Specifications

Vehicle Specifications

NOTE: Specifications and design subject to change without notice.

Engine

Make	Kawasaki
Type	OHV, horizontal shaft, 4 cycle, 90° V-twin, liquid cooled
Model 777	FD750D
Model 797	FD791D
Aspiration	Natural
Cylinders	2
Displacement	745 cm^3 (45.5 cu in.)
Stroke/Cycle	4 cycle
Bore	78 mm (3.07 in.)
Stroke	78 mm (3.07 in.)
Compression Release	Automatic
Spark Plug Gap	0.75 mm (0.030 in.)
Slow Idle	1550 rpm
Fast Idle	3600 rpm
Lubrication	Positive displacement pump
Cooling System	Liquid cooled
Air Cleaner - S.N. (-030000)	Paper element with foam pre-cleaner
Air Cleaner - S.N. (030001-)	Canister-type, dual-stage, dry, replacable
Engine Oil Capacity (With Filter)	2.0 L (2.1 qt)
Oil Filter	Replaceable, full flow
Weight, Dry (Without Muffler)	58 kg (128 lb)

Electrical System

Charging System	Flywheel alternator, 20 amp regulated
Ignition	Transistorized flywheel magneto
Starter	Solenoid shift

Fuel System

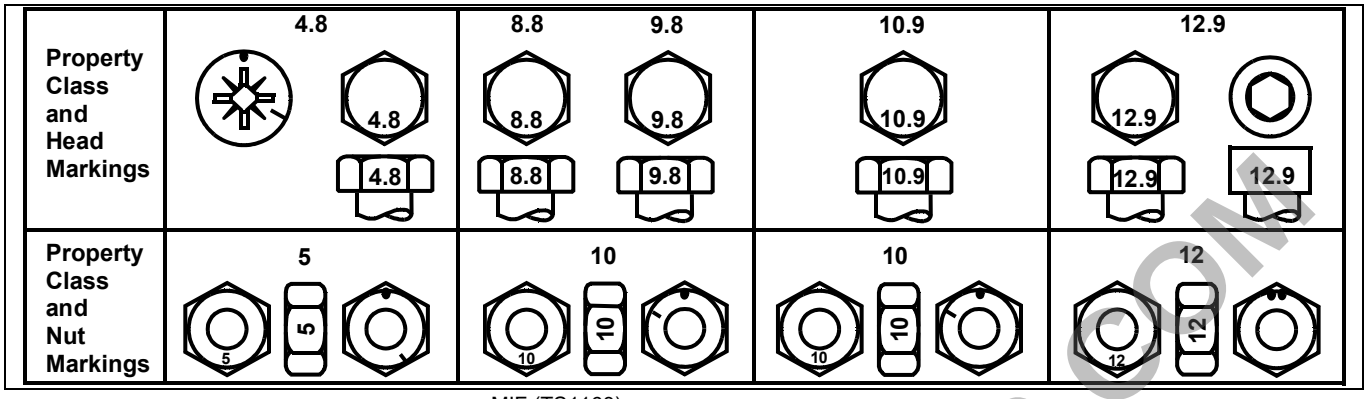
Fuel Tank Location	Left side of operator
Fuel Tank Capacity	45.4 L (12.0 gal)
Fuel (Minimum Octane)	Unleaded gasoline, 87 octane
Fuel Delivery	Electric fuel pump
Carburetor (777)	Float-type, fixed main jet, two barrel
Throttle Body (797)	Digital fuel injection
Fuel Filter	Replaceable, in-line
Fuel Shutoff Solenoid (777)	In carburetor float bowl

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Repair Information

Metric Fastener Torque Values



MIF (TS1163)

	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

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.

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 class. 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.

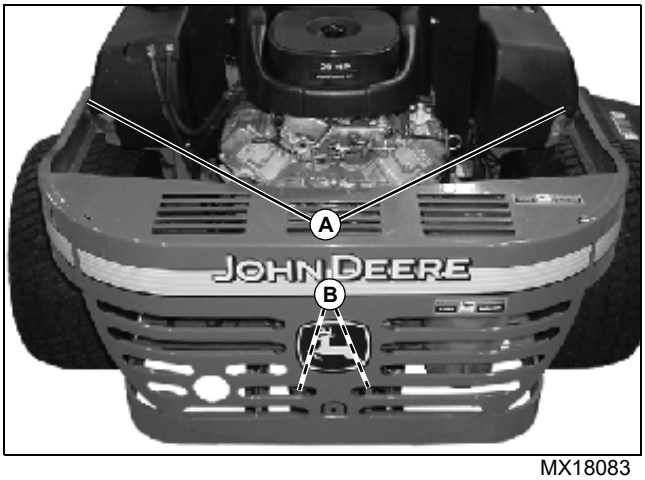
Tighten toothed or serrated-type lock nuts to the full torque value.

Reference: JDS-G200.

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Repair

Remove and Install Rear Grille - S.N. (-030000)



MX18083

1. Remove cap screws and washers (A).
2. Remove carriage bolts and nuts (B). Remove grille from machine.
3. Install rear grille. Install hardware (A and B). Tighten securely.

Remove and Install Rear Grille - S.N. (030001-)



MX20882

1. Remove cap screws and nuts (A).
2. Lift rear of grille up slightly at rear and slide back to remove.
3. Install rear grille. Install cap screws and nuts (A). Tighten securely.

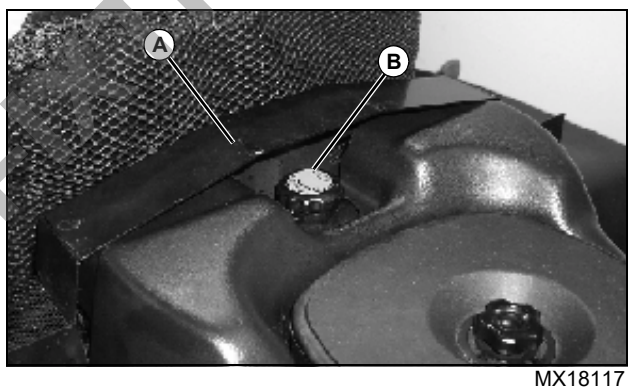
Servicing Cooling System

Draining Cooling System

CAUTION: Avoid injury! The radiator will be hot and can burn skin. Built-up pressure may cause explosive release of coolant when the radiator cap is removed:

- **Shut off the engine and allow to cool.**
- **Do not remove the cap unless the radiator and the engine are cool enough to touch with bare hands.**
- **Slowly loosen the cap to the first stop to release all pressure. Then remove the cap.**

1. Park machine on flat level surface and set park brake.
2. Allow engine to cool.



MX18117

Picture Note: S.N. (-030000) model shown.

