Special Instruction
Installation Procedure for Product Link PL420 Retrofit {7606}
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Installation Procedure for Product Link PL420 Retrofit {7606}

SMCS - 7606

On Highway Truck:
CT660 (S/N: TRK1-UP; TKL1-UP; TGT1-UP; TSW1-UP; TSY1-UP)

Introduction

This Special Instruction will provide instructions for installation, configuration and troubleshooting of the Product Link PL420.

Important Safety Information

Work safely. Most accidents that involve product operation, maintenance, and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs.

A person must be alert to potential hazards. This person must also have the necessary training, skills, and tools in order to perform these functions properly.

Safety precautions and warnings are provided in this instruction and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons. Caterpillar cannot anticipate every possible circumstance of a potential hazard.

Therefore, the warnings in this publication and the warnings that are on the product are not all inclusive. Avoid using a tool, a procedure, a work method, or operating technique that is not recommended by Caterpillar. If used, ensure the safety of the operating personnel and others.

Ensure that the product will not be damaged or the product will be made unsafe by the operation, lubrication, maintenance, or the repair procedures.

WARNING

Structural damage, an overturn, modification, alteration, or improper repair can impair this structure's protection capability thereby voiding this certification. Do not weld on or drill holes in the structure. Consult a Caterpillar dealer to determine this structure's limitations without voiding its certification.

PL420 System Components

Illustration 1 g02698097

377-9503 Communication Electronic Control Module (PL420)

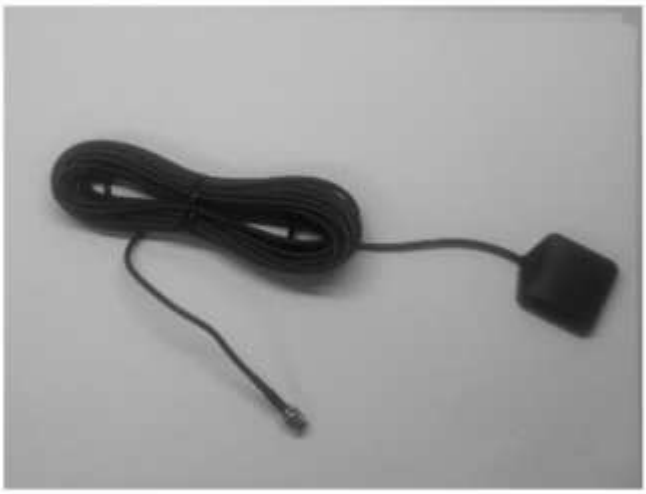


Illustration 2 g02698239

375-6374 Antenna

Illustration 3 g02698240

390-2510 Control Harness As (Voc truck factory install harness (Tyco connector on right))

Antenna

Illustration 4 g02698241

375-6374 Antenna

PL420 Wiring Schematic

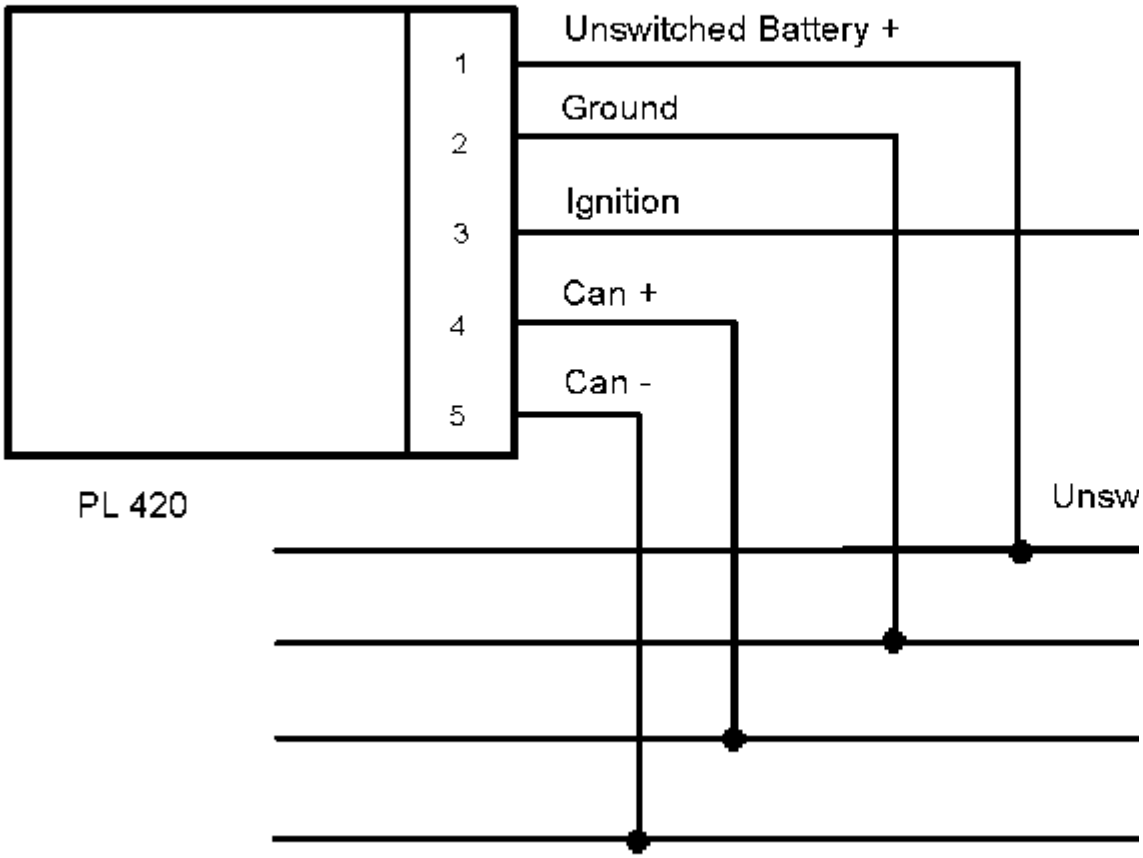


Illustration 5

Table 1

Voc Truck Factory Install Harness Wiring Chart		
Voc Truck PL420	**Function**	**Tyco Connector**
7	N/A	6
8	N/A	7
9	N/A	8
10	N/A	9
11	N/A	10

12	N/A	11
13	N/A	12
14	N/A	13
16	N/A	14
17	N/A	15
18	N/A	16
19	CAN +	17
20	CAN -	4
21	Ground	5
22	N/A	2
23	Ignition	3
24	BATT +	1

Installation of the Antenna

Location for Mounting the Antenna

Note: The antenna is preassembled with lock washer, nut, 0.5 mm (0.02 inch) coaxial cable and radio connectors. Brackets that are specific for the truck may be available for the application.

Check the list of parts for the truck.

