300D, 310D, 315D Backhoe Loader Operation and Test

TECHNICAL MANUAL

TM1496 21SEP05 (ENGLISH)

For complete service information also see:

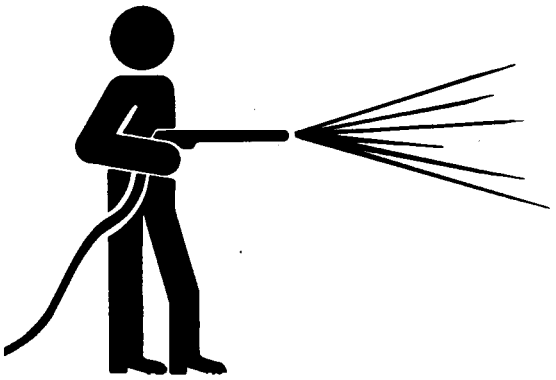
Worldwide Construction And Forestry Division

LITHO IN U.S.A.

Work in Clean Area

Before starting a job:

- Clean work area and machine.
- Make sure you have all necessary tools to do your job.
- Have the right parts on hand.
- Read all instructions thoroughly; do not attempt shortcuts.



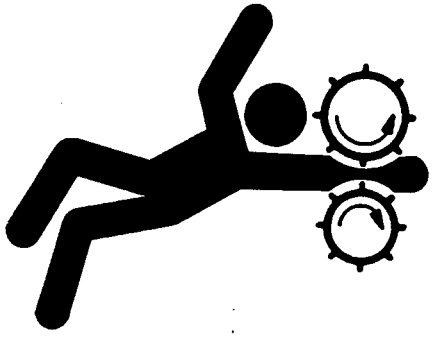
T6642EJ –UN–18OCT88

DX,CLEAN –19–04JUN90–1/1

Service Machines Safely

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.



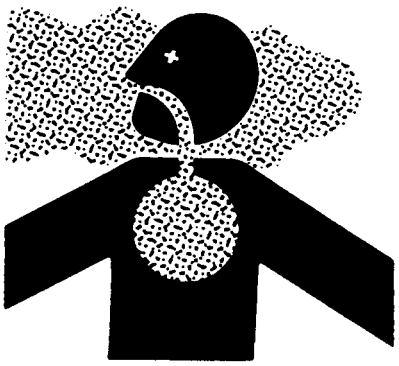
TS228 –UN–23AUG88

DX,LOOSE –19–04JUN90–1/1

Work In Ventilated Area

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area

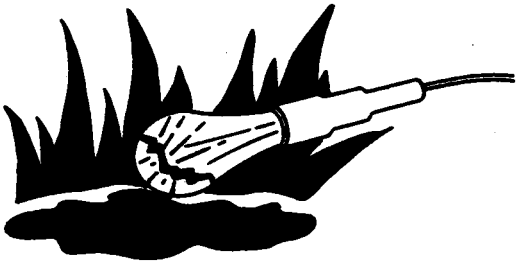


TS220 –UN–23AUG88

DX,AIR –19–17FEB99–1/1

Illuminate Work Area Safely

Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.



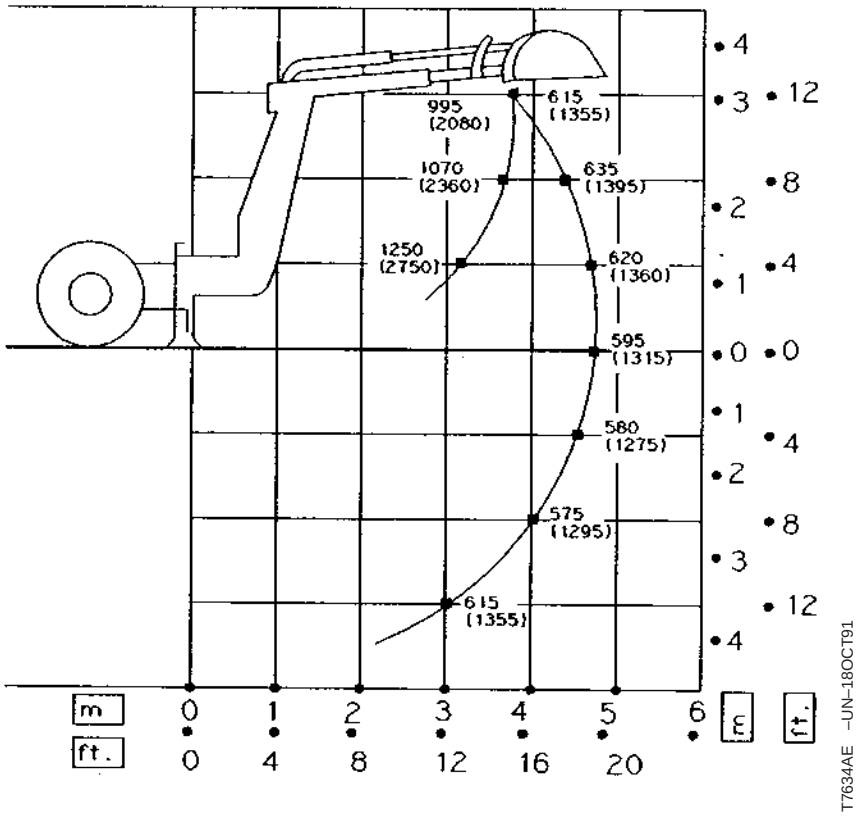
TS223 –UN–23AUG88

DX,LIGHT –19–04JUN90–1/1

300D Backhoe Loader Drain And Refill Capacities

	Metric	U.S.
Engine coolant	16 L	17 qt
Engine oil (including filter)	8.5 L	9 qt
Torque converter and reverser	7.5 L	8 qt
Transaxle		
(without MFWD)	21 L	22 qt
(with MFWD)	22 L	23 qt
Fuel tank		
Serial No. —802199	106 L	28 gal
Serial No. 802200—	129 L	34 gal
Hydraulic system reservoir	41.5 L	44 qt

TX,115,DH1387 –19–12OCT94–1/1



Lift Capacity, Backhoe With Extendible Dipperstick, Extended Based On SAE J31 (Except With Loader Bucket On Ground)

Continued on next page

TX,115,DH1398 –19–29OCT91–2/3

Hardware Torque Specifications

Check cap screws and nuts to be sure they are tight. If hardware is loose, tighten to torque shown on the following charts unless a special torque is specified.

TX,90,FF1225 –19–15MAR93–1/1

Checking Wheel Fasteners

Tighten wheel cap screws and fasteners.

Front Axle—Specification

Standard Axle—Torque ..... 136 +20 -27 N•m (100 +15 -20 lb-ft)

MFWD Axle—Torque ..... 300 +110 -40 N•m (221 +81 -29 lb-ft)

Rear Axle—Specification

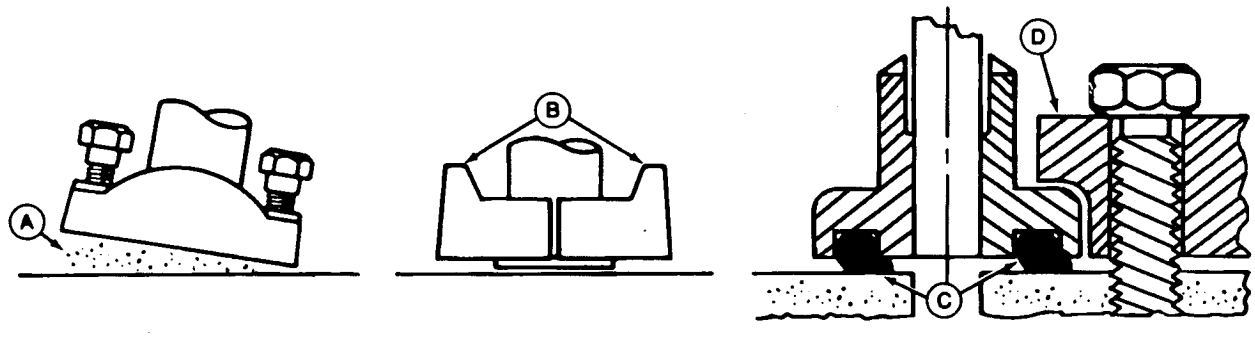
Standard Axle—Torque ..... 575 +170 -115 N•m (425 +125 -85 lb-ft)

T6000AU –UN–18OCT88

T87507 –UN–21OCT88

TX,90,DH1383 –19–09DEC93–1/1

Service Recommendations for Metric Series Four Bolt Flange Fitting



T6890BB –UN–01MAR90

A—Sealing Surface **B—Split Flange** **C—Pinched O-Ring** **D—Single Piece Flange**

1. Clean sealing surfaces (A). Inspect. Scratches cause leaks. Roughness causes seal wear. Out-of-flat causes seal extrusion. If defects cannot be polished out, replace component.

2. Install the correct O-ring (and backup washer if required) into groove using petroleum jelly to hold it in place.

3. Split flange: Loosely assemble split flange (B) halves. Make sure split is centrally located and perpendicular to the port. Hand tighten cap screws to hold parts in place. Do not pinch O-ring (C).

4. Single piece flange (D): Place hydraulic line in center of flange and install four cap screws. Flange must be centrally located on port. Hand tighten cap screws to hold flange in place. Do not pinch O-ring.

5. After components are properly positioned and cap screws are hand tightened, tighten one cap screw, then tighten the diagonally opposite cap screw. Tighten two remaining cap screws. Tighten all cap screws as specified in the chart below.

   DO NOT use air wrenches. DO NOT tighten one cap screw fully before tightening the others. DO NOT over tighten.

TORQUE CHART[a]		
Thread[b]	N•m	lb-ft
M6	12	9
M8	30	22
M10	57	42
M12	95	70
M14	157	116
M16	217	160
M18	334	246
M20	421	318
[a]Tolerance ± 10%. The torques given are enough for the given size connection with the recommended working pressure. Increasing cap screw torque beyond these amounts will result in flange and cap screw bending and connection failures.		
[b]Metric standard thread.		

04T,90,K175 –19–05JAN96–1/1

Mixing of Lubricants

In general, avoid mixing different brands or types of oil. Oil manufacturers blend additives in their oils to meet certain specifications and performance requirements.

Mixing different oils can interfere with the proper functioning of these additives and degrade lubricant performance.

Consult your John Deere dealer to obtain specific information and recommendations.

DX,LUBMIX –19–18MAR96–1/1

Diesel Engine Coolant

The engine cooling system is filled to provide year-round protection against corrosion and cylinder liner pitting, and winter freeze protection to -37°C (-34°F).

The following engine coolant is preferred for service:

- John Deere COOL-GARD Prediluted Coolant

The following engine coolant is also recommended:

- John Deere COOL-GARD Coolant Concentrate in a 40 to 60% mixture of concentrate with quality water.

Other low silicate ethylene glycol base coolants for heavy-duty engines may be used if they meet one of the following specifications:

- ASTM D5345 (prediluted coolant)
- ASTM D4985 (coolant concentrate) in a 40 to 60% mixture of concentrate with quality water

Coolants meeting these specifications require use of supplemental coolant additives, formulated for heavy-duty diesel engines, for protection against corrosion and cylinder liner erosion and pitting.

A 50% mixture of ethylene glycol engine coolant in water provides freeze protection to -37°C (-34°F). If protection at lower temperatures is required, consult your John Deere dealer for recommendations.

Water quality is important to the performance of the cooling system. Distilled, deionized, or demineralized water is recommended for mixing with ethylene glycol base engine coolant concentrate.

IMPORTANT: Do not use cooling system sealing additives or antifreeze that contains sealing additives.

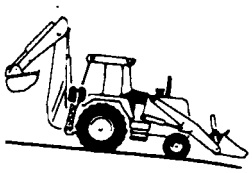
Coolant Drain Intervals

Drain the factory fill engine coolant, flush the cooling system, and refill with new coolant after the first 3 years or 3000 hours of operation. Subsequent drain intervals are determined by the coolant used for service. At each interval, drain the coolant, flush the cooling system, and refill with new coolant.

When John Deere COOL-GARD is used, the drain interval may be extended to 5 years or 5000 hours of operation, provided that the coolant is tested annually AND additives are replenished, as needed, by adding a supplemental coolant additive.

If COOL-GARD is not used, the drain interval is reduced to 2 years or 2000 hours of operation.

DX,COOL –19–04JUN90–1/1

❹ **Brake Drag Check**	 T6171AL –UN–09DEC88	Position machine on a gradual grade with front of machine downhill. Lift bucket so it clears ground. Shift FNR lever to neutral, differential lock pedal up, disengage park brake and release service brakes. *LOOK: Machine must move or coast.* *NOTE: If machine does not move freely on slope, drive the machine for five minutes. Feel axle housing area to locate which brake is dragging.*	**OK:** Go to next check. **NOT OK:** Brakes dragging. Go to Group 9020-10, Brake Drag Check. – – –1/1

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Steering System Checks

– – –1/1

❶ **Steering System Checks**	Operate engine at approximately 1000 rpm. Turn steering wheel from full left to full right several times. *LOOK: Front wheels must move smoothly in both directions.* *LOOK: When steering wheel is stopped, the front wheels must stop moving.* *NOTE: Internal leakage or a sticking steering valve spool can cause wheels to continue to move after steering wheel is stopped.*	**OK:** Go to next check. **NOT OK:** Go to Group 9025-15, Steering Valve Does Not Return to Neutral. – – –1/1

❷ **Steering System Leakage Check**	*NOTE: Hydraulic oil must be at operating temperature.* Run engine at slow idle. Turn steering wheel until wheels are in maximum right turn position. Continue turning steering wheel, using approximately 11.3 N•m (100 lb-in.) force while counting steering wheel rpm. Repeat leakage check turning steering wheel to the left. *LOOK: Steering wheel must not turn more than 5 rpm to the left or right. Use good judgement, excessive steering wheel rpm does not mean steering will be affected.*	**OK:** Go to next check. **NOT OK:** If steering wheel turns more than 5 rpm, verify whether valve or cylinder is leaking. Go to Group 9025-25 , Steering System Leakage Test. – – –1/1

❷ **Rear Light Switch Check**	Turn key switch to ON position. Push side console rear light rocker switch in. *LOOK: Rear light (s) must come on.*	**OK:** Go to next check. **NOT OK:** Check fuse and bulbs. **OK:** Check wiring. Go to Group 9015-10, Light Circuit Checks. – – –1/1

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❸ **Turn Signal Check**	Turn key switch to ON position. Push right side of turn signal rocker switch down. *LOOK: Right front and rear amber lights must flash. Right indicator light on top of steering column must flash.* Push left side of turn signal rocker switch down. *LOOK: Left front and rear amber lights must flash. Left indicator light on top of steering column must flash.*	**OK:** Go to next check. **NOT OK:** Check fuses and wiring. Go to Group 9015-15, Lighting Circuit Checks. – – –1/1

❹ **Warning Light Check**	Key switch ON. Push bottom of warning light rocker switch in. *LOOK: Both front and rear amber lights must come one. Both turn signal indicators and light in warning light rocker switch must flash.*	**OK:** Go to next check . **NOT OK:** Check fuses and wiring. Go to Group 9015-15, Lighting Circuit Checks. – – –1/1

❺ **Horn Check**	Turn key switch to ON position. Push horn button *LISTEN: Horn must sound.*	**OK:** Go to next check. **NOT OK:** Check fuses and wiring. Go to Group 9015-15, Accessory Checks. – – –1/1

Cab Component Checks

– – –1/1

The engine is equipped with a gear driven oil pump and full-flow oil filter. The oil filter has an internal bypass valve which opens if the filter element becomes restricted. Most engines are equipped with an oil cooler mounted externally on the cylinder block. The engine is equipped with a pressure regulator valve to relieve excessive pressure build-up in the main oil gallery, and a bypass valve to prevent oil starvation if the oil cooler and filter become plugged.

Balancer shafts are used on some four-cylinder engines to reduce vibration. The two shafts rotate on bushings in cylinder block and are counter-rotating at twice engine speed.

The engine has a pressurized cooling system, consisting of radiator, water pump, multi-blade fan, and one or two thermostats.

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CTM8,GR01,11 –19–18FEB95–2/2

4039 John Deere Engine—Use CTM8

For additional engine information, the component technical manual (CTM) is also required.

Use the CTM in conjunction with this machine manual.

