



SkyFire™ Subscriber S-IAD Installation

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SkyFire™ Subscriber S-IAD Installation

1.0 General

1.1 Purpose

This method will cover the mounting of the SkyFire™ Subscriber Integrated Access Device (S-IAD) unit and Subscriber Power and Signal Interface (SPSI). In addition running, securing, and connecting power cables for the S-IAD and SPSI.

1.2 Scope

The scope of this document is to outline the procedures for the proper installation of the S-IAD unit, SPSI, and associated equipment ensuring a level of consistency thereby minimizing any discrepancies upon power-up and operation.

1.3 Applications

This method applies to initial installations and extensions for the following models:

1. RZ-IAD58

2.0 Reference Documentation

12-10-EN-0301-01, "SkyFire™, Power, Ground and System Cabling"

12-10-EN-xxxx-xx, "Installation Safety Manual"

3.0 Preparations

3.1 Safety Conventions and Precautions

The following symbols appear within this document:



When this symbol appears on the equipment or within this document, read the Installation Safety Manual (ISM) for additional safety information before taking further action or it highlights important safety-related information.



Performing the indicated procedure may expose the technician to hazardous voltages or hazardous electrical currents. To avoid personal injury, when indicated disconnect or turn off the power source.

 Performing the indicated task may cause the cabinet to tip over. To avoid personal injury, follow the instructions given in the text.

 Equipment may be too heavy for one person to lift. To avoid personal injury, lift the equipment with one person for each 35 lb (16 kg) of weight.

 To avoid damaging the equipment with electrostatic discharge (ESD), place a static-control strap on your wrist and attach the ground clip to closest grounding contact before handling the equipment.

 Interruption of the safety earth ground system could create an electrical-shock hazard. To avoid personal injury, all electrical connections marked with this symbol must be properly connected.

Observe all the general safety precautions against personal and equipment damage outlined in the ISM at all times. ISM located at URL.....

Exercise caution when aligning the SIAD to ensure that no tools or parts are allowed to drop from the roof environment.

Prior to starting the operations presented in this method, arrange all materials, tools, and test equipment at the work location to minimize fatigue and inconvenience.

Inspect equipment for damage upon receipt. If damage is detected, call the Return Materials Authorization (RMA) office for replacement. (972) xxx-xxxx

Read this method in its entirety prior to performing any procedures.

3.2 FCC Precautions

 Caution changes or modifications not expressly approved by Raze Technologies that pertain to compliance could void the user's authority to operate the subscriber equipment.

- Radio frequency radiation exposure requirements:

This equipment is intended to be mounted on a fixed outdoor structure. A distance of 2 meters should be maintained between the radiating element and any nearby person. The antenna should not be co-located with other antennas. Failure to observe these

restrictions may cause the equipment to operate with RF power density levels greater than those allowed by FCC regulations.

- It is recommended that an AC surge arrestor be used at the AC plug the unit is plugged into.
- Only professional installers that have taken the Raze Technologies training class and are certified will be able to install this equipment including the antenna.
- This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
 - Reorient or relocate the receiving antenna.
 - Increase the separation between the equipment and receiver
 - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
 - Consult the dealer or an experienced radio/TV technician for help.

3.3 ACTA Precautions

- This equipment complies with Part 68 of the Federal Communications Commission Rules and the requirements adopted by ACTA. On the outside surface of this equipment is a label that contains, among other information, a product identifier in the format US:AAAEQ##TXXX. If requested, this number must be provided to the telephone company.
- Raze Technologies, Inc. does not use interface plugs or jacks to connect to the Telco. The connection is made on the customer side of the NID at the terminal

block. The terminal block that is inside the NID has to be part 68 compliant before connection can occur, this will be stated in our installation manual.

- The REN is used to determine the number of devices that may be connected to a telephone line. Excessive RENs on a telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company. The REN for this product is part of the product identifier that has the format US:AAAEQ##TXXX. The digits represented by ## are the REN without a decimal point (e.g., 03 is a REN of 0.3).
- If this product causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.
- The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.
- If trouble is experienced with this product, for repair or warranty information, please contact Raze Technologies (972) 516-1240. If the equipment is causing harm to the telephone network, the telephone company may request that the equipment be disconnected until the problem is resolved. Note that this equipment is not intended to be repaired by the customer (user).
- Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.
- If your home has specially wired alarm equipment connected to the telephone line, ensure the installation of this product does not disable your alarm equipment. If you have questions about what will disable alarm equipment, consult a trained technician.

