



Autopilot

AUTOMATED STEERING SYSTEM

Version 4.00
Revision A
September 2016

LEGAL NOTICES

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Or

Mail a request for recycling instructions to:

Trimble Europe BV
c/o Menlo Worldwide Logistics
Meerheide 45
5521 DZ Eersel, NL





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Chapter 1

AUTOPILOT SYSTEM TOOLS

- ▶ Cable service kit for the NavController II / NavController III navigation controllers
- ▶ Hydraulic test kit for the Autopilot system

This chapter describes tools that are required for servicing the Trimble® Autopilot™ automated steering system.

Cable service kit for the NavController II / NavController III navigation controllers

The Deutsch DTM Service kit is now available through Ladd Industries. This kit will support the repair or modification of cable connectors on the Trimble NavController II /NavController III navigation controller.

Part number availability

The kits come with pins and sockets for stamped and solid contacts. Because most cables are 16–20 gauge wire, use the DTT-20-00 crimping tool and corresponding stamped contacts.

However, if you currently use the HDT-48-00 crimping tool you can use the solid contacts with your crimper for 18 gauge wire, but the 16 gauge wire will not fit in the solid contact unless you trim the wire first.

Name	Part number	Image
Trimble Deutsch DTM service kit	7005-107	
Crimping tool for size 20 pin 16-20 gauge wire and stamped contacts	DTT-20-00	
Crimping tool for size 20 pin 18-24 gauge wire and solid contacts	HDT-48-00 (TPN 5401-1568)	

Ordering information

To place an order please contact:

LADD Industries

Tel: 800-223-1236

Email: laddcustomersupport@te.com

On the order please include the:

- ▶ Shipping address
- ▶ Billing account information or credit card details (type of card, expiry date, and name on card)
- ▶ Telephone number

Please state that you are a Trimble Reseller to ensure that you get preferential Trimble pricing.

Note – *This offer is only available in the United States, and Ladd has a minimum order of \$50 when re-ordering.*

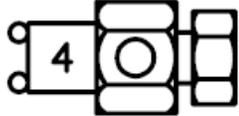
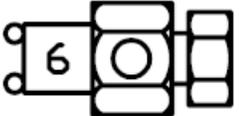
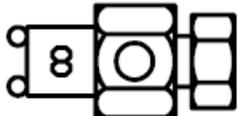
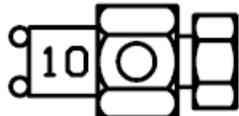
Hydraulic test kit for the Autopilot system

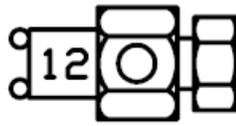
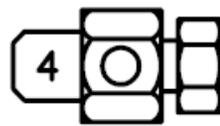
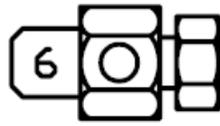
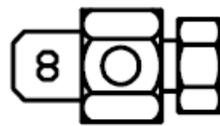
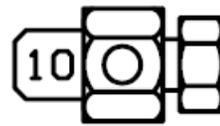
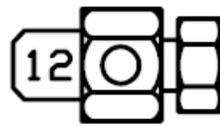
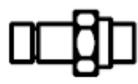
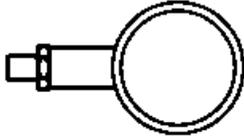
This section describes how to build a kit to test the Autopilot system hydraulics. You can obtain a test kit by buying:

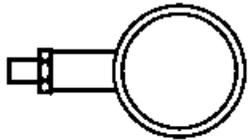
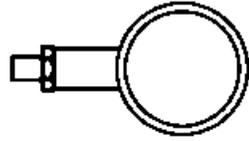
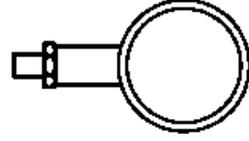
- ▶ Individual components from third-party companies
- ▶ A pre-assembled kit from TIFCO Industries

Building a basic test kit

Include the following components in a basic test kit:

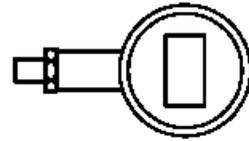
Name	Quantity	Part number	Example
Hydraulic adaptor	1	4-4 LOHL6GP5TP	
Hydraulic adaptor	2	6-4 LOHL6GP5TP	
Hydraulic adaptor	2	8-4 LOHL6GP5TP	
Hydraulic adaptor	1	10-4 LOHL6GP5TP	

Name	Quantity	Part number	Example
Hydraulic adaptor	1	12-4 LOHL6GP5TP	
Hydraulic adaptor	1	4-4 XHX6G5TP	
Hydraulic adaptor	2	6-4 XHX6G5TP	
Hydraulic adaptor	1	8-4 XHX6G5TP	
Hydraulic adaptor	1	10-4 XHX6G5TP	
Hydraulic adaptor	1	12-4 XHX6G5TP	
Hydraulic adaptor	6	PD331	
Hydraulic adaptor	4	PD242	
18"-24" hydraulic hose	1	PDH-19	
Hypro pressure gauge: 2-1/2 LF SS 1/4 BM 5000 PSI	1	(Hypro part number): GG5000	

Name	Quantity	Part number	Example
Hypro pressure gauge: 2-1/2 LF SS 1/4 BM 3000 PSI	1	(Hypro part number): GG3000	
Hypro pressure gauge: 2-1/2 LF SS 1/4 BM 600 PSI	2	(Hypro part number): GG600	
Hypro pressure gauge: 2-1/2 LF SS 1/4 BM 200 PSI	2	(Hypro part number): GG200	

Building a complete test kit

To create a complete test kit, include the following additional components:

Name	Quantity	Part number	Example
Digital pressure gauge	2	SCM-050-0-PD	
Flow meter alum 3500 psi, 2–2.0 GPM, 1/4 NPTF	1	(Hedland part number) H201A-020	
Flow meter alum 3500 psi, 5–5.0 GPM, 1/2 SAE	1	(Hedland part number) H600A-005	
Flow meter alum 3500 psi, 3–30 GPM, 3/4 SAE	1	(Hedland part number) H700A-030	

Valve cartridges

For a complete test kit, add the following valve cartridges:

For use with H2 / H3

Description	Part number
Eaton bypass 160 psi – Hybrid	56922
Eaton bypass 40 psi – Hybrid	59119
Eaton P-comp 160 psi – Hybrid	56910
Eaton P-comp 40 psi – Hybrid	56909
Eaton P-comp plug – Hybrid	56907
Eaton PTS 160 – Hybrid	56905

Basic SUN cartridges for PSV4 and Counterbalance manifold

Description	Part number	Part number
SUN Counter Balance cartridge in counterbalance valve	47284	CBCA-LHN
SUN 50 psi PressureComp cartridge in PSV4	55147	LPDC-XDN
SUN 150 psi Pressure Comp cartridge in PSV4	2523–2018	LPDC-XGN

Ordering information

Company	Web address
Parker Diagnostics	http://www.parker.com/
Hypro Gauges	http://www.hypropumps.com/
Hedland Flow Meters	http://www.hedland.com

Alternative options

TIFCO Industries sells a pre-assembled kit that is designed for the agricultural market. Go to <http://www.tifco.com>.



≡ Chapter 2

AUTOPILOT SYSTEM INFORMATION

- ▶ LED states
- ▶ Determining the NavController firmware version
- ▶ Upgrading the NavController firmware
- ▶ Autopilot Toolbox CAN Diagnostics
- ▶ Hydraulics
- ▶ Fault codes: Causes and solutions

This chapter describes the controller LED states, firmware versions, hydraulic theory, and the error codes that can occur on the Autopilot automated steering system. It then explains how to correct the faults.

LED states

There are four LED states that indicate the status of the NavController II /NavController III navigation controllers:

LED state	Controller status	Solution
Solid on	MCU not working	Autopilot function not available
Slow blinking at 0.5 Hz	Fail-safe monitor mode	Autopilot function not available. Need to reflash firmware.
Medium blinking at 1 Hz	Monitor mode (usually when connected to Flashloader software)	Autopilot function not available
Rapid blinking at 12 Hz	Application mode	Normal operation
2 short blinks, break	Controller State: NavControllerIII is upgrading IMU firmware	Autopilot will not function until IMU flashing is complete

Determining the NavController firmware version

Use the Autopilot display as described below to view the firmware version and date on the selected screen. Update the controller firmware to the latest revision, if available.

On the	Do this
FieldManager display	Press the Home button.
EZ-Guide 500 lightbar	Select <i>Autopilot configuration / About Autopilot</i>
EZ-Guide Plus lightbar	From the <i>Configuration</i> screen, select <i>AUTOPILOT / DIAGNOSTIC</i> .
AgGPS 170 field computer	From the main menu, select <i>EQUIPMENT / AgGPS AUTOPILOT</i> .
FmX® integrated display	On the home screen, press the <i>System information</i> tab.
CFX-750™ display	Select <i>Settings / Vehicle /Status /Autopilot Status</i> .
TMX-2050™ display running the FmX Plus application	On the home screen, press the <i>System information</i> tab.
TMX-2050 display running the Precision-IQ™ application	On the home screen, press the menu button on the upper right corner and then select <i>Diagnostics</i> . On the <i>diagnostics</i> page, click System performance .
Autopilot Toolbox	Select <i>Tools /Information</i> .

Upgrading the NavController firmware

Note – The firmware for the NavController II and III contained in the same files. NavController III requires firmware version 10 or later. The Flashloader 200 utility is used to upgrade the NavController unit.



Before flashing firmware to the NavController, ensure that:

- ▶ The NavController is turned on.
- ▶ NMEA output is turned off from the Autopilot system.
- ▶ No other program is using the serial port on the computer that will be used to flash the firmware (for example, the Autopilot Toolbox utility).
- ▶ A power inverter is not being used to power the computer.

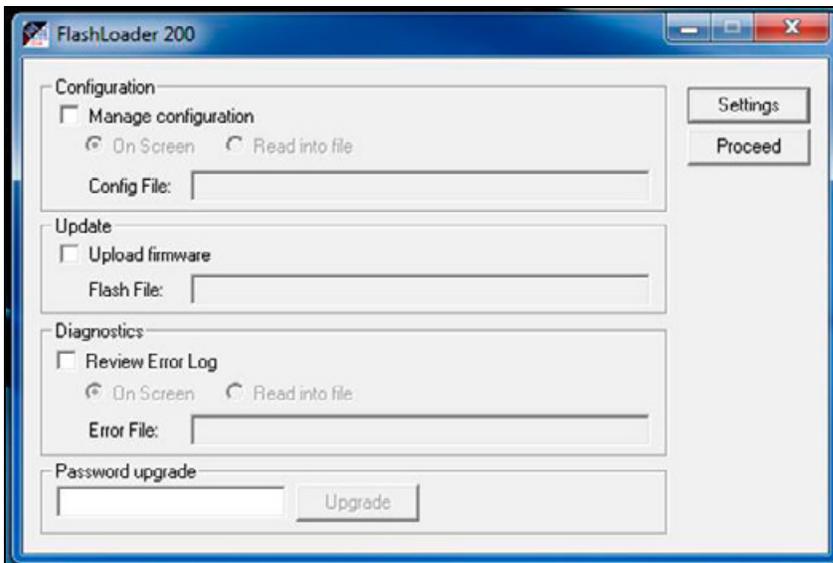
- ▶ There is a good serial connection to the NavController, either via a hard serial port or a USB serial adapter. Trimble recommends SeaLink USB-Serial adapters: This can be obtained at <http://www.sealevel.com/store/2105r-usb-to-1-port-rs-232-db9-serial-interface-adapter.html>

Note – Poor serial connections can cause firmware flashing to fail.

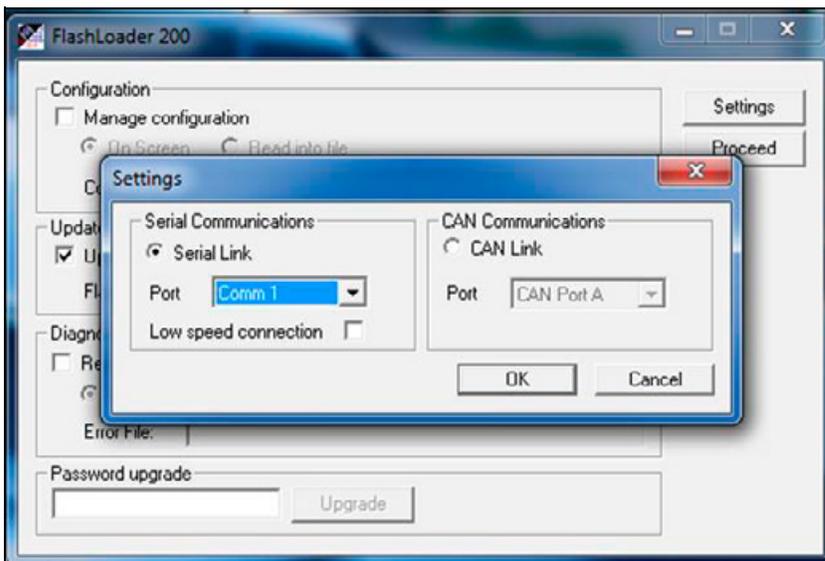
- ▶ The firmware file to be flashed is downloaded and stored in a known location on the computer.

Flashing the firmware

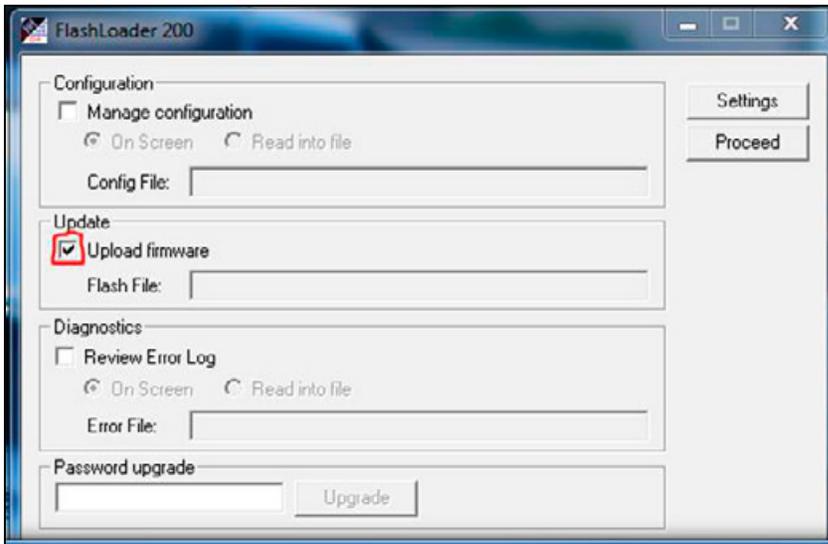
1. Run the Flashloader 200 utility and then click **Settings**:



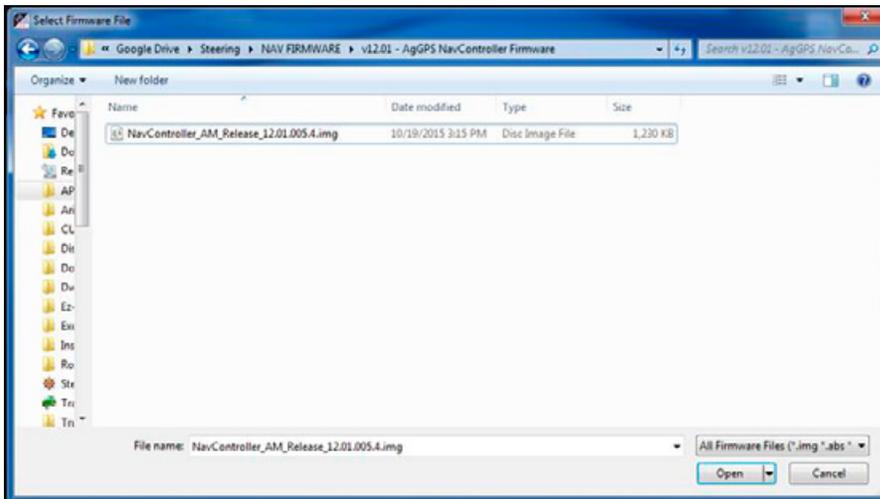
2. Select the required *Serial Communications* link and then click **OK**:



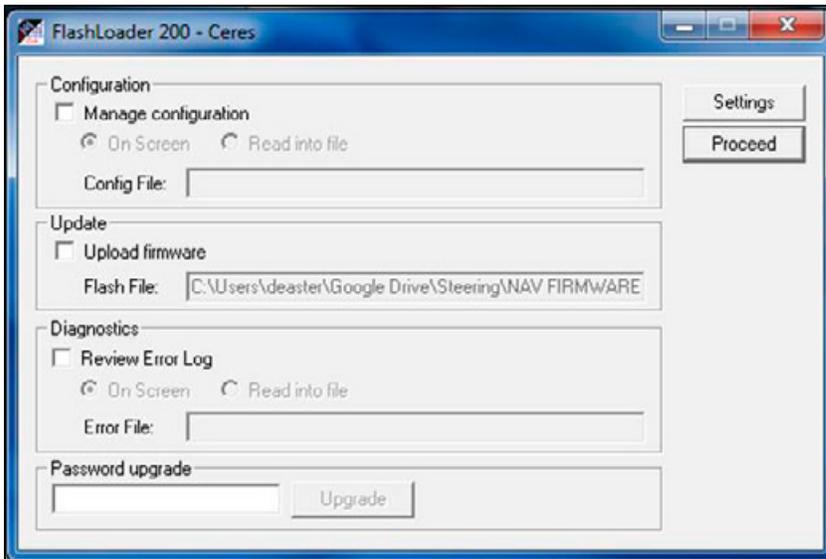
3. Select the *Upload Firmware* checkbox:



4. Browse to the desired NavController Firmware .img file and then click **Open**:



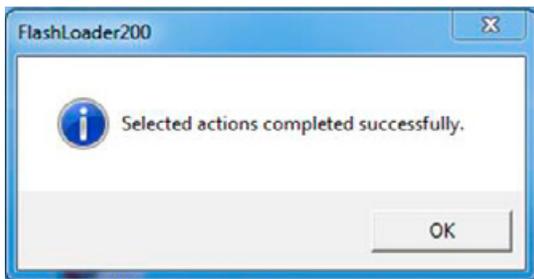
5. Click **Proceed**:



The Flashloader utility will now do the following:

- *Querying*: This should go quickly (~5 seconds). If the utility stops working, there is a serial communication problem.
- *Uploading New Firmware*: It takes approximately 1–3 minutes for the firmware to be uploaded to the controller.
- *Erasing Program Space*: This should go quickly (~10-15 seconds).
- *Programming New Firmware*: This should go relatively quickly (~ 30 seconds).

When complete, a message appears to confirm that the action was completed successfully:



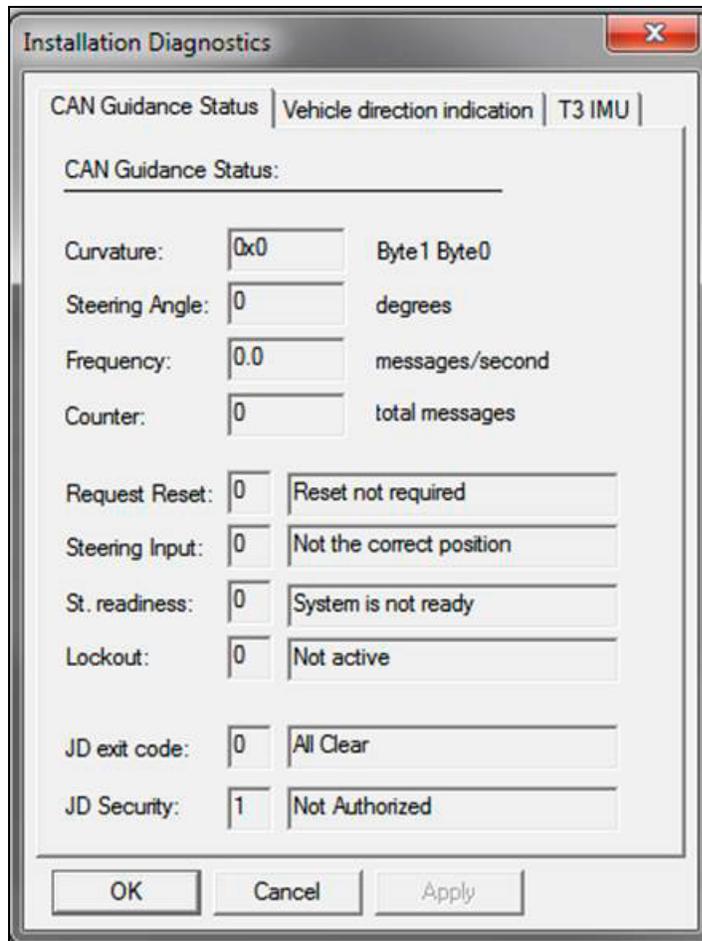
The NavController will now reset. Depending on the version of the firmware, the LED, may go dark for a while and the Sonalert will emit a series of beeps that speed up. At the end of the beeps, the LED will blink once, and will then appear as normal.

Note – Setting the Vehicle profile to "Default Vehicle" before flashing the firmware will clear the flash file memory on the NavController, thereby erasing any corrupted profile settings. When this is done, the sonalert series of beeps occurs.

Note – On NavController IIIs. If a newer version of IMU firmware is contained within the controller firmware, the IMU processor will be upgraded after the controller is updated. During this process, the LED will quickly blink twice, then break, blink quickly twice, then break and continue this until the IMU update is complete. **Do not remove power during the upgrade.**

Autopilot Toolbox CAN Diagnostics

For vehicles that use the CAN interface for the NavController to send curvature commands to a closed loop controller on the machine, the Autopilot Toolbox utility has a *Can Diagnostics* page to help troubleshoot connection or state errors.



CAN basics

Types of CAN vehicle implementation

- ▶ **ISO**. Follows the communication protocol outlined by ISO 11783:
 - Krone
 - CLAAS
- ▶ **ISO "Plus"**. Follows the communication protocol outlined by ISO 11783 but has more stipulations added
 - AGCO DT/RT (additional Sauer Danfoss status items)
 - AGCO Challenger MT wheeled/Massey Ferguson
 - John Deere (must pass Security and Curvature matching)
 - Valtra

- ▶ **Proprietary.** Messaging is unique:
 - AGCO MT tracked vehicles
 - Fendt 700/800 (entirely proprietary)
 - Case IH & New Holland tractors and combines
 - Austoft 8800 sugarcane harvester

Communication basics

- ▶ **Guidance Status Message.** Machine telling controller current:
 - Curvature (steering angle), Units of "X" km-1 (positive is turning right).
 - Steering Input Status:
 - 00 - not the correct position
 - 01 - correct position
 - 10 - error indication
 - 11 - not available
 - Reset required:
 - 00 - Reset not Required
 - 01 - Reset Required
 - 10 - Error indication
 - 11 - not available
 - Steering System Readiness:
 - 00 - System is not ready
 - 01 - System is Ready
 - 10 - Error Indication
 - 11 - Not Available
 - Valve lockout/Roading switch
 - 00 - not active
 - 01 - Active
 - 10 - Error Indication
 - 11 - Not Available
- ▶ **Guidance Command Message.** Controller telling machine the desired curvature.
 - Curvature Command Status:
 - 00 - not intended to steer
 - 01 - Intended to Steer
 - 10 - Reserved
 - 11 - not available
- ▶ **Messages occur at 10 Hz.** If no messages for a set period of time: the controller, the machine or both throw a fault (118s, 177s and so on).

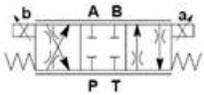
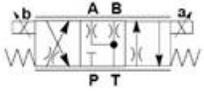
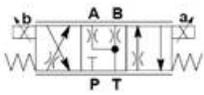
A lack of messages is usually the result of CAN bus electrical problems:

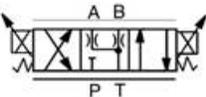
- ▶ Faulty wiring
- ▶ Termination issues
- ▶ Unhooked cables
- ▶ For some proprietary communication protocols, system errors can be transmitted and cause faults (for example, steering position out of range on Fendt vehicles).

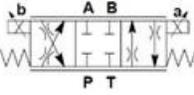
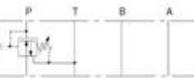
Hydraulics

Valves and manifolds

Trimble uses two valve sizes (D03 and D05) in various configurations and flow ratings.

Valve	Image	Description
<p>D03 19 LPM PWM closed center proportional valve and subplate</p> 		<p>Trimble P/N 49903 Manufacturer P/N KDG4V-3S-2C19N-M-KU-P1-U-H5-60</p> <p>This is a 19 LPM PWM valve that is closed center when the spool is in the neutral position. Meter-in and meter-out flow control. It is used in applications where there is a constant pressure supply. The aluminum sub-plate serves only as a mount with direct ports to P, T, A, and B.</p>
<p>D03 8 LPM PWM proportional valve</p> 		<p>Trimble P/N 67987 Manufacturer P/N KDG4V-3S33C08A-MKUP1H5-60EN692</p> <p>This valve is an 8 LPM PWM valve that has the A and B ports orificed to tank when the spool is in the neutral position (motor spool). Meter-in only flow control. It is used in both Open Center and Closed Center applications.</p>
<p>D03 8 LPM proportional valve with H3 manifold open-center configuration</p>		<p>Trimble P/N 89017</p> <p>This valve/manifold combination is used on smaller open center vehicles. The valve is P/N 67987; an 8LPM PWM valve. Counterbalance valves are used for flow control through the A and B ports.</p>
<p>D03 22 LPM PWM proportional valve</p> 		<p>Trimble: P/N 67988 Manufacturer: P/N KDG4V-3S33C22A-MKUP1H5-60EN692</p> <p>This valve is a 22 LPM PWM valve that has the A and B ports orificed to tank when the spool is in the neutral position (motor spool). Meter-in only flow control. It is used in both Open Center and Closed Center applications.</p>

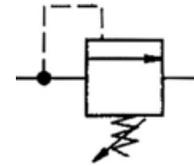
Valve	Image	Description
<p>D03 22 LPM PWM proportional valve with H3 closed-center configuration</p>		<p>Trimble P/N 89018</p> <p>This valve/manifold combination is used in medium-sized vehicles for closed-center load sensing applications.</p> <p>LS1 and LS2 have a pilot to shift the cartridge between them.</p> <p>The valve is P/N 67988; a 22 LPM PWM valve.</p>
<p>D03 22 LPM PWM proportional valve with H3 open-center configuration</p>		<p>Trimble P/N 89020</p> <p>This valve/manifold combination is used on medium open-center vehicles. The valve is P/N 67988, a 22LPM PWM valve.</p> <p>Counterbalance valves are used for flow control through the A and B ports.</p>
<p>D05 60 LPM PWM proportional valve</p> 		<p>Trimble P/N 67040</p> <p>Manufacturer P/N D3FWE02SCNJW0</p> <p>This is a closed-center 60 LPM PWM valve used on 4WD tractors in combination with the P/N 89019 manifold.</p> <p>Flow control in meter-in and meter-out.</p>
<p>D05 Manifold</p>		<p>Trimble P/N 89019</p> <p>This manifold is used with the D05 PWM valve.</p> <p>It has counterbalance isolation and is configured for closed-center use with a shuttle between LS1 and LS2.</p>
<p>60 LPM PWM proportional valve and manifold</p>		<p>Trimble P/N 0720-4900</p> <p>This valve/manifold combination is used on the John Deere ILS machines.</p> <p>It has a 60 LPM valve with D05 sub-plate, shuttle assembly, and pilot-operated checks.</p>

Valve	Image	Description
<p>DO3 8 LPM PWM closed-center proportional valve</p> 		<p>Trimble P/N 47165 Manufacturer P/N KDG4V-3S-2C08N-M-U-H5-60</p> <p>This is an 8 LPM PWM valve that is closed center when the spool is in the neutral position.</p> <p>It is used in applications where there is a constant pressure supply. Flow control in meter-in and meter-out.</p> <p>This is currently used only on the pilot controlled John Deere 8XX0 4WD and John Deere 4X40/4X55/4X60 tractors.</p>
<p>Pressure-reducing DO3 sandwich valve</p> 		<p>Trimble P/N 62427 Manufacturer P/N DGMX2-3-PP-L-YW-S-40</p> <p>This is a pressure-reducing valve used on the pilot controlled John Deere 8XX0 4WD and John Deere 4X40/4X55/4X60 tractors.</p>

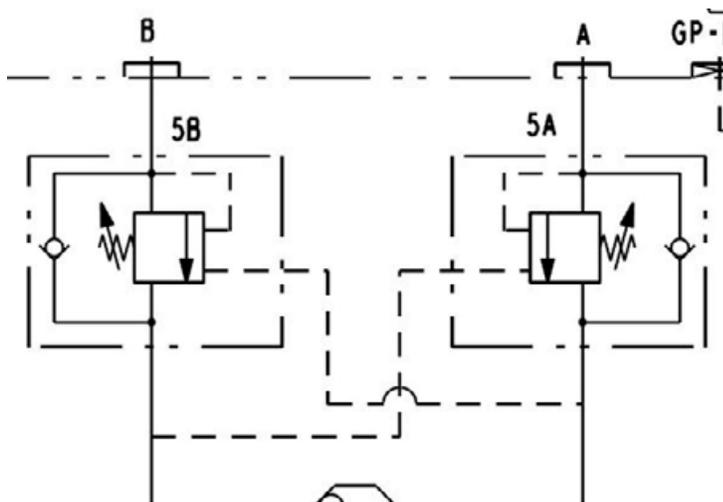
Cartridges

Counterbalance valves: Operation

Counterbalance valves are used in circuit design to prevent a weight from falling uncontrollably. This is done by using a valve that has a spring pressure against it to regulate the flow. The pressure in the direction of the flow is 'piloted' against this spring. When the pressure exceeds the spring pressure, the valve is opened and flow is allowed. For controlling loads, the spring pressure is usually set some safe value above the pressure applied by the load.



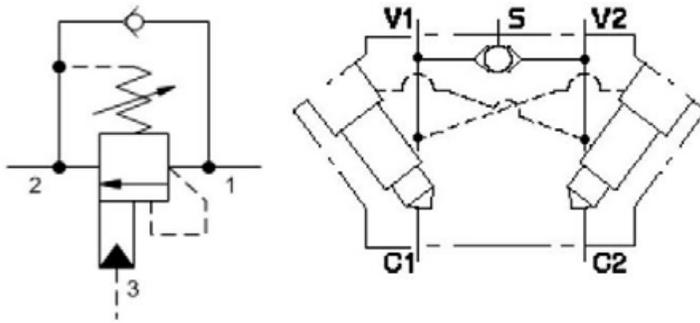
The Autopilot system uses counterbalance valves in a dual configuration to isolate either the H3 or the handpump from the steering circuit when the other actuator is in use. In this case they are cross piloted so that flow out of one port (A) opens return flow for the other (B).



Note that the check valve allows for free flow out of H3 with no requirements to overcome the pilot pressure. The pilot pressure is what can be adjusted (shown by the arrow with the spring through it in the image above) on the older versions of H3. The new versions of H3 do not allow for adjustment. This is set to open at a specific pressure and should not be adjusted. The function of the return port being piloted open based on the pressure at the load port facilitates a metering function that controls the return flow based on the load pressure. This effectively provides the meter-out function as the valve spool does not employ a meter-out capability. The CBV cartridges have a secondary function: To provide a work port pressure relief function. If the work port (cylinder line) exceeds the set pressure of the CBV, the CBV will open and allow oil to flow into the H3, backflow through the proportional valve, and out to tank.

The DCBV used in isolating the hand pump for reactive systems does essentially the same thing. DCBVs isolate anything upstream of them from pressure that is seen downstream, so when the Autopilot system is steering the DCBV this keeps the reactive steering handpump from seeing that pressure; the load-holding ability of a DCBV valve is used to isolate the handpump from the Autopilot system pressure. A pilot-operated check also functions this way but a DCBV adds both the relief capability and has better metering properties.

The shuttle valve in the DCBV is in an alternate location to the pressure transducer used for manual over-ride.



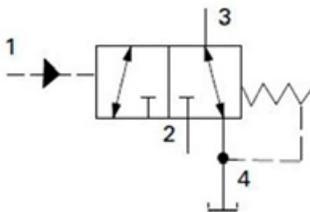
Remember: C goes to cylinder, V goes to valve (in this case, the hand pump) and **do not touch the pressure adjustment!**

Pilot to shift cartridges: Operation

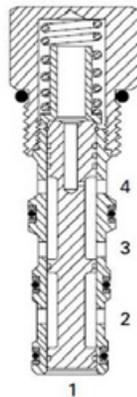
Pilot-to-shift cartridges are used to change the LS line output in the LS2 line between the input from the LS1 line generally coming from the vehicle hand pump and the internal LS signal from H3. The different values are the pre-load against the internal signal to keep the hand pump in control. A lower value will make it harder to switch back to manual steering but makes it quicker for the Autopilot system to get the pressure it needs upon initial engagement. The PTS functions very similarly to a shuttle valve.

When not needed for the particular circuit, that is, open-center circuits, the PTS cartridge cavity is capped off using a simple SAE plug allowing all the LS passages in H3 to connect as LS1. LS2 and Px are not used and will also be plugged with SAE plugs.

Functional Symbol

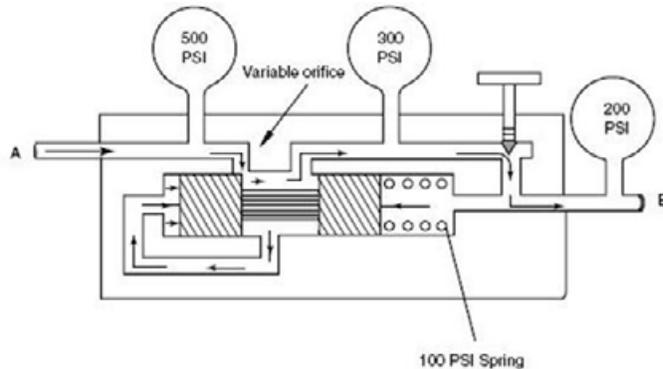


Sectional View



Pressure-compensation (P-Comp) cartridges: Operation

A pressure-compensated flow-control valve has a provision for maintaining the pressure drop across the proportional valve as the load pressure and supply pressures vary. This is used to control speed of actuation, that is the back and forth wheel movement.



When the H3 valve is the only component providing the load sense signal to the priority valve, the pressure supplied to the spool is what the H3 valve has called for. But when additional items are on the circuit (SCVs, hand pumps, brakes, and so on), other items may be calling for a higher pressure than that needed by the H3 valve.

A pressure compensation valve is used to keep a constant pressure across the steering spool in H3, regardless of input pressure. The value of the P-Comp valve is the pressure maintained across the spool. So if the system is too aggressive, insert a lower value P-Comp valve. If the system is sluggish, put in a higher value P-Comp valve or just put a specific cavity plug in which will allow full pressure across the spool (done in most kits as a the flow rate through H3 is not highly dependent on the differential spool pressure).

Note – A simple SAE plug will not work in this case as the LS port in the P-Comp cavity must be blocked.

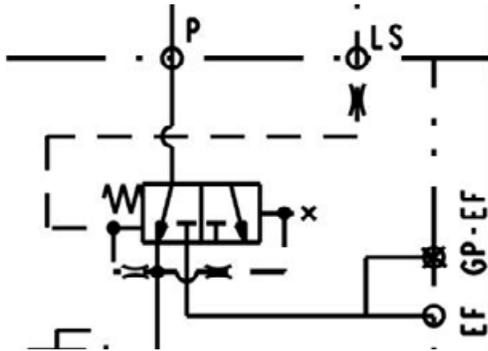
Priority flow regulation valve dynamic (PFRD) cartridges: Operation

Priority valves are used to control the flow/pressure between circuits by catering to devices when they request it - thus making hydraulic circuits more efficient.

In the case of H3 (with the priority valve sandwich block), the pressure from the pump is intercepted and put into the P port. Then the EF (excess flow) line is run back to the hand-pump.

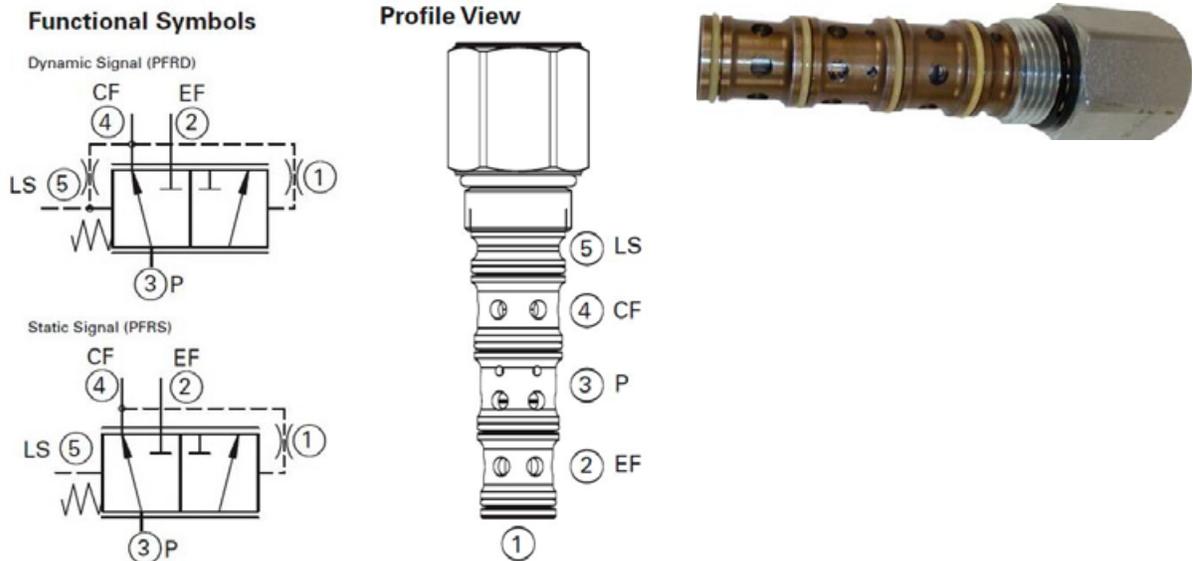


When manual steering, flow goes right through the H3, out the EF line, to the hand pump. When the Autopilot system is engaged, the LS pressure in H3 causes the PRFD to divert some or all of the pump flow to H3. Any flow not needed by H3 is directed to the EF port.



PFRD cartridges are similar to the pressure compensation cartridge discussed earlier in that they maintain a pressure across the H3 spool and also control the flow rate to the priority (H3) and excess flow (EF) port. All flow from the pump goes to H3 or out the EF port.

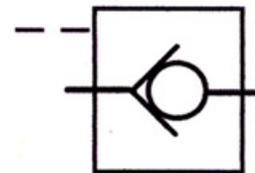
Generally, the EF port returns oil to the tank via several other open-center components. Trimble uses two variations: 110psi and 145 psi, like the P-Comp valve, and these are the pressures maintained across the H3 spool. The 145 psi cartridge will flow more oil through the H3 valve than the 110 psi cartridge.



Check valves: Operation:

Check valves are used to limit the flow of a fluid in one direction only. These are used in the Autopilot system to control load sense signal bleed off, and tank back pressure feedback.

Some check valves also have a preloaded opening pressure (cracking pressure) so that flow may only go in the desired direction after exceeding a specified pressure. This is mostly used on some kits to help keep tank back pressure from causing steering wheel movement while engaged.



Fault codes: Causes and solutions

Autopilot system fault code 1 "FE Send Message"

Cause

A critical Autopilot system fault has occurred. The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This is an operating system fault. It occurs when the inter-task message queue becomes filled for a specific task. This can happen primarily through excessive throughput loading on the processor or through a firmware defect.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 2 "FE Task Init."

Cause

A critical Autopilot system fault has occurred. The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This is an operating system fault. It occurs when task initialization fails for a specific task.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 3 "FE Go Trap"

Cause

A critical Autopilot system fault has occurred. The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This is an operating system fault. It occurs when the operating system startup fails. This can happen primarily through excessive throughput loading on the processor, or through a firmware defect.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 4 "A/D Scan Timeout"

Cause

A critical Autopilot system fault has occurred. The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This is an operating system fault due to data sampling task failure. It occurs when the high precision ADC scan (used to sample IMU) fails to complete on time.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 5 "A/D Scan Overrun"

Cause

A critical Autopilot system fault has occurred. The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This is an operating system fault due to data sampling task failure. It occurs when the prior high precision ADC scan fails to complete before the next one begins.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 6 "A/D Data Not Ready"

Cause

A critical Autopilot system fault has occurred. The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This is an operating system fault due to data sampling task failure. It occurs when some portion of the data acquisition sequence fails to complete on time.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 7 "A/D Chan Overrun"

Cause

A critical Autopilot system fault has occurred. The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This is an operating system fault due to data sampling task failure. It occurs when a high precision ADC interrupt occurs after all channels have been scanned.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 8 "Vpp Jumpered"

Cause

This is an internal flash programming error during assembly.

Possible failure modes

This fault occurs when the internal flash programming voltage jumper is detected as being attached. This jumper should only be applied during the programming of the boot-monitor. This is a manufacturing error during assembly.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 9 "Battery Bad"

Cause

This fault occurs when the internal NVRAM backup battery status indicates a low voltage.

Possible failure modes

If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 11 "SP Open Failed"

Cause

A critical Autopilot system fault has occurred. This error occurs when a serial port initialization fails. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when a serial port initialization fails.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 12 "Matrix Inv. Failed"

Cause

A critical Autopilot system fault has occurred. This is an operating system error. The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This fault is a math library failure. It occurs when a matrix inversion attempt fails.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 13 "MATHERR Exception"

Cause

A critical Autopilot system fault has occurred. This is an operating system error. The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This fault is a math library failure. It occurs when a double precision floating point operation or function fails.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 14 "MATHERRF Exception"

Cause

A critical Autopilot system fault has occurred. This is an operating system error. The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This fault is a math library failure. It occurs when a single precision floating point operation or function fails.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 15 "Fatal Error Reboot"

Cause

A critical Autopilot system fault has occurred. This error occurs when the controller suffers a fatal error and performs a reboot.

Possible failure modes

This fault occurs when the controller suffers a fatal error and performs a reboot. A classic example is a brief interruption of electrical power to the controller.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 16 "App Undefined ISR"

Cause

A critical Autopilot system fault has occurred. This error occurs when an uninitialized CPU interrupt is detected. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when an uninitialized CPU interrupt is detected.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 17 "TPU Undefined ISR"

Cause

A critical Autopilot system fault has occurred. This error occurs when an uninitialized TPU module interrupt is detected. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when an uninitialized TPU module interrupt is detected.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 18 "MIOS1 Undefined ISR"

Cause

A critical Autopilot system fault has occurred. This error occurs when an uninitialized MIOS1 module interrupt is detected. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when an uninitialized MIOS1 module interrupt is detected.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 19 "QADC Undefined ISR"

Cause

A critical Autopilot system fault has occurred. This error occurs when an uninitialized QADC64 module interrupt is detected. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when an uninitialized QADC64 module interrupt is detected.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 21 "Uninit. App Assert"

Cause

A critical Autopilot system fault has occurred. This error occurs when an application assert is called with an unregistered error type. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when an application assert is called with an unregistered error type.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 22 "Acc X Overvoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the X-axis accelerometer is sampled at a value greater than 4.99924 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This error occurs when the voltage from the X-axis accelerometer is sampled at a value greater than 4.99924 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 23 "Acc X Undervoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the X-axis accelerometer is sampled at a value less than 0.00076 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the X-axis accelerometer is sampled at a value less than 0.00076 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 24 "Acc Y Overvoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the Y-axis accelerometer is sampled at a value greater than 4.99924 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the Y-axis accelerometer is sampled at a value greater than 4.99924 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 25 "Acc Y Undervoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the Y-axis accelerometer is sampled at a value less than 0.00076 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the Y-axis accelerometer is sampled at a value less than 0.00076 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 26 "Acc Z Overvoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the Z-axis accelerometer is sampled at a value greater than 4.99924 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the Z-axis accelerometer is sampled at a value greater than 4.99924 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 27 "Acc Z Undervoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the Z-axis accelerometer is sampled at a value less than 0.00076 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the Z-axis accelerometer is sampled at a value less than 0.00076 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 28 "Gyro X Overvoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the X-axis gyro is sampled at a value greater than 4.99924 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the X-axis gyro is sampled at a value greater than 4.99924 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller gyro.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 29 "Gyro X Undervoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the X-axis gyro is sampled at a value less than 0.00076 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the X-axis gyro is sampled at a value less than 0.00076 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller gyro.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 30 "Gyro Y Overvoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the Y-axis gyro is sampled at a value greater than 4.99924 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the Y-axis gyro is sampled at a value greater than 4.99924 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller gyro.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 31 "Gyro Y Undervoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the Y-axis gyro is sampled at a value less than 0.00076 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the Y-axis gyro is sampled at a value less than 0.00076 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller gyro.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 32 "Gyro Z Overvoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the Z-axis gyro is sampled at a value greater than 4.99924 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the Z-axis gyro is sampled at a value greater than 4.99924 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller gyro.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 33 "Gyro Z Undervoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the Z-axis gyro is sampled at a value less than 0.00076 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the Z-axis gyro is sampled at a value less than 0.00076 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Drive the vehicle at 10-13 kph (6-8 mph) for approximately 100 meters (100 yards) to orientate the controller gyro.
4. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 34 "Heater Overvoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the IMU thermistor is sampled at a value greater than 4.99924 volts. The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This error occurs when the voltage from the IMU thermistor is sampled at a value greater than 4.99924 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 35 "Heater Undervoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the IMU thermistor is sampled at a value less than 0.00076 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the IMU thermistor is sampled at a value less than 0.00076 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 36 "VRef Overvoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the IMU precision voltage reference is sampled at a value greater than 4.99924 volts.

The fault condition must be explicitly cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the IMU precision voltage reference is sampled at a value greater than 4.99924 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 37 "VRef Undervoltage"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the IMU precision voltage reference is sampled at a value less than 0.00076 volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the IMU precision voltage reference is sampled at a value less than 0.00076 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault persists, replace the controller. Possible causes include IMU sensor or cable failure.
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 39 "Steering Overvolt"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the steering sensor is sampled at a value greater than 4.85 volts. The fault condition must be cleared to resume Autopilot system operation. Also check steering sensor connection and operation.

Possible failure modes

This error occurs when the voltage from the steering sensor is sampled at a value greater than 4.85 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Depending on which steering sensor you have, use one of the solutions described in more detail below.
4. If the fault is still not resolved, contact Trimble Support.

Steering pot (rotary potentiometer)

1. Inspect the steering sensor linkage for damage, misalignment, or tightness.
2. Use the Autopilot Toolbox II software or the FieldManager™ display to check the *Steering Sensor Calibration* setting. Observe the sensor volts—this should read close to 2.5 volts at the center position. Center position is with the front tires of the tractor pointing forward in a straight line.
3. Perform the Steering Sensor Calibration Test. Observe the voltage range in the left, center, and right positions. The normal voltage range is ± 1.25 -1.75 volts from the center value.
4. Observe the smoothness of the voltage reading from the steering sensor. If the voltage readings from the steering sensor are erratic, replace the steering sensor.
5. Perform the Steering Sensor Calibration Test on the new steering sensor. If the voltage is near or above 4.85 volts, or near or below 0.15 volts, recalibrate the steering sensor to prevent the fault 39 or a fault 40 (Steering Undervolt). You may need to adjust the steering arm to get correct sensor movement.
6. If the steering sensor calibration is correct, select a different vehicle and accept the change. Then reload the correct vehicle again.

Steering cylinder sensor

Use the Autopilot Toolbox software or the FieldManager display to check the Steering Sensor Calibration setting:

1. Observe the sensor volts. It should read close to 2.5 volts at the center position. Center position is with the front tires or tractor pointing forward in a straight line.
2. Perform the Steering Sensor Calibration Test. Observe the voltage range in the left, center, and right positions. The left position is when the front wheels are pointing to the left. Normal voltage range is ± 1.25 -1.75 volts from the center value.
3. Observe the smoothness of the voltage reading from the steering sensor. If the voltage readings from the steering sensor are erratic, replace the steering sensor.

4. Perform the Steering Sensor Calibration Test on the new steering sensor. If the voltage is near or above 4.85 volts, or near or below 0.15 volts, recalibrate the steering sensor to prevent the fault 39 or a fault 40 (Steering Undervolt).
5. Verify that the correct vehicle profile is being used. If the steering sensor calibration and the vehicle setting are correct, select a different vehicle and accept the change. Then reload the correct vehicle again.

AutoSense device

Note – *When the AutoSense™ device is used, a steering sensor calibration is not required.*

Use the Autopilot Toolbox II software or the FieldManager display to check the steering sensor diagnostics:

1. Verify that the vehicle is configured correctly.
2. Ensure that the AutoSense device is selected as the steering sensor.
3. If the steering sensor is set as a steering pot, reload the vehicle profile to allow the correct steering sensor option to be set.

Autopilot system fault code 40 "Steering Undervolt"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the steering sensor is sampled at a value less than 0.15 volts. The fault condition must be cleared to resume Autopilot system operation. Also check steering sensor connection and operation.

Possible failure modes

This error occurs when the voltage from the steering sensor is sampled at a value less than 0.15 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Depending on which steering sensor you have, use one of the solutions described in more detail below.
4. If the fault is still not resolved, contact Trimble Support.

Steering pot (rotary potentiometer)

1. Ensure that the steering pot linkage has not come loose, allowing the sensor to fall out of range.
2. Ensure that the cable that leads to the steering pot is connected to the steering sensor.
3. If the cable is connected, trace the cable back to the Autopilot navigation controller to verify that the cable is not damaged.
4. Unplug the steering sensor and then check pin A of the 3-pin Weatherpack connector to verify that the navigation controller is supplying 5 volts. Use Pin C as the ground for the test.
5. Reconnect the sensor and then probe pin B (the signal wire) with a voltmeter to verify that pin B is sending 0-5 volts back to the navigation controller.
6. If you detect voltage on Pin A but not on Pin B, replace the steering sensor.
7. Use the Autopilot Toolbox II software or the FieldManager display to verify that the steering sensor is correctly calibrated. If the voltage is near or below 0.15 volts, Trimble recommends that you recalibrate the steering sensor. You may need to adjust the steering arm to get correct sensor movement.

Steering cylinder sensor

Use this section if the vehicle is a Case STX AccuGuide-ready or a New Holland TJ IntelliSteer-ready tractor (these use a steering sensor that is built into the steering cylinder of the tractor).

If the fault codes indicate that there is a faulty steering sensor, check the harness for faults. The harness is held against a hydraulic hose with black, plastic, spiral loom.

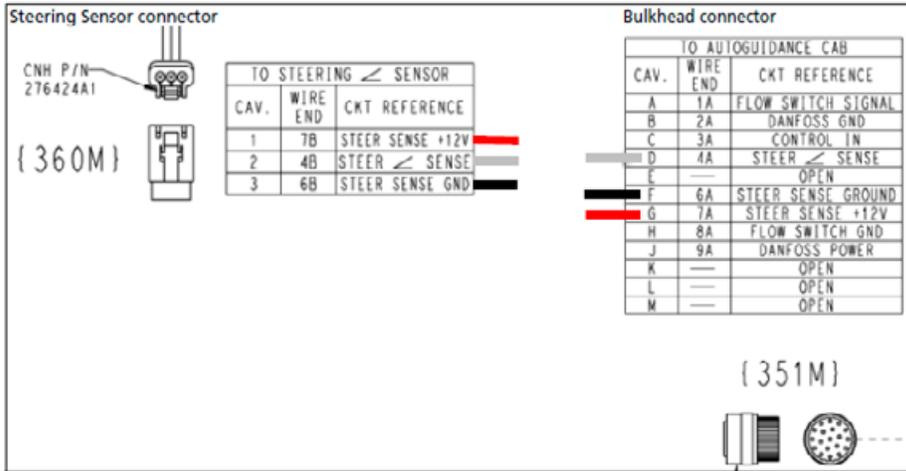
Carry out a continuity test:

1. Check the continuity of each wire from one end to the other. The wire is normal if there is a short circuit.
2. Check continuity between each wire and the other two wires. The wire is normal if there is an open circuit.

3. Check continuity between each wire and chassis ground. The wire is normal if there is an open circuit.

Wire ID	Bulkhead	Sensor cavity	Wire color	Description
4	D	2	White	Sensor signal
6	F	3	Black	Ground
7	G	1	Red	+12 V

Wire information is shown below:



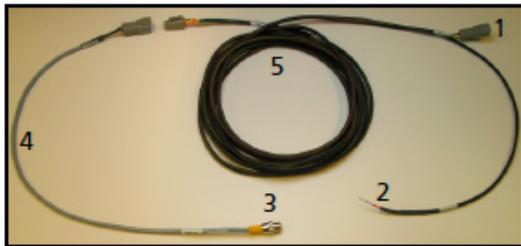
4. If you discover:

- A broken wire, locate the break and repair it with a splice, or replace the harness. The tractor serial number determines the correct harness part number.
- Shorted wires, replace the harness.
- A short to the chassis, replace the harness.

If you do not discover a harness failure, replace the steering sensor cylinder.

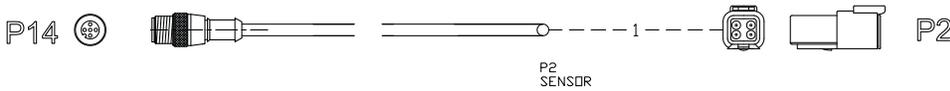
AutoSense device

The following figure shows the AutoSense™ steering device harness:



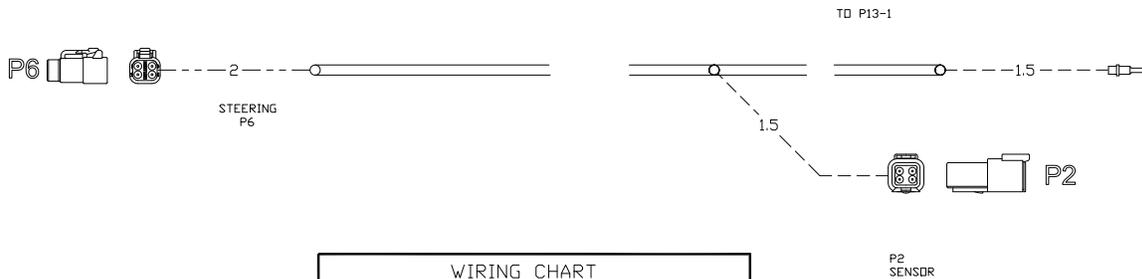
Item	Description
1	P-6 connector
2	Power connector
3	AutoSense connector
4	Jumper cable (P/N 57560)
5	AutoSense steering cable (P/N 57885)

Jumper cable (P/N 57560) schematic:



WIRING CHART					
WIRE ID#	CONN-TERM	CONN-TERM	WIRE COLOR	WIRE SIZE	DESCRIPTION
1	P14-1	P2-3	BN	(22)	STEERING SENSOR 12V+
2	P14-2	P2-4	WH	(22)	STEERING SENSOR GND
3	P14-3	P2-1	BU	(22)	STEERING SENSOR 5V+ IN
4	P14-4	P2-2	BK	(22)	STEERING SENSOR 5V- IN

AutoSense steering cable (P/N 57885) schematic:



WIRING CHART					
WIRE ID#	CONN-TERM	CONN-TERM	WIRE COLOR	WIRE SIZE	DESCRIPTION
1	P6-1	P2-1	BR	18	STEERING SENSOR 5V+ IN
2	P6-2	P2-2	RD/WH	18	STEERING SENSOR 5V- IN
3	P6-3	ITEM 6	DR	18	STEERING SENSOR 12V+
4	P6-4	P2-4	YW	18	STEERING SENSOR GND

1. Verify that the orange wire labeled "P13 Pin 1" is connected to the "P13 Pin 1" connector on the NAV II harness (P/N 54601).
2. Verify that the P13 Pin 1 connector is supplying 12 volts. If you are not receiving voltage on the P13 Pin 1 connector, check the NAV II harness (P/N 54601) for voltage. If there is no voltage, verify that the Autopilot system is turned on and that the green LED is blinking on the NAV II harness.
3. Verify that the P6 connector is connected to P6 on the NAV II harness. Check the pins in the connector to make sure that they are seated correctly.
4. Check the AutoSense cable (P/N 57885) along its length through the tractor to verify that the cable is not damaged.
5. Check voltage at the 4-pin wire connector on the AutoSense cable (P/N 57885), where it connects to the jumper cable to verify 12 volts on Pin 3 and ground on Pin 4.
6. Check the voltage on the jumper cable (P/N 57560), to verify that there are 12 volts on pin 1 (1 o'clock position) and ground on pin 2 (11 o'clock position), with the notch in the 12 o'clock position.
7. Check continuity from one end of the cable to the other to ensure no wires are shorted to each other or ground.
8. If you observe 12 volts at the P13 Pin 1 connector and not at the AutoSense connector, the cable may be damaged or defective. To verify this, replace the cable.
9. If all cables and voltages appear to work correctly, replace the AutoSense device.

Autopilot system fault code 41 "Man Ovrdr Overvolt"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the manual override sensor is sampled at a value greater than 4.5 volts. The fault condition must be cleared to resume Autopilot system operation. Also check Hydraulic Pressure Transducer.

Possible failure modes

This error occurs when the voltage from the manual override sensor is sampled at a value greater than 4.5 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Select and then use one of the following solutions:
 - The Pressure Relief is set too high (see [page 69](#)) and one of the following occurs:
 - Steering is turned and held fully in one direction.
 - A selective control valve is activated.
 - The manual override sensor is unplugged or has been damaged, see [page 69](#).
 - Incorrect firmware for the 2006 or newer hybrid, see [page 70](#).
 - Incorrect profile for any of the hybrids, see [page 70](#).
4. If the fault is still not resolved, contact Trimble Support.

Checking the Pressure Relief setting

1. Connect a gauge into the left or right steering control hose at either of the steering cylinders.
2. Fully turn the steering wheel in one direction. The pressure should be 2800 psi-2900 psi. Pressures above about ~3000 psi will cause the pressure transducer to output a signal greater than 4.5 volts.
3. Set the Pressure Relief to the manufacturer's specifications.

If the manual override sensor or any of the cable connections to the sensor are unplugged, the manual override voltage will indicate 5.0 volts.

Checking the manual override sensor

Check all connections, including at the sensor, to ensure that all pins are locked into place in the connector. Check continuity from one end of a cable to the other.

- ▶ Navigation Controller I cables (P/N 41378 and P/N 49918) (wheeled tractors):
 - Pin A, Gnd, J1-5
 - Pin B, Signal, J1-1
 - Pin C, +5.0V out, J1-12
- ▶ Navigation Controller I cables (P/N 43753 (Cat Hydraulic) and P/N 49959 (Flow Switch)):
 - Pin A, Gnd, J1-5
 - Pin B, +5V, J1-12

- Pin C, Signal, J1-1
- ▶ NavController II /NavController III cables (P/N 54618 and P/N 54626). For cable schematics, refer to Chapter 3.
 - P2-A, Gnd, P1-3
 - P2-B, +5V, P1-2
 - P2-C, Signal, P1-1

If necessary, replace the cable harness and/or the pressure transducer.

Checking the firmware version

Ensure that the latest version of the firmware is loaded onto the NavController II /NavController III. Do not assume that the latest firmware loaded on your computer is the current firmware available: Check the firmware version on the Trimble Partners website. If necessary, download the new firmware.

Checking the profile

Ensure that the correct profile is being used. Search the Knowledge Base using "can not find desired vehicle profile" as the search key.

Autopilot system fault code 42 "Man Ovr Undervolt"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the manual override sensor is sampled at a value less than 0.3 volts. This can be caused by a faulty cable, a defective manual override sensor, or an incorrect vehicle profile.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Check all connections, including at the sensor, to ensure that all pins are locked into place in the connector. Check continuity from one end of a cable to the other.
 - Nav I cables (P/N 41378 and P/N 49918) (wheeled tractors):
 - Pin A, Gnd, J1-5
 - Pin B, Signal, J1-1
 - Pin C, +5.0V out, J1-12
 - Nav I cables (P/N 43753 (Cat hydraulic) and P/N 49959 (flow switch)):
 - Pin A, Gnd, J1-5
 - Pin B, +5V, J1-12
 - Pin C, Signal, J1-1
 - NavController II /NavController III cables (P/N 54618 and P/N 54626). For cable schematics, see Chapter 3.
 - P2-A, Gnd, P1-3
 - P2-B, +5V, P1-2
 - P2-C, Signal, P1-1

Note – *Cable P/N 54626 includes a 10 k Ohm ¼ watt resistor in the pin 1 or A wire. If the resistor has failed, it will cause Fault 42.*

2. If the vehicle uses a flow switch with cable P/N 54626, verify that there is at least constant 0.3 volts. If 0.3 volts are not present, then check the Pin 1 or A wire for the resistance shown in the previous note.
3. If the vehicle uses a flow switch for manual override, you may need to remove the flow switch to test its operation:
 - a. Inspect the flow switch to ensure all mechanical parts are functioning.
 - b. Check the continuity between pins B and C while observing the flow, to verify the flow switch is operating correctly. There should be continuity between pins A and C with no flow.
 - c. If the switch fails the continuity check or resistance test, replace the cable harness.
4. If necessary, replace the pressure transducer or flow switch.
5. Use either the Autopilot Toolbox II software or the FieldManager display to verify that the correct vehicle is selected. Reload or select the vehicle profile that is required for the vehicle.

Autopilot system fault code 43 "Gear Lev Overvolt"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the gear level sensor is sampled at a value greater than 4.952 volts. The fault condition must be cleared to resume Autopilot system operation. Clear controller guidance faults and check gear lever status with the Autopilot Toolbox software.

Possible failure modes

This fault occurs when the voltage from the gear level sensor is sampled at a value greater than 4.952 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the wire connections and integrity of the wire harness. Also check the integrity of the gear lever sensor.
4. Use the Autopilot Toolbox software to determine the gear lever sensor response:
 - a. Operate the vehicle in a safe location.
 - b. Use the Autopilot Toolbox software to check the gear lever sensor response.
 - c. Click the **Edit Setup/Diagnostics** icon and then select the *Diagnostics* tab. Select *Gear Lever Indication* and then press the **Edit** button.
 - d. Observe the "State" status upon changing from park to forward gear and park to reverse gear. Sensor response should indicate the correct directional change.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 44 "Gear Lev Undervolt"

Cause

A critical Autopilot system fault has occurred. This error occurs when the voltage from the gear level sensor is sampled at a value less than 0.15 volts. The fault condition must be cleared to resume Autopilot system operation. Clear controller guidance faults and check gear lever status with the Autopilot Toolbox software.

Possible failure modes

This error occurs when the voltage from the gear level sensor is sampled at a value less than 0.15 volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the wire connections and integrity of the wire harness. Also check the integrity of the gear lever sensor.
4. Use the Autopilot Toolbox software to determine the gear lever sensor response:
 - a. Operate the vehicle in a safe location.
 - b. Use the Autopilot Toolbox software to check the gear lever sensor response.
 - c. Click the **Edit Setup/Diagnostics** icon and then select the *Diagnostics* tab. Select *Gear Lever Indication* and then press the **Edit** button.
 - d. Observe the "State" status upon changing from park to forward gear and park to reverse gear. Sensor response should indicate the correct directional change.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 45 "RPM Too Low"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the measured engine RPM frequency falls below the minimum expected for a tracked vehicle. The fault condition must be cleared to resume Autopilot system operation. Check for damaged RPM cable harness.

Possible failure modes

This fault occurs when the measured engine RPM frequency falls below the minimum expected for a tracked vehicle.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the steering valve cable harness.
4. Check the integrity of the steering valve coils and cable connections.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 46 "Valve Coil Short"

Cause

A critical Autopilot system fault has occurred. This error occurs when hardware overcurrent detection indicates a fault. The fault condition must be cleared to resume Autopilot system operation. Check for a damaged steering valve cable harness or steering valve coil failure.

Possible failure modes

This error occurs when hardware over-current detection indicates a fault.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the steering valve cable harness.
4. Check the integrity of the steering valve coils and cable connections.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 47 "Valve Coil Imax"

Cause

A critical Autopilot system fault has occurred. This error occurs when hardware overcurrent detection indicates a fault. The fault condition must be cleared to resume Autopilot system operation. Check for damaged steering valve cable harness or steering valve coil failure.

Possible failure modes

This error occurs when hardware over-current detection indicates a fault.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the steering valve cable harness.
4. Check the integrity of the steering valve coils and cable connections.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 48 "MOSFET Short"

Cause

A critical Autopilot system fault has occurred. This error occurs when the sum of the sampled current through the electro-hydraulic solenoids is greater than 3.0 Amps. The fault condition must be cleared to resume Autopilot system operation. Check for a damaged steering valve cable harness or steering valve coil failure.

