
TORO Network Radio Link

Troubleshooting Guide

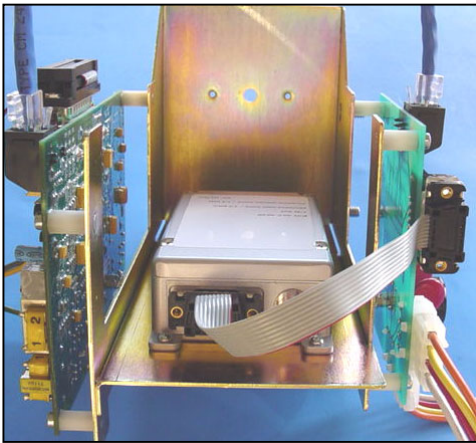


The Network Radio Link Kit consists of 3 main parts, (1) the Maxon Radio (2) the Radio Interface PCB and (3) the Universal Modem. The following paragraph outlines the general function of the three components and will be discussed in detail on the following pages.

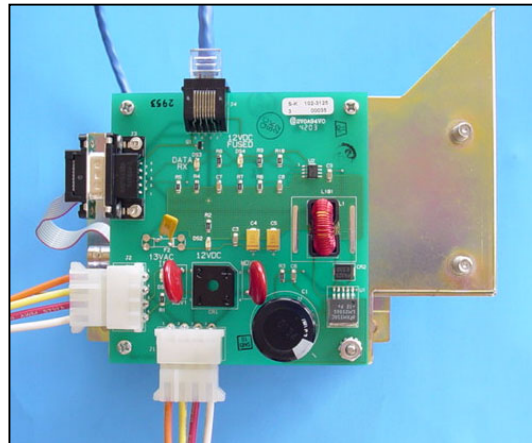
The Maxon Radio receives and transmits communication data between the Central Computer Interface and the Field Satellite.

The Radio Interface PCB performs 3 functions, (1) provides power to the Maxon Radio (2) provides power to the radio side of the Universal Modem and (3) serves as an interface for Rx and Tx communication data between the radio and the Universal Modem/Timing Mechanism.

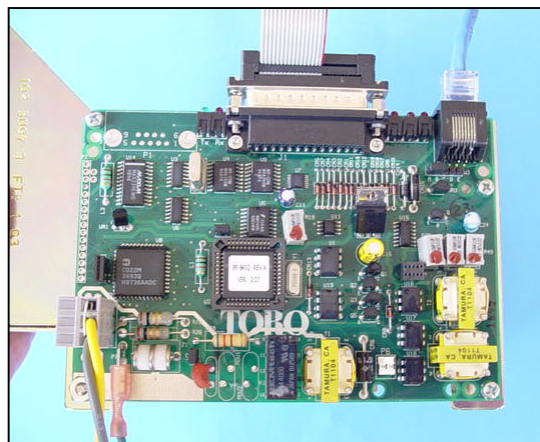
The Universal Modem relays the Rx and Tx communication data to and from the Timing Mechanism. **Note:** *The Universal Modem receives 12 VDC power from two sources. The Radio Interface PCB supplies 12 VDC with an analog ground to the radio side of the modem. I will call it Radio Side. The TM supplies 12 VDC with a digital ground to other components on the modem, including the relay that opens the modem for communication. I will call it TM Side. Both sources must be present for the Universal Modem to communicate.*



