

DRAFT

SNM941

CONNECTED SITE GATEWAY

INSTALLATION GUIDE

Version 1.2

Revision A

October 2017

Legal Notices

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Release Notice

This is the October 2017 release (Revision A) of the *SNM941 Connected Site Gateway Installation Guide*. It applies to version 1.2 of the SNM941 Connected Site Gateway.

Limited Warranty Terms and Conditions

See Limited Warranty Terms and Conditions, page 35.

Software Components Notices

See Software Components, page 36.

Notices

Trimble SNM941-90 – LTE, BLE, Wi-Fi – Americas

FCC Identifier: PWR, WCSNM941

Trimble SNM941-90 complies with FCC radiation exposure limits set forth for an occupational/controlled environment. This equipment should be operated with a minimum distance of 20cm between the radiator and your body or another transmitting antenna.

The marketed product name is SNM941.

The -90 variant of the SNM941 is certified for use with the Trimble GNSS, 112057.

In order to maintain compliance with FCC RF exposure requirements, the Trimble SNM941 antenna, 112057 must be used.

Class A Statement – Notice to Users

This equipment has been tested and found to comply with the limits for a Class A 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 communication. 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 the 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 and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

Canada

This Class A digital apparatus complies with Canadian RSS-GEN, RSS-247.

Cet appareil numérique de la classe A est conforme à la norme RSS-GEN, RSS-247 du Canada.

Pour SNM941-90:

Trimble SNM941-90 conforme à l'exposition de l'industrie rayonnement Canada limites établies pour un travail / environnement contrôlé. Cet équipement doit être utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps ou une autre antenne d'émission.

Trimble SNM941-90 est certifié pour une utilisation avec l'antenna Trimble 4-In-1, 112057.

Afin de maintenir la conformité aux exigences d'exposition aux RF IC, l'antenna Trimble SNM941, 112057, doit être utilisée.

Types d'antennes sont approuvés.

GNSS 4-In-1 antenna, 112057.

Trimble SNM941-90 complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using Trimble SNM941, 112057.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne Trimble SNM941, 112057.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés.

Industry Canada Identifier: 1756A-SNM941.

Trimble SNM941-60 - LTE, BLE, Wi-Fi - Non Americas

Europe

The global variant of this product is intended to be used in all EU member countries. This product has been tested and found to comply with the requirements for a Class A device pursuant to European Council Directive 89/336/EEC on EMC and CB Scheme for electrical safety, thereby satisfying the requirements for CE Marking and sale within the European Economic Area (EEA). These requirements are designed to provide reasonable protection against harmful interference when the SNM941 equipment is operated in a commercial environment.

Hereby, Trimble Navigation declares that the SNM941 devices are in compliance with the essential requirements and other relevant provisions of CE.



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Notice to Our European Union Customers

For product recycling instructions and more information, please go to www.trimble.com/Corporate/Environmental_Compliance.aspx.

WEE

Recycling in Europe: To recycle Trimble WEEE (Waste Electrical and Electronic Equipment, products that run on electrical power.), Call +31 497 53 24 30, and ask for the "WEEE Associate". Or, mail a request for recycling instructions to:



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

RoHS

The RoHS directive aims to restrict certain dangerous substances commonly used in electronic and electronic equipment.

RoHS

Conformité Européenne (European Conformity)

CE mark indicates manufacturer claims product is compliant with the relevant EU legislation applicable. (European Council Directive 89/336/EEC: Radio Equipment Directive (2014/53/EU), CB Scheme IEC 60950-1)



Hot Surface

Indicate that the marked item can be hot and should not be touched without taking care. It should be allowed to cool before servicing (IEC 60417-5041).



Direct Current

Indicates that the equipment is suitable for direct current only (IEC 60417-5031).



Declaration of Conformity

We, Trimble Inc.,

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declare under sole responsibility that the product:
SNM941
complies with Part 15 of FCC Rules.


Operation is subject to the following two conditions:

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Safety Information

Before you use the Trimble® SNM941 Connected Site® Gateway, ensure that you have read and understood all safety requirements.


 **WARNING** – This alert warns of a potential hazard which, if not avoided, could result in severe injury or even death.


 **CAUTION** – This alert warns of a potential hazard or unsafe practice that could result in minor injury or property damage or irretrievable data loss.

NOTE – An absence of specific alerts does not mean that there are no safety risks involved.

 **CAUTION** – The operating temperature range is -30°C to $+85^{\circ}\text{C}$ and the storage temperature range is -40°C to $+85^{\circ}\text{C}$. Exceeding these ranges may cause damage to the unit, machine, and the operator.


Installing antennas

 **CAUTION** – If wiring around the negative master disconnect, the antenna mount *must* be electrically isolated from the asset's chassis ground.

 **CAUTION** – For your own safety, and to comply with the RF Exposure requirements of the FCC, always observe these precautions:

- Do not locate antenna within 20 cm of any other transmitting antenna, to avoid co-location issues.

Wiring notices

 **CAUTION** – Wiring around a master disconnect switch, if installed, may void the warranty of the machine or equipment. Refer to the machine or device user manual and warranty information. If it is deemed necessary to wire around this switch and directly to battery a 5 A fuse must be installed on the Battery Negative line of the harness.

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Introduction

Welcome to the SNM941 Installation Guide. This document describes how to install and verify initial operation of the SNM941.

It is necessary, even for an experienced installer, to review this entire manual in order to become familiar with the special features that differentiate the SNM941 from any other telematics device. If you are not familiar with GNSS or vehicle telematics, visit the Trimble website (www.trimble.com) for an interactive look at Trimble and these technologies.

About the SNM941 device

The Trimble® SNM941 device comes in two models. The SNM941-60 supports cellular communications in all regions excluding the Americas (but including Brazil). The SNM941-90 supports cellular communications in the Americas (excluding Brazil). Both variants offer GNSS positioning, cellular communications, wireless LAN communications, Ignition sense, Engine On sense, three digital inputs, one analog input, and wired communications using CANbus, RS-232, and Ethernet.

The Trimble SNM941 devices are designed to operate reliably in very harsh installation environments including all types of heavy construction equipment. These devices can be installed in-cab or out-of-cab. If the host asset has an electronic control module (ECM) installed somewhere, the SNM941 can be installed in that same location, *but not in the engine compartment*.

