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Section 55

Chapter 9

INSTRUMENT CLUSTER (ICU2)
TG SERIES P.I.N. JAW 137300 AND AFTER

Programming and Fault Codes

Special Note: Only Fault Codes which have changed due to the Later Version ICU (ICU2) are included in this section. If the tractor has the Later Version ICU, use the schematic foldouts in this section with the early version fault code troubleshooting.

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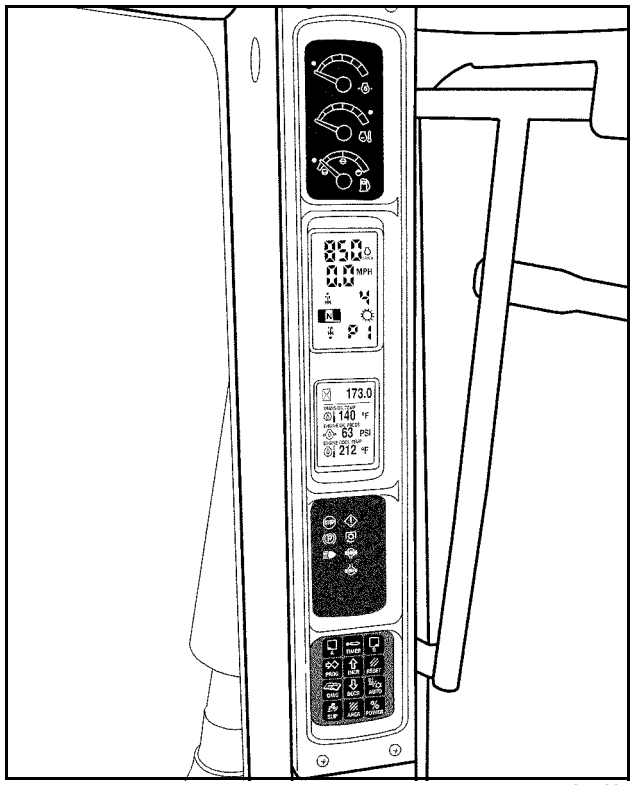
INSTRUMENT CLUSTER (ICU2)

The instrument cluster is mounted on the front right hand cab post. The instrument cluster will automatically monitor various operating systems and functions on your tractor. The condition of the monitored systems is indicated by analog gauges, LED indicator lamps and LCD text displays.

The instrument cluster displays tractor performance information and provides audible alarm conditions which are important to the operation of the tractor and implement system.

When the key switch is turned to the ON position, the tractor instrumentation will do a self check of all monitored systems. All indicator lamps and display screens will energize for 3 seconds. Before starting the tractor, make sure all systems are operating. If any system is not operating, contact your dealer.

See your operator's manual for further information regarding the instrument cluster.



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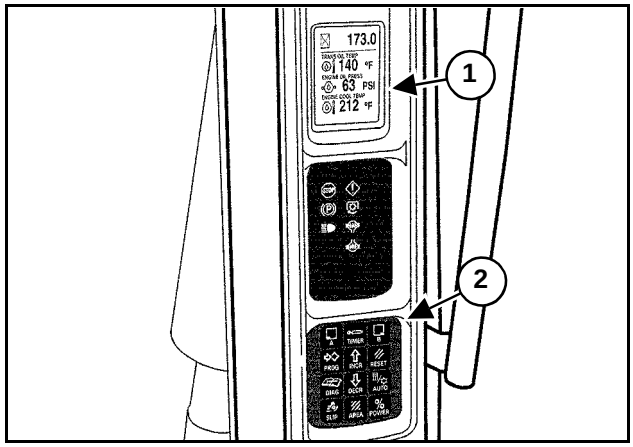

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1. PROGRAMMABLE DISPLAY - This display is used to communicate information or text messages. Each message is associated with a graphic icon to identify the vehicle system. Normally, engine hours are displayed at the top of the display. If the RESET is pressed and held for 2 seconds, old hours will be displayed. When the PTO is engaged the PTO icon and the speed will override the engine hour display. Auto auxiliary (if equipped) display will also override the engine hour display, but not the PTO display. Text messages will override entire display when in programming mode or when warnings occur.

   The Standard Programmable Display provides performance information on the engine, transmission and hydraulic systems as well as fault warnings when they occur.

   The Deluxe Programmable Display provides additional performance information on the engine, transmission and hydraulic systems, as well as fault warnings when they occur.

2. KEYPAD - The keypad is used to access, modify, clear or set limits to the information within the display or to clear fault warnings from the display. The Standard (six key) and Deluxe (twelve key) keypad functions are as follows:

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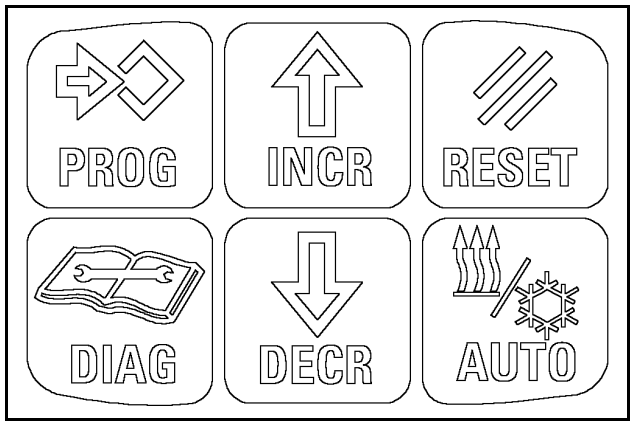
STANDARD KEYPAD	
Key	**Function**
PROG	1 - To enter setup mode and to select parameters within setup and diagnostics mode. 2 - To enter display monitor adjustment menu for ICU data screen order, backlighting and contrast.
INCR (Up Arrow)	To increase value of displayed number or scroll up through information screens.
DECR (Down Arrow)	To decrease value of displayed number or scroll down through information screens.
RESET	Used to reset warning faults, programming modes and diagnostic modes.
DIAG	To enter diagnostics mode and display ENGINE hours.
AUTO	Function not available.



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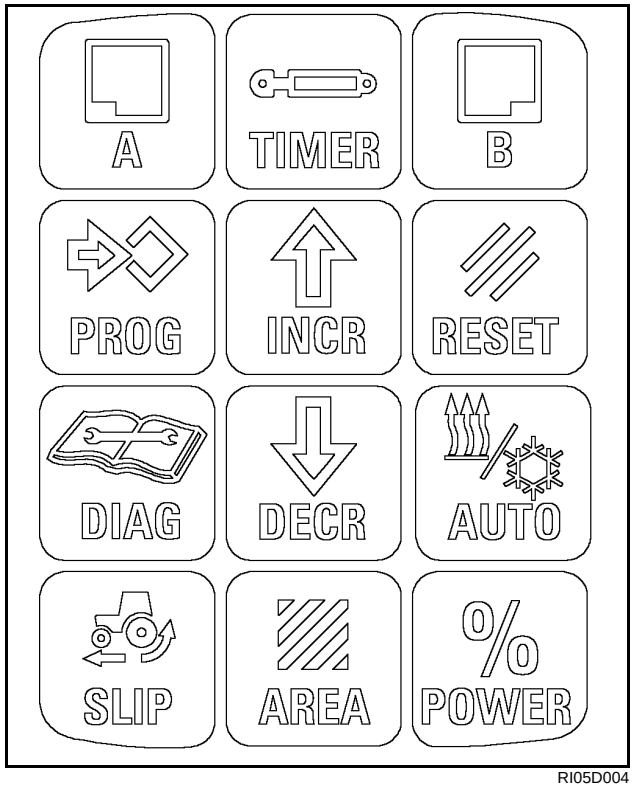
DELUXE KEYPAD	
Key	**Function**
“A”	To toggle menu screen selection.
“B”	To toggle menu screen selection.
TIMER*	To display remote hydraulic timer screen.
PROG	1 - To enter setup mode and to select parameters within setup and diagnostics mode. 2 - To enter display monitor adjustment menu for ICU data screen order, backlighting and contrast.
INCR (Up Arrow)	To increase value of displayed number or scroll up through information screens.
RESET	Used to reset warning faults, programming modes and diagnostic modes.
DIAG	To enter diagnostics mode and display ENGINE hours.
DECR (Down Arrow)	To decrease value of displayed number or scroll down through information screens.
AUTO	Function not available.
SLIP	To display percent slip when equipped with radar.
AREA	To display Area Information screen or to edit implement width and accumulated area.
% POWER**	To display % power, % slip and fuel rate.



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*This function is not available on tractors equipped with stepper motor AUX valves.

**This function is not available on tractors equipped with mechanical fuel injection pumps.

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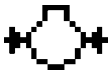
WARNING/FAULT DISPLAYS

The programmable display will notify the operator when there is a problem with the engine, transmission, hydraulics or other operational systems that require corrective action. The warnings include an audible alarm, one or more indicator lights and text in the programmable display. The warnings are divided into four levels of importance and descending order of priority within each level. In the case of multiple faults or warnings the higher level or higher priority within a level will be the warning displayed. The following tables are listings of the icons, warning text, problems and corrective action required in order of importance and priority.

Critical Warning Displays - Level 1

Level 1 critical warnings require immediate attention or there will be serious damage to the tractor. When a critical fault occurs, the red stop light, the amber warning light and the audible alarm will flash continuously and a text message will appear in the lower display. For very high engine coolant temp and very low engine oil pressure, the light near the gauge will also flash. **Shut down the engine immediately**.

NOTE: *For tractors equipped with the Deluxe Instrument Cluster, the engine will be shut down in 30 seconds after the fault is detected. The lower display will show the 30 second count down timer.*

Display		Problem	Corrective Action
	ENGINE INTAKE AIR TEMP VERY HIGH	Very high air to air temperature.	Shut the tractor engine OFF immediately and check the heat exchanger for blockage.
	**ENGINE OIL PRESSURE VERY LOW**	Very low engine oil pressure.	Shut the tractor engine OFF immediately and check oil level or other cause.
	ENGINE COOLANT TEMP VERY HIGH	Very high engine coolant temperature.	Shut the tractor engine OFF immediately and check coolant level or radiator for blockage or other cause.
	TRANSMISSION OIL TEMP VERY HIGH	High transmission oil temperature.	Shut the tractor engine OFF immediately and check for blocked cooler or other cause.

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Non-Critical Displays - Level 2

Faults or warnings are for conditions that will not immediately damage the tractor but left uncorrected could develop into Level 1 - Critical Faults. A Level 2 fault could also cause other systems to be inoperative. When Level 2 fault warnings occur, the amber light will flash for 4 seconds then be on continuously. The audible alarm will sound continuously for 4 seconds and the programmable display will show the fault text continuously. When the RESET key is pressed the warning text will clear for 10 minutes but the amber light will remain on. When the fault is corrected the amber lamp will go off.

Display		Problem	Corrective Action
	ENGINE AIR TEMP	High air to air temperature approaching critical.	Check for blocked air cooler. If condition persists contact your dealer.
	TRANSMISSION CONTROLLER OFF LINE	The transmission electronic controller is not communicating over the data bus.	Check and replace fuse #43 and #44 if necessary. If condition persists contact your dealer.
	ARMREST CONTROLLER OFF LINE	The arm rest control console electronic controller is not communicating over the data bus.	Check and replace fuse #33 if necessary. If condition persists contact your dealer.
	HITCH CONTROLLER OFF LINE	The hitch electronic controller is not communicating over the data cable.	Check and replace fuse #39 if necessary. If condition persists contact your dealer.
	AUX CONTROLLER OFF LINE	The remote hydraulic electronic controller is not communicating over the data bus.	Check and replace fuse #36 if necessary. If condition persists contact your dealer.
	INSTRUMENT OFF LINE	The tractor monitor is not communicating over the data cable.	Check and replace fuses #16 and #37 if necessary. If condition persists contact your dealer.
	PTO CONTROLLER OFF LINE	The PTO electronic controller is not communicating over the data bus.	Check and replace fuse #38 if necessary. If condition persists contact your dealer.
	ENGINE CONTROLLER OFF LINE	The engine electronic controller is not communicating over the data bus.	Check and replace fuse #1, and #15 if necessary. If condition persists contact your dealer.
	TRANSMISSION FAULT	The transmission electronic controller has detected an electronic or electrical failure.	If condition persists contact your dealer.
	ARMREST FAULT	The transmission electronic controller has detected an electronic or electrical failure.	If condition persists contact your dealer.
	HITCH FAULT	The hitch electronic controller has detected an electronic or electrical failure.	If condition persists contact your dealer.

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Display		Problem	Corrective Action
	AUX FAULT	The remote hydraulics electronic controller has detected an electronic or electrical failure.	If condition persists contact your dealer.
	INSTRUMENT FAULT	The tractor monitor has detected an electronic or electrical failure.	If condition persists contact your dealer.
	ENGINE FAULT	The engine electronic controller has detected an electronic or electrical failure.	If condition persists contact your dealer.
	***TRANSMISSION SETUP**	Calibration setup programming is required on the transmission electronic controller.	Contact your dealer.
	***ARMREST SETUP**	Calibration setup programming is required on the arm rest control console electronic controller	Contact your dealer.
	***HITCH SETUP**	Calibration setup programming is required on the hitch electronic controller.	Contact your dealer.
	***AUX SETUP**	Calibration setup programming is required on the remote hydraulic electronic controller.	Contact your dealer.
	***INSTRUMENT SETUP**	Calibration setup programming is required on the tractor monitor.	Contact your dealer.
	***ENGINE SETUP**	Calibration setup programming is required on the engine electronic controller.	Contact your dealer.
	***AUX NEUTRAL**	The remote hydraulic control lever(s) were not in neutral on startup.	Move lever(s) back to neutral.
	***TURN PTO OFF**	The power take off switch was not in the off position on startup.	Move power take off switch to the OFF position.
	***HITCH CAPTURE**	The hitch position control did not match the actual hitch position on startup.	Move the hitch position control to match the actual hitch position.
	ENGINE INTAKE AIR TEMP SENSOR FAULT	Mechanical fuel pump models only.	Check this sensor or wiring.
*These faults/warnings will cause the audible alarm to sound three times which means operator action is required.			

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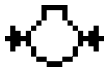
Display		Problem	Corrective Action
	ENGINE COOLANT TEMP SENSOR FAULT	Mechanical fuel pump models only.	Check this sensor or wiring.
	ENGINE OIL PRESSURE SENSOR FAULT	Mechanical fuel pump models only.	Check this sensor or wiring.
	SIT DOWN (MX 180, MX200, MX220, MX240 and MX270 only)	The transmission was shifted from PARK or NEUTRAL without the operator seated.	Shift the transmission to PARK, sit down and then proceed. If condition persists, contact your dealer.
	SLOW DOWN (MX210, MX230, MX255, MX285)	The transmission is overspeeding.	Slow the tractor down. **NOTE:** *The audible alarm will sound continuously. The ground speed readout will flash. Amber warning lamp will flash continuously.*
	MINIMUM THROTTLE	The electronic engine controller has taken the engine to low idle and the throttle lever is not at the minimum position.	Move the throttle lever to the minimum position (lever full back).
	CHECK SEAT SWITCH	The tractor has detected the presence of an operator for 25 hours continuously.	With the key switch ON, the operator needs to stand up then sit down in the seat.
	TRANSMISSION OIL TEMP HIGH	High transmission oil temperature approaching critical.	Check for blocked air cooler. If condition persists contact your dealer.
	ENGINE COOLANT TEMP HIGH	High engine coolant temperature.	Check coolant level or blocked air cooler. If condition persists contact your dealer.
	**ENGINE OIL PRESSURE LOW**	Low engine oil pressure.	Check engine oil level or other causes. If condition persists contact your dealer.
	TRANSMISSION OIL PRESSURE LOW	Low transmission oil pressure.	Check transmission oil level or other causes. If condition persists contact your dealer.

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Level 3; Faults for conditions that will not immediately damage the tractor but will require servicing soon. When Level 3 warnings occur, the amber light will flash for 4 seconds then be on continuously. The audible alarm will sound continuously for 4 seconds and the programmable display will flash the fault text continuously. When the RESET key is pressed the warning text will clear for 10 minutes but the amber light will remain on until the fault is corrected.

Display		Problem	Corrective Action
	ALTERNATOR OUTPUT VOLTAGE LOW	Alternator no output. High electric load or bad battery.	Check for cause at earliest convenience.
	ALTERNATOR OUTPUT VOLTAGE HIGH	Alternator high voltage	Check for cause at earliest convenience.
	LOW FUEL	Low fuel level.	Refuel.
	BATTERY VOLTAGE LOW	Battery voltage is below 11 volts.	Check alternator belt. Check battery water level. Test battery.

Level 4; Faults are for conditions that will not immediately damage the tractor but will require service. when Level 4 warnings occur, the amber light will flash for 4 seconds then be on continuously. The audible alarm will sound for 4 seconds continuously and the programmable display will flash the text continuously. When the RESET key is pressed the warning text will clear for 1 hour, but the amber lamp will remain on until the fault is corrected.

Display		Problem	Corrective Action
	ENGINE AIR FILTER BLOCKED	Engine air filter restriction.	Clean engine primary air filter at earliest convenience.
	TRANSMISSION OIL FILTER BLOCKED	Transmission oil filter restriction.	Replace transmission filter at earliest convenience.
	FUEL SENSOR FAULT	Fuel sensor below 1.25 volts for 1 second.	Check fuel sensor or wiring.
	TRANSMISSION OIL TEMP SENSOR FAULT	Faulty signal	Check transmission oil temp sensor or wiring.
	HYDRAULIC OIL FILTER BLOCKED	Hydraulic oil filter restriction.	Replace hydraulic filter at earliest convenience.

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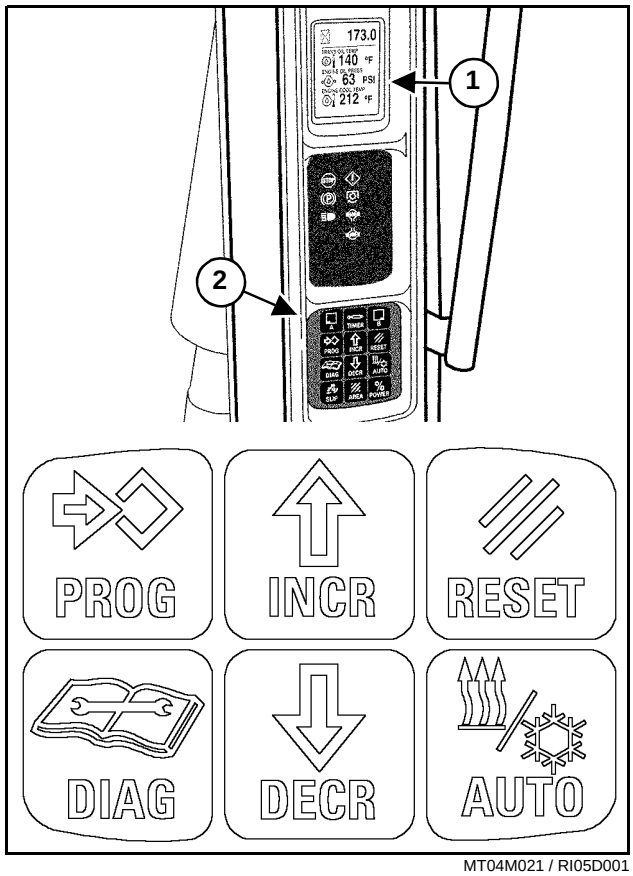
Deluxe Monitor Display (If Equipped)

The performance monitor is a two part system which includes the display (1) and the keypad (2). The display communicates performance information and system fault warnings. The key pad is used to access or edit information on the display. There are two monitor systems, the Standard Performance Monitor and the optional Deluxe Performance Monitor.



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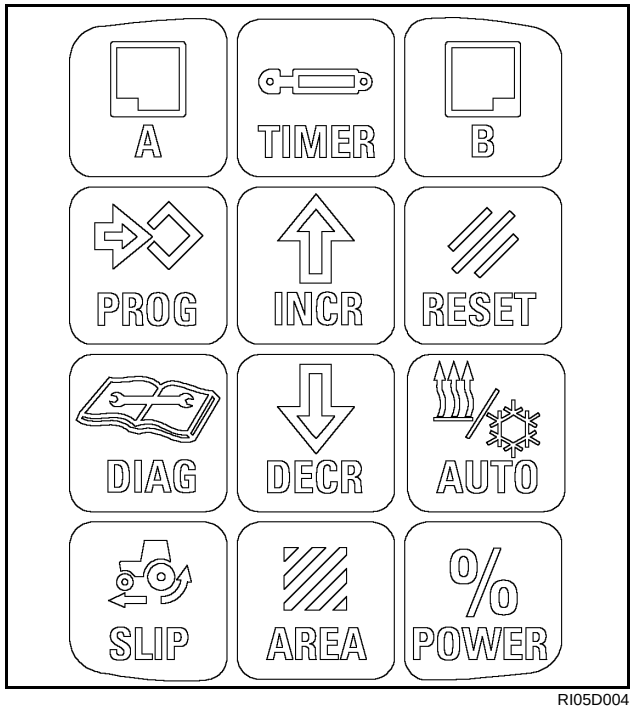
The Standard Performance Monitor displays information on the engine, transmission, hydraulic or climate control systems and through the (six key) keypad to scroll through the information screens and edit those screens.

The Deluxe Performance Monitor displays the same information as the Standard Monitor with additional information on the engine, hydraulics, fuel, area, distance, wheel slip, end of row (if equipped) and tractor service systems. The enhanced (twelve key) key pad allows the operator to scroll through or directly access these systems and edit the contents.

An important feature of the Deluxe Performance Monitor is that it includes an automatic engine shut down if a critical fault warning is active.

NOTE: *The automatic temp control button has no effect on current production tractors. The AUX (remote EHR) timer button function has no effect on available monitors for tractor models MX180, MX200, MX220, MX240 and MX270 with stepper motor AUX system.*



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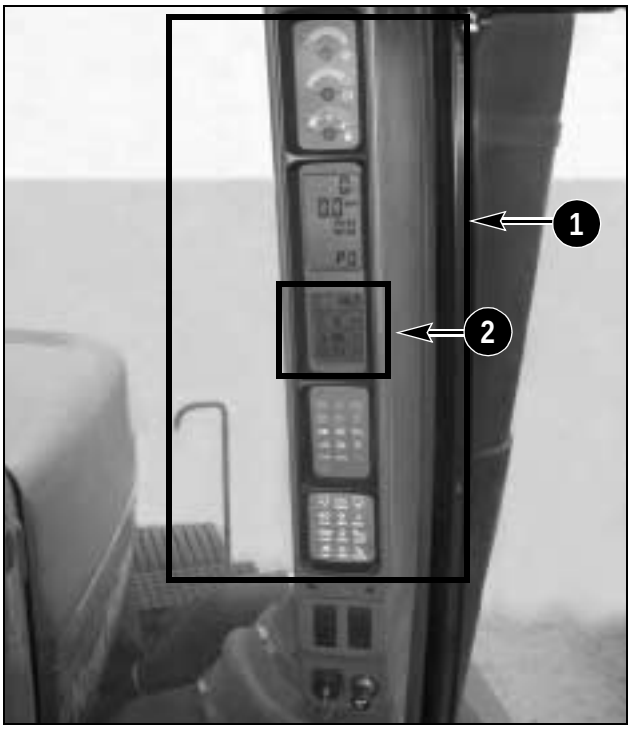
INSTRUMENTATION PROGRAMMING

General Information

The standard instrumentation controller must be configured/calibrated before any other controller. Tractor Standard instrumentation programming is performed through three levels. The first level, operation setup permits adjustment of display units and tire radius. The second level, controller configuration permits viewing of the current selection for tractor model (set during third level) and configuration of the electronic controllers that are expected to be on the TDB (Tractor Data Bus). The third level requires the use of the service tool to select the tractor model and fuel tank size.