Maxon Radio



Radio Interface PCB

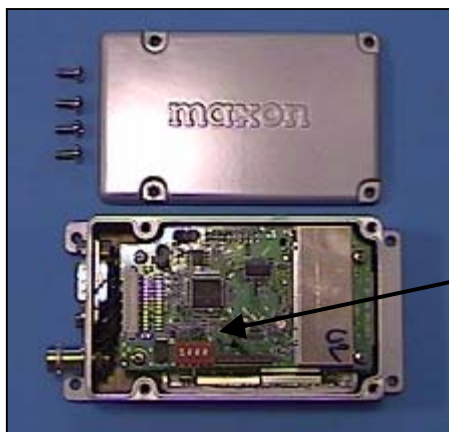


Universal Modem

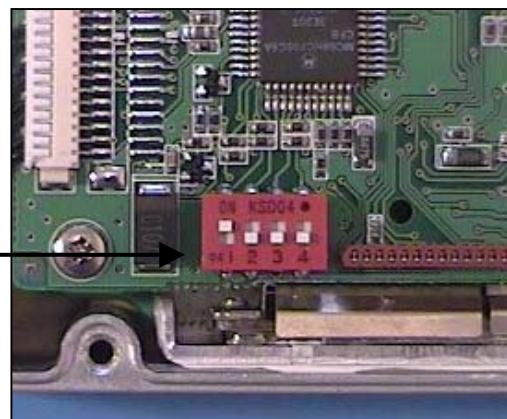
Maxon Radio Programming Guide

The Maxon radio used in the Radio Link Kit is a 16 channel programmable radio configured for narrowband communication. The pre-programmed radio is shipped in a standard configuration set on Channel #1 with a frequency of 453.9625. Other channels and frequencies can be used by changing dip switch settings inside the radio. Default settings from the factory are shown below.

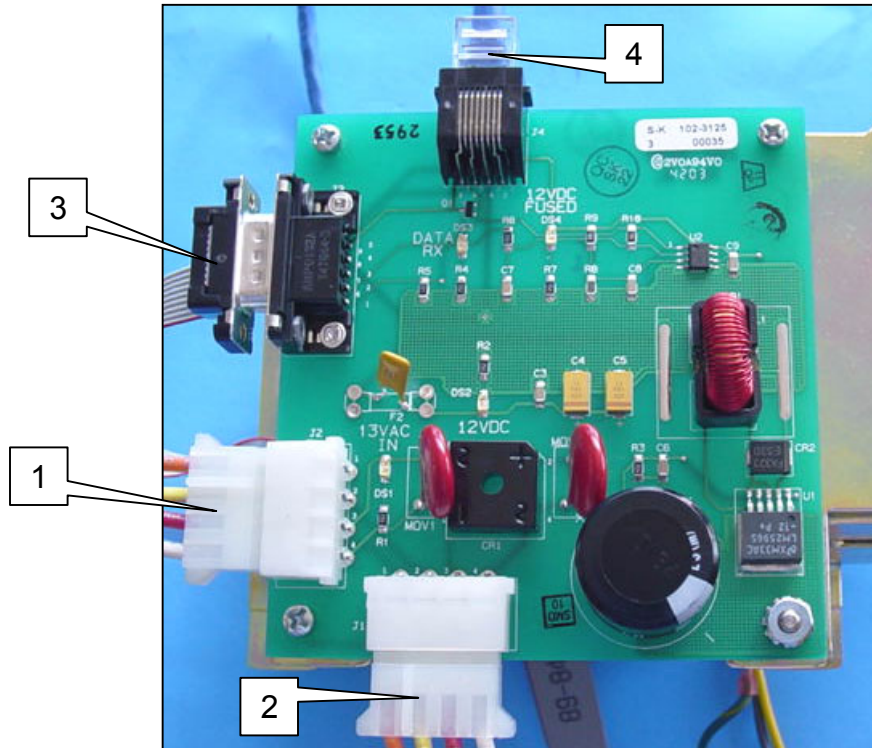
Channel	Freq.	SW 1	SW 2	SW 3	SW 4
1	453.9625	OFF	OFF	OFF	OFF
2	461.5000	OFF	OFF	OFF	ON
3	461.5875	OFF	OFF	ON	OFF
4	462.7625	OFF	OFF	ON	ON
5	462.8875	OFF	ON	OFF	OFF
6	462.9125	OFF	ON	OFF	ON
7	463.2125	OFF	ON	ON	OFF
8	463.3750	OFF	ON	ON	ON
9	463.6125	ON	OFF	OFF	OFF
10	463.6375	ON	OFF	OFF	ON
11	464.5000	ON	OFF	ON	OFF
12	464.5500	ON	OFF	ON	ON
13	464.8000	ON	ON	OFF	OFF
14	469.5000	ON	ON	OFF	ON
15	469.8000	ON	ON	ON	OFF
16	open	ON	ON	ON	ON