Possible failure modes

This error occurs when the sum of the sampled current through the electro-hydraulic solenoids is greater than 3.0 Amps.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the steering valve cable harness.
4. Check the integrity of the steering valve coils and cable connections.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 49 "Coil Short to GND"

Cause

A critical Autopilot system fault has occurred. This error occurs when the sum of the sampled current through the electro-hydraulic solenoids falls below the expected minimum for automatic mode operation. The minimum value for front steer vehicles is 0.12 Amps. The minimum for articulated steer vehicles 0.035 Amps. The fault condition must be cleared to resume Autopilot system operation. Check for a damaged steering valve cable harness or steering valve coil failure.

Possible failure modes

This error occurs when the sum of the sampled current through the electro-hydraulic solenoids falls below the expected minimum for automatic mode operation. The minimum value is 0.12 Amps.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the steering valve cable harness.
4. Check the integrity of the steering valve coils and cable connections.
5. Check that the correct valve is installed for the vehicle.
6. Check that the vehicle has the correct steering valve and manifold.
7. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 50 "Coil Shorted"

Cause

System fault detected. This error occurs when a sampled current through one of the electro-hydraulic solenoids is greater than 5.0 Amps. The fault condition must be cleared to resume Autopilot system operation. Check for a damaged steering valve cable harness or steering valve coil failure.

Possible failure modes

This error occurs when a sampled current through one of the electro-hydraulic solenoids is greater than 5.0 Amps.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the steering valve coils and cable connections.
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 51 "Valve Pressure Fault"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the sampled pressure from one of the electro-hydraulic solenoids is larger than the expected maximum. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the sampled pressure from one of the electro-hydraulic solenoids is larger than the expected maximum.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the steering valve cable harness.
4. Check the integrity of the steering valve coils and cable connections.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 52 "Sum Pressure Max"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the sum of the sampled pressures from both of the electro-hydraulic solenoids is larger than the expected maximum. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the sum of the sampled pressures from both of the electrohydraulic solenoids is larger than the expected maximum.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the steering valve cable harness.
4. Check the integrity of the steering valve coils and cable connections.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 53 "Sum Pressure Min"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the sum of the sampled pressures from both of the electro-hydraulic solenoids is less than the expected minimum. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the sum of the sampled pressures from both of the electrohydraulic solenoids is less than the expected minimum.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the steering valve cable harness.
4. Check the integrity of the steering valve coils and cable connections.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 54 "SafeMCU Prog. Error"

Cause

A critical Autopilot system fault has occurred. This error occurs when a failure in the Safety MCU programming process occurs. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when a failure in the Safety MCU programming process occurs.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 55 "SafeMCU No Stack"

Cause

A critical Autopilot system fault has occurred. This error occurs when a failure in the Safety MCU reports that it is out of stack space. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when a failure in the Safety MCU reports that it is out of stack space.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 56 "SafeMCU Msg Timeout"

Cause

A critical Autopilot system fault has occurred. This error occurs when the safety MCU reports that the main MCU communication has had a timeout. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This error occurs when the safety MCU reports that the main MCU communication has had a timeout.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 57 "Angle Out of Bounds"

Cause

A critical Autopilot system fault has occurred. This error occurs when the safety MCU reports that the steering angle sensor indicates that the wheel position exceeds the specified maximum angle. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This error occurs when the safety MCU reports that the steering angle sensor indicates that the wheel position exceeds the specified maximum angle.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 58 "Steering Unsafe"

Cause

A critical Autopilot system fault has occurred. This error occurs when the safety MCU reports some condition, which is unsafe for automatic operation. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the safety MCU reports some condition, which is unsafe for automatic operation.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 59 "MCU2 Vel. Unsafe"

Cause

A critical Autopilot system fault has occurred. This error occurs when the safety MCU reports that the wheel speed sensor frequency is too low for automatic operation. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This error occurs when the safety MCU reports that the wheel speed sensor frequency is too low for automatic operation.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Consult the vehicle service manual for correct transmission speed sensor adjustment or specifications.
4. If the fault is still not resolved, contact Trimble Support. There may be a controller guidance hardware failure.

Autopilot system fault code 62 “Missing 1PPS” 20.1

Cause

A critical Autopilot system fault has occurred. This error occurs when there is no PPS (pulse per second) signal from the receiver.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Depending on which GPS receiver you have, use one of the solutions described below.
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system firmware with non-EZ-Guide 500 (AgGPS 252) GPS receiver

Check the cable from the NavController II /NavController III to the receiver for damage. Ensure that the pins are not bent and that they are fully locked into place in the connector. In particular, check pin 4 on the NavController II / NavController III to receiver cables (P/Ns 54608, 54609, and 54610).

- ▶ Use a voltmeter to check the continuity of pin 4 from one end of the cable to other.
- ▶ Disconnect and then reconnect the cable at the GPS receiver and the NavController II /NavController III.
- ▶ Reflash the GPS receiver firmware.
- ▶ If the receiver cable is not faulty, replace the GPS receiver.

Autopilot system firmware with EZ-Guide 500 lightbar

Check the cable from the NavController II /NavController III to the EZ-Guide® 500 lightbar for damage. Ensure that the pins are not bent and that they are fully locked into place in the connector. In particular, check pin 4 on the NavController II /NavController III to lightbar cables (P/Ns 54630 or 62754).

AccuGuide or IntelliSteer-ready vehicle with EZ-Guide 500 lightbar

- ▶ Check the cable from the NavController II /NavController III to the EZ-Guide 500 lightbar for damage. Ensure that the pins are not bent and that they are fully locked into place in the connector.
- ▶ Verify that the EZ-Guide 500-to-hybrid Autopilot cable (P/N 62700) is installed as described below. If it is not installed correctly, it causes a continuous Fault 62 message on the display.

To install the EZ-Guide 500 system on a hybrid system, you require the EZ-Guide 500- to-hybrid Autopilot cable:

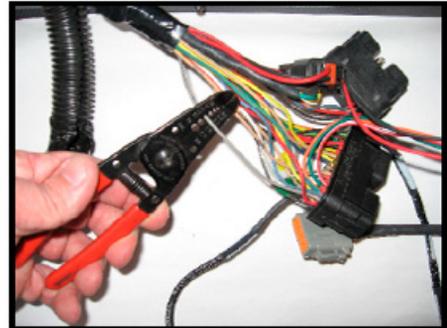
1. Locate the Autopilot controller main and auxiliary harnesses.



2. On the 40-pin main harness, identify the PPS wire. It is in position 21.



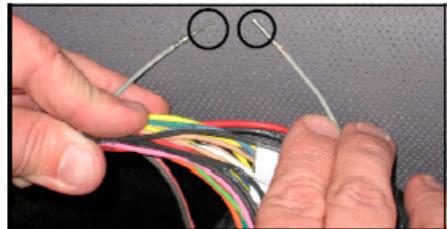
3. Cut the PPS wire, as shown. Ensure that you bisect the wire between the wire loom and the connector.



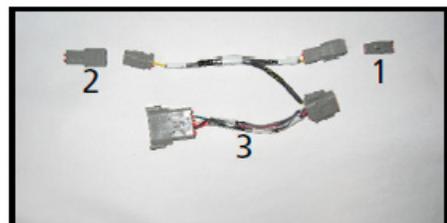
4. Strip the cut wire ends.



5. Add Deutsch connector pins to the wires.

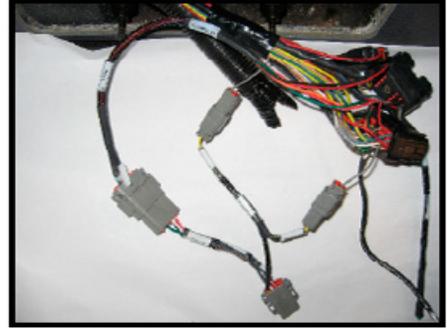


6. Attach connectors to the wires:
 - a. Add a Deutsch-in connector P5 cap (1) to the wire end that connects to the Autopilot controller.
 - b. Add a Deutsch-out connector S6 cap (2) to the Autopilot harness end. Insert the Deutsch pins into pin 1 on each cap.



7. Connect the Deutsch connectors to the two appropriate connectors on the EZ-Guide 500-to-hybrid Autopilot cable (P/N 62700) (3).

8. Connect the P4 connector on the cable to the P4 cable supplied in the hybrid completion kit (ZTN 56694 00).



Autopilot system fault code 64 "Output Balance Bad"

Cause

This fault occurs when the output balance voltage from the ELC steering interface is outside the stated voltage. This steering interface is used on many CAT and John Deere tracked tractors. The box and cables connect the Autopilot NavController to the fly-by wire system on the tracked tractor.

The fault may be caused by:

- ▶ **Poor ground connection on the vehicle:** If there is a poor ground connection on the vehicle, do one or more of the following, in the order shown, until the fault is resolved:
 - a. Check the Autopilot system ground wire for damage including bent, broken, or pinched wires.
 - b. Verify that the vehicle frame-to-cab ground strap/cable is installed and is not cut or damaged.
 - c. Clean all ground terminals, including those on the battery, frame, and cab.
 - d. On John Deere tracked tractors, install the grounding cable as described in the document AG_SprtNote_JD_Tracks_Grounding_Location_Issues.pdf.
- ▶ **Defective or failed steering interface box:** If there is a defective or failed steering interface box, do one or more of the following, in the order shown, until the fault is resolved:
 - a. Check the cables that lead from the NavController to the steering interface box for pinched, broken or damaged wires. Either repair any damage or replace the cable.
 - b. Verify that the pins in the connector are properly seated by tugging gently on each wire in the connector. Repair or replace any pin or connector that is not connected properly.
 - c. Check the cables that lead from the NavController to the tractor harness. Check the cable for pinched, broken, or damaged wires. Either repair any damage or replace the cable.
 - d. Disconnect the cable connectors where the interface box connects to the tractor system and then reconnect them. Ensure that the connectors are free from dirt and debris.
- ▶ **An incorrect vehicle profile:** Do the following to ensure that the vehicle profile is correct:
 - a. Use the Autopilot Toolbox II software or the FieldManager display to verify that the NavController has the correct vehicle profile.
 - b. Reload the vehicle profile.
 - c. If you have completed all of these steps and fault 64 continues to occur, replace the steering interface box.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Make sure that you have completed the checks shown above.
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 65 "Output Bal. OverVol"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the output balance voltage from the ELC steering interface is too close to the +5v rail. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the output balance voltage from the ELC steering interface is too close to the +5 V rail.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 66 "Output Bal. UnderV"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the output balance voltage from the ELC steering interface is too close to the 0v rail. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the output balance voltage from the ELC steering interface is too close to the 0v rail.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 67 "Steering In Fault"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the fault indication from the ELC steering interface indicates a fault has occurred. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the fault indication from the ELC steering interface indicates a fault has occurred.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:

- a. On the display, check the fault detail.
- b. Record the fault code and then select **OK**.

2. Check the controller firmware version. See [page 16](#).

The following can cause the SIU-200 unit to output the 5 V fault:

- The 5 V power to the box is outside a 4.5 to 5.5 V range.
- The power supplied to each of the John Deere steering potentiometers is sampled outside a 4.0 to 5.5 V range.

To check this: Use the Ground input to the SIU-200 unit (connector S13 pin 12 on P/N 62148) to back probe into the JD harness from the ECU (cable P/N 44921) to see if pins A, D and G are all between 4 and 5.5 V. Also check the JD harness to the potentiometer (cable P/N 44537) on the same pins. Do this when everything is connected and powered on.

- The grounds for each of the steering potentiometers is outside a 0 to 1 V range.
To check this: Use the Ground input to the SIU-200 unit (connector S13 pin 12 on P/N 62148) to back probe into the JD harness from the ECU (cable P/N 44921) to see if pins C, F and J are all between 0 and 1 V. Also check the JD harness to the potentiometer (cable P/N 44537) on the same pins. Do this when everything is connected and powered on.
- The duty cycle of the PWM supplied to the box by the NavController is not between 10%-90%. The value is indicated by the steering status in the display.
- The keep alive pulse is not present. This is necessary only when the system engaged and there is no way to check this.

3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 70 "Test Build Expired"

Cause

A critical Autopilot system fault has occurred. This error occurs when the expiration date of the currently loaded controller firmware has been reached. The fault will persist, preventing automatic mode. Upgrade controller guidance to the latest released firmware.

Possible failure modes

This error occurs when the expiration date of the currently loaded controller firmware has been reached.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. The GPS receiver may be generating false time:
 - Reinitialize or cycle power on the receiver.
 - Use the AgRemote software version 2.xx. to clear the BB RAM and restore factory defaults.
4. If the fault is still not resolved, contact Trimble Support. There may be a controller guidance hardware failure

Autopilot system fault code 71 "Top FET Sense Err"

Cause

A critical Autopilot system fault has occurred. This error occurs when the sum of the sampled current through the electro-hydraulic solenoids, is larger than the expected minimum for manual mode operation. The threshold for front steer vehicles is 0.12 Amps. The minimum for articulated steer vehicles is 0.035 Amps. Check the integrity of the cable harness and steering valve coils.

Possible failure modes

This error occurs when the sum of the sampled current through the electro-hydraulic solenoids, is larger than the expected minimum for manual mode operation. The threshold is 0.12 Amps.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the steering valve cable harness.
4. Check the integrity of the steering valve coils and cable connections.
5. Check for possible steering valve failure.
6. If the fault is still not resolved, contact Trimble Support. There may be a controller guidance hardware failure.

Autopilot system fault code 72 "Left Pressure OvrVt"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the voltage from the left pump pressure sensor is sampled at a value too close to the +5v rail. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the left pump pressure sensor is sampled at a value too close to the +5v rail.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 73 "Left Pressure UndVt"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the voltage from the left pump pressure sensor is sampled at a value too close to the 0v rail. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the left pump pressure sensor is sampled at a value too close to the 0 V rail.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 74 "Right Pressure OvrV"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the voltage from the right pump pressure sensor is sampled at a value too close to the +5v rail. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the right pump pressure sensor is sampled at a value too close to the +5 V rail.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 75 "Right Pressure UndV"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the voltage from the right pump pressure sensor is sampled at a value too close to the +5 V rail. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the right pump pressure sensor is sampled at a value too close to the +5 V rail.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 76 "VT Assert Failure"

Cause

A critical Autopilot system fault has occurred. This is a firmware error. It occurs when a fault is detected in the display object pool management section. The fault condition must be cleared to resume Autopilot system operation. Update controller firmware to latest revision.

Possible failure modes

This is a firmware error. It occurs when a fault is detected in the display object pool management section.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the cable harness (termination/noise).
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 77 "VT Object Pool Buffer Overflow"

Cause

A critical Autopilot system fault has occurred. This is a firmware error. It occurs when the object pool message buffer overflows. The object pool buffers message during working set upload, prior to first activation of working set, and while display is changing data masks. The fault condition must be cleared to resume Autopilot system operation. Update controller and display firmware to latest revisions.

Possible failure modes

This is a firmware error. It occurs when the object pool message buffer overflows.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the cable harness (termination/noise).
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 78 "VT Comms Error"

Cause

A critical Autopilot system fault has occurred. This error occurs when a communication error is detected between the controller and display. The fault condition must be cleared to resume Autopilot system operation. Update controller and display firmware to latest revisions. Remove any recently added CAN bus ECUs (implements).

Possible failure modes

This error occurs when a communication error is detected between the controller and display.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the cable harness (termination/noise).
4. Remove any recently added CAN bus ECUs (implements).
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 79 "VT Watchdog Timeout"

Cause

A critical Autopilot system fault has occurred. This error occurs when the Display Manager detects a timeout on a command sent to the display or on a wait for a message from the Display. The fault condition must be cleared to resume Autopilot system operation. Update controller guidance and display firmware to latest revisions.

Remove any recently added CAN bus ECUs (implements).

Possible failure modes

This error occurs when the Display Manager detects a timeout on a command sent to the display or on a wait for a message from the display.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Update the display firmware (CAN Bus). There may be a display firmware fault.
4. Check the integrity of the cable harness (termination/noise).
5. Remove any recently added CAN bus ECUs (implements).
6. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 80 "PP Task Assert Failure"

Cause

This fault occurs when the system detects a fault in the Path Planning task section. You must clear the fault condition to resume Autopilot system operation.

The fault may be caused by:

- ▶ **A corrupted AB Line file:** If an AB Line file is corrupt, do one or more of the following, in the order shown, until the fault is resolved:
 - a. Close the field or job and then reload the AB Line file for the field or job. The display resends the AB Line to the NavController.
 - b. Reload the AB Line to the display's data card from a saved copy of the data that may not be corrupted.
 - c. Remark the AB Line.
- ▶ **A corrupted data card:** If the data card is corrupt, do one or more of the following, in the order shown, until the fault is resolved:
 - a. Replace the data on the card:
 - Save the data from the original data card to an office computer.
 - Reformat the data card.
 - Reload the data from the office computer onto the data card.
 - b. Try a different data card.
- ▶ **Poor communication between the NavController and the Autopilot display:** If there is poor communication between the NavController and the Autopilot display, do one or more of the following, in the order shown, until the fault is resolved:
 - a. Ensure that there are no pinches, cuts, or other damage in the cable between the display and the NavController.
 - b. Verify that all pins are properly seated in each connector. Tug on each wire to make sure that it is seated.
 - c. Make sure that all connectors are tight.
- ▶ **The distance of the vehicle from the field or job (more than 1024 swaths):** If the vehicle is more than 1024 swaths from the field or job, fault code 80 may occur on some systems where there is a small implement width. Wait until the vehicle is in the field before you load the job or AB Line file.
- ▶ **A firmware error:** If there is a firmware error, do one or more of the following, in the order shown, until the fault is resolved:
 - a. Use the Autopilot Toolbox II software to verify that the NavController has the latest version of the firmware.
 - b. Verify that the display has the latest firmware installed.
 - c. Reflash or update the NavController to the latest firmware for the system.
 - d. Report the error to Trimble Support. Include your \Diagnostics\ folder.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 81 "CAN-VT Assert Failure"

Cause

A critical Autopilot system fault has occurred. This is a firmware error. It occurs when a fault is detected in the display CAN layer section. The fault condition must be cleared to resume Autopilot system operation. Update controller guidance and display firmware to latest revisions. Remove any recently added CAN bus ECUs (implements).

Possible failure modes

This is a firmware error. It occurs when a fault is detected in the display CAN layer section.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Update the display firmware (CAN Bus). There may be a display firmware fault.
4. Check the integrity of the cable harness (termination/noise).
5. Remove any recently added CAN bus ECUs (implements).
6. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 82 "CN Task Assert Failure"

Cause

A critical Autopilot system fault has occurred. This is a firmware error. It occurs when a fault is detected in the CAN task section. The fault condition must be cleared to resume Autopilot system operation. Update controller guidance firmware to latest revisions. Remove any recently added CAN bus ECUs (implements) and check integrity of cable harness.

Possible failure modes

This is a firmware error. It occurs when a fault is detected in the CAN task section.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the cable harness (termination/noise).
4. Remove any recently added CAN bus ECUs (implements).
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 83 "Steering Fault Overvoltage"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the voltage from the steering fault indicator on the fly-by-wire interface unit is sampled at a value too close to the +5 V rail. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the steering fault indicator on the fly-by-wire interface unit is sampled at a value too close to the +5 V rail.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 84 "Steering Fault Undervoltage"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the voltage from the steering fault indicator on the fly-by-wire interface unit is sampled at a value too close to the 0v rail. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the voltage from the steering fault indicator on the fly-by-wire interface unit is sampled at a value too close to the 0 V rail.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 85 "Coil Short Slew Detected"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the coil shorted detection logic detects steering angle movement that is opposite to the commanded direction. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the coil shorted detection logic detects steering angle movement that is opposite to the commanded direction.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Depending on the situation, try the following solutions:
 - Check whether the manual override sensitivity is set too low (see [page 112](#)). The Autopilot system's manual override sensitivity setting controls how hard you must turn the steering wheel before the movement is detected by the system, and automated steering is disengaged. If the sensitivity is set too low, the system will not detect when you turn the steering wheel. However, the Autopilot controller will detect that the steering wheel has turned in the opposite direction to that which was expected, and the system returns Fault Code 85.
 - Check whether the steering pot is calibrated incorrectly or not calibrated (see [page 112](#)). Vehicles using the steering pot as the steering sensor may be incorrectly calibrated. The NavController II / NavController III does not know in which direction the wheels are turning, causing Fault Code 85.
 - Check whether the steering valve cables are wrongly connected (see [page 112](#)). When installing the Autopilot system, the steering valve cable connectors were connected to the opposite (wrong) side of the valve.
Check whether there is a defective valve solenoid or cable (see [page 112](#)):
 - The valve solenoid may have failed, causing a valve short.
 - The cable may be damaged, causing a short in the electrical system.
 - Check whether the AutoSense device is initialized incorrectly (see [page 112](#)). The NavController II / NavController III Autopilot system using the AutoSense device must be initialized prior to calibration. If the initialization process is not completed, the correct direction is not established, causing Fault Code 85.
4. If the fault is still not resolved, contact Trimble Support.

Manual override sensitivity

Lower the number to increase the Manual Override Sensitivity setting so that the system detects when you turn the steering wheel.



CAUTION – Do not correct the setting so much that overrides are detected even when you are not touching the wheel.

Steering pot

- ▶ Check the steering sensor for damage. Make sure that there is a full range of motion from left to right.
- ▶ Verify and/or recalibrate the steering sensor using the Autopilot Toolbox software or the FieldManager display.
- ▶ If you suspect damage, or you are unable to correctly calibrate the sensor, replace the steering sensor.

Steering valve cables

Swap the valve cable connectors.

Valve solenoid or cable

- ▶ Inspect valve solenoid connections for damage or corrosion. Clean the connectors. If required, replace the valve.
- ▶ Inspect the length of the valve cable for damage. If required, replace or repair the cable.
- ▶ Inspect cable connectors for corrosion or damage. If required, replace the connectors.

Note – *Note – For Navigation Controller I systems experiencing Fault Code 85, inspect the complete valve cable. The valve cable connects to the valve, steering sensor, and manual override sensor.*

AutoSense device

- ▶ Make sure that the AutoSense device is correctly oriented. For example, left or right wheel, and if the label is up or down.
- ▶ Drive the vehicle forward in a straight line for at least one minute. Do not drive the vehicle in reverse. Then calibrate the Autopilot system.

Autopilot system fault code 86 "Battery Voltage Low"

Cause

A critical Autopilot system fault has occurred. This fault can occur when either of the following conditions occur:

- ▶ V Battery to controller is detected at less than 10 Volts. The fault condition must be cleared to resume Autopilot system operation.
- ▶ There is a poor power or ground connection.

Possible failure modes

This fault occurs when the system detects V Battery to controller as less than 10 Volts or when a power or ground connection is loose.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the vehicle battery voltage. Recharge or replace the battery as required.
4. Toggle the switch terminals to check for loose or faulty power connections. Repair or replace items as required.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 87 "Battery Voltage High"

Cause

A critical Autopilot system fault has occurred. This fault occurs when V Battery to controller is detected at greater than 16 Volts. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when V Battery to controller is detected at greater than 16 Volts.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the vehicle system voltage.
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 88 "Temperature High"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the navigation controller temperature is detected at above 85 C. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the navigation controller temperature is detected at above 85 °C.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 89 "Temperature Low"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the navigation controller temperature is detected at below -40 °C. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when the navigation controller temperature is detected at below -40 °C.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 90 "Fet or coil open"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the system does not detect a valve coil circuit. The fault condition must be cleared to resume Autopilot system operation. Check for a damaged steering valve cable harness or steering valve coil failure.

Possible failure modes

This fault occurs when the system does not detect a valve coil circuit.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the integrity of the steering valve cable harness.
3. Check the integrity of the steering valve coils and cable connections.
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 91 "Valve Wiring Fault"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the system detects a short to ground in the valve coil circuit. The fault condition must be cleared to resume Autopilot system operation. Check for a damaged steering valve cable harness or steering valve coil failure.

Possible failure modes

This fault occurs when the system detects a short to ground in the valve coil circuit.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the integrity of the steering valve cable harness.
3. Check the integrity of the steering valve coils and cable connections.
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 96 "Low side short to battery"

Cause

A critical Autopilot system fault has occurred. This fault occurs when system detects the low side of the coil being shorted to battery. The fault condition must be cleared to resume Autopilot system operation. Check for a damaged steering valve cable harness or steering valve coil failure.

Possible failure modes

This fault occurs when system detects the low side of the coil being shorted to battery.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the integrity of the steering valve cable harness.
3. Check the integrity of the steering valve coils and cable connections.
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 97 "Coil overcurrent"

Cause

A critical Autopilot system fault has occurred. This fault occurs when the system detects either a short across the coil or low side shorted to battery. The fault condition must be cleared to resume Autopilot system operation. Check for a damaged steering valve cable harness or steering valve coil failure.

Possible failure modes

This fault occurs when the system detects either a short across the coil or low side shorted to battery.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the integrity of the steering valve cable harness.
3. Check the integrity of the steering valve coils and cable connections.
4. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 98 "Internal Fault Hi Side"

Cause

A critical Autopilot system fault has occurred. This fault occurs when a short is detected in one of the FETS. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when a short is detected in one of the FETS.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 99 "Internal Measurement Fault"

Cause

A critical Autopilot system fault has occurred. This fault occurs when an internal current measurement fault is detected. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when an internal current measurement fault is detected.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 106 "Internal Fault Low Side"

Cause

A critical Autopilot system fault has occurred. This fault occurs when a short is detected in one of the FETS. The fault condition must be cleared to resume Autopilot system operation.

Possible failure modes

This fault occurs when a short is detected in one of the FETS.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 107 "FE SendMsg Too Big"

Cause

A critical Autopilot system fault has occurred. An attempt was made to send an intertask message that was larger than the maximum allowed message size.

Possible failure modes

This fault occurs when there is a error in the controller's firmware.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 108 "CAN Sensor OPS Message Timeout"

Cause

This fault occurs when the CAN Auto-guidance message is not received within the specified interval. It happens only if the Autopilot system is connected to a Case Accu-Guide or New Holland Intelli Steer Ready vehicles.

The fault can be caused by one of the following:

- ▶ **Faulty seat switch:** Use the Autopilot Toolbox software to make sure that the Autopilot system recognizes the seat switch: To do this:
 - a. Click *Edit Setup / Diagnostics*.
 - b. In the *Diagnostics* tab, click **Operator Present Switch**.
 - c. Make sure that the *State* changes to *Active* when you sit down and then changes again when you stand up.
 - d. Do one of the following:
 - If the State does not change, the seat switch may be defective. Call a tractor technician to verify the operation with the service tool and to replace the switch, if required.
 - If the State changes and the fault continues, you may need to reload the vehicle profile as described below.
- ▶ **Incorrect vehicle profile:** Use Autopilot Toolbox software or the FieldManager™ display to see which vehicle is selected. The vehicle name or profile name will be followed by "AG" (for Accu-Guide), or "IS" (for Intelli-Steer Ready). If required, reload or select the correct vehicle profile.
- ▶ **CAN system failure:**
 - Check the integrity of the cable harness going to the seat switch. Inspect for cut or pinched wires. Inspect the connector for damage to the pins. Make sure that the pins are fully seated in the connector.
 - Make sure that the CAN harness is correctly terminated.
 - Make sure that the CAN jumper is correctly installed. Applies only to Steiger or TJ models.
 - Remove any recently added CAN bus ECUs, specifically for implements.
 - If you cannot see any defects, call a tractor technician to inspect the vehicle and to verify correct CAN system operation.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the integrity of the cable harness (termination/noise).
3. Remove any recently added CAN bus ECUs (implements).
4. If the fault is still not resolved, contact Trimble Support

Autopilot system fault code 109 "CAN Sensor OPS Message Error"

Cause

A critical Autopilot system fault has occurred. The CAN Operator Presence Switch Status message indicates an error state for switch status.

Possible failure modes

Error reported by tractor Armrest Unit ECU.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Use the electronic service tool to check error codes from the armrest controller. Follow EST fault diagnostics.
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 110 "CAN Autoguidance Message Timeout"

Cause

This fault occurs when the CAN Auto-guidance message is not received within the specified interval. It happens only if the Autopilot system is connected to a Case Accu-Guide or New Holland Intelli Steer Ready vehicles.

The fault can be caused by one of the following:

- ▶ **Incorrect vehicle profile:** Use Autopilot Toolbox or the FieldManager display to see which vehicle is selected. The vehicle name or profile name will be followed by "AG" (for Accu-Guide), or "IS" (for Intelli-Steer Ready). If required, reload or select the correct vehicle profile.
- ▶ **CAN system failure:**
 - Check the integrity of the cable harness going to the seat switch. Inspect for cut or pinched wires. Inspect the connector for damage to the pins. Make sure that the pins are fully seated in the connector.
 - Make sure that the CAN harness is correctly terminated.
 - Make sure that the CAN jumper is correctly installed. Applies only to Steiger or TJ models.
 - Remove any recently added CAN bus ECUs, specifically for implements.
 - If you cannot see any defects, a tractor technician may need to inspect the vehicle and verify correct CAN system operation.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the integrity of the cable harness (termination/noise).
3. Remove any recently added CAN bus ECUs (implements).
4. If the fault is still not resolved, contact Trimble Support

Autopilot system fault code 111 "CAN Autoguidance Message Error (Vehicle Direction)"

Cause

A critical Autopilot system fault has occurred. CAN Autoguidance message indicates an invalid or faulted state for the vehicle direction estimate. Estimate of vehicle direction is unknown.

Possible failure modes

Error reported by tractor ETC ECU.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Use the electronic service tool to check error codes from the armrest controller. Follow EST fault diagnostics.
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 112 "CAN Autoguidance Message Error (Isolation Valve Invalid)"

Cause

A critical Autopilot system fault has occurred. CAN Autoguidance message indicates an invalid or faulted state for the Isolation Valve Status. The valve cannot be controlled.

Possible failure modes

Error reported by tractor ETC ECU.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Use the electronic service tool to check error codes from the armrest controller. Follow EST fault diagnostics.
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 113 "CAN Autoguidance Message Error (Isolation Valve Inconsistent)"

Cause

A critical Autopilot system fault has occurred. CAN Autoguidance message indicates that the Isolation Valve state is inconsistent with that being commanded by the navigation controller. Either the isolation valve indicates manual mode when automatic has been commanded, or automatic mode when manual has been commanded by the navigation controller.

Possible failure modes

- ▶ CAN bus hardware problem (noise)
- ▶ ETC ECU failure
- ▶ Controller firmware defect

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the cable harness (termination/noise).
4. Remove any recently added CAN bus ECUs (implements).
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 114 "AutoTrac Quadrature Steering Override Not Detected"

Cause

A critical Autopilot system fault has occurred. The navigation controller did not detect the main steering override quadrature encoder used by John Deere AutoTrac systems.

Possible failure modes

- ▶ Damage to cable harness, or disconnected sensor
- ▶ Damaged quadrature encoder
- ▶ Controller hardware failure
- ▶ Controller firmware defect

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the integrity of the main encoder cable harness and connectors.
4. Check the main encoder. Replace if required.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 115 "IMU Orientation Wrong"

Cause

A critical Autopilot system fault has occurred. The orientation of the controller with respect to the vehicle local level has been determined to be inconsistent with the calibrated alignment angles. This check is performed only once per power cycle.

Possible failure modes

- ▶ The controller may be installed incorrectly.
- ▶ Vehicle may be powered up while on a steep incline (> 20 degrees).
- ▶ The IMU sensors may be defective.
- ▶ Controller firmware defect.

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Verify that the controller is installed at the correct orientation.
4. Drive the vehicle to a flat area. Cycle the vehicle power and check if the fault reoccurs.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 116 "Wheel Speed Sensor Input Is Not Detected"

Cause

A critical Autopilot system fault has occurred. The tractor is seen to be travelling above 2.0 m/s and no wheel speed sensor input has been detected. This check is performed only once per power cycle.

Possible failure modes

- ▶ Damaged cable harness (wheel speed sensor disconnected)
- ▶ Wheel speed sensor failed
- ▶ Controller hardware failure
- ▶ GPS receiver failure or misconfiguration

Note – *If this is a very intermittent problem, use the display to clear the controller fault and continue to operate.*

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the controller firmware version. See [page 16](#).
3. Check the connections between the cable harness and the wheel speed sensor.
4. Check the wheel speed sensor. Replace if required.
5. If the fault is still not resolved, contact Trimble Support.

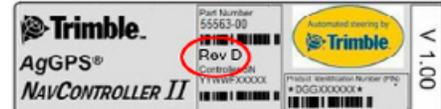
Autopilot system fault code 117 "AutoTrac Quadrature Steering Backup Not Detected"

Cause

A critical Autopilot system fault has occurred. This error occurs when the navigation controller does not detect the backup steering override quadrature encoder used by John Deere AutoTrac systems. The fault condition must be cleared to resume Autopilot system operation.

Solution

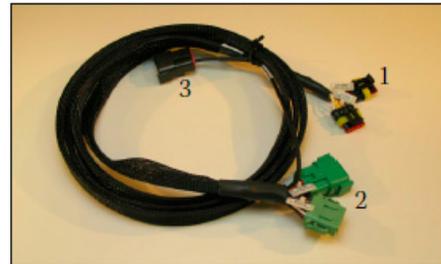
1. Inspect the NavController II label for the Rev letter. The NavController II must be Rev D or later. If the Rev letter is not shown, the NavController II is Rev C or earlier, which does not support a John Deere AutoTrac Ready Autopilot installation.



All revisions of NavController III are compatible.

2. Verify that the correct John Deere vehicle profile is selected in the vehicle configuration section of the Autopilot Toolbox II software or the FieldManager display. The correct profile contains "AT" as part of the name.
3. Check the cable (P/N 57535) for possible defects, including broken or pinched wires and bent or broken pins in each connector. Ensure that each pin is fully seated in each socket.

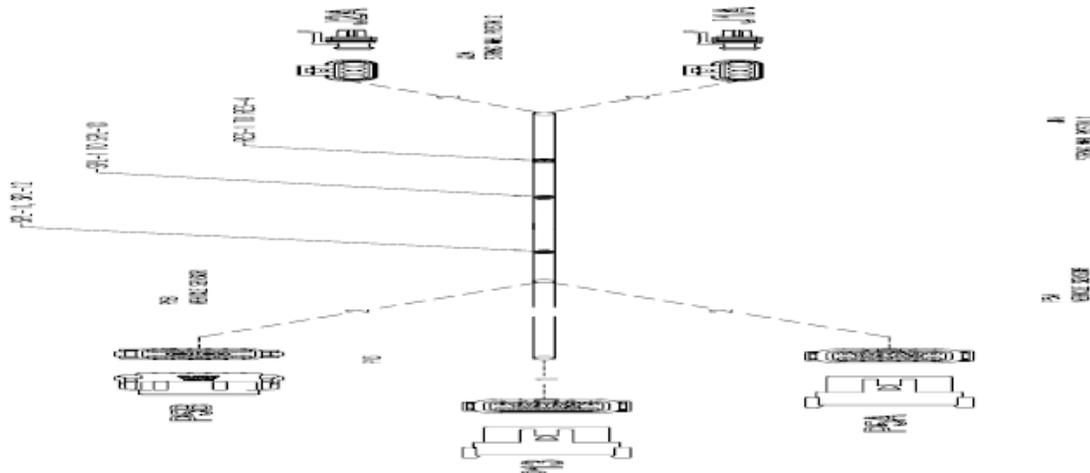
Item	Description
1	J1A and J2A steering encoder jumper
2	P5A and P5B vehicle sensors
3	P13 spare sensor



4. Disconnect and then reconnect the J1A and J2A jumpers to the tractor harness.
5. If the fault continues, install new cables between the NavController II / NavController III and the John Deere AutoTrac. See the figure and table on the following page.



The table shows the wiring for the NavController II / /NavController III and John Deere AutoTrac



Cabling diagram

Wire ID #	Conn-term	Conn-term	Wire		Description
			Color	Size	
1A	J1A-1	SPL-1	WH	18	+5 V OUT
1B	SPL-1	RES-1	WH	18	+5 V OUT
1C	SPL-1	SPL-3	WH	18	+5 V OUT
1D	SPL-3	RES-2	WH	18	+5 V OUT
1E	SPL-3	SPL-9	WH	18	+5 V OUT
1F	SPL-9	SPL-11	WH	18	+5 V OUT
2A	J1A-2	SPL-2	YW	18	IN_5V_6_ADT+
2B	SPL-2	RES-1	YW	18	IN_5V_6_ADT+
2C	SPL-2	P5A-4	YW	18	IN_5V_6_ADT+
3A	J1A-3	SPL-4	OR	18	IN_5V_5_ADT-
3B	SPL-4	RES-2	OR	18	IN_5V_5_ADT-
3C	SPL-4	P5A-3	OR	18	IN_5V_5_ADT-
4A	J1A-4	SPL-10	BK	18	GND_SIG
4B	SPL-10	SPL-12	BK	18	GND_SIG
4C	SPL-12	P5A-11	BK	18	GND_SIG
5A	J2A-1	SPL-5	GY	18	
5B	SPL-5	RES-3	GY	18	
5C	SPL-5	SPL-7	GY	18	
5D	SPL-7	RES-4	GY	18	
5E	SPL-7	SPL-9	GY	18	
6A	J2A-2	SPL-6	BU	18	IN_5V_9_ADT-
6B	SPL-6	RES-3	BU	18	IN_5V_9_ADT-
6C	SPL-6	P5A-9	BU	18	IN_5V_9_ADT-
7A	J2A-3	SPL-8	OR	18	IN_5V_10_ADT-
7B	SPL-8	RES-4	OR	18	IN_5V_10_ADT-

Wire ID #	Conn-term	Conn-term	Wire		Description
			Color	Size	
7C	SPL-8	P13-3	OR	18	IN_5V_10_ADT-
8	J2A-4	SPL-10	BK	18	GND_SIG
9	P5B-1	P5A-1	BR	18	
10A	P5B-2	SPL-11	RD/WH	18	+5 V OUT
10B	SPL-11	P5A-2	RD/WH	18	+5 V OUT
11	P5B-5	P5A-5	OR		
12	P5B-6	P5A-6	BU		
13	P5B-7	P5A-7	VT		
14	P5B-8	P5A-8	GY		
15	P5B-10	P5A-10	OR/WH		GND_SIG
16	P5B-11	SPL-12	BK		GND_SIG
17	P5B-12	P5A-12	WH		

Autopilot system fault code 118 "Steering Status Report Packet Not Detected"

A critical Autopilot system fault has occurred. The Steering Status Report Packet sent by the CAT MT steering sub system is not detected. This is a liability warning that automatic control of steering and implement valves will occur. The warning must be acknowledged every time the tractor is started.

To ensure that the packet is received by the Autopilot controller:

1. Turn off the Autopilot system power switch.
2. Start the tractor.
3. Acknowledge the ISO Class 2 enabled message on the armrest console:



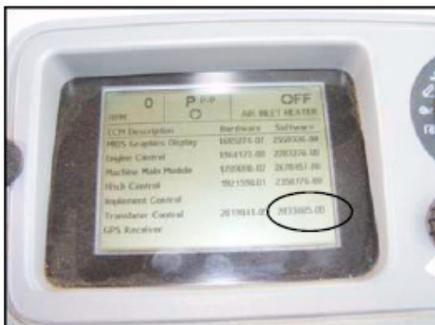
4. Turn on the Autopilot system power switch.

Cause / Solutions

When the Autopilot automated steering system is installed on a CAT MT 7xx/CAT MT 8xx vehicle, the system can return the Fault Code 118.

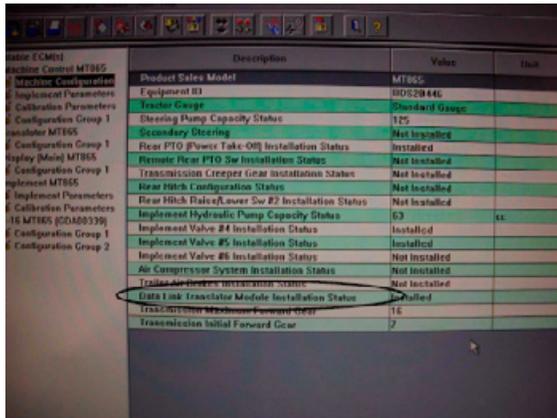
There are several factors that can generate Fault Code 118:

- ▶ **Incorrect version of CAN translator installed:** Verify that the vehicle has the correct version of CAN translator installed. On the tractor armrest MIDS display:
 - a. Turn the upper knob to the hash marks at the 1 o'clock position.
 - b. Press the Enter key and the right arrow key at the same time. The translator software must be version 283-3405-00 or later:



- If the firmware version is incorrect, a CAT dealer must upgrade the software for Autopilot to operate.

- If this does not appear as an option, a CAT dealer must set "Data Link Translator Module Installation Status" to Installed. This can be done only with the CAT service tool.

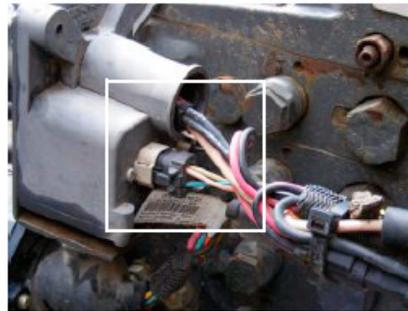


- ▶ **Class 3 Mode not enabled:** To check that Class 3 is enabled, on the tractor armrest MIDS display:
 - From the hardware/software page, rotate the main selector knob to the M/E setting, at the 5 o'clock position.
 - Rotate the lower left knob to highlight "P3" (page 3). The highlighted page has a black background.
 - Press the left or right arrow key until the "Class 3" box has a thick, dark border around it.
 - Rotate the small, black knob to highlight the word "ENABLE". A warning message appears.
 - Press the Enter key to acknowledge the ISO 11783 activation.
 - At every power cycle, a warning that the ISO 11783 network is enabled appears on the tractor's MIDS monitor. The tractor will not accept Autopilot commands until this warning is acknowledged. To acknowledge the warning, press the Enter key (center right). Class 3 is enabled.
 - Rotate the main selector knob to the 12 o'clock position.
- ▶ **Incorrect vehicle profile selected:** To verify the vehicle profile:
 - Vehicle profile **CAT MT700** is used on non-CAN bus-enabled Autopilot system installations (when the tractor is not CAN bus-enabled). This installation requires cable P/N 54636 connected between P5 of the NavController main harness and a steering interface connected to the tractor's steering under the steering console.
 - Vehicle profile: **CAT MT700 (CAN)** is used on CAN bus-enabled Autopilot system installations (when the tractor is CAN bus-enabled). This installation requires cable P/N 54850 connected between P12 of the NavController auxiliary harness and the tractor's CAN bus, which is a 4-pin Deutsch DT connector that is in the bottom rear corner of the electrical panel to the right of the driver's seat. The connector has red, yellow, green, and black wires.
- ▶ **Cabling issues:**
 - Make sure that the cable connecting the Autopilot system to the tractor's CAN bus is undamaged and is correctly and securely connected.
 - Ensure that the cable harness (P/N 56850) is securely connected between P12 of the NavController auxiliary harness and the tractor's 4-pin Deutsch DT connector that is in the bottom rear corner of the electrical panel to the right of the driver's seat. The connector has red, yellow, green, and black wires.
 - Inspect the entire length of the cable for damage (for example, cuts, crimps, pinches, or wear).
 - Disconnect each connector and carefully tug on each wire to ensure that every pin is properly locked in place.

- Check that the ISO connector is installed on the rear of the tractor. On the back of the ISO connector are 2 smaller connectors. One connector is a 4-pin DT-Deutsch connector with yellow, green, red, and black wires.

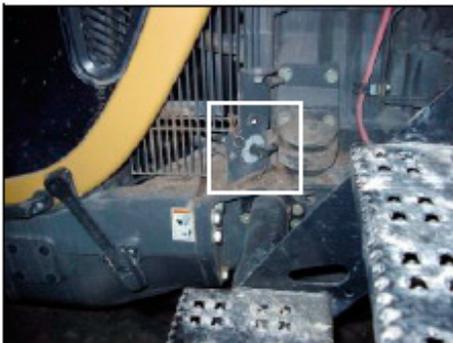


ISO Connector location



CAN connector

- Check that the grounds on the external harness are correctly connected. Under the right floor board, a harness connects to the tractor. This harness goes to the connector on the rear of the tractor, to chassis ground (unbraided), and cab ground (braided wire).
- Check that both terminators are installed on the external CAN network. They are located:
 - In the connector on the back of the tractor.
 - Under the right side floorboard panel. It is either a 6 or 8-pin Packard connector.
- Check the fuse panel for a loose circuit breaker. The fuse panel is the lower one towards the front of the tractor. Also ensure that the connectors on the outside of the fuse panel are correctly connected.
- Reset the master disconnect switch on the tractor. This is located at the bottom of the operator access stairs.



- Ensure that all the pins are seated in the 70-pin connector on the tractor's translator controller. The controller is under the operator's seat. To access it, remove the center floorboard panel.
- Near the tractor's Translator controller are two 8-pin connectors. Ensure that all the wires are seated properly in these connectors. These connectors are also located under the operator's seat and accessed by removing the center floorboard panel.
- Do a continuity check on the CAN bus wiring:
 - a. Remove the 70-pin connector from the tractor's translator controller.
 - b. Remove the two terminator circuits from the CAN network:
 - On the back of back of the tractor, remove the 4-pin DT connector from the CAN bus connector.
 - Remove the 6 or 8-pin Packard connector (locate under the right floorboard) from the harness.
 - c. Check the continuity on the wires between where the terminator circuits were plugged in.

Note – *If you do not disconnect the controller, this check will not work.*

▶ Tractor Steering issues

- Make sure that the roading lockout switch on the tractor's armrest is turned OFF. Otherwise, the tractor will not accept any steering commands.
- Make sure that the clutch pedal switch is not set to show that the clutch is depressed. Otherwise, the Autopilot system will not accept a steering command. This switch is extremely sensitive and even if the pedal is up, it may indicate that the clutch is depressed. Pull up on the clutch pedal to see if the system will steer.
- If the MT steering controller thinks that the steering system is in open loop control, it will not accept a steering command from an Autopilot controller. Steer the tractor slightly right or left so that the sensor on the steering motor detects motion. If the issue is still unresolved, reset the master disconnect located at the bottom of the operator access stairs.
- On AGCO Wheeled tractors with the PVED-CL valve, there is a light that will indicate the status of the steering controller. Check to make sure the valve is in a green state.

LED color	PVED-CL operation status	PVED-CL status
Black / Off	Not available	No battery power supplied to the PVED-CL.
Orange	Fault	PVED-CL is in fault state. More information is available in DM1 CAN message.
	Operational	PVED-CL is operational but no device has been selected. Once a steering device is activated, the LED changes to green.
Green	Operational	PVED-CL is operational.
	Reduced	PVED-CL is in reduced stated.
	Calibration	PVED-CL is operating in calibration mode
Red	Not available	A critical PVED-CL specific fault has happened. PVED-CL is in fail silent state (silent = disconnected from the CAN bus).

Autopilot system fault code 119 "Steering Override Parameter Error"

Cause

The Steering Override parameter sent by the CAT MT steering system has value 2 (error).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 120 "Steering Override Parameter Not Available"

Cause

The Steering Override parameter sent by the CAT MT steering system has value 3 (unavailable).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 121 "Gear Lever Parameter Error"

Cause

The Gear Lever parameter sent by the CAT MT steering system has value 14 (error).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 122 "Gear Lever Parameter Not Available"

Cause

The Gear Lever parameter sent by the CAT MT steering system has value 15 (not available).

Possible failure modes

Error reported by MT steering control mode.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select OK.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 123 "Gear Lever Parameter Unknown"

Cause

The Gear Lever parameter sent by the CAT MT system has value 4–13 (unknown state).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 124 "Road Lockout Switch Parameter Error"

Cause

The Road Lockout Switch parameter sent by the CAT MT system has value 2 (error).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select OK.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 125 "Gear Lever Parameter Not Available"

Cause

The Road Lockout Switch parameter sent by the CAT MT system has value 3 (unavailable).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 126 "Steering Command Reset Required Parameter Error"

Cause

The Steering Command Reset Required parameter sent by the CAT MT system has value 2 (error).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select OK.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 127 "Steering Command Reset Required Parameter Not Available"

Cause

The Steering Command Reset Required parameter sent by the CAT MT steering system has value 3 (unavailable).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 128 "Steering Subsystem Ready Parameter Error"

Cause

The Steering Subsystem Ready parameter sent by the CAT MT system has value 2 (error).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 129 "Steering Subsystem Ready Parameter Not Available"

Cause

The Steering Subsystem Ready parameter sent by the CAT MT system has value 3 (unavailable).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 130 "CAN Communication Status Parameter Error"

Cause

The CAN Communication Status parameter sent by the CAT MT system has value 2 (error).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 131 "CAN Communication Status Parameter Not Available"

Cause

The CAN Communication Status parameter sent by the CAT MT system has value 3 (unavailable).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 151 "Inching Pedal Depressed Parameter Error"

Cause

The Inching Pedal Depressed parameter sent by the CAT MT steering system has value 2 (error).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 152 "Inching Pedal Depressed Parameter Not Available"

Cause

The Inching Pedal Depressed parameter sent by the CAT MT steering system has value 3 (unavailable).

Possible failure modes

Error reported by MT steering control module.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Check the ISO software version.
3. If the fault is still not resolved, contact the tractor dealer.

Autopilot system fault code 156 "Noisy 1PPS Signal"

Cause

This fault occurs when there is excess electrical noise in the PPS line that the NavController interprets as a 1PPS signal. If the system receives more than the expected number of 1PPS messages from the receiver in a given time interval, the system returns a fault. The fault can be caused by a number of issues, described below.

Note – *The 1PPS signal is a very accurate time signal transmitted by GPS satellites and is used to synchronize the communication of the Autopilot system.*

Solution

▶ **A faulty cable:**

- a. Inspect the length of the cable from the NavController to the GPS receiver for pinched, cut, or worn wires. Inspect the cable shielding for cuts or worn areas. The decrease in shielding may allow interference to enter the cable. The cable part number will depend on the model of receiver and whether the controller is a NAV I or NavController II / NavController III.
- b. If you suspect the cable has a defect, replace it.

▶ **Electrical interference:** If there is electrical interference:

- a. Disconnect any other monitors (spray monitor, seed monitor, or 2-way radio) that may be using the same power supply as the NavController.
- b. Ensure that any 2-way radio or CB antennas are away from the GPS antenna.
- c. Ensure that any other radio or CB antenna cables do not run parallel to the GPS receiver cable or the antenna cable.
- d. If the fault does not occur following the tests, relocate the third-party device's antenna, cable, or power source.

▶ **A faulty receiver:** If the fault continues following the previous tests:

- a. Install the latest firmware in the receiver.
- b. Replace the receiver to see if the fault is resolved.

▶ **Having a laptop connected to the NavController:** In many situations, you require a laptop to configure and calibrate the Autopilot system. Once you do that, disconnect the laptop from the NavController to prevent Fault 156 from occurring.

Autopilot system fault code 157 "TAP Bounds Check Failed"

Cause

The configuration value is out of bounds.

Possible failure modes

This fault occurs when the vehicle profile file is corrupt or when the value entered is out of bounds.

Solution

1. Clear the fault code:
 - a. On the display, check the fault detail.
 - b. Record the fault code and then select **OK**.
2. Reload a new version of the vehicle profile.
3. If the fault is still not resolved, contact Trimble Support.

Autopilot system fault code 158 “JD xx30T Engaged Status Incorrect”

Note – This fault applies only to John Deere xx30T vehicles.

Cause

The John Deere xx30T steering interface box indicates manual mode after the software application initiates the engage command.

The fault could be caused by:

- ▶ The steering interface box incorrectly connected to the vehicle steering system.
- ▶ The steering interface box incorrectly connected to the Autopilot controller
- ▶ A wrong (older) steering interface box used for the xx30 vehicle
- ▶ Steering interface box failure

Solutions

- ▶ Verify the steering interface box connection to the vehicle steering system.
- ▶ Verify the steering interface box connection to the Autopilot controller.
- ▶ Verify that you are using the correct version of the steering interface box.
- ▶ Replace the steering interface box.

Autopilot system fault code 160 “Software Diagnostics Assertion”

Cause

This fault can occur when the Autopilot controller software application detects an incorrect or out of range value when running diagnostic checks.

The fault could be caused by:

- ▶ Incorrect vehicle configuration selected
- ▶ Malfunctioning vehicle sensors
- ▶ Software defect

Solution

1. Record the fault code details.
2. Clear the fault code.
3. Verify that the correct vehicle configuration is selected.
4. Verify that the Autopilot controller software version is current.
5. If the fault is still not resolved, contact Trimble Support.

Autopilot System Fault Code 161: Row Sensor A Undervoltage

Causes

This error occurs whenever Row Crop Sensor A (generally the left sensor) has an voltage below the minimum of 0.25V (indicating open)

Possible causes:

- ▶ Sensors are disconnected
- ▶ Cabling is cut or damaged
- ▶ Sensors are damaged

Solution

1. Check Sensor Cabling and connect or repair as necessary.
2. Check sensor integrity and replace as necessary (refer to manufacturer's specifications).
3. If using a header that does not use Row Guidance, remove the plugin.

Autopilot System Fault Code 162: Row Sensor A Overvoltage

Causes

This error occurs whenever Row Crop Sensor A (generally the left sensor) has a voltage value over the maximum of 4.75 volts (indicating short to supply voltage).

Possible causes:

- ▶ Sensors are damaged
- ▶ Cabling is cut or damaged
- ▶ Sensors are damaged

Solution

1. Check Sensor Cabling and connect or repair as necessary.
2. Check sensor integrity and replace as necessary (refer to manufacturer's specifications).
3. If using a header that does not use Row Guidance, remove the plugin.

Autopilot System Fault Code 163: XCM Autoguidance engage error

Causes

This error occurs in Global Arm Rest Unit (GARU) equipped CNH vehicles when the XCM controller sends a remote engage message to the Nav Controller

Possible causes

Error on vehicle side.

Solution

1. Restart vehicle and Nav Controller to reinitialize the systems.
2. Check Vehicle profile to ensure proper profile is being used.
3. Have CNH Tractor Technician confirm firmware on vehicle is correct.
4. Have Vehicle repaired as necessary

Autopilot System Fault Code 164: Not currently Used

Autopilot System Fault Code 165: Row Sensor B Undervoltage

Causes

This error occurs whenever Row Crop Sensor B (generally the right sensor) has an voltage below the minimum of 0.25V (indicating open)

Possible causes:

- ▶ Sensors are disconnected
- ▶ Cabling is cut or damaged
- ▶ Sensors are damaged

Solution

1. Check Sensor Cabling and connect or repair as necessary.
2. Check sensor integrity and replace as necessary (refer to manufacturer's specifications).
3. If using a header that does not use Row Guidance, remove the plugin.

Autopilot System Fault Code 166: Row Sensor B Overvoltage

Causes

This error occurs whenever Row Crop Sensor B (generally the right sensor) has a voltage value over the maximum of 4.75 volts (indicating short to supply voltage)

Possible causes:

- ▶ Sensors are damaged
- ▶ Cabling is cut or damaged
- ▶ Sensors are damaged

Solution

1. Check Sensor Cabling and connect or repair as necessary.
2. Check sensor integrity and replace as necessary (refer to manufacturer's specifications).
3. If using a header that does not use Row Guidance, remove the plugin.

Autopilot System Fault Code 167: Eaton Maestro Status Message Timeout

Causes

This error occurs when the Eaton Maestro system status message (Typically used on CNH Sugar cane harvesters) has not been received for 1 second (generally updates at 50 Hz),

Possible causes:

- ▶ CAN Connection issues
- ▶ Vehicle ECU is not powered
- ▶ Vehicle ECU firmware version incorrect
- ▶ Improper Profile

Solution

1. Make sure vehicle power is on.
2. Check Cabling.
3. Check for proper vehicle profile.
4. Have Technician confirm ECU Firmware version.

Autopilot System Fault Code 168: CNH Engine speed timeout

Causes

This error occurs when the ECU on the machine has not sent the engine speed status message for more than 2 seconds (generally updates at 10 hz)

Possible causes:

- ▶ CAN Connection issues
- ▶ Vehicle ECU is not powered
- ▶ Vehicle ECU Firmware version incorrect
- ▶ Improper Profile

Solution

1. Make sure vehicle power is on.
2. Check cabling.
3. Check for proper vehicle profile.
4. Have Technician confirm ECU Firmware version.

Autopilot System Fault Code 169: CNH Quadrature encoder manual override overvoltage

Causes

This error occurs when the voltage output received from the turn signal quadrature encoder is sampled at over 4.85 volts.

Possible causes:

- ▶ Cabling short to Supply voltage
- ▶ Sensor is malfunctioning
- ▶ Improper vehicle profile

Solution

1. Check vehicle profile.
2. Check cabling per CNH service manual
3. Check Sensor per CNH service manual

Autopilot System Fault Code 170: CNH Quadrature encoder manual override undervoltage

Causes

This error occurs when the voltage output received from the turn signal quadrature encoder is sampled at under 0.15 V.

Possible causes:

- ▶ Cabling damage
- ▶ Sensor is malfunctioning
- ▶ Improper vehicle profile

Solution

1. Check vehicle profile.
2. Check cabling per CNH service manual.
3. Check Sensor per CNH service manual.

Autopilot System Fault Code 171: CNH Quadrature encoder manual override channels shorted

Causes

This error occurs when the outputs from the CNH turn signal encoder are shorted to each other

Possible causes:

- ▶ Cabling damage
- ▶ Sensor is malfunctioning
- ▶ Improper vehicle profile

Solution

1. Check vehicle profile.
2. Check cabling per CNH service manual.
3. Check Sensor per CNH service manual.

Autopilot System Fault Code 172: CAN File system error

Causes

This error occurs when the CAN File system service has timed out.

Possible causes:

- ▶ CAN initialization error
- ▶ Firmware Corruption
- ▶ Hardware damage

Solution

1. Restart vehicle and controller.
2. Set profile to default vehicle and reload Firmware to the controller.
3. Repair/replace controller.

Autopilot System Fault Code 173: Memory Backup Restore Failure

Causes

This error occurs when the memory backup restoration during initialization failed. Possible reflashing of memory occurred.

Possible causes:

- ▶ Firmware upgrade interrupted
- ▶ Firmware on Controller has corrupted
- ▶ Hardware failure

Solution

1. Set profile to default vehicle and reload Firmware to the controller.
2. Repair/replace controller.

Autopilot System Fault Code 174: Vehicle profile requires newer firmware

Causes

This error occurs when the vehicle profile firmware minimum version is greater than the version that is on the controller. Early FW versions do not have this code and will reset to default vehicle

Possible causes:

- ▶ Firmware is obsolete for vehicle profile
 - Error value 1 is required controller firmware version
 - Error value 2 is current controller firmware version

Solution

1. Upgrade Controller to required firmware version.
2. Reload VDB.

Autopilot System Fault Code 175: System Soft Reboot

Causes

This error occurs when the firmware on the controller has done a soft reboot.

Possible causes:

- ▶ Firmware upgrade process may trigger this

Solution

1. Restart controller.
2. Set to Default vehicle VDB and reload Controller Firmware.
3. Record Fault error values and report to Trimble Support.

Autopilot System Fault Code 176: Sauer Danfoss Controller Enable Failure

Causes

This error occurs when the Sauer Danfoss Valve enable failure is indicated in the can messaging from the Sauer Danfoss controller.

Possible causes:

- ▶ Rooding switch on vehicle is on
- ▶ Sauer Danfoss Controller has not been enabled by cab switch
- ▶ Vehicle engagement requirements are not met:
 - Vehicle in park
 - Vehicle not moving
 - Vehicle header or threshing unit not on.
- ▶ Vehicle does not have Autoguidance option enabled

Solution

1. Verify rooding switch is off.
2. Verify Vehicle Autoguidance switch is enabled.
3. Record Fault error values and report to Trimble Support.

Autopilot System Fault Code 177: John Deere State Machine Failure

Causes

This error occurs when the John Deere CAN state machine change did not take place as expected within the timeout.

Note – *Faults 182, 183, and 184 can be considered special cases of this fault.*

Error values: 1 Autopilot state of secure authentication.

State of Secure Authentication

Value	Description
0	Start
1	Waiting for ISO guidance message
2	Requesting Authentication
3	Waiting for response
4	Waiting for vehicle automation status
5	Normal operation state

Possible causes:

- ▶ Controller to Vehicle CAN connection issues (fault 182)
- ▶ Vehicle is not Guidance ready
- ▶ John Deere Vehicle not unlocked for Third party guidance or unlocked for incorrect third party guidance (fault 184)
- ▶ Authentication failed for reasons other than missing activation code (fault 183)
- ▶ Firmware error

Solution

1. Check cabling for controller - ensure connection to P4 connector.
2. Verify machine is Autoguidance ready (Take P.I.N. number to John Deere Dealer).
3. Refer to Fault 182 for CAN Connection issues.
4. Refer to Fault 183 for Authentication failure due to reasons other than activation code.
5. Refer to Fault 184 for activation code errors.

Autopilot System Fault Code 178: John Deere CAN guidance Limit Status Fault

Causes

This error occurs when the John Deere vehicle controller status limit indicates a fault.

Error values:

- ▶ 1 John Deere CAN Exit Code (listed in the table below)
- ▶ 2 UI Message Code

Value	Description	Status message in the Autopilot Toolbox utility or on display
0	No Reason or "All Clear"	"No Reason or "All Clear"
1	Tractor in Park	Tractor in Park
2	Internal Tractor Steering Fault	Tractor Steering Fault
3	Vehicle Speed Too Low for Too Long	Vehicle Speed Too Low for Too Long
4	Alternative Guidance system active	Alternative Guidance System
13	Automation Command Message Timeout	Guidance Command Message Timeout
16	Authorization has been Denied	Authorization Denied
21	Vehicle Speed too High	Speed to High
22	Oil Temperature Below Threshold	Oil Temperature Too Low
23	In Diagnostics Mode	In Diagnostics Mode
24	Controller State is Incompatible	Controller State is Incompatible
25	Resume Switch not Pressed	Resume Switch not Pressed
26	Curvature Not Matched	Curvature Not Matched
49	Security Error	
50	Authorization Pending	Authorization Pending
51	Operator Presence	Operator Presence Missing
52	Implement Has Released Control	Implement Has Released Control
53	Global Stop received	Global Stop received
54	Operator override	Operator override
55	Access manager blocked	
56	Security Error 1	Auth. Err.: Implement Not Authorized
57	Security Error 2	Auth. Err.: Wrong Tractor Serial Number
58	Security Error 3	Auth. Err.: Various Reasons
59	Security Error 4	Auth. Err.: Security Failed
60	Security Error 5	Auth. Err.
61	Security Error 6	Auth. Err.
62	Error	
63	Not Available	Autoguidance Not Installed

Possible causes:

- ▶ Refer to Error Table for reason

Solution

Remedy the error using the solution presented in the table on the previous page.

Autopilot System Fault Code 179: ISO Guidance status message error

Causes

This error occurs when the Vehicle controller is sending an ISO status message that contains an error state.

Check the CAN Guidance status page in the Autopilot Toolbox utility or on the display for possible causes:

- ▶ Reset Request Message is in an error state
- ▶ Steering input is in an error state
- ▶ Steering readiness is in an error state
- ▶ Vehicle lockout is in an error state

Solution

1. Shut down and restart vehicle.
2. Clear active or passive vehicle faults.
3. Confirm vehicle is Autoguidance Ready.
4. Valve or Steering controller is not enabled or calibrated - have system enabled via manufacturer tool (i.e. AGCO EDT or CNH EST) and calibrate valve per service manual.
5. Steering sensor is not calibrated - calibrated per vehicle service manual.
6. Steering sensor is malfunctioning - troubleshoot per vehicle service manual.
7. Steering sensor is reading out of limits - Reset stops on vehicle all the way in, recalibrate steering sensor, adjust stops to limit travel of wheels such that limit is not exceeded.
8. Steering readiness is not met or in error.
 - Activate threshing mechanism if required.
 - Activate header mechanism as required.
 - Validate sensors that provide input for these mechanisms are functioning properly:
Speed sensors
Height sensors, and so on.
9. Vehicle lockout is in an error state:
 - Toggle switch to proper position.
 - Check switch mechanism per vehicle service manual.

Autopilot System Fault Code 180: John Deere CAN Guidance Limit Status not available

Causes

This error occurs when the John Deere steering controller indicates the limit status is not available”

- ▶ Error value 1: John Deere Exit code (See Table from Fault 178)
- ▶ Error value 2: UI Message code

Possible causes:

- ▶ Active Faults on machine
- ▶ Incompatible Firmware on John Deere Machine

Solution

1. Clear Faults on Machine.
2. Have Vehicle upgraded to latest firmware by John Deere dealer

Autopilot System Fault Code 181: John Deere CAN Guidance Limit Status Reserved

Causes

This error occurs when the John Deere steering controller indicates the limit status is reserved

- ▶ Error value 1: John Deere Exit code (see table for Fault 178)
- ▶ Error value 2: UI Message code

Possible causes:

- ▶ Active Faults on machine
- ▶ Incompatible Firmware on John Deere Machine

Solution

1. Clear Faults on Machine.
2. Have Vehicle upgraded to latest firmware by John Deere dealer.

Autopilot System Fault Code 182: John Deere CAN No Guidance Message Received

Causes

This error occurs when the John Deere steering controller guidance message is not being received by the NavController.