- To comply with regulations of FCC for RF human body safety, ensure that antenna is mounted more than 500 mm (19.7 inch) from truck operator.
- Orient the antenna so that the top of the antenna is in a horizontal position with a clear 360 degree view of the sky. In-dash installation is acceptable/recommended depending on placement. For CT660 retrofits, the antenna should be installed under the storage compartment in the non-metallic dash.
- Mount the antenna more than 500 mm (19.7 inch) from the PL420 in order to minimize interference between the radio and the antenna.
- Keep a distance between the PL420 antenna and other antennas that transmit a radio signal. Caterpillar recommends a distance of 1 m (3.3 ft). Keep no less than 500 mm (19.7 inch) between the PL420 antenna and other antennas that transmit a radio signal. The list of radio antennas to maintain a distance from include the citizen band radio, data radio and commercial communication radios.

- Keep in mind the routing of the antenna cable. Do not route the antenna cable near any source of extreme heat (exhaust). Do not mount the antenna or the antenna cable so that the limitations of temperature −40° C (−40.0° F) and 85° C (185.0° F)are exceeded.
- Route the antenna cable so the cable would not be subject to abrasion or pinching.
- Route the antenna cable with a minimum bend radius of 49.5 mm (1.94 inch). Bend radius depends on the type of cable used. Do not bend the radius any less than ten times the diameter of the cable. The cable used is LMR 200UF .

The mounting hole diameter considered is 19 mm (0.75 inch).

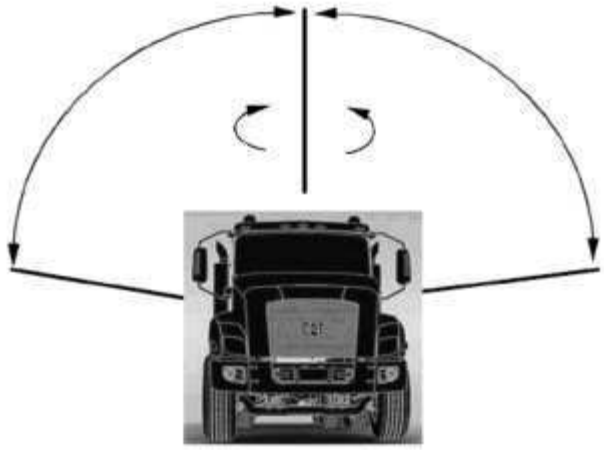


Illustration 6 g02698678

GPS coverage area is 215 degrees

Instructions for Installing the PL420 Units into a CT660 Truck

Note: These instructions are specifically for retrofit installation on a Cat Vocational Truck.

Tools and Supplies

- T20 Torx type screw driver
- Drill with 1/8 inch bit
- Non-residue alcohol wipes (1 per unit)
- Tyco pin removal tool

- Industrial Velcro® with adhesive backing
- Tie wraps (at least 4 inches long)
- #6 self tapping sheet metal screws (3 per unit)
- Circuit tester or Volt/ Ohm/ Meter
- Fuse holder assembly (one per truck)
- 1Amp fuse (one per truck)
- Wire butt splices (2 per truck) for 18 Gauge wire

Preparing the Cab

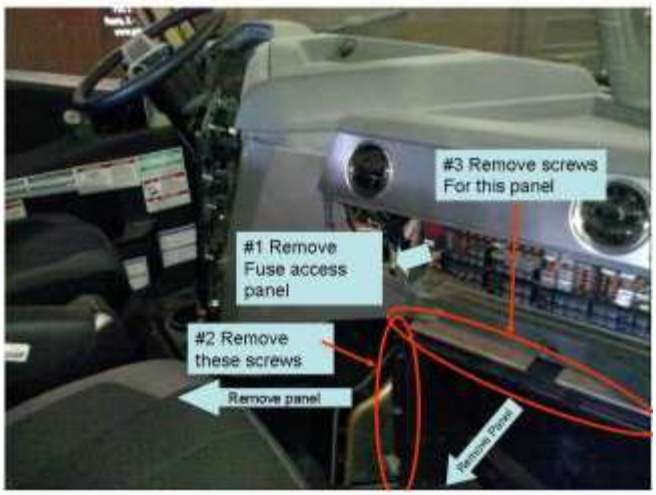


Illustration 7 g02725078

CT660 dash with panels removed

(1) Fuse access panel

(2) Vertical kick panel

(3) Lower kick panel screws

1. Remove the fuse panel cover (1). Remove the panel, when sitting in the passenger seat and with your hand at the top of the cover panel, by pulling toward the passenger seat.

2. Remove the vertical kick panel (2) exposed by removing the fuse panel cover. There are 4 Torx head screws along the edge closest to the firewall. After removing the screws, remove the panel by pulling from between the seats.

3. Remove the lower front kick panel under the fuse panel by first removing 4 Torx screws (3) at the top of the panel. These screws are accessible after the fuse panel cover is removed. After removing the screws, gently work the blind latches loose and remove the panel.

   Note: Too much twisting can break the blind latch post on the panel.

With both panels removed, the area around and behind the dash can be easily accessed for mounting the PL420

GPS antenna installation

Illustration 8 g02725224

CT660 dash with panels removed

(4) Clean area where GPS antenna is to be mounted

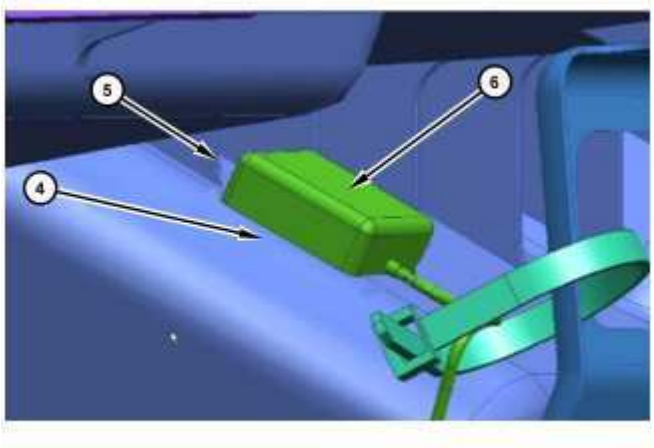


Illustration 9 g02725095

Dash side view of area where GPS antenna is to be mounted

(4) Clean area where GPS antenna is to be mounted

(5) Reinforcement rib to reference antenna mounting location

(6) GPS antenna

1. Cut matching pieces of Industrial Strength Velcro, approximately the same size of the GPS antenna. Locate the reinforcement rib closest to the right side of the cab. The GPS antenna will be mounted on the flat portion of the plastic surface, centered on the rib. To remove body oils from handling, wipe down the back of the GPS antenna and the plastic dash area with an alcohol wipe.

Illustration 10 g02725223

Dash side view of area where GPS antenna is to be mounted

(5) Reinforcement rib to reference antenna mounting location

(6) GPS antenna

2. Allow the areas to air dry. Remove the tape from the Velcro and apply the self sticking adhesive backed Velcro to the dash and the back of the GPS antenna. Press the matching pieces of Velcro together to secure the antenna to the dash and rout the antenna wire as shown.

