EchoPoint Reader SR-600-101 Installation Guide

Version 1.0

echo point
BY **SAVI TECHNOLOGY**

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U.S. Regulatory Approvals

EchoPoint Reader SR-600-101

Federal Communications Commission (FCC) Notice

The Federal Communications Commission has established technical standards regarding radio frequency energy emitted by computer devices. 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 radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference with radio/TV reception. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications to this equipment that are not expressly approved by Savi Technology could void the warranty and the authority to operate this equipment.

Savi Technology is not responsible for radio/TV interference caused by using unauthorized cable or by making unauthorized changes to this equipment.

Product Safety

The EchoPoint Reader SR-600-101 is ETL listed (UL 1950).

Network Adapter SA-600-01

Federal Communications Commission (FCC) Notice

The Federal Communications Commission has established technical standards regarding radio frequency energy emitted by computer devices. 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 radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference with radio/TV reception. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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International Regulatory Approvals

EchoPoint Reader SR-600-101

Declaration of Conformity

Hereby, Savi Technology, Inc.
615 Tasman Drive
Sunnyvale, California 94086-1707
declares that the EchoPoint Reader SR-600-101 is in compliance with the
essential requirements and other relevant provisions of Directive 1999/5/EC.

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Product Safety

CB Scheme (IEC 60950).

Network Adapter SA-600-01

Declaration of Conformity

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Warning

This is a class A product. In a domestic environment this product may cause radio
interference in which case the user may be required to take adequate measures.

Conventions in this Guide

The following table explains guide conventions and typography usage.

Guide Conventions

Example	*Meaning and Use*
Note:	*Notes call attention to facts or advice that deserve special attention.*
⚠	*Caution notices call attention to the possibility of damaging the product, the system, or your work (for example, potential loss of data).*
✋	*Warning notices call attention to the possibility of injury to people.*
Example	*Examples provide a scenario to further explain the preceding direction or procedure.*
Terminal Locked	Bold type is used for prompts, field names, and other text as displayed on the screen.
A:\INSTALL	Bold type is also used for text you enter exactly as shown.
`1005    DATA`	Monospaced type is used for system messages, examples of data files, program code, and other text where column alignment is important.
name.bmp or *tag_id*	Italic type is used for emphasis of a word or phrase that is new or especially important.
Ctrl + **Z**	Used for a keyboard control codes or manual keystrokes. This example tells you to hold the **Ctrl** key while you press the **Z** key.

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Figure **Page**

1 Introduction

EchoPoint Readers perform tag collections and may exchange data with tags as part of the Savi System. The EchoPoint Reader SR-600-101 installation kit enables the user to mount the EchoPoint Reader in permanent or semipermanent sites, or in a mobile vehicle.

Savi System

The Savi System uses state-of-the-art wireless technology to monitor, track, and locate assets in complex commercial, industrial, and military environments.

The system comprises tags (also called transponders), readers (also called interrogators), Signposts, and a computer with installed RFID management software. Tags can store and transmit data. Certain tag models can receive data and commands from readers and EchoPoint Signposts and some models can recognize the proximity of EchoPoint Signposts.

EchoPoint Reader Description

The EchoPoint Reader SR-600-101 has an omnidirectional read/write pattern with an adjustable range of up to 300 feet (91.44 meters), and can be networked to provide cellular coverage of a nearly unlimited area. Its power source can be 92 to 125 VAC, 184 to 250 VAC, or 6 to 15 VDC. A portable tripod mount, a solar power unit, or a cable for powering the reader from a vehicle are all available for use with the EchoPoint Reader SR-600-101.

The EchoPoint Reader SR-600-101 operates at 433.92 MHz. The reader can communicate with all models of active SaviTags and supports tag database files, group collections, and tag security functions. With EchoPoint Tag models, the EchoPoint Reader SR-600-101 operates only as a receiver.

Tag Communication

The EchoPoint Reader SR-600-101 reads tag database files and supports the security features of the SaviTag 410 and SaviTag 412. It also receives communication from the new EchoPoint Tag ST-602-01 as part of a SmartChain installation.

Specifications

The EchoPoint Reader SR-600-101 can be mounted in permanent or semipermanent sites, as well as in a mobile vehicle. EchoPoint Readers are designed for indoor or outdoor use.