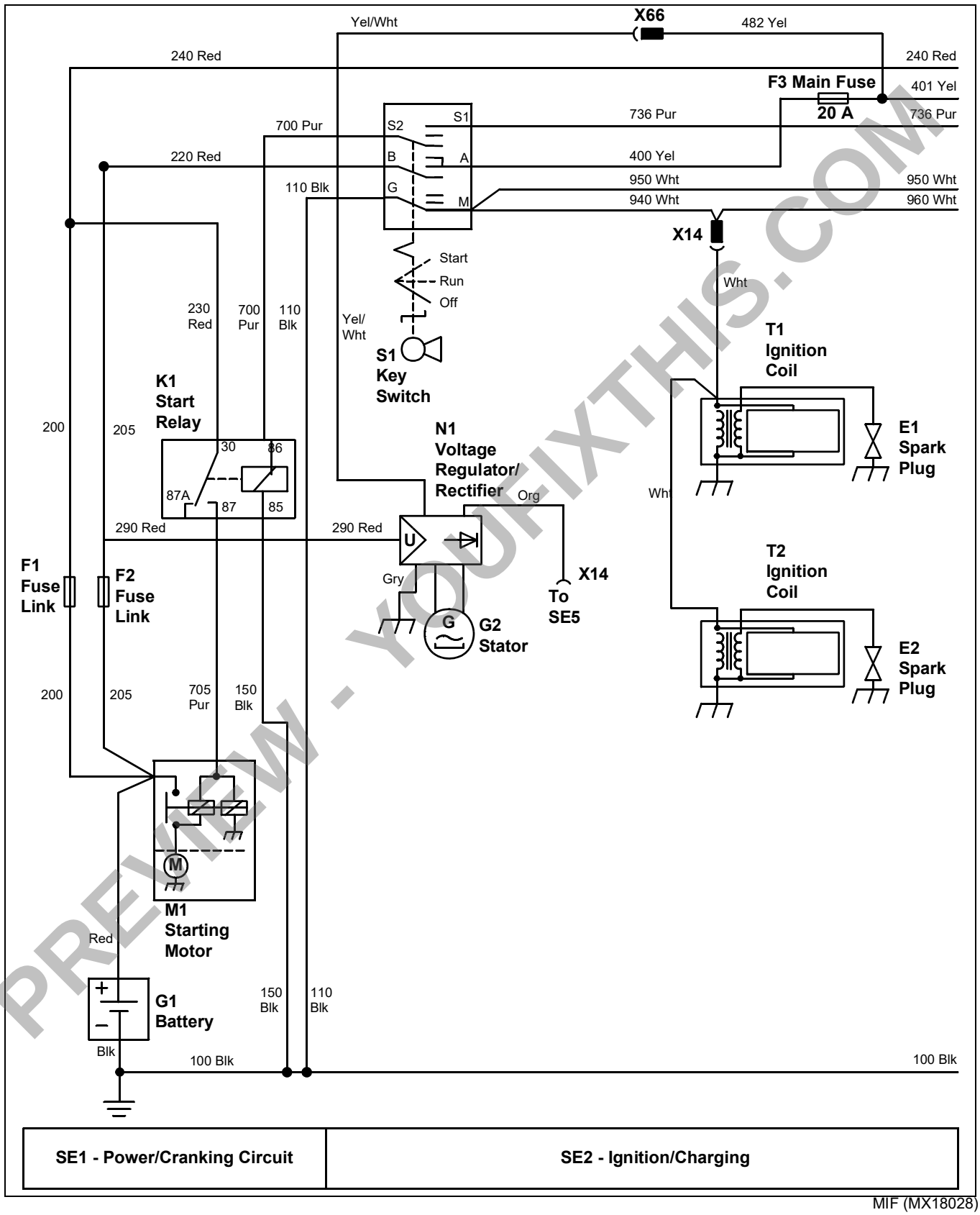
3. Remove radiator primary screen (A).
4. Slowly open radiator cap (B) to the first stop to release all pressure.
5. Close radiator cap tightly.

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Schematics and Harnesses

Electrical Schematic - Model 777 - S.N. (-020000) (1 of 4)

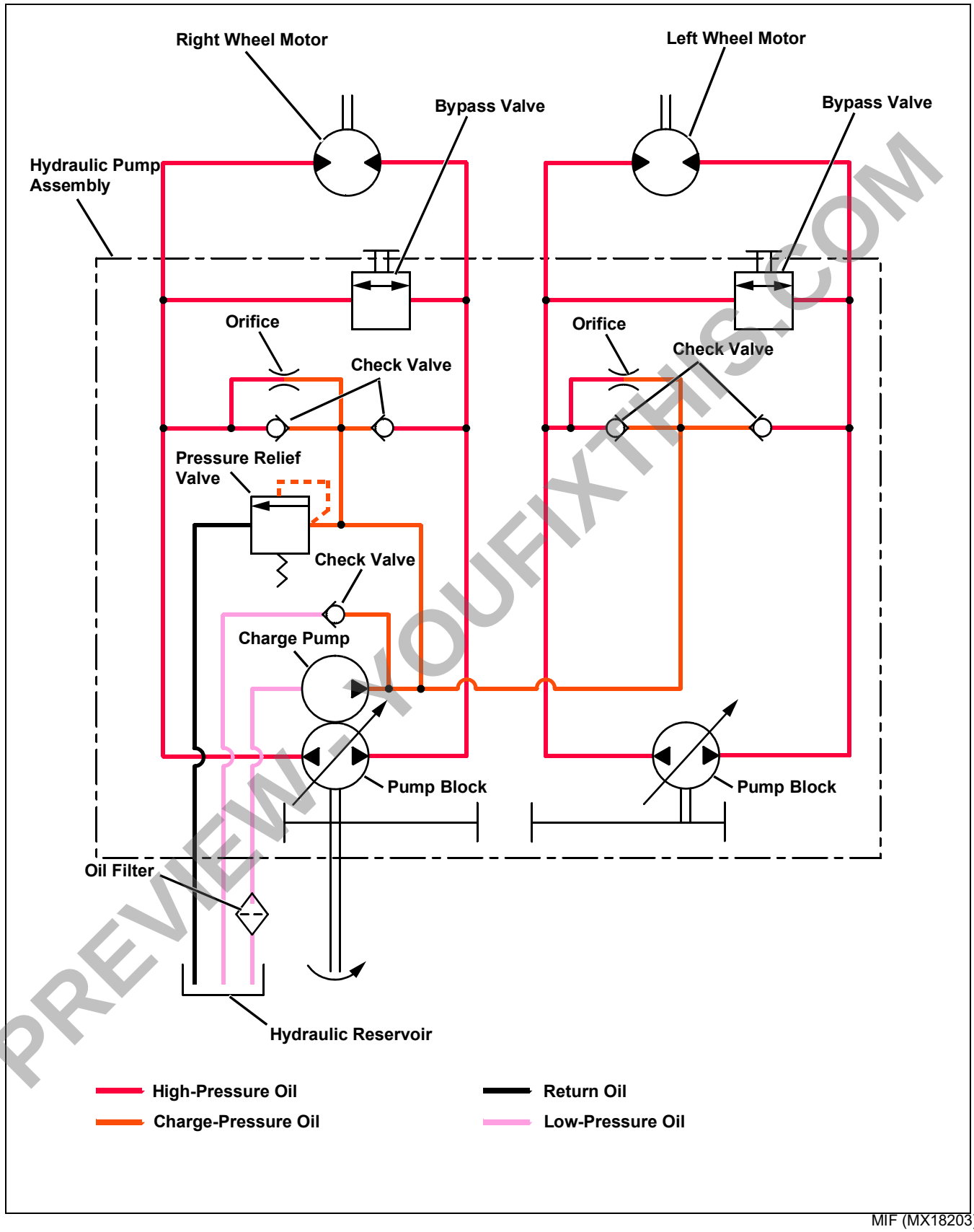


MIF (MX18028)

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Hydraulic System Schematic



MIF (MX18203)

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Diagnostics

Engine Diagnosis

Symptom: Engine Cranks but Will Not Start.

