Modicon
990 NAD 230 00
Modbus Plus Tap

GI–MBPL–TAP
Publication Number: 043505142 Rev. 3.0

To Our Customer

This device must be installed as specified in a network layout plan or similar diagram, showing the device's mounting location and cable connections. Improper installation can cause problems with the network operation. If you do not have a diagram showing the mounting location and cabling information, you should obtain one from your network administrator before proceeding with the installation. The *Modbus Plus Network Planning and Installation Guide* (890 USE 100 00) describes how to prepare a network plan.

Tools You Will Need

You will need a wire cutter to cut the cables, and a wire stripper or knife to remove the cable outer jacket. You will need a wire crimper to connect the ground lug to the shield drain wire of the drop cable, and a flat screwdriver for connecting the ground lug to the tap.

You will also need an insertion tool for pressing the wires into the tap terminals. Use of the tool is required. The tool is available from AMP Incorporated, P.O. Box 3608, Harrisburg, PA 17105–3608 USA (part number 552714-3), or from your local Modicon product representative (part number 043509383). The correct tool's shank color is white, indicating that it is designed for installing 24 ... 28 AWG (0.08 ... 0.2 mm) wires.

Mounting the Tap

Before mounting the Tap, install the supplied grounding screw and nut onto the Tap as shown in Figure 1. Before you connect any wiring to the Tap, mount it at its planned location. Figure 1 shows the Tap's dimensions.

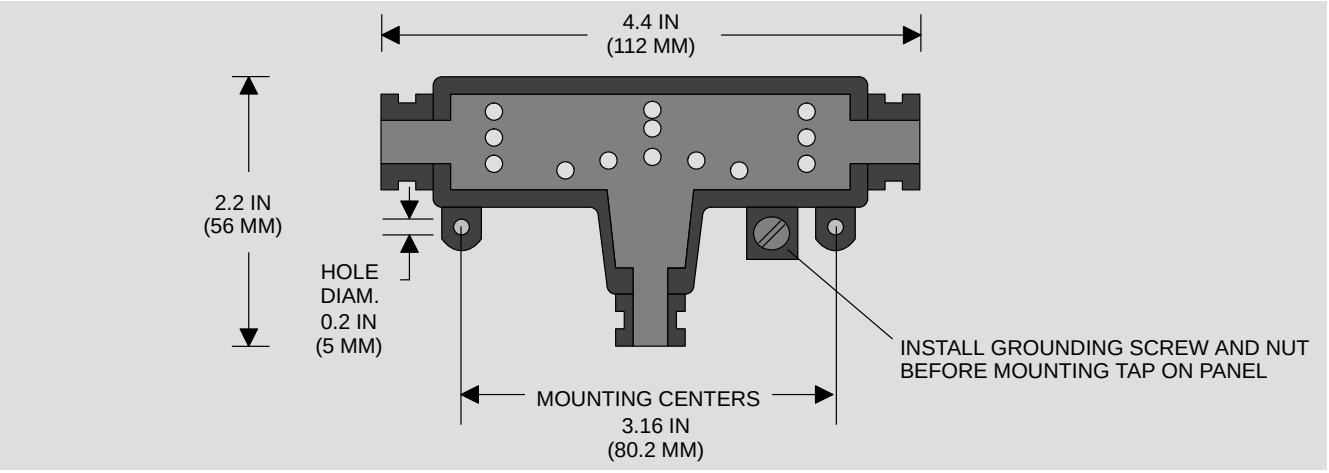

Figure 1 Tap Layout and Dimensions (Cover Open)

Connecting the Trunk Cables

Identifying the ‘Inline Sites’ and ‘End Sites’

Before you can complete the network trunk cable connections to any Tap, you must know whether the Tap is installed at an ‘Inline Site’ or at an ‘End Site’ on your network.

End Sites are always located at the two extreme ends of a ‘cable section’. Every other site is an Inline Site. If RR85 Repeaters are used, a cable section is that part of the network that exists between two Repeaters. If Repeaters are not used, the entire network is one cable section.

Figure 2 shows a typical network with three cable sections. Note the positions of End Sites and Inline Sites.

Cable Connections: The Tap at each End Site will have one cable connected. The Tap at each Inline Site will have two cables connected. Figure 2 shows cable connections for several End Sites and Inline Sites.