IMPORTANT: *All three levels of programming must be performed when moving an instrumentation controller from one tractor to another.*

NOTE: *When replacing the standard instrumentation controller the fuel tank size selection must be selected using the service tool configuration window.*



MD05F002

1. STANDARD INSTRUMENTATION
2. PROGRAMMABLE DISPLAY

Configure the instrumentation with the key in the ON position and the engine not running. Be sure the batteries are fully charged. Turn off all accessories during configuration.

Operation Setup

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

STEP 1

Enter operation setup by pressing and holding the PROG key for 3 seconds within the first 10 seconds of turning the key switch to the ON position.

NOTE: *If any fault codes are recorded, they must be corrected before configuration is possible. See Fault Code Retrieval in this section.*

STEP 2

RD05F102

The display will read **CONFIG MENU** with all menu items listed. The default highlighted option is **ICU**. Press the **PROG** key.

MD05F003

NOTE: *If another option is highlighed use the **INCR** or **DECR** keys to highlight **ICU**.*

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STEP 3

MD05F005

The display will read **CONFIG ICU** with options, **Operator Setup**, **Controller Config** and **Exit**. The default will highlight **Operator Setup**. Press the **PROG** key.

STEP 4

MD05F006

The display will read **CONFIG ICU** with the operator setup options, **Unit**, **Tire Radius**, **Radar Cal**, **Old Hours** and **Exit.** The default will highlight **Unit**. Press the **PROG** key.

STEP 5

MD05F007

The display will show under the **UNIT** heading **English** and **Metric**. The last stored heading will be highlighted. The default setting is **English**. Display units can now be selected, either **English** or **Metric**, by using the **INCR** or **DECR** keys. Press the **PROG** key to save your choice. The display will return to the operator setup options.

STEP 6

MD05F009

Use the **INCR** or **DECR** keys to highlight **Tire Radius**. Press the **PROG** key.

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STEP 7

MD05F010

The display will read **TIRE RADIUS** with the radius icon above the **MANUAL** or **AUTO** options. Use the **INCR** and **DECR** keys to select either **MANUAL** or **AUTO** format. Press the **PROG** key to enter the selected format.

If **MANUAL** is selected, proceed to Step 8. If **AUTO** (automatic) is selected, proceed to Step 9.

STEP 8

MD05F011

When the **MANUAL** format is selected the display will read **TIRE RADIUS** with the radius icon above the previously saved radius.

1. Use the **INCR** or **DECR** keys to change the radius number by 1 mm (0.1 inch). Pressing and holding the **INCR** or **DECR** keys will rapidly change the radius number.
2. When the correct radius number is reached, press the **PROG** key to save that number.

STEP 9

MD0F012

To use the **AUTO** format for determining tire radius the following preparations must be made:

1. Mark a straight-line course of 60 meters (196.86 feet) with a start line and finish line that can be clearly seen from the cab.
2. Position the tractor at an adequate distance from the start line to allow the tractor to achieve and maintain a steady speed faster than 2 MPH (3.22 KPH).
3. Turn the key switch **OFF**. Press and hold the **PROG** key for 3 seconds within the first 10 seconds of starting the engine.
4. The display will read **CONFIG MENU** and a list of options. With the **ICU** highlighted press the **PROG** key.
5. The display will read **CONFIG MENU** followed by **Operator Setup**, **Controller Config** and **Exit**. With **Operator Setup** highlighted press the **PROG** key.
6. The display will show the **CONFIG ICU** options. Use the **INCR** or **DECR** keys to select **Tire Radius** and press the **PROG** key.
7. The display will read **TIRE RADIUS** with the radius icon above the **MANUAL** or **AUTO** options. Use the **INCR** or **DECR** keys to select **AUTO** and press the **PROG** key.

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STEP 10

MD05F013

When the **AUTO** format is selected in Step 9 the display will show the radius icon followed by **AUTO.** The next line reads ***READY*** and the bottom of the screen reads **PRESS <INCR> TO START**.

STEP 11

MD05F014

Select a forward gear and engine rpm that will maintain a steady speed above 2 MPH (3.22 KPH), release the clutch and press the **INCR** key when the front wheels touch the start line. The display will read ***WORKING*** and **PRESS <DECR> TO STOP.**

STEP 12

MD05F015

Press the **DECR** key when the front wheels touch the finish line.

If successful the **ICU** will calibrate the tire radius, diplay and save the new value for 2 seconds before returning to the **CONFIG ICU** options screen.

If unsuccessful, due to unsteady tractor speed or the **INCR** and **DECR** keys were not pressed at the proper time the display will read ***FAILED*** for 2 seconds before returning to **CONFIG ICU** options. Repeat Steps 9 through 12.

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RADAR CALIBRATION

STEP 13

MD05F016

After the **Tire Radius** has been completed the **CONFIG ICU** options screen is displayed.

NOTE: *If only calibrating the radar, complete Steps 1, 2 and 3 to display the **CONFIG ICU** options.*

Use the **INCR** or **DECR** keys to highlight **Radar Cal** and press the **PROG** key.

If the tractor is not equipped with radar the display will read **RADAR NOT PRESENT**.

STEP 14

MD05F017

The display will show the radar icon and **RADAR CAL**. The next line shows **MANUAL** with the manual icon and the bottom line shows **AUTO**. Use the **INCR** and **DECR** keys to highlight either **MANUAL** or **AUTO**. Use the **PROG** key to enter the selected format.

If **MANUAL** is selected, proceed to Step 15. If **AUTO** (automatic) is selected, proceed to Step 16.

NOTE: *It is recommended to use the **AUTO** format. The **MANUAL** format may need to be repeated numerous times before the correct calibration is achieved.*

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STEP 15

MD05F018

When the **MANUAL** format is sected the display will show the radar icon followed by **RADAR CAL**. The bottom of the display will show the previously saved or default (27.47) calibration number.

1. Use the **INCR** or **DECR** keys to change the number. Decrease the number to increase radar read out speed and reduce the percentage of slip displayed during operation. Increase the number to decrease the read out speed and increase the percentage of slip display.
2. When the corrected calibration number is reached, press the **PROG** key to save that number.

STEP 16

MD05F019

To use the **AUTO** format for determining the radar calibration the following preparations must be made:

1. Mark a straight-line course of 60 meters (196.86 feet) with a start line and finish line that can be clearly seen from the cab.
2. Position the tractor at an adequate distance from the start line to allow the tractor to achieve and maintain a steady speed faster than 2 MPH (3.22 KPH).
3. Turn the key switch OFF. Press and hold the **PROG** key for 3 seconds within the first 10 seconds of starting the engine.
4. The display will read **CONFIG MENU**. With I**CU** highlighted press the **PROG** key.
5. The display will show the **CONFIG ICU** options. Use the **INCR** or **DECR** keys to select **Radar Cal** and press the **PROG** key.
6. The display will show the radar icon followed by **RADAR CAL**. The next line reads **MANUAL** followed by the manual icon and the bottom line reads **AUTO**. Use the **INCR** or **DECR** key to select **AUTO** and press the **PROG** key.

STEP 17

MD05F020

When the **AUTO** format is selected in Step 16 the display will show the radar icon and **RADAR CAL**. The next line reads **AUTO** and below that ***READY*.** The bottom of the screen reads **PRESS <INCR> TO START**.

STEP 18

MD05F021

Select a forward gear and engine rpm that will maintain a steady speed above 2 MPH (3.22 KPA), release the clutch and press the **INCR** key when the front wheels touch the start line. the display will read ***WORKING*** and **PRESS <DECR> TO STOP**,

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STEP 19

MD05F022

Press the **DECR** key when the front wheels touch the finish line.

If successful, the **ICU** will calculate the new radar calibration and display ***COMPLETE***. Press the **PROG** key to save the new value and return to the **CONFIG ICU** options screen.

If unsuccessful, due to unsteady tractor speed or the **INCR** and **DECR** keys were not pressed at the proper time, the display will read ***FAILED***, Repeat Steps 16 through 19, or press **PROG** to exit the **RADAR CAL**.

STEP 20

MD05F005

Press the **DECR** key to highlight **EXIT**. Press the **PROG** key.

STEP 21

RD05F101

The **CONFIG MENU** is displayed.

STEP 22

RD05F101

Press the **INCR** key to highlight **EXIT**. Press the **PROG** key to exit tractor setup and return to normal operation.

STEP 23

If the programmable display reads **FAILED** at any time during the calibration process a condition has occurred which caused the calibration process to fail. Press the **PROG** key to exit the calibration.

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Controller Configuration

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

STEP 24

RD05F101

1. Enter the operation setup by pressing and holding the **PROG** key for 3 seconds within the first 10 seconds of turning the key switch to the ON position.

NOTE: *If any fault codes are recorded, they must be corrected before configuration is possible. See Fault Code Retrieval in this section.*

2. The display will read **CONFIG MENU**. This is the control selection menu. Pressing the **DECR** key will toggle through the list of controllers. The controllers will appear in this order (if equipped):
   ICU (Instrumentation Controller)
   TRANS (Transmission Controller)
   ARM (Armrest Controller)
   HITCH (Hitch Controller)
   AUX (Remote Hydraulic Controller)
   PTO (PTO Controller)

STEP 25

MD05F025

3. Press the **PROG** key with **ICU** on the display. The display will read **CONFIG ICU**, **1. Operator Setup**, **2. Controller Config**, and **3. Exit**. (Instrumentation operation setup). Press the **DECR** key to highlight **2. Controller Config** (Instrumentation controller configuration). Press the **PROG** key to enter the controller configuration menu.

NOTE: *If the selected controller does not exist or respond to communication, the display will read COMM ERR (communication error). The display can be cleared by pressing the **PROG** key.*

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Configuration/Calibration Mode

STEP 26

MD05F026

The display will read **CONFIG ICU**, **1. Tractor Model**, **2. Fuel Tank**, **3. Controller Config** and **4. Exit**. Use the **INCR** or **DECR** key to highlight **3. Controller Config** and press the **PROG** key.

NOTE: *The **1. Tractor Model** or **2. Fuel Tank** do not need to be configured unless the **ICU** has been replaced. Use the **INCR** and **DECR** key to highlight and the **PROG** key to view Tractor Models or fuel Tank.*

If the model number is not correct, use the Electronic Service Tool configuration window, tractor model select option to correct the model number.

The display will read **MANUAL** and **AUTO**. Use the **INCR** or **DECR** keys to select (highlight) either **MANUAL** or **AUTO**. The default format is MANUAL. If the MANUAL format is selected the controller menus must be toggled through and configured into the system manually. If the **AUTO** is selected, the instrumentation controller will check to see which other controllers are present on the tractor through the Case Data Bus.

STEP 27

MD05F174

Select between **MANUAL** or **AUTO** and press the **PROG** key. If **AUTO** was chosen, the system will go to Step 35. If **MANUAL** was chosen, the system will go to the next step.

STEP 28

MD05F027

The bottom of the display will read **SWCD** (Color Display not available at this time). Press the **INCR** or **DECR** key to select **NO** and press the **PROG** key. The system will go to the next step.

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STEP 29

MD05F029

The bottom of the display will read **ENGINE** (engine controller). Press the **INCR** or **DECR** key to toggle between **YES** and **NO**. Select your choice and press the **PROG** key. The system will go to the next step.

STEP 30

MD05F030

The bottom of the display will read **TRANS** (transmission controller). Press the **INCR** or **DECR** key to toggle between **YES** and **NO**. Select your choice, press the **PROG** key, The system will go to the next step.

STEP 31

MD05F176

The bottom of the display will read **ARM** (armrest controller). Press the **INCR** or **DECR** key to select **YES** and press the **PROG** key, The system will go to the next step.

STEP 32

MD05F031

The bottom of the display will read **HITCH** (hitch controller). Press the **INCR** or **DECR** key to toggle between **YES** and **NO**. Select your choice and press the **PROG** key, The system will go to the next step.

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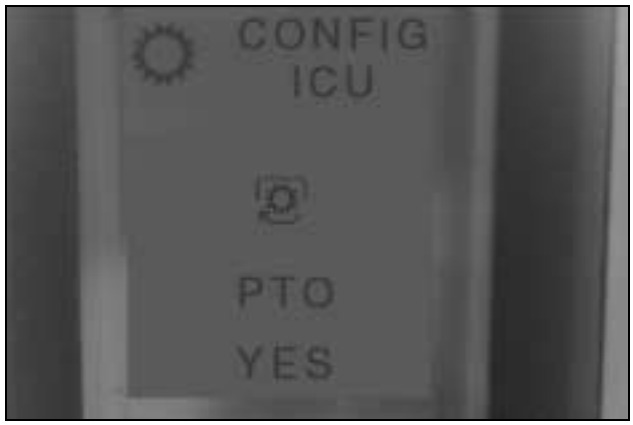
STEP 33

MD05F032

The bottom of the display will read **AUX** (remote hydraulic controller). Press the **INCR** or **DECR** key to toggle between **YES** and **NO**. Select your choice and press the **PROG** key, The system will go to the next step.

STEP 34



RD05G002

The bottom of the display will read **PTO** (PTO controller). Press the **INCR** or **DECR** key to toggle between **YES** and **NO**. Select your choice and press the **PROG** key, The system will go to the next step.

STEP 35

MD05F036

The bottom of the display will read **Tractor ECU** (Not available at this time). Press the **INCR** or **DECR** key to select **NO** and press the **PROG** key. The system will go to the next step.

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STEP 36

MD05F025

Press the **DECR** key. The display will read **CONFIG ICU, 1. Operator Setup**, **2. Controller Config, 3. Exit.** Use the **DECR** key to highlight **Exit**. Press the **PROG** key to exit instrumentation controller configuration.

STEP 37

RD05F101

The display will read **CONFIG MENU**. Press the **INCR** key. The display will read **Exit**. Press the **PROG** key to return to normal operation.

STEP 38

Cycle the key switch **OFF**, then **ON**. Check controllers for any fault codes. Erase the fault codes if any exist.

IMPORTANT: *The controller must be calibrated when moved from one tractor to another.*

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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 1

MD05F003

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

STEP 2

RD05F161

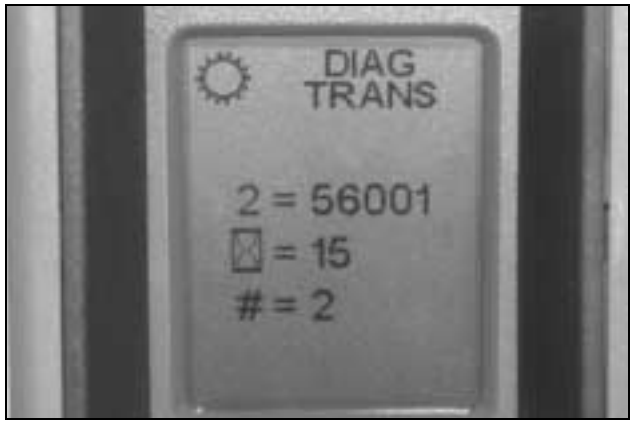
Use the **DECR** key to scroll through the different controllers: **ICU** (standard instrumentation) - **ENGINE** (engine) - **TRANS** (transmission) - **ARM** (armrest) - **HITCH** (three point hitch) - **AUX** (remote hydraulics) - **PTO** (PTO Controller).

STEP 3

MD05F040

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 4



MD05F041

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.

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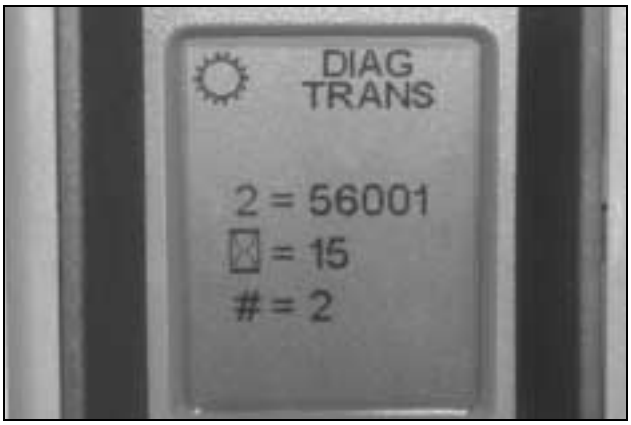
STEP 5



MD05F041

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

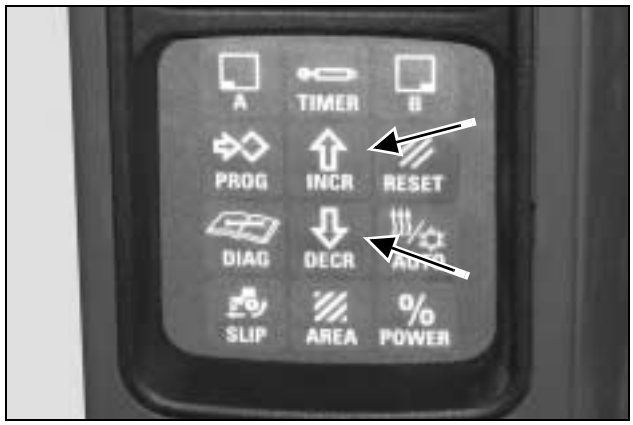
NOTE: ***All*** *the fault codes for that controller will be erased.*

STEP 6

RD05F163

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

STEP 7



MD05F003

Another controller can be selected at this time by using the **INCR** and **DECR** keys to scroll through the controller list as in Step 2.

STEP 8

RD05F164

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

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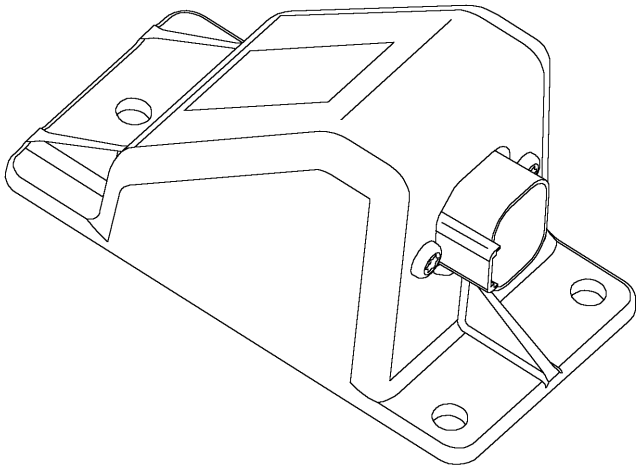
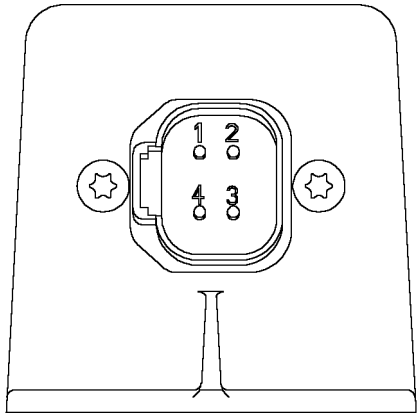
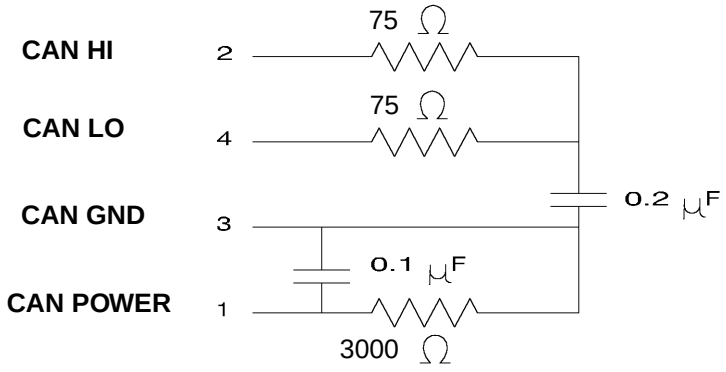
PASSIVE TERMINATOR BENCH TEST

The Tractor is equipped with two passive terminators. One is located on the engine by the engine controller and the other is in the cab behind the standard instrumentation controller. The passive terminators are used to stabilize the data bus system This test can be used in conjunction with data bus fault codes when it is desired to check passive terminators. To bench test an passive terminator, do the following:

1. Disconnect the terminator and remove it from the tractor.
2. Use a digital multimeter (CAS1559) for the following checks.
3. Measure the resistance between terminal 2 (can high) and 4 (can low). The resistance should be approximately 150 ohms.
4. Measure the resistance between terminal 1 (can power) and 3 (can ground). The resistance should be approximately 3000 ohms.
5. Next measure the resistance between terminals 2 and 1, 2 and 3 and 4 and 1, 4 and 3. After a momentary resistance reading the meter will show an open circuit, or OL (overload).
6. If the correct resistance readings are not measured the terminator must be replaced.







PASSIVE TERMINATOR

RI02E021, 22 and 23

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SYMPTOM BASED FAULTS - NO FAULT CODES
Instrumentation Display Will Not Illuminate When Key Is Turned On
No Fault Code

Meaning:
The INST controller (display) is not to be powered or has failed.

Possible failure mode:
1. Failed cab power relay - engine will run after starting.
2. Failed controller power relay - engine will stop after starting.
3. Failed key switch - engine will stop after starting.
4. Fuse #37 failed or circuit from fuse to controller pin 2 of connector CN2 failed open.
5. Poor ground supply to Display pin 4 of connector CN2.

Background:
The key switch activates the cab power relay and the controller relay when the key is placed in the start and run position. The cab power relay supplies battery power (switched power) to the controller relay. Both relays must be powered for the controllers to be powered.

NOTE: *Both the cab power relay and the controller relay must make a clicking sound when the key is turned on.*

Wiring information:
Instrumentation controller connector CN2-2<--->Fuse 37<--->241 (Controller relay) 241<--->138 (cab power relay)
240<--->unswitched power

Corrective action:

STEP 1 - Cycle key switch - (20 times)
Turn the front wiper on.
Turn the key switch on and off while monitoring the display and the front wiper, the display and front wiper must turn on and off everytime when the key is cycled.
-- OK - The display and front wiper turned on every time when key switch was turned on.
-- NOT OK - The wiper turned on but the display did not turn on when the key was turned on. Go to Step 4.
-- NOT OK - The display and the wiper did not turn on, go to Step 2.

STEP 2 - Check power to cab power relay
The cab power relay is located in the fuse compartment behind the operator seat.
Turn the key on, the relay should make a clicking sound.
-- OK - Relay clicks, but wiper did not turn on - Replace relay (failed contacts).
-- NOT OK - Relay did not click - Check power supply to relay. Go to Step 3.

STEP 3 - Check power and ground to the cab power relay
Check relay ground - correct if needed.
Turn key on.
Check for relay coil power at ring terminal 138 for switched power from the key switch.
-- OK - Replace relay
-- NOT OK - Failed key switch
No power to key switch
Failed wire from the key switch to relay

STEP 4 - Check fuse 37
With the key switch on the display will not illuminate.
Check fuse 37.
-- OK - Go to Step 5.
-- NOT OK - Replace fuse, If fuse fails when key is turned on, go to Step 9.

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STEP 5 - Check power at fuse 37

With the key switch on and the display not illuminate.
Remove fuse 37 and check for 12 volts.
-- OK - Go to Step 7.
-- NOT OK - Go to Step 6.