3.4 Required Materials

- General Telecommunications Installation Tools
- Engineering Package or equivalent

- Digital Multi-meter
- Techni-Tool Insulated Cable Stripper (Part # 702ST108) or equivalent

4.0 Procedures

Procedure 1. Signal Acquisition Tool

The following procedure will cover the use of the Signal Acquisition Tool to discover the optimal receive signal from the Base Station to the S-IAD for purposes of installing the S-IAD antenna mast at the customer site.

Procedure 2. S-IAD Antenna Mast and SPSI Installation

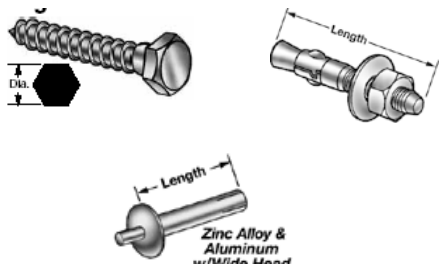
The following procedure will cover the installation of the S-IAD antenna mast and the SPSI.

 When following instructions in this method to install and connect the S-IAD antenna and cable connections, take **EXTREME** care to avoid contact with overhead power lines, lights and power circuits. Contact with power lines, lights and power circuits may be fatal.



The outdoor antenna used to receive the base station signals is required to comply with local installation codes and the appropriate sections of the National Electrical Code (NEC). These codes require proper grounding of the metal structure of the outdoor antenna and grounding of the connecting cable(s) at the point where it enters the building.

Step	Action	Observation
1.	The SPSI should be located reasonably close to the Network Interface Device (NID) box and/or to the building entry point at a location that will allow access to a 110/120 VAC outlet. Installation of the SPSI will vary from customer site to site.	
2.	Once the site has been located for the antenna mount and the SPSI as performed in Procedure 1, determine the best mounting option from the list below for the S-IAD antenna mast and SPSI. <u>Antenna Mast Mounting Options</u> Solid Wood or Siding Brick or Concrete Antenna Mast Pole <u>SPSI Mounting Options</u> Solid Wood or Siding Brick or Concrete Antenna Mast Pole	 It is recommended that the Subscriber Antenna NOT be mounted on a rooftop utilizing conventional rooftop applications such as satellite dish or television antenna installations.
3.	Ensure that the appropriate mounting hardware for the site specific type of mast installation is available and then securely mount the antenna mast and SPSI to the structure using the appropriate method from step 2.	Mounting hardware to include: machine bolts, anchors, washers 

Step	Action	Observation
4.	Examples of mounting hardware for S-IAD mounting bracket. For masonry, brick, concrete, etc. 1. Drive Rivets/Nail in Anchor/Zinc Alloy $\frac{1}{4} \times 1 \frac{1}{4}$". 2. Galvanized Steel Wedge Stud Anchors $\frac{1}{4} \times 2 \frac{1}{4}$". For wood, corrugated aluminum siding with wood backing. 3. Galvanized Lag Screws/Hex head $\frac{1}{4} \times 2$".	
5.	Mount the S-IAD and Antenna to the mast using the supplied mounting bracket and U-bolts.	
6.	End of procedure.	

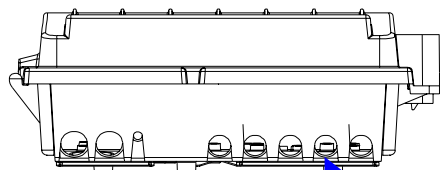
Procedure 3. S-IAD and SPSI Cable Runs and Connections

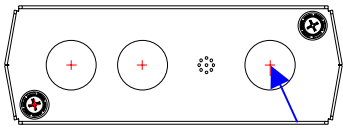
The following procedure will cover the cabling of the AC/DC power converter, routing and terminating the DC power and signal cable and grounding of the S-IAD and SPSI.

The S-IAD is installed at the customer site and is an exterior device. The S-IAD operates on a nominal 12-15 VDC power, which is converted in the SPSI from a customer provided 110