Internal Jumper Connections: Each Tap package contains two short jumper wires. The jumpers are not installed in the Tap when it is shipped. The jumpers *must* be installed into the Taps at End Sites. They *must not* be installed into the Taps at Inline Sites. In Figure 2, the Taps marked ‘J’ must have their jumpers installed.

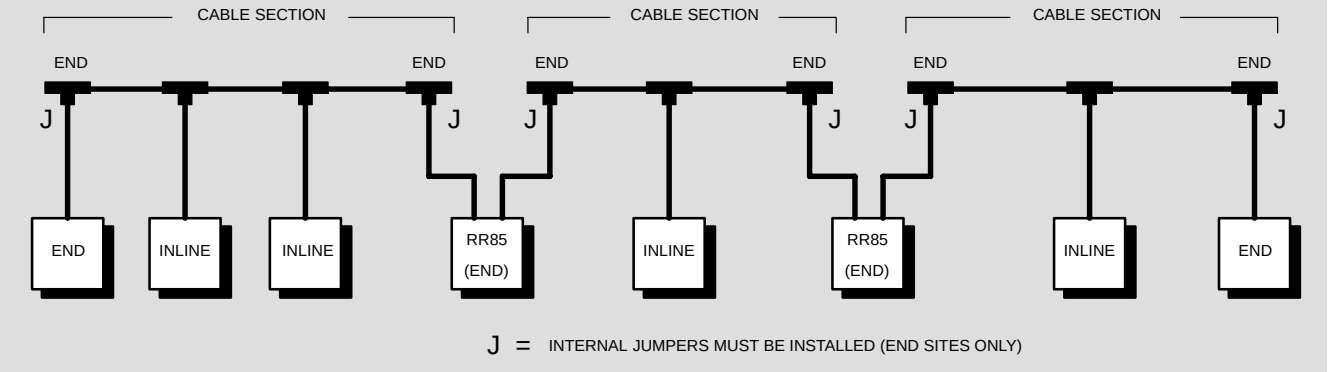

Figure 2 Identifying End Sites and Inline Sites

Identifying Cables in ‘Single-Cable’ and ‘Dual-Cable’ Layouts

You can use single-cable or dual-cable layouts in your network. Here is how cables will be routed to your Taps.

Single-cable Layouts: Inline Sites always have *one* Tap. Two cables are routed to the Inline Site location. They connect to each side of the Tap. End Sites have one cable, for connection to one side of the Tap.

Dual-cable Layouts: Inline Sites always have *two* Taps. Four cables are routed to the Inline Site location. They connect to each side of each Tap. End Sites have two cables, for connection to one side of each Tap.

Labeling of Cables: Each cable must be properly labeled to identify the Tap at which it is to be connected. If you do not have a network plan showing the connections to your Tap, or if the cables are not properly labeled, you should not continue with the installation until you obtain this information.

Cable Entry and Jumpers (Inline Sites)

At each inline site, two lengths of cable will be installed in the Tap. See Figure 2 for an example of cable routing. The Taps must be connected in series. The cable to the *right side* of the previous Tap must connect to the *left side* of this Tap. The cable to the *left side* of the next Tap must connect to the *right side* of this Tap.

Jumpers Not Installed: The two jumpers must not be installed. Figure 3 shows a Tap at an inline site.

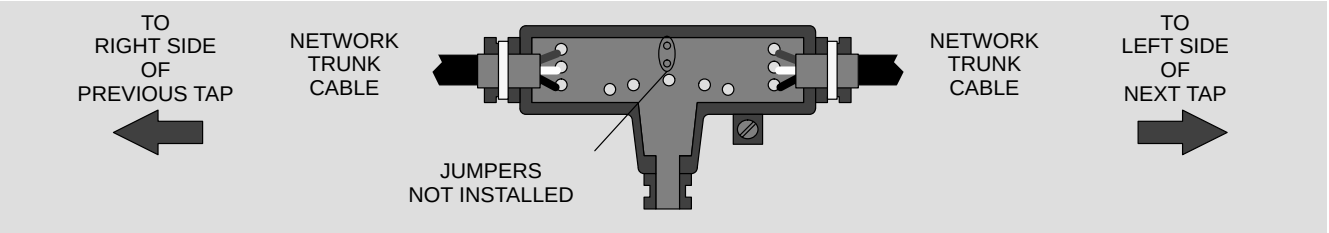

Figure 3 Trunk Cable Entry – Jumpers Not Installed (Tap at Inline Site)

Cable Entry and Jumpers (End Sites)

At each end site, one length of cable will be installed in the Tap. See Figure 2 for an example of cable routing.