Table 1-1   EchoPoint Reader SR-600-101 Specifications

Physical	
Dimensions:	30 cm (12 in.) dia. x 14 cm (5.5 in.)
Case Material:	Polypropylene with UV inhibitors
Weight:	1.9 kg (4.2 lb)
Environmental	
Temperature:	–32ºC to +70ºC (operating) –40ºC to +70ºC (storage)
Humidity:	100% condensing
Vibration:	MIL-STD-801E Method 514.4, Category 10
Power	
AC Source:	92–125/184–250 VAC, 50/60 Hz, 100 mA max.
DC: Source:	6–15 VDC, 300mA average (internally regulated)
Digital	
Data Rate:	28 Kbps (RF tag communication)
Memory:	512 K RAM for interim tag data
Wireless	
Frequency:	433.92 MHz (transmit and receive); SAW stabilized local oscillator
Range:	300 feet (91.44 meters) (typical)
Transmission Power:	0.1 mW ERP
Modulation:	FSK; +/- 50 KhZ
Receiver Sensitivity:	–98 dBm
Type:	Superheterodyne
IF Frequency:	10.7 MHz
IF Bandwidth:	500 KHz

Models and Options

EchoPoint Readers are supplied with network cables and power cables necessary for operation.

Available accessories include a solar power unit, a vehicle power cable, AC power adapter and cables, spare batteries, a battery charger, and mounting hardware. Please contact your Savi customer service representative for information about ordering additional equipment or accessories.

Table 1-2 shows the EchoPoint Reader models and their options. All models operate at 433.92 MHz.

Table 1-2   EchoPoint Reader Models

Model	Description	Power/Plug
SR-600-101	EchoPoint Reader SR-600-101	110-127 VAC 60 Hz Type 1
SR-600-101-2	EchoPoint Reader SR-600-101	220-240 VAC 50 Hz Type 2 or 4
SR-600-101-3	EchoPoint Reader SR-600-101	110-127 VAC 60 Hz Type 3
SR-600-101-6	EchoPoint Reader SR-600-101	110-127 VAC 50/60 Hz Type 2
SR-600-101-D	EchoPoint Reader SR-600-101	12 VDC Pigtail wires

Getting Assistance

If you have trouble with the product, after you have checked your connections and the *EchoPoint Reader SR-600-101 Installation Guide*, contact Savi Technical Support.

Technical Support

To contact Savi Technical Support:

- Telephone 1-888-994-SAVI (7284) between 5:00 a.m. and 5:00 p.m., Pacific Time

- Or send e-mail to **help@savi.com** at any time

Whether you contact Savi by telephone or e-mail, please have the exact sequence of operations (if possible) that caused the problem and the following information available:

- Site location

- Incident description

- Estimated severity level of the incident

- Model number and version

- Serial number

- Computer type (Gateway, Dell, etc.) and model

- Operating system and service pack level

- Network protocol

Please contact Savi Technical Support if you have suggestions for how Savi can improve the next revision of the product or this manual.

2 EchoPoint Reader Installation

Installing the EchoPoint Reader SR-600-101 is a four-step process. First, consult a site plan to determine the reader's installation location. Second, position the reader to enable the most efficient communication range. Third, connect power cables and network cables, and supply power. Finally, verify network communication between the EchoPoint Reader and the computer.

Planning a Site

Please refer to the *Savi System Installation Guide* for complete instructions on conducting a site survey and planning your RFID network configuration. Once the site plan is in place, refer to it to determine the site locations at which to install EchoPoint Readers for the Savi System. Follow this manual to ensure the proper installation of each EchoPoint Reader SR-600-101. For the most efficient use of your Savi System, please consult Savi Customer Service for recommendations.

Positioning EchoPoint Readers

EchoPoint Readers are designed to operate in a wide variety of environments. They are housed in rugged, weatherproof enclosures. In ideal conditions (large, open, and unobstructed areas), EchoPoint Readers can collect tags up to 300 feet (91.44 meters) away.

An area can contain factors that limit the EchoPoint Reader collection range, including:

- Asymmetrical shape to the collection area
- Obstructions such as multiple walls, chained areas, solid-core doors, and enclosures
- RF interference from other equipment such as computers, walkie-talkies, cellular phones, elevators, electrical motors, or other RF-emitting devices
- EchoPoint Reader SR-600-101 mounting height of less than 30 feet (9.144 meters)
- Difficult surface on the tracked item, such as a metal or RF-absorbent surface
- Tag location relative to the EchoPoint Reader, such as behind a metal obstruction (as illustrated in Figure 2-1) or stacked under multiple layers

Some of these factors may be beyond your control. The goal when positioning the EchoPoint Reader SR-600-101 is to optimize advantages and reduce limitations to make the collection range as efficient as possible.

