AI3050S Sargas
AEI Reader

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Softrail

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1. BRIEF OVERVIEW

The AI3050S reader system was developed to provide an easy solution for installing an AEI reader beside a track. The AI3050S AEI Reader houses a Sargas AEI Reader in a weatherproof enclosure. This enclosure contains a 120 VAC to 12 VDC and a 120 VAC to 5 VDC power supplies.

The Sargas reader has a network interface and is capable of multiplexing between two antennas (one on each side of track). It also has two digital inputs.

The 120 VAC to 5 VDC power supply is used to supply power to the Sargas reader. The 120 VAC to 12 VDC power supply can be used to supply power to external sensors such as a presence detector or switch (turnout) position monitor.

2. EQUIPMENT INSTALLATION

2.1. Antenna Installation

One or two external antennas can be connected to the AI3050S reader. Normally two antennas are connected and are mounted on poles on opposite sides of the track. They can be mounted across from each other (+/- 5 feet) and 11 feet from the center of the rail. The center of each reader antenna should be 3 ½ feet above the top of the rail. The antennas should be pointing toward the track.

Please note for train speeds less than 25 mph there is a great deal of tolerance in the placement of the antennas. They can be mounted vertically from one foot to 6 feet above the top of the rail and can be positioned 8 to 12 feet from the center of the rail.

A conduit should be placed under the rail for the coaxial cable running from the controller to the antenna on the opposite side of the track.

2.2. Reader Installation

There are five main components in the AI3050S reader's enclosure. These are:

- Sargas AEI RF Reader
- Ethernet Terminal Block
- Sensor Terminal Block
- 12 VDC Power Supply
- 5 VDC Power Supply

Figure 1 shows the layout of the components.

