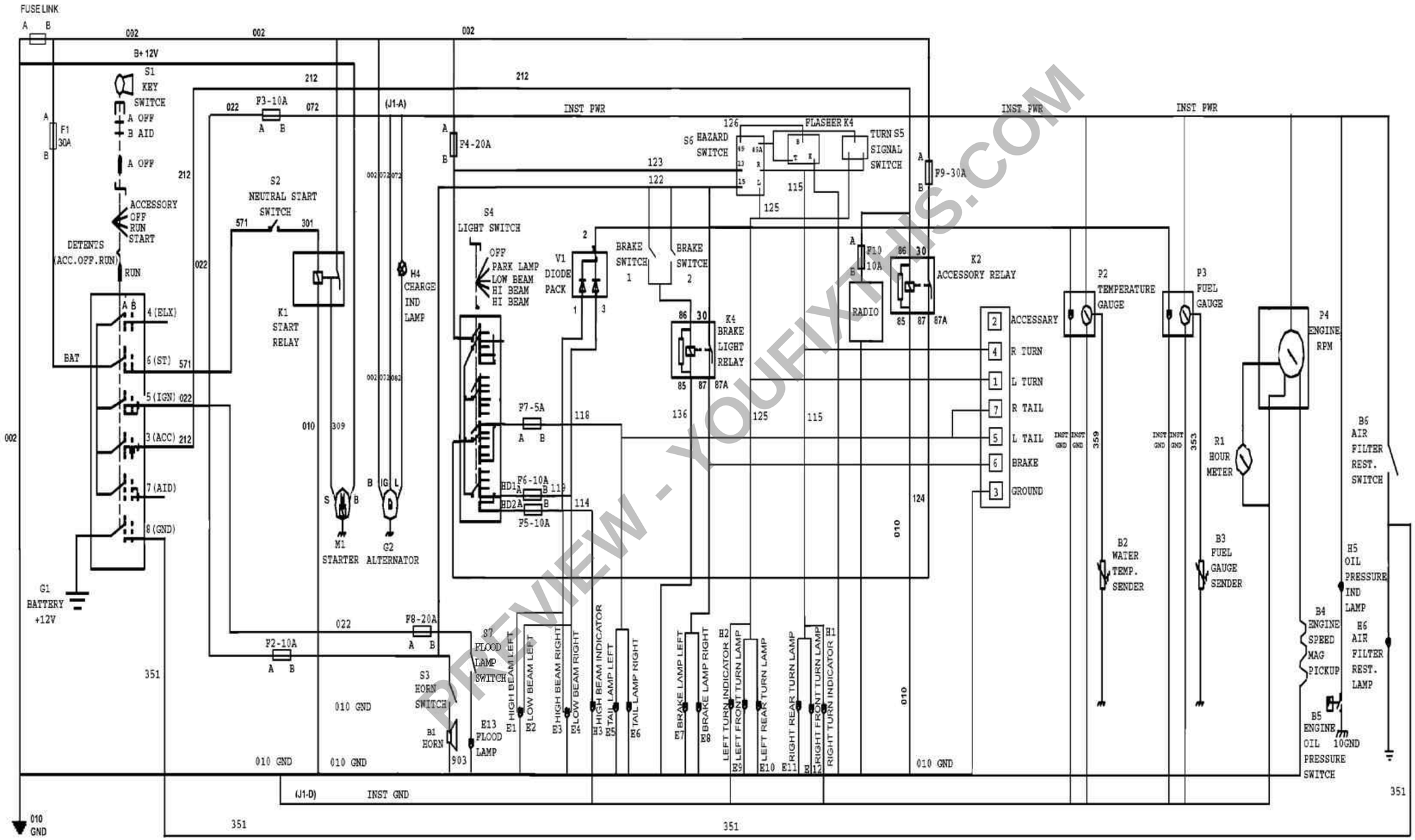


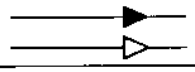
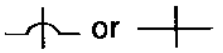
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Group 30 - Hydraulic Schematics

Hydraulic Circuit Symbols

LINES

1		WORKING (MAIN) LINES
2		PILOT CONTROL LINES
3		DRAIN LINE
4		HYDRAULIC / PNEUMATIC } FLOW DIRECTION
5		CROSSING LINES
6		JOINING LINES
7		FLEXIBLE LINE

PUMPS

8		FIXED DISPLACEMENT
9		VARIABLE DISPLACEMENT

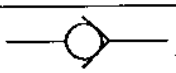
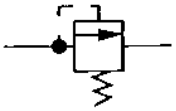
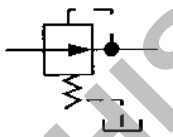
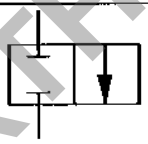
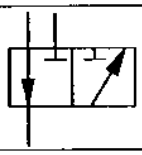
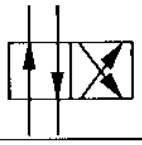
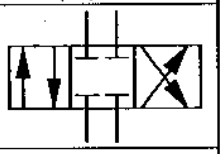
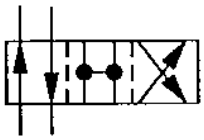
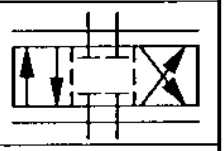
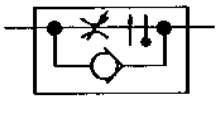
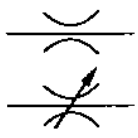
MOTORS

10		FIXED DISPLACEMENT
11		VARIABLE DISPLACEMENT

RESERVOIR

12		VENTED RESERVOIR
13		PRESSURIZED RESERVOIR
14		RESERVOIR RETURN - ABOVE FLUID LEVEL
15		RESERVOIR RETURN - BELOW FLUID LEVEL

VALVES

16		CHECK VALVE
17		MANUAL ON/OFF VALVE
19		PRESSURE RELIEF VALVE
20		PRESSURE REDUCTION VALVE
21		TWO POSITION, TWO CONNECTION VALVE
22		TWO POSITION, THREE CONNECTION VALVE
23		TWO POSITION, FOUR CONNECTION VALVE
24		THREE POSITION, FOUR CONNECTION VALVE
25		TWO POSITION, FOUR CONNECTION VALVE WITH TRANSMISSION
26		THREE POSITION, FOUR CONNECTION VALVE WITH INFINITE POSITIONING
27		ADJUSTABLE FLOW CONTROL VALVE (TEMPERATURE AND PRESSURE COMPENSATED)
18		FIXED / VARIABLE } ORIFICE