STEP 6 - Check controller relay

The controller relay is located in the fuse compartment behind the operator seat.
Check relay ground supply wire.
Turn key on.
Check for relay coil power at ring terminal 241 at the Cab power relay.
-- OK - Replace relay.
-- NOT OK - Failed wire from the controller relay to fuse 37.

STEP 7 - Check power and ground supply to the instrumentation controller

Install fuse 37.
Remove the instrumentation controller.
Turn the key on.
Check connector CN2, pin 2 for 12 volts.
-- NOT OK - Replace the wire between fuse 37 and the instrumentation controller connector CN2, pin 2.
-- OK - Go to Step 8.

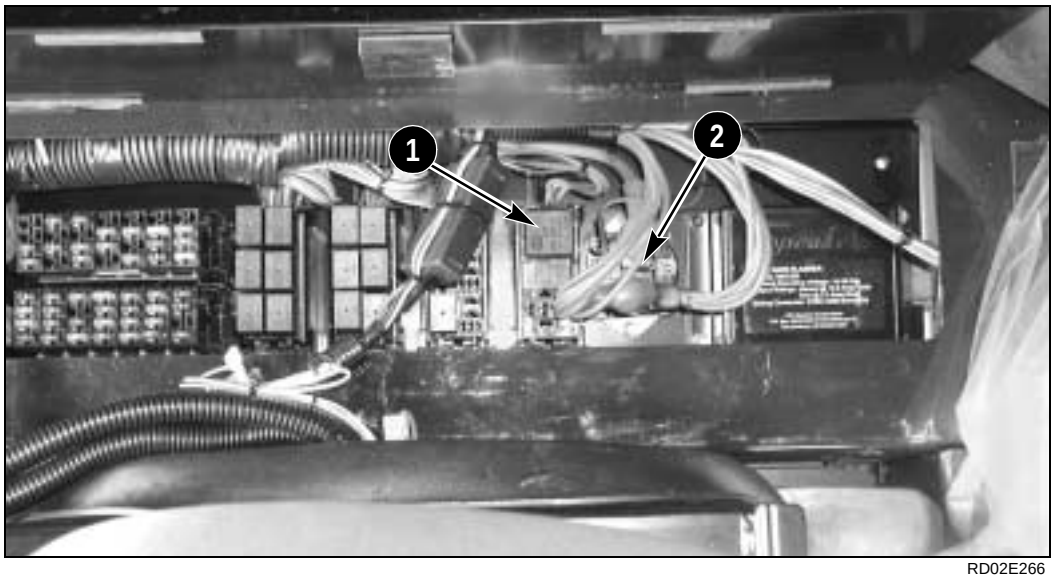
STEP 8 - Check the ground supply at connector CN2, pin 4

Check the ground supply at connector CN2, pin 4.
-- OK - Replace the instrumentation controller.
-- NOT OK - Correct grounding problem.

STEP 9 - Check the power supply to the instrumentation controller

Install fuse 37.
Remove the instrumentation controller.
Turn the key on.
Check connector CN2, pin 2 for 12 volts.
-- NOT OK - fuse fails, Replace the wire between fuse 37 and the instrumentation controller connector CN2, pin 2.
-- OK - Plug the instrumentation controller in, If fuse 37 fails replace the instrumentation controller.

NOTE: *If the problem is intermittent, one of the relays is starting to fail or has dirty contacts.*



RD02E266

Fuse/relay compartment (behind operator seat)

1. CONTROLLER RELAY 2. CAB POWER RELAY

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The Tractor Will Start But The Display Does Not Illuminate No Fault Code

Meaning:
The instrumentation controller (display) is not powered or has failed.

Possible failure mode:
1. Failed controller power relay - Engine will stop after starting.
2. Fuse #37 failed or circuit from fuse to controller pin 2 of connector CN2 failed open.
3. Poor ground supply to Display pin 4 of connector CN2.

Background:
The key switch activates the cab power relay and the controller relay when the key is placed in the start and run position. The cab power relay supplies battery power (switched power) to the controller relay. Both relays must be powered for the controllers to be powered.

NOTE: *Both the cab power relay and the controller relay must make a clicking sound when the key is turned on.*

Wiring information:
Instrumentation controller connector CN2, pin 2<-->fuse 37<--> 241 (Controller relay) 241 <--> 138 (cab power relay) 240 <--> unswitched power

Corrective action:

STEP 1 - Check fuse 37
With the key switch on and the display not illuminated.
Check fuse 37.
-- OK - Go to Step 4.
- -NOT OK - Replace fuse, If fuse fails when replaced go to Step 6.

STEP 2 - Check power at fuse 37
With the key switch on and the display not lit.
Check fuse 37.
-- OK - Go to Step 4.
-- NOT OK - Go to Step 3.

STEP 3 - Check controller relay
The controller relay is located in the fuse compartment behind the operator seat.
Check relay ground supply wire.
Turn key on.
Check for relay coil power at pin 85 at the controller relay.
-- OK - Replace relay.
-- NOT OK - Failed wire from the controller relay to fuse 30.

STEP 4 - Check the power supply to the instrumentation controller
Install fuse 37.
Remove the instrumentation controller.
Turn the key on.
Check connector CN2, pin 2 for 12 volts.
-- NOT OK - Replace the wire between fuse 37 and the instrumentation controller connector CN2, pin 2.
-- OK - Go to Step 5.

STEP 5 - Check the ground supply at connector CN2, pin 4
Check the ground supply at connector CN2, pin 4.
-- OK - Replace the instrumentation controller.
-- NOT OK - Correct grounding problem.

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STEP 6 - Check the power supply to the instrumentation controller

Install fuse 37.
Remove the instrumentation controller.
Turn the key on.
Check connector CN2, pin 2 for 12 volts.
-- NOT OK - fuse fails, replace the wire between fuse 37 and the instrumentation controller connector CN2, pin 2.
-- OK - Plug the instrumentation controller in, If fuse 37 fails replace the instrumentation controller.

NOTE: *If the problem is intermittent, the controller power relay is starting to fail or has dirty contacts.*

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STANDARD INSTRUMENTATION CONTROLLER FAULT CODES

NOTE: *Inputs that go out of range are considered in fault, and will be reported on the instrumentation display as INST with the fault code number. Faults occurring on inputs that the instrumentation is not configured for will not be reported as a fault*

FAULT CODE INST 1015
Seat Switch Stuck Closed

Cause:
The switch is located in the seat cushion. The seat switch closes when the seat is sat in and opens when the operator gets up. If the switch is closed for over 24 engine hours, this fault code will be recorded.

Possible failure mode:
1. Seat switch stuck closed.
2. Seat switch wiring circuit problems.

Solution:
Check the seat switch function.
Check the wiring from the instrumentation controller to the seat switch.

1. Check the seat switch function with the service tool. The seat switch status can be monitored through the monitor screen of the service tool.
   Click the button ‘CHANGE PARAMETER SELECTIONS.’
   When the ‘PARAMETER LIST’ screen shows up, select ‘SEAT OPERATOR PRESENT SW’ and add it to the ‘VIEW LIST.’
   Now you can monitor the function of the seat switch.
   Sit down and then stand up a few times.
   The seat switch should close when the seat is sat in and open when the operator gets up.
   If the status on the screen changes with the operator’s position, the seat switch is functioning OK. The fault code might be recorded for intermittent seat problems.
   If the status on the screen does not change with the operator’s position, there is a problem with the seat switch or their wiring.
   Go to the next Step.
2. Check the seat switch function
   A. Disconnect the seat switch at the connector C133 (located behind seat).
   B. Probe between pin 5 and pin 6 of connector C133. Seat switch must close when seat is sat in and opened when operator gets off the seat.

   If the seat switch does not function correctly, check for the following:
   A. Seat switch not located correctly in seat.
   B. Failed seat switch.
   C. If the seat switch does function correctly, go to the next Step.
3. Check the wiring from the instrumentation controller to the seat switch connector C133

There should be continuity from cavity 2 of connector CN1 to cavity 6 of connector C133.
There should be 12 VDC power supply at the cavity 5 of connector C133.

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

NOTE: *See schematic section 68 at the rear of this section.*

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FAULT CODE INST 5011
Engine Oil Pressure Sensor Signal Too Low

Cause:
The engine oil pressure sensor signal voltage is out of range low (the signal was below 0.25 volts for 1 second).

Possible failure modes:
1. Engine oil pressure sensor failed.
2. Engine oil pressure sensor wiring harness problems (open circuit, short to ground).
3. Instrument controller failure.

Solution
Check the engine oil pressure sensor resistance and the wiring from the instrumentation controller to the engine oil pressure sensor.

1. Validate the pressure sensor power supply.
   Open up the tractor hood and locate the engine oil pressure sensor.
   Disconnect connector C216 from the engine oil pressure sensor.
   Clean the connection. Clean the mating pin and connector. Inspect pin A, B, and C in the connector.
   Measure the voltage at the supply input, pin B. It must be 5 volts.
   If it is as specified, go to the next Step.
   If not, then check for 5 volts out of the instrument controller pin 8 at connector CN2.
   If there is not 5 volts at the controller, then pull pin 8 terminal out to determine if 5 volts is present on the controller pin when pin 8 wire is not connected.

NOTE: *Use the correct tool to remove pins from connectors.*

2. Check the sensor ground.
   Measure the continuity between pin A of connector C216 to the chassis ground.
   If there is good continuity (less than 1 ohm), go to the next step.
   If there is not good continuity, go to step 4.
3. Check the function of the engine oil pressure sensor.
   Validate that the sensor output voltage is greater than 0.25 volts at pin C of connector C216.
   If not, then replace the engine oil pressure sensor.
   If yes, then validate that output voltage is present at the instrument controller input pin 23 at connector CN1. If there is no voltage at the controller, then locate and repair an open circuit in the wire harness signal line.
4. Check the wiring from the engine oil pressure sensor connector C216 to connectors CN1 and CN2 at the instrument controller.
   There should be good continuity between pin A of C216 and the clean ground.
   There should be good continuity between pin B of C216 and pin 8 of connector CN2.
   There should be good continuity between pin C of C216 and pin 23 of connector CN1.
   If there is any open circuit, check the continuity from C216 to connectors CN1 and CN2 to locate the problem.

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

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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FAULT CODE INST 10031
Controller Memory Error

Cause:
Controller memory error - loss of valid engine hours EEPROM checksum.

Possible failure modes:
Memory defect or intermittent controller.

Solution:
1. When the valid engine hours are lost in the controller memory (EEPROM checksum), the controller will reset engine hour meter to 50000.0 hours to highlight the failure. It will continue counting the hours from that point.
2. Make sure the controller has a good connection (connector CN2) to the battery and is properly grounded. Shut down the tractor and restart.
3. Calibrate the instrumentation controller.
4. If the same fault appears again, replace the controller.

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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FAULT CODE INST 10032
Controller Memory Error

Cause:
Controller failure: vehicle configuration information lost.

Possible failure modes:
Memory defect or intermittent controller

Solution:
1. Make sure the controller has a good connection (connector CN2) to the battery and is properly grounded.
2. Calibrate the instrumentation controller. Clear the fault code. Shut down the tractor and restart
3. If the same fault code appears again, change the controller.

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

FAULT CODE INST 10033
Controller Memory Error

Cause:
Controller failure: customer configuration information lost. This is triggered once when either the tire or the English/ Metric setting is detected or lost.

Possible failure modes:
Memory defect or intermittent controller.

Solution:
1. Set English/metric setting to proper mode and set the tire radius accordingly.
2. Make sure the controller has a good connection (connector CN2) to the battery and is properly grounded.
3. Calibrate the instrumentation controller. Clear the fault code. Shut down the tractor and restart.
4. If the same fault code appears again, change the controller.

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

FAULT CODE INST 10034
Controller Memory Error

Cause:
Controller memory error: loss of valid fuel table information.

Possible failure modes:
1. Updated software without loading new fuel table.
2. Memory defect or intermittent controller.

Solution:
Use the service tool fuel update screen to load a new fuel table into the instrumentation controller. Clear the fault codes.

NOTE: *Updating software to a later version requires loading a new fuel table.*

Clear fault code. Shut down the tractor and restart. If the same fault appears again, make sure the controller has a good connection (connector CN2) to the battery and is properly grounded.

Clear the fault code. Shut down the tractor and restart. If problem persists, replace the controller.

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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FAULT CODE INST 10035
Controller Memory Error
Loss Of Valid Radar Configuration Information

Cause:
Controller memory error: loss of valid radar configuration information.

Possible failure modes:

1. Intermittent power supply or ground to controller.
2. Controller memory defect.

Solution:
Verify power and ground to the controller. Perform radar calibration per the operator's manual.

1. Make sure the controller has a good connection (connector CN2) to the battery and is properly grounded.
2. Perform the radar calibration for the instrumentation controller per the operator's manual.
3. Clear the fault code. Turn the key switch OFF, then ON. If the same fault code appears again, replace the instrumentation controller.

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FAULT CODE INST 11011
Fuel Level Sensor Signal Too Low

Cause:
Fuel level sensor signal voltage out of range low (The signal was below 0.125 volts for 1 second).

Possible failure mode:
1. Fuel level sensor failure.
2. Fuel level sensor wiring harness problems.
3. Instrument controller failure.

Solution:
Check the fuel sensor resistance and the wiring from the instrumentation controller to the fuel level sensor.

1. Test the resistance of the fuel level sensor: Locate the fuel level sensor on the top of the fuel tank.
   Disconnect connector C066 from the fuel level sensor. Clean the connection. Clean the mating pin and connector. Inspect pin A,B, and C in the connector.
   Clean the connection. Clean the mating pin and the connector.
   Validate that the sensor is getting 8 volts at its power supply input at pin A.
   If there is 8 volts, go to step 2.
   If not, then check for 8 volts out of the instrument controller pin 21 at connector CN2.
   If there is not 8 volts at the controller, pull pin 8 terminal out to determine if 8 volts is present on the controller pin when pin wire 8 is not connected.

NOTE: *Use the correct tool to remove pins from connectors.*

   If 8 volts is present, then go to step 4 and check for shorts to ground in the harness.
   If there is not 8 volts, then replace the instrument controller.

2. Check the sensor ground.
   Measure the continuity between pin C of connector C066 and the chassis ground. If there is good continuity (less than 1 ohm), go to the next step.
   If there is not good continuity, go to step 4.

3. Check the function of the fuel level sensor.
   Validate that the sensor output voltage is greater that 0.125 volts at pin B of connector C066.
   The power supply to the fuel sensor is 8VDC from cavity 22 of the instrument controller connector CN1. When the fuel tank is empty, the fuel level signal from pin B should be around 0.25 V. When the fuel tank is full, the fuel level signal from pin B should be around 4.50 V. A straightforward way of testing the fuel sender is to put the sender into a tall oil container and watch the voltage change when the sender is at different depths.
   If the signal is out of range, replace the fuel level sender.
   If the signal is within range, validate that the voltage signal is present at the instrument controller input pin 21 at connector CN2.
   If no voltage is present at the controller, locate and repair an open circuit in the wire harness signal line.
4. Check the wiring from the fuel level sensor connector C066 to connector CN2 at the instrument controller. There should be 8 VDC power at supply pin A of C066 when the tractor key is in the ON position. There should be good continuity between pin C of C066 and the clean ground.
   There should be good continuity between pin B of connector C066 and pin 21 of connector CN2.
   There should be good continuity between pin A of connector C066 and pin 22 of connector CN1. If there is any open circuit, check the continuity from connector C066 to C060 to CN1 to locate the problem.

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

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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FAULT CODE INST 12011
Communication Lost With Armrest Controller

Cause:
Communication lost between the instrumentation controller and the armrest controller.

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

Solution:
Make sure both the armrest controller and the instrument controller function properly. Check the data bus connections.
1. Check the function of the Armrest controller.
   A. Make sure the connector C137 is plugged in to the armrest controller.
   B. Check the LED lamp on the armrest controller.
   LED lamp on - failed controller, replace the controller.
   LED lamp flashing - controller is OK.
   LED lamp off - no power to the controller, check the power supply and its fuse.

NOTE: *The LED lamp for the armrest controller is located on the controller circuit board. It can be seen by looking through the opening next to connector C137 from the rear of the armrest.*

2. Check the function of the Instrument controller.
   A. If there is no display and no back light on the tractor instrumentation, it is most likely that there is no power to the controller. Check the power supply, its fuse and the ground to the controller. Make sure the connector (CN2) to the instrumentation 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 most likely the instrument controller has failed. Replace the instrument controller.
   C. If the display is normal, go to number 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 good.
   B. Turn the tractor key switch 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 the Data Bus passive terminators.
   The following checks are basically looking into one end of the data bus and checking the terminator at the other end.
   A. Check the passive terminator at the rear of the tractor. Disconnect the terminator at connector C175. With the key switch in the ON position, measure the voltage on the wires connected to C175.
      At pin 1, the red wire should have 12 volts battery voltage.
      At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
      If the above checks are ok, it means the front terminator and data bus wiring is OK. If the voltage is not as specified, go to the next check.
   B. Check the passive terminator at the front of the tractor.
      Connect the rear terminator and disconnect the front terminator at connector C205.
      At pin 1, the red wire should have 12 volts battery voltage.
      At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
      If the above checks are OK, it means the rear terminator and data bus wiring is OK. If not, check for bad connections and damaged wires along the data bus.
      If the above checks are OK, it means the rear terminator and data bus wiring is OK. If not, check for bad connections and damaged wires along the data bus.

NOTE: *When there is a bad connection along the Data Bus wiring, this fault code will be accompanied by multiple fault codes such as TRANS 12011 and 12031, PTO 54120 and 54140, INST 12011 and 12031 and AUX 12011.*
NOTE: *Always inspect connector ends for damaged, bent or dislocated pins when troubleshooting.*
NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*
NOTE: *Also see the Data Bus schematic foldout at the end of this section.*

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FAULT CODE INST 12021
Communication Lost With Remote Hydraulic Controller

Meaning:
Communication lost between the instrumentation and the remote hydraulic controller.

Possible failure modes:
1. Bad connection between the instrumentation and remote hydraulic controller.
2. Controller failure.

Solution:
Make sure both the instrument controller and the remote hydraulic controller are functioning correctly.
Check the Data Bus connections.

1. Check the function of the Remote hydraulic controller.
   A. Make sure connector (C055) is plugged in to the remote hydraulic controller.
   B. Check the LED lamp on the remote hydraulic controller.
   LED lamp on - failed controller, replace the controller.
   LED lamp flashing - controller is OK.
   LED off - no power to the controller, check the 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 most likely that there is no power to the controller. Check the power supply, its fuse and the ground to the controller. Make sure the connector (CN2) to the instrumentation 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 most likely the instrument controller has failed. Replace the instrument controller.
   C. If the display is normal, go to number 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 good.
   B. Turn the tractor key switch 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 the Data Bus passive terminators.
   The following checks are basically looking into one end of the data bus and checking the terminator at the other end.
   A. Check the passive terminator at the rear of the tractor. Disconnect the terminator at connector C175. With the key switch in the ON position, measure the voltage on the wires connected to C175.
   At pin 1, the red wire should have 12 volts battery voltage.
   At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
   At pin 3, there should be continuity from pin 3 to the clean ground.
   At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
   If the above checks are OK, it means the front terminator and data bus wiring is OK. If the voltage is not as specified, go to the next check.
   B. Check the passive terminator at the front of the tractor.
   Connect the rear terminator and disconnect the front terminator at connector C205.
   At pin 1, the red wire should have 12 volts battery voltage.
   At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
   At pin 3, there should be continuity from pin 3 to the clean ground.
   At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
   If the above checks are OK, it means the rear terminator and data bus wiring is OK. If not, check for bad connections and damaged wires along the data bus.

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

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

NOTE: *See schematic sections 24, 25 and 26 and sections 53 and 54 at the rear of this section.*

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

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FAULT CODE INST 12031
Communication Lost With Hitch Controller

Cause:
Communication is lost between the instrumentation controller and the hitch controller.

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

Solution:
Make sure both the hitch controller and the instrumentation controller are functioning correctly.
Check the Data Bus connections.

1. Check the function of the hitch controller.
   A. Make sure the connector (C059) to the hitch controller is plugged in.
   B. Check the LED lamp on the hitch controller.
   LED lamp on - failed controller, replace the controller.
   LED lamp flashing - controller is OK.
   LED off - no power to the controller, check the 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 most likely that there is no power to the controller. Check the power supply, its fuse and the ground to the controller. Make sure the connector (CN2) to the instrumentation 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 most likely the instrument controller has failed. Replace the instrument controller.
   C. If the display is normal, go to number 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 good.
   B. Turn the tractor key switch 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 the Data Bus passive terminators.
   The following checks are basically looking into one end of the data bus and checking the terminator at the other end.
   A. Check the passive terminator at the rear of the tractor. Disconnect the terminator at connector C175. With the key switch in the ON position, measure the voltage on the wires connected to C175.
   At pin 1, the red wire should have 12 volts battery voltage.
   At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
   At pin 3, there should be continuity from pin 3 to the clean ground.
   At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
   If the above checks are OK, it means the front terminator and data bus wiring is OK. If the voltage is not as specified, go to the next check.
   B. Check the passive terminator at the front of the tractor.
   Connect the rear terminator and disconnect the front terminator at connector C205.
   At pin 1, the red wire should have 12 volts battery voltage.
   At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
   At pin 3, there should be continuity from pin 3 to the clean ground.
   At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
   If the above checks are OK, it means the rear terminator and data bus wiring is OK. If not, check for bad connections and damaged wires along the data bus.

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

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

NOTE: *See schematic sections 24, 25 and 26 and 51 and 52 at the rear of this section.*

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

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FAULT CODE INST 12043
Communication Lost With Data Bus and all Other Controllers

Cause:
The instrumentation 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.
3. Passive terminator failed.

Solution:
Make sure the instrumentation controller is properly connected with the Data Bus.
Check the Data Bus function.

1. Check the function of the instrument controller.
   A. If there is no display and no back light on the tractor instrumentation, it is most likely that there is no power to the controller. Check the power supply, its fuse and the ground to the controller. Make sure the connector (CN2) to the instrumentation 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 most likely the instrument controller has failed. Replace the instrument controller.
   C. If the display is normal, go to number 2.
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 good.
   B. Turn the tractor key switch 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 the Data Bus passive terminators.
   The following checks are basically looking into one end of the data bus and checking the terminator at the other end.
   A. Check the passive terminator at the rear of the tractor. Disconnect the terminator at connector C175. With the key switch in the ON position, measure the voltage on the wires connected to C175.
      At pin 1, the red wire should have 12 volts battery voltage.
      At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
      If the above checks are OK, it means the front terminator and data bus wiring is OK. If the voltage is not as specified, go to the next check.
   B. Check the passive terminator at the front of the tractor.
      Connect the rear terminator and disconnect the front terminator at connector C205.
      At pin 1, the red wire should have 12 volts battery voltage.
      At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
      If the above checks are OK, it means the rear terminator and data bus wiring is OK. If not, check for bad connections and damaged wires along the data bus.

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

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

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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

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FAULT CODE INST 12051
Communication Lost With PTO Controller

Cause:
Communication lost between the instrumentation controller and the PTO controller.

Possible failure modes:
1. Bad connection between the instrumentation and PTO controller.
2. Controller failure.

Solution:
Make sure both the PTO controller and the instrumentation controller are functioning properly.
Check the Data Bus connections.

