Section 55
Chapter 3

HITCH CONTROLLER
Calibration and Fault Codes
FAULT CODE HITCH 9316 'No Load' Offset Voltage Out Of Range For Both Draft Pins ........................... 55-51
FAULT CODE HITCH 9317 Hitch Controller Requires Calibration ............................................................... 55-51
FAULT CODE HITCH 9318 Engine Speed Too Low For Hitch Lower Calibration ....................................... 55-51
FAULT CODE HITCH 9319 Hitch Is Calibrated As Position Only ............................................................... 55-52
FAULT CODE HITCH 9320 Calibration Aborted Due To Tractor Moving ..................................................... 55-52
FAULT CODE HITCH 9321 No Engine Speed During Hitch Calibration ...................................................... 55-52
FAULT CODE HITCH 10030 Controller Memory Failure .............................................................................. 55-53
FAULT CODE HITCH 10060 Controller Relay Failure Or Hitch Valves Shorted To Power ............................. 55-53
FAULT CODE HITCH 10061 Hitch Raise/Lower Solenoids Circuit Failed Open ......................................... 55-54
FAULT CODE HITCH 10071 Controller Internal Failure ............................................................................... 55-54
FAULT CODE HITCH 10072 Controller Internal Failure ............................................................................ 55-55
FAULT CODE HITCH 10090 Controller Internal Failure ............................................................................ 55-55
FAULT CODE HITCH 11010 Load Command Potentiometer Failure .......................................................... 55-56
FAULT CODE HITCH 11020 Drop Rate Command Potentiometer Failure .................................................. 55-56
FAULT CODE HITCH 11030 Travel Range Potentiometer Failure .............................................................. 55-56
FAULT CODE HITCH 11050 Upper Limit Potentiometer Failure ................................................................. 55-57
FAULT CODE HITCH 11069 Rockshaft Position Potentiometer Is Outside Normal Operating Range ........ 55-58
FAULT CODE HITCH 11070 Hitch Position Command Potentiometer Failure ............................................ 55-59
FAULT CODE HITCH 12011 Communication Lost With The Armrest Controller ......................................... 55-60
FAULT CODE HITCH 12031 Communication Lost With The Data Bus ....................................................... 55-62
FAULT CODE HITCH 12041 Communication Lost With The Instrument Controller .................................... 55-63
FAULT CODE HITCH 52230 Hitch Position Is Above Upper Limit Setting ................................................... 55-65
FAULT CODE HITCH 52260 Up/Down Fender Switch Failure ................................................................. 55-66
FAULT CODE HITCH 65535 Memory Not Cleared From The Factory ....................................................... 55-66

SCHEMATIC FOLDOUTS ............................................................................................................ .................... 55-67
Can Data Bus - Front to Rear Harness .......................................................................................... ............... 55-67
Instrument Cluster ............................................................................................................ ............................. 55-69
Armrest Controller (ARU) Section 46 ........................................................................................... ................. 55-71
Armrest Controller (ARU) Section 47 ........................................................................................... ................. 55-73
Armrest Controller (ARU) Section 48 ........................................................................................... ................. 55-75
Armrest Controller (ARU) Section 49 and Hitch Control System (EDC) ....................................................... 55-77
Hitch Control System (EDC) .................................................................................................. 55-79
HITCH CONTROLLER CALIBRATION

Setup Process

Requirements For Calibration

NOTE: The standard instrumentation and armrest controllers must be calibrated before the hitch controller can be calibrated.

NOTE: The hitch must be recalibrated anytime that any electrical or hydraulic hitch component is repaired or replaced.

• Before starting the hitch calibration procedure, check the wiring harness and components for damage or loose connections. Replace or repair any damaged part as necessary.

• There must not be an implement mounted to the three point hitch during calibration.

• Lengthen both the right hand and left hand lift links so that a minimum of 50 mm (2 inches) of thread is visible.

• Be sure that the hitch is free to move all the way between the lift cylinders minimum and maximum limits. Make sure that no interference exists during hitch movement (such as a quick coupler contacting a draw bar). Be sure there are no persons in the back of the tractor during hitch calibration as the hitch will raise and lower during the calibration process.

• Do not calibrate the hitch with the tractor moving.

• The transmission oil must be warmed to more than 38°C (100°F).

• The engine speed must be 1600 RPM or higher during calibration.

Hitch Setup Main Menu

Hitch setup / calibration is performed from the programmable display on the standard monitor.

Once the requirements for calibration have been met, hitch calibration can begin.

NOTE: Programming can only be entered within the first 10 seconds of turning the key switch to the ON position.

To get to the hitch setup main menu, do the following:

1. Start the tractor.

2. Push the program button and hold for two seconds within the first ten seconds after turning on the key switch. A short beep will indicate that the program mode has been accessed and the display will read INST SET MENU.

3. Push the DECR key three times. The display will read HITCH SET MENU.

4. Push the program key to enter the main menu.

When the Hitch Set main menu is entered, the setup options include the following:

1. HITCH CAL-Capability to calibrate the hitch system.
   A. Calibration of systems configuration.
   B. Calibration of systems parameters
2. HITCH SETTINGS-Capability to set user settings of certain parameters.

3. HITCH VIEW-Capability to view information about the controller.

The HITCH CAL will be the first option upon entry into the setup main menu. Press the INC or DECR key to move through the main menu which includes HITCH CAL, HITCH SETTINGS and HITCH VIEW. To enter the submenu of your choice, press PROG.

**NOTE:** If any fault codes are recorded, they must be corrected before programming is possible.

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**Hitch Calibration Menu**

The Hitch Cal menu allows the user to calibrate the system parameters. These parameters include the tractor type, number of draft pins, draft pin offset voltage, position feedback potentiometer and valve thresholds.

**STEP 1**

The lower line of the display will have the word “Type”. The tractor type must be entered in the top line of the display. If the tractor has been previously calibrated, the top line will have that calibration number. If the controller has not been calibrated, the display will default to the number “1”.

1. Use the INCR or DECR keys to scroll through the cylinder sizes to find the size that applies to your tractor.

   1 = Two 3.5 inch (88.9 mm) ID cylinders.
   2 = Two 3.75 inch (95.2 mm) ID cylinders.
   3 = One 3.75 (95.2 mm) and One 4.125 (104.8 mm) ID cylinders.
   4 = Two 4.125 (104.8 mm) ID cylinders.

2. When the correct cylinder size is found, press the PROG key to enter the selection.
SECTION 55 - HITCH CONTROLLER - CHAPTER 3

STEP 2

At this step, the controller is looking for the number of draft pins in the system.

1. If the hitch controller detects two draft pins, and the armrest controller is calibrated for draft, the hitch controller will assume there are two draft pins and go to Step 3.

2. If the armrest controller is calibrated for position only, the controller will assume there are no draft pins and go to Step 3. Fault code HITCH 9313 will be recorded if draft pins are detected.

NOTE: Fault code HITCH 9313 will not stop the calibration process.

3. If neither item 1 or 2 are true, the lower line of the display will read “Pins”. This means that the number of draft pins must be programmed into the controller.

4. If the hitch controller has been previously calibrated, the top line will have that calibration number. If the controller has never been calibrated, the top line of the display will read “0”.

5. Use the INCR or DECR keys to scroll through the number of draft pins.

6. When the correct number of draft pins is displayed on the upper line of the display, press the PROG key to select that number of draft pins. The system will go to Step 3 after the selection has been made.

NOTE: If a failure is detected, the system will go to Step 10.

STEP 3

The display will now read “Lower Hitch”. It will allow you to lower the hitch. Be sure the engine is at 1600 RPM minimum.

1. To lower the hitch, press and hold the PROG key. The hitch will lower as long as the PROG key is depressed. While the hitch is lowering, the display will change to “Lower Hitch ON”.

2. When the PROG button is released, the system will go to Step 4.

3. To abort calibration, press either the INCR or DECR key. The system will go to Step 9.

NOTE: If a failure is detected, the system will go to Step 10.
**STEP 4**
The display will now read “Cal Raise”. This will allow you to calibrate the raise threshold of the hitch valve.

1. To calibrate the raise portion of the hitch valve, press the “PROG” key. The controller will start the raise calibration. Whenever current is applied to the coil, the display will change to “Cal Raise ON”.

**NOTE:** Calibration may take a few minutes. While calibration is taking place, the “ON” will flash intermittently.

2. When the controller has found the upper threshold of the valve, the hitch will move to the maximum raised position. The system will then go to Step 5.

3. To abort calibration, press either the INCR or DECR key. The system will go to Step 9.

**NOTE:** If a failure is detected, the system will go to Step 10.

**STEP 5**
The display will read ENG SPD. If the engine RPM is at or above 1600 RPM, there will be an asterisk (*) on the display. If there is no asterisk, increase engine speed until the asterisk appears. Then press the PROG key.

**NOTE:** If the program key is pressed without an asterisk on the display, Cal Fail will appear on the display and calibration cannot continue.

**STEP 6**
The display will now read “Cal Lower”. This will allow you to calibrate the lower threshold of the hitch valve.

1. To calibrate the lower portion of the hitch valve, press the “PROG” key. The controller will start the lower calibration. Whenever current is applied to the coil, the display will change to “Cal Lower ON”.

2. The hitch will move down for approximately 0.8 seconds as soon as the PROG key is released. The hitch will then stop while the hitch valve finds its lower threshold. Then the hitch will move down to the lower limit.

**NOTE:** Calibration may take a few minutes. While calibration is taking place, the “ON” will flash intermittently.
3. To abort calibration, press either the INCR or DECR key. The system will go to Step 9.

**NOTE:** Be sure the engine is at 1600 RPM minimum.

**NOTE:** If a failure is detected, the system will go to Step 10.

**STEP 7**

The display will now read “Lower Limit ON”. The system wants you to acknowledge that the hitch has reached the lower limit.

1. Push the “PROG” key to acknowledge that the hitch is at the lower limit. The system will then go to Step 8.

2. To abort calibration, press either the INCR or DECR key. The system will go to Step 9.

**NOTE:** If the PROG key is not pressed within 6 minutes, the calibration will fail and the system will go to Step 9.

**NOTE:** If a failure is detected, the system will go to Step 10.

**STEP 8**

The display will now read “Cal Done”. This indicates that hitch calibration has been successfully completed.

1. Press the “PROG” key to return to the main menu.

2. HITCH CAL will be on the display. Press the INCR key to go to HITCH EXIT menu. Press the PROG key to exit calibration.
STEP 9
If the display reads “Cal Aborted”. This means that the calibration process was aborted at some point.
1. Press the “PROG” key to return to the main menu.
2. There are several things that can cause the calibration to be aborted.
   A. The tractor starts moving.
   B. No engine speed.
   C. The operator aborted calibration.

STEP 10
When the display reads “Cal Fail”, it means that a failure has occurred during the calibration process. The controller will now be in the halt mode.
1. Press the “PROG” key to go back to the main menu.

NOTE: Entry into hitch calibration will not be allowed until the key switch has been cycled off, then on.
Hitch Setting Menu

Go to the Hitch Setting menu as shown under Hitch Setup Main Menu. The Hitch Setting Menu allows you to set certain performance parameters.

NOTE: Each parameter has a default setting that would be preferred under normal operating conditions.

STEP 11

The lower line of the display will read “Drop 1”. This will allow you to set the slowest drop rate of the hitch. The three choices are 12, 16 and 20 second. The default setting is 12 seconds.

1. Press the INCR or DECR key to scroll through the selections.
2. Press the PROG key to select your choice of drop rate. The system will go to the next step.

STEP 12

The lower line of the display will read “R/D Rate” (raise/drop rate). The top line of the display will show the present user setting for this (either yes or no). If YES is selected, the system will use the drop rate setting to set the raise rate. If NO is selected, the hitch will raise to the rate specified in Step 13. The default setting for this step is NO.

1. Press the INCR or DECR key to toggle between yes and no.
2. Press the PROG key to select your choice. If YES is selected, the system will go to Step 14. If NO is selected, the system will go to Step 13.

STEP 13

The lower line of the display will read “Raise”. This will allow you to choose the approximate desired time to fully raise the hitch. There are five choices for this: 2, 4, 6, 8, and 10 seconds. The default time is 2 seconds.

1. Press the INCR or DECR key to change the selection.
2. Press the PROG key to choose your selection. The system will go to Step 14 when your choice is made.
STEP 14
The lower line of the display will read “Hitch Up”. This will allow you to choose the approximate desired percentage of hitch travel that will be used for determining when the hitch is up for the Auto-MFD and Auto-DIFFLOCK (disengagement) functions. The choices are 60, 70, 80 and 90%. The default is 70%.

1. Press the INCR or DECR key to change the selection.

2. Press the PROG key to choose your selection. The system will go to Step 15 when your choice is made.

STEP 15
The display will now read “Done Settings”. This indicates that the user settings have been successfully programed.

1. Press the PROG key to return to HITCH SET, the main menu.

2. Press the DECR key to go to the HITCH VIEW menu.
Hitch View Menu

The Hitch View Menu allows the user to see the version number of the software presently programmed into the controller. Press the PROG key with HITCH VIEW on the display.

