316, 318 and 420 Lawn and Garden Tractors

JOHN DEERE

TECHNICAL MANUAL

316, 318 and 420 Lawn and Garden Tractors

TM1590 (01MAY95) English

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John Deere
Lawn & Grounds Care Division
TM1590 (01MAY95)

LITHO IN U.S.A.
ENGLISH

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All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

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RECOGNIZE SAFETY INFORMATION

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 operating practices.



T81389 -UN-07DEC88

DX,ALERT -19-03MAR93

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.



TS187 -19-30SEP88

DX,SIGNAL -19-03MAR93

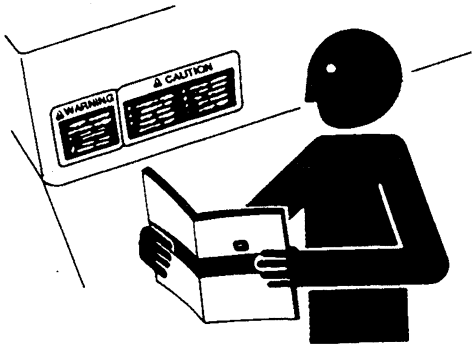
FOLLOW SAFETY INSTRUCTIONS

Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from your John Deere dealer.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual and need assistance, contact your John Deere dealer.



TS201 -UN-23AUG88

DX,READ -19-03MAR93

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MACHINE SPECIFICATIONS

	316	318	420
ENGINE			
Manufacturer	Onan	Onan	Onan
Type	Gasoline	Gasoline	Gasoline
Model Number			
Early	B43E	B43G	B48G
Later	P218G	P218G	P220G
Horsepower (SAEJ607)			
Early	11.9 kW (16 hp)	13.4 kW (18 hp)	14.9 kW (20 hp)
Later	13.4 kW (18 hp)	13.4 kW (18 hp)	14.9 kW (20 hp)
Torque	4.4 kg m (31.5 ft lbs)	4.4 kg m (31.5 ft lbs)	4.4 kg m (31.8 ft lbs)
Engine Rated Speeds			
Fast Idle (No Load)	3450 rpm	3450 rpm	3450 rpm
Low Idle (No Load)	1350 rpm	1350 rpm	1350 rpm
Number of Cylinders	2	2	2
Crankshaft Alignment	Horizontal	Horizontal	Horizontal
Stroke/Cycle	4 Cycle	4 Cycle	4 Cycle
Bore	82.55 mm (3.25 in.)	82.55 mm (3.25 in.)	82.55 mm (3.25 in.)
Stroke			
Early	66 mm (2.620 in.)	66 mm (2.620 in.)	73 mm (2.875 in.)
Later	73 mm (2.875 in.)	73 mm (2.875 in.)	73 mm (2.875 in.)
Displacement			
Early	710 cm^3 (43.3 cu in.)	710 cm^3 (43.3 cu in.)	782 cm^3 (47.7 cu in.)
Later	782 cm^3 (47.7 cu in.)	782 cm^3 (47.7 cu in.)	782 cm^3 (47.7 cu in.)
Compression Ratio			
Early	6.2:1	6.5:1	7.0:1
Later	7.0:1	7.0:1	7.0:1
Cylinder Material	Aluminum	Aluminum	Aluminum
Cooling	Air	Air	Air
Air Filter Type	Dry with Pre-Cleaner	Dry with Pre-Cleaner	Dry with Pre-Cleaner
Lubrication System	Full Pressure w/Filter	Full Pressure w/Filter	Full Pressure w/Filter
Crankcase Capacity (w/o Filter)	1.4 L (1.5 U.S. qt)	1.4 L (1.5 U.S. qt)	1.4 L (1.5 U.S. qt)
Oil Filter	Replaceable	Replaceable	Replaceable
Spark Plugs	NGK BPR5EFS Champion RS14YC	NGK BPR5EFS Champion RS14YC	NGK BPR5EFS Champion RS14YC
FUEL SYSTEM			
Fuel Tank Location	Rear	Rear	Rear
Fuel Gauge	Standard	Standard	Standard
Fuel Reserve System	N/A	Standard	Standard
Fuel Tank Capacity	17 L (4.5 U.S. gal)	17 L (4.5 U.S. gal)	25 L (6.5 U.S. gal)
Fuel (min. octane)	85 Octane Unleaded	85 Octane Unleaded	85 Octane Unleaded
Fuel Pump Location	Engine	Engine	Engine
Fuel Pump Type	Pulse	Pulse	Pulse
Fuel Delivery	Fixed Jet Carburetor	Fixed Jet Carburetor	Fixed Jet Carburetor
ELECTRICAL SYSTEM			
Ignition	Electronic	Electronic	Electronic
Type of Starter	12 Volts, Solenoid	12 Volts, Solenoid	12 Volts, Solenoid
Charging System	Early, 15 amp Stator Later, 20 amp Stator	20 amp Stator	20 amp Stator