Dip Switches

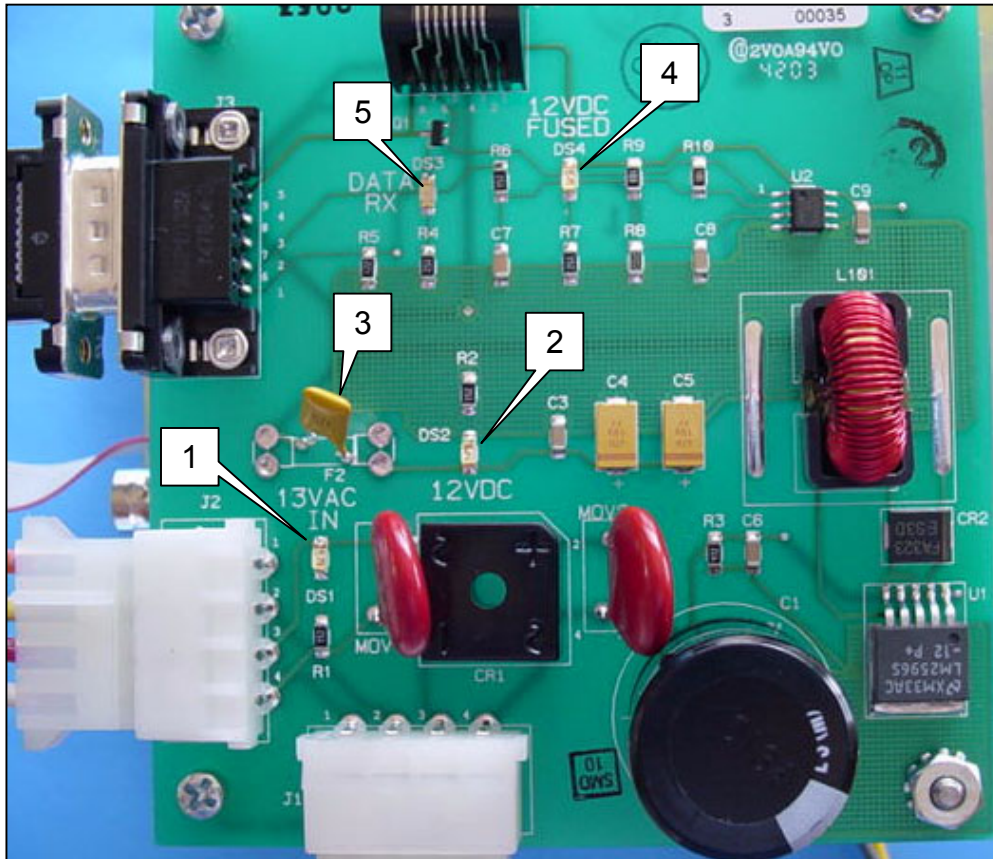


Radio Interface PCB



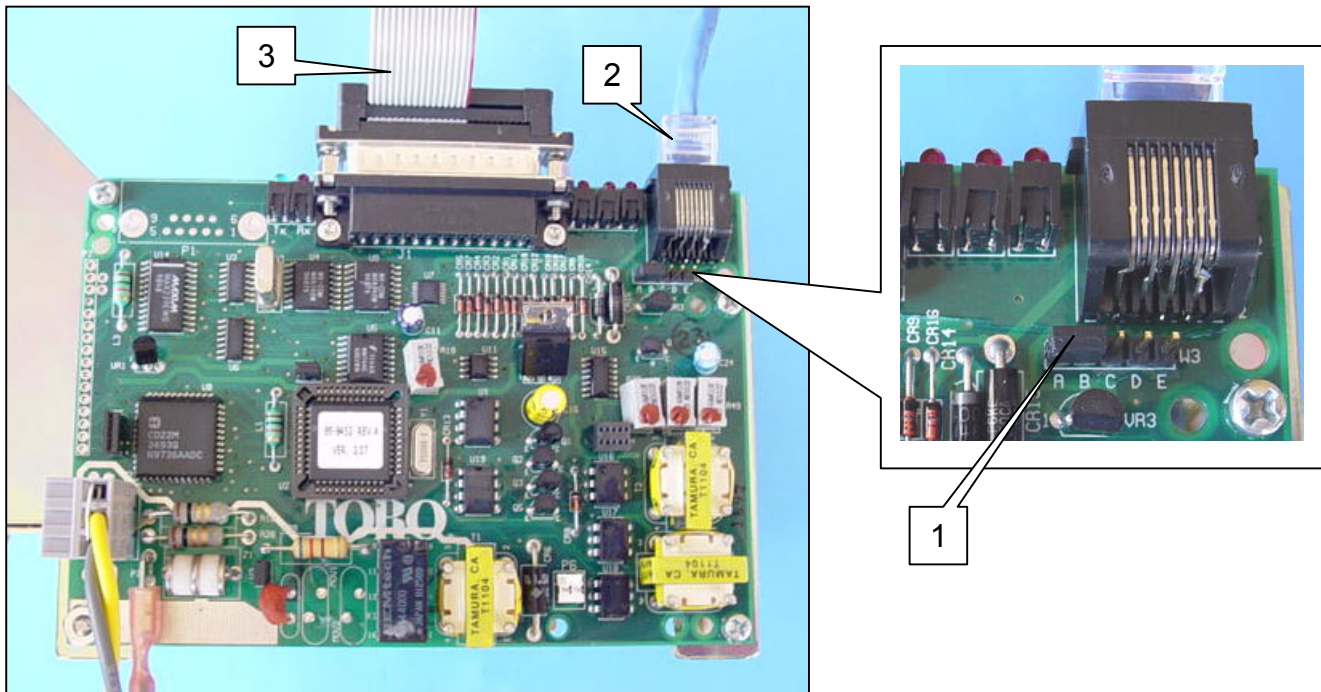
- 1 13 VAC incoming power from the Distribution Board across the red and white wires.
- 2 This cable is used to supply 13 VAC and 24 VAC to the rear Distribution Board on Network LTC+ satellites with station counts higher than 32.
- 3 This nine pin cable connects the Maxon Radio to the Radio Interface PCB and serves two functions. (1) The Radio Interface PCB rectifies the 13 VAC into 12 VDC to power the radio. Pins 4 and 5 supply the 12 VDC to the radio with pin 4 being the ground. (2) The Tx and Rx communication data from the radio is carried across this cable with Tx using pin 1, Rx using pin 2, PTT is pin 3 and squelch pin 6.
- 4 The RJ-45 cable also serves the same two functions as above, but in this case to the Universal Modem. (1) Pins 3 and 4 supply the 12 VDC to the radio side of the Universal Modem with pin 4 being the ground. (2) Pin 5 carries the Tx communication data, pin 7 carries the Rx communication data, pin 6 is the PTT and pin 8 is the squelch. The cable is a straight through cable so checking for continuity is easily accomplished. The pin numbers are located under the RJ-45 connector on the Radio Interface PCB.

Radio Interface PCB continued....