**STEP 16**

The top line of the display will read “VER #1”. This indicates that the bottom line of the display will have the first two characters of the version number.

**STEP 17**

Press the PROG key to go to the next part of the number. The top line of the display will read “VER #2”. This indicates that the bottom of the display will have the last two characters of the version number. Press the PROG key to go to the next step.

**STEP 18**

The display will now read “HITCH VIEW”. This indicates that this menu is completed. Press DECR key to go to HITCH EXIT.

**STEP 19**

Press the PROG key to exit the hitch menus.

**STEP 20**

Cycle the key switch OFF, then ON. Check to see if there are any fault codes. Erase any fault codes if they exist.
Fault Code Retrieval

Controllers can be checked for fault codes at any time. Up to 10 fault codes can be stored in each controller.

**STEP 21**

With the key switch in the ON or RUN position, press and hold the DIAG key on the programmable display keyboard to enter the controller selection screen. The display will read INST DIAG MENU.

**STEP 22**

Use the DECR key to scroll through the different controllers: INST (standard instrumentation) - ENG (engine) - TRANS (transmission) - ARM (armrest) - HITCH - AUX (remote hydraulics) - PTO (power take off) - PERF (performance monitor).

**STEP 23**

When the required controller is displayed, press the PROG key. If a controller is selected that is not on the Data Bus (does not exist), the display will read COMM ERR.

**STEP 24**

Use the INCR and DECR keys to scroll through the 10 possible fault codes. The controller name will be at the top of the display. The fault code and which number that fault is (01 to 10), will be at the bottom of the display.
STEP 25

To erase the fault codes from a controller, press and hold both the INCR and DECR keys for 10 seconds.

NOTE: All the fault codes for that controller will be erased.

STEP 26

When the fault codes are erased, the display will return to the main screen for that controller.

STEP 27

Another controller can be selected at this time by using the INCR and DECR keys to scroll through the controller list as in Step 21.

STEP 28

To exit the select controller screen, scroll until EXIT is displayed and press the PROG key. This will return you to normal operation.
HITCH FAILURE MODES

There are failures and combination of failures that cause the hitch to be fully inoperable. These are as follows:

MEMORY FAILURES - If there is a memory failure, the hitch will not operate and the green LED on the controller (At the rear of the cab) will be ON. There will not be a fault code recorded in the memory.

HALT CONDITIONS - Halt failure conditions are shown in the diagnostic codes. Hitch motion is fully disabled. Also, if a failure is detected during calibration, the system will go to this mode and the actual failure will be recorded.

DOUBLE FAILURES INVOLVING THE UP/DOWN SWITCH - When the up/down switch and a second limp home failure occur, hitch motion is available only through the remote fender switches (When equipped).

FAILURES THAT RESULT IN NO FAULT BEING STORED

1. Hitch is above the upper limit.
2. Hitch will not go all the way down or up. Position or control potentiometers could be loose. Valve parameters may have shifted.
3. Hitch does not lower or raise. Possible hydraulic contaminant in the valve prevents the spool from opening.

Calibration Fault Codes

Hitch system problems that exists at start up will prevent entry into the calibration mode. These faults can be read through the diagnostic function of the instrumentation display. Faults that occur during the calibration process will cause calibration to stop.

Performance Fault Codes

There are four non-normal modes of operation: HALT, LIMP, DEGRADED 2 and DEGRADED 1. Different failures will generate different modes of operation as shown in the fault code listing. The following shows the differences between these modes.

HALT (H) - The hitch is totally disabled and no electrical actuation is possible.

LIMP (L) - The hitch can be recorded only up or down from the UP/DOWN switch or from the remote fender switch. Only momentary motion is allowed and the tractor must be stopped.

DEGRADED 2 (D2) - Due to a failure, the draft mode is not a valid mode.

DEGRADED 1 (D1) - The hitch is fully operational with default values for certain variables.
SYMPTOM BASED FAULTS - NO FAULT CODES

COMM FAULT / HITCH OFF LINE

Meaning:
The hitch controller is not being powered or the Data Bus has a problem.

Possible failure mode:
1. Fuse 39 has failed.
2. The harness routing around rear controllers is loose or not installed against the cab.
3. Hitch raise and lower solenoid power supply wire from C058-01 is shorted to chassis ground. Fuse 38 will be failed.
4. The hitch power supply wire to C058-12 is shorted to chassis ground. Fuse 38 will be failed.
5. The hitch power supply wire to C058-12 is failed open.
6. Hitch controller ground wire to C058-11 is failed open.
7. C059-4 Data Bus low
8. C059-5 Data Bus high

Background:
The Instrument display monitors the hitch controller and measures the hitch controller through the Data Bus. If the hitch controller is not powered or the Data Bus has a problem, the Display will read COMM ERR and the hitch will not work.

Solenoid information:
Approximately 5.1 ohms at - 40 C (-40 F)
Approximately 6.9 ohms at 25 C (77 F)
Approximately 9.5 ohm at 100 C (212 F)

Wiring information:
NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

Hitch raise and lower circuit:
C058-01 ---> C335-2 ---> splice ---> C151-1 (Hitch Raise solenoid) C151-2 ---> C058-02
splice ---> C152-1 (Hitch Lower solenoid) C152-2 ---> C058-03

Power supply to hitch controller:
C058-12 ---> splice(T16) ---> C314-B ---> splice to center terminal B, Raise Left and Lower Center Remote Hitch Switches.
splice(T16) ---> C10-9 ----> to fuse 39
splice(T16) ---> C315-B ---> center terminal B Lower Right Remote Hitch Switch

Controller ground circuit:
See Schematic Poster

Corrective action:

STEP 1 - Check fuse 39
Check fuse 39.
-- OK - if fuse is not failed, go to Step 3.
-- NOT OK - go to Step 2.

STEP 2 - Replace fuse 39
Replace fuse 39.
Start the engine.
Raise and lower the hitch several times.
-- If the fuse failed, go to Step 4.
-- If the fuse fails, but not right away, go to Step 4.
-- If the fuse did not fail, return tractor to service.
**STEP 3 - Check hitch controller LED light**
Remove rear controller cover.
Check wire harness routing of the controllers and installed against the cab (Make sure wires are not loose or draped in front of controllers).
With the key ON check the LED light on the hitch controller.
-- If the LED lamp is OFF, the hitch controller is not being powered, go to Step 10.
-- If the LED lamp is flashing, the hitch controller has power up correctly, go the Step 17
-- If the LED lamp is ON steady, the hitch controller may have a software, power or internal hardware problem.

1. Reload hitch software in to hitch controller with service tool.
2. Replace hitch controller, go to Step 19.

**STEP 4 - Check hitch power supply wire C058-12 for short to ground**
Measure the resistance between C058-02 and chassis ground. It must be more than 100k ohms. Turn key OFF.
-- OK - go to Step 5.
-- NOT OK - install a new wire.

**STEP 5 - Raise solenoid coil resistance and wiring check**
Turn the key to the OFF position.
Measure the resistance between pin C058-01 and C058-2.
-- OK - go to Step 7.
-- NOT OK - wiring or solenoid problem. Use CAS-2577 Cab Lift Tool and lift the tractor cab. Go to Step 6.

**STEP 6 - Raise solenoid coil resistance check**
Disconnect the hitch raise solenoid at connector C151.
Measure the solenoid resistance between pin 1 and pin 2.
-- OK - go to Step 7.
-- NOT OK - replace the solenoid.

**STEP 7 - Lower solenoid coil resistance and wiring check**
Measure solenoid resistance between pin C058-01 to C058-3.
-- OK - go to Step 8.
-- NOT OK - wiring or solenoid problem. Use CAS-2577 Cab Lift Tool and lift the tractor cab. Go to Step 8.

**STEP 8 - Lower solenoid coil resistance check**
Disconnect hitch lower solenoid at connector C152.
Measure solenoid resistance between pin 1 to pin 2.
-- OK - go to Step 9.
-- NOT OK - Replace solenoid.

**STEP 9 - Raise and Lower solenoid wiring check**
Disconnect both the raise and lower solenoids.
Measure the resistance between C058-01 and chassis ground. It must be more than 100k ohms.
-- OK - go to Step 10.
-- NOT OK - install new wire from C058-01 to C151-1 and C152-1.

**STEP 10 - Check power supply wire C058-12**
Turn key ON.
Check pin C058-12 for 12 volts.
-- OK - go to Step 15.
-- NOT OK - Step 11.
STEP 11 - Check power supply wire C058-12 for open circuit
Measure the resistance between C058-12 and fuse 39 must be less than 10 ohms.
-- OK - go to Step 16.
-- NOT OK - go to Step 12 to find open circuit.

STEP 12 - Check wiring
Measure the resistance between C058-12 and splice T16 must be less than 10 ohms.
-- OK - go to Step 13.
-- NOT OK - install new wire.

STEP 13 - Check wiring
Measure the resistance between splice T16 and C010-9 must be less than 10 ohms.
-- OK - go to Step 14.
-- NOT OK - install new wire.

STEP 14 - Check wiring
Measure the resistance between C010-9 and Fuse 39 must be less than 10 ohms.
-- OK - go to Step 15.
-- NOT OK - install new wire.

STEP 15 - Check hitch controller ground supply wire C058-11
Measure the resistance between C058-11 and chassis ground, it must be less than 10 ohms.
-- OK - go to Step 16.
-- NOT OK - install new ground wire.

STEP 16 - Test hitch controller
Connect connector C058 to the hitch controller.
Turn key ON.
-- OK - the LED light on the hitch controller is flashing ON and OFF.
-- NOT OK - Double check power and ground supply, then replace hitch controller, go to Step 19.

STEP 17 - Check Data Bus low
C059-4 Data Bus low for loose connections or bent pins.
Measure the resistance between the hitch Data Bus connection and the transmission controller Data Bus connection, it must be less than 10 ohms.

STEP 18 - Check Data Bus high
C059-5 Data Bus high for loose connections or bent pins.
Measure the resistance between the hitch Data Bus connection and the transmission controller Data Bus connection, it must be less than 10 ohms.

STEP 19 - Replace hitch controller
Make sure wire harness routing of the controllers is installed against the cab (Make sure the wires are not loose or draped in from of controllers).
Write the fault code on the failed controller.
Install and calibrate a new controller.

NOTE: See schematic sections 51 and 52 at the rear of this section.
HITCH WILL NOT RAISE

Meaning:
The hitch system has one of the following problems that can not be detected by the hitch controller.

Possible failure mode:
1. Low or no regulated pressure.
2. PFC pump supply / pressure problem.
3. The 8 volt power supply wire from the hitch controller C059-6 to the rockshaft sensor C1555-A is shorted to 12 volts (Fault code PTO 11069 may be active).
4. Hitch raise solenoid valve coil is loose or fell off but is still connected electrically.
5. Hitch raise solenoid is mechanically stuck in the OFF position.
6. The hitch lower solenoid is mechanically stuck in the ON position.
7. The wire from hitch controller C058-02 to hitch raise solenoid C151-2 is shorted to power.
8. The wire from the remote lower switch to the hitch controller C058-10 is shorted to power (Fault code HITCH 52260 may be active).

Background:
This problem can not be detected by the hitch controller.

Solenoid information:
Approximately 5.1 ohms at - 40 C (-40 F)
Approximately 6.9 ohms at 25 C (77 F)
Approximately 9.5 ohm at 100 C (212 F)

Wiring information:
NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

C059-6 ---> C155-A (Rockshaft sensor).
C058-02----> C151-2 (Hitch Raise solenoid) C151-1 ---> C058-01 (12 volt power supply).
C058-10 --->splice T15 --->C314-C to terminal B on lower center and raise left hand remote switch.
C058-10 ---> splice T15--> C315-A ---> C313A to lower right hand remote switch.

IMPORTANT: The hitch must be calibrated whenever a hitch component is replaced.

Corrective action:

STEP 1 - Check regulated and remote valve pressure
Check regulated pressure with the TRANS VIEW menu on the display.
Check high pressure standby pressure through the remote valves.
-- NOT OK - correct hydraulic problem.
-- OK - go to Step 2.

STEP 2 - Disconnect hitch remote raise/lower switch
Disconnect all remote hitch raise/lower switches.
Start tractor and test hitch.
-- NOT OK - Go to Step 3.
-- OK - Hitch raises and lowers correctly, replace failed switch.

STEP 3 - Measure controller output voltage to rockshaft sensor C155-C
Disconnect the rockshaft sensor at connector C155.
Turn the key to the ON position.
Measure controller output voltage at C155-A to C155-C. It must be approximately 8 volts.
-- NOT OK - Connect connector C155 to the remote hitch switch and go to Step 4.
-- OK - Connect connector C155 to the rockshaft sensor and go to Step 5.
STEP 4 - Measure controller output voltage at pin C059-6
Remove the controller cover from the rear of the tractor.
Disconnect connector C059 (Brown) from the hitch controller.
Remove pin 6 from connect and install a test wire that can safely easily be probed.
Connect C059 to hitch controller.
Turn ignition key to the ON position.
Measure controller output voltage at C059-6, It must be approximately 8 volts.
Turn the key to the OFF position.
-- NOT OK - replace the hitch controller, go to Step 13.
-- OK - replace the wire from C059-6 to C155-A.

