Group 20 - Wiring Schematics

Schematic Information

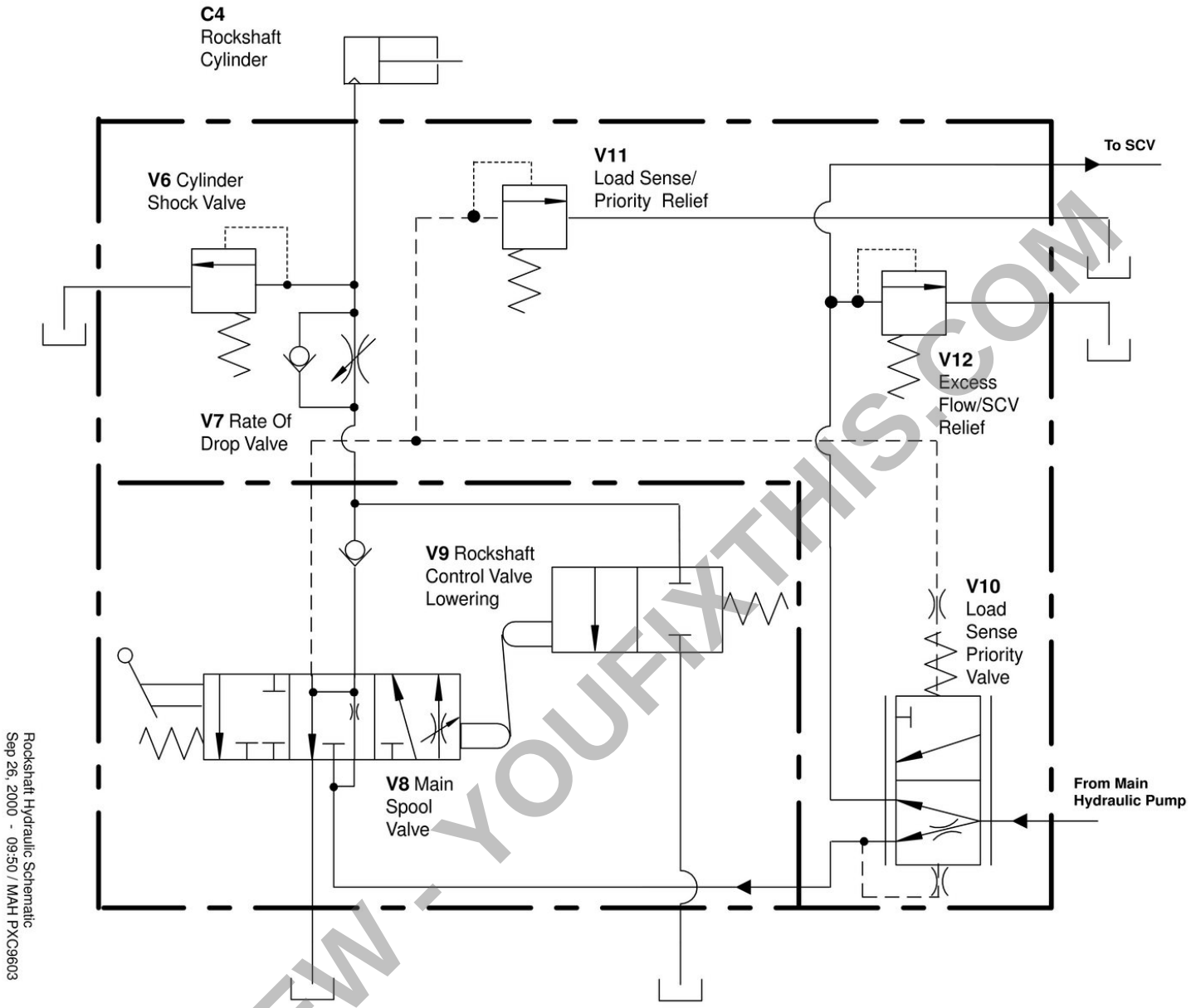
The wiring schematics are drawn with the battery positive circuit across the top and the ground, or battery negative, circuit across the bottom. The flow is then, as much as possible, from top to bottom through each circuit and component. All components are shown in their normal (de-energized) position.

The circuit numbers used in the schematics represent entire circuit sections using the same number. Actual circuits may have letter suffixes added to indicate specific portions of the circuit. For the exact designation, refer toDiagnosis Test and Adjust Group 15in this section or to the tractor wiring harness.