Related information

Sources of related information include the following:

- Support Notes – Product support notes describe new features of the product, information not included in the installation guide, and information on machine model-specific installation. They are available from Trimble Support (see below) and the Trimble Civil Engineering and Construction Sales team. Support notes are updated as firmware updates are released.
- Trimble training courses – Consider a training course to help you use your GNSS telematics system to its fullest potential. For more information, go to the Trimble website at www.trimble.com/training.html.

Technical support

If you have a problem and cannot find the information that you need in the product documentation, contact your local dealer. Else, go to the Support area of the Trimble website (trimble.com/Support/Technical_Support.aspx). Select the product you need information on. Product updates, documentation, and any support issues are available for download.

Overview

- ▶ Exterior description
- ▶ Electrical harness connector
- ▶ Antenna connectors
- ▶ Mounting provisions
- ▶ Electrical harness

This chapter introduces the Trimble SNM941 Connected Site® Gateway. These units make it easy to receive status information from all types of construction assets, to effectively manage them, and to link assets to back office applications.

The SNM941 device is ideal for the following applications:

- Heavy earthmoving equipment, such as track type tractors, scrapers, and motor graders
- On/Off road equipment such as dump trucks, aggregate haulers, and service trucks

Exterior description

The Trimble SNM941 device is a rugged telematics and data communications appliance. The device enclosure is made of heavy duty aluminum. The front of the device contains the electrical harness connector (see [page 12](#)) and antenna ports (see [page 11](#)). The bottom of the device includes the four mounting through-holes (see [page 12](#)).



Figure 2.1 SNM941 exterior

Electrical harness connector

The electrical harness connector is a 34-pin weatherproof electrical connector with a mechanical locking system. For a description of the connector signals and wiring harness configuration, see [Chapter 6, SNM941 Wiring Harness](#).

Some machine installations may use a specialized wiring harness depending on the telematics features available on that particular machine. Trimble recommends that you use only harnesses provided by Trimble or by your machine's original equipment manufacturer.

For more information, see [Chapter 4, Installation](#).

NOTE – *If adding additional conductors to a factory harness, the conductors must be at least 18 AWG. Larger conductors are acceptable.*

Antenna connectors

The SNM941 device has four connectors that connect to the 4-In-1 antenna, Trimble P/N 112057:

- GNSS antenna connector – This connector is a SMA jack.
- Two cellular modem connectors – One connector is a TNC jack and other is a reverse polarity SMA (RP-SMA) jack.
- Wireless Local Area Network (WLAN or Wi-Fi) antenna connector – This connector is a reverse polarity TNC jack.

The Trimble-certified supplied GNSS, WLAN/Wi-Fi and cellular antennas are combined in a single housing. [Figure 2.1 on page 10](#) shows the locations of these connectors.

For more information, see [Chapter 4, Installation](#).

 **CAUTION** – The antenna body does not provide a grounding path.

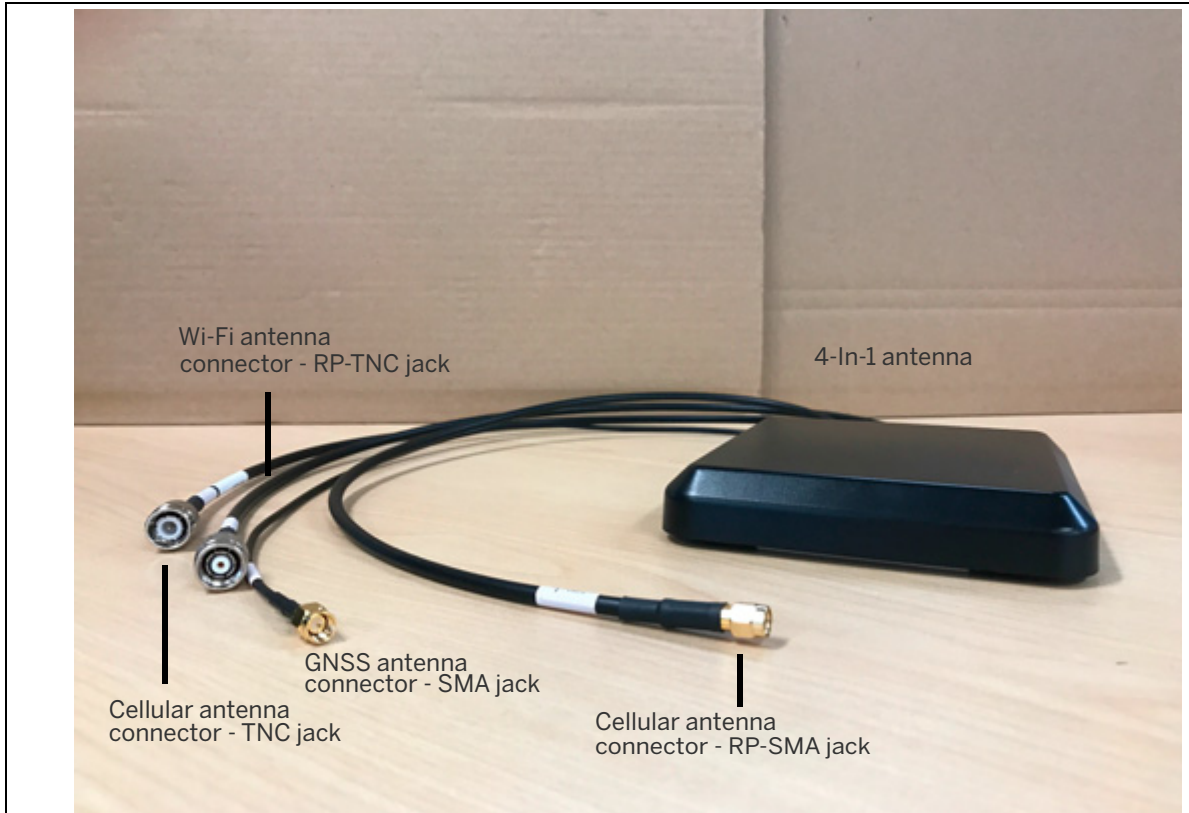


Figure 2.2 4-In-1 antenna (P/N 112057)

Mounting provisions

The SNM941 and antenna is intended to be mounted directly to the asset that is being monitored, with the exception of the machine chassis. The bottom of the antenna has an industrial adhesive that can be used to mount the antenna directly to the device/machine. The antenna can only be directly adhesive mounted to non-metallic surfaces that do not have metal immediately underneath. If mounting to a metallic surface, you need an antenna riser, P/N 112056. The riser can be mounted with fasteners, adhesive, or magnets.