Mounting the PL420 unit

Note: Harness connector may be wired incorrectly. "DO NOT" connect the PL420 to the dash harness until the dash harness connector wiring has been verified. Use the following worksheet as a reference to ensure that all connections are accurate.

Table 2

Wire Connection Worksheet				
Description	**PL420 Pin Number**	**PL420 Wire Color**	**Service Connector Pin Number**	**Service Connector Wire Color**

Unswitched Battery +	1	Red		
Ground	2	Black		
Ignition	3	Orange		
CAN +	4	Yellow		
CAN -	5	Green		

Proper PL420 Harness Connector Wiring

Illustration 11 g03608176

1. Install Fuse Battery positive power with a 1A fuse assembly.

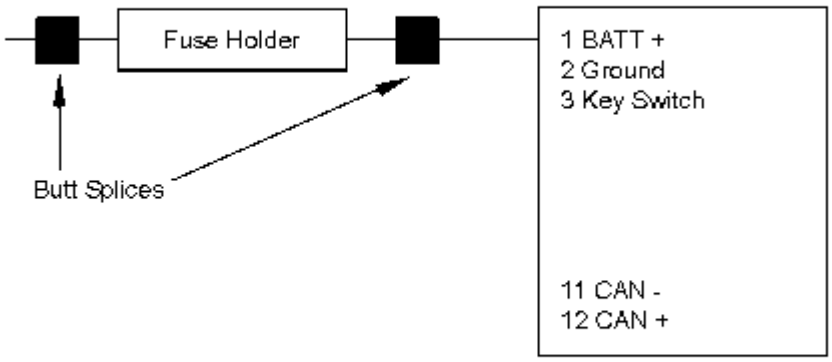


Illustration 12 g03608461

2. After verifying the harness connector wiring, install the fuse holder in the Red wire to Pin 1 of the connector. Install a 1 Amp fuse into the fuse holder.
3. Route the fuse holder next to the PL420 pigtail. Use a plastic zip tie to secure the fuse holder to the pigtail for easy serviceability.
4. Verify that the PL420 internal battery is connected. Remove the back cover and inspect the battery connector. Insure that the battery is installed. Replace the cover and continue with the installation.

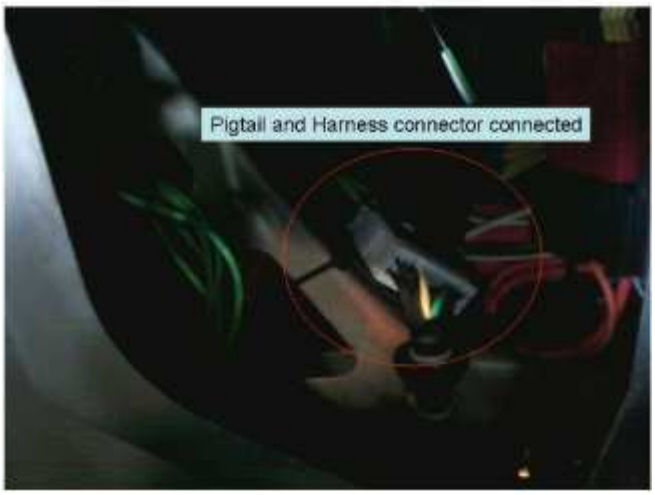


Illustration 13 g02725227

5. Insert the provided Pig tail cable into the PL420. Plug the pigtail cable into the dash harness.

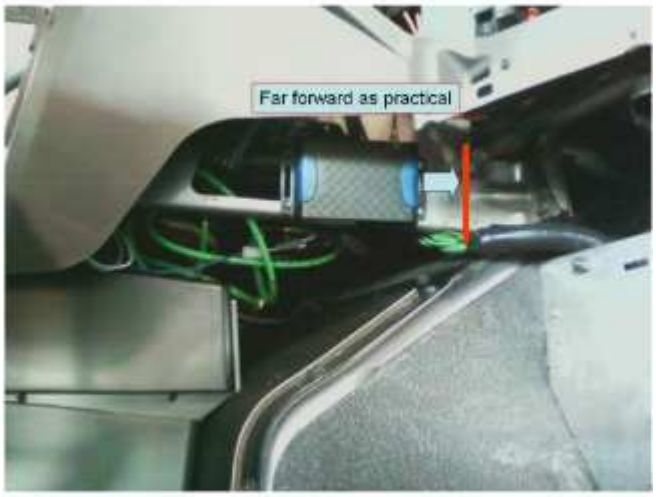


Illustration 14 g02725228

Location of PL420 unit in dash

6. Locate the PL420 unit on the bottom metal brace, as close to the firewall as practical. Do not stretch the wires as stretching will cause intermittent operation of the PL420. The ideal location is next to the raised area of the bracket, closet to the firewall, but only if the cable connection will allow. Mark the hole locations.
7. Remove PL420 to accommodate the drilling operation. 1/8 inch pilot holes are recommended before inserting the #6 self tapping screws. The bracket material is heavy and may be difficult to drill.
8. Install the harness and antenna wiring. Secure the PL420 with the self tapping screws.
9. If not already installed, install Blast Warning Label on visor.

Record Status

If there is an issue with the installation or a question regarding the status at the time of installation, creating screenshots will greatly aid in beginning the investigation. Create a few screenshots before disconnecting Cat ET and leaving the truck.

1. Connect Communication Adapter and PC with Cat Electronic Technician. With Key Switch ON, select the PL420 ECM Allow the PL420 to access satellites and cell phone towers. Accessing the satellites and cell phone towers make take a few seconds.

