

8110, 8210, 8310 and 8410 Tractors Diagnostic



TECHNICAL MANUAL

For complete service information also see:

8110, 8210, 8310 and 8410 Tractor Operation and Test	TM1797
8000 and 8000 Ten Series Wheel Tractor Repair	TM1575
Power Tech 8.1L 6081 Engines - Repair...	CTM86
Power Tech 8.1L 6081 Engines - Operation and Diagnostics	CTM134
Alternators and Starters	CTM77

Deere & Company
TM1796 (06JUL00)

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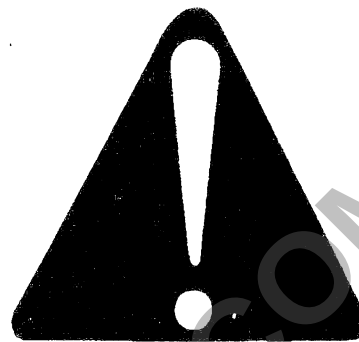
212

INDX

Recognize Safety Information

This is a safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.



DX,ALERT -19-29SEP98-1/1

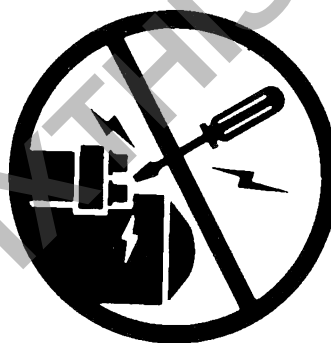
T81389 -UN-07DEC88

Prevent Machine Runaway

Avoid possible injury or death from machinery runaway.

Do not start engine by shorting across starter terminals. Machine will start in gear if normal circuitry is bypassed.

NEVER start engine while standing on ground. Start engine only from operator's seat, with transmission in neutral or park.



DX,BYPAS1 -19-29SEP98-1/1

TS177 -UN-11JAN89

Handle Fluids Safely—Avoid Fires

When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.



DX,FLAME -19-29SEP98-1/1

TS227 -UN-23AUG88

Section 211 SERVICE CODES

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SPECIFICATIONS

Item	Measurement	Specification
ACU Address 03		
Throttle Lever Command Voltage	Volts (Throttle Lever Full Back)	0.5
	Volts (Throttle Lever Full Forward)	4.5
ACU Address 04		
Shift Control Lever Switch Signals	Park and Neutral	000
	Reverse Gear Hold	101
	Forward Gear Hold	011
ACU Address 05		
Shift Control Lever Switch Signals	Park	110
	Neutral and Gear Hold Positions	010
	Forward (+) and Reverse (-)	001
	Forward (-) and Reverse (+)	100
ACU Address 06		
Shift Control Lever Switch Signals	Park and Reverse (+)	101
	Forward (-)	100
	Reverse Gear Hold	000
	Out of Park, Reverse (-), Forward	000
	Gear Hold, Forward (+) and Full Neutral.	
ACU Address 07		
Hitch Raise/Lower Rocker Switch Position	Off	100
	Raise	001
	Lower	010
ACU Address 08		
Hitch Load/Depth Control Potentiometer Voltage	Volts (CCW)	0.50
	Volts (CW)	4.50

Continued on next page

AG,RX33672,711 -19-30APR00-1/2

ACU 002—SCV Lever Calibration Failure

AG,OUO1045,427 -19-26AUG99-1/1

211
ACU
3**Service Code Diagnosis**

NOTE: ACU 002 indicates an SCV lever calibration has failed or been lost.

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① ACU Memory Loss

NOTE: Recall, Record and Clear Codes before proceeding. (See Reference 245-05-001).

If service code ACU 02 is stored, there is an ACU internal memory loss related to calibration data recorded at ACU address 21. Do the following:

NOTE: This service code will not generate an alarm.

1. Calibrate ALL controls associated with ACU address 21. See **ACU Calibration** (Reference 245-ACU-001).
2. Clear ACU service codes at ACU address 01.
3. Cycle the ignition switch (OFF—ON).
4. If service code "ACU 02 returns, and the SCV levers do not operate properly, replace the ACU and calibrate. See **ACU Calibration** (Reference 245-ACU-001).

OK: Diagnostics completed.

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ACU 027—Calibration Not Successful

AG.OUO1045,429 -19-05MAY00-1/1

211
ACU
5**Service Code Diagnosis**

NOTE: ACU 027 indicates ACU calibration was not successful, an "information" alarm is generated. Calibration may not been successful due to configuration selection at address 24.