In cases where the adhesive will not adequately stick, especially in cold environments, mount the antenna to the riser P/N 112056 ahead the time in a warm environment. Then fix to the asset using fasteners or magnets.

In the case of installations where extreme vibration may be encountered, such as directly on the chassis of a tracked machine, you should mount the SNM941 using a mechanical shock isolation system.

NOTE – The top of the antenna should face the open sky. No other antenna should be installed within 20 cm (7.8") of this antenna.

For more information, see [Chapter 4, Installation](#).

Electrical harness

The electrical harness depends on the machine installation.

For details, see [Chapter 6, SNM941 Wiring Harness](#).

Recommended Tools and Supplies

- ▶ Tools

- ▶ Supplies

Every SNM941 installation will vary due to unique features of the asset being equipped.

The tools and supplies listed below are the absolute minimum required to complete an SNM941 installation. A complete mechanic's field tool kit is preferred.

***NOTE** – Holes will most likely need to be drilled into the machine for installation purposes. Ensure that the area drilled will not void contract or warranty on machine while not compromising the safety of the operator.*

Tools

- Mechanic's socket set
- Mechanic's open-end wrench set
- Assorted screw drivers
- Digital multimeter
- Drill
- Assorted metal drill bits

Supplies

- (4) ¼" or 6 mm fasteners – either nuts and bolts with suitable washers (stainless steel is preferred) or self-tapping screws
- Tie wraps
- Electrical tape
- Cable sheathing such as split loom

Optional additional supplies may include SNM941 mounting brackets, antenna mounting brackets, and shock mounts.

Installation

- ▶ General installation approach
- ▶ AccuGrade/GCS900 gateway device installation
- ▶ Trimble Earthworks gateway device installation
- ▶ Complete the device connections

This chapter describes the general procedure to install an SNM941 device and its necessary peripheral devices. Trimble assumes you have a basic knowledge of mechanical and electrical technical operations. For a list of recommended tools and supplies for installation, see [Chapter 3, Recommended Tools and Supplies](#).

NOTE – Before installing any telematics device, note its serial number for later reference.

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General installation approach

In general, the installation is a simple process, however, failure to follow correct installation guidelines will result in a non-functional or dysfunctional unit. Before starting the installation process, consider the following guidelines:

- Installation length of components and length of connection wires to main unit. Keep in mind that it is easier to extend the length of wires from asset terminals rather than change the location of the antennas or control box.
- Ensure that you are prepared with various installation tools as each installation can be unique to the machine that it is installed on.

The installation can be performed by doing the following tasks:

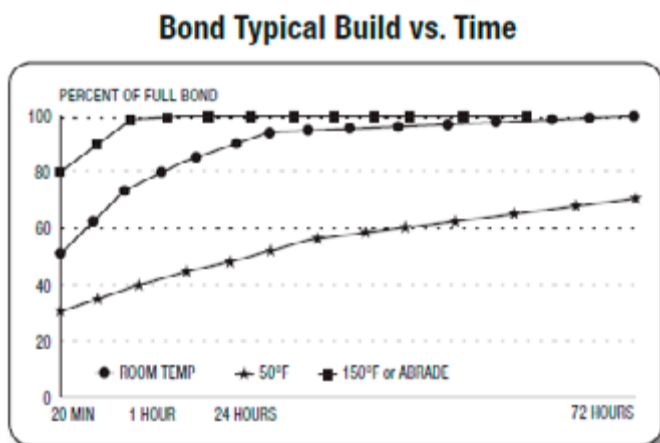
1. Determine the mounting location for the SNM941 device.
2. Determine the mounting location for the 4-In-1 antenna. The length of the cabling on the antenna to the SNM941 is 0.6 m. Antenna extension cable is available.
3. Plan the route of the electrical harness.
4. Secure the SNM941 device.
5. Install the fuses – telematics installation only.
6. Make the electrical connections – telematics installation only.
7. Complete the device connections.

Further installation notes

- The SNM941 is designed for use on construction equipment. Attaching to the vehicle chassis or body is standard procedure and will work well. If possible, avoid attaching the device to a subcomponent that is prone to extreme shock or vibration, such as the engine block, or suspension components. On a tracked machine, isolation mounts (P/N 84264-20 for telematics and Accugrade/GCS installations, and P/N 109530 for Earthworks installations) may be required if mounting directly to the chassis.
- Ensure that the chosen mounting location of the SNM941 is in a practical location. If installing for a specific customer, confirm with the customer that the chosen location is acceptable. For example, installation in the lunch box compartment may not be an acceptable location.
- Electrical Interference – The SNM941 device operates well in electrically noisy environments, but installation best practices include avoiding close proximity to alternators, generators, electric motors, DC to AC converters, switching power supplies, and arc welding equipment. If electrical interference is suspected, enclose the SNM941 device wiring harness in a grounded shield wrap or grounded conduit.

Guidelines for antenna mounting – adhesive mount

1. The cure time to reach full strength at room temperature is 24 hours. The longer it can be mounted before being placed into service, the better.
2. Cure time is longer for environments 10° C (50° F) to room temperature.
3. Adhesive mounting should not be attempted below 10° C without supplemental heat.
4. The cure time can be greatly accelerated by preheating the mounting surface and adhesive with a heat gun, as shown in the graph below:



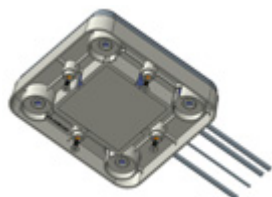
5. The mounting surface should be flat within 2 mm.
6. If placing on a glossy surface, it is best to lightly abrade the surface before final cleaning.
7. Adequate clean the surface: remove all dust, grease and grim and then use an alcohol wipe. A cleaning towel and alcohol wipe are provided with P/N 112056. Allow all the cleaning agent to vaporize before attempting to place the adhesive tape on the cleaned surface.
8. When mounting the riser to a steel surface, you can use magnets to help fixture the antenna while the adhesive cures.

Guidelines for antenna mounting – riser mount

Antenna Riser mount, P/N 112056

A variety of options are available for attaching the antenna–riser combination to the asset. The options provided are outlined below.