Positioning EchoPoint Readers

Figure 2-1   Impediment Limiting the EchoPoint Reader Collection Range
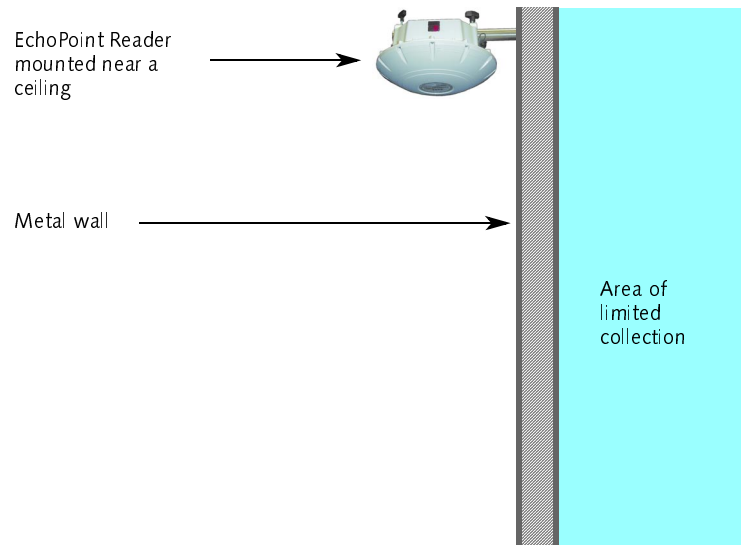
If the location forces you to use a less-than-ideal position for the reader, the collection range could be reduced, requiring additional readers.

> **Example** *If an EchoPoint Reader must be mounted on a wall, the collection range will not extend to the opposite side of the wall. You may need a second EchoPoint Reader to monitor the area behind the wall.*

Each of the following recommendations is intended to optimize the collection range of the equipment. Whenever possible, place the EchoPoint Reader:

• In a horizontal plane, with its dome directed downwards
• High off the ground, preferably within the range of 15–30 feet (4.572–9.144 meters)
• Away from large metal surfaces

Mounting the EchoPoint Reader

The EchoPoint Reader SR-600-101 can be mounted using any of the Savi Universal Mounting hardware. However, you might want to be sure that the reader is operational and verified on the network before mounting it in any hard-to-reach position.

Mounting kits available from Savi Technology include hardware to mount an EchoPoint Reader on a pole (wooden, metal, or concrete), I-beam, wall, or a tripod. Please refer to the instructions included with the mounting kit for proper installation.

RFID hardware can be physically attached in any position or location. If your installation requires a special attachment, Savi can develop and manufacture a custom fixture.

If you have any problems communicating with the EchoPoint Reader during or after the installation, please refer to Chapter 3, "Maintenance," for troubleshooting procedures.

Connecting Power to the EchoPoint Reader

> *Note:*   *While the EchoPoint Reader SR-600-101 is rated for use in severe environments, the power and network connector seals may deteriorate with repeated installation and removal. Therefore, Savi recommends the use of heat shrink tubing (Savi part number 680-02423-001) for units subject to outdoor use.*

When connecting the EchoPoint Reader's power cable, be sure to check any relevant configuration or wiring diagrams beforehand.

The power source can be 6 to 15 VDC, 110 VAC, or 220 VAC. The socket-outlet shall be installed near the equipment and shall be easily accessible. The EchoPoint Reader SR-600-101 does not require adjustment or modification for different power sources. An appropriate power cable is supplied, based on the requirements specified when the order was placed.

