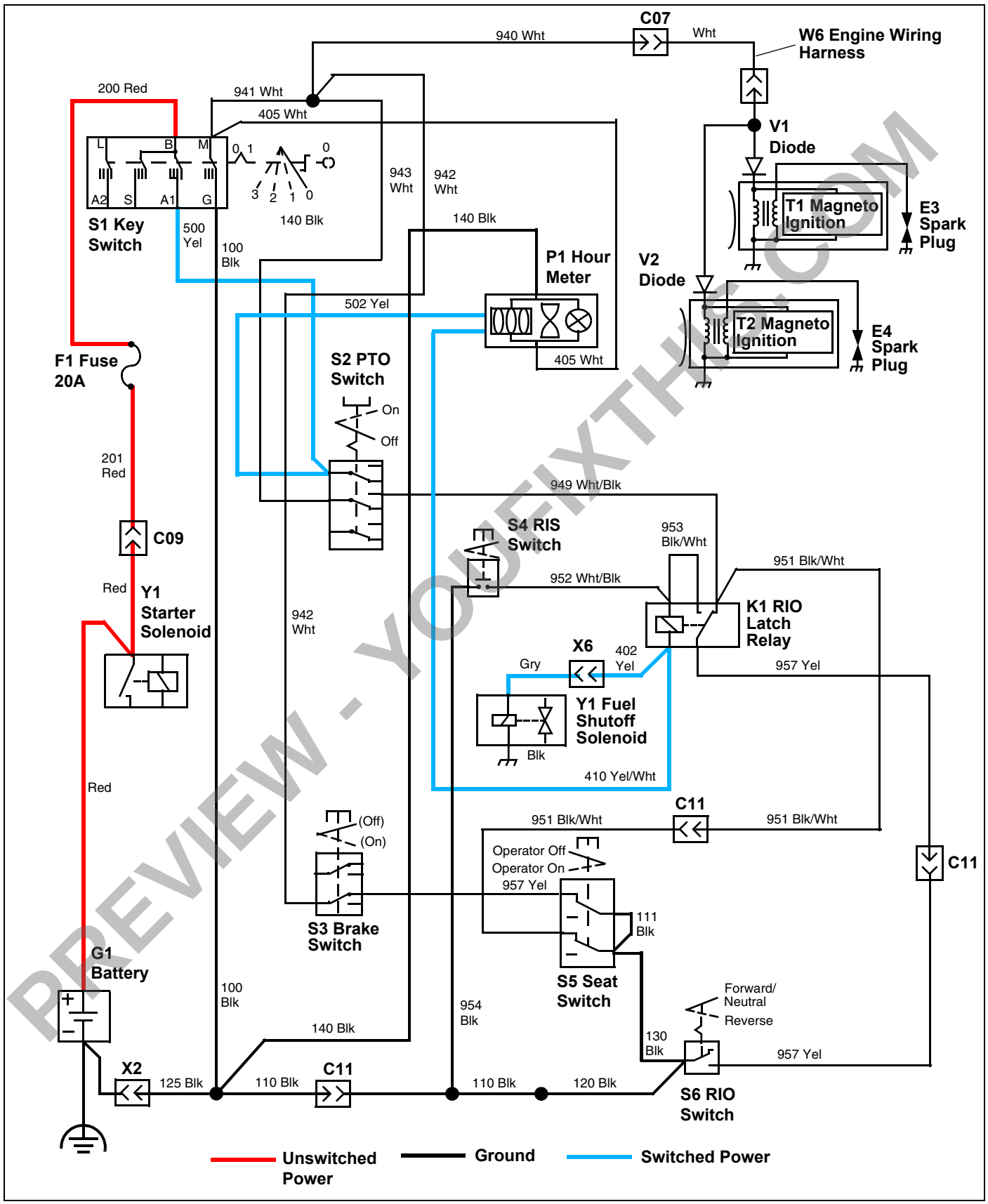
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Ignition and Shutoff Circuit Electrical Schematic - D140/150/160/170



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