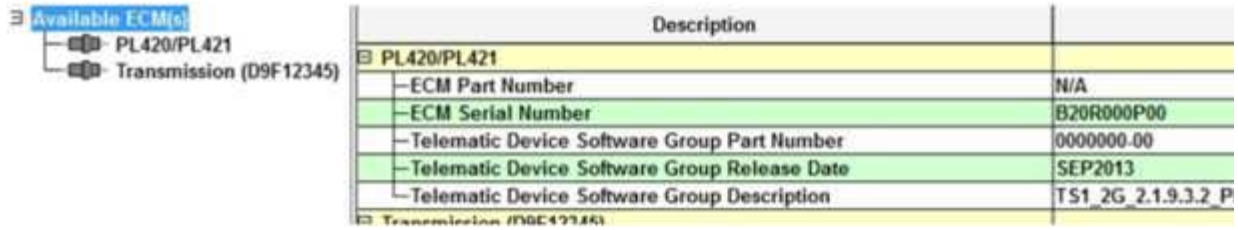


Illustration 15

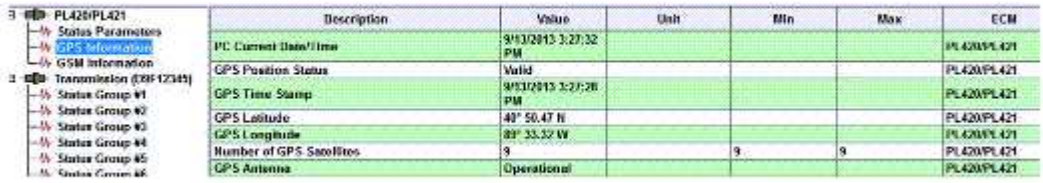


Illustration 16 g03609816

Illustration 17

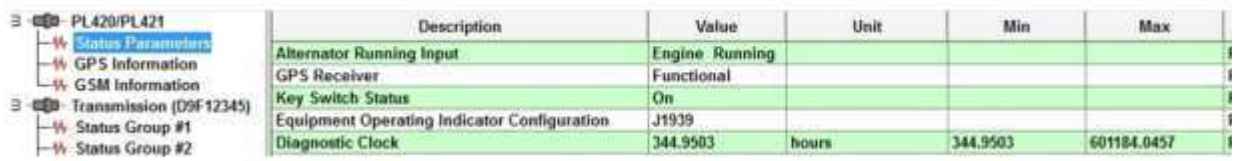


Illustration 18

2. Record screen shots of the ECM summary and all three Status Screens. Paste screen shots into Word file. Record VIN # in the same Word file. Refer to Illustration 15 through Illustration 18.

Subscriber Identity Module (SIM) Card Replacement

The PL420 ships with a valid Subscriber Identity Module (SIM) card installed from the factory. There may be circumstances, however, that require changing the SIM card. This section covers the mechanical steps to swap out a SIM card.

Note: There is no mechanism at this time to define new SIM card parameters with Cat ET. Therefore, cellular providers outside the ATT worldwide network of partners are not supported at this time. Check with your Caterpillar Service Rep for information prior to changing cellular carriers.

Steps to Replace a SIM Card

Replacing a SIM Card should be performed in a clean, dry, dust-free environment. If the PL420 is already installed on the truck, the PL420 should be removed.

The process of replacing or upgrading a SIM Card follows these basic steps:

1. Remove SIM card cover
2. Remove battery
3. Remove existing card
4. Insert new SIM card
5. Replace battery and SIM card cover

SIM Card Removal

1. Deactivate currently installed SIM card in preparation for replacement.

   Note: Refer to Product Link DSN for information on deactivating current SIM card

2. Locate SIM card access cover on the back of the PL420.
3. Remove the flat head screw using a flat head screwdriver.

Illustration 19 g02725708

4. Remove SIM card access cover and set aside.

Illustration 20 g02725709

5. Carefully remove the battery from the compartment.

Illustration 21 g02725711

6. Carefully slide SIM card retainer in the direction of the arrow to unlock the clip.

NOTICE

Very little force is required to unlock the SIM card retainer. Do not use sharp tools.

Illustration 22 g02725712

7. Carefully pull the SIM card and retainer perpendicular to the contacts.

   Note: The SIM card contacts will push the card and retainer up to facilitate grasping of the card and retainer.

Illustration 23 g02725714

8. Grasp the SIM card with your thumb and forefinger and pull the SIM card from the retainer.

Replacing the SIM Card

1. Obtain replacement SIM card from applicable carrier.
2. Install replacement SIM card in the reverse order that the SIM card was removed.
3. Reinstall battery
4. Reinstall SIM card access cover.
5. Tighten the SIM card access cover screw.
6. Activate the new SIM card and return the truck to service.

Ordering Process

To Subscribe to Services for a New PL420

See your Product Link Administrator for assistance with the following steps:

1. Verify that the asset is defined under the correct customer account in the Cat Equipment Data system.
2. Log into VisionLink Store.
3. Select the Initiate Service tab.

Illustration 24

4. Enter the "Asset Serial No." and "Asset Make" and select the Search button.
5. The VisionLink Store will retrieve ownership information from the Equipment Data system. If the asset is not defined in Equipment Data, an error message will be displayed.

Illustration 25

6. If validations pass, known asset information including ownership will be displayed. Enter any additional information required including Device Serial No. for dealer-installed modules. The Carrier Name and SIM Serial No. will be automatically populated based on device serial number

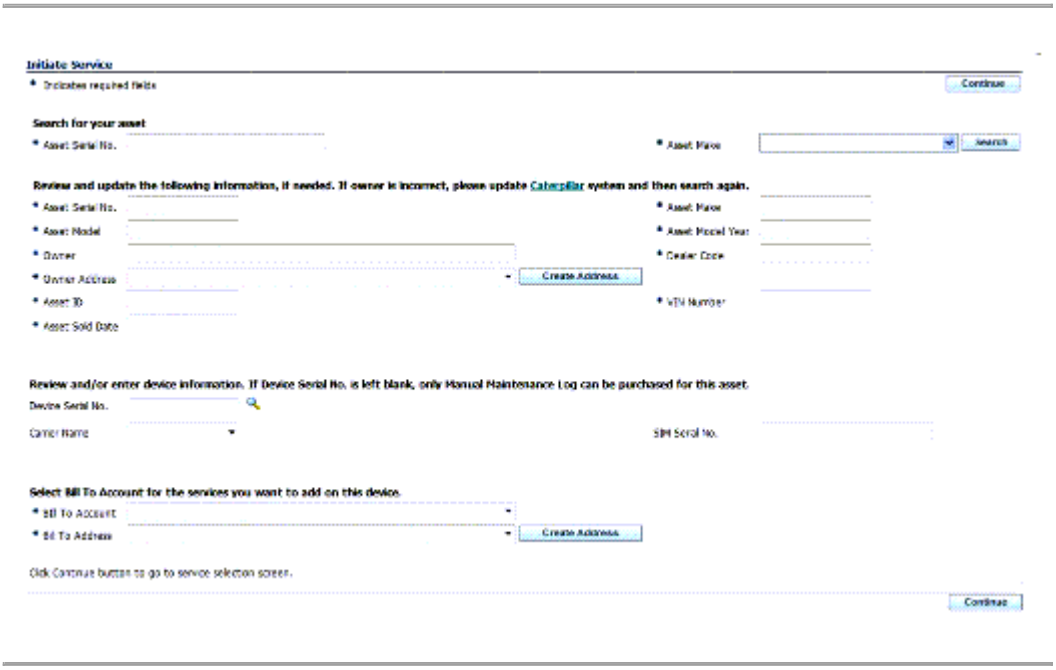


Illustration 26 g03610040

7. After reviewing all fields, select the Continue button to advance to the Service Selection screen.

8. On the Service Selection screen, choose the appropriate service plans to be activated and click the Add to Cart button to view the current Shopping Cart.

