

## Installation Guide

# AA3233

## Subway Rail Antenna

16-0144-001 Rev A 05/2020

This guide includes information for the installation of the AA3233-002 Subway Rail Antenna with integrated check tag, and the AA3233-003 Subway Rail Antenna. These rugged, 915 MHz antennas are specifically designed for the rail industry. These antennas are designed for mounting between track rails.



This guide is intended for use by authorized TransCore dealers, installers, and service personnel.

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For further information, contact:

**TransCore**

8600 Jefferson Street NE  
Albuquerque, New Mexico 87113 USA

**TransCore Technical Support**

Phone: (505) 856-8007  
Web: [www.transcore.com](http://www.transcore.com)

**TransCore Sales Support**

Phone: (800) 923-4824

**WARNING TO USERS IN THE UNITED STATES  
FCC RADIO FREQUENCY INTERFERENCE STATEMENT**

**47 CFR §15.105(A)**

**NOTE:** 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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate RF energy and may cause harmful interference to radio communications if not installed and used in accordance with the instruction manual. Operating this equipment in a residential area is likely to cause harmful interference, in which case, depending on the regulations in effect, the user may be required to correct the interference at their own expense.

**NO UNAUTHORIZED MODIFICATIONS**

**47 CFR §15.21**



**CAUTION:** This equipment may not be modified, altered, or changed in any way without permission from TransCore, LP. Unauthorized modification may void the equipment authorization from the FCC and will void the TransCore warranty.

**USE OF SHIELDED CABLES IS REQUIRED**

**47 CFR §15.27(A)**

**NOTE:** Shielded cables must be used with this equipment to comply with FCC regulations.

TransCore, LP  
USA

## Installing the AA3233 Antenna

Please read all directions before installing the antenna. Make sure that all parts are present and all tools and materials are available.

### Accessory Kit

Items included in the accessory kit (P/N 19079-01) are shown in [Table 1](#).

**Table 1 Accessory Kit**

Accessory Kit Item	Quantity (each)
Paper drilling template	1
Large plastic bubble bag	1
Connector enclosure cover	1
Connector enclosure gasket	1
Shoulder screw, 10-32, 0.188 SL	12
Connector conduit, ST sealed	1
Conduit sealing locknut	1
Stud anchor, stainless steel, 3/8-in x 3-in long	6
Set screw, socket, cup 10-32, 3/4-in long	2

### Required Tools and Supplies

Use the following tools and supplies to install the antenna:

- Safety goggles
- Power drill (hammer drill recommended)
- 3/8-in diameter x 3-in long masonry bit
- Soft-jaw pliers for “N” type connector (NSN 5120-00-624-8065<sup>1</sup>)
- Torque wrench with in-lb resolution
- Torque wrench with ft-lb resolution
- Phillips head screw driver with in-lb torque wrench adapter
- 3/8-in socket head and open-end wrench with in-lb torque wrench adapter
- 9/16-in open-end wrench with ft-lb torque wrench adapter
- 20-in straight-edge
- Six 3/8-in 16 x 3 in Trubolt Red Head Wedge Anchors

<sup>1</sup> *National Stock Number (NSN) is a 13-digit numeric code, identifying all the ‘standardized material items of supply’ as they have been recognized by the United States government.*

- Liquid thread locker
- Liquid-tight flexible electrical conduit (UL listed)
- Straight, insulated liquid-tight, 1-in electrical conduit connector
- Concrete (if needed)
- Test tag and reader to verify tag operation

## Installation Procedures

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This section provides procedures for the following tasks:

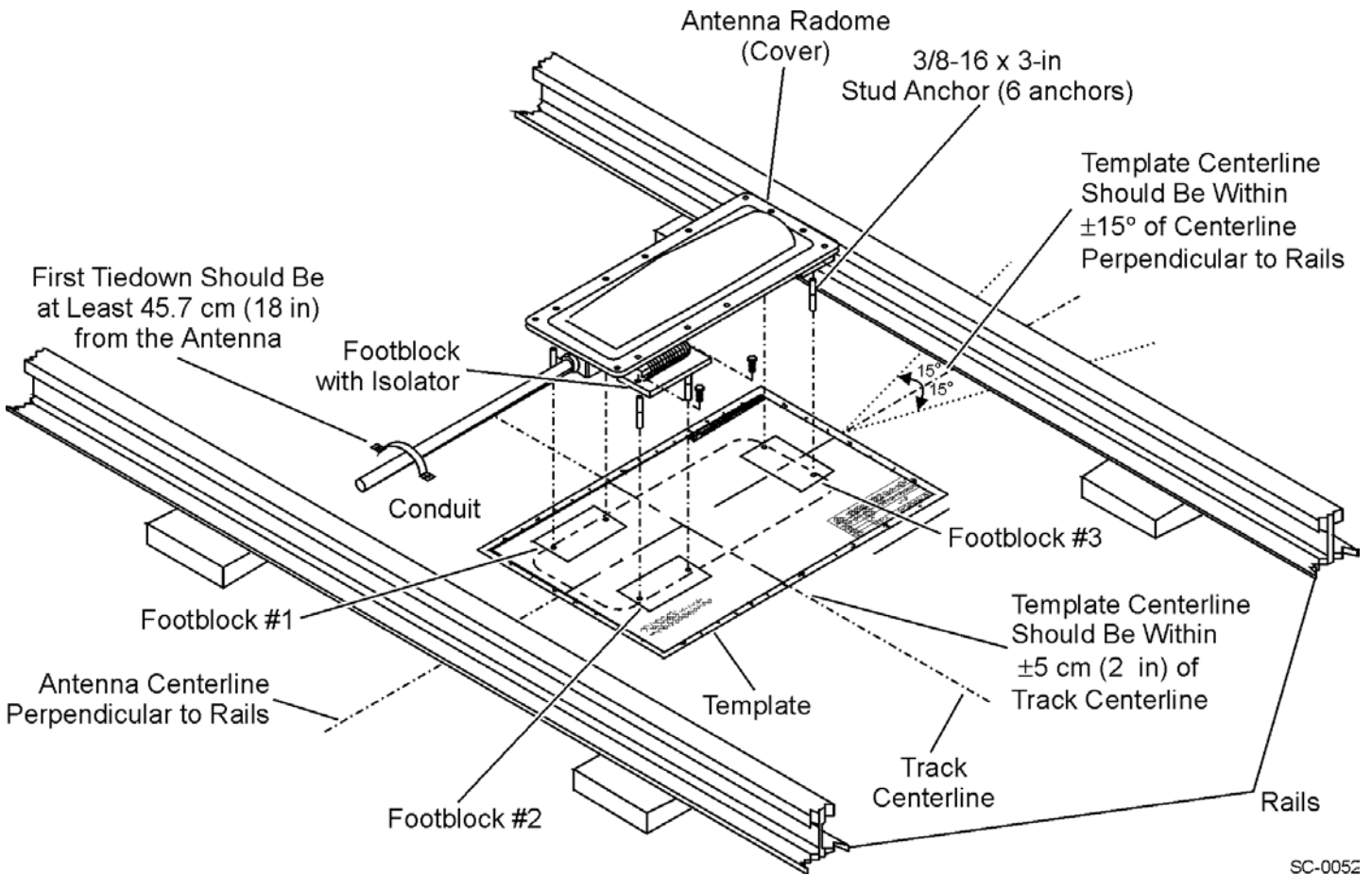
- Preparing the antenna site
- Securing the antenna hardware connections
- Fastening the antenna to the trackbed

**Note:** *To install the AA3233 Antenna correctly, follow these procedures in the order in which they are presented. The AA3233-002 has an integrated check tag. Instructions that pertain only to the installation of the check tag will be noted.*

### Preparing Antenna Site

Before you install the antenna, use the following instructions to prepare the site where the antenna is to be installed.

1. Identify the approximate antenna location on the track bed. The location should be centered between the rails. Mark parallel and perpendicular centerlines on the track bed ([Figure 1](#)).