M44215 –UN–07SEP88

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TX,9010,YY507 –19–05MAR93–1/1

Symptom	Problem	Solution
	Incorrect fuel injection pump timing	Time injection pump. See Injection Pump Timing in Group 9010-25.
	Excessive valve clearance	Adjust valve clearance. See Check and Adjust Valve Clearance in CTM8.
	Bent push rods	Inspect. Replace.
	Worn rocker arm shafts	Replace.
	Loose connecting rod caps	Inspect, tighten connecting rod cap screws. See Torque-Turn Connecting Rod Cap Screws in CTM8.
	Loose main bearing caps	Inspect, tighten main bearing cap screws. See procedure under Install Crankshaft in CTM8.
	Worn main bearings	Replace bearings. See Remove Crankshaft Main Bearings in CTM8.
	Worn connecting rod bearings	Replace bearings. See Inspect and Measure Connecting Rod Bearings in CTM8.
	Incorrect cam timing	Check engine timing. Repair. See procedure under Install and Time Camshaft in CTM8.
	Scored piston	Inspect. Replace.
	Worn piston pin bushings and pins	Inspect. Replace pins and bushings. See Inspect Piston Pins and Bushings in CTM8.
Low Oil Pressure (Oil Pressure Light on—Red "Stop" Flashing)	Low oil level	Add oil to proper lever. Inspect engine oil.
	Wrong viscosity oil/oil diluted with diesel fuel	Change oil. Check injection pump shaft seals and transfer pump diaphragm. See Remove Injection Pump in CTM8.

Continued on next page

Slow And Fast Idle

SPECIFICATIONS	
Slow Idle RPM	850 ± 50
Fast Idle RPM	2375 ± 50

SERVICE EQUIPMENT AND TOOLS
Tachometer
Sealing Wire Pliers

1. Run engine until it is at normal operating temperature.
2. Install tachometer. See procedure in this group.

CAUTION: Take care to avoid rotating fan blades while making injection pump adjustments.

3. Disconnect speed control rod (B) from fuel injection pump lever.
4. Start engine.
5. Hold injection pump lever forward (toward radiator). Check to make sure slow idle is 850 ± 50 rpm.

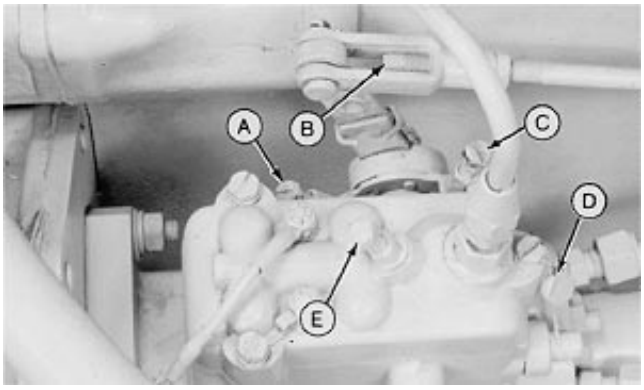
Specification

Slow Idle—RPM ..... 850 ± 50

6. If slow idle is not correct:
   a. Check air cleaner elements.
   b. Loosen lock nut and turn screw (A) out one or two turns.
   c. Loosen lock nut and turn screw (E) to adjust slow idle.
   d. Turn screw (A) in until rpm starts to increase then turn screw out one full turn. Tighten lock nuts.
7. Hold injection pump lever rearward (away from radiator). Check to make sure fast idle is 2375 ± 50 rpm.

Specification

Fast Idle—RPM ..... 2375 ± 50



T6023AD –UN–18OCT88

A—Lever Stop Screw
B—Speed Control Rod
C—Fast Idle Adjusting Screw
D—Sealing Wire
E—Slow Idle Adjusting Screw

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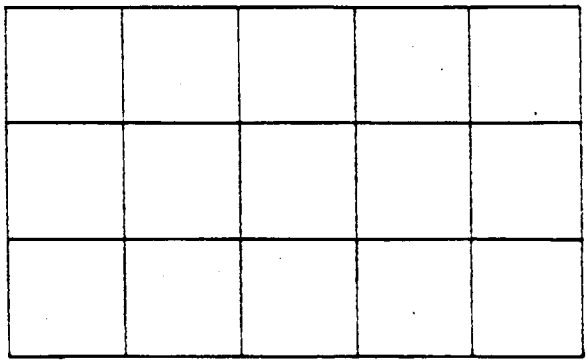
TX,9010,YY513 –19–02JUN93–1/2

JT05529 Air Flow Meter Test Record



T6041AL –UN–20APR89

CUSTOMER NAME AND ADDRESS

DATE: _____

MACHINE MODEL NO. _____

SERIAL NO. _____

PRE-TEST INSPECTION					
OK	**SERV REQD**		**OK**	**SERV REQD**	
❒	❒ Coolant Level				
❒	❒ Belt Tension		❒	❒ Correct Fan Installation (Sucker Fan)	
❒	❒ Radiator Fin Condition		❒	❒ Radiator Cap	
❒	❒ Fan Tip & Shroud Condition				

AIR FLOW TEST

1. Park brake ON.
2. Transmission in Neutral and side shields closed.
3. Divide the surface of the grille into 16 equal squares.
4. Start engine.
5. Perform air flow test at fast idle. Observe correct air flow direction and place air flow meter in direct contact with grille. (Arrow pointing to grille).
6. Record air flow in each square.
7. Combined total of air flow test readings must be greater than specifications.

TX,9010,YY518 –19–02JUN93–1/1

Visually Inspect Electrical System

Make the following visual electrical inspection prior to starting the tractor after receiving customer complaint:

1. Look for bare wires that could ground a component or short across to another component.

2. Look for missing or worn conduit. This could indicate a wire problem.

3. Look for loose or broken connectors and wires.

4. Inspect batteries for:

   - Corroded terminals
   - Loose terminals or battery posts
   - Dirty condition
   - Damp condition
   - Cracked case
   - Proper electrolyte level

5. Check alternator belt tension.

6. After machine has been shut down for five minutes inspect for overheated parts. They will often smell like burned insulation. Put your hand on the alternator. Heat in these parts when the unit has not been operated for some time is a sure clue to charging circuit problems.

7. If your visual inspection does not indicate the possible malfunction, but your inspection does indicate that the machine can be run, turn the key switch to the IGN position. Try out the accessory circuits, indicator lights, gauge lights. How does each of these components work? Look for sparks or smoke which might indicate shorts.

8. Start machine. Check all gauges for good operation and check to see if system is charging or discharging.

9. In general, look for anything unusual.

   Many electrical failures cannot be detected even if the machine is started. Therefore, a systematic and complete inspection of the electrical system is necessary.

TX,901505,QQ369 –19–07FEB96–1/1

Step 1—Switch ON Check battery side of circuit breaker (C) for battery voltage	Battery voltage normal. Go to Step 2.
	Low voltage, repair high resistance.
	Open circuit from battery.
Step 2—Switch OFF Check component side of circuit breaker for battery voltage	Battery voltage normal. Go to Step 4.
	Low voltage, repair high resistance.
	No voltage. Go to Step 3.
Step 3—Switch OFF Check component side of circuit breaker for continuity to ground	Continuity to ground. Repair grounded circuit at or before switch.
	No continuity to ground, replace circuit breaker.
Step 4—Switch ON Check component side of circuit breaker for battery voltage	Battery voltage normal. Go to Step 6.
	Low voltage, repair high resistance.
	No voltage. Go to Step 5.
Step 5[a]—Disconnect wire at battery side of component (G). Switch ON. Check wire at (G) for battery voltage	Battery voltage, repair component.
	No voltage, repair grounded or open circuit at or after switch.
Step 6—Switch ON Check lead to component at (G) for battery voltage	Battery voltage normal. Go to Step 7.
	Low voltage, repair high resistance in circuit between fuse and component.
	No voltage, repair high resistance or open circuit between fuse and component.
Step 7—Switch ON Check ground wire of component at (I) for voltage	No voltage, good continuity to ground. Repair component.
	Voltage, poor continuity to ground. Repair high resistance or open ground circuit.
[a]A multimeter will not apply a load to the circuit at step 5. The multimeter result is tested as a voltage condition in the result column.	

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TX,9015,QQ1697 –19–10AUG95–2/2

- E6—Right Rear Work Light (SE8,W5)
- E7—Left Front Drive Light (SE8,W5)
- E8—Right Front Drive Light (SE8,W5)
- E9—Left Tail Light (SE8,W5)
- E10—Right Tail Light (SE8,W5)
- E11—Left Brake Light (SE13,W5)
- E12—Right Brake Light (SE13,W5)
- E13—Beacon Light (SE14,W5)
- E14—Fuel Gauge Light (SE15,W8)
- E15—Seat Belt Light (SE9,W6) (SN789401—)
- F1—MFWD/ALT Fuse (SE2,W6)
- F2—Fuel Shutoff/Start Aid/Reverse Alarm Fuse (SE5,W6)
- F3—Dome Light Fuse (SE3,W6)
- F4—Radio Fuse (Unswitched Power) (SE3,W6)
- F5—Windshield Wiper/Washer Fuse (SE6,W6)
- F6—Heater Circuit Breaker (SE5,W6)
- F7—Rear Work Light Fuse (SE7,W6)
- F8—Front Work Light/Tail Light Fuse (SE8,W6)
- F9—FNR/Park Brake Fuse (SE9,W6)
- F10—Turn/Stop/Horn Fuse (SE12,W6)
- F11—Left Turn Light Fuse (SE13,W6)
- F12—Right Turn Light Fuse (SE13,W6)
- F13—Return-To-Dig/Beacon Fuse (SE14,W6)
- F14—Monitor Fuse (SE15,W6)
- F15—Hazard/Monitor Fuse (Unswitched Power) (SE16,W6)
- F16—Start Fuse (SE11,W6)
- F17—Fuse Block (W6)
- G1—Battery (SE1,W8)
- G2—Alternator (SE1,W8)
- H1—Left Indicator Turn Light (SE13,W7)
- H2—Left Front Turn Light (SE13,W5)
- H3—Left Rear Turn Light (SE13,W5)
- H4—Right Front Turn Light (SE13,W5)
- H5—Right Rear Turn Light (SE13,W5)
- H6—Right Indicator Turn Light (SE13,W7)
- H7—Logic Module (SE16,W6) (SN—XXXXXX)
- H8—Display Module (SE16,W6)
- H9—Red Warning Light (SE17,W6)
- H10—Yellow Warning Light (SE17,W6)
- H11—Alarm (SE17,W6)
- K1—Start Relay (SE1,W8)
- K2—Accessory Relay (SE1,W6)
- K3—Park Light Relay (SE9,W6)
- K4—Ether Aid Relay (SE4,W6) (SN—794216)

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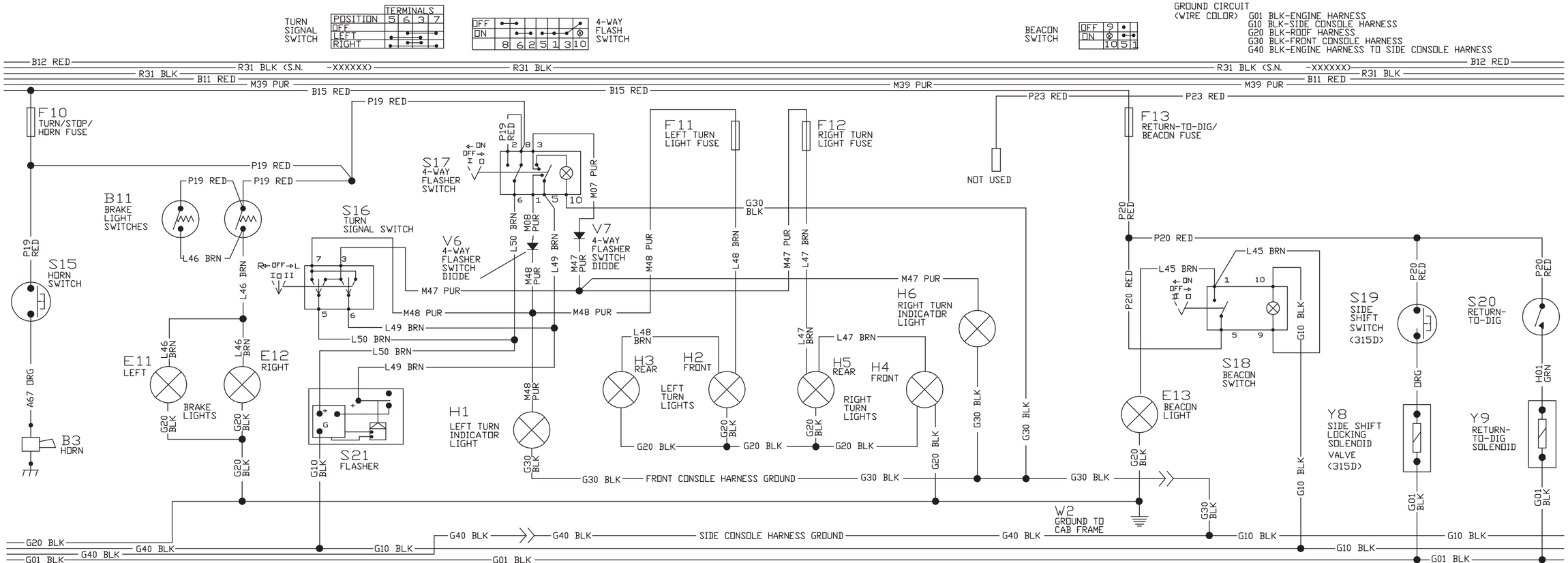

SYSTEM FUNCTIONAL SCHEMATIC (5 OF 7)

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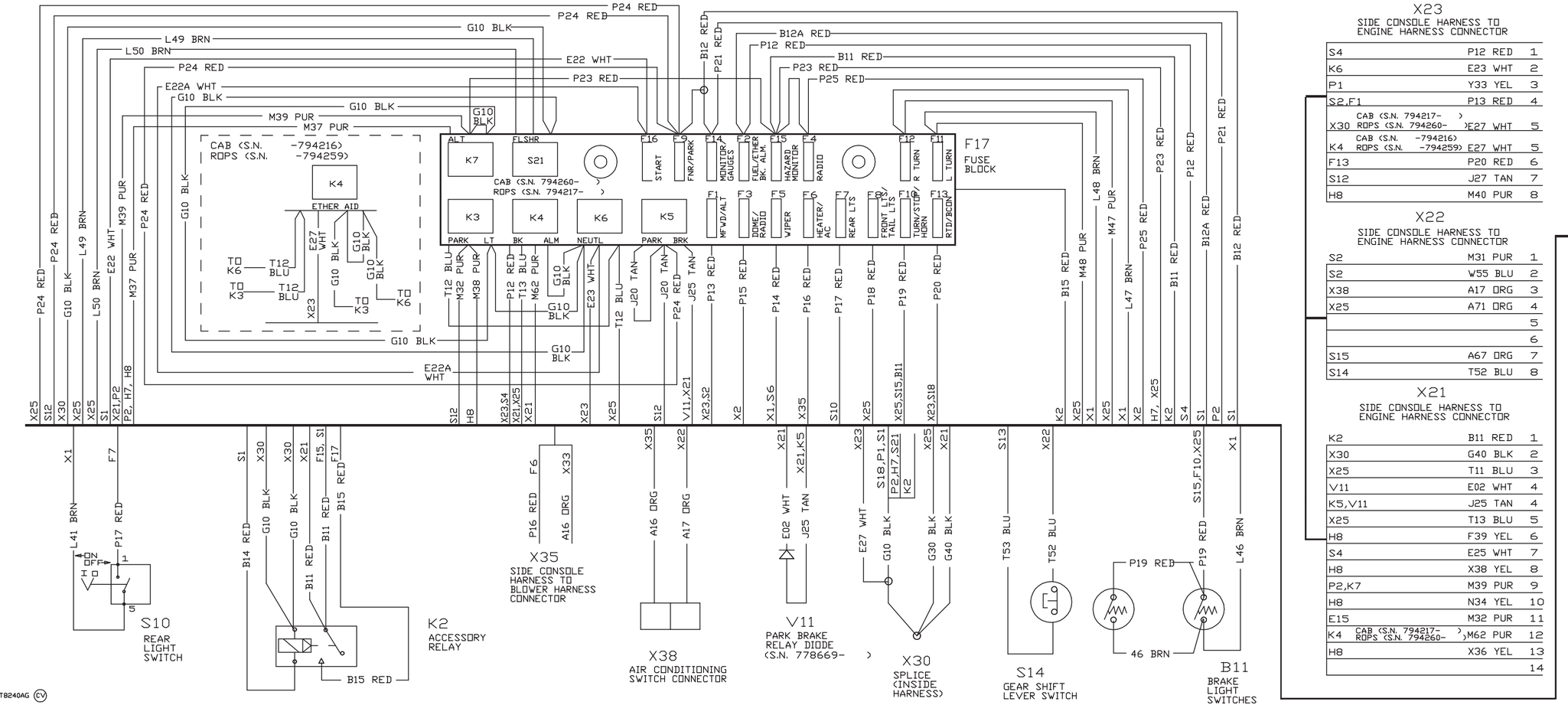
TX,9015,DY375 –19–26AUG02–6/8

