M0071030-10 (en-us)
February 2024

Operation and Maintenance Manual

Driver Safety System

SSX 1-UP (CATSAFETY)

Language: Original Instructions

Scan to find and purchase genuine Cat® parts and related service information.

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.

Regulatory Compliance Information

Radio Frequency Components

i08703291

Wireless Device
(Driver Safety System - If Equipped)

SMCS Code: 7008; 7600-ZM

⚠ WARNING

Care must be taken in handling lithium batteries.

Lithium batteries are not a serviceable part.

Personal injury can result from battery exploding.

Caution must be used because there is risk of an explosion if the battery is replaced by an incorrect type.

Do not dispose of battery or batteries in a fire. The battery is capable of exploding and emitting caustic chemicals.

Dispose of used batteries according to federal and local laws.

sDoC

(Simplified Declaration of Conformity)

European Union

Caterpillar Inc. 100 NE Adams Peoria, IL 61629 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 61629 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 Driver Safety System communication device specifications are provided to aid in conducting any related hazard assessment and to ensure compliance with all local regulations:

Table 1

WiFi (IEEE 802.11b/g/n)	
Type	**Specification**
Frequency Range	2.412 - 2.472, 2.484 GHz(1)
Output Power(2)	17 dBM
Channel Space	5 MHz
Modulation Type	OFDM, CCK, DQPSK, BPSK
Antenna gain/type	4.93 dBi / Coax RP SMA

(1) The 2.484 GHz applies only in Japan
(2) Maximum RMS output power measured at 1dB from IEEE spectral mask or EVM

Table 2

Bluetooth	
Type	**Specification**
Frequency Range	2402 - 2483 MHz
Output Power	6.98 dBm
Channel Space	1MHz
Modulation Type	GFSK, 4- DQPSK, 8DPSK
Antenna gain/type	4.93 dBi

Table 3

Bluetooth (Low Energy)	
Type	**Spec**
Frequency Range	2402 - 2480 MHz
Output Power	3.55 dBm
Channel Space	2 MHz
Modulation Type	GFSK
Antenna gain/type	4.93 dBi

Table 4

Cellular					
Mode	**Tx Freq (MHz)**	**Rx Freq (MHz)**	**Power (W)**	**Modulation**	**Antenna gain/ type**
GSM850	824 - 849	869 - 894	1.648	GMSK /8PSK	2.14 dBi Coax Standard SMA
EGSM900	890 - 915	935 - 960	1.955	GMSK /8PSK	
	880 - 890	925 - 935	1.955	GMSK /8PSK	
DCS1800	1710 - 1785	1805 - 1880	1.0	GMSK /8PSK	
PCS1900	1850 - 1910	1930 - 1990	0.793	GMSK /8PSK	
WCDMA850 (band V)	824 - 849	869 - 894	0.238	QPSK	
WCDMA900 (band VIII)	880 - 915	925 - 960	0.25	QPSK	
WCDMA1700 (band IV)	1710 - 1755	2110 - 2155	0.233	QPSK	
WCDMA1900 (band II)	1850 - 1910	1930 - 1990	0.234	QPSK	
WCDMA2100 (band V)	1920 - 1980	2110 - 2170	0.25	QPSK	

Table 5

GPS	
Frequency Range	1575.42 MHz

Table 6

Camera	
Type	**Spec**
IR LED Driver Supply Voltage	12V
Peak Supply Current @ 12V (IR-Pods connected and activated)	4000 mA
Average Supply Current @ 12V (IR-Pods connected and activated)	140 mA
Module Supply Voltage	5A
Strobe pulse Frequency (DSS software controlled)	60Hz
Strobe pulse Width (DSS software controlled)	0.1 to 2.4 mS
Max strobe pulse (Limited by IR Driver)	2.4mS
Absolute Maximum Specifications	
Maximum Supply Voltage – Camera Module	5.5V
Maximum Supply Voltage -IR Driver	15W 1.33A

Table 7

Speaker	
Power	5W
Impedance	8 Ohms

Table 8

Electric Motor (Vibration)	
Supply Voltage	12V (14.5V Max)
Supply Current	.5A

Table 9

Electronic Control Module (ECM)	
Type	**Spec**
Supply Voltage	12V
Supply Current @ 12V Standard setup: camera, 2 IR-Pods, GPS, Speaker, DSS software tracking	1.6A
Supply Current @ 12V Standard setup with vibration motor running and optional Maintenance Box (DS-MAIN)	3.5A
Standby Current (Powered down, IGN low)	<1mA
GPIO Combined 12V Output Current	2A
GPIO Combined 5V Output Current	2A
GPIO Logic Output Voltage	5V
GPIO Maximum Output Current	0.3mA
GPIO Input High-Voltage Threshold	2.5V
GPIO Input Low Voltage Threshold	1.9V
Vibration Alert Output Voltage	12V
Vibration Alert Maximum Current (Limited)	1.5A
Absolute Maximum Specifications	
Maximum Supply Voltage (Over Voltage Protected)	31V
Maximum Power Consumption	100W
GPIO Input Voltage Max	16V
GPIO Input Voltage Min	-0.5V
Fuse Rating Type: 250V Time Lag	10A

Table 10

GPS	
Supply Voltage	4.75 - 5.25V
Supply Current	29 mA

Certification Notices

Canada Notice to Users

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. Complies Class A digital apparatus ANSI C63.2 and ANSI C63.4:2009 Industry Canada ICES-003.