(1) Is battery voltage within 11.8-13.2 volts?

Yes - Go to step (2).

No - Charge and test battery. (See “Charge Battery” on page 273.) (See “Battery Load Test” on page 273.)

(2) Model 777 only: Is choke adjusted properly?

Yes - Go to step (3).

No - Adjust choke. (See “Adjust Choke - Model 777” on page 47.)

(3) Is fuel in tank fresh, clean and of proper grade?

Yes - Go to step (4).

No - Replace fuel in tank and lines with fresh, clean fuel of proper grade.

(4) Remove spark plugs. Are the spark plug tips clear of any drops of fuel?

Yes - Go to step (5).

No - Possible incorrect use of choke. Clean spark plugs and set choke properly.

No - Check for plugged air cleaner.

No - Model 777 only: Check float level for proper adjustment. (See “Remove and Install Carburetor - Model 777” on page 71.)

(5) The ignition system should produce a steady, strong blue spark. (See “Test Spark” on page 46.) Is the spark weak or no spark at all?

Yes - Go to step (6).

No - Ignition system operation is satisfactory. Go to step (10).

(6) Disconnect white wire at terminal of each ignition coil. Test wires for infinite resistance with key switch in RUN and START positions. Does meter show infinite resistance?

Yes - Go to step (7).

No - Repair short circuit as required.

(7) Do ignition coils test OK? (See “Ignition Coil Test” on page 281.)

Yes - Go to step (8).

No - Replace ignition coil(s).

Symptom: Engine Cranks but Will Not Start.

(8) Is air gap between ignition coil and flywheel adjusted properly? (See “Air Gap Adjustment” on page 91.)

Yes - Go to step (9).

No - Adjust air gap.

(9) Check flywheel for damage. Inspect magnetic pole plate which is mounted on outer surface of flywheel. Is flywheel with magnetic pole plate in good condition?

Yes - Go to step (10).

No - Replace flywheel. (See “Remove and Install Flywheel” on page 91.)

(10) Is cylinder compression within specification? (See “Check Compression” on page 49.)

Yes - Go to step (11).

No - Repair or replace engine as necessary. (See “Remove and Install Engine” on page 89.) (See “Disassemble and Assemble Cylinder Head and Valves” on page 84.) (See “Inspect Cylinder Head and Valves” on page 84.) (See “Inspect Piston and Cylinder” on page 99.)

(11) Is battery voltage present at fuel pump with key switch in RUN and START positions? (See “Power Circuit Operation - Switched Power, Standard Equipment” on page 173.)

Yes - Go to step (12).

No - Repair open or short circuit. (See “Run Circuit Operation - Operator On Seat - Model 777” on page 193.) (See “Run Circuit Operation - Operator On Seat - Model 797” on page 203.)

(12) Is fuel flow within specifications? (See “Test Fuel Flow - Model 777” on page 53.) (See “Test Fuel Flow - Model 797” on page 54.)

Yes - Go to step (13).

No - Model 777: Follow “Results” of the fuel pressure test procedure.

No - Model 797: Follow “Results” of the fuel pressure test procedure. If pressure is still high or low, replace fuel pressure regulator.

(13) Is fuel pressure within specifications? (See “Test Fuel Pressure - Model 777” on page 55.) (See “Test Fuel Pressure - Model 797” on page 55.)

Yes - Go to step (14).

No - Follow “Results” of the fuel pressure test procedure.

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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
Electrical
Hydrostatic Power Train
Brakes
Attachments
Miscellaneous

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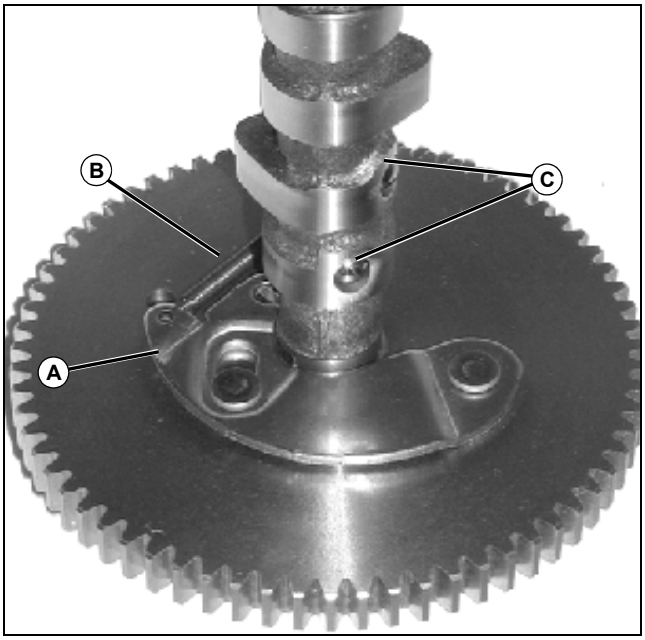
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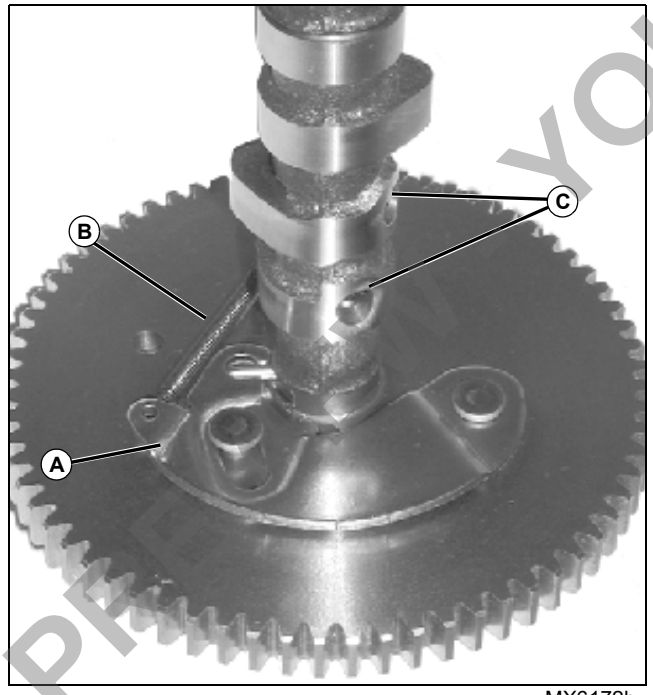
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Automatic Compression Release (ACR) Operation



MX6172a

Picture Note: Cranking



MX6172b

Picture Note: Running

Function

The automatic compression release (ACR) relieves some of the compression created during starting of the engine. This is done by slightly raising the exhaust valve as the engine rotates through the compression stroke.