Installing Jumpers: Both jumpers must be installed. Install them at the two center pins. Then connect them to the lower two pins at the opposite side of the Tap from the cable entry. Figure 4 shows two Taps at end sites.

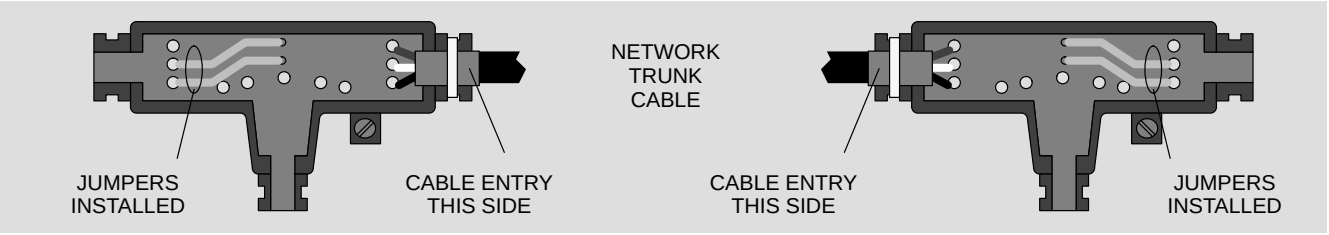

Figure 4 Trunk Cable Entry – Jumpers Installed (Tap at Inline Site)

Figure 5 shows how to connect each wire. (A) Do not strip the wire. Place the wire into the terminal slot so that the end of the wire is flush with the inside of the terminal. (B) Using the proper insertion tool, press the wire fully into the terminal. (C) Plastic caps are supplied with the Tap. Press a plastic cap down fully into the terminal.

Use of the insertion tool is required. Ordering information for the tool is on the first page of these instructions. Make sure the tool is clean and in good condition before using it.

Figure 5 Wire Terminal Connection (Detail)

Connecting the Trunk Cables (Continued)

Preparing the Cable

The trunk cable contains one set of twisted-pair signal wires and a shield drain wire.

If you are connecting two trunk cables to the Tap, repeat this procedure for each cable.

Strip the cable's outer jacket to a length of 1 inch (25mm) as shown in Figure 6. Do not strip the wires. Slide the shield braid back over the cable's outer jacket. Remove the foil liner.

The Tap package includes a rubber boot. Cut the boot into two pieces. Slide one piece of the boot over the cable shield and outer jacket as shown in Figure 6. If you are connecting two trunk cables to the Tap, slide the other piece of the boot over the other cable as shown in the figure.

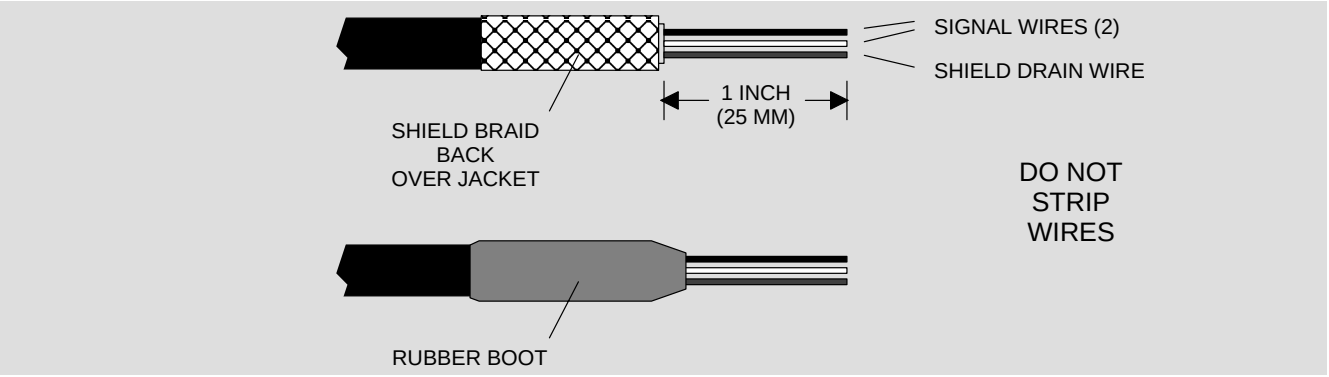

Figure 6 Preparing the Trunk Cable

Connecting the Wires

Caution: Before installing any wiring into the Tap's terminals, make sure the Tap is tightly secured to its mounting position.