1. Mont the antenna to the pedestal.
2. There are multiple mounting features once the antenna is mounted to the unit:
 - a. Fastener mounting option 1:



- 4x M4 fasteners into thread inserts from below

b. Fastener mounting option 2:



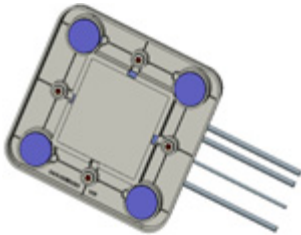
- Fasteners from above into mounting plate tabs
- Sized for M6 Fasteners
- Quantity of 3 used at a minimum

c. Fastener mounting option 3:



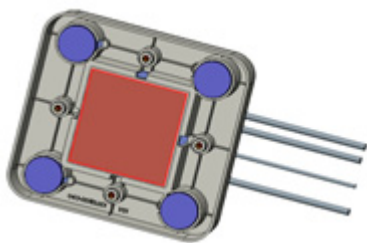
- Fasteners from above into mounting plate tabs
- Sized for M6 Fasteners
- Quantity of 3 used at a minimum

d. Magnetic mount:



- High Strength Rare Earth Magnets in 4 locations
 - Covered with a rubber boot that resists sliding and damage to the mounting surface
- TIP** – Remove the mounting tab plate from the riser so that the magnets are exposed by removing the four M4 flat head fasteners.

e. Adhesive mount:



- Use 3 mm foam adhesive tape for slightly out flat surfaces.
- Use magnets to help fixture during adhesive curing.

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AccuGrade/GCS900 gateway device installation

Determine the mounting location of the SNM941 device

The SNM941 can be installed in various locations; however the recommended location is in the cab or a side compartment, but not the engine compartment, to allow for:

- ease of access
- increased security
- a minimal distance from the antennas and control box to the main unit.
- SIM card access

The SNM941 mounting plate is designed to be fixed in an area with the dimensions of 185 mm x 230 mm (7.28 in x 9.05 in), to allow adequate space for attachment of the electrical harness, as well as the coaxial antenna connections.

CAUTION – Maximum operating temperature is +85° C and maximum storage temperature is +85° C.

Be sure to avoid mounting the unit in an area with excessive exposure to moisture, dirt, direct heat, sunlight and chemicals, while still allowing for accessibility, as well as good air flow.

Plan the route of the electrical harness

Keep in mind the following factors:

- The 34-pin connector on the electrical harness must reach and attach to the SNM941 device. *It is not necessary to plug the connector into the SNM941 at this time. Be sure to disconnect the harness before beginning make any other electrical harness connections in steps 3 & 4.*
- Ensure that the brown connector on the SNM941 harness can easily reach the corresponding brown connector on the GCS/AccuGrade harness. If there is no brown connector on the GCS/AccuGrade harness, refer to the **SNM941 Ordering Guide** (this can be found online in the Trimble Store help files).


Secure the SNM941 device

- Trimble recommends that you use the provided mounting bracket for installation of the SNM941. If the chosen mounting location is outside of the cab on a tracked vehicle, then the shock plate must be used. *Please note that the shock mount must be bolted to the machine. In most cases this means that the holes must be drilled to accommodate for this.*
- If the mounting bracket is not to be used, drill a rectangular array of 7 mm (¼") holes with the dimensions of 215.4 mm x 60 mm (8.48" x 2.36").
- Secure the SNM941 to the mounting position using four M6 or ¼" bolts, nuts, and washers.
- Firmly tighten the bolts.

Determine the location of the 4-In-1 antenna

The antenna locations will have a significant effect on the performance quality of the SNM941 device.

- Mount antenna with the face of the antenna horizontal with the open sky, in an area that has a clear 360° view of the sky and is at least 20 cm from all other transmitting antennas, the operator and any other occupant, while still allowing the antenna cables to easily reach the SNM941.
- The antenna should not be easily sighted, to reduce the chances of tampering or disablement.
- The antennas should be firmly attached to the asset so that they will not come loose due to shock, vibration, or thermal cycling.
- The antenna may be mounted directly to a horizontal surface near the top of the asset using the industrial adhesive or the antenna bracket.
- The antenna must mounted at least 1" from metal structures and surfaces. Use the Trimble antenna mounting bracket to position the antenna away from metal as needed.
- If the SNM941 is mounted more than 600 mm from the antenna, you must use the extension cable set P/N 110046-44. The extensions will be 4.4 m in length. Typically these will be required if the SNM941 is chassis mounted. When routing the extension cables make sure to avoid sharp corners, excessive heat sources, frequent flexing of the coax cables, an extremely tight bend radius, or sources of electrical noise.

 **CAUTION** – The antenna connectors and extension cable connectors must be isolated from chassis ground.

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Trimble Earthworks gateway device installation

Determine the mounting location of the SNM941 device

The SNM941 can be installed in various locations; however the recommended location is near the cab roof-line, typically with the SNR radio. to allow for:

- ease of access
- a minimal distance from the antenna
- SIM card access

The SNM941 mounting is designed to be mounted concurrently with the SNR radio and to allow adequate space for attachment of the electrical harness, as well as the coaxial antenna connections.

Plan the route of the electrical harness

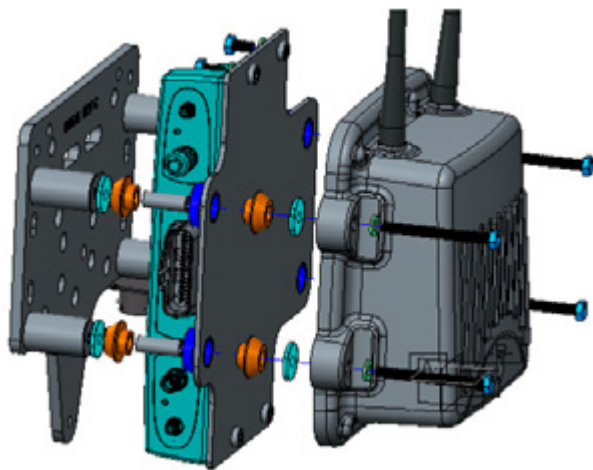
Keep in mind the following factors:

- The 34-pin connector on the electrical harness must reach and attach to the SNM941 device. *It is not necessary to plug the connector into the SNM941 at this time. Be sure to disconnect the harness before beginning to make any other electrical harness connections.*
- Connect the **Internet Gateway** connector to the **Internet ETH 2** connector on the Earthworks harness.