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❶ ACU Configuration Selection	<p><i>NOTE: Recall, Record and Clear Codes before proceeding. (See Reference 245-05-001).</i></p> <p>With engine OFF access ACU address 24 and perform ACU Configuration Selection and check display for correct configuration entry. (See Reference 245-ACU-024).</p> <p>Display should read:</p> <p>24 000</p>	<p>OK: Configuration is correct.</p> <p>GO TO: ❷.</p> <p>NOT OK: Configuration is incorrect.</p> <p>GO TO: ❸.</p>
❷ Invalid Calibration	<p>ACU service code "27" is stored if an armrest control device is not properly calibrated during the calibration process (address 20).</p> <p>This code will be stored ONLY if an ACU calibration procedure has been started and either of the two following occurs:</p> <ul style="list-style-type: none"> • The calibrated voltage range from the control is LESS than 1.7 volts —OR— • The control was NOT calibrated during calibration. <p>Other service codes, related to the control that caused code "27" to be stored, may or may not also be stored.</p> <ul style="list-style-type: none"> • If other service codes were also stored, the controller(s) that generated the code must be calibrated. • If no other service codes were stored, ALL controls must be calibrated. <p>Calibrate controls as necessary and perform "ACU Calibration". (See Reference 245-ACU-001).</p>	<p>OK: Diagnostics completed.</p> <p>NOT OK: Replace ACU and calibrate. See ACU Calibration (Reference 245-ACU-001).</p>

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ACU 070—IMS SWITCH ERROR

AG,OUO1045,440 -19-21MAR00-1/1

Service Code Diagnosis

NOTE: NOTE: ACU 070 will occur and generate an alarm if one of the following occur.

- All inputs are shorted to ground, 5 or 12 volts.
- IMS switch is positioned in a transitional state for more than 13 seconds.
- IMS switch indicates a non-center position at start-up.

Additional References:

- ACU Theory of Operation (See Reference 245-ACU-200).
- ACU Wiring Diagram (See Reference 245-ACU-300).
- Cab Connecting Harnesses (See Reference 240-25-009).
- Tractor Schematic (See Reference 240-25-001).
- General References (See Reference 210-15-001).

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① IMS Switch Circuit Test

Access ACU address 31 and perform **IMS Switch Circuit Test** (See Reference 245-ACU-031).

NOTE: If switch is moved slowly, the normally open and normally closed switch contacts may not change at the same time. This will cause display of either 100 or 001 during slow switch movement. This is normal and should not be of concern.

ACU Address 31—Specification

IMS Switch Position Signals Center	101
Position	
Position 1	110
Position 2	011

The IMS switch operation can be checked by measuring continuity between the pins at the switches 4-way connector:

Switch Position	Pins	Pins	Pins	Pins	Pins	Pins
	1—2	1—3	1—4	2—3	2—4	3—4
Sequence 1	closed	open	open	closed	open	open
Off	closed	closed	closed	open	closed	open
Sequence 2	open	closed	open	closed	closed	closed

OK: APS switch signals are correct, diagnostics complete.

NOT OK: Switch signals are not correct, repair or replace switch and connection as needed. Check for correct signal by repeating IMS Switch Position Test Reference (Reference 245-ACU-031).

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HITCH WON'T RAISE AND / OR LOWER

AG,OUO1041,1412 -19-05MAY00-1/1

Observable Symptom Diagnosis

NOTE: Service code diagnosis may resolve this observable symptom and must be performed first. See Additional References for Service Code Descriptions.

Additional References:

- Recall, Record, and Clear codes (See Reference 245-05-001.)
- Service Code Descriptions (See Reference 245-05-003.)
- Control Unit Addresses (See Reference 245-05-004.)
- Hitch / SCV System ISO Diagram (See Reference 270-25-003.)
- HCU Circuit Wiring Diagram (SE7) (See Reference 245-HCU-300.)
- General References (See Reference 210-15-001.)

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① Hydraulic Pressure Verification

*NOTE: If this symptom arose immediately following disassembly and service of the valve stack, a part(s) may have been missed during reassembly. See **Load Sense (Dime Valve) Circuit Leak Test** (Reference 270-15-004).*

A lack of pressure in the hydraulic circuits will not provide enough force in the hitch cylinders to lift the load.