FCC Notice

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

1. This device may not cause harmful interference.

2. This device must accept any interference received, including interference that may cause undesired operation. This equipment has been tested and found to comply with the 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 may void the users authority to use this device.

Certification Markings

Indonesia – 53101/SDPPI/2017 3130

Austrailia – R-NZ

Brazil – Approval No.06784–17–07855

EAEU – (Russia, Belarus, Kazakhstan, Armenia, Kyrgyzstan)

Mexico

New Zealand – R-NZ

South Africa

Ukraine – 028

Zambia – ZMB / ZICTA / TA / 2017 / 9/ 3

Product Information Section

General Information

i10067662

General Information

SMCS Code: 7220

Note: Driver Safety System (DSS) 5.0 controller is not compatible with v4.6.4 and earlier software.

DSS Operation

The Caterpillar Driver Safety System (DSS) operates using near-infrared (IR) LEDs, centered on wavelengths at 850 N·m (626 lb ft) (mining systems) and 940 N·m (693 lb ft) (Guardian 2). These wavelengths allow the operator of the vehicle to be illuminated using a non-visible portion of the light spectrum. This avoids distracting the operator of the vehicle while providing DSS with a properly illuminated image.

Subcription Required

DSS is a subscription based fatigue management solution. To confirm availability and to purchase a subscription terms, contact your Cat ® dealer. For more information on subscription terms, please visit:

https://www.caterpillar.com/content/caterpillarDotCom/en/legal-notices/minestar-software-end-user-agreement

Cat ® MineStar reseller agreement is required prior to any Caterpillar dealer selling Cat MineStar technologies.

A Cat MineStar subscription purchase agreement is required prior to any DSS device connected to DSSi server. Contact your Cat dealer for more information. This applies to any use whether for trial or exploratory with limited or no network coverage.

By installing this product, you are agreeing to the terms stated in the most recent software end user agreement and acknowledge that you have an executed the Cat MineStar software purchase agreement for DSS.

The Customer Requirements Document (CRD) is required prior to DSS device connectivity to DSSi.

Intended Use

DSS is intended to provide non-intrusive fatigue and distraction notifications to operators and site management. When DSS is combined with fatigue management, the system is proven to help reduce the number of fatigue related incidents and the probability of accidents during operations. Use of this system does not replace other safety precautions and procedures for operating a machine. Refer to the Operation and Maintenance Manual of the machine for additional information. DSS is not intended to be the sole or fail-safe solution for fatigue management. DSS is a tool that should be used in conjunction with properly trained operators, safety and compliance management, sound operational safety policies and procedures, and additional safety and fatigue management systems.

DSS Face and Eye Tracking

DSS is intended to track the unobstructed head and eyes of an operator. Eyewear and certain combinations of facial features and other facial wear, can limit or prevent the system from functioning correctly. Examples of the types of facial features or facial wear that might affect the functioning of DSS include eyewear, masks, scarfs, facial hair, and tattoos. DSS may also not detect all eye closure and distraction events due to the immeasurable combination of facial features, face coverings and other variances that, in many cases, might be unique to each individual operator. For detailed information contact your Cat ® dealer for additional support.

Eyewear Recommendations

The DSS camera must clearly “see” the operator’s eyes to detect closure. Eyewear which does not meet minimum specifications will block and/or reflect the IR light, preventing the camera from accurately detecting eye closure. To maximize DSS effectivity, eyewear must allow IR light to pass through and minimize reflected IR light. Transmission must be at least greater than 50 percent, although greater than 80 percent is recommended. Eyewear with light colored and thin frames is recommended. Eyewear frames greater than 4 mm (0.1 inch) on the lower portion of eyewear may impact the ability of the system to accurately detect eye closure and are not recommended.

Reflection must be less than 20 percent, although less than 10 percent is recommended. To further minimize reflection, curved lenses are recommended. Eyewear with flat lenses is more likely to reflect IR light toward the DSS camera.

Ensure Driver Facing Camera (DFC) adjustment and proper mounting of mining IR lights has been accomplished.

Control – Ruggedized, fanless, high-powered computer is the core of the DSS

Camera and Infrared (IR) Lights – For eye and face tracking. The camera also measures hard braking and cornering or impacts

Speaker – Plays audible operator alerts

Global Positioning System (GPS) Module – Tracks location and determines speed and direction of the vehicle

Electric Motor – Vibrates the seat to alerts operator

System Overview

Illustration 1 g07745967

Driver Facing Camera Event Screen

(1) DSS Processor # and OS Version
(2) Fleet Name / Local Time Setting
(3) Alarms
(4) Confirmation
(5) Acknowledgement
(6) Location (GPS)
(7) Time of start FOV event
(8) Duration of event
(9) Time from start of trip
(10) Total driving time this trip
(11) Distance travelled during trip
(12) Total time not driving this trip
(13) Distance during event
(14) Speed at start of event
(15) Picture when system tracking returns inside of cab
(16) Detection
(17) Start frame