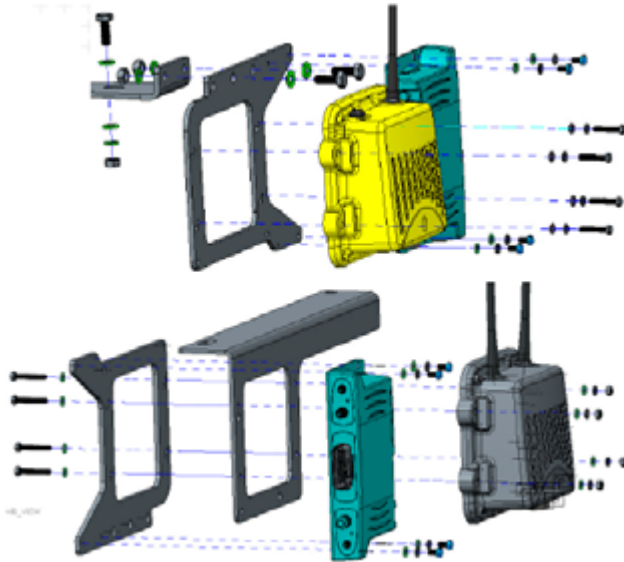
Secure the SNM941 device

Mount the SNM941 with the SNR Radio, using one of the following methods:

- Stack the SNM941 mounting bracket between the SNR radio and the provided base bracket.



- Mount the SNM941 side-by-side with the SNR radio: mount off existing SNR bracket, or on isolated cab structure, as shown:



Determine the location of the antenna

The antenna location will have a significant effect on the performance quality of the SNM941 device.

- Mount the antenna in an area that has a clear 360° view of the sky and is at least 20 cm from all other transmitting antennas, the operator and any other occupant, while still allowing the antenna cables to easily reach the SNM941.
- The antenna should not be easily sighted, to reduce the chances of tampering or disablement.
- The antenna should be firmly attached to the asset so that they will not come loose due to shock, vibration, or thermal cycling.
- The antenna may be mounted directly to a horizontal surface near the top of the asset using the industrial adhesive or the antenna bracket, Trimble P/N 112056.
- The antenna must be mounted at least 1" from metal structures and surfaces. Use the Trimble antenna mounting bracket to position the antenna away from metal as needed.

Complete the device connections

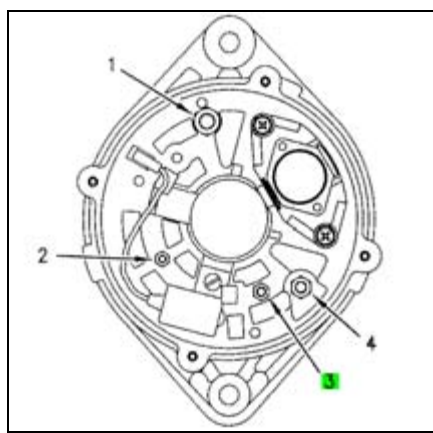
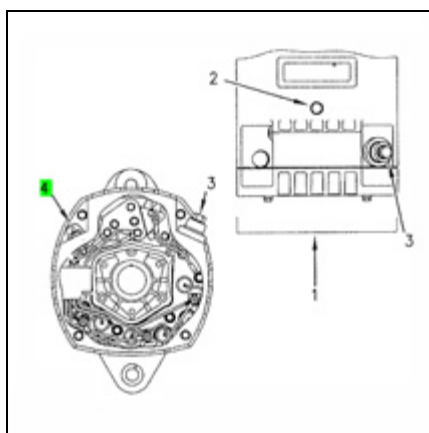
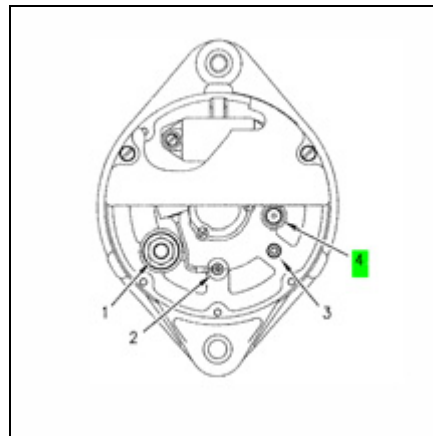
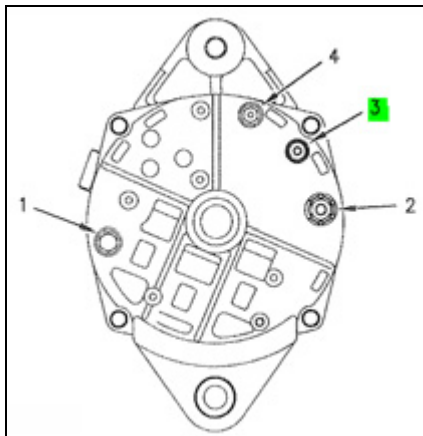
- Attach the antenna connectors to the SNM941.
- For use with GCS900 or AccuGrade systems, plug the brown connector from the SNM941 harness to the corresponding brown connector on the GCS900 or AccuGrade harness.
- For use with Earthworks, plug the **Internet Gateway** connector from the SNM941 harness to the corresponding **Internet Eth 2** on the machine control harness. Attach the input harness to the SNM941.
- Turn the machine on and observe to see the flashing LEDs.