You can also power the EchoPoint Reader SR-600-101 from a Savi Solar Power Module, or by vehicle power. A fixed-length, molded cable is supplied with the Solar Power Module. The Vehicle Power Cable can be purchased as an accessory item.
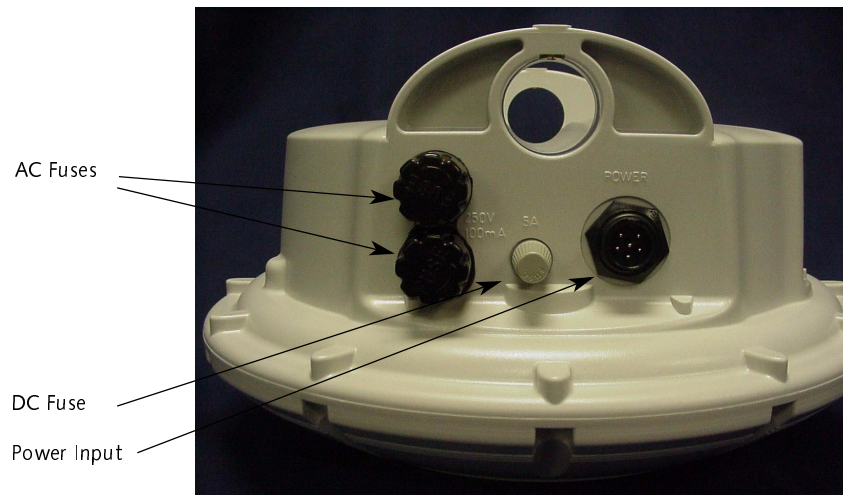
» **To connect the power cable to the reader:**

1. Select the appropriate power cable for the power source.

   ¤ The 220 VAC cable terminates in a European connector.

   ¤ The 110 VAC cable terminates in a North American connector.

2. If installing the EchoPoint Reader SR-600-101 in an outdoor location, slide heat shrink tubing onto the power cable before connecting the cable to the reader.

   a. Follow the instructions included with the heat shrink kit to apply the tubing to the cable.

3. On the EchoPoint Reader, plug the cable's female connector into the power input socket next to the DC fuse holder. (See Figure 2-2.)

   a. Turn the connector to align its notch on the side nearest the EchoPoint Reader's dome.

   b. Firmly push the locking ring forward and rotate it clockwise to lock the connector.

Figure 2-2   Power Connector and AC and DC Fuses

4. Connect the other end of the power cable (male connector) to the appropriate power source, such as the Savi Solar Power Module or an AC outlet.

Connecting the Network Cable(s)

When connecting the EchoPoint Reader's network cables, be sure to check any relevant configuration or wiring diagrams beforehand.
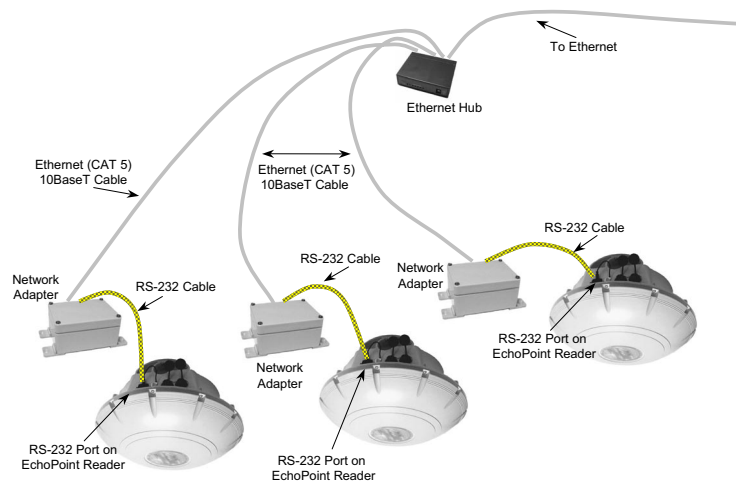
Note: While the EchoPoint Reader SR-600-101 is rated for use in severe environments, the power and network connector seals may deteriorate with repeated installation and removal. Savi recommends the use of heat shrink tubing (Savi part number 680-02423-001) for units subject to outdoor use.

Ethernet Connection

The Ethernet connection requires a Savi Network Adapter SA-600-01 (Savi part number 860-03675-001) and Savi SmartChain software.

The Network Adapter is included with the EchoPoint Reader SR-600-101. Savi SmartChain software is available separately from Savi Technology.