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Ref. 270-15B-005 Schematic

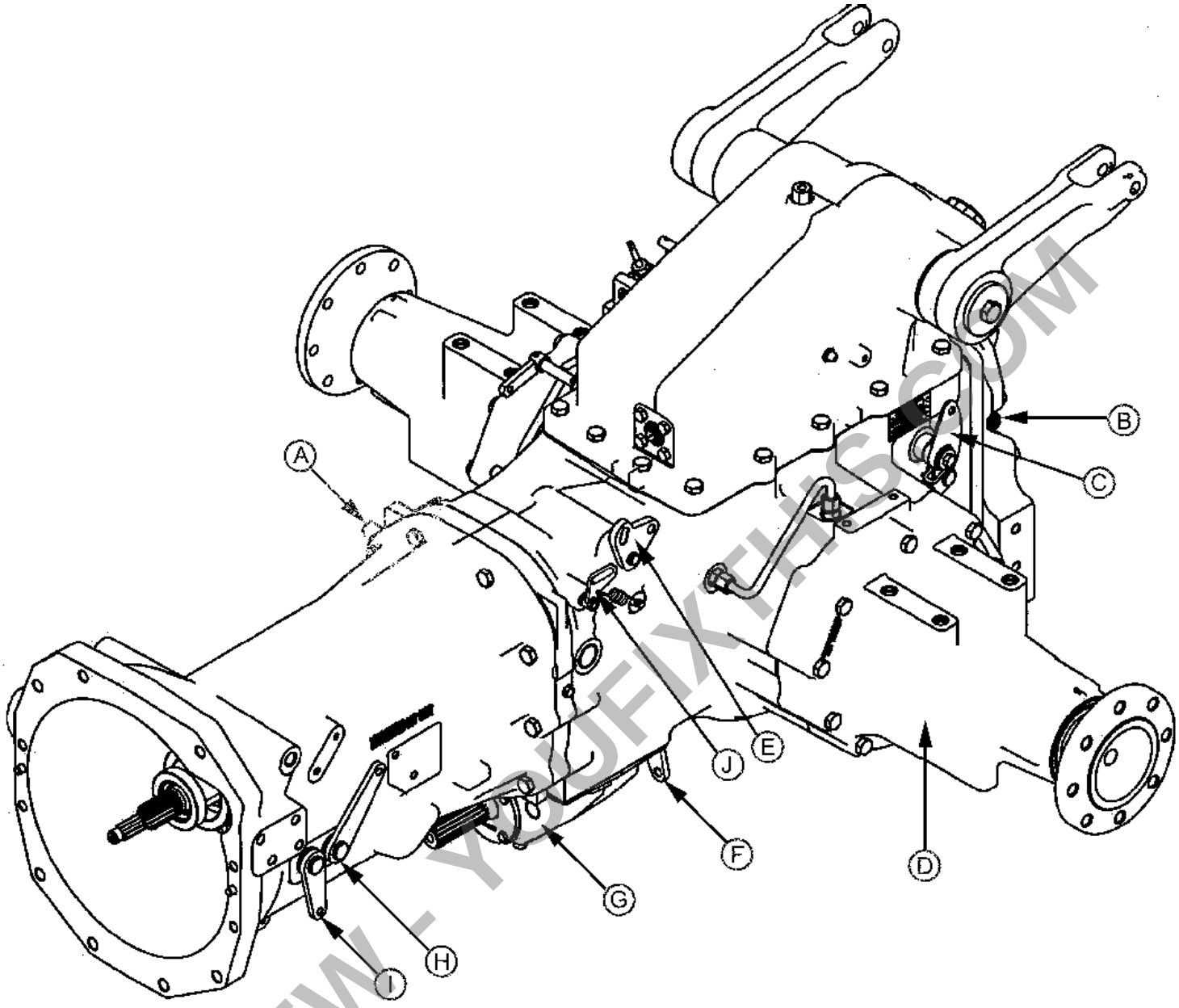


rockshaft hydraulic schematic

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Ref. 250-15A-003 Detailed Description



Power Train Complete

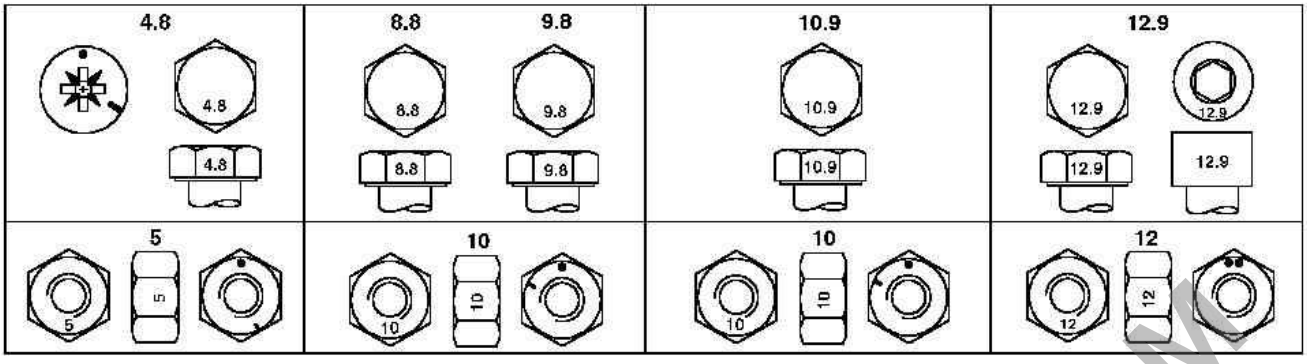
LEGEND:

A	Gear Shift Linkage
B	PTO Shaft
C	Left Brake Linkage
D	Final Drive/Axle
E	Range Lever Linkage
F	MFWD Linkage
G	MFWD Gearbox
H	Traction Clutch Linkage
I	PTO Clutch Linkage
J	Interlock Lever

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Metric Bolt and Cap Screw Torque Values



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

Metric Bolt and Cap Screw Torque Values, 1 of 2

	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.								

Metric Bolt and Cap Screw Torque Values, 2 of 2

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 fastener 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.

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Group 20 - Diagnostic and Testing Procedures

Troubleshooting

To prevent unnecessary loss of time and money, use the following seven steps for a quick and accurate method of locating troubles:

[1] - KNOW THE UNIT

In other words, ′Do your homework′. Study the Operator′s Manual and this manual to know how the individual components work and what their function is in the overall system.

Keep up with the latest service information. Read and then file in a handy place. Information received today may have the cause and remedy of a problem being encountered.

[2] - CONSULT THE OPERATOR

Ask the operator how the machine was performing when it started to fail. Find out what was unusual about it.

Also, find out if any ′do-it-yourself′ service was performed. You may find the problem somewhere else, but you should know if any corrective measures have already been taken.

Ask how the machine is used and how often it is serviced. Many problems are caused by poor maintenance or abuse.

[3] - OPERATE THE MACHINE

If the machine is operable, operate it yourself. Do not rely completely on the operators story, check it out yourself.

Are gauges reading normal? If not, maybe the component being monitored is not functioning correctly or the gauge is faulty.

How is the performance? Is the action perhaps too fast or too slow, erratic, or none at all?

Do the controls feel solid or spongy? Do they seem to be sticking?

Do you smell or see any signs of smoke?

Do you hear any unusual sounds? Where?

[4] - INSPECT THE MACHINE

Get off the machine and make a visual check. Use your eyes, ears and nose to spot any signs of trouble.

Look closely at the components. Inspect for cracked welds, loose hardware, damaged linkages, worn or broken lines, etc.

During the inspection, make notes of all trouble signs.

[5] - LIST THE POSSIBLE CAUSES

With the information obtained during steps 1 through 4, make a list of possible causes.