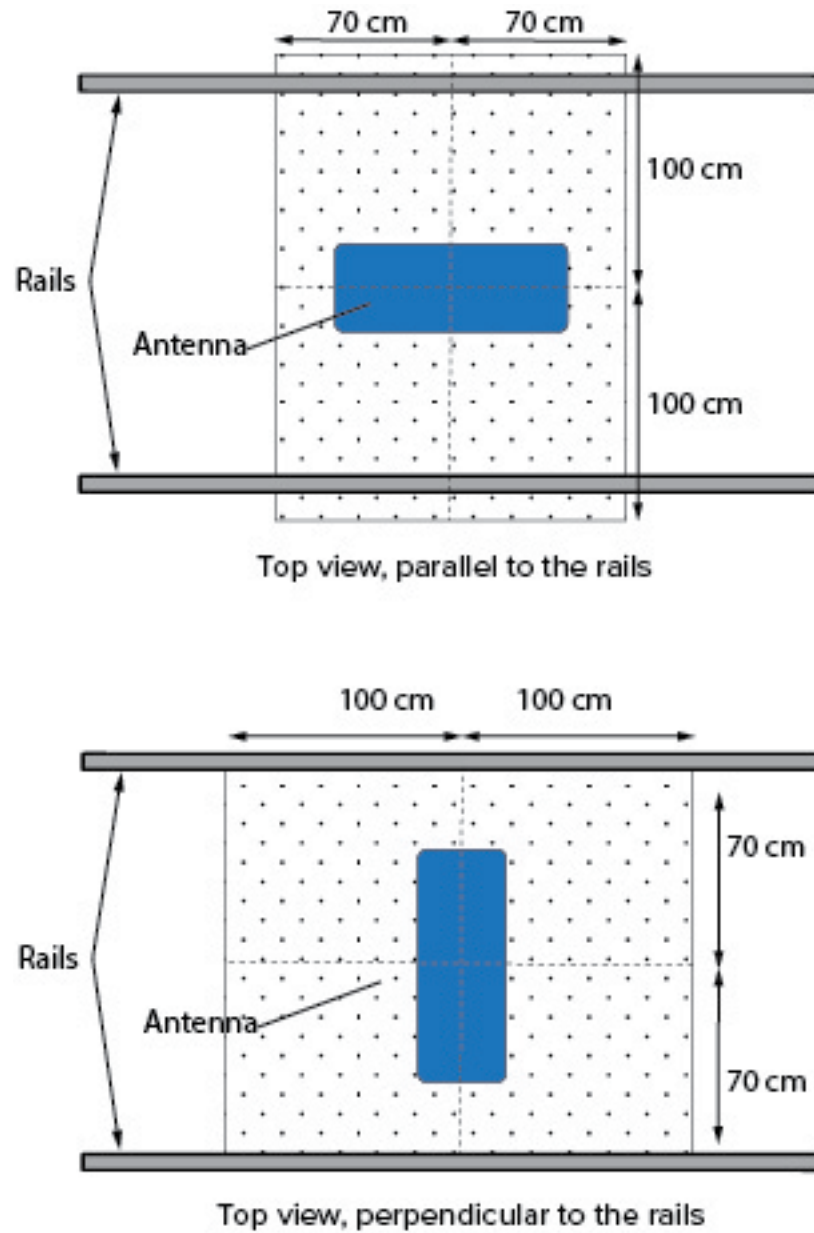


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**Figure 1 Antenna Configuration Showing Correct Placement and Orientation between Rails**

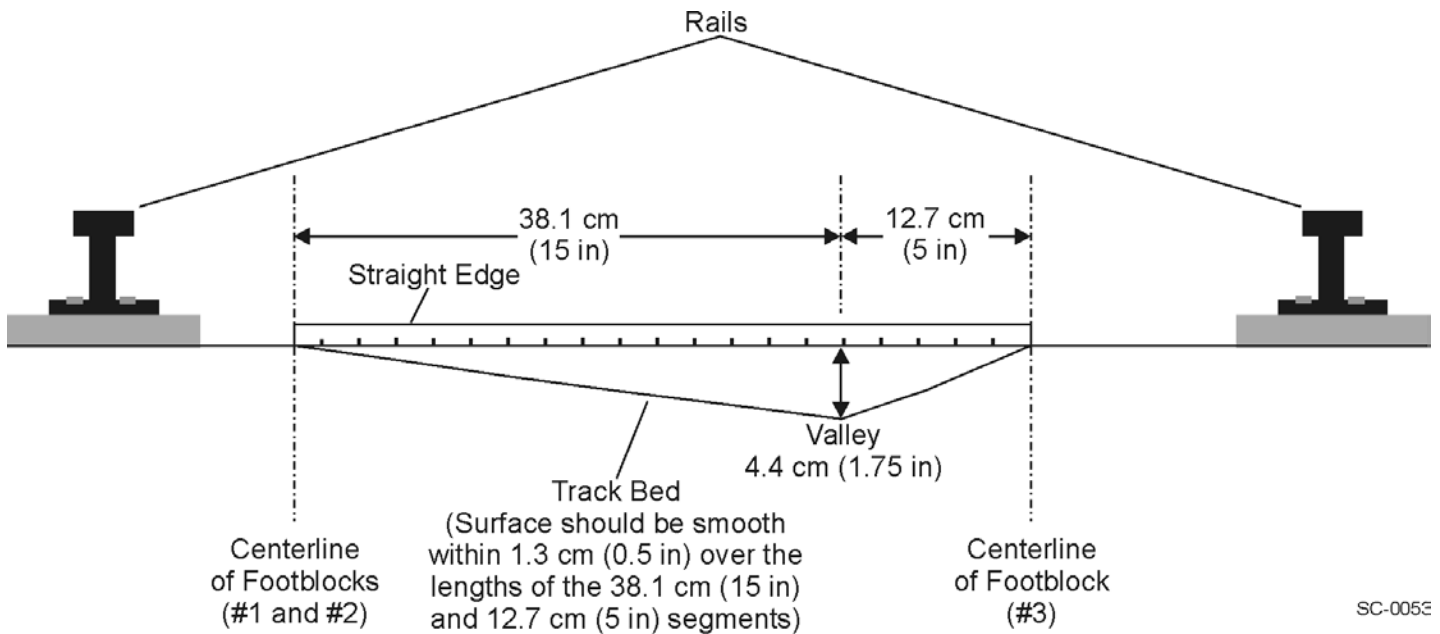
**Note:** Remove the template from the concrete base before installing the antenna.