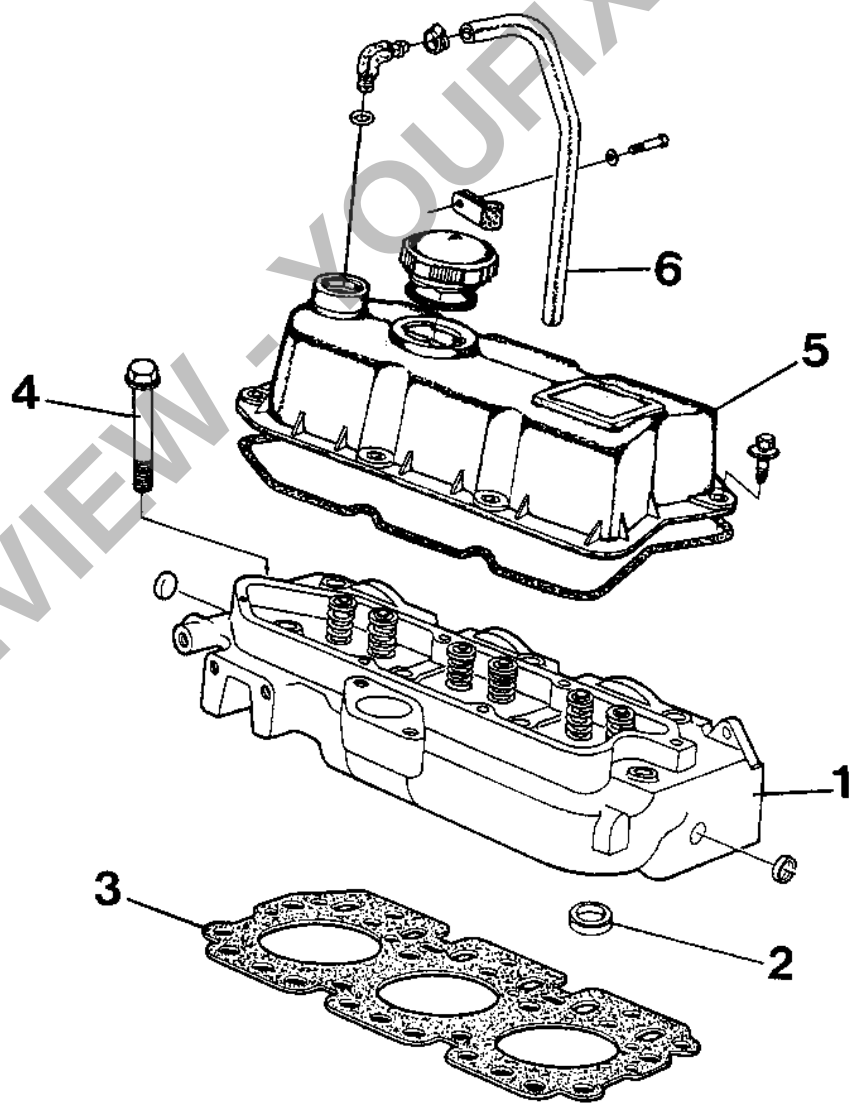
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Torques for Hardware

ITEM	TORQUE
Rocker arm shaft clamp	47 N·m (35 lb-ft)
Cylinder head cap screws:	
Step 1	100 N·m (75 lb-ft)
Step 2	150 N·m (110 lb-ft)
Step 3	Wait 5 minutes and verify 150 N·m (110 lb-ft)
Step 4	Tighten additional 60° ± 10°
Fuel injection nozzles to cylinder head	33 N·m
Intake manifold to cylinder head	47 N·m (35 lb-ft)
Exhaust manifold to cylinder head	47 N·m (35 lb-ft)
Rocker arm cover to cylinder head	11 N·m

Cylinder Head - Exploded View

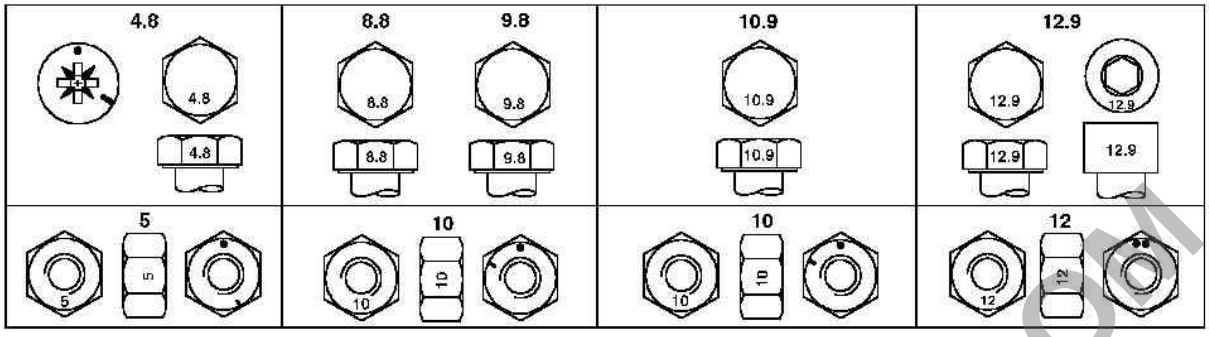


LEGEND:

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Metric Bolt and Cap Screw Torque Values



Top, Property Class and Head Markings; Bottom, Property Class and Nut Markings

	Class 4.8		Class 8.8 or 9.8		Class 10.9		Class 12.9	
Size	**Lubricated [a] N˙m(lb-ft)**	**Dry [b] N˙m(lb-ft)**	**Lubricated [a] N˙m(lb-ft)**	**Dry [b] N˙m(lb-ft)**	**Lubricated [a] N˙m(lb-ft)**	**Dry [b] N˙m(lb-ft)**	**Lubricated [a] N˙m(lb-ft)**	**Dry [b] N˙m(lb-ft)**
M6	4.7 (3.5)	6 (4.4)	9 (6.6)	11.5 (8.5)	13 (9.5)	16.5 (12.2)	15.5 (11.5)	19.5 (14.5)
M8	11.5 (8.5)	14.5 (10.7)	22 (16)	28 (20.5)	32 (23.5)	40 (29.5)	37 (27.5)	47 (35)
M10	23 (17)	29 (21)	43 (32)	55 (40)	63 (46)	80 (59)	75 (55)	95 (70)
M12	40 (29.5)	50 (37)	75 (55)	95 (70)	110 (80)	140 (105)	130 (95)	165 (120)
M14	63 (46)	80 (59)	120 (88)	150 (110)	175 (130)	220 (165)	205 (150)	260 (190)
M16	100 (74)	125 (92)	190 (140)	240 (175)	275 (200)	350 (255)	320 (235)	400 (300)
M18	135 (100)	170 (125)	265 (195)	330 (245)	375 (275)	475 (350)	440 (325)	560 (410)
M20	190 (140)	245 (180)	375 (275)	475 (350)	530 (390)	675 (500)	625 (460)	790 (580)
M22	265 (195)	330 (245)	510 (375)	650 (480)	725 (535)	920 (680)	850 (625)	1080 (800)
M24	330 (245)	425 (315)	650 (480)	820 (600)	920 (680)	1150 (850)	1080 (800)	1350 (1000)
M27	490 (360)	625 (460)	950 (700)	1200 (885)	1350 (1000)	1700 (1250)	1580 (1160)	2000 (1475)
M30	660 (490)	850 (625)	1290 (950)	1630 (1200)	1850 (1350)	2300 (1700)	2140 (1580)	2700 (2000)
M33	900 (665)	1150 (850)	1750 (1300)	2200 (1625)	2500 (1850)	3150 (2325)	2900 (2150)	3700 (2730)
M36	1150 (850)	1450 (1075)	2250 (1650)	2850 (2100)	3200 (2350)	4050 (3000)	3750 (2770)	4750 (3500)