What were the signs you found while inspecting the machine? What is the most likely cause?

[6] - REACH SOME CONCLUSIONS

Look over the list of possible causes and decide which are the most likely and which are the easiest to verify.

Review the ′Diagnosing Malfunctions′ section as a helpful guide.

Reach your decision on the probable causes and plan to check them first.

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Group 15 - Specifications

Machine Specifications

→NOTE:

(Specifications and design subject to change without notice.)

Power

Available Power		
Tractor Model	**6403**	**6603**
Factory Observed PTO Power @ 2100 rpm	67 kW (90 hp)	77kW (103 hp)
Maximum Rated Torque	449 N˙m (331 lb-ft)	495 N˙m (365 lb-ft)

Engine Specifications

General Specifications		
Engine		
Tractor Model	**6403**	**6603**
Engine Model	4045T PowerTech®	6068T PowerTech®
Aspiration	Turbo	Turbo
Cylinders	4	6
Bore	106 mm (4.17 in.)	106 mm (4.17 in.)
Stroke	127 mm (5 in.)	127 mm (5 in.)
Displacement	4.5L (276 cu in.)	6.8L (414 cu in)
Compression	17.0:1	17.0:1
Firing Order	1-3-4-2	1-5-3-6-2-4
Intake Valve	0.31 - 0.38 mm (0.012 - 0.015 in.)	0.31 - 0.38 mm (0.012 - 0.015 in.)
Exhaust Valve	0.41 - 0.48 mm (0.016 - 0.019 in.)	0.41 - 0.48 mm (0.016 - 0.019 in.)
Slow Idle	850 ± 50 rpm	850 ± 50 rpm
Fast Idle	2275 ± 25 rpm	2275 ± 25 rpm
Operating Speed Range	850 - 2275 rpm	850 - 2275 rpm

Electrical System—12-Volt, Negative Ground		
Battery Voltage	**12-volt**	**12-volt**
Cold Cranking Amps	550 CCA	925 CCA
Alternator Amperage	65 Amp	65 Amp
Starting Motor Power	3.1 kW (4.2 hp)	3.1 kW (4.2 hp)
7-Pin Connector	Optional	Optional

Transmission		
Transmission Type	**6403**	**6603**
Collar Shift	**Standard**	**Standard**
Gears Forward	9	9
Gears Reverse	3	3
Speed Ranges	3	3

Top Shaft Synchronized (TTS)	Optional	Optional
Gears Forward	9	9
Gears Reverse	3	3
Speed Ranges	3	3

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Group 40 - Electrical System Operational Checkout

Electrical System Operational Checkout

Electrical System Operational Check

(1) Dash Self Test

Action:

Before starting engine, with key switch in "Run" position, do the hourmeter display, battery indicator and oil pressure lights come on?

Result:

YES:GO TO 2

NO:GO TO Ref. 240-15H-006 Instrument Panel Overall Diagnostics

(2) Horn

Action:

If equipped, push the horn button. Does the horn sound?

Result:

YES:GO TO 3

NO:GO TO Ref. 240-15F-006 Horn Diagnostics

(3) Starting Circuit

Action:

Can the engine be turned over with the starter?

Result:

YES:GO TO 4

NO:GO TO Ref. 240-15T-006 Starting System Diagnostics

(4) Starting Circuit

Action:

Does the engine start while cranking?

Result:

YES:GO TO 6

NO:GO TO 5

(5) By-Pass Start

Action:

Has a by-pass starting attempt been made?

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Section 212 - OBSERVABLE SYMPTOMS

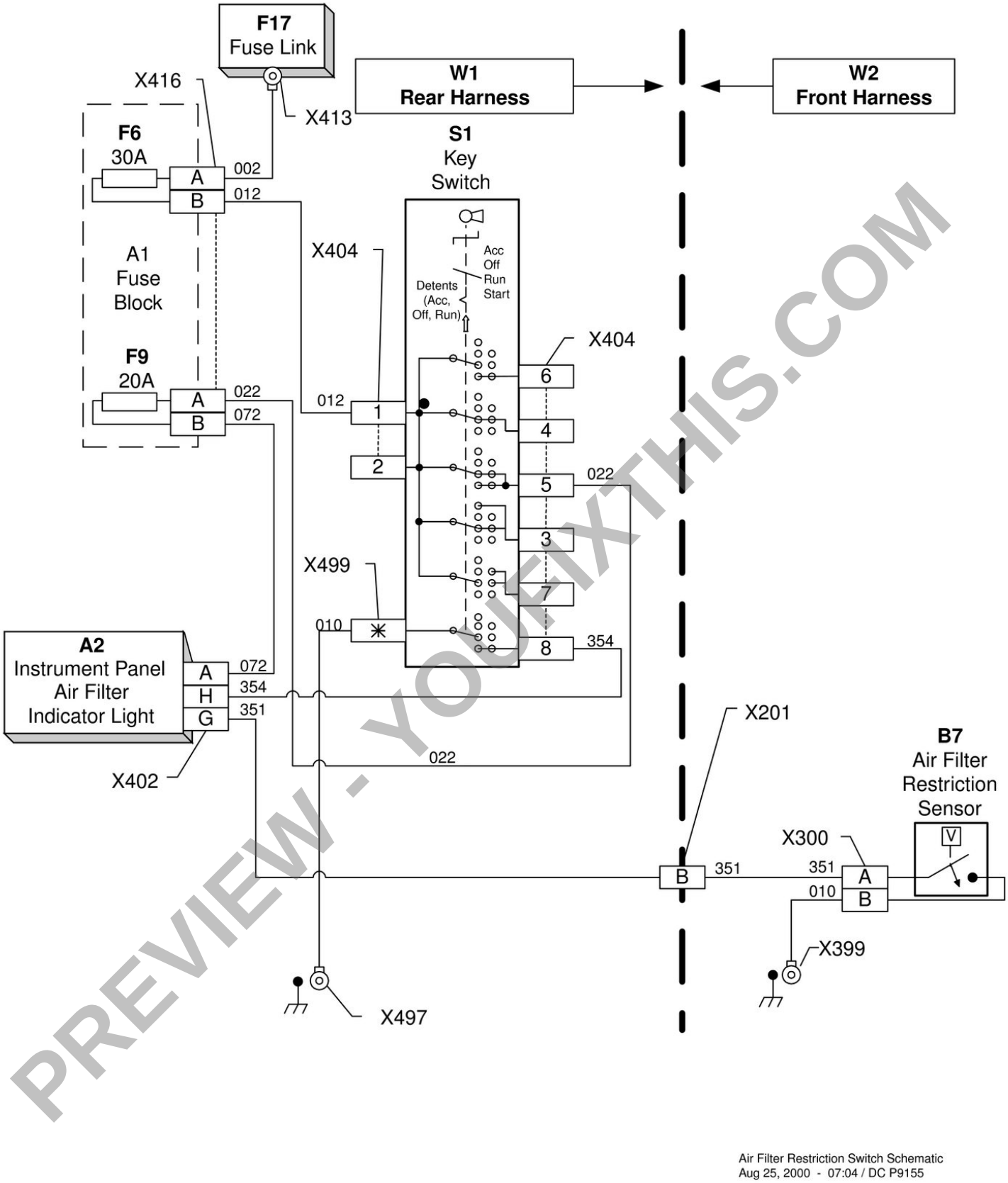
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Ref. 240-15A-005 Electrical Schematics