Theory of Operation

The ACR consists of a flyweight (A) that is attached to the cam gear, balls (C), and a return spring (B). The ACR is attached to the camshaft and has limited serviceability.

When the engine is cranked, the pins are held above the surface of the exhaust cam lobes, causing the exhaust valves to open slightly during the compression stroke. The result is a lowered cylinder pressure, allowing the engine to turn over more easily.

When the engine starts, the centrifugal force overcomes the force of the return spring and the flyweight moves away from its at-rest position. As the flyweight rotates, the compression release pins withdraw below the surface of the cam lobe, allowing normal valve timing and engine operation.

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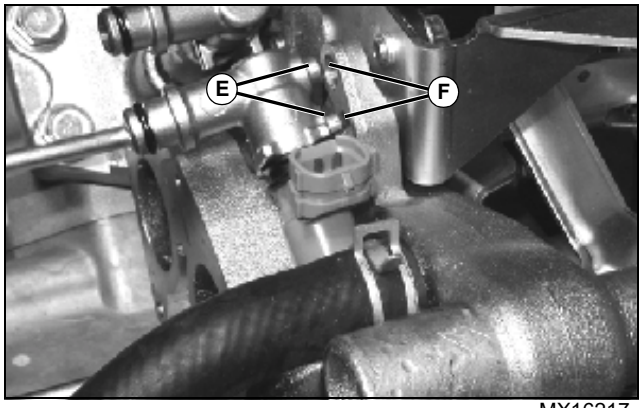
IMPORTANT: Avoid damage! Never drop the injector, especially on a hard surface. This can permanently damage the injector.

5. Pull out the fuel injector (D) from the intake manifold.

NOTE: Take care not to damage the injector inserts when they are pulled from the throttle body.

6. Inspect injector for damage and test injector. (See “Fuel Injector Test - Model 797” on page 284.)

7. Before assembly, replace any seals and O-rings with new ones. Apply engine oil to the seal(s) and O-ring(s).



MX16217

8. Install the injector into the intake manifold.

9. Securely place the projections (E) of the injector cap into the holes (F) of the intake.

10.Connect the injector connector and injector cap.

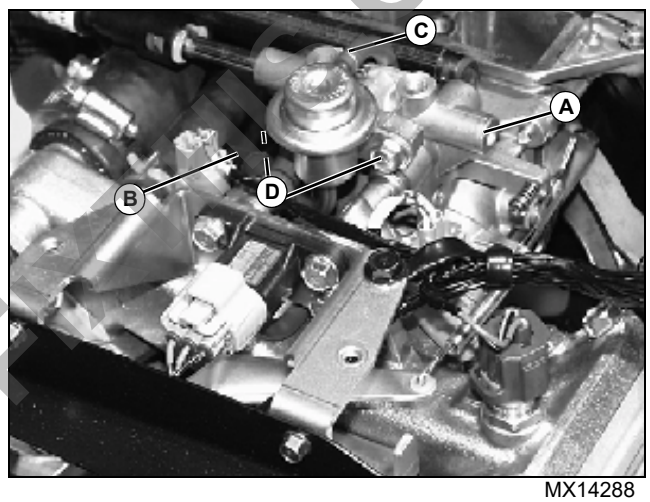
11.Install the throttle body, cooling fan, radiator, and air cleaner assemblies in the reverse of removal.

Remove and Install Fuel Pressure Regulator - Model 797

1. Remove air cleaner assembly. (See “Remove and Install Air Cleaner - S.N. (-030000)” on page 67 or See “Remove and Install Air Cleaner - S.N. (030001-)” on page 68.)

2. Remove air cleaner base.

CAUTION: Avoid Injury! Release of fluids from pressurized fuel system can cause serious injuries. Relieve fuel system pressure before servicing.



MX14288

3. Loosen the fuel pressure relief screw (A) to relieve the high pressure in the fuel system; then tighten it.

4. Remove vacuum hose (C) and fuel return hose (B).

5. Remove two cap screws (D) and remove the regulator.

6. Check the vacuum hose (C), fuel return hose (B) and O-ring for brittleness, cracks, or damage, and replace if necessary.

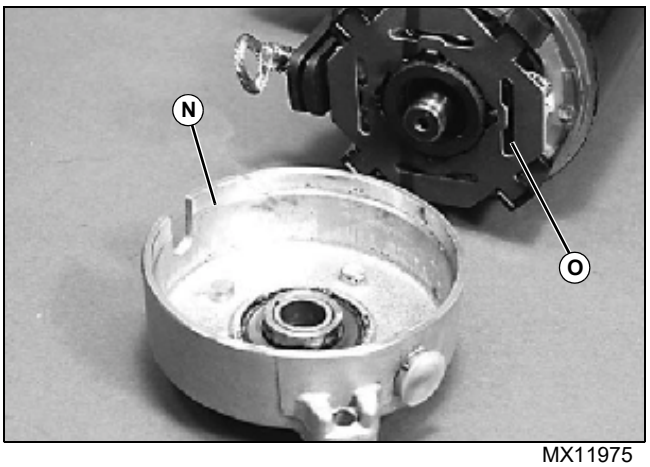
7. Apply engine oil to the O-ring.

8. Install fuel pressure regulator, vacuum hose (C) and clamp, and fuel return hose (B) and clamp.

9. Tighten the two cap screws (D).

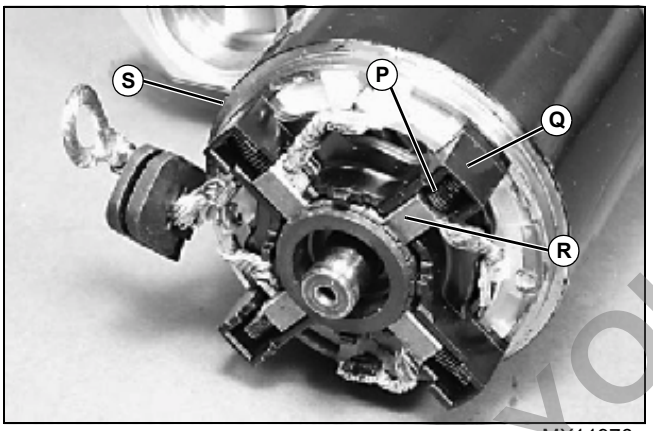
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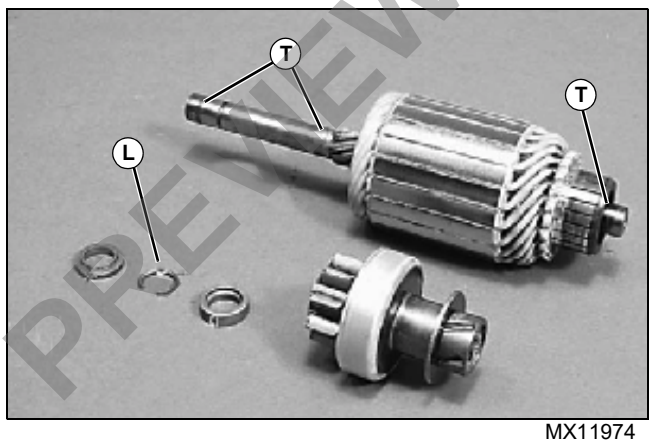
MX11975