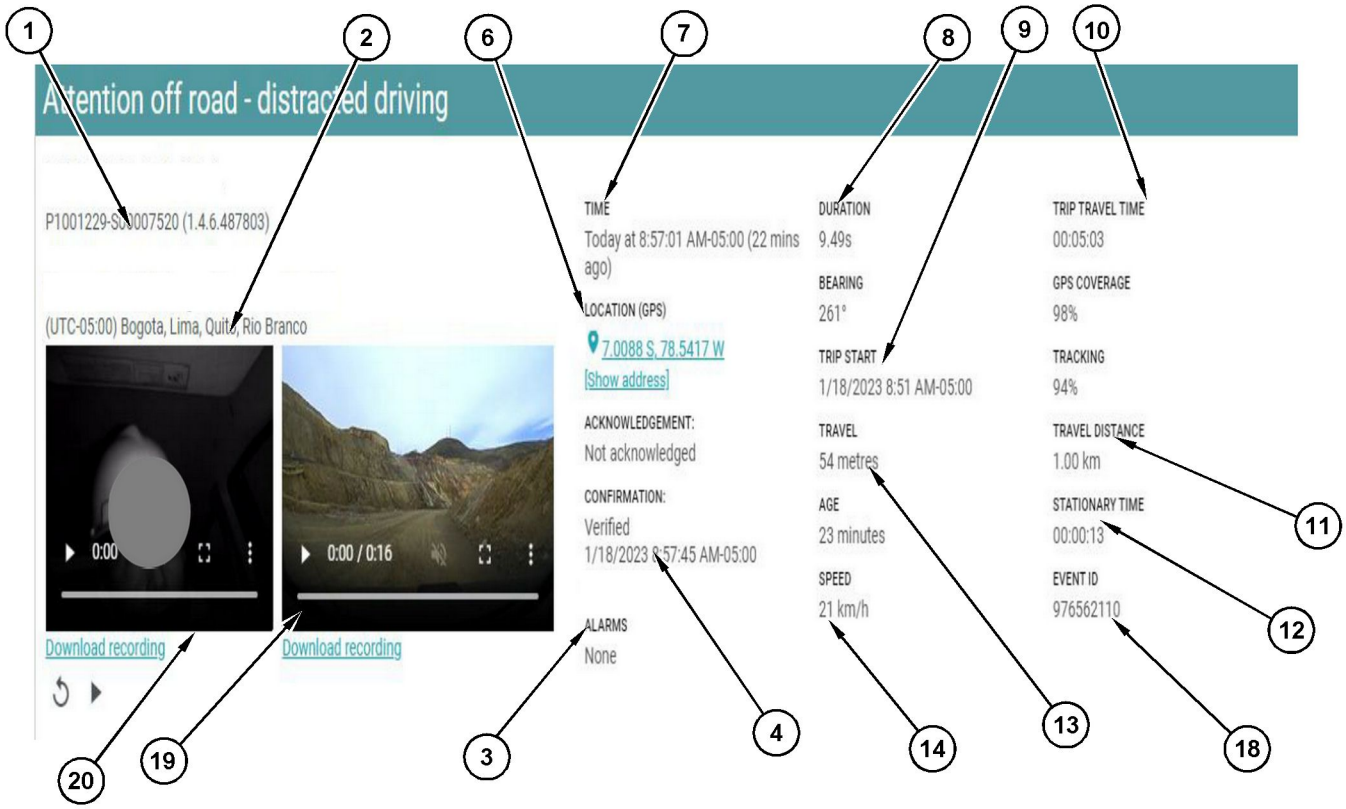

Illustration 2 g07745968

DSS event detection screen

(1) DSS Processor # and OS version
(2) Fleet Name / Local time setting
(3) Alarms
(4) Confirmation
(5) Acknowledgement
(6) Location (GPS)
(7) Time of start FOV event
(8) Duration of event
(9) Time from start of trip
(10) Total driving time this trip
(11) Distance travelled during trip
(12) Total time not driving this trip
(13) Distance during event
(14) Speed at start of event
(15) Picture when system tracking returns inside of cab
(16) Detection
(17) Start frame
(18) Event Id
(19) Forward Facing Camera
(20) Driver Facing Camera

DSS Processor # and OS Version (1) – Displays the DSS processor number and the current operating system software version.

Fleet Name / Local Time Setting (2) – Displays the fleet name and local time calculation (location).

Alarms (3) – LV has alarm, HME has no alarm.

Confirmation (4) – Time FOV was verified by CMC. This can be delayed if the communication signals are poor.

Acknowledgment (5) – This shows the acknowledgment

Location (GPS) (6) – GPS location at start of event.

Time of start FOV event(7) – This is the time of start FOV event.

Duration of event (8) – This shows the duration of event.

Time from start of trip (9) – Total trip time when event detected.

Total driving time this trip (10) – Time from start of shift.

Distance during event (13) – This shows the distance during event.

Speed at start of event (14) – This indicates the speed at start of event.

Detection Frame(16) – Picture when system becomes aware of FOV inside cab,

Start Frame (17) – Picture before the FOV starts. Full picture of face.

Detected Event Type (14) – DSS classification type.

Event Id (18) – This shows the event Id

Forward Facing Camera (19) – Shows the view of the forward facing camera.

Driver Facing Camera (20) – Shows the view of the driver.

System Operation

How the System Works

Note: DSS controllers may not have current software installed from factory. All DSS controllers require imaging to the latest software upon initial installation.

The system measures the amount of eyelid closure and the position of the head of the driver when the vehicle is in motion at a defined rate of speed set by the customer.

When the system detects eye closure or head movement that exceeds the parameters set, an event is recorded. The event triggers an alarm in the cabin and vibrates the seat of the operator. Subject to network connectivity and an active subscription, the system uploads the event to the DSS database for near real-time analysis by a trained monitor at the 24/7 monitoring center.

A human intervention layer for confirmed fatigues is implemented through an agreed “Fatigue Intervention Plan” with the company. Regular reporting provides managers with business intelligence to effect change to the root cause of fatigue in the business.

Refer to Special Instruction, M0134631, “Procedure to Install and Configure Driver Safety System (DSS) v5.0”, for complete installation and configuration information.