If the SCV valves are operating normally, ie: delivering full power to their attached functions, these pressures are likely available. If the functions lack power, or there is any question concerning their performance, a pressure check should be made. Perform **Hitch / SCV Pressures Verification** check. (See Reference 270-15-003.)

OK: Correct **Pilot** and **Standby** pressures are available to the valve stack.

GO TO ②.

NOT OK: Stall pressure was not correct and would not rise as the adjustment was turned.

GO TO ③.

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10 Turn Signal Circuit Check**Perform the following voltage checks:**

1. Remove and inspect fuse F19 (10A). Check for 12 volts on terminal "A". Replace fuse if necessary.
2. Disconnect Steering Column Module Connector (A3). Check for 12 V on terminal 7 circuit 032 side of connector.
3. Place Key Switch (S1) in RUN position. Jumper from terminal 7 of Steering Column Module to terminal 3 for LEFT signal. Check for voltage on terminal 3 of Trailer Lighting and Accessory Outlet (7 Pin). Jumper from terminal 7 to terminal 4 for RIGHT signal. Check for voltage on terminal 5 of Trailer Lighting and Accessory Outlet.
4. Reconnect Steering Column Module Connector. Locate and disconnect ICU Connector.
5. Place Turn Signal Switch (S15) in RIGHT turn position. Check for 12 V on terminal 17 of ICU Connector.
6. Place Turn Signal Switch in LEFT turn position. Check for 12 V on terminal 16 of ICU Connector.
7. Reconnect ICU Connector. Locate and disconnect CCU / PCU (A7), X2 Connector. Check for CCD voltage on terminals B1 and A1 of X2 Connector.

CCD Network Voltage—Specification

CCD Network Voltage Voltage..... 2.5 V (+/-0.5 V)

OK: All voltage readings OK. Low or no voltage on terminal 3 of Trailer Lighting and Accessory Outlet (X26).

GO TO **12**.

OK: All voltage readings OK. Low or no voltage on terminal 5 of Trailer Lighting and Accessory Outlet (X26).

GO TO **13**.

NOT OK: Low or no voltage on terminal 7 of Steering Column Module Connector (A3). Repair circuit 032 as necessary.

GO TO **3**.

NOT OK: Voltage on terminal 7 of Steering Column Module (A3). Jumper wire to terminals 3 and 4 of Steering Column Module Connector (A3) energizes terminals 3 and 5 of Trailer Lighting and Accessory Outlet (X26). Replace Steering Column Module (A3).

GO TO **3**.

NOT OK: Low or no voltage on terminal 17 of ICU Connector in RIGHT turn position. Repair circuit 151 as necessary.

GO TO **3**.

NOT OK: Low or no voltage on terminal 16 of ICU Connector in LEFT turn position. Repair circuit 149 as necessary.

GO TO **3**.

NOT OK: Voltage out of specification on terminal B1 or A1 of X2 Connector to CCU. See CCD Network Diagnosis (Reference 245-05-005.) Repair as necessary.

GO TO **3**.

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INDX

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ACU 151—SCV No. 5 Control Switch Status

AG,OUO1045,451 -19-26AUG99-1/1

211
ACU
31

Service Code Diagnosis

NOTE: ACU 151 indicates SCV No. 5 switch circuit status is incorrect, an "information" alarm is generated. Service code does not necessarily mean that the switch is at fault.

Additional References:

- ACU Theory of Operation (See Reference 245-ACU-200).
- ACU Wiring Diagram (See Reference 245-ACU-300).
- Cab Connecting Harnesses (See Reference 240-25-009).
- Tractor Schematic (See Reference 240-25-001).
- General References (See Reference 210-15-001).

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1 SCV Control Switch Test

NOTE: Recall, Record and Clear Codes before proceeding. (See Reference 245-05-001).

Access ACU address 16 and perform **SCV Control Switch Test**. (See Reference 245-ACU-012).

ACU Address 16—Specification

SCV Control Voltage and Switch Status.....	0.2.0—1.2.0
Float	
Retract/Forward Detent.....	1.2.1—1.8.1
Retract/Forward Midrange.....	1.3.0—2.8.0
Center OFF	2.4.1—3.1.1
Extend/Rearward Midrange.....	2.7.0—4.4.0
Extend/Rearward Detent	3.8.1—4.8.1

NOTE: The display will show both the voltage reading (two left digits) and the switch status information (right digit). The voltage reading is displayed to the nearest tenth volt. The right digit will always be either "0" or "1" to designate an open or closed switch, respectively.