Insert the cable into the Tap. Viewing the Tap as shown in Figure 7, connect the wires. The terminals are marked as follows:

Terminal	Meaning	Location	Wire Color
GND	Network Trunk Cable, Ground	Top	Shield Drain Wire
W	Network Trunk Cable, White	Center	WHITE
BLK	Network Trunk Cable, Blue or Black	Bottom	BLUE or BLACK

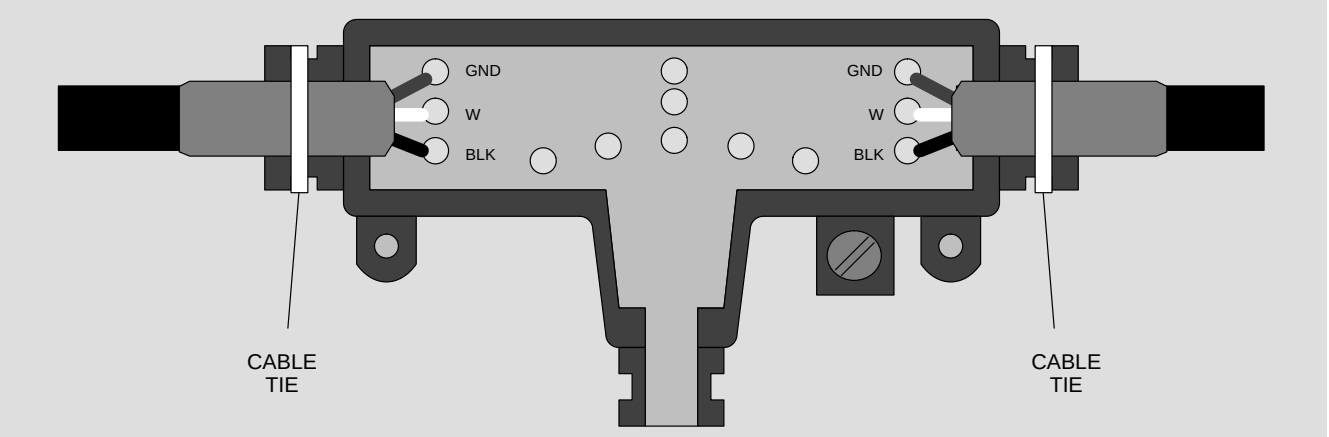

Figure 7 Trunk Cable Connections

Figure 7 shows two lengths of trunk cable connected to a Tap at an Inline Site. Jumpers should be removed, as shown in this figure and in Figure 3.

Note that if you are connecting the cable to a Tap at an End Site, only one length of cable will be connected. In this case both jumpers must be installed at the terminals at the opposite end of the Tap, as shown in Figure 4.

Figure 8 shows how to connect each wire. (A) Do not strip the wire. Place the wire into the terminal slot so that the end of the wire is flush with the inside of the terminal. (B) Using the proper insertion tool, press the wire fully into the terminal. (C) Plastic caps are supplied with the Tap. Press a plastic cap down fully into the terminal.

Use of the insertion tool is required. Ordering information for the tool is on the first page of these instructions. Make sure the tool is clean and in good condition before using it.

If you remove a wire after you have connected it, do not try to reconnect the wire at the same point on the wire. Cut the wire back by 1/8 inch (3 mm), then connect it at a new point on the wire.

Figure 8 Wire Terminal Connection (Detail)

Securing the Cable

The Tap package includes a cable tie for each cable. Install the cable tie as shown in Figure 7 and tighten it securely.

Connecting the Drop Cable to the Tap

Preparing the Cable

The drop cable contains two sets of twisted-pair signal wires with separate shield wires. It also has an outer shield drain wire. This is a total of seven wires.

Strip the cable jacket to a length of 3 inches (75mm) as shown in Figure 9. Remove the shield material to expose the wires. Do not strip the wires.

Trim the four signal wires and the two inner shield wires to a length of 1 inch (25mm) as shown in Figure 9. Leave the outer shield drain wire at its length of 3 inches (75mm). Crimp the supplied grounding lug to this wire.