- 1 **13 VAC IN** LED: When illuminated indicates 13 VAC from the Distribution Board across the red and white wires.
- 2 **12 VDC** LED: When illuminated indicates 12 VDC rectified by the Radio Interface PCB.
- 3 This component is an inline fuse on the 12 VDC circuit.
- 4 **12 VDC FUSED** LED: When illuminated indicates the fuse is in good condition on the 12 VDC circuit. If the LED is out the fuse is probably blown. The Universal Modem and the Maxon Radio will not get the 12 VDC required to operate properly.
- 5 **DATA Rx** LED: This should only illuminate when radio communication data is being transmitted on the Rx line. If it is stuck on there is a problem with the radio, most likely the carrier detect not properly set. Radio replacement will be necessary. **Note:** *The Maxon Radio used with Network Radio Link is not interchangeable with the Sentinel radio. The carrier detect (Rx side) and the deviation (Tx side) are different.*

Universal Modem



- 1 Check to see if the jumper between pin A and pin B has been installed.
- 2 **RJ-45 cable** connecting from the Radio Interface PCB. This cable carries the 12 VDC to the radio side of the Universal Modem on pins 3 and 4 with pin 4 being the ground. The Tx communication data on pin 5, the Rx communication data on pin 7, the PTT on pin 6 and squelch on pin 8.
- 3 **25 pin to 16 pin Modem Cable** connecting from the Timing Mechanism. This cable serves 2 functions (1) Supplies 12 VDC to the Universal Modem (*TM Side components*) including the relay and (2) Provides a path for Rx and Tx communication data.

Modem cable continuity tests:

12 VDC = pin 17 modem side, pin 9 TM side

Rx = pin 3 modem side, pin 12 TM side

Tx = pin 2 modem side, pin 14 TM side



25 pin Modem side

Top Row = 1-13
Bottom Row = 14 - 25

16 pin TM side

Top Row = 1-15 odd
Bottom Row = 2-16 even
Tab determines top

NETWORK LTC[®] Plus Radio Kit Plastic Pedestal Installation Instructions

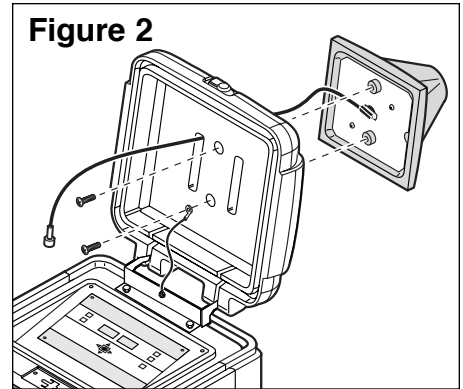
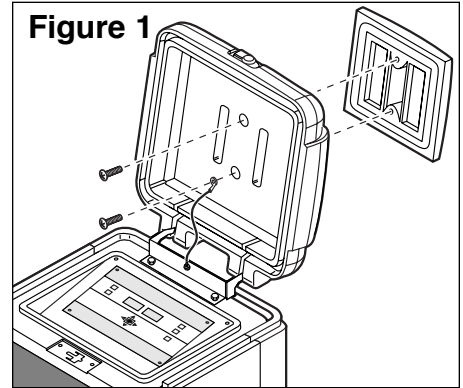
The LTC Plus radio kit is designed to equip the LTC Plus satellite with radio communication interface. With the radio kit, LTC Plus satellites can be controlled remotely using a radio from the central. This instruction will guide you through all the necessary steps for proper and complete installation.

NOTE: The following installation requirements must be accomplished before the radio kit can be operated.

- A site survey must be performed by an authorized Toro representative to determine the narrow-band radio frequency and antenna type that is best suited for the location.
- An FCC narrow-band radio license is required by federal law and must be in effect prior to radio operation. It is the responsibility of the equipment end-user to acquire, maintain and renew this license.
- The LTC Plus radio module must be programmed with the appropriate frequency by an authorized Toro representative.
- The lead tone in SitePro[®] must be changed from 0.50 seconds (default) to 0.75 seconds.