Air Filter Restriction Switch Schematic
Aug 25, 2000 - 07:04 / DC P9155

Air Filter Schematic

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Group 15H - Instrument Panel Overall Diagnostics

Ref. 240-15H-001 Brief Description

The instrument panel in the dash is the primary display of operating information to the operator. The display consists of analog gauges for the tachometer, fuel gauge and engine temperature gauge. There are warning lights for the air filter restriction, oil pressure, battery/charging, PTO and high beam headlights. There is a single digital readout for the hourmeter.

Ref. 240-15H-002 Basic Operation

The dash instrument panel is the primary display of information to the operator. With key in "Run" position, engine not running, the instrument warning lights will illuminate to perform a self test. After the engine is started, the lights will go out if there is not a problem with the system. With the engine running, the instruments will display fuel level, engine temperature, engine speed and alert operator of problems by illuminating the corresponding warning light.

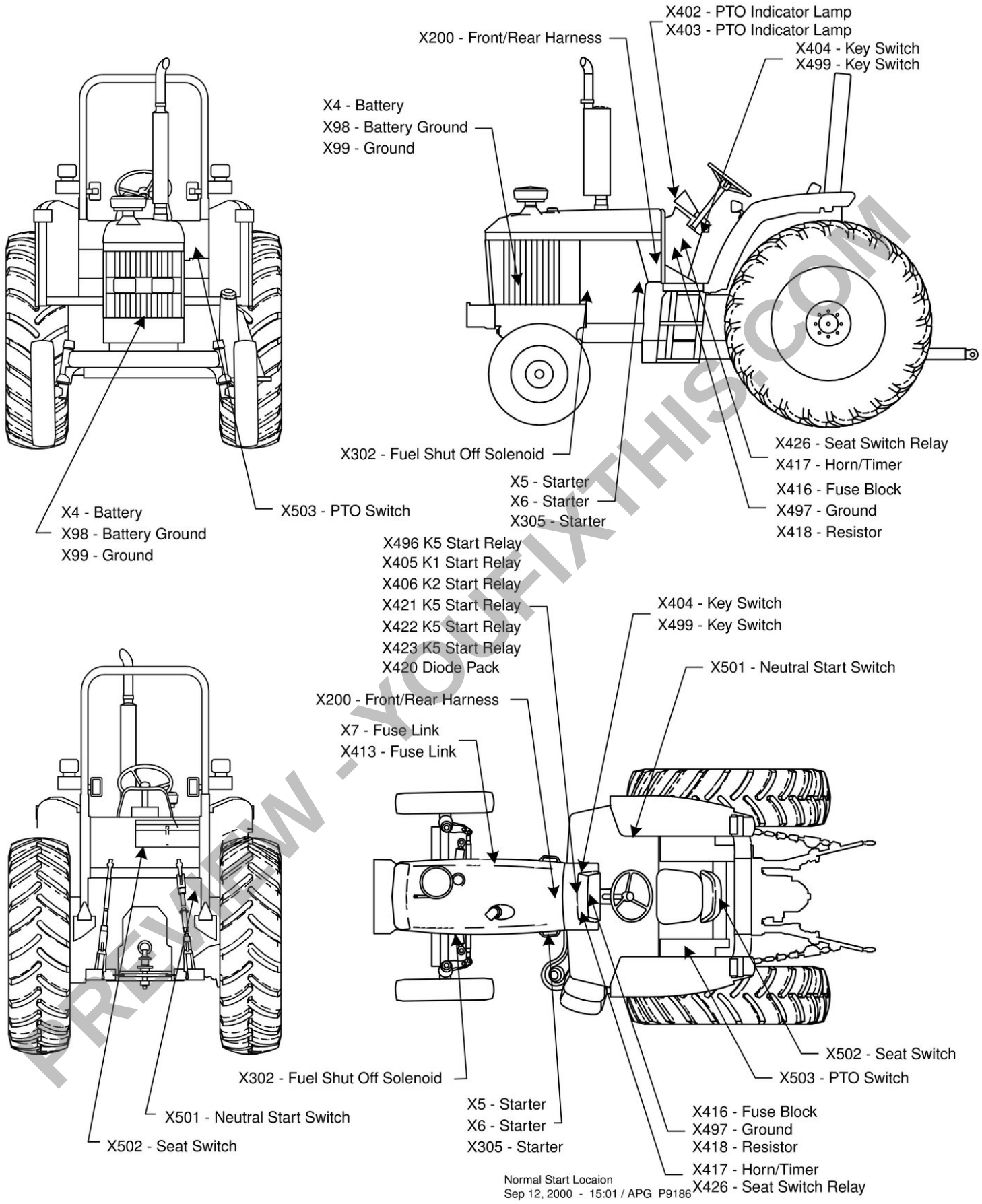
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Ref. 240-15T-004 Connector Locations