T8240AG –19–18DEC98



X23
SIDE CONSOLE HARNESS TO ENGINE HARNESS CONNECTOR

S4	P12 RED	1
K6	E23 WHT	2
P1	Y33 YEL	3
S2,F1	P13 RED	4
X30 CAB (S.N. 794217-) ROPS (S.N. 794260-)	E27 WHT	5
K4 CAB (S.N. -794216) ROPS (S.N. -794259)	E27 WHT	5
F13	P20 RED	6
S12	J27 TAN	7
H8	M40 PUR	8

X22
SIDE CONSOLE HARNESS TO ENGINE HARNESS CONNECTOR

S2	M31 PUR	1
S2	W55 BLU	2
X38	A17 ORG	3
X25	A71 ORG	4
		5
		6
S15	A67 ORG	7
S14	T52 BLU	8

X21
SIDE CONSOLE HARNESS TO ENGINE HARNESS CONNECTOR

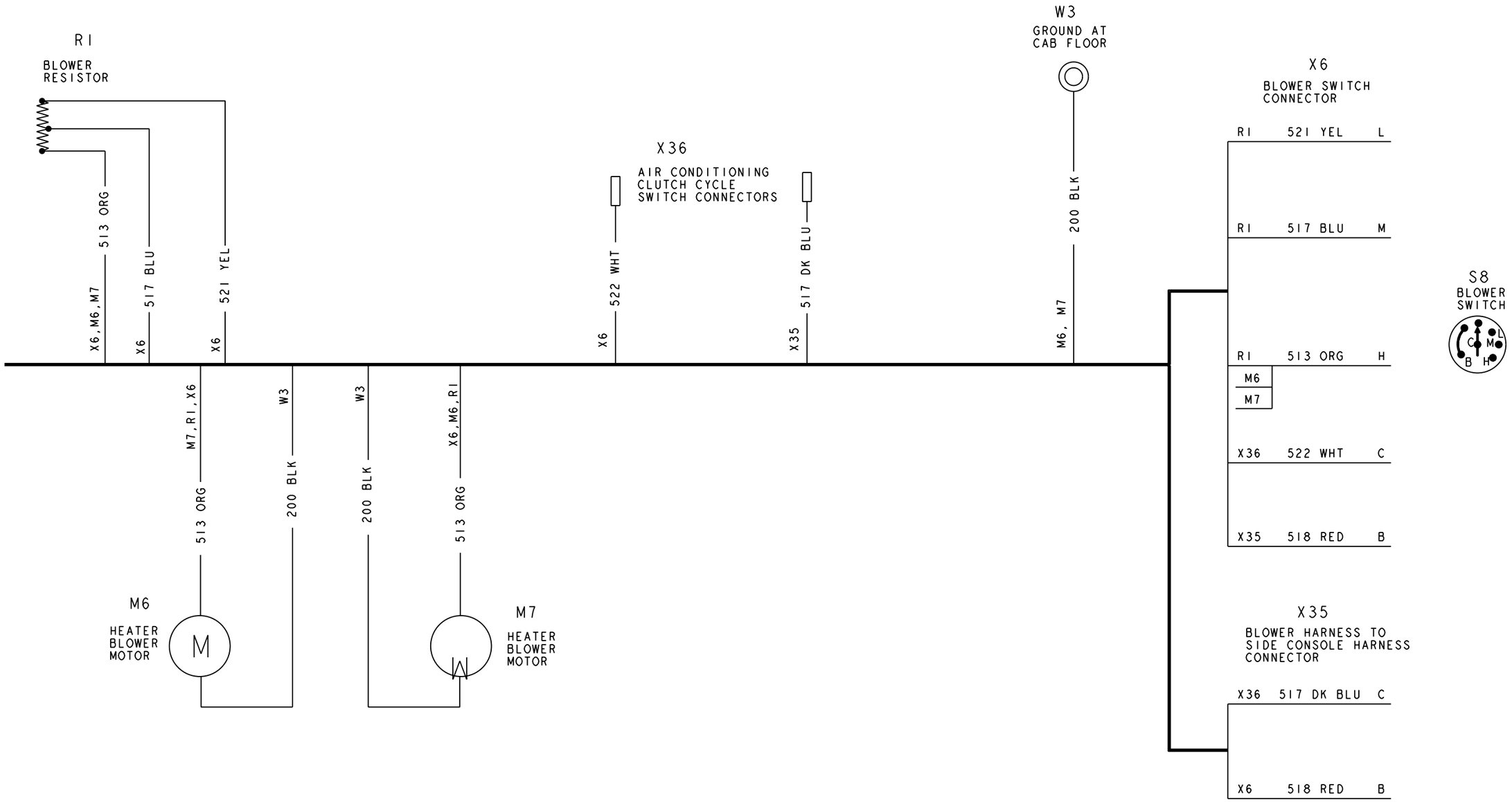
K2	B11 RED	1
X30	G40 BLK	2
X25	T11 BLU	3
V11	E02 WHT	4
K5,V11	J25 TAN	4
X25	T13 BLU	5
H8	F39 YEL	6
S4	E25 WHT	7
H8	X38 YEL	8
P2,K7	M39 PUR	9
H8	N34 YEL	10
E15	M32 PUR	11
K4 CAB (S.N. 794217-) ROPS (S.N. 794260-)	M62 PUR	12
H8	X36 YEL	13
		14

X25
SIDE CONSOLE HARNESS TO FRONT CONSOLE HARNESS CONNECTOR

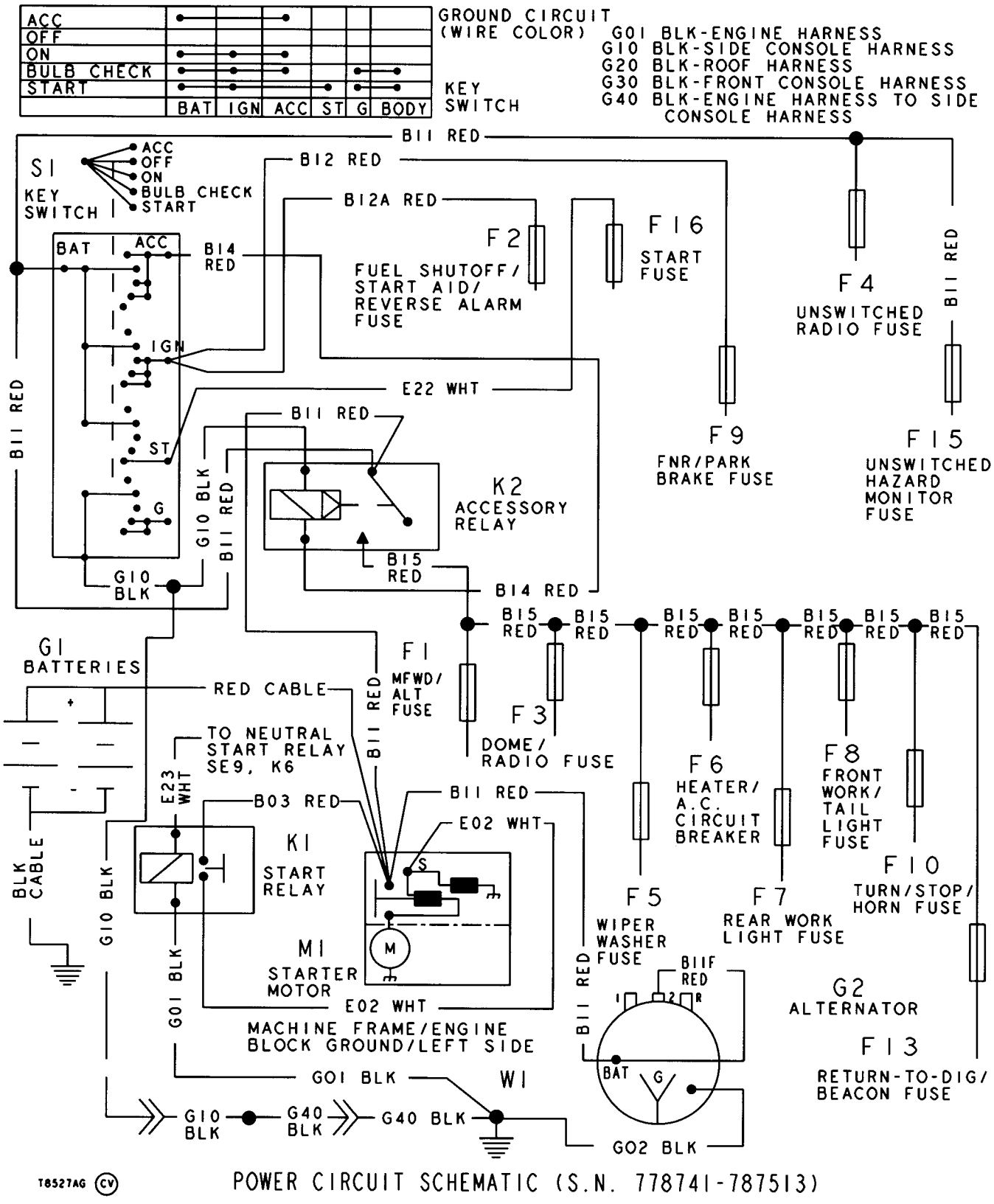
X3	A61 ORG	1
X3	A62 ORG	2
X3	A63 ORG	3
X3	A64 ORG	4
X22	A71 ORG	5
F5,S6,X1	P14 RED	6
F12	M47 PUR	7
X3	A69 ORG	8
F15,H7	P23 RED	9
B11,F10,S15	P19 RED	10
S21	L50 BRN	11
S21	L49 BRN	12
F11	M48 PUR	13
X30	G30 BLK	14
X21	T11 BLU	15
CAB (S.N. 794217-) ROPS (S.N. 794260-) X23,K4	E27 WHT	16
F9	P24 RED	17
		18
X3	A68 ORG	19
F8	P18 RED	20
X1	L43 BRN	21
F8	P18 RED	22
X1	L42 BRN	23
K6	T12 BLU	24

Blower Harness (W10) Wiring Diagram

T7812AT –19–25APR97



TX,9015,QQ2115 –19–31AUG95–1/1



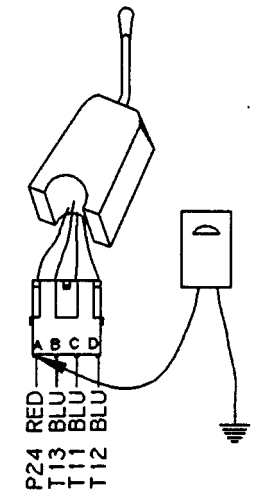
Continued on next page

TX,9015,QQ3171 –19–31AUG95–2/3

T8527AG –19–10AUG95

9015 15 3

FNR Lever



T7199BP –19–02OCT90

Key switch ON. FNR lever in neutral

With harness connected, check voltage at terminals with P24 red wire and T12 blue wire.

Are 12 volts measured at each terminal?

YES: Go to next step in this check.

NO: Check wiring harness.

9015
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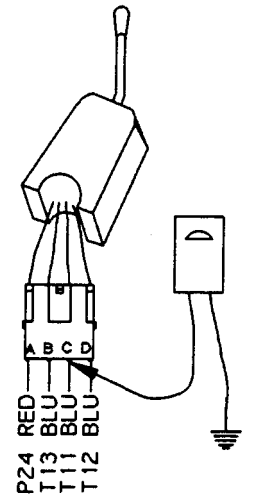


T7199BQ –19–02OCT90

Key switch ON.

With harness connected, and FNR lever moved to forward, check voltage at terminal with T11 blue wire.

Move FNR lever to reverse, check voltage at T13 blue wire.

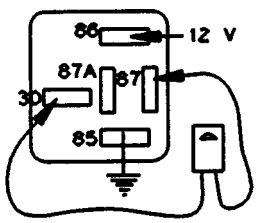
Are 12 volts measured at each terminal?

YES: FNR lever is good. Go to next check.

NO: Replace FNR lever.

– – –1/1

Neutral Start Relay



T7287BH –UN–16AUG90

Key switch OFF.

Disconnect harness from relay.

Connect battery voltage to terminal #86. Ground terminal #85. Does relay click?

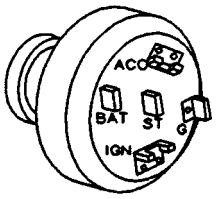
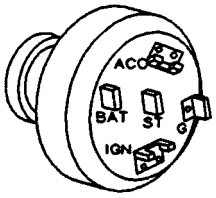
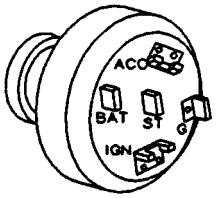
Measure continuity between terminals #30 and #87.

Is continuity measured?

YES: Relay is good. Check wiring harness.

NO: Replace neutral start relay

– – –1/1

Key Switch Check	 T7199BO –UN–17SEP90	Key switch OFF. With harness connected, check voltage of B11 red wire at BAT terminal of key switch. Are 12 volts measured?	**YES:** Go to next step in this check. **NO:** Check wiring harness between battery and key switch.
	 T7199BO –UN–17SEP90	Remove fuel shut off/start aid/reverse alarm fuse. Remove FNR/park brake fuse. Remove start fuse. Turn key switch to START position. With harness connected, check voltage at IGN and ST terminals. Are 12 volts measured at each terminal?	**YES:** Go to next step in this check. **NO:** Replace key switch
	 T7199BO –UN–17SEP90	Key switch ON. With harness connected, check voltage at ACC terminal of key switch. Are 12 volts measured?	**YES:** Go to next check. **NO:** Replace key switch. – – –1/1

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Indicator Circuit Operational Information

The Indicator Circuit has TWO modes of operation:

- Bulb check mode
- Failure mode

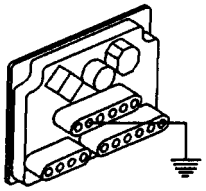
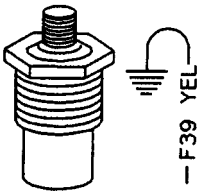
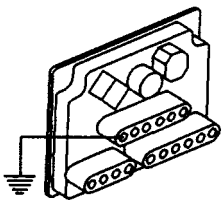
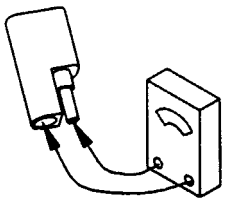
The following conditions must exist for indicator circuit to function in bulb check mode:

Key switch moved to BULB CHECK position

The following conditions must exist for indicator circuit to function in a failure mode:

Engine must be running for a failure to be indicated on a display module light. An indicator switch or alternator relay senses a failure and supplies a ground for an indicator light, warning light and buzzer.