Check AP Toolbox CAN Guidance Status page to check message frequency.

Possible causes:

- ▶ Controller is not connected to CAN bus (make sure interface cable is connected to P4 not P12)
- ▶ Vehicle is not guidance over CAN ready.
- ▶ CLC (Cab Load Controller) firmware version on Tractor is non compatible
- ▶ Termination issues with Implement Bus
- ▶ GreenStar display is enabled on Command Center 3 vehicles
- ▶ Precision Ag Applications is enabled on Gen 4 Command center vehicles
- ▶ John Deere 6R machine does not have ITEC enabled

Solution

1. Verify cabling is correct (interface cable is connected to P4).
2. Check Frequency of Messages and John Deere Status Messages in APToolbox or Display CAN diagnostics page.
3. Verify that vehicle is CAN ready.
4. Upgrade the CLC controller FW version - refer to support note "SUP26678_Upgrade_CLC_on_JD.pdf.
5. Inspect Implement bus following the instructions in support notes: AGPB_Troubleshooting John Deere Termination Problems.pdf and AP_CAN_JDeere_SUP26761_Communication and performance .pdf
6. GreenStar Display is enabled on Command Center 3 displays - refer to support note: AGSB25831_Autopilot_Disabling GreenStar.pdf
7. Precision Ag Applications is enabled on the Generation 4 John Deere display - Disable it per John Deere DTAC solution - 98021. Ensure the latest revision of the DTAC solution is used as updated information may be available.
8. Refer to Support note: SUP26464_Autopilot_JD_fault 177 on 6R tractors.pdf.
9. Confirm ITEC is enabled on 6R machines

Autopilot System Fault Code 183: John Deere CAN Secure Authentication failed

Causes

This error occurs when the John Deere steering controller and NavController fail to authenticate communications

Error value 1: State of John Deere Secure Authentication

Value	Description
0	Start
1	Waiting for ISO guidance message
2	Requesting Authentication
3	Waiting for response
4	Waiting for vehicle automation status
5	Normal operation state

Possible causes:

- ▶ Start up initialization timing error.
- ▶ No activation or incorrect third party guidance activation on John Deere Machine
- ▶ Machine is not guidance ready
- ▶ Incompatible Firmware on John Deere Machine

Solution

1. Restart Tractor and NavController.
2. Enter proper Trimble Third party guidance activation unlock.
3. Ensure vehicle is guidance ready by providing PIN number to John Deere dealer.
4. Have machine upgraded to latest firmware payload by John Deere Dealer.

Autopilot System Fault Code 184: John Deere Secure Authentication failed - No Activation Code

Causes

This error occurs when the John Deere steering controller and NavController fail to authenticate communications due to no activation code

Possible causes:

- ▶ No activation or incorrect third party guidance activation on John Deere Machine

Solution

Enter proper Trimble Third party guidance unlock.

Autopilot System Fault Code 185: Generic Fault - CAN Message Timeout

Causes

This error occurs when a can message has timed out.

Error value 1: Message Type

Value	Message Description
1	CNH 4WD or CCM Auto guidance Message
2	CNH Operator Switch message
3	Challenger MT Tracked Steering Angle Message
4	CNH XCM3 Steering Info message
5	CNH XCM3 Steering Status message
6	CNH Sugar Cane Maestro Status message
7	CNH Engine Speed Status message
8	Fendt Steering Command message
9	Fendt Override response message
10	Fendt Error Response message
11	ISO11783 Guidance Machine Status message
12	John Deere Over CAN Vehicle automation message
13	John Deere Over CAN external guidance command and stat message
14	Agrifac Machine status message

Error value 2: Time since the message should have been received

Error value 3: 1 if any messages have been received, 0 if no messages of this type have been received

Possible causes:

- ▶ No Connection to CAN bus or device that sends this message is not on the bus/active.

Solution

1. Ensure proper connection to machine.
2. Verify Firmware on machine is up to date.
3. Verify that guidance on machine is set to Enabled either through activation/lockout switches or by the dealer with the service tool

Autopilot System Fault Code 186: OnSwath Line acquisition Path Planning Failed

Causes

This error occurs when OnSwath cannot find an optimal line acquisition path to the guidance line from the vehicle's position

Error values indicate possible causes:

- ▶ Engagement on excessively sharp curves or turns
- ▶ OnSwath settings are at extreme values with high aggressiveness
- ▶ Engaging at high angles and short distances to the line

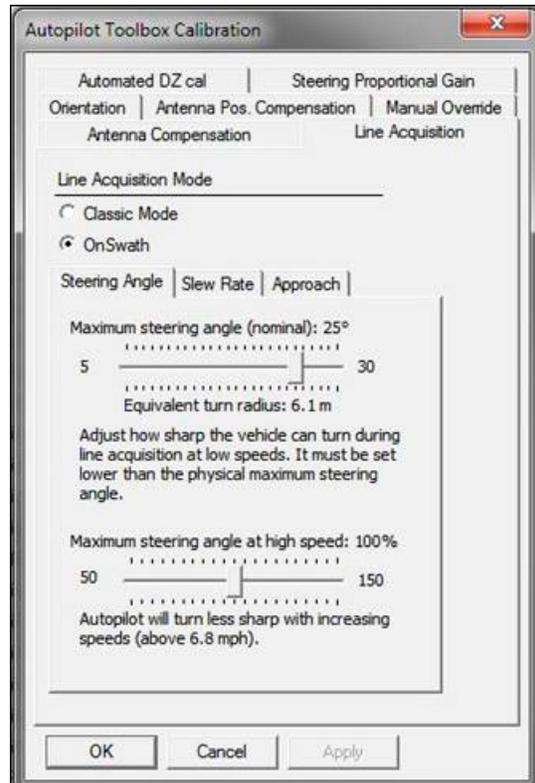
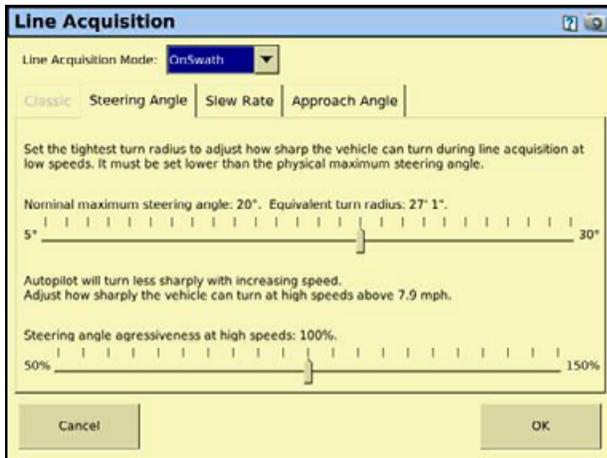
Solution

1. Lower OnSwath Aggresiveness.
2. Engage system with less heading error to the guidance line.
3. Disable OnSwath.

OnSwath Advanced Line Acquisition Settings

This section describes how to use the OnSwath™ advanced line acquisition capability with the Trimble Autopilot automated steering system.

To enable the OnSwath advanced line acquisition capability, either change from Classic Mode to OnSwath on the FmX integrated display software version 8.0 or later, or enable it in the Autopilot Toolbox software version 3.0 or later.

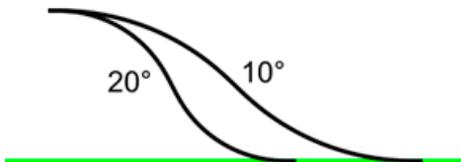


Available settings

Nominal maximum steering angle: This sets the desired steering angle (turn radius) the system will use during line acquisition. This is not a hard limit and may be exceeded. The value must be set to less than the physical maximum steering angle of the vehicle. A good starting point is 50-75% of the physical maximum. The default values for the vehicle profile are in this range.

Variations in this setting have a trade-off of smoothness versus aggressiveness. The diagram below shows the differences in possible paths at different steering angle values.

Note – *This setting will affect the sharpest angle between the vehicle and a towed implement.*



Steering angle high speed aggressiveness: This setting controls how the Autopilot will reduce the steering angle used at higher speeds. With a higher aggressiveness value, the Autopilot will make sharper turns at high speed. Lower aggressiveness values will limit the sharpness of high speed turns more, to maintain smoother, more stable operation. The speed noted above the slider indicates when a reduction in steering angle will start to occur.

Nominal maximum slew rate: This sets the slew rate that the Autopilot system will use during line acquisition. A higher slew rate will increase the rate at which the steering angle (turn radius) changes, up to the vehicle's physical capabilities.

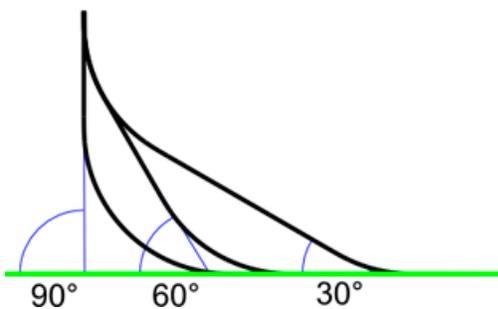
For vehicles with poor hydraulic performance - lower this setting. This is not a hard limit, and may be exceeded up to the vehicles capabilities. This value must be set lower than the physical capabilities of the machine. Default values for vehicles are a good starting point.

Note – *Lowering this value may help with vehicle "Jerk" and oscillations.*

Steering slew rate high speed aggressiveness: The Autopilot system will reduce the slew rate at speeds above the displayed value. A lower aggressiveness will reduce the slew rate at high speeds more. This leads to smoother and more stable operation. A higher aggressiveness will reduce the slew rate less. The speed noted above the slider indicates where the slew rate reduction will begin.

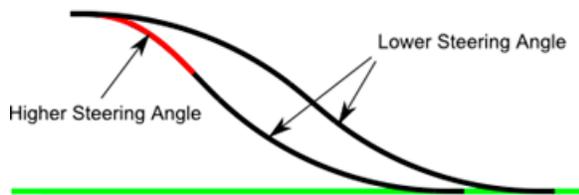
Note – *Lowering this value may help with vehicle "Jerk" and oscillations.*

Maximum approach angle to the swath: Set the desired approach angle that the Autopilot system will drive to the line if adequate space is available. If space is not available, the angle may not be achievable. The following figure shows possible paths to the line based on different approach angles:



Initial turn aggressiveness: This setting adjusts how sharp or smooth the initial turn toward to the line will be in comparison to the final turn onto the line. This affects only the initial turn towards, while the final turn onto the line is not affected.

A higher value will turn harder and sharper towards the line. A lower value will have an initial turn that will be smoother and more gradual. The figure below shows different paths based on different initial turn aggressiveness values with the same final turn.



Recommended setup procedure



WARNING – Before starting the configuration procedure - ensure that the vehicle is in an open field free of obstacles and objects, in the desired operating configuration (for sprayers, with booms extended; for combines, with header attached), where you can evaluate the settings.

The OnSwath technology allows you to tailor the performance of the vehicle to the operation or operator's preferences, as long as the desired preferences are within the physical capabilities of the machine. When following the steps below, adjust the settings while evaluating the performance as the vehicle turns onto the line.

1. **Maximum Approach Angle.** It is recommended to set the desired *Maximum Approach Angle to the Swath* first. This value can be changed later, with little effect on the other settings.
2. **Low Speed Setup.** Set the *Nominal Maximum Steering Angle* and *Nominal Maximum Slew Rate* for the vehicle. Evaluate the turn onto the line at low speed. It is recommended to stay below 6.5 km/h (4 mph).
 - A good starting point for the *Nominal Maximum Steering Angle* is approximately 50-75% of the machine's physical capabilities. For example, a typical wheel tractor might have a maximum steering angle of 35 to 40 degrees. Profiles come with default values that are a good starting point for the vehicle.
 - A good starting point for *Maximum Nominal Slew Rate* is best set around half or below half of the capability of the machine. For example, a typical wheel tractor might have slew rates between 20 and 35 degrees per second. A good starting value would be 10 degrees per second. The vehicle profiles for OnSwath have, by default, suitable starting values for the vehicle.

Note – If the Slew Test is available (part of the Steering Gain Calibration), the slew rate can be approximated by measuring the slew time from hard left to hard right while the vehicle is moving slowly forward at operating RPM. The slew rate is the angle change (full left to full right) divided by the slew time. For example, if the maximum steering angle is 35 degrees and the slew time is 2000 milliseconds, the slew rate is 70 degrees / 2 seconds = 35 degrees per second. Please note that this method is strictly an approximation - it is not the actual steady state slew rate of the vehicle. Actual performance of the vehicle during line acquisition will have many factors including, but not limited to, terrain, hydraulic load, tire size, soil conditions, and engine RPM.

3. **High Speed Setup** . Adjust the *Steering Angle High Speed Aggressiveness* and the *Steering Slew Rate High Speed Aggressiveness* to achieve the desired turn and turn rate at higher speeds. The speed at which these settings start taking effect is indicated. Evaluate line acquisition performance at increasing speeds for the most demanding scenarios (for example, end of row turns). Keep increasing the speed until either:
 - The maximum operating speed is reached. You may choose to increase the aggressiveness values for faster line acquisition. Ensure that operation is stable and safe at any given speed.
 - The system becomes unstable or too aggressive. Reduce the high speed aggressiveness values until the indicated speeds match or are lower than the unstable/too aggressive operating speed. Reevaluate performance. Reduce further if necessary.

4. **Initial Turn Aggressiveness.** Once the desired performance for the turn onto the line has been achieved, this setting can be used to make the initial turn towards the line aggressiveness, while not changing the turn onto the line. Increasing the *Initial Turn Aggressiveness* will make the turn towards the line more aggressive, reducing the overall time needed to acquire the line.

Autopilot System Fault Code 187: Display and Receiver Combination not supported

Causes

This Error occurs when the display and receivers being used are not supported by Autopilot

Possible causes:

- ▶ Incompatible Displays and receivers

Solution

Refer to Display manual for compatible receivers

Autopilot System Fault Code 188: Vehicle Steering mode is not supported

Causes

This error occurs when the vehicle being steered is in a non supported steering mode (i.e. crab steering or 4 wheel steering)

Possible causes:

- ▶ Incompatible steering modes

Solution

Change Steering mode on vehicle to a compatible mode:

- ▶ Regular
- ▶ Rear steer
- ▶ Articulated

Autopilot System Fault Code 189: SAM-200 Steering fault

Causes

This error occurs when the SAM-200 Motor reports a fault to the NavController

Error value 1 indicates the SAM-200 fault per EZ-Pilot Fault Code list

Possible causes:

- ▶ SAM-200 fault

Solution

Review SAM-200 fault and remedy as required

Autopilot System Fault Code 190: Remote Engage Fault

Causes

This error occurs when the remote engage switch input is inverted or has been pressed for too long

Possible causes:

- ▶ The remote engage switch is wired wrong
- ▶ Remote engage switch has been pressed for more than 4 seconds

Solution

1. Check Switch wiring.
2. Press remote engage button for a shorter time.

Autopilot System Fault Code 191: No Communication with IMU

Causes

This error occurs only on NavController IIIs when the IMU processor has not responded to the main processor

Possible causes:

- ▶ IMU Processor is currently updating - wait for upgrade to complete
- ▶ Power interruption during firmware upgrade

Solution

1. Wait for upgrade to complete.
2. Set vehicle to default vehicle and reflash firmware.

Autopilot System Fault Code 192: Failed to Flash IMU

Causes

This error only occurs on a NavController III when a failure occurred when attempting to upgrade the Firmware on the IMU Processor

Possible causes:

- ▶ Poor Connection to the controller during firmware upgrade
- ▶ Incompatible firmware versions

Solution

1. Verify good serial connection to the controller.
Some USB to serial connectors are unreliable - Trimble suggests a SeaLevel SeaLink:
<http://www.sealevel.com/store/2105r-usb-to-1-port-rs-232-db9-serial-interface-adapter.html>
2. Verify firmware being loaded to the NavController is v10 or later

Autopilot System Fault Code 192: Failed to Flash IMU

Causes

This Error only occurs on a NavController III when a failure occurred when attempting to upgrade the Firmware on the IMU Processor

Possible causes:

- ▶ Poor Connection to the controller during firmware upgrade
- ▶ Incompatible firmware versions

Solution

1. Verify good serial connection to the controller. Some USB to serial connectors are unreliable - Trimble suggests a SeaLevel SeaLink: <http://www.sealevel.com/store/2105r-usb-to-1-port-rs-232-db9-serial-interface-adapter.html>.
2. Verify firmware being loaded to the NavController is v10 or later

Autopilot System Fault Code 193: IMU Error State

Causes

This Error only occurs on a NavController III when the IMU processor is reporting an error state

Possible causes:

- ▶ Firmware flash of IMU corrupt
- ▶ Failed Hardware

Solution

1. Set Vehicle to Default vehicle and reflash current firmware.
2. Downgrade the NavController FW to v10.02 and then back up to v11.05 or higher.
3. Replace unit

Autopilot System Fault Code 194: IMU Bad Data

Causes

This Error only occurs on a NavController III when a the data from the IMU is invalid

Possible causes:

- ▶ Erroneous FW operating on the IMU
- ▶ IMU parts are malfunctioning

Solution

1. Set Vehicle to Default vehicle and reflash current firmware.
2. Down grade the NavController FW to v10.02 and then back up to v11.05 or higher.
3. Replace unit

Autopilot System Fault Code 195: Vehicle Profile incompatible with this version of Autopilot hardware

Causes

This Error only occurs when the vehicle profile is incompatible with the NavController Hardware.

Possible causes:

- ▶ Loading AM profiles on CNH NavControllers
- ▶ Loading CNH saved configurations on AM NavControllers

Solution

Use only profiles designed to work with the NavController

Autopilot System Fault Code 196: NextSwath Turn Error

Causes

This error only occurs when the NextSwath Feature has an error.

Possible causes:

- ▶ NextSwath configuration erroneous
- ▶ Field boundaries are too complex

Solution

Use only profiles designed to work with the NavController.

Autopilot System Fault Code 197: Bron Tile Plow Valve Coil Faults

Causes

This Error only occurs when the Bron ECU is sending error messages about valve coil faults

Error Value 1 indicates which coil is faulting

Value	Description
1	Grade up Valve Coil Fault
2	Grade Down Valve Coil Fault
3	Pitch UP Valve Coil Fault
4	Pitch Down Valve Coil Fault
5	Left EDC Valve Coil Fault
6	Right EDC Valve Coil Fault

Possible causes:

- ▶ Coil Fault issue on Bron Machine

Solution

Troubleshoot coils per Bron Service manual

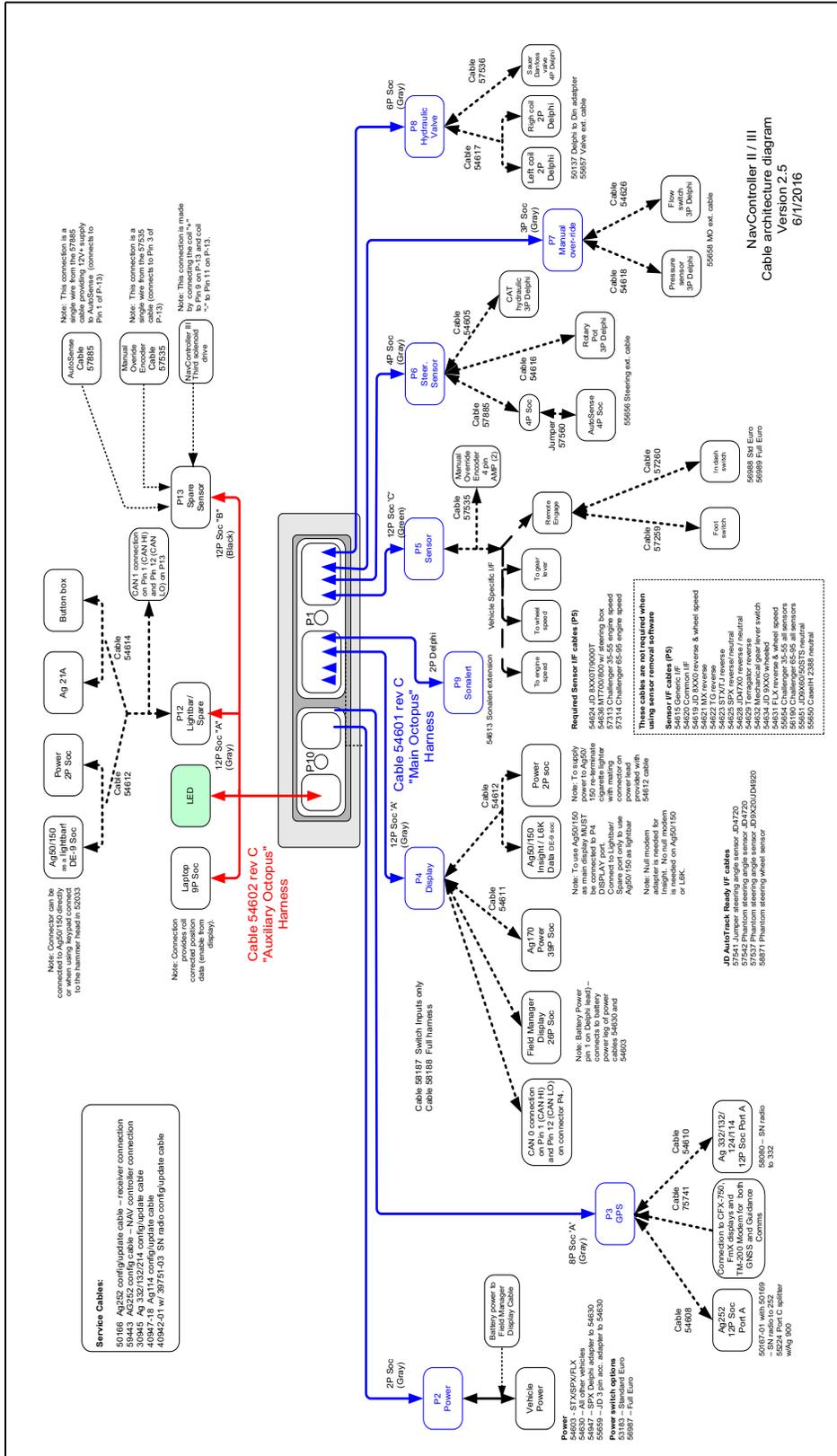


Chapter 3

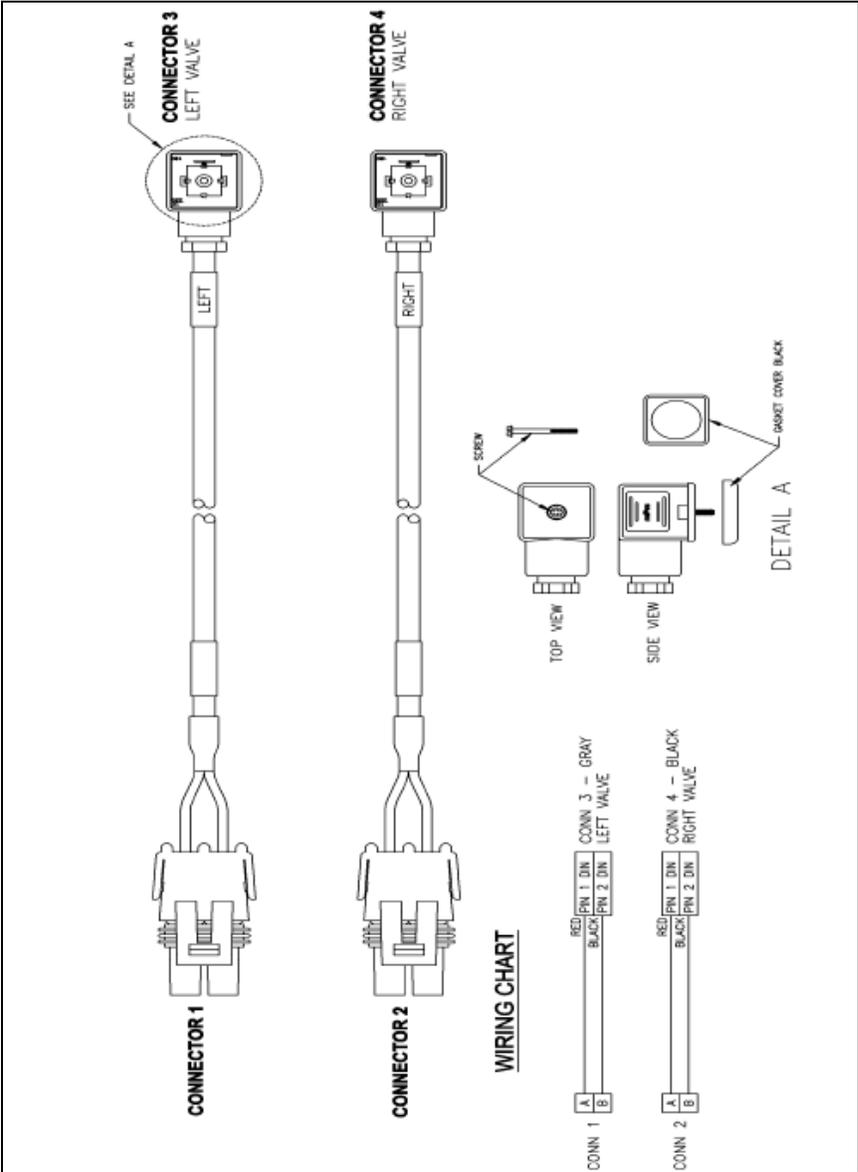
AUTOPILOT SYSTEM HARNESS SCHEMATICS

This chapter shows the Autopilot system harness schematics.

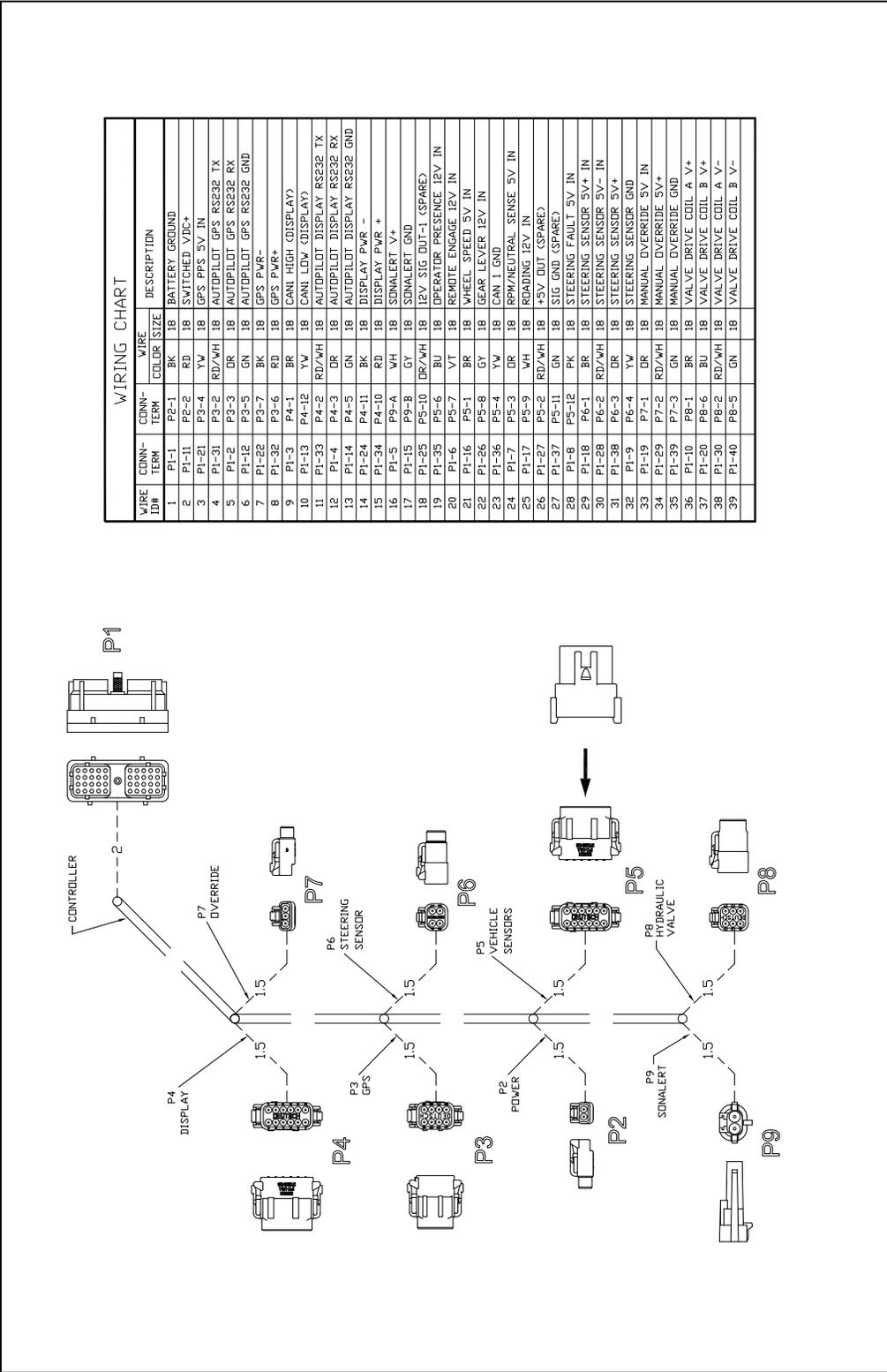
Autopilot system cable architecture



Cable assembly, Delphi /DIN jumper (P/N 50137)

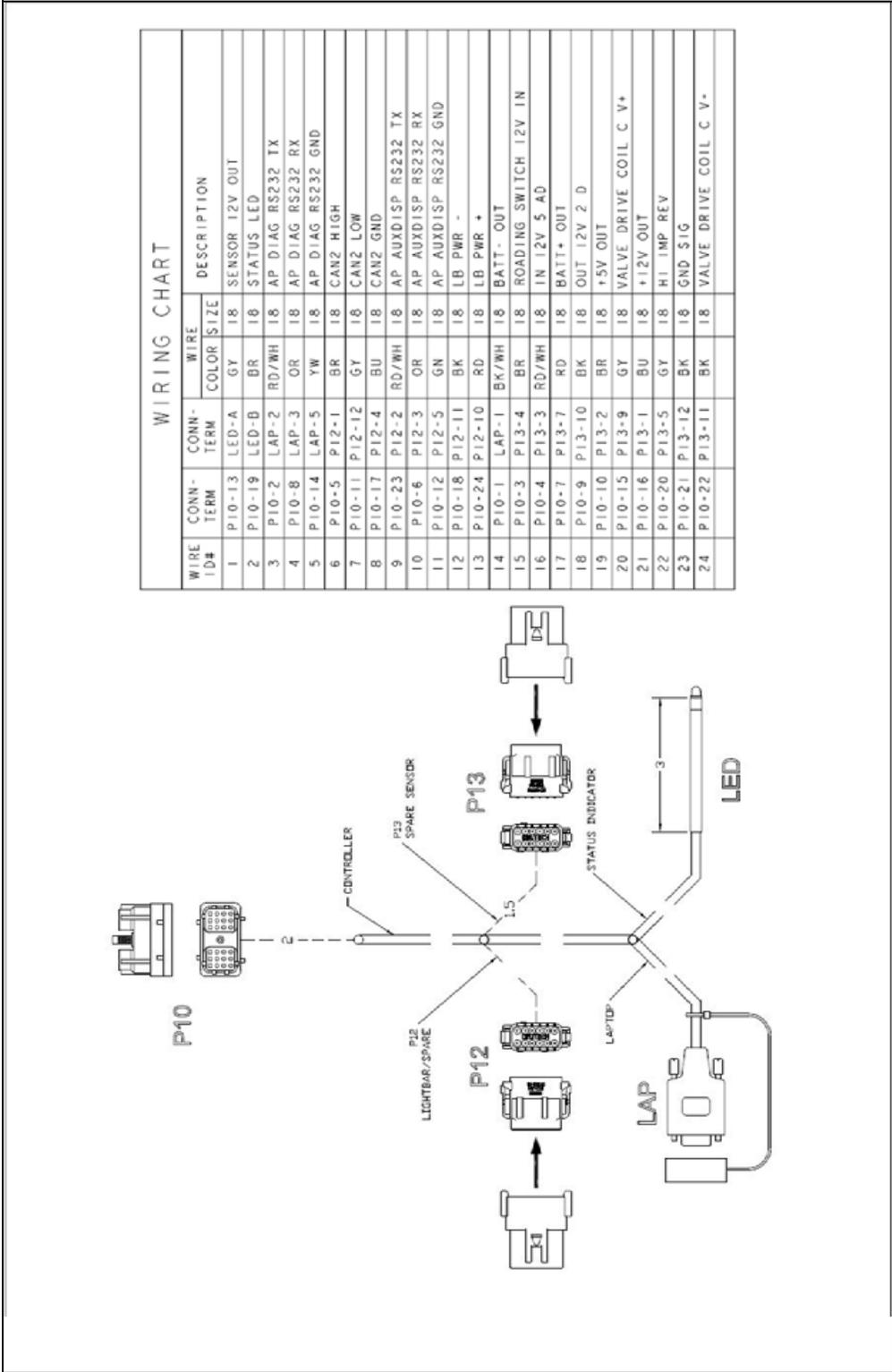


Main harness: P/N 54601



WIRING CHART				
WIRE ID#	CONN-TERM	WIRE COLOR	SIZE	DESCRIPTION
1	P1-1	BK	18	BATTERY VDC+
2	P1-11	RD	18	SWITCHED VDC+
3	P1-21	YW	18	GPS PPS 5V IN
4	P1-31	RD/WH	18	AUTOPILOT GPS RS232 TX
5	P1-2	DR	18	AUTOPILOT GPS RS232 RX
6	P1-12	P3-5	GN	AUTOPILOT GPS RS232 GND
7	P1-22	BK	18	GPS PWR-
8	P1-22	P3-6	RD	GPS PWR+
9	P1-3	P4-1	BR	CAN1 HIGH (DISPLAY)
10	P1-13	P4-12	YW	CAN1 LOW (DISPLAY)
11	P1-33	RD/WH	18	AUTOPILOT_DISPLAY RS232 TX
12	P1-4	DR	18	AUTOPILOT_DISPLAY RS232 RX
13	P1-14	P4-5	GN	AUTOPILOT_DISPLAY RS232 GND
14	P1-24	P4-11	BK	DISPLAY PWR -
15	P1-34	P4-10	RD	DISPLAY PWR +
16	P1-5	P9-A	VH	SIGNALERT V+
17	P1-15	P9-B	GY	SIGNALERT GND
18	P1-25	P5-10	DR/WH	12V SIG OUT-1 (SPARE)
19	P1-35	P5-6	BU	OPERATOR PRESENCE 12V IN
20	P1-6	P5-7	VT	REMOTE ENGAGE 12V IN
21	P1-16	P5-1	BR	WHEEL SPEED 5V IN
22	P1-26	P5-8	GY	GEAR LEVER 12V IN
23	P1-36	P5-4	YW	CAN 1 GND
24	P1-7	P5-3	DR	RPM/NEUTRAL SENSE 5V IN
25	P1-17	P5-9	VH	READING 12V IN
26	P1-27	P5-2	RD/WH	+5V DUT (SPARE)
27	P1-37	P5-11	GN	SIG GND (SPARE)
28	P1-8	P5-12	PK	STEERING FAULT 5V IN
29	P1-18	P6-1	BR	STEERING SENSOR 5V+ IN
30	P1-28	P6-2	RD/WH	STEERING SENSOR 5V- IN
31	P1-38	P6-3	DR	STEERING SENSOR 5V+
32	P1-9	P6-4	YW	STEERING SENSOR GND
33	P1-19	P7-1	DR	MANUAL OVERRIDE 5V IN
34	P1-29	P7-2	RD/WH	MANUAL OVERRIDE 5V+
35	P1-39	P7-3	GN	MANUAL OVERRIDE GND
36	P1-10	P8-1	BR	VALVE DRIVE COIL A V+
37	P1-20	P8-6	BU	VALVE DRIVE COIL B V+
38	P1-30	P8-2	RD/WH	VALVE DRIVE COIL A V-
39	P1-40	P8-5	GN	VALVE DRIVE COIL B V-

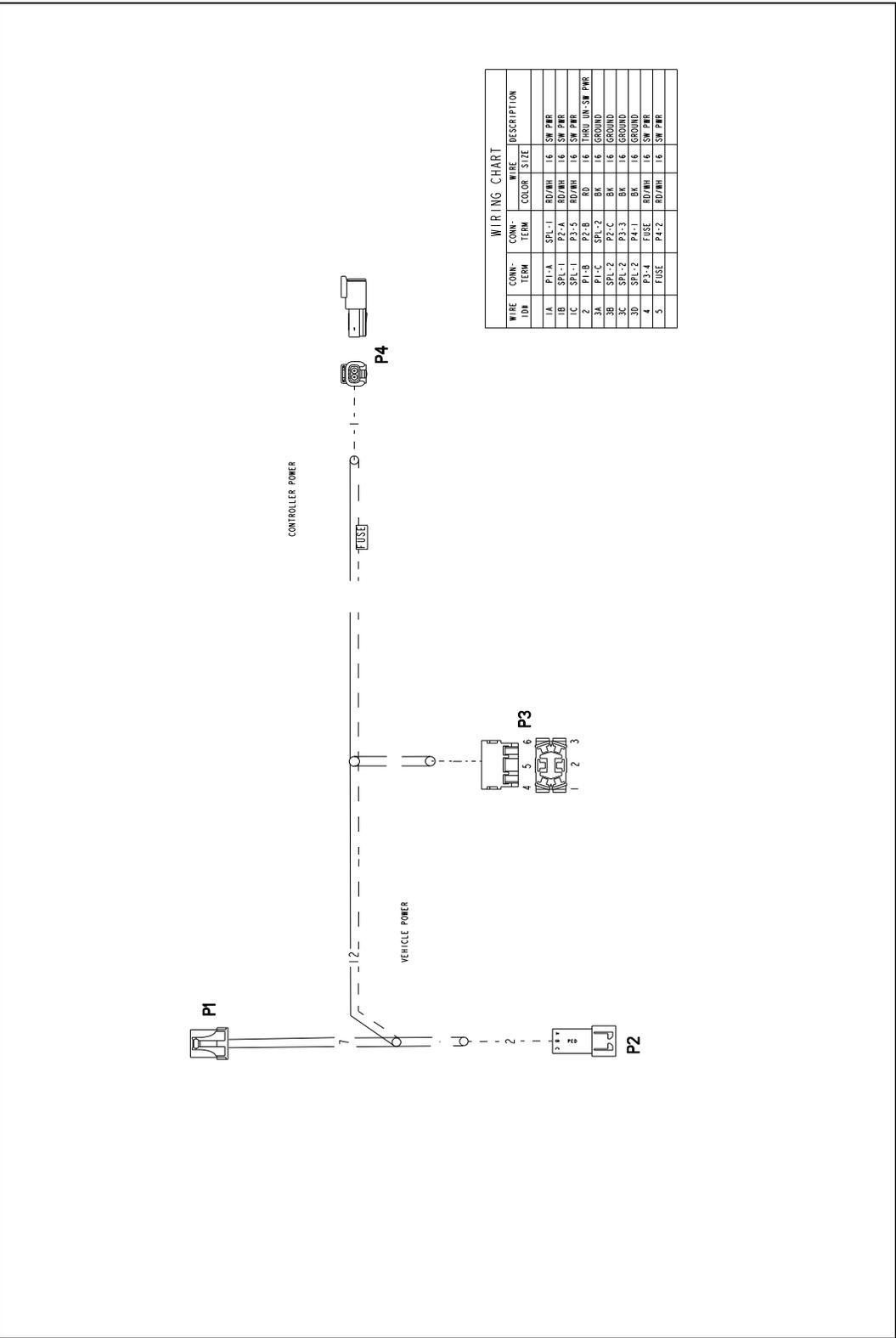
Auxiliary harness: P/N 54602



WIRING CHART

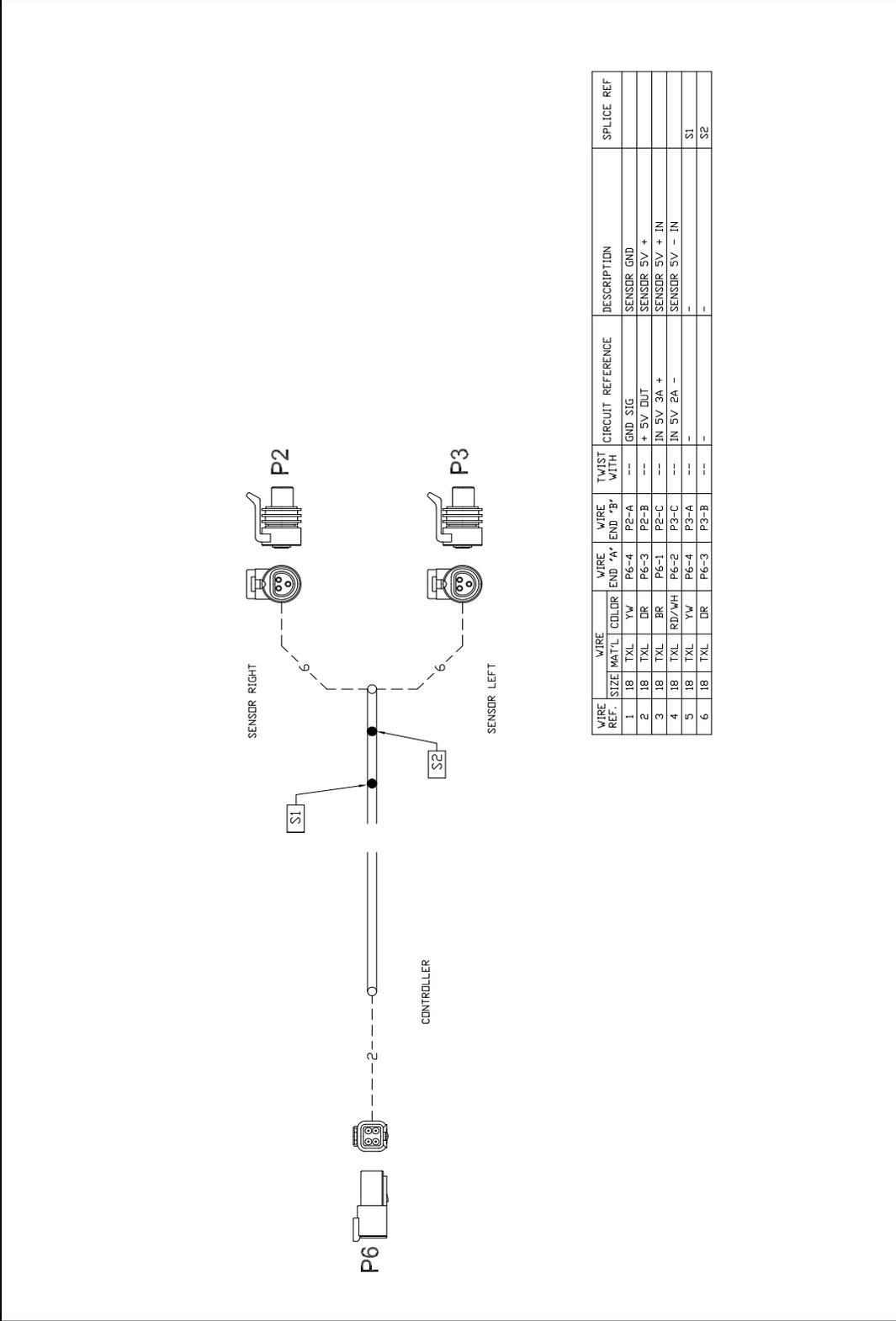
WIRE ID#	CONN-TERM	CONN-TERM	WIRE		DESCRIPTION
			COLOR	SIZE	
1	P10-13	LED-A	GY	18	SENSOR 12V OUT
2	P10-19	LED-B	BR	18	STATUS LED
3	P10-2	LAP-2	RD/WH	18	AP DIAG RS232 TX
4	P10-8	LAP-3	OR	18	AP DIAG RS232 RX
5	P10-14	LAP-5	YW	18	AP DIAG RS232 GND
6	P10-5	P12-1	BR	18	CAN2 HIGH
7	P10-11	P12-12	GY	18	CAN2 LOW
8	P10-17	P12-4	BU	18	CAN2 GND
9	P10-23	P12-2	RD/WH	18	AP AUXDISP RS232 TX
10	P10-6	P12-3	OR	18	AP AUXDISP RS232 RX
11	P10-12	P12-5	GN	18	AP AUXDISP RS232 GND
12	P10-18	P12-11	BK	18	LB PWR -
13	P10-24	P12-10	RD	18	LB PWR +
14	P10-1	LAP-1	BK/WH	18	BATT- OUT
15	P10-3	P13-4	BR	18	ROADING SWITCH 12V IN
16	P10-4	P13-3	RD/WH	18	IN 12V 5 A0
17	P10-7	P13-7	RD	18	BATT+ OUT
18	P10-9	P13-10	BK	18	OUT 12V 2 D
19	P10-10	P13-2	BR	18	+5V OUT
20	P10-15	P13-9	GY	18	VALVE DRIVE COIL C V+
21	P10-16	P13-1	BU	18	+12V OUT
22	P10-20	P13-5	GY	18	HI IMP REV
23	P10-21	P13-12	BK	18	GND SIG
24	P10-22	P13-11	BK	18	VALVE DRIVE COIL C V-

SPX/STX/FLX power harness: P/N 54603

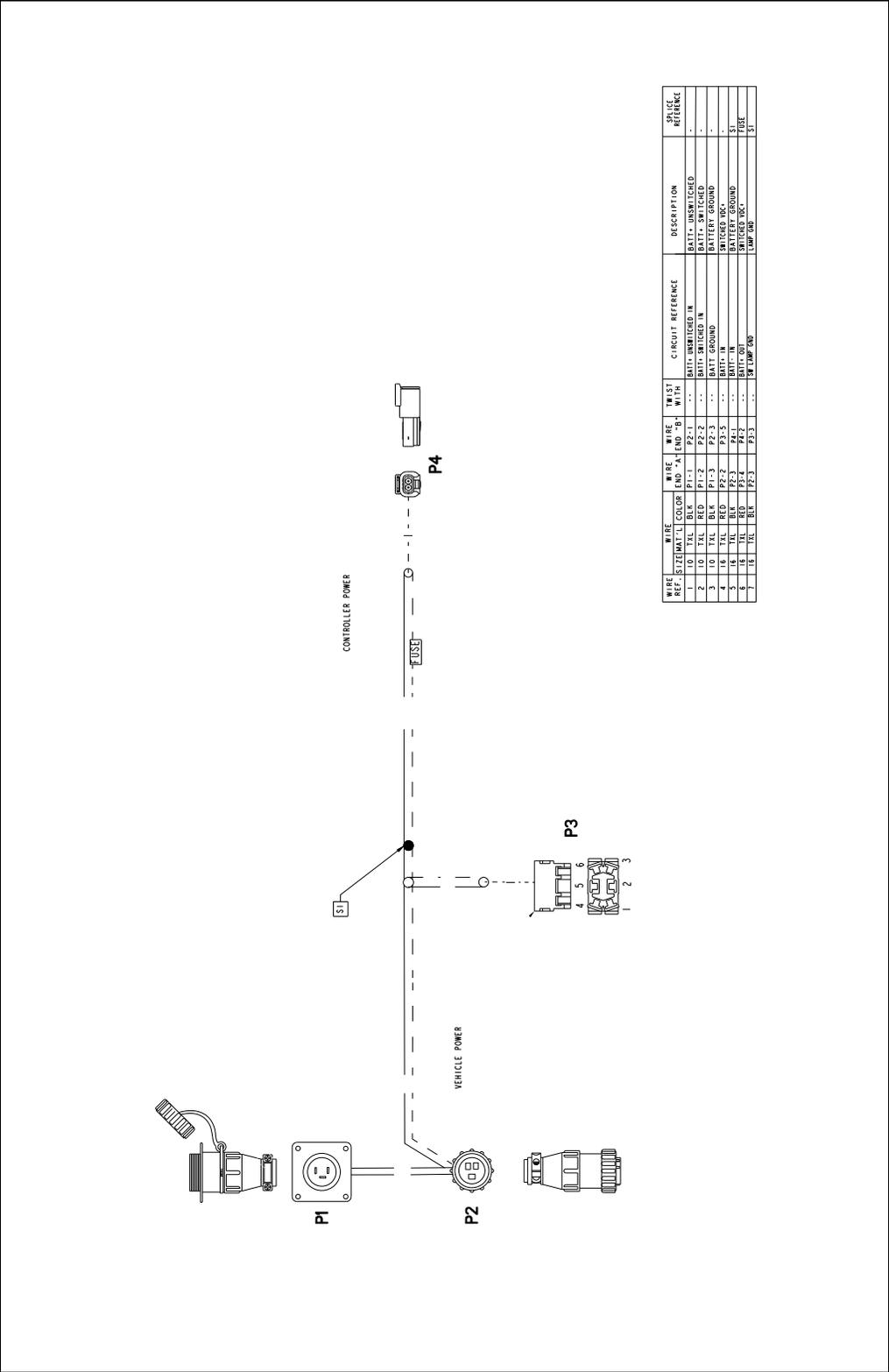


WIRING CHART					
WIRE ID#	CONV. TERM.	CONV. TERM.	WIRE COLOR	WIRE SIZE	DESCRIPTION
1A	P1-A	SPL-1	RD/WH	16	SW PWR
1B	SPL-1	P2-A	RD/WH	16	SW PWR
1C	SPL-1	P3-5	RD/WH	16	SW PWR
2	P1-B	P2-B	RD	16	THRU UN-SW PWR
3A	P1-C	SPL-2	BK	16	GROUND
3B	SPL-2	P2-C	BK	16	GROUND
3C	SPL-2	P3-3	BK	16	GROUND
4	P1-D	P3-4	RD/WH	16	SW PWR
5	FUSE	PA-2	RD/WH	16	SW PWR

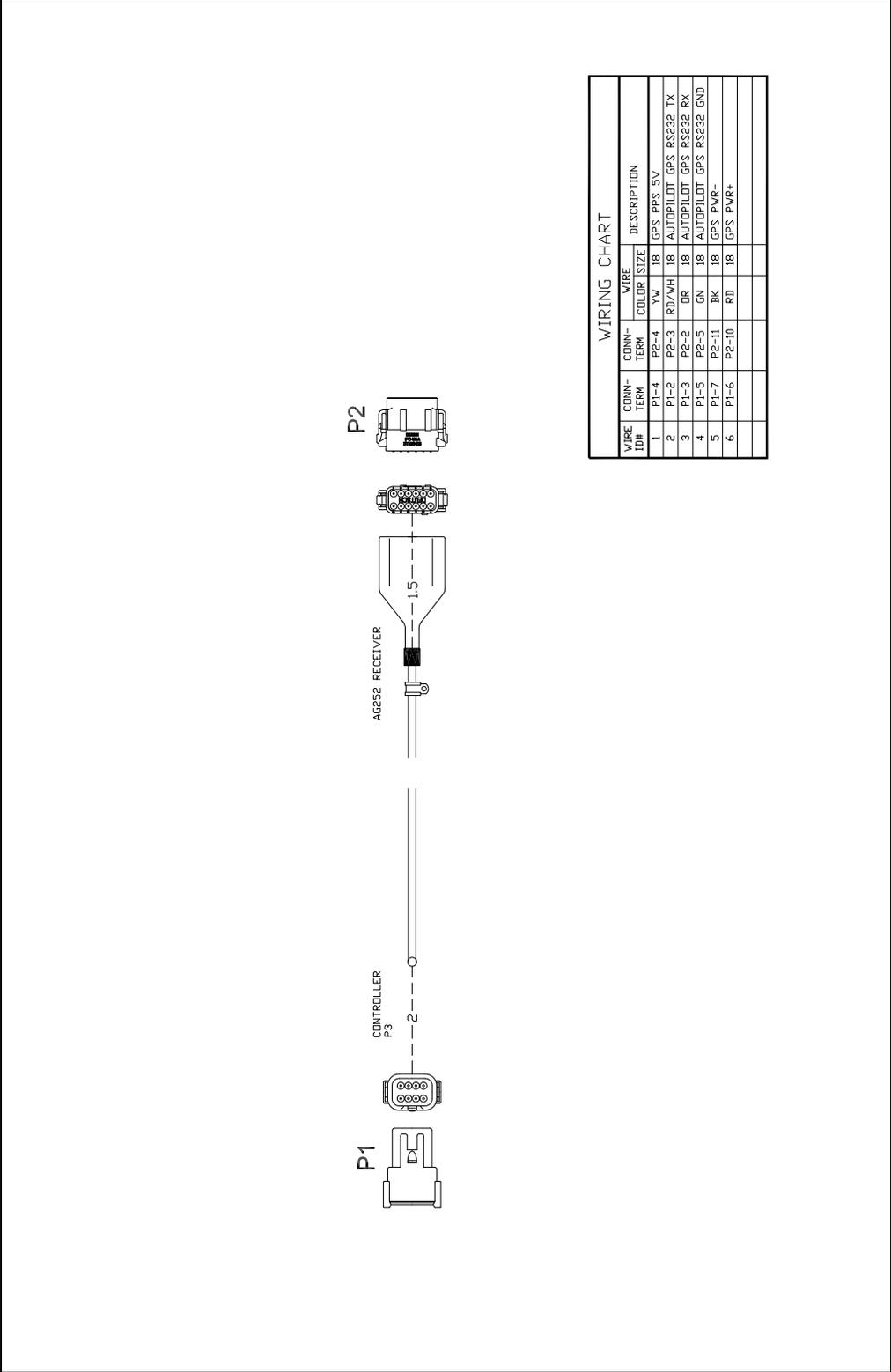
Challenger steering interface harness: P/N 54605



MX/TG power harness: P/N 54607



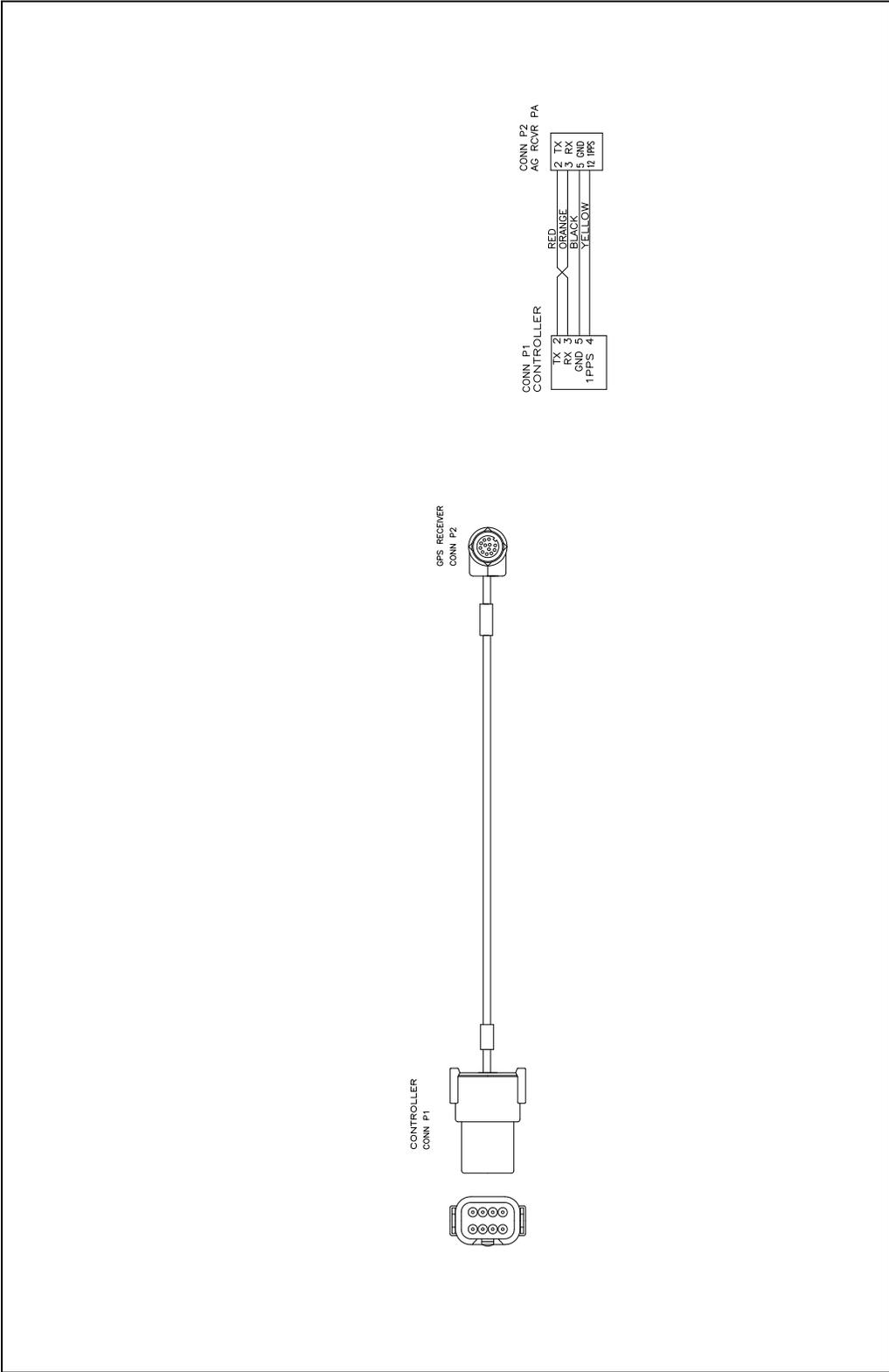
AgGPS 252 receiver harness: P/N 54608



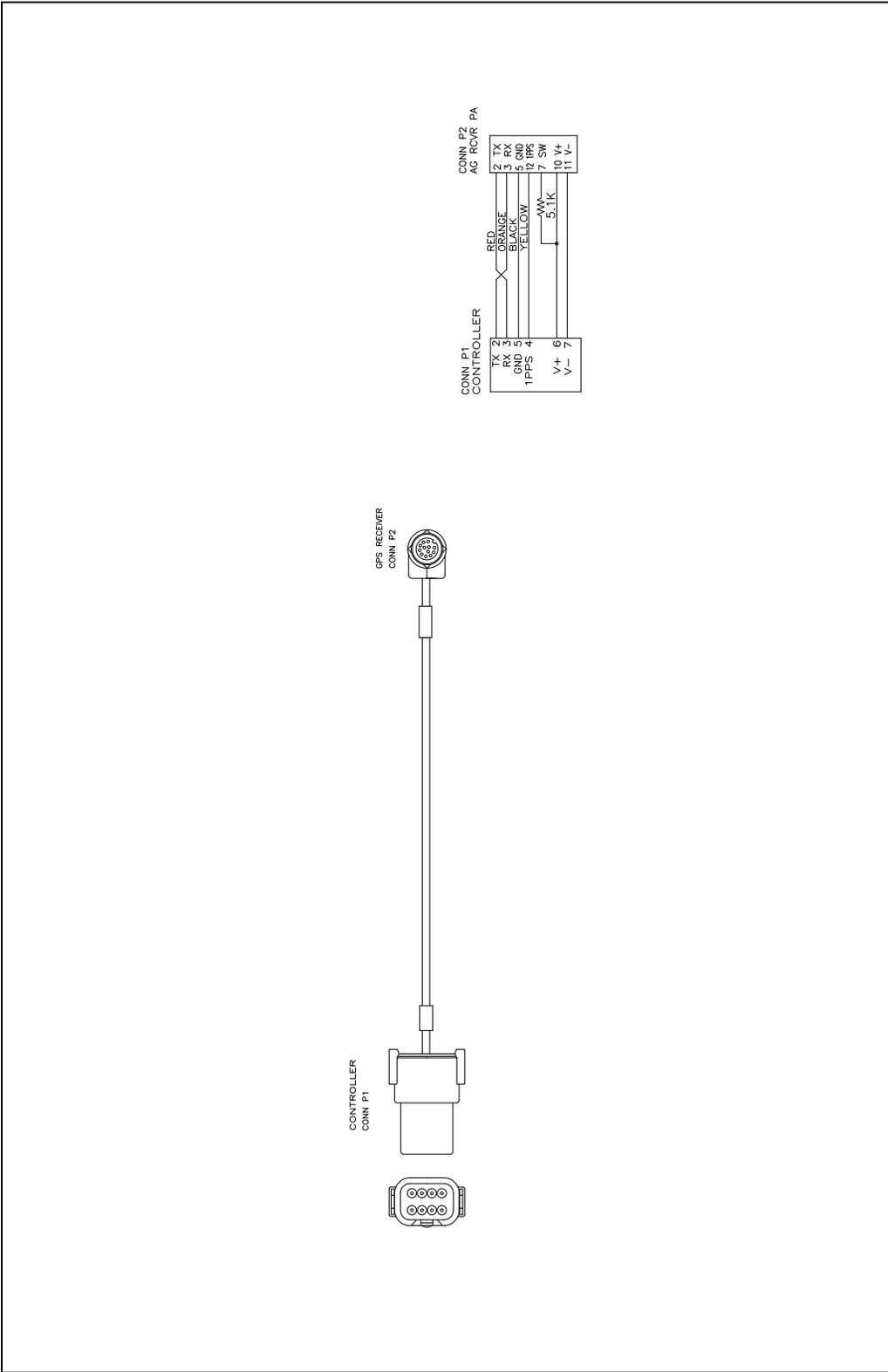
WIRING CHART

WIRE ID#	CONN-TERM	WIRE COLOR	WIRE SIZE	DESCRIPTION
1	P1-4	YW	18	GPS PPS SV
2	P2-4	YW	18	AUTOPILOT GPS RSE32 TX
3	P1-2	RD/WH	18	AUTOPILOT GPS RSE32 RX
4	P2-2	DR	18	AUTOPILOT GPS RSE32 RX
5	P1-5	GN	18	AUTOPILOT GPS RSE32 GND
6	P2-5	GN	18	AUTOPILOT GPS RSE32 GND
	P1-7	BK	18	GPS PWR-
	P2-10	RD	18	GPS PWR+

