M0087660-03 (en-us)
July 2021

Operation and Maintenance Manual

Tire Monitoring System

ELK 2000-UP (Machine Control & Guidance Products)

Language: Original Instructions

Scan to access the latest service information, purchase additional media, and buy genuine Cat® parts.

Important Safety Information

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, including human factors that can affect safety. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you verify that you are authorized to perform this work, and have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the “Safety Alert Symbol” and followed by a “Signal Word” such as “DANGER”, “WARNING” or “CAUTION”. The Safety Alert “WARNING” label is shown below.

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

A non-exhaustive list of operations that may cause product damage are identified by “NOTICE” labels on the product and in this publication.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. You must not use this product in any manner different from that considered by this manual without first satisfying yourself that you have considered all safety rules and precautions applicable to the operation of the product in the location of use, including site-specific rules and precautions applicable to the worksite. If a tool, procedure, work method or operating technique that is not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that you are authorized to perform this work, and that the product will not be damaged or become unsafe by the operation, lubrication, maintenance or repair procedures that you intend to use.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Cat dealers have the most current information available.

NOTICE

When replacement parts are required for this product Caterpillar recommends using original Caterpillar® replacement parts.

Other parts may not meet certain original equipment specifications.

When replacement parts are installed, the machine owner/user should ensure that the machine remains in compliance with all applicable requirements.

In the United States, the maintenance, replacement, or repair of the emission control devices and systems may be performed by any repair establishment or individual of the owner's choosing.

Table of Contents

Foreword

Literature Information

This manual should be stored in the operator's compartment in the literature holder or seat back literature storage area.

This manual contains safety information, operation instructions, and maintenance recommendations.

Some photographs or illustrations in this publication show details or attachments that can be different from your product.

Continuing improvement and advancement of product design might have caused changes to your product which are not included in this publication. Read, study and keep this manual with the product.

Whenever a question arises regarding your product, or this publication, please consult your Cat dealer for the latest available information.

Safety

The safety section lists basic safety precautions. In addition, this section identifies the text and locations of warning signs and labels used on the machine.

Operation

The operation section is a reference for the new operator and a refresher for the experienced operator. This section includes a discussion of gauges, switches, product controls, attachment controls, and programming information.

Photographs and illustrations guide the operator through correct procedures of checking, starting, operating and stopping the product.

Operating techniques outlined in this publication are basic. Skill and techniques develop as the operator gains knowledge of the product and its capabilities.

Maintenance

The maintenance section is a guide to equipment care.

Safety Section

i06656312

Safety Messages

SMCS Code: 4203; 7490

Safety Messages

⚠ WARNING

Do not operate or work on this machine unless you have read and understand the instructions and warnings in the Operation and Maintenance manuals. Failure to follow the instructions or heed the warnings could result in injury or death. Contact your authorized dealer for replacement manuals. Proper care is your responsibility.

Operation

Clear all personnel from the machine and from the area.

Clear all obstacles from the path of the machine. Beware of hazards (wires, ditches, and so forth).

Be sure that all windows are clean.

Secure the doors and the windows.

If the machine is equipped with rear view mirrors, then adjust the mirrors according to the specifications of the Operation and Maintenance Manual.

Make sure that the horn, the travel alarm (if equipped), and all other warning devices are working properly.

Fasten the seat belt securely.

Warm up the engine and the hydraulic oil before operating the machine.

Only operate the machine when you are in a seat.

The seat belt must be fastened when you are operating the machine. Only operate the controls when the engine is running.

When you operate the machine slowly in an open area, check for proper operation of all controls and all protective devices. Before you move the machine, make sure that no one will be endangered. The machine can tip when you cross ditches, ridges, or other unexpected obstructions.

Do not allow riders on the machine unless the machine has the following equipment:

- Additional seat
- Additional seat belt
- Rollover Protective Structure (ROPS)

Note any needed repairs during machine operation. Report any needed repairs.

Avoid any conditions that can lead to tipping the machine. The machine can tip when you work on hills, on banks and on slopes. Also, the machine can tip when you cross ditches, ridges, or other unexpected obstructions.

Avoid operating the machine across the slope. When possible, operate the machine up the slopes and down the slopes.

Maintain control of the machine.

Do not overload the machine beyond the machine capacity.

Be sure that the hitches and the towing devices are adequate.