STEP 5 - Disconnect wire C058-10 from hitch controller
With key OFF, disconnect connector C058 (Green) from the hitch controller.
Remove pin 10 from the connector and install connector C058 onto the hitch controller.
Test the hitch.
-- OK - hitch raised and lower correctly, go to Step 12.
-- NOT OK - hitch did not raise or lower, go to Step 6.

STEP 6 - Testing hitch raise solenoid, coil and circuit
Turn the key to the OFF position.
Disconnect connector C058 (Green) from the hitch controller.
Connect a ground wire to C058-02 (Raise solenoid ground supply).
Connect a power wire to C058-01 (Raise solenoid power supply).
Stand clear of hitch and start the tractor. The hitch should raise.
  - OK - hitch raised, go to Step 11.
  - NOT OK - hitch did not raise, go to Step 7.

STEP 7 - Check that Raise solenoid coil is correctly installed
Check that the hitch raise solenoid coil is correctly installed and nut is in place.
  -- OK - go to Step 8.
  -- NOT OK - install the nut and test the hitch again.

STEP 8 - Raise solenoid spool movement check
Disconnect connectors C151 from the raise solenoid.
Remove and inspect the hitch raise solenoid. Check the O-rings and that inner spool moves when power and ground is applied to coil.
  -- OK - go to Step 9.
  -- NOT OK - clean and or replace the solenoid and test the hitch again.

STEP 9 - Lower solenoid spool movement check
Disconnect connectors C152 from the lower solenoid.
Remove and inspect the hitch lower solenoid. Check the O-rings and that inner spool moves when power and ground is applied to coil.
  -- OK - go to Step 10.
  -- NOT OK - clean and or replace the solenoid and test the hitch again.

STEP 10 - Manually raise hitch
Start the tractor and from a safe location insert a small punch into the center of the raise solenoid.
OK - hitch raised when punch was inserted, go to Step 11.
NOT OK - hitch does not raise. Repair the hitch valve. See Section 8007.

STEP 11 - Install test wire to hitch raise coil
Install a jumper wire from C058-02 to the hitch raise coil C151-2.
Install all connectors, start the tractor and test the hitch.
  -- OK - hitch raised and lower correctly, install a new wire.
  -- NOT OK - hitch did not raise or lower, go to Step 14.
STEP 12 - Check remote hitch raise switch at connector C058
Turn the key on.
Pin C058-10 should only be powered when the hitch raise switch is depressed.
Check pin C058-10 for power.
-- OK - Pin C058-10 is only powered when the hitch raise switch is depressed. Hitch should work.
-- NOT OK - Pin C058-10 is powered when the hitch raise switch is not depressed, go to Step 13.

STEP 13 - Disconnect remote hitch remote switches
Disconnect the hitch remote hitch switches at the back of the tractor connector C312, C313A and C313B.
Turn the key on.
Pin C058-10 should not be powered.
Check pin C058-10 for power.
-- OK - Pin C058-10 is not powered, replace hitch switch.
-- NOT OK - Pin C058-10 is powered when key is turned on. Replace wire C058-10 from connector to hitch switch(s) connector C312, C313A and C313B to the LH and RH fender switches.

STEP 14 - Replace hitch controller
Make sure the wire harness routing of the controller is installed against the cab (Make sure the wires are not loose or draped in front of the controllers).
Write the fault code on the failed controller.
Install and calibrate a new controller.

NOTE: See schematic sections 51 and 52 at the rear of this section.
HITCH WILL NOT LOWER

Meaning:
The hitch system has one of the following problems that can not be detected by the hitch controller.

Possible failure mode:
1. Low or no regulated pressure.
2. PFC pump supply / pressure problem.
3. Hitch lower solenoid valve coil is loose or fell off but is still connect electrically.
4. Hitch lower solenoid mechanically stuck in the OFF position.
5. The hitch raise solenoid mechanical stuck in the ON position.
6. The wire from hitch controller C058-03 to hitch lower solenoid C152-2 is shorted to power.
7. The wire from the remote raise switch to the hitch controller C058-10 is shorted to power.

Background:
This problem can not be detected by the hitch controller.

Solenoid information:
Approximately 5.1 ohms at - 40 C (-40 F)
Approximately 6.9 ohms at 25 C (77 F)
Approximately 9.5 ohm at 100 C (212 F)

Wiring information:
NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.
C058-03----> C152-2 (Hitch Lower solenoid) C152-1 ---> C058-01 (12 volt power supply)

Raise circuit:
C058-09 ---> C314A --> 312-C (center) or 313A-A (LH).
C058-09 ---> C315-C --> 313B-C (RH switch).

IMPORTANT: To avoid pin and harness damage, use CAS - 2593-31 male test lead when taking measurements.

IMPORTANT: The hitch must be calibrated whenever a hitch component is replaced.

Corrective action:

STEP 1 - Check regulated and remote valve pressure
Check the regulated pressure with the TRANS VIEW menu on the display.
Check high pressure stand-by pressure through the remote valves.
-- NOT OK - correct the hydraulic problem.
-- OK - go to Step 2.

STEP 2 -
Disconnect remote hitch raise/lower switch.
Start tractor and test hitch.
-- OK - Hitch raises and lowers correctly, replace failed switch.
-- NOT OK - Connect harness to remote hitch control switch and go to Step 3.

STEP 3 - Disconnect remote hitch raise switch wire from the hitch controller
With key OFF, remove the controller cover from the rear of the tractor.
Disconnect connector C058 (Green) from the hitch controller.
Remove pin 09 from the connector and then install connector C058 onto hitch controller.
Test the hitch.
-- OK - hitch raised and lower correctly, go to Step 10.
-- NOT OK - hitch did not raise or lower, go to Step 4.
STEP 4 - Testing hitch lower coil and circuit
Disconnect connector C058 (Green) from the hitch controller.
Connect a ground wire to C058-03 (Lower solenoid ground supply).
Connect a power wire to C058-01 (Lower solenoid power supply).
Stand clear of the hitch and start the tractor. The hitch should lower.
-- OK - hitch lowered, go to Step 11.
-- NOT OK - hitch did not raise, go to Step 5.

STEP 5 - Is Lower solenoid coil installed correctly
Check that the hitch lower solenoid coil is installed correctly.
-- OK - go to Step 6.
-- NOT OK - install the solenoid coil correctly and test the hitch again.

STEP 6 - Lower solenoid spool movement check
Disconnect connectors C152 from the lower solenoid.
Remove and inspect hitch lower solenoid. Check o-rings and that the inner spool moves when power and ground is applied to coil.
-- OK - go to Step 7.
-- NOT OK - clean and or replace solenoid. Test the hitch again.

STEP 7 - Raise solenoid spool movement check
Disconnect connectors C151 from the raise solenoid.
Remove and inspect hitch raises solenoid. Check o-rings and that inner spool moves when power and ground is applied to coil.
-- OK - go to Step 8.
-- NOT OK - clean and or replace the solenoid. Test the hitch again.

STEP 8 - Manually lower hitch
Start the tractor. Carefully insert a small punch into the center of the lower solenoid.
-- OK - hitch lowered when punch was inserted, go to Step 9.
-- NOT OK - hitch did not lower. There is a hitch valve or hydraulic system problem. See Section 8000 or 8009.

STEP 9 - Install test wire to hitch lower coil
Install a jumper wire from C058-03 to the hitch Lower coil C152-2.
Install all connectors and test the hitch.
-- OK - hitch raised and lower correctly. Install a new wire.
-- NOT OK - hitch did not raise or lower, go to Step 10.

STEP 10 - Check hitch raise switch at connector C058
Turn the key on.
Pin C058-09 should only be powered when the hitch lower switch is depressed.
Check pin C058-09 for power.
-- OK - Pin C058-09 is only powered when the hitch lower switch is depressed. Hitch should lower.
-- NOT OK - Pin C058-09 is powered when the hitch lower switch is not depressed, go to Step 11.

STEP 11 - Disconnect hitch remote switches
Disconnect the hitch remote hitch switch at the back of the tractor connector C80 or (C81 and C260 fender).
Turn the key on.
Pin C058-09 should not be powered.
Check pin C058-09 for power.
-- OK - Pin C058-09 is not powered, replace hitch switch.
-- NOT OK - Pin C058-09 is powered, key is turned on. Replace wire C058-09 from connector to hitch switch(s).
   See schematic.

STEP 12 - Replace hitch controller
Make sure the wire harness routing of the controllers is tight against the cab, not loose or draped in front of controllers.
Write the fault code on the failed controller.
Install and calibrate a new controller.

NOTE: See schematic sections 51 and 52 at the rear of this section.
HITCH WILL NOT RAISE WHEN REMOTE RAISE SWITCH IS OPERATED

HITCH WILL NOT LOWER WHEN REMOTE LOWER SWITCH IS OPERATED

Meaning:
The hitch system has one of the following problems that can not be detected by the hitch controller.

Possible failure mode:
1. The remote raise or lower switch is failed.
2. The wire from hitch controller C058-09 to remote up switch is failed open or shorted to chassis ground.
3. The wire from hitch controller C058-10 to the remote lower switch is failed open or is shorted to chassis ground.
4. The remote hitch up/down switch is not being powered by fuse 39.

Background:

Raise circuit
The remote raise switch supplies a power signal to the hitch controller pin C058-9 when the switch is depressed. The hitch controller (if captured) will then supply a modulated ground signal to the raise solenoid and the hitch should raise.

NOTE: The operator must capture the hitch once the remote up/down switches are used.
-- The hitch controller will not energize the raise solenoid if the wire between the hitch controller and the remote up switch is failed.
-- The up switch contacts will fail (Burn out) if the wire between the controller and the up switch is shorted to ground.
-- The remote up/down switch must have power from C058-12 when the key is turned on or when the tractor is started. See schematic.

Lower circuit
The remote lower switch supplies a power signal to the hitch controller pin C058-10 when the switch is depressed. The hitch controller (if captured) will then supply a modulated ground signal to the lower solenoid and the hitch will lower.

NOTE: The operator must capture the hitch once the remote up/down switches are used.
-- The hitch controller will not energize the lower solenoid if the wire between the hitch controller and the remote lower switch is failed.
-- The lower switch contacts will fail (Burn out) if the wire between the controller and the lower switch is shorted to ground.
-- The remote up/down switch must have power from C058-12 when the key is turned on or when the tractor is started. See schematic.

Wiring information:
See schematic

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

IMPORTANT: To avoid pin and harness damage, use CAS - 2593-31 male test lead when taking measurements.
Corrective action:

**STEP 1 - Check power supply**
Disconnected the hitch switch or switches.
Turn key on.
12 volts must be measured at the hitch switches, pin B.
-- OK - 12 volts measured at pin 2 (B), go to Step 2.
-- NOT OK - 12 volts not measured at pin 2 (B), troubleshoot failed wire from fuse 39.

**STEP 2 - Check remote switch raise function**
Measure the resistance between the switch pins 2 and 3 (B and C).
-- OK - The switch closed when raise button was depressed and opened when release, go to Step 3.
-- NOT OK - The switch did not close when raise button was depressed and opened when released, failed switch go to Step 4.

**STEP 3 - Check remote switch lower function**
Measure the resistance between the switch pins 1 and 2 (B and A).
-- OK - The switch closed when lower button was depressed and opened when released, go to Step 5.
-- NOT OK - The switch did not close when lower button was depressed and opened when released, failed switch go to Step 4.

**STEP 4 - Check remote hitch raise/lower switch for short to chassis ground**
Turn key off.
Remove controller cover from the rear of the tractor.
Disconnect connector C058 (Green) from the hitch controller.
Measure the resistance between the remote switch harness pin 1 (A) and chassis ground, it must be more than 100 K ohms.
Measure the resistance between the remote switch harness pin 3 (C) and chassis ground, it must be more than 100 K ohms.
-- OK - The remote switch harness is not shorted to chassis ground, replace failed switch.
-- NOT OK - The one of the wire in the harness is shorted to chassis ground, replace shorted wire then install new switch.

**STEP 5 - Check remote hitch raise/lower switch for power**
Turn key off.
Connect the remote switches.
Remove rear controller cover.
Disconnect connector C058 (Green) from the hitch controller.
Check that pins 9 and 10 of connector C058 are fully seated.
Install test leads with male end in to cavities 9 and 10 of the hitch harness.
Turn key on. Hitch fault is recorded again on the display.
Do not use a test light.
12 volt must be measured at harness pin 9 when the remote raise switch is depressed and no voltage when released.
12 volts must be measured at harness pin 10 when the remote lower switch is depressed and no voltage when released.
-- OK - 12 volts was measured when the remote raise and lower switch was depressed and no voltage when released, go to Step 6.
-- NOT OK - 12 volts was not measure when the remote raise and lower switch were depressed or voltage was measure when switch is release. Replace failed wire in remote hitch switch hitch.