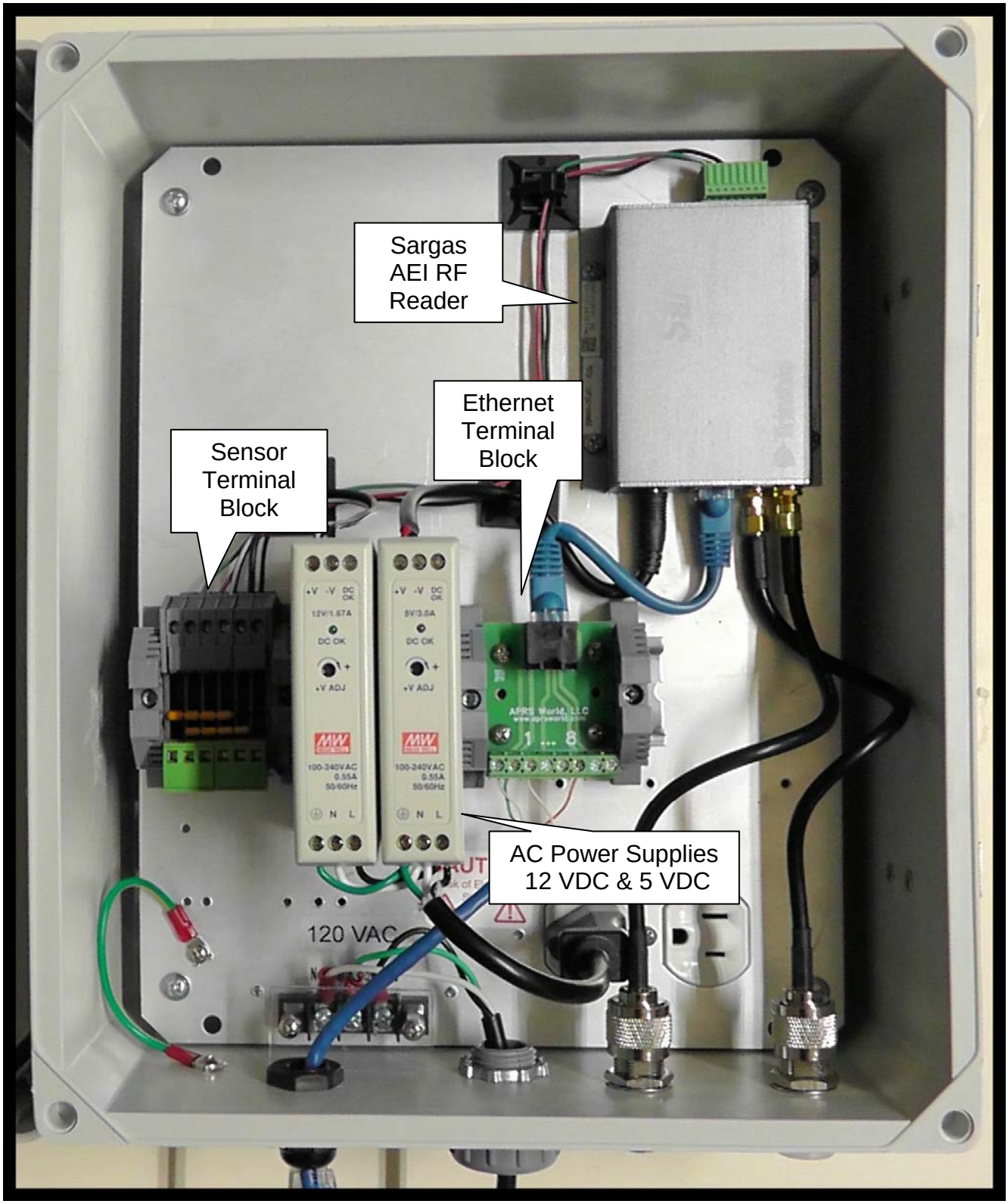

Figure 1 - AI3050S Reader Layout

There can be up to seven cable connections to the AI3050S reader. The following is the list of connections:

- Antenna 1 coaxial cable (connector is N-Female)
- Antenna 2 coaxial cable (connector is N-Female)
- Ground stud
- 120 VAC power cable
- Ethernet cable
- Sensor 1 cable
- Sensor 2 cable

Figure 2 shows the bottom of the AI3050S reader's enclosure where the cable connections are made or enter the enclosure.

Figure 2 - Cable Connections

Power is connected to the three terminals located under a clear plastic protective cover near the bottom left side of the mounting plate in the controller's enclosure (see Figure 1).

When power is applied, the green lights on the power supplies, and the blue lights on the Sargas reader should come on.

A ground rod and strap must be connected to the grounding stud located on the left side of the bottom of the controller's enclosure (see Figure 2).

There are two terminal blocks inside the enclosure. One is for the Ethernet cable connection (see Figure 3) and the other is for up to two optional external sensors (see Figure 4).

The Ethernet connection can either be through the Ethernet terminal block or a direct RJ-45 connection to the Sargas reader. When using the terminal block the following are the terminal connections:

Signal	Wire Color	Terminal
TX +	White / Green Stripe	1
TX -	Green	2
RX +	White / Orange	3
RX -	Orange Stripe	6

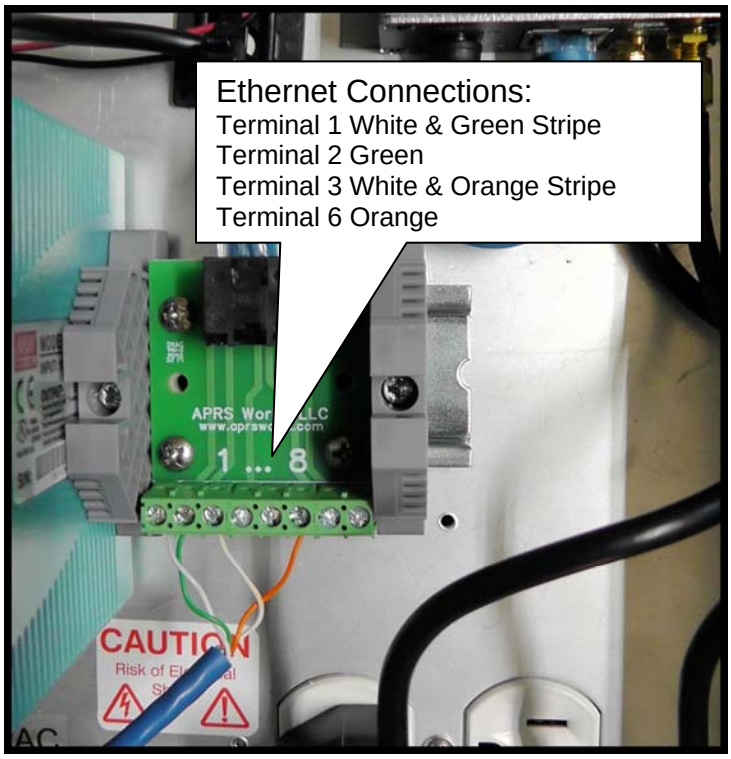

Figure 3 - Ethernet Terminal Block

Sensor connections are made through the sensor terminal block. Terminal 1 thru 3 are for digital input 0 and terminal 4 thru 6 are for digital input 1.

The following table shows the terminal assignment.