2. Ensure that area where the antenna will be mounted in the railroad trackbed is clear of any metal obstruction other than the rails as shown in [Figure 2](#).



**Figure 2 Metal-free Zone Around Antenna**

3. Check that the track bed is sufficiently level by laying a 20 in (50 cm) straight edge on the track bed perpendicular to the rails. This straight edge should align with the centerline of the two isolators (refer to [Figure 1](#) for location of isolator) located near the connector and the centerline of the end isolator. Measure the distance from the track bed to the bottom of the straight edge. The track bed should not dip more than 1.75 in (4.42 cm) below the straight edge at a distance of 5-in (12.7 cm) from the centerline of foot block #3. Additionally, the track bed surface should be smooth (within 0.5 in) over the lengths of the 15-in (38.1 cm) and 5 in (12.7 cm) segments ([Figure 3](#)).



**Figure 3 Test Configuration for Antenna Installation**

4. Place the template on top of the intersecting centerlines. Center the antenna template — within 2 in (5.1 cm) of track centerline — on the line that is parallel to the rails, then align it with the line drawn perpendicular to the rails (within 15 degrees).
5. If the track bed is out of specification from the measurements provided in Step 4 of this section, grout the track bed base with up to 0.5 in (1.3 cm) of grout replacement to bring it to specification. Allow sufficient time for the grout to cure before proceeding to the next step. Redraw the track bed centerlines if necessary.

**Note:** If track bed cannot be brought into the specification stated in Step 3, change antenna location.

6. When the track bed base is within the requirements of Step 3, stretch the template across any “valley” (as shown in Figure 3) to get the proper center-to-center spacing between the foot blocks. Use the template to mark and drill six 0.375 in (0.95 cm) wide x 3 in (7.6 cm) deep holes in the concrete. Check that the template centerlines are aligned with the track bed centerlines (see Step 3 of this section).
7. Clear the concrete dust from the wedge anchor holes.