**STEP 6 - Test hitch controller**
Install connector C058 on to hitch controller.
Turn key on and clear all fault codes.
Start engine and capture hitch.
Press the remote raise switch and then the remote lower switch.
-- OK - Raise and lower switch control hitch.
-- NOT OK - Raise or lower switch did not control hitch, go to Step 7.
STEP 7 - Replace hitch controller
Check switch function per Step 5.
-- OK - 12 volts was measure when the remote raise and lower switch was depressed and no voltage when released, replace failed controller.
  ● Write fault code on failed hitch controller.
  ● Replace controller.
  ● Check that controller harness routed tight against the cab, not loose or draped in front of controllers.
  ● Calibrate controller.
-- NOT OK - 12 volts was not measured when the remote raise and lower switch were depressed or voltage was measured when switch is released. Go back to Step 1.
HITCH WILL NOT CAPTURE AT START UP

Meaning:
The hitch draft arms are up higher than the hitch upper limit setting.

Possible failure mode:
Hitch being held up in the up position.
The upper limit knob was turned when engine was turned off.
The oil in hitch cylinder has expanded (Sun) and cause the hitch to raise out of limit.

Corrective action:
1. Place up/down switch to center position.
2. Move armrest position control lever to max. setting.
3. Press and hold the up/down switch to the monetary and hold until hitch lowers.

HITCH RAISES ON ITS OWN WHEN TRACTOR IS MOVING AND LOWERS WHEN TRACTOR STOPS MOVING

Meaning:
The hitch is responding to slip or draft control.

Possible failure mode:
The draft control knob is set to low (less than 5).
The ground speed radar circuit if failed. (The ground speed on display will read 0 when moving).
Incorrect tire size entered during calibration. (Excessive wheel slip will be read on display).

Corrective action:
1. Set draft control to a higher setting (above 5).
2. Check KPH (mph) display when driving.
   -- If the speed read in display shows 0 when tractor is moving, the radar gun or the wiring circuit is failed.
3. Incorrect tire size may be entered in the Instrumentation controller. The display will indicate excessive wheel slip.
HITCH CONTROLLER FAULT CODES

FAULT CODE HITCH 1010 Hitch Up/Down Switch Failure

Cause:
The Data Bus signaled that the hitch up/down switch has failed.
The hitch controller received the signal from the armrest controller.

Possible failure modes:
1. The hitch up/down switch failed in the armrest controller (in most cases).
2. Software execution error in the armrest controller (small chance).

Solution:
The hitch up/down switch is hard wired to the armrest controller. If the hitch up/down switch fails in the armrest controller, the fault code ARM 1049 should exist.
1. Check for fault code ARM 1049 at the armrest controller. If ARM 1049 exists, follow the corresponding corrective action.
2. Check the function the armrest controller.

NOTE: See schematic section 48 at the rear of this section.

FAULT CODE HITCH 1020 Slip Select Switch Failure

Cause:
The Data Bus signaled that the slip select switch has failed.
The hitch controller received the signal from the armrest controller.

Possible failure modes:
1. The slip select switch failed in the armrest controller (in most cases).
2. Software execution error in the armrest controller (small chance).

Solution:
The slip select switch is hard wired to the armrest controller. If the slip select switch fails in the armrest controller, the fault code ARM 1059 should exist.
1. Check for fault code ARM 1059 at the armrest controller. If ARM 1059 exists, follow the corresponding corrective action.
2. Check the function the armrest controller.

NOTE: See schematic section 46 at the rear of this section.
FAULT CODE HITCH 1030 Slip Set Switch Failure

Cause:
The Data Bus signaled that the slip set switch has failed.
The hitch controller received the signal from the armrest controller.

Possible failure modes:
1. The slip set switch failed in the armrest controller (in most cases).
2. Software execution error in the armrest controller (small chance).

Solution:
The slip set switch is hard wired to the armrest controller. If the slip set switch fails in the armrest controller, the fault code ARM 1059 should exist.

1. Check for fault code ARM 1059 at the armrest controller. If ARM 1059 exists, follow the corresponding corrective action.
2. Check the function the armrest controller.

NOTE: See schematic section 46 at the rear of this section.
FAULT CODE HITCH 3010 Transmission Speed Sensor Failed

Cause:
The Data Bus signaled that the transmission speed sensor has failed.
The hitch controller received the signal from the instrumentation controller.

Possible failure mode:
1. The transmission speed sensor failed (in most cases).
2. Software execution error in instrumentation controller (small chance).

Solution:
The speed sensor is hard wired to the instrumentation controller. The instrumentation controller sends the wheel (transmission) speed signal to the hitch controller and the PTO controller by way of the Data Bus.
If the sensor or the instrumentation controller has problem, both fault code HITCH 3010 and PTO 54060 should appear. If only HITCH 3010 is recorded, the problem is more likely with the hitch controller.

1. If the service tool is connected to the tractor, do the following:
   Go to the Monitor screen, click the Monitor Icon.
   Click the CHANGE PARAMETER SELECTIONS Icon.
   Select the INST GROUND SPEED - WHEEL and then ADD.
   You will be able to monitor the wheel speed sensor signal on the screen.
   Drive the tractor and watch the signal change when the tractor speed changes.
   If there is no wheel speed signal, go to step 2.
   If there is wheel speed signal, compare it to the speed display on the instrumentation cluster.
   If the speed signal looks fine on service tool but not on the instrumentation cluster, it is more likely a problem with the instrumentation cluster.
   If both signals seem fine, check the function of the hitch controller.

2. Test the resistance of the transmission speed sensor:
   Locate the transmission speed sensor on top of the transmission.
   Disconnect connector C069 from the sensor.
   Inspect the connector. Clean the connection.
   Measure the sensor resistance between pin A and Pin B.
   The resistance should be around 3 k ohms at 20 degree Celsius.
   If the resistance is not in the specified range, replace the transmission speed sensor.
   If it is as specified, go to next step.

3. Check the wiring from the transmission speed sensor to connector C060 and then to connector C061 at the instrumentation controller.
   There should be a 5 VDC power supply from pin28 of C061 to pin A of connector C069 when the tractor key is in the ‘RUN’ position.
   There should be good continuity from pin B of connector C069 to the clean ground.
   Check for open circuit and wiring shortage.

NOTE: Always inspect connector ends for damage, bent or dislocated pins when troubleshooting.

4. If none of above, check the function of the instrumentation controller and the hitch controller.

NOTE: Also see the Data Bus schematic foldout at the end of this section.

NOTE: See schematic sections 24, 25 and 26 at the rear of this section.
FAULT CODE HITCH 3020 Wheel Slip Sensing Error

Cause:
The percent wheel slip is determined by the difference between the wheel speed and the ground speed. The hitch controller receives the information from the instrumentation controller through the Data Bus.

Possible failure modes:
1. Wheel slip sensing (radar gun, wheel speed sensor) failed (in most cases).
2. Percent slip calculation failed in instrumentation controller (small chance).

Solution:
The wheel speed sensor and the radar gun (for the ground speed) are hard wired to instrumentation controller. If the problem is with the wheel speed sender, then the fault code HITCH 3010 and PTO 54060 should appear.

If there is no HITCH 3010 and PTO 54060, the problem is more likely with the radar gun. There is also a small chance of instrumentation controller malfunction.

1. Check the wiring of radar gun.
   Disconnect connector C068 at the radar.
   The power supply at pin C of connector C068 should be about 5 VDC when the tractor key is in the ‘RUN’ position.
   There should be good continuity from pin A of connector C068 to the clean ground.
   Check for open circuit and wiring shortage.

NOTE: Always inspect connector ends for damage, bent or dislocated pins when troubleshooting.

2. Check the function of the radar.
   The signal is from Pin B of the Radar and connected to the pin 19 of the instrument cluster through Pin 25 of connector C060. The radar will detect the speed of any thing moving in front of it. So a quick hand moving in front of the radar will be an easy way to test the frequency change of the radar signal. Special tools (such as oscilloscope) is needed to check the frequency.
   If the radar does not work as expected, replace the radar in the following procedures:
   a. Disconnect the radar wiring.
   b. Remove the radar from the vehicle.
   c. Install the new radar.
   d. Reconnect the wiring and check the function of the new radar.

3. If there is not problem with the radar and its wiring, check the function of the instrumentation controller and the hitch controller.

NOTE: See schematic sections 24, 25 and 26 at the rear of this section.
FAULT CODE HITCH 3030 Engine Speed Error

Cause:
The Data Bus signaled that the engine speed message is in error or not available from the instrument controller.

Possible failure modes:
1. Engine speed sensing failed in the instrument controller.
2. Software execution error in the instrument controller.

Solution:
1. Make sure the engine is running properly.
2. Re calibrate the instrumentation controller.
3. Check the engine speed display on the instrument display. If the display is not working properly, replace the instrumentation controller.
SECTION 55 - HITCH CONTROLLER - CHAPTER 3

FAULT CODE HITCH 4019 Right Draft Pin Failure

**Cause:**
The hitch controller has detected a problem with the right hand draft pin signal. The system will use the other pin to operate in draft mode.

**Possible failure modes:**
1. Right draft pin failed.
2. Wiring problem from the hitch controller to the right hand draft pin.

If the problem is intermittent the draft function is disabled until the next engine start up.

**Solution:**
The most effective way of troubleshooting is to use a Y harness to measure the pin signal. The draft pin signals can also be monitored with the service tool. Another way is to check the pin function or the pin wiring directly.

1. **Use a Y harness:**
   Plug in the Y harness at the pin connector(C153). Cavity A is the ground, Cavity B is the draft pin signal, and Cavity C is the power supply (+8 VDC).
   a) Check the power supply at Cavity C. If the +8 VDC does not present, check the wiring from C153 to Pin 1 of C059.
   b) Check the function of the right draft pin.
   Replace the pin in any of the following cases:
   - No signal output.
   - Signal not within 2.95 to 3.05 when there is no load.
   - The output does not change with the load change.

2. **Use the service tool:**
   Go to the Monitor screen by click the Monitor Icon.
   Click the CHANGE PARAMETER SELECTIONS Icon.
   Click the HITCH DRAFT PIN-RIGHT-VOLTAGE and then ADD. You will be able to monitor the right draft pin signal status on the screen.
   - The voltage should be 2.95 to 3.05 when there is no load.
   - The voltage should change with the load change in the range of 2.3 to 5.3 VDC at -60 KN to 160 KN.

3. **Check the function of the draft pin.**
   a) If a spare draft pin is available, unplug the right pin connector. Plug in the new pin, clear the fault codes, start the tractor, and enable hitch. Lower and raise the hitch a few times.
   - If the fault code is not recorded, the draft pin failed.
   - If the fault code is recorded again, check the wiring.
   b) If there is neither fault code hitch 4029 or hitch 4039, that means the left draft pin is working. Use the left pin as the test pin and repeat the above test.

4. **Check the wiring from the hitch controller to the right hand draft pin.**
   a) Disconnect the pin connector. At the controller side, check the power supply across Cavity C and A. It should be 8 volts.
   b) Check the continuity from C153 to C059.
   c) At the draft pin side, measure the continuity of the pin circuit. The resistance should be 180 kohm across A and C and 18 kohm across B and C.

**NOTE:** Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

**NOTE:** The resistances at the draft pin side are for reference only. Incorrect resistance means bad pin but some bad pins may have correct resistances.

**NOTE:** See schematic sections 51 and 52 at the rear of this section.
SECTION 55 - HITCH CONTROLLER - CHAPTER 3

FAULT CODE HITCH 4029 Left Draft Pin Failure

Cause:
The hitch controller has detected a problem with the left hand draft pin signal.
The system will use the other pin to operate in draft mode.

Possible failure modes:
1. Left draft pin failed.
2. Wiring problem from the hitch controller to the left hand draft pin.

If the problem is intermittent the draft function is disabled until the next engine start up.

Solution:
The most effective way of troubleshooting is to use a Y harness to measure the pin signal. The draft pin signals can also be monitored with the service tool. Another way is to check the pin function or the pin wiring directly.

1. Use a Y harness:
   Plug in the Y harness at the pin connector(C154). Cavity A is the ground, cavity B is the draft pin signal, and cavity C is the power supply (+8 VDC).
   a) Check the power supply at cavity C. If the +8 VDC does not present, check the wiring from C154 to Pin 1 of C059.
   b) Check the function of the left draft pin.
   Replace the pin in any of the following cases:
   No signal output.
   Signal not within 2.95 to 3.05 when there is no load.
   The output does not change with the load change.

2. Use the service tool:
   Go to the Monitor screen by click the Monitor Icon.
   Click the CHANGE PARAMETER SELECTIONS Icon.
   Click the HITCH DRAFT PIN-LEFT-VOLTAGE and then ADD. You will be able to monitor the left draft pin signal status on the screen.
   The voltage should be 2.95 to 3.05 when there is no load.
   The voltage should change with the load change in the range of 2.3 to 5.3 VDC at -60 KN to 160 KN.

3. Check the function of the draft pin.
   a) If a spare draft pin is available, unplug the pin connector(C154). Plug in the new pin, clear the fault codes, start the tractor, and enable hitch. Lower and raise the hitch a few times.
   If the fault code is not recorded, the draft pin failed.
   If the fault code is recorded again, check the wiring.
   b) If there is neither fault code hitch 4019 or hitch 4039, that means the right draft pin is working. Use the right pin as the test pin and repeat the above test.