1. Check the function of the PTO controller.
   Make sure the connector (C056) to the PTO controller is plugged in.
   Check the LED lamp on the PTO controller.
   LED lamp on - failed controller, replace the controller.
   LED lamp flashing - controller is OK.
   LED lamp off - no power to controller, check the 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 most likely that there is no power to the controller. Check the power supply, its fuse and the ground to the controller. Make sure the connector (CN2) to the instrumentation 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 most likely the instrument controller has failed. Replace the instrument controller.
   C. If the display is normal, go to number 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 good.
   B. Turn the tractor key switch 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 the Data Bus passive terminators.
   The following checks are done looking into one end of the data bus and checking the terminator at the other end:
   A. Check the passive terminator at the rear of the tractor. Disconnect the terminator at connector C175. With the key switch in the ON position, measure the voltage on the wires connected to C175.
      At pin 1, the red wire should have 12 volts battery voltage.
      At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
      If the above checks are OK, it means the front terminator and data bus wiring is OK. If the voltage is not as specified, go to the next check.
   B. Check the passive terminator at the front of the tractor.
      Connect the rear terminator and disconnect the front terminator at connector C205.
      At pin 1, the red wire should have 12 volts battery voltage.
      At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
      If the above checks are OK, it means the rear terminator and data bus wiring is OK. If not, check for bad connections and damaged wires along the data bus.

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

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

NOTE: *See schematic sections 24, 25 and 26 and 44 and 45 at the rear of this section.*

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

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FAULT CODE INST 12071 Communication Lost With Transmission Controller

Cause:
Comminution is lost between the instrumentation controller and the transmission controller.

Possible failure mode:
1. Bad connection between instrumentation controller and transmission controller.
2. Controller failure.

Solution:
Make sure both the transmission controller and the instrumentation controller are functioning properly.
Check the Data Bus connections.

1. Check the function of the transmission controller.
   A. Make sure connector C027 is plugged in to the transmission controller.
   B. Check the LED lamp on the transmission controller.
   LED lamp on - failed controller, replace the controller.
   LED lamp flashing - controller is OK.
   LED lamp off - no power to the controller, check the 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 most likely that there is no power to the controller. Check the power supply, its fuse and the ground to the controller. Make sure the connector (CN2) to the instrumentation 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 most likely the instrument controller has failed. Replace the instrument controller.
   C. If the display is normal, go to number 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 good.
   B. Turn the tractor key switch 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 the Data Bus passive terminators.
   The following checks are basically looking into one end of the data bus and checking the terminator at the other end.
   A. Check the passive terminator at the rear of the tractor. Disconnect the terminator at connector C175. With the key switch in the ON position, measure the voltage on the wires connected to C175.
   At pin 1, the red wire should have 12 volts battery voltage.
   At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
   At pin 3, there should be continuity from pin 3 to the clean ground.
   At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
   If the above checks are OK, it means the front terminator and data bus wiring is OK. If the voltage is not as specified, go to the next check.
   B. Check the passive terminator at the front of the tractor.
   Connect the rear terminator and disconnect the front terminator at connector C205.
   At pin 1, the red wire should have 12 volts battery voltage.
   At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
   At pin 3, there should be continuity from pin 3 to the clean ground.
   At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
   If the above checks are OK, it means the rear terminator and data bus wiring is OK. If not, check for bad connections and damaged wires along the data bus.

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

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

NOTE: *See schematic sections 24, 25 and 26 and 37 through 40 at the rear of this section.*

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

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FAULT CODE INST 12091
Communication Lost With Engine Controller

Cause:
Communication lost between the instrumentation controller and the engine controller.

Possible failure modes:
1. Bad connection between the instrumentation controller and the engine controller.
2. Controller failure.

Solution:
Make sure both the engine controller and the instrumentation controller are functioning properly.
Check the Data Bus connections.

1. Check the function of the engine controller.
   A. Make sure the connector to the engine controller is plugged in and the Data Bus connectors are all properly connected.
   B. If the engine controller is correctly connected with the Data Bus, then the fuel lift pump will buzz when the key switch is turned to the ON position. If the fuel lift pump does not make noise with the key on, replace the engine controller.

NOTE: *Refer to the engine controller troubleshooting procedures.*

2. Check the function of the instrument controller.
   A. If there is no display and no back light on the tractor instrumentation, it is most likely that there is no power to the controller. Check the power supply, its fuse and the ground to the controller. Make sure the connector (CN2) to the instrumentation 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 most likely the instrument controller has failed. Replace the instrument controller.
   C. If the display is normal, go to number 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 good.
   B. Turn the tractor key switch 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 the Data Bus passive terminators.
   The following checks are basically looking into one end of the data bus and checking the terminator at the other end.
   A. Check the passive terminator at the rear of the tractor. Disconnect the terminator at connector C175. With the key switch in the ON position, measure the voltage on the wires connected to C175.
      At pin 1, the red wire should have 12 volts battery voltage.
      At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
      If the above checks are OK, it means the front terminator and data bus wiring is OK. If the voltage is not as specified, go to the next check.
   B. Check the passive terminator at the front of the tractor.
      Connect the rear terminator and disconnect the front terminator at connector C205.
      At pin 1, the red wire should have 12 volts battery voltage.
      At pin 2, the yellow wire should read 2.5 to 4 volts (2.5 volts nominally).
      At pin 3, there should be continuity from pin 3 to the clean ground.
      At pin 4, the green wire should have 1 to 2.5 volts (2.5 volts nominally).
      If the above checks are OK, it means the rear terminator and data bus wiring is OK. If not, check for bad connections and damaged wires along the data bus.

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

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

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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

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FAULT CODE INST 13011
Engine Coolant Temperature Sensor Signal Too Low

Cause:
Engine coolant temperature sensor voltage out of range low.

Possible failure modes:
1. Engine coolant temperature sensor failed.
2. Engine coolant temperature sensor wiring harness problems (short to ground).
3. Instrument controller failure.

Solution:
Check the engine coolant temperature sensor resistance, the instrumentation controller and the wiring to the engine coolant temperature sensor.

1. Test the resistance of the engine coolant temperature sensor.
   Open up the tractor hood and locate the engine coolant temperature sensor.
   Disconnect connector C215 from the engine coolant temperature sensor.
   Inspect the connector and clean the connection.
   Measure the sensor resistance between the connection and the chassis ground as shown in the table below.

Temp Deg F	Ohms
0	24K
10	18K
50	5.5K
70	3.3K
90	2K
110	1.3K
130	835

   If the resistance is not as specified, replace the engine coolant temperature sensor.
   If it is as specified, go to the next Step.
2. Check the wiring from the engine coolant temperature sensor to connectors CN1 and CN2 at the instrumentation controller.
   The power supply at the engine coolant temperature sensor connector should be about 5 VDC when the tractor key is in the ‘ON’ position.
   There should be good continuity from the engine coolant temperature sensor connector C215A to the cavity 5 of C060 and then to the cavity 20 of CN1.
   Check for an open circuit or short to ground.

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

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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FAULT CODE INST 13012
Engine Coolant Temperature Sensor Signal Too High

Cause:
Engine coolant temperature sensor voltage out of range high.

Possible failure modes:
1. Engine coolant temperature sensor failed.
2. Engine coolant temperature sensor wiring harness problems (open circuit, short to power).
3. Instrument controller failure.

Solution:
Check the engine coolant temperature sensor resistance, the instrumentation controller and the wiring to the engine coolant temperature sensor.

1. Test the resistance of the engine coolant temperature sensor.
   Open up the tractor hood and locate the engine coolant temperature sensor.
   Disconnect connector C215 from the engine coolant temperature sensor.
   Inspect the connector. Clean the connection.
   Measure the sensor resistance between the connection and the chassis ground as shown in the table below.

Temp Deg F	Ohms
0	24K
10	18K
50	5.5K
70	3.3K
90	2K
110	1.3K
130	835

   If the resistance is not as specified, replace the engine coolant temperature sensor.
   If it is as specified, go to the next Step.

2. Check the wiring from the engine coolant temperature sensor to connectors CN1 and CN2 at the instrumentation controller.
   The power supply at the engine coolant temperature sensor connector should be about 5 VDC when the tractor key is in the ‘RUN’ position.
   There should be good continuity from the engine coolant temperature sensor connector C215A to the cavity 5 of C060 and then to the cavity 20 of CN1.
   Check for an open circuit and shortage to power.

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

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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FAULT CODE INST 13021
Transmission Oil Temperature Sensor Signal Too Low

Cause:
Transmission oil temperature sensor voltage out of range low.

Possible failure modes:
1. Transmission oil temperature sensor failed.
2. Transmission oil temperature sensor wiring harness problems (short to ground).
3. Instrument controller failure.

Solution:
Check the transmission oil temperature sensor resistance, the instrumentation controller and the wiring from the instrumentation controller to the transmission oil temperature sensor.

1. Test the resistance of the transmission oil temperature sensor
   Locate the transmission oil temperature sensor at the transmission oil filter.
   Disconnect connector C089 from the transmission oil temperature sensor.
   Inspect the connector. Clean the connection.
   Measure the sensor resistance between the connection and the chassis ground as shown in the table below.

Temp Deg F	Ohms
0	24K
10	18K
50	5.5K
70	3.3K
90	2K
110	1.3K
130	835

   If the resistance is not as specified, replace the transmission oil temperature sensor.
   If it is as specified, go to the next Step.
2. Check the wiring from the transmission oil temperature sensor C89 pin 1 to connector C60 pin 22 to connector CN1 pin 24 at the instrumentation controller.
   The power supply at the transmission oil temperature sensor connector should be about 5 VDC when the tractor key is in the ‘ON’ position.
   There should be good continuity from the transmission oil temperature sensor connector to the cavity 4 of C060 and then to the cavity 10 of CN2.
   Check for an open circuit or short to the ground.

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

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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FAULT CODE INST 13022
Transmission Oil Temperature Sensor Signal Too High

Cause:
Transmission oil temperature sensor voltage out of range high.

Possible failure modes:
1. Transmission oil temperature sensor failed.
2. Transmission oil temperature sensor wiring harness problems (open circuit, short to power).
3. Instrument controller failure.

Solution:
Check the transmission oil temperature sensor resistance, the instrumentation controller and the wiring from the instrumentation controller to the transmission oil temperature sensor.

1. Test the resistance of the transmission oil temperature sensor.
   Locate the transmission oil temperature sensor at the transmission oil filter.
   Disconnect connector C089 from the transmission oil temperature sensor.
   Inspect the connector. Clean the connection.
   Measure the sensor resistance between the connection and the chassis ground as shown in the table below.

Temp Deg F	Ohms
0	24K
10	18K
50	5.5K
70	3.3K
90	2K
110	1.3K
130	835

   If the resistance is not as specified, replace the transmission oil temperature sensor.
   If it is as specified, go to the next Step.

2. Check the wiring from the transmission oil temperature sensor C89 pin 1 to connector C60 pin 22 to connector CN1, pin 24 at the instrumentation controller.
   The power supply at the transmission oil temperature sensor connector should be about 5 VDC when the tractor key is in the ‘ON’ position.
   There should be good continuity from the transmission oil temperature sensor connector to the cavity 22 of C060 and then to the cavity 10 of CN2.
   Check for an open circuit or short to the ground.

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

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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FAULT CODE INST 13044
Short is Detected as Fuel Shutoff Relay is Latched
(Mechanical Engine Only)

Cause:
When fuel shut-off is latched, greater than 500 milliamp current draw was sensed at fuel relay solenoid Pin 13, connector CN2 on instrument cluster. This fault code may be generated during a Level 1 critical warning for very high engine intake air to air temperature, very high engine coolant temperature , very low engine oil pressure, or very high transmission oil temperature.

Possible failure modes:
1. Possible short circuit in Wire 602(W) beteween Conector CN2, pin 13 and fuel shutoff relay pin 2.
2. Defective fuel shutoff relay.

Solution:

1. Check for short circuit in wire 602(W) from connector CN2, pin 13 to connector 60M, pin 14, to connector 333F, pin 8, to connector 7M, pin B, to fuel shutoff relay, pin 2.
2. Replace fuel shutoff relay with known good relay.

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

NOTE: *See schematic sections 19 through 24 at the rear of this section.*

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FAULT CODE INST 13051
Air To Air Intake Temperature Sensor Signal Too Low

Cause:
Air to air intake temperature sensor voltage out of range low.

Possible failure modes:
1. Air to air intake oil temperature sensor failed.
2. Air to air intake oil temperature sensor wiring harness problems (short to ground).
3. Instrument controller failure.

Solution:
Check the air to air intake temperature sensor resistance, the instrumentation controller and the wiring from the instrumentation controller to the air to air intake temperature sensor.

1. Test the resistance of the air to air intake temperature sensor.
   Open the tractor hood and locate the air to air intake temperature sensor.
   Disconnect connector C075 from the air to air intake temperature sensor.
   Inspect pin A and B in the connector. Clean the connection. Clean the mating pin and the connector.
   Use the table below and measure the sensor resistance between pin A and pin B.

Temp Deg C	Ohms
0	32650
5	25390
10	19900
15	15710
20	12940
25	1000
30	8057

   If the resistance is not as specified, replace the air to air intake temperature sensor.
   If it is as specified, go to the next Step.

2. Check the wiring from the air intake temperature sensor to connectors CN1 and CN2 at the instrumentation controller.
   The power supply at the pin A of the air to air intake temperature sensor connector should be about 5 VDC when the tractor key is in the ‘ON’ position.
   There should be good continuity from pin A of C075 to pin 8 of connector C334 to cavity 26 of connector C060 and then to cavity 21 of connector CN1.
   There should be good continuity between pin B of C075 and the clean ground.
   Check for open circuit and shortage to ground.

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

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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FAULT CODE INST 13052
Air To Air Intake Temperature Sensor Signal Too High

Cause:
Air to air intake temperature sensor voltage out of range high.

Possible failure modes:
1. Air to air intake oil temperature sensor failed.
2. Air to air intake oil temperature sensor wiring harness problems (open circuit, short to power).
3. .Instrument controller failure.

Solution:
Check the air to air intake temperature sensor resistance, the instrumentation controller and the wiring from the instrument controller to the air to air intake temperature sensor.

1. Test the resistance of the air to air intake temperature sensor.
   Open the tractor hood and locate the air to air intake temperature sensor.
   Disconnect connector C075 from the air to air intake temperature sensor.
   Inspect pin A and B in the connector. Clean the connection. Clean the mating pin and the connector.
   Use the table below and measure the sensor resistance between pin A and pin B.

Temp Deg C	Ohms
0	32650
5	25390
10	19900
15	15710
20	12940
25	1000
30	8057

   If the resistance is not as specified, replace the air to air intake temperature sensor.
   If it is as specified, go to the next Step.
2. Check the wiring from the air intake temperature sensor to connectors CN1 and CN2 at the instrumentation controller.
   The power supply at the pin A of the air to air intake temperature sensor connector should be about 5 VDC when the tractor key is in the ‘ON’ position.
   There should be good continuity from pin A of C075 to pin 8 of connector C334 to cavity 26 of connector C060 and then to cavity 21 of connector CN1.
   There should be good continuity between pin B of C075 and the clean ground.
   Check for open circuit and shortage to ground.

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

NOTE: *See schematic sections 24, 25 and 26 at the rear of this section.*

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FAULT CODE INST 53005
Engine Shutdown activated by ICU2 Controller

Causec
This fault code is generated by the instrument cluster due to a Level 1 Critical Warning. The Instrument Cluster signaled very high engine intake air to air temperature, very high engine coolant temperature, very low engine oil pressure or very high transmission oil temperature.

Possible failure modes:
1. Very High Engine Coolant Temperature
2. Very Low Engine Oil Pressure
3. Very High Engine Intake Air to Air Temperature
4. Very High Transmission Oil Temperature

Solution:
This fault code is recorded each time a Level 1 Critical Warning automatic engine shutdown has been activated.

1. Shut the tractor engine OFF immediately and check coolant level or radiator for blockage or other cause.
2. Shut the tractor engine OFF immediately and check oil level or other cause.
3. Shut the tractor engine OFF immediately and check the heat exchanger for blockage.
4. Shut the tractor engine OFF immediately and check for blocked cooler or other cause.

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ARMREST CONTROLLER CALIBRATION

General Information

NOTE: *The standard instrumentation controller must be calibrated before the armrest controller is calibrated.*

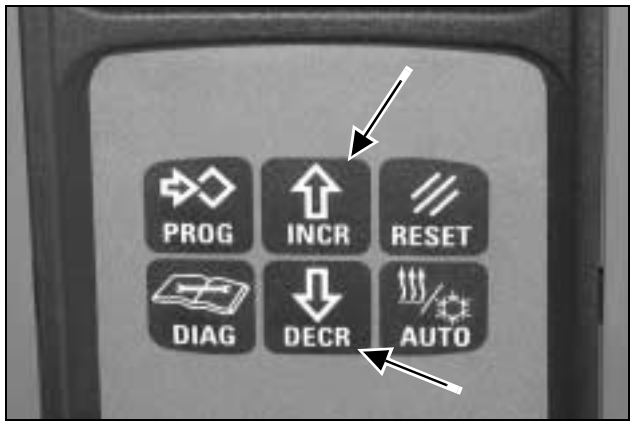
The armrest controller is located in the right hand armrest of the operators seat. The controller monitors the switches and potentiometers which are located in the armrest and then broadcasts their status over the Tractor Data Bus. (Except the front and rear differential lock switches and the PTO switch. These switches are wired directly to relays.) The other controllers on the tractor obtain this information from the TDB.

Armrest controller calibration is performed through the programmable display on the standard instrumentation.

MD05F002

There are a five possible main menus that can be cycled through. Only those menus that the standard instrumentation controller is configured for will appear on the display. The possible menus are:

1. **HITCH** - This menu is for the calibration of the hitch position command potentiometer.
2. **THROTTLE** - This menu calibrates the hand throttle lever potentiometer voltage for high and low idle.
3. **AUX FLOW** - This menu calibrates the flow potentiometers for high and low flow.
4. **AUX LEVER** - (Remote hydraulic valve) This menu is used to tell the controller how many remote hydraulic valves are present on the tractor, and to record the voltage for the extend and retract position for each of the valve control levers.
5. **ARM MFD** - This menu calibrates the flow potentiometers for high and low flow.
6. **ARM TRANS** - This menu calibrates the flow potentiometers for high and low flow.
7. **VIEW** - This menu is used to see what version of software is currently installed.
8. **EXIT** - Used to exit armrest controller calibration.



MD05F183

STANDARD

MD05F003

DELUXE

The **INCR** and **DECR** keys are used to toggle between these menus.

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Entering Armrest Calibration

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

To get to the armrest controller calibration main menu, do the following:

STEP 1

RD05F101

Turn the keys switch to the **ON** position. Push the program key and hold for two seconds within the first ten seconds of turning on the key switch. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

STEP 2

RD05F143

Press the **DECR** key until **ARM** is highlighted. Press the **PROG** key to enter the programing menus.

NOTE: *If not equipped with a hitch, go to Step 13.*

Hitch Menu

STEP 3

MD05F097

Select the calibration option for the hitch control lever (if equipped). When the display reads **ARM HITCH**, press the **PROG** key.

STEP 4

MD05F098

MD05F099

The display will read **H Pos Up**. Move the hitch position lever to the full up position. An asterisk (*) will appear on the display when the potentiometer is in a valid range. Press the **PROG** key to record the voltage.

NOTE: *Do not go to the transport lock position.*

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STEP 5

MD05F100

MD05F101

Press the PROG key. The display will read **H Pos Dn**. Move the hitch position lever to the full down position. An asterisk (*) will appear in the display when the potentiometer is in a valid range. Press the **PROG** key to record the voltage.

NOTE: *If either the up or down position was not valid, and the asterisk did not appear in the display, the display will read cal failed and this calibration option will abort. A problem will have to be corrected before calibration will be possible.*

STEP 6

RD05F189

MD05F102

The display will now read **Draft** or **No Draft**. There must be a hitch load command potentiometer in the armrest controller to select **Draft**. Select **No Draft** and the hitch will be configured as a position only hitch. The hitch calibration option is now complete.

Press the **PROG** key. The display will read **ARM HITCH**. To exit the armrest calibration go to step 29. Press the **DECR** key and go to the next step to continue with armrest calibration.

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Throttle Menu

STEP 7

MD05F103

Select the calibration option for throttle lever. When the display reads **ARM THROTTLE,** press the **PROG** key.

STEP 8

MD05F104

The display will read **hi idle**. Move the hand throttle lever to the high idle position. An asterisk (*) will appear on the display when the potentiometer is in a valid range. Press the **PROG** key to record the voltage.

STEP 9

MD05F105

The display will read **lo idle**. Move the throttle lever to the low idle. An asterisk (*) will appear in the display when the potentiometer is in a valid range. Press the *PROG* key to record the voltage. The display will now read **ARM THROTTLE**. To exit the armrest calibration, go to Step 29. Press the **DECR** key and go to the next step to continue with the armrest calibration.

NOTE: *If either the high or low idle position was not valid, and the asterisk did not appear in the display, the display will read cal failed and this calibration option will abort. The problem will have to be corrected before calibration will be possible.*

Remote Valve Menu

STEP 10

MD05F106

Select the calibration option for the remote hydraulic flow controls. When the display reads **ARM AUX FLOW** press the **PROG** key.

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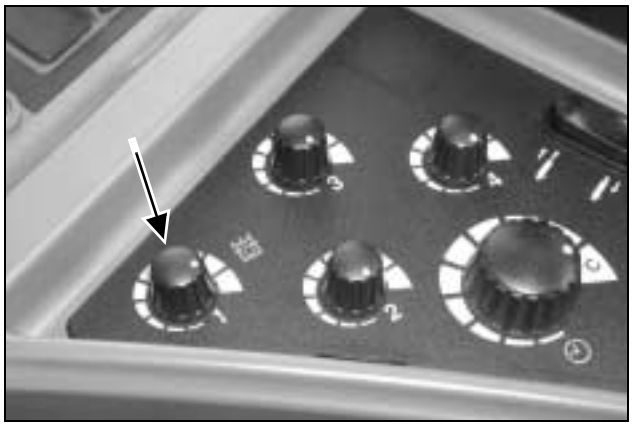
STEP 11

RD05F145

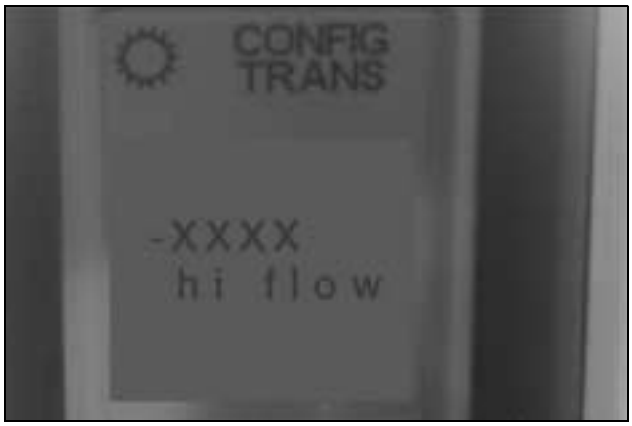
The display will read **-XXXX lo flow**.



MD05F107

Turn the **#1 flow potentiometer** completely counterclockwise until the **1** appears in the first **X** position of the display. Press the **PROG** key.

STEP 12



RD05F188.

The display will read **-XXXX hi flow**. Turn the #1 flow potentiometer completely clockwise until the **1** appears in the first **-** position of the display. Press the PROG key.

STEP 13

The screen reads, **ARM AUX FLOW**. Press the **DECR** key to select **AUX ARM LEVER**.

STEP 14

MD05F110

When the display reads **ARM AUX LEVER**, press the **PROG** key.