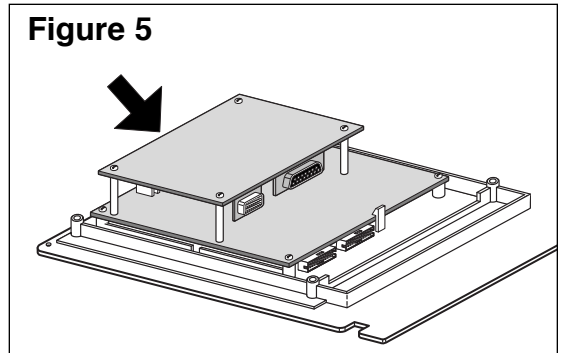
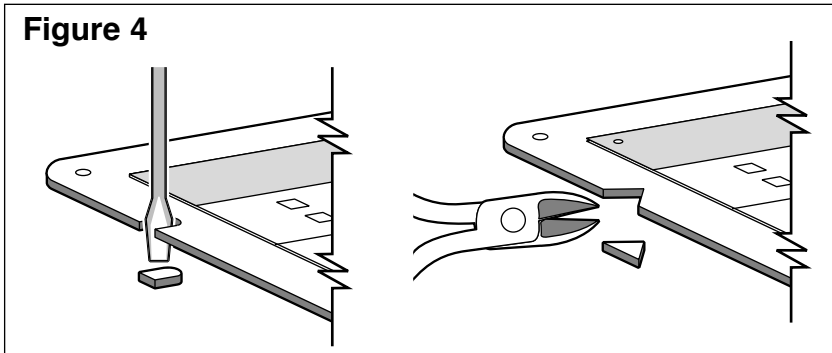
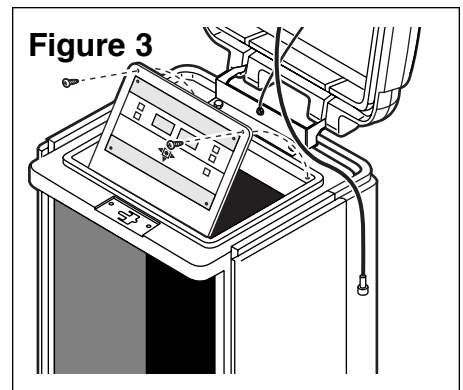
Installation Procedure

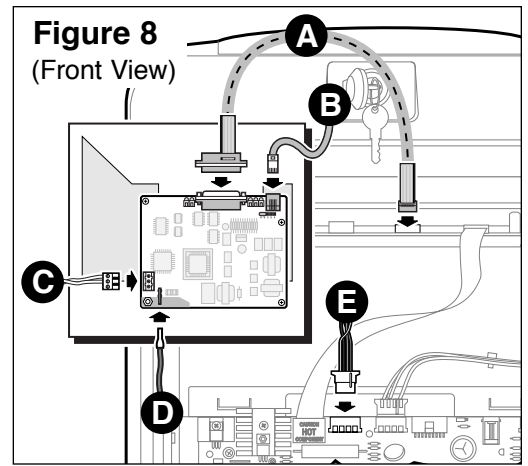
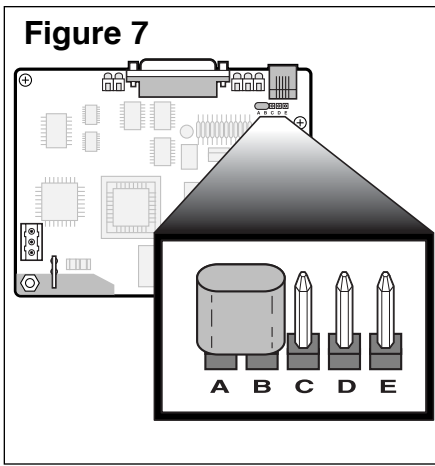
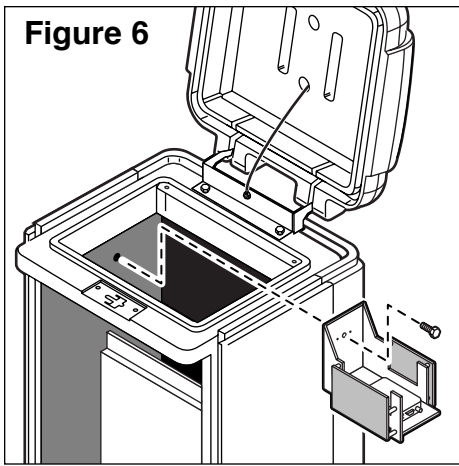
- Step 1** - Unlock and open the satellite pedestal cover. Remove the pedestal front panel to access the power supply and place the power supply switch to OFF.
- Step 2** - Remove the vent cover from the pedestal cover by unscrewing the two mounting screws located underneath. See **Figure 1**.
- Step 3** - Slide the external antenna cable through one of the vent holes in the pedestal cover. Position the external antenna on top of the pedestal cover and secure it with the two mounting screws that were removed from the vent cover. See **Figure 2**.