[a] "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings.

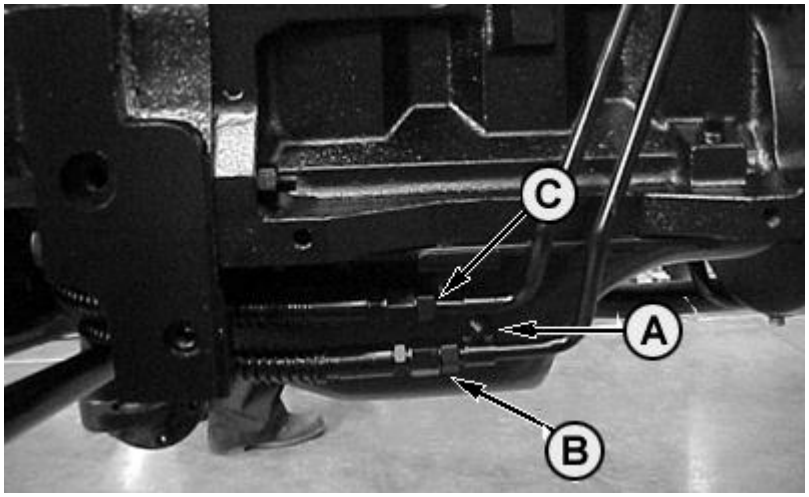
[b] "Dry" means plain or zinc plated without any lubrication.

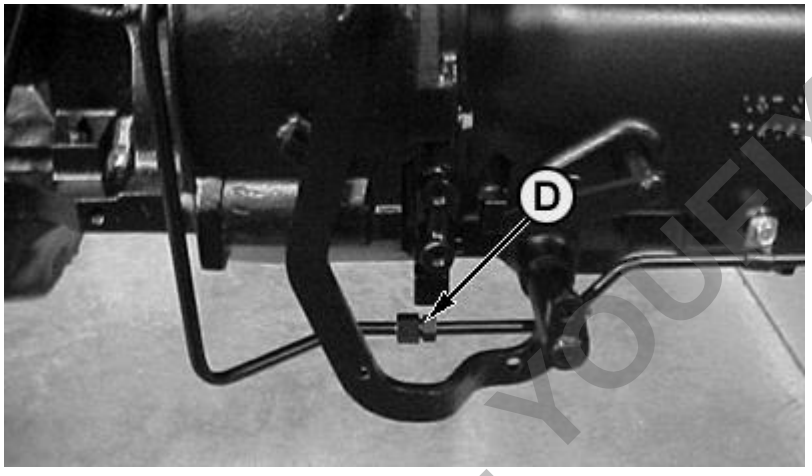
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Remove Engine

[1] -





LEGEND:

A	Steering Line Bracket
B	Hydraulic Steering Hose
C	Hydraulic Steering Hose
D	Hydraulic Steering Return Line

Disconnect battery. (See procedure in Section 40, Group 10.)

[2] - Remove air cleaner.

[3] - Remove radiator. Remove radiator (See procedure in Group 10.)

[4] -

→NOTE:

The approximate capacity of transmission is 32 L for 13.6 X 28, 12 PR rear tyre..

The approximate capacity of transmission is 34 L for 14.9 X 28, 12 PR rear tyre..

Drain transmission/hydraulic oil.

[5] - Remove dash panels and hood.

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Engine Turns Over But Will Not Start or Starts Hard

CONDITIONS:

- Range shift lever in neutral.
- Park brake engaged.
- PTO disengaged.
- Key switch OFF.
- Engine and fuel system repair in CTM8.
- Engine and fuel/air tests and adjustments found in this group.
- Ignition and electrical tests in Section 240, Group 15.

Test Location	Normal	If Not Normal
1. Fuel tank caps.	No pressure or vacuum when removed from tank.	Replace tank vent or hose.
2. Fuel tank.	Diesel fuel of correct grade for ambient temperature.	Replace with correct fuel.
3. Fuel shut-off solenoid.	Opens to allow fuel flow when key switch is turned on.	Reset solenoid by turning key switch off, then on. (See section 220-15-24.)
4. Fuel filter.	Fuel flows at outlet when primer pump operated.	Drain water and sediment. Replace element. Bleed air from supply line.
5. Fuel leak-off line.	Small amount of fuel flows when engine running.	Clean or replace line.
6. Starter (not shown).	Turns engine over easily at 90 rpm minimum when engine is cranked.	Check starter and starting circuit.
7. Injection pump.	Delivers fuel to injection nozzles when engine is cranked (lines loosened at nozzles). Injection properly timed.	Adjust injection pump timing. Repair pump
8. Injection nozzles.	Correct spray pattern when tested. See CTM8.	Check fuel lines for obstruction. Clean, repair, adjust or replace as necessary.
9. Valves.	Intake clearance: 0.35 mm (0.014 in.) Exhaust clearance: 0.45 mm (0.018 in.)	Adjust. Valve clearance adjustment. (See Section 220-15-34)
10. Manifold heater (optional equipment, not shown).	Element heats when key switch is pushed in.	Check element and circuit.
11. Crankcase oil.	Flows easily.	Replace with correct viscosity.
12. Fuel shut-off.	Completely off when start engine	Push completely inside
13. Air Filter	No excessive restriction.	Service.