7. Pull the end cover (N) from the yoke and remove the insulator (O).



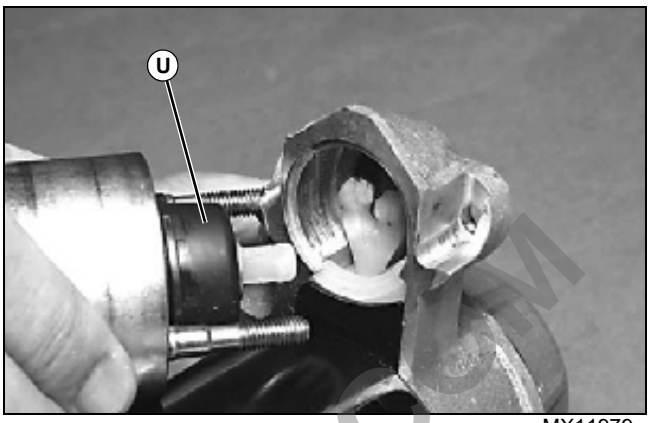
MX11976

8. Remove the brush springs (P) from the brush holder (Q). Separate the brushes (R) from the holder and remove the holder from the yoke (S).



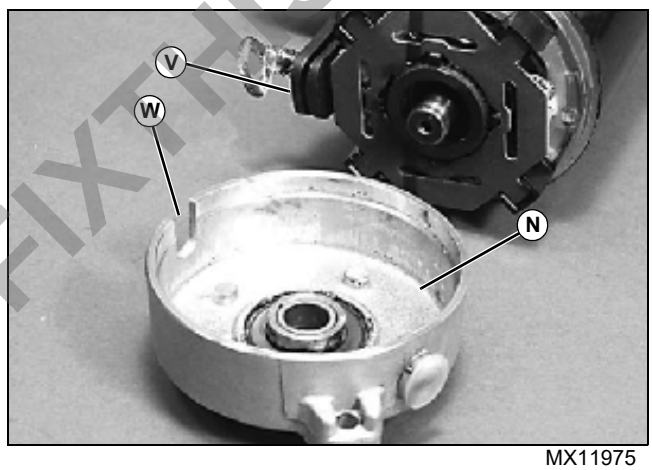
MX11974

9. Before beginning assembly apply a small amount of electric grease to the indicated areas (T) of the armature shaft. Obtain a new snap ring (L). Assemble the pinion gear on the armature shaft with the new snap ring and install the pinion assembly and actuating arm. Slide the yoke over the armature.



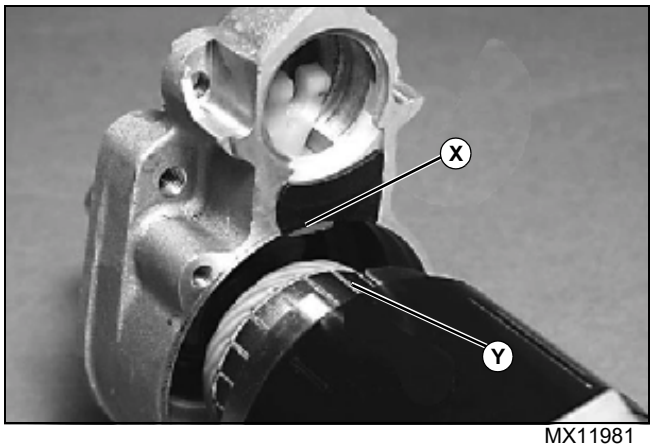
MX11979

10. Inspect the solenoid rubber boot (U) for visible damage (hole, rips, dry rot, etc.); replace if necessary.



MX11975

11. Install the brush assembly and insulator on the yoke. Fit the notch (V) in the (-) lead grommet onto the projection (W) on the end cover (N). Install the end cover.



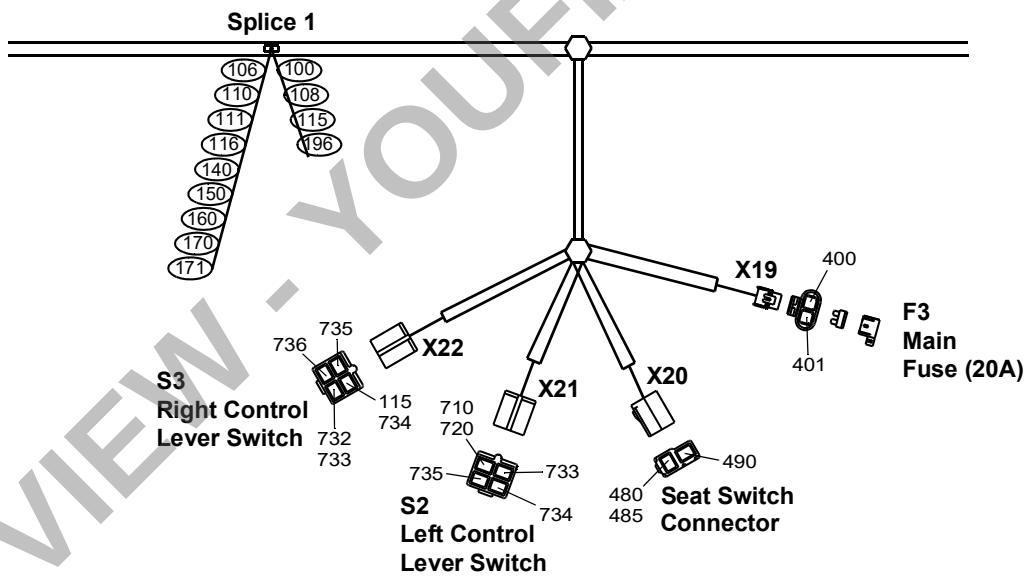
MX11981

12. Grease the pinion gear fork fingers, and set the pinion gear fork so that the fingers fit into the groove in the gear. Fit the notch (Y) in the yoke onto the projection (X) on the pinion gear fork. Install the through bolts through the rear cover and thread into the pinion gear cover.

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Model 777 - S.N. (-020000) (2 of 4)

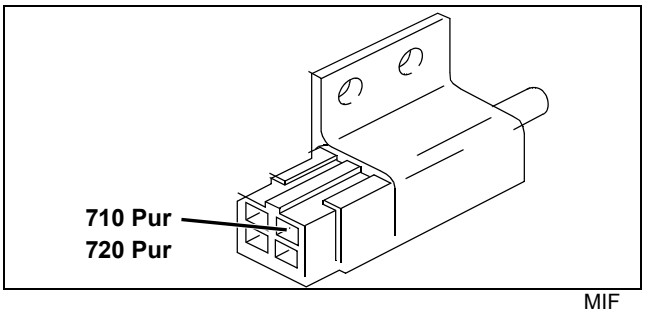


MIF (MX18033)

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System: Cranking Circuit

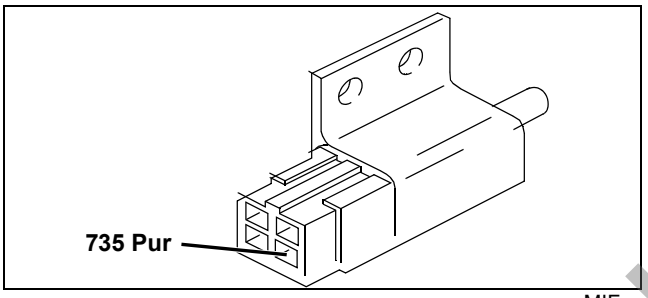


MIF

(11) Measure voltage at left control lever switch (S2). Is battery voltage present?