Note: This publication is available from your Cat ® dealer.

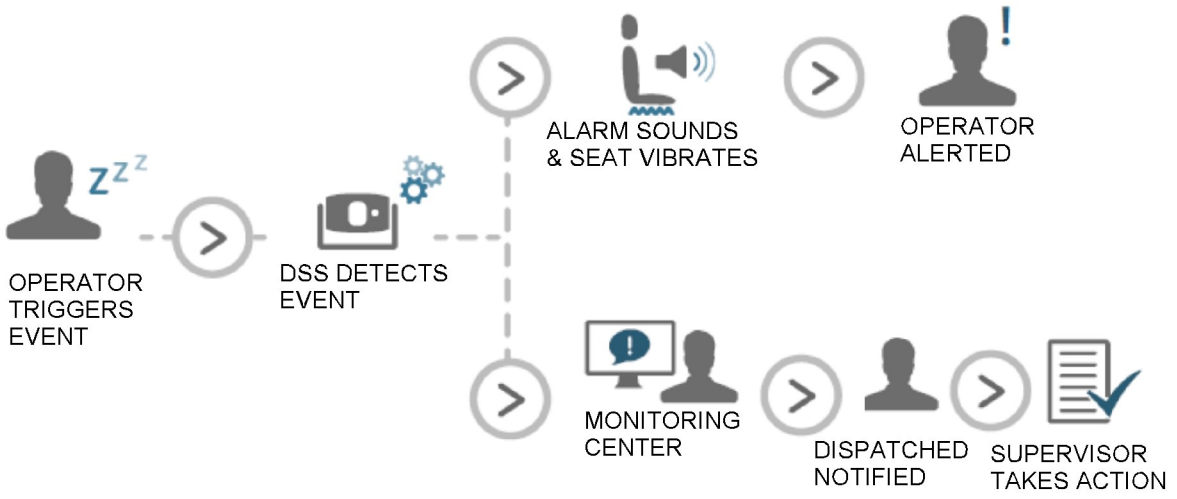

Illustration 3 g06137045

The following describes the process of the DSS once an event has been triggered:

- Operator triggers an event
- DSS detects the event
- Alarm sounds and seat vibrate
- Event sent to the monitoring center
- Operator alerted
- Dispatch is notified
- Supervisor action taken

Data Communication Disclaimer

The system is designed to have a network and cloud connection and Caterpillar monitoring connectivity points for optional experience.

If the DSS technology is not connected to a network, Caterpillar monitoring will be available.

If the system is operating without the above connectivity points, the in-cab system and operator alerts may fail to work properly.

No DSS device installed at a customer site will be monitored or set up for monitoring by Caterpillar without a signed software purchase agreement.

Any DSS hardware or software installed and transmitting data like images, video, data, meta-data offboard to Cat staging will not be monitored by Caterpillar until requested to migrate to DSSi.

Any customer electing to discontinue use of DSS must submit a Technology Solution Center (TSC) support ticket requesting termination of use for DSS. Upon such requests Caterpillar will confirm the request via site approver as identified in the CRD.

A Customer Requirements Document (CRD) site approver must confirm approval to below terms prior to Caterpillar execution of the request:

- Discontinue Caterpillar monitoring of requested DSS installed device(s).
- Disable all accounts (user accounts and device accounts).
- Any continuation of hardware or software as an onboard fatigue monitoring system may result in poor or failure of operation including operator alerts.

Review Event Data

The reviewing manager sees only the in-cab footage during the event (approximately 3-5 seconds). DSS is not a closed caption television. Authorized personnel can only see that footage after an event has occurred.

Data Access

The data can only be accessed by authorized personnel in the company.

An Alarm Goes Off And Driver Is Not Fatigued Or Distracted

The camera is designed to track eye and head movements. If the eye or head movement exceeds the set parameters, the operator will get an alarm.

A safety advisor at the 24/7 Monitoring Center reviews all data to determine whether an actual event is occurring before notifying the company. Only verified events are reported to the company. DSS is designed to prevent operators from fatigue and distraction during operations.

The Sensors Are Obstructed

The system will register an event called a “Field of View Exception” . If covered, the system will not work and the management will be advised.

A full image of the cab prior to the sensor being covered will be provided to the supervisor.

i10067679

System Components
(Driver Safety System (DSS))

SMCS Code: 7220

The Driver Safety System (DSS) consists of the following components:

- Control
- Power Cable
- Camera
- Forward Facing Camera (FFC)
- Infrared (IR) lights
- Speaker
- Global Positioning System (GPS) module
- Electric motor (vibration)
- Ethernet Cable
- WiFi/Bluetooth Antenna (Optional for v4.0 model only)
- GSM/WiFi Antenna

Control

The core of the DSS is a ruggedized, fanless, high-powered control. The following features of the control are:

- Connects all components
- Processes all events

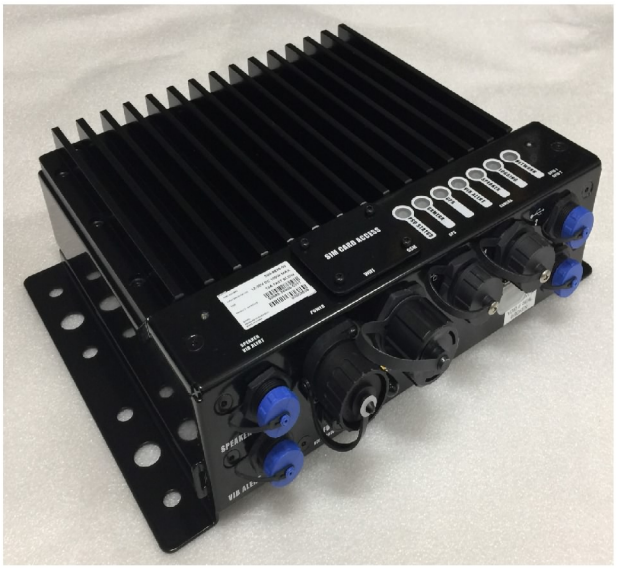

Illustration 4 g06186038

Version 5.0 control

The features of the v5.0 Control are the same as 4.0 with the following exceptions:

- Removed Built-In GSM Modem
- WiFi and GSM Antenna connections
- GSM SIM card slot (GSM card not provided)

Camera and Infrared (IR) Lights

For eye and face tracking. The camera also measures hard braking and cornering or impacts.

Note: Use a T6 security torx bit to open IR Pod covers to adjust the IR lights towards operator face.

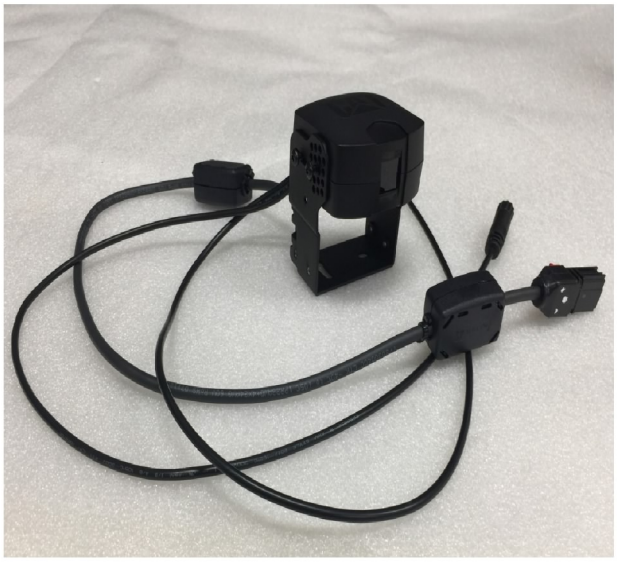

Illustration 5 g06186096

Version 4.0 Camera

Illustration 6 g06266754

Version 4.0 Camera Cable

The following are features of the camera:

Note: Use a T10 security torx bit for vertical adjustment of the camera.

- Camera tracks the eyes and head position for event analysis
- Built in buzzer
- Built in test button (hold for 2 seconds until audio from speaker initiates “System Testing”
- 30 cm (11.81 inch) molex connector cable attached to the camera.
- 5 m (16.4 ft) long IP67 USB cable split molex connector and GPIO connector
- Built in LED as indicator for diagnostic status
- Larger ferrite beads on cables

Illustration 7 g06642837

Forward Facing Camera (FFC)

Illustration 8 g06642839

Forward Facing Camera (FFC) Cable

The following are features of the Forward Facing Camera:

- The Forward Facing Camera captures the driver's point of view simultaneously with the driver-facing camera.
- Enables manual and automated image and video capture of the machine's forward view.
- 5.0 m (16.40 ft) in overall length.

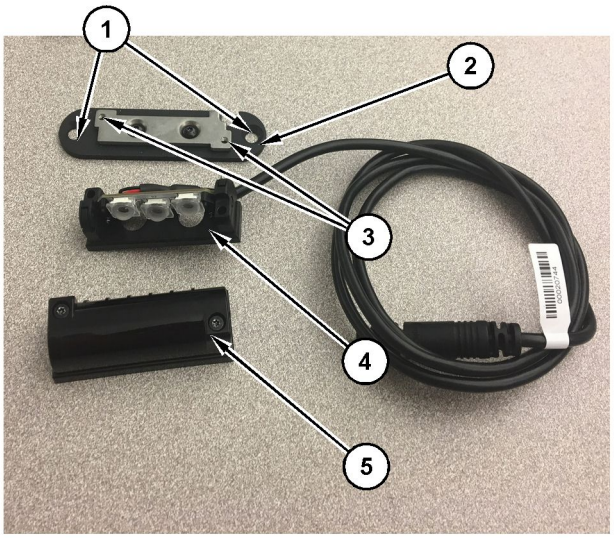

Illustration 9 g07746605

IR lights

(1) Mounting Holes
(2) Mounting Base
(3) Cover Mounting Holes
(4) LED Assembly
(5) LED Cover

The following are features of the IR pods:

- Infrared (IR) lights assist with facial tracking by maintaining sufficient light regardless of lighting in and around the cabin.
- Plate is fastened on the dash under the IR Pod cover for the v3.1 IR pods

Speaker

Illustration 10 g06135194

Speaker

The following features of the speaker are:

- Provides an audible alarm when a fatigue or distraction event occurs
- Uses differential sound transmission on the left and the right channel to suppress noises from mobile phones and other electronic devices close to the speaker
- Sound files that come with the DSS software are modified in a way that the left channel of the stereo is the inversion of the right channel.

Note: The DSS-IVS control unit is equipped with a differential amplifier. This amplifier allows for negating of all noise induced by the electronics, the WiFi interface, or external transmitters such as mobile phones, and provides clear and loud sound.

GPS Module

Illustration 11 g06135203

GPS module

The purpose and the following features of the GPS module are:

- Provide location of asset
- Provide speed of vehicle for triggering events
- Configured to operate and generate alerts/events above a set speed threshold

Note: Important when installing DSS-IVS in commercial vehicles as operators often keep the engine idling while waiting on goods loading/ unloading or while resting.