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Group 10 - General Specifications

John Deere 5103E Tractor

5103E—3029D Naturally Aspirated Engine	
Observed PTO power	24 kW (32.5 PS)
Max. engine torque	128 N.m
Cylinders	3
Bore	106.5 mm
Stroke	110 mm
Displacement	2.9 L
Compression ratio	17.8:1
Firing order	1-2-3
Slow idle	850±25
Fast idle	2485±25
Operating ragne	1400-2300
Injection pump timing - Trem II	17.5±1° BTDC
Injection pump timing - Trem III	15.5±1° BTDC

Electricals	
Battery	12 V, 88 Ah
Alternator	43 Amp
Starter	12 V, 2.5 kW

Transmission	
Clutch type	Single
Gearbox type	Collar Shift
No. of forward gears	8
No. of reverse gears	4
PTO speed	540 rpm

Brakes	
Type	Wet disc brakes
Actuation	Mechanical

Hydraulics	
Pump output - Hydraulic	25.7 l/min
Lifting capacity	1100 kgf

Wheels and Tyres	
Front tyre	6.0 x 16, 8 PR
Rear tyre	12.4 X 28, 12 PR

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Dimensions and Weight	
Total weight	1890 kg
Wheel base	1950 mm
Overall lenght	4080 mm
Overall width	1650 mm
Overall height (with exhaust pipe)	2205 mm
Ground clearance	365 mm
Turning radius w. brake	2840 mm
Turning radius w/o brake	3210 mm

Filling capacities	
Fuel tank	50 lit
Engine sump	8.5 lit
Transmission	33 lit
Hydraulics	Common to trans

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Group 05 - Safety

Recognize Safety Information



This is a 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.

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

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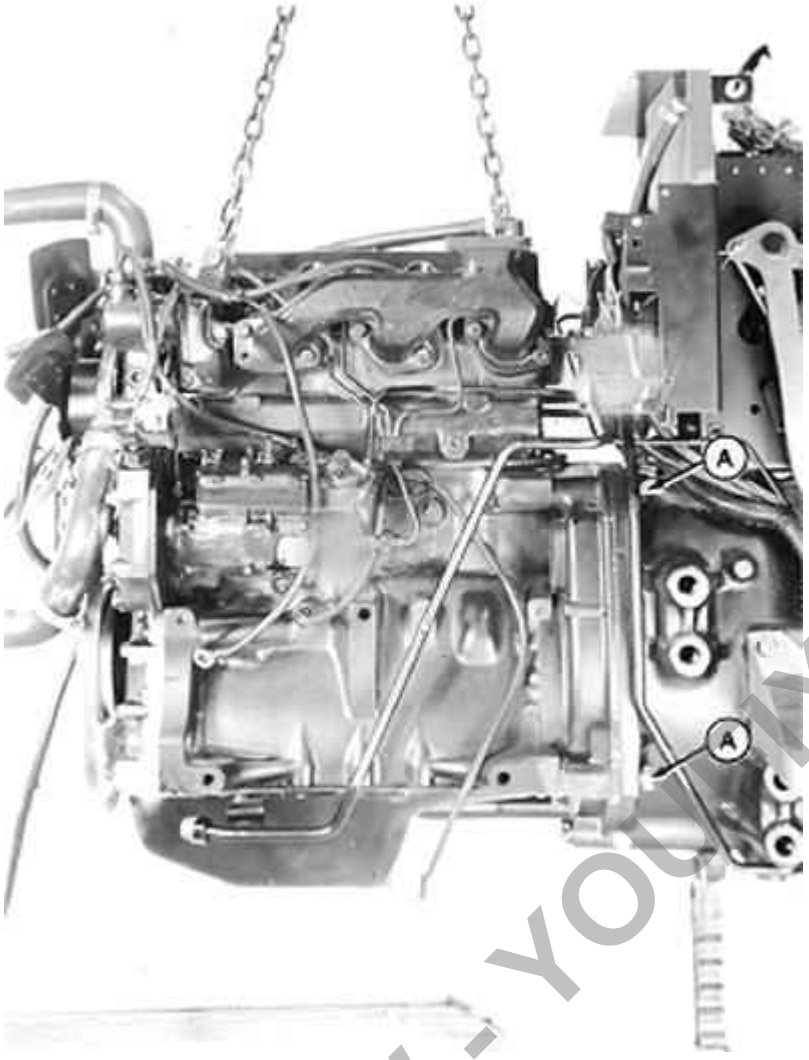
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Install Engine



LEGEND:

A	Center Control Console
B	Cap Screw (4 used)

[1] - Install clutch. (See procedure for Single clutch and Dual clutch in Section 50, Group 10.)

[2] - . Install engine to transmission (See procedure in Section 50, Group 05.)

[3] - Install center control console (A). Apply thread lock and sealer (Medium Strength) to cap screws (B) and install cap screws. Tighten cap screws (B) to specification.

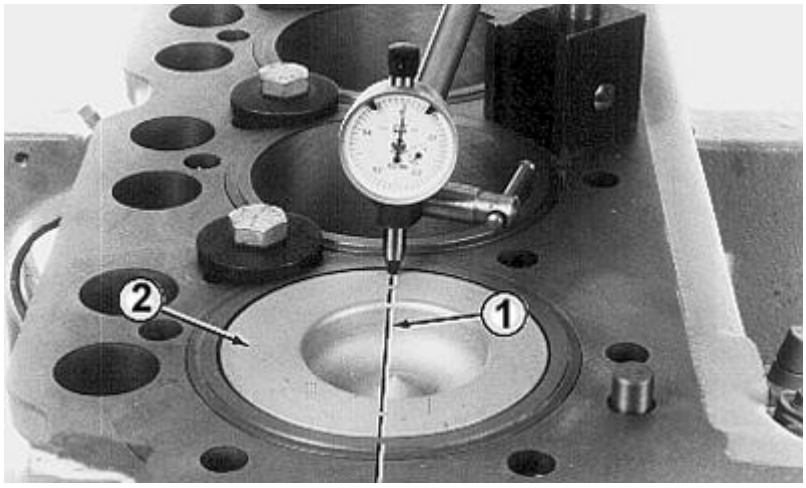
Item	Measurement	Specification
Center Control Console Cap Screws	Torque	70 N˙m

Number	Name	Use
• T43512 (us) • TY9473 (canadian) • 242 LOCTITE ™ (loctite)	Thread Lock and Sealer (Medium Strength)	Center Control Console Cap Screws.

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Measure Piston Protrusion



LEGEND:

1 Centerline of Cylinder Liner Bore
2 Piston at “TDC”

→NOTE:

Press down on top of piston to remove clearances before measuring piston protrusion.

[1] - Set dial indicator at “zero”.

[2] - While pressing gauge downward, turn crankshaft until piston is at “TDC” position.

[3] - Piston protrusion should be within 0.08 mm - 0.35 mm..

Item	Measurement	Specification
Piston	Protrusion above block	0.08—0.35 mm (0.003—0.014 in.)

[4] - If protrusion is out of specifications, check all concerned parts to determine the cause.