Never straddle a wire cable. Never allow other personnel to straddle a wire cable.

Before you maneuver the machine, make sure that no personnel are between the machine and the trailing equipment.

Always keep the “Rollover Protective Structure” (ROPS) installed during machine operation.

Regulatory Compliance Information

Radio Frequency Components

i08470808

Wireless Device
(Tire Monitoring System Display (APPPLS2) - If Equipped)

SMCS Code: 7008; 7600-ZM

sDoC

(Simplified Declaration of Conformity)

European Union

Caterpillar Inc. 100 NE Adams Peoria, IL 61529 USA

Hereby,Caterpillar Inc. declares this radio equipment is in compliance with directive “2014/53/EU” . The full text of the European Declaration of Conformity is available at the following web address:

https://www.cat.com/radio-compliance

Caterpillar suggests that the Declaration of Conformity is obtained shortly after purchase.

Specifications

The following communication device specifications are provided to aid in conducting any related hazard assessment and to ensure compliance with all local regulations:

Table 1

Tire Monitoring System			
Model	**Make**	**Part Number**	**Antenna**
APPPLS2	Display	563-2057	563-2058

Certification Notice

Australia Notice

The Cat APPLS2 Display is approved for use in Australia.

Complies with the following standard: ETSI EN 300–220–1

Canada Notice

This device complies with Industry Canada license exempt RSSs. Operation is subject to the following two conditions:

- This device may not cause interference
- This device must accept any interference, including interference that may cause undesired operation of the device.

This radio transmitter, IC ID: 4785A-APS2, has been approved by Industry Canada to operate.

FCC Notice

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with limits for a class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/tv technician for help

Changes or modifications to this device without the express approval of Caterpillar may void the users authority to use this device.

Certification Markings

Australia and New Zealand – This device is approved for use in Australia and New Zealand. Certification ID: 300-220-1

Canada – This device is approved for use in Canada. IC ID: 4785A-4R

India – This device is approved for use in India. Certification ID: ETA-SD-20200201734

Indonesia – This device is approved for use in Indonesia. Certification ID: 69432/SDPPI/2020

Israel – This device is certified and approved for use in Israel. 62525101

Thailand – This device is approved for use in Thailand. Certificate ID: 1010-2550

United States – This device is approved for use in the United States. FCC ID: RMD4R

i08470811

Wireless Device
(Tire Monitoring System Receiver (APPGLT) - If Equipped)

SMCS Code: 7008; 7600-ZM

sDoC

(Simplified Declaration of Conformity)

European Union

Caterpillar Inc. 100 NE Adams Peoria, IL 61529 USA

Hereby,Caterpillar Inc. declares this radio equipment is in compliance with directive “2014/53/EU” . The full text of the European Declaration of Conformity is available at the following web address:

https://www.cat.com/radio-compliance

Great Britain

Caterpillar Inc. 100 NE Adams Peoria, IL 61529 USA

Hereby,Caterpillar Inc. declares this radio equipment is in compliance with the relevant statutory requirements. The full text of the Great Britain Declaration of Conformity is available at the following web address:

https://www.cat.com/radio-compliance

Caterpillar suggests that the Declaration of Conformity is obtained shortly after purchase.

Specifications

The following communication device specifications are provided to aid in conducting any related hazard assessment and to ensure compliance with all local regulations:

Table 2

Tire Monitoring System			
Model	**Make**	**Part Number**	**Antenna**
APPGLT	Receiver	493-0506	493-6193

Certification Markings

Australia and New Zealand – This device is approved for use in Australia and New Zealand. Certification ID: 300-220-1

Canada – This device is approved for use in Canada. IC ID: 4785A-4R

India – This device is approved for use in India. Certification ID: ETA-SD-20200201734

Indonesia – This device is approved for use in Indonesia. Certification ID: 69432/SDPPI/2020

Israel – This device is certified and approved for use in Israel. 62525101

Thailand – This device is approved for use in Thailand. Certificate ID: 1010-2550

United States – This device is approved for use in the United States. FCC ID: RMD4R

i08470816

Wireless Device
(Tire Monitoring System Sensor (APS2) - If Equipped)

SMCS Code: 7008; 7600-ZM

sDoC

(Simplified Declaration of Conformity)

European Union

Caterpillar Inc. 100 NE Adams Peoria, IL 61529 USA

Hereby,Caterpillar Inc. declares this radio equipment is in compliance with directive “2014/53/EU” . The full text of the European Declaration of Conformity is available at the following web address:

https://www.cat.com/radio-compliance

Great Britain

Caterpillar Inc. 100 NE Adams Peoria, IL 61529 USA

Hereby,Caterpillar Inc. declares this radio equipment is in compliance with the relevant statutory requirements. The full text of the Great Britain Declaration of Conformity is available at the following web address:

https://www.cat.com/radio-compliance

Caterpillar suggests that the Declaration of Conformity is obtained shortly after purchase.