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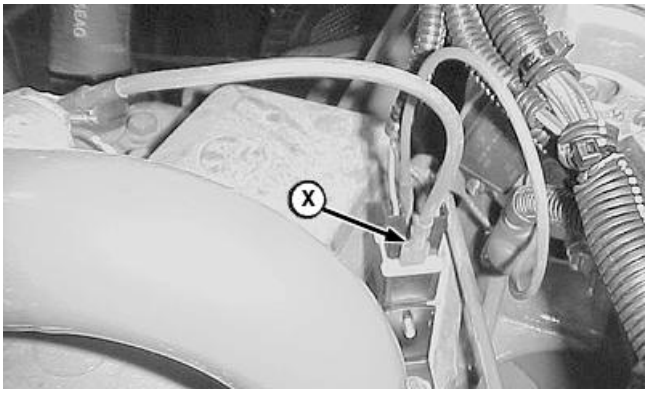
Connector locations

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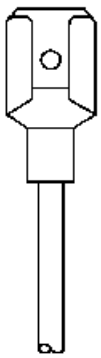
X312

Pin Number	Circuit Code
*	002

X313 - Manifold Heater (Relay to Heater)



X313 Connector Location

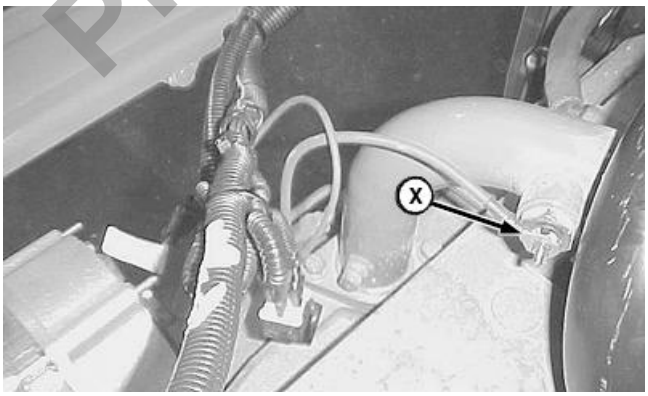


X313 Connector Drawing

X313

Pin Number	Circuit Code
*	383

X314 - Manifold Heater



X314 Connector Location

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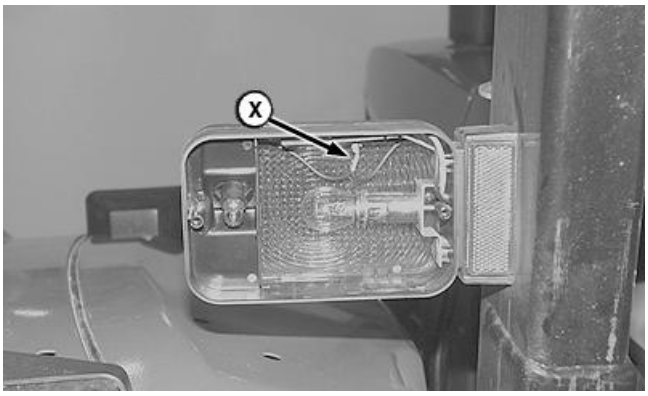
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X591 Connector Drawing

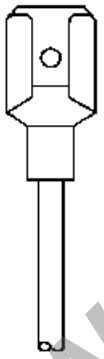
X591

Pin Number	Circuit Code
*	Black

X592 - Left Warning and Tail Light Bulb Ground



X592 Connector Location

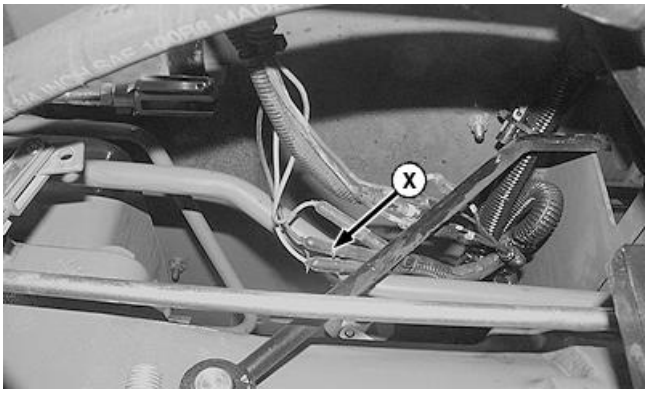


X592 Connector Drawing

X592

Pin Number	Circuit Code
*	Black

X595 - Right Warning and Tail Light Ground



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C	Fuse (15 Amp)
D	Key Switch
E	10-Amp Fuse
F	10-Amp Fuse
G	Instrument Cluster
H	Air Filter Restriction Indicator Light
I	Air Filter Restriction Switch
J	Ground
K	Power Circuit
L	Ground Circuit
M	Control Circuit

FUNCTION:

Alerts operator of the need to service air filter.

MAJOR COMPONENTS:

- Fuse (15 Amp)
- 10-Amp Fuses
- Instrument Cluster
- Air Filter Restriction Indicator Light
- Air Filter Restriction Switch

THEORY OF OPERATION:

Unswitched power from battery (A) is available at the following components:

- Fuse Link (B)
- Key Switch Fuse (C)
- Key Switch (D)
- Instrument Cluster Fuse (F)
- Instrument Cluster (G)

When the key switch (D) is in the RUN position, current flows through circuit 032, 10-amp fuse (E), circuit 072, then to terminal J1-A of instrument cluster, causing the instrument cluster to power up. The instrument cluster supplies power out terminal J1-G to air filter restriction switch (I).

The contacts of air filter restriction switch (I) are vacuum-activated and are open when the engine air intake system is operating normally (no restrictions), air filter restriction indicator (H) is not on.

When the air intake becomes restricted, vacuum increases in the air filter housing. When the vacuum reaches a predetermined level, the switch contacts will close and provide a path to ground for air filter restriction indicator light (H), thus causing the indicator light to come on.