4. Check the wiring from the hitch controller to the left hand draft pin.
   a) Disconnect the pin connector(C154). At the controller side, check the power supply across cavity C and A. It should be 8 volts.
   b) Check the continuity from C154 to C059.
   c) At the draft pin side, measure the continuity of the pin circuit. The resistance should be 180 kohm across A and C and 18 kohm across B and C.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: The resistances at the draft pin side are for reference only. Incorrect resistance means bad pin but some bad pins may have correct resistances.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 4039 Both Draft Pins Failed

Cause:
Both draft pins failed when tractor is configured for two draft pins.

Possible failure modes:
1. Draft pin failure.
2. Wiring problem.

If the problem is intermittent, the draft function is disabled until the next engine start up.

Solution:
The chance for both draft pins to fail at the same time is rare. If fault code hitch 4019 or hitch 4029 exists, check the single pin function or its wiring. If none of the codes exists, check the power supply or the ground to the two pins.

1. Check for the single pin fault code hitch 4019 or hitch 4029. If any exists, follow its corresponding diagnosing procedures.

2. If none of hitch 4019 or hitch 4029 exists, check the power supply or the ground to the two pins.
   a) Check the power supply at either left pin connector or right pin connector. There should be +8 volts at cavity C of C153 or cavity C of C154. If not, check the continuity from cavity 1 of C059 to the cavity C of the pin connector.
   b) Check the ground to the two pins. There should be continuity between cavity A of either left pin connector or right pin connector and the cavity 11 of C059. If not, check the wiring in between.

3. If none of above, check the function of the hitch controller.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: See schematic sections 51 and 52 at the rear of this section.
SECTION 55 - HITCH CONTROLLER - CHAPTER 3

FAULT CODE HITCH 6014 Hitch Lower Solenoid
Failed Open Or Shorted To Ground

Cause:
The hitch lower solenoid or its wiring has failed open or is shorted to ground.

Possible failure mode:
1. Hitch lower solenoid failure.
2. Wiring from the hitch controller to the hitch lower solenoid failed open or shorted to the ground.

Solution:
Check the hitch lower solenoid resistance and the continuity from the hitch controller to the hitch lower solenoid.

1. Test the hitch lower solenoid resistance at the hitch controller connector (C058).
   Remove the controller cover from the rear of the tractor.
   Disconnect connector (C058) (Green) from the hitch controller.
   Inspect pin 3 in the connector. Clean the connection.
   Clean the mating pin and connector.
   Test continuity between pin 1 and pin 3. The resistance should be:
   Approximately 5.1 ohms at -40 C (-40 F).
   Approximately 6.9 ohms at 25 C (77 F).
   Approximately 9.5 ohm at 100 C (212 F).
   If the hitch lower solenoid resistance is not in the range, go to step 2.
   If it is as specified, start the engine and test the hitch again.
   If fault code is recorded again, check the function of the hitch controller.
   If not, problem fixed.

2. Test the hitch lower solenoid resistance at the hitch lower solenoid connector (C152).
   Test continuity between pin 1 and pin 2. The resistance should be:
   Approximately 5.1 ohms at -40 C (-40 F).
   Approximately 6.9 ohms at 25 C (77 F).
   Approximately 9.5 ohm at 100 C (212 F).
   If the hitch lower solenoid resistance is not in the range, replace the solenoid.
   If it is as specified, wiring problem. Go to step 3.

3. Check the wiring harness from connector C058 to C152 for shortage to ground.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 6015 Hitch Lower Solenoid Shorted To 12 Volts

Cause:
The hitch lower solenoid or its wiring is shorted to 12 volts.

Possible failure modes:
1. Wiring from the hitch controller to the hitch lower solenoid shorted to 12 volts.
2. Hitch lower solenoid failure.

Solution:
Check the hitch lower solenoid resistance and the continuity from the hitch controller to the hitch lower solenoid.

1. Test the hitch lower solenoid resistance at the hitch controller connector (C058).
   - Remove the controller cover from the rear of the tractor. Disconnect connector (C058) (Green) from the hitch controller.
   - Inspect pin 3 in the connector. Clean the connection.
   - Clean the mating pin and connector.
   - Test continuity between pin 1 and pin 3. The resistance should be:
     - Approximately 5.1 ohms at -40 C (-40 F).
     - Approximately 6.9 ohms at 25 C (77 F).
     - Approximately 9.5 ohm at 100 C (212 F).
   - If the hitch lower solenoid resistance is not in the range, go to step 2.
   - If it is as specified, start the engine and test the hitch again.
   - If fault code is recorded again, check the function of the hitch controller.
   - If not, problem fixed.

2. Test the hitch lower solenoid resistance at the hitch lower solenoid connector (C152).
   - Test continuity between pin 1 and pin 2. The resistance should be:
     - Approximately 5.1 ohms at -40 C (-40 F).
     - Approximately 6.9 ohms at 25 C (77 F).
     - Approximately 9.5 ohm at 100 C (212 F).
   - If the hitch lower solenoid resistance is not in the range, replace the solenoid.
   - If it is as specified, wiring problem. Go to step 3.

3. Check the wiring harness from connector C058 to C152 for shortage to 12 volts.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 6024 Hitch Raise Solenoid
Failed Open Or Shorted To Ground

Cause:
The hitch raise solenoid or its wiring has failed open or is shorted to ground.

Possible failure mode:
1. Hitch raise solenoid failure.
2. Wiring from the hitch controller to the hitch raise solenoid failed open or shorted to the ground.

Solution:
Check the hitch raise solenoid resistance and the continuity from the hitch controller to the hitch raise solenoid.

1. Test the hitch raise solenoid resistance at the hitch controller connector (C058).
   Remove the controller cover from the rear of the tractor.
   Disconnect connector (C058) (Green) from the hitch controller.
   Inspect pin 2 in the connector. Clean the connection.
   Clean the mating pin and connector.
   Test continuity between pin 1 and pin 2. The resistance should be:
   Approximately 5.1 ohms at -40 C (-40 F).
   Approximately 6.9 ohms at 25 C (77 F).
   Approximately 9.5 ohm at 100 C (212 F).
   If the hitch raise solenoid resistance is not in the range, go to step 2.
   If it is as specified, start the engine and test the hitch again.
   If fault code is recorded again, check the function of the hitch controller.
   If not, problem fixed.

2. Test the hitch raise solenoid resistance at the hitch raise solenoid connector (C151).
   Test continuity between pin 1 and pin 2. The resistance should be:
   Approximately 5.1 ohms at -40 C (-40 F).
   Approximately 6.9 ohms at 25 C (77 F).
   Approximately 9.5 ohm at 100 C (212 F).
   If the hitch raise solenoid resistance is not in the range, replace the solenoid.
   If it is as specified, wiring problem. Go to step 3.

3. Check the wiring harness from connector C058 to C151 for shortage to ground.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 6025 Hitch Raise Solenoid Shorted To 12 Volts

Cause:
The hitch raise solenoid or its wiring is shorted to 12 volts.

Possible failure modes:

1. Wiring from the hitch controller to the hitch raise solenoid shorted to 12 volts.
2. Hitch raise solenoid failure.

Solution:
Check the hitch raise solenoid resistance and the continuity from the hitch controller to the hitch raise solenoid.

1. Test the hitch raise solenoid resistance at the hitch controller connector (C058).
   Remove the controller cover from the rear of the tractor.
   Disconnect connector (C058) (Green) from the hitch controller.
   Inspect pin 2 in the connector. Clean the connection.
   Clean the mating pin and connector.
   Test continuity between pin 1 and pin 2. The resistance should be:
   - Approximately 5.1 ohms at - 40 C (-40 F).
   - Approximately 6.9 ohms at 25 C (77 F).
   - Approximately 9.5 ohm at 100 C (212 F).
   If the hitch raise solenoid resistance is not in the range, go to step 2.
   If it is as specified, start the engine and test the hitch again.
   If fault code is recorded again, check the function of the hitch controller.
   If not, problem fixed.

2. Test the hitch raise solenoid resistance at the hitch raise solenoid connector (C151).
   Test continuity between pin 1 and pin 2. The resistance should be:
   - Approximately 5.1 ohms at - 40 C (-40 F).
   - Approximately 6.9 ohms at 25 C (77 F).
   - Approximately 9.5 ohm at 100 C (212 F).
   If the hitch raise solenoid resistance is not in the range, replace the solenoid.
   If it is as specified, wiring problem. Go to step 3.

3. Check the wiring harness from connector C058 to C151 for shortage to 12 volts.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 8001 Battery Voltage Less Than 9.8 Volts

Possible failure mode:
1. Battery voltage is too low.
2. Alternator regulator malfunction.
3. The controller has a bad connection to power or is not grounded properly.

Solution:
Check for battery voltage, alternator regulator output, and the controller connection to power and ground.

1. Check for fault codes PTO 10033, ARM 8011, TRANS 8011, and AUX 8011. These are all fault codes for battery voltage low. If they exist, it is most likely that the battery voltage is low.
2. Test battery voltage. It should be around 12 - 14 volts.
3. If the battery voltage is OK, check system voltage at cavity 12 of connector C058. Check for bad connection and improper ground at cavity 11 of the same connector. Check for shortage to the ground along the power supply to the controller.
4. Test alternator output if the battery voltage would not hold even when the tractor has been running. The voltage should be above 14 volts at C077 - B+.
5. If none of above, check the function of the remote hydraulic controller.

NOTE: See schematic sections 51 and 52 at the rear of this section.

FAULT CODE HITCH 8002 Battery Voltage Too High

Cause:
Battery voltage over 17 volts.

Possible failure modes:
1. Alternator regulator malfunction.
2. The battery positive wiring is accidentally connected to external higher voltage source.

Solution:
Test the alternator output and check for external power source.

1. Check for fault code TRANS 8012 and AUX 8012. These are all fault codes for battery voltage high. If they exist, it is most likely that the battery voltage is high.
2. Test battery voltage. It should be around 12 - 14 volts.
3. Test alternator output at C077-B+. It should be below 15.5 volts.
4. Check for external power shortage to the controller power supply at cavity 12 of connector C058. Check for shortage along the power supply to the controller.
5. If none of above, check the function of the hitch controller.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 9301 Hitch Raise Valve Threshold Is Too High During Calibration

Cause:
During calibration, PWM threshold to start hitch raising is above the limit (55%).

Possible failure modes:
1. Raise solenoid coil resistance is too high.
2. Wire harness or connector problem between hitch raise solenoid and hitch controller.
3. Battery voltage is very low.
4. Hitch valve raise portion is stuck closed.

Solution:
Make sure the calibration procedure is correct. Then do the following for troubleshooting.
1. Make sure the battery voltage and the alternator output voltage is above 9.8 volts DC. Refer to fault code hitch 8001 for battery voltage troubleshooting procedures.
2. Test the hitch raise solenoid coil (C151) and its wiring for high resistance or openings. Refer to fault code hitch 6024 troubleshooting procedures for details.
3. Make sure there is proper hydraulic pressure to the hitch valve. Check for valve failure (solenoid spool or the valve main spool stuck closed). Repair or replace the spools or the valve according to the problem.

NOTE: See schematic sections 51 and 52 at the rear of this section.

FAULT CODE HITCH 9302 Hitch Raise Valve Threshold Is Too Low During Calibration

Cause:
During calibration, PWM threshold to start hitch raising is above the limit (55%).

Possible failure modes:
1. Raise solenoid coil resistance is too low.
2. Battery voltage is very high.
3. Valve failure.

Solution:
Make sure the calibration procedure is correct. Then do the following for troubleshooting.
1. Test battery voltage and the alternator output voltage (must be less than 14.7 volts DC). Refer to fault code hitch 8002 for battery voltage troubleshooting procedures.
2. Test raise solenoid coil (C151) for low resistance. The resistance should be 6.4 to 6.8 ohms. Refer to fault code hitch 6024 troubleshooting procedures for details.
3. Make sure there is proper hydraulic pressure to the hitch valve. Check for valve failure (center spring broken, spool too loose). Repair or replace the spools or the valve according to the problem.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 9303 Full Raise Current Out Of Range

Cause:
During calibration full raise current out of range.

Possible failure modes:
1. Raise solenoid coil resistance is too low.
2. Battery voltage is very high.

Solution:
Make sure the calibration procedure is correct. Then do the following for troubleshooting.

1. Test battery voltage and the alternator output voltage (must be less than 14.7 volts DC).
   Refer to fault code hitch 8002 troubleshooting procedures.
2. Test raise solenoid coil (C151) and its wiring for shortage. The resistance should be 6.4 to 6.8 ohms.
   Refer to fault code hitch 8002 troubleshooting procedures.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 9304 Hitch Position Is Not At Maximum

**Cause:**
During calibration, the hitch position is not at maximum height or the potentiometer is not within specifications.

**Possible failure modes:**
1. Mechanical interference prevents hitch from moving fully up.
2. Rock shaft potentiometer failed.
3. Wiring harness damage.
4. Potentiometer’s linkage problem.

**Solution:**
Make sure there is no mechanical interference in the hitch linkage.
Check for rock shaft potentiometer failure and linkage problems.