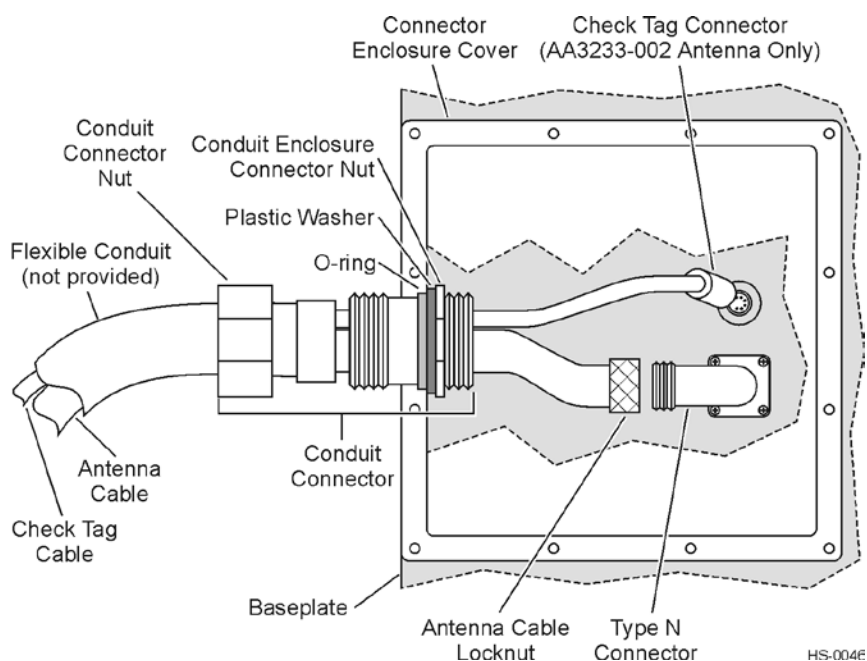
## Securing Antenna Hardware Connections

After you have prepared the site as specified in “Preparing Antenna Site”, follow the steps below to secure the hardware connections.

1. Place the antenna upside down on its cover (radome facing down) on top of the template to protect the cover from being scratched.



- Remove the locking nut and plastic washer from the conduit connector. Insert connector through the 1-in conduit connector onto the end of the connector enclosure cover. Replace the washer and nut and tighten the conduit enclosure connector nut to torque of 28 ft-lb (Figure 4).



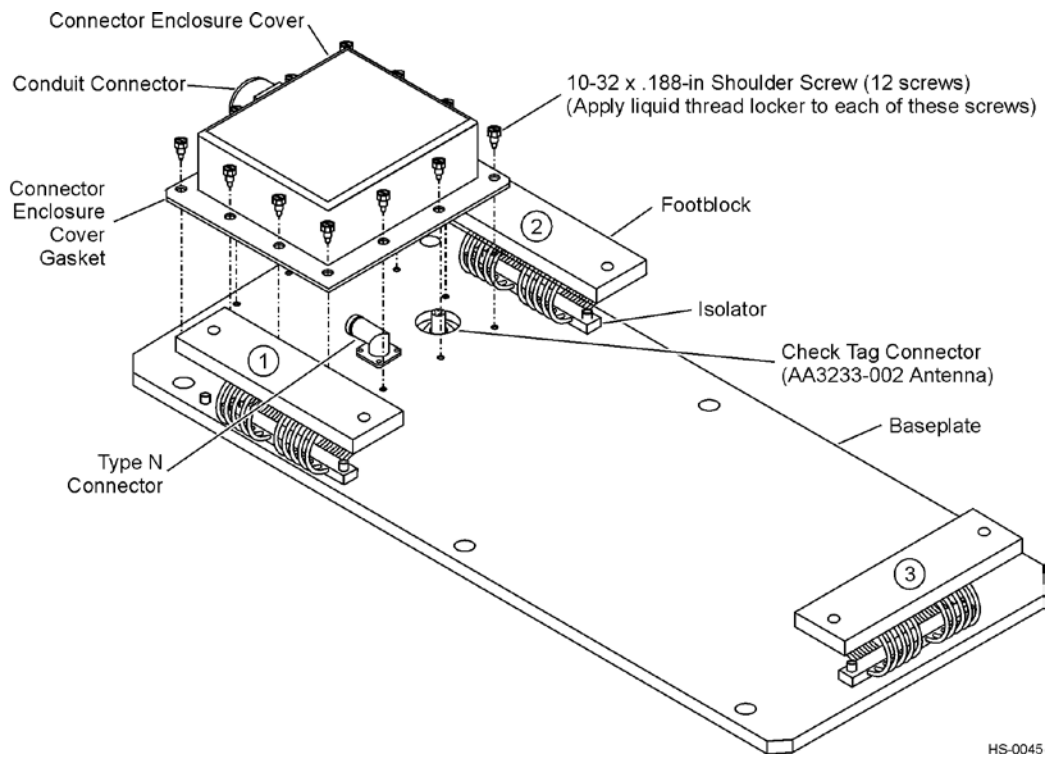
**Figure 4 Antenna Hardware Connections**