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Test Location	Normal	If Not Normal
28. Left terminal of fuse F6.	Battery voltage.	Check for corroded connection or break in wire between fuse F6 and fuse F5.
29. Left terminal of fuse F2.	Battery voltage.	Check for corroded connection or break in wire between fuse F6 and fuse F2.
30. Right terminal of fuse F2	Battery voltage.	Check for failed fuse F2. If fuse is good, check for corroded or loose terminals.
31. Terminal B of light switch.	Battery voltage.	Check for corroded connection or break in wire between fuse/relay block and light switch.

CONDITIONS:

- Light switch in HD_1 position.

Lighting System Test points—Headlights and Instruments Lights

Test Location	Normal	If Not Normal
32. Terminal HD_1 of light switch.	Battery voltage.	Check that light switch is in HD_1 position. If switch is in HD_1 position, test light switch.
33. Terminal 86 of high beam headlight relay (K4).	Battery voltage.	Check for corroded connection or break in wire between fuse/relay block and light switch.
34. Terminal 87 of high beam headlight relay (K4).	Battery voltage. High beam relay energized.	Check for corroded connections. Test relay.
35. Left terminal of backlight diode (V3).	Battery voltage.	Check for corroded connection or break in wire between relay terminal 87 and diode.
36. Terminal C of 6-pin instrument cluster connector.	Battery voltage. High beam indicator on.	Check for corroded connection or break in wire between fuse/relay block and 6-pin connector.
37. Right terminal of backlight diode (V3).	Battery voltage.	Test diode and connections.
38. Right terminal of backlight diode (V2).	Battery voltage.	Check for corroded connection or break in wire between backlight diodes.
39. Terminal B of 10-pin instrument cluster connector.	Battery voltage. Instrument cluster backlights on.	Check for corroded connection or break in wire between fuse/relay block and 10-pin connector.
40. Terminal L of male pin side of 16-pin connector.	Battery voltage.	Check for corroded connection or break in wire between high beam relay terminal 87 and 16-pin connector.
41. Terminal L of female socket side of 16-pin connector.	Battery voltage.	Make sure connector is fully pressed together. Check for corroded or damaged terminals. Repair or replace connector.
42. Terminal A of 3-pin right headlight connector.	Battery voltage.	Check for corroded connection or break in wire between 16-pin connector and 3-pin connector.
43. Terminal C of 3-pin right headlight connector.	Less than 0.2 volt.	Check for corroded connection or break in black wire 010B between 3-pin connector and ring terminal ground.
44. Terminal A of 3-pin left headlight connector.	Battery voltage.	Check for corroded connection or break in wire between 3-pin right headlight connector and 3-pin left headlight connector.
45. Terminal C of 3-pin left headlight connector.	Less than 0.2 volt.	Check for corroded connection or break in wire between 3-pin right headlight connector and 3-pin left headlight connector.

CONDITIONS:

- Light switch in HD_2 position.

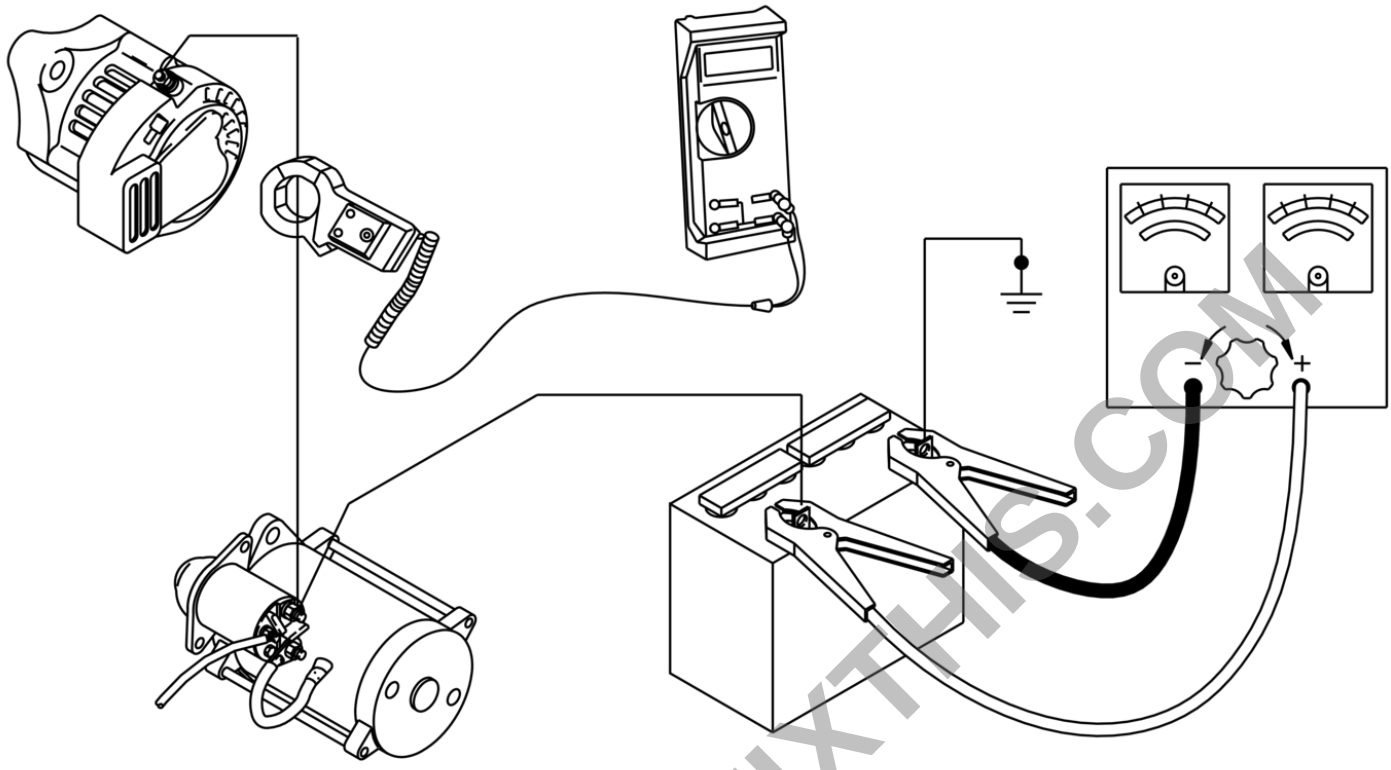
Lighting System Test points—Headlights and Instruments Lights