21A secondary display harness: P/N 54609

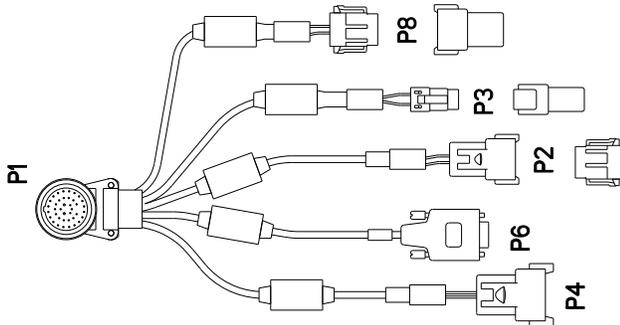


AgGPS 110/114/132 receiver harness: P/N 54610

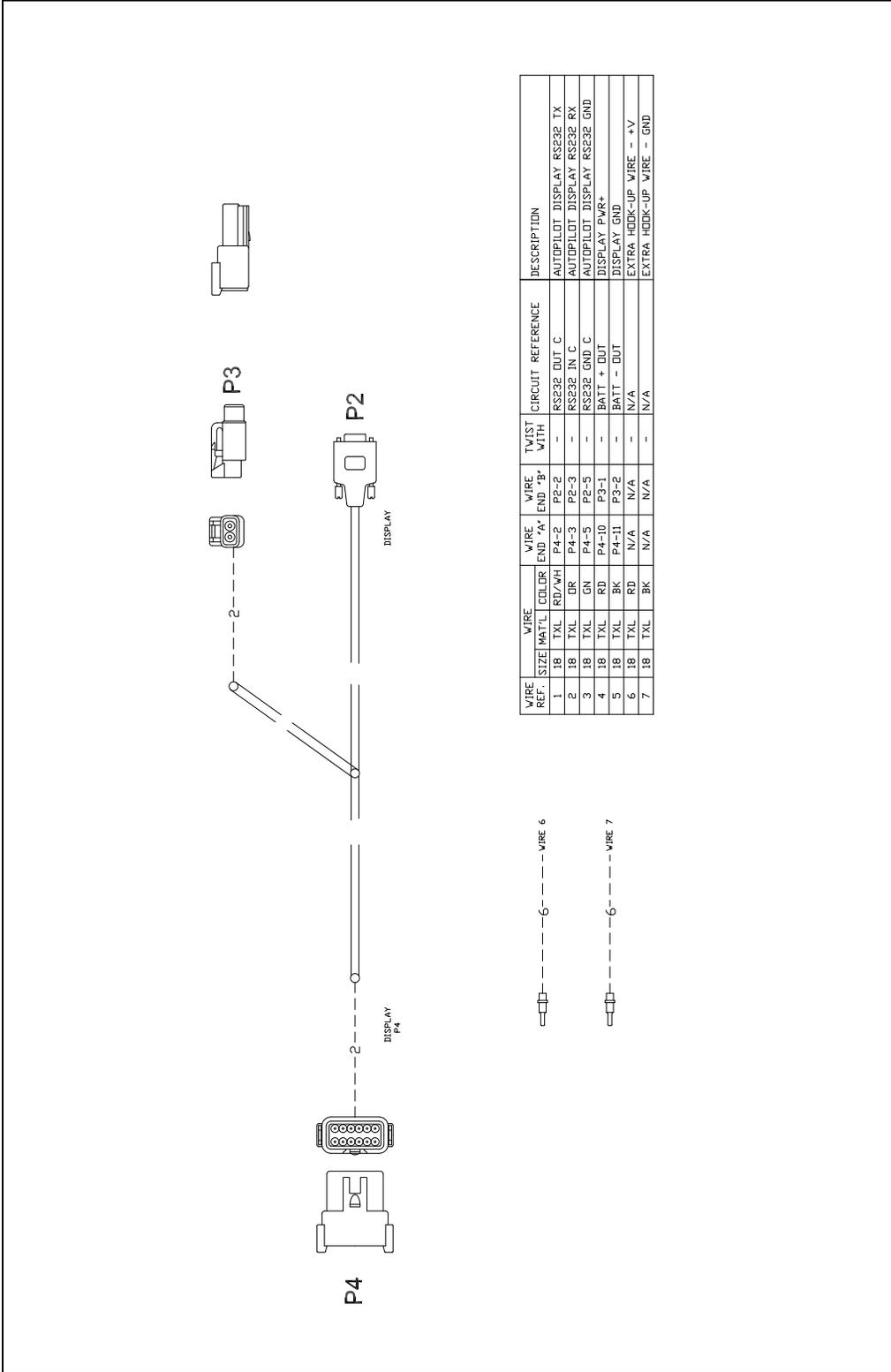


AgGPS 170 Field Computer harness: P/N 54611

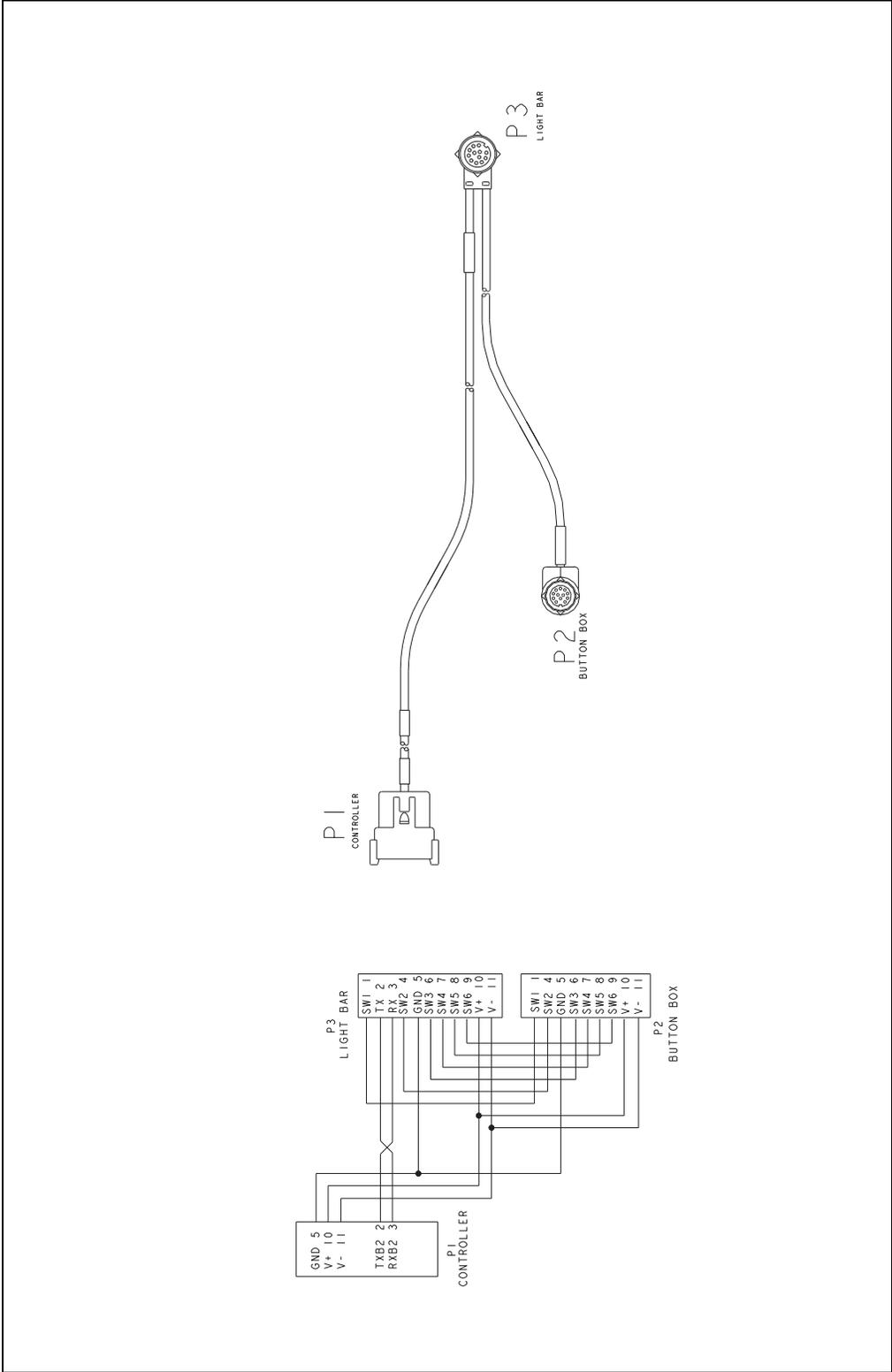
P1	MAIN CONNECTOR DESCRIPTION	WIRING AND PIN OUT CHART				TERMINATES AT				
		JUMPERS	WIRE USED	WIRE BUNDLE COND.	COLOR	P2	P3	P4	P6	P8
M	CANLO		BB	BB	YELLOW		1			
L	CANFO		BB	BB	BROWN		4			
e	CANCO		BB	BB	BROWN		4			
					GREEN		2			
A	Brp0 Grd		AA	AA	ORANGE		5			
B	SWMO		AA	AA	WHITE		1			
D	Boil +	JUMPER	CC	CC	RED			IO		6
E	Boil +	JUMPER [20]	CC	CC	RED					
F	Boil -	JUMPER	CC	CC	BLK			II		7
G	Boil -	JUMPER [20]	CC	CC	BLK					
P	TXD2		GG	GG	BROWN					3
N	RXD2		GG	GG	ORANGE					2
R	GN2		GG	GG	YELLOW					5
S	GN2		GG	GG	YELLOW					5
T	RXD1		CC	CC	ORANGE					2
U	TXD1		CC	CC	BROWN					3
X	Brp0		AA	AA	GREEN			4		
Y	SWMI		AA	AA	BLUE			6		
f	RTSO		EE	EE	RED					7
g	CTSO		EE	EE	BLACK					8
h	RXD0		EE	EE	ORANGE					2
i	TXD0		EE	EE	BROWN					3
k	SWME		AA	AA	RED/BLK			7		
n	AWAKE GND		AA	AA	YELLOW			8		
d	AWAKE		AA	AA	ORANGE			3		
q	GND0		EE	EE	YELLOW					5



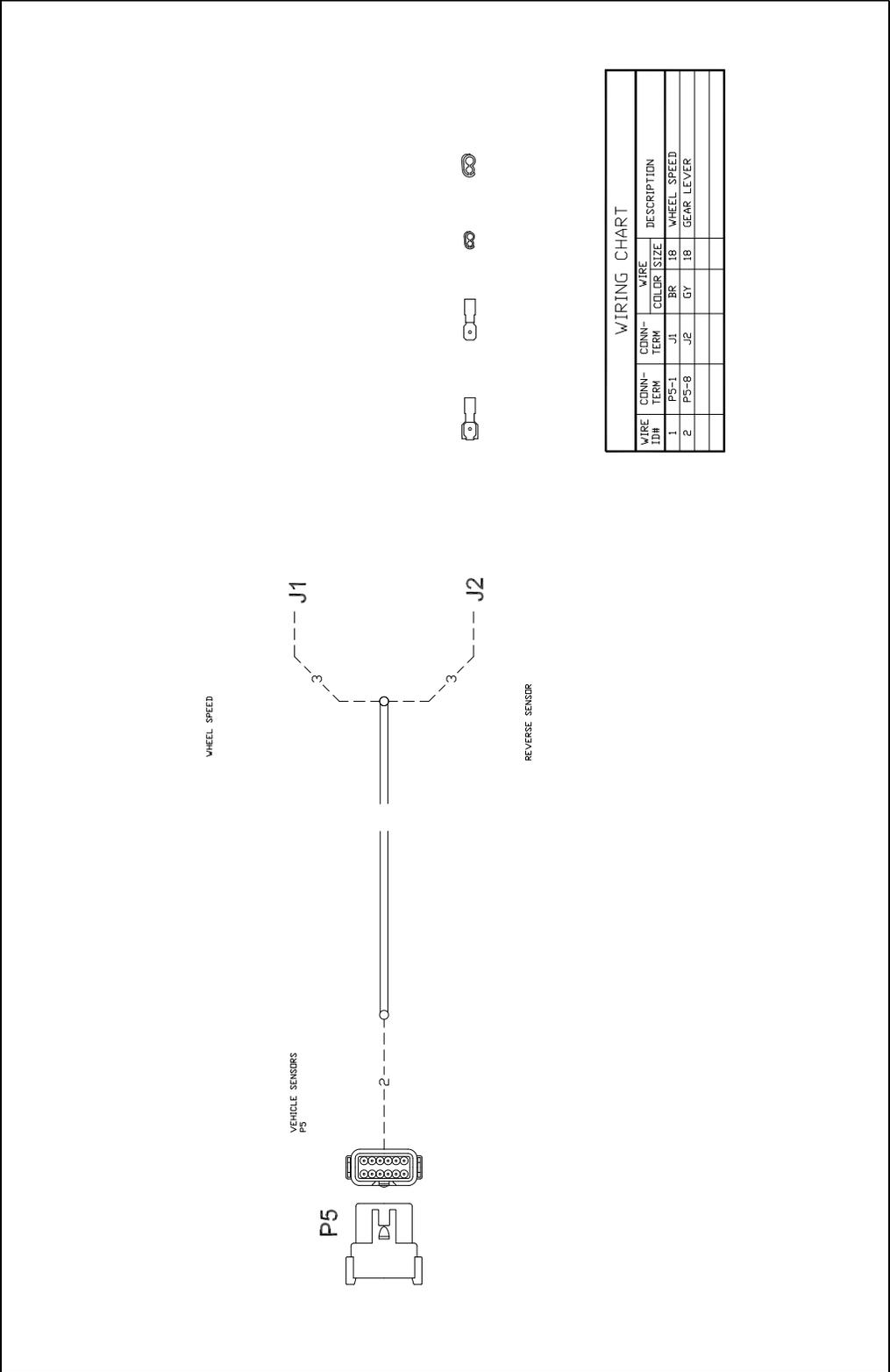
EZ-Guide Plus Lightbar: P/N 54612



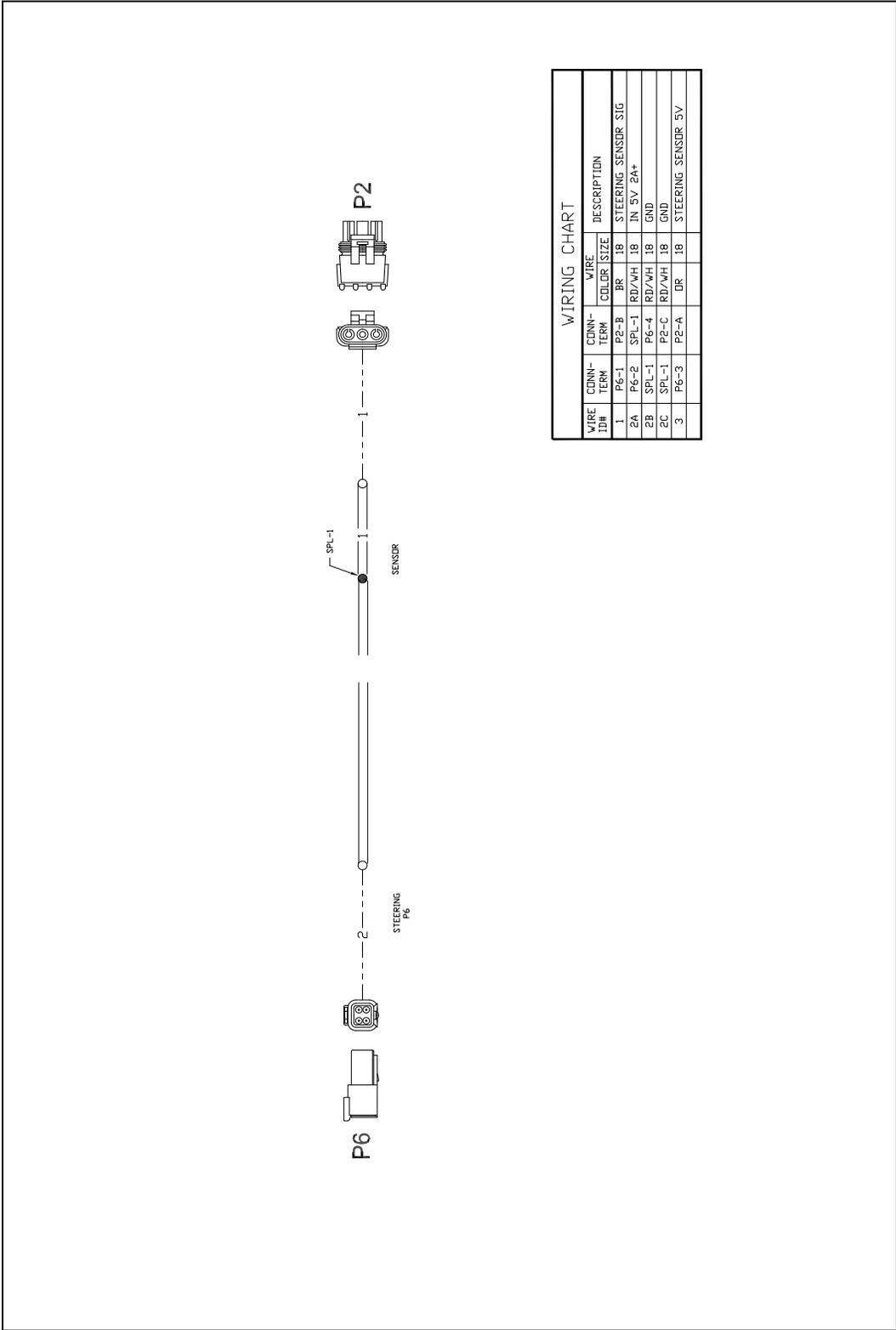
LBO harness: P/N 54614



Generic interface harness: P/N 54615



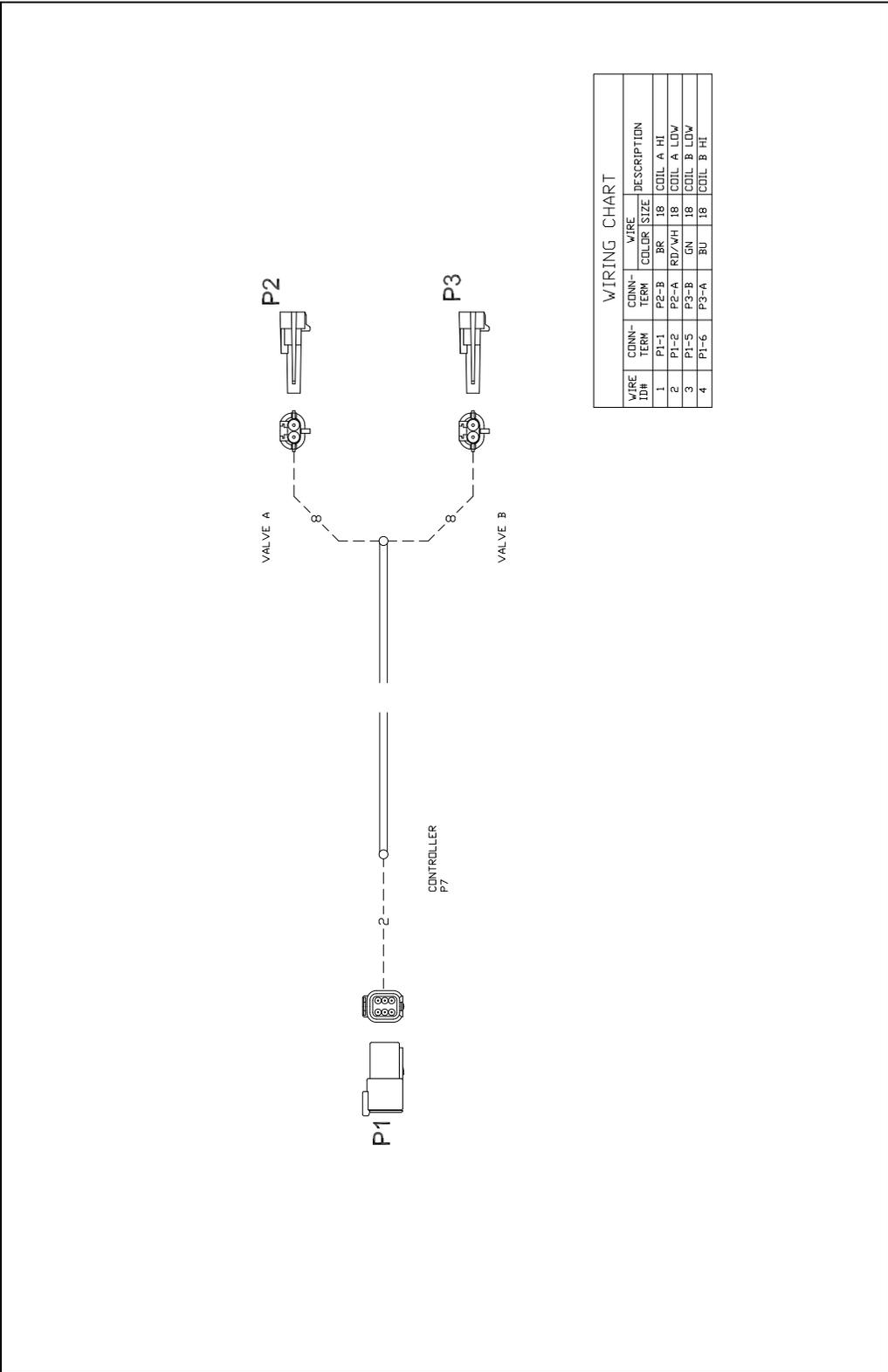
Steering angle sensor harness: P/N 54616



WIRING CHART

WIRE ID#	CONN- TERM	CONN- TERM	WIRE COLOR	WIRE SIZE	DESCRIPTION
1	P6-1	P2-B	BR	18	STEERING SENSOR SIG
2A	P6-2	SPL-1	RD/WH	18	IN 5V 2A+
2B	SPL-1	P6-4	RD/WH	18	GND
2C	SPL-1	P2-C	RD/WH	18	GND
3	P6-3	P2-A	DR	18	STEERING SENSOR 5V

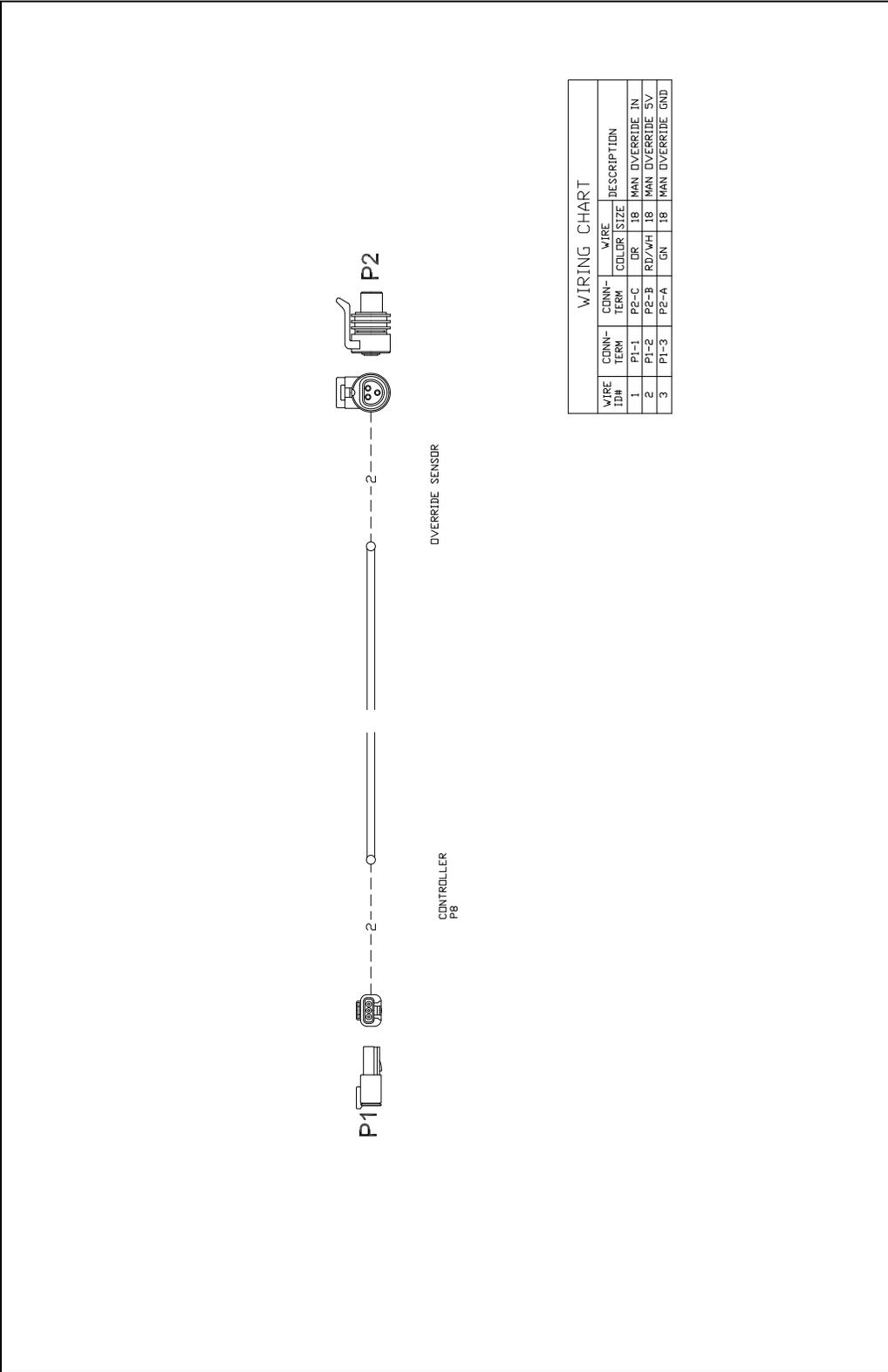
Electro hydraulic valve harness: P/N 54617



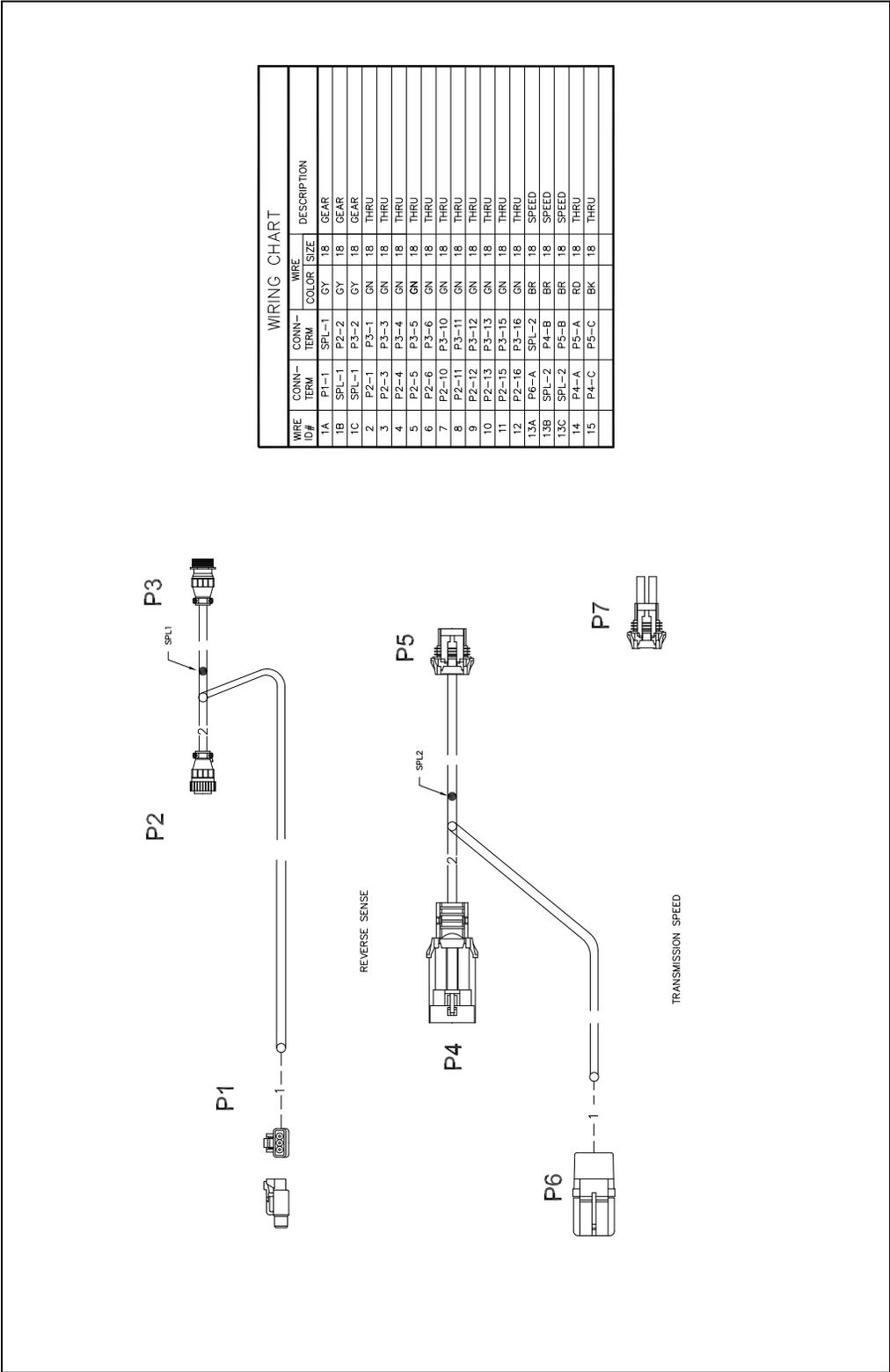
WIRING CHART

WIRE ID#	CONN-TERM	CONN-TERM	WIRE		DESCRIPTION
			COLOR	SIZE	
1	P1-1	P2-B	BR	18	COIL A HI
2	P1-2	P2-A	RD/WH	18	COIL A LOW
3	P1-5	P3-B	GN	18	COIL B LOW
4	P1-6	P3-A	BU	18	COIL B HI

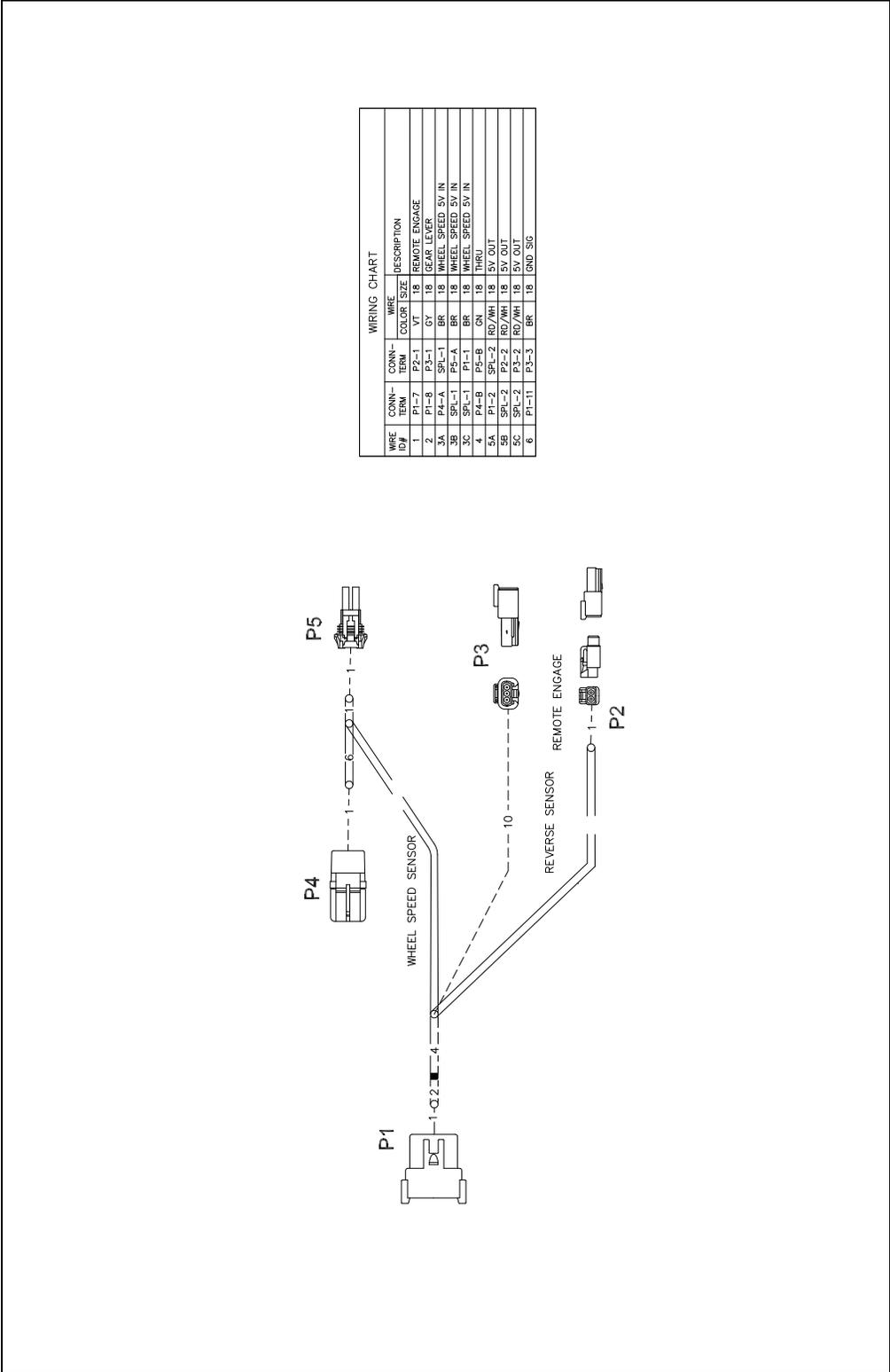
Pressure transducer harness: P/N 54618



John Deere 8000 series interface harness: P/N 54619



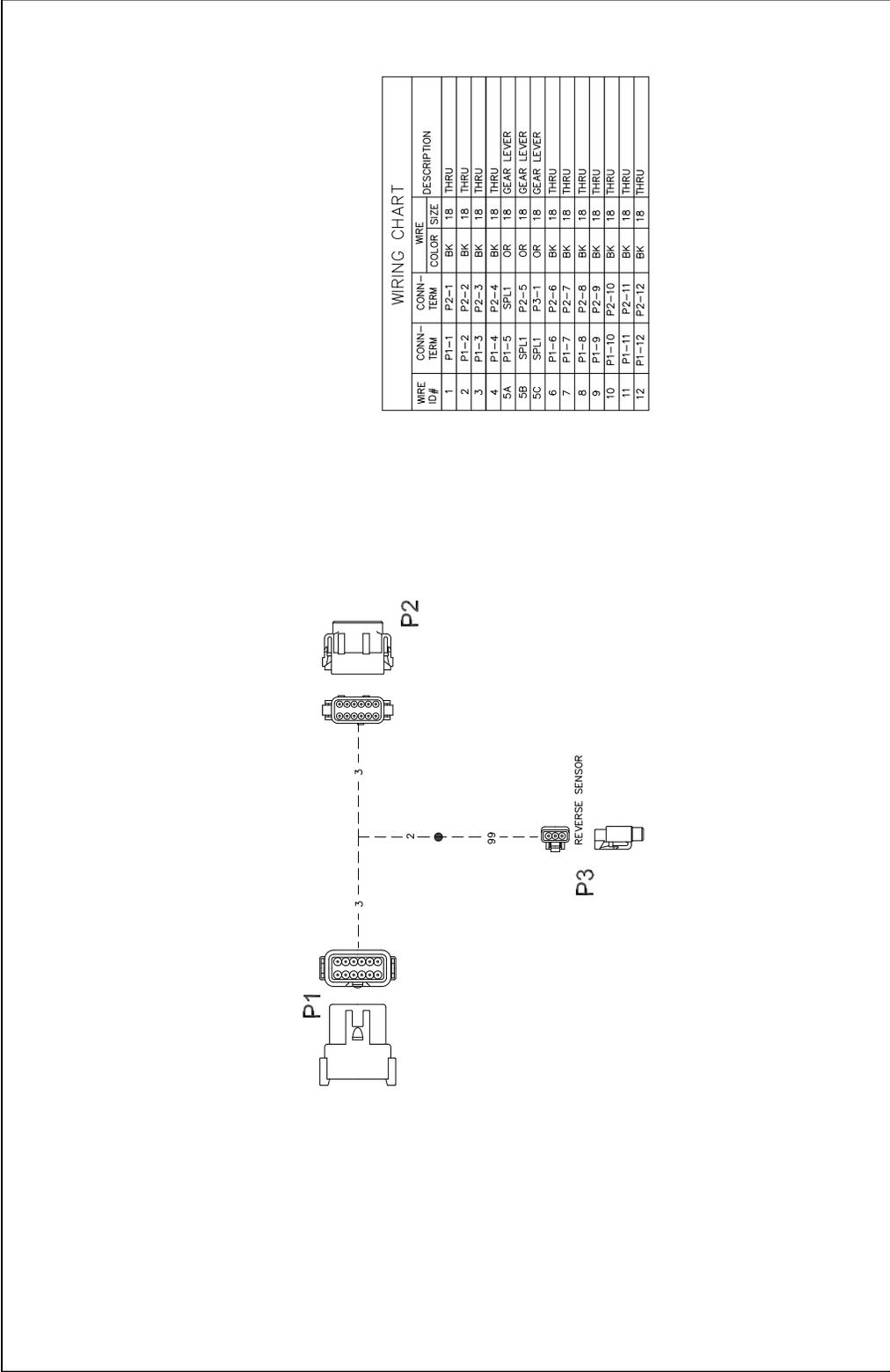
Common interface harness: P/N 54620



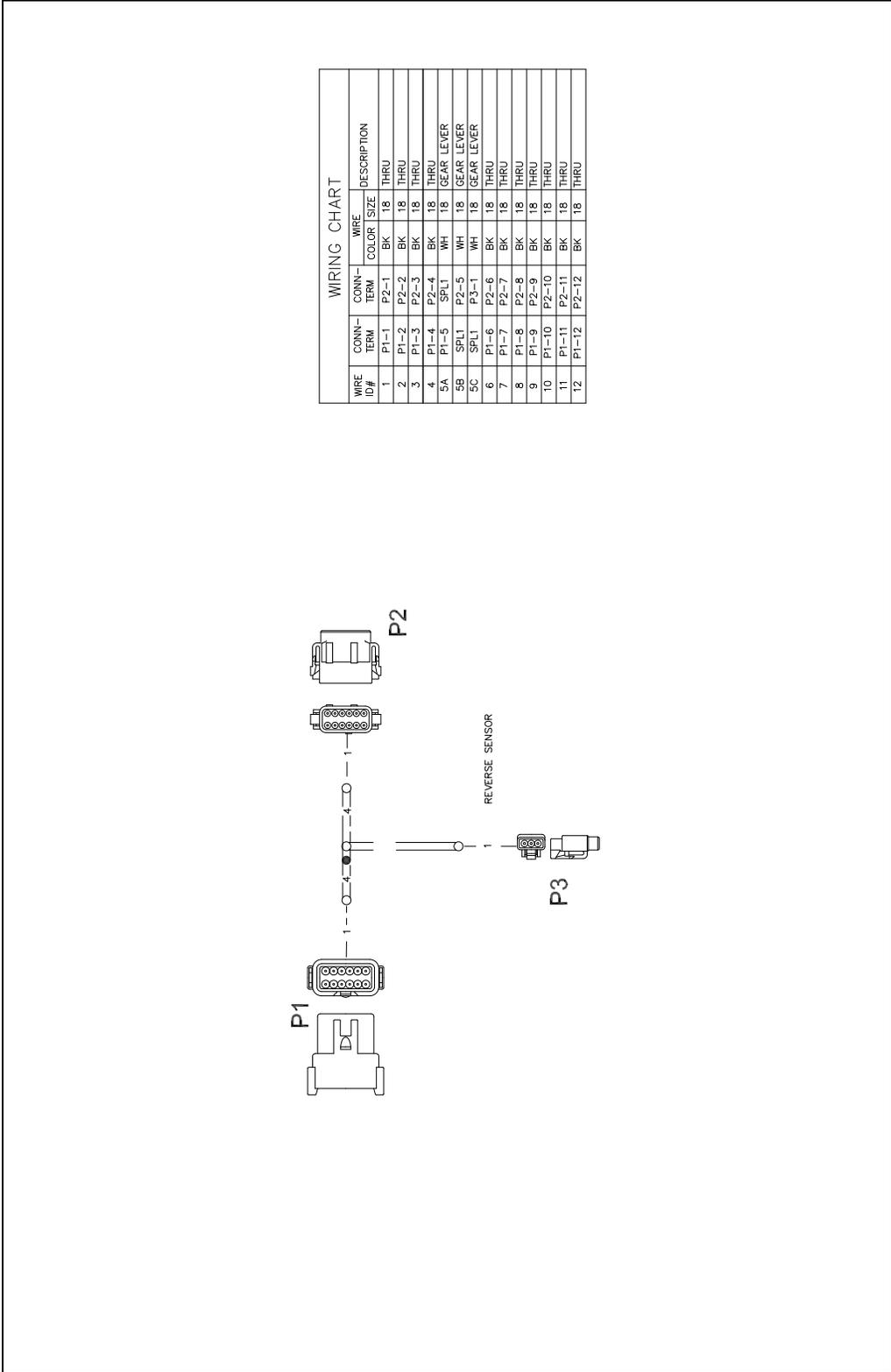
WIRING CHART

WIRE ID#	CONN-TERM	CONN-TERM	WIRE COLOR	WIRE SIZE	DESCRIPTION
1	P1-7	P2-1	VT	18	REMOTE ENGAGE
2	P1-8	P3-1	GY	18	GEAR LEVER
3A	P4-A	SPL-1	BR	18	WHEEL SPEED 5V IN
3B	SPL-1	P5-A	BR	18	WHEEL SPEED 5V IN
4	P1-1	P4-B	GN	18	THRU
5A	P1-2	SPL-2	RD/WH	18	5V OUT
5B	SPL-2	P2-2	RD/WH	18	5V OUT
5C	SPL-2	P3-2	RD/WH	18	5V OUT
6	P1-11	P3-3	BR	18	OND SIG

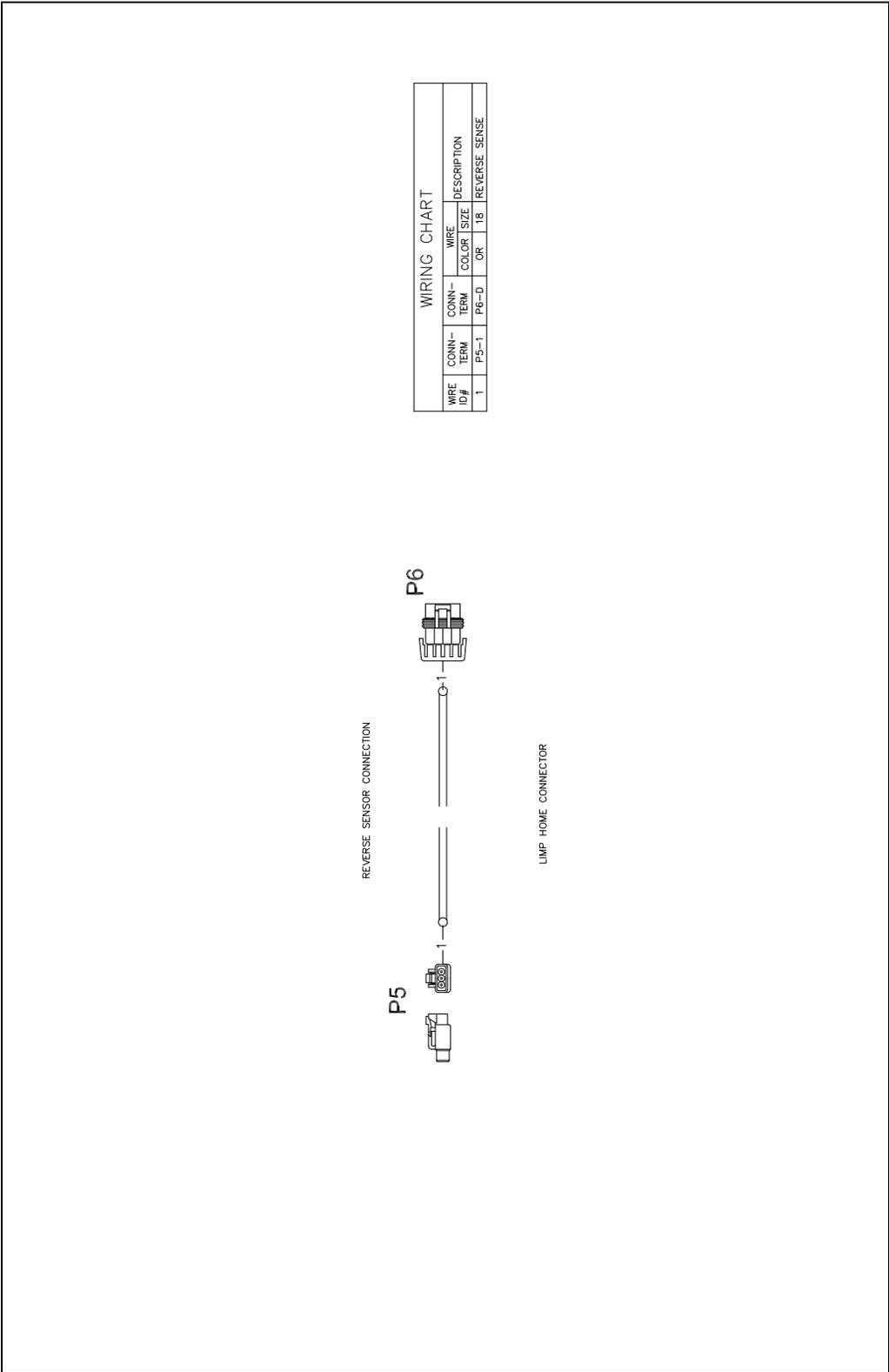
MX Magnum interface harness: P/N 54621



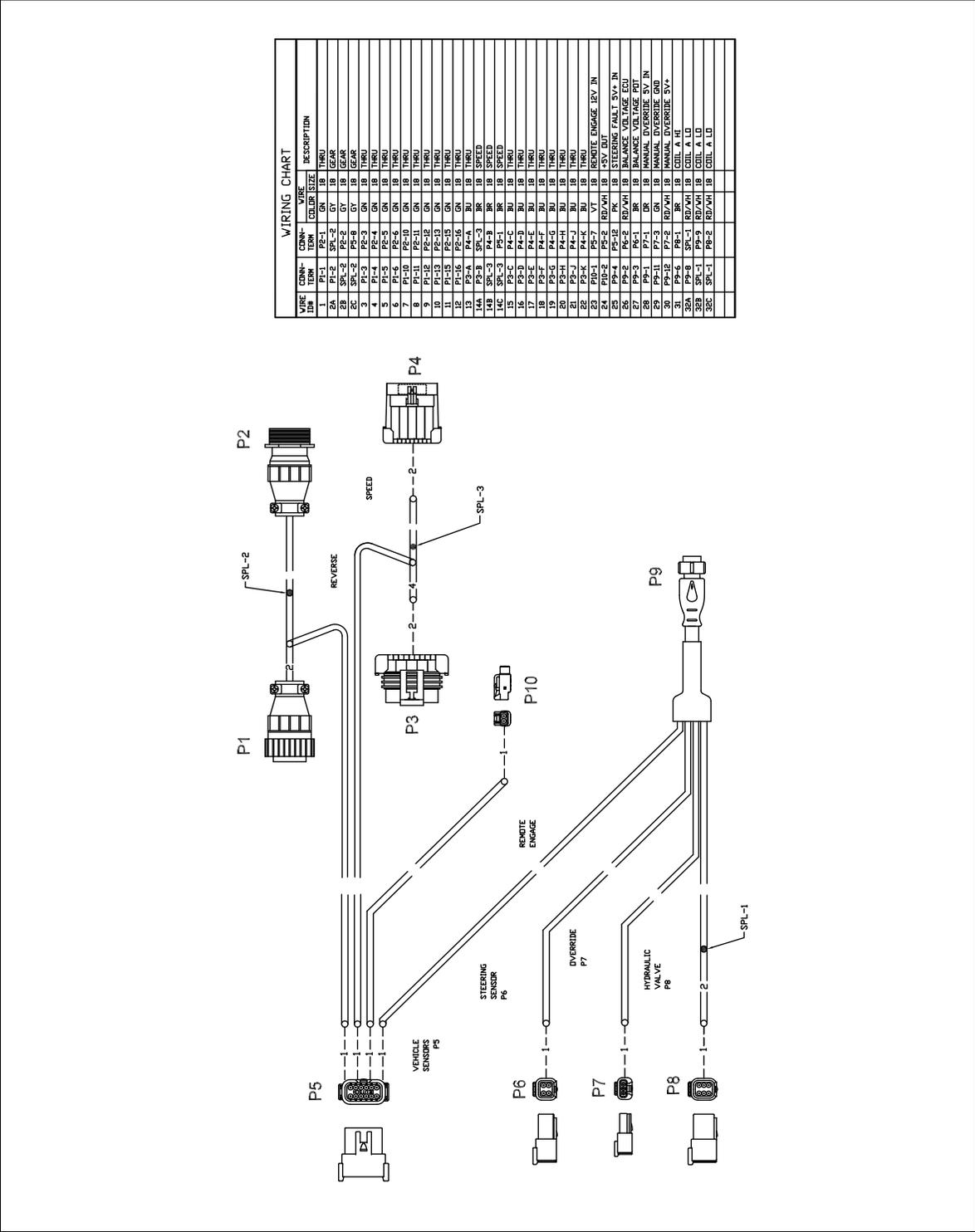
TG interface harness: P/N 54622



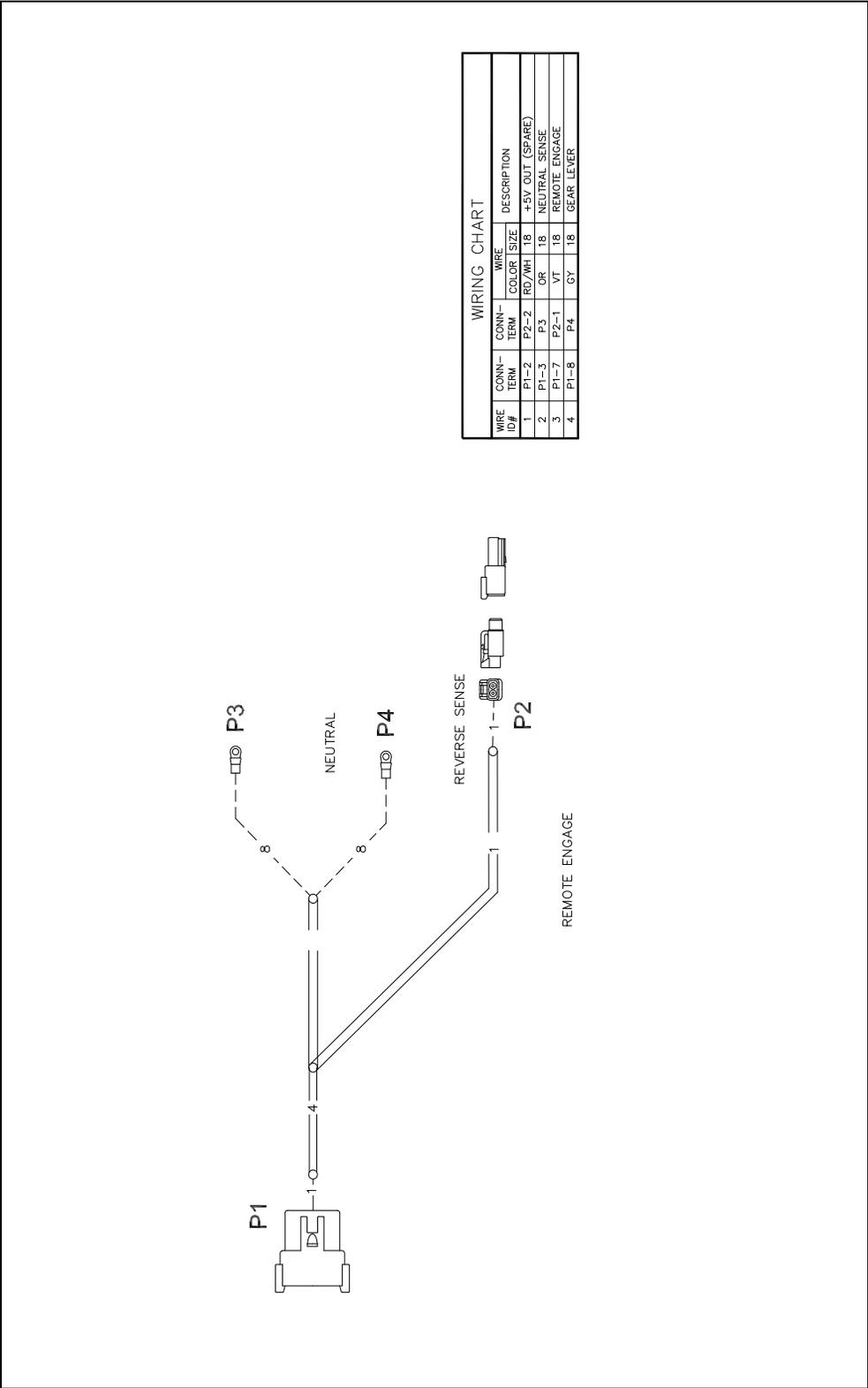
STX/TJ interface harness: P/N 54623



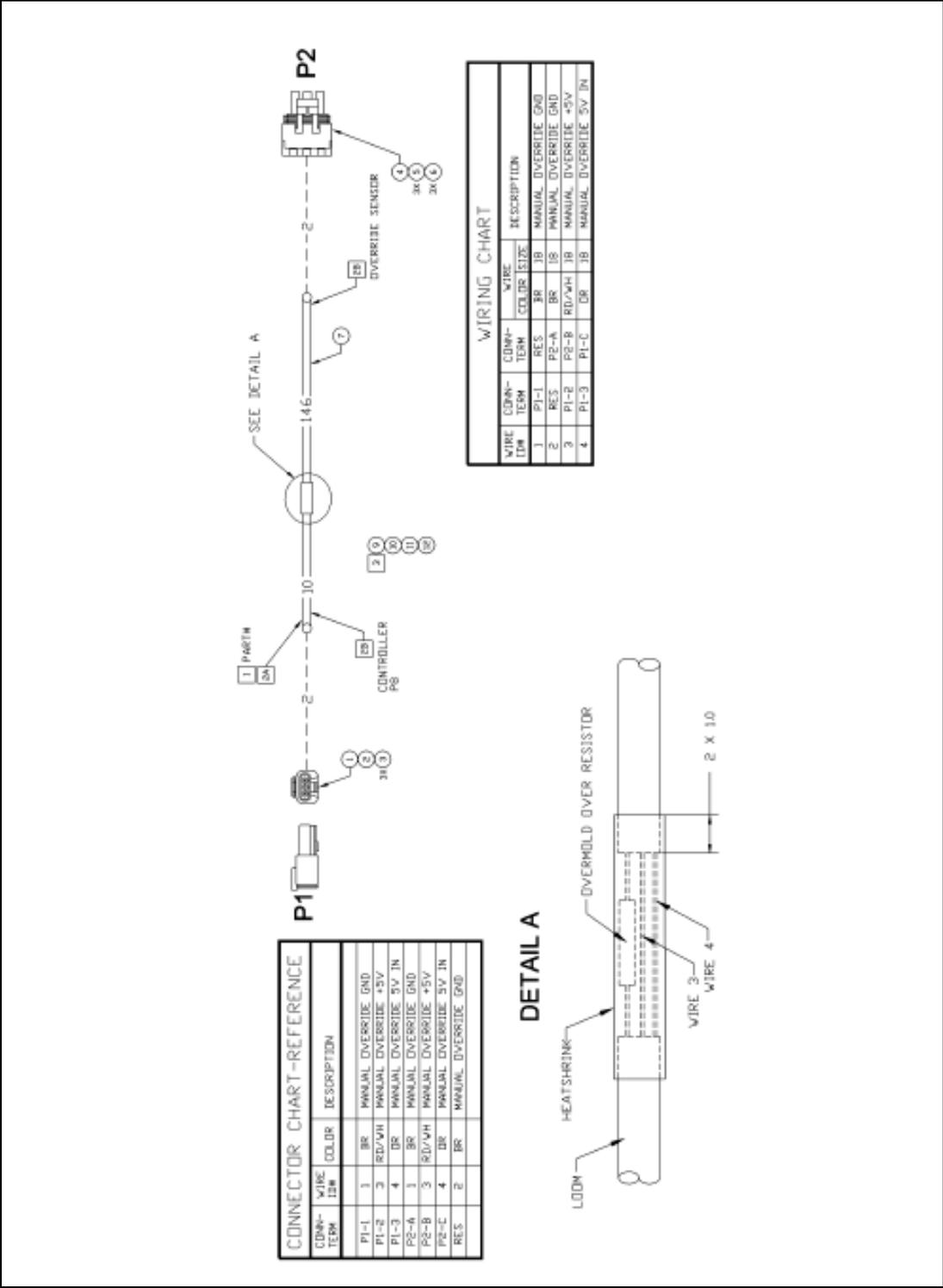
John Deere tracked interface harness: P/N 54624



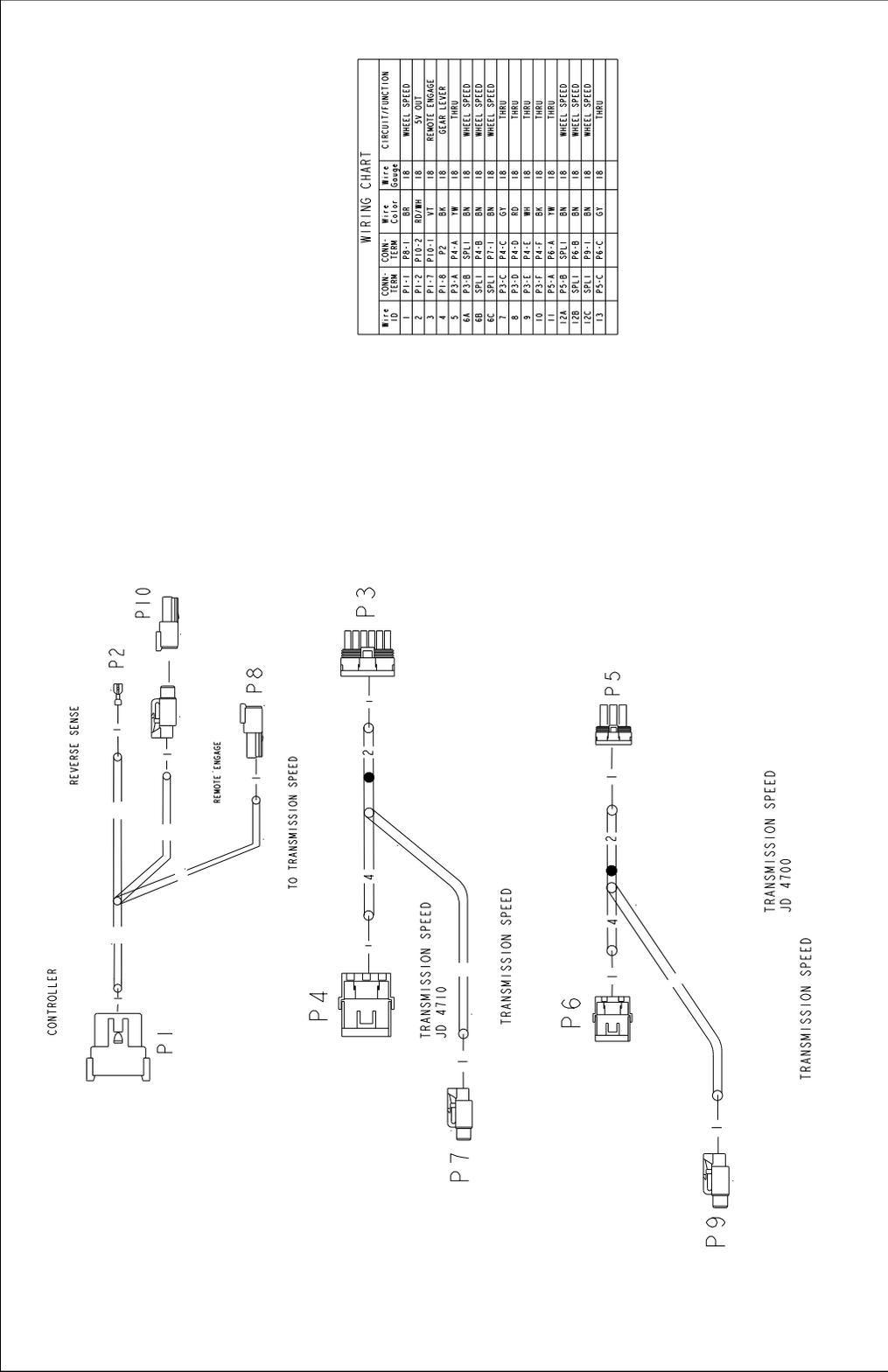
SPX interface harness: P/N 54625



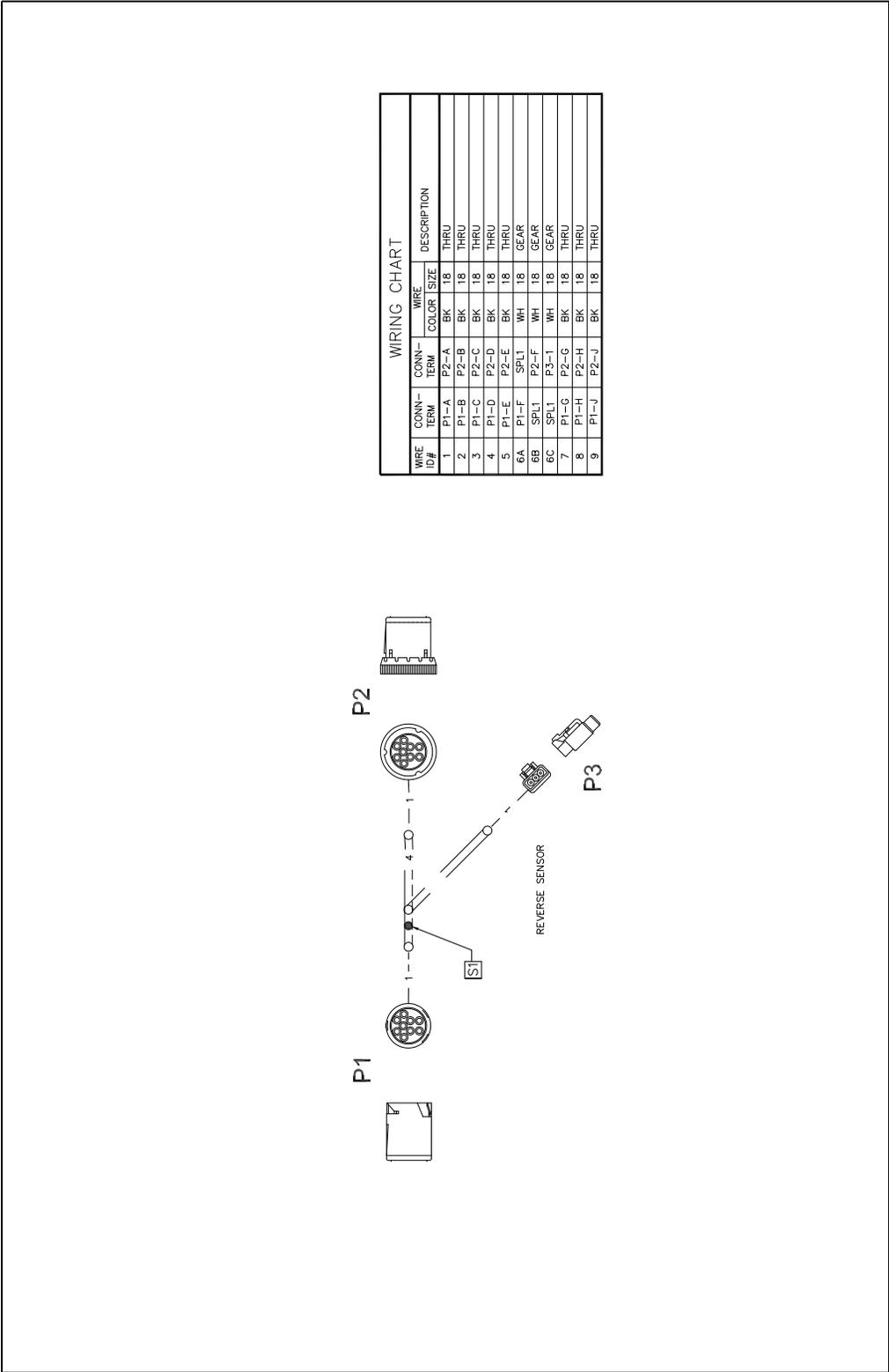
Cable assembly, hydrovalve flow, Ceres: P/N 54626



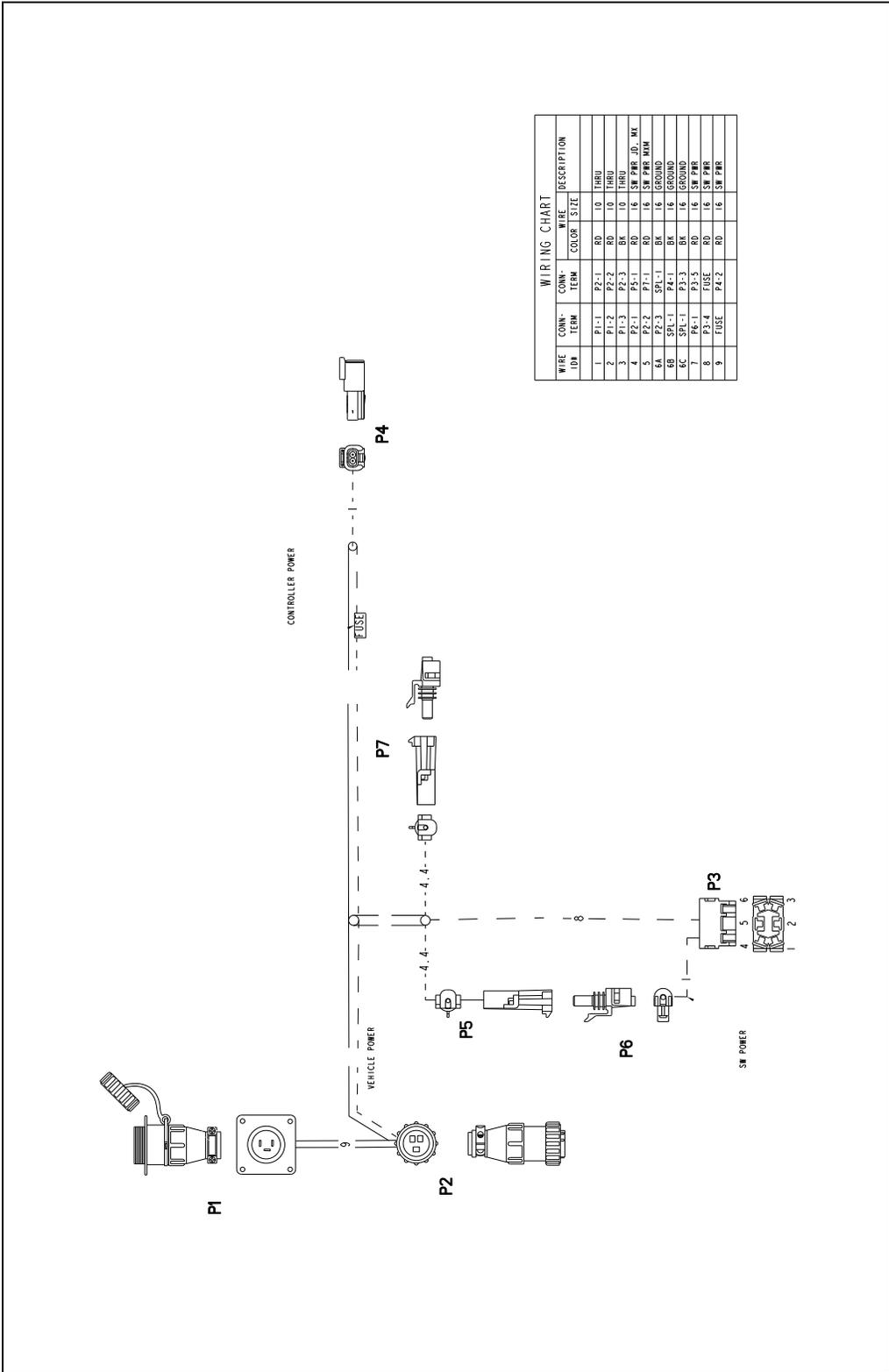
John Deere 47xx interface harness: P/N 54628