STEP 15

MD05F111

The display will read **AUX EXT** (extend). Move all the remote hydraulic levers to the full extend position (Rearward detent). If equipped with a fifth remote hydraulic section, press and release the fifth remote hydraulic control switch (momentary) in the extend direction (rearward).

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STEP 16

MD05F112

The display will indicate which levers are in the extend position with the number of the remote. A dash (-) indicates that the corresponding lever is not in the extend position. When completed with all the levers, press the **PROG** key. The voltage for all the levers that are in the extend position will be recorded. An **X** will be displayed for any lever that did not have a valid extend voltage recorded.

STEP 17

MD05F113

The display will read **AUX RET** (retract). Move all the remote hydraulic levers to the full retract position (First forward detent).

NOTE: *Do not move the lever to the float position.*

STEP 18

MD05F114

The display will indicate which levers are in the retract position with the number of the remote. If the 5th remote was actuated for the extend position, it need not be actuated again. The number **5** will already appear on the display. A dash (-) indicates that the corresponding lever is not in the retract position. Press the **PROG** key to record the voltage for all the levers in the retract position. An **X** will be displayed for any lever that did not have a valid retract voltage recorded.

The remote lever calibration is now complete. Press **PROG** and the display will now read **ARM AUX LEVER**. To exit the armrest calibration, go to Step 21. Press **DECR** and go to the next step to continue with the armrest calibration.

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ARM MFD

STEP 19

RD05F147

RD05F148

Select the software view option from the main menu. The display will read **ARM MFD**. Press the **PROG** key. The display will read **YES MFD ?** Press the **INCR** key to change to **NO MFD ?** if not equipped. Press the **PROG** ket to exit the **ARM MFD** menu.

ARM TRANS

STEP 20

RD05F151

RD05F153

Select the software view option from the main menu. The display will read **ARM TRANS**. Press the **PROG** key. The display will read **YES Creeper ?** Press the **INCR** key to change to **NO Creeper ?** if not equipped. Press the **PROG** ket to exit the **ARM TRANS** menu.

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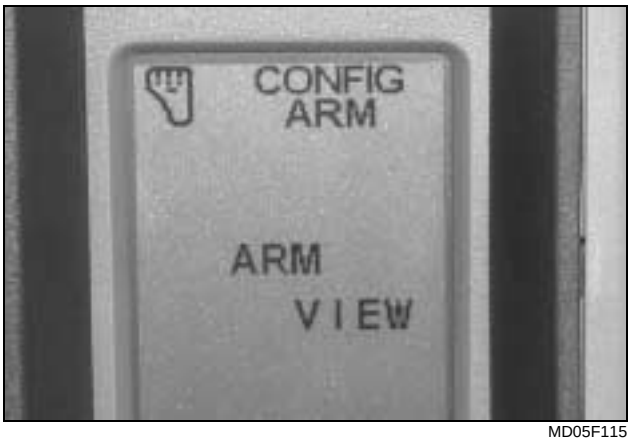
View Menu

STEP 21



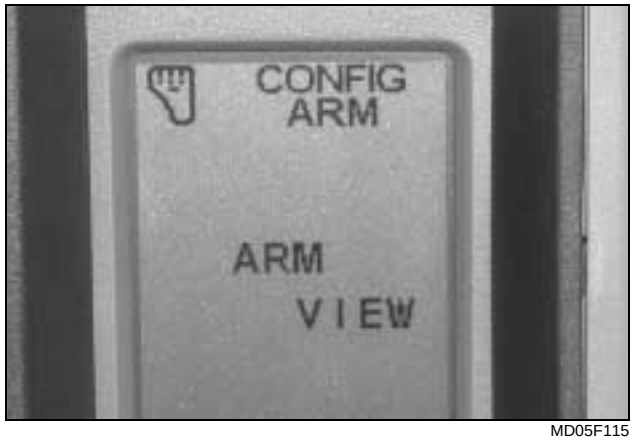
MD05F115

MD05116

Select the software view option from the main menu. The display will read **ARM VIEW**. Press the **PROG** key. The software is displayed in two parts. The display will read **Ver#1** on the top of and the first part of the software code on the bottom of the display. Press the **PROG** key.

STEP 22

MD05F117



MD05F115

The second part of the software code will now be shown. The display will read **Ver#2** on the top and the software code on the bottom of the display. Press the **PROG** ket to exit the view menu. The display will now read **ARM VIEW**.

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Exit Calibration

STEP 23

MD05F118

Use the **DECR** key to select the **ARM EXIT** menu and press the **PROG** key to exit armrest controller calibration. The display will now read **CONFIG MENU**. Press the **INCR** or **DECR** key until the display reads **EXIT SET MENU**. Press the **PROG** key to return to normal operation.

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ARMREST CONTROLLER FAULT CODES

FAULT CODE ARM 1019
Transmission Gear Selection Switch Failure

Cause:
This fault code is triggered when up shift and down shift switches are detected to be closed at the same time.

Possible failure modes:

1. Switch failed.
2. External wiring failure (damaged wires, loose connectors, or bent pins).
3. Armrest controller internal failure (power supply or signal sensing failed).

Solution:

Test the switch function, wiring, and the function of the armrest controller.

NOTE: *The transmission gear selection switch information is broadcast over the Data Bus. The transmission gear selection switch can be monitored using the MONITOR window in the service tool and selecting Armrest Trans Shift Switch - Shift Down and Armrest Trans Shift Switch - Shift Up.*

1. Open the armrest controller housing and disconnect connector J211.
2. Test the transmission gear selection switch and its wiring. Pay attention to wiring damage, loose connectors, or bent pins.
   a. When the switch is in SHIFT UP position, there should be continuity between pin 1 and pin 2 and no continuity between pin 1 and pin 3.
   b. When the switch is in SHIFT DOWN position, there should be continuity between pin 1 and pin 3 and no continuity between pin 1 and pin 2.
   c. When the switch is in OFF position, there should be no continuity between any two of pin 1, pin 2, and pin 3.
   If the switch is not functioning as specified above, replace the switch.
3. Check controller function:
   a. Cycle the key switch to OFF, then to the ON position. Measure the voltage output from the controller at pin 1 of J211. It should be approximately 12 volts.
   b. Short pin 1 to pin 2 to simulate the shift up function. Short pin 1 to pin 3 to simulate the shift down function. Monitor the switch status on the monitor screen of the service tool.
   If the controller does not function properly, replace the armrest controller.

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TRANSMISSION CONTROLLER CONFIGURATION AND CALIBRATION

Important General Information

- Before starting the transmission calibration procedure, check the wiring harness and components for damage or loose connections. Replace or repair any damaged part as necessary.
- Before calibrating the transmission controller, be sure the Standard Instrumentation (ICU) and Armrest (ARM) controllers are calibrated.
- Be sure that no persons are in front of or in back of the tractor during calibration.

> **WARNING:** *Since the clutch calibration process involves engaging transmission clutches, this procedure should only be performed in open areas, free of obstructions. The tractor may experience a small amount of movement during calibration and the tractor operator should be ready to stop the tractor at any time.* M588

- The transmission oil must be warmed to more than 60°C (140°F).
- The engine speed must be 1200 RPM or higher during calibration.

When Calibration is Required

After service work has been performed on a transmission valve, master clutch, clutch pedal or the transmission controller calibration is required.

Clutch calibration is performed through the programmable display on the standard instrumentation.

MD05F002

There are 6 main menu options in the transmission configuration/calibration mode:

1. TRANS VIEW - This menu displays clutch calibration values (milliamp and temperature). System oil temperature, inching pedal calibration values, software revision numbers, transmission system pressure, and engine load in percent. Normal tractor operation is allowed while this menu is being displayed.
2. TRANS SETUP - This menu is used to enter the clutch calibration and to set default gear values for transmission controller.
3. TRANS ADJUST - This menu can only be accessed when the Electronic Service Tool (EST) is in use on the tractor. **Do Not Enter this menu.**
4. TRANS DIAG - This menu can only be accessed when the Electronic Service Tool (EST) is in use on the tractor. **Do Not Enter this menu.**
5. TRANS FSUS - This menu can only be accessed when the Electronic Service Tool (EST) is in use on the tractor.
6. TRANS EXIT - This menu entry will exit the calibration mode for the transmission system.

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To access these menus:

STEP 1

RD05F101

Push and hold the **PROG** key for two seconds within the first ten seconds after starting the tractor. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

STEP 2

RD05F103

Push the **DECR** key until the display reads **TRANS** and press the **PROG** key again.

STEP 3

RD05F104

The display will read **TRANS VIEW**. Press The **DECR** key.

STEP 4

RD05F125

The display will read TRANS SETUP. Press the DECR key.

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STEP 5

RD05G004

IMPORTANT: *The TRANS ADJUST menu will only appear when the Electronic Service Tool (EST) is in use. Do Not enter this menu. Press the DECR key.*

The display will read TRANS ADJUST. Press The DECR key.

STEP 6

RD05G006

IMPORTANT: *The TRANS DIAG menu will only appear when the Electronic Service Tool (EST) is in use. Do Not enter this menu. Press the DECR key.*

The display will read TRANS DIAG. Press The DECR key.

STEP 7

The next display will be TRANS FSUS, but only if equipped with the Suspended Axle Option.

IMPORTANT: *The TRANS FSUS menu will only appear when the Electronic Service Tool (EST) is in use. Press the DECR key.*

STEP 8

RD05F134

The display will read **TRANS EXIT**. Press The **PROG** key to exit.

Trans View Mode

NOTE: *Calibration can only be entered by pressing and holding the PROG key within the first 10 seconds of starting the tractor.*

NOTE: *If any fault codes are recorded, they must be cleared before calibration is possible. Retrieve, record and clear any fault codes. See Fault Code Retrieval in this section.*

STEP 9

RD05F101

Push and hold the **PROG** key for two seconds within the first ten seconds after starting the tractor. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

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STEP 10

RD05F103

Push the **DECR** key until the display reads **TRANS** and press the **PROG** key again.

STEP 11

RD05F104

The display will read T**RANS VIEW**. Press The PROG key to enter the Transmission View Menus.

STEP 12

RD05F105

The display will read **VIEW CLTCH**. Push the **PROG** key.

STEP 13

RD05F106

The display will read **ODD mA**. This displays the calibrated clutch current values in milliamps. The ODD clutch current value is displayed first. Push the **DECR** key.

STEP 14

RD05F179

The display will read **EVEN mA**. This displays the calibrated clutch current values in milliamps. Continue pushing the **DECR** key to display the calibrated clutch current values for C1, C3, C5, LOW, MID, HIGH, REV and MSTR clutch.

NOTE: *Pushing the **PROG** key at any point will return you to the upper level menu, **VIEW CLTCH**.*

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STEP 15

RD05F107

The Master Clutch milliamp reading is the final readout. Push the **PROG** key.

NOTE: *If you continue to push the **DECR** key the display will start through the menu again starting with the ODD clutch mA reading.*

STEP 16

RD05F105

The display will return to **VIEW CLTCH**. To display the next Transmission View Menu push the **DECR** key.

STEP 17

RD05F108

The display will read **CAL CLTCHTMP**. The Calibration Clutch Temperature View Menu shows the clutch temp at which the calibration was performed. Push the **PROG** key.

STEP 18

RD05F109

The display will read **ODD DEGC**. The Calibration Clutch Temperature View Menu shows the clutch temp at which the calibration was performed. Push the **DECR** key.

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STEP 19

RD05G008

The display will read **EVEN DEGC**. The Calibration Clutch Temperature View Menu shows the clutch temp at which the calibration was performed.

Continue pushing the **DECR** key to display the calibrated clutch temperature values for C1, C3, C5, LOW, MID, HIGH, REV and MSTR clutch.

NOTE: *Pushing the **PROG** key at any point will return you to the upper level menu, **CAL CLTCHTMP**.*

STEP 20

RD05F110

The Master Clutch temperature display reading is the final readout. Push the **PROG** key.

NOTE: *If you continue to push the **DECR** key the display will start through the menu again starting with the **ODD** clutch temp reading.*

STEP 21

RD05F108

The display will return to **CAL CLTCHTMP**. To display the next Transmission View Menu push the **DECR** key.

STEP 22

RD05F111

The display will read **OIL TEMP**. Push the **PROG** key.

STEP 23

RD05F112

The display will read **OIL DEGC**. This is the actual transmission oil temperature. Pres the **PROG** key.

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STEP 24

RD05F111

The display returns to **OIL TEMP** display. To display the next Transmission View Menu push the **DECR** key.

STEP 25

RD05F113

The display will read **VIEW PEDAL**. The Clutch Pedal View Menu displays the position of the clutch. Push the **PROG** key.

STEP 26

RD05F114

The current pedal position is displayed, 100% for inching pedal up (top of clutch). Depress the inching pedal to the floor.

STEP 27

RD05F115

The display will read 0% for inching pedal to the floor (bottom of clutch). Release pedal and push the **PROG** key.

STEP 28

RD05F113

The display will again read **VIEW PEDAL**. To display the next Transmission View Menu push the **DECR** key.

STEP 29

RD05F116

The display will read **SW REVISION**. This is the Software Revision View Menu. Push the **PROG** key.

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STEP 30

RD05F117

The display will read **VER#1**. Version #1 is the major software version number, the lower number (1.11.) is the minor software version number. Push the **DECR** key.

STEP 31

RD05F118

The display will read **VER#2**. Version #2 is the engineering software version numbers. Push the **PROG** key.

STEP 32

RD05F116

The display will again read **SW REVISION**. To display the next Transmission View Menu push the **DECR** key.

STEP 33

RD05F119

The display will read **PRES TRNSDCR**. This menu leads to the transmission system pressure display. Push the **PROG** key.

STEP 34

RD05F120

The display will read **PRES KPA**. This is the Transmission System Pressure. Push the **PROG** key.

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STEP 35

RD05F119

The display will again read **PRES TRNSDCR**. To display the next Transmission View Menu push the **DECR** key.

STEP 36

RD05G009

The display will read **LOAD**. This is the engine load display. Push the **PROG** key.

STEP 37

RD05F122

The display will read **LOAD %**. The engine load is displayed in percentage related to the engine torque. Push the PROG key.

STEP 38

RD05G009

The display will again read **ENG LOAD**. To display the next Transmission View Menu push the **DECR** key.

STEP 39

RD05F124

The display will read **EXIT VIEW**. Push the **PROG** key to exit. Press the DECR key to return to the first item in menu.

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Trans Setup Mode

NOTE: *Calibration can only be entered by pressing and holding the PROG key within the first 10 seconds of starting the tractor.*

NOTE: *If any fault codes are recorded, they must be cleared before calibration is possible. Retrieve, record and clear any fault codes. See Fault Code Retrieval in this section.*

STEP 40

RD05F101

Push and hold the **PROG** key for two seconds within the first ten seconds after starting the tractor. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

STEP 41

RD05F103

Push the **DECR** key until the display reads **TRANS** and press the **PROG** key again.

STEP 42

RD05F104

The display will read **TRANS VIEW**. Press The **DECR** key.

STEP 43

RD05F125

The display will read **TRANS SETUP**. Press The **PROG** key.

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STEP 44

RD05F126

The display will read **CLTCH CAL**. See the Clutch Calibration Procedure. To see the next setup menu press the **DECR** key.

NOTE: *The display will go directly to Step 48,* ***GEAR DEFAULT****, unless the Electronic Service Tool (EST) is in use.*

STEP 45

The display will read **RESET NVM**. To see the next setup menu press the **DECR** key.

IMPORTANT: *The* ***RESET NVM*** *menu will only appear when the Electronic Service Tool (EST) is in use. Do Not enter this menu. Press the* ***DECR*** *key.*

STEP 46

The display will read **SETUP BKUP ALM**. To see the next setup menu press the **DECR** key.

IMPORTANT: *The* **SETUP BKUP ALM** *menu will only appear when the Electronic Service Tool (EST) is in use. Do Not enter this menu. Press the* ***DECR*** *key.*

STEP 47

The display will read **SETUP FSUS**. To see the next setup menu press the **DECR** key.

IMPORTANT: *The* ***SETUP FSUS*** *menu will only appear when the Electronic Service Tool (EST) is in use. To see the next setup menu press the* ***DECR*** *key.*

STEP 48

RD05F131

The display will read **GEAR DEFAULT**. See the Gear Default Mode in this section. Press The **DECR** key.

STEP 49

The display will read **EXIT SETUP**. Press The **PROG** key to exit.

Clutch Calibration Procedure

NOTE: *Calibration can only be entered by pressing and holding the* ***PROG*** *key within the first 10 seconds of starting the tractor.*

NOTE: *If any fault codes are recorded, they must be cleared before calibration is possible. Retrieve, record and clear any fault codes.*

WARNING: *Since the valve calibration process involves engaging transmission clutches, this procedure should only be performed in open areas, free of obstructions. The tractor may experience a small amount of movement during calibration and the tractor operator should be ready to stop the tractor at any time.* M588

STEP 50

Start the tractor. The tractor must be running to perform clutch calibration procedure. The transmission oil temperature should be above 60 degrees C (140 degrees F) for the calibration procedure.

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RD05F101

Push and hold the **PROG** key for two seconds within the first ten seconds after starting the tractor. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

RD05F103

Push the **DECR** key until the display reads **TRANS** and press the **PROG** key again.

STEP 51

RD05F104

When the **TRANS VIEW** menu is displayed, push the **DECR** key.

STEP 52

RD05F125

The display will read **TRANS SETUP**. Press The **PROG** key to enter the Transmission Setup Menus.

STEP 53

RD05F126

The display will read **CLTCH CAL**. Push the **PROG** key.

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STEP 54

RD05F128

The display will read **OIL DEGC**. The transmission oil temp should be between 60 and 105 degrees C (140 to 221 degrees F). Push the **PROG** key.

NOTE: *If the temperature was not in range see Step 55. If the transmission oil temperature was in the proper range see Step 56.*

STEP 55

RD05F129

If the transmission oil temp is below 60 degrees C the **LOW OIL TEMP** message will be displayed for 4 seconds. The display will then return to the oil temperature display.

NOTE: *If the **PROG** key is pressed when **LOW OIL TEMP** is on display the calibration procedure may be continued. Calibration at a lower temperature should only be performed when the recommended temperature range cannot be achieved.*

NOTE: *If the oil temp is above 105 degrees C the display will read **HOT OIL TEMP**, if the oil temp is below 10 degrees C the display will read **COLD OIL TEMP**. The display will return to oil temperature display after 4 seconds.*

STEP 56

MD05F072

The display will read ENG RPM. Increase the engine RPM to 1100 to 1300 RPM. Push the PROG key.

NOTE: *If the program key is pushed when the RPM is not in the proper range The display will read **CAL ABORTED**. Pushing the **PROG** key again will display **CAL EXIT**. To continue the calibration procedure push the **PROG** key.*

STEP 57

RD05G016

The display will now read **ENG STBLZNG**. After several seconds the display will change.

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STEP 58

RD05F173

The display will read **SHIFT TO FWD**. Shift the transmission control lever to FWD.

> **WARNING:** *Since the valve calibration process involves engaging transmission clutches, this procedure should only be performed in open areas, free of obstructions. The tractor may experience a small amount of movement during calibration and the tractor operator should be ready to stop the tractor at any time.* M588

STEP 59

If the inching pedal is not up, the display will read **PEDAL UP**. Move inching pedal to up position.

STEP 60

RD05F174

The display will now read **ODD CLUTCH**. Push the **PROG** key once.

STEP 61

RD05F182

The display will read **ODD mA**. The tractor transmission controller will automatically run through the Odd clutch calibration procedure.

STEP 62

RD05F175

The display will read ***ODD mA** when the Odd clutch calibration is completed. Push the **PROG** key.

STEP 63

RD05F178

The display will read **EVEN CLUTCH**. Push the **PROG** key and the tractor transmission controller will automatically run through the Even clutch calibration procedure.

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The display will read *EVEN mA when the Even clutch calibration is completed. Push the PROG key.

Repeat this procedure to calibrate the C1, C3, C5, LOW, MID, HIGH, REV and MSTR clutch.

STEP 64

RD05F186

After performing the calibration procedure on all clutches the display will now read *MSTR mA. Push the PROG key once.

STEP 65

RD05G017

The display will now read EXIT CAL. Push the prog key once.

STEP 66

RD05G018

The display will now read SHIFT TO PARK. Shift the transmission control lever into PARK position.

STEP 67

RD05G017

The display will now read EXIT CAL again.

Reduce engine speed to low idle. Turn ignition switch to OFF position. The calibration will be saved when the tractor is shutdown.

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Calibration Error Messages

Listed below are calibration error messages that can appear during a calibration failure.

POT OPEN CKT: Potentiometer open circuit or disconnected.

POT HIGH VAL: Potentiometer is higher than safety value.

POT SHRT CKT: Potentiometer short circuit.

POT LOW VAL: Potentiometer is lower than safety value.

SLOW UP MVMNT: Not moved over a certain time when raising.

SLOW TO MAX: Maximum position not reached in time.

SLOW DN MVMNT: Not moved over a certain time when lowering.

SLOW TO MIN: Minimum position not reached in time.

NOT CAL: Front suspension not calibrated.

TRCTR MOVING: Tractor moving when calibrating.

Gear Default Mode

When a tractor is started up and shifted into Forward the default gear is 7th. If shifted into Reverse the default gear is 2nd. Follow this procedure to change the Forward, or Reverse default gear settings.

Forward gear default can be set for 1st through 13th gear. Reverse gear default can be set for 1st through 4th gear.

NOTE: *Calibration can only be entered by pressing and holding the **PROG** key within the first 10 seconds of starting the tractor.*

NOTE: *Do not perform this procedure with the Electronic Service Tool in use.*

STEP 68

RD05F101

Push and hold the **PROG** key for two seconds within the first ten seconds after starting the tractor. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

RD05F103

Push the **DECR** key until the display reads **TRANS** and press the **PROG** key again.

STEP 69

RD05F104

When the **TRANS VIEW** menu is displayed, push the **DECR** key.

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STEP 70

RD05F125

The display will read **TRANS SETUP**. Press The **PROG** key to enter the Transmission Setup Menus.

STEP 71

RD05F126

The display will read **CLTCH CAL**. Push the **DECR** key.

STEP 72

RD05F131

The display will read **GEAR DEFAULT**. Push the **PROG** key.

STEP 73

RD05F166

The display will read **SETUP FWD GEAR**. Push the **PROG** key

STEP 74

RD05F167

The display will read ***FWD GEAR# 7**. Press the **INCR** key to increase the gear number, or press the **DECR** key to decrease the gear number. If no change is desired leave gear number as it is. Press the **PROG** key when desired gear number is set.

STEP 75

RD05F168

The display will read **SETUP REV GEAR**. Push the **PROG** key

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STEP 76

RD05F169

The display will read ***REV GEAR# 2.** Press the **INCR** key to increase the gear number, or press the **DECR** key to decrease the gear number. If no change is desired leave gear number as it is. Press the **PROG** key when desired gear number is set.

STEP 77

RD05F171

The display will read **EXIT SET GEAR**. Press the **PROG** key to exit this menu.

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Front Suspension Installation Menu

This menu allows the user to install, or remove the FSUS (Front Suspension).

NOTE: *This menu will only work when the Electronic Service Tool is in use.*

STEP 78

RD05F101

Push and hold the **PROG** key for two seconds within the first ten seconds after starting the tractor. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

RD05F103

Push the **DECR** key until the display reads **TRANS** and press the **PROG** key again.