Test Location	Normal	If Not Normal
46. Terminal HD_2 of light switch.	Battery voltage.	Check that light switch is in HD_2 position. If switch is in HD_2 position, test light switch.
47. Terminal 86 of low beam headlight relay (K3).	Battery voltage.	Check for corroded connection or break in wire between fuse/relay block and light switch.
48. Terminal 87 of low beam headlight relay (K3).	Battery voltage. Low beam relay energized.	Check for corroded connections. Test relay.
49. Left terminal of backlight diode (V2).	Battery voltage.	Check for corroded connection or break in wire between low beam relay terminal 87 and diode.
50. Right terminal of backlight diode (V2).	Battery voltage. Instrument cluster backlights on.	Check diode and connections.
51. Terminal K of male pin side of 16-pin connector.	Battery voltage.	Check for corroded connection or break in wire between low beam relay terminal 87 and 16-pin connector.

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Alternator/Regulator Test



Alternator/Regulator Test

REASON:

To determine condition of alternator/regulator.

EQUIPMENT:

- JT05685 Load Tester
- JT02153 Current Clamp-On Probe

CONNECTIONS:

[1] - Park brake engaged.

[2] - Be sure battery is fully charged and all tractor accessories are off.

[3] - Turn load knob of load tester off (fully counterclockwise).

[4] - Connect red load tester clamp to positive (+) post of battery.

[5] - Connect black load tester clamp to negative (—) post of battery.

[6] - Put current clamp-on probe over large red cable between alternator and starter.

PROCEDURE:

[1] - Start engine and run at 2400 rpm.

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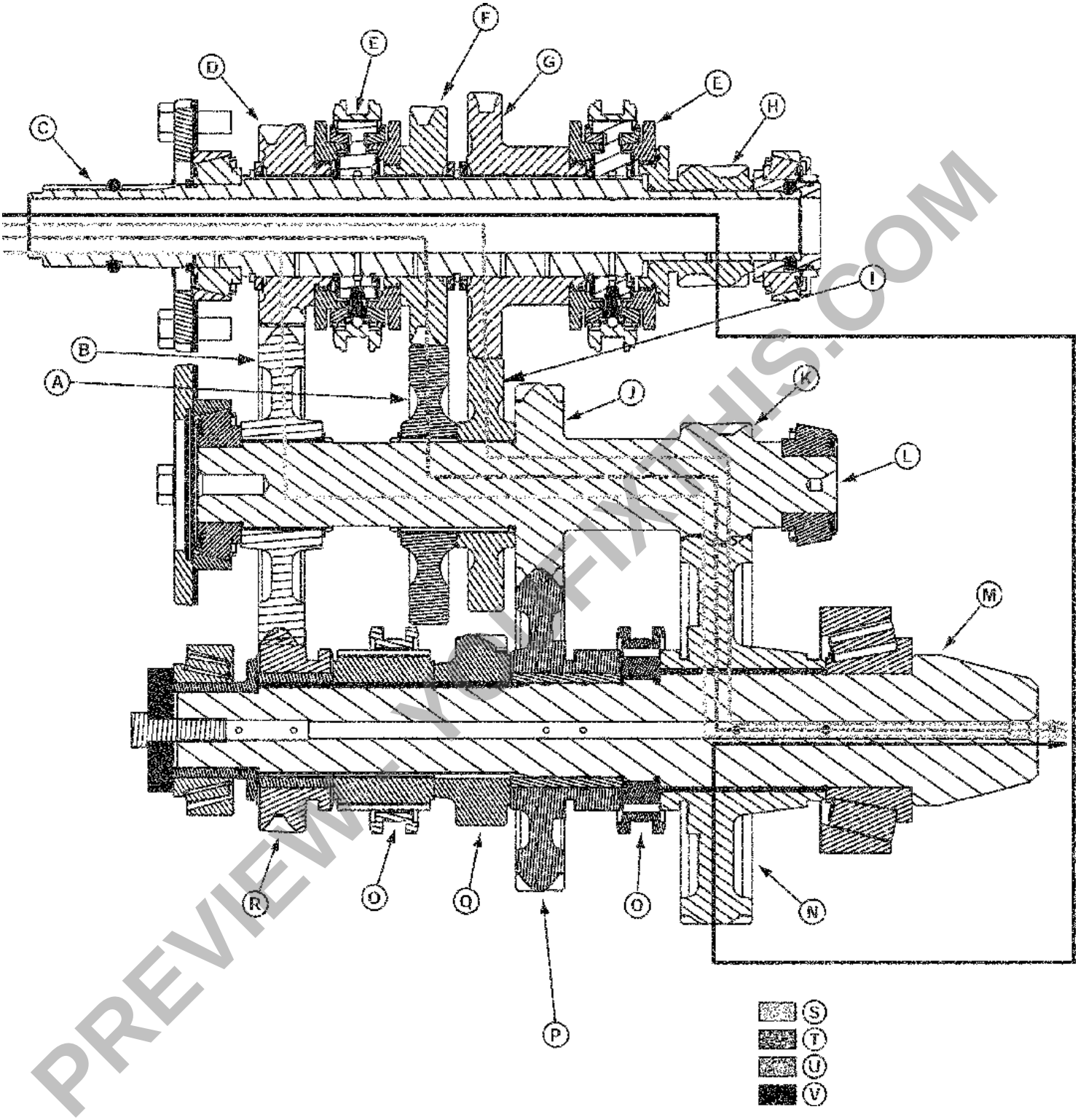
K12 Right Turn/Warning Lights Relay (SE8)
K15 Bypass Start Relay #1 (SE2)
K16 Bypass Start Relay #2 (SE2)
K17 Back-up Alarm Relay (Optional) (SE14)
K18 HVAC Relay (SE16)
K19 Left Blower Relay (SE16)
K20 Right Blower Relay (SE16)
K21 Wiper System Relay (SE17)
K22 Warning Relay (SE7)
K23 Turn Signal Warning Flasher Relay (SE8)
M1 Starting Motor (SE1)
M2 Left Blower Motor (SE16)
M3 Right Blower Motor (SE16)
M4 AC Compressor Clutch (SE16)
M5 Front Wiper Motor (SE17)
M6 Front Washer Pump (SE17)
M7 Rear Wiper Motor (SE17)
M8 Rear Washer Pump (SE17)
R1 Manifold Heater (SE1)
R2 Resistor (3 Ohm, 5 Watt) (SE2)
R3 Blower Motor Resistors (SE16)
S1 Key Switch (SE1)
S2 Rear PTO Switch (SE2)
S3 Neutral Start Switch (SE2)
S4 Seat Switch (SE13)
S5 Horn Switch (SE4)
S6 Light Switch (SE5)
S7 Turn Signal Switch (SE8)
S8 Blower Switch (SE16)
S9 A/C On/Off Switch (SE16)
S10 Front Wiper Switch (SE17)
S11 Rear Wiper Switch (SE17)
S12 Left Door Switch (SE19)
S13 Reverse Switch (SE14)
S14 Beacon Light Switch (SE10)
S15 High/Low Beam Switch (SE6)
S16 Hazard Warning Switch (SE14)
S17 Right Work Lamp Switch
S18 Left Work Lamp Switch
S19 Hand Brake Switch
V1 Air Intake Relay Diode (SE1)
V2 Low Beam Backlight Diode (SE6)
V3 High Beam Backlight Diode (SE6)
V4 Accessory Relay Diode (SE3)
V5 Bypass Relay Diode (SE3)
V6 A/C Compressor Clutch Diode (SE16)
X1 Trailer Connector (SE12)
X2 Junction Box (SE11)
Y1 Fuel Shutoff Solenoid (SE2)