Terra-Gator interface harness: P/N 54629

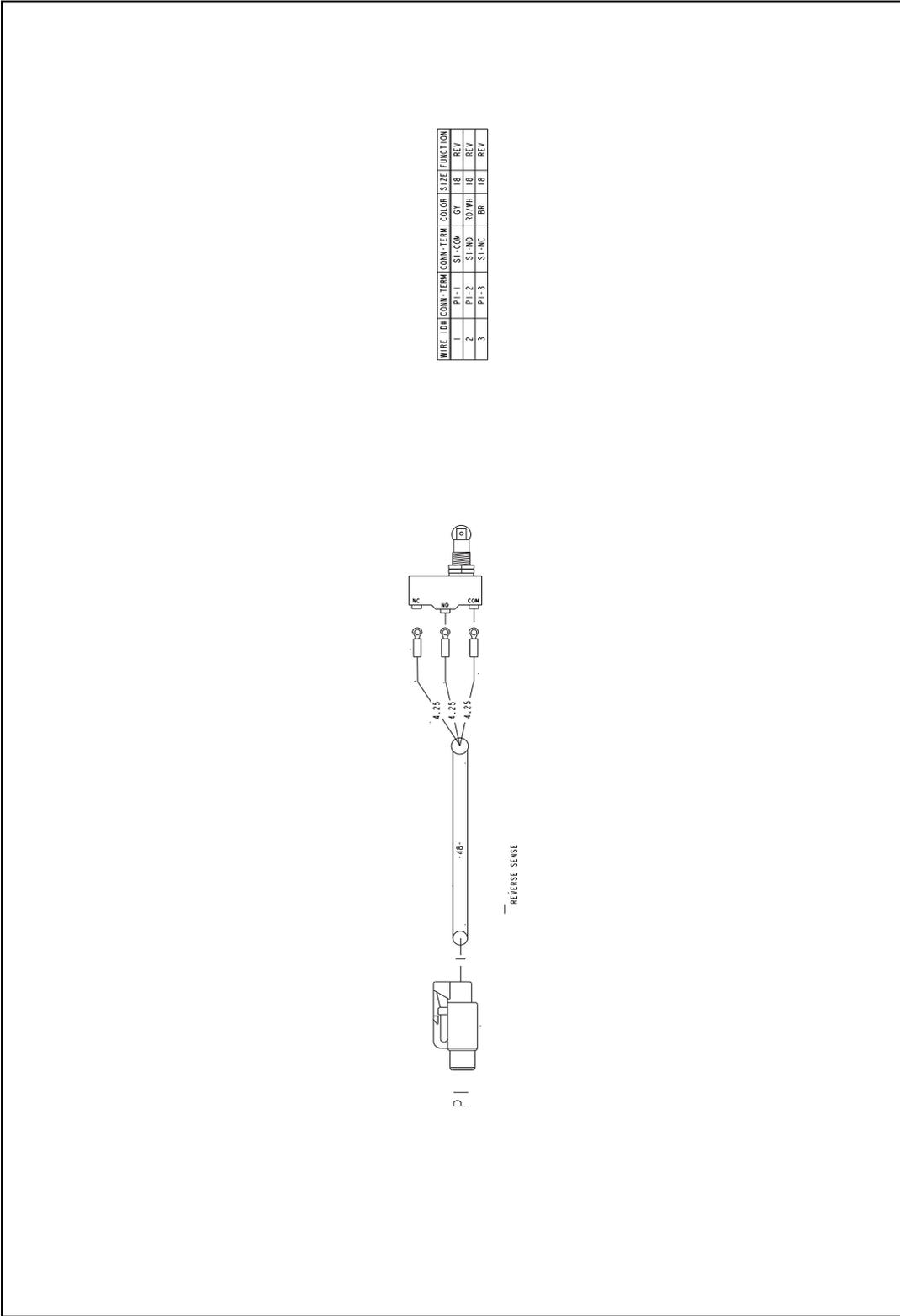


John Deere/Cat MT power interface harness: P/N 54630

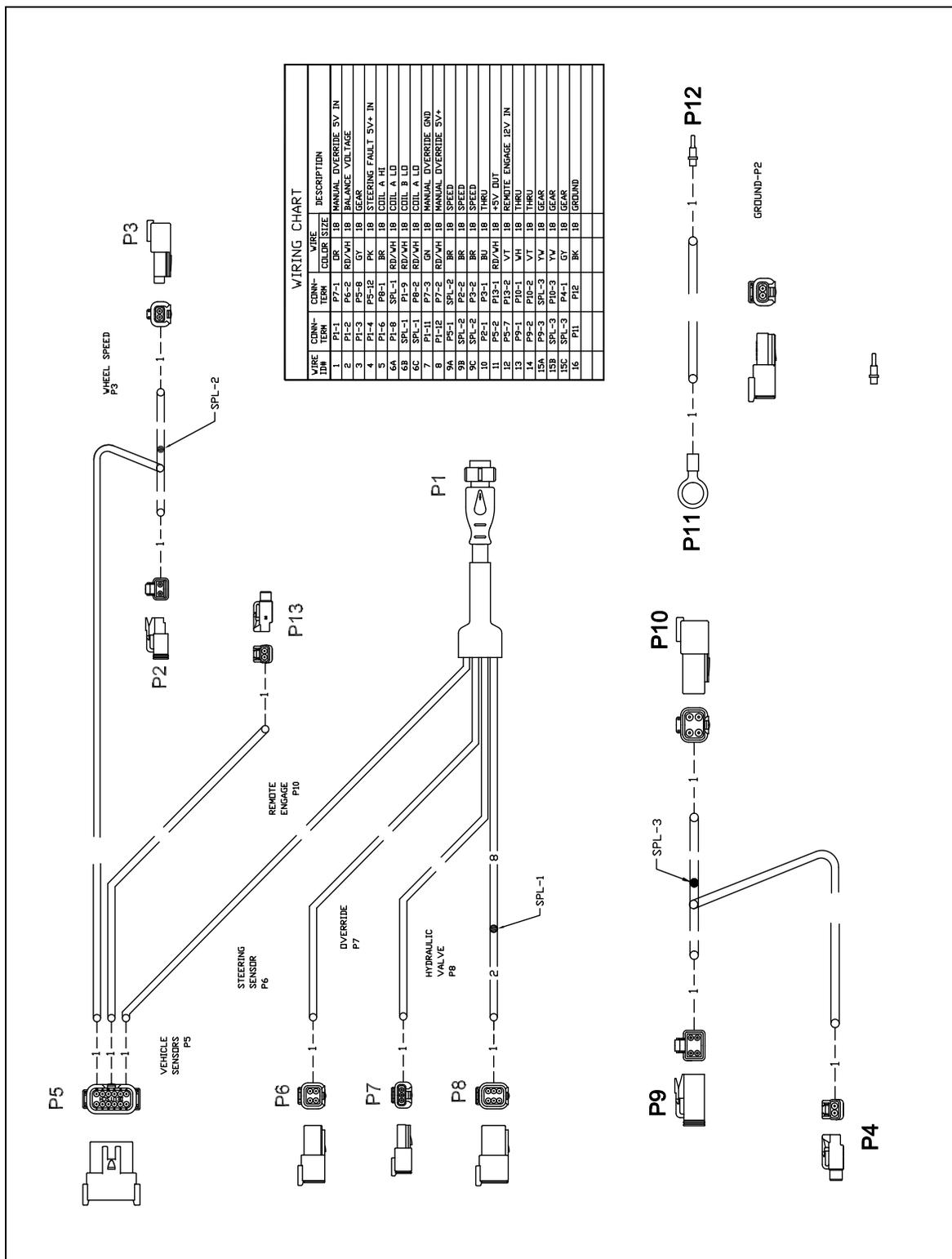


WIRE ID#	CONN. TERM.	CONN. TERM.	WIRE		DESCRIPTION
			COLOR	SIZE	
1	P1-1	P2-1	RD	10	THRU
2	P1-2	P2-2	RD	10	THRU
3	P1-3	P2-3	BK	10	THRU
4	P2-1	P5-1	RD	16	SW PWR JD_MK
5	P2-2	P7-1	RD	16	SW PWR MIN
6A	P2-3	SPT-1	BK	16	GROUND
6B	P2-3	SPT-1	BK	16	GROUND
7	P6-1	P3-3	RD	16	SW PWR
8	P3-4	FUSE	RD	16	SW PWR
9	FUSE	P4-2	RD	16	SW PWR

Gear lever interface harness: P/N 54632

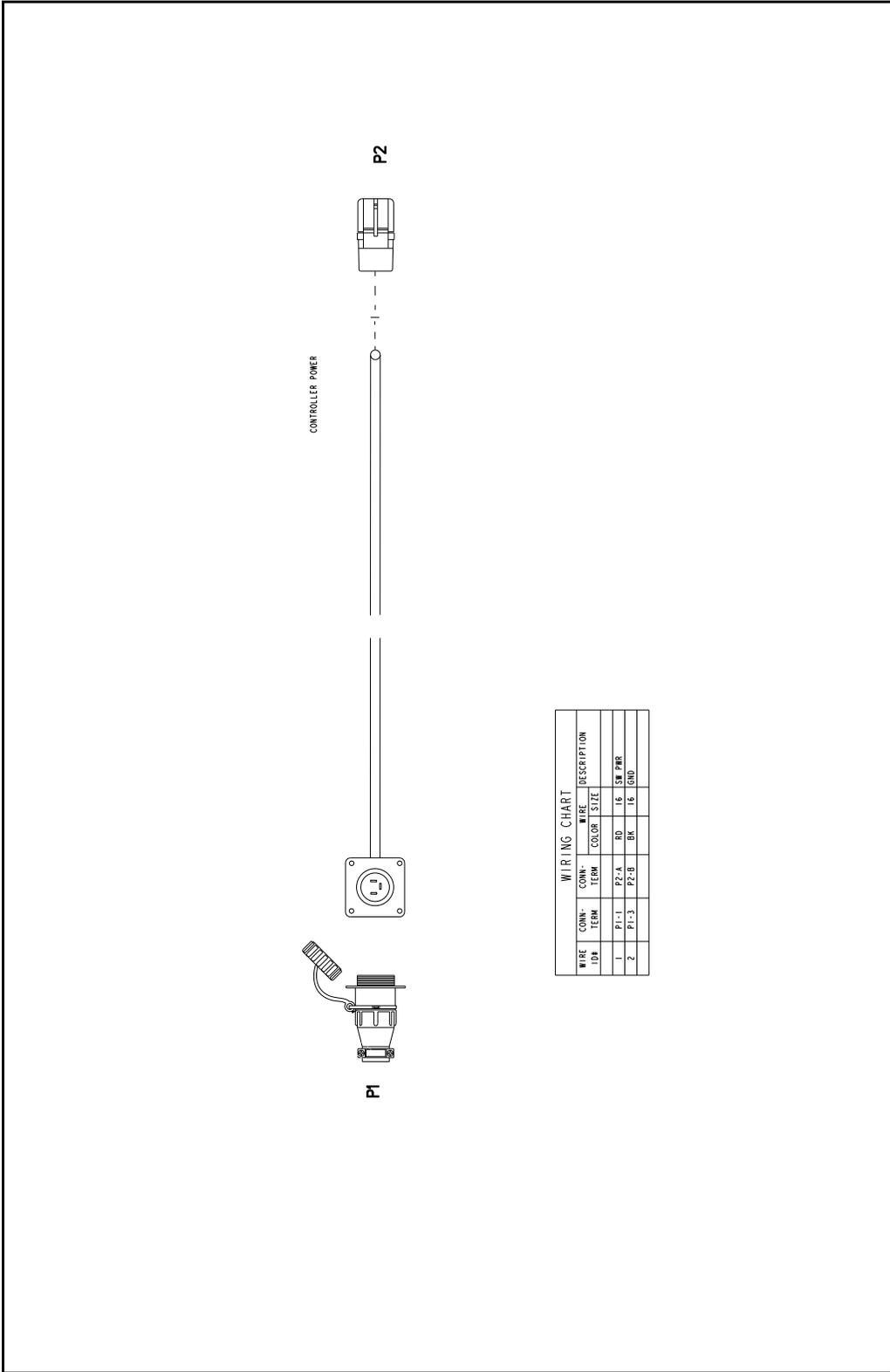


Challenger MT interface harness: P/N 54636



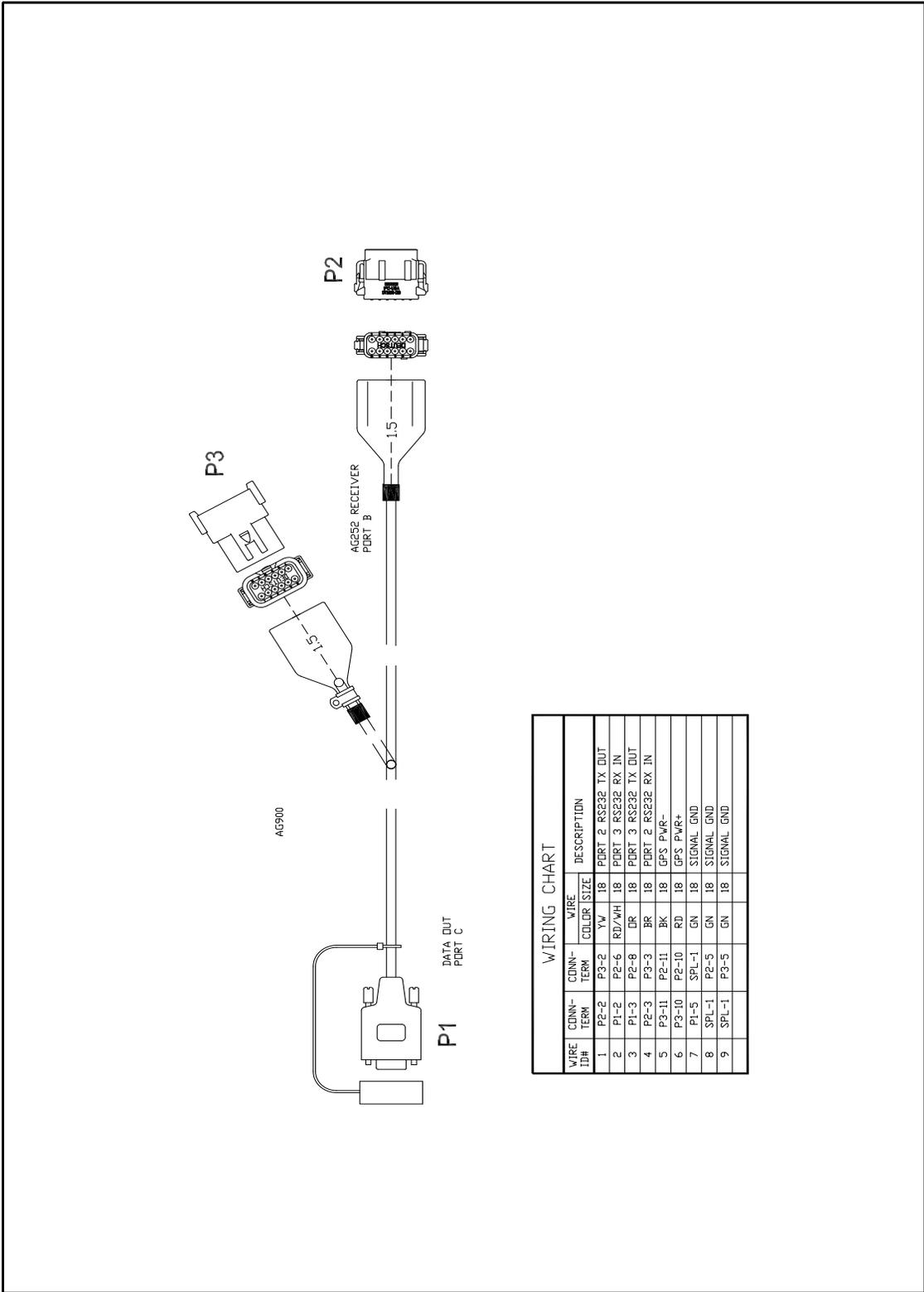
WIRE ID#	CONN. TERM	CONN. TERM	WIRE COLOR	WIRE SIZE	DESCRIPTION
1	P1-1	P7-1	DR	18	MANUAL OVERRIDE SV IN
2	P1-2	P6-2	RD/VH	18	BALANCE VOLTAGE
3	P1-3	P5-8	GY	18	IGEAR
4	P1-4	P5-2	BK	18	STEERING FAULT SV+ IN
5	P1-5	P5-1	RD/VH	18	COIL A LU
6	P1-6	P5-1	RD/VH	18	COIL B LU
6C	SPL-1	P6-2	RD/VH	18	COIL A LU
7	P1-11	P7-3	GN	18	MANUAL OVERRIDE GND
8	P1-12	P7-2	RD/VH	18	MANUAL OVERRIDE SV+
9A	P5-1	SPL-2	BR	18	SPEED
9B	SPL-2	P5-2	BR	18	SPEED
10	P5-2	P5-1	BK	18	THRU
11	P5-1	P5-1	BK	18	THRU
12	P5-2	P13-1	RD/VH	18	+SV OUT
13	P5-7	P13-2	VT	18	REMOTE ENGAGE 12V IN
14	P9-1	P10-1	VH	18	THRU
15A	P9-2	P10-2	VT	18	THRU
15B	SPL-3	P10-3	YV	18	IGEAR
15C	SPL-3	P10-3	YV	18	IGEAR
15E	SPL-3	P10-3	YV	18	IGEAR
16	P11	P12	BK	18	GROUND

SPX Power Adapter: P/N 54947



WIRING CHART				
WIRE ID	CONV. TERM	WIRE COLOR	WIRE SIZE	DESCRIPTION
1	P1-1	RD	16	SW PWR
2	P1-3	BK	16	GRD

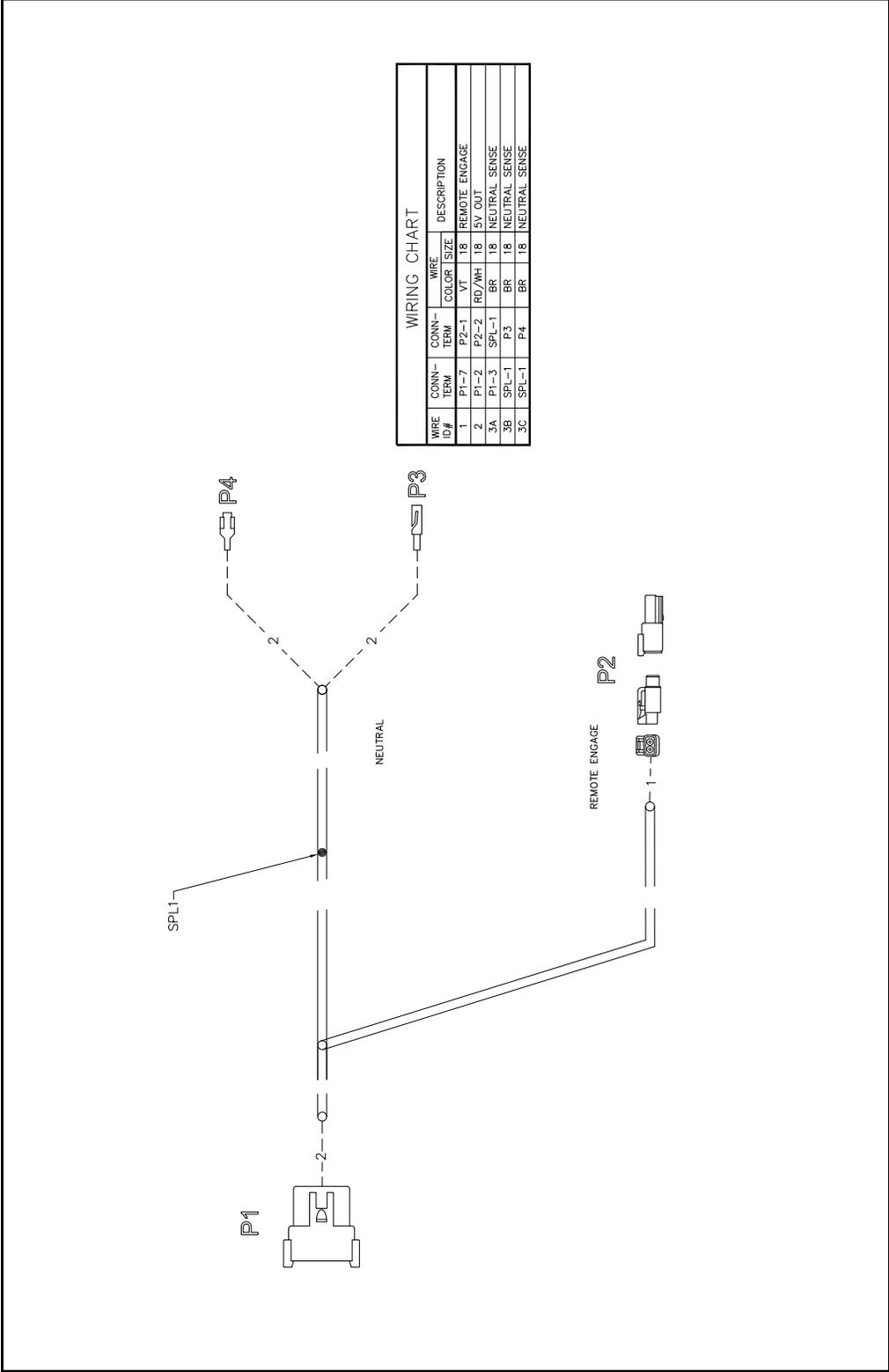
AgGPS 252 data harness: P/N 55224



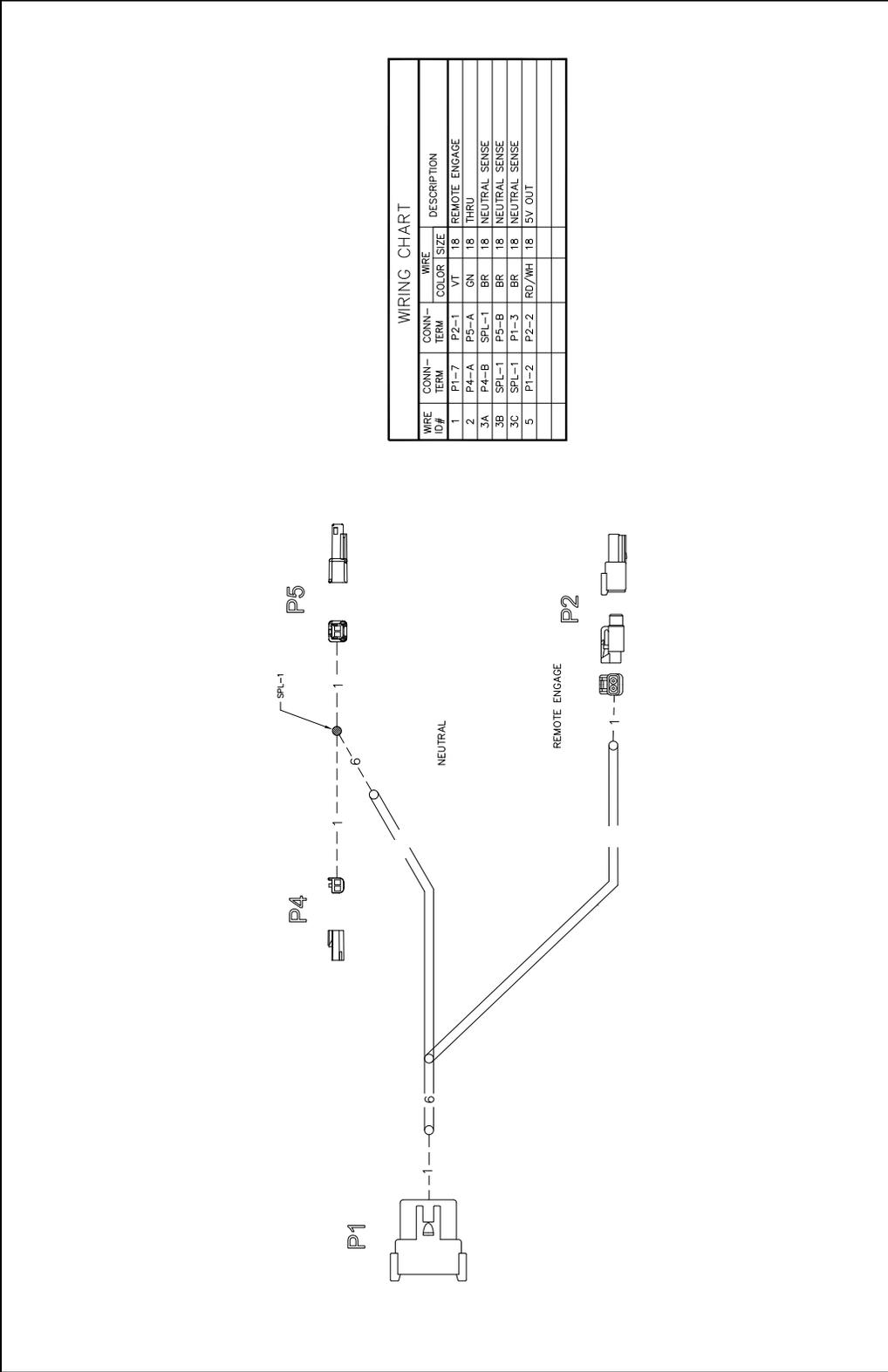
WIRING CHART

WIRE ID#	CONN-TERM	CONN-TERM	WIRE		DESCRIPTION
			COLOR	SIZE	
1	P2-2	P3-2	YW	18	PORT 2 RS232 TX OUT
2	P1-2	P2-6	RD/WH	18	PORT 3 RS232 RX IN
3	P1-3	P2-8	BR	18	PORT 3 RS232 TX OUT
4	P2-3	P3-3	BR	18	PORT 2 RS232 RX IN
5	P3-11	P2-11	BK	18	GPS PWR-
6	P3-10	P2-10	RD	18	GPS PWR+
7	P1-5	SPL-1	GN	18	SIGNAL GND
8	SPL-1	P2-5	GN	18	SIGNAL GND
9	SPL-1	P3-5	GN	18	SIGNAL GND

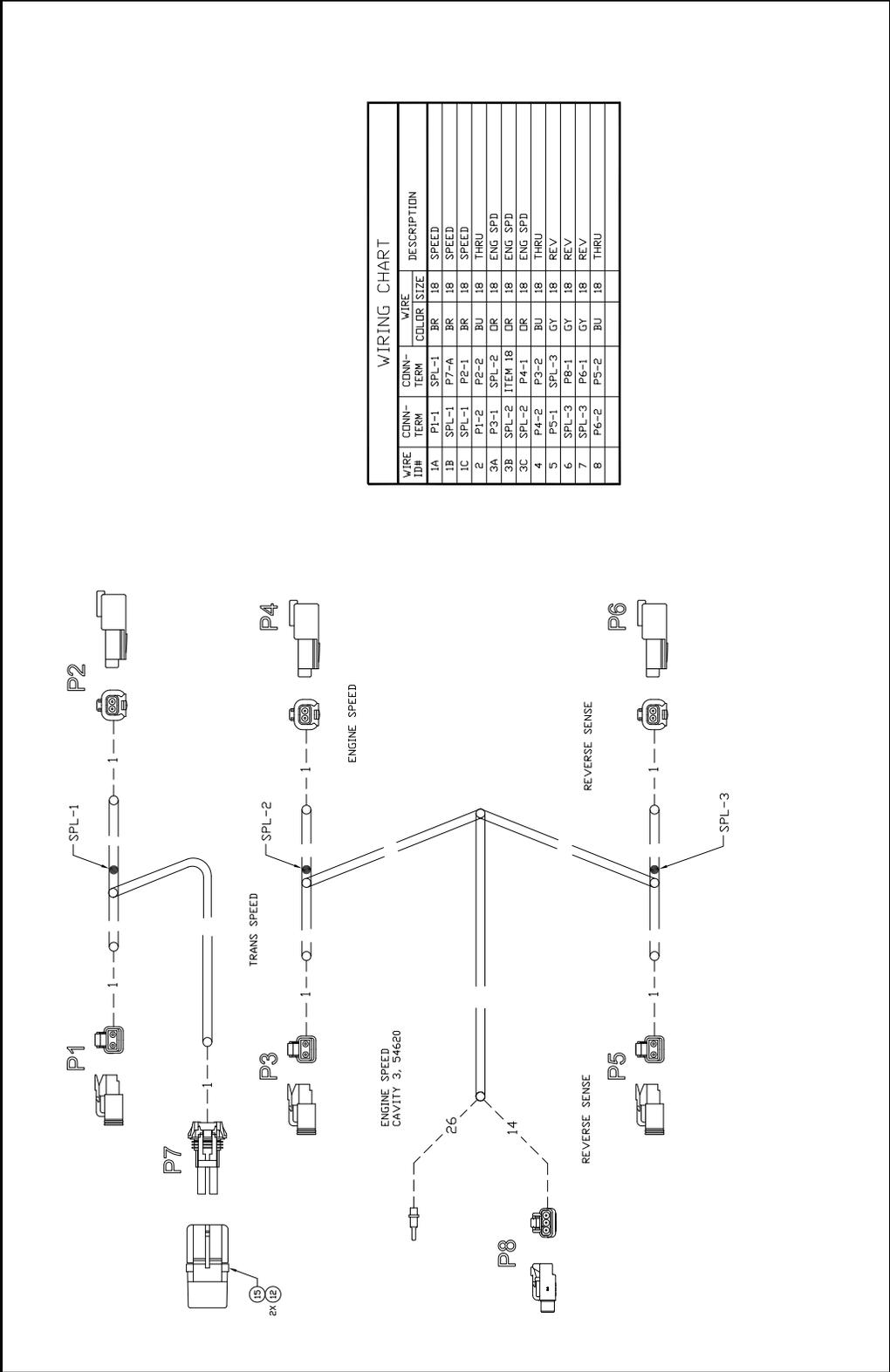
Case IH 2388 interface harness: P/N 55650



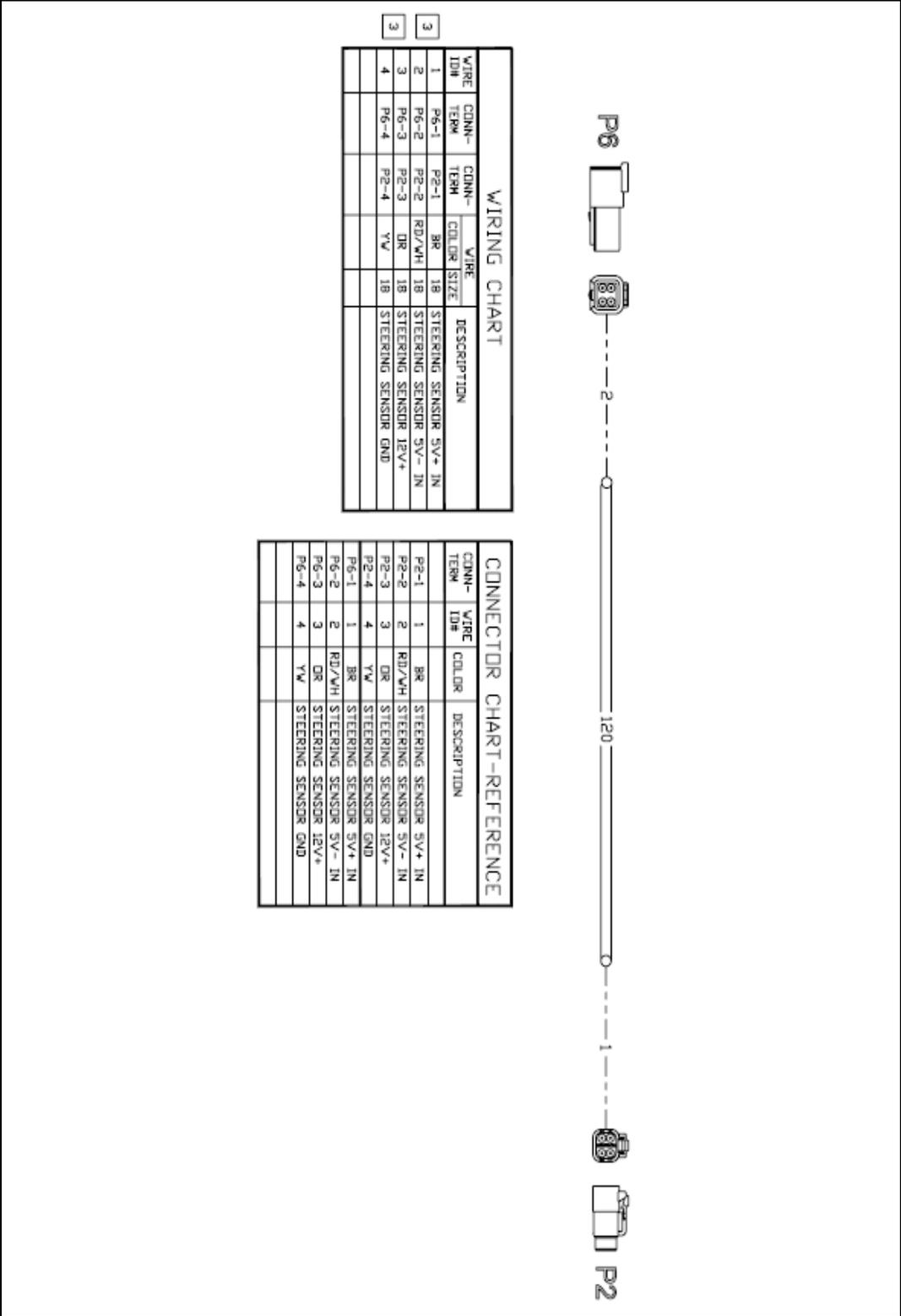
John Deere combine interface harness: P/N 55651



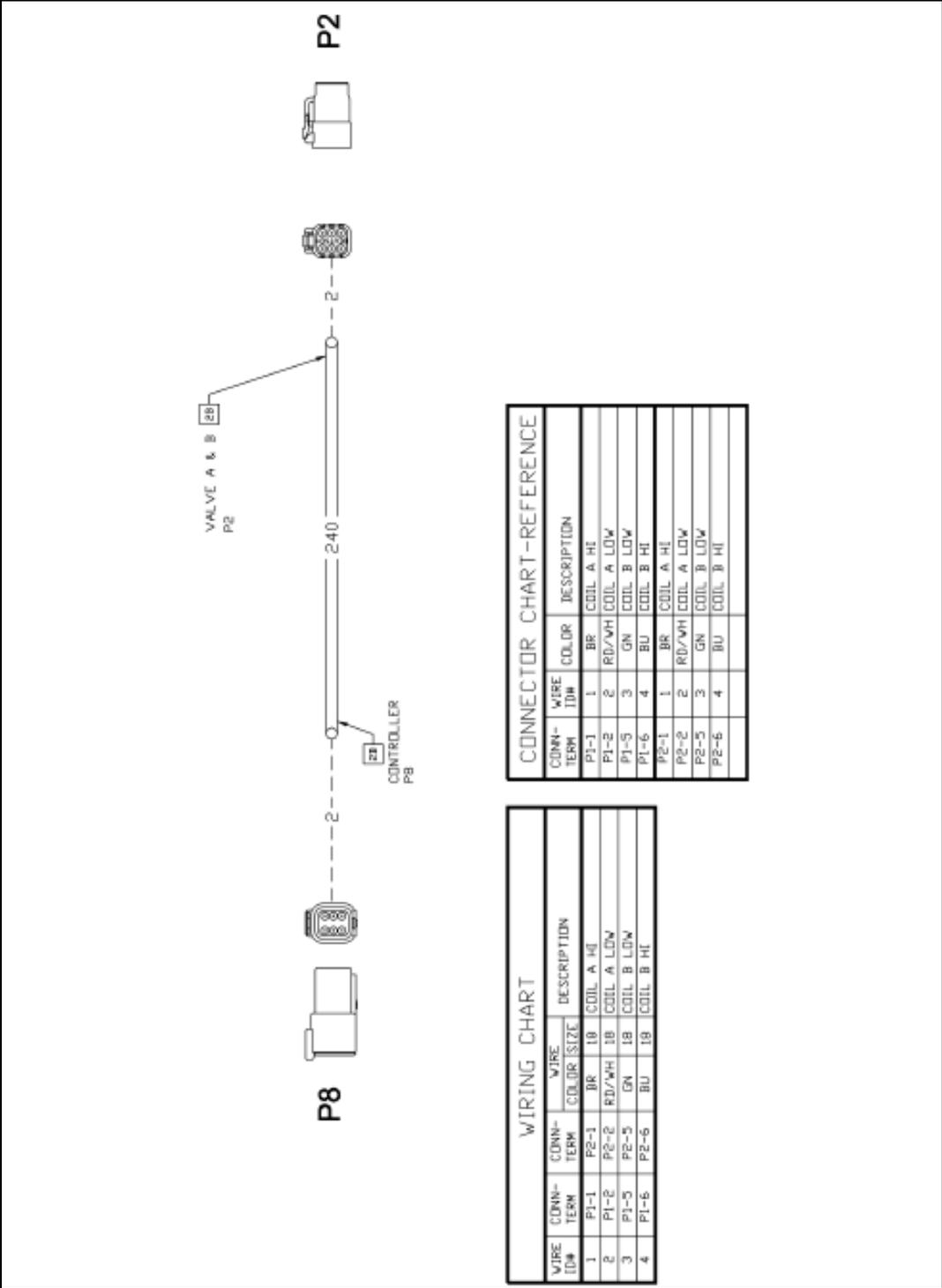
Challenger 35-55 interface harness: P/N 55654



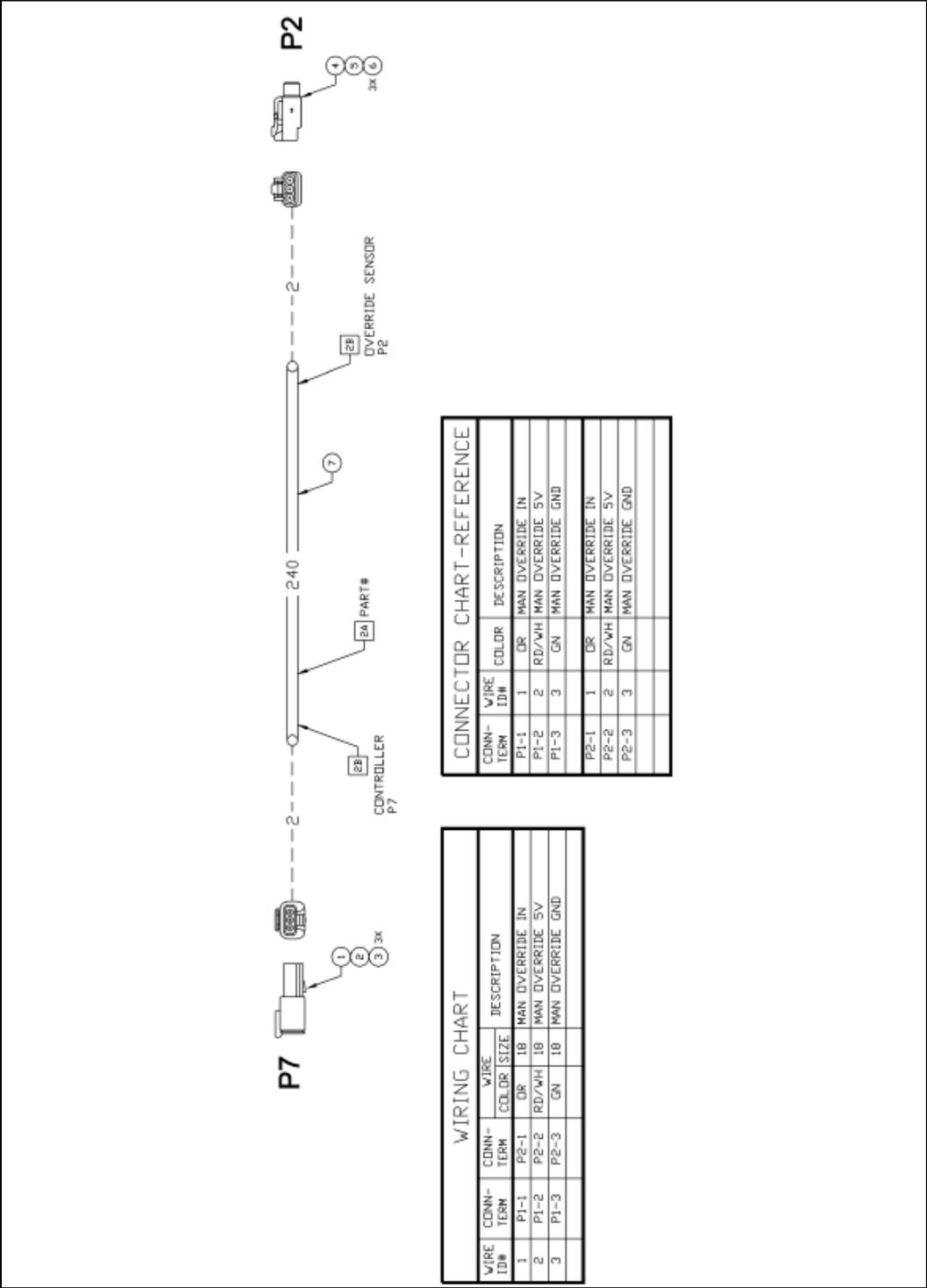
Extended cable assembly, straight sensor: P/N 55656



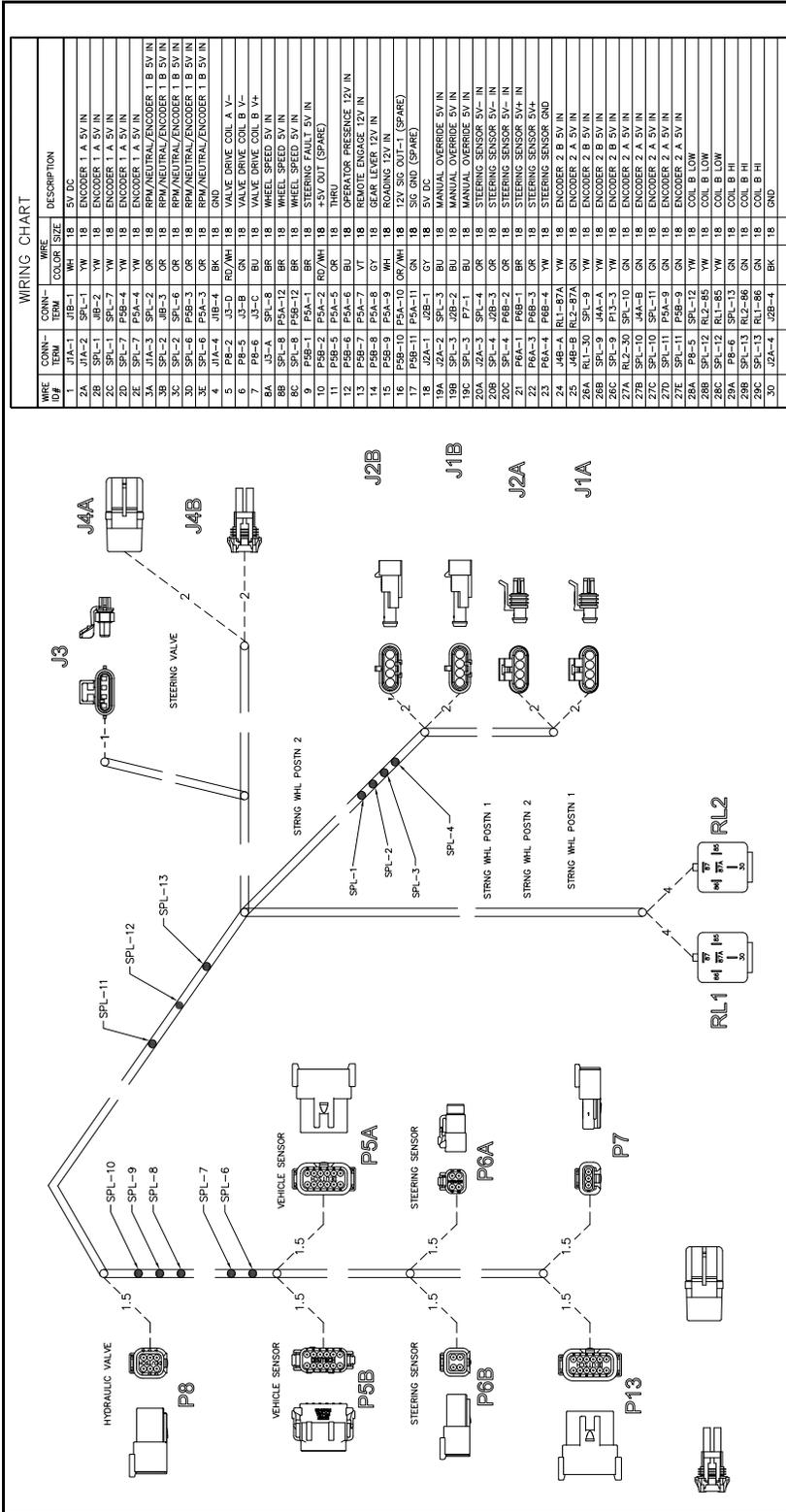
Cable assembly, hydrovalve extended: P/N 55657



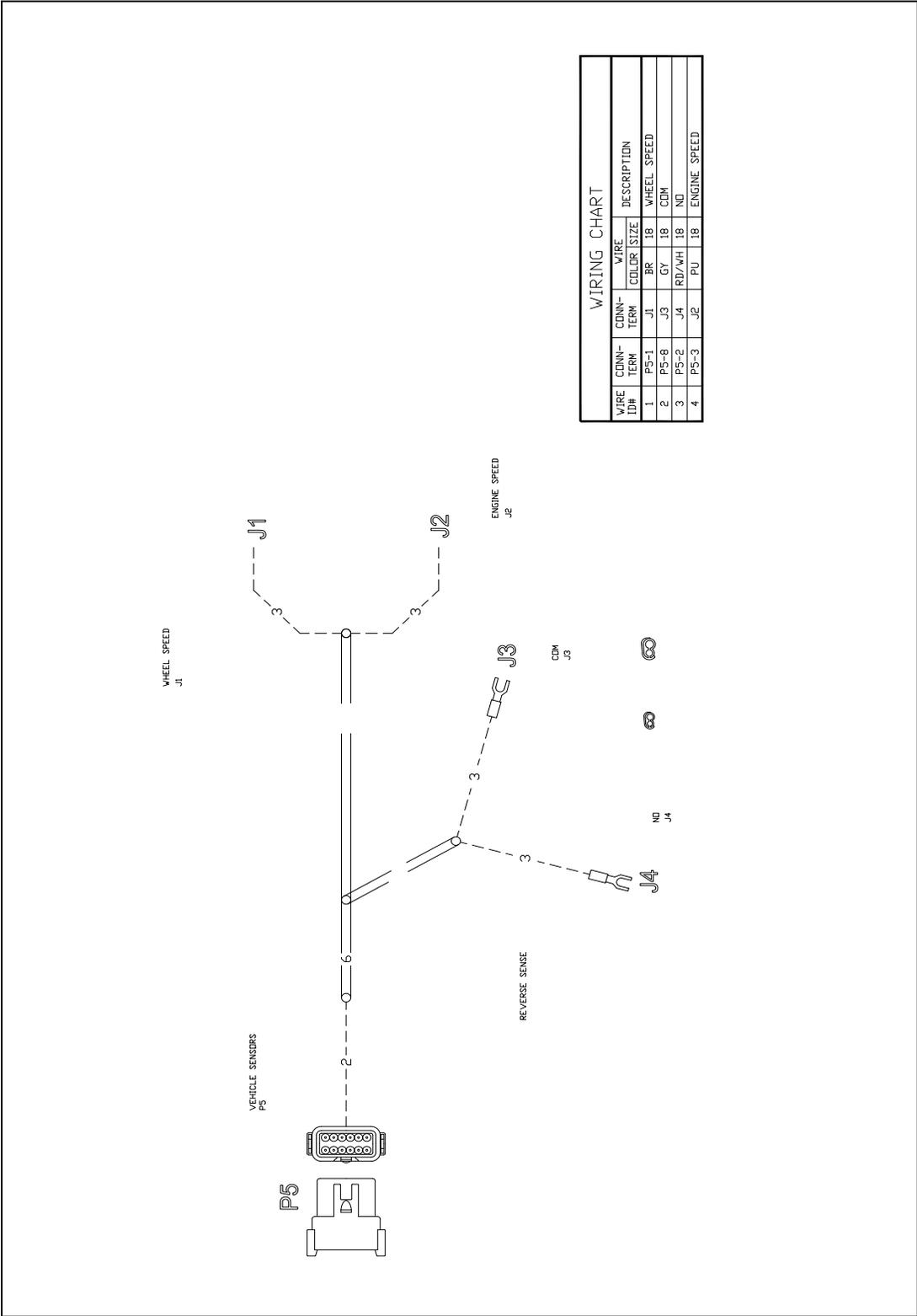
Extended cable assembly, manual overhead: P/N 55658



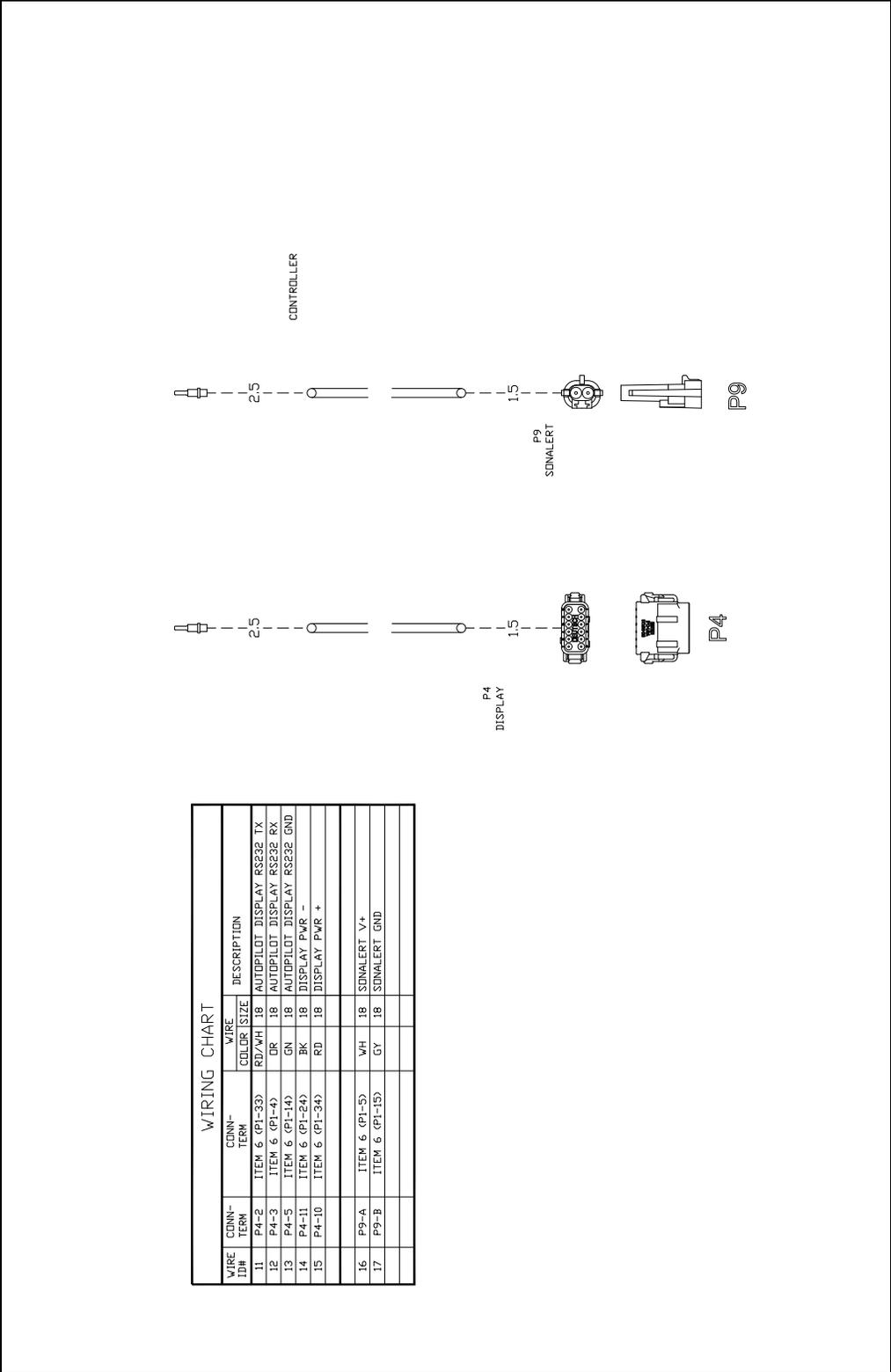
John Deere 8020 AutoTrac interface harness: P/N 56133



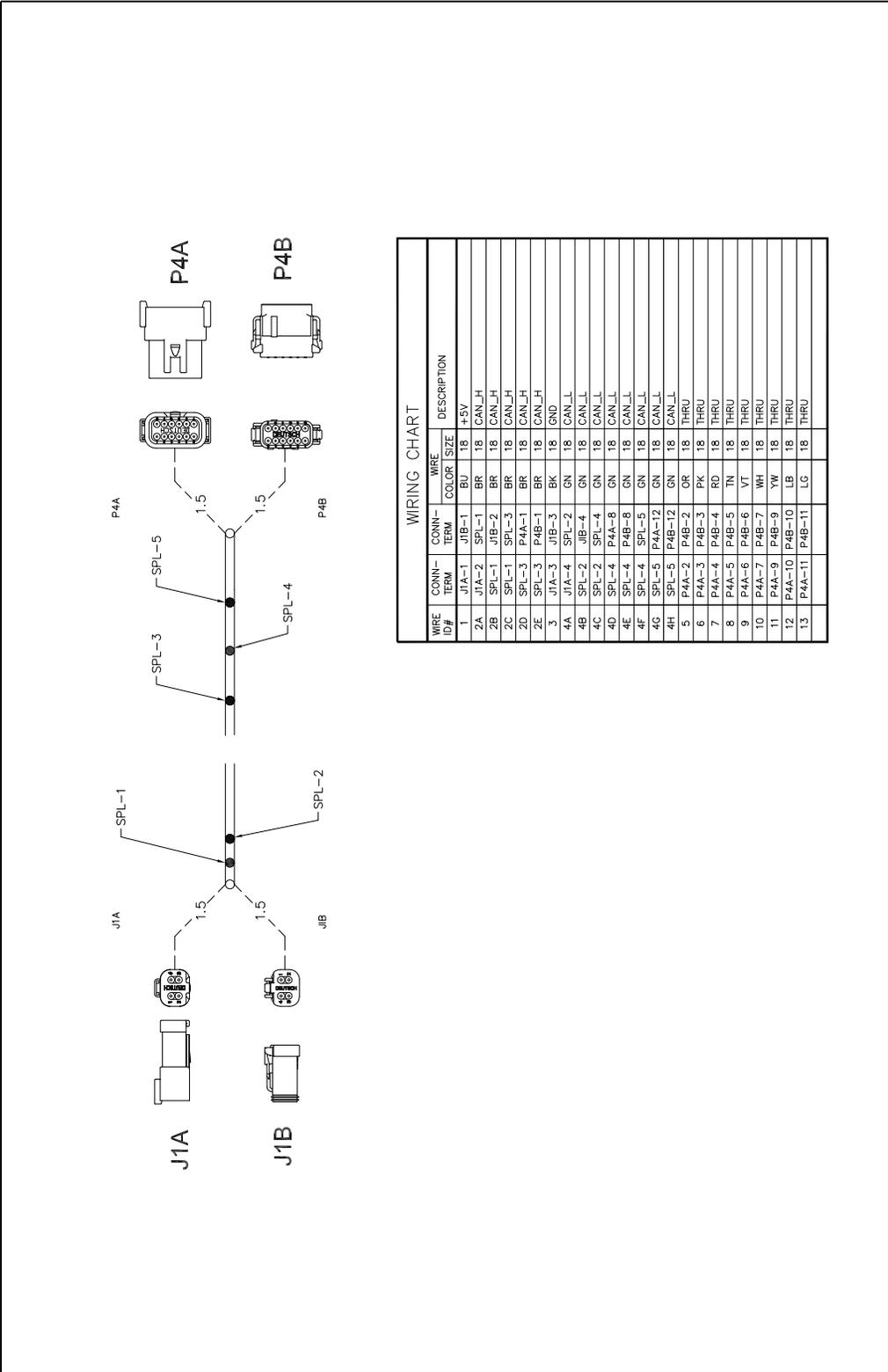
Challenger 65-95 Interface Cable: P/N 56190



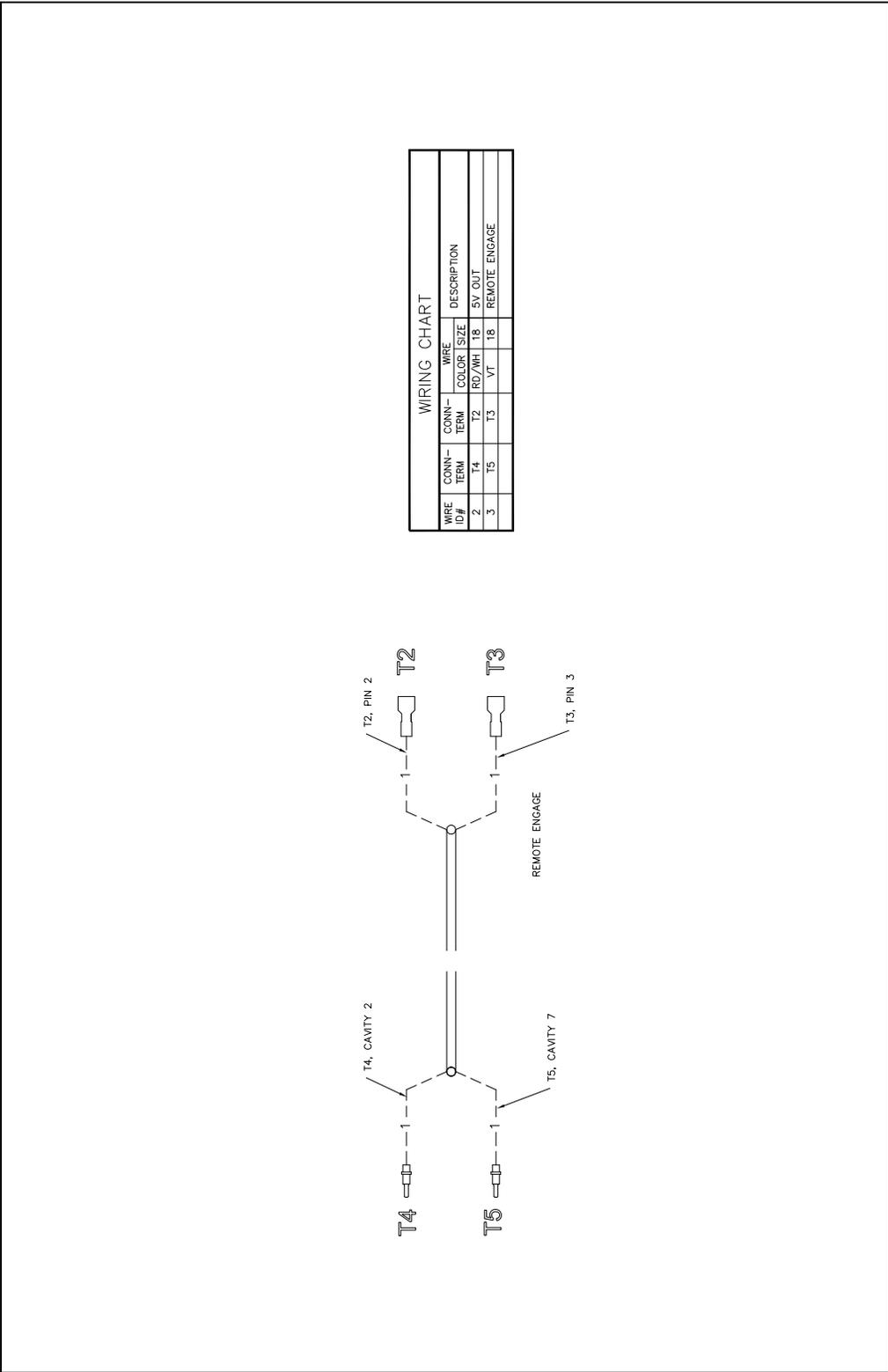
Hybrid interface harness: P/N 56694



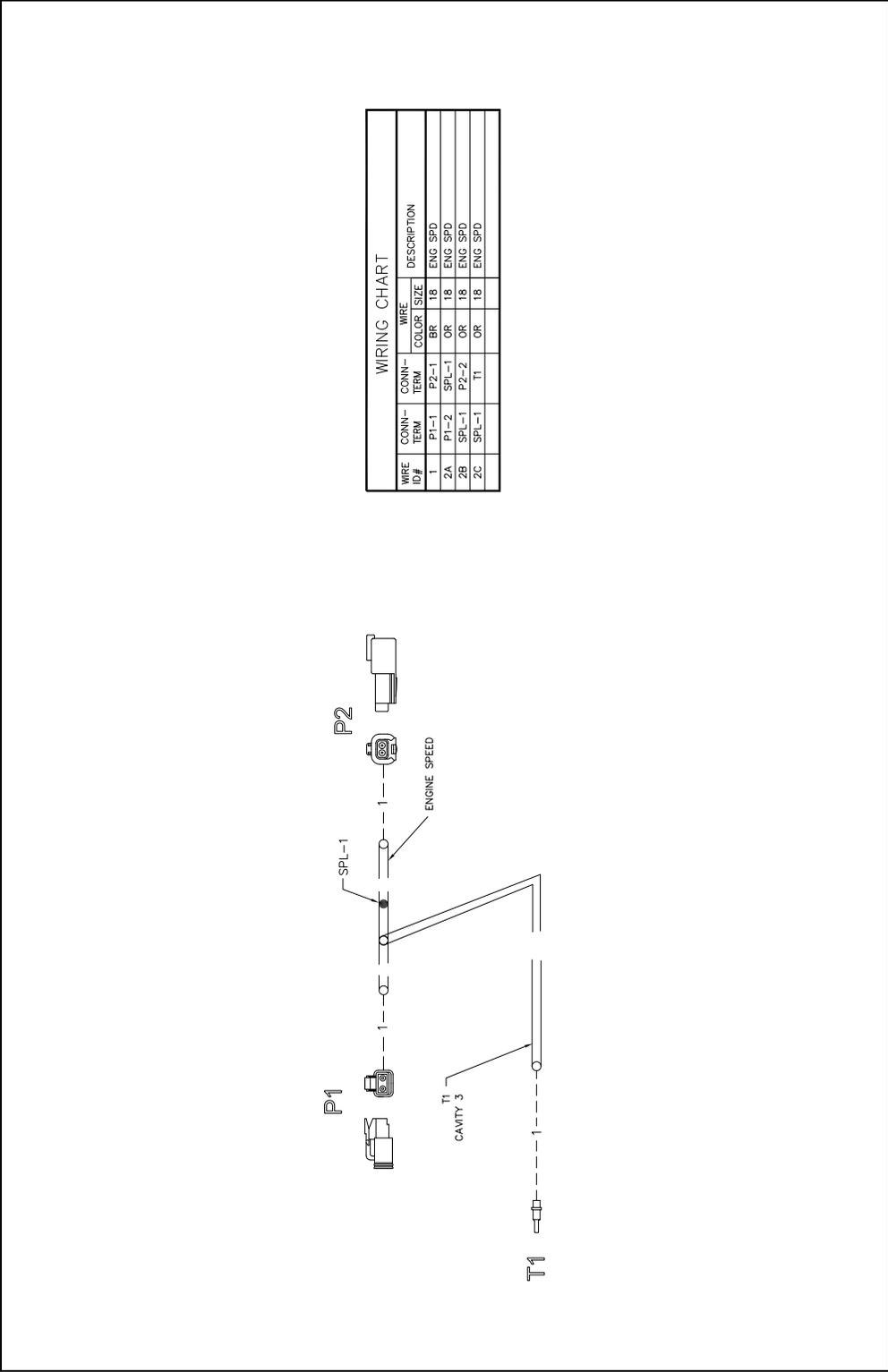
Challenger MT ISO interface harness: P/N 56850