STEP 79

RD05F104

When the **TRANS VIEW** menu is displayed, push the **DECR** key.

STEP 80

RD05F125

The display will read **TRANS SETUP**. Press The **PROG** key to enter the Transmission Setup Menus.

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STEP 81

RD05G012

Press the **DECR** key multiple times until **SETUP FSUS** is displayed. Press the **PROG** key to enter the Menu.

STEP 82

RD05G037

RD05G035

The display will read NO FSUS, or YES FSUS. To change status press INCR or DECR key. When the status is correct press PROG key.

STEP 83

RD05G041

The display will read DONE. After 1 second the display exits this menu.

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Front Suspension Menus

The following menus are available for the Front Suspension.

1. FSUS CAL - This menu allows the user to Calibrate the Front Suspended axle.
2. FSUS DEMO - This menu can only be accessed when the Electronic Service Tool (EST) is in use on the tractor. It allows the user to switch the Front Suspended Axle ON or OFF especially at speeds greater than 12 KMH.
3. FSUS MANUAL - This menu allows the operator to manually operate the Front Suspension. The axle may be raised or lowered when the tractor is stationary.
4. EXIT FSUS- This menu entry will exit the Front Suspension Menus.

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Front Suspension Calibration

NOTE: *This menu will only work when the Electronic Service Tool is in use.*

STEP 84

RD05F101

Start the engine.

Push and hold the **PROG** key for two seconds within the first ten seconds after starting the tractor. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

RD05F103

Push the **DECR** key until the display reads **TRANS** and press the **PROG** key again.

STEP 85

RD05F104

When the **TRANS VIEW** menu is displayed, push the **DECR** key.

STEP 86

RD05F125

The display will read **TRANS SETUP**. Press The **DECR** key.

STEP 87

RD05G019

The display will read **TRANS FSUS**. Press The **PROG** key.

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STEP 88

RD05G042

The display reads FSUS CAL. Press the PROG key to automatically start the calibration process. The Suspended Axle Switch lamp will flash on and off.

STEP 89

RD05G030

The display numbers (nnnn) will change as the calibration is in progress. This display is the front axle position sensor output voltage.

STEP 90

RD05G026

When the calibration is completed the display will show FSUS Cal Done.

NOTE: *If the PROG key is pressed during the calibration the display will read CAL ABORTED.*

STEP 91

RD05G043

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RD05G044

If the calibration process fails the display will read CAL FAILED. The Suspended Axle Switch lamp will turn off. If the CAL FAILED message appears press the PROG key to access the Error Message Display.

STEP 92

RD05G047

Error Message Display Example.

Possible Error Messages

tttt	bbbbbbbb
POT	OPEN CKT
POT	HIGH VAL
POT	SHRT CKT
POT	LOW VAL
POT	LOW RNG
SLOW	UP MVMNT
SLOW	TO MAX
SLOW	DN MVMNT
SLOW	TO MIN
NOT	CAL
WHEEL	MOVED

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Front Suspension Demo

The menu is accessed through the Trans Setup Menu.

NOTE: *This menu will only work when the Electronic Service Tool is in use.*

STEP 93

RD05F101

Start the engine.

Push and hold the **PROG** key for two seconds within the first ten seconds after starting the tractor. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

RD05F103

Push the **DECR** key until the display reads **TRANS** and press the **PROG** key again.

STEP 94

RD05F104

When the **TRANS VIEW** menu is displayed, push the **DECR** key.

STEP 95

RD05F125

The display will read **TRANS SETUP**. Press The **DECR** key.

STEP 96

RD05G019

The display will read **TRANS FSUS**. Press The **PROG** key.

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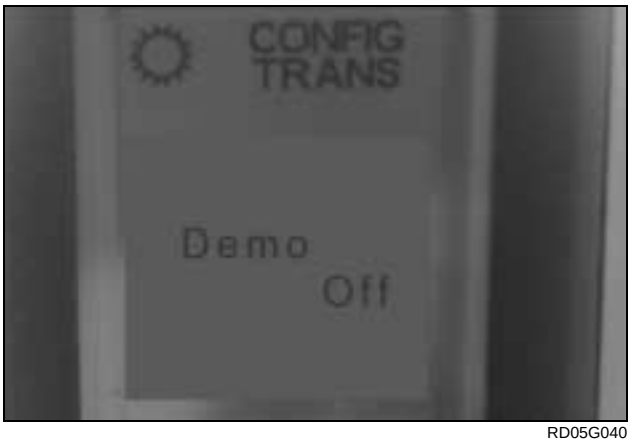
STEP 97

RD05G038

Press the **DECR** key multiple times until **FSUS DEMO** is displayed. Press the PROG key.

STEP 98



RD05G040

RD05G039

The display will read DEMO OFF, or DEMO ON. To change status press INCR or DECR key. When the status is correct press PROG key.

The DEMO allows the user to switch the Front Suspended Axle ON or OFF especially at speeds greater than 12 KMH.

Front Suspension Manual Menu

NOTE: *This menu will only work when the Electronic Service Tool is in use.*

STEP 99

RD05F101

Start the engine.

Push and hold the **PROG** key for two seconds within the first ten seconds after starting the tractor. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

RD05F103

Push the **DECR** key until the display reads **TRANS** and press the **PROG** key again.

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STEP 100

RD05F104

When the **TRANS VIEW** menu is displayed, push the **DECR** key.

STEP 101

RD05F125

The display will read **TRANS SETUP**. Press The **DECR** key.

STEP 102

RD05G019

The display will read **TRANS FSUS**. Press The **PROG** key.

STEP 103

RD05G028

Push the **DECR** key until the display reads **FSUS Manual** and then press the **PROG** key.

STEP 104

RD05G030

The display will read POS nnnn mV. This display is the front axle position sensor output voltage. Press the DECR key.

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STEP 105

RD05G031

The display will read RAISE nnnn mV. Press and hold the Front Suspended Axle switch to raise the suspended axle. Release the switch to stop. Press the DECR key again.

NOTE: *The manual raise feature can be useful for troubleshooting the raise function. Power the raise solenoid ON and OFF and check for 12 volts at raise solenoid.*

STEP 106

RD05G033

The display will read LOWER nnnn mV. Press and hold the Front Suspended Axle switch to lower the suspended axle. Release the switch to stop. Press the DECR key again.

NOTE: *The manual lower feature can be useful for troubleshooting the lower function. Power the lower solenoid ON and OFF and check for 12 volts at lower solenoid.*

STEP 107

RD05G034

The display will read LOCK nnnn mV. Both the upper and lower lock solenoids are now powered ON. Press and hold the Front Suspended Axle switch to power OFF the lock solenoids.

NOTE: *The manual lock feature can be useful for troubleshooting the lock function. Power the lock solenoids ON and OFF and check for 12 volts at the upper and lower lock solenoids.*

To continue manual adjustments press the INCR keys to get back to lower and raise screens.

Press the DECR key when the display reads LOCK nnnn mV.

STEP 108

RD05G045

The display will read EXIT MANUAL. Press PROG key to exit menu.

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TRANSMISSION CONTROLLER FAULT CODES

TRANS 60 FNRP pod in illogical state (in no position)

Cause:

If FNRP pot indicates not in neutral, not in forward, and not in reverse for 2.5 seconds, the transmission controller will record this fault code.

Possible failure modes:

1. The operator may be holding the lever up for too long.

2. The transmission control (FNRP) pot failure

3. Wiring harness problem from the transmission control (FNRP) pot to the transmission controller.

Solution:

The transmission control (FNRP) pod is directly wired to the transmission controller. The transmission controller monitors the shuttle shifting and displays the shuttle position on the instrumentation cluster.

1. Make sure the operator is not holding the lever up for too long.

2. Troubleshooting by viewing the shuttle position display.
In some cases, problems can be detected by viewing the display while shifting the transmission control (FNRP) lever.
Turn Key 'ON' and watch the shuttle position display.
If Forward icon does not lit up on display when in Forward, either the Forward switch failed open or its wiring shorted to ground.
If Reverse icon does not lit up on display when in Reverse, either the Reverse switch failed open or its wiring shorted to ground.
If Neutral icon does not lit up steady when in Neutral or Park, either the Neutral switch failed closed or its wiring shorted to power.

3. Troubleshooting by checking FNRP switch function.
Disconnect the cover panel under the Armrest (steering column for MU8). Locate connector C051. Measure continuities on the transmission control (FNRP) pot side.
Measure between Pin 6 (Forward) and Pin 8 (5 Vref), there should be about 500 - 600 Ohms when in Forward position and about 2500 - 3000 Ohms when in other positions. If not, the Forward switch failed.
Measure between Pin 5 (Reverse) and Pin 8, there should be about 500 - 600 Ohms when in Reverse position and about 2500 - 3000 Ohms when in other positions. If not, the Reverse switch fails open.

Measure between Pin 7 (not Neutral) and Pin 3, there should be no continuity in Park or Neutral position and there should be continuity in Forward or Reverse positions. If not, the Neutral switch failed.

NOTE: *Neutral switch off indicates tractor is in Neutral. Neutral switch on indicates tractor is not in Park.*

If any above switch failure is detected, replace the transmission control (FNRP) pot.

If no switch failure is detected, go to next step.

4. Check the wiring from connector C051 to the transmission controller.
Check the wiring from connector C051 to connector C351 on the transmission controller.
Follow the wiring schematics. Conduct continuity checking (in a similar way to the way specified in step 2) between pins at each connectors.

NOTE: *Pay attention to bent pin, loose pin, wire damage, and any possible shortage between pins and wires.*

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TRANS 76
Transmission over speed

Cause:

The transmission controller is hard wired to the wheel speed sensor. This fault code is recorded each time the transmission is oversped.

Possible failure modes:

1. The transmission was oversped.

Solution:

1. Take precautions to avoid over-speeding the transmission. Select lower gear when traveling down inclines, especially when pulling heavy loads.

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TRANS 136
Communication lost with the instrumentation controller

Cause:

Communication lost between transmission controller and instrumentation controller.

Possible Failure modes:

1. Bad Can Bus connection between the transmission controller and instrumentation controller.

2. Controller failure.

Solution:

Make sure both the transmission controller and instrumentation controller are functioning OK.
Check the Data Bus connections.

1. Check the function of the transmission controller:
Make sure there is no other fault code or symptom indicating transmission controller malfunctioning.

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 (CN2) to the Instrument controller is plugged in.

   B. If there is display on the tractor instrumentation but the display is erratic, such as totally strange symbols, and other controllers claim communication lost with the Instrument controller, it is more like the Instrument controller failed. Replace the controller.

   C. If nothing wrong can be found 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 1 volts (2.5 V nominally).
   At pin 3, the black wire, 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.

   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 1 volts (2.5 V nominally).
   At pin 3, the black wire, there should be continuity from pin 3 to the clean ground.

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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 rear 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 135, PTO 54120, INST 12011, AUX 12011, INST 12031, and PTO 54140.*

NOTE: *Pay good attention to loose connectors, bent pins in the connector, and wire damage.*

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REMOTE HYDRAULICS CONTROLLER CALIBRATION

Requirements For Calibration

IMPORTANT: *The remote hydraulic controller must be calibrated anytime any service work is done on the remote valves or when the controller is changed.*

- Before starting the remote hydraulic calibration procedure, check the wiring harness and components for damage or loose connections. Replace or repair any damaged part as necessary.
- Before calibrating the remote hydraulic controller, be sure the Standard Instrumentation (INST) and Armrest (ARM) controllers are calibrated.
- The hydraulic oil must be warmed to 49°C (120°F) or higher.
- Engine speed must be set to 1500 RPM or higher.
- Disconnect any implements before calibration.

Aux Set Main Menu

Remote hydraulic calibration is performed through the programmable display on the standard instrumentation.

MD05F002

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

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

To get to the aux set main menu, do the following:

1. Start the tractor.
2. Push the **PROG** key and hold for two seconds within the first ten seconds. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

MD05F120

3. Push the **DECR** key four times. The display should read **AUX**.
4. Push the **PROG** key to enter the main menu.

There are 5 main menu options in the **AUX**:

1. **AUX VIEW** - This menu displays the software revision code and scraper configuration.
2. **AUX ADJUST** - The adjustment menu offers the operator a means of tailoring the flow from a remote section to meet the needs of the job to be done. The extend and retract flows are adjustable independently.
3. **AUX SETUP** - The setup option menu is for the configuration of the implement controls. There is the option of none, one and two. Default is none.
4. **AUX CAL** - The calibration menu allows the control to find the flow thresholds of the valves. Only the valves that are configured in the armrest controller at power up are calibrated.
5. **AUX EXIT** - Used to exit the **AUX**.

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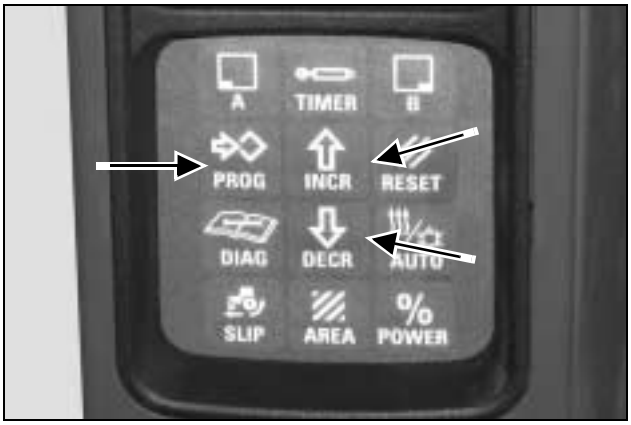

MD05F003

Use the **INCR** or **DECR** key to move through these menus. To enter the menu of your choice, press the **PROG** key.

Aux View Menu

STEP 1

MD05F121

With **AUX VIEW** on the display, press the **PROG** key.

STEP 2

MD05F122

The current software is displayed in two parts. **Ver #1** is the first part of the current software number.

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STEP 3

MD05F123

Press the **PROG** key. The screen will now read **Ver #2**. This is the second part of the current software number.

STEP 4

MD05F124

Press the **PROG** key. The display will now show how many scrapers are configured in the system.

NOTE: *Scraper configuration is performed in the* ***AUX SETUP*** *menu.*

STEP 5

MD05F121

Press the **PROG** key. The **AUX VIEW** screen will now be displayed. Press the **PROG** key to display **AUX EXIT**. Press the **PROG** key again to exit the view menu.

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Aux Adjust Menu

STEP 6

MD05F125

With **AUX ADJUST** on the display, press the **PROG** key.

STEP 7

MD05F126

Press the **INCR** or **DECR** key to select the remote section (1 through 5) and the extend or retract circuit for that section.

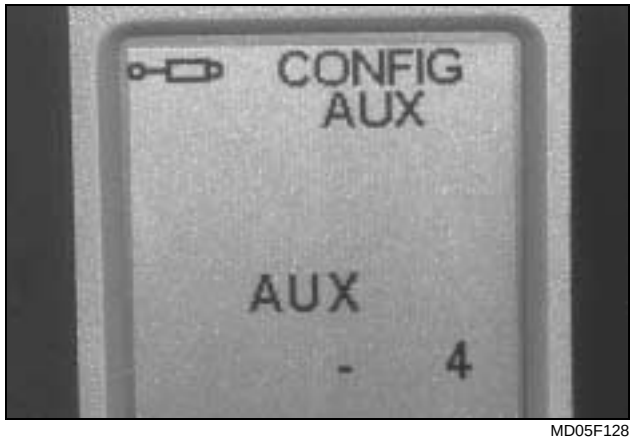
NOTE: *Only valve sections with a valid lever range and no faults will be broadcast (over the Tractor Data Bus) from the armrest controller will be listed in this menu.*

STEP 8

MD05F127

Press the **PROG** key for the section circuit of your choice. The current valve setting, which will be a number between -20 to +20 will be displayed. If the value displayed is increased, the flow curve associated with that valve will be shifted to the left. This results in a higher flow for a given flow potentiometer setting for that flow direction. If the value is decreased, the flow curve associated with that valve will be shifted to the right. This results in a lower flow for a given flow potentiometer setting for that direction. As the displayed value is changed, the shift in the flow curve will take effect immediately. The range of adjustment is -20 to +20, with 0 having no effect on the flow curve.

STEP 9



MD05F128

Press the **INCR** or **DECR** key to increase or decrease the number. Each time the **INCR** or **DECR** key is pressed, the flow will change 0.2 to 0.6 GPM (0.7 to 2.2 LPM).

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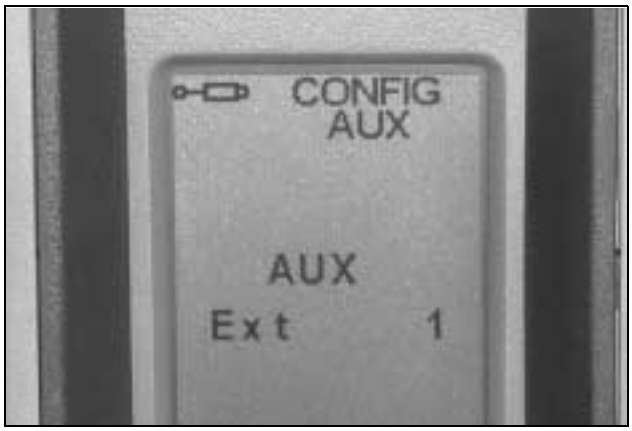
STEP 10



MD05F126

Press the **PROG** key to return to the valve section selection menu. Repeat Step 7 through 9 for other valve sections.

STEP 11

MD05F134

Press the **INCR** or **DECR** key to return to the **EXIT** screen. Press the **PROG** key.

NOTE: *The **AUX** controller must leave through the **EXIT** screen or the adjustments will not be saved.*

Aux Setup Menu

STEP 12

MD05F129

With **AUX SETUP** on the display, push the **PROG** key.

STEP 13

MD05F130

The **SETUP** menu will be entered at the current value, either none, 1 or 2 scrapers. Use the **INCR** or **DECR** key to select your option, then push the **PROG** key.

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STEP 14

MD05F129

The display will return to the **AUX SETUP** screen. Use the **INCR** or **DECR** key to go to the next menu item.

Aux Cal Menu

Calibration Process

Before the calibration process starts, the system will perform a pre-calibration check. This check includes:

- Levers and switches for the available valve sections are in the neutral position.
- There are no faults present.
- The feedback signal used for the calibration indicates less than 100 PSI (689 kPa) and is greater than 0.25 volts.

If any of these checks do not pass, the calibration will be exited with a message displayed of the fault. Selection of the INCR or DECR key will bring the main calibration menu back.

If the checks pass, the present calibration values are set to a default value and the calibration process will begin.

The sequence of calibration is sequential from valve section one through section five of the available sections. The valve order for each section is lower first, then raise. The valve and section that is in process of calibration will be displayed.

The valve is commanded to starting current. After three seconds, the pressure reading is verified that it has not changed more than 27 PSI (186 kPa) higher. If the feedback signal is above this, calibration will be stopped. If the value is below this pressure check, the pressure reading is stored for the initial value and used for a relative reference for the remainder of this valve calibration.

Every 200 mS, the commanded current will be incremented until the feedback signal has become greater than 27 PSI (186 kPa) from the initial value recorded. The valve is then commanded to zero current and allowed to settle for three seconds. The feedback is then checked for a value below 18 PSI (124 kPa) from the initial value. A minimum of one second and up to 30 seconds is allowed for this signal to decay. The valve is then commanded at the current just found minus 16 mA. The current is incremented every three seconds until a change of 27 PSI (186 kPa) or greater from the initial value is reached. Again the valve is allowed to settle as above. If the feedback signal does not decay within the time frame allowed, the calibration will exit.

When calibration is completed, the thresholds will be saved and Done will be displayed on the instrumentation display. If calibration is stopped, one of the following messages will be displayed:

- Enable - lever not in neutral during pre-cal check.
- Quit - During calibration, the lever of valve being calibrated was moved from neutral, INCR, Decr or PROG key was pushed.
- PSI - Feedback signal out of range low or high during pre-cal check.
- Cal Time - Pressure takes to long to drop during settling phase of calibration
- Cal Halt - Anytime a fault is associated with the section is detected.
- Cal Fail - Starting current generates too much pressure or the commanded current has gone through its valid range without finding the threshold.

NOTE: *Disconnect any implement from the remote hydraulic valves before performing the AUX CAL procedure.*

NOTE: *Before performing the AUX CAL procedure, make sure valve spools are moving freely. With the engine running, cycle each remote hydraulic section to the extend and retract detente position.*

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If Equipped with MegaFlow

For vehicles equipped with the Mega-Flow option, a pause is provided to allow field technicians to calibrate both remote systems with one pressure transducer.

Once the calibration procedure is in progress for the 1st remote section, move the 3rd remote lever out of neutral. The calibration will pause after the 2nd remote section is calibrated. Move the transducer to the right side diagnostic fitting. Place the 3rd remote lever back into neutral and select continue from the menu. The calibration process will continue.

The valve is commanded to starting current. After three seconds, the pressure reading is verified that it has not changed more than 27 PSI (186 kPa) higher. If the feedback signal is above this, calibration will be stopped. If the value is below this pressure check, the pressure reading is stored for the initial value and used for a relative reference for the remainder of this valve calibration.

Every 200 mS, the commanded current will be incremented until the feedback signal has become greater than 27 PSI (186 kPa) from the initial value recorded. The valve is then commanded to zero current and allowed to settle for three seconds. The feedback is then checked for a value below 18 PSI (124 kPa) from the initial value. A minimum of one second and up to 30 seconds is allowed for this signal to decay. The valve is then commanded at the current just found minus 16 mA. The current is incremented every three seconds until a change of 27 PSI (186 kPa) or greater from the initial value is reached. Again the valve is allowed to settle as above. If the feedback signal does not decay within the time frame allowed, the calibration will exit.

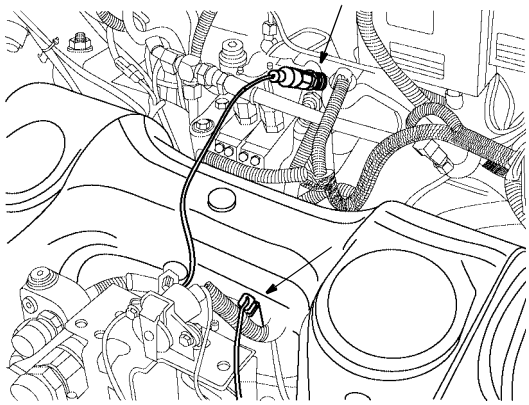
When calibration is completed, the thresholds will be saved and Done will be displayed on the standard instrumentation display. If calibration is stopped, one of the following messages will be displayed:

- Enable - lever not in neutral during pre-cal check.
- Quit - During calibration, the lever of valve being calibrated was moved from neutral, INCR, Decr or PROG key was pushed.
- PSI - Feedback signal out of range low or high during pre-cal check.
- Cal Time - Pressure takes to long to drop during settling phase of calibration
- Cal Halt - Anytime a fault is associated with the section is detected.
- Cal Fail - Starting current generates too much pressure or the commanded current has gone through its valid range without finding the threshold.

NOTE: *Disconnect any implement from the remote hydraulic valves before performing the AUX CAL procedure.*

NOTE: *Before performing the AUX CAL procedure, make sure valve spools are moving freely. With the engine running, cycle each remote hydraulic section to the extend and retract detente position.*

STEP 15



RD02E096

Connect Remote Hydraulic Calibration Tool CAS 2806 to the implement potentiometer connector (C150M below cab) and the load sensing diagnostic port on the remote valve.

STEP 16

MD05F131

With **AUX CAL** on the display, Press the **PROG** key.