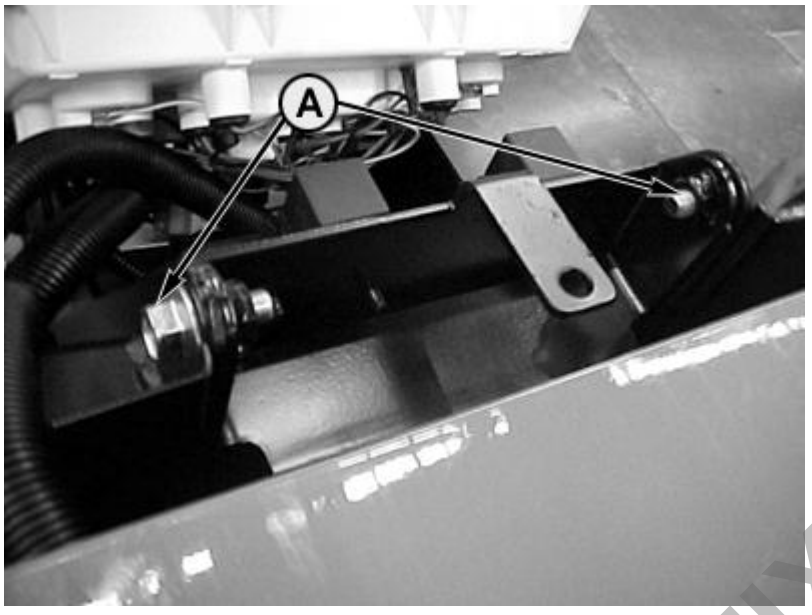
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Remove and Inspect Radiator

[1] - Remove engine side shields and grills.

[2] - Remove left and right side dash panels.



LEGEND:

A	Hood Mtg. Hinge

[3] - Remove cap screw, washers and bushing (A), from each hinge.`

[4] - Remove hood.

CAUTION:

Explosive release of fluids from pressurized cooling system can cause serious burns.

Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

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LEGEND:

A	Tie Straps
B	Transmission Return Line
C	Throttle Pedal Linkage
D	Park Brake Spring

Connect throttle linkage (C) and park brake spring (D).

[6] - Connect fuel lines and wiring harness, if removed.

[7] - Connect transmission return line (B) and install tie straps (A) as necessary.

[8] - Connect battery negative (—) cable to battery.

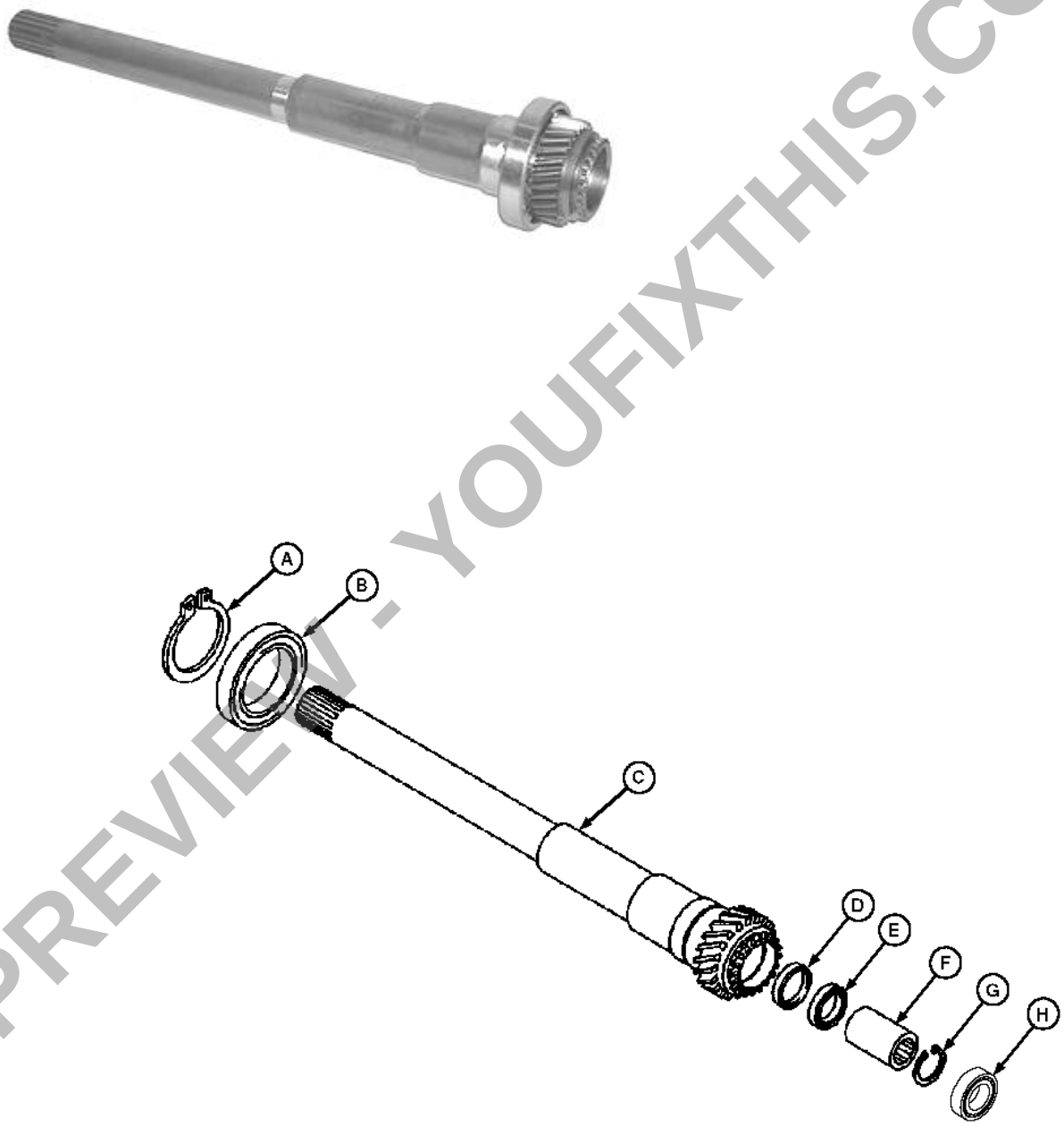
[9] - Install left- and right-hand dash panels.

[10] - . Fill transmission/differential with proper oil (See Section 10, Group 20.)