9. Proceed with checking out until a confirmation order number is provided.

Configuration

Diagnostic Capabilities

Connecting a Computer to the PL420

Required Software

This system requires Caterpillar Electronic Technician (Cat ET) version 2011B or later.

Note: Always update Cat ET to the latest version in order to access all of the available functionality of the PL420.

Supported Hardware Connections

The PL420 is configured with Cat ET and will use the following communications interfaces:

- The **317-7484** Communication Adapter Gp (Caterpillar Communications Adapter III) hardware is connected between the truck service connector and the PC serial port or parallel port. The Cat ET "Communications Interface Device" is configured for the "Caterpillar Communications Adapter III".

Note: The configuration parameters for the "Communications Interface Device" are found in Cat ET under "Utilities" menu, "Preferences" drop-down menu.

Cat ET is a software program that is used to access data. The service technician can use Cat ET in order to perform maintenance on the truck. Some of the options that are available with Cat ET are listed below:

- Viewing the status of parameters.
- Printing reports.

The following list contains some of the diagnostic functions and programming functions that are performed by the service tools.

- The failures of the ECM system are displayed.
- The settings for the ECM are displayed.
- Display the clock hour of the internal diagnostic clock.
- The number of occurrences and the clock hour of the first occurrence and the last occurrence is displayed for each logged diagnostic code.
- The definition for each logged diagnostic code and each event is displayed.

Configure Computer Interface Communications for Cat ET

Note: The configuration parameters for the "Communications Interface Device" are found in Cat ET under "Utilities" menu, "Preferences" drop-down menu.

1. Use the Communication Adapter Gp to connect a computer with the required Cat ET software to the serial service connector of the wiring harness.
2. Select "Utilities" on the tool bar.
3. From the drop-down menu, select "Preference".
4. From the "Communications" tab, click the drop-down menu and select "Caterpillar Communications Adapter III".
5. Click the "Connect" icon or click "File" on the menu bar. Click "Connect" from the pull-down menu in order to establish communication with the PL420.

Illustration 27 g03

Illustration 27 shows the two ECMs that are available for connection.

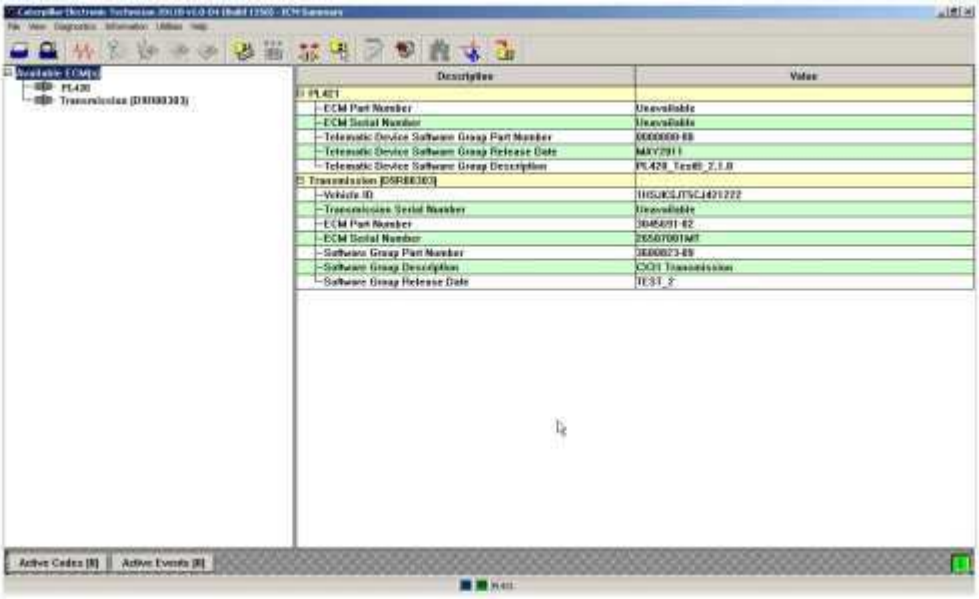


Illustration 28 g02

Illustration 28 is the Status screen showing Cat ET is not receiving data.

Status Groups for Caterpillar Electronic Technician (Cat ET)

In order to access the status groups, follow the procedure that is listed below.

1. Select the "Information" tab on the menu bar.

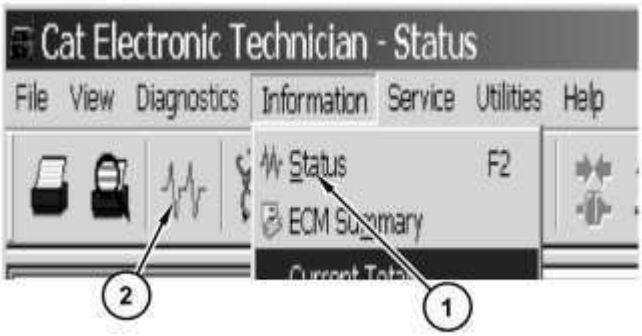


Illustration 29 g02174312

(1) Status on Menu Bar

(2) Status Icon on Tool Bar

2. Click "Status" (1) or click the "Status" icon (2) on the tool bar. Refer to Illustration 29.

The status groups should be used in order to verify that the installation of the PL420 module has been successful.

There are only three screens available in Cat ET for verifying and servicing the PL420 system.

"Status Parameters" Screens

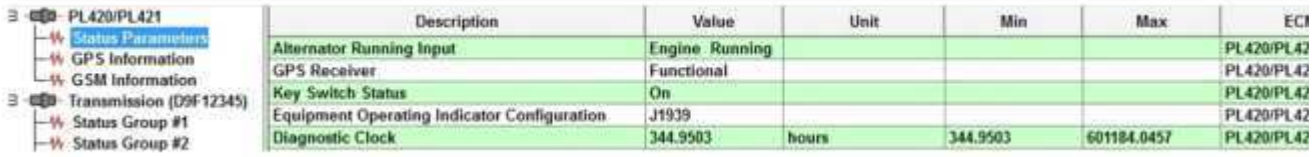


Illustration 30 g03

"Status Parameters" screen

Connected to PL420 showing status. The PL420 "Status Parameters" screens show the current operational status of the PL420. Refer to Illustration 30.

Table 3

Status Information for PL420	
PL420 Information	**Description**
GPS Receiver	Functional : The hardware for the GPS receiver is functional
	Not Functional : The hardware for the GPS receiver is not functional
Possible Device Power Disconnection	Yes : The PL420 has missed reports due to a power loss. This value is reset automatically after the status reported to the office.
	No : The PL420 has not missed any scheduled reports due to power loss.