GSM/WiFi Antenna

Illustration 12 g06186059

Optional GSM/WiFi antenna

The GSM/WiFi Antenna is a heavy-duty, fully IP67 waterproof antenna. The GSM/WiFi combines a 2 in 1 Cellular (2G and 3G) and WiFi in a compact format but yet durable even in extreme environments.

Bluetooth/WiFi Antenna

Illustration 13 g06186089

Optional Bluetooth/WiFi Antenna

The WiFi/Bluetooth antenna is a high efficiency, high gain adhesive mount dual band wireless antenna, and IP67 waterproof. The high-quality low profile covert housing can be attached on glass or plastic. The WiFi/Bluetooth antenna is designed for applications that require omnidirectional gain across both bands. This omnidirectional gain is to ensure wide coverage area and constant reception and transmission for WiFi and Bluetooth applications.

Electric Motor (Vibration)

Illustration 14 g06137137

The following features of the electric motor are:

- Provides a physical vibration through the operators seat when an event occurs

Installation

Refer to Special Instruction, M0134631, “Procedure to Install and Configure Driver Safety System (DSS) v5.0” for complete installation and configuration information. This publication is available at your Cat dealer.

Refer to Special Instruction, M0103425, “Installation and Configuration of the Driver Safety System Forward Facing Camera for Mining Applications” for complete installation and configuration information. This publication is available at your Cat ® dealer.

Identification Information

i07591049

Manufacturing Information

SMCS Code: 7606

Entity Authorized by the Manufacturer

Entity authorized by the manufacturer at the territory of Eurasian Economic Union: “Caterpillar Eurasia” LLC.

Russia, Moscow, 115035 Sadovnicheskaya Emb 75

Phone: +7 (495) 2133340, Fax: +7 (495) 2133372, email: cat_moscow@cat.com

Manufacturer: Caterpillar Inc.

100 NE Adams Street Peoria, Illinois 61629 United States of America

Country of origin - China

Term and Conditions of Storage and Transportation

The product is packed in consumer packaging of manufacturer. The product should be stored in the factory packing and storage conditions for climatic factors of Group 4 in accordance with GOST 15150-69. When loading and transportation requirements on warning labels on the boxes must be followed, shocks and bumps that can affect the appearance and performance of the device should not be allowed.

Transportation can be done by all kinds of covered transport vehicles. When transporting by air, ensure that the device is transported in a sealed heated compartment.

Maintenance Section

Maintenance Recommendations

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General Maintenance Information

SMCS Code: 7220

A successful deployment of a site operator safety initiative will require proper implementation of the Driver Safety System (DSS). DSS is often thought of as, the in-cab hardware, however, the DSS is enables a comprehensive system to ensure the drivers and the site are safe. This system requires several pieces to all work together. The key pieces to a successful site implementation include (but are not limited to):

- Effective change management.
- Management support and assignment of a site champion.
- Proper hardware installation and network connection.
- Clear and up to date monitoring plan including a well-documented Fatigue Intervention Plan.
- Ongoing discussions and training regarding this DSS.
- Ongoing care of the in-cab hardware and active subscription through the Cat ® dealer.

Note: Like any safety product, the ongoing care is essential for proper long-term operation.

The DSS hardware is robust, but the hardware is also a sensitive piece of technology used in a harsh environment. Therefore, some ongoing preventative care will need to be performed to assure the safety of the drivers and equipment for years to come.

i10083143

Maintenance Interval Schedule

SMCS Code: 1000; 1400; 3030; 4450; 4469; 4480; 4490; 4491; 5070; 5612; 5927; 6282-041; 6319; 6320; 6345; 6346; 6461; 6700; 6700-041; 6700-041-KH; 6901; 7000; 7004-JST; 7007; 7008; 7220; 7312; 7327; 7400; 7451; 7490; 7500; 7519; 7541; 7605; 7615; 7730

Ensure that all safety information, warnings, and instructions are read and understood before any operation or any maintenance procedures are performed.

The user is responsible for the performance of maintenance, including all adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Use mileage, fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST, to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance.

Note: Before each consecutive interval is performed, all maintenance from the previous interval must be performed.

Daily

Every 8 Service Hours or Daily

Every 1000 Service Hours or 6 Months

i07144737

IR Lights and Cables - Check/ Clean

SMCS Code: 5660

Inspect the Infrared (IR) lights and cables for the following:

- No visual damage
- Mounted correctly and secure
- Lens is clean (clean with a soft dry cloth)
- Illumination of the face of the operator (may need to shield the IR light to see 3 faint glowing LEDs)
- Cables are properly connected and secure

i07038578

Camera and Cables - Check/ Clean

SMCS Code: 7347-535; 7348-535

Inspect the Camera and Cables for the following:

- No visual damage
- Camera is mounted correctly, secure, and not able to be moved
- Cables are properly connected and secure
- Camera bracket is mounted correctly, secure, and not able to be moved
- Lens is clean (clean with a soft dry cloth)

Version 4.0 only:

- Initiate test button and complete with no errors. Document and inform supervisor of any errors.
- Make sure all LEDs on the DSS unit are green. Document and inform supervisor of any other color then green and the component associated with the light

i07038596

Speaker and Cables - Check/ Clean

SMCS Code: 7338-535-SPE

Inspect the Speaker and Cables for the following:

- No visual damage
- Cables are properly connected and secure
- Mounted correctly and secure
- Set at desired volume level of the operator
- Clear any debris that may be covering the speaker

i07038598

Satellite Antenna and Cables - Check

SMCS Code: 733B-535

Inspect the Satellite Antenna and Cables for the following:

- No visual damage
- Mounted correctly and secure
- Check the entire length of the cable to assure all connections are wrapped and protected
- Clear view of the sky is available
- Cables are properly connected and secure
- Safe place away from falling or shooting obstacles from above and below.

i07038600

Modem and Cables - Check

SMCS Code: 7610-535; 7620-535

Inspect the modem, modem antenna, and cables for the following:

- No visual damage
- Mounted correctly and secure
- Cables are properly connected and secure
- Antenna mounted properly connected and secure
- Antenna has clear view of sky
- Antenna is in a safe place away from falling or shooting obstacles from above and below

i09766171

Test Button and Cables - Check

SMCS Code: 7610-535; 7620-535

Test button is located on bottom of Driver Facing Camera (DFC) hold for 2 seconds until audio from speaker initiates “System Testing”

- Make sure all LEDs on the Driver Safety System (DSS) unit are green. Document and inform supervisor of any other color then green and the component associated with the light

i07038608

Vibration Motor and Cables - Check

SMCS Code: 5927-535

Inspect the Vibration Motor and Cables for the following:

- No visual damage
- Mounted correctly
- Secured to the seat and effective
- Cables are properly connected and secure

i09764189

DSS Control and Cables - Check

SMCS Code: 7610; 7620

Inspect and verify the Driver Safety System (DSS) control and cables for the following:

- No visual damage
- Enough air circulation
- Vibration isolation is provided
- Mounting hardware secure and in good condition
- DSS mounted securely and correctly into the bracket
- Connector protectors are in place and not damaged

i07038732

GSM/WIFI Antenna and Cable - Check

SMCS Code: 733B-535

Inspect the Antenna and Cables for the following:

- No visual damage
- Antenna mounted correctly, secure, and not able to be moved
- Check the entire length of the cable to assure all connections are wrapped and protected
- Cables are properly connected and secure
- Clear view of the sky
- Safe place away from falling or shooting obstacles from above and below
- Inspect that the SIM card is properly and securely inserted in the SIM card bay

i07038735

Bluetooth/WIFI Antenna and Cable - Check

SMCS Code: 733B-535

Inspect the antenna and cables for the following:

- No visual damage
- Antenna mounted correctly and secure
- Cables are properly connected and secure
- Within close proximity to other bluetooth devices

i07264338

Isolation Absorber - Check

SMCS Code: 7000-535; 7960-535

Inspect the isolation absorber for the following:

- No visual damage
- Mounted correctly and secure
- Absorber still soft and pliable

Service Information Section

Troubleshooting

i09797492

Common Problems

SMCS Code: 7220

Common Problems and Guidelines

This section outlines common problems that occur. The section provides guidelines for the following subjects:

- Intentional Problems
- Unintentional Problems

Intentional Problems

Intentional problems consist of the following issues:

- Facial Tracking
- Vibration Alert
- Network Communication
- Satellite (GPS) Tracking
- Sound Alert

Table 11

Common Intentional Problems and Solutions	
Cause	**Solution**
Covering of the camera or Infra-red (IR) pods	Uncover camera or IR pod
Foreign substance on camera lens or IR pods	Remove substance and clean camera or IR pods
Moving of the camera	Calibrate and position camera properly
Disconnecting of the camera, IR pods, or cables	Reconnect camera or IR pods
Damaging of the camera, IR pods, or cables	Replace camera or IR pods
Damaging of the speaker or cutting of the cable	Replace speaker
Cables disconnected	Reconnect Cables
Damaged cables or component	Replace cables or component

Table 11 describes the possible causes of common intentional problems and suggests possible solutions.

Unintentional Problems

Intentional problems consist of the following issues:

- Facial Tracking
- Vibration Alert
- Satellite (GPS) Tracking
- Sound Alert
- Network Communication

Table 12

Common Unintentional Problems and Solutions	
Cause	**Solution**
Cables pulled out and disconnected	Install and reconnect cables
Dirty camera lens or IR pods	Clean camera lens or IR pods
Camera or IR pod unable to track correctly	Calibrate and position camera and IR pods properly
No Network (v4.0 only)	Securely reinsert Subscriber Identity Module (SIM) card back in bay

Table 12 describes the possible causes of common unintentional problems and suggests possible solutions.

Camera LED Test Button

Table 13

Version 4.0 Camera LED Test Button Compatibility			
Features	**DSS v3.1 and 4.2b Software Equipped with a v4.0 Camera**	**DSS v3.1 and 4.3 Software Equipped with a v4.0 Camera**	**DSS v4.0 and 4.3 Software Equipped with a v4.0 Camera**
Test Button on Camera	Nonfunctional	Functional	Functional
Light Emitting Diode (LED)	Stays ON	Refer to LED Logics	Refer to LED Logics
Buzzer	Nonfunctional	Nonfunctional	Nonfunctional

Startup conditions consist of the following:

- Critical failures cause red LED, stays on until restart or test button is pressed to initiate the system test.
- Warnings cause orange LED, stays on for 2 minutes.
- Functioning correctly will cause Green LED, which stays on for 2 minutes.

Test button pressed conditions consist of the following:

- LED flashes green while system test is running.
- Critical failures will cause Red LED to stay on until restart or “Test Button” is pressed.
- Warnings will cause Orange LED to stay on for 30 seconds.
- Functioning as intended will cause Green LED to stay on for 30 seconds.