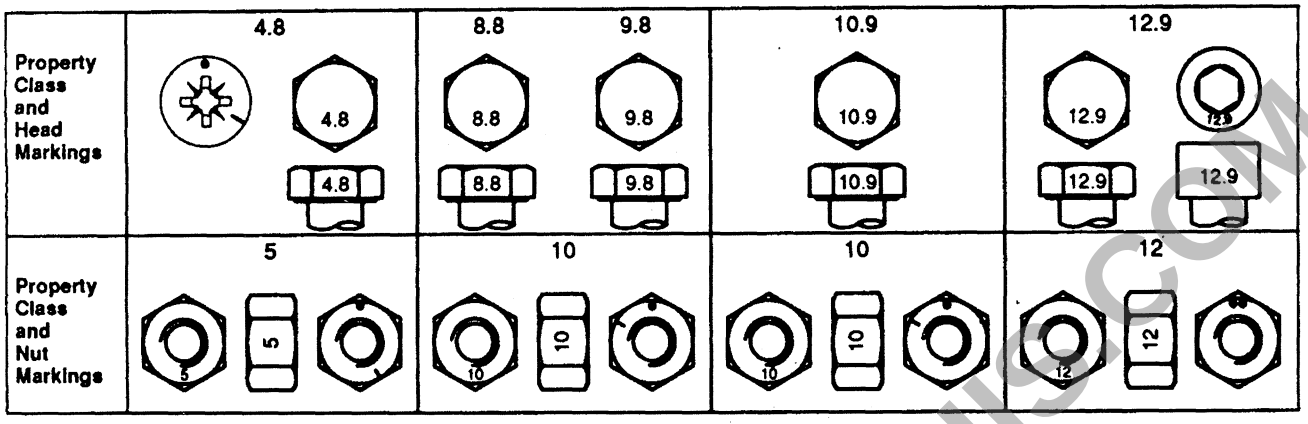
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MX,15901010,1 -19-25APR95

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METRIC BOLT AND CAP SCREW TORQUE VALUES



TS1163 -19-04MAR91

Size	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]	
	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	190
M16	100	73	125	92	190	140	240	175	275	200	350	255	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 values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

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

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to 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 without any lubrication.*

DX,TORQ2 -19-20JUL94

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ONAN ENGINE REPAIR—USE CTM2

For complete repair information, the component technical manual (CTM) is also required. Use the component technical manual in conjunction with this machine manual.



TS225 -UN-17JAN89

20 05 1

MX,15902005,1 -19-09DEC94

REMOVE AND INSTALL ENGINE

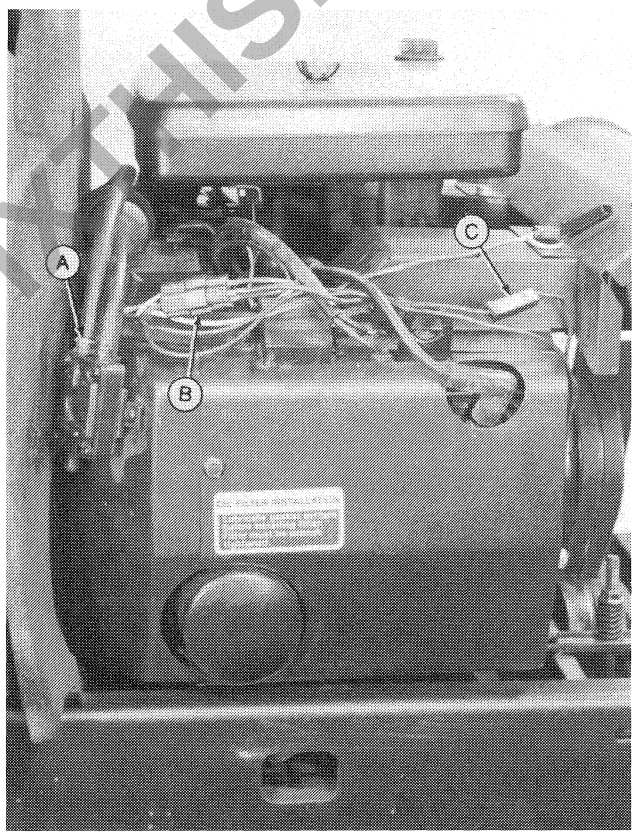
1. Disconnect battery negative (—) cable.