"GPS Information" Status

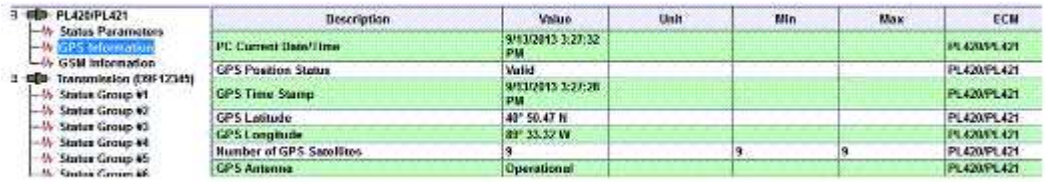


Illustration 31 g03609816

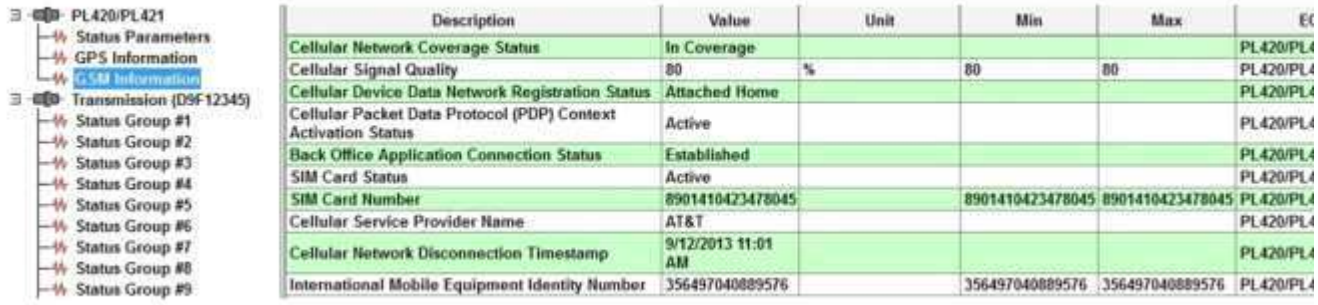
GPS information displayed

The PL420 "GPS Information" screen shows the status of the GPS. Refer Illustration 31. Refer to Table 4 for an explanation of the GPS-related parameters.

Table 4

GPS Information Parameters	
Status	**Description**
PC Current Date/Time	The current Date and Time of the host PC is displayed.
GPS Position Status	Valid: The Product Link Module has previously calculated a valid fix. Invalid: The Product Link Module has not calculated a previous fix.
GPS Time Stamp	The time stamp from the last fix is displayed. The time can be compared to the Current Date/Time to verify that the time since the last position was calculated.
GPS Latitude	The last valid GPS Latitude is displayed.
GPS Longitude	The last valid GPS Longitude is displayed.
Number of GPS Satellites	The number of GPS satellites currently in use by the GPS receiver. (1)
GPS Antenna	GPS Antenna Operational - The antenna is operational. GPS Antenna Fault - There is an issue with the antenna. GPS Antenna is not installed - The antenna is not installed or is disconnected.

(1) Three or more satellites are needed to get an updated position fix.



Description	Value	Unit	Min	Max	EC
Cellular Network Coverage Status	In Coverage				PL420/PL4
Cellular Signal Quality	80	%	80	80	PL420/PL4
Cellular Device Data Network Registration Status	Attached Home				PL420/PL4
Cellular Packet Data Protocol (PDP) Context Activation Status	Active				PL420/PL4
Back Office Application Connection Status	Established				PL420/PL4
SIM Card Status	Active				PL420/PL4
SIM Card Number	8901410423478045		8901410423478045	8901410423478045	PL420/PL4
Cellular Service Provider Name	AT&T				PL420/PL4
Cellular Network Disconnection Timestamp	9/12/2013 11:01 AM				PL420/PL4
International Mobile Equipment Identity Number	356497040889576		356497040889576	356497040889576	PL420/PL4

Illustration 32 g03

GSM information displayed

Table 5

Cellular Information Parameters	
Status	**Description**
Cellular network coverage status	In Coverage - Attached to network. Out of coverage - Not attached to network. Check Trimble Store subscriptions and SIM activation. Network Not Allowed - No coverage in the area from the SIM provider (or partner).
Cellular Signal Quality	Display percentage values (0 percent, 5 percent, 25 percent, 50 percent, 75 percent, and 100 percent). If a value is shown, a cell tower can be seen.
Cellular Device Data Network Registration Status	Searching - Device is currently trying to attach or searching a network to register to. Not Attached - Device is not attached to the network and is not searching a network to register to. Attached Home - Device is registered to a home network. Attached Roaming - Device is registered to a roaming network. Registration Denied - Device is not allowed to attach to the network. Authentication failure or GRPS service is not active. Unknown - Unknown error in registration process.
Cellular Packet Data Protocol (PDP) Context Activation Status	Active - Can communicate. Not Active - Cannot communicate. Likely incorrect APN or network denied. Missing or Unknown APN - Possible masterboard problem.
SIM Card Status	Active - Functional. Not Active - Contact DSN to have the SIM activated. Not Detected - Modem cannot detect the SIM card. Failure - Check activation with network. Possible failed SIM

	card. Need PIN - Obtain security PIN from SIM provider. Need PUK - SIM card is blocked. Need PUK from SIM provider to unlock SIM.
SIM Card Number	Unique identifier for the SIM card
Cellular Service Provider Name	SPN (Ex: AT&T, T - Mobile)
Cellular Network Disconnection Timestamp	Last time the cellular modem lost connection with the cellular network
International Mobile Equipment Identity Number (IMEI)	A unique 15-digit or 17-digit code used to identify a GSM device to the GSM network. IMEI number is used by the GSM network to identify valid devices.

Symptom Procedures

Electronic Service Tool Does Not Communicate with ECM

System Operation Description

During the installation of a PL420 system, the wiring harness is connected to the existing Data Link wiring on the truck. If the installation is not done properly, the continuity of the Cat Data Link wiring may be open intermittently. This condition may not be apparent immediately. Improper installation will cause a problem when you are trying to connect the Caterpillar Electronic Technician (Cat ET) service tool to the truck.

- Cat ET may report that no ECM has been found.
- Cat ET may not report every ECM that is on the truck.
- Cat ET may report an ECM but the ECM will not have any data.

If the Data Link wires for the PL420 are reversed, the ECM will not appear after connecting Cat ET.

Test Step 1. VERIFY THAT THE DATA LINK WIRES ARE NOT REVERSED.

A

Check that the positive Data Link wire (893-GN) in the wiring harness for the PL420 is connected to the wire (893-GN or 944-OR) of the wire harness for the truck.

B

Check that the negative Data Link wire (892-BR) in the wiring harness for the PL420 is connected to the negative Data Link wire (892-BR or 945-BR) of the wire harness for the truck.

Table 6

Voc Truck Factory Install Harness Wiring Chart		
Voc Truck PL420	**Function**	**Tyco Connector**
7	N/A	6
8	N/A	7
9	N/A	8
10	N/A	9
11	N/A	10
12	N/A	11
13	N/A	12
14	N/A	13
16	N/A	14
17	N/A	15
18	N/A	16
19	CAN +	17
20	CAN -	4
21	Ground	5
22	N/A	2
23	Ignition	3
24	BATT +	1

Expected Result

The Data Link wires are properly connected.