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Disassemble, Inspect and Assemble Traction Clutch Driven Shaft (Light Duty-Dual Clutch)



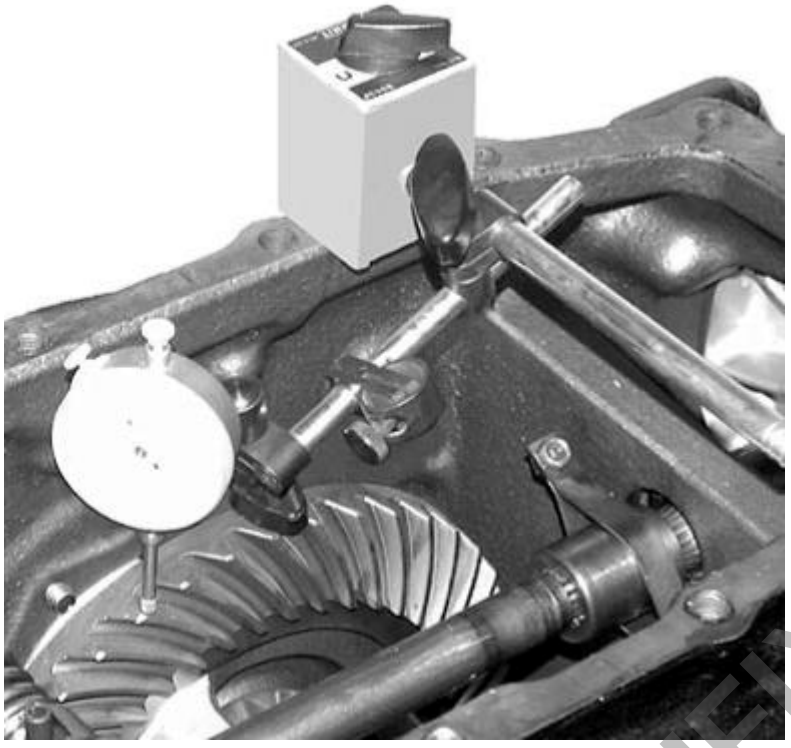
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LEGEND:

A	Snap Ring
B	Bearing
C	Traction Clutch Drive Shaft

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Differential Backlash Adjustment



IMPORTANT:

Always check and adjust backlash after cone point adjustment has been made.

[1] - While slowly rotating differential carrier, lightly tap carrier away from differential drive shaft with a soft-faced mallet to make sure bearing on back side of ring gear is seated.

[2] - Attach a dial indicator to housing, as shown, with contact point positioned on ring gear splines.

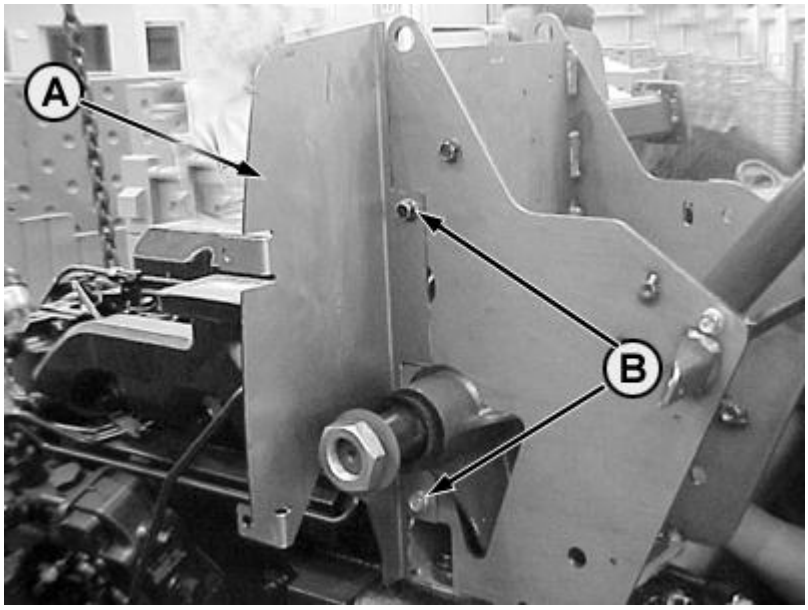
[3] - While holding differential drive shaft, move carrier and ring gear to determine backlash.

Item	Measurement	Specification
Differential Ring Gear	Backlash	0.18—0.33 mm

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[4] - Install left shield (A) & right shield . Tighten 4 nos. of cap screws (B) to 40 N-m.



LEGEND:

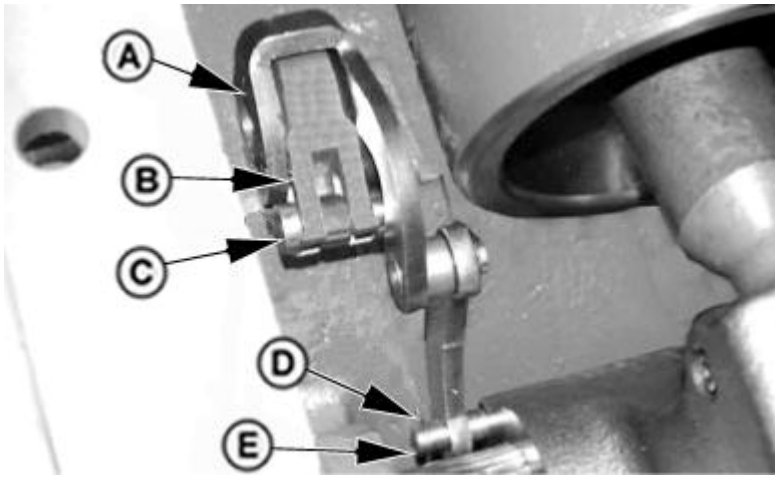
A	Left Shield
B	Cap Screws

Item	Measurement	Specification
.		
Connecting Strip Cap Screw	Torque	40 N.m. (30 lb-ft)

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[14] -

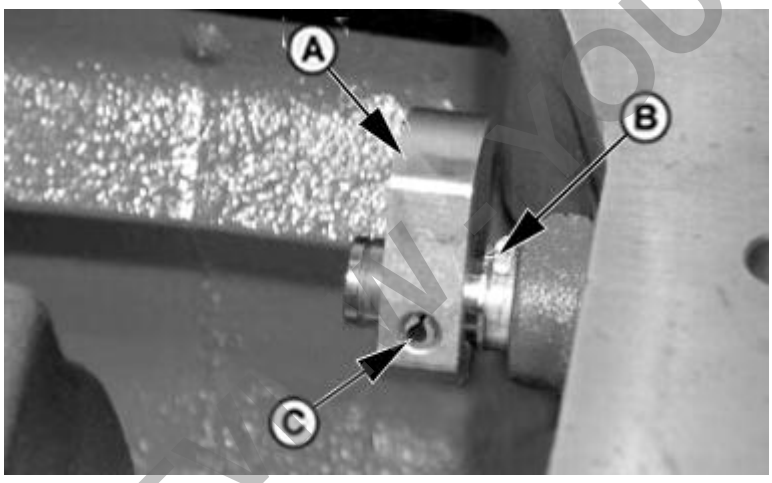


LEGEND:

A	Cam Assembly
B	Link
C	Pin Head
D	E-Clip
E	Pin

Remove E-clip (D), cam assembly (A), and link (B).