Specifications

The following communication device specifications are provided to aid in conducting any related hazard assessment and to ensure compliance with all local regulations:

Table 3

Specifications			
Model	**Frequency**	**Power**	**Voltage**
APS2	433.895 - 433.945 MHz	-18 dBm Typical 10 dBm Max	2.3V - 3.6V

Certification Notice

Australia Notice

The Caterpillar APS2 Sensor is approved for use in Australia.

Complies with the following standard: ETSI EN 300–220–1

Canada Notice to Users

This device complies with Industry Canada license exempt RSSs. Operation is subject to the following two conditions:

- This device may not cause interference
- This device must accept any interference, including interference that may cause undesired operation of the device.

FCC Notice

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with limits for a class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/tv technician for help

Changes or modifications to this device without the express approval of Caterpillar may void the users authority to use this device.

Certification Markings

Australia and New Zealand – This device is approved for use in Australia and New Zealand. Certification ID: 300-220-1

Canada – This device is approved for use in Canada. IC ID: 4785A-APS2

India – This device is approved for use in India. Certification ID: ETA-SD-20200201734

Indonesia – This device is approved for use in Indonesia. Certification ID: 69432/SDPPI/2020

Israel – This device is certified and approved for use in Israel. 71725-51

Thailand – This device is approved for use in Thailand. Certificate ID: 1010-2550

United States – This device is approved for use in the United States. FCC ID: RMDAPS2

Product Information Section

Identification Information

i06656331

General Information

SMCS Code: 4203; 7490

System Information

The part number for the system covered in this publication is 434 - 4542 Tire Monitor Gp.

For installation instructions of the 434 - 4542 Tire Monitor Gp , refer to Special Instruction, REHS9135.

System Overview

The Tire Monitoring System constantly monitors the pressure and temperature of each tire on the machine. The constant monitoring provides real-time information of the status of each tire. The information is displayed through the Messenger display.

The Tire Monitoring System has the following features:

- Monitor the pressure and temperature of each tire.
- Monitor Active and Logged Events
- Axle configuration information
- Sensor installation status

Tire Maintenance

Proper tire maintenance is critically important for reducing tire operating expense. When properly maintained and inflated, tires will provide proper vehicle handling and operation with maximum tire lifetime.

Tire Monitoring System Maintenance

Inspect all clamps, guards, clips, and straps for proper installation. Attach electrical wiring to hoses and tubes that contain flammable fluids or combustible fluids should be avoided. Keep wiring and electrical connections free of debris.

Electrical wires should be checked daily. If any of the following conditions exist, parts must be replaced before the machine is operated.

- Fraying
- Signs of abrasion or wear
- Cracking
- Discoloration
- Cuts on insulation
- Other damage

Operation Section

Operation

i07281374

Basic Operation

SMCS Code: 4203; 7490

The graphical display can be used to view information regarding the pressure and temperature of each tire. Only check the tires when the machine is stopped and in a safe location. Never check the status of a tire when the machine is in motion.

The following parameters can be viewed through the graphical display.

- Tire temperature
- Tire pressure

The following parameters can be changed through the graphical display:

- Installation status and sensor ID for all tires
- Configuration of the nominal “cold” inflation pressure for each axle
- Configuration of the percentage threshold (below nominal) for the “low pressure” (WL1) and “very low pressure” (WL2) events
- Configuration of the percentage threshold (above nominal) for the “high pressure” (WL2) event

Graphical Display Operation

The graphical display contains three components related to the tire monitor:

- Parameter screen contains live readings of the pressure and temperature
- Configuration screen allows configuration of the tire sensors, cold inflation pressure, and alert percentages
- Fault indicator will pop up on the lower section of the screen when a fault related to the tire monitor occurs