⚠ CAUTION: Severe electro-static discharge (ESD) can render the satellite Timing Mechanism (TM) and radio assembly defective and inoperable. Place one hand on the metal bracket of the satellite to ground yourself before handling the TM and the radio assembly.

- Step 4** - Remove the two mounting screws that secure the TM assembly to the plastic pedestal. See **Figure 3**.
- Step 5** - Lift the TM assembly and remove one of the D-shaped knockout located on the upper left and right sides of the TM support plate. If the support plate does not have a knockout, use a wire cutter to cut a V-shaped notch for the antenna cable to pass through. See **Figure 4**.
- Step 6** - If the TM assembly is equipped with a standard modem, locate and remove it from the assembly. You may choose to retain the modem at the location but make sure that the data and power cables are removed from the standard modem sockets. See **Figure 5**.





- Step 7** - Locate the pre-tapped 1/4" screw hole at the left side of the satellite cabinet.
- Step 8** - Install the radio assembly to the cabinet using the provided 1/4" screw. See **Figure 6**.
- Step 9** - Locate the pins labeled **A**, **B**, **C**, **D** and **E** on the universal modem module. See **Figure 7**. Verify that a jumper between **A** and **B** exist. Without the jumper, the universal modem module will not function properly.
- Step 10** - Connect the 25 to 16-pin plug to the universal modem and TM assembly. See **Figure 8** label "**A**".
- Step 11** - Plug the RJ-45 cable (**Figure 8** label "**B**") to the universal modem module RJ-45 socket. Route and connect the other end of the cable to the rear PCB radio assembly RJ-45 socket. See **Figure 10** label "**B**".
- Step 12** - Connect the universal modem communication cable (**Figure 8** label "**C**") and the ground cable (**Figure 8** label "**D**"). If the satellite is equipped with a standard modem, use the existing communication and ground cables. Otherwise, use the provided cable. Route the data cable from the pump PCB and connect the ground wire to the ground post. See **Figure 9** label "**C**" and "**D**".
- Step 13** - Connect the 4-wire cable assembly to the **J2** socket of the satellite front distribution board. See **Figure 8** label "**E**". Connect the other end of the cable assembly to the **J2** socket of the rear PCB of the radio assembly. See **Figure 10** label "**E**".
- Step 14** - For satellites with more than 32 stations, connect the other 4-wire cable assembly to the **J1** socket of the rear radio assembly PCB and to the **P2** socket of the satellite rear Distribution board. See **Figure 10** label "**F**".
- Step 15** - Connect the data cable to the radio receiver and route the other end to the rear PCB of the radio assembly. See **Figure 10** label "**G**".
- Step 16** - Connect the antenna cable to the radio receiver. See **Figure 11**.
- Step 17** - Position the antenna cable in the TM support plate notch and reinstall the TM assembly to the satellite with the two mounting screws.
- Step 18** - Secure the antenna cable to the wire support of the pedestal cover using the provided wire tie. Allow enough antenna cable loop for the door to fully open. See **Figure 12**.
- Step 19** - Place the satellite power switch back to ON and replace the satellite front panel cover.
- Step 20** - Test the satellite and radio for proper operation.