2. Disconnect headlight lead and headlight ground.

3. Remove grille, side panels, hood, hood support and air cleaner.

4. Disconnect items (A—C).

A—Fuel Pump Inlet Line
B—Regulator/Coil Lead
C—PTO Lead



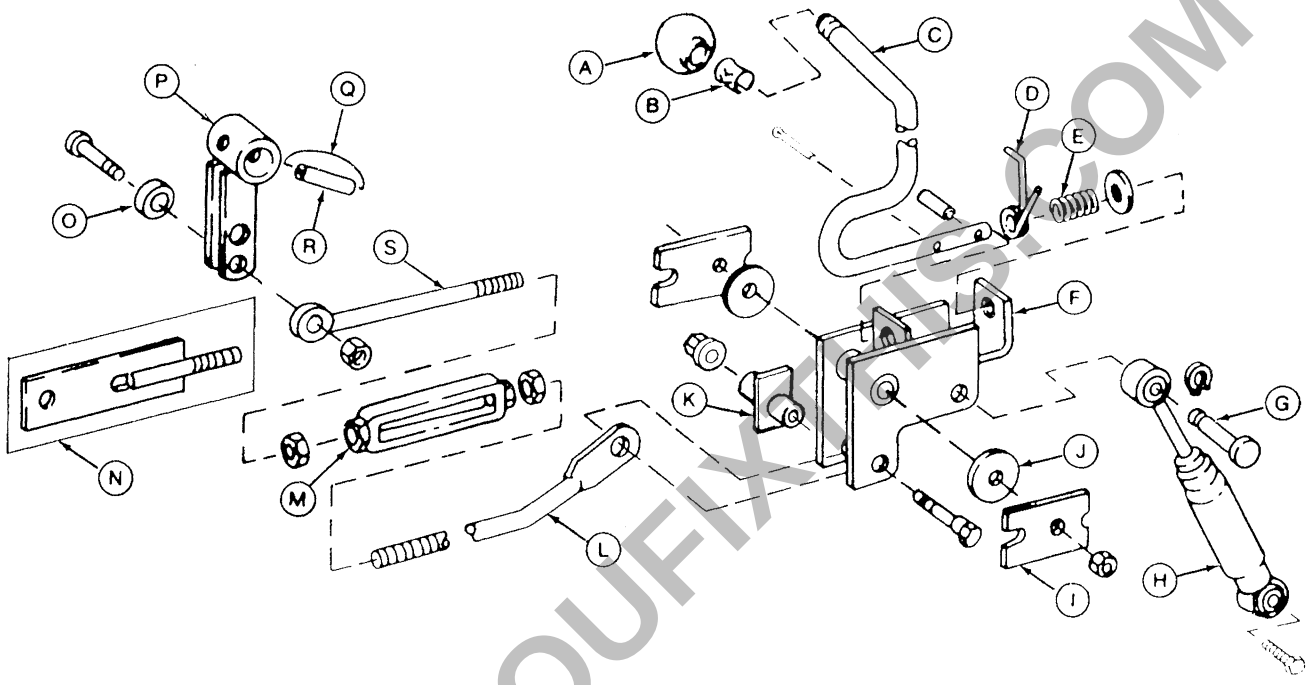
M49500 -UN-20DEC89

MX,15902005,2 -19-09DEC94

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INSPECT AND REPAIR TRANSMISSION CONTROL LINKAGE—VERSION ONE (ALL MODELS)



M77907 -UN-13FEB95

A—Knob
B—Clip
C—Speed Control Lever
D—Torsion Spring
E—Compression Spring
F—Bracket
G—Pin
H—Shock Absorber
I—Brake Plate (2 used)
J—Friction Disc (2 used)
K—Guide
L—Speed Control Rod
M—Turnbuckle
N—Stud (Early Models)
O—Spacer
P—Swashplate Arm
Q—Wire
R—Spring Pin
S—Eyebolt (Later Models)

1. Remove belly screen/pan, fender deck and fuel tank.

2. Remove engine side panels, battery and battery base.

3. Remove right-hand pedestal side panel.

4. Inspect linkage for wear or damage. Replace parts as necessary.

5. Adjust hydrostatic lever friction and neutral return linkage. (See procedures in Section 250, Group 15.)

MX,15905010,1 -19-20MAR95

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ABOUT THIS GROUP

Always perform the system checkout procedures in Group 05 BEFORE making any tests or adjustments in this group. The step-by-step procedures in this group provide you with the detailed diagnostic information you will need to isolate a malfunction. Basic diagnostic equipment is used.

It is assumed that you are familiar with the machine and its engine, fuel and air system components.

Engine rpm and temperature are critical in most engine tests. Be sure to follow test specifications carefully.

Always start with the first step and follow the sequence from left to right. Read each step completely before performing the test.

Upon completing a test or adjustment, check to see whether the problem is corrected by performing the checkout procedures in Group 05.

MX,159022010,1 -19-27APR95

1 TROUBLESHOOTING GUIDE

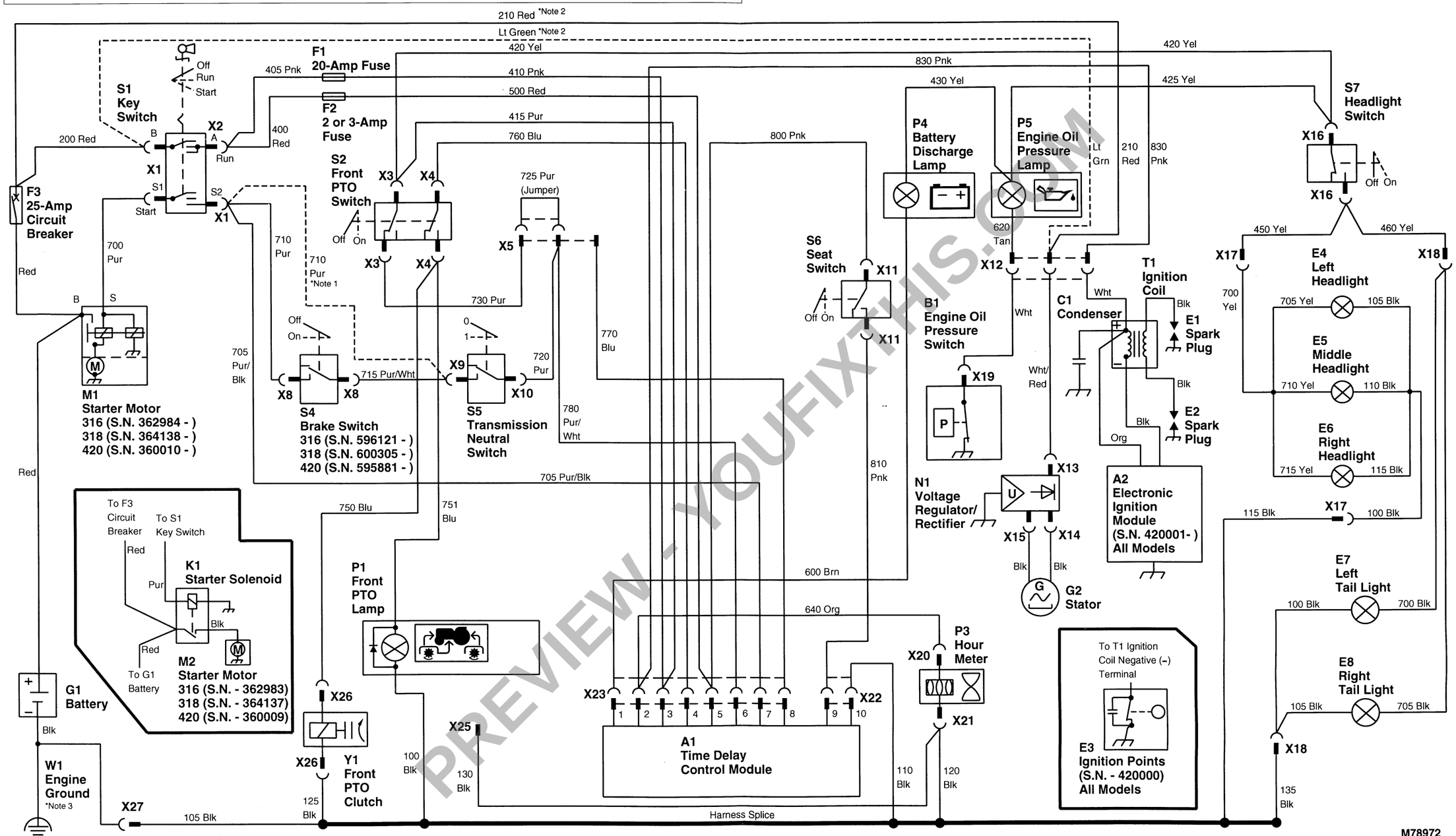
If engine does not operate properly, select the appropriate symptom from the list below. (If engine does not crank, see Section 240.)