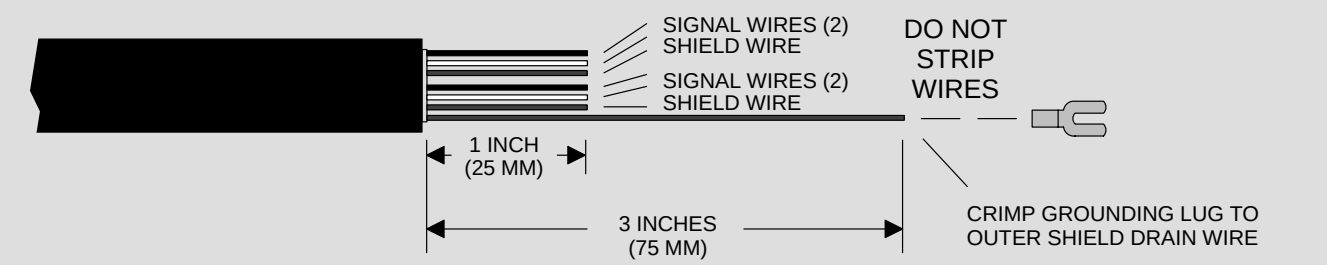

Figure 9 Preparing the Drop Cable

Connecting the Signal Wires

Note the wire colors:

- One set of wires is colored WHITE and ORANGE, with a bare shield wire.
- The other set is colored WHITE and BLUE, with a bare shield wire.

Before connecting the wires, make sure you have identified the two sets of twisted-pair wires. The two white wires are not interchangeable. When you connect the wires, you must connect each wire to its proper terminal.

Insert the cable into the Tap and secure it with a cable tie. Viewing the Tap as shown in Figure 10, connect the wires. The terminals are marked as follows, from left to right:

Terminal	Location	Wire Color
O	Left	ORANGE
W	Left center	WHITE
GND	Center	Shields (both sets of wires)
W	Right Center	WHITE
B	Right	BLUE

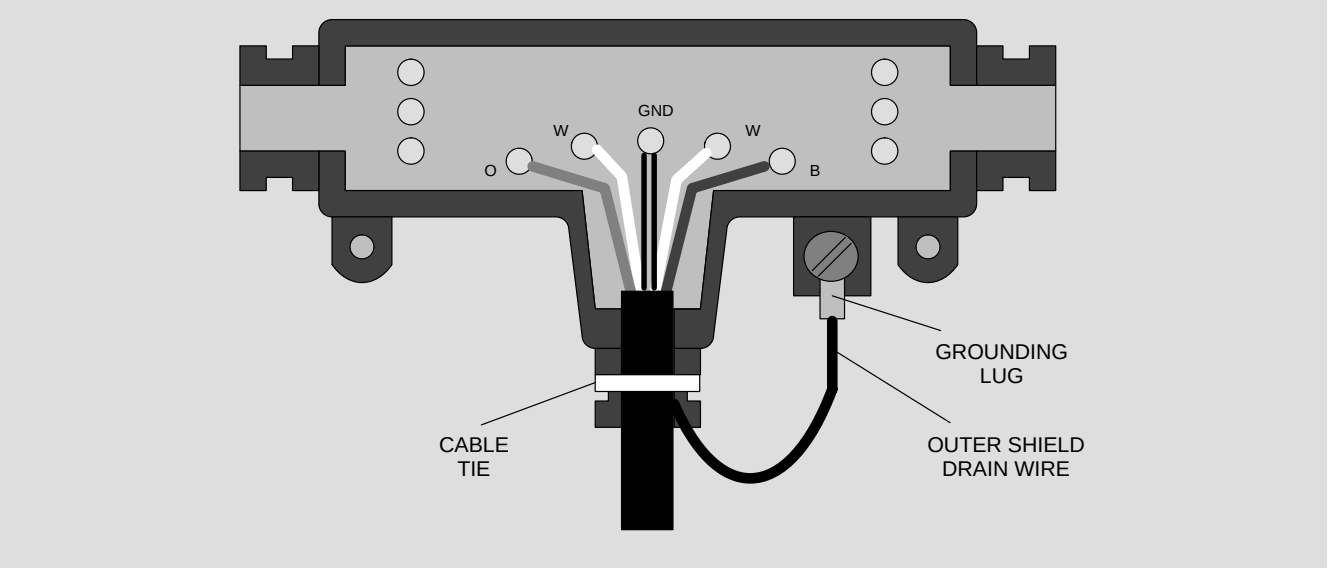

Figure 10 Drop Cable Connections

Figure 11 shows how to connect each wire. (A) Do not strip the wire. Place the wire into the terminal slot so that the end of the wire is flush with the inside of the terminal. (B) Using the proper insertion tool, press the wire fully into the terminal. (C) Plastic caps are supplied with the Tap. Press a plastic cap down fully into the terminal.