Machine Parameters

Pressure / Temperature Readings

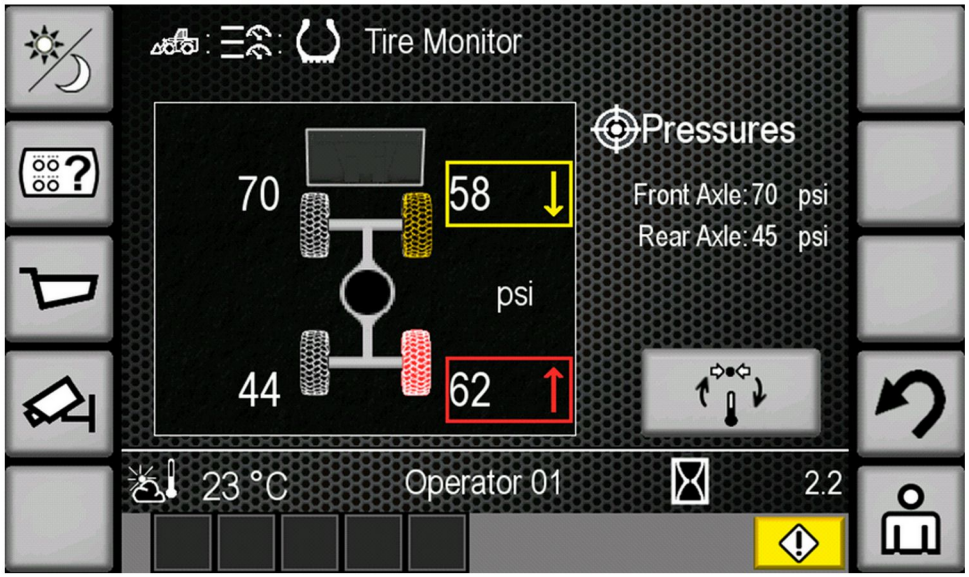

Illustration 1 g06274582

Displays a top down view of the machine with pressure or temperature readings for each tire. Pressure for a particular tire is low or high, the system will highlight that tire with a yellow (low severity) or red (medium severity) box. The system uses an arrow indicator to specify whether pressure is low (down arrow) or high (up arrow).

Pressure / Temperature Toggle

Press this button to switch between pressure or temperature display.

Target Pressure

Displays the target cold inflation pressures configured for each axle.

Note: Tire readings can take up to five minutes to appear after the machine is initially keyed on.

Configuration

Service Mode

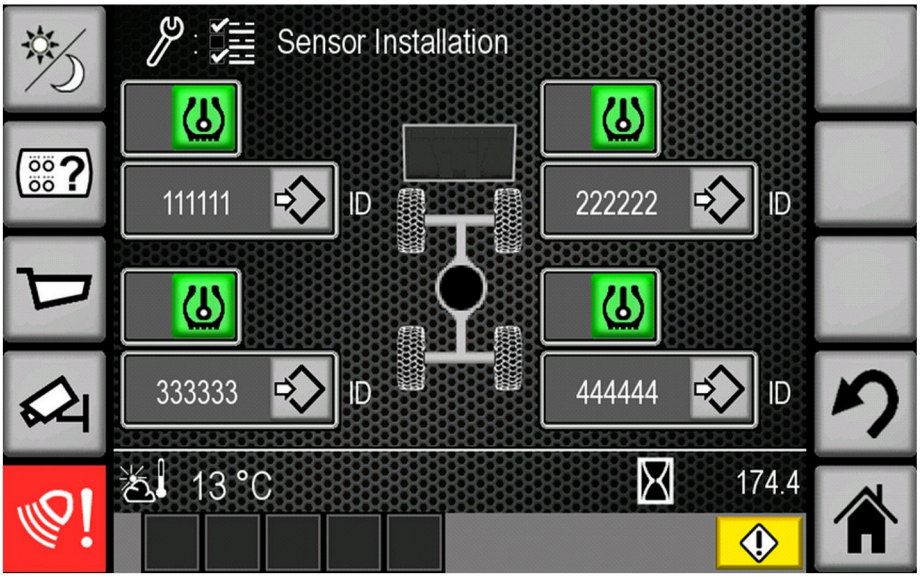

Illustration 2 g06274583

The settings for the tire monitor require the “Service Mode” to be enabled. The “Service Mode” protects certain features from access by the operator. These features include the “Configurations” menu, “Calibrations” menu, and the ability to mark “Service Complete” in the “Preventive Maintenance” feature. To enable the “Service Mode” , enter the “Service Mode” password and set the “Service Mode” to “Enabled” .