- ENGINE WILL NOT START OR STARTS HARD: GO TO A
- ENGINE BACKFIRES: GO TO B
- ENGINE MISSES: GO TO C
- ENGINE SURGES OR STALLS FREQUENTLY: GO TO D
- ENGINE DOES NOT DEVELOP FULL POWER: GO TO E
- ENGINE RUNS ERRATICALLY: GO TO F
- ENGINE OVERHEATS: GO TO G
- ABNORMAL ENGINE NOISE: GO TO H
- LOW OIL PRESSURE: GO TO I
- ENGINE SMOKES EXCESSIVELY AND USES TOO MUCH OIL: GO TO J
- ENGINE SMOKES EXCESSIVELY AND USES TOO MUCH FUEL: GO TO K

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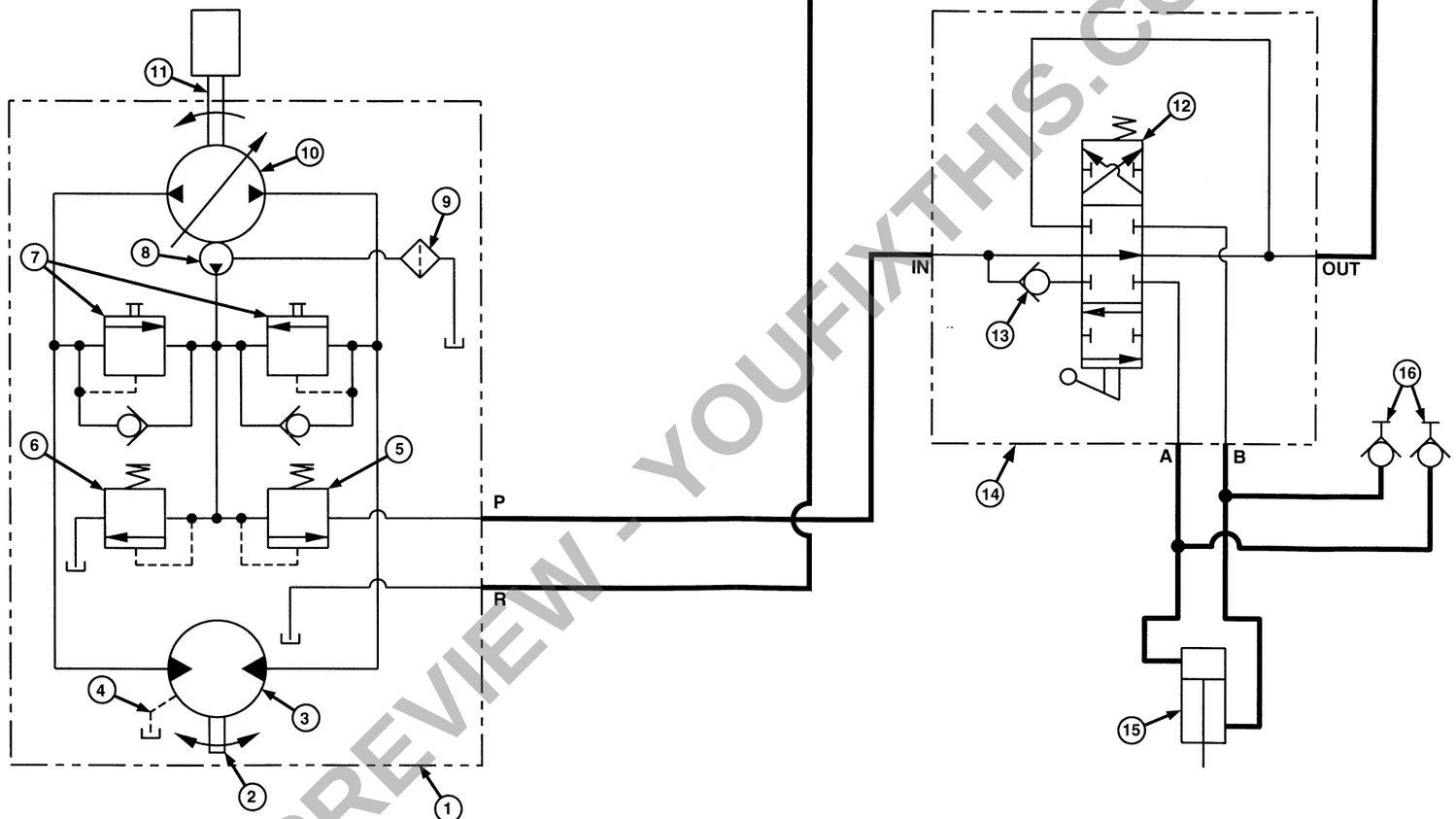
316, 318 AND 420 ELECTRICAL SCHEMATIC – SINGLE PTO