TX,901515,QQ534 –19–07DEC90–1/1

Converter Oil Temperature Light	 T7199BS –19–16AUG90	Disconnect middle connector from display module. Ground pin terminal 15 for X38 yellow wire from switch and ground to frame. Without starting engine, turn key to BULB CHECK, then release to ON. Is converter oil temperature light on?	**YES:** Indicator light is good. Check wiring harness. **NO:** Check display module. Replace bulb or module. – – –1/1
Hydraulic Filter Restriction Indicator Switch	 T7199CK –19–17SEP90	Disconnect F39 yellow wire from switch and ground to frame. Without starting engine, turn key switch to BULB CHECK, then release to ON. Is hydraulic filter restriction indicator light on?	**YES:** Replace switch. **NO:** Switch is good. Go to next check. – – –1/1
Hydraulic Filter Restriction Indicator Light	 T7199BT –19–16AUG90	Disconnect middle connector on display module. Ground pin terminal 16 for F39 yellow wire to machine frame. Without starting engine, turn key switch to BULB CHECK, then release to ON. Is hydraulic filter restriction indicator light on?	**YES:** Indicator light is good. Check wiring harness. **NO:** Check display module. Replace bulb or module. – – –1/1
Display Module And Logic Module Diode	 T7961AA –UN–10MAR93	Remove diode from connector. Connect an ohmmeter to diode terminals. Is continuity measured? Reverse ohmmeter probes. Is continuity measured?	**YES:** If continuity is measured in both checks, diode has failed in a shorted mode. Replace. **NO:** If continuity is NOT measured in either check diode has failed in an open mode. Replace. **NO:** If continuity is measured in one check and not the other, diode is OK. – – –1/1

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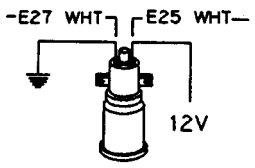
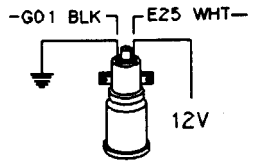
Start Aid Solenoid Cab (S.N.—794216) ROPS (S.N.—794259)	 T7199BX –19–17SEP90	*NOTE: Remove start aid fluid canister from holder to prevent injecting starting fluid into engine.* Key switch OFF. Disconnect harness from solenoid. Connect battery voltage to terminal with E25 white wire. Ground terminal with E27 white wire. Does solenoid "click"?	**YES:** Start aid solenoid is good. Check wiring harness. **NO:** Replace start aid solenoid. – – –1/1

Start Aid Solenoid Cab (S.N.794217—) ROPS (S.N.794260—)	 T7828AK –19–23SEP92	*NOTE: Remove start aid fluid canister from holder to prevent injecting starting fluid into engine.* Key switch OFF. Disconnect harness from solenoid. Connect battery voltage to terminal with E25 white wire. Ground terminal with GO1 black wire. Does solenoid "click"?	**YES:** Start aid solenoid is good. Check wiring harness. **NO:** Replace start aid solenoid. – – –1/1

Fuel Shut-Off Circuit Operational Information

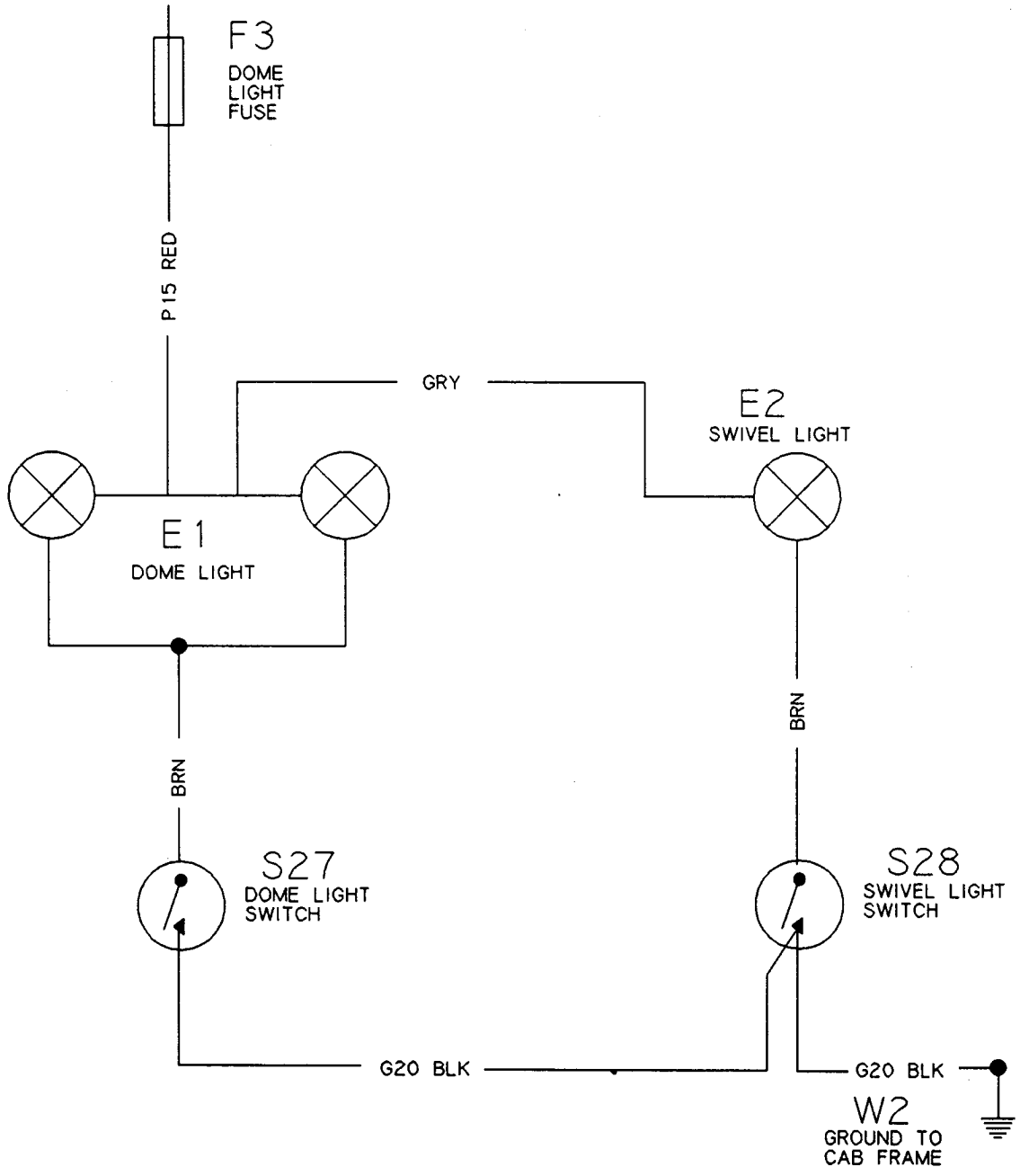
The following conditions must exist for fuel shut-off circuit to function:

Key switch in IGN or ON position

TX,9015,QQ1814 –19–12MAR93–1/1

Dome Light Circuit Schematic

GROUND CIRCUIT
(WIRE COLOR)
G01 BLK-ENGINE HARNESS
G10 BLK-SIDE CONSOLE HARNESS
G20 BLK-ROOF HARNESS
G30 BLK-FRONT CONSOLE HARNESS
G40 BLK-ENGINE HARNESS TO SIDE CONSOLE HARNESS



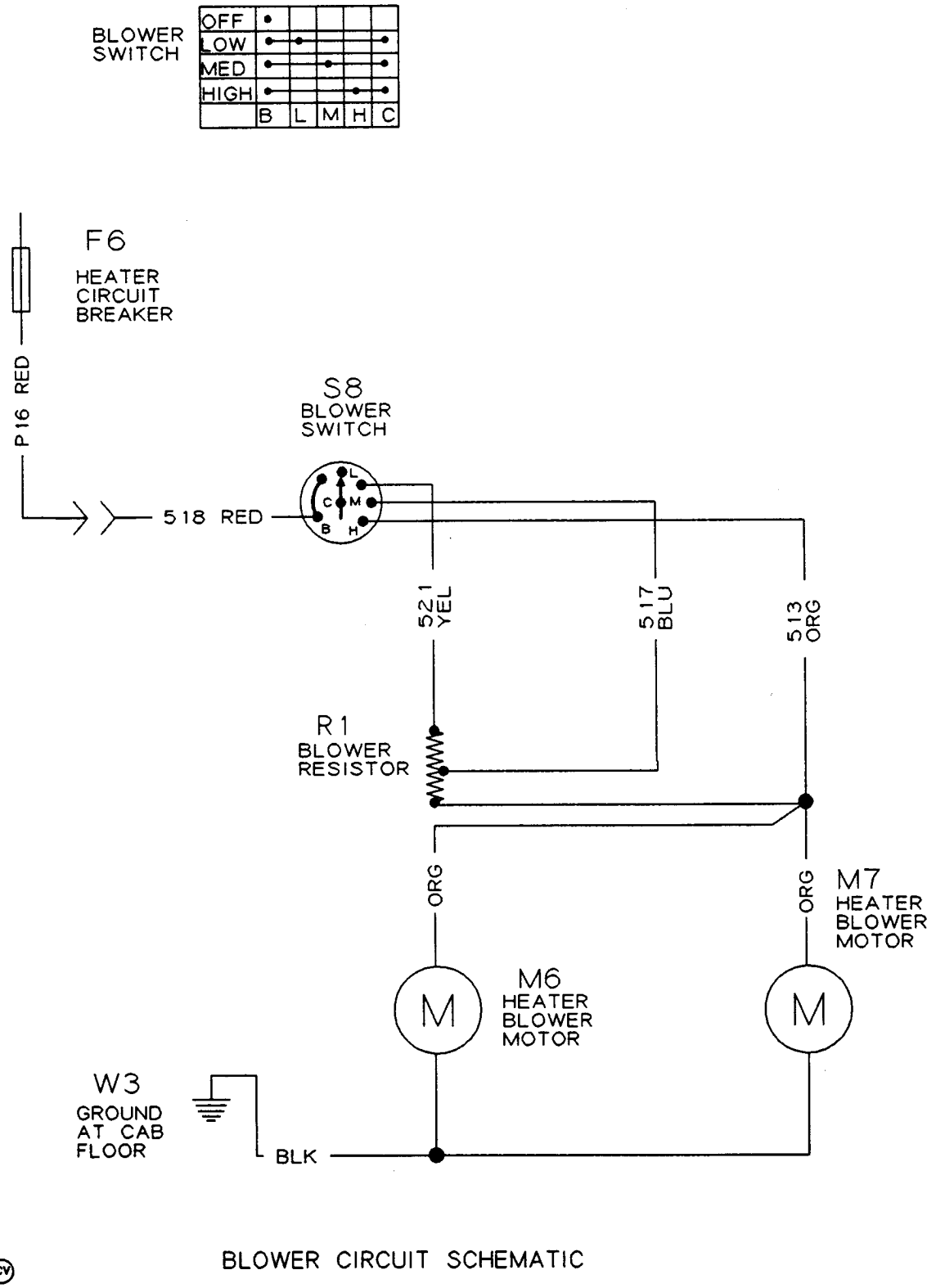
T7828AP (CV)

DOME LIGHT CIRCUIT SCHEMATIC

T7828AP –19–23SEP92

TX,9015,QQ1763 –19–12MAR93–1/1

Blower Circuit Schematic



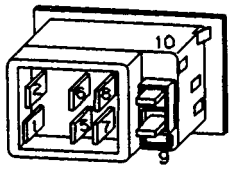
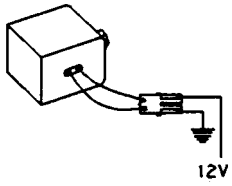
T7857AD –19–30SEP92

TX,901515,QQ809 –19–17JUN94–1/1

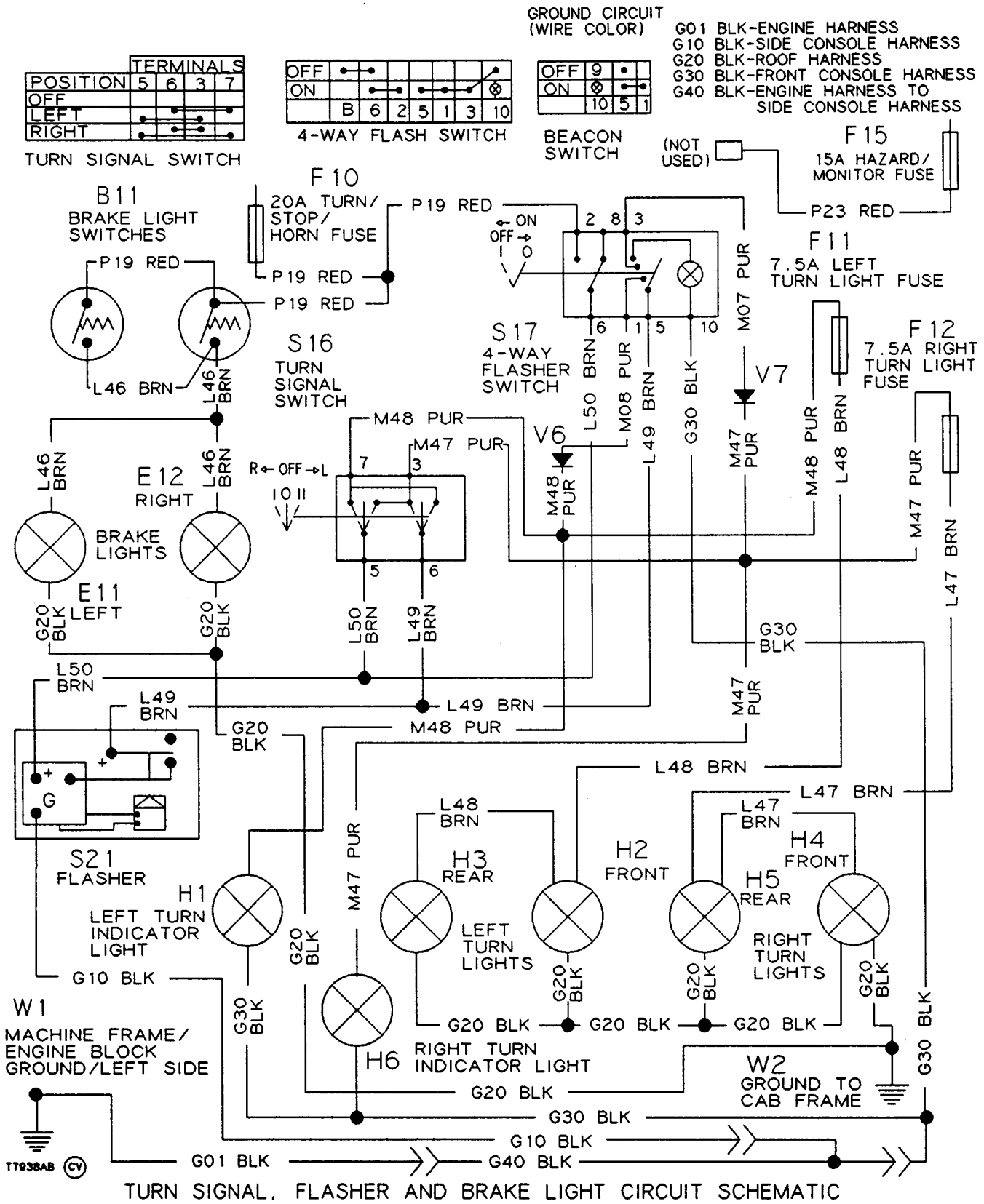
Park Brake/Neutral Disconnect Circuit Diagnostic Procedures

This circuit is powered by FNR/park brake fuse.

– – –1/1

Park Brake Switch—Dash	 T7199CS –UN–16AUG90	Disconnect harness from park brake switch. Park brake switch OFF. Check for continuity between terminals 5 and 7, and 6 and 8. Is continuity measured? Park brake switch ON. Check for continuity between terminals 5 and 1, and 6 and 2. Is continuity measured?	**YES:** Park brake switch is good. Check wiring harness. **NO:** Replace park brake switch. – – –1/1
Park Brake Solenoid	 T7199CT –UN–16AUG90	**CAUTION: Solenoid may be damaged if voltage is applied to connector terminal A with black wire.** Key switch OFF. Disconnect harness from park brake solenoid. Connect battery voltage to solenoid connector terminal B with red wire and ground connector terminal A with black wire. Does solenoid click?	**YES:** Solenoid is good. Check wiring harness. **NO:** Replace solenoid. – – –1/1

Turn Signal, Flasher And Brake Light Circuit Schematic

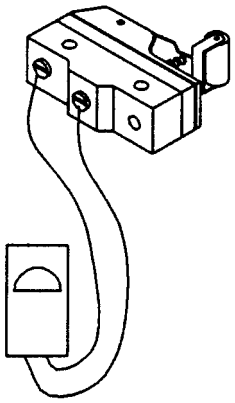
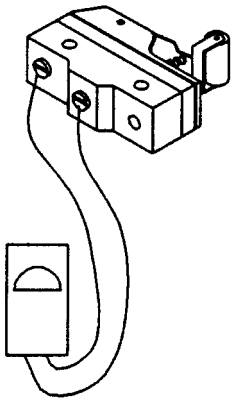


TX,9015,QQ1999 –19–16MAR93–1/1

Return-To-Dig Circuit Diagnostic Procedures

This circuit is powered by the return-to-dig/beacon fuse.

– – –1/1

Return-To-Dig Switch	 T7199DG –UN–17SEP90	Disconnect harness from return-to-dig switch. Check for continuity between common terminal and open terminal. Is continuity measured?	**YES:** Replace return-to-dig switch. **NO:** Go to next step in this check.
	 T7199DG –UN–17SEP90	Disconnect harness from return-to-dig switch. Actuate return-to-dig switch. Check for continuity between common terminal and open terminal. Is continuity measured?	**YES:** Return-to-dig switch is good. Go to next check. **NO:** Replace return-to-dig switch.

– – –1/1

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Auxiliary Valve Circuit Theory Of Operation

The circuit consists of auxiliary valve relay, auxiliary valve switch, auxiliary valve diode, auxiliary valve foot switch and auxiliary valve solenoid. Components are grounded by the RO1 black wire through cab side console harness. With key switch on, power is routed through PO1 red wire to auxiliary valve relay terminal 30 and to auxiliary valve switch terminal 7. With auxiliary valve switch in OFF position power is routed out terminal 3 of auxiliary valve switch to terminals 85 and 87 of auxiliary valve relay. The relay is energized latching terminals 30 and 87 of auxiliary valve relay.

When auxiliary valve switch is moved to FOOT ON position, power is routed out terminals 5 and 6. Power from terminal 6 is sent to terminal 9 for light in switch. Power from terminal 5 is sent to auxiliary valve foot switch. When foot switch is depressed power is sent to auxiliary valve solenoid energizing solenoid.