Note: The password is set from the factory but can be changed via “Electronic Technician” (ET). Consult your Cat Dealer to access.

Sensor Installation

After enabling the “Service Mode” , go to: “Configurations” , “Tire Monitor” , “Sensor Installation” . This screen is used to enable/disable individual tire sensors and program tire sensor IDs.

Tire sensors are enabled by default. To disable a sensor, press the green toggle button on the screen for that particular tire. When disabled, pressure and temperature will not be monitored and fault indicators will be disabled for that tire. Press the toggle button again to enable that tire sensor.

When enabled, the tire sensor ID can be entered if a new tire sensor is being installed on the machine. Press the “Enter” button for that particular tire to type in the 6-digit tire sensor ID. This ID is printed on 493 - 0508 Pressure Sensor. Valid digits are 0 through 9 or A through F.

After entering the tire sensor ID, key off the machine and firmly install the tire sensor on the tire valve stem. Ensure that the physical tire location matches the tire location programmed on the display. Next, key on the machine and navigate to the tire monitor parameters screen. Check that the tire pressure and temperature are properly displayed.

Note: Tire readings can take up to five minutes to appear after the machine is initially keyed on.

Cold Inflation Pressure

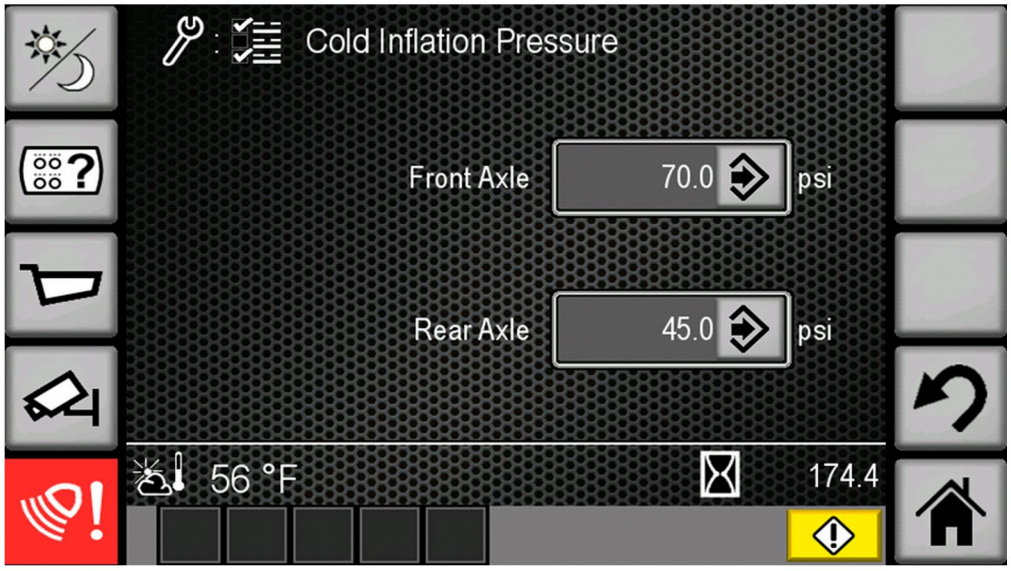

Illustration 3 g06274598

After enabling “Service Mode” , go to: “Configurations” , “Tire Monitor” , “Cold Inflation Pressure” to adjust the “Nominal” cold inflation pressure for each axle.

It is best practice to inflate tires to this pressure early in the morning when tires are cold. For inflation guidelines refer to Operation and Maintenance Manual, SEBU9245.