M78972

1060 X 660

MX,159024015,2 -19-16MAY95

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M78844

HYDRAULIC SYSTEM SCHEMATIC — 316

1060X660

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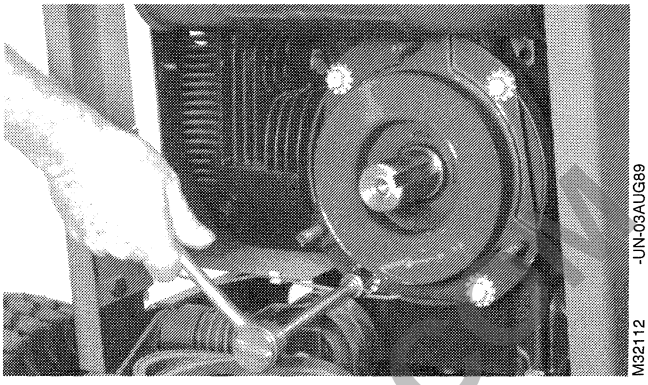
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INSTALL FRONT PTO CLUTCH

IMPORTANT: Make sure clutch wire lead is in same position as when removed, to prevent shorting of wires.

1. Install field coil and fasten with four cap screws and lock washers. Be sure coil assembly pilots, on backside of coil, are seated in engine face. Tighten cap screws.

2. Install rotor and key.



Early 420 Shown

MX,15904005,8 -19-01MAR95

NOTE: Some models have a notch in the hub of the armature assembly. This notch MUST slip over the extended key in the crankshaft.

3. On 316 and 318:

—Install three springs on mounting studs.
—Install armature assembly.

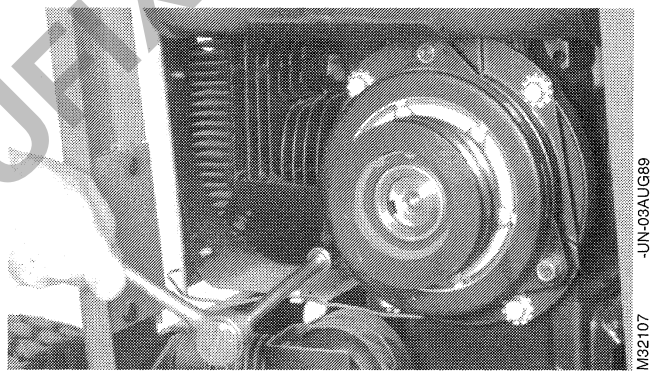
On 420:

—Install armature assembly.
—Install three springs on mounting studs.
—Push idler back and install brake plate.

4. Install lock nuts. DO NOT tighten nuts.

5. Install washer and cap screw on end of crankshaft. Tighten cap screw to 47 N·m (35 lb-ft).

6. Connect PTO clutch wire lead.



Early 420 Shown

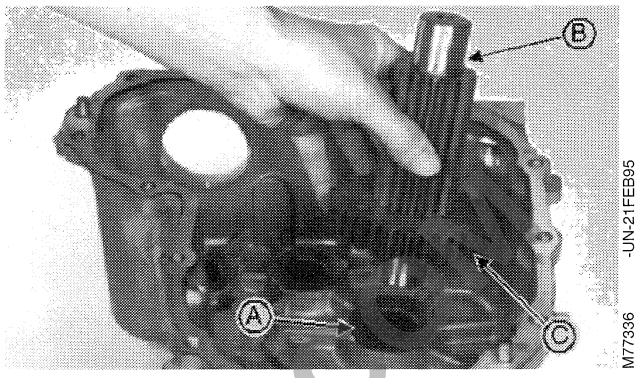
MX,15904005,9 -19-08MAY95

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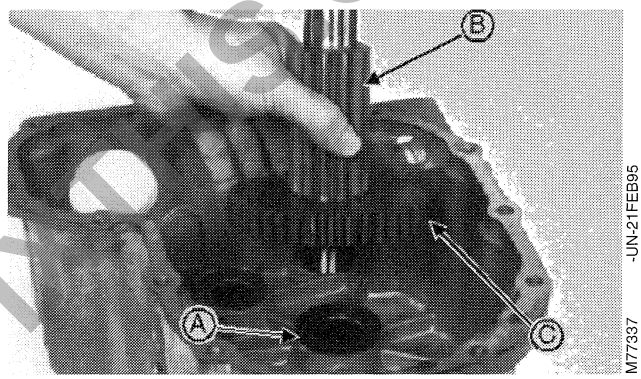
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5. Assemble gear (C) and shaft (B).