Terminal	Description
1	+12 VDC
2	Ground
3	Digital Input 0
4	Digital Output 0
5	+12 VDC
6	Ground
7	Digital Input 1
8	Digital Output 1

When there is a contact closure between terminals 1 and 3, digital input 0 will be reported as high and between 5 and 7; digital input 1 will be high. If there is not a contact closure between the respective terminals the digital inputs will be reported as low.

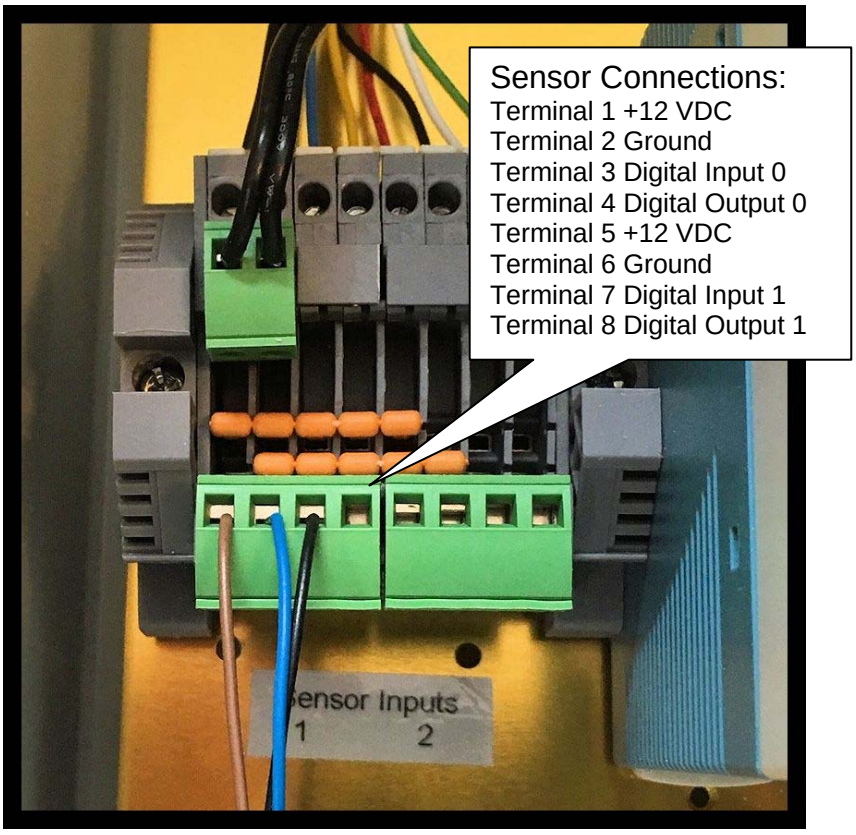

Figure 4 - Sensor Terminal Block

Softrail uses Banner Engineering's R-GAGE QT50RAF and M-GAGE Q7LMEM sensors to detect train presence. The QT50RAF is a radar sensor and the Q&LMEM is a magnetic field sensor. Information about these can be found at:

QT50RAF https://www.bannerengineering.com/us/en/products/part.79026.html

Q7LMEB https://www.bannerengineering.com/us/en/products/part.31942.html

If using either of these two sensors the following table shows the wiring connections:

Terminal	Description	Sensor Wire Color	Sensor Pin
1 or 5	+12 VDC	Brown	1
2 or 6	Ground	Blue	3
3 or 7	Digital Inputs	Black	4
4 or 8	Digital Outputs	Gray	5 M-GAGE Only

More information about installing the QT50RAF sensor can be found in Paragraph 4.

Additional information about installing the Q7LMEB can be found in Paragraph 5.

Softrail also uses a limit switch as an inexpensive method to monitor the position of a railroad switch (turnout). The limit switch provides a contact closure the AI3050S reader.

More information about installing the limit switch can be found in Paragraph 5.

3. Sargas Configuration Software

To change the IP address of the Sargas reader, use your web browser to make a network connection with the Sargas reader. If you know the Sargas reader's current IP address, you can enter it directly. If not enter the Sargas reader's URL. The URL of the reader is printed on the side of the module. In Figure 5 the Sargas' URL is Sargas-45b229. If the Sargas Reader is directly connected to a PC, add ".local" to the URL. When prompted, enter "web" as the username and "radio" as the password.

Figure 5 - Sargas URL

After a few moments, you will be connected to the Sargas status screen (see Figure 6).

Figure 6 - Sargas Status Display

To change the network settings click on "Settings" and then on "Ethernet Interface", which will cause the screen in Figure 7 to appear.