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Ref. 250-15F-003 Detailed Description

Transaxle Power Flow—A Range, Speed and Reverse Gears



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A-Range Power Flow

LEGEND:

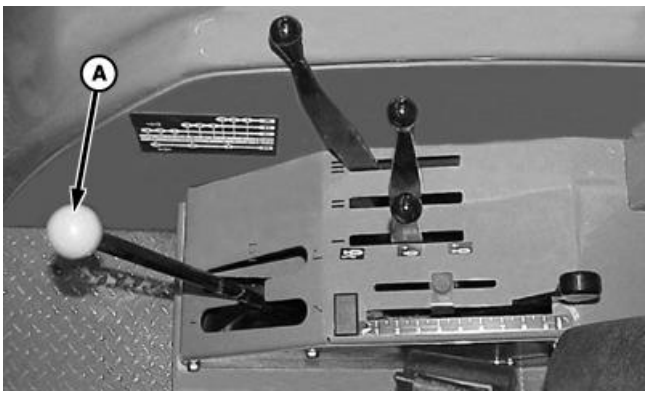
A	2nd Speed Output Gear
B	1st Speed Output Gear (C-Range Input Gear)
C	1st Stage (Input Shaft)
D	1st Speed Input Gear
E	Shift Collar or Synchronizer
F	2nd Speed Input Gear
G	3rd Speed Input Gear
H	Reverse Input Gear
I	3rd Speed Output Gear

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Group 20 - Component Location

Ref. 250-20-001 Component Information

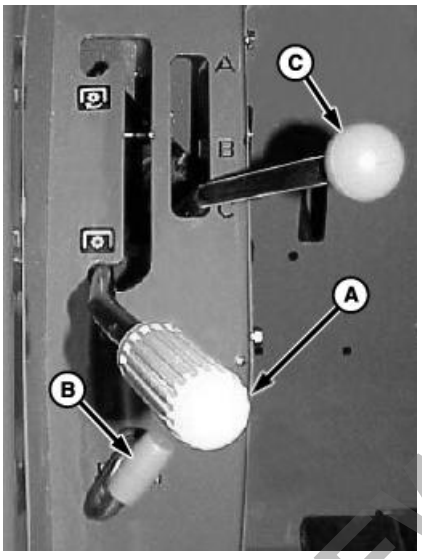
Gear Shift Lever



LEGEND:
A Gear Shift Lever

Gearshift Lever

Range, PTO and MFWD Levers



LEGEND:
A PTO Lever
B MFWD Lever
C Transmission Range Lever

Range, PTO and MFWD Levers

Differential Lock Pedal



LEGEND:
A Differential Lock Pedal

Differential Lock Pedal

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Action:

Raise Implement fully so that system goes into relief. Release SCV lever and observe implement. Does Implement leak down in less than 15 seconds?

Result:

YES:GO TO 6

NO:GO TO Ref. 270-15C-006 Selective Control Valve Diagnostics

(6) Check Float Function

Action:

When checking the float valves does the Implement lower when put into float from the raised position?

Result:

YES:GO TO 7

NO:GO TO Ref. 270-15C-006 Selective Control Valve Diagnostics

(7) Check Regen Function

Action:

When checking the Regen valve (with a loader bucket) does the bucket roll over smoothly with a load?

Result:

YES:DONE

NO:GO TO Ref. 270-15C-006 Selective Control Valve Diagnostics

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Ref. 280-15-006 Steering System Diagnostics

Steering System Diagnostics

(1) Check Reservoir

Action:

Check reservoir for proper type and quantity of oil.

Is type and level OK?

Result:

YES:GO TO 2

NO: Replace or add oil as needed.GO TO 2

(2) Check Tractor Set-Up

Action:

Check tire pressures, ballasting and implement fit-up.

→NOTE:

For Specifications, refer to Operator′s Manual OMRE175728.

Is the tractor set up properly?

Result:

YES:GO TO 3

NO:Make setup changes to machine using specifications in Operator′s Manual. GO TO 3

(3) Check for Leaks

Action:

Inspect steering lines and hoses for damage or leaks.

Are there any leaks present?

Result:

YES: Repair leak(s).GO TO 1

NO:GO TO 4

(4) Check Steering Toe-In

Action:

Check steering toe-in.

Refer to TM6020, Section 60 for check and adjustment procedures.

Was toe-in adjustment correct?

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