Results

- OK - The wires for the Data Link are properly connected. Proceed to ""Test Step 2" ".
- NOT OK - The wires for the Data Link are reversed.

Repair

Reinstall the Data Link wires correctly and check the operation of the PL420 module by using Cat ET.

STOP.

Test Step 2. CHECK THE WIRING WITH A MULTIMETER.

A

Turn off the truck and turn the disconnect switch to the OPEN position.

B

Measure the resistance of the negative Data Link wire from the service connector (contact "E") to the location for the spliced Data Link wire. Note the resistance.

C

Measure the resistance of the positive Data Link wire from the service connector (contact "D") to the location for the spliced Data Link wire. Note the resistance.

Expected Result

The resistance in both wires is less than 5 ohms.

Results

- OK - The resistance is less than 5 ohms. Proceed to ""Test Step 3" ".
- NOT OK - The resistance is greater than 5 ohms.

Repair

Repair the wiring harness. After repairing, resume the PL420 installation setup procedures.

STOP.

Test Step 3. VERIFY THAT THE WIRING FOR THE Data Link IS PROPERLY CONNECTED.

A

Check the spliced connections for the Data Link that were made during the installation. Verify that all connections are clean and tight.

B

Reconnect the harness connectors that were disturbed during the installation. Ensure that all of the pins are correctly seated in the sockets.

C

Reconnect the cable from the service tool connector. Attempt to access the Data Link by using Cat ET.

Expected Result

Cat ET lists the ECM systems that are available on the truck. The ECM for the PL420 can be accessed.

Results

- OK - Cat ET lists the electronic control modules that are available on the truck. The ECM for the PL420 can be accessed. Resume the setup procedures for the installation of the PL420. STOP.
- NOT OK – The Cat ET does not list the electronic control modules that are installed on the truck. The PL420 ECM cannot be accessed. Proceed to""Test Step 4" " .

Test Step 4. CHECK FOR A DIAGNOSTIC CODE FOR THE Data Link.

Check the monitoring system for a diagnostic code for the Data Link.

Expected Result

There is a diagnostic code for the Data Link.

Results

- YES - There is a diagnostic code for the Data Link .
- NO - There are no diagnostic codes for the Data Link. Proceed to ""Test Step 5" ".

Repair

Perform the troubleshooting procedure for that diagnostic code that is found in the service manual for that ECM.

STOP.

Test Step 5. RETURN THE WIRING TO THE ORIGINAL CONDITION.

A

Return the Data Link wires to the original condition. Remove any splices that were made and reconnect the wiring harness.

B

Connect Cat ET to the service connector. Verify that all of the appropriate electronic control modules are present. The ECM for the PL420 will not be present.

Expected Result

All of the appropriate electronic control modules are present.

Results

- YES - All of the appropriate electronic control modules are present. The wiring is correct. Return to the installation procedure for the PL420 and reinstall the wiring for the Data Link. Continue with the setup of the PL420. STOP.
- NO - All of the appropriate electronic control modules are not present.

Repair

A problem still exists with the Data Link wiring. This problem does not relate to the installation of the PL420. Troubleshoot the entire Data Link circuit to all available electronic control modules. After the problem is found and corrected, return to the installation procedure for the PL420. Reinstall the wiring for the Data Link. Continue with the setup of the PL420.

STOP.

Reports and Messages Not Available

System Operation Description

There are problems that could be reported with the PL420 system but the problems are not caused by the PL420 system. Check for active diagnostic codes for the PL420. Correct any diagnostic codes before proceeding. Visually inspect the following for damage: module, antenna, and cables. Verify that there are no loose connections.

The PL420 system depends on several communication links in order to transfer data from the truck to the office. The following procedures assume that these communication links are operating properly. The proper communication links are listed below:

- The cellular network for communications is operational in the geographic area of concern. The network is operational when messages can travel to the cell tower and then to Caterpillar.
- The PL420 system is correctly configured to communicate on the network for cellular communications. Correct configuration was verified during manufacturing tests.
- The PL420 is configured properly and the software is functioning. The PL420 module should not be replaced without verifying that these issues have been investigated. Contact your Caterpillar Technical Communicator for aid in resolving these issues.
- Subscriptions to the PL420 module must be up to the current date.

If reports and messages are not available, perform the following steps in order to determine the cause.

Test Step 1. ACCESS THE PL420 THROUGH CATERPILLAR ELECTRONIC TECHNICIAN (Cat ET).

A

Connect Cat ET to the truck.

B

Verify that the PL420 is present.

Expected Result

The PL420 is present.

Results

- OK - The PL420 is available. Proceed to ""Test Step 4" ".
- NOT OK - The PL420 is not present in the Cat ET screen.

Repair

Verify that the wiring for the PL420 has been installed correctly. Check the wiring with a multimeter. If the PL420 is not present, refer to ""Electronic Service Tool Does Not Communicate with ECM" ". STOP.

Test Step 2. VERIFY THAT THE PL420 MODULE HAS NOT BEEN DISABLED.

A

Go to the "Cellular Information" screen in Cat ET.

B

Verify that the "Cellular Network Coverage Status" is "In Coverage".

Expected Result

The "Cellular Network Coverage Status" module is "In Coverage", PL420 is reporting.

Results

- OK - The "Cellular Network Coverage Status" for PL420 is "In Coverage". Go to ""Test Step 4" ".
- NOT OK - The "Cellular Network Coverage Status" for PL420 is "Out of Coverage". Go to ""Test Step 4" ".
- NOT OK - The "Cellular Network Coverage Status" for PL420 is "Network Not Allowed". Go to ""Test Step 5" ".

Test Step 3. VERIFY THAT THE PL420 IS RECEIVING CELLULAR SIGNALS.

A

Go to the "Cellular Information" status screen in Cat ET.

B

Verify that the "Cellular Signal Quality" is greater than 25 percent.

C

Verify that the antenna is correctly installed.

D

Verify that the unit is in cellular map coverage of the provider.

Expected Result

The "Cellular Signal Quality" detected is greater than 25 percent.

Results

- OK - There is cell coverage in the area and the antenna is correctly installed. Proceed to ""Test Step 5" ".
- NOT OK - Either the unit is out of cell coverage or antenna is installed incorrectly. Verify that the unit is in cellular map coverage of the provider. Proceed to ""Test Step 7" " to check antenna installation.

Test Step 4. VERIFY THAT THE PL420 MODULE IS CONFIGURED PROPERLY.

A

Go to the "APN Configuration" screen.

B

Verify that the "APN Cellular Carrier" is configured to the correct cellular service provider.

C

Verify that the "APN Username" is configured to the correct cellular network. Refer to cellular provider for correct APN info.