6. Install output shaft assembly through tabbed thrust washer (A).



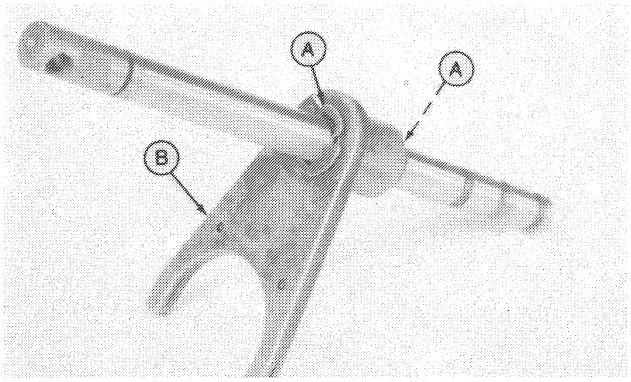
One-Speed Differential



Two-Speed Differential

MX,15905015,19 -19-14MAR95

7. Two-speed differential; assemble shift rod by installing fork (B) and two E-rings (A).



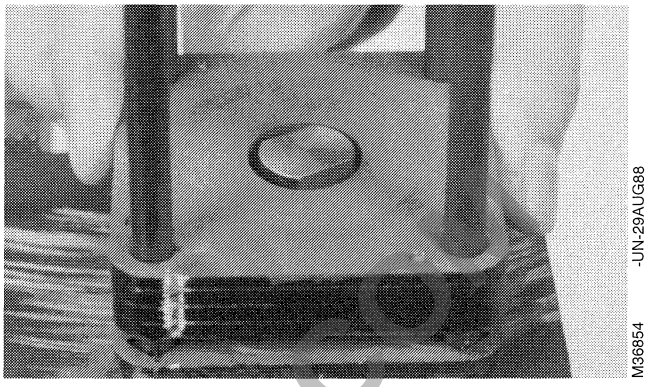
MX,15905015,20 -19-23FEB95

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36. Remove upper cover plate (four plates bonded together).

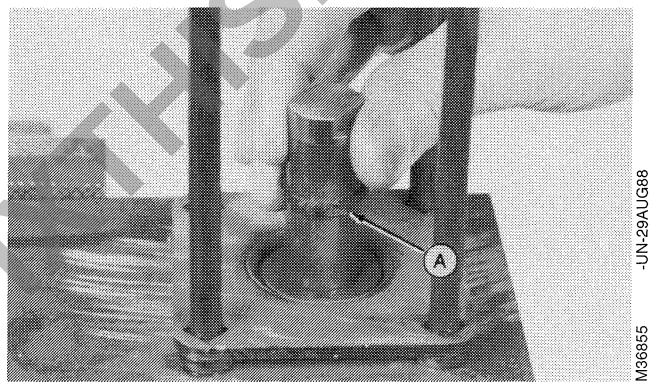
37. Check plate surface for grooves, dents, or metal flakes. A polished pattern due to the action of the seal is normal.



MX,15906006,26 -19-01MAR95

38. Remove steering shaft and snap ring (A).

39. Inspect steering shaft serrations, threads, and flats for grooves, wear, or damage.

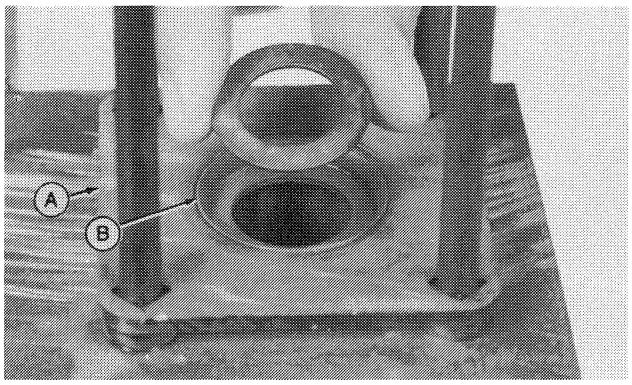


MX,15906006,27 -19-01MAR95

60
06
11

40. Remove washer and steering tube (A).

NOTE: Steering tube and retaining plate (B) are a matched set. If either part is worn or damaged, both must be replaced.

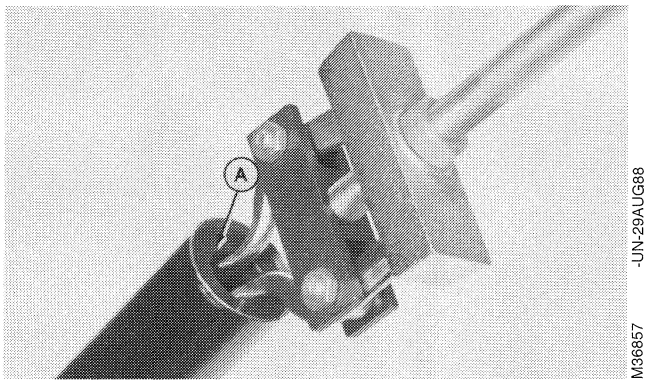


MX,15906006,28 -19-01MAR95

IMPORTANT: Hold steering tube in a soft-jaw vice. Be careful not to crush steering tube.