Figure 2-3   EchoPoint Readers in an Ethernet Installation

» **To connect the Network Adapter:**

1. Connect the DB-9 connector of the RS-232 cable on the Network Adapter to the RS-232 port of the EchoPoint Reader.

2. Connect the RJ-45 connector of the Ethernet cable on the Network Adapter to the Ethernet hub.
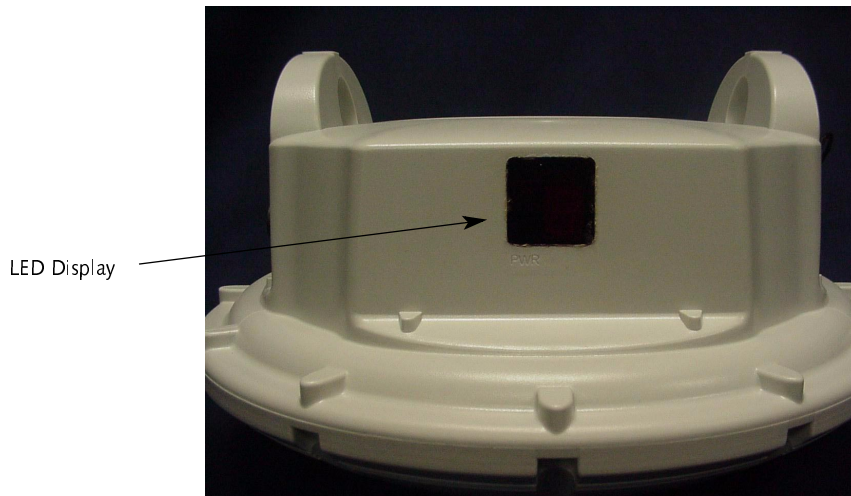
Figure 2-4   Network Connector and RS-232 Ports

RS-232 Port

Network In

Network Out
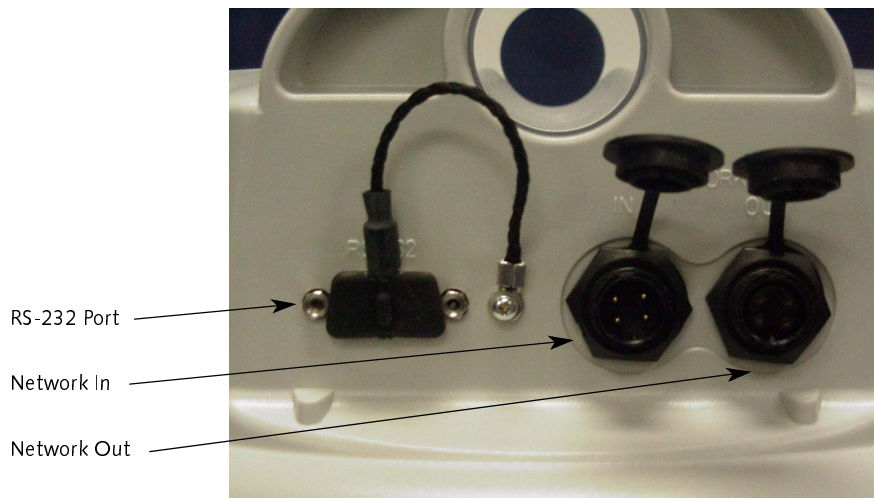
Applying Power to the EchoPoint Reader

After connecting power and network cables, apply power to the EchoPoint Reader.

Figure 2-5   EchoPoint Reader SR-600-101 LED Display Panel

LED Display

» **To confirm that power is present in the EchoPoint Reader:**

1. Observe the indicators and the seven-segment display on the LED display panel. The power indicator should be illuminated whenever power is present.

   a. During the initial power-on sequence, the EchoPoint Reader displays its identification number (ID) in the LED display as a sequence of five digits.

      | Example | *EchoPoint Reader ID number 1234 displays the numbers 0, then 1, then 2, then 3, and then 4 in sequence during the initialization process.* |

b. After the ID display, two indicators flash at different rates. One is the center bar of the segmented display and the other is a small indicator within the segmented display. If the indicators fail to flash, the EchoPoint Reader is non-operational.

2. If at any time you are not sure that the EchoPoint Reader is operating properly, reset the reader by disconnecting and then reconnecting the power source.

    After resetting the EchoPoint Reader SR-600-101, it should repeat the power-on sequence described above.

The EchoPoint Reader is now ready for you to verify communication functions.