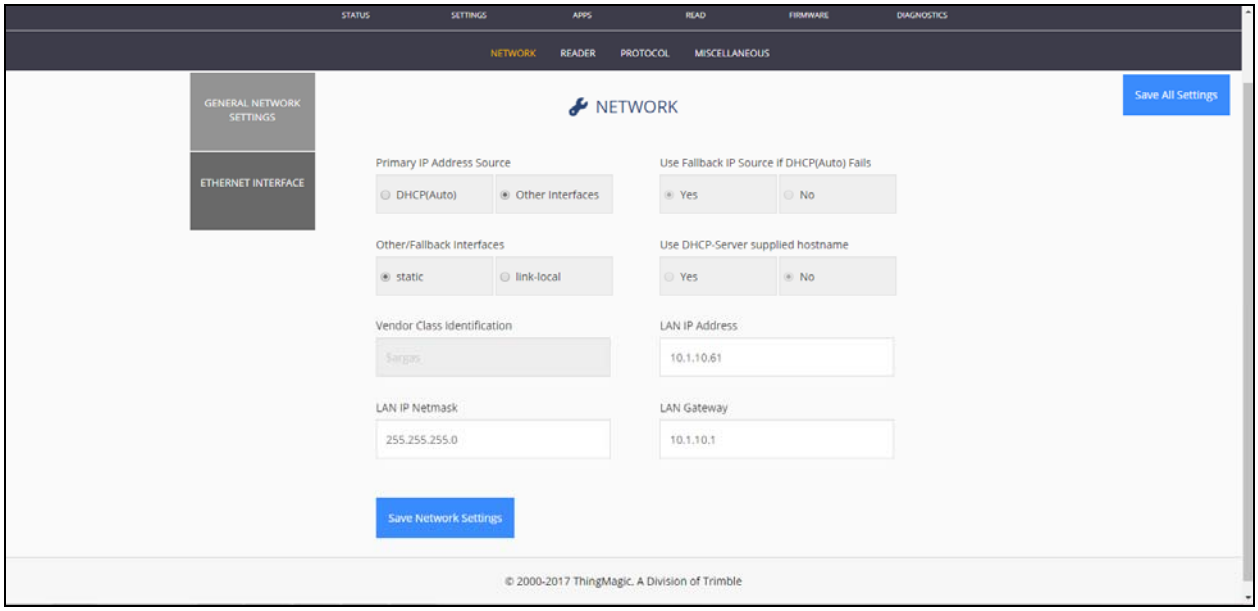

Figure 7 - Sargas Network Settings

Please note that because the Sargas Railroad AEI RF Reader has a special railroad interface, many of the configuration parameters shown in its browser pages have been disabled.

4. QT50R Presence Radar

The QT50R presence radar should be mounted 30 inches above the top of the rail on the same pole as the controller. The front of the radar should be facing the track and pointing up at a 20 degree angle. In the back of the unit there is a set of 8 dipswitches. To open the back of the unit insert the special tool into the holes and turn counter clockwise. See Figure 8.

The dipswitches should have the following settings:

Switch 1 down
Switch 2 down
Switch 3 up
Switch 4 down
Switch 5 up
Switch 6 down
Switch 7 down
Switch 8 up

The dipswitches should have been pre-set to the preceding positions prior to shipment.

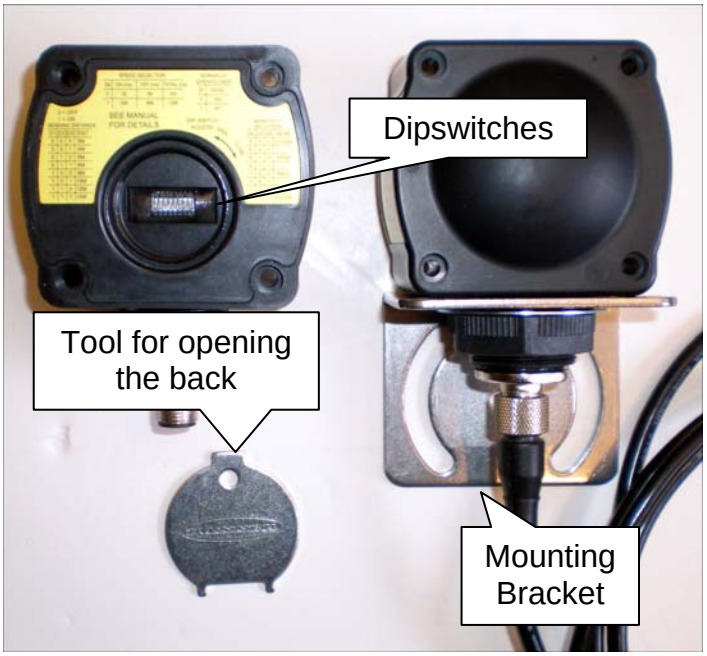

Figure 8 - QT50R Presence Radar

5. Antenna and M-GAGE (Q7LMEB) Installation

The two external antennas should be mounted on poles on opposite sides of the track. They should be mounted across from each other (+/- 5 feet) and 11 feet from the center of the rail. The center of each reader antenna should be 3 ½ feet above the top of the rail. The antennas should be pointing toward the track.