When auxiliary valve switch is moved to CONTINUOUS ON position, power is routed out terminal 1 and 2. Power from terminal 2 is sent to terminal 9 for light in switch. Power from terminal 1 is sent to auxiliary valve solenoid energizing solenoid, keeping continuous power on solenoid.

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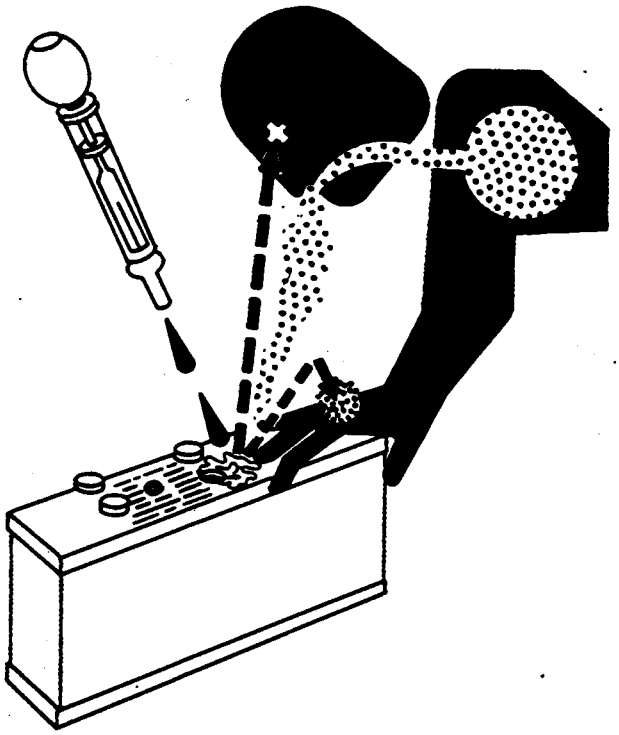
TX,9015,QQ2582 –19–12APR94–1/1

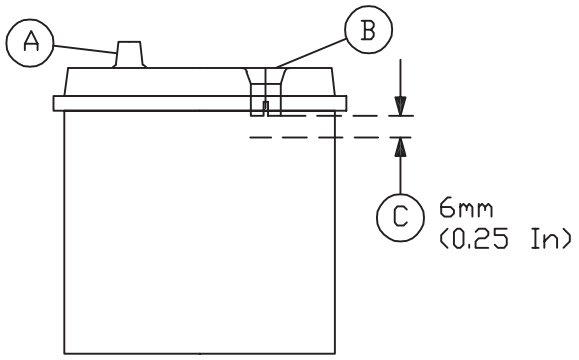
Check Battery Electrolyte Level And Terminals

1. Remove hold-down clamps.
2. Remove battery covers.

A—Battery Post
B—Fill Tube
C—Electrolyte Level Range

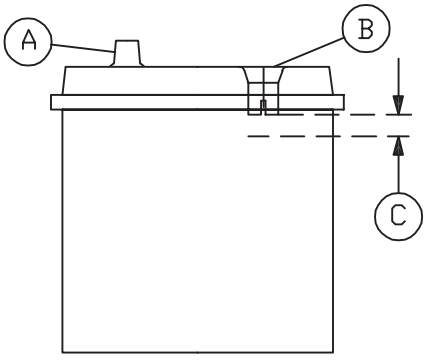


TS203 –UN–23AUG88



T6996DB –UN–09SEP03

Single Level Fill Tube Application



T6996DA –UN–09SEP03

Dual Level Fill Tube Application

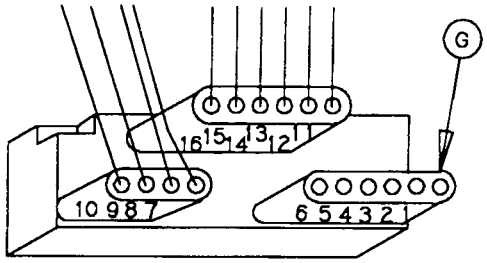
Continued on next page

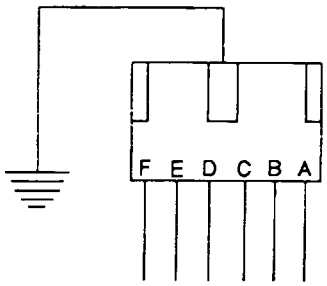
TX,9015,QQ1696 –19–01SEP95–1/2

Logic Module Test In Machine (S.N. — XXXXXX)

1. Disconnect 6 wire connector (G) from left side of display. Turn key switch ON. Ground pins "D" "E" and "F" one at a time.
2. Pin "D" must be grounded first to "arm" logic module.
3. With pin "D" grounded, yellow service required light, red STOP light and alarm must come on.
4. With pin "E" grounded, yellow service required light must come on.
5. With pin "F" grounded, red STOP light and alarm must come on.

   If logic module does not work when grounding pins "D", "E" and "F", check logic module wiring by continuing with step 6. If wiring is OK, replace logic module.
6. To check wiring, reconnect wiring at display module.





T6883BE –UN–03NOV88

T6883BE CV

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TX,9015,QQ3201 –19–31AUG95–1/2

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A—High Pressure Oil **B—Lubrication Oil** **C—Return Oil (Pressure Free)** **D—Oil Flow in Neutral**

Oil Flow In Neutral

When the directional control lever is moved to the neutral position, pressure oil (A) is blocked from the forward clutch and reverse brake by the directional control solenoid valve. The directional control solenoid valve is de-energized.

Reverser pump and torque converter continue to operate providing lubrication oil and oil to the cooler.

Both the forward clutch and reverse brake pistons dump oil (C) to reservoir which results in a complete interruption of power flow through the reverser.

Continued on next page

TX,210D,1937 –19–12JUL94–2/6

A—High Pressure Oil **B—Lubrication Oil** **C—Return Oil (Pressure Free)** **D—Disconnect Clutch Solenoid**

The disconnect clutch solenoid is used to disengage the forward clutch or reverse brake without moving the FNR lever. This provides maximum engine power to the hydraulic function during loader operation.

The disconnect clutch solenoid can be de-energized by pressing the button on the transmission shift lever or loader control valve lever. When de-energized, spring force moves the inner spool IN which blocks the flow of high pressure oil to the direction control valve solenoid. At the same time, the spool connects the forward clutch and reverse brake passages to sump which disengages power flow by releasing all previous engagement pressure oil.

With reverse brake engaged, the ring gear cannot rotate. The input shaft turns inside the planetary assembly.

This rotation causes the pinion gears to rotate against the inside of the ring gear causing planetary and output shaft assembly to rotate in opposite directions of input shaft. This causes a 10% speed reduction in reverse gears.

Forward clutch continues to receive lubrication oil (B). Forward clutch piston oil is open to return to disengage forward clutch.

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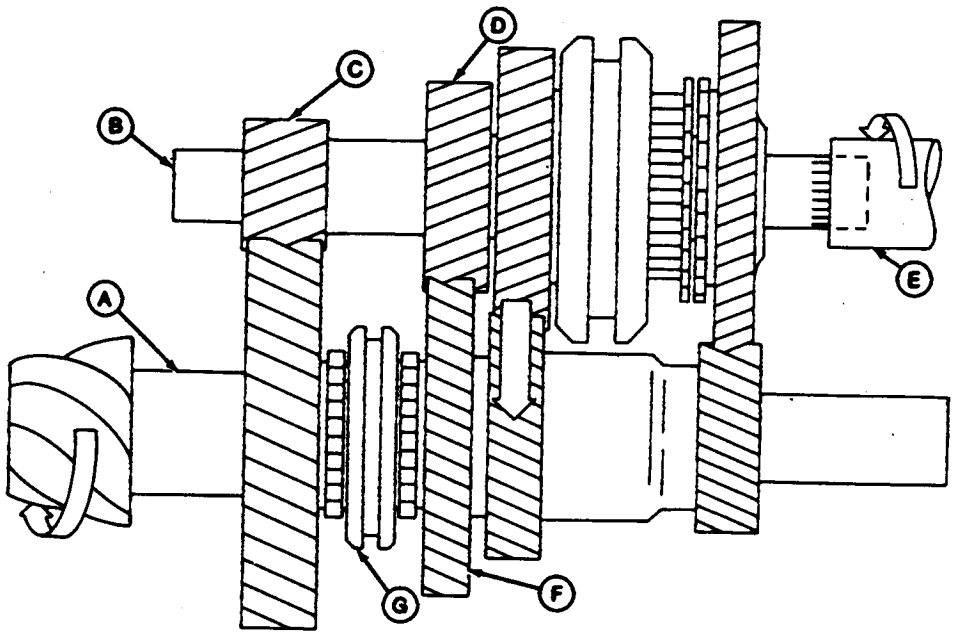
TX,300D,1966 –19–12JUL94–2/2

Second Speed Operation



T92938 –UN–18APR89

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A—Differential Drive Shaft
B—Transmission Drive Shaft
C—First Speed Driving Gear
D—Second Speed Driving Gear
E—Transmission Input Shaft
F—Second Speed Driven Gear
G—Shifter Collar (300D)

The transmission input shaft (E) is driven by the reverser. It, in turn, drives the transmission drive shaft, and is in constant mesh with the second speed driven gear (F).

When the transmission is in second speed the shifter collar (G) is slid to the right. The second speed driven gear is locked to the differential drive shaft (A). Power is thereby transmitted to the differential assembly.

310D, 315D ONLY—A synchronizer collar is used on differential drive shaft between first and second speed driven gears which provides a fully synchronized transmission.

TX,300D,1970 –19–08MAR93–1/1

Pinion gears (E) continue to be driven by rotating differential housing (F). These pinion gears push against bevel drive gears as before. Angle of gear teeth tries to force meshed gears apart. On the side with more traction, pinion gears begin to "walk" around drive gear and push against restraining force transmitted from tire. Drive gear is wedged outward and compresses a clutch pack with disks (G) splined to axle and plates (H) tanged to housing. Disks begin to slip less against plates as compressing force increases. As the pack slippage decreases driveshaft begins to receive driving force through the differential housing.

Since the tire with less traction is exerting less force trying to keep its axle from turning, the bevel gear does not force is being transmitted to this drive shaft. As long as the difference in traction between tires remains the same, the clutch pack on the side with less traction will continue to slip more than the clutch pack for the other side.

With MFWD engaged, differential works to automatically balance driving power to available traction.

TX,300D,1980 –19–07DEC90–2/2

Reverser Oil Passage Identification

A—Torque Converter Oil Out
B—Torque Converter Oil In

T5982AK1 –UN–02NOV88

Torque Converter Support

9020
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Continued on next page

TX,300D,1946 –19–08MAR93–1/5

Symptom	Problem	Solution
Low System Pressure in Reverser	Low oil level	Add oil to correct level.
	Wrong oil	Drain and replace oil. See Group 9000-04.
	Restricted suction screen in reverser	Remove and clean. See repair manual.
	Converter-in (cooler) relief valve stuck open or broken	Remove, inspect, clean and repair. See repair manual.
	Directional control valve solenoid spring stuck or broken	Inspect and repair spring. See repair manual. Do Reverser System Pressure Test. See Group 9020-25.
	Leakage in reverser	Do Four Gauge Leakage Test , Group 9020-25.
	Worn reverser oil pump	Do Reverser Pump Flow Test. See Group 9020-25.
Low Forward Pressure in Reverser	Low oil level	Add oil to correct level.
	Wrong oil	Drain and replace oil. See Group 9000-04.
	Restricted suction screen in reverser	Remove and clean. See repair manual.
	Converter-in (cooler) relief valve stuck open or broken	Remove, inspect, clean and repair. See repair manual.
	Directional control valve solenoid spring stuck or broken	Inspect and repair spring. See repair manual. Do Reverser System Pressure Test, Group 9020-25.
	Leakage in forward clutch	Do stall test. Do Four Gauge Leakage Test , Group 9020-25.
	Worn reverser oil pump	Do Reverser Pump Flow Test, Group 9020-25.

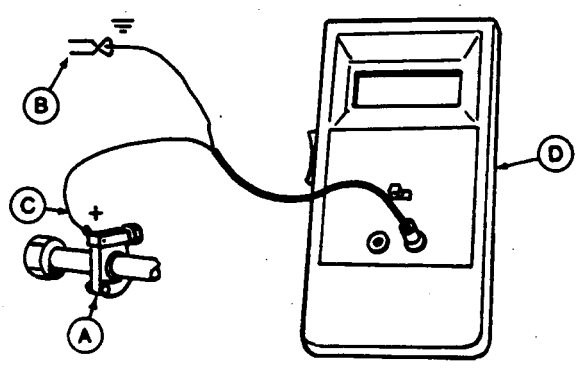
Continued on next page

Symptom	Problem	Solution
MFWD Jumps Out of Gear	Worn U-Joints in drive shaft	Inspect and repair. See repair manual.
	Incorrect differential backlash	Adjust backlash. See repair manual.

TX,300D,2091 –19–08MAR93–18/18

JT05801 Clamp-On Electronic Tachometer Installation

SERVICE EQUIPMENT AND TOOLS
Tachometer
A—Clamp-On Transducer
Remove paint with emery cloth and connect to a straight section of injection line within 100 mm (4 in.) of pump. Finger tighten only. DO NOT over tighten.
B—Black Clip (-). Connect to main frame.
C—Red Clip (+). Connect to transducer.
D—Tachometer Readout. Install cable.

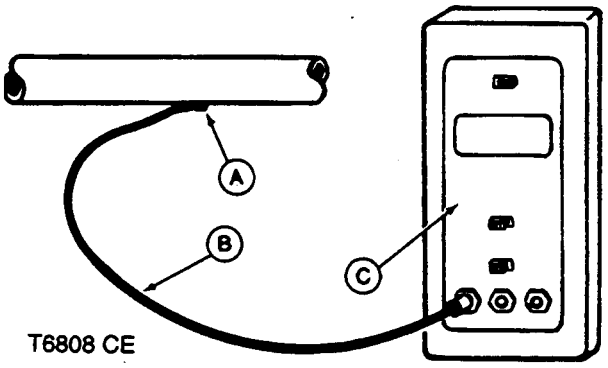


T6813AG –UN–28FEB89

10T,9010,K182 –19–10AUG95–1/1

JT05800 Digital Thermometer Installation

SERVICE EQUIPMENT AND TOOLS
Digital Thermometer
A—Temperature Probe
Fasten to a bare metal line using a tie band. Wrap with shop towel.
B—Cable
C—Digital Thermometer



T6808CE –UN–28FEB89

902525,AA4 –19–28FEB95–1/1

9020
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Transaxle Oil Warm-Up Procedure

SPECIFICATIONS	
Engine Speed	Fast idle (2375 ± 25 rpm)

1. Raise machine off ground using loader and stabilizers.

Continued on next page

TX,9020,YY914 –19–21APR94–1/2

Reverser Disconnect Clutch Solenoid Test (SN 792483—)

SPECIFICATIONS	
Oil Temperature	65 ± 5°C (150 ± 10°F)
Engine Speed	1500 ± 25 rpm
Forward and Reverse Pressure with Disconnect Switch Activated	0.0 kPa (0.0 bar) (0 psi)
Forward and Reverse Maximum Allowable Pressure Difference with Disconnect Switch not Activated	70 kPa (0.7 bar) (10 psi)

ESSENTIAL TOOLS
JT05487 (1/8 M NPT 7/16-20 M 37°) Connector (2 used)

SERVICE EQUIPMENT AND TOOLS
Digital Thermometer
Electronic Tachometer
A—Gauge 0—2000 kPa (0—20 bar) (0—300 psi) (2 used)

1. Install tachometer and thermometer. (See procedure in this group.)
2. Make test connections.
3. Heat oil to specifications.

Specification

Oil—Temperature ..... 65 ± 5°C (150 ± 10°F)

(See Reverser Oil Warm-Up procedure in this group.)

4. Run engine at specifications.

Specification

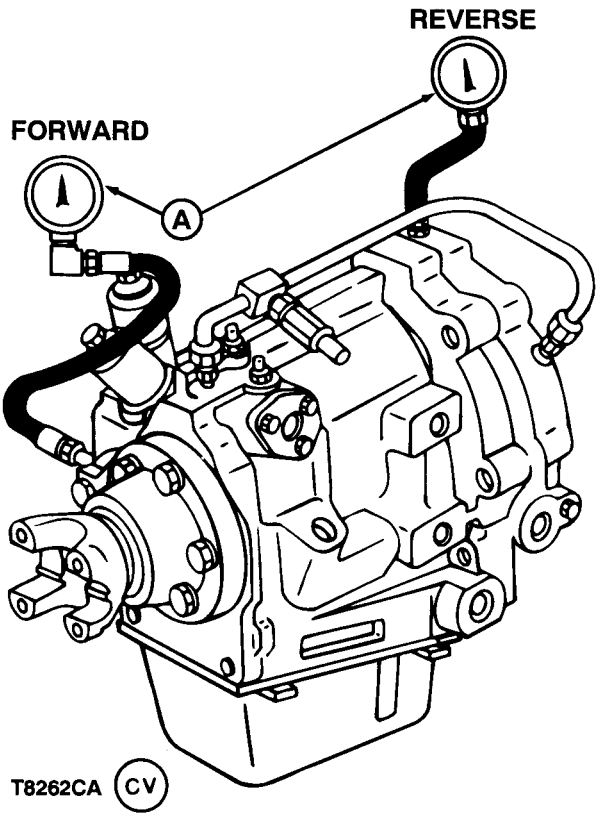
Engine—Speed ..... 1500 ± 25 rpm

Shift FNR lever to forward. Make a record of forward pressure gauge reading. Depress disconnect clutch switch. Forward pressure must decrease to zero pressure.