41. Inspect bushing (A) for wear or damage. If bushing replacement is necessary, straighten crimped area of steering tube using a punch.

42. Remove bushing using a 2-jaw puller and slide hammer.

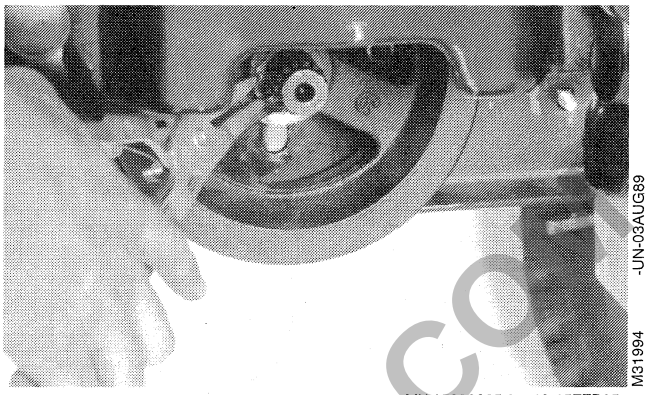


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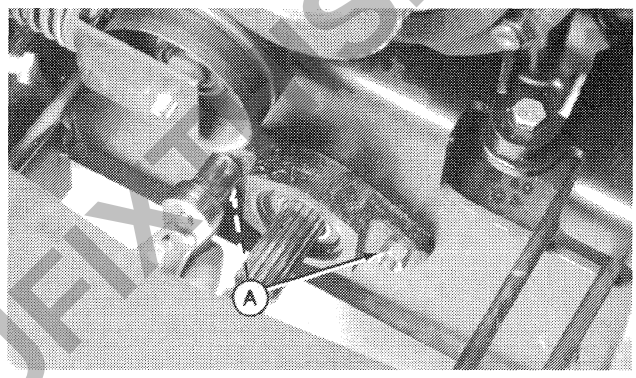
10. Remove snap ring from drive pulley.

11. Remove drive pulley from PTO shaft.



MX,15908005,9 -19-15FEB95

12. Remove two pivot pin retaining nuts (A).



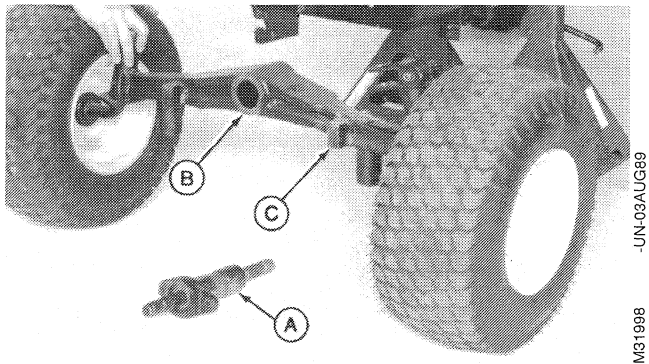
MX,15908005,10 -19-15FEB95

13. Place a floor jack under center of axle.

14. Slide pivot pin (A) out towards front of tractor. Remove axle.

15. Inspect pivot pin bore (B) and axle (C) for damage or excessive wear. Replace axle if necessary.

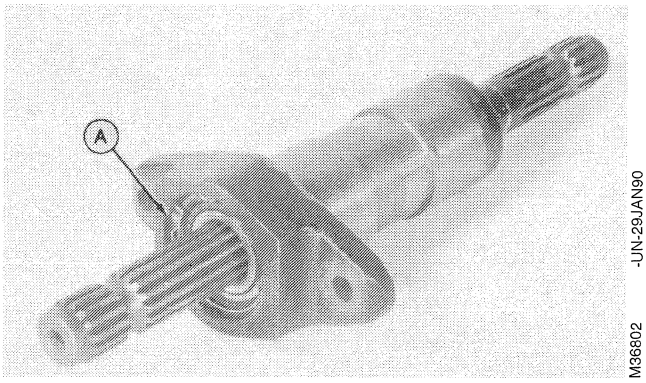
16. Inspect pivot pin for damage or wear. (See procedure in this group.)



MX,15908005,11 -19-15FEB95

DISASSEMBLE AND INSPECT PIVOT PIN—420

1. Remove snap ring (A).

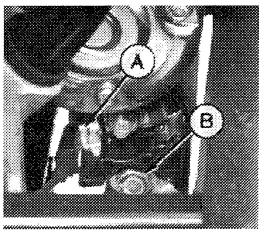
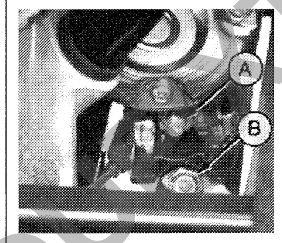
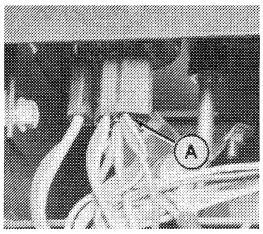