1. Check hitch linkage for mechanical interference. Make sure there is no external object that may prevent the hitch from full up travel.

2. Check for the linkage problem of the rockshaft potentiometer.
   a) Check the linkage from the rockshaft to the potentiometer. Make sure it is not loose, damaged, or improperly installed.
   b) Adjust rockshaft position potentiometer to 0.80 + 0.10 volts when hitch is fully lowered.
   c) Tighten set screw on rockshaft potentiometer.

3. Test the function of the rockshaft potentiometer.
   Signal output from 0 to 5 VDC (1/24 volts per degree) at pin B when pin A is connected to power supply and pin C is grounded.
   Disconnect the rockshaft potentiometer at C155.
   The resistance is about 4 kohm measured across pins A and C.
   The resistance increases with clockwise rotation from 0 to about 4 kohm measured across pins B and C.
   Turn potentiometer along the full working range, the multimeter reading must be smooth and continuous.

4. Test the wiring harness of the rock shaft potentiometer.
   a) Test the cavity 6, 7, and 8 of connector C059. The resistance between cavity 6 and 8 should be around 4 kohm. The resistance between cavity 7 and 6 or 8 should change from 0 to 4 kohm when the potentiometer shaft changes its positions.
   b) Test the continuity between connector C059 and connector C155. The three wires should all have good connections.

**NOTE:** *Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.*

**NOTE:** *See schematic sections 51 and 52 at the rear of this section.*
SECTION 55 - HITCH CONTROLLER - CHAPTER 3

FAULT CODE HITCH 9306 Hitch Lower Valve Threshold
Is Too High During Calibration

Cause:
During calibration, PWM threshold to start hitch lower is above the limit (55%).

Possible failure modes:
1. Lower solenoid coil resistance is too high.
2. Wire harness or connector problem between hitch lower solenoid and hitch controller.
3. Battery voltage is very low.
4. Hitch valve lower portion is stuck closed.

Solution:
Make sure the calibration procedure is correct. Then do the following for troubleshooting.
1. Make sure the battery voltage and the alternator output voltage is above 9.8 volts DC.
   Refer to fault code hitch 8001 for battery voltage troubleshooting procedures.
2. Test the hitch lower solenoid coil (C152) and its wiring for high resistance or openings.
   Refer to fault code hitch 6024 troubleshooting procedures for details.
3. Make sure there is proper hydraulic pressure to the hitch valve.
   Check for valve failure (solenoid spool or the valve main spool stuck closed).
   Repair or replace the spools or the valve according to the problem.

NOTE: See schematic sections 51 and 52 at the rear of this section.

FAULT CODE HITCH 9307 Hitch Lower Valve Threshold
Is Too Low During Calibration

Cause:
During calibration, PWM threshold to start hitch lower is below the limit (4%).

Possible failure modes:
1. Lower solenoid coil resistance is too low.
2. Battery voltage is very high.
3. Valve failure.

Solution:
Make sure the calibration procedure is correct. Then do the following for troubleshooting.
1. Test battery voltage and the alternator output voltage (must be less than 14.7 volts DC).
   Refer to fault code hitch 8002 for battery voltage troubleshooting procedures.
2. Test lower solenoid coil (C152) and its wiring for low resistance.
   Refer to fault code hitch 6024 troubleshooting procedures for details.
3. Make sure there is proper hydraulic pressure to the hitch valve.
   Check for valve failure (center spring broken, spool too loose).
   Repair or replace the spools or the valve according to the problem.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 9308 Time Allowed For Calibration Has Expired

**Cause:**
During calibration the time allowed for calibration has expired.

**Possible failure modes:**
Operator did not acknowledge (within 6 minutes) when hitch is fully lowered in Step 6 of calibration procedure.

**Solution:**
1. Recalibrate the hitch.

---

FAULT CODE HITCH 9309 Hitch Position At The Bottom Of Travel Is Not Within Specification

**Cause:**
During calibration, the hitch rockshaft position potentiometer signal at the fully lowered position is not within specifications.

**Possible failure modes:**
1. Mechanical interference prevents hitch from moving fully down.
2. Rock shaft potentiometer failed.
3. Wiring harness damage.
4. Potentiometer’s linkage problem.

**Solution:**
Make sure there is no mechanical interference in the hitch linkage.
Check for rock shaft potentiometer failure and linkage problems.

1. Check hitch linkage for mechanical interference. Make sure there is no external object that may prevent the hitch from full down travel.
2. Check for the linkage problem of the rockshaft potentiometer.
   a) Check the linkage from the rockshaft to the potentiometer. Make sure it is not loose, damaged, or improper installed.
   b) Adjust rockshaft position potentiometer to 0.80 +/- 0.10 volts when hitch is fully lowered.
   c) Tighten set screw on rockshaft potentiometer.
3. Test the function of the rockshaft potentiometer.
   Signal output from 0 to 5 VDC (1/24 volts per degree) at pin B when pin A is connected to power supply and pin C is grounded.
   Disconnect the rockshaft potentiometer at C155.
   The resistance is about 4 kohm measured across pins A and C.
   The resistance increase with clockwise rotation from 0 to about 4 kohm measured across pin B and C.
   Turn potentiometer along the full working range, the multimeter reading must be smooth and continuous.
4. Test the wiring harness of the rock shaft potentiometer.
   a) Test the cavity 6, 7, and 8 of connector C059. The resistance between cavity 6 and 8 should be around 4 kohm. The resistance between cavity 7 and 6 or 8 should change from 0 to 4 kohm when the potentiometer shaft changes its positions.
   b) Test the continuities between connector C059 and connector C155. The three wires should all have good connections.

**NOTE:** Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

**NOTE:** See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 9310 Range Of The Hitch Position Is Not Within Specification

Cause:
During calibration, the hitch rockshaft position potentiometer signal difference between the fully lowered and fully raised position is not within specifications.

Possible failure modes:
1. Rock shaft potentiometer failed.
2. Wiring harness damage.
3. Potentiometer’s shaft loose from the lever.
4. Mechanical interference.

Solution:
Make sure there is no mechanical interference in the hitch linkage.
Check for rock shaft potentiometer failure and linkage problems.

1. Check hitch linkage for mechanical interference. Make sure there is no external object that may cause the hitch out of range.

2. Check for the linkage problem of the rockshaft potentiometer.
   a) Check the linkage from the rockshaft to the potentiometer. Make sure it is not loose, damaged, or improper installed.
   b) Adjust rockshaft position potentiometer to 0.80 +/- 0.10 volts when hitch is fully lowered.
   c) Tighten set screw on rockshaft potentiometer.

3. Test the function of the rockshaft potentiometer.
   Signal output from 0 to 5 VDC (1/24 volts per degree) at pin B when pin A is connected to power supply and pin C is grounded.
   Disconnect the rockshaft potentiometer at C155.
   The resistance is about 4 kohm measured across pins A and C.
   The resistance increase with clockwise rotation from 0 to about 4 kohm measured across pin B and C.
   Turn potentiometer along the full working range, the multimeter reading must be smooth and continuous.

4. Test the wiring harness of the rock shaft potentiometer.
   a) Test the cavity 6, 7, and 8 of connector C059. The resistance between cavity 6 and 8 should be around 4 kohm. The resistance between cavity 7 and 6 or 8 should change from 0 to 4 kohm when the potentiometer shaft changes its positions.
   b) Test the continuities between connector C059 and connector 155. The three wires should all have good connections.

NOTE:  
*Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.*

NOTE:  
*See schematic sections 51 and 52 at the rear of this section.*
FAULT CODE HITCH 9311 Ratio Of Position Command To Rockshaft Range Is Not Within Specification

Cause:
During calibration, the ratio of rockshaft position range to position command potentiometer range is not within specifications.

Possible failure modes:
1. Rockshaft potentiometer has failed.
2. Rockshaft potentiometers shaft is loose from the lever.
3. Position command potentiometer failed at the arm controller.
4. Position command potentiometers shaft is loose from the lever.

Solution:
Make sure there is no mechanical interference in the hitch linkage.
Check for rockshaft potentiometer failure and hitch linkage problems.
Check for the position command potentiometer function and linkage problems.

1. Check hitch linkage for mechanical interference. Make sure there is no external object that may cause the hitch out of range.
2. Check for the linkage problem of the rockshaft potentiometer.
   a) Check the linkage from the rockshaft to the potentiometer. Make sure it is not loose, damaged, or improper installed.
   b) Adjust rockshaft position potentiometer to 0.80 +/- 0.10 volts when hitch is fully lowered.
   c) Tighten set screw on rockshaft potentiometer.
3. Test the function of the rockshaft potentiometer.
   Signal output from 0 to 5 VDC (1/24 volts per degree) at pin B when pin A is connected to power supply and pin C is grounded.
   Disconnect the rockshaft potentiometer at C155.
   The resistance is about 4 kohm measured across pins A and C.
   The resistance increase with clockwise rotation from 0 to about 4 kohm measured across pin B and C.
   Turn potentiometer along the full working range, the multimeter reading must be smooth and continuous.
4. Test the wiring harness of the rockshaft potentiometer.
   a) Test the cavity 6, 7, and 8 of connector C059. The resistance between cavity 6 and 8 should be around 4 kohm. The resistance between cavity 7 and 6 or 8 should change from 0 to 4 kohm when the potentiometer shaft changes its positions.
   b) Test the continuities between connector C059 and connector C155. The three wires should all have good connections.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

5. Check for position command potentiometer problem at the arm controller.
   Refer to fault code ARM 69 for potentiometer information, routing information, and diagnosing procedures.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 9312 Selected Pin Is Connected To The Left Side Rather Than The Right Side

Cause:
During calibration, draft with one pin was selected.
If one pin draft is selected, the draft pin should be installed on the right side of the tractor.
This fault code is logged if the pin is detected on the left side rather than the right side.

Solution:
Make sure the right hand draft pin connector is connected and wired correctly.
Recalibrate hitch if the draft must be with 2 pins.

1. Verify that the connector to the right hand draft pin is connected and wired correctly if draft with one pin is required.
2. Check the right hand draft pin connection along its wiring. Make sure there is no bent pin, loose connection, and damaged wires.
3. Calibrate the hitch again if the intent was for draft with 2 pins.

NOTE: See schematic sections 51 and 52 at the rear of this section.

FAULT CODE HITCH 9313 Hitch Is Calibrated As Position Only

Cause:
During calibration, the hitch controller is calibrated as position control only due to armrest being calibrated as position only even though draft pins were detected.
Hitch is electrically disabled.

Solution:
Check the armrest calibration and correct if necessary. Calibrate the hitch controller again if draft is desired.
FAULT CODE HITCH 9314 Right Draft Pin No Load
Offset Voltage Out Of Range

Cause:
During calibration, the 'No Load' offset voltage is out of range for right draft pin. The draft control requires that the 'No load' voltage is 3.00 +/- 0.05 volts to ensure the draft quality. The hitch controller will check it during calibration.

Possible failure modes:
1. Right draft pin failed.
2. Wiring problem from the hitch controller to the right hand draft pin.

Solution:
The 'No Load' offset point can be permanently shifted if the draft pin is installed backwards and overloaded. The pin signal can be checked by using a Y harness or using the monitoring screen of the service tool.
If the signal exists but just slightly beyond the range (say in the range 2.3 - 3.7 volts), the wiring is OK, but pin failed.
If there is no signal or signal is far beyond the range, it can either be pin failure or wiring problems.

1. Use a Y harness:
   Plug in the Y harness at the pin connector(C153). cavity A is the ground, cavity B is the draft pin signal, and cavity C is the power supply (+8 VDC).
   a) Check the power supply at cavity C. If the +8 VDC is not present check the wiring from C153 to Pin 1 of C059.
   b) Check the function of the right draft pin.
   Replace the pin in any of the following cases:
   No signal output.
   Signal not within 2.95 to 3.05 when there is no load.
   The output does not change with the load change.

2. Use the service tool:
   Go to the Monitor screen by click the Monitor Icon.
   Click the CHANGE PARAMETER SELECTIONS Icon.
   Click the HITCH DRAFT PIN-RIGHT-VOLTAGE and then ADD. You will be able to monitor the right draft pin signal status on the screen.
   The voltage should be 2.95 to 3.05 when there is no load.
   The voltage should change with the load change in the range of 2.3 to 5.3 VDC at -60 KN to 160 KN.

3. Check the function of the draft pin.
   a) If a spare draft pin is available, unplug the right pin connector. Plug in the new pin, clear the fault codes, start the tractor, and enable hitch. Lower and raise the hitch a few times.
   If the fault code is not recorded, the draft pin failed.
   If the fault code is recorded again, check the wiring.
   b) If there is neither fault code hitch 4029 nor hitch 4039, that means the left draft pin is working. Use the left pin as the test pin and repeat the above test.

4. Check the wiring from the hitch controller to the right hand draft pin.
   a) Disconnect the pin connector. At the controller side, check the power supply across cavity C and A. It should be 8 volts.
   b) Check the continuity from C153 to C059.
   c) At the draft pin side, measure the continuity of the pin circuit. The resistance should be 180 kohm across A and C and 18 kohm across B and C.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: The resistances at the draft pin side are for reference only. Incorrect resistance means bad pin but some bad pins may have correct resistances.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 9315 Left Draft Pin No Load
Offset Voltage Outside Normal Range

Cause:
During calibration, the 'No Load' offset voltage is outside normal range for left draft pin.
The draft control requires that the 'No load' voltage is 3.00 +/- 0.05 volts to ensure the draft quality.
The hitch controller will check it during calibration.