Yes - Go to step (12).

No - Test wire 710 pur and connections.

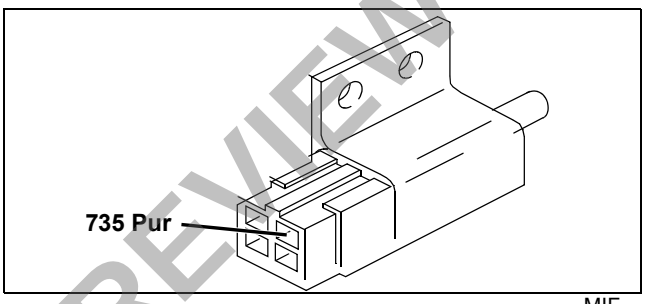


MIF

(12) Measure voltage at left control lever switch (S2). Is battery voltage present?

Yes - Go to step (13).

No - Test left control lever switch. (See “Control Lever Switch Test and Adjustment” on page 278.)



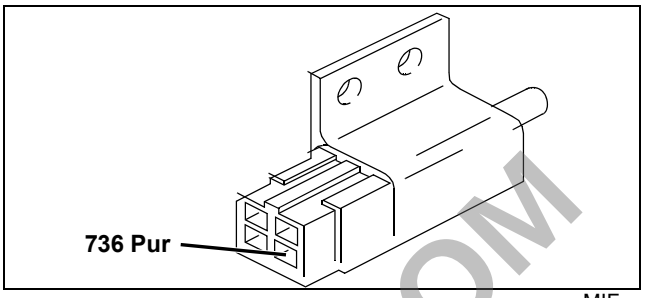
MIF

(13) Measure voltage at right control lever switch (S3). Is battery voltage present?

Yes - Go to step (14).

No - Test wire 735 pur and connections.

System: Cranking Circuit

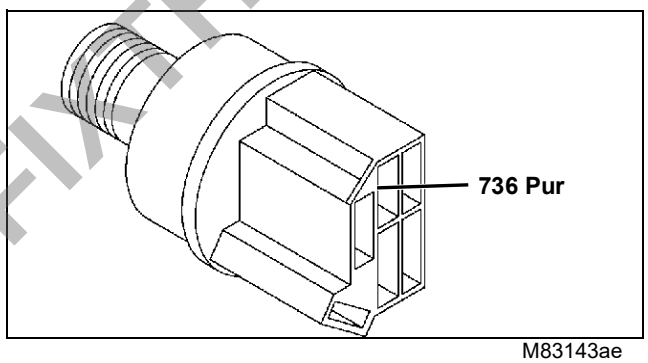


MIF

(14) Measure voltage at right control lever switch (S3). Is battery voltage present?

Yes - Go to step (15).

No - Test right control lever switch. (See “Control Lever Switch Test and Adjustment” on page 278.)

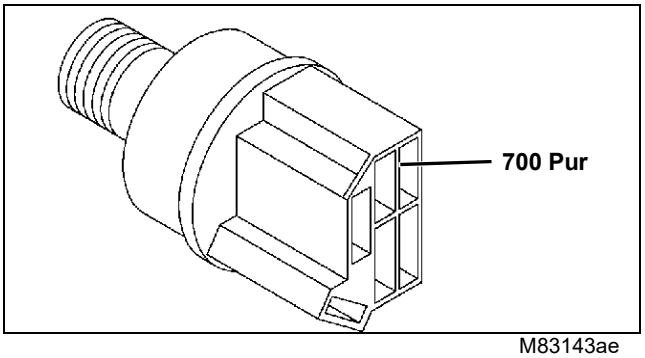


M83143ae

(15) Measure voltage at key switch (S1) - terminal S1. Is battery voltage present?

Yes - Go to step (16).

No - Test wire 736 pur and connections.



M83143ae

(16) Measure voltage at key switch (S1) - terminal S2. Is battery voltage present?

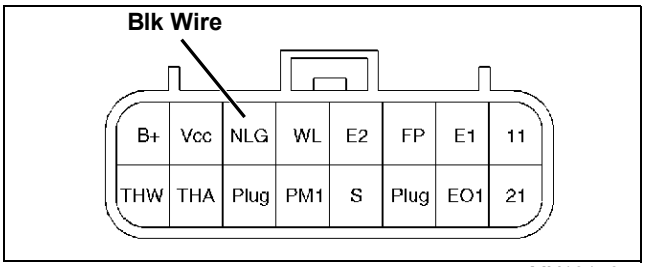
Yes - Go to step (17).

No - Test key switch. (See “Key Switch Test” on page 278.)

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System: Run Circuit

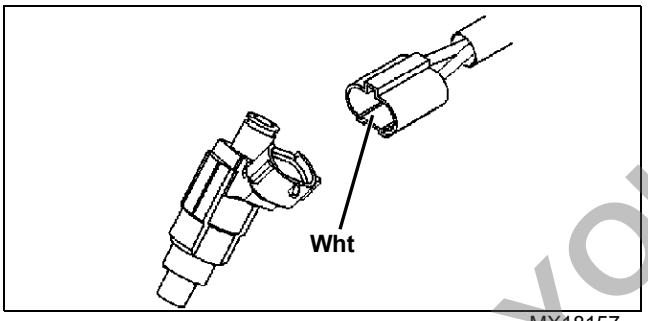


MX18158

(30) With the key switch in the OFF position and ECU connector (X40) disconnected, measure continuity between ignition coil connectors (X36 and X37) and ECU connector (X40). Is continuity indicated?

Yes - Go to step (31).

No - Test blk wire between ECU connector (X40) and connector (X36) and connections.

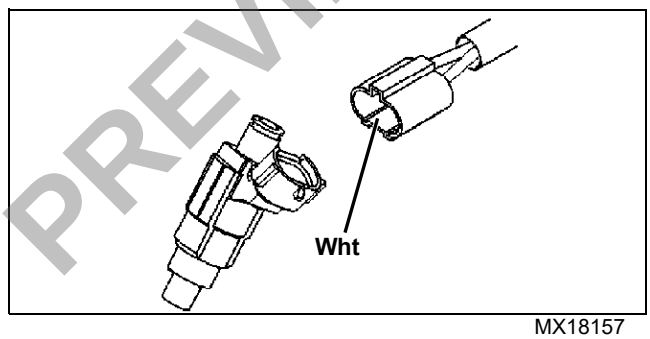


MX18157

(31) With the key switch in the RUN position, and fuel injector connectors (X44 and X45) disconnected, measure voltage at fuel injector 1 connector (X44). Is battery voltage present?

Yes - Go to step (32).

No - Test wht wire and connections.