Specification

Forward and Reverse—Pressure
with Disconnect Switch Activated ..... 0.0 kPa (0.0 bar) (0 psi)

Release disconnect clutch switch. Forward pressure must return to recorded pressure.



T8262CA –19–06JUL94

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300D,DS4661 –19–12JUL94–1/2

Reverser Oil Cooler Restriction Test (SN — 792482)

SPECIFICATIONS	
Oil Temperature	65 ± 1°C (150 ± 2°F)
Oil Flow	11.4 L/min (3.0 gpm)
Inlet and Outlet Maximum Pressure Difference	140 kPa (1.4 bar) (20 psi)

ESSENTIAL TOOLS
203654 (1/2 M NPT 7/16-20 M 37°) Connector (2 used)
JT03348 (1/2 F NPT) Tee (2 used)
I—JT03212 (1/2 ID 1/2 M NPT) Adapter (6 used)
J—JT03070 (1/2 F NPT 1-1/6-12 37° SW) Adapter (2 used)

SERVICE EQUIPMENT AND TOOLS
Flowmeter with Temperature Gauge
A—Hydraulic Analyzer or Pressure Gauge
B—Gauge 0—200 kPa (0—2.0 bar) (0—30 psi)
Hydrostatic Switching Unit or Two Similarly Calibrated Gauges

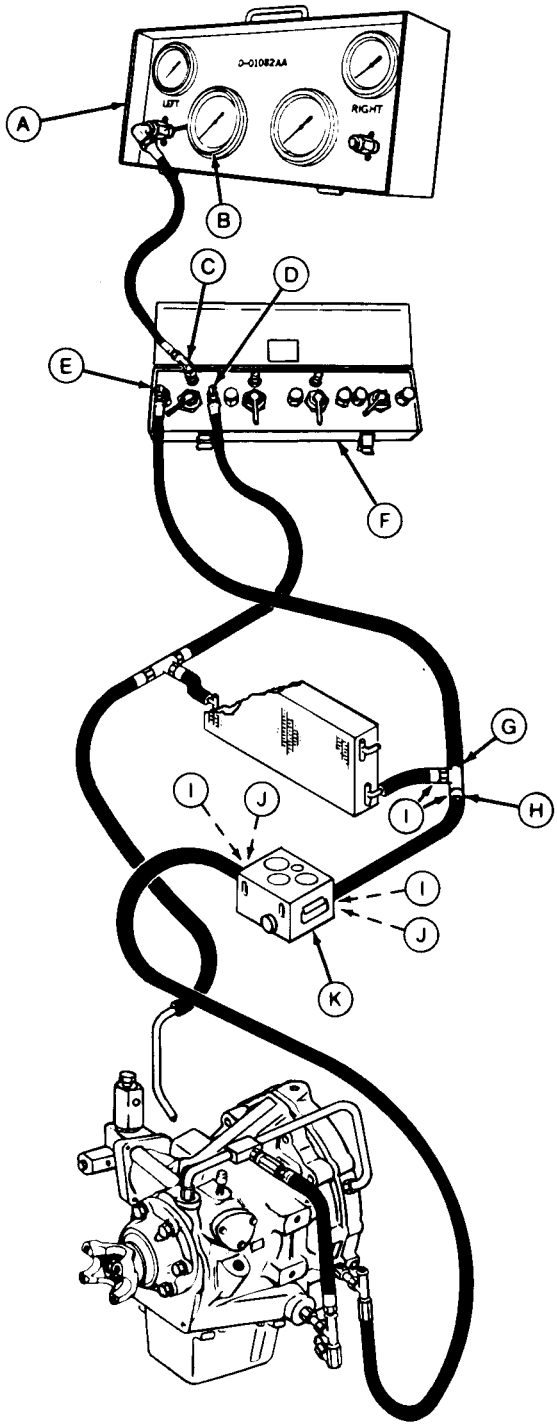
NOTE: If an internally restricted oil cooler is suspected, the oil cooler can be back flushed to check for debris. Steps 1—3 describe how to back flush the cooler and Steps 4—7 describe how to test cooler for an internal restriction.

1. To back flush the cooler, connect reverser pump outlet to cooler outlet. Disconnect cooler inlet line and put end of hose in a five gallon bucket.

2. Start engine and run at slow idle for 20 seconds. DO NOT empty reverser sump.

3. Connect cooler hoses to original position on flowmeter.

A—Hydraulic Analyzer
B—Gauge
C—Gauge Port
D—No. 2 Input
E—No. 1 Input
F—Switch Unit
G—Connector
H—Tee
I—Adapter
J—Adapter
K—Flowmeter



T7393AC –UN–30OCT90

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TX,300D,1956 –19–12JUL94–1/2

Reverser Pump Flow (SN 792483—)

SPECIFICATIONS	
Engine Speed	1500 ± 5 rpm
Oil Temperature	65 ± 1°C (150 ± 2°F)
New Reverser Pump Flow	12.1 L/min (3.2 gpm)
Used Reverser Pump Flow	8.5 L/min (2.25 gpm)
System (Pump) Pressure	931 ± 100 kPa (9.3 ± 1.0 bar) (135 ± 15 psi)

ESSENTIAL TOOLS
JT03064 (1-1/16-12 M 37° 1/2 F NPT) Adapter
E—JT05487 (1/8 M NPT 7/16-20 37°) Connector
F—JT03104 (3/8 M NPT 7/16-20 M 37°) Connector (2 used)

SERVICE EQUIPMENT AND TOOLS
Electronic Tachometer
Digital Thermometer
Flowmeter
Gauge 0—2000 kPa (0—20 bar) (0—300 psi)
D—Gauge 0—1000 kPa (0—10 bar) (0—150 psi)

1. Install tachometer and thermometer. (See procedure in this group.)

2. Install flowmeter and gauges.

IMPORTANT: Flowmeter must be open before starting machine to prevent damage to reverser pump.

3. Open flowmeter.

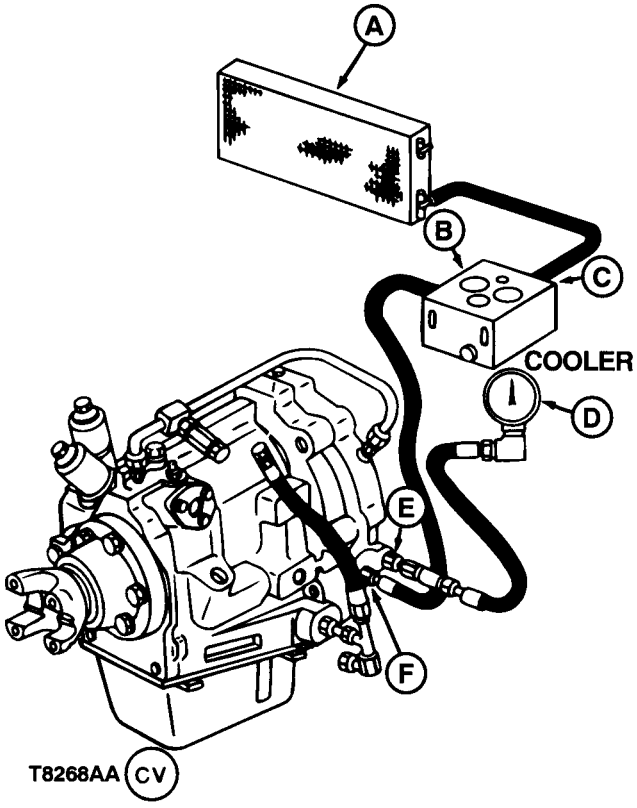
4. Disconnect converter-in relief valve hose. Install cap and plug.

5. Slowly increase rpm from slow idle to test specification.

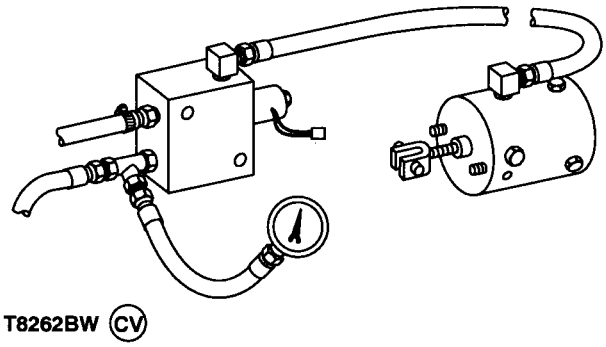
Specification

Engine—Speed ..... 1500 ± 5 rpm

Watch cooler pressure gauge (D). If it exceeds 275 kPa (2.7 bar) (40 psi), stop test. Locate and repair restriction in cooler circuit before proceeding with test. Pressure above 275 kPa (2.7 bar) (40 psi) could damage torque converter or oil cooler.



T8268AA –19–06JUL94



T8262BW –UN–06JUL94

A—Oil Cooler
B—Flowmeter
C—Adapter
D—Gauge
E—Connector
F—Connector (2 used)

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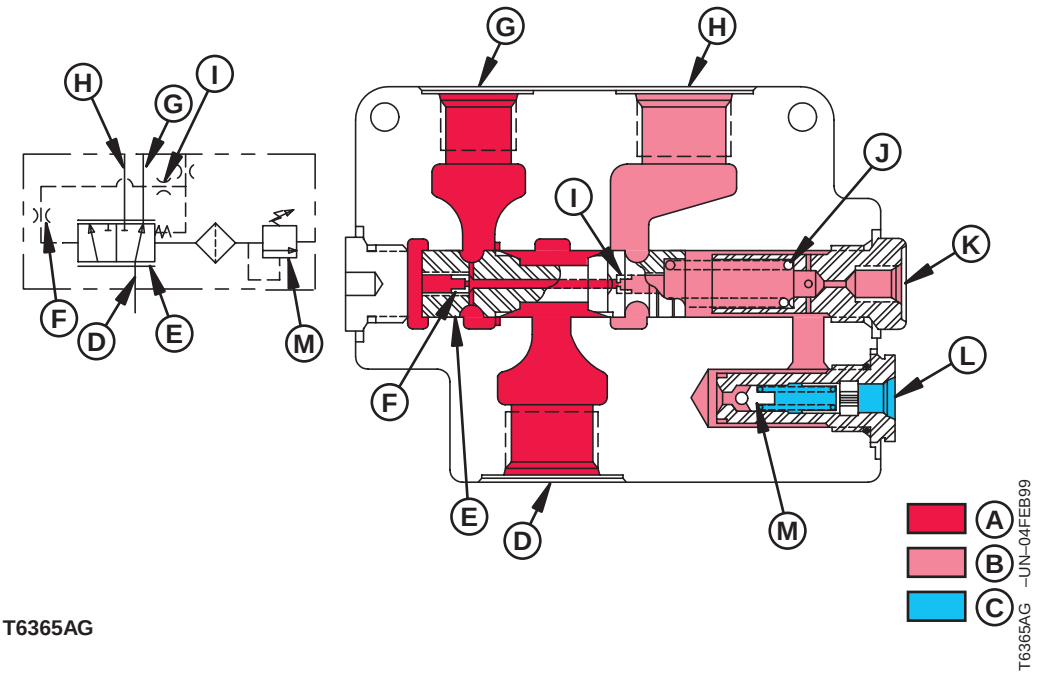
TX,300D,DS4666 –19–12JUL94–1/2

Section 9025
Hydraulics

Contents

Continued on next page



T6365AG

Engine Running—Steering To Stop

A—High Pressure Oil
B—Relief Pressure Oil
C—Return Oil
D—From Steering Pump
E—Spool
F—Orifice
G—To Steering
H—To Backhoe
I—Orifice
J—Spring
K—Load Sensing Line
L—To Reservoir
M—Relief Valve Poppet

When the operator steers the machine for a full turn the cylinder bottoms against the steering stops. To limit steering system pressure a relief system is built into the priority valve assembly.

When the cylinder bottoms, the pressure in the steering cylinder increases. This pressure is sensed at the load sensing port (K). When the pressure in the load sensing port increases enough to push poppet (M) off of its seat, oil in the load sensing circuit flows to return. Load sensing pressure is limited to the pressure setting of the relief valve.

Pressure to the steering valve (pilot pressure), which is sensed at the orifice (F), continues to increase until it can move the spool (E) to the right against the load sensing pressure plus spring (J) force. At this time, all oil flows out the backhoe port (H).

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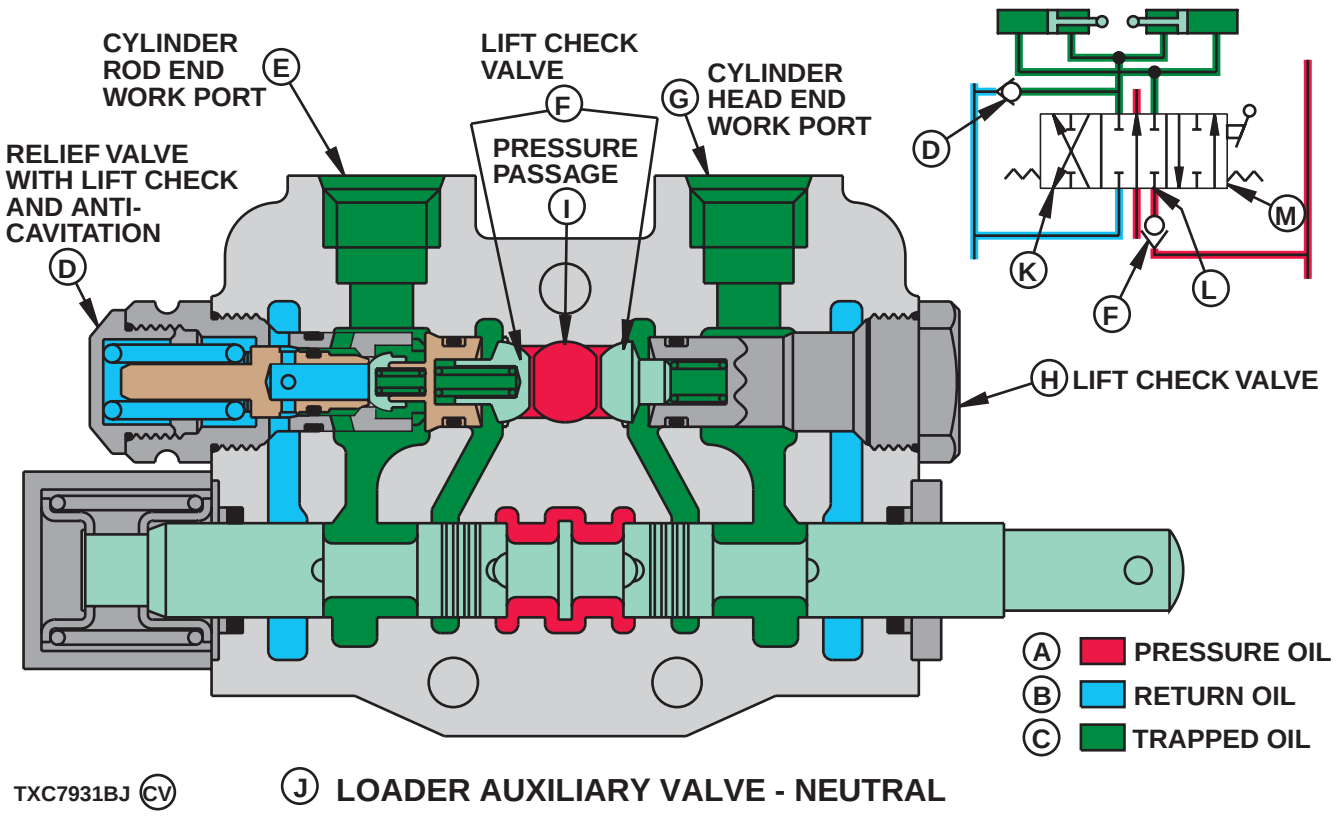
TX,D300,DS2093 –19–21JUL94–4/4

Hydraulic Filter Operation

The hydraulic return filter removes contaminants from the hydraulic system oil. The filter housing contains a bypass valve and a filter restriction switch.