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STEP 17

MD05F132

The display will read **AUX Start.** Do not move the remote levers out of the neutral position.

NOTE: *An **EXIT** option is available by pressing the **INCR** key. Selecting **EXIT** will bring you back to the previous menu.*

MD05F182

If any of the remote levers are not in the neutral position the display will read **AUX Enable**.

STEP 18

MD05F133

Press the **PROG** key to select **START**. This will start the pre-calibration checks.

If any of these checks do not pass, the calibration will be exited with a message displayed of the problem. If the display reads **AUX Psi**;

1. The Remote Hydraulic Calibration Tool CAS 2806 is not connected.

2. The load sense pressure is too high.

3. Steering was activated.

4. A hydraulic lever was activated.

5. There is a fault in the hydraulic system.

Selection of the **INCR** or **DECR** key will bring the main calibration menu back.

STEP 19

MD05F177

The system will go automatically into the calibration process when the pre-calibration is completed. The screen will display each remote valve as it is calibrated and will automatically cycle through all remote valves in numeric order. The calibration process for a five valve remote system will take approximately five minutes. When calibration is completed, the display will read Done. Push the **PROG** key to return to the **AUX Cal** menu. If the calibration process could not be completed, the display will read the reason why. See Calibration Process at the beginning of **Aux Cal** Menu.

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REMOTE (AUX) CONTROLLER FAULT CODES

FAULT CODE AUX 12041
Communication Lost With The Instrumentation Controller

Cause:
Communication lost between remote hydraulic controller and the instrumentation controller.

Possible failure modes:
1. Bad connection between remote hydraulic controller and the instrumentation controller.
2. Controller failure.

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

1. Check the function of the remote hydraulic controller:
   a) Make sure connector (C055 Green) is plugged in to the remote hydraulic controller.
   b) Check the LED light on the remote hydraulic controller.
   The LED light for remote hydraulic controller is on the bottom of the 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 (CN2) to the Instrument controller is plugged in.
   b) If there is display on the tractor instrumentation but the display is erratic, such as totally strange symbols, and other controllers claim communication lost with the Instrument controller, it is more likely the Instrument controller failed, replace the controller.
   c) If the display is normal, 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.
   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.

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

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

NOTE: *See schematic sections 24,25 and 26 and sections 53 and 54 at the rear of this section.*

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

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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.*

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

MD05F002

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.*

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

RD05F101

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

1. Start the tractor.
2. Push the PROG key 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 **CONFIG MENU**.
3. Push the **DECR** key three times to highlight **HITCH**.
4. Push the **PROG** 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.
4. **HITCH EXIT** - Used to exit the hitch menus.

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

MD05F183

1. STANDARD

MD05F003

2. DELUXE

Hitch Calibration Menu

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

MD05F045

The **Hitch Cal** menu allows the user to calibrate the system parameters. These parameters include the tractor type, 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**.

RD05G046

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

   1 = Two 88.9 mm (3.5 inch) ID cylinders.
   2 = One 88.9 mm (3.5 inch) and One 95.2 mm (3.75 inch) ID cylinders.
   3 = Two 95.2 mm (3.75 inch) ID cylinders.
   4 = One 92.5 mm (3.75 inch) and One 104.8 (4.125 inch) ID cylinders.

2. When the correct cylinder size is found, press the PROG key to enter the selection.

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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 programed 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

MD05F179

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 until the hitch lowers completely. The hitch will lower as long as the PROG key is depressed. While the hitch is lowering, the display will change to **Hitch Lower 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 9.*

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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.*

MD05F047

MD05F048

2. When the controller has found the raise 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

MD05F049

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

MD05F050

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**.

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MD05F051

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 it's 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.

MD05F052

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.*

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STEP 8

MD05F053

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 hitch main menu.

MD05F045

MD05F063

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.*

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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.

MD05F054

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

Press **PROG** key.

STEP 10

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.

MD05F055

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 11

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 12. The default setting for this step is **No**.

MD05F056

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 13. If **No** is selected, the system will go to Step 12.

STEP 12

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.

MD05F057

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 13 when your choice is made.

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STEP 13

The lower line of the display will now read **Hitch Up**. This will allow you to choose the desired percentage of hitch travel that will be used to determine if the hitch is up for the auto - area accumulation function. There are four choices: **60%**, **70%**, **80%** and **90%**. The default is 70%.

MD05F058

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

MD05F058

2. To select a percentage, press the **PROG** key. The system will go to step 14.

STEP 14

The display will now read **Done Settings**. This indicates that the user settings have been successfully programed.

MD05F059

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

MD05F060

2. Press the **DECR** key to go to the **HITCH VIEW** menu.

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Hitch View Menu

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

STEP 15

MD05F061

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 16

MD05F062

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 17

MD05F060

The display will now read **HITCH VIEW.** This indicates that this menu is completed.

Press **DECR** key to go to **HITCH EXIT**.

STEP 18

MD05F063

Press the **PROG** key to exit the hitch menus

STEP 19

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

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HITCH CONTROLLER FAULT CODES
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 CN2 at the instrumentation controller.
   There should be a 5 VDC power supply from pin 12 of CN1 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.*

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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 CN2 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.

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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, 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.*

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PTO CONTROLLER CONFIGURATION

General Information

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

The PTO controller configuration is performed through the programmable display on the standard instrumentation.

MD05F002

There are three operations under the main PTO menu.

1. PTO SPEED - Selects either a one or two speed PTO.
2. B LAMPS - Allows the brake lamp relay controller to be used by the PTO.
3. VIEW - Allows the operator to view PTO software version and the ratio between the engine speed and the PTO shaft speed.
4. EXIT - Returns to the main menu.

The INCR and DECR keys are used to toggle between these menus.

PTO Main Menu

NOTE: *Controller programming can only be entered within the first 10 seconds of turning the key switch to the on or run position.*

STEP 1

RD05F101

Turn the key switch to the on position. Push the **PROG** key and hold for two seconds within the first ten seconds of turning on the key switch. A short beep will indicate that the program mode has been accessed and the display will read **CONFIG MENU**.

STEP 2

RD05F135

Press the **INCR** key until the display reads **PTO** . Press the PROG key.

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PTO Speed Menu

STEP 3

RD05F136

The display will read **PTO SPEED**. Press the **PROG** key again. Use the **INCR** or **DECR** key to toggle between 1 and 2 and choose the number that applies to the number of PTO speeds that the tractor has.

STEP 4

RD05F137

Press the **PROG** key to record your choice. The display will read (1) or (2) SPEED.

View Menu

STEP 5

RD05F138

RD05F139

Press the **DECR** key. The menu will read **PTO VIEW**. Press the PROG key. The display will read **SW 1**. This is the first part of the software version number.

STEP 6

RD05F140

Press the **PROG** key. The display will read SW 2. This is the second part of the software version number.

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STEP 7

RD05F138

RD05F141

Press the **PROG** key. The display will read **PTO VIEW**. Press The **DECR** key and the display will read **PTO EXIT**. Pressing the **PROG** key will exit from PTO configuration.

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SYMPTOM BASED FAULTS - NO FAULT CODES

PTO Will Not Engage -- “TURN PTO OFF” Is On Display

Meaning:
The PTO will not turn when PTO switch is placed in the ON position and no fault codes are recorded.

Possible failure mode:
1. PTO controller is not reading engine RPM at PIN C056-1 (Gray) from the alternator.
2. The 12 volt power supply wire or the PTO solenoid failed OPEN (Pin C057-4 Black connector).
3. Problem with PTO solenoid circuit.

Background:
The PTO controller looks at engine speed from the alternator and PTO output shaft speed before and after the PTO switch is turned on. The PTO controller will engage the PTO solenoid just enough to start shaft rotation. Once shaft rotation is detected the PTO controller will control clutch modulation and run up speed for several seconds before full clutch pressure is applied. If the PTO controller fails to receive information from the PTO solenoid circuit, alternator (engine RPM) or output shaft speed sensor, the PTO will not engage.

Tractors with an engine controller
-- The engine controller will provide engine RPM to the display when the alternator fails but not to the PTO controller, therefore the PTO will not engage when the PTO is turned on if the alternator fails.
-- If the PTO solenoid circuit is failed open, no fault code is recorded.
-- Problem with PTO solenoid.

Tractors without a engine controller
-- The alternator provides engine RPM to the display and to the PTO controller. The transmission controller uses data bus information from the instrumentation controller. When the alternator fails the PTO and the transmission will not engage. Engine RPM will not be displayed on the instrumentation display.
-- If the PTO solenoid circuit is failed open no fault code is recorded.
-- Problem with PTO solenoid.

PTO solenoid resistance
PTO solenoid 6.0 - 6.8 ohms at 25 C (70 F).

Wiring information:

NOTE: *Always inspect connector ends for damaged or bent or dislocated pins when troubleshooting.*
C057-5 --> C159-B (PTO solenoid) C159-A --> C057-4

Alternator (W) --> C085 --> C333-12 --> Splice--> C060-12 -->CN1-19 (instrument cluster)

Corrective action:

STEP 1 - Alternator check
Clear all fault codes.
Start the tractor and check the display for engine RPM (Tractors without a engine controller).
Turn PTO ON and then OFF.
Check for PTO fault codes.
-- NOT OK - PTO did not turn and PTO fault code 54261 is recorded, go to Step 3 (Tractor with engine controller).
-- NOT OK - No engine RPM read on display, Go to Step 2 (Tractors with no engine controller).
-- NOT OK - No PTO fault codes and PTO will not turn, Go to Step 3.
-- NOT OK - A new PTO fault code was record, go to new fault code for corrective action.

STEP 2 - Check the alternator
Check alternator output at terminal “W”.
-- OK - Go to Step 3.
-- NOT OK - Replace alternator.

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STEP 3 - Check wiring

Remove the controller cover from the rear of the tractor.
Check the wire and connections between the alternator terminal “W” and the PTO controller pin C056-1 for an open circuit.

NOTE: *A test wire can be run from the alternator terminal “W” to the PTO controller pin C056-1.*

STEP 4 - Check PTO solenoid circuit

Disconnect Connector C057
Measure the resistance between pin C057-5 and C057-4.
-- OK - Resistance measured was between 6.0 and 6.8 ohms at 25 C (100 F).
-- NOT OK - The resistance was not between 6.0 to 6.8 ohms, go to Step 5.

STEP 5 - Test solenoid

Disconnect PTO solenoid at connect C0159.
Measure the resistance of the PTO solenoid.
Inspect connector pins.
-- OK - Replace damaged wire.
-- NOT OK - Replace PTO solenoid.

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PTO CONTROLLER FAULT CODES
FAULT CODE PTO 54050
Wheel Slip Sensing Error In The Instrumentation Controller

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

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

RADAR FUNCTION
The radar is connected to the vehicle electrical system through a 4 pin connector.
Pin A: GND
Pin B: SIG,
Pin C: B+
Pin D: Present
Pin A is the radar ground. Which is connected to the vehicle clean ground through SPL-F1.
Pin B is the radar signal. The signal is of square wave form with 'Low' 0.8 VDC or less and 'High' 3.7VDC minimum. Its frequency is scaled to 44 HZ/mph and proportional to ground speed. The signal is connected to the ICU pin 13 CN1 through connector C060 Pin 25.
Pin C is the power supply to the radar from Fuse 34 through connector C010 pin 83.
Pin D is the signal from radar to ICU indicating radar is connected to the system. It is connected to the ICU Pin 13 through connector C060 Pin 28.

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 fault code HITCH 3010 and PTO 54060 should be recorded.

If there is no HITCH 3010 and PTO 54060, the problem is most 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.
2. Check the function of the radar.
   The signal is from Pin B of the radar and connected to the pin 13 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 no problem with the radar and its wiring, check the function of the instrumentation controller and the hitch controller.

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

NOTE: *See schematic sections 24,25 and 26 at the rear of this section.*

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FAULT CODE PTO 54060
Ground Speed Signal Failed In The Instrumentation Controller

Cause:
The Data Bus signaled that the transmission speed sensor has failed.
The PTO 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).

WHEEL SPEED SENSOR INFORMATION
Cavity A: Signal
Cavity B: Ground
Operating Temperature: - 40 degree C to 125 degree C
Resistance: 2700 to 3300 ohms
Inductance: 1.9 to 2.9 H
Output: 30 Hz to 7 kHz Quasi-Sinusoidal

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 via Data Bus.

If the sensor or the instrumentation controller has a problem, both fault code HITCH 3010 and PTO 54060 should appear. If only PTO 54060 is recorded, the problem is most likely with the PTO controller.

1. If the service tool is connected to the tractor, do the following:
   Go to the Monitor screen by clicking on 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 PTO 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 CN1 at the instrumentation controller.
   There should be 5 VDC power supply from pin 12 of CN1 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.
4. If none of above, check the function of the instrumentation controller and the PTO controller.

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

NOTE: *See schematic sections 24,25 and 26 and 12 thru 18 at the rear of this section.*

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FAULT CODE PTO 54130
Communication Lost With The Instrumentation Controller

Cause:
Communication lost between PTO controller and instrumentation controller.

Possible failure mode:
1. Bad connection between PTO controller and instrumentation controller.
2. Controller failure.

Solution:
Make sure both the instrumentation controller and the PTO controller are functioning OK.
Check the Data Bus connections.

1. Check the function of the PTO controller:
   a) Make sure the connector (C056) to the PTO controller is plugged in.
   b) Check the LED lamp on the PTO controller.
   LED lamp on - failed controller, replace the controller.
   LED lamp 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 most likely that there is no power to the controller. Check the power supply, its fuse, and the ground to the controller. Make sure the connector CN2 to the instrument controller is plugged in.
   b) If there is display on the tractor instrumentation but the display is erratic, such as unusual symbols, and other controllers claim communication lost with the instrument controller, it is most likely the instrument controller has failed. Replace the controller.
   c) If nothing wrong can be found 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 data ,bus and checking 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.
   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 rear terminator and data bus wiring is OK.
   If not, check for bad connection and damaged wire along the Data Bus.

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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, TRANS 12031 and PTO 54140.*

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

NOTE: *See schematic sections 44,45 and 24 at the rear of this section.*

NOTE: *Also see the data bus schematic foldout at the end of this section.*

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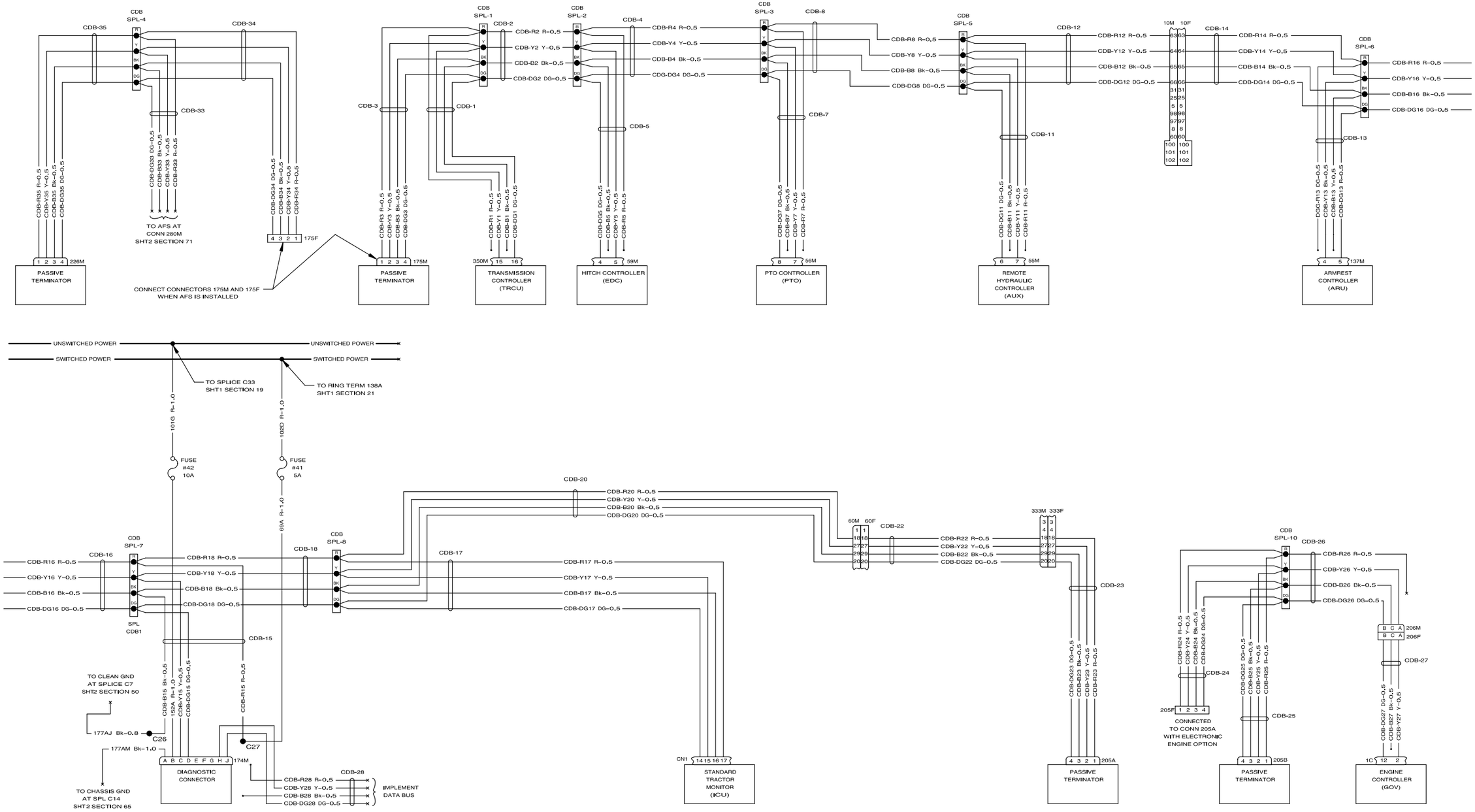

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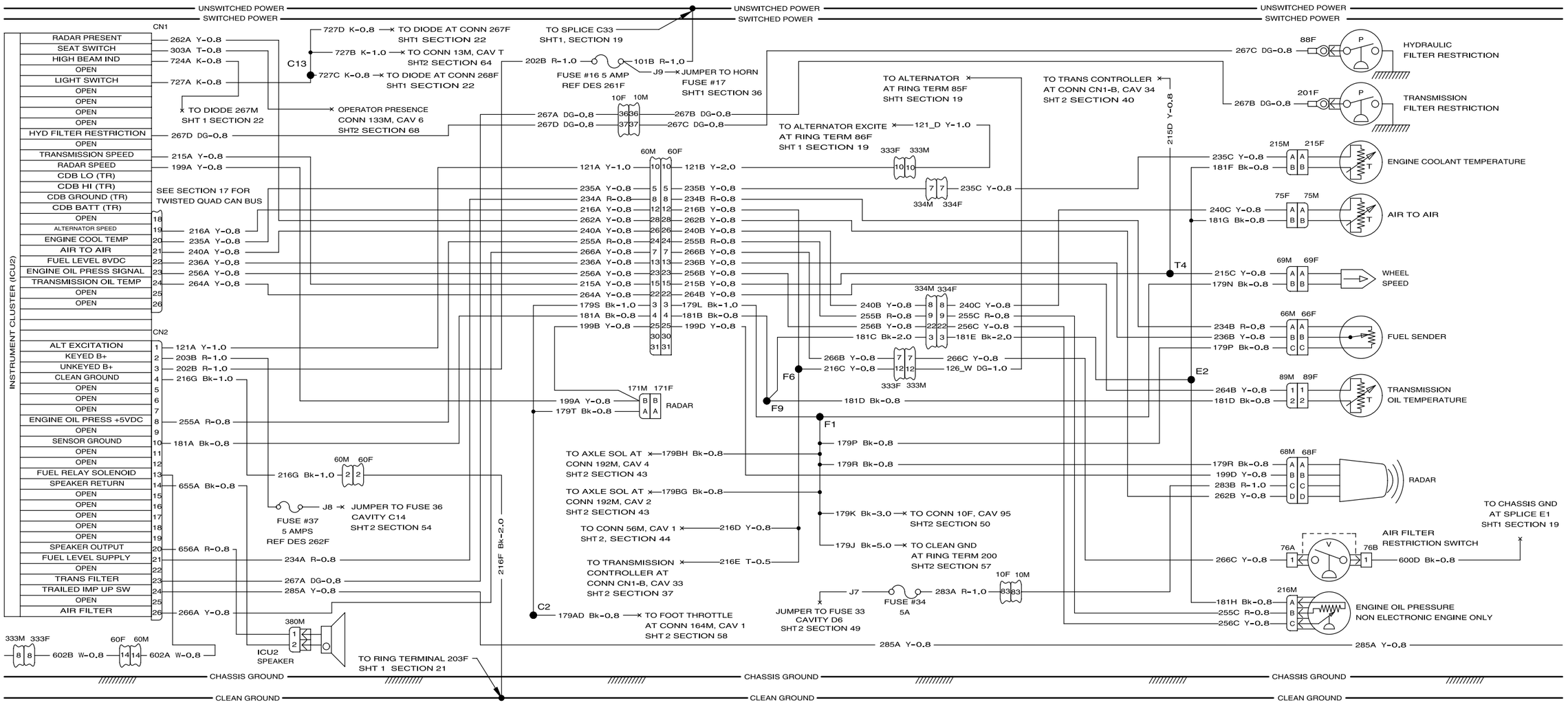

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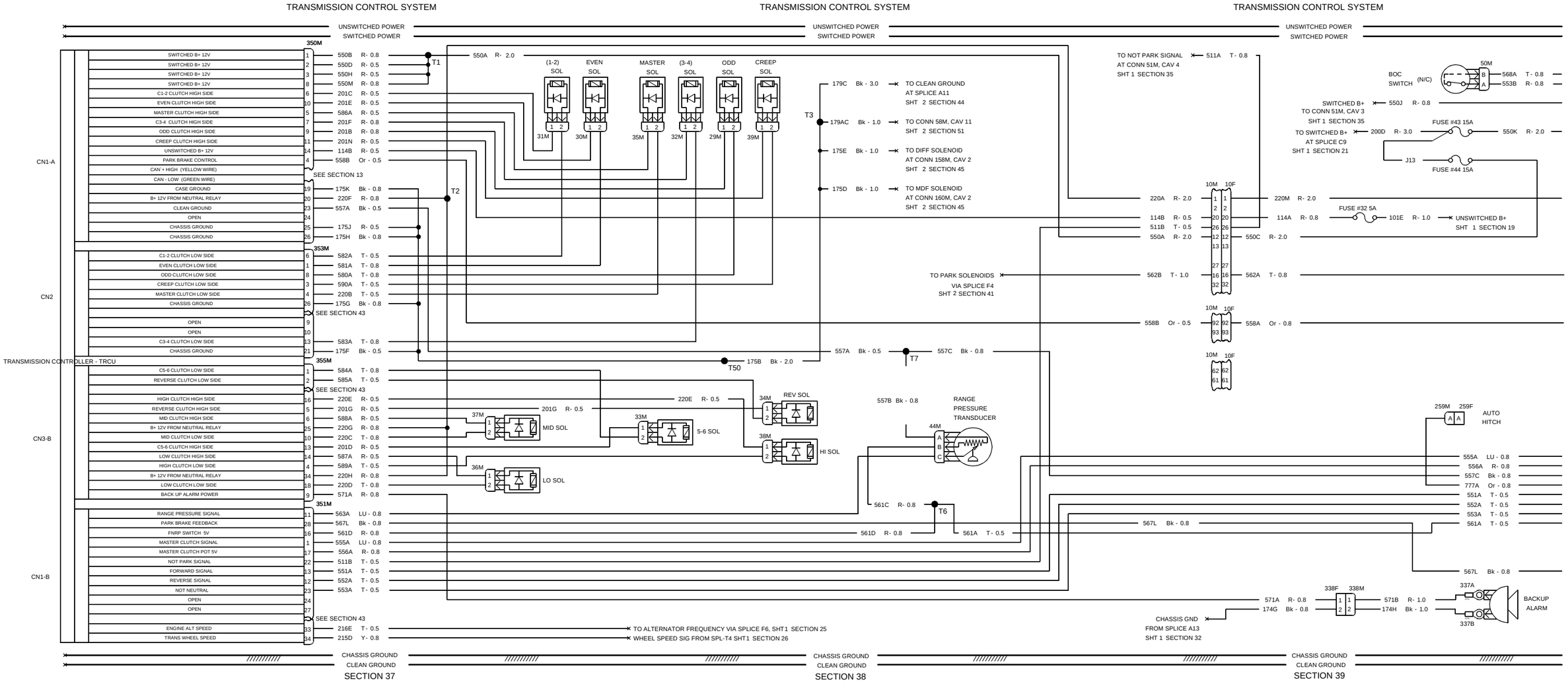