Possible failure modes:
1. Left draft pin failed.
2. Wiring problem from the hitch controller to the left hand draft pin.

Solution:
The 'No Load' offset point can be permanently shifted if the draft pin is installed backward and overloaded. The pin signal can be checked by using a Y harness or using the monitoring screen of the service tool.

If the signal exists but just slightly beyond the range (say in the range 2.3 - 3.7 volts), the wiring is OK, but pin has failed.
If there is no signal or signal is far beyond the range, it can either be pin failure or wiring problems.

1. Use a Y harness:
   a) Check the power supply at cavity C. If the +8 VDC is not present, check the wiring from C154 to Pin 1 of C059.
   b) Check the function of the left draft pin.
      Replace the pin in any of the following cases:
      - No signal output.
      - Signal not within 2.95 to 3.05 when there is no load.
      - The output does not change with the load change.

2. Use the service tool:
   Go to the Monitor screen, click the Monitor Icon.
   Click the CHANGE PARAMETER SELECTIONS Icon.
   Click the HITCH DRAFT PIN-LEFT-VOLTAGE and then ADD. You will be able to monitor the left draft pin signal status on the screen.
   The voltage should be 2.95 to 3.05 when there is no load.
   The voltage should change with the load change in the range of 2.3 to 5.3 VDC at -60 KN to 160 KN.

3. Check the function of the draft pin.
   a) If a spare draft pin is available, unplug the pin connector(C154). Plug in the new pin, clear the fault codes, start the tractor, and enable hitch. Lower and raise the hitch a few times.
      If the fault code is not recorded, the draft pin failed.
      If the fault code is recorded again, check the wiring.
   b) If there is neither fault code hitch 4019 nor hitch 4039, that means the right draft pin is working. Use the right pin as the test pin and repeat the above test.

4. Check the wiring from the hitch controller to the left hand draft pin.
   a) Disconnect the pin connector(C154). At the controller side, check the power supply across cavity C and A. It should be 8 volts.
   b) Check the continuity from C154 to C059.
   c) At the draft pin side, measure the continuity of the pin circuit. The resistance should be 180 kohm across A and C and 18 kohm across B and C.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: The resistances at the draft pin side are for reference only. Incorrect resistance means a bad pin but some bad pins may have correct resistances.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 9316 ‘No Load’ Offset Voltage
Out Of Range For Both Draft Pins

Cause:
During calibration, the ‘No Load’ offset voltage is out of normal range for both draft pins.

Possible failure mode:
1. Draft pin failure.
2. Wiring problem.

Solution:
The chance for both draft pins to fail at the same time is rare. If fault code hitch 9014 or hitch 9015 exists, check the single pin function or its wiring. If none of the codes exists, check the power supply or the ground to the two pins.

1. Check for the single pin fault code hitch 4019 or hitch 4029. If any exists, follow its corresponding diagnosing procedures.

2. If none of hitch 4019 or hitch 4029 exists, check the power supply or the ground to the two pins.
   a) Check the power supply at either left pin connector or right pin connector. There should be +8 volts at cavity C of C153 or cavity C of C154.
      If not, check the continuity from cavity 1 of C059 to the cavity C of the pin connector.
   b) Check the ground to the two pins. There should be continuity between cavity A of either left pin connector or right pin connector and the cavity 11 of C059.
      If not, check the wiring in between.

3. If none of above, check the function of the hitch controller.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: See schematic sections 51 and 52 at the rear of this section.

FAULT CODE HITCH 9317 Hitch Controller Requires Calibration

Cause:
During calibration, hitch controller requires calibration.

Solution:
1. Recalibrate the controller.

FAULT CODE HITCH 9318 Engine Speed Too Low
For Hitch Lower Calibration

Cause:
For hitch lower calibration, the engine speed has to be above 1500 RPM. If the engine speed is lower than 1500 RPM during hitch lower calibration, this fault code is recorded.

Solution:
1. Be sure the engine speed is above 1500 RPM and recalibrate the hitch.
FAULT CODE HITCH 9319 Hitch Is Calibrated As Position Only

Cause:
During calibration, hitch controller calibrated as position only. The armrest controller is calibrated for draft.

Solution:
The armrest calibration and the hitch calibration should match each other for draft or position control. Check the armrest calibration and correct if necessary. Calibrate the hitch controller again if draft is desired.

FAULT CODE HITCH 9320 Calibration Aborted Due To Tractor Moving

Cause:
During calibration, the calibration aborted due to tractor moving.

Possible failure modes:
1. Tractor moved during the calibration (in most cases).
2. Tractor speed sensor failure (small chance).

Solution:
Make sure the tractor does not move during the calibration. If the tractor did not move, check the wheel speed sensor. Refer to fault code hitch 3010 for details of wheel speed sensor troubleshooting.

NOTE: In rare cases, external electromagnetic interference may introduce signals and affect the hitch calibration process. If it is suspected to be such a case, try to avoid high electromagnetic interference devices such as welding machine, high voltage transformer, Radio broadcast tower, etc.

FAULT CODE HITCH 9321 No Engine Speed During Hitch Calibration

Cause:
Hitch calibration attempted when the engine is not running or engine speed signal failed.

Solution:
Make sure the engine is running normal during the hitch calibration. If the engine is running properly, check the engine alternator RPM signal from the instrumentation cluster. Refer to fault code PTO 54261 for detail on engine speed signal troubleshooting.
FAULT CODE HITCH 10030 Controller Memory Failure

Cause:
Controller memory failure. The system can not read calibration values (EEPROM failure).

Possible failure modes:
1. EEPROM defect or intermittent ECU.

Solution:
Calibrate the hitch controller again. If the same fault code is logged after calibration, change the controller.

NOTE: In rare cases, external electromagnetic interference may introduce signals and affect the hitch calibration process. If it is suspected to be such a case, try to avoid high electromagnetic interference devices such as welding machine, high voltage transformer, radio broadcast tower, etc.

FAULT CODE HITCH 10060 Controller Relay Failure Or Hitch Valves Shorted To Power

Cause:
There is an internal relay inside the hitch controller. This relay supples voltage to the hitch valve solenoids when it is energized. If it senses voltage when it is not energized, this fault code will be recorded.

Possible failure modes:
1. Controller internal relay stuck closed.
2. Wires from the controller to the valves shorted to power when the relay is not on.

Solution:
Make sure there is no external shortage between the hitch valve wiring and the power supply of the hitch controller or other external power.
Check the function of the controller.

1. Check for wire shortage to power.
   a. Disconnect connector C058 (Green) from the hitch controller.
   b. Check the voltage on all the terminals of hitch valve solenoid (cavity 1, 2, 3 of C058).
      There should be no voltage on any terminals.
      If there is voltage (above 1 volt) on any terminal, trace the wire for shortage.
   c. Pay attention to wire shortage between the hitch valve solenoid and the power supply (cavity 12 of C058).
      If the resistance between any of them is low, check for wiring damage.

2. If no external shortage, check controller internal relay.
   The relay will kick on after the power is turned on for two seconds and kick off after the power is turned off.
   A ‘click’ can be heard at the controller when the relay kicks on or off. The ‘click’ can also be felt when touching the controller box with a bare hand.
   Remove the controller cover on the back of the tractor.
   Listen or feel for the relay ‘click’ when turn the key on for more than two seconds and then turn off.
   If there is click, the relay is working OK.
   If there is no click, replace the controller.

NOTE: If the problem is intermittent, it may be caused by temperature change on a progressively deteriorating controller. Some shortages are intermittent at initial stage.

NOTE: See schematic sections 51 and 52 at the rear of this section.
Fault code Hitch 10061 Hitch Raise/Lower Solenoids Circuit
Failed Open

Possible failure mode:
1. Wiring problem from the hitch controller to the solenoids.
2. Controller internal relay stuck open.
3. Both raise and lower solenoids failed.

Solution:
The chance for both raise and lower solenoids to fail at the same time is rare. If fault code hitch 6014 or 6024 exists, check the single solenoid resistance and its wiring harness. If none of the codes exists, check the controller internal relay and hitch valve wiring.

1. Check for fault code HITCH 6014 and 6024. If either exists, follow its corresponding diagnosing procedures.
2. If neither of HITCH 6014 or 6024 exists, check the continuity from cavity 1 of connector C058 to cavity 1 of either connector C151 or C152.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

3. If none of above, check the function of the internal relay of the hitch controller.
   The relay will turn on after the power is turned on for two seconds and turn off after the power is turned off.
   A ‘click’ can be heard at the controller when the relay turns on or off. The ‘click’ can also be felt when touching the controller box with a bare hand.
   Remove the controller cover on the back of the tractor.
   Listen or feel for the relay ‘click’ when turning the key on for more than two seconds and then off.
   If there is click, the relay is working OK.
   If there is no click, replace the controller.

NOTE: If the problem is intermittent, it may be caused by temperature change on a progressively deteriorating controller. Some shortages are intermittent at initial stage.

NOTE: See schematic sections 51 and 52 at the rear of this section.

Fault code Hitch 10071 Controller Internal Failure

Cause:
The hitch lower coil driver inside the hitch controller is shorted to 12 volts.

Solution:
Make sure the controller has good power and ground connections. Start the tractor again. If the fault code is recorded again, replace the controller.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 10072 Controller Internal Failure

Cause:
The hitch lower coil driver inside the hitch controller is shorted to 12 volts.

Solution:
Make sure the controller has good power and ground connections. Start the tractor again. If the fault code is recorded again, replace the controller.

NOTE: See schematic sections 51 and 52 at the rear of this section.

FAULT CODE HITCH 10090 Controller Internal Failure

Cause:
A voltage regulator in the controller has failed.

Solution:
Make sure the controller has a good connection to the battery and is properly grounded.

   1. Check cavity 1 of J2 connector (C059 Brown). Make sure the harness connected to it is not shorted to 12 volts or to ground.
   2. Start the tractor again. If the fault code is recorded again, replace the controller.

NOTE: See schematic sections 51 and 52 at the rear of this section.

FAULT CODE HITCH 11010 Load Command Potentiometer Failure

Cause:
The Data Bus signaled that the load command potentiometer has failed. The hitch controller received the signal from the armrest controller.

Possible failure modes:
1. Load command potentiometer in armrest controller (in most cases).
2. Software execution error in the armrest controller (small chance).

Solution:
The load command potentiometer is hard wired to the armrest controller. If the load command potentiometer fails in the armrest controller, the fault code ARM 79 should exist.

   1. Check for fault code ARM 79 at the armrest controller. If ARM 79 exists, follow the corresponding corrective action.
   2. Check the function of the armrest controller.

NOTE: See schematic section 47 at the rear of this section.
FAULT CODE HITCH 11020 Drop Rate Command Potentiometer Failure

Cause:
The Data Bus signaled that the drop rate command potentiometer has failed.
The hitch controller received the signal from the armrest controller.

Possible failure modes:
1. The drop rate command potentiometer failed in the armrest controller (in most cases).
2. Software execution error in the armrest controller (small chance).

Solution:
The drop rate command potentiometer is hard wired to the armrest controller. If the drop rate command potentiometer fails in the armrest controller, the fault code ARM 159 should exist.

1. Check for fault code ARM 159 at the armrest controller. If ARM 159 exists, follow the corresponding corrective action.
2. Check the function the armrest controller.

NOTE: See schematic sections 49 and 50 at the rear of this section.

FAULT CODE HITCH 11030 Travel Range Potentiometer Failure

Cause:
The Data Bus signaled that the travel range potentiometer has failed.
The hitch controller received the signal from the armrest controller.

Possible failure modes:
1. The travel range potentiometer failed in the armrest controller (in most cases).
2. Software execution error in the armrest controller (small chance).

Solution:
The travel range potentiometer is hard wired to the armrest controller. If the travel range potentiometer fails in the armrest controller, the fault code ARM 169 should exist.

1. Check for fault code ARM 169 at the armrest controller. If ARM 169 exists, follow the corresponding corrective action.
2. Check the function the armrest controller.

NOTE: See schematic sections 49 and 50 at the rear of this section.
FTAULT CODE HITCH 11050 Upper Limit Potentiometer Failure

Cause:
The Data Bus signaled that the upper limit potentiometer has failed.
The hitch controller received the signal from the armrest controller.

Possible failure modes:
1. The upper limit potentiometer failed in the armrest controller (in most cases).
2. Software execution error in the armrest controller (small chance).

Solution:
The upper limit potentiometer is hard wired to the armrest controller. If the upper limit potentiometer fails in the armrest controller, the fault code ARM 149 should exist.

1. Check for fault code ARM 149 at the armrest controller. If ARM 149 exists, follow the corresponding corrective action.
2. Check the function the armrest controller.