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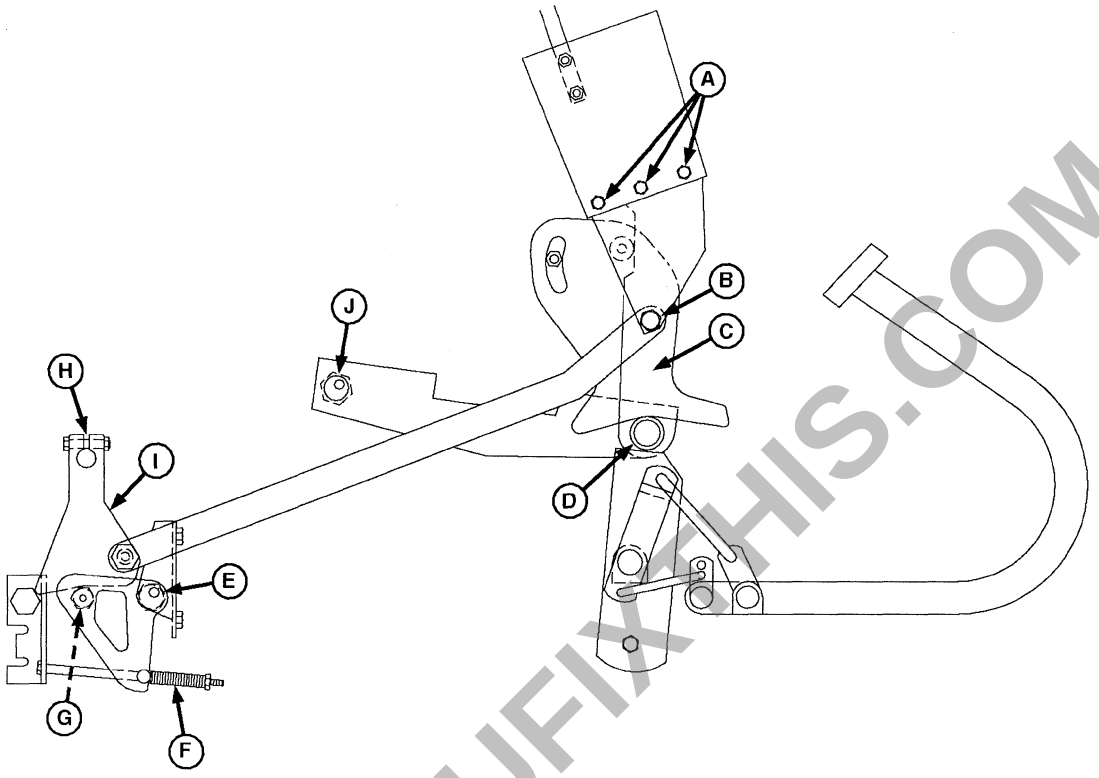
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2C Starter Test—For Machines: 316 (SN 362984—) 318 (SN 364138—) 420 (SN 360010—)	PTO switch OFF. Key switch OFF. Hydrostatic lever in N/STOP position. Park brake engaged. Disconnect spark plug wires from spark plugs and ground to engine block.	 M77929 -UN-17JAN95	Connect one end of a jumper wire to terminal (A) on the starter solenoid, then briefly touch other end of jumper to battery cable terminal (B). *LISTEN: Starter must operate.*	STARTER OPERATES: GO TO 2E STARTER DOESN'T OPERATE: GO TO 2D MX,159024025,32-19-16MAY95
2D Starter Solenoid Test—For Machines: 316 (SN 362984—) 318 (SN 364138—) 420 (SN 360010—)	PTO switch OFF. Key switch OFF. Hydrostatic lever in N/STOP position. Park brake engaged. Spark plug wires disconnected and grounded.	 M77930 -UN-17JAN95	Briefly jump between starter terminal (A) and battery cable terminal (B), located on the starter solenoid, *LISTEN: Starter must operate.*	STARTER OPERATES: Replace solenoid, then GO TO 2, Group 05. STARTER DOESN'T OPERATE: Check battery and starter wiring connections, then GO TO 3, Group 25. MX,159024025,33-19-16MAY95
2E Starter Circuit Test at Key Switch	PTO switch OFF. Hydrostatic lever in N/STOP position. *NOTE: Engaged park brake required on machines:* *316 (S.N. 596121—)* *318 (S.N. 600305—)* *420 (S.N. 595881—)* Engage park brake.	 M37167 -UN-25JAN90	Turn key switch to RUN position. Check for voltage at terminal (A) on back of key switch (purple and purple/black wires).	VOLTAGE: Replace key switch, then GO TO 2, Group 05. NO VOLTAGE: Early machines, GO TO 2G Later machines, GO TO 2F MX,159024025,34-19-16MAY95

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M51871 -UN-26APR95

A—Bolts
B—Bolt
C—Cam Plate
D—Roller
E—Eccentric
F—Detent Spring
G—Roller
H—Slot
I—Swashplate Control Arm
J—Eccentric

Loosen bolts (A and B).

Place a screwdriver in slot (H) and move swashplate control arm (I) until roller (G) is centered in detent notch.

Adjust length of detent spring (F) to 50 mm (1.970 in.).

⚠ CAUTION: BE AWARE OF SPINNING DRIVE SHAFT AND WHEELS WHEN PERFORMING THE NEXT ADJUSTMENT.

Start and run engine at fast idle.

Loosen bolt and adjust eccentric (E) until rear wheels stop turning, then tighten eccentric bolt.

Stop engine.

Loosen bolt and adjust eccentric (J) until bolt (B) is exactly centered in hole, while making sure roller (D) is centered in notch of cam plate (C).

Tighten bolt (B) and eccentric (J) bolt while holding eccentric in place.

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