D

Verify that the "APN Password" is configured with the correct password for cellular network. Refer to cellular provider for correct APN info.

E

Verify that the "APN SIM PIN" is configured with the correct SIM Card PIN. Refer to SIM Card Provider to determine and program SIM PIN.

Expected Result

All settings are correct.

Results

- OK - The PL420 is configured correctly. Proceed to ""Test Step 5" ".
- NOT OK – The PL420 is not configured correctly.

Repair

Correct the configuration of the PL420. The "APN Configuration" can be verified in the "Cellular Network Coverage Status" within "GSM Information" of Cat ET.

STOP.

Test Step 5. VERIFY THAT THE PL420 MODULE HAS NOT BEEN TURNED OFF.

A

Go to "Status Parameters" of Cat ET.

B

Verify the "Possible Device Power Disconnection" is Labeled as "No".

Expected Result

"Possible Device Power Disconnection" is Labeled as "No".

Results

- OK - The "Possible Device Power Disconnection" is Labeled as "No". The PL420 has operated since successfully transmitting the last report. Proceed to ""Test Step 6" ".
- NOT OK - The "Possible Device Power Disconnection" is Labeled as "Yes". The PL420 has been disconnected from power and transmissions have been prevented. The power loss could explain the failure to get any messages.

Repair

Turn on the unit.

STOP.

Test Step 6. CHECK FOR "ACTIVE" AND/OR "LOGGED" CODES FOR THE PL420 ECM.

A

Follow the steps in ""Connecting a Computer to the PL420" " in order to connect a laptop computer to the PL420 system.

B

Go to the menu bar for Cat ET. Select the "Diagnostics" tab. From the drop-down menu, choose the type of code. Choose "Active Codes" or "Logged Codes".

Results

- OK - There are no "active" or "logged" diagnostic codes. Proceed to ""Test Step 7" ".
- NOT OK - An "active" or "logged" diagnostic code exists.

Repair

Refer to theSystems Operation, Troubleshooting, Testing and Adjusting, REHS8143, "Diagnostic Code List", in order to correct possible problems.

STOP.

Test Step 7. CHECK THE INSTALLATION OF THE ANTENNA.

Observe installation of the antenna for the PL420. Verify that the antenna is installed with a clear view of the sky. The antenna must be in a location that is free from interference. Examples of interference include the following items:

- Devices on the roof of the truck that could potentially be sources of radio frequency interference
- Other antennas that are close to the antenna for the PL420.
- The truck is inside a metal building or another similar structure
- The truck is under large signs that are lighted
- The truck is under power lines

Note: Refer to ""Installation of the Antenna" " for additional details on optimal installation of the antenna.

Expected Result

The antenna is installed on the highest point on the truck. There is a clear view of the sky.

Results

- OK - The antenna for the PL522 and 523 is installed properly. Verify that all of the connections for the antenna are tight. Proceed to ""Test Step 8" ".
- NOT OK - The installation of the antenna is not optimal.

Repair

Accept the current performance of the communication or reinstall the antenna at a superior location.

STOP.

Test Step 8. VERIFY THAT THE ANTENNA IS NOT DAMAGED.

A

Visually inspect the antenna.

B

Disconnect the connection of the GPS antenna at the module.

Expected Result

The antenna has no physical damage.

Results

- OK - Replace the antenna with a known good antenna. Verify that communication is reestablished.
- NOT OK - Damage is found.

Repair

Replace the antenna assembly. Verify that the module is operating correctly.

STOP.

Position Reports Not Available

System Operation Description

This section contains steps that can be used to help determine the possible cause of erratic reports of interval. Check for active diagnostic codes for the PL420. Correct any diagnostic codes before proceeding. Visually inspect the following items for damage: PL420 module, antenna and cables. Verify that there are no loose connections.

The PL420 system depends on several communication links in order to transfer data from the truck to the office. The following procedures assume that these communication links are operating properly. The proper communication links are listed below:

- The network for cellular communications is operational in the geographic area of concern. The network is operational when messages can travel to the satellite and the messages can travel to the earth and Caterpillar.
- The PL420 system is correctly configured to communicate on the network for cellular communications. Correct configuration was verified during manufacturing tests.
- VisionLink is configured properly and the software is functioning. The PL420 module should not be replaced without verifying that these issues have been investigated. Contact the Caterpillar Technical Communicator for aid in resolving these issues. The unit is likely to have been configured correctly if the following occurs:

- The SMH report is received.

There is a probability that the system GPS has failed. Proceed with the following steps in order to determine the cause.

Test Step 1. ACCESS THE PL420 THROUGH CATERPILLAR ELECTRONIC TECHNICIAN (Cat ET).

A

Connect the Cat ET service tool to the truck.

B

Verify that the PL420 is present.

Expected Result

The PL420 is present.

Results

- OK - The PL420 is present. Proceed to ""Test Step 3" ".
- NOT OK – The PL420 is not present in the Cat ET screen.

Repair

Verify that the wiring for the PL420 has been installed correctly. Check the wiring with a multimeter. If the PL420 is not present, refer to ""Electronic Service Tool Does Not Communicate with ECM" ".

STOP.

Test Step 2. VERIFY IF THE TRUCK HAS MOVED

A

Verify if the truck has moved since the last known position report.

Expected Result

The truck has not moved.

Results

- OK - The truck has not moved. Therefore, the truck has not sent any position reports. STOP.
- NOT OK - The truck movement is unknown. Proceed to ""Test Step 3" ".

Test Step 3. VERIFY THAT THE GPS RECEIVER FUNCTIONS.

A

Select "GPS Information" for Cat ET.

B

Verify that the "GPS Position Status" is "Valid".

C

Verify that the GPS has calculated a location within the configured amount of time ("GPS Fix Validity Time Duration"). The "GPS Time Stamp" can be compared to the "PC Current Date/Time" in order to calculate the time since the last calculation of the position.

D

Select "Status Parameters". Verify "GPS Receiver" states "Functional".

Expected Result

The "GPS Position Status" is "Valid". The last calculation (GPS) of the position was within the configured amount of time ("GPS Fix Validity Time Duration") .

Results

- OK - The indications on the Cat ET screen are correct. The GPS Receiver is functioning properly. Proceed to ""Test Step 5" ".
- NOT OK - The indications on the "GPS Information" are incorrect. Proceed to ""Test Step 5" ".
- NOT OK - The indications on the "GPS Receiver" are not "Functional". Proceed to ""Test Step 5" ".

Test Step 5. VERIFY THAT THE ANTENNA IS NOT DAMAGED.

A

Visually inspect the antenna.

B

Disconnect the connection of the GPS antenna at the module.

Expected Result

The antenna has no physical damage.

Results

- OK - Replace the antenna with a known good antenna. Verify that communication is reestablished.
- NOT OK - Damage is found.

Repair

Replace the antenna assembly. Verify that the module is operating correctly.

STOP.

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