NOTE: See schematic sections 49 and 50 at the rear of this section.
FAULT CODE HITCH 11069 Rockshaft Position Potentiometer Is Outside Normal Operating Range

Cause:
The hitch rockshaft position potentiometer signal difference between the fully lowered and fully raised position is not within specifications.

Possible failure modes:
1. Rock shaft potentiometer failed.
2. Wiring harness damage.
3. Potentiometer’s linkage problem.
4. Mechanical interference.

Solution:
Make sure there is no mechanical interference in the hitch linkage.
Check for rock shaft potentiometer failure and linkage problems.

1. Check hitch linkage for mechanical interference. Make sure there is no external object that may cause the hitch to be out of range.

2. Check for the linkage problem on the rockshaft potentiometer.
   a) Check the linkage from the rockshaft to the potentiometer. Make sure it is not loose, damaged, or improperly installed.
   b) Adjust rockshaft position potentiometer to 0.80 + 0.10 volts when hitch is fully lowered.
   c) Tighten set screw on rockshaft potentiometer.

3. Test the function of the rockshaft potentiometer.
   Signal output from 0 to 5 VDC (1/24 volts per degree) at pin B when pin A is connected to power supply and pin C is grounded.
   Disconnect the rockshaft potentiometer at C155.
   The resistance is about 4 kohm measured across pins A and C.
   The resistance increase with clockwise rotation from 0 to about 4 kohm measured across pin B and C.
   Turn potentiometer along the full working range, the multimeter reading must be smooth and continuous.

4. Test the wiring harness of the rock shaft potentiometer.
   a) Test the cavity 6, 7, and 8 of connector C059. The resistance between cavity 6 and 8 should be around 4 kohm. The resistance between cavity 7 and 6 or 8 should change from 0 to 4 kohm when the pot shaft changes its positions.
   b) Test the continuities between connector C059 and connector 155. The three wires should all have good connections.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 11070 Hitch Position Command Potentiometer Failure

Cause:
The Data Bus signaled that the hitch position command potentiometer has failed.
The hitch controller received the signal from the armrest controller.

Possible failure modes:
1. The hitch position command potentiometer failed in the armrest controller (in most cases).
2. Software execution error in the armrest controller (small chance).

Solution:
The hitch position command potentiometer is hard wired to the armrest controller. If the hitch position command potentiometer fails in the armrest controller, the fault code ARM 69 should exist.

1. Check for fault code ARM 69 at the armrest controller. If ARM 69 exists, follow the corresponding corrective action.
2. Check the function the armrest controller.

NOTE: See schematic section 47 at the rear of this section.
SECTION 55 - HITCH CONTROLLER - CHAPTER 3

FAULT CODE HITCH 12011 Communication Lost With The Armrest Controller

Cause:
Hitch controller is not receiving or recognizing information from the armrest controller.

Possible failure modes:
1. Bad connection between hitch controller and the armrest controller.
2. Controller failure.

Solution:
Make sure both the armrest controller and the hitch controller functioning OK.
Check the Data Bus connections.

1. Check the function of the hitch controller.
   a) Make sure the connector to the hitch controller is plugged in.
   b) Check the LED light on the hitch controller.
      LED light on - failed controller, replace the controller.
      LED light flashing - controller is OK.
      LED off - no power to controller, check power supply and its fuse.

2. Check the function of the armrest controller.
   a) Make sure the connector C137 to the armrest controller is plugged in.
   b) Check the LED light on the armrest controller.
      LED light on - failed controller, replace the controller.
      LED light flashing - controller is OK.
      LED off - no power to controller, check power supply and its fuse.

NOTE: The LED light for the armrest controller is located on the controller circuit board. It can be seen by looking through the space besides connector C137 from the rear of the armrest.

3. Check the power supply to the Data Bus.
   The power supply to the Data Bus is from the switched power through Fuse #41.
   a) Make sure Fuse #41 is not burned out.
   b) Turn the tractor Key 'ON'. Check the power supply at Fuse #41. There should be 12 volts.
      If not, check the power supply from the switched power.

4. Check the integrity of Data Bus at the passive terminators.
The following checks are basically looking into one end of the bus and check the terminator at the other end.
   a) Check from the passive terminator at the rear of the tractor.
      Disconnect the terminator at connector C175.
      With the key on, measure the voltage on the wires connected to C175.
      At pin 1, the red wire, it should read 12 volts battery voltage.
      At pin 2, the yellow wire, it should read 2.5 to 4 volts (2.5 V nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire, it should read 2.5 to 1 volts (2.5 V nominally).
      If the above checks are OK, it means that the front terminator and data bus wiring is OK.
      If not, go to next step.
   b) Check from the passive terminator at the front of the tractor.
      Reconnect the rear terminator and disconnect the front terminator at connector C205.
      With the key on, measure the voltage on the wires connected to C205.
      At pin 1, the red wire, it should read 12 volts battery voltage.
      At pin 2, the yellow wire, it should read 2.5 to 4 volts (2.5 V nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire, it should read 2.5 to 1 volts (2.5 V nominally).
      If the above checks are OK, it means that the front terminator and data bus wiring is OK.
      If not, check for bad connection and damaged wire along the Data Bus.
NOTE: When there is a bad connection along the Data Bus wiring, the fault code will be accompanied by multiple fault codes such as TRANS 12011, PTO 54120, INST 12011, AUX 12011, INST 12031, PERF 12031, TRANS 12031 and PTO 54140.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: See schematic sections 49 through 52 at the rear of this section.

NOTE: Also see the Data Bus schematic foldouts 12 through 18 at the end of this section.
Fault Code Hitch 12031 Communication Lost With The Data Bus

Cause:
Hitch controller has found that it cannot communicate with the Data Bus.

Possible failure modes:
1. Data Bus is not powered.
2. Data Bus is shorted.

Solution:
Make sure the hitch controller is well connected to the Data Bus.

Check the Data Bus function.

1. Check the connection to the hitch controller.
   a) Make sure the connector C059 is firmly plugged in to the hitch controller.
   b) Make sure the hitch controller has a good connection to the Data Bus.

2. Check the power supply to the Data Bus.
   The power supply to the Data Bus is from the switched power through Fuse #41.
   a) Make sure Fuse #41 is not burned out.
   b) Turn the tractor Key 'ON'. Check the power supply at Fuse #41. There should be 12 volts.
      If not, check the power supply from the switched power.

3. Check the integrity of Data Bus at the passive terminators.
   The following checks are basically looking into one end of the bus and check the terminator at the other end.
   a) Check from the passive terminator at the rear of the tractor.
      Disconnect the terminator at connector C175.
      With the key on, measure the voltage on the wires connected to C175.
      At pin 1, the red wire, it should read 12 volts battery voltage.
      At pin 2, the yellow wire, it should read 2.5 to 4 volts (2.5 V nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire, it should read 2.5 to 1 volts (2.5 V nominally).
      If the above checks are OK, it means that the front terminator and data bus wiring is OK.
      If not, go to next step.
   b) Check from the passive terminator at the front of the tractor.
      Reconnect the rear terminator and disconnect the front terminator at connector C205.
      With the key on, measure the voltage on the wires connected to C205.
      At pin 1, the red wire, it should read 12 volts battery voltage.
      At pin 2, the yellow wire, it should read 2.5 to 4 volts (2.5 V nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire, it should read 2.5 to 1 volts (2.5 V nominally).
      If the above checks are OK, it means that the front terminator and data bus wiring is OK.
      If not, check for bad connection and damaged wire along the Data Bus.

Note: When there is a bad connection along the Data Bus wiring, the fault code will be accompanied by multiple fault codes such as TRANS 12011, PTO 54120, INST 12011, AUX 12011, INST 12031, PERF 12031, TRANS 12031 and PTO 54140.

Note: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

Note: Also see the Data Bus schematic foldout at the end of this section.

Note: See schematic sections 51 and 52 at the rear of this section.
Fault Code Hitch 12041 Communication Lost
With The Instrument Controller

**Cause:**
The hitch controller is not receiving or recognizing information from the instrumentation controller.

**Possible failure codes:**
1. Bad connection between hitch controller and the instrument controller.
2. Controller failure.

**Solution:**
Make sure both the instrument controller and the hitch controller functioning OK.
Check the Data Bus connections.

1. Check the function of the hitch controller.
   a) Make sure the connector to the hitch controller is plugged in.
   b) Check the LED light on the hitch controller.
      LED light on - failed controller, replace the controller.
      LED light flashing - controller is OK.
      LED off - no power to controller, check power supply and its fuse.

2. Check the function of the instrument controller.
   a) If there is no display and no back light on the tractor instrumentation, it is more likely that there is no power to controller. Check power supply, its fuse, and the ground to the controller. Make sure the connector (C061) to the instrument controller is plugged in.
   b) If there is a display on the tractor instrumentation but the display is erratic, such as unusual symbols, and other controllers claim communication is lost with the instrument controller, it is likely that the instrument controller has failed. Replace the controller.
   c) If nothing can be found wrong with the instrument controller, go to step 3.

3. Check the power supply to the Data Bus.
   The power supply to the Data Bus is from the switched power through Fuse #41.
   a) Make sure Fuse #41 is not burned out.
   b) Turn the tractor Key 'ON'. Check the power supply at Fuse #41. There should be 12 volts.
      If not, check the power supply from the switched power.

4. Check the integrity of Data Bus at the passive terminators.
   The following checks are basically looking into one end of the bus and check the terminator at the other end.
   a) Check from the passive terminator at the rear of the tractor.
      Disconnect the terminator at connector C175.
      With the key on, measure the voltage on the wires connected to C175.
      At pin 1, the red wire, it should read 12 volts battery voltage.
      At pin 2, the yellow wire, it should read 2.5 to 4 volts (2.5 V nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire, it should read 2.5 to 1 volts (2.5 V nominally).
      If the above checks are OK, it means that the front terminator and data bus wiring is OK.
      If not, go to next step.
   b) Check from the passive terminator at the front of the tractor.
      Reconnect the rear terminator and disconnect the front terminator at connector C205.
      With the key on, measure the voltage on the wires connected to C205.
      At pin 1, the red wire, it should read 12 volts battery voltage.
      At pin 2, the yellow wire, it should read 2.5 to 4 volts (2.5 V nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire, it should read 2.5 to 1 volts (2.5 V nominally).
      If the above checks are OK, it means that the front terminator and data bus wiring is OK.
      If not, check for bad connection and damaged wire along the Data Bus.
NOTE: When there is a bad connection along the Data Bus wiring, the fault code will be accompanied by multiple fault codes such as TRANS 12011, PTO 54120, INST 12011, AUX 12011, INST 12031, PERF 12031, TRANS 12031 and PTO 54140.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: Also see the Data Bus schematic foldouts 12 through 18 at the end of this section.

NOTE: See schematic sections 24, 51 and 52 at the rear of this section.
FAULT CODE HITCH 52230 Hitch Position Is Above Upper Limit Setting

Cause:
Hitch controller found that hitch position is above upper limit.

Possible failure modes:
1. The position of the hitch was above the upper limit setting when tractor was started.
2. Rock shaft position potentiometer failed.
3. Upper limit potentiometer failed in the armrest controller.

Solution:
Make sure there is no mechanical interference in the hitch linkage.
Raise the hitch upper limit setting above the hitch position or lower the hitch until the hitch upper limit setting is reached.
Shut down the tractor and restart, the fault code should be gone.
If the fault code is still there, do the following:
1. Test the function of the rockshaft potentiometer.
   Refer to fault code hitch 11069 for details.
2. If the rock shaft functions OK, test the function of the upper limit potentiometer in the armrest controller.
   Refer to fault code ARM 149 for details.

NOTE: See schematic sections 51 and 52 at the rear of this section.
FAULT CODE HITCH 52260 Up/Down Fender Switch Failure

Cause:
Hitch UP/DOWN fender switch failure.

Possible failure modes:
1. Both switches are pushed together.
2. Switch was pushed before engine start up.
3. Switch was pushed while tractor was moving.
4. Switch Up was pushed when the hitch is against the upper limit setting.
5. Switch Down was pushed when the hitch is against the lower limit setting.

Solution:
Fault code should not be there any more when the fender switch is released. If the code is still there, test the fender switch function and its wiring.

1. Make sure the hitch remote switch is not pressed. Check for mechanical interference which may cause the switch be pressed. Shut down the tractor and start it again. Check the fault code in the hitch controller.
   If the fault code is gone, the problem is fixed.
   If the fault code appears again, go to the next step.

2. Test the function of the fender switch.
   Disconnect the fender switch connector. Check the continuities between the cavities.
   There should be no continuity between any two cavities when the switch is not pressed.
   There should be continuity between cavity A and B when the down switch is pressed.
   There should be continuity between cavity C and B when the up switch is pressed.
   For tractor with fender extension, check the two switches on the fender too.

3. If no of above, test the wiring from the hitch controller (C058) to the fender switch.
   The three wires should have good continuity from end to end, but no shortage between wires.

NOTE: Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.

NOTE: See schematic sections 51 and 52 at the rear of this section.

FAULT CODE HITCH 65535 Memory Not Cleared From The Factory

Cause:
The hitch controller memory has not been cleared from the factory.

Solution:
This is not a fault. Clear the fault code from the controller.