Continued on next page

TX,9025,3011 –19–07JAN93–1/2



TXC7931BJ CV

J LOADER AUXILIARY VALVE - NEUTRAL

A—Pressure Oil
B—Return Oil
C—Trapped Oil
D—Relief Valve with Lift Check and Anti-Cavitation
E—Cylinder Rod End Work Port
F—Lift Check Valve (2 used)
G—Cylinder Head End Work Port
H—Lift Check Valve
I—Pressure Passage
J—Loader Auxiliary Valve-Neutral
K—Retract Cylinders
L—Neutral
M—Extend Cylinders

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19

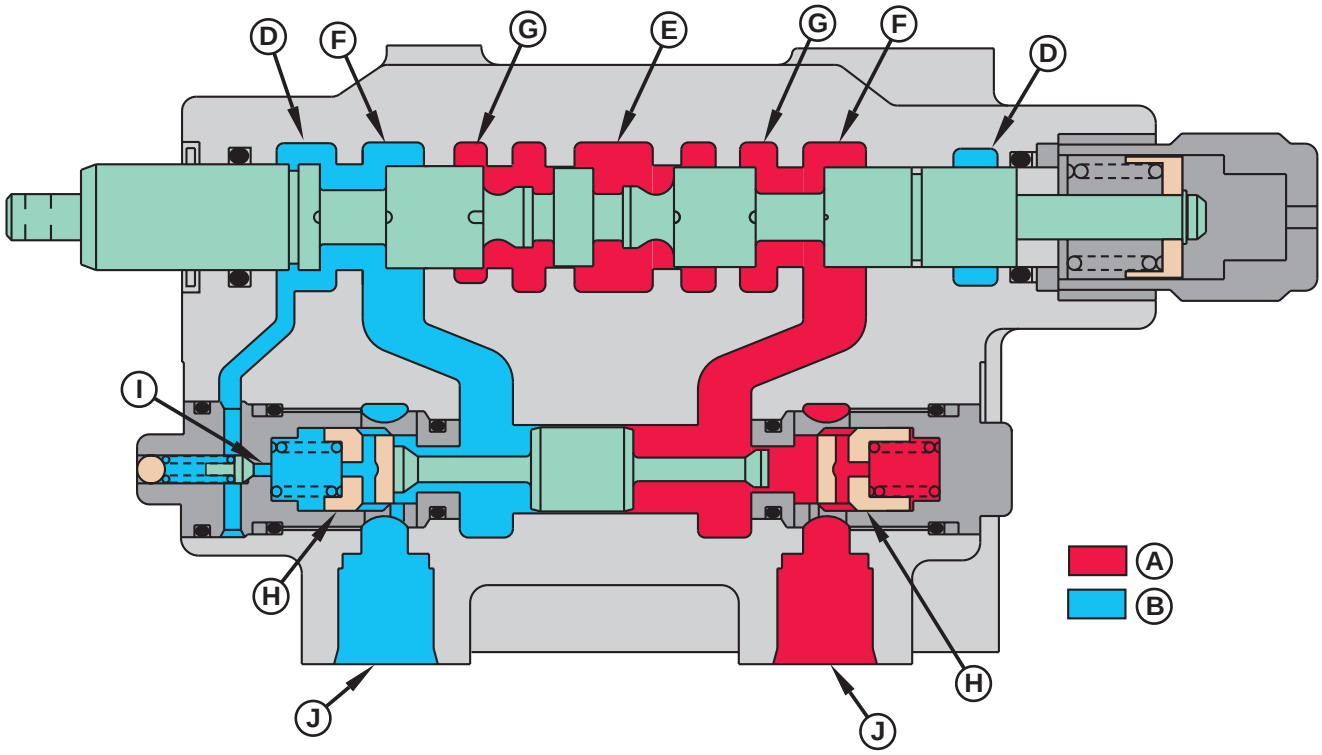
The loader auxiliary section is a three-position, four-way, spool-type valve.

The auxiliary section contains one lift check/relief valve (D) and one anti-cavitation check valve (I). When the valve spool is in neutral, the oil is trapped in the work circuits (E and G). This prevents movement of cylinders and linkage.

Pressure oil flows through the center of the spool and valve section. The lift checks (F) remain seated because the pressure passage (I) remains lower than the pressure in work circuits.

TX,902505,BR41 –19–21JUL94–6/6

Stabilizer Valve Operation



TXC7348AD

Ⓒ STABILIZER VALVE - LOWER

T7348AD –19–10SEP98

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A—Pressure Oil
B—Return Oil
C—Stabilizer Valve—Lower
D—Return Passage
E—Pressure Passage
F—Connecting Passage
G—Power Passage
H—Poppet
I—Thermal Relief Valve
J—Work Port

The stabilizer valve is a two-spool valve containing two lockout poppets for each spool. When the spool is in neutral, oil from the hydraulic pump flows through the pressure passage (E) to the backhoe control valve.

When the spool is moved to lower the stabilizer (as shown), the spool is pulled out. This directs oil into connecting passage (F), pushing the shuttle valve against left hand poppet (H). As pressure increases, the left poppet opens allowing that work port to be connected to return passage (D). As pressure increases, the right-hand poppet (H) is pushed off its seat filling the cylinder head end circuit (J) and pushing the stabilizer arm down.

When the spool is returned to neutral, pressure oil is cut off from the shuttle valve and poppets. The poppets are seated by pressure oil in cylinder work port and held by trapped oil. The thermal relief valve (I) opens when there is an expansion of oil in the trapped circuit due to external heat.

TX,902505,BR65 –19–07JAN93–1/1

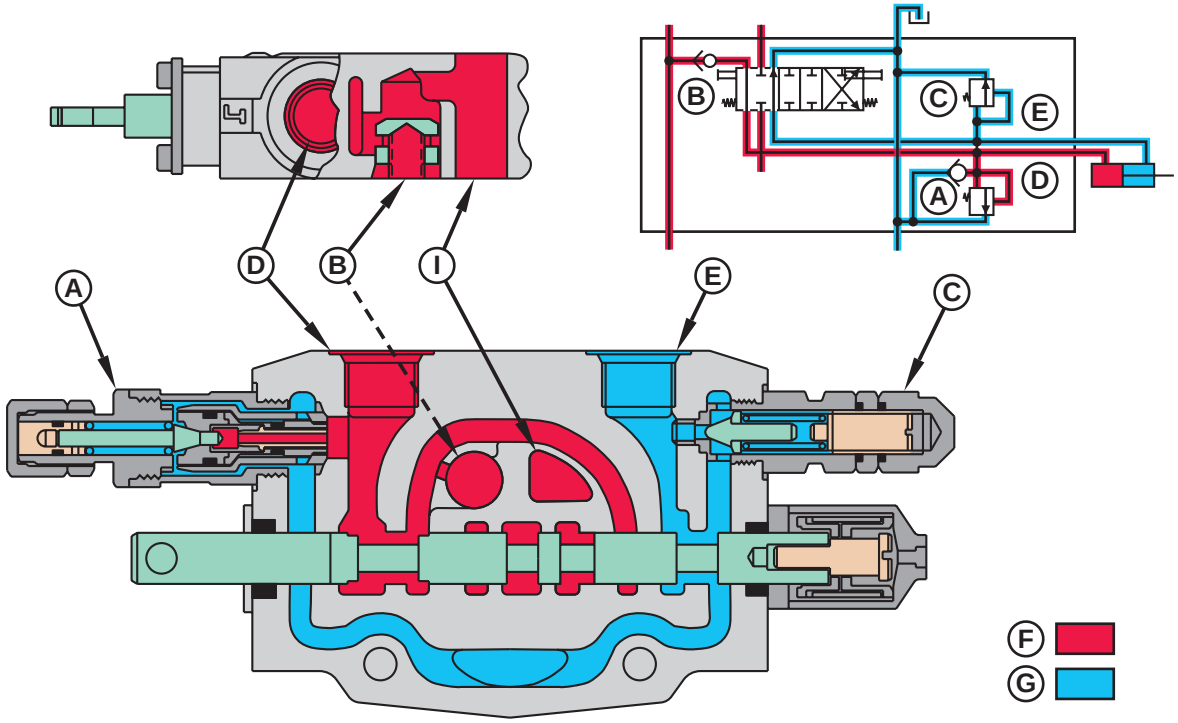
A—Circuit Relief Valve with Anti-Cavitation
B—Left Work Port
C—Lift Check
D—Right Work Port
E—Pressure Oil
F—Return Oil
G—Pressure Passage
H—Backhoe Swing Valve—Left

The swing section is a three-position, four-way, open-center, spool-type valve. The valve contains two combination circuit relief and anti-cavitation valves.

During a left swing, oil flows to the lift check (C), into pressure passage, past the spool and out work port (B). Return oil from the cylinder flows into work port (D), past the spool, into the return passage.

The 300D has a one way orifice fitting located in outlet ports (B) and (D) to regulate swing cycle time and protect system components.

TX,9025,BS398 –19–21JUL94–5/7



TXC7355AF

H BACKHOE BOOM VALVE - LOWER

T7355AF –UN–26FEB99

A—Circuit Relief Valve with Anti-Cavitation
B—Lift Check
C—Circuit Relief
D—Work Port
E—Work Port
F—Pressure Oil
G—Return Oil
H—Backhoe Boom Valve—Lower
I—Functional Inlet

The boom section is a three-position, four-way, open-center, spool-type valve. The valve contains a circuit relief (C) and a pilot operated circuit relief with anti-cavitation valve (A).

NOTE: On later machines boom lower relief (A) is direct acting with anti-cavitation.

During boom lower operation, oil flows to the lift check (B), to the work port (D). Return oil from the cylinder flows into work port (E) past the spool, into the return passage.

Continued on next page

TX,9025,BS398 –19–21JUL94–6/7

❻ **Hydraulic Control Valve Lift Check Test**	*NOTE: Gresen valve sections must be tested in both directions because each work port has its own lift check. Husco valve sections have one lift check for both work ports, and therefore only need to be checked in one direction.* 1. Raise loader until bucket is 1 m (3 ft) off the ground with the bucket level. 2. Position backhoe at maximum reach with bottom of bucket level with ground, 1 m (3 ft) off the ground. 3. Stop the engine. 4. Activate each function one at a time. a. loader boom raise b. loader bucket rollback c. backhoe boom up d. dipperstick extend e. backhoe bucket curl 5. Start engine, raise front of unit with bucket tipped 45° down. Put backhoe so each function is loaded opposite to Step B trying to raise rear of unit. Stop engine. 6. Activate each function one at a time. a. loader boom lower b. loader bucket dump c. backhoe boom down d. dipperstick retracted e. backhoe bucket dump *LOOK: These functions must not move when the control lever is activated.* *FEEL: It is normal for first function operated to "jerk" because of stored hydraulic pressure in system but must not continue to move.*	**OK:** Go to next check. **NOT OK:** Remove and inspect relief valves checks. Go to repair manual. – – –1/1

9025
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5

Loader Control Valve Checks

– – –1/1

Symptom	Problem	Solution
Hydraulic Function Makes "Chattering" Noise	Low oil level	Add oil to correct level.
	Hydraulic oil aerated	Incorrect oil, drain and refill. Suction hose has air leak. Inspect and tighten. Hydraulic And Reverser Oil
	Hydraulic pump suction screen restricted (300D, 310D, S.N. — 802199) (315D, All Machines)	Remove and clean screen in hydraulic reservoir
	Malfunctioning or wrong circuit relief valve installed in backhoe valve.	Inspect, remove and repair. See repair manual.
Functions Drift	Oil leaking past cylinders or control valve.	Do System Operational Checkout drift test to pinpoint cylinder or valve leakage. See Group 9025-10 .
Control Valve Sticks Or Works Hard	Control valve lever linkage binding	Inspect and adjust linkage. See Group 9025-20. Inspect valve spools. See repair manual.
	Hydraulic system overheating	Test component leakage. See Group 9025-25.
	Broken return spring	Remove and replace. See repair manual.
	Contamination in control valve	Remove and clean. See repair manual. Locate source of contamination. Repair and clean oil in system.
	Scored valve bore or bent spool	See repair manual.

Continued on next page

TX,902515,BR89 –19–21JUL94–5/8

7. Loosen cap screw (A) and move return-to-dig switch so roller (B) is touching area (C) on the cam.

NOTE: On later machines switch will have a plastic roller on actuator arm. Omit steps 8 and 9 on these machines. Older machines have a metal roller on actuator arm.

8. Move switch toward cam until a "click" is heard.

9. Move switch away from cam until a "click" is heard.

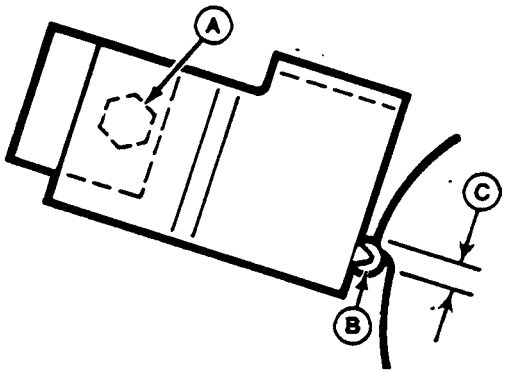
10. Tighten cap screw without moving switch.

11. Remove pin from sensor tube yoke.

12. While watching clearance between cam and switch, turn command pointer back and forth to be sure cam does not hit switch bracket.

NOTE: Be sure that switch arm and roller does not bottom on switch housing.

13. If cam touches bracket or switch arm, and roller bottoms on switch housing, reposition switch. (See steps 7—10.)



T87154 –UN–09NOV88

A—Cap Screw
B—Roller
C—Area on Cam

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TX,9025,BS404 –19–21JUL94–3/3

Loader Control Valve Linkage Adjustment

SPECIFICATIONS	
Right Side of Knob-to-Tape Distance	250 mm (10 in.)
Front of Loader Knob-to-Tape Distance	130 mm (5.25 in.)

NOTE: Levers must be positioned correctly to allow full travel and proper operation of loader valves. Cab and other components have been removed in some photographs for clarity.

1. Put loader control valve spools in neutral position.

Continued on next page

TX,9025,BS405 –19–21JUL94–1/5

2. Make test connection at priority valve gauge port (A).

3. Install temperature probe in reservoir. Warm oil to specifications.

Specification

Engine—Speed ..... Fast idle
Oil—Temperature ..... 65 ± 5°C (150 ± 10°F) (cylinder hot to touch)

See Hydraulic Oil Warm-up in Group 9025-25.

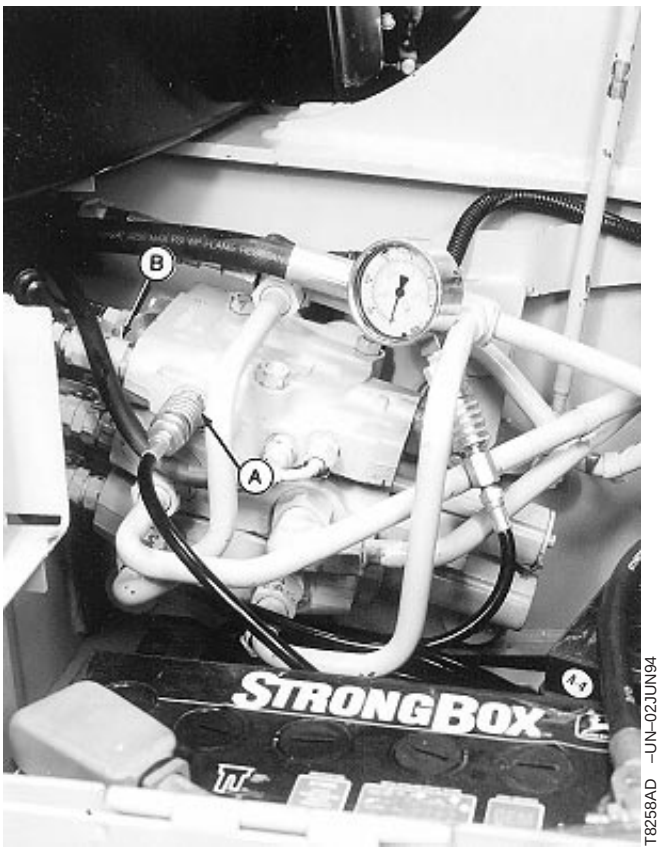
4. Activate and hold loader boom raise over relief. Record main hydraulic system relief setting from gauge.

Specification

System Relief Valve Setting—
Pressure ..... 17 925—19 650 kPa (179—197 bar) (2600—2850 psi)

NOTE: System relief is screw adjustable. Remove relief end cap and adjust to specification. Turn clockwise to increase pressure.

5. Adjust or replace system relief (B) as required.



T8258AD –UN–02JUN94

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TX,9025,BS410 –19–21JUL94–2/2

3. Operate all hydraulic control valves to release pressure in the hydraulic system. Remove auxiliary pump inlet line to backhoe valve. Cap valve (A) and connect gauge (B) to inlet line (C).