Use of the insertion tool is required. Ordering information for the tool is on the first page of these instructions. Make sure the tool is clean and in good condition before using it.

If you remove a wire after you have connected it, do not try to reconnect the wire at the same point on the wire. Cut the wire back by 1/8 inch (3 mm), then connect it at a new point on the wire.

Figure 11 Wire Terminal Connection (Detail)

Connecting the Outer Shield Wire to the Tap

You should have already crimped the grounding lug onto the outer shield drain wire (see Figure 9). Connect the lug to the Tap's grounding screw as shown in Figure 10.

Securing the Cable to the Tap

The Tap package includes a cable tie for the drop cable. Install the cable tie as shown in Figure 10 and tighten it securely.

Grounding the Drop Cable

Modbus Plus network drop cables require a ground connection to the backplane or equivalent ground point at the networked device location. The connection is made by means of a metal loop clamp that grounds the cable shield to the ground point. The loop clamp is supplied in the Tap package.

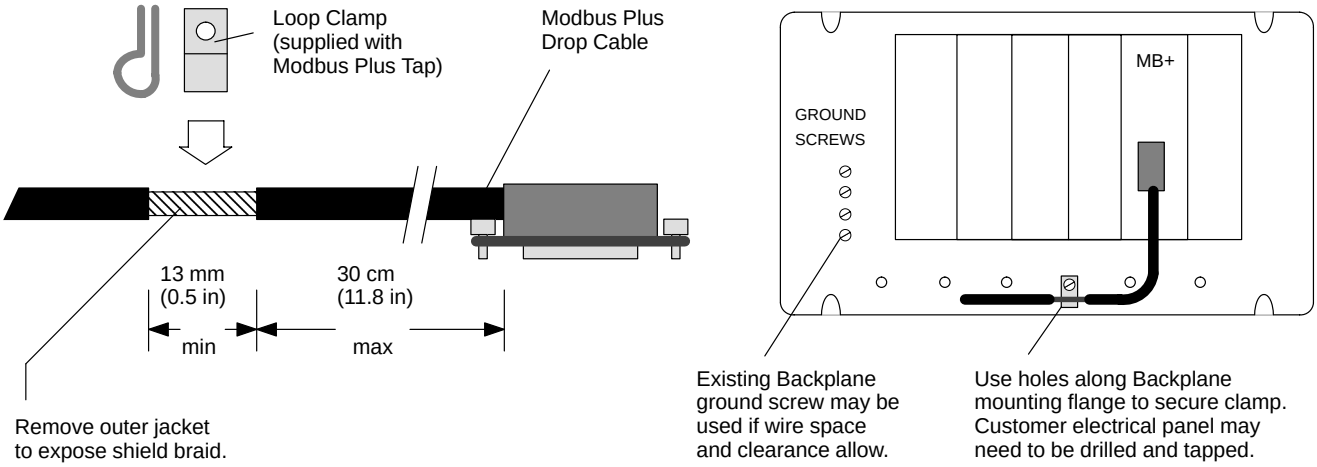

Figure 12 Grounding the Drop Cable

Preparing the Cable for Grounding

Figure 12 shows how to prepare the drop cable for grounding. Before stripping the cable's outer jacket, determine the distance from the cable's end connector to the intended ground point on your backplane or panel. This distance will depend on the location of the networked device, and the available locations for ground points. The maximum allowable distance from the ground point to the drop cable's connector is 30 cm (11.8 in).

Remove 13 - 25 mm (0.5 - 1 in) of the cable's outer jacket to expose the shield braid, as shown in Figure 12. Install the loop clamp on the shield braid.

Securing the Cable to the Ground Point

If you are installing the cable at a Modicon Quantum backplane, note the ground screws at the left side of the backplane and the series of holes along the backplane's lower flange (see Figure 12). One of these is suitable for a ground point. Note that you may have to drill and tap the panel surface behind the backplane.

If you are installing the cable at a site that does not have a Modicon Quantum backplane, drill and tap the panel surface as required to provide a suitable ground point.

Secure the loop clamp and cable to the selected ground point.

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