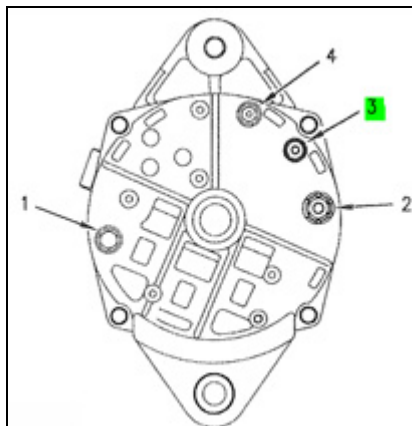
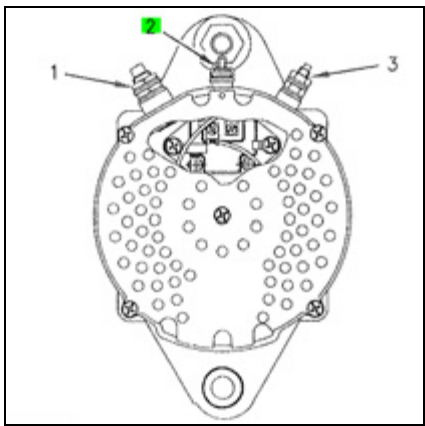
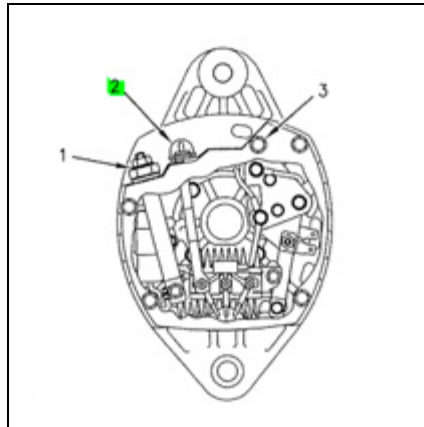
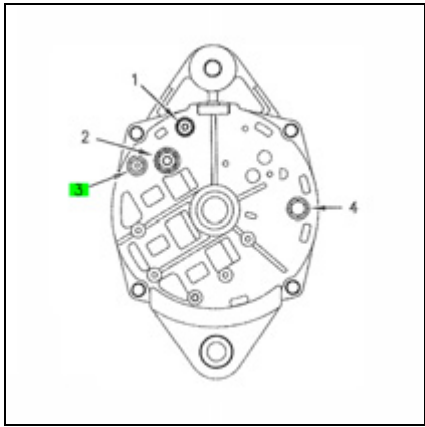
Locating the R Terminal

The location of the R terminal differs depending on the alternator used in the machine. If you cannot locate the alternator's R terminal, contact a qualified service technician for that machine.

The following are some examples of different alternators used in heavy machines, and the location of the R terminal.

On machines that do not have an R terminal signal connection or a similar connection that is only active when the engine is running, connect the R terminal wire directly to the yellow key switch wire. Both of these inputs can be driven by a key-switched signal source. In this case, engine hours are accrued when the key switch is on, even if the engine is not running.





In situations in which an alternator pictured above is not applicable, R terminal can be determined by using a voltage meter. Clip the Alternator Wires (be careful to do this far enough from the alternator to repair the wire and make the final connection).

The alternators typically have 3 outputs. To determine the R-terminal look for a wire that shows all of the following behavior:

- No voltage when the machine is off.
- No voltage when the machine Key switch is on, but the engine is not running.
- DC voltage equivalent to battery or pulse signal of 50 Hz or greater when the machine engine is running. For pulse signals it may show half of battery voltage, so confirm that you have your frequency adjusted to account for pulse signals.

This connection should be made in parallel to the output. After connecting the white R terminal wire to the identified R terminal, run the machine for a minimum of 10 minutes to confirm in the web service tool that the correct run time is accruing.

In some cases the alternator may be sending a pulse signal, or be outside the correct supported frequency to register. If service hours are not reporting correctly, it is possible to connect to the positive output of the oil pressure gauge, but this should only be done if the R terminal is not a workable solution.

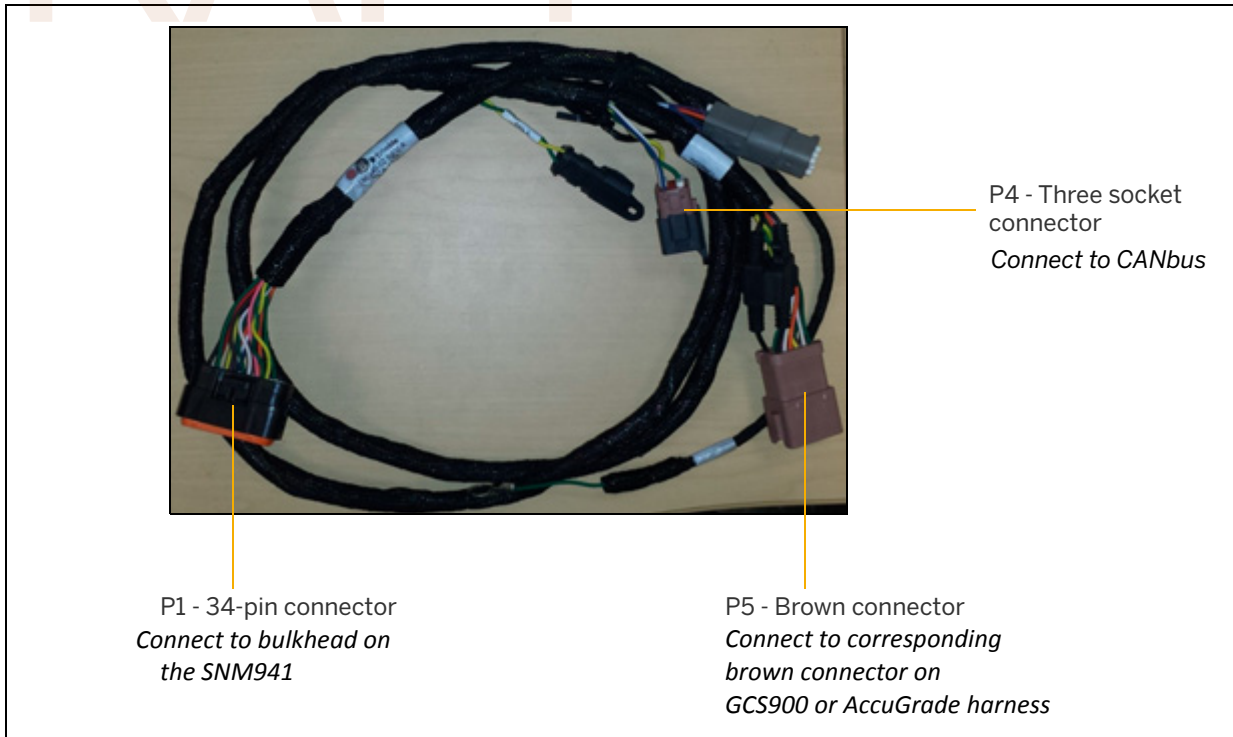
SNM941 Wiring Harness

- ▶ SNM941 wiring harness
- ▶ Telematics installation wires configuration
- ▶ Brown connector pinouts
- ▶ Earthworks, 8-pin connector pinouts
- ▶ Recommended DC electrical specifications

This chapter describes the SNM941 wiring harness and electrical connections in detail.