Remote engage harness: P/N 57260

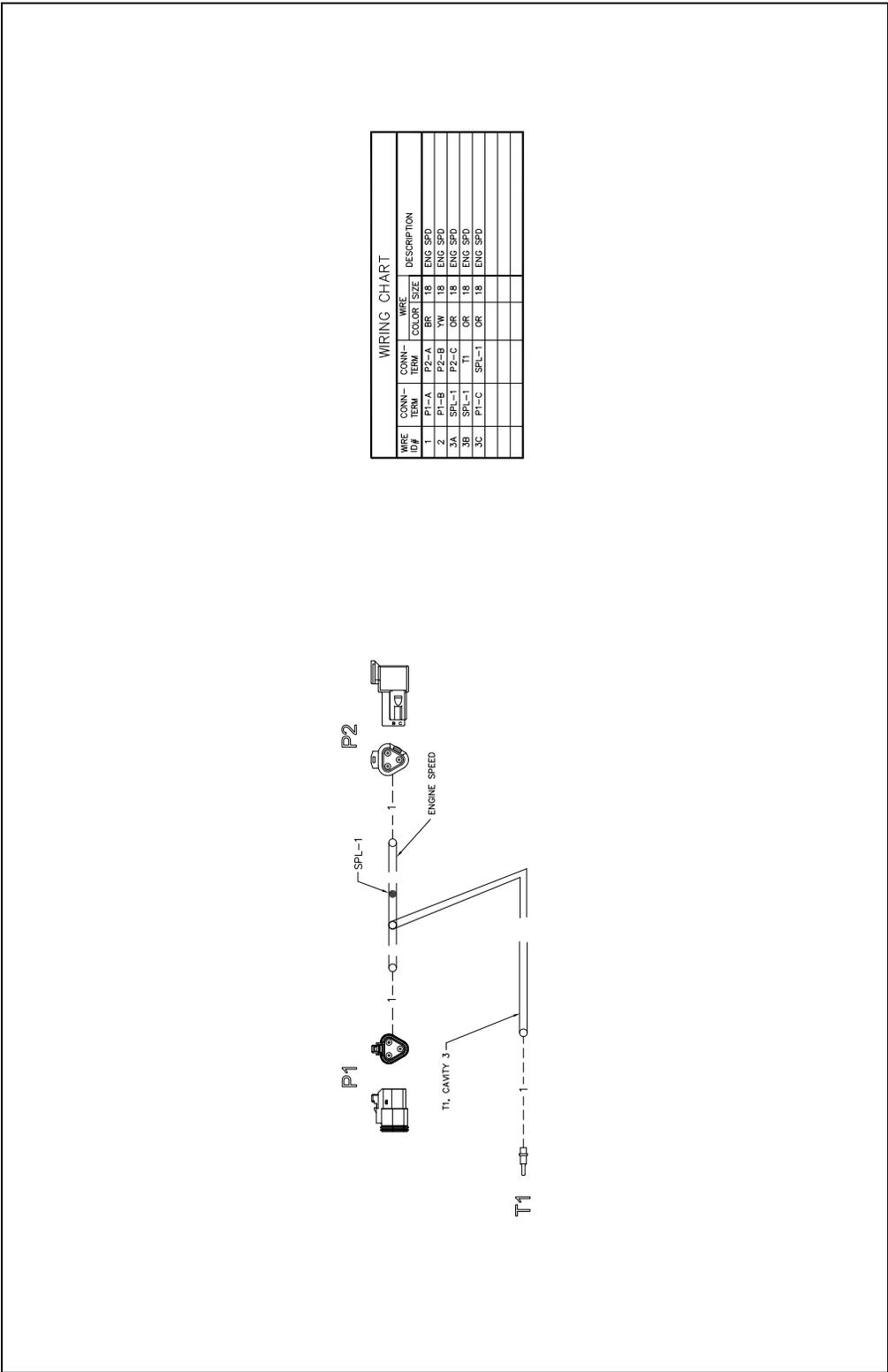


Challenger 35–55 engine interface harness: P/N 57313



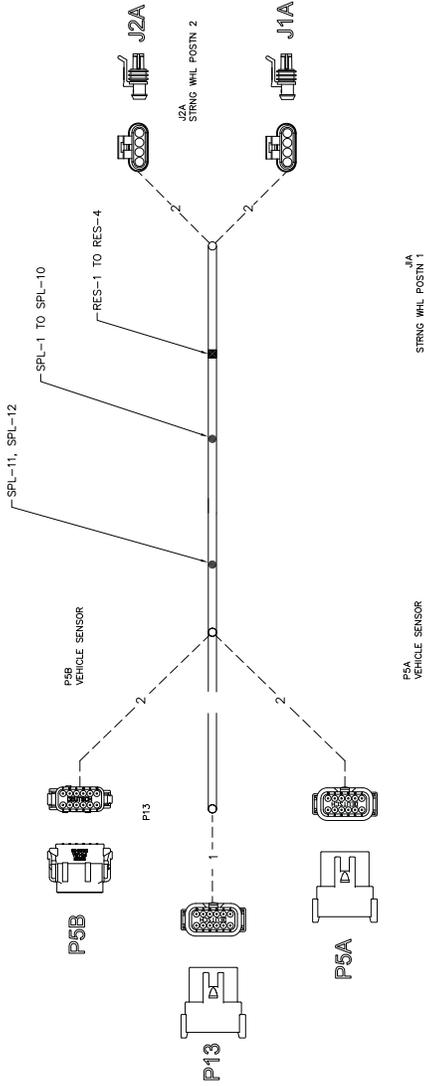
WIRING CHART				
WIRE ID#	CONN-TERM	CONN-TERM	WIRE COLOR	DESCRIPTION
1	P1-1	P2-1	BR	ENG SPD
2A	P1-2	SPL-1	OR	ENG SPD
2B	SPL-1	P2-2	OR	ENG SPD
2C	SPL-1	T1	OR	ENG SPD

Challenger 65–95 engine interface harness: P/N 57314

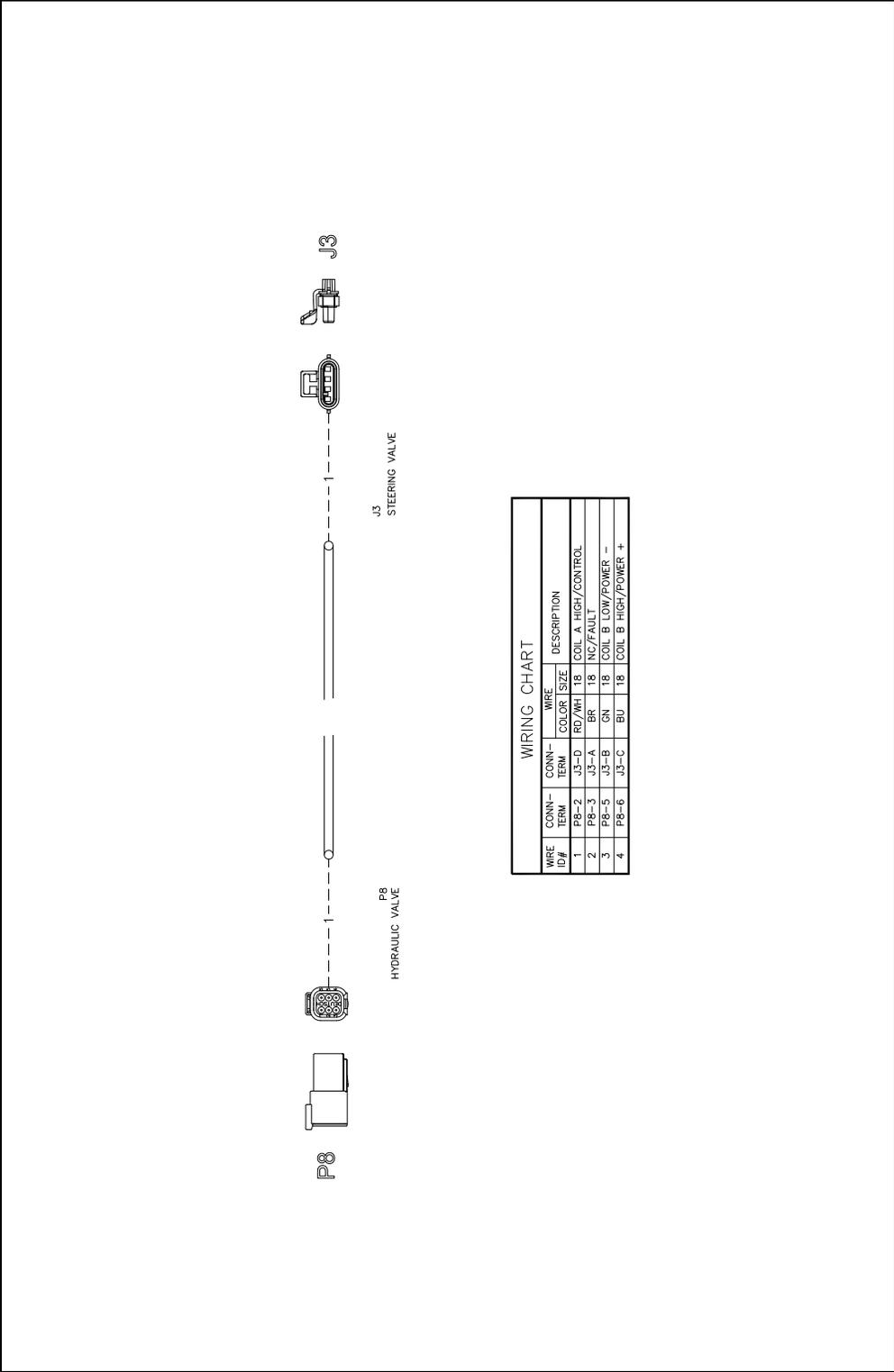


John Deere AutoTrac manual override harness: P/N 57535

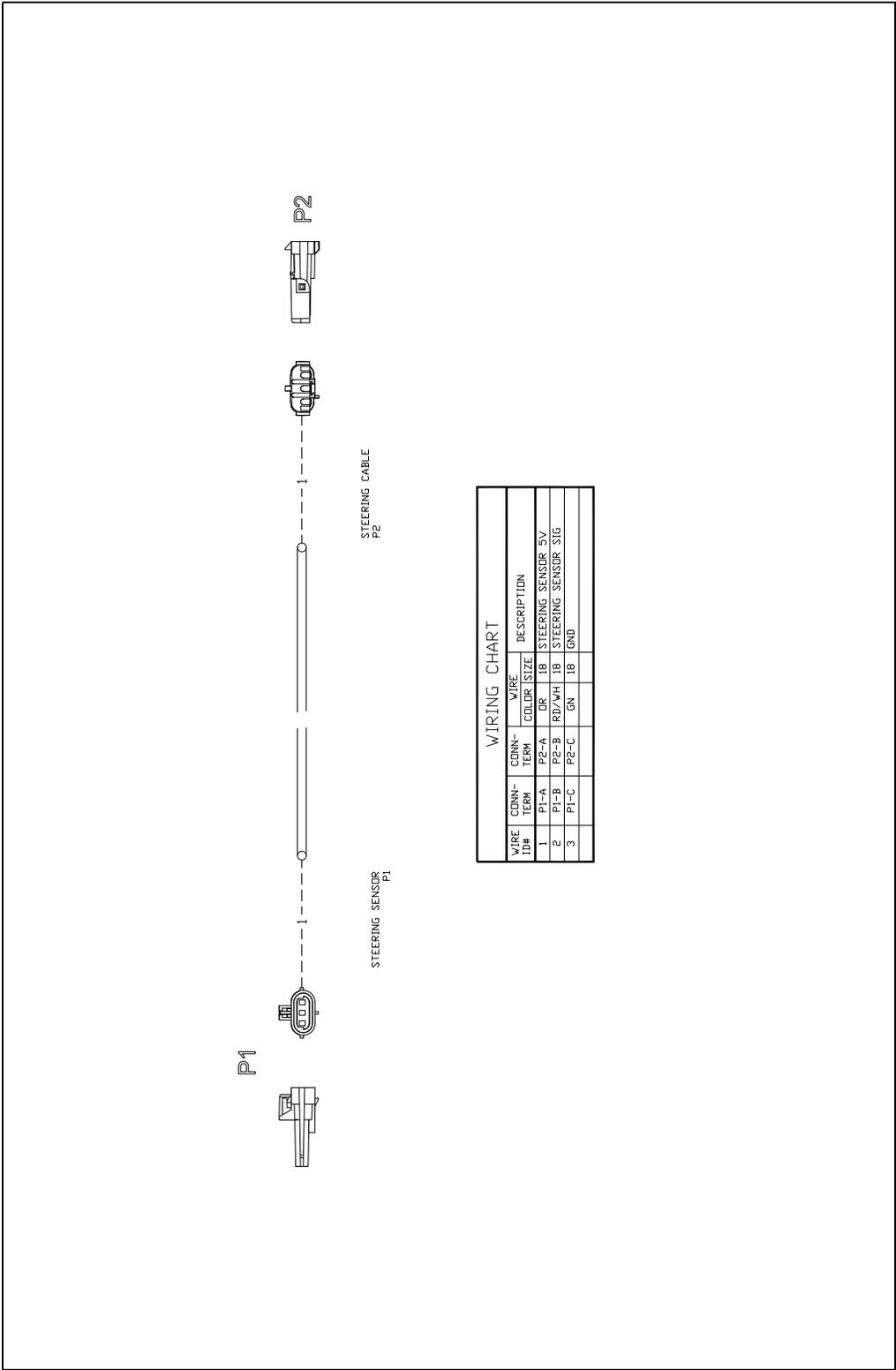
WIRING CHART					
WIRE ID	CONN-TO	WIRE COLOR	WIRE SIZE	DESCRIPTION	
1B	SPL-1	WH	18	+5V OUT	
1C	SPL-1	WH	18	+5V OUT	
1D	SPL-3	WH	18	+5V OUT	
1E	SPL-3	WH	18	+5V OUT	
1F	SPL-9	WH	18	+5V OUT	
2A	J1A-2	YW	18	IN_5V_E_A01+	
2B	SPL-2	RES-1	YW	18	IN_5V_E_A01+
2C	SPL-2	P5A-4	YW	18	IN_5V_E_A01+
3A	J1A-3	OR	18	IN_5V_S_A01-	
3B	SPL-4	RES-2	OR	18	IN_5V_S_A01-
3C	SPL-4	P5A-3	OR	18	IN_5V_S_A01-
4A	J1A-4	BK	18	OND_SIG	
4B	SPL-10	SPL-12	BK	18	OND_SIG
4C	SPL-12	P5A-11	BK	18	OND_SIG
5A	J2A-1	SPL-5	GY	18	
5B	SPL-5	RES-3	GY	18	
5C	SPL-5	SPL-7	GY	18	
5D	SPL-7	RES-4	GY	18	
5E	SPL-7	SPL-9	GY	18	
6A	J2A-2	SPL-6	BU	18	IN_5V_S_A01-
6B	SPL-6	RES-3	BU	18	IN_5V_S_A01-
6C	SPL-6	P5A-9	BU	18	IN_5V_S_A01-
7A	J2A-3	OR	18	IN_5V_10_A01-	
7B	SPL-8	RES-5	OR	18	IN_5V_10_A01-
7C	SPL-8	P13-3	OR	18	IN_5V_10_A01-
8	J2A-4	SPL-10	BK	18	OND_SIG
9	P5B-1	P5A-1	BR	18	
10A	P5B-2	SPL-11	RD/WHT	18	+5V OUT
10B	SPL-11	P5A-2	RD/WHT	18	+5V OUT
11	P5B-5	P5A-5	OR	18	
12	P5B-6	P5A-6	BU	18	
13	P5B-7	P5A-7	GY	18	
14	P5B-8	P5A-8	GY	18	
15	P5B-10	P5A-10	OR/WHT	18	OND_SIG
16	P5B-11	SPL-12	BK	18	OND_SIG
17	P5B-12	P5A-12	WH	18	



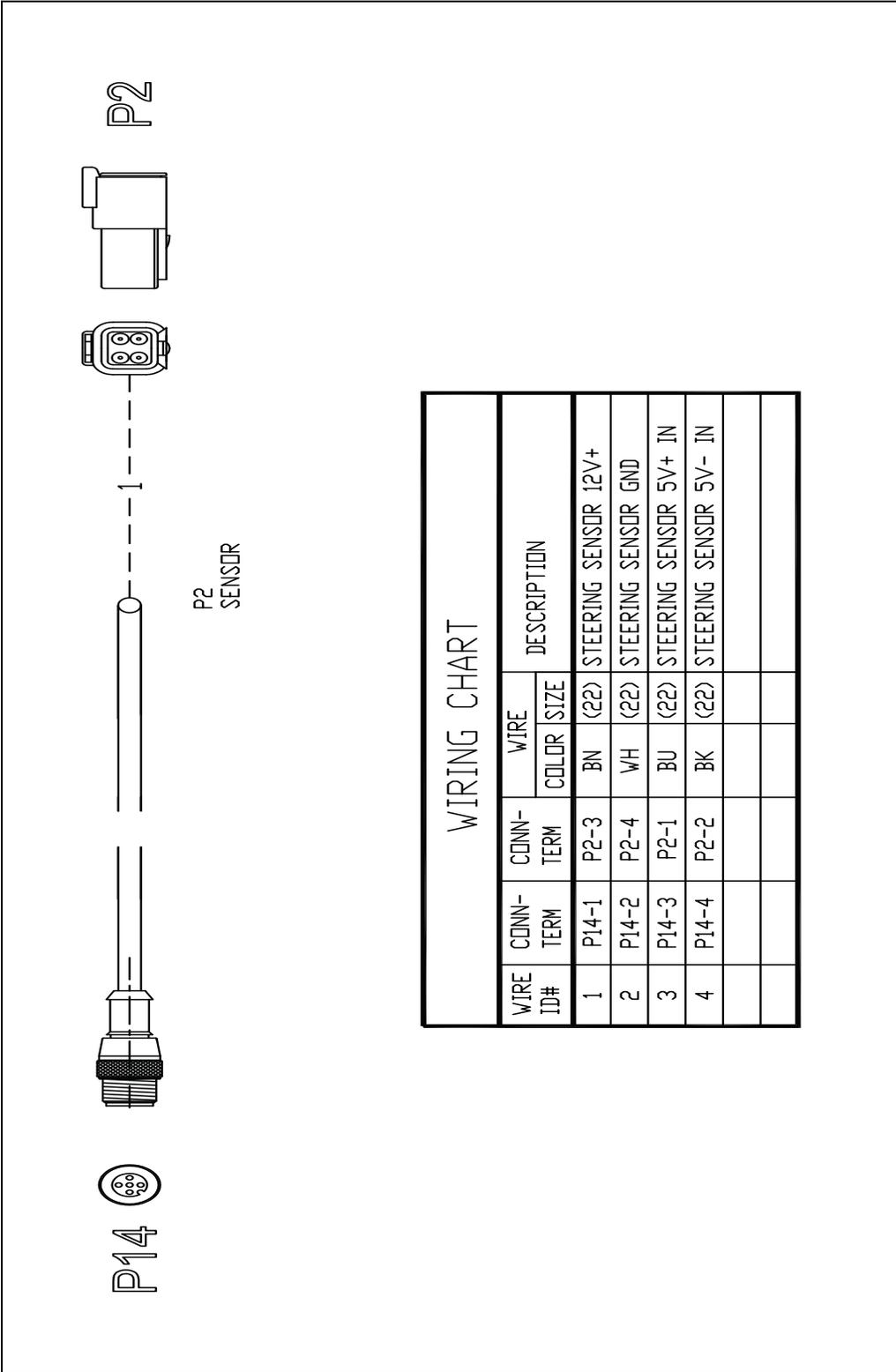
John Deere AutoTrac valve harness: P/N 57536



John Deere AutoTrac steering jumper harness: P/N 57541



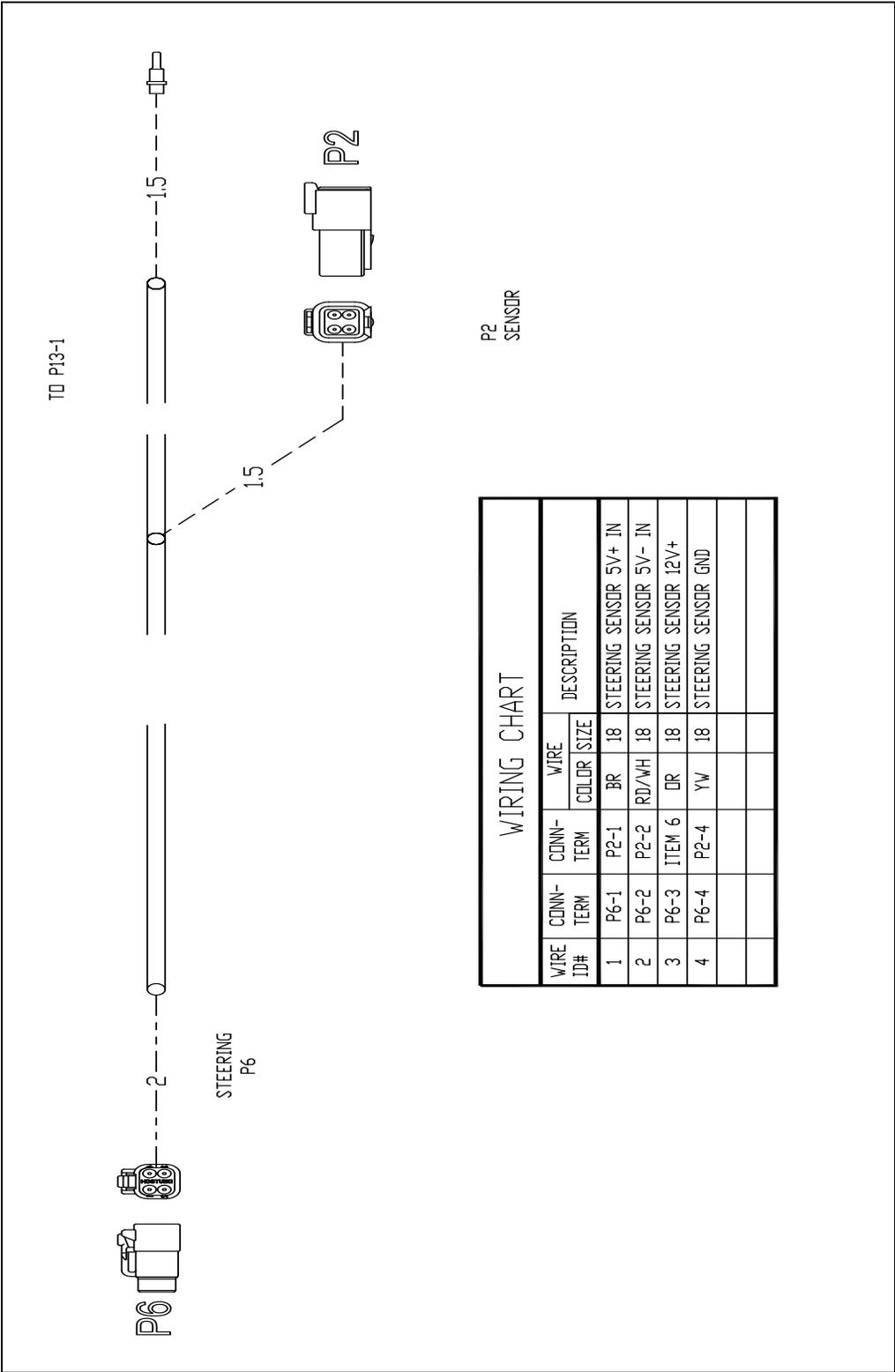
AutoSense device harness: P/N 57560



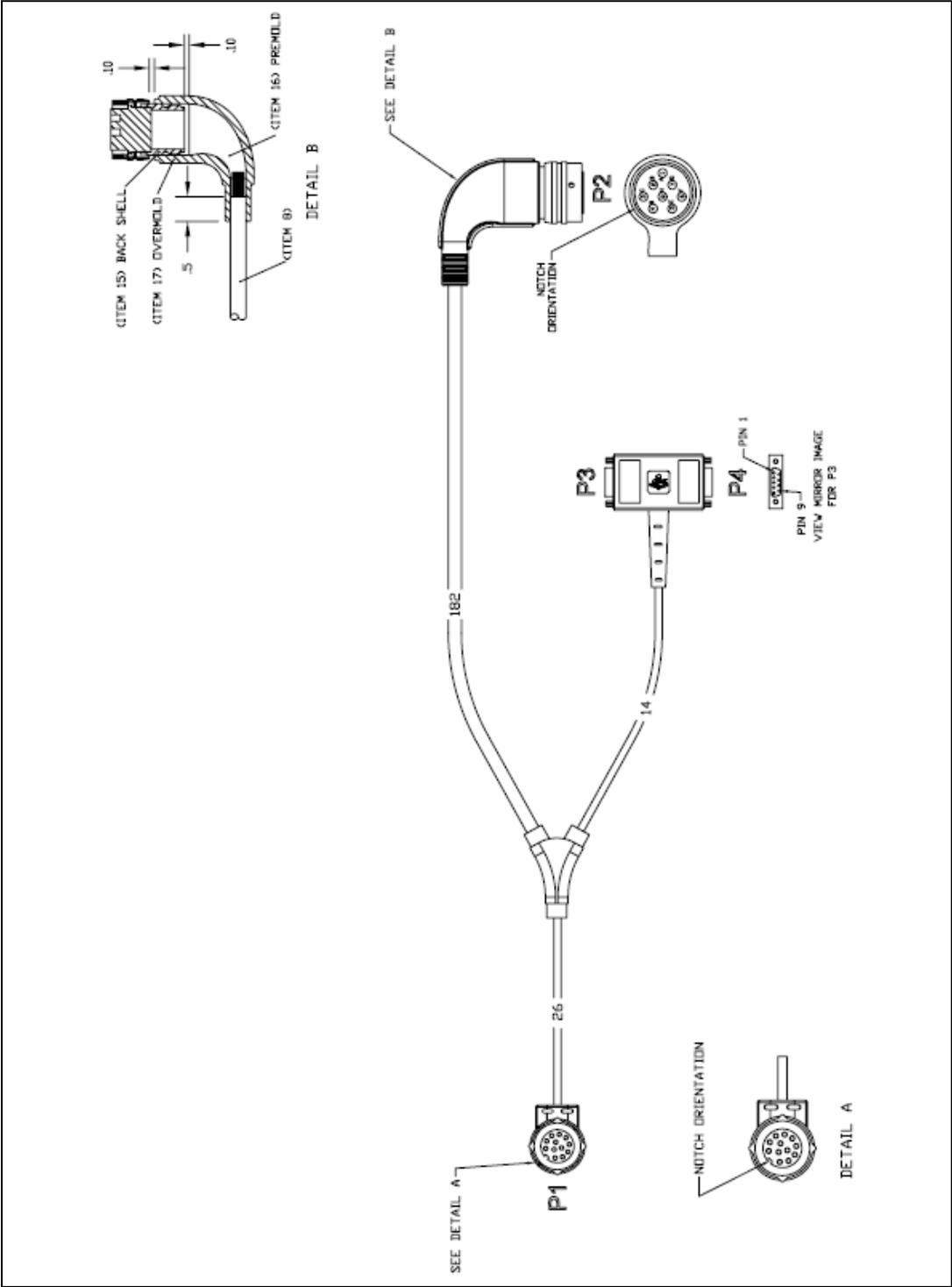
WIRING CHART

WIRE ID#	CONN-TERM	CONN-TERM	WIRE		DESCRIPTION
			COLOR	SIZE	
1	P14-1	P2-3	BN	(22)	STEERING SENSOR 12V+
2	P14-2	P2-4	WH	(22)	STEERING SENSOR GND
3	P14-3	P2-1	BU	(22)	STEERING SENSOR 5V+ IN
4	P14-4	P2-2	BK	(22)	STEERING SENSOR 5V- IN

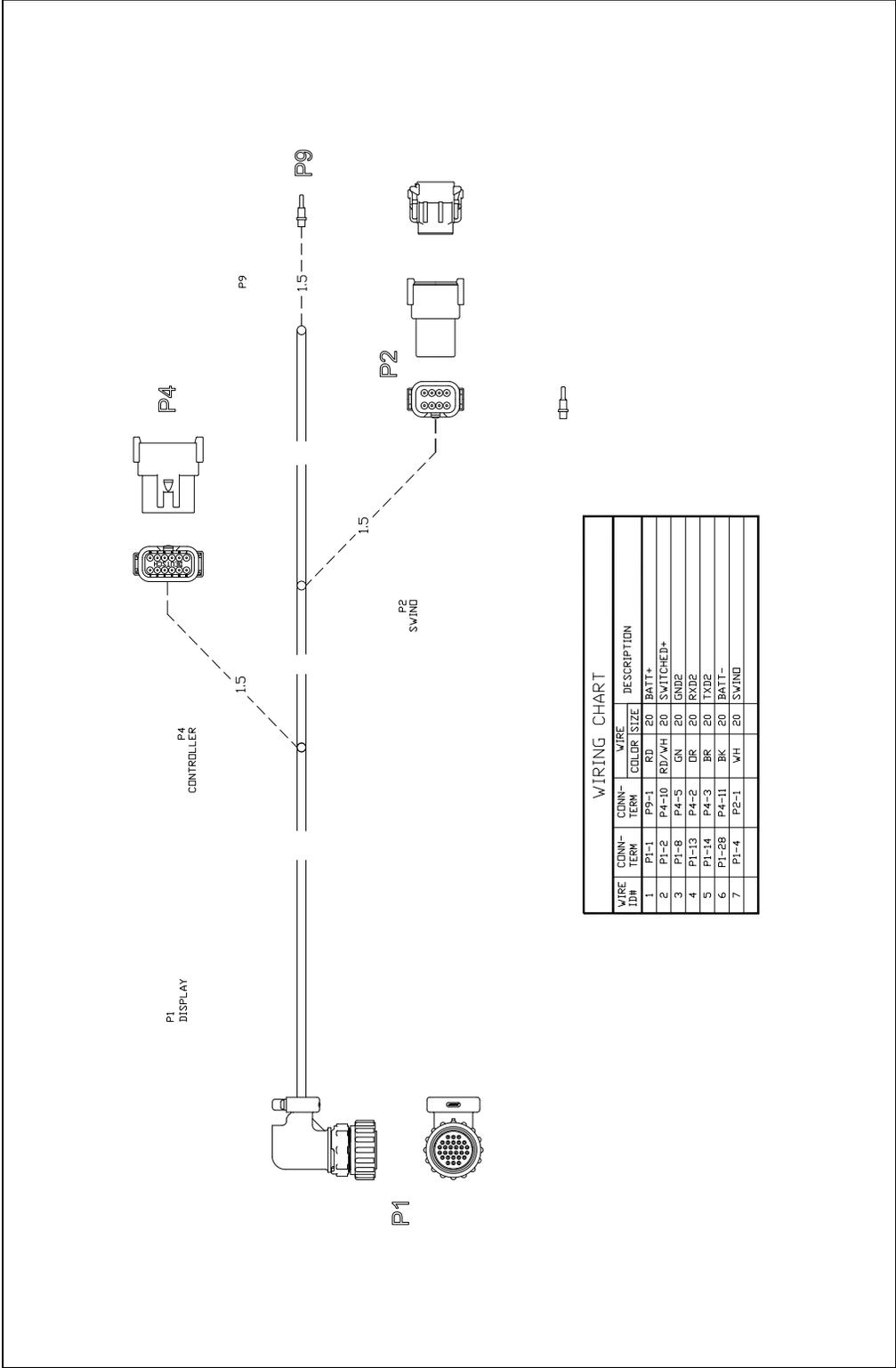
AutoSense vehicle harness: P/N 57885



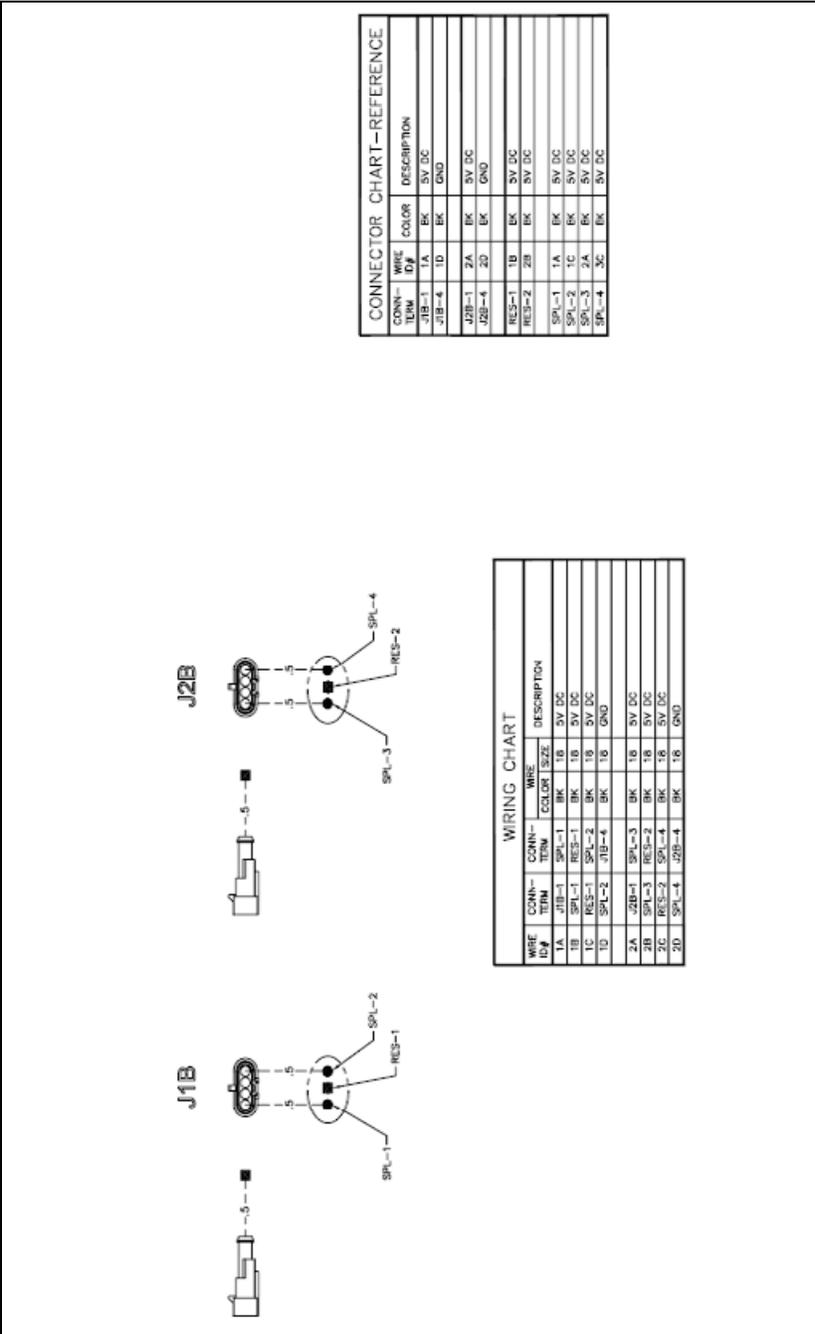
Data cable assembly, AgGPS 332 receiver to radio: P/N 58080



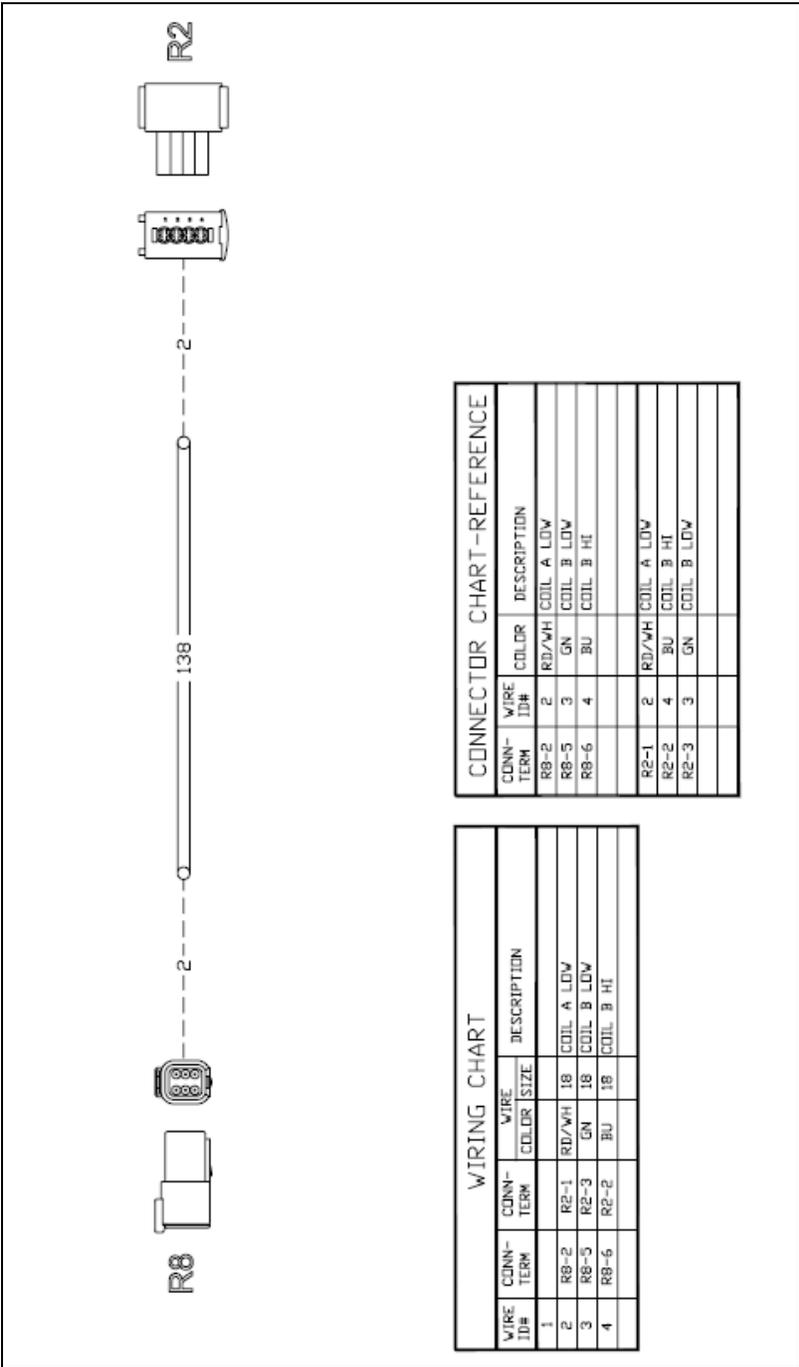
FieldManager Display harness (Autopilot): P/N 58187



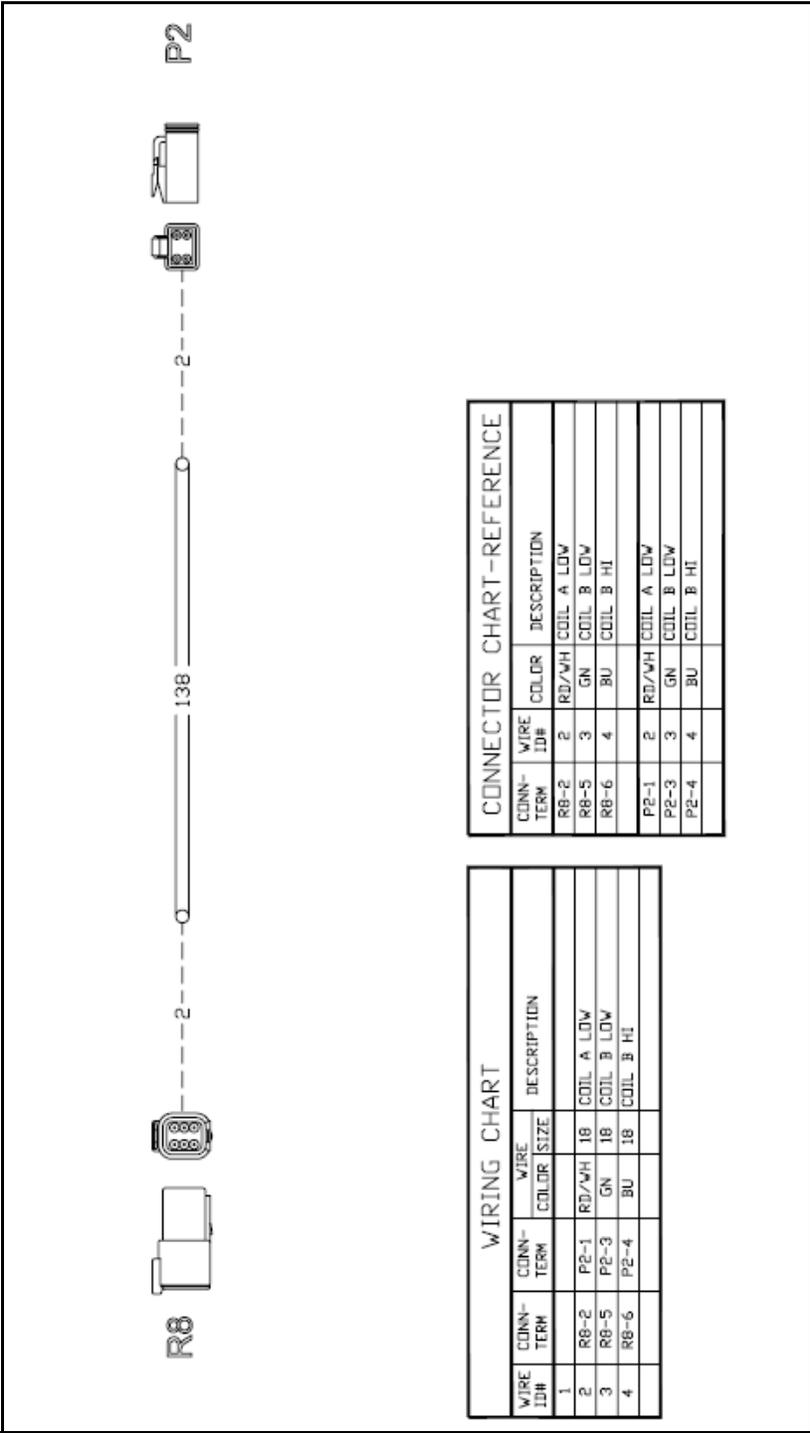
Cable assembly, Phantom mo, sensor-atr, P/N 58871



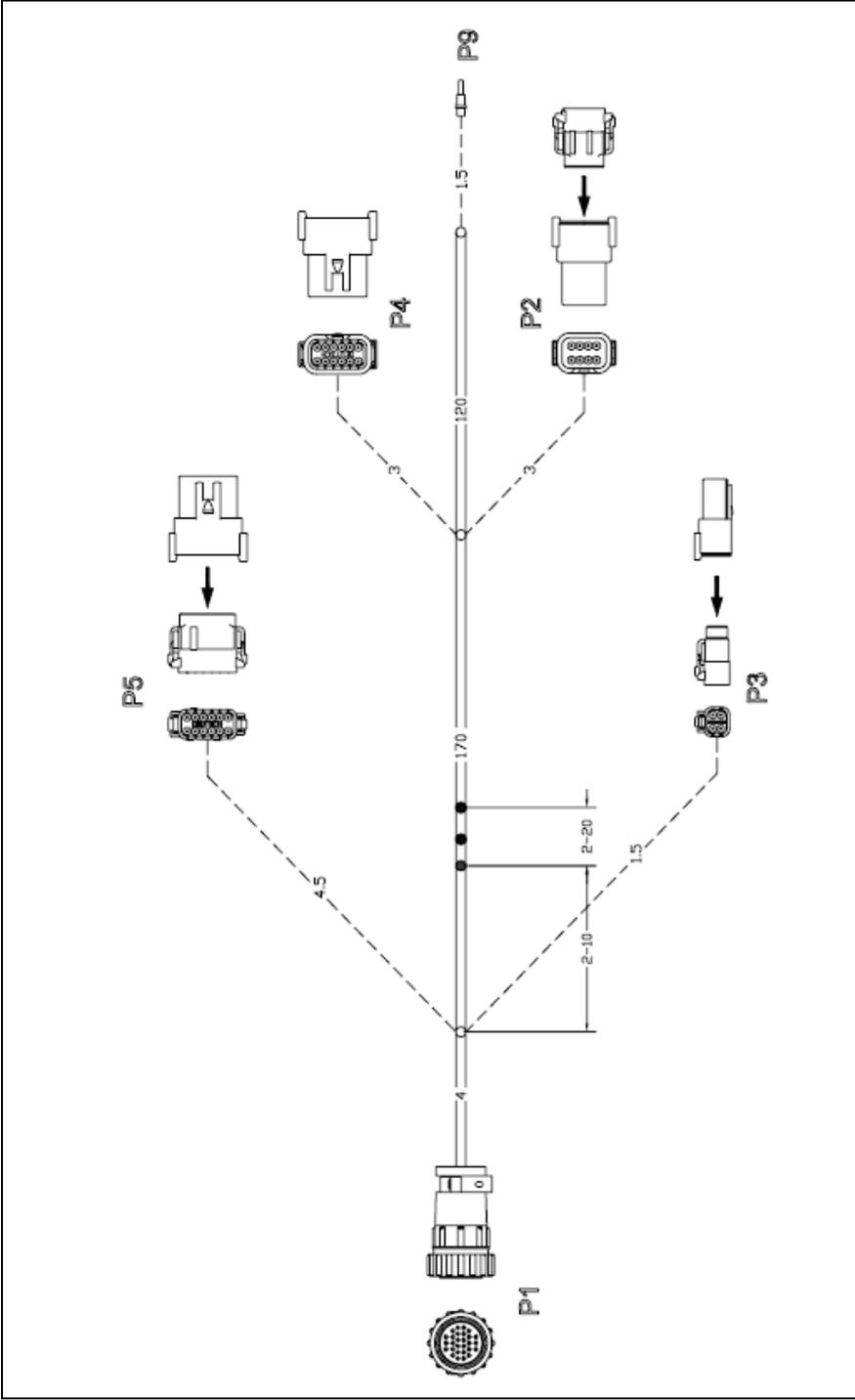
Cable assembly, S-D PVES pilot head with AMP connector: P/N 59816



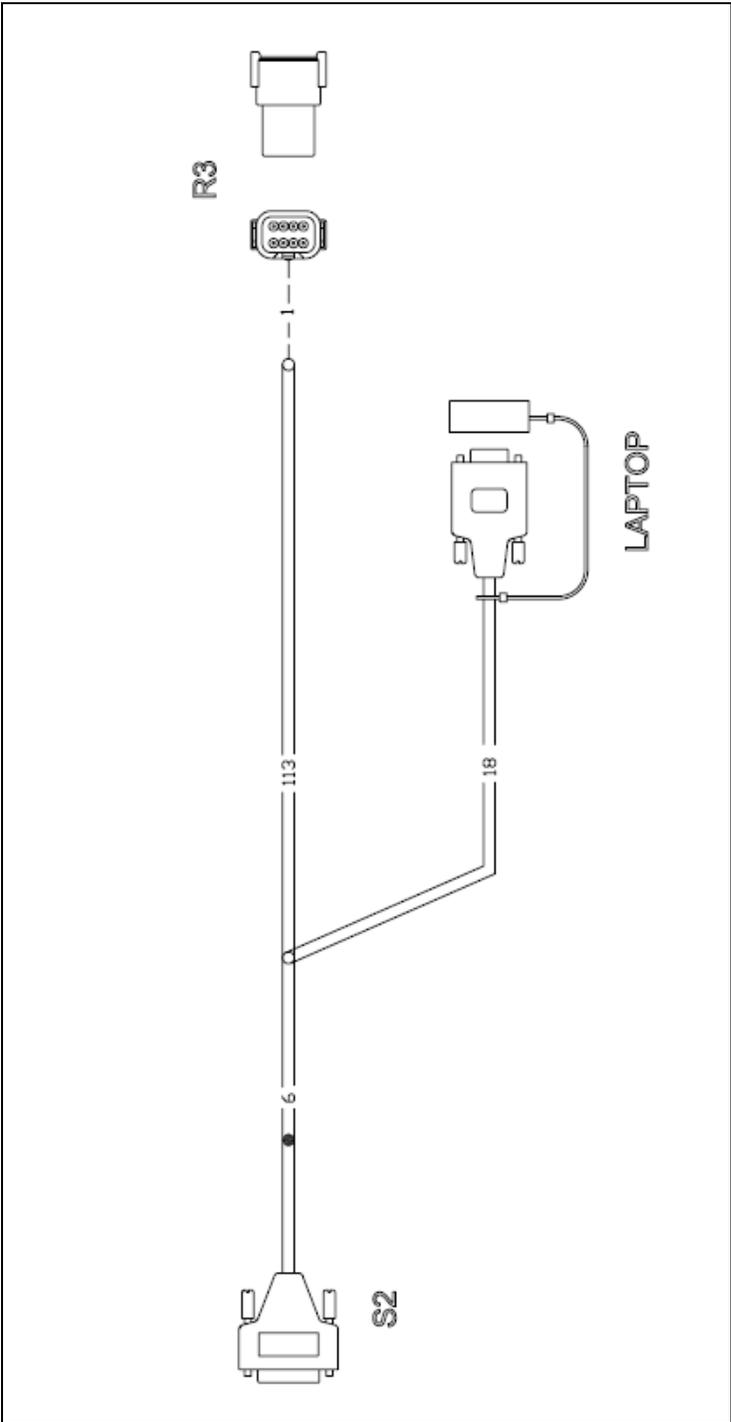
Cable assembly, S-D PVES pilot head with Deutsch connector: P/N 59870



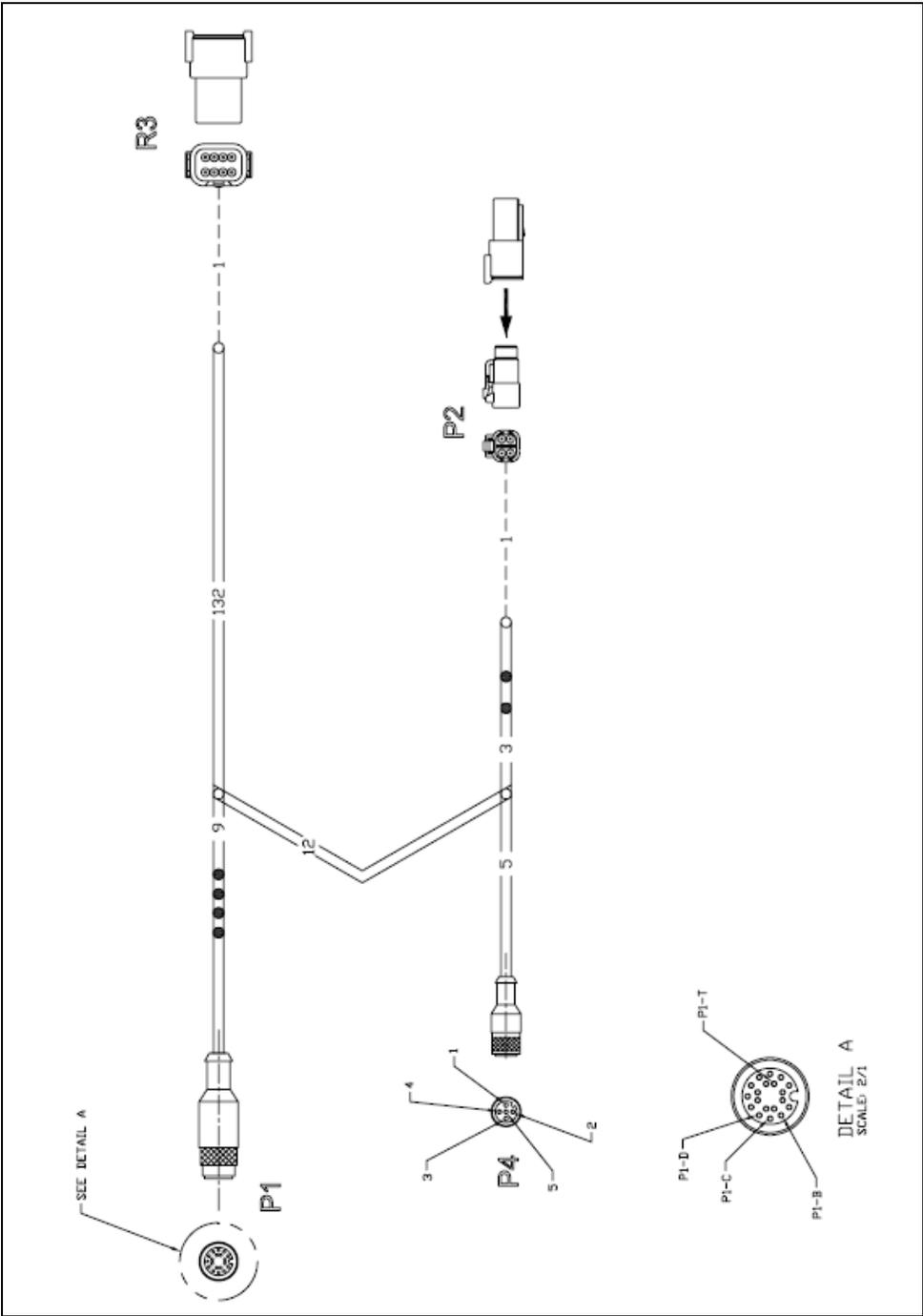
Cable assembly, Cougar basic application: P/N 59872



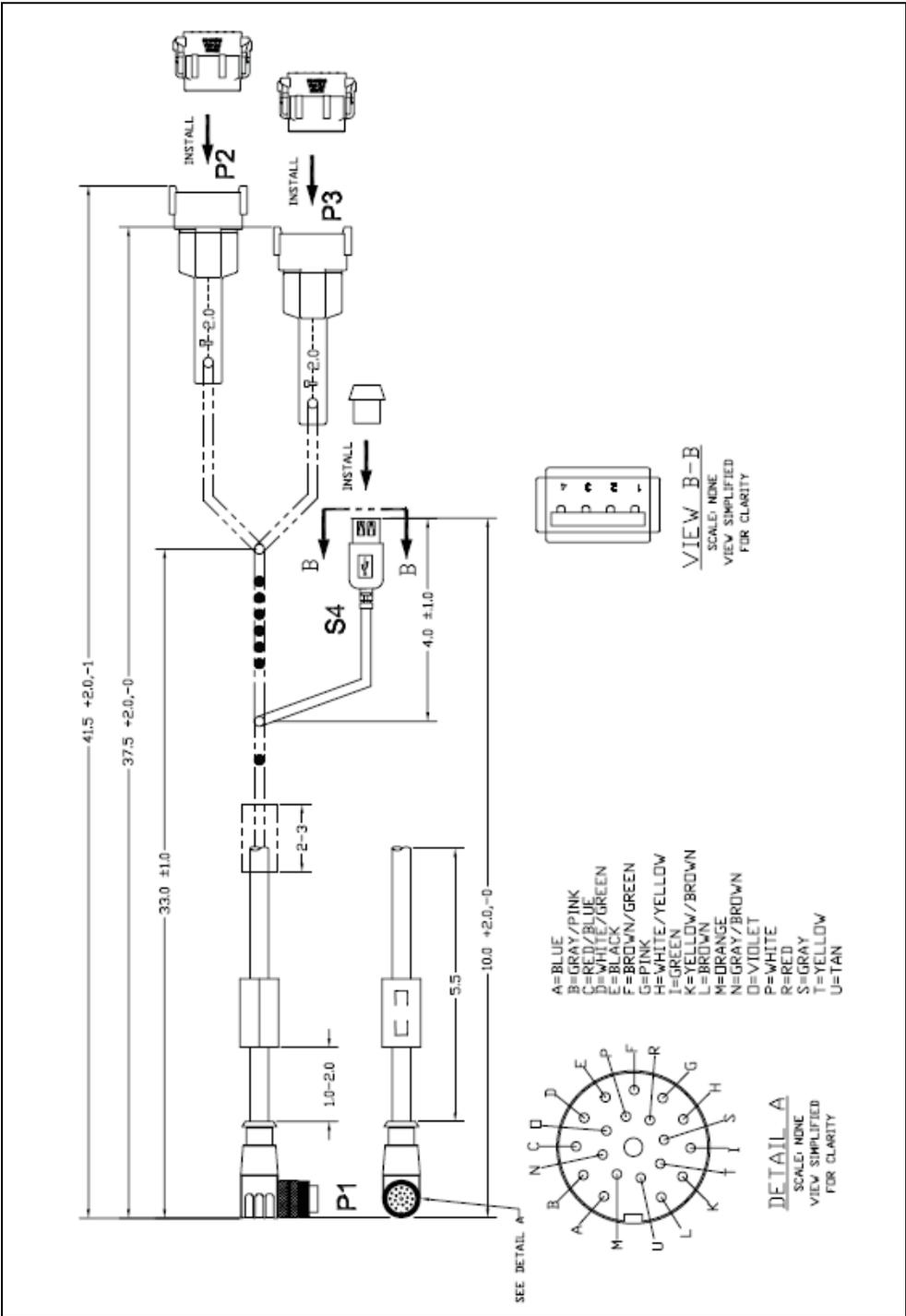
Cable, AgGPS 442 receiver to AP NavController II / NavController III: P/N 62037



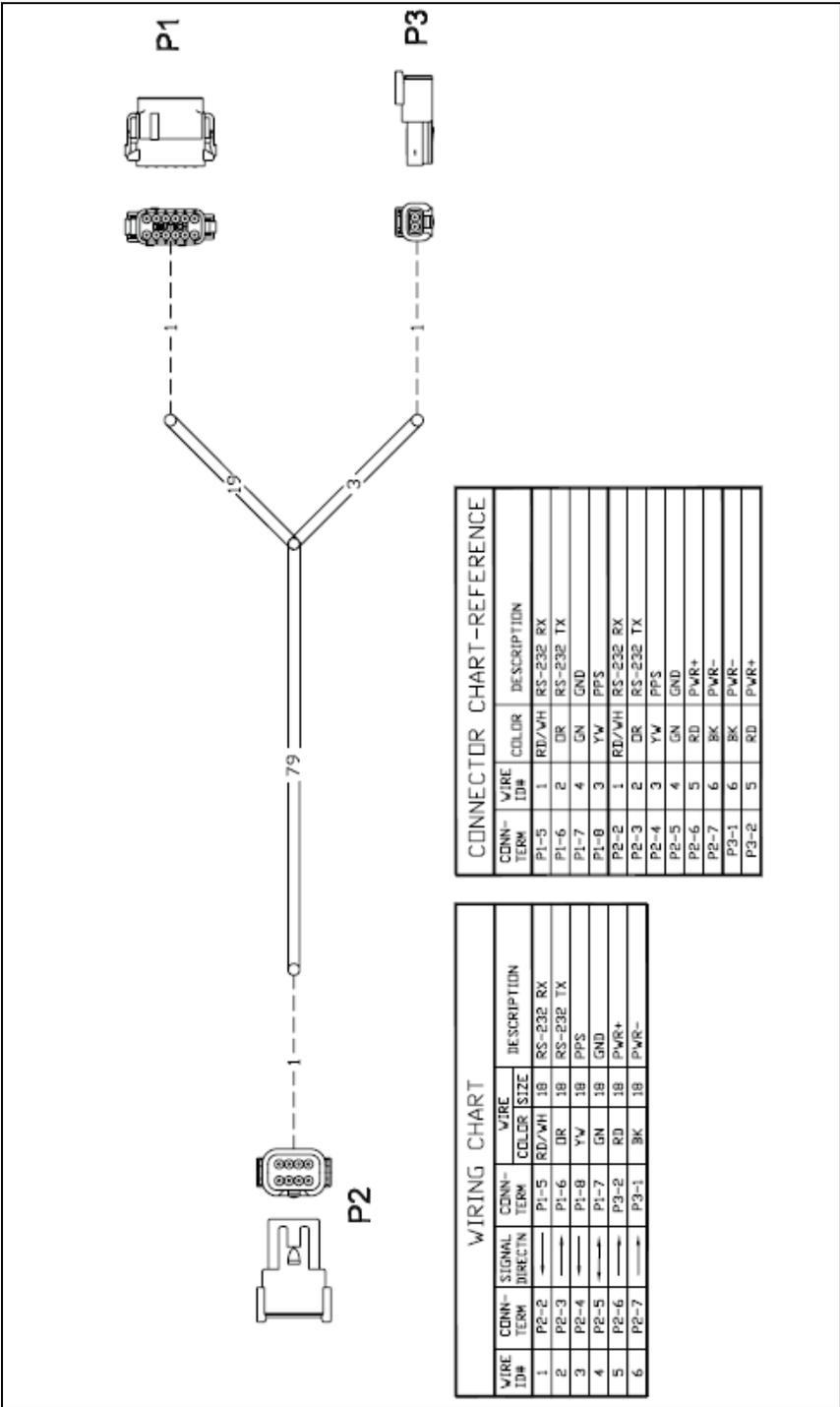
Cable, EZ-Guide 500 lightbar to NavController II/ NavController III: P/N 62063



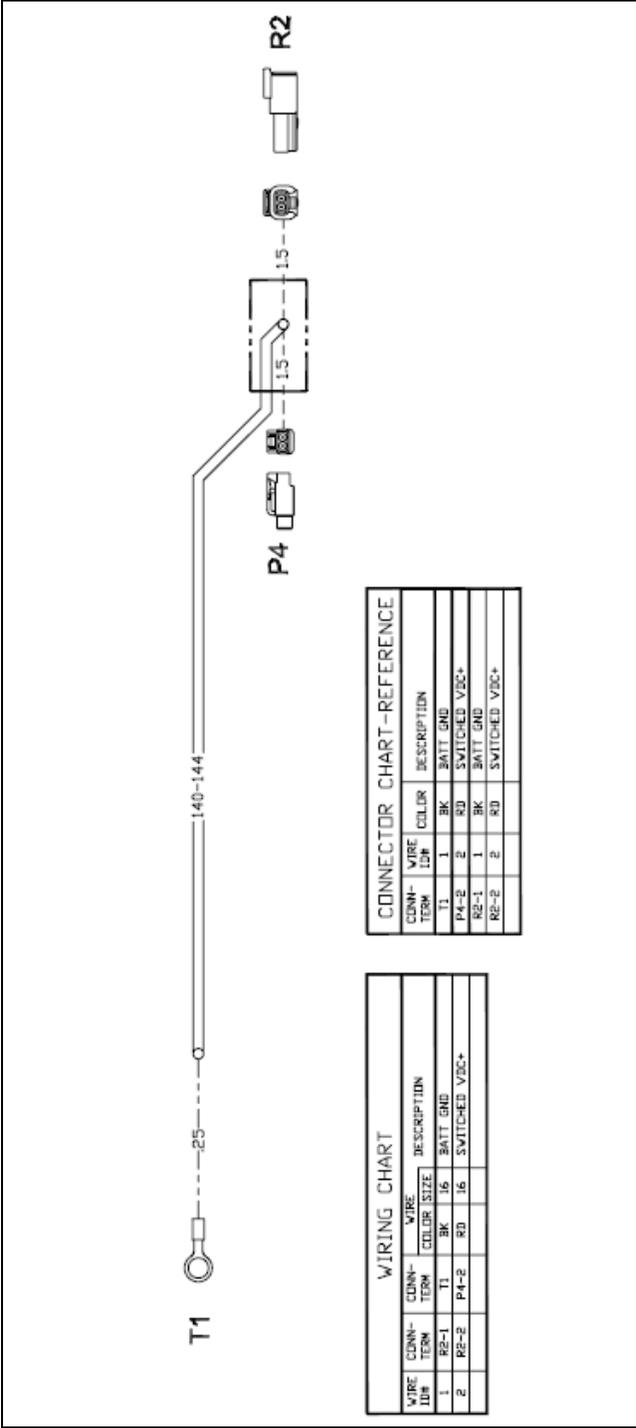
Cable, EZ-Guide 500 lightbar, 19-pin port expander: P/N 62609