[15] -



LEGEND:

A	Cam
B	Snap Ring
C	Roll Pin

Remove roll pin (C), cam (A), and snap ring (B).

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- Park brake engaged.

PROCEDURE:

- Check battery electrolyte level.
- Check battery cable condition.
- Check ground cable connection (A).
- Check condition of starter and alternator connections.
- Check fuses; located near fuse link.
- Check connection and condition of fuse link.

NORMAL:

- Battery electrolyte between full and add indicators.
- All electrical connections clean and tight.
- Fuses good and of correct rating.
- Fuse link connection clean and tight.
- No brakes in fuse link (B).

IF NOT NORMAL:

- Add distilled water to battery to bring electrolyte to proper level.
- Clean and tighten electrical connections.
- Replace fuses as required. Determine reason for blown fuses. Go to Section 240, Group 15 for diagnosis, tests and adjustments.
- Clean and tighten fuse link connection.
- Replace fuse link. Determine reason for broken fuse link. Go to Section 240, Group 15 for diagnosis, tests and adjustments.

Hydraulic System Check

CONDITIONS:

- Engine running.
- Hydraulic oil at operating temperature.
- Range shift lever in neutral.
- Park brake engaged.

PROCEDURE:

- Operate all hydraulic controls.
- Turn engine off. Check on and under machine for signs of hydraulic oil leakage.

NORMAL:

- No oil leakage.
- Hydraulic controls operate smoothly through entire range of function.

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S	Starting Spring
T	Throttle Lever

Governor maintains a set engine speed under varying loads.

The injection pump governor is a mechanical centrifugal flyweight type contained in a housing assembled to the injection pump and serviced with the pump.

The flyweights (L) are mounted on the injection pump camshaft. The flyweights move the thrust sleeve (K) in and out with changes in engine rpm. The thrust sleeve works against the tensioning lever (C). The tensioning lever is connected to the injection pump control rack (Q) by the link (P). The governor spring (E) connects the tensioning lever assembly to the throttle lever (T).

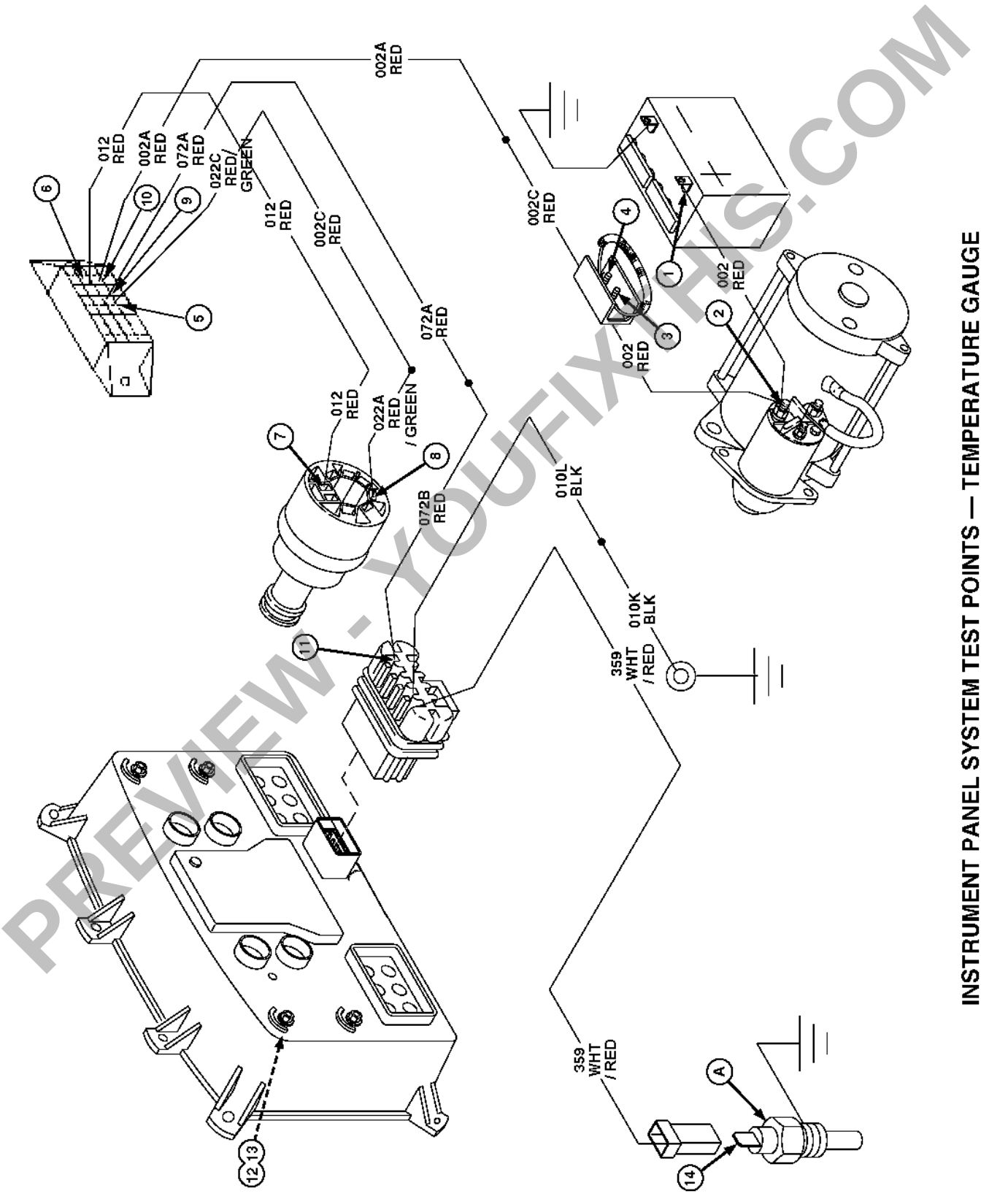
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CONDITIONS:

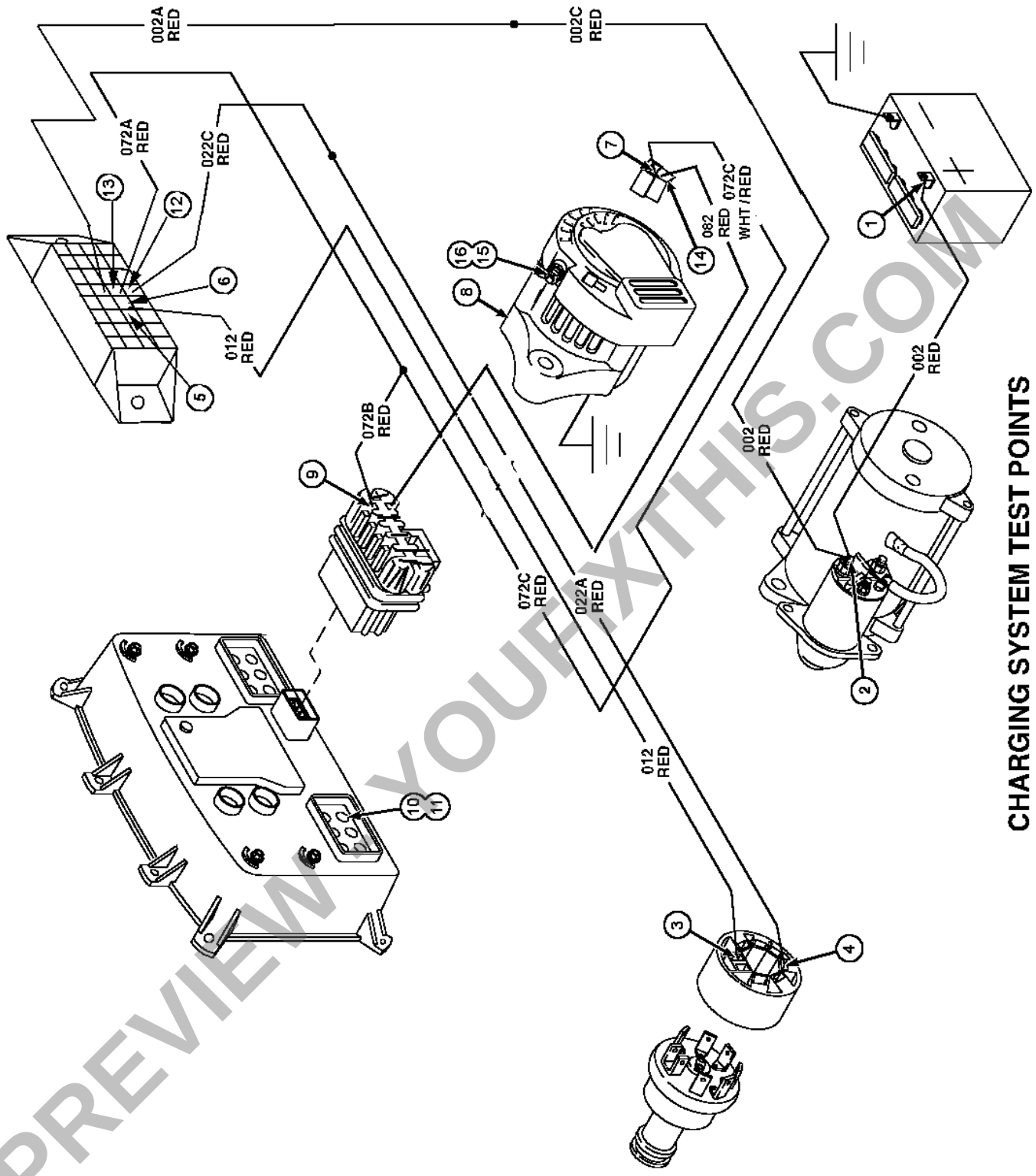
- Remove wire from temperature sender (A).

Test Location	Normal	If Not Normal
12. Temperature gauge on instrument panel.	Gauge indicates COLD.	Replace instrument panel.



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Test Location	Normal	If Not Normal
4. IGN terminal of key switch.	Battery voltage.	Check that key switch is in the run position. If key switch is in run, switch is bad. Replace.
5. Bottom terminal A of key switch.	Battery voltage.	Check for corroded connections or break in wire or splice between key switch and fuse F1.
6. Top terminal B of key switch.	Battery voltage.	Check for corroded connections or break in wire or splice between key switch and fuse F1.
7. Upper terminal IG of alternator connector.	Battery voltage.	Check for corroded connections or break in wire between fuse block and alternator.

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C	PTO Pinion Shaft
D	PTO Output Shaft
E	PTO Drive Gear
F	Shift Collar

FUNCTION:

Transfers or relays engine power output to drive rear mounted implements or attachments.

MAJOR COMPONENTS:

- PTO Drive Shaft
- PTO Shaft
- PTO Pinion Shaft
- PTO Gear
- PTO Output Shaft
- Snubber Brake
- PTO Shift Collar

THEORY OF OPERATION:

Pushing the PTO lever forward moves PTO shift collar and power is transmitted from PTO pinion to PTO drive gear (E). In engaged condition, , power from the engine is transmitted through PTO shaft (A) and the PTO pinion shaft (C).

The PTO pinion shaft turns the PTO drive gear (E) which then turns the PTO output shaft (D).

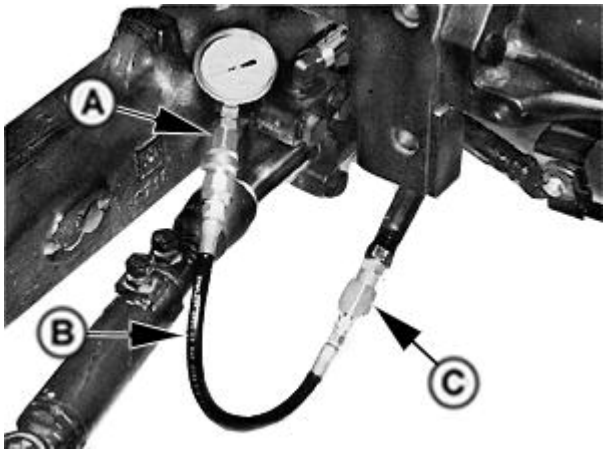
When the PTO lever is pulled to the disengaged position, power is not transmitted to PTO output shaft .

Snubber brake (B) aids in bringing the PTO shaft to a stop when the PTO clutch is disengaged.

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Steering Valve Relief Test



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LEGEND:

A	Gauge
B	Hose
C	Connector

REASON:

To determine if manufacturer setting of relief valve maintains correct pressure or is leaking.

EQUIPMENT:

- Gauge with coupler 3000 psi (A)
- Hose with coupler (B)
- Connector 7/16-20 M 37° SW x 13/16-16 ORFS (C)

CONNECTIONS:

[1] - Assemble gauge, hose and adaptor.

[2] - Disconnect hydraulic hose from left-hand side of steering cylinder.

[3] - Connect test equipment to hydraulic hose.

PROCEDURE:

[1] - Run engine at fast idle

[2] - Turn steering wheel full left and continue turning while observing gauge.

Item	Measurement	Specification
Hydraulic Steering Hose	Pressure	12990—13493 kPa (130—135 bar) (1884—1957 psi)

RESULTS:

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