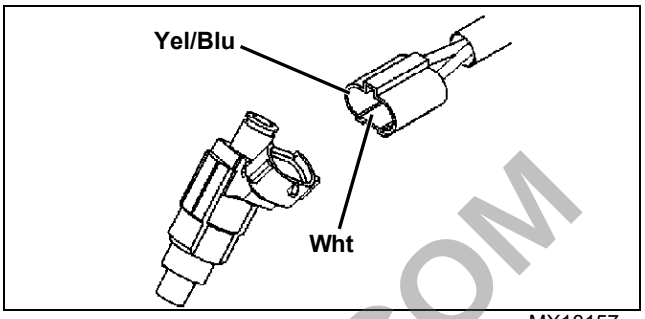
MX18157

(32) Measure voltage at fuel injector 2 connector (X45). Is battery voltage present?

Yes - Go to step (33).

No - Test wht wire and connections.

System: Run Circuit



MX18157

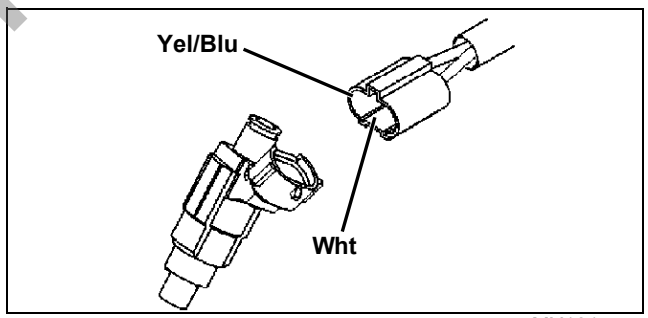
(33) With key switch in the START position, connect test light between the terminals of fuel injector 1 connector (X44). Is pulsing voltage present?

Yes - Go to step (34).

No - Test wire yel/blu between ECU connector (X40) and connections.

No - If wire and connections test good, replace ECU.

No - If pulsing voltage is present, test fuel injector. (See “Fuel Injector Test - Model 797” on page 284.)



MX18157

(34) With key switch in the START position, connect test light between the terminals of fuel injector 2 connector (X45). Is pulsing voltage present?

Yes - Go to step (35).

No - Test yel/blu wire between ECU connector (X40) and connections.

No - If wire and connections test good, replace ECU.

No - If pulsing voltage is present, test fuel injector. (See “Fuel Injector Test - Model 797” on page 284.)

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Optional Headlight Circuit Operation

Function

To provide power to the headlights for illumination of the work area.

Operating Conditions

- Headlight switch in ON position.

Theory of Operation

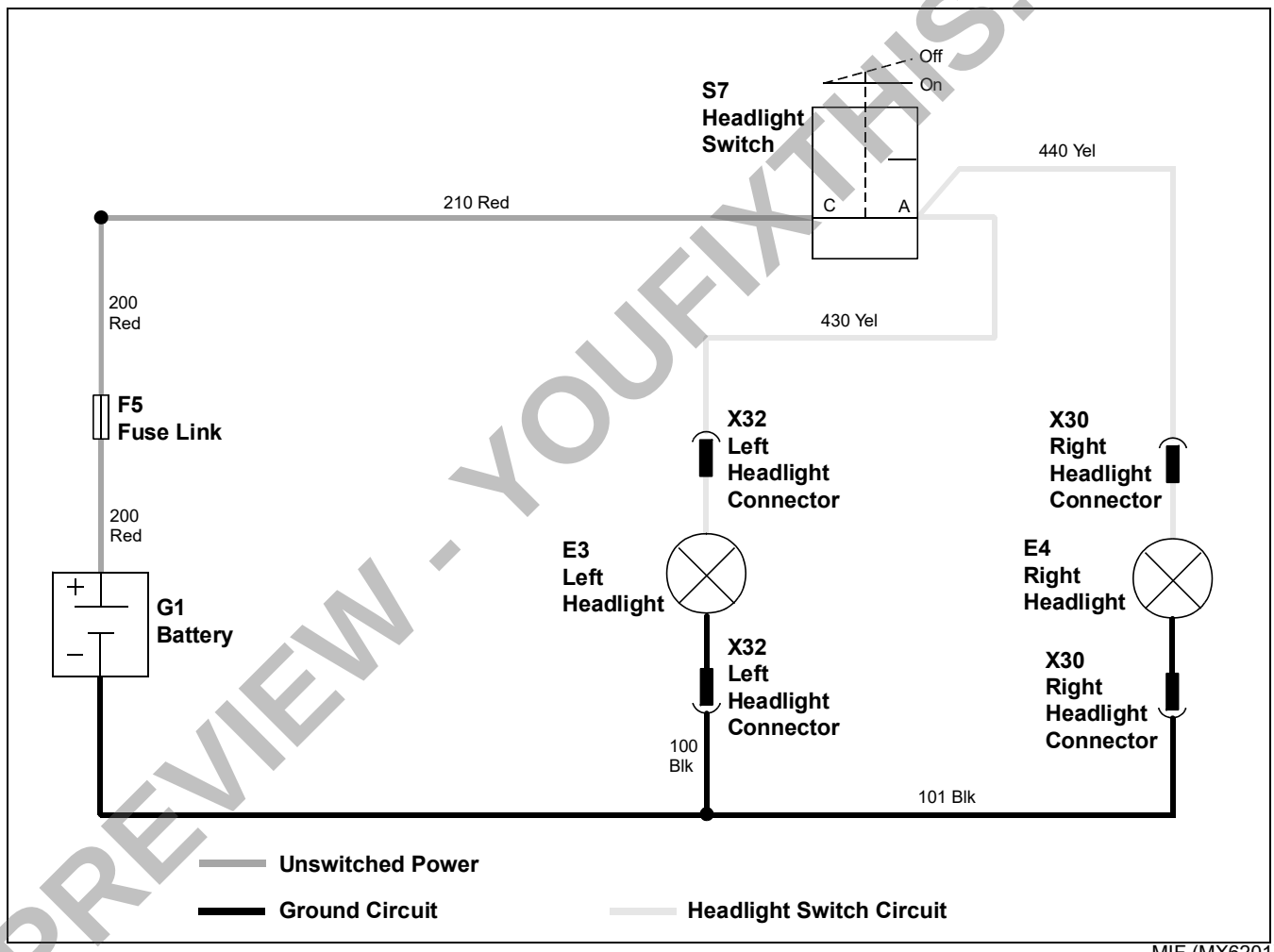
The battery provides current to the headlight switch (S7) and protects the headlight circuit with a fuse link (F5). Current flows from the battery (G1) positive (+) terminal through the fuse link (wire 200) to the headlight switch (S7) (wire 210 red).

With the headlight switch in the ON position, current flows to the headlights (E3 left and E4 right) (wires 430 and 440 yel) to illuminate the lamps.

The ground circuit (wires 101[15] and 100 blk) provides a path to ground for the headlights.

---

15. S.N. (020001-)



MIF (MX6201)

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Symptom: Sluggish Operation Under Load

(4) Is reservoir outlet free of restrictions?

Yes - Go to step (5).

No - Clean reservoir outlet.

(5) Are lines free of any sharp bends or restrictions?

Yes - Go to step (6).

No - Replace line(s).

(6) Are all fittings tight?