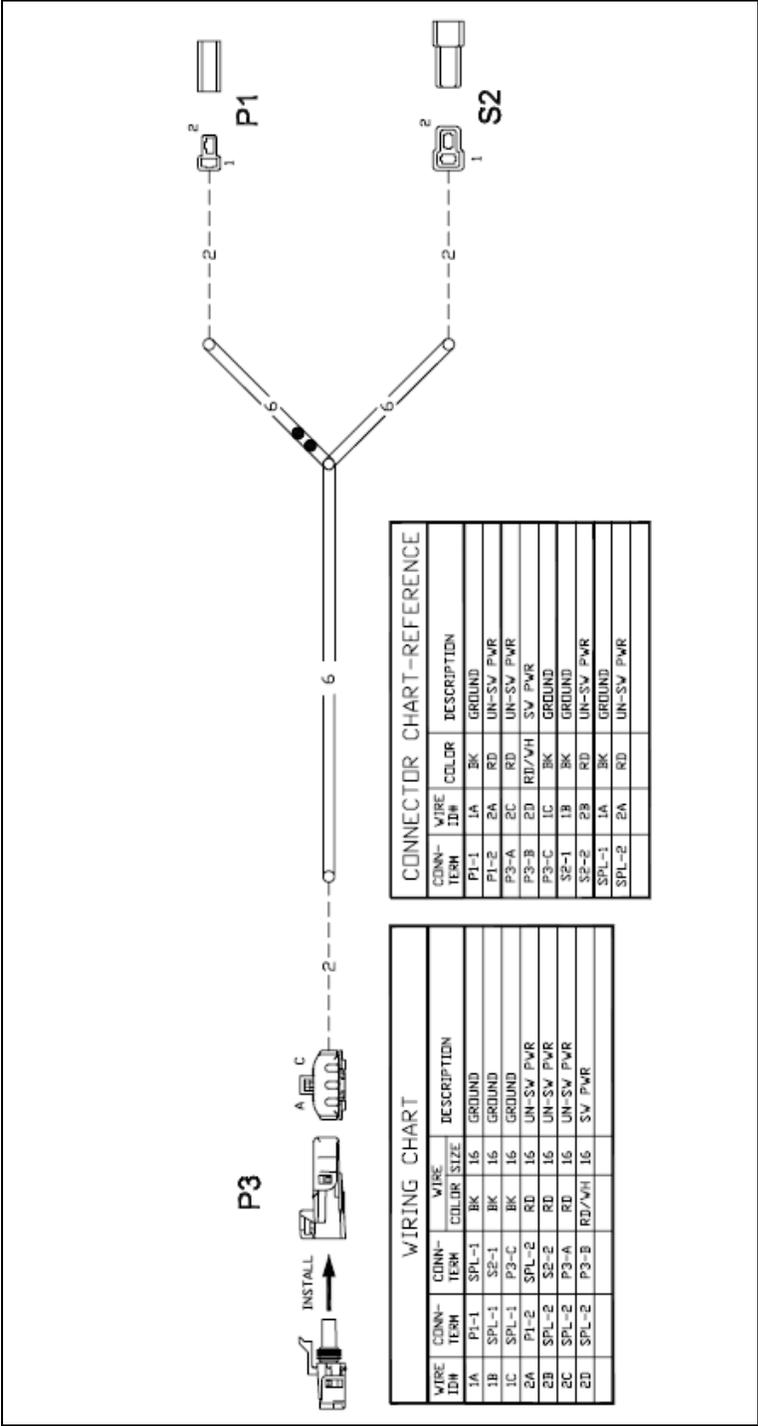
Cable, EZ-Guide 500 lightbar port A to NavController II / NavController III for Autopilot: P/N 62754



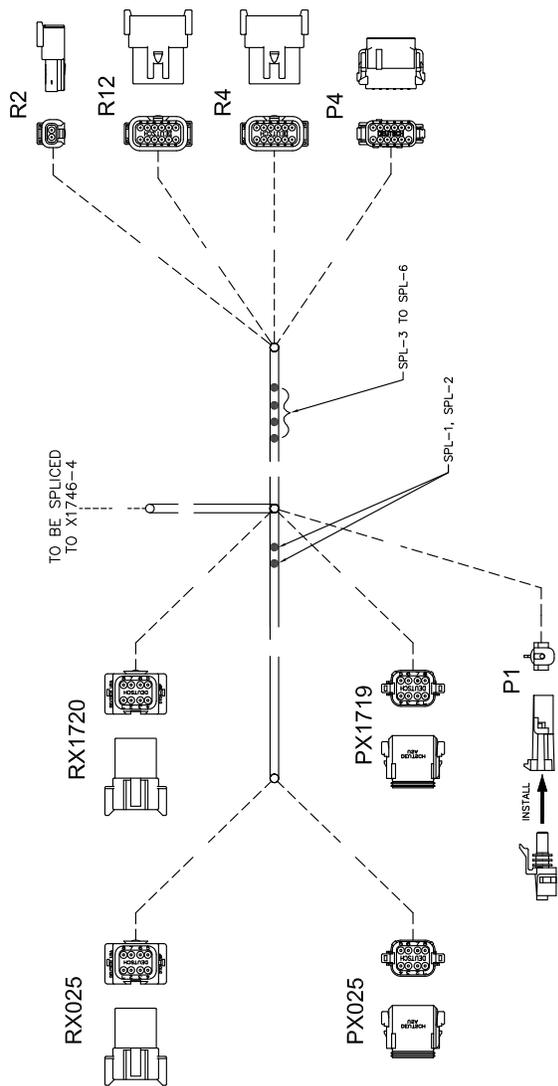
Cable ground lead, JD8xx0T: P/N 63424



Power jumper cable PUMA T 7000 series: P/N63588



Fend 700/800 Fendt CAN interface: P/N 65548



CONNECTOR CHART-REFERENCE			
CONN-TERM	WIRE ID#	COLOR	DESCRIPTION
R4-1	11C	YW	CAN_H ISO
R4-2	18	OR	THRU
R4-3	19	BU	THRU
R4-4	20	BR	THRU
R4-10	21	BR	THRU
R4-11	22	WH	THRU
R4-12	10C	GN	CAN_L ISO
RX1720-1	1A	RD	+12V BAT
RX1720-2	5	OR	THRU
RX1720-3	2A	BK	GROUND
RX1720-4	6	BU	THRU
RX1720-5	7	YW	CAN_H V
RX1720-6	8	BR	CAN_L V
RX1720-7	7	BR	THRU
RX1720-8	8	PK	THRU
RX025-1	10A	GN	CAN_L ISO
RX025-2	12	OR	THRU
RX025-3	13	BU	THRU
RX025-4	14	BR	THRU
RX025-5	15	PK	THRU
RX025-6	16	WH	THRU
RX025-7	17	GY	THRU
RX025-8	11A	YW	CAN_H ISO
R12-1	4C	GN	CAN_L V
R12-12	3C	GN	CAN_L V
X1746-4	9	RD/WH	SW POWER
SPL-1	1A	RD	+12V BAT
SPL-2	1A	BR	GROUND
SPL-3	4A	YW	CAN_H V
SPL-4	3A	GN	CAN_L V
SPL-5	10A	GN	CAN_L ISO
SPL-6	11A	YW	CAN_H ISO

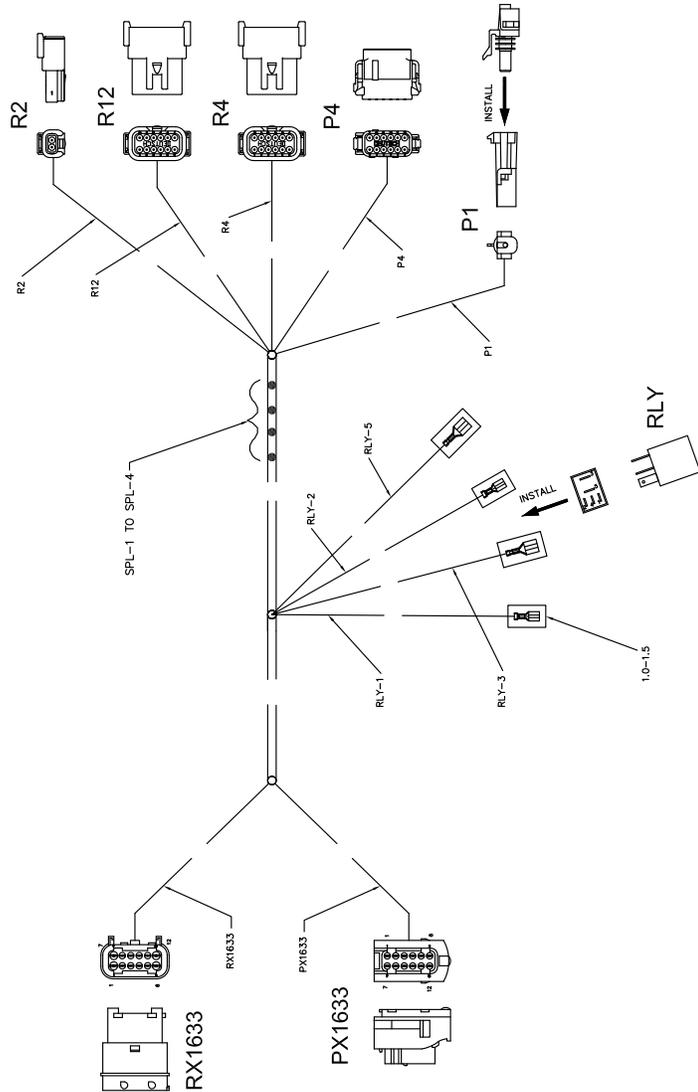
CONNECTOR CHART-REFERENCE			
CONN-TERM	WIRE ID#	COLOR	DESCRIPTION
P1-1	1B	RD	+12V BAT
P4-2	18	OR	THRU
P4-3	19	BU	THRU
P4-4	20	BR	THRU
P4-10	21	BR	THRU
P4-11	22	WH	THRU
PX1719-1	1C	RD	+12V BAT
PX1719-2	5	OR	THRU
PX1719-3	2B	BK	GROUND
PX1719-4	6	BU	THRU
PX1719-5	7	YW	CAN_H V
PX1719-6	8	BR	CAN_L V
PX1719-7	7	BR	THRU
PX1719-8	8	PK	THRU
PX025-1	10B	GN	CAN_L ISO
PX025-2	12	OR	THRU
PX025-3	13	BU	THRU
PX025-4	14	BR	THRU
PX025-5	15	PK	THRU
PX025-6	16	WH	THRU
PX025-7	17	GY	THRU
PX025-8	11B	YW	CAN_H ISO
R2-1	2C	BK	GROUND
R2-2	9	RD/WH	SW POWER

WIRING CHART			
WIRE ID#	CONN-TERM	WIRE COLOR	DESCRIPTION
1A	RX1720-1	RD	+12V BAT
1B	SPL-1	RD	+12V BAT
1C	PX1719-1	RD	+12V BAT
2A	RX025-3	BK	GROUND
2B	PX1719-3	BK	GROUND
2C	SPL-2	BR	GROUND
3A	RX1720-6	GN	CAN_L V
3B	SPL-4	GN	CAN_L V
3C	SPL-4	GN	CAN_L V
4A	RX1720-5	YW	CAN_H V
4B	SPL-3	YW	CAN_H V
4C	SPL-3	YW	CAN_H V
5	RX1720-2	OR	THRU
6	RX1720-4	OR	THRU
7	RX1720-7	BR	THRU
8	RX1720-8	PK	THRU
9	R2-2	RD/WH	SW POWER
10A	RX025-1	GN	CAN_L ISO
10B	SPL-5	GN	CAN_L ISO
10C	SPL-5	GN	CAN_L ISO
11A	RX025-8	YW	CAN_H ISO
11B	SPL-6	YW	CAN_H ISO
11C	SPL-6	YW	CAN_H ISO
12	RX025-2	OR	THRU
13	RX025-3	BU	THRU
14	RX025-4	BR	THRU
15	RX025-5	PK	THRU
16	RX025-6	WH	THRU
17	RX025-7	GY	THRU
18	R4-2	OR	THRU
19	R4-3	BU	THRU
20	R4-4	BR	THRU
21	R4-10	BR	THRU
22	R4-11	WH	THRU

Fendt 900 CAN interface: P/N 6549

CONNECTOR CHART—REFERENCE			
CONN-TERM	WIRE ID#	COLOR	DESCRIPTION
P1-1	2	RD/WHT	+12V BAT
P4-2	11	OR	THRU
P4-3	12	BU	THRU
P4-5	13	BR	THRU
P4-10	14	PK	THRU
P4-11	15	WHT	THRU
PX1633-3	3B	GN	CAN_L ISO
PX1633-4	4B	YW	CAN_H ISO
PX1633-5	5B	GN	CAN_L V
PX1633-6	6B	YW	CAN_H V
R2-1	7	BK	GROUND
R2-2	10	RD/WHT	SW POWER
R4-1	4C	YW	CAN_H ISO
R4-2	11	OR	THRU
R4-3	12	BU	THRU
R4-5	13	BR	THRU
R4-10	14	PK	THRU
R4-11	15	WHT	THRU
R4-12	5C	GN	CAN_L ISO
R12-1	6C	YW	CAN_H V
R12-12	5C	GN	CAN_L V
RX1633-1	1	RD	+12V BAT
RX1633-2	2	RD/WHT	+12V BAT
RX1633-3	3A	GN	CAN_L ISO
RX1633-4	4A	YW	CAN_H ISO
RX1633-5	5A	GN	CAN_L V
RX1633-6	6A	YW	CAN_H V
RX1633-7	7	BK	GROUND
RX1633-8	8	BK	GROUND
RX1633-9	9	RD	SW POWER TO COIL
RX1633-10	10	RD	SW POWER TO COIL
SPL-1	5A	GN	CAN_L ISO
SPL-2	5A	GN	CAN_L ISO
SPL-3	5A	GN	CAN_L ISO
SPL-4	6A	YW	CAN_H V
RLY-1	9	RD	SW POWER TO COIL
RLY-2	8	BK	GROUND
RLY-3	1	RD	+12V BAT
RLY-5	10	RD/WHT	SW POWER

WIRING CHART			
WIRE ID#	CONN-TERM	WIRE COLOR/SIZE	DESCRIPTION
1	RX1633-1	RD 18	+12V BAT
2	RX1633-2	RD/WHT 18	+12V BAT
3A	RX1633-3	GN 18	CAN_L ISO
3B	SPL-1	GN 18	CAN_L ISO
3C	SPL-1	GN 18	CAN_L ISO
4A	RX1633-4	YW 18	CAN_H ISO
4B	SPL-2	YW 18	CAN_H ISO
4C	SPL-2	YW 18	CAN_H ISO
5A	RX1633-5	GN 18	CAN_L V
5B	SPL-3	GN 18	CAN_L V
5C	SPL-3	GN 18	CAN_L V
6A	RX1633-6	YW 18	CAN_H V
6B	SPL-4	YW 18	CAN_H V
6C	SPL-4	YW 18	CAN_H V
7	RX1633-7	BK 18	GROUND
8	RX1633-8	BK 18	GROUND
9	RX1633-9	RD 18	SW POWER TO COIL
10	RLY-5	RD/WHT 18	SW POWER
11	P4-2	OR 18	THRU
12	P4-3	BU 18	THRU
13	P4-5	BR 18	THRU
14	P4-10	PK 18	THRU
15	P4-11	WHT 18	THRU



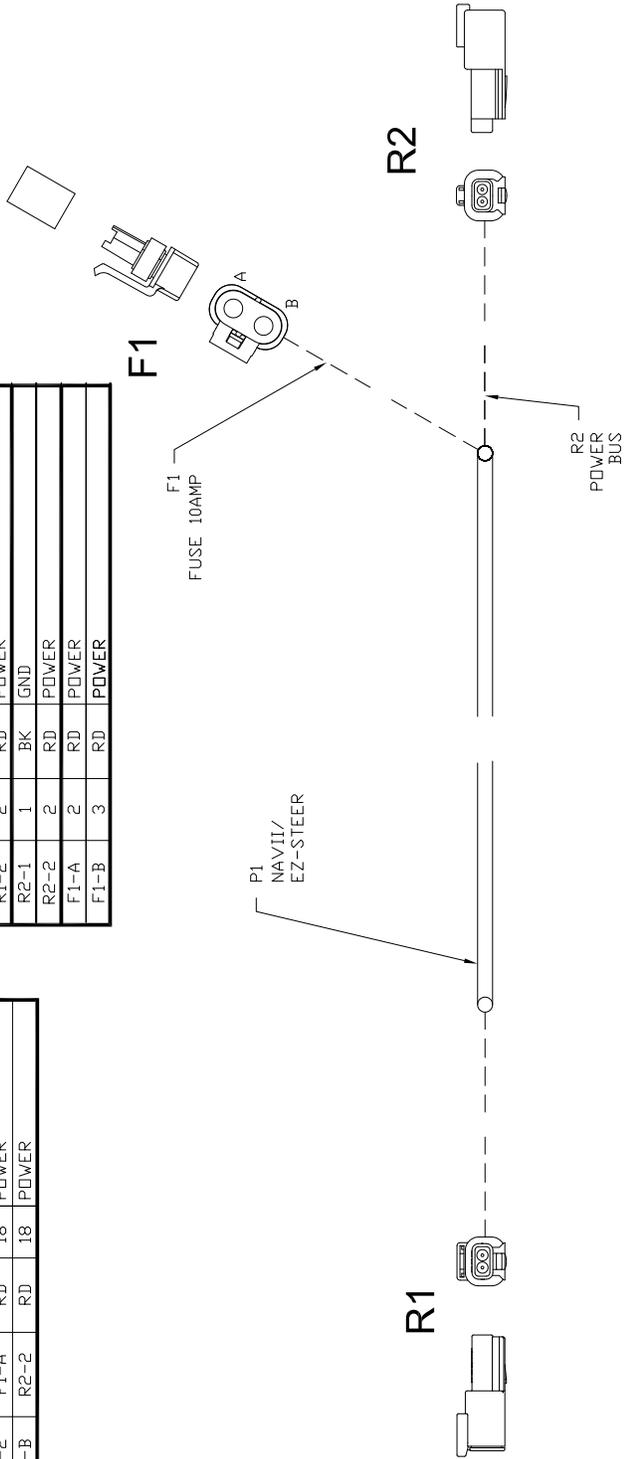
2-pin DTM to 2-pin DT power adapter: P/N 67095

CONNECTOR CHART-REFERENCE

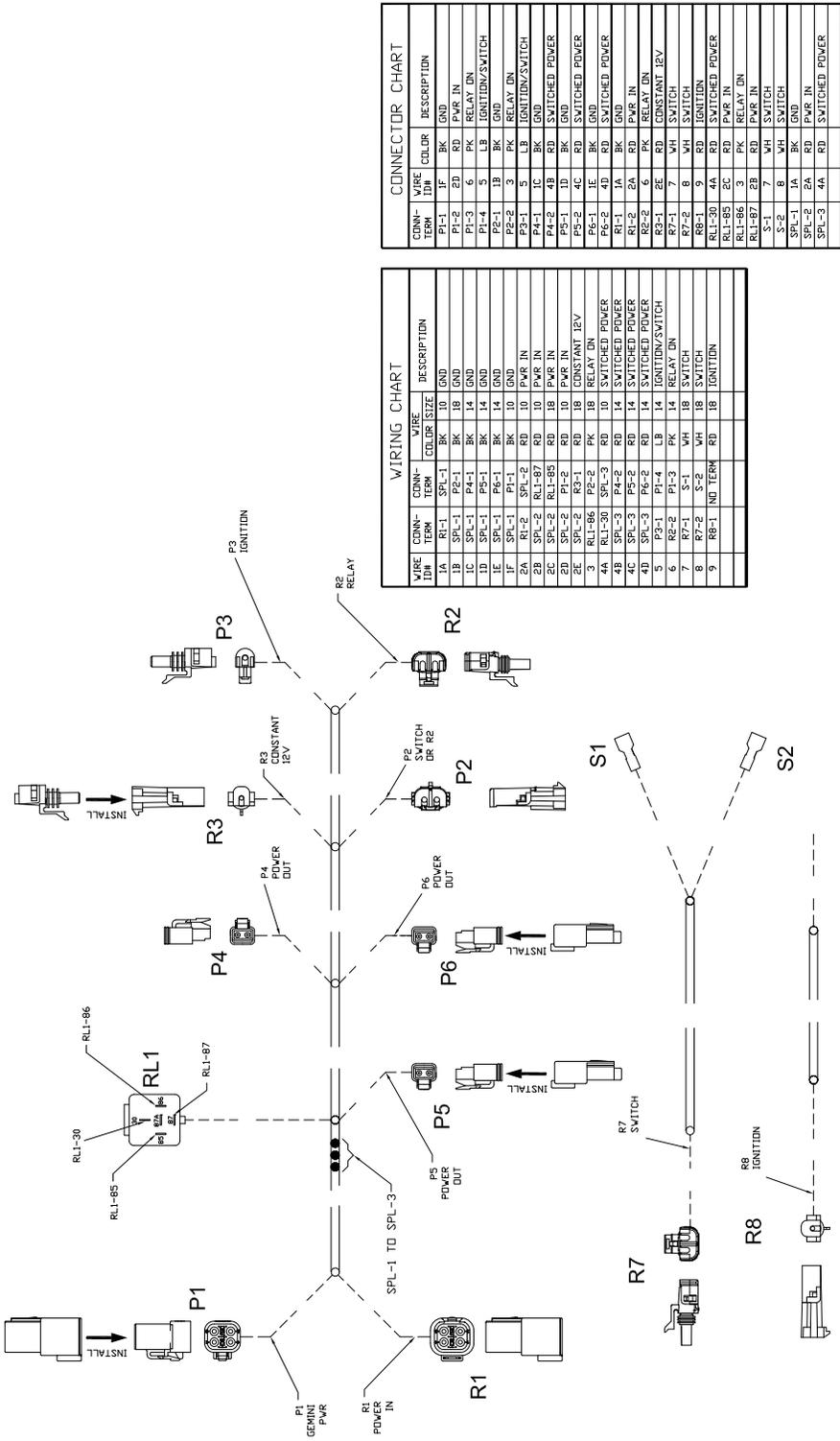
CONN-TERM	WIRE ID#	COLOR	DESCRIPTION
R1-1	1	BK	GND
R1-2	2	RD	POWER
R2-1	1	BK	GND
R2-2	2	RD	POWER
F1-A	2	RD	POWER
F1-B	3	RD	POWER

WIRING CHART

WIRE ID#	CONN-TERM	WIRE		DESCRIPTION
		COLOR	SIZE	
1	R1-1	BK	18	GND
2	R1-2	RD	18	POWER
3	F1-B	RD	18	POWER



CFX-750/FmX display power buss harness with relay and switch: P/N 67295



CONN-TERM	WIRE COLOR	DESCRIPTION
P1-1	1F	BK GND
P1-2	2D	RD PMR IN
P1-3	6	PK RELAY DN
P1-4	5	LB IGNITION/SWITCH
PE-1	1B	BK GND
PE-2	3	PK RELAY DN
PE-3	1B	BK GND
PE-4	1C	RD IGNITION/SWITCH
P4-1	4B	RD SWITCHED POWER
P5-1	1D	BK GND
P5-2	4C	RD SWITCHED POWER
P6-1	1E	BK GND
P6-2	4D	RD SWITCHED POWER
R1-1	1A	BK GND
R1-2	2A	RD PMR IN
R1-3	2E	RD PMR IN
R2-1	8E	PK CONSTANT 12V
R7-1	7	VH SWITCH
R7-2	8	VH SWITCH
R8-1	9	RD IGNITION
RL1-30	4A	RD SWITCHED POWER
RL1-85	5C	RD RELAY DN
RL1-86	2B	RD SWITCHED POWER
RL1-87	2B	RD SWITCHED POWER
S-1	8	VH SWITCH
S-2	8	VH SWITCH
SPL-1	1A	BK GND
SPL-2	2A	RD PMR IN
SPL-3	4A	RD SWITCHED POWER

CONN-TERM	WIRE COLOR	WIRE SIZE	DESCRIPTION
1A	RI-1	BK 18	GND
1B	SPL-1	BK 18	GND
1C	P4-1	BK 14	GND
1D	SPL-1	BK 14	GND
1E	P6-1	BK 14	GND
1F	SPL-1	BK 10	GND
2A	SPL-2	RD 18	PMR IN
2B	SPL-2	RD 18	PMR IN
2C	SPL-2	RD 18	PMR IN
2D	SPL-2	RD 18	PMR IN
2E	SPL-2	RD 18	CONSTANT 12V
3	RL1-86	PK 18	RELAY DN
4A	RL1-30	RD 18	SWITCHED POWER
4B	SPL-3	RD 14	SWITCHED POWER
4C	SPL-3	RD 14	SWITCHED POWER
4D	SPL-3	RD 14	SWITCHED POWER
5	P3-1	LB 14	IGNITION/SWITCH
6	R2-2	PK 14	RELAY DN
7	R7-1	S-1	VH SWITCH
8	R7-2	S-2	VH SWITCH
9	R8-1	ND TERM	RD 18 IGNITION

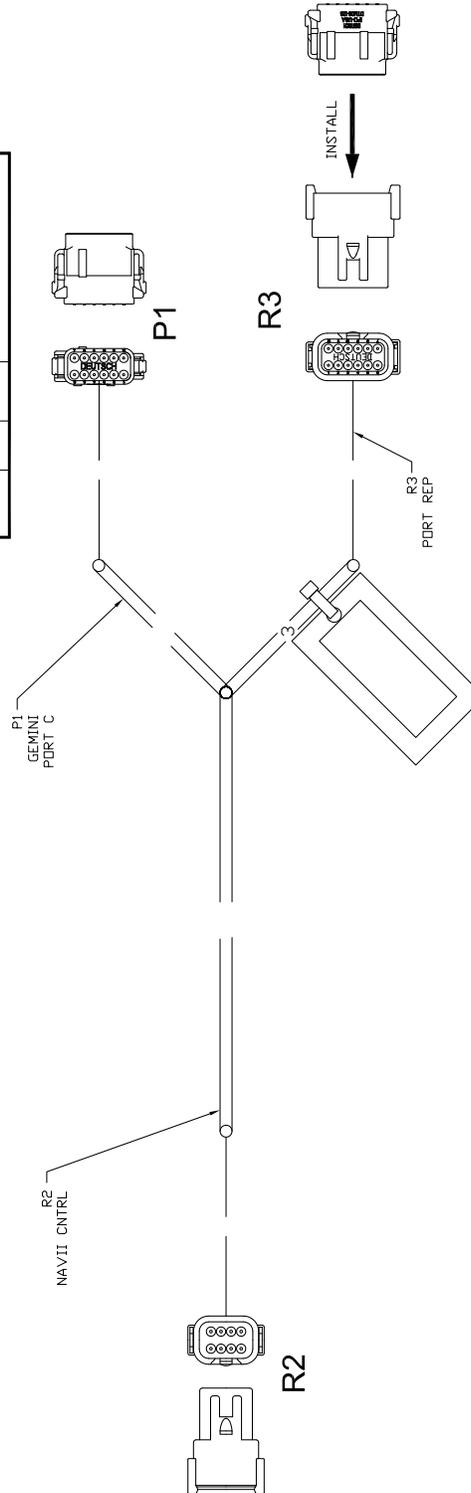
CFX-750 / FmX display to NavController with port replicator: P/N 75741

WIRING CHART

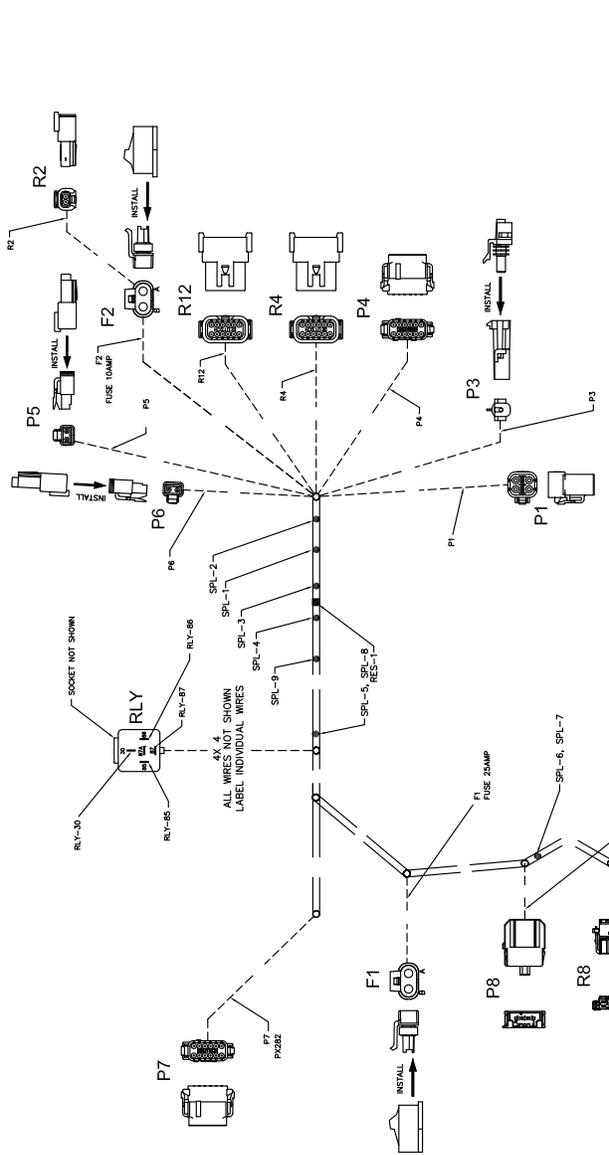
WIRE ID#	CONN-TERM	WIRE		DESCRIPTION
		COLOR	SIZE	
1	P1-1	R3-1	YV 18	CAN HI
2	P1-2	R2-4	PK 18	DIGITAL OUT (PPS)
3	P1-3	R2-2	DR 18	RS232 RX (GEMINI IN)
4	P1-4	R2-3	GY 18	RS232 TX (GEMINI OUT)
5	P1-5	R2-5	WH 18	RS232 RETURN
6	P1-6	R3-6	VT 18	VIDEO IN
7	P1-7	R3-7	BR 18	VIDEO GND
8	P1-8	R3-8	BK/WH 18	POWER GND
9	P1-9	R3-9	RD/WH 18	UNREG V+ OUT
10	P1-10	R3-10	TN 18	DIGITAL GND
11	P1-11	R3-11	LB 18	DIG/ANA IN
12	P1-12	R3-12	GN 18	CAN LO

CONNECTOR CHART-REF

CONN-TERM	WIRE ID#	COLOR	DESCRIPTION
P1-1	1	YV	CAN HI
P1-2	2	PK	DIGITAL OUT (PPS)
P1-3	3	DR	RS232 RX (GEMINI IN)
P1-4	4	GY	RS232 TX (GEMINI OUT)
P1-5	5	WH	RS232 RETURN
P1-6	6	VT	VIDEO IN
P1-7	7	BR	VIDEO GND
P1-8	8	BK/WH	POWER GND
P1-9	9	RD/WH	UNREG V+ OUT
P1-10	10	TN	DIGITAL GND
P1-11	11	LB	DIG/ANA IN
P1-12	12	GN	CAN LO
R2-2	3	DR	RS232 RX (GEMINI IN)
R2-3	4	GY	RS232 TX (GEMINI OUT)
R2-4	2	PK	DIGITAL OUT (PPS)
R2-5	5	WH	RS232 RETURN
R3-1	1	YV	CAN HI
R3-6	6	VT	VIDEO IN
R3-7	7	BR	VIDEO GND
R3-8	8	BK/WH	POWER GND
R3-9	9	RD/WH	UNREG V+ OUT
R3-10	10	TN	DIGITAL GND
R3-11	11	LB	DIG/ANA IN
R3-12	12	GN	CAN LO



Challenger MT and MF Autopilot CAN interface cable: P/N 77644



CONNECTOR CHART-REF

CONN. TERM	WIRE	COLOR	DESCRIPTION
SPL-1	2A	OR	CAN L ISO
SPL-1	2B	OR	CAN L ISO
SPL-2	3A	OR	CAN H ISO
SPL-2	3B	OR	CAN H ISO
SPL-3	4A	OR	CAN L ISO
SPL-3	4B	OR	CAN L ISO
SPL-4	5A	OR	CAN H ISO
SPL-4	5B	OR	CAN H ISO
SPL-5	6A	OR	CAN L ISO
SPL-5	6B	OR	CAN L ISO
SPL-6	7A	OR	CAN H ISO
SPL-6	7B	OR	CAN H ISO
SPL-7	8A	OR	CAN L ISO
SPL-7	8B	OR	CAN L ISO
SPL-8	9A	OR	CAN H ISO
SPL-8	9B	OR	CAN H ISO

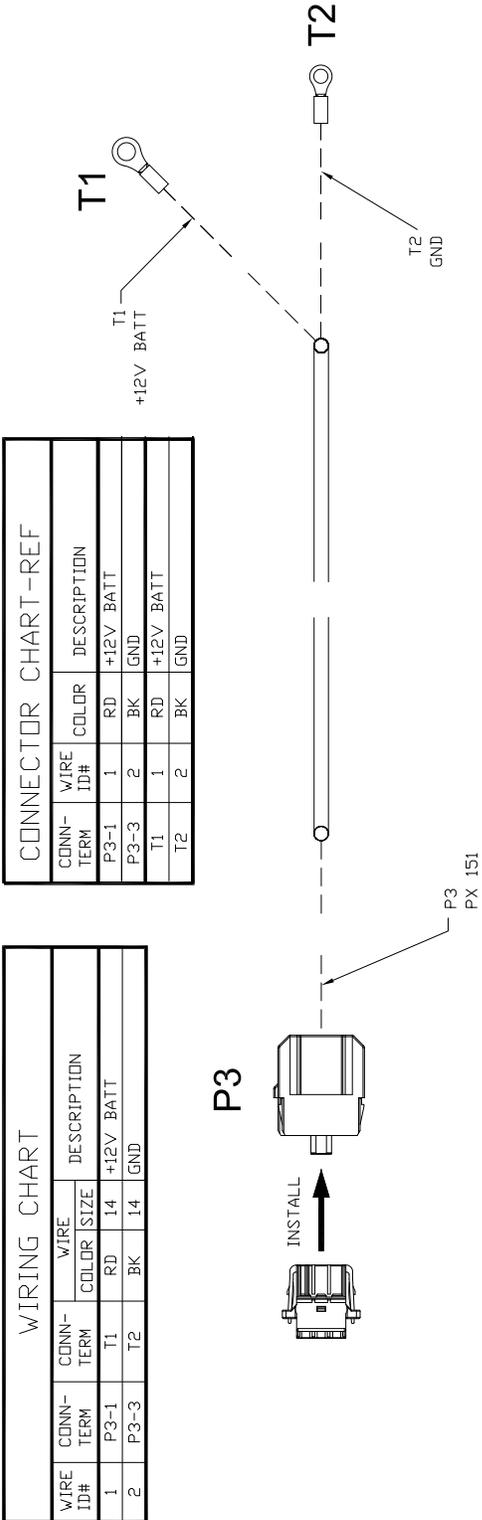
CONNECTOR CHART-REF

CONN. TERM	WIRE	COLOR	DESCRIPTION
F1-A	18	OR	+12V SW SA
F1-B	18	OR	+12V SW SA
F2-A	18	OR	+12V SW
F2-B	18	OR	+12V SW
F1-2	18	OR	+12V BATT
F1-4	18	OR	+12V BATT
F1-6	18	OR	+12V BATT
F1-8	18	OR	+12V BATT
F1-10	18	OR	+12V BATT
F1-12	18	OR	+12V BATT
F1-14	18	OR	+12V BATT
F1-16	18	OR	+12V BATT
F1-18	18	OR	+12V BATT
F1-20	18	OR	+12V BATT
F1-22	18	OR	+12V BATT
F1-24	18	OR	+12V BATT
F1-26	18	OR	+12V BATT
F1-28	18	OR	+12V BATT
F1-30	18	OR	+12V BATT
F1-32	18	OR	+12V BATT
F1-34	18	OR	+12V BATT
F1-36	18	OR	+12V BATT
F1-38	18	OR	+12V BATT
F1-40	18	OR	+12V BATT
F1-42	18	OR	+12V BATT
F1-44	18	OR	+12V BATT
F1-46	18	OR	+12V BATT
F1-48	18	OR	+12V BATT
F1-50	18	OR	+12V BATT
F1-52	18	OR	+12V BATT
F1-54	18	OR	+12V BATT
F1-56	18	OR	+12V BATT
F1-58	18	OR	+12V BATT
F1-60	18	OR	+12V BATT
F1-62	18	OR	+12V BATT
F1-64	18	OR	+12V BATT
F1-66	18	OR	+12V BATT
F1-68	18	OR	+12V BATT
F1-70	18	OR	+12V BATT
F1-72	18	OR	+12V BATT
F1-74	18	OR	+12V BATT
F1-76	18	OR	+12V BATT
F1-78	18	OR	+12V BATT
F1-80	18	OR	+12V BATT
F1-82	18	OR	+12V BATT
F1-84	18	OR	+12V BATT
F1-86	18	OR	+12V BATT
F1-88	18	OR	+12V BATT
F1-90	18	OR	+12V BATT
F1-92	18	OR	+12V BATT
F1-94	18	OR	+12V BATT
F1-96	18	OR	+12V BATT
F1-98	18	OR	+12V BATT
F1-100	18	OR	+12V BATT

WIRING CHART

WIRE ID#	CONN. TERM	COLOR	SIZE	WIRE DESCRIPTION
1	P7-1	BL	18	+12V SW SA
2	P7-2	SP	18	CAN L ISO
3	P7-3	SP	18	CAN L ISO
4	P7-4	SP	18	CAN L ISO
5	P7-5	SP	18	CAN L ISO
6	P7-6	SP	18	CAN L ISO
7	P7-7	SP	18	CAN L ISO
8	P7-8	SP	18	CAN L ISO
9	P7-9	SP	18	CAN L ISO
10	P7-10	SP	18	CAN L ISO
11	P7-11	SP	18	CAN L ISO
12	P7-12	SP	18	CAN L ISO
13	P7-13	SP	18	CAN L ISO
14	P7-14	SP	18	CAN L ISO
15	P7-15	SP	18	CAN L ISO
16	P7-16	SP	18	CAN L ISO
17	P7-17	SP	18	CAN L ISO
18	P7-18	SP	18	CAN L ISO
19	P7-19	SP	18	CAN L ISO
20	P7-20	SP	18	CAN L ISO
21	P7-21	SP	18	CAN L ISO
22	P7-22	SP	18	CAN L ISO
23	P7-23	SP	18	CAN L ISO
24	P7-24	SP	18	CAN L ISO
25	P7-25	SP	18	CAN L ISO
26	P7-26	SP	18	CAN L ISO
27	P7-27	SP	18	CAN L ISO
28	P7-28	SP	18	CAN L ISO
29	P7-29	SP	18	CAN L ISO
30	P7-30	SP	18	CAN L ISO
31	P7-31	SP	18	CAN L ISO
32	P7-32	SP	18	CAN L ISO
33	P7-33	SP	18	CAN L ISO
34	P7-34	SP	18	CAN L ISO
35	P7-35	SP	18	CAN L ISO
36	P7-36	SP	18	CAN L ISO
37	P7-37	SP	18	CAN L ISO
38	P7-38	SP	18	CAN L ISO
39	P7-39	SP	18	CAN L ISO
40	P7-40	SP	18	CAN L ISO
41	P7-41	SP	18	CAN L ISO
42	P7-42	SP	18	CAN L ISO
43	P7-43	SP	18	CAN L ISO
44	P7-44	SP	18	CAN L ISO
45	P7-45	SP	18	CAN L ISO
46	P7-46	SP	18	CAN L ISO
47	P7-47	SP	18	CAN L ISO
48	P7-48	SP	18	CAN L ISO
49	P7-49	SP	18	CAN L ISO
50	P7-50	SP	18	CAN L ISO
51	P7-51	SP	18	CAN L ISO
52	P7-52	SP	18	CAN L ISO
53	P7-53	SP	18	CAN L ISO
54	P7-54	SP	18	CAN L ISO
55	P7-55	SP	18	CAN L ISO
56	P7-56	SP	18	CAN L ISO
57	P7-57	SP	18	CAN L ISO
58	P7-58	SP	18	CAN L ISO
59	P7-59	SP	18	CAN L ISO
60	P7-60	SP	18	CAN L ISO
61	P7-61	SP	18	CAN L ISO
62	P7-62	SP	18	CAN L ISO
63	P7-63	SP	18	CAN L ISO
64	P7-64	SP	18	CAN L ISO
65	P7-65	SP	18	CAN L ISO
66	P7-66	SP	18	CAN L ISO
67	P7-67	SP	18	CAN L ISO
68	P7-68	SP	18	CAN L ISO
69	P7-69	SP	18	CAN L ISO
70	P7-70	SP	18	CAN L ISO
71	P7-71	SP	18	CAN L ISO
72	P7-72	SP	18	CAN L ISO
73	P7-73	SP	18	CAN L ISO
74	P7-74	SP	18	CAN L ISO
75	P7-75	SP	18	CAN L ISO
76	P7-76	SP	18	CAN L ISO
77	P7-77	SP	18	CAN L ISO
78	P7-78	SP	18	CAN L ISO
79	P7-79	SP	18	CAN L ISO
80	P7-80	SP	18	CAN L ISO
81	P7-81	SP	18	CAN L ISO
82	P7-82	SP	18	CAN L ISO
83	P7-83	SP	18	CAN L ISO
84	P7-84	SP	18	CAN L ISO
85	P7-85	SP	18	CAN L ISO
86	P7-86	SP	18	CAN L ISO
87	P7-87	SP	18	CAN L ISO
88	P7-88	SP	18	CAN L ISO
89	P7-89	SP	18	CAN L ISO
90	P7-90	SP	18	CAN L ISO
91	P7-91	SP	18	CAN L ISO
92	P7-92	SP	18	CAN L ISO
93	P7-93	SP	18	CAN L ISO
94	P7-94	SP	18	CAN L ISO
95	P7-95	SP	18	CAN L ISO
96	P7-96	SP	18	CAN L ISO
97	P7-97	SP	18	CAN L ISO
98	P7-98	SP	18	CAN L ISO
99	P7-99	SP	18	CAN L ISO
100	P7-100	SP	18	CAN L ISO

Challenger MT and MF 3-pin power adapter: P/N 77646



CONNECTOR CHART-REF

CONN-TERM	WIRE ID#	COLOR	DESCRIPTION
P3-1	1	RD	+12V_BATT
P3-3	2	BK	GND
T1	1	RD	+12V_BATT
T2	2	BK	GND

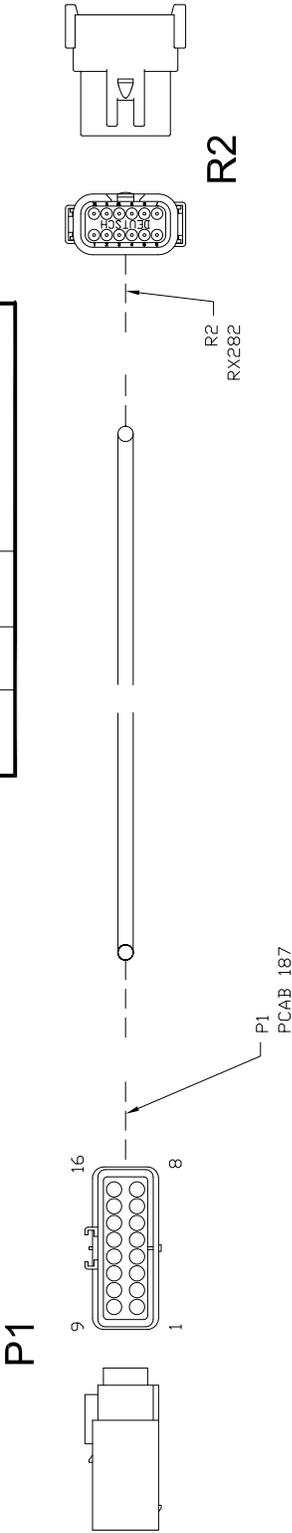
WIRING CHART

WIRE ID#	CONN-TERM	WIRE		DESCRIPTION
		COLOR	SIZE	
1	P3-1	RD	14	+12V_BATT
2	P3-3	BK	14	GND

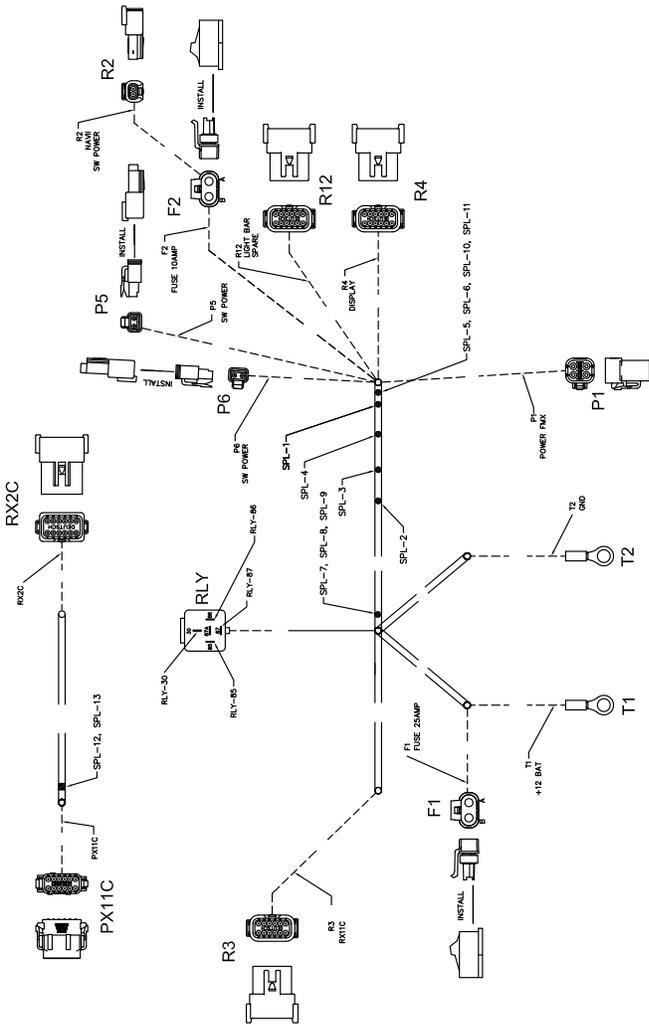
Challenger MT and MF CAN interface adapter: P/N 77647

WIRING CHART				
WIRE ID#	CONN-TERM	WIRE		DESCRIPTION
		COLOR	SIZE	
1	P1-1	RD	18	+12V SW 5A
2	P1-3	GN	18	CAN ISO L
3	P1-4	YW	18	CAN ISO H
4	P1-5	GN	18	CAN2 L
5	P1-6	YW	18	CAN2 H

CONNECTOR CHART-REF			
CONN-TERM	WIRE ID#	COLOR	DESCRIPTION
P1-1	1	RD	+12V SW 5A
P1-3	2	GN	CAN ISO L
P1-4	3	YW	CAN ISO H
P1-5	4	GN	CAN2 L
P1-6	5	YW	CAN2 H
R2-1	1	RD	+12V SW 5A
R2-2	2	GN	CAN ISO L
R2-3	3	YW	CAN ISO H
R2-4	4	GN	CAN2 L
R2-5	5	YW	CAN2 H



Valtra T Series CAN interface: P/N 82681



CONNECTOR CHART—REF

CONN- ID#	WIRE COLOR	DESCRIPTION
REL-30	RD	12V SW
REL-85	RD	12V SW
REL-86	RD	12V SW
REL-87	RD	12V SW
SPL-1	RD	12V SW
SPL-2	RD	12V SW
SPL-3	RD	12V SW
SPL-4	RD	12V SW
SPL-5	RD	12V SW
SPL-6	RD	12V SW
SPL-7	RD	12V SW
SPL-8	RD	12V SW
SPL-9	RD	12V SW
SPL-10	RD	12V SW
SPL-11	RD	12V SW

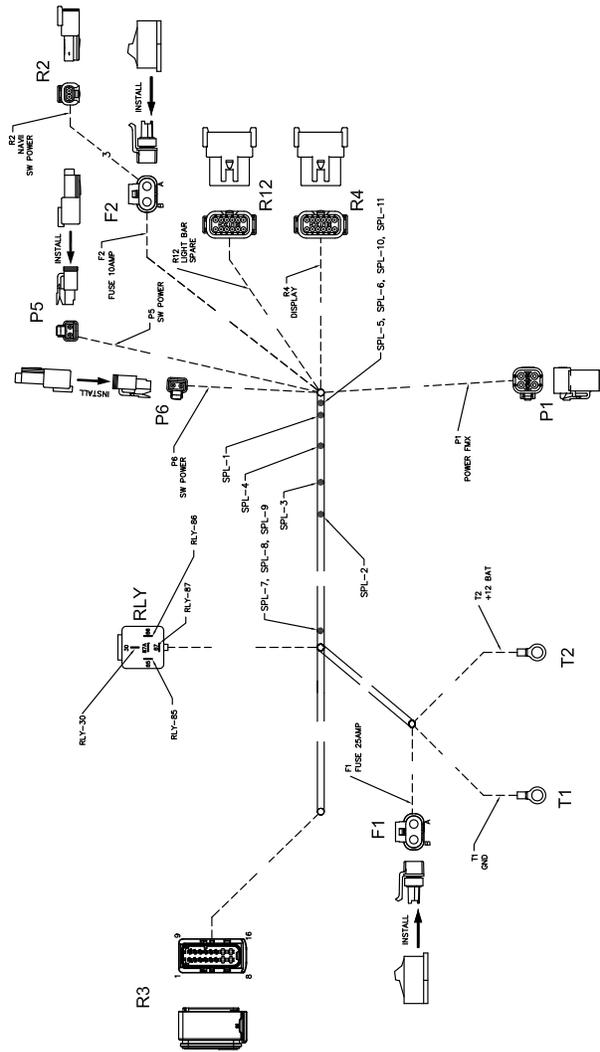
CONNECTOR CHART—REF

CONN- ID#	WIRE COLOR	DESCRIPTION
PX11C-1	RD	CAN ISO L
PX11C-2	RD	CAN ISO H
PX11C-3	RD	CAN SW
PX11C-4	RD	CAN SW L
PX11C-5	RD	CAN SW R
PX11C-6	RD	CAN SW L
PX11C-7	RD	CAN SW H
PX11C-8	RD	CAN SW L
PX11C-9	RD	CAN SW H
PX11C-10	RD	CAN SW L
PX11C-11	RD	CAN SW H
PX11C-12	RD	CAN SW L
PX11C-13	RD	CAN SW H
PX11C-14	RD	CAN SW L
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PX11C-27	RD	CAN SW H
PX11C-28	RD	CAN SW L
PX11C-29	RD	CAN SW H
PX11C-30	RD	CAN SW L
PX11C-31	RD	CAN SW H
PX11C-32	RD	CAN SW L
PX11C-33	RD	CAN SW H
PX11C-34	RD	CAN SW L
PX11C-35	RD	CAN SW H
PX11C-36	RD	CAN SW L
PX11C-37	RD	CAN SW H
PX11C-38	RD	CAN SW L
PX11C-39	RD	CAN SW H
PX11C-40	RD	CAN SW L
PX11C-41	RD	CAN SW H
PX11C-42	RD	CAN SW L
PX11C-43	RD	CAN SW H
PX11C-44	RD	CAN SW L
PX11C-45	RD	CAN SW H
PX11C-46	RD	CAN SW L
PX11C-47	RD	CAN SW H
PX11C-48	RD	CAN SW L
PX11C-49	RD	CAN SW H
PX11C-50	RD	CAN SW L
PX11C-51	RD	CAN SW H
PX11C-52	RD	CAN SW L
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PX11C-57	RD	CAN SW H
PX11C-58	RD	CAN SW L
PX11C-59	RD	CAN SW H
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PX11C-61	RD	CAN SW H
PX11C-62	RD	CAN SW L
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PX11C-66	RD	CAN SW L
PX11C-67	RD	CAN SW H
PX11C-68	RD	CAN SW L
PX11C-69	RD	CAN SW H
PX11C-70	RD	CAN SW L
PX11C-71	RD	CAN SW H
PX11C-72	RD	CAN SW L
PX11C-73	RD	CAN SW H
PX11C-74	RD	CAN SW L
PX11C-75	RD	CAN SW H
PX11C-76	RD	CAN SW L
PX11C-77	RD	CAN SW H
PX11C-78	RD	CAN SW L
PX11C-79	RD	CAN SW H
PX11C-80	RD	CAN SW L
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PX11C-87	RD	CAN SW H
PX11C-88	RD	CAN SW L
PX11C-89	RD	CAN SW H
PX11C-90	RD	CAN SW L
PX11C-91	RD	CAN SW H
PX11C-92	RD	CAN SW L
PX11C-93	RD	CAN SW H
PX11C-94	RD	CAN SW L
PX11C-95	RD	CAN SW H
PX11C-96	RD	CAN SW L
PX11C-97	RD	CAN SW H
PX11C-98	RD	CAN SW L
PX11C-99	RD	CAN SW H
PX11C-100	RD	CAN SW L

WIRING CHART

WIRE ID#	CONN- ID#	WIRE COLOR	SIZE	DESCRIPTION
1	REL-30	RD	16	12V SW
2	REL-85	RD	16	12V SW
3	REL-86	RD	16	12V SW
4	REL-87	RD	16	12V SW
5	SPL-1	RD	16	12V SW
6	SPL-2	RD	16	12V SW
7	SPL-3	RD	16	12V SW
8	SPL-4	RD	16	12V SW
9	SPL-5	RD	16	12V SW
10	SPL-6	RD	16	12V SW
11	SPL-7	RD	16	12V SW
12	SPL-8	RD	16	12V SW
13	SPL-9	RD	16	12V SW
14	SPL-10	RD	16	12V SW
15	SPL-11	RD	16	12V SW
16	PX11C-1	RD	16	CAN ISO L
17	PX11C-2	RD	16	CAN ISO H
18	PX11C-3	RD	16	CAN SW
19	PX11C-4	RD	16	CAN SW L
20	PX11C-5	RD	16	CAN SW R
21	PX11C-6	RD	16	CAN SW L
22	PX11C-7	RD	16	CAN SW H
23	PX11C-8	RD	16	CAN SW L
24	PX11C-9	RD	16	CAN SW H
25	PX11C-10	RD	16	CAN SW L
26	PX11C-11	RD	16	CAN SW H
27	PX11C-12	RD	16	CAN SW L
28	PX11C-13	RD	16	CAN SW H
29	PX11C-14	RD	16	CAN SW L
30	PX11C-15	RD	16	CAN SW H
31	PX11C-16	RD	16	CAN SW L
32	PX11C-17	RD	16	CAN SW H
33	PX11C-18	RD	16	CAN SW L
34	PX11C-19	RD	16	CAN SW H
35	PX11C-20	RD	16	CAN SW L
36	PX11C-21	RD	16	CAN SW H
37	PX11C-22	RD	16	CAN SW L
38	PX11C-23	RD	16	CAN SW H
39	PX11C-24	RD	16	CAN SW L
40	PX11C-25	RD	16	CAN SW H
41	PX11C-26	RD	16	CAN SW L
42	PX11C-27	RD	16	CAN SW H
43	PX11C-28	RD	16	CAN SW L
44	PX11C-29	RD	16	CAN SW H
45	PX11C-30	RD	16	CAN SW L
46	PX11C-31	RD	16	CAN SW H
47	PX11C-32	RD	16	CAN SW L
48	PX11C-33	RD	16	CAN SW H
49	PX11C-34	RD	16	CAN SW L
50	PX11C-35	RD	16	CAN SW H
51	PX11C-36	RD	16	CAN SW L
52	PX11C-37	RD	16	CAN SW H
53	PX11C-38	RD	16	CAN SW L
54	PX11C-39	RD	16	CAN SW H
55	PX11C-40	RD	16	CAN SW L
56	PX11C-41	RD	16	CAN SW H
57	PX11C-42	RD	16	CAN SW L
58	PX11C-43	RD	16	CAN SW H
59	PX11C-44	RD	16	CAN SW L
60	PX11C-45	RD	16	CAN SW H
61	PX11C-46	RD	16	CAN SW L
62	PX11C-47	RD	16	CAN SW H
63	PX11C-48	RD	16	CAN SW L
64	PX11C-49	RD	16	CAN SW H
65	PX11C-50	RD	16	CAN SW L
66	PX11C-51	RD	16	CAN SW H
67	PX11C-52	RD	16	CAN SW L
68	PX11C-53	RD	16	CAN SW H
69	PX11C-54	RD	16	CAN SW L
70	PX11C-55	RD	16	CAN SW H
71	PX11C-56	RD	16	CAN SW L
72	PX11C-57	RD	16	CAN SW H
73	PX11C-58	RD	16	CAN SW L
74	PX11C-59	RD	16	CAN SW H
75	PX11C-60	RD	16	CAN SW L
76	PX11C-61	RD	16	CAN SW H
77	PX11C-62	RD	16	CAN SW L
78	PX11C-63	RD	16	CAN SW H
79	PX11C-64	RD	16	CAN SW L
80	PX11C-65	RD	16	CAN SW H
81	PX11C-66	RD	16	CAN SW L
82	PX11C-67	RD	16	CAN SW H
83	PX11C-68	RD	16	CAN SW L
84	PX11C-69	RD	16	CAN SW H
85	PX11C-70	RD	16	CAN SW L
86	PX11C-71	RD	16	CAN SW H
87	PX11C-72	RD	16	CAN SW L
88	PX11C-73	RD	16	CAN SW H
89	PX11C-74	RD	16	CAN SW L
90	PX11C-75	RD	16	CAN SW H
91	PX11C-76	RD	16	CAN SW L
92	PX11C-77	RD	16	CAN SW H
93	PX11C-78	RD	16	CAN SW L
94	PX11C-79	RD	16	CAN SW H
95	PX11C-80	RD	16	CAN SW L
96	PX11C-81	RD	16	CAN SW H
97	PX11C-82	RD	16	CAN SW L
98	PX11C-83	RD	16	CAN SW H
99	PX11C-84	RD	16	CAN SW L
100	PX11C-85	RD	16	CAN SW H
101	PX11C-86	RD	16	CAN SW L
102	PX11C-87	RD	16	CAN SW H
103	PX11C-88	RD	16	CAN SW L
104	PX11C-89	RD	16	CAN SW H
105	PX11C-90	RD	16	CAN SW L
106	PX11C-91	RD	16	CAN SW H
107	PX11C-92	RD	16	CAN SW L
108	PX11C-93	RD	16	CAN SW H
109	PX11C-94	RD	16	CAN SW L
110	PX11C-95	RD	16	CAN SW H
111	PX11C-96	RD	16	CAN SW L
112	PX11C-97	RD	16	CAN SW H
113	PX11C-98	RD	16	CAN SW L
114	PX11C-99	RD	16	CAN SW H
115	PX11C-100	RD	16	CAN SW L

Fendt 800-900 Can Interface 2011+: P/N 82682



CONNECTOR CHART-REF

CONN-REF	WIRE	COLOR	DESCRIPTION
1	RD	RD	+12V BATT
2	RD	RD	+12V BATT
3	RD	RD	+12V BATT
4	RD	RD	+12V BATT
5	RD	RD	+12V BATT
6	RD	RD	+12V BATT
7	RD	RD	+12V BATT
8	RD	RD	+12V BATT
9	RD	RD	+12V BATT
10	RD	RD	+12V BATT
11	RD	RD	+12V BATT
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13	RD	RD	+12V BATT
14	RD	RD	+12V BATT
15	RD	RD	+12V BATT
16	RD	RD	+12V BATT
17	RD	RD	+12V BATT
18	RD	RD	+12V BATT
19	RD	RD	+12V BATT
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96	RD	RD	+12V BATT
97	RD	RD	+12V BATT
98	RD	RD	+12V BATT
99	RD	RD	+12V BATT
100	RD	RD	+12V BATT

WIRING CHART

WIRE	CONN-REF	WIRE	DESCRIPTION
1	RD	RD	+12V BATT
2	RD	RD	+12V BATT
3	RD	RD	+12V BATT
4	RD	RD	+12V BATT
5	RD	RD	+12V BATT
6	RD	RD	+12V BATT
7	RD	RD	+12V BATT
8	RD	RD	+12V BATT
9	RD	RD	+12V BATT
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18	RD	RD	+12V BATT
19	RD	RD	+12V BATT
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96	RD	RD	+12V BATT
97	RD	RD	+12V BATT
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100	RD	RD	+12V BATT

Fendt 800-200 CAN adapter cable: P/N 83493

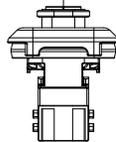
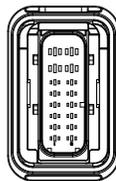
CONNECTOR CHART-REFERENCE

CONN TERM	WIRE			DESCRIPTION
	ID#	COLOR	SIZE	
X4214_P-1	10	YW	18	CAN1 H
X4214_P-2	11	GN	18	CAN1 L
X4214_P-3	1	YW	18	CAN3 H
X4214_P-4	2	GN	18	CAN3 L
X4214_P-5	3	YW	18	CAN ISO H
X4214_P-6	4	GN	18	CAN ISO L
X4214_P-8	5	RD	18	+12SW
X4214_P-9	12	YW	18	CAN1 H
X4214_P-10	13	GN	18	CAN1 L
X4214_P-11	6	YW	18	CAN3 H
X4214_P-12	7	GN	18	CAN3 L
X4214_P-13	8	YW	18	CAN ISO H
X4214_P-14	9	GN	18	CAN ISO L
X4214_S-1	10	YW	18	CAN1 H
X4214_S-2	12	YW	18	CAN1 H
X4214_S-4	11	GN	18	CAN1 L
X4214_S-5	13	GN	18	CAN1 L
X4214_S-6	5	RD	18	+12SW
X4214_S-7	1	YW	18	CAN3 H
X4214_S-8	6	YW	18	CAN3 H
X4214_S-10	2	GN	18	CAN3 L
X4214_S-11	7	GN	18	CAN3 L
X4214_S-13	3	YW	18	CAN ISO H
X4214_S-14	8	YW	18	CAN ISO H
X4214_S-16	4	GN	18	CAN ISO L
X4214_S-17	9	GN	18	CAN ISO L

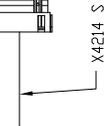
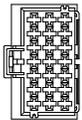
WIRING CHART

WIRE ID#	CONN TERM	WIRE			DESCRIPTION
		COLOR	SIZE	SIZE	
1	X4214_P-3	X4214_S-7	YW	18	CAN3 H
2	X4214_P-4	X4214_S-10	GN	18	CAN3 L
3	X4214_P-5	X4214_S-13	YW	18	CAN ISO H
4	X4214_P-6	X4214_S-16	GN	18	CAN ISO L
5	X4214_P-8	X4214_S-6	RD	18	+12SW
6	X4214_P-11	X4214_S-8	YW	18	CAN3 H
7	X4214_P-12	X4214_S-11	GN	18	CAN3 L
8	X4214_P-13	X4214_S-14	YW	18	CAN ISO H
9	X4214_P-14	X4214_S-17	GN	18	CAN ISO L
10	X4214_P-1	X4214_S-1	YW	18	CAN1 H
11	X4214_P-2	X4214_S-4	GN	18	CAN1 L
12	X4214_P-9	X4214_S-2	YW	18	CAN1 H
13	X4214_P-10	X4214_S-5	GN	18	CAN1 L

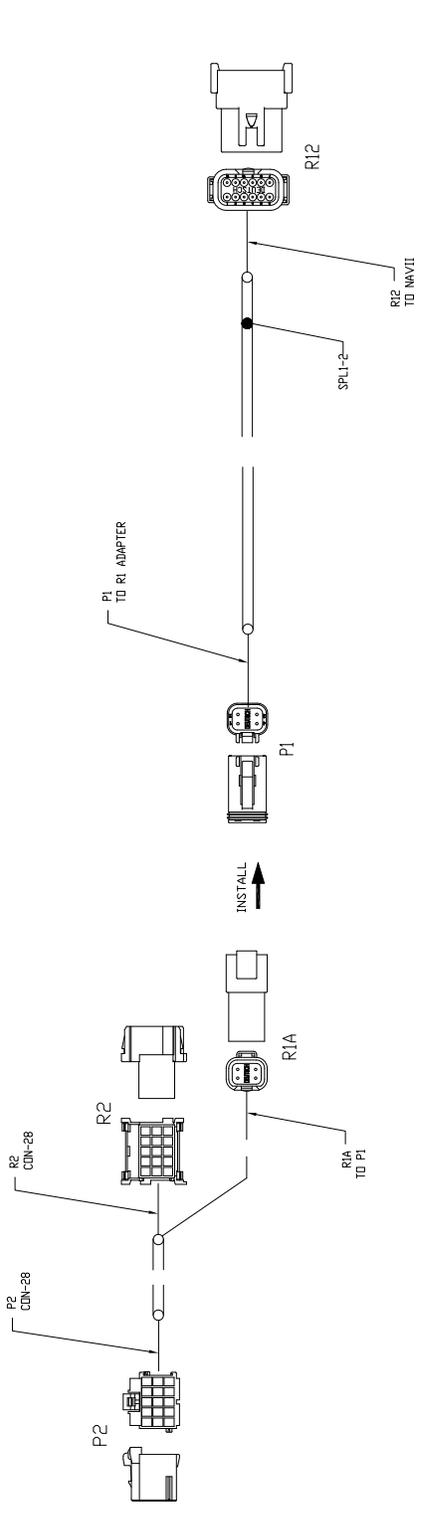
X4214_P



X4214_S



Cable Assy, AGCO CAN interface - MF7000, MF7100, Valtra BT; MF9030, Valtra BS 3020H: P/N 84796