4. Install digital thermometer probe in reservoir. Warm oil to specifications.

Specification

Oil—Temperature ..... 65 ± 5°C (150 ± 10°F)

See Hydraulic Oil Warm-up in Group 9025-25.

5. Run engine at specified speed and record pressure on gauge.

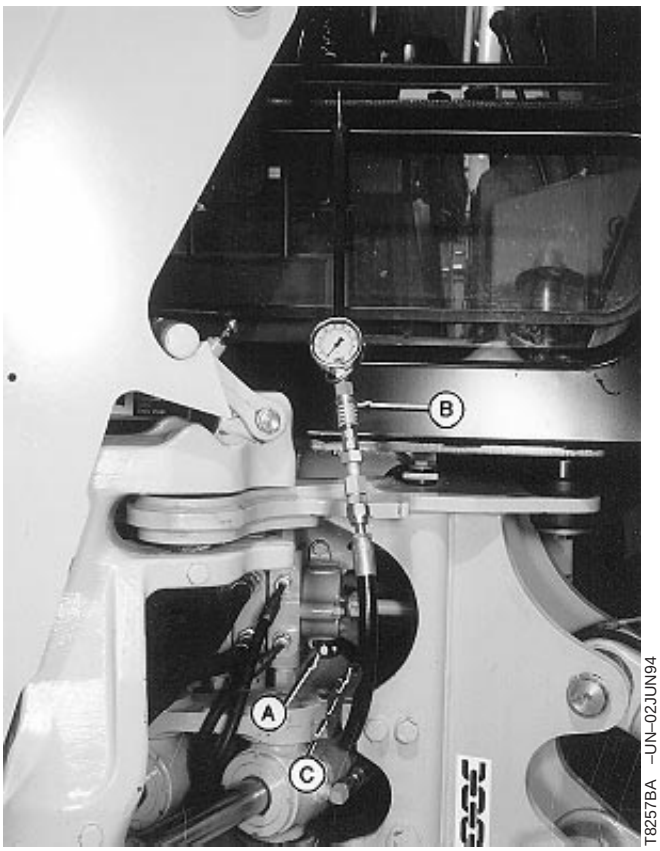
Specification

Engine—Speed ..... Fast idle

Auxiliary Pump—Relief Pressure Setting..... 20 500—23 800 kPa (205—238 bar) (2975—3450 psi)

IMPORTANT: Steering pump relief valve must be set higher than main hydraulic system relief valve to prevent damage to steering pump relief. See Main Hydraulic Relief Pressure Test in this group.

6. Relief cartridge is not adjustable. Replace if necessary.



T8257BA –UN–02JUN94

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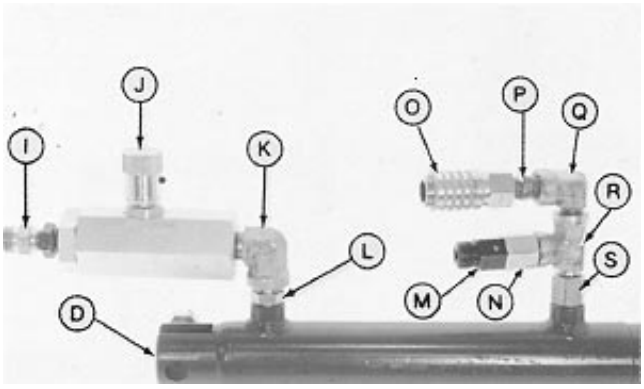
TX,9025,BS415 –19–21JUL94–2/2

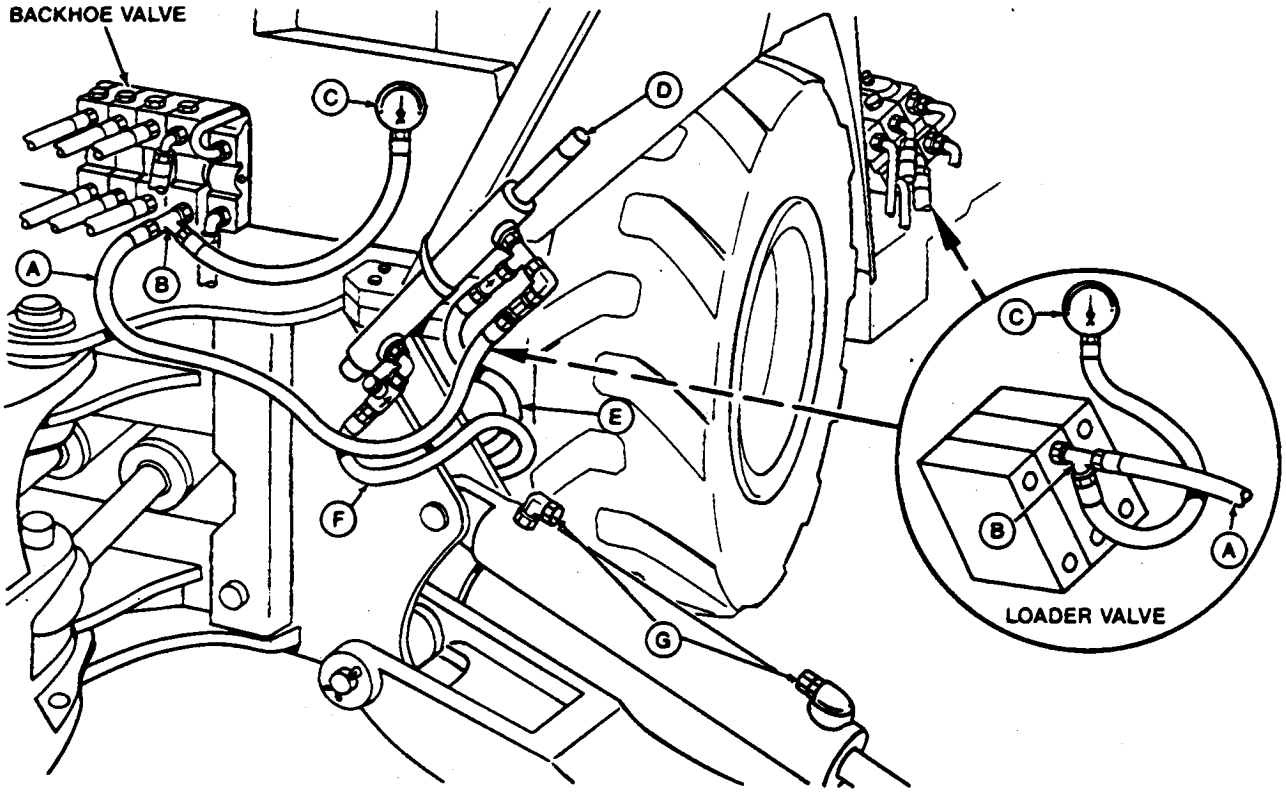
Specification	
310D, 315D Husco Backhoe	
Circuit—Pressure (Crowd Out)	24 100 kPa (241 bar) (3500 psi)
Pressure (Bucket Curl)	24 100 kPa (241 bar) (3500 psi)
Pressure (Boom Down)	12,900 kPa (129 bar) (1875 psi)
Pressure (Swing Left)	19 000 kPa (190 bar) (2750 psi)
Pressure (Crowd In)	19 000 kPa (190 bar) (2750 psi)
Pressure (Bucket Dump)	24 100 kPa (241 bar) (3500 psi)
Pressure (Boom Raise)	26 200 kPa (262 bar) (3800 psi)
Pressure (Swing Right)	19 000 kPa (190 bar) (2750 psi)

TX,9025,BS419 –19–22JUL94–5/5



T6725AB –UN–26OCT88

TX,9025,BS422 –19–22JUL94–3/6



T6773AN –19–21MAR89

A—Rod End Hose To Tee
B—Tee
C—Gauge
D—Cylinder
E—Stabilizer Hose (Rod End)
F—Stabilizer Hose (Head End)
G—38H1415 Cap (2 Used)

1. Lower stabilizers to ground and stop engine.

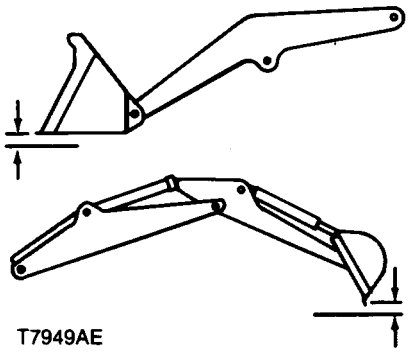
Continued on next page

TX,9025,BS422 –19–22JUL94–4/6

4. Position level loader bucket cutting edge same distance off ground as backhoe bucket.

NOTE: If bucket cutting edges touch the ground within one minute, excessive leakage is indicated in the cylinders or control valve. Position machine as shown, with the bucket pivot pin one meter (36 in.) off ground.

5. Run engine at slow idle and observe bucket cutting edges for one minute.



T7949AE –UN–25FEB93

Specification

Engine—Speed	Low idle
Function—Max Allowable Drift	50 mm/min (2.00 in/min)

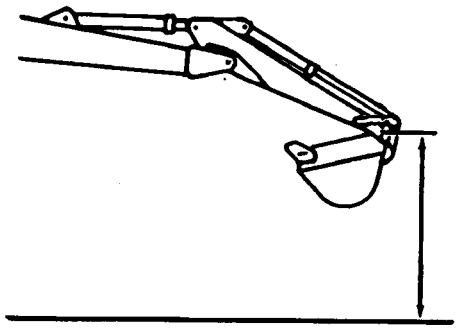
Backhoe Cylinder Drift

TX,902525,BS231 –19–21JUL94–2/7

6. Position the crowd cylinder with rod 20—50 mm (0.75—2.00 in.) extended from the fully retracted position.

7. Position the bucket cylinder with rod 20—50 mm (0.75—2.00 in) retracted from the fully extended position.

8. Measure movement of boom, crowd, and bucket cylinders for five minutes.



T7949AF –UN–26MAR93

Specification

BH Boom, Crowd Cylinder—Max Allowable Drift (Std. Dipper)	5 mm/min (0.20 in/min)
Max Allowable Drift (Ext. Dipper)	6 mm/min (0.25 in/min)
BH Bucket Cylinder—Max Allowable Drift	3 mm/min (0.12 in/min)

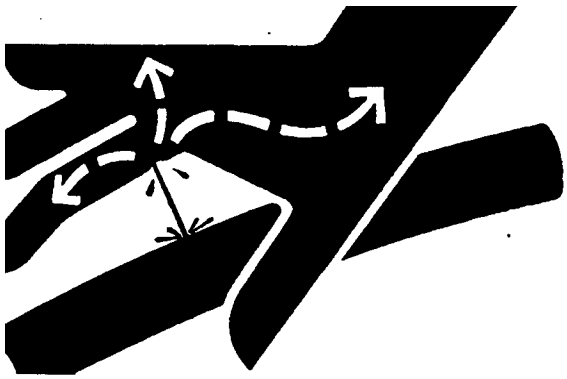
Divide measured rod drift by five to determine drift per minute.

Continued on next page

TX,902525,BS231 –19–21JUL94–3/7

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.



X9811 –UN–23AUG88

3. Operate controls to relieve pressure in hydraulic system.
4. Hold side shift switch in ON position.
5. Remove return line and plug. Put beaker under fitting.
6. Start unit and hold boom raise function for one minute. Measure oil.

Specification

Oil—Maximum Leakage ..... 125 mL (4.2 oz)

If leakage is excessive, replace O-ring or replace valve as necessary. See repair manual.

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T60,9025,C420 –19–21JUL94–2/2

The expansion valve diaphragm is activated by sensing temperature and pressure within the valve body. The internal bulb senses the evaporator outlet or discharge temperature and pressure of refrigerant as it passes through the valve back to the low pressure or suction side of the compressor. (See Expansion Valve Operation in this group for additional information on theory of operation.)

If too much refrigerant is flowing into evaporator, the liquid refrigerant will still be evaporating as it leaves the evaporator, causing a low temperature at the evaporator outlet. The low temperature causes the expansion valve variable orifice to decrease in size, restricting refrigerant flow. If the evaporator outlet temperature is too warm, the orifice will increase in size, allowing more refrigerant into evaporator.

If evaporator (K) temperature becomes too low, the clutch cycle switch (M) will interrupt current flow to the compressor clutch coil, stopping system operation until the temperature becomes normal, between 31° and 40°.

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Air Conditioning Circuit Operational Information

The following conditions must exist for air conditioning circuit to function:

- Key switch ON
- Machine running
- Air conditioning switch turned
- ON Blower switch turned to low, medium or high.

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Air Conditioning Operational Checks

This procedure is designed so the mechanic can make a quick check of the system using a minimum amount of diagnostic equipment. If you need additional information, read Theory of Operation (Group 9031-05).

The engine or other major components must be at operating temperature for some checks.

Locate system check in the left column and read completely, following this sequence from left to right. Read each check completely before performing.

At the end of each check, if no problem is found, that check is complete. When a problem is indicated, additional checks or repair information will be given.T.M. Group or CTM number required for repair will be given. If verification is needed, you will be given next best source of information:

Group: 10 (System Operational Checks)

Group: 15 (Diagnostic Information)

Group: 20 (Adjustments)

Group: 25 (Tests)

CTM (Component Technical Manual)

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❶ Visual Inspection Of Components

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All Lines And Hoses	Engine OFF. Inspect all lines and hoses. Are lines and hoses straight, NOT kinked or worn from rubbing on other machine parts or 'weather checked'? Are hose and line connections clean NOT showing signs of leakage, such as oil or dust accumulation at fittings? All hose and line clamps must be in place and tight. Clamps must have rubber inserts or cushions in place to prevent clamps from crushing or wearing into hoses or lines?	**YES:** Check Complete. **NO:** Reposition hoses or lines and tighten or replace clamps. Tighten fittings or replace O-rings in fittings. Replace hoses or lines as required. – – –1/1

A—30 AMP Heater/A.C. Circuit Breaker
B—Heater Temperature Switch (S22)
C—Blower Switch (S8)
D—Ground at Cab Floor
E—Blower Harness (W10)
F—Heater Blower Motor (M7)
G—Heater Blower Motor (M6)
H—Blower Resistor (R1)
I—Evaporator
J—Clutch cycle switch (S26)
K—Receiver Dryer
L—Condenser
M—Compressor R12/R134a (Y10)
N—High Pressure Switch (S24)
O—Low Pressure Switch (S23)
P—Air Conditioning Compressor Harness (W11)
Q—Blower Harness to Side console Harness Connector (X35)
R—Air Conditioning Switch (S25)
S—Expansion Valve
T—Low Pressure Test Port
U—High Pressure Relief Valve
V—High Pressure Quick Disconnect

NOTE: For electrical call-outs in parenthesis, see Wiring and Schematic Diagrams Legend in Group 9015-10.

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R134A Compressor Oil Charge Check

OTHER MATERIAL
TY16134 U.S. Air Conditioning Flushing Solvent
TY22025 U.S. Refrigerant Oil

Remove compressor if R134a leakage was detected and repaired. See Remove and install Compressor in Repair Manual.

Drain oil from the compressor and record the amount. See Compressor Oil Removal procedure in this group.

NOTE: Drain oil and save if this is a new compressor.

If the oil drained from a compressor removed from operation is very black or the amount of oil is less than 6 mL (0.2 fl oz), perform the following:

1. Remove and discard the receiver-dryer.
2. Remove, clean, but do not disassemble the valve.
3. Flush the complete system with TY16134 air conditioning flushing solvent.
4. If the compressor is serviceable, pour flushing solvent in the manifold ports and internally wash out the old oil.
5. Install a new receiver-dryer.
6. Install required amount of TY22025 refrigerant oil in the compressor. (See R134a Component Oil Charge in this group.)
7. Connect all components, evacuate and charge the system.

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R134A Compressor Oil Removal

1. Remove compressor from machine. See Remove and Install Compressor in Repair Manual.
2. Remove inlet/outlet manifold from compressor, and clutch dust cover.
3. Drain oil into graduated container while rotating compressor shaft.
4. Record measured oil and discard oil properly.
5. Install new oil. See R134a Component Oil Charge in this Group.
6. Install compressor. See Remove and Install Compressor in Repair Manual.

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ESSENTIAL TOOLS
JT02047 R134a Refrigerant Recovery/Recycling and Charging Station

IMPORTANT: Use correct refrigerant recovery, recycling and charging stations. DO NOT use refrigerant, hoses, fittings, components or refrigerant oils intended for R12 refrigerant.

1. Connect refrigerant recovery, recycling and charging station.(See installation procedure in this group.)
2. Close both low and high pressure valves on refrigerant recovery, recycling and charging station.
3. Open cab doors and windows.

Continued on next page

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