Yes - Go to step (7).

No - Tighten fitting(s) and bleed air from system.

(7) Is the filter free of restrictions?

Yes - Go to step (8).

No - Replace filter.

(8) Is the pump drive belt free from breaks, wear, fraying, glazing, or stretching?

Yes - Go to step (9).

No - Replace pump drive belt. (See “Inspect and Replace Pump Drive Belt - S.N. (010001-020000)” on page 315. See “Inspect and Replace Pump Drive Belt - S.N. (020001-)” on page 316.)

(9) Is the tensioner functioning properly and free of damage?

Yes - Go to step (10).

No - See “Repair Hydrostatic Pump Drive Belt Tensioner Assembly - S.N. (010001-020000)” on page 320.

(10) Are the bypass valves closed completely?

Yes - Go to step (11).

No - IMPORTANT: DO NOT over tighten bypass valve. Close bypass valves. (See “Repair Specifications” on page 295 for correct torque specification.)

(11) Is hydrostatic pump operating properly?

Yes - Go to step (12).

No - See “Test Hydrostatic Pump Flow” on page 313.

(12) Are the wheel motors operating properly?

No - Inspect wheel motors. (See “Disassemble and Assemble Wheel Motor” on page 335.)

Test Conditions:

- Machine parked on a level surface.
- Key switch in OFF position.
- Park brake engaged.
- Control levers in NEUTRAL position.

Symptom: Excessive Noise

(1) Is the park brake released while attempting to operate the mower?

Yes - Go to step (2).

No - Make sure the park brake is disengaged when operating the mower.

(2) Is hydraulic reservoir filled to correct level with clean oil of correct specifications?

Yes - Go to step (3).

No - Fill reservoir to correct level with proper oil.

(3) Is reservoir outlet free of restrictions?

Yes - Go to step (4).

No - Clean reservoir outlet.

(4) Are lines free of any sharp bends or restrictions?

Yes - Go to step (5).

No - Replace line(s).

(5) Are all fittings tight?

Yes - Go to step (6).

No - Tighten fitting(s) and bleed air from system.

(6) Is the filter free of restrictions?

Yes - Go to step (7).

No - Replace filter.

(7) Are the bypass valves closed completely?

Yes - Go to step (8).

No - IMPORTANT: DO NOT over tighten bypass valve. Close bypass valves. (See “Repair Specifications” on page 295 for correct torque specification.)

(8) Is hydrostatic pump operating properly?

Yes - Go to step (9).

No - See “Test Hydrostatic Pump Flow” on page 313.

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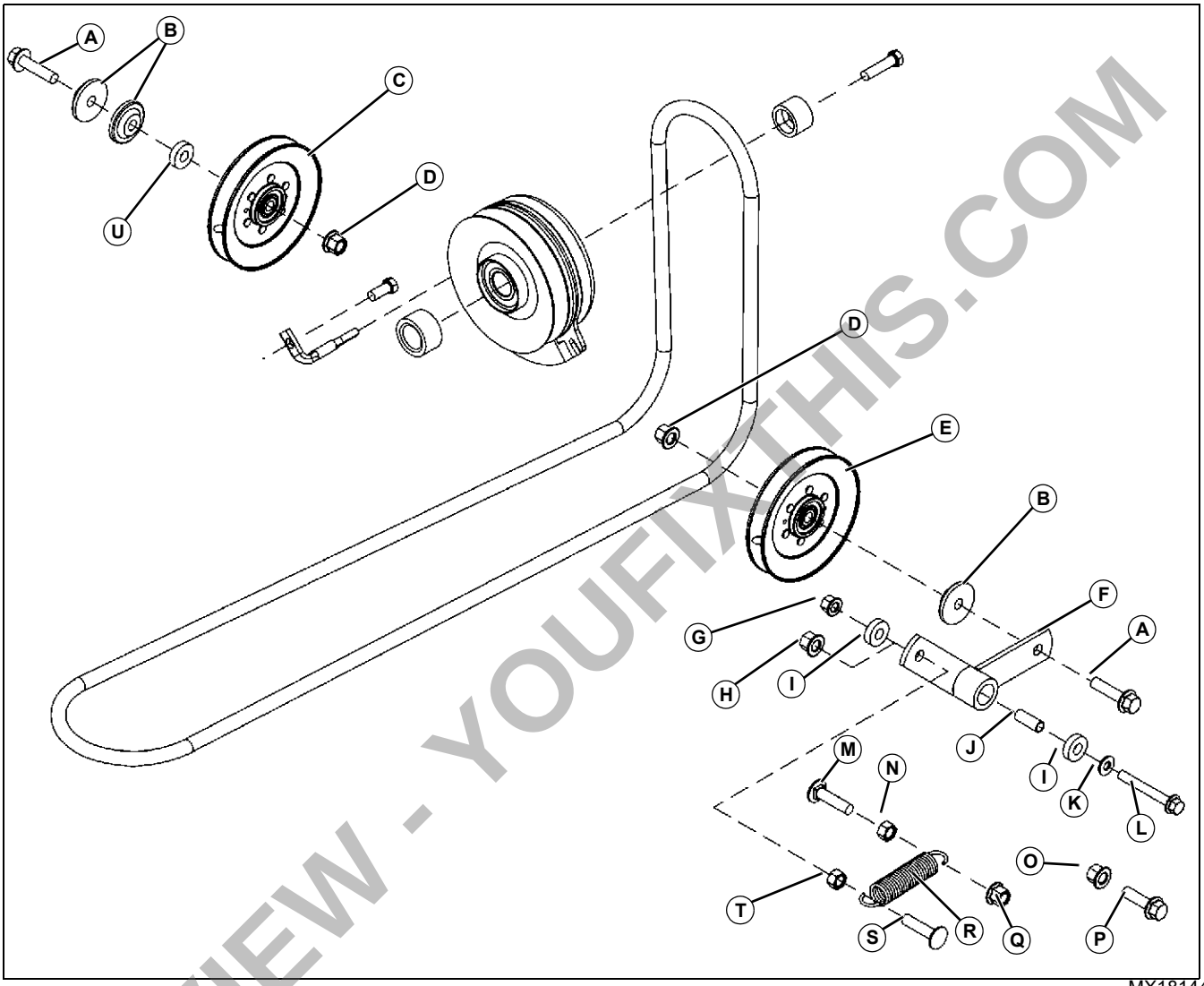
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Disassemble and Inspect Mule Drive Belt Idler and Tensioner Assembly

1. Remove mule drive belt. (See “Replace Mule Drive Belt” on page 378.)



MX18144

A - Cap Screw (2 used)
B - Spacer (3 used)
C - Adjustment Idler Sheave
D - Lock Nut (2 used)
E - Tension Idler Sheave
F - Tension Idler Arm
G - Idler Arm Pivot Nut
H - Spring Anchor Nut
I - Bearing (2 used)
J - Spacer
K - Washer
L - Idler Pivot Cap Screw
M - Spring Anchor Screw (Frame)
N - Jam Nut
O - Nut
P - Travel Limit Cap Screw
Q - Nut
R - Tensioner Spring
S - Spring Anchor Screw (Idler Arm)
T - Nut
U - Spacer

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