CONNECTOR CHART - REFERENCE				CONNECTOR CHART - REFERENCE			
CONN-TERM	WIRE ID#	COLOR	DESCRIPTION	CONN-TERM	WIRE ID#	COLOR	DESCRIPTION
P1-1	41A	GN	CAN L TRUNK	R1B-1	24	GN	CAN L TRUNK
P1-2	42A	YM	CAN H TRUNK	R1B-2	25	YM	CAN H TRUNK
P1-3	41B	GN	CAN L TRUNK	R1B-3	26	GN	CAN L TRUNK
P1-4	42B	YM	CAN H TRUNK	R1B-4	27	YM	CAN H TRUNK
P2-1	1	GY	THRU	R2-1	1	GY	THRU
P2-2	2	GY	THRU	R2-2	2	GY	THRU
P2-3	3	GY	THRU	R2-3	3	GY	THRU
P2-4	4	GN	CAN L TRUNK	R2-4	6	GN	CAN L TRUNK
P2-5	5	YM	CAN H TRUNK	R2-5	7	YM	CAN H TRUNK
P2-6	8	GY	THRU	R2-6	8	GY	THRU
P2-7	9	GY	THRU	R2-7	9	GY	THRU
P2-8	10	GY	THRU	R2-8	10	GY	THRU
P2-9	11	GY	THRU	R2-9	11	GY	THRU
P2-10	12	GY	THRU	R2-10	12	GY	THRU
P2-11	13	GY	THRU	R2-11	13	GY	THRU
P2-12	14	GY	THRU	R2-12	14	GY	THRU
P2-13	15	GY	THRU	R2-13	15	GY	THRU
P2-14	16	GY	THRU	R2-14	16	GY	THRU
P3-1	21	GY	THRU	R3-1	21	GY	THRU
P3-2	22	GY	THRU	R3-2	22	GY	THRU
P3-3	23	GY	THRU	R3-3	23	GY	THRU
P3-4	24	GN	CAN L TRUNK	R3-4	25	GN	CAN L TRUNK
P3-5	25	YM	CAN H TRUNK	R3-5	27	YM	CAN H TRUNK
P3-6	28	GY	THRU	R3-6	28	GY	THRU
P3-7	29	GY	THRU	R3-7	29	GY	THRU
P3-8	30	GY	THRU	R3-8	30	GY	THRU
P3-9	31	GY	THRU	R3-9	31	GY	THRU
P3-10	32	GY	THRU	R3-10	32	GY	THRU
P1A-1	4	GN	CAN L TRUNK	R1E-1	42C	YM	CAN H BRANCH
P1A-2	5	YM	CAN H TRUNK	R1E-2	41C	GN	CAN L BRANCH
P1A-3	6	GN	CAN L TRUNK				
P1A-4	7	YM	CAN H TRUNK				

WIRING CHART				
WIRE ID#	CONN-TERM	COLOR	SIZE	DESCRIPTION
1	P2-1	R2-1	GY 18	THRU
2	P2-2	R2-2	GY 18	THRU
3	P2-3	R2-3	GY 18	THRU
4	P2-4	R1A-1	GN 18	CAN L TRUNK
5	P2-5	R1A-2	YM 18	CAN H TRUNK
6	R1A-3	R2-4	GN 18	CAN L TRUNK
7	R1A-4	R2-5	YM 18	CAN H TRUNK
8	P2-6	R2-6	GY 18	THRU
9	P2-7	R2-7	GY 18	THRU
10	P2-8	R2-8	GY 18	THRU
11	P2-9	R2-9	GY 18	THRU
12	P2-10	R2-10	GY 18	THRU
13	P2-11	R2-11	GY 18	THRU
14	P2-12	R2-12	GY 18	THRU
15	P2-13	R2-13	GY 18	THRU
16	P2-14	R2-14	GY 18	THRU
21	P3-1	R3-1	GY 18	THRU
22	P3-2	R3-2	GY 18	THRU
23	P3-3	R3-3	GY 18	THRU
24	P3-4	R1B-1	GN 18	CAN L TRUNK
25	P3-5	R1B-2	YM 18	CAN H TRUNK
26	R1B-3	R3-4	GN 18	CAN L TRUNK
27	R1B-4	R3-5	YM 18	CAN H TRUNK
28	P3-6	R3-6	GY 18	THRU
29	P3-7	R3-7	GY 18	THRU
30	P3-8	R3-8	GY 18	THRU
31	P3-9	R3-9	GY 18	THRU
32	P3-10	R3-10	GY 18	THRU
41A	P1-1	SPL1	GN	CAN L TRUNK
41B	SPL1	P1-3	GN	CAN L TRUNK
41C	SPL1	R1E-12	GN	CAN L BRANCH
42A	P1-2	SPL2	YM	CAN H TRUNK
42B	SPL2	P1-4	YM	CAN H TRUNK
42C	SPL2	R1E-1	YM	CAN H BRANCH

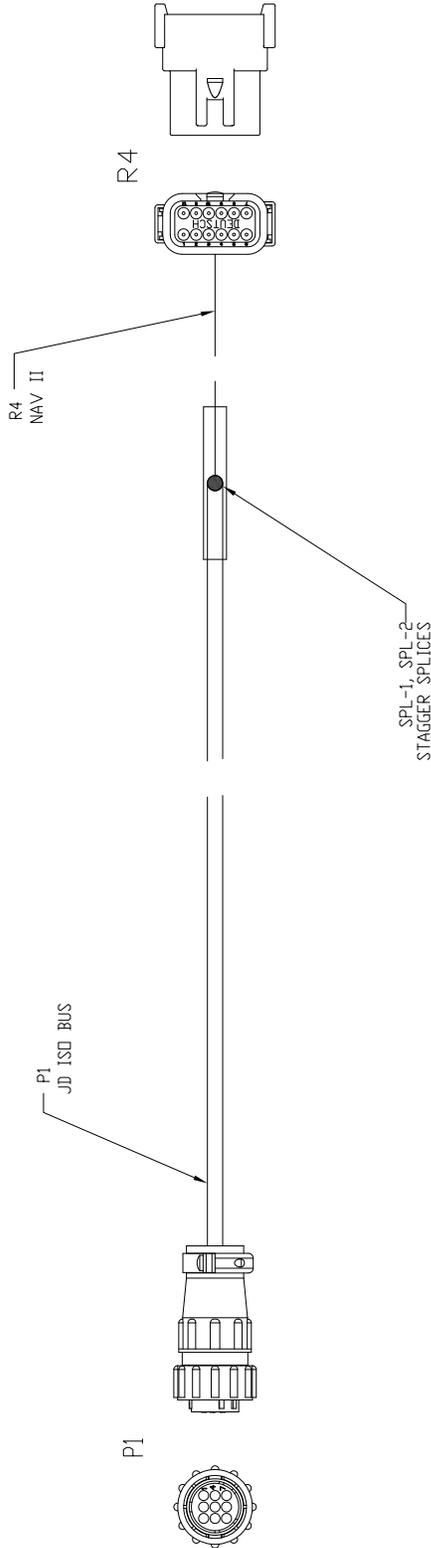
Cable Assy, JDAT ISO_CAN Interface: P/N 85037

CONNECTOR CHART-REFERENCE

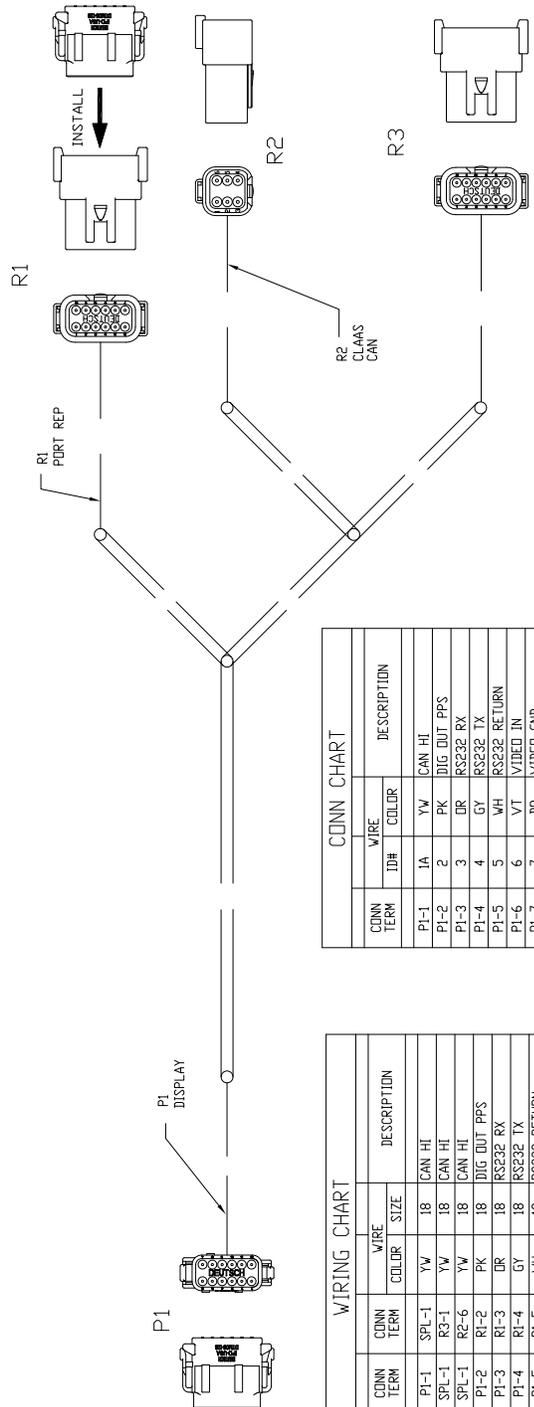
CONN TERM	WIRE		DESCRIPTION
	ID#	COLOR	
P1-1	1	RD	RELAY ACTIVATION
P1-2	2A	GN	CAN L ISO
P1-3	2B	BK	CAN L ISO
P1-4	3A	YW	CAN H ISO
P1-5	3B	RD	CAN H ISO
P1-7	1	RD	RELAY ACTIVATION
R4-1	3C	YW	CAN H ISO
R4-12	2C	GN	CAN L ISO
SPL-1	2A	GN	CAN L ISO
SPL-2	3A	YW	CAN H ISO

WIRING CHART

WIRE ID#	CONN TERM	WIRE		DESCRIPTION
		COLOR	SIZE	
1	P1-1	RD	18	RELAY ACTIVATION
2A	P1-2	GN	18	CAN L ISO
2B	SPL-1	BK	18	CAN L ISO
2C	SPL-1	GN	18	CAN L ISO
3A	P1-4	YW	18	CAN H ISO
3B	SPL-2	RD	18	CAN H ISO
3C	SPL-2	YW	18	CAN H ISO



Claas Lexion and Jaguar AP and YM over CAN cable: P/N 85791'



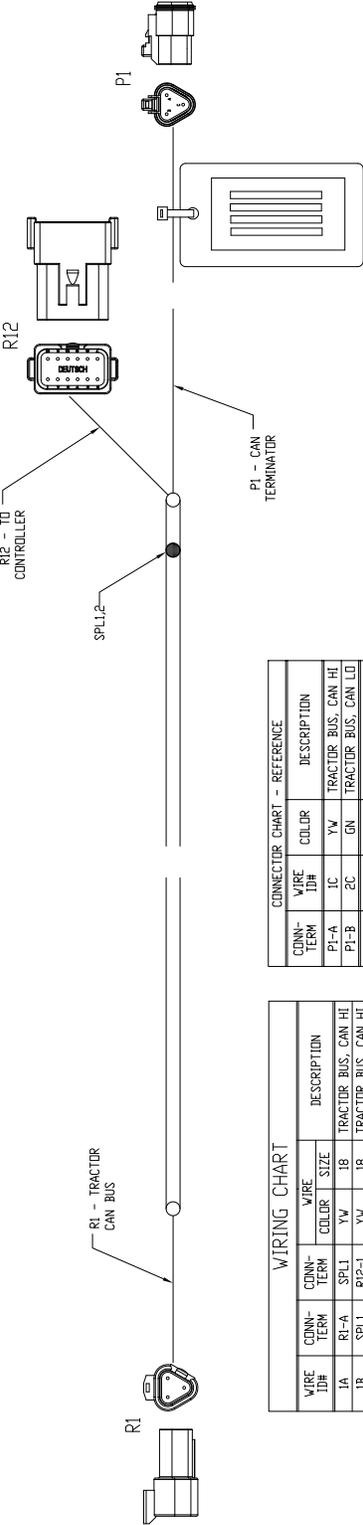
CONN CHART

CONN TERM	WIRE		DESCRIPTION
	ID#	COLOR	
PI-1	1A	YW	CAN HI
PI-2	2	PK	DIG OUT PPS
PI-3	3	DR	RS232 TX
PI-4	4	GY	RS232 TX
PI-5	5	WH	RS232 RETURN
PI-6	6	VT	VIDEO IN
PI-7	7	BR	VIDEO GND
PI-8	8	BK/WH	POWER GND
PI-9	9	RD/WH	UNREG V+ DUT
PI-10	10	TN	DIGITAL GND
PI-11	11	BU	DIG/ANLG IN
PI-12	12A	GN	CAN LO
RI-2	2	PK	DIG OUT PPS
RI-3	3	DR	RS232 RX
RI-4	4	GY	RS232 TX
RI-5	5	WH	RS232 RETURN
RI-6	6	VT	VIDEO IN
RI-7	7	BR	VIDEO GND
RI-8	8	BK/WH	POWER GND
RI-9	9	RD/WH	UNREG V+ DUT
RI-10	10	TN	DIGITAL GND
RI-11	11	BU	DIG/ANLG IN
RI-12	12C	GN	CAN LO
RI-13	12B	GN	CAN LO
RI-14	12A	GN	CAN LO
SPI-1	1A	YW	CAN HI
SPI-2	12A	GN	CAN LO

WIRING CHART

WIRE ID#	CONN TERM	WIRE		DESCRIPTION
		COLOR	SIZE	
1A	PI-1	YW	18	CAN HI
1B	R3-1	YW	18	CAN HI
1C	SPL-1	YW	18	CAN HI
2	PI-2	PK	18	DIG OUT PPS
3	PI-3	DR	18	RS232 TX
4	PI-4	GY	18	RS232 TX
5	PI-5	WH	18	RS232 RETURN
6	PI-6	VT	18	VIDEO IN
7	PI-7	BR	18	VIDEO GND
8	PI-8	BK/WH	18	POWER GND
9	PI-9	RD/WH	18	UNREG V+ DUT
10	PI-10	TN	18	DIGITAL GND
11	PI-11	BU	18	DIG/ANLG IN
12A	SPL-4	GN	18	CAN LO
12B	R3-4	GN	18	CAN LO
12C	SPL-4	GN	18	CAN LO

AGCO CAN combines: P/N 90324



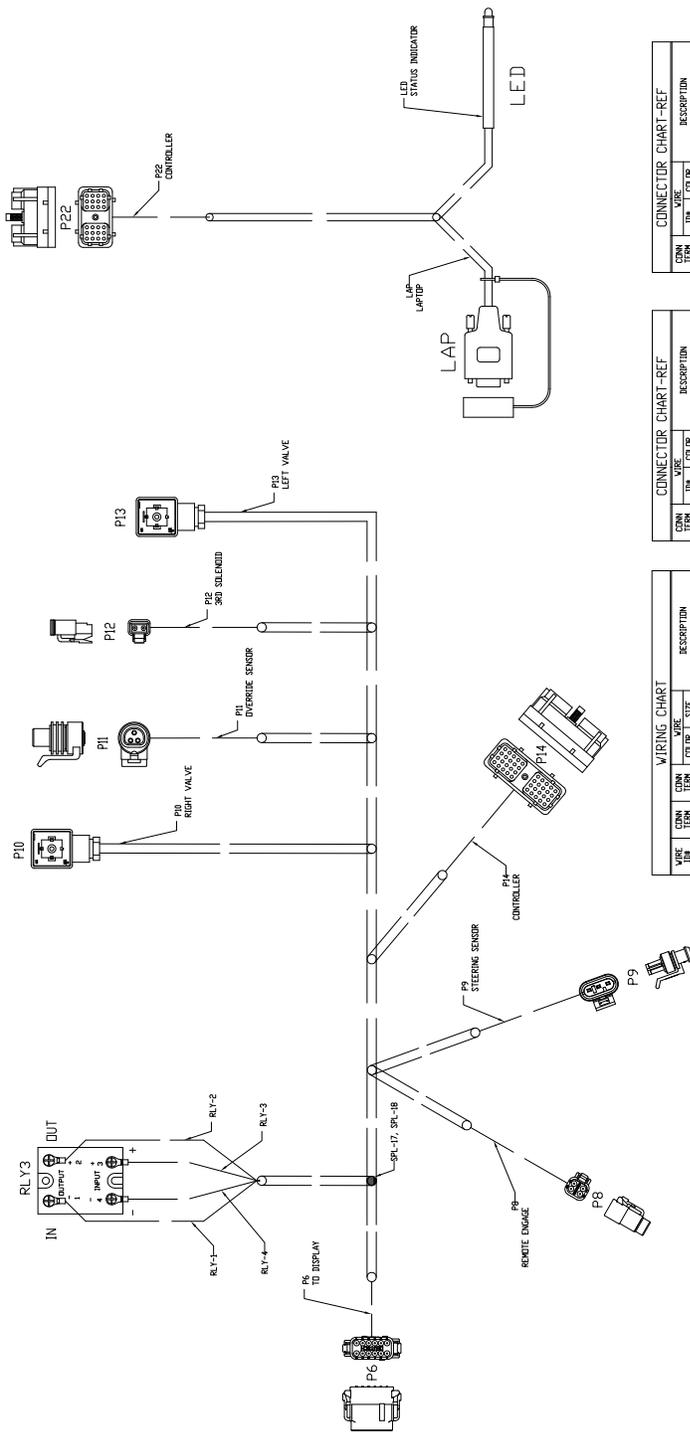
CONNECTOR CHART - REFERENCE

CONN-TERM	WIRE ID#	COLOR	DESCRIPTION
P1-A	1C	YW	TRACTOR BUS, CAN HI
P1-B	2C	GN	TRACTOR BUS, CAN LO
R1-A	1A	YW	TRACTOR BUS, CAN HI
R1-B	2A	GN	TRACTOR BUS, CAN LO
R12-1	1B	YW	TRACTOR BUS, CAN HI
R12-12	2B	GN	TRACTOR BUS, CAN LO

WIRING CHART

WIRE ID#	CONN-TERM	WIRE		DESCRIPTION
		COLOR	SIZE	
1A	R1-A	YW	18	TRACTOR BUS, CAN HI
1B	SPL1	YW	18	TRACTOR BUS, CAN HI
1C	R12-1	YW	18	TRACTOR BUS, CAN HI
2A	SPL1	GN	18	TRACTOR BUS, CAN LO
2B	R1-B	GN	18	TRACTOR BUS, CAN LO
2C	SPL2	GN	18	TRACTOR BUS, CAN LO
	P1-B	GN	18	TRACTOR BUS, CAN LO

MacDon Factory Ready Interface: P/N 93353

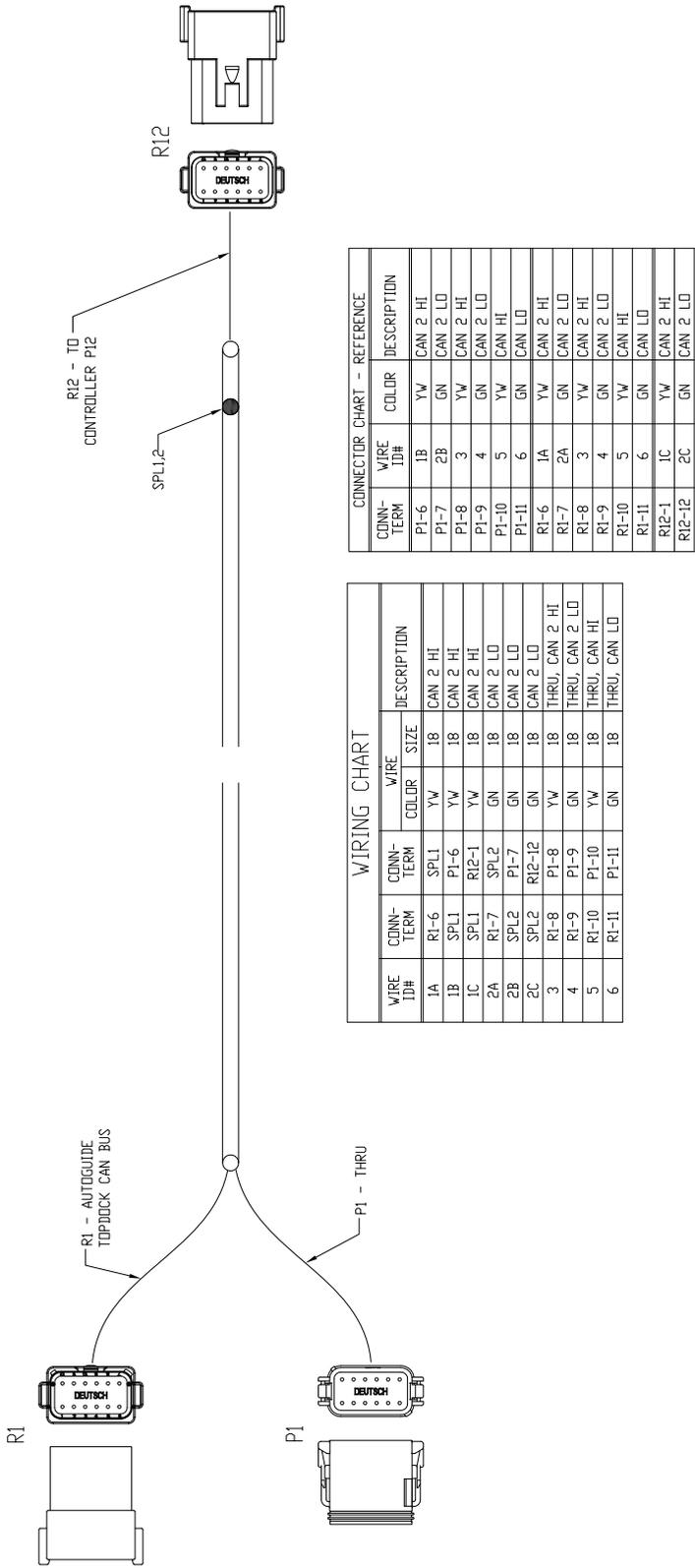


CONN	WIRE	COLOR	DESCRIPTION
P22-1	65	BR/WH	BATT. BIT
P22-2	66	RD/WH	AP DIAG RES22 TX
P22-3	67	OR	AP DIAG RES22 RX
P22-4	68	VM	AP DIAG RES22 GND
P22-19	64	BR	STATUS LED
RLY-3-1	53	RD	PWR-BATT. LEV
RLY-3-2	54	OR	MANUAL OVERRIE GND
RLY-3-3	55	OR	MANUAL OVERRIE SV IN
RLY-3-4	41	RD	DIS. OUT
LAP-1	55	BR/WH	BATT. BIT
LAP-2	56	OR	AP DIAG RES22 TX
LAP-3	57	OR	AP DIAG RES22 RX
LAP-4	58	VM	AP DIAG RES22 GND
LAP-5	69	VM	AP DIAG RES22 GND
LAP-6	63	OR	STATUS LED
LAP-7	64	OR	STATUS LED
SP-17	59A	RD	BATT. PWR
SP-18	59A	BR	BATT. PWR

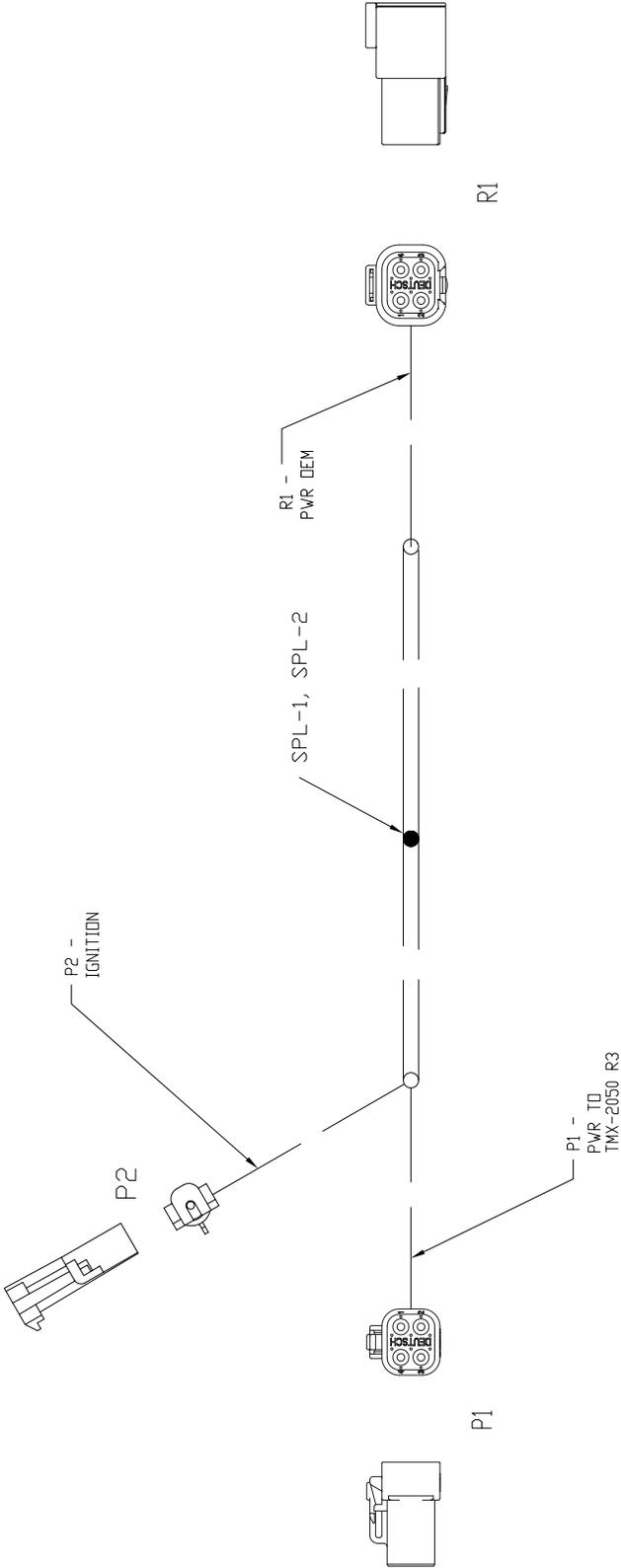
CONN	WIRE	COLOR	DESCRIPTION
P4-1	50	VM	STEERING SENSOR GND
P4-2	51	RD	DISP. AT PWR.
P4-3	52	OR	STEERING SENSOR SV IN
P4-4	53	OR	VALVE DRIVE COIL A V+
P4-5	60	ON	VALVE DRIVE COIL B V+
P4-6	54	ON	MANUAL OVERRIE GND
P4-7	55	RD/WH	MANUAL OVERRIE SV IN
P4-8	56	OR	BATT. GND
P4-9	57	OR	REWRITE ENGAGE EV IN
P4-10	58	OR	REWRITE ENGAGE EV IN
P4-11	59	OR	VALVE DRIVE COIL A V+
P4-12	59	OR	VALVE DRIVE COIL A V+
P4-13	59	OR	VALVE DRIVE COIL A V+
P4-14	59	OR	VALVE DRIVE COIL A V+
P4-15	59	OR	VALVE DRIVE COIL A V+
P4-16	59	OR	VALVE DRIVE COIL A V+
P4-17	59	OR	VALVE DRIVE COIL A V+
P4-18	59	OR	VALVE DRIVE COIL A V+
P4-19	59	OR	VALVE DRIVE COIL A V+
P4-20	59	OR	VALVE DRIVE COIL A V+
P4-21	59	OR	VALVE DRIVE COIL A V+
P4-22	59	OR	VALVE DRIVE COIL A V+
P4-23	59	OR	VALVE DRIVE COIL A V+
P4-24	59	OR	VALVE DRIVE COIL A V+
P4-25	59	OR	VALVE DRIVE COIL A V+
P4-26	59	OR	VALVE DRIVE COIL A V+
P4-27	59	OR	VALVE DRIVE COIL A V+
P4-28	59	OR	VALVE DRIVE COIL A V+
P4-29	59	OR	VALVE DRIVE COIL A V+
P4-30	59	OR	VALVE DRIVE COIL A V+
P4-31	59	OR	VALVE DRIVE COIL A V+
P4-32	59	OR	VALVE DRIVE COIL A V+
P4-33	59	OR	VALVE DRIVE COIL A V+
P4-34	59	OR	VALVE DRIVE COIL A V+
P4-35	59	OR	VALVE DRIVE COIL A V+
P4-36	59	OR	VALVE DRIVE COIL A V+
P4-37	59	OR	VALVE DRIVE COIL A V+
P4-38	59	OR	VALVE DRIVE COIL A V+
P4-39	59	OR	VALVE DRIVE COIL A V+
P4-40	59	OR	VALVE DRIVE COIL A V+
P4-41	59	OR	VALVE DRIVE COIL A V+
P4-42	59	OR	VALVE DRIVE COIL A V+
P4-43	59	OR	VALVE DRIVE COIL A V+
P4-44	59	OR	VALVE DRIVE COIL A V+
P4-45	59	OR	VALVE DRIVE COIL A V+
P4-46	59	OR	VALVE DRIVE COIL A V+
P4-47	59	OR	VALVE DRIVE COIL A V+
P4-48	59	OR	VALVE DRIVE COIL A V+
P4-49	59	OR	VALVE DRIVE COIL A V+
P4-50	59	OR	VALVE DRIVE COIL A V+
P4-51	59	OR	VALVE DRIVE COIL A V+
P4-52	59	OR	VALVE DRIVE COIL A V+
P4-53	59	OR	VALVE DRIVE COIL A V+
P4-54	59	OR	VALVE DRIVE COIL A V+
P4-55	59	OR	VALVE DRIVE COIL A V+
P4-56	59	OR	VALVE DRIVE COIL A V+
P4-57	59	OR	VALVE DRIVE COIL A V+
P4-58	59	OR	VALVE DRIVE COIL A V+
P4-59	59	OR	VALVE DRIVE COIL A V+
P4-60	59	OR	VALVE DRIVE COIL A V+

WIRE	CONN	WIRE	DESCRIPTION
38A	SP-17	RD	BATT. PWR
38B	SP-17	RD	BATT. PWR
38C	SP-17	RD	BATT. PWR
38D	SP-17	RD	BATT. PWR
38E	SP-17	RD	BATT. PWR
38F	SP-17	RD	BATT. PWR
38G	SP-17	RD	BATT. PWR
38H	SP-17	RD	BATT. PWR
38I	SP-17	RD	BATT. PWR
38J	SP-17	RD	BATT. PWR
38K	SP-17	RD	BATT. PWR
38L	SP-17	RD	BATT. PWR
38M	SP-17	RD	BATT. PWR
38N	SP-17	RD	BATT. PWR
38O	SP-17	RD	BATT. PWR
38P	SP-17	RD	BATT. PWR
38Q	SP-17	RD	BATT. PWR
38R	SP-17	RD	BATT. PWR
38S	SP-17	RD	BATT. PWR
38T	SP-17	RD	BATT. PWR
38U	SP-17	RD	BATT. PWR
38V	SP-17	RD	BATT. PWR
38W	SP-17	RD	BATT. PWR
38X	SP-17	RD	BATT. PWR
38Y	SP-17	RD	BATT. PWR
38Z	SP-17	RD	BATT. PWR
39	SP-18	BR	BATT. GND
40	SP-18	BR	BATT. GND
41	SP-18	BR	BATT. GND
42	SP-18	BR	BATT. GND
43	SP-18	BR	BATT. GND
44	SP-18	BR	BATT. GND
45	SP-18	BR	BATT. GND
46	SP-18	BR	BATT. GND
47	SP-18	BR	BATT. GND
48	SP-18	BR	BATT. GND
49	SP-18	BR	BATT. GND
50	SP-18	BR	BATT. GND
51	SP-18	BR	BATT. GND
52	SP-18	BR	BATT. GND
53	SP-18	BR	BATT. GND
54	SP-18	BR	BATT. GND
55	SP-18	BR	BATT. GND
56	SP-18	BR	BATT. GND
57	SP-18	BR	BATT. GND
58	SP-18	BR	BATT. GND
59	SP-18	BR	BATT. GND
60	SP-18	BR	BATT. GND
61	SP-18	BR	BATT. GND
62	SP-18	BR	BATT. GND
63	SP-18	BR	BATT. GND
64	SP-18	BR	BATT. GND
65	SP-18	BR	BATT. GND
66	SP-18	BR	BATT. GND
67	SP-18	BR	BATT. GND
68	SP-18	BR	BATT. GND
69	SP-18	BR	BATT. GND
70	SP-18	BR	BATT. GND
71	SP-18	BR	BATT. GND
72	SP-18	BR	BATT. GND
73	SP-18	BR	BATT. GND
74	SP-18	BR	BATT. GND
75	SP-18	BR	BATT. GND
76	SP-18	BR	BATT. GND
77	SP-18	BR	BATT. GND
78	SP-18	BR	BATT. GND
79	SP-18	BR	BATT. GND
80	SP-18	BR	BATT. GND
81	SP-18	BR	BATT. GND
82	SP-18	BR	BATT. GND
83	SP-18	BR	BATT. GND
84	SP-18	BR	BATT. GND
85	SP-18	BR	BATT. GND
86	SP-18	BR	BATT. GND
87	SP-18	BR	BATT. GND
88	SP-18	BR	BATT. GND
89	SP-18	BR	BATT. GND
90	SP-18	BR	BATT. GND
91	SP-18	BR	BATT. GND
92	SP-18	BR	BATT. GND
93	SP-18	BR	BATT. GND
94	SP-18	BR	BATT. GND
95	SP-18	BR	BATT. GND
96	SP-18	BR	BATT. GND
97	SP-18	BR	BATT. GND
98	SP-18	BR	BATT. GND
99	SP-18	BR	BATT. GND
100	SP-18	BR	BATT. GND

Rogator/Terragator CAN Interface: P/N 95324



OEM power to TMX-2050 power adapter: P/N 95918



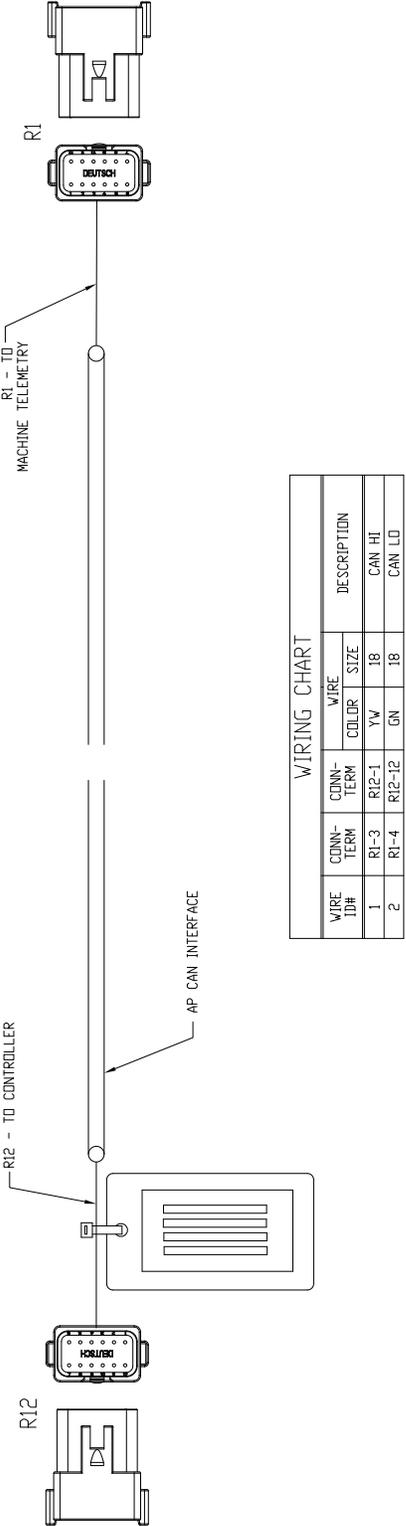
CONN CHART REF

CONN TERM	WIRE		DESCRIPTION
	ID#	COLOR	
R1-1	3A	BK	-BATT
R1-2	2A	RD	+BATT
R1-4	1	RD	IGNITION
P2-1	1	RD	IGNITION
P1-1	3B	BK	-BATT
P1-2	2B	RD	+BATT
P1-3	3C	BK	-BATT
P1-4	2C	RD	+BATT
SPL-1	2A	RD	+BATT
SPL-2	3A	BK	-BATT

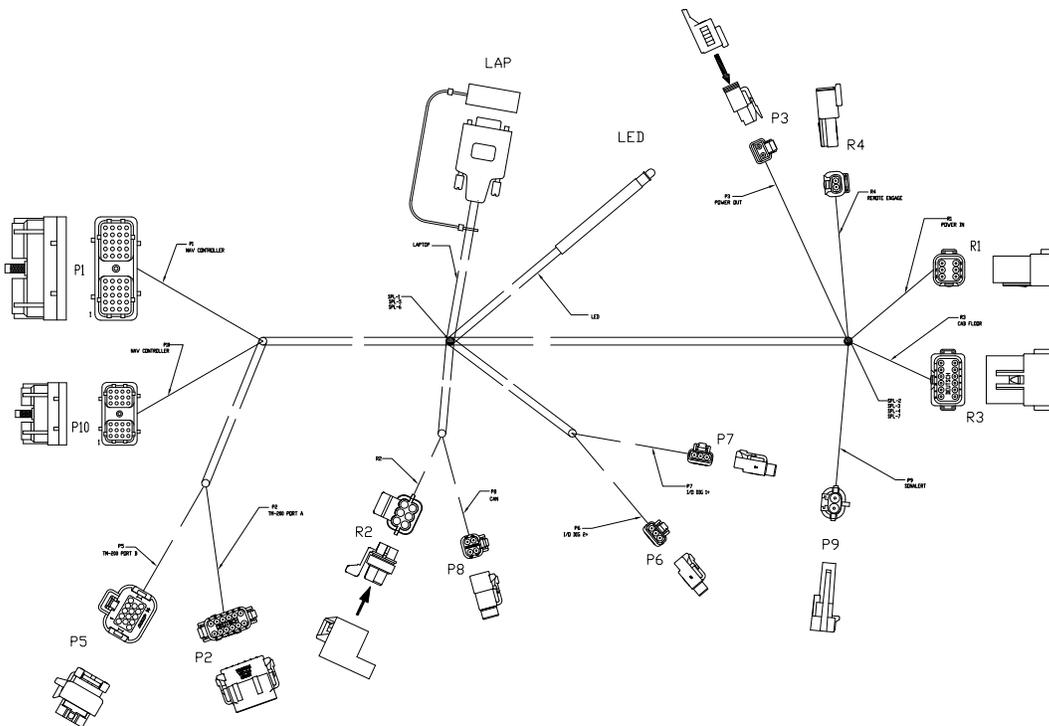
WIRING CHART

WIRE ID#	CONN TERM	WIRE		DESCRIPTION
		COLOR	SIZE	
1	R1-4	RD	14	IGNITION
2A	R1-2	RD	10	+BATT
2B	SPL-1	RD	12	+BATT
2C	SPL-1	RD	12	+BATT
3A	R1-1	BK	10	-BATT
3B	SPL-2	BK	12	-BATT
3C	SPL-2	BK	12	-BATT

Rogator CAN interface: P/N 98324



Main Autopilot, NavController II / TMX-2050 display in-cab, Versatile: P/N 103038



WIRING CHART

WIRE ID#	CONN TERM	CONN TERM	WIRE COLOR	SIZE	DESCRIPTION
1A	R1-1	SPL-7	RD	14	12V SA MACHINE POWER
1B	SPL-7	P5-1	RD	16	12V SA POWER TO TM-200
1C	SPL-7	P3-2	RD	14	12V SA AUX. POWER
2	R1-2	P5-2	RD	16	12V 10A POWER TO TM-200
3	P1-1	P5-5	RD	18	POWER TO NAV
4	P5-3	R2-1	RD	18	12V I/O
5	P5-4	P7-1	BR	18	DIG+
7A	P5-7	SPL-1	Y/W	20	CAN HI 1
7B	SPL-1	R2-2	Y/W	20	CAN HI 1
7C	SPL-1	P6-2	Y/W	20	CAN HI 1
8A	P5-8	SPL-6	GN	20	CAN LD 1
8B	SPL-6	R2-6	GN	20	CAN LD 1
8C	SPL-6	P6-4	GN	20	CAN LD 1
9A	P1-1	SPL-2	GN	18	GND
9B	SPL-2	R1-5	BK	14	GND
9C	SPL-2	R1-6	BK	18	GND
9D	SPL-2	P3-1	BK	14	GND
9E	SPL-2	P5-10	BK	18	GND
9F	SPL-2	P5-11	BK	18	GND
9G	SPL-2	P5-14	BK	18	GND
10	P5-13	P6-1	VT	18	DIGI
11A	P1-6	SPL-3	DR	18	AUTO STEER ENABLE
11B	SPL-3	R1-4	DR	18	AUTO STEER ENABLE
11C	SPL-3	R4-1	DR	18	REMOTE ENGAGE
12	P1-18	R3-1	BR	18	STEERING SENSOR SV+ IN
13	P1-28	R3-2	RD/WH	18	STEERING SENSOR SV- IN
14	P10-16	R3-3	DR	18	STEERING SENSOR +12V
15	P1-9	R3-4	Y/W	18	STEERING SENSOR GND
17	P1-19	R3-5	DR	18	MANUAL OVERRIDE SV IN
18	P1-29	R3-6	RD/WH	18	MANUAL OVERRIDE +12V
19	P1-39	R3-7	GN	18	MANUAL OVERRIDE GND
20	P1-20	R3-8	BU	18	VALVE DRIVE COIL B V+
21	P1-26	R3-9	RD/WH	18	VALVE DRIVE COIL A V+
22	P1-40	R3-10	GN	18	VALVE DRIVE COIL B V-
23	R2-8	P8-1	RD	20	+12V TBC
24	R2-1	P8-3	BK	20	GND TBC
25	P10-13	LED-A	GY	18	STATUS LED
26	P10-14	LED-B	BR	18	STATUS LED
27	P10-1	LAP-1	BK/WH	18	BATT -OUT
28	P10-2	LAP-2	RD/WH	18	AP DIAG RS232 TX
29	P10-3	LAP-3	DR	18	AP DIAG RS232 RX
29	P10-4	LAP-4	Y/W	18	AP DIAG RS232 GND
29	P10-5	LAP-5	Y/W	18	AP DIAG RS232 GND
31	P1-21	P2-2	PK	18	DIGITAL OUT (PPS)
32	P1-31	P2-3	DR	18	AP DIAG RS232 TX
33	P1-2	P2-4	RD/WH	18	AP DIAG RS232 RX
34	P1-2	P2-5	BR	18	AP DIAG RS232 GND
36	R2-C	P5-12	BK	18	12V RETURN
37A	P1-27	SPL-4	WH	18	+5V OUT (SPARE)
37B	SPL-4	R3-11	WH	18	+5V OUT (SPARE)
37C	SPL-4	R4-2	WH	18	+5V OUT (SPARE)
38A	P5-9	SPL-5	BU	18	GND J
38B	SPL-5	P6-2	BU	18	GND J
38C	SPL-5	P7-2	BU	18	GND J
39	P1-5	P9-4	WH	18	SDNALERT V+
40	P1-15	P9-8	GY	18	SDNALERT GND

CONNECTOR CHART-REF

CONN TERM	ID#	WIRE COLOR	DESCRIPTION
LAP-1	27	BK/WH	BATT -OUT
LAP-2	28	RD/WH	AP DIAG RS232 TX
LAP-3	29	DR	AP DIAG RS232 RX
LAP-4	30	Y/W	AP DIAG RS232 GND
LAP-5	30	Y/W	AP DIAG RS232 GND
LED-A	25	GY	STATUS LED
LED-B	26	BR	STATUS LED
P1-1	9A	BK	GND
P1-2	33	RD/WH	AP DIAG RS232 RX
P1-5	39	WH	SDNALERT V+
P1-6	11A	DR	AUTO STEER ENABLE/REMOTE ENGAGE
P1-9	16	Y/W	STEERING SENSOR GND
P1-11	3	RD	POWER TO NAV
P1-12	34	Y/W	AP DIAG RS232 GND
P1-15	40	GY	SDNALERT GND
P1-18	12	BR	STEERING SENSOR SV+ IN
P1-19	17	DR	MANUAL OVERRIDE SV IN
P1-20	20	BU	VALVE DRIVE COIL B V+
P1-21	31	PK	DIGITAL OUT (PPS)
P1-27	37A	WH	+5V OUT (SPARE)
P1-28	13	RD/WH	STEERING SENSOR SV- IN
P1-29	18	RD/WH	MANUAL OVERRIDE +12V
P1-30	21	RD/WH	VALVE DRIVE COIL A V-
P1-31	32	DR	AP DIAG RS232 TX
P1-39	19	GN	MANUAL OVERRIDE GND
P1-40	22	GN	VALVE DRIVE COIL B V-
P2-2	31	PK	DIGITAL OUT (PPS)
P2-3	32	DR	AP DIAG RS232 TX
P2-4	33	RD/WH	AP DIAG RS232 RX
P2-5	34	Y/W	AP DIAG RS232 GND
P3-1	9D	BK	12V SA AUX PWR
P3-2	10	VT	DIGI
P5-1	18	RD	12V SA POWER TO TM-200
P5-2	2	RD	12V 10A POWER TO TM-200
P5-3	4	RD	12V I/O
P5-4	5	BR	DIG+
P5-5	3	RD	POWER TO NAV
P5-7	7A	Y/W	CAN HI 1
P5-8	8A	GN	CAN LD 1
P5-9	8B	BU	GND J
P5-10	9C	BK	GND
P5-11	9F	BK	GND
P5-12	36	BK	12V RETURN
P5-14	10	VT	DIGI
P5-14	9G	BK	GND
P6-1	10	VT	DIGI
P6-2	38B	BU	GND J
P7-1	5	BR	DIG+
P7-2	38C	BU	GND J
P8-1	23	RD	+12V TBC
P8-2	7C	Y/W	CAN HI 1
P8-3	24	BK	GND TBC
P8-4	8C	GN	CAN LD 1
P9-A	39	WH	SDNALERT V+
P9-B	40	GY	SDNALERT GND

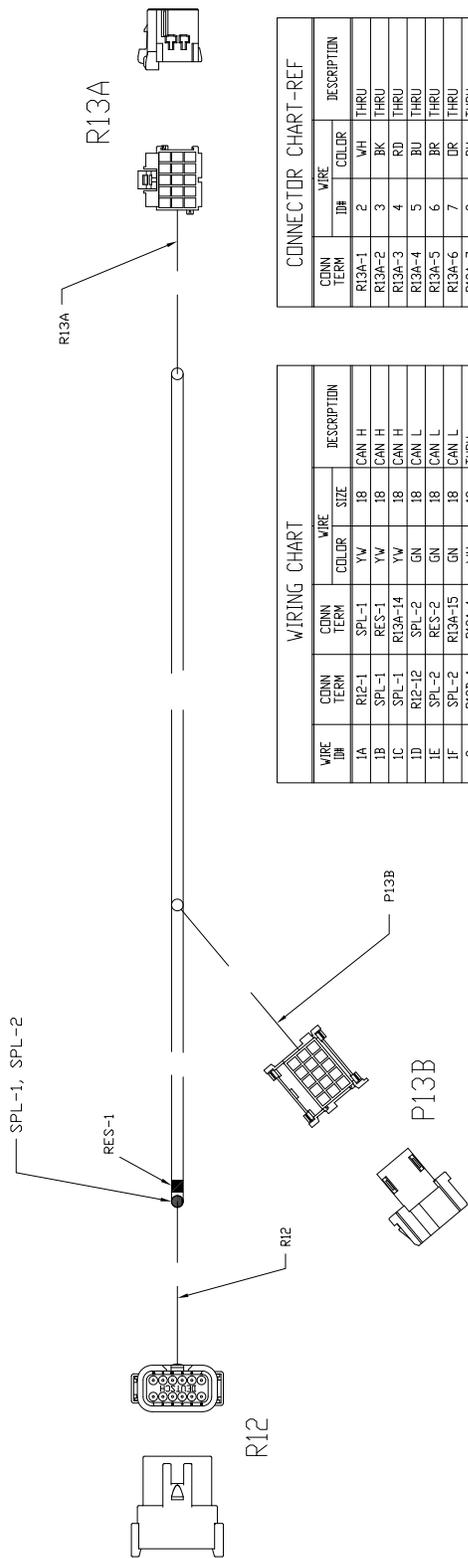
CONNECTOR CHART-REF

CONN TERM	ID#	WIRE COLOR	DESCRIPTION
P10-1	27	BK/WH	BATT -OUT
P10-2	28	RD/WH	AP DIAG RS232 TX
P10-3	29	DR	AP DIAG RS232 RX
P10-4	30	Y/W	AP DIAG RS232 GND
P10-5	30	Y/W	AP DIAG RS232 GND
P10-13	25	GY	STATUS LED
P10-14	26	BR	STATUS LED
P10-16	14	DR	STEERING SENSOR +12V
P10-19	26	BR	STATUS LED
R1-1	1	RD	12V SA MACHINE POWER
R1-2	2	RD	12V 10A POWER TO TM-200
R1-4	11B	DR	AUTO STEER ENABLE
R1-5	9B	BK	GND
R1-6	9C	BK	GND
R1-8	9E	BK	GND
R1-9	9F	BK	GND
R2-A	4	RD	12V I/O
R2-B	23	RD	+12V TBC
R2-C	36	BK	12V RETURN
R2-D	24	BK	GND TBC
R2-E	7A	Y/W	CAN HI 1
R2-F	8B	GN	CAN LD 1
R3-1	12	BR	STEERING SENSOR SV+ IN
R3-2	13	RD/WH	STEERING SENSOR SV- IN
R3-3	14	DR	STEERING SENSOR +12V
R3-4	16	Y/W	STEERING SENSOR GND
R3-5	17	DR	MANUAL OVERRIDE SV IN
R3-6	18	RD/WH	MANUAL OVERRIDE +12V
R3-7	19	GN	MANUAL OVERRIDE GND
R3-8	20	BU	VALVE DRIVE COIL B V+
R3-9	21	RD/WH	VALVE DRIVE COIL A V-
R3-10	22	GN	VALVE DRIVE COIL B V-
R3-11	37B	WH	+5V OUT (SPARE)
R3-11	37C	WH	+5V OUT (SPARE)
R4-2	37C	WH	+5V OUT (SPARE)

SPLICE CHART-REF

CONN TERM	ID#	CONN	WIRE DESCRIPTION
SPL-1	7A	P5-7	CAN HI 1
	7B	R2-E	
	7C	P8-2	
SPL-2	9A	P1-1	GND
	9B	R1-5	
	9C	R1-6	
	9D	P3-1	
	9E	P5-10	
	9F	P5-11	
	9G	P5-14	
SPL-3	11A	P1-6	AUTO STEER ENABLE
	11B	R1-4	
	11C	R4-1	
SPL-4	37A	P1-27	+5V OUT (SPARE)
	37B	R3-11	
	37C	R4-2	
SPL-5	38A	P5-9	GND J
	38B	P6-2	
	38C	P7-2	
SPL-6	8A	P5-8	CAN LD 1
	8B	P8-4	
SPL-7	1A	R1-1	12V SA MACHINE POWER
	1B	P5-1	12V SA POWER TO TM-200
	1C	P3-2	12V SA AUX. POWER

CAN Interface, Amazone Pantera: P/N 104492



WIRING CHART

WIRE ID#	CONN TERM	CONN TERM	WIRE			DESCRIPTION
			COLOR	SIZE	DESCRIPTION	
1A	R12-1	SPL-1	YW	18	CAN H	
1B	R12-1	RES-1	YW	18	CAN H	
1C	R12-1	SPL-1	YW	18	CAN H	
1D	R12-1	SPL-2	GN	18	CAN L	
1E	R12-1	RES-2	GN	18	CAN L	
2	R12-2	R13A-15	GN	18	CAN L	
3	P13B-1	R13A-1	VH	18	THRU	
4	P13B-2	R13A-2	BK	18	THRU	
5	P13B-3	R13A-3	RD	18	THRU	
6	P13B-4	R13A-4	BU	18	THRU	
7	P13B-5	R13A-5	BR	18	THRU	
8	P13B-6	R13A-6	DR	18	THRU	
9	P13B-7	R13A-7	PU	18	THRU	
10	P13B-8	R13A-8	GY	18	THRU	
11	P13B-9	R13A-9	BU	18	THRU	
12	P13B-10	R13A-10	BR	18	THRU	
13	P13B-11	R13A-11	DR	18	THRU	
14	P13B-12	R13A-12	BK/WH	18	THRU	
	P13B-13	R13A-13	RD/WH	18	THRU	

CONNECTOR CHART-REF

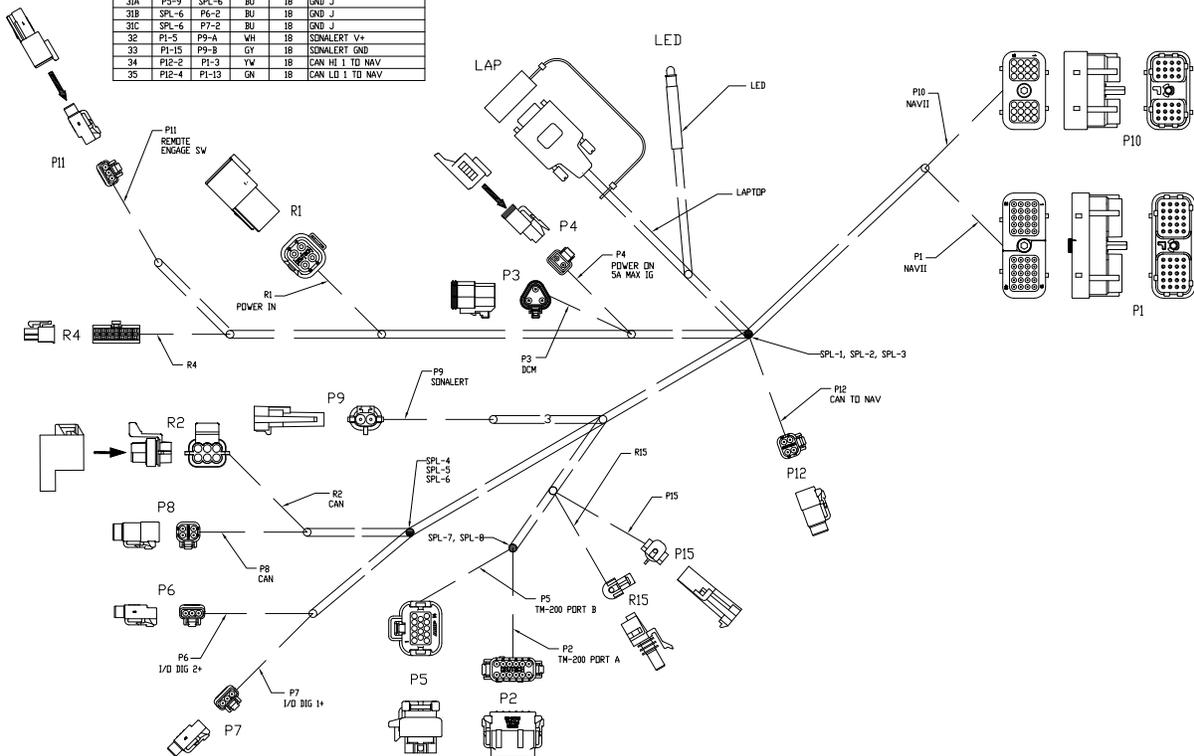
CONN TERM	ID#	WIRE		DESCRIPTION
		COLOR	THRU	
R13A-1	2	WH	THRU	
R13A-2	3	BK	THRU	
R13A-3	4	RD	THRU	
R13A-4	5	BU	THRU	
R13A-5	6	BR	THRU	
R13A-6	7	DR	THRU	
R13A-7	8	PU	THRU	
R13A-8	9	GY	THRU	
R13A-9	10	BU	THRU	
R13A-10	11	BR	THRU	
R13A-11	12	DR	THRU	
R13A-12	13	BK/WH	THRU	
R13A-13	14	RD/WH	THRU	
R13A-14	1C	YW	CAN H	
R13A-15	1F	GN	CAN L	
P13B-1	2	VH	THRU	
P13B-2	3	BK	THRU	
P13B-3	4	RD	THRU	
P13B-4	5	BU	THRU	
P13B-5	6	BR	THRU	
P13B-6	7	DR	THRU	
P13B-7	8	PU	THRU	
P13B-8	9	GY	THRU	
P13B-9	10	BU	THRU	
P13B-10	11	BR	THRU	
P13B-11	12	DR	THRU	
P13B-12	13	BK/WH	THRU	
P13B-13	14	RD/WH	THRU	
R12-1	1A	YW	CAN H	
R12-1	1D	GN	CAN L	
RES-1	1B	YW	CAN H	
SPL-1	1A	YW	CAN H	
SPL-2	1D	GN	CAN L	

Autopilot Integrated, Kubota M7, TMX-2050 display with TM-200 Module: P/N 106111

WIRING TABLE				
WIRE IN	CONN TERM	CONN TERM	WIRE COLOR	DESCRIPTION
1	R4-3	P10-17	BK	IGN
2	R4-10	P10-5	YW	CAN2 HIGH
3	R4-11	P10-11	GN	CAN2 LOW
4	P11-1	P1-5	PU	REMOTE ENGAGE 12+
5	P11-2	P1-37	BR	REMOTE ENGAGE GND
6	LAP-1	P10-1	BK/WH	BATT - DUT
7	LAP-2	P10-2	RD/WH	AP DIAG RS232 TX
8	LAP-3	P10-8	DR	AP DIAG RS232 RX
9	LAP-5	P10-14	YW	AP DIAG RS232 GND
10	LED-A	P10-13	GY	STATUS LED
11	LED-B	P10-19	BR	STATUS LED
12A	R1-2	SPL-7	BK	IGN
12B	SPL-7	P5-11	BK	IGN
13A	R1-4	SPL-8	RD	POWER IN
13B	SPL-8	P5-2	RD	POWER IN
14A	R1-2	SPL-2	RD	POWER IN
14B	SPL-2	P3-8	RD	12V+ POWER
14C	SPL-2	P5-1	RD	12V+ POWER
15	R15	P5-6	RD/WH	IGNITION ON
16A	P15	SPL-3	RD/WH	IGNITION ON
16B	SPL-3	P3-C	RD/WH	IGNITION ON
16C	SPL-3	P4-2	RD	IGNITION ON
16D	SPL-3	R4-2	RD/WH	IGNITION ON
16E	SPL-3	P11-2	RD	IGNITION ON
16F	SPL-3	P1-11	RD	IGNITION ON PWR TO NAV
18	P5-3	R2-A	RD	I2 I/O
19	P5-4	P7-1	BR	DIG 2+
20A	P5-7	SPL-4	YW	CAN HI 1
20B	SPL-4	R2-E	YW	CAN HI 1
20C	SPL-4	P8-2	YW	CAN HI 1
21A	P5-8	SPL-5	GN	CAN LD 1
21B	SPL-5	R2-F	GN	CAN LD 1
21C	SPL-5	P8-4	GN	CAN LD 1
22A	P1-1	SPL-1	BK	IGN
22B	SPL-1	P5-14	BK	IGN
22C	SPL-1	R1-1	BK	IGN
22D	SPL-1	P1-4	BK	IGN
22E	SPL-1	P5-10	BK	IGN
22F	SPL-1	P4-1	BK	IGN
23	P5-13	P6-1	VT	DIG 1+
24	R2-8	P8-1	BR	12V+ TBC
25	R2-9	P8-3	BK	12V RETURN
26	P1-2	P2-2	PK	DIGITAL DUT PPS
27	P1-31	P2-3	DR	AP DIAG RS232 TX
28	P1-2	P2-4	RD/WH	AP DIAG RS232 RX
29	P1-12	P2-5	YW	AP DIAG RS232 GND
30	R2-C	P5-12	BK	12V RETURN
31A	P5-9	SPL-6	BU	IGN J
31B	SPL-6	P6-2	BU	IGN J
31C	SPL-6	P1-2	BU	IGN J
32	P1-5	P9-A	WH	SDNALERT V+
33	P1-15	P9-B	GY	SDNALERT GND
34	P12-2	P1-3	YW	CAN HI 1 TO NAV
35	P12-4	P1-13	GN	CAN LD 1 TO NAV

CONNECTOR CHART-REF		
CONN TERM	WIRE IN	DESCRIPTION
P1-1	22A	BK GND
P1-2	28	RD/WH AP DIAG RS232 RX
P1-3	34	YW CAN HI 1 TO NAV
P1-5	32	WH SDNALERT V+
P1-6	4	PU REMOTE ENGAGE 12+
P1-11	16F	RD IGNITION ON PWR TO NAV
P1-12	29	YW AP DIAG RS232 GND
P1-13	35	GN CAN LD 1 TO NAV
P1-15	33	GY SDNALERT GND
P1-21	26	PK DIGITAL DUT PPS
P1-31	27	DR AP DIAG RS232 TX
P1-37	5	BR REMOTE ENGAGE GND
P10-1	6	BK/WH BATT - DUT
P10-2	7	RD/WH AP DIAG RS232 TX
P10-5	2	YW CAN2 HIGH
P10-8	8	DR AP DIAG RS232 RX
P10-11	3	GN CAN2 LOW
P10-13	10	GY STATUS LED
P10-14	9	YW AP DIAG RS232 GND
P10-17	1	BK GND
P10-19	11	BR STATUS LED
P2-2	26	PK DIGITAL DUT PPS
P2-3	27	DR AP DIAG RS232 TX
P2-4	28	RD/WH AP DIAG RS232 RX
P2-5	29	YW AP DIAG RS232 GND
P3-4	22B	BK DCM GND
P3-8	14B	RD 12V+ POWER
P3-C	16B	RD/WH IGNITION ON
P4-1	22F	BK GND
P4-2	16C	RD IGNITION ON
P5-1	14C	RD 12V+ POWER
P5-2	13B	RD POWER IN
P5-3	18	RD I2 I/O
P5-4	19	BR DIG 2+
P5-6	15	RD/WH IGNITION ON
P5-7	20A	GN CAN HI 1
P5-8	21A	GN CAN LD 1
P5-9	31A	BU GND J
P5-10	22E	BK GND
P5-11	12B	BK GND
P5-12	30	BK 12V RETURN
P5-13	23	VT DIG 1+
P5-14	22B	BK GND

CONNECTOR CHART-REF		
CONN TERM	WIRE	DESCRIPTION
P15	16A	RD/WH IGNITION ON
P6-1	23	VT DIG 1+
P6-2	31B	BU GND J
P7-1	19	BR DIG 2+
P7-2	31C	BU GND J
P8-1	24	RD 12V+ TBC
P8-2	20C	YW CAN HI 1
P8-3	25	BK GND TBC
P8-4	21C	GN CAN LD 1
P9-A	32	WH SDNALERT V+
P9-B	33	GY SDNALERT GND
P11-1	4	PU REMOTE ENGAGE 12+
P11-2	5	BR REMOTE ENGAGE GND
P11-3	16E	RD IGNITION ON
P12-2	34	YW CAN HI 1 TO NAV
P12-4	35	GN CAN LD 1 TO NAV
R1-1	22C	BK GND
R1-2	14A	RD POWER IN
R1-3	12A	BK GND
R1-4	13A	RD POWER IN
R15	15	RD/WH IGNITION ON
R2-A	18	RD I2 I/O
R2-B	24	RD 12V+ TBC
R2-C	30	BK 12V RETURN
R2-D	25	BK GND TBC
R2-E	20B	YW CAN HI 1
R2-F	21B	GN CAN LD 1
R4-2	16D	RD/WH IGNITION ON
R4-3	1	BK GND
R4-10	2	YW CAN2 HIGH
R4-11	3	GN CAN2 LOW
LAP-1	6	BK/WH BATT - DUT
LAP-2	7	RD/WH AP DIAG RS232 TX
LAP-3	8	DR AP DIAG RS232 RX
LAP-5	9	YW AP DIAG RS232 GND
LED-A	10	GY STATUS LED
LED-B	11	BR STATUS LED
SPL-1	22A	BK GND
SPL-2	14A	RD POWER IN
SPL-3	16A	RD/WH IGNITION ON
SPL-4	20A	GN CAN HI 1
SPL-5	21A	GN CAN LD 1
SPL-6	31A	BU GND J
SPL-7	12A	BK GND
SPL-8	13A	RD POWER IN



Autopilot Integrated, Kubota M7, FmX / CFX-750 display: P/N 106112

WIRING CHART	CONNECTOR	CHART-REF	DESCRIPTION
1	W1	W1	W1
2	W2	W2	W2
3	W3	W3	W3
4	W4	W4	W4
5	W5	W5	W5
6	W6	W6	W6
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WIRING CHART	CONNECTOR	CHART-REF	DESCRIPTION
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2	W2	W2	W2
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WIRING CHART	CONNECTOR	CHART-REF	DESCRIPTION
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