Note: *The EchoPoint Reader SR-600-101 has a watchdog sensor that automatically resets the reader if power fluctuations or other interruptions occur that might affect the reader's performance.*

Verifying Reader Communication

To confirm that an EchoPoint Reader SR-600-101 is installed and functioning correctly, it is necessary to verify that the Reader:

- Can communicate with the computer (verifies that the reader is detected on the network)
- Can collect tags in the collection area
- Can communicate with each specific tag in the collection area

Once the EchoPoint Reader is installed, run the asset management software to locate the reader. If the program does not detect the reader, use a computer with an installed test program (such as Savi Tools–Savi part number 861-01235-001) to perform the following procedures verifying EchoPoint Reader communications:

» **To verify reader communications:**

1. If using Savi Tools, connect the laptop or computer to the RS-232 port and start the software program.

2. Verify that the selected EchoPoint Reader appears on the network.

3. Confirm that the EchoPoint Reader communicates with tags by performing a tag collection.

4. Verify that the EchoPoint Reader communicates with specific tags by attempting to beep each tag.

Refer to the reference material accompanying the test program software for specific instructions on performing the above functions. When these procedures have been completed successfully, the EchoPoint Reader is installed and operational.

3 Maintenance

With minimal care, an EchoPoint Reader SR-600-101 should perform flawlessly. However, in the event that a problem with an EchoPoint Reader occurs, the procedures in this chapter should help you troubleshoot it.

Changes or modifications to the equipment that are not expressly approved by Savi Technology could void the warranty and the authority to operate the equipment.

Using the equipment in a manner not specified by the manufacturer might impair the protection that the equipment provides.

Savi Technology is not responsible for radio/TV interference caused by using unauthorized cable or by making unauthorized changes to this equipment.

Repair and Maintenance

The EchoPoint Reader SR-600-101 is designed to be maintenance-free. It is manufactured with the highest-quality components and is thoroughly tested before delivery.

The EchoPoint Reader uses AC power fuses for circuit protection. Two AC power fuses are mounted with the DC power fuse as shown in Figure 2-2, "Power Connector and AC and DC Fuses," on page 2-7. The AC fuses are 100 mA (BUSSMAN type MDL-1/10), 250-VAC, Savi part number 670-01294-001. The DC fuse is a 5-amp (BUSSMAN type GMW-5), 125-volt, miniature, non-time-delay fuse, Savi part number 670-00624-003.

Troubleshooting

Table 3-1 lists causes and solutions to problems that could occur with the EchoPoint Reader SR-600-101.

In the unlikely event that an EchoPoint Reader fails or problems occur that simple troubleshooting cannot solve, Savi Technical Support may recommend that the EchoPoint Reader be returned to Savi Technology.

Table 3-1   Possible Problems and Solutions

Problem	Solution
COM port unavailable/ no communication (possibly used for another device such as a mouse)	– Connect the EchoPoint Reader cable to another COM port. – Verify that the software setting matches the COM port where the reader is connected.
No power (indicator light is not blinking)	– Confirm that power is available by checking any circuit breakers, power switches, or safety switches. – If AC-powered, verify the presence and voltage of the power by connecting a test unit to the power source. Check the AC fuses. – If DC-powered, verify the continuity of the DC power fuse on the EchoPoint Reader, the source voltage (6 to 15 VDC), and the polarity of the connections. – If solar-powered, verify the output voltage of the module is 6 or 12 VDC. – Verify that the power cable is securely plugged into the power source and the EchoPoint Reader input. – Try a different power source. – Replace the power cable.
Network cables damaged or disconnected	– Verify that the network cable is securely plugged into the EchoPoint Reader. – Verify that the network cable is securely plugged into the Network Adapter. – Check cables for physical damage.

Table 3-1   Possible Problems and Solutions (Cont.)

Problem	Solution
ID needs confirmation	– Reset the power (by disconnecting and then reconnecting the live power source) to view the EchoPoint Reader serial number, which flashes in sequence after the reader is reset. See "Applying Power to the EchoPoint Reader" on page 2-10 – Compare the EchoPoint Reader serial number to the ID used in the management software and on the printed label.
Unknown	– Turn power off and then back on. – Call Savi Technical Support.

Technical Support

If your EchoPoint Reader SR-600-101 presents a problem that neither this manual nor troubleshooting tips can help you solve, you can contact Savi Technical Support in either of two ways:

- Telephone 1-888-994-SAVI (7284) between 5:00 a.m. and 5:00 p.m., Pacific Time

- Or send e-mail to **help@savi.com** at any time

Whether you contact Savi by telephone or e-mail, please have the exact sequence of operations (if possible) that caused the problem and the following information available:

- Site location
- Incident description
- Estimated severity level of the incident
- Model number and version
- Serial number
- Computer type (Gateway, Dell, etc.) and model
- Operating system and service pack level
- Network protocol

Please contact Savi Technical Support if you have suggestions for how Savi can improve the next revision of the product or this manual.