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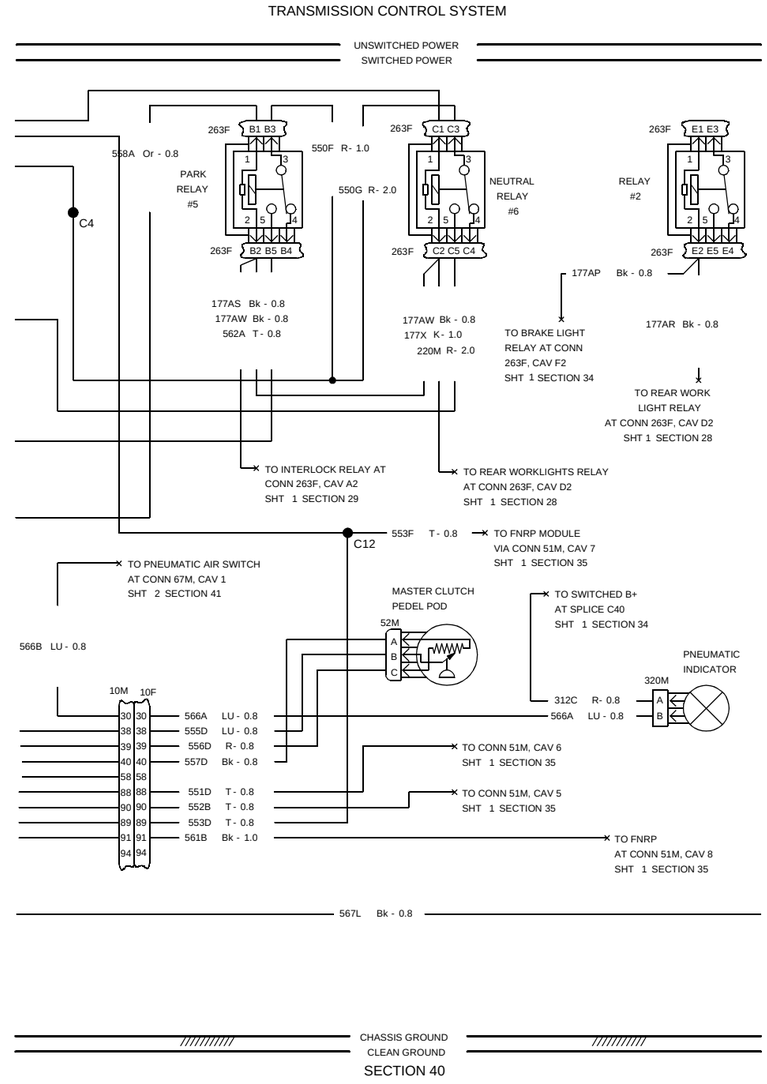
TRANSMISSION CONTROL SYSTEM



SECTION 40

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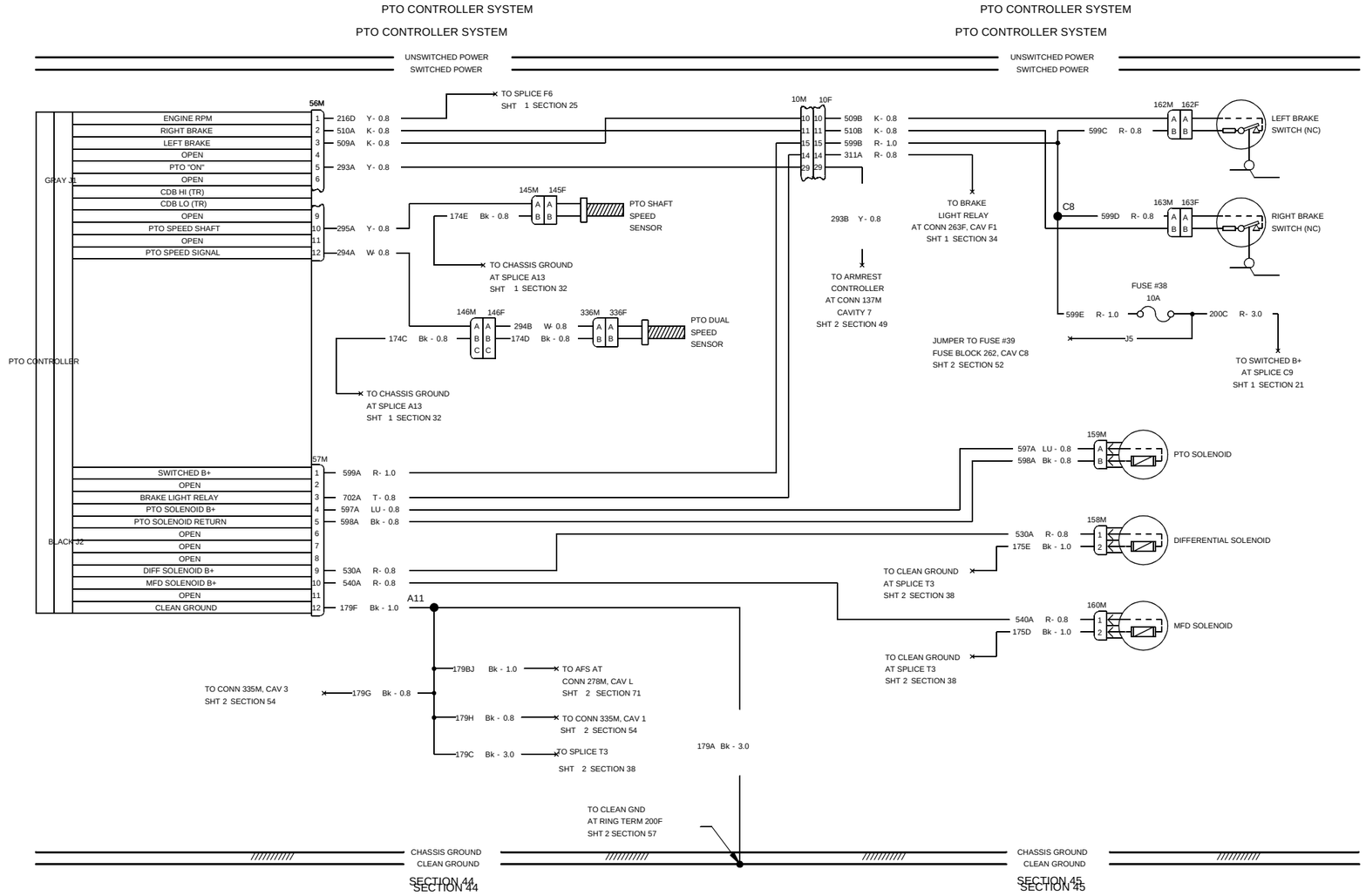

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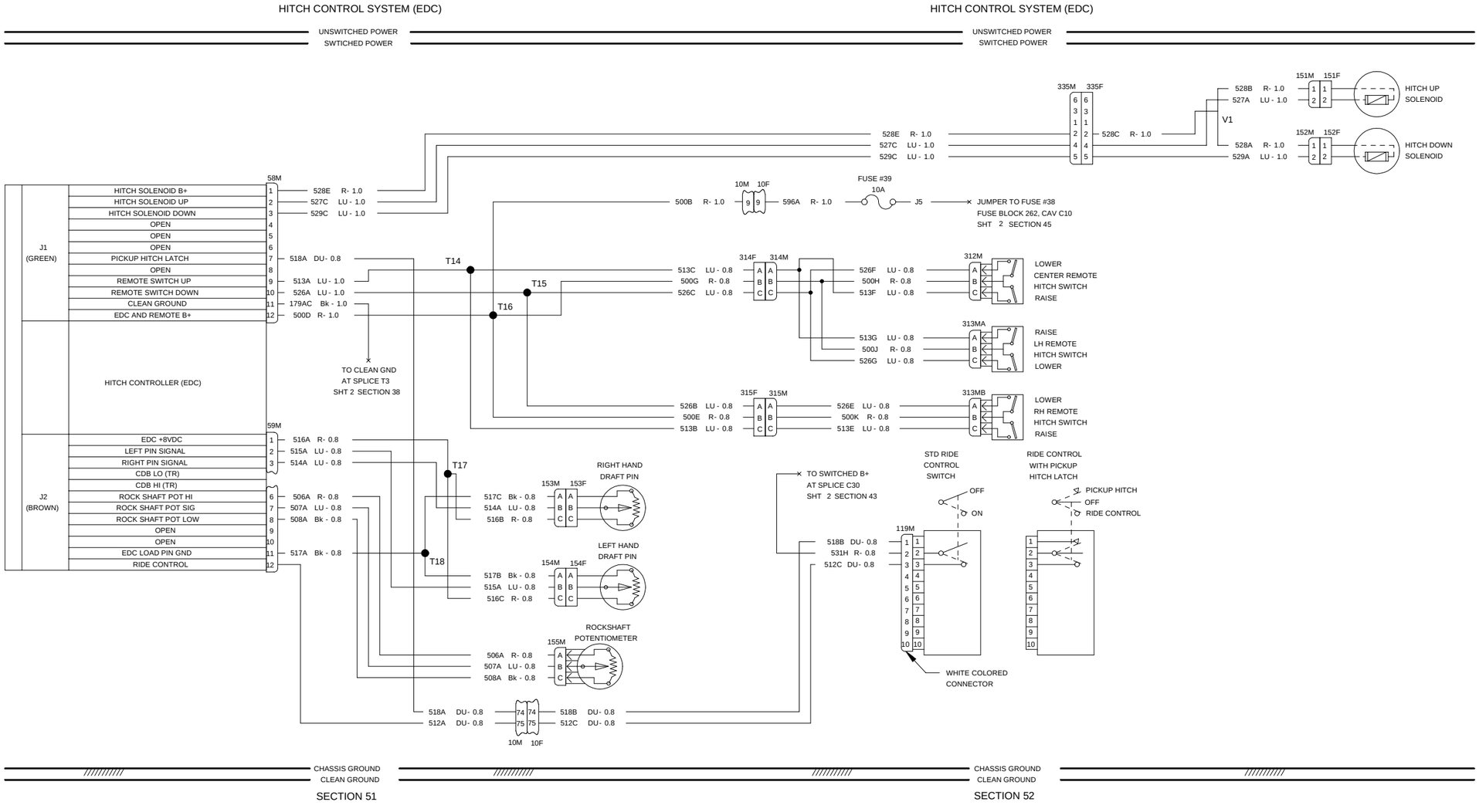

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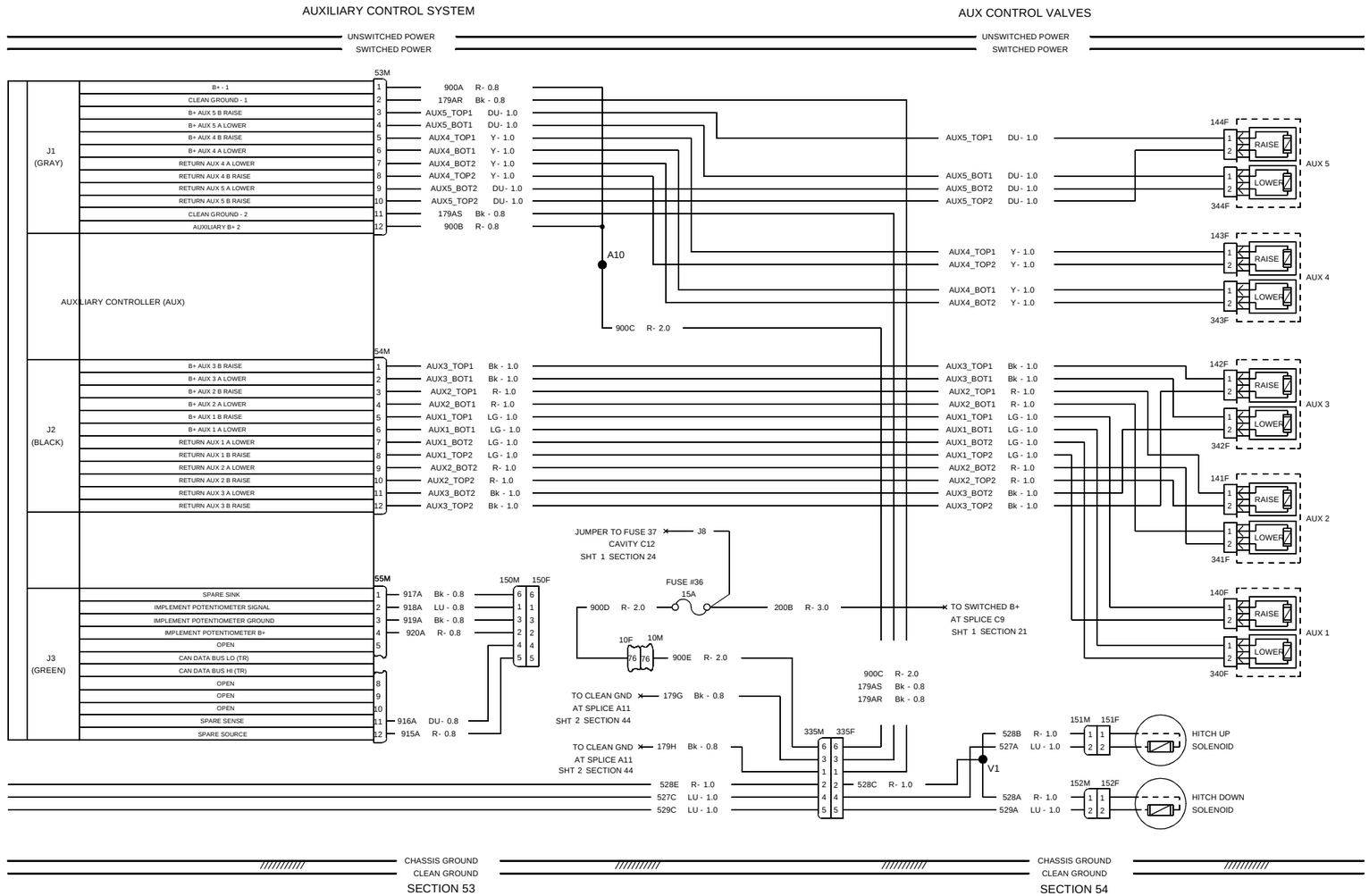
AUXILIARY CONTROL SYSTEM
AUX CONTROL VALVES
UNSWITCHED POWER
SWITCHED POWER
53M
J1
(GRAY)
B+ - 1
CLEAN GROUND - 1
B+ AUX 5 B RAISE
B+ AUX 5 A LOWER
B+ AUX 4 B RAISE
B+ AUX 4 A LOWER
RETURN AUX 4 A LOWER
RETURN AUX 4 B RAISE
RETURN AUX 5 A LOWER
RETURN AUX 5 B RAISE
CLEAN GROUND - 2
AUXILIARY B+ 2
900A R- 0.8
179AR Bk - 0.8
AUX5_TOP1 DU- 1.0
AUX5_BOT1 DU- 1.0
AUX4_TOP1 Y- 1.0
AUX4_BOT1 Y- 1.0
AUX4_BOT2 Y- 1.0
AUX4_TOP2 Y- 1.0
AUX5_BOT2 DU- 1.0
AUX5_TOP2 DU- 1.0
179AS Bk - 0.8
900B R- 0.8
A10
900C R- 2.0
AUXILIARY CONTROLLER (AUX)
54M
J2
(BLACK)
B+ AUX 3 B RAISE
B+ AUX 3 A LOWER
B+ AUX 2 B RAISE
B+ AUX 2 A LOWER
B+ AUX 1 B RAISE
B+ AUX 1 A LOWER
RETURN AUX 1 A LOWER
RETURN AUX 1 B RAISE
RETURN AUX 2 A LOWER
RETURN AUX 2 B RAISE
RETURN AUX 3 A LOWER
RETURN AUX 3 B RAISE
AUX3_TOP1 Bk - 1.0
AUX3_BOT1 Bk - 1.0
AUX2_TOP1 R- 1.0
AUX2_BOT1 R- 1.0
AUX1_TOP1 LG - 1.0
AUX1_BOT1 LG - 1.0
AUX1_BOT2 LG - 1.0
AUX1_TOP2 LG - 1.0
AUX2_BOT2 R- 1.0
AUX2_TOP2 R- 1.0
AUX3_BOT2 Bk - 1.0
AUX3_TOP2 Bk - 1.0
144F
RAISE
LOWER
344F
AUX 5
143F
343F
AUX 4
142F
342F
AUX 3
141F
341F
AUX 2
140F
340F
AUX 1
JUMPER TO FUSE 37
CAVITY C12
SHT 1 SECTION 24
J8
FUSE #36
15A
TO SWITCHED B+
AT SPLICE C9
SHT 1 SECTION 21
200B R- 3.0
900D R- 2.0
10F
10M
900E R- 2.0
TO CLEAN GND
AT SPLICE A11
SHT 2 SECTION 44
179G Bk - 0.8
179H Bk - 0.8
55M
J3
(GREEN)
SPARE SINK
IMPLEMENT POTENTIOMETER SIGNAL
IMPLEMENT POTENTIOMETER GROUND
IMPLEMENT POTENTIOMETER B+
OPEN
CAN DATA BUS LO (TR)
CAN DATA BUS HI (TR)
OPEN
OPEN
OPEN
SPARE SENSE
SPARE SOURCE
917A Bk - 0.8
918A LU - 0.8
919A Bk - 0.8
920A R- 0.8
916A DU- 0.8
915A R- 0.8
150M
150F
335M
335F
528E R- 1.0
527C LU - 1.0
529C LU - 1.0
528C R- 1.0
V1
528B R- 1.0
527A LU - 1.0
528A R- 1.0
529A LU - 1.0
151M
151F
HITCH UP
SOLENOID
152M
152F
HITCH DOWN
SOLENOID
CHASSIS GROUND
CLEAN GROUND
SECTION 53
SECTION 54

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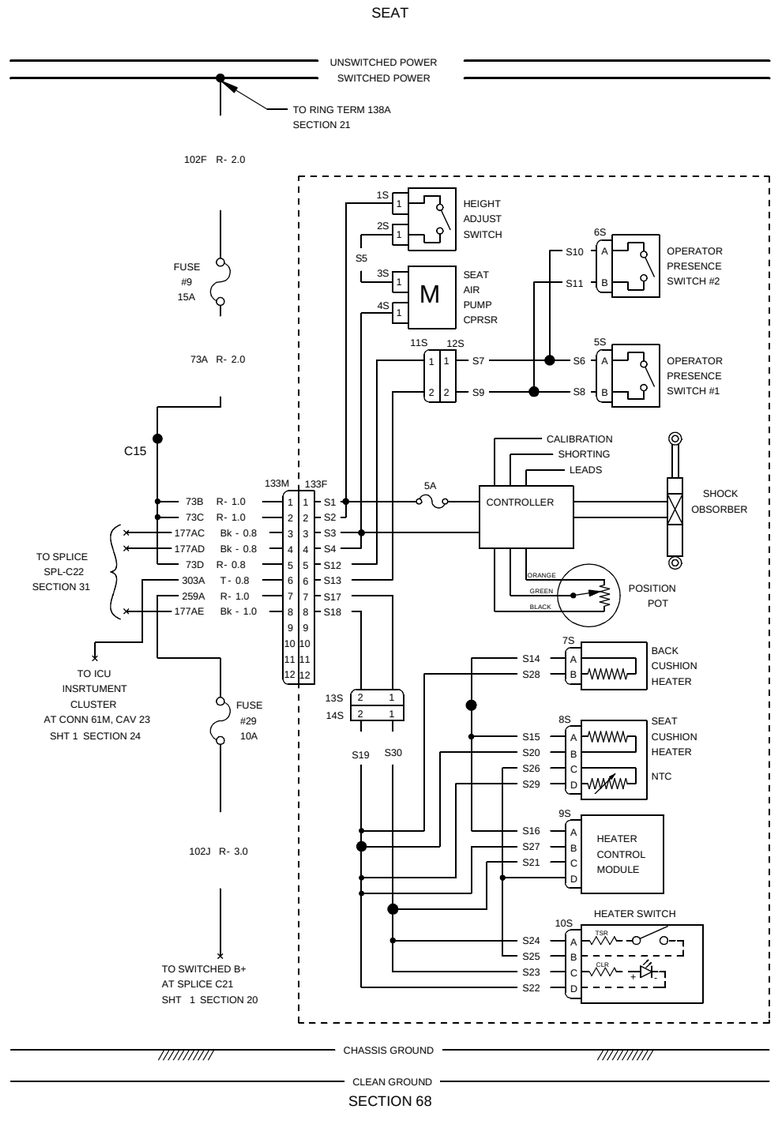
SEAT
UNSWITCHED POWER
SWITCHED POWER
TO RING TERM 138A
SECTION 21
102F R- 2.0
FUSE
#9
15A
73A R- 2.0
C15
73B R- 1.0
73C R- 1.0
177AC Bk - 0.8
177AD Bk - 0.8
73D R- 0.8
303A T- 0.8
259A R- 1.0
177AE Bk - 1.0
TO SPLICE
SPL-C22
SECTION 31
TO ICU
INSRTUMENT
CLUSTER
AT CONN 61M, CAV 23
SHT 1 SECTION 24
FUSE
#29
10A
102J R- 3.0
TO SWITCHED B+
AT SPLICE C21
SHT 1 SECTION 20
133M
133F
1S
HEIGHT
ADJUST
SWITCH
2S
S5
3S
SEAT
AIR
PUMP
CPRSR
4S
M
6S
S10
S11
OPERATOR
PRESENCE
SWITCH #2
11S
12S
S7
S9
5S
S6
S8
OPERATOR
PRESENCE
SWITCH #1
CALIBRATION
SHORTING
LEADS
5A
CONTROLLER
SHOCK
OBSORBER
ORANGE
GREEN
BLACK
POSITION
POT
S1
S2
S3
S4
S12
S13
S17
S18
7S
S14
S28
BACK
CUSHION
HEATER
13S
14S
8S
S15
S20
S26
S29
SEAT
CUSHION
HEATER
NTC
S19
S30
9S
S16
S27
S21
HEATER
CONTROL
MODULE
HEATER SWITCH
10S
TSR
CLR
S24
S25
S23
S22
CHASSIS GROUND
CLEAN GROUND

SECTION 68

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