OK: Performed test, problem was not found. Check for intermittent causes using ACU BEEP Mode Test. (See Reference 245-ACU-002). If fault is not found and code does not return, diagnostics completed.

NOT OK: Found problems in circuitry, connections or control potentiometer. Repair as needed, clear codes, operate SCV control switch and recall codes. Recall, Record and Clear Codes (See Reference 245-05-001). Code does not return, diagnostics completed.

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CCU 062—CLEAN OIL RESERVOIR LOW

AG,OUO1041,1314 -19-08MAR00-1/1

Service Code Diagnosis

NOTE: CCU 062 is stored when the Clean Oil Reservoir Switch (B18) opens after the float reaches the alarm level and engine speed greater than 700 rpm for 75 rpm-minutes. The Clean Oil Reservoir Switch is a float type switch. The Warning, Hydraulic and Level lamps will light until condition no longer exists.

Additional References:

- CCU Wiring Diagram (SE-8) (See Reference 245-CCU-300)
- ECU Wiring Diagram (SE-10) (See Reference 245-ECU-300)
- Cab Harness (See Reference 240-25-014)
- Cab Harness (European) (See Reference 240-25-015)
- Cab Connecting Harnesses (See Reference 240-25-016)
- Chassis Harness (See Reference 240-25-017)
- General References (See Reference 210-15-001)

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1 Preliminary Check

NOTE: Recall, Record and Clear Codes before proceeding. (See Reference 245-05-001).

Perform the following checks:

- Transmission-Hydraulic Oil Level in sightglass located at rear of tractor, beneath SCV valve stack. Run engine at 1000 rpm for at least one minute; then shut off engine and wait two minutes before checking oil level. Make sure tractor is on level ground and hitch in lowered position. Oil level should be at upper mark on glass.
- Determine if 750 hours of operation have occurred since last Transmission-Hydraulic Filter change. If so, replace filter. Remember to lubricate new filter packing with hydraulic oil only.
- Check for external leaks from lines, hoses and other hydraulic components. Oil could be leaking from the secondary circuit (SCVs/ Hitch), or from inlet lines to either the secondary piston pump, steering pump or the charging pump has failed during operation. Add oil as required.

OK: Oil Level OK.

GO TO 3.

NOT OK: Make necessary repairs.

GO TO 2.

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HCU 052—Draft Sensor Circuit

AG,OUO1052,556 -19-26AUG99-1/1

Service Code Diagnosis

NOTE: This code will be stored if a problem was detected within the draft sensor, the sensor circuits, or due to sensor misadjustment.

Additional References:

- HCU Theory of Operation (See Reference 245-HCU-200.)
- Hitch Control Unit (HCU) System (See Reference 270-20-001.)
- HCU Wiring Diagram (SE7) (See Reference 245-HCU-300.)
- General References (See Reference 210-15-001.)

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1 Draft Sensor Test

NOTE: Recall, record and clear codes before proceeding. (See Reference 245-05-001.)

To determine cause, perform the **Draft Sensor Test**. (See Reference 245-HCU-005.)

HCU Address 05—Specification

Draft Sensor Voltage (no load) Voltage..... 1.60V — 1.70V

OK: Sensor tests "good".

NOT OK: Problems were found and corrected. Calibration completed.

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PCU 036—AB VALVE CIRCUIT FAULT

AG,OUO1041,1049 -19-13MAR00-1/1

211
PCU
41

Service Code Diagnosis

NOTE: PCU 036 is stored when shifting into 1F, 2F, 3F, 4F or 1R and the PCU senses a valve circuit fault. The ACU will not operate the Not Neutral Relay (K22) because of the valve circuit fault. The PCU will default to NEUTRAL and the cornerpost will display "N". The operator must move the shift lever to NEUTRAL before attempting to go back into gear. The Information and Transmission lamps will light.

Additional References:

- List of Powershift (PST) Transmission Theories (See Reference 250-20-001)
- PCU Theory of Operation (See Reference 245-PCU-200)
- List of Powershift (PST) Drawings (See Reference 250-25-001)
- PCU Wiring Diagram (See Reference 245-PCU-300)
- General References (See Reference 210-15-001)

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1 PST Shift Valve
Circuit Check

NOTE: Recall, Record and Clear Codes before proceeding. (See Reference 245-05-001.)

Access PCU address 20 and perform **PCU Shift Valve Circuit Test**. (See Reference 250-15-008)

After accessing address 20, select the AB element by moving the shift lever to the FORWARD position. The display should start with AB.