SNM941 wiring harness

The SNM941 wiring harnesses are 186940-02 for AGCS systems and 201641-46 for Earthworks. They derive the best available power from the Brown connector. For telematics the harness may need to be modified to change the power input wires from the Brown connector and re-routed to the appropriate power source.



The following table describes the conductors in the Wiring harness kit.

34-Pin Connector	Signal Description	186940-02		201641-46	
		Wire Color	Termination	Wire Color	Termination
1	Battery - Input	Black	J4 -Brown Connector - Pin 2	Black	J2 -8 Pin Connector - Pin 2
3	Chassis Sense	Green	J2 - Ring Terminal	Green	J3 - Ring Terminal
5	Key Switch Input	Yellow	J4 -Brown Connector - Pin 1	Brown	J2 - 8 Pin Connector - Pin 7
6	Analog Input	Purple	J5 - 6 Socket Connector - Pin 5	Purple	J5 - 6 Socket Connector - Pin 5
7	Digital Input 1	Brown	J5 - 6 Socket Connector - Pin 2	Brown	J5 - 6 Socket Connector - Pin 2
9	Ethernet TX-	Green	J4 -Brown Connector - Pin 6	Orange	J2 -8 Pin Connector - Pin 5
10	Ethernet TX+	White	J4 -Brown Connector - Pin 5	White	J2 -8 Pin Connector - Pin 6
12	RS-232 TX	Pink	J4 -Brown Connector - Pin 10	N/A	
13	CAN A Low	Green	J6 - 3 Socket Connector - Pin B	Green	J6 - 4 Socket Connector - Pin 3
14	CAN A High	Yellow	J6 - 3 Socket Connector - Pin A	Yellow	J6 - 4 Socket Connector - Pin 2
19	Battery + Input	Red	J4 -Brown Connector - Pin 1/12	Blue	J2 - 8 Pin Connector - Pin 1
22	Digital Input 3	Orange	J5 - 6 Socket Connector - Pin 4	Orange	J5 - 6 Socket Connector - Pin 4
23	R-Terminal Input	White	J5 - 6 Socket Connector - Pin 1	White	J5 - 6 Socket Connector - Pin 1
24	Digital Input 2	Blue	J5 - 6 Socket Connector - Pin 3	Blue	J5 - 6 Socket Connector - Pin 3

34-Pin Connector	Signal Description	186940-02		201641-46	
		Wire Color	Termination	Wire Color	Termination
26	Ethernet RX-	Blue	J4 -Brown Connector - Pin 8	Blue	J2 - 8 Pin Connector - Pin 4
27	Ethernet RX+	Brown	J4 -Brown Connector - Pin 7	Brown	J2 - 8 Pin Connector - Pin 3
29	RS-232 RX	Orange	J4 -Brown Connector - Pin 3	N/A	
32	RS-232 Ground	Green	J4 -Brown Connector - Pin 11	N/A	

Pin numbers not listed above are not connected in the wiring harness. For additional detail on the nature of the signal connections, see table on [page 29](#).

NOTE – All electrical conductors used in the installation of an SNM941 Connected Site Gateway must be 18 AWG or larger.

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Telematics installation wires configuration

The following table describes the conductors in the electrical harness:

Conductor ID	Conductor Pin Number*	Signal description	Connection
A	5	Key Switch Input	An electrical accessory circuit that becomes active when the asset's key switch is moved to the "accessory" and "run" positions. Required to initialize the SNM941 as soon as an operator activates an asset. <i>NOTE – If this connection is not made, the device will shut off after 10 minutes of run time.</i>
B	19	Battery + Input	Positive terminal on battery. Terminal with the highest voltage in multi-battery configurations. Required to provide continuous power to the SNM941.
C	1	Battery - Input	Negative terminal on battery. Terminal that connects to chassis ground in multi-battery configurations. Required to provide continuous power to the SNM941.
E	3	Chassis Ground	Reliable connection to asset's conductive chassis. Required to detect open negative master disconnect. Required EMI connection to asset's conductive chassis. Failure to make this connection could cause erratic behavior on the device.

The following table describes the conductors in the 6-pin Deutsch connector on the electrical harness:

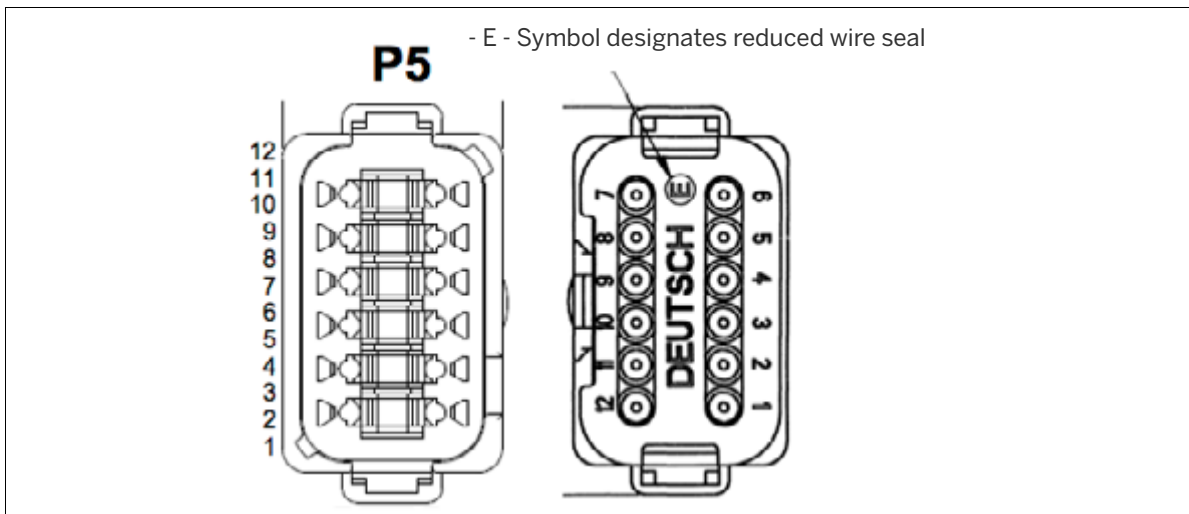
Conductor ID	Conductor Pin Number*	Signal description	Wire color	Connection
D	23	R-Terminal Input	White	The relay terminal on the engine's alternator or a signal such as an oil pressure switch that provides a signal of 85% of system voltage or greater. This signal is used to determine runtime hours. If the R-terminal is not accessible, see Chapter 5, Locating the R Terminal .
F	7	Digital Input 1	Brown	Optional – A sensor that provides a ground signal when a monitored situation occurs. If not used connect to ground or let float. This can be an open circuit or short circuit to ground, i.e. when the monitored state occurs, the signal should be ground. For more information, see Brown connector pinouts, page 30 or refer to the GCSFlex Installation Guide.