Pressure Alert Threshold

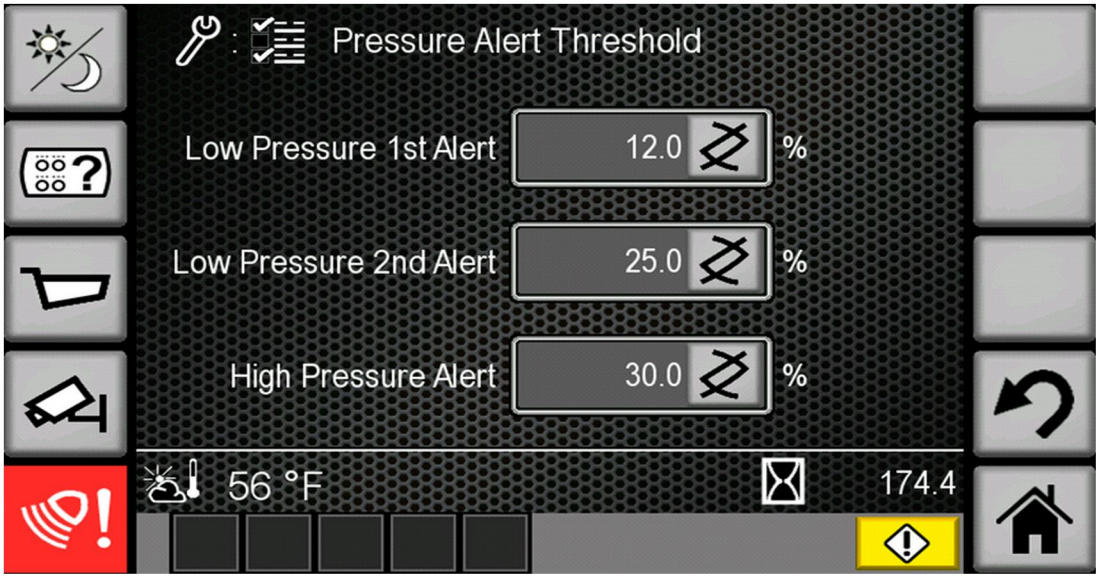

Illustration 4 g06274608

To adjust the thresholds that will influence when the low and high-pressure events will trigger, go to: “Configurations” , “Tire Monitor” , “Pressure Alert Threshold” after enabling the “Service Mode” .

The pressure at which a low-pressure event will trip is calculated by the following equation:

((100 Minus Low Pressure Percentage) Multiply by Cold Inflation Pressure) Divide by 100

The pressure at which a high-pressure event will trip is calculated by the following equation:

((100 Plus High Pressure Percentage) Multiply by Cold Inflation Pressure) Divide by 100

Note: There are separate thresholds for the first alert (WL1) and second alert (WL2) for the low-pressure event.

i07314589

Event Codes

SMCS Code: 4203; 7490

Event codes alert the operator or the technician that an abnormal operating condition exists in one of the machine systems.

When the tire pressure monitoring ECM activates an event code, the operator or the technician will be alerted by the Messenger display. Most active events will be logged by the ECM. Some events are active only. Active only events are not logged. The events that are active and the events that are logged can be viewed with the following equipment:

Fault Indicators

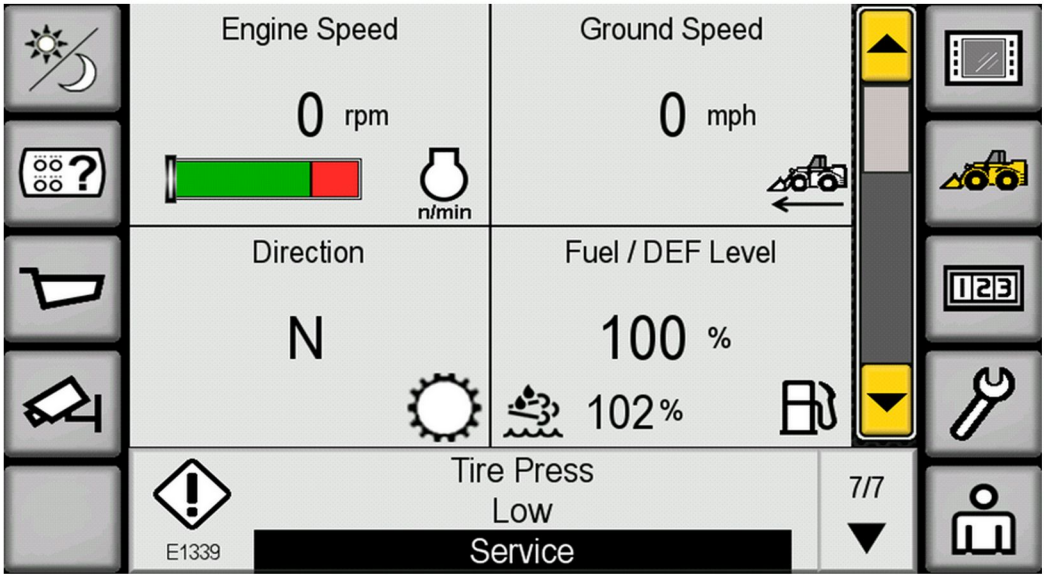

Illustration 5 g06274612

Fault indicators alert the operator or the technician that an abnormal operating condition exists in one of the machine systems. When the Tire Monitoring System ECM activates an event code, the operator or the technician will be alerted by the Tire Monitoring System display. The events that are active and the events that are logged can be viewed with the following equipment Tire Monitoring System display.

The lower area of the graphical display is reserved for fault indicator pop-ups.

Table 4

Fault Codes		
Fault Codes	**Description**	**Problem**
D3473-9	Tire Monitoring Module: Abnormal Update Rate.	The receiver device is not communicating on the CAN J1939 datalink.
D3474-4	Left Front Tire Pressure/Temperature Sensor: Voltage Below Normal.	The left front tire sensor has a low battery.
D3474-9	Left Front Tire Pressure/Temperature Sensor: Abnormal Update Rate.	The left front tire sensor is not communicating, missing, or programmed with an incorrect ID.

(continued)

(Table 4, contd)

Fault Codes		
Fault Codes	**Description**	**Problem**
D3474-13	Left Front Tire Pressure/Temperature Sensor: Out of Calibration.	The left front tire sensor ID has not been programmed.
D3475-4	Right Front Tire Pressure/Temperature Sensor: Voltage Below Normal.	The right front tire sensor has a low battery.
D3475-9	Right Front Tire Pressure/Temperature Sensor: Abnormal Update Rate.	The right front tire sensor is not communicating, missing, or programmed with an incorrect ID.
D3475-13	Right Front Tire Pressure/Temperature Sensor: Out of Calibration.	The right front tire sensor ID has not been programmed.
D3745-4	Left Rear Tire Pressure/Temperature Sensor: Voltage Below Normal.	The left rear tire sensor has a low battery.

(continued)

(Table 4, contd)

Fault Codes		
Fault Codes	**Description**	**Problem**
D3745-9	Left Rear Tire Pressure/Temperature Sensor: Abnormal Update Rate.	The left rear tire sensor is not communicating, missing, or programmed with an incorrect ID.
D3745-13	Left Rear Tire Pressure/Temperature Sensor: Out of Calibration.	The left rear tire sensor ID has not been programmed.
D3746-4	Right Rear Tire Pressure/Temperature Sensor: Voltage Below Normal.	The right rear tire sensor has a low battery.
D3746-9	Right Rear Tire Pressure/Temperature Sensor: Abnormal Update Rate.	The right rear tire sensor is not communicating, missing, or programmed with an incorrect ID.
D3746-13	Right Rear Tire Pressure/Temperature Sensor: Out of Calibration.	The right rear tire sensor ID has not been programmed.
E1205	Low Left Front Tire Pressure.	Pressure in the left front tire is low.
E1206	Low Right Front Tire Pressure.	Pressure in the right front tire is low.
E1211	High Left Front Tire Pressure.	Pressure in the left front tire is high.
E1212	High Right Front Tire Pressure.	Pressure in the right front tire is high.
E1338	Low Left Rear Tire Pressure.	Pressure in the left rear tire is low.
E1339	Low Right Rear Tire Pressure.	Pressure in the right rear tire is low.
E1340	High Left Rear Tire Pressure.	Pressure in the left rear tire is high.
E1341	High Right Rear Tire Pressure.	Pressure in the right rear tire is high.

Index

Product and Dealer Information

Note: For product identification plate locations, see the section “Product Identification Information” in the Operation and Maintenance Manual.

Delivery Date: _____

Product Information

Model: _____

Product Identification Number: _____

Engine Serial Number: _____

Transmission Serial Number: _____

Generator Serial Number: _____

Attachment Serial Numbers: _____

Attachment Information: _____

Customer Equipment Number: _____

Dealer Equipment Number: _____

Dealer Information

Name: _____ Branch: _____

Address: _____

_____

_____

	Dealer Contact	Phone Number	Hours
Sales:	_____	_____	_____
Parts:	_____	_____	_____
Service:	_____	_____	_____