Please note for train speeds less than 25 mph there is a great deal of tolerance in the placement of the antennas. They can be mounted vertically from one foot to 6 feet above the top of the rail and can be positioned 8 to 12 feet from the center of the rail.

A minimum of a 1 inch diameter conduit should be placed under the rail for the coaxial cable running from the controller to the antenna on the opposite side of the track.

Please note that the tags and antennas are linear polarized in the horizontal plane. The "HOR UP" on the back of the antenna must be pointed at the sky (see Figure 9). If not the system will not be able to read the AEI tags.

One of the antennas has an M-Gage magnetic field sensor which is used to detect train presence (see Figure 10). This antenna should be mounted closest to the enclosure and is connected to the Antenna 1 connector (see Figure 2). The M-Gage must be initialized when there a no railcars are present. Softrail will send a signal to initialize the M-Gage detector. If the antenna is ever moved, Softrail will have to re-initialize the sensor.

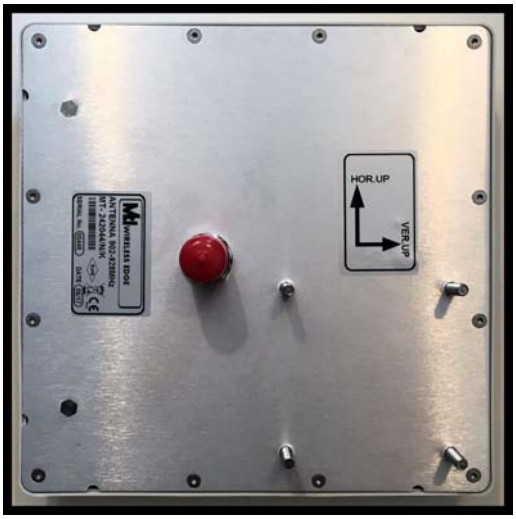

Figure 9 - Back of the Antenna

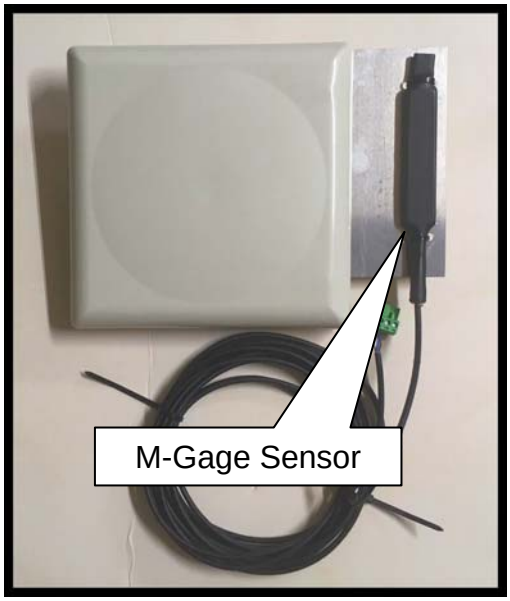

Figure 10 - Near Antenna with M-GAGE Presence Detector

6. Switch (turnout) Position Monitor

A limit switch can be used to determine the position of the railroad switch by monitoring the position of the railroad switch's throw rod.

A rod attached to the limit switch will be mounted so that it will move when the railroad switch's throw rod changes position (see Figure 11 & Figure 12). This will open or close the contacts in the limit switch.

Figure 11 - Limit Switch Close-up

Figure 12 - Limit Switch

7. TECHNICAL SUPPORT AND UPDATES

Periodically Softrail issues maintenance releases and new versions of this program. Maintenance releases are free and correct problems found with the program and/or provide minor enhancements to the program. Before contacting us with problems we suggest that you check our web page at www.aeitag.com to insure that you have the latest maintenance release of the program.

Technical support is free for the first year after purchase. A maintenance agreement can be purchased to extend the period of technical support.

For technical support or more information on the maintenance agreement contact Softrail at:

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