Conductor ID	Conductor Pin Number*	Signal description	Wire color	Connection
G	24	Digital Input 2	Blue	Optional – A sensor that provides a ground signal when a monitored situation occurs. If not used connect to ground or let float. This can be an open circuit or short circuit to ground, i.e. when the monitored state occurs the signal should be ground.
H	22	Digital Input 3	Orange	Optional – A sensor that provides a system voltage signal when a monitored situation occurs. Connect to system voltage or let float. This will cause the unit to wake up when the asset is in low power mode.
I	6	Analog Input	Purple	Optional – A sensor with an analog output or an accessory electrical circuit where voltage monitoring is required. This sensor must be no greater than system voltage.

For more information on conductor pin numbers, see the Wiring Harness kit table on [page 27](#).

Brown connector pinouts

The following figure shows the configuration of the brown connector.



The following table describes the configuration of the pinouts.

Pin	Function	GCS900	SNM941 186940-02
1	Switched Power. Power available only when the 3D system is on.	Yes	Yes
2	Power Ground	Yes	Yes
3	RS-232 TX Display, RX Radio (AGCS RS-232-0)	Yes	Yes
4	CAN Hi (GCS CAN-0)	Yes	No
5	Ethernet TXD+	Yes	Yes

Pin	Function	GCS900	SNM941 186940-02
6	Ethernet TXD-	Yes	Yes
7	Ethernet RXD+	Yes	Yes
8	Ethernet RXD-	Yes	Yes
9	CAN Low (GCSCAN0)	Yes	No
10	RS-232 TX Display, RX Radio (AGCS RS-232-0)	Yes	Yes
11	RS-232 Ground	No	No
12	Typically unswitched power. Power is always available (may not be applicable to all base kits).	Some	Yes

For more information on the nature of the signal connections, see [Recommended DC electrical specifications, page 32](#).

Earthworks, 8-pin connector pinouts

The following table describes the configuration of the pinouts.

Pin	Function
1	Battery +
2	Power Ground
3	Ethernet RX+
4	Ethernet RX-
5	Ethernet TX-
6	Ethernet TX+
7	Keyswitch Power
8	N/A

Recommended DC electrical specifications

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{BATT}	7	24	32	Volts
Supply Current, Active Mode ^{1,2}	I_{BATT}	190	233	1500	mA
Supply Current, Hibernate Mode ²	I_{BATT}	—	5	12	mA
Supply Current, Daily Average ^{2,3}	I_{BATT}	—	600	—	mA-h
Pulse Input Voltage High ⁴	V_{RTH}	85			% V_{BATT}
Pulse Input Voltage Low	V_{RTL}			55	% V_{BATT}
Ignition High Voltage	V_{IGIH}	80	—	—	% V_{BATT}
Ignition Low Voltage (including open circuit)	V_{IGIL}	—	V_{IGIH}^{-1}		V
Ignition Input Pull-down Resistance	R_{IGN}	7		10	k Ω
Digital Switch To Ground Input Voltage High	V_{DIH}	2.5			V
Digital Switch To Ground Input Voltage	V_{DIL}			1.0	V
Digital Switch To Battery Input Voltage High ⁵	V_{SBIH}	85			% V_{BATT}
Digital Switch To Battery Input Voltage Low ^{5,6}	V_{SBIL}			55	% V_{BATT}
Analog Input Voltage	V_{ANALOG}	0		100	% V_{BATT}

¹Max tested at $V_{in} = 7$ V, cell on and idle, Wi-Fi on and Carrier being transmitted, relay driver sourcing 200 mA, Filtered Power Out sourcing 200mA, USB sourcing 500mA.

²Typical measurements taken with external voltage of 12.0 V.

³Measurement calculated based on average current consumption over a 24 hour period multiplied by 24 hours.

⁴Typical at 14V, 2 EIA/TIA-232-F Compliant, 3 EIA/TIA-485-B Compliant.

⁵This measurement applies only if the PulseIn-2 input is configured as a digital input.

⁶This input can also be left floating to represent an input low signal.

Installing the SIM Card

Many versions of the SNM941 device come with a Trimble-supplied SIM card. In some circumstances, such as needing a high data rate plan for a grade control system, you may need to replace this standard SIM card with another. This chapter details how to successfully replace the SIM card. Before changing the SIM card, contact your local Trimble SNM941 dealer to determine if a different SIM is necessary.

Replacing the SIM card

The SIM card door is located at the back of the enclosure, away from the 34-pin connector. Ensure that the SIM pin number is entered into web interface, TB5x0, or CB4x0 *before* you replace the SIM.

1. When you replace the SIM card, ensure you are working in a dry and clean environment.
2. Remove the power from the SNM941 device during this procedure.
3. To reduce the chances of electrostatic discharge (ESD) damage, discharge the SNM941 enclosure to chassis ground before starting work.
4. Remove the two screws from the SIM door and open the SIM door.
5. Gently push the SIM card towards the front of the device. This will trigger a release which will eject the SIM card towards you.



6. Carefully remove the SIM card taking care not to touch the gold connectors.



7. To install new SIM card:
 - a. Hold the SIM card with the notch side going in first and the gold contacts facing down towards the PCB.
 - b. Insert into the slot and then gently push in, to trigger the locking mechanism.

NOTE – The SIM card will not insert completely into unit. This is normal.

NOTE – It is recommended to use only industrial grade SIM card with 2FF form factor.

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- your name, address, and telephone numbers
- proof of purchase
- a copy of this Trimble warranty
- a description of the nonconforming Product including the model number
- an explanation of the problem

The customer service representative may need additional information from you depending on the nature of the problem.

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