Critical Failure results consist of the following:

- Camera fault (no LED light on).
- Both IR Pods fail.
- Preferred Audio fails (Preferred Audio set in the configuration file, Piezo Buzzer, or Speaker).
- GPS Not Detected (more than “Not Valid”).
- Critically low disk space (Configuration setting “Free Log Disk Space To Maintain” .

Warning Failure results consist of the following:

- 1 IR Pod fails.
- GPS Detected but not valid.
- Network connection available, but DSS credentials not valid.
- Network connection unavailable (credentials skipped).
- Low disk space (2 x Config setting “Free Log Disk Space To Maintain”).
- Vibration motor is enabled in the configuration file but not functioning.

Dark Images or IR Illumination Not Working

Dark images indicate an IR Pod illumination issue which could be possible loss of 12V at GPIO Port 1.

1. Observe the IR Pods, the LEDs should be visible.

2. Log into the system web interface and open the dashboard. Verify Camera MC Firmware version is 2.01.000.

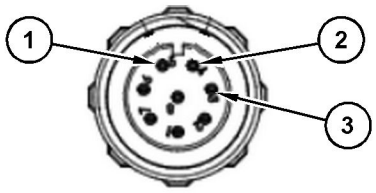

Illustration 15 g06683513

(1) Pin 5
(2) Pin 4
(3) Pin 3

3. If IR LEDs are not visible or 'No Firmware' message is displayed, measure GPIO 1 and 2 output between pin 3 (3) and pin 5 (1), voltage should measure 12V.

Measure between pin 4 (2) and pin 5 (1), voltage should measure 5V.

If voltage **is** present, replace Driver Facing Camera (DFC), extension cable, and both IR illumination lights. Consult your Cat ® dealer for more information.

If 12V **is not** present on GPIO 1 but **is** on GPIO 2, and 5V is measured on both ports, proceed to Step 4

4. Connect camera to GPIO 2 and Global Positioning System (GPS) to GPIO 1. Check for proper operation.

Observe web interface dashboard for camera Management complex (MC) firmware and GPS location.

Note: As a result of GPIO 1 12V failure, GPS may not function.

If GPS or camera does not function, replace ECM, extension cable, camera, and IR pods. Consult your Cat ® dealer for more information.

If Camera and GPS are functional, replace the DFC and IR Pods. Inspect the camera extension cable connector for damage, evidence of moisture or corrosion. Refer to “Camera and Cables - Check/Clean“ for more information.

If camera issue returns replace ECM and camera extension cable. Consult your Cat ® dealer for more information.

GPS Not Detected Due to Poor or Weak Signal

GPS not detected due to poor or weak GPS signal is indicated by a red or orange LED on ECM.

This condition occurs when GPS is not detected after a software update or a prolonged stationary period in an area with limited GPS signal.

When the vehicle/GPS has unobstructed view to the sky and a quality signal is available this condition will resolve.

Reference Information Section

Reference Materials

i09797488

Product Identification Number

SMCS Code: 7000

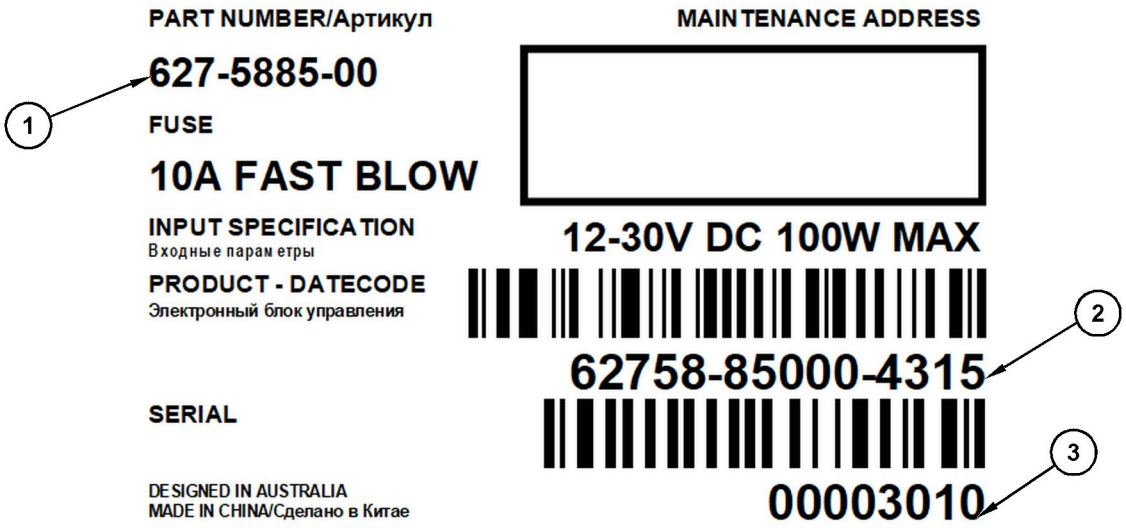

Illustration 16 g07585555

Electronic Control Module

(1) Part number (2) Product date code (3) Controller serial number

- The Driver Safety System (DSS) Electronic Control Module (ECM) Product Identification Number is marked with a serial number that represents part number (1), engineering change level, and a date code.
- The last two digits on part number (1) represent the engineering change level.
- The last five numbers on product date-code (2) represents the week and year. For more information, refer to Illustration 16 .
- The number below the product datecode (2) represents the controller serial number (3).

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:	_____	_____	_____