(See Reference 245-05-002, Access Control Unit Addresses.)

Specification

Shift Valves Duty Cycle Amperage Duty	1.00
Cycle No. 1	
Duty Cycle No. 2	0.0
Duty Cycle No. 3	0.29
Duty Cycle No. 4	0.44
Duty Cycle No. 5 (Ramps Up and Down).....	1.0 (peak)

Causes of Incorrect Amperage Readings:

- Resistance across the solenoid terminals greater than 10-12 ohms.
- Resistance in circuits from PCU to solenoid greater than 1.0 ohms (circuits 616, 697).
- Faulty Powershift Control Unit (PCU).

If no problems are found with the circuits, replace and calibrate the PCU.

(See Reference 245-PCU-300, PCU Wiring Diagram)

(See Reference 245-PCU-001, PCU Calibration)

OK: Test passed. Clean / replace sticking AB solenoid shift valve (Y20).

NOT OK: Test failed. Check the resistance of the AB solenoid shift valve and its circuits 616 and 697 (A7X3 pins C3-616 and J2-697).

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SCU 113—SCV No. 1 Extend Valve Circuit (During CAL)

AG,OUO1052,660 -19-08MAY00-1/1

Service Code Diagnosis

NOTE: This Service Code will be stored if the circuit from the SCV switch to the valve shows a fault. The code is similar to Service Code SCU 111 except that it was stored during calibration.

Additional References:

- SCU Theory of Operation (See Reference 245-SCU-200.)
- Selective Control Valve (SCV) (See Reference 270-20-008.)
- SCU Wiring Diagram (SE7) (See Reference 245-SCU-300.)
- General References (See Reference 210-15-001.)
- SCV No. 1 Control Potentiometer Test (See Reference 245-SCU-007.)

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1 SCV Switch Circuit Check

NOTE: Recall, record and clear codes before proceeding. (See Reference 245-05-001.)

A test of the SCV 1 switch circuit will show the "position" of the control and whether it is communicating properly with the SCV valve. If necessary, check the voltage reading for the potentiometer at ACU Address 12 (See SCV Control Switch Test, Reference 245-ACU-012.)

At SCU Address 13, perform the **SCV No. 1 Solenoid Command Test**. (See Reference 245-SCU-013.)

SCU Address 13—Specification

SCV No. 1 Solenoid Command	199
Rearward Detent	
Forward Detent.....	299
Center-Off.....	000

OK: SCV switch circuit tests "good".

NOT OK: Testing indicates an electrical fault. Repair as necessary before calibrating the SCU. (See Reference 245-SCU-001.)

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**7 Diode Block V1
Voltage Supply Check****Perform the following tests in order:**

1. Place Road Light Switch (S17) in FIELD 1 position. Remove Diode V1. Check for 12 V on terminal 4.
2. Place Road Light Switch in FIELD 2 position. Check for 12 V on terminal 6.
3. Replace Diode V1 with a known good diode. Check for 12 volts on terminal 2 of Trailer Lighting and Accessory Outlet.

OK: 12 V indicated on terminal 4. Low or no voltage indicated on terminal 86 of K5 Relay. Repair circuit 145 as necessary.

GO TO ③.

OK: 12 volts indicated on terminal 2 of Trailer Lighting and Accessory Outlet (X26) with known good diode. Replace diode (V1).

GO TO ③.

NOT OK: Low or no voltage indicated on terminal 4 and / or 6 when Light Switch is in FIELD 1 or FIELD 2 position.

GO TO ⑧.

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**13 Circulator Blower
Harness (4-WAY)
Check**

Disconnect Circulator Blower Harness (X50) (4-WAY).

Check for 12 V at terminal C of Circulator Blower Motor Harness to Cab Harness.

NOTE: HVAC System Circuits (See Reference 240-25-004.)

OK: 12 V at terminal C. Use the 7 Step Electrical Test Procedure to check circuit 227 from terminal C of Circulator Blower Harness (X50) (4-WAY) switch harness to Blower Motor Relay (K30) terminal 86. See Reference 210-15-009. Repair as necessary.

GO TO ③.

NOT OK: Low or no voltage at terminal C of Circulator Blower Harness (X50) (4-WAY). Repair circuit 227 from terminal C of Circulator Blower Harness (X50) (4-WAY) to Blower Motor Switch (S10) harness terminal 1.

GO TO ③.

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