- Insert the flexible conduit into the 1-in conduit connector, and tighten the conduit connector nut to torque of 12 ft-lb (Figure 4). The flexible conduit is now secured to the connector enclosure cover.
- Insert the antenna cable and check tag cable (AA3233-002 only) from the reader into the flexible conduit. Slide the cable(s) through the flexible conduit (Figure 4).
- Pull the antenna cable through the hole in the connector enclosure cover and out of the connector enclosure cover until the cable end extends approximately 1 ft (30.5 cm) beyond the cover.
- Attach the antenna cable to the type N connector located on the antenna baseplate by first tightening the conduit locknut securely by hand and then using the soft-jaw pliers to tighten the locknut an additional one-half turn. Attach the antenna cable to the reader.
- (AA3233-003 only)** Place the antenna in the right-side up (radome facing up) position and test the antenna by reading a tag held about 18 in (45 cm) over the antenna.
- (AA3233-002 only)** Attach the check tag cable to the check tag connector located on the antenna baseplate by inserting then twisting the connector  $\frac{1}{4}$  turn to right to lock the connector. Attach the check tag cable to the reader.
  - Check that the antenna is working properly by reading a check tag. (This step assumes that the installer is using and is familiar with an AI200 Reader.)

- Ensure that the reader is switched on and in data mode(#00). Enter command #8110 to enable the check tag.

**Reader response: #===== 00**

- Switch off reader.
9. Turn the antenna upside down on top of the template to protect the cover from being scratched. Attach the connector enclosure cover to the connector base plate using twelve 10-32 x .188-in shoulder screws (Figure 5).
  10. Apply liquid thread locker to all screw threads. Tighten each screw until its shoulder bottoms out against the baseplate and secure to torque of 20 in-lb.



**Figure 5 Components and Foot Blocks with Isolators on Antenna underside**

## Fastening Antenna to Track Bed

After you have secured the antenna connections as specified in “[Securing Antenna Hardware Connections](#)”, follow the steps below to fasten the antenna to the track bed.

1. Lift the antenna from on top of the template.
2. Remove the template from the antenna location and place antenna right side up (radome facing up) on template.
3. Assemble the washer and nut on the wedge anchor stud so that the nut rests below the chamfered head.

4. Place anchor in hole. Strike top sharply with a hammer to drive the anchor into the hole (Figure 6). Tighten nut to torque of 25 ft-lb.



Figure 6 Placing Stud Anchor into Hole



#### Caution

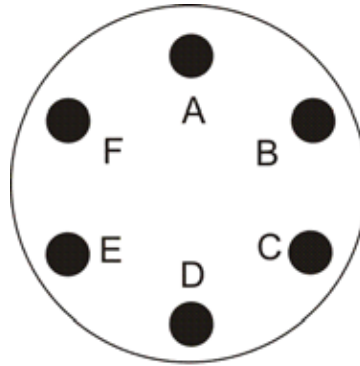
***The stud anchors must not protrude more than 0.5 in (1.3 cm) through the foot-block holes, that is, not more than 1 in (2.5 cm) above the concrete surface.***

5. Remove nuts and washers from stud anchors.
6. Place the antenna over the stud anchors.
7. Replace the nuts and washers on the anchor studs, apply liquid thread locker to threads, and tighten nuts until they are seated.
8. Secure the nuts to torque of 25 ft-lb.
9. Check that the antenna is anchored firmly to the concrete.
10. If the 1/4-20 set screws or lock nuts have been removed or loosened from the isolators or baseplate, replace them and secure to torque of 40 in-lb.
11. Fasten the radio frequency coaxial cable to reader.
12. Fasten conduit to track bed using tie-downs. The first tie-down should be located at least 18 in (45 cm) from the antenna (Figure 1 on page 6) to allow the isolators to move freely.

## Check Tag Connector (AA3233-002 Only)

### Check Tag Connector

This section shows the pin-out designations for the check tag connector (Figure 7).



HW-0381

**Figure 7 Check Tag Connector Pin-Outs**

Table 2 lists the pin-out signals and descriptions.

**Table 2 Pin-Out Signal Descriptions**

Pin	Color (reference only)	Pair	Description
A	White/blue stripe	1	Primary power
B	Blue/white stripe	1	Ground
C	Bare	1	Shield (ground)
D	Orange/white stripe	2	Check tag enable
E	White/orange stripe	2	Check tag enable (return)
F	Bare	2	Shield (ground)



**For more information:**

**Sales Support**  
800.923.4824

**Technical Support**  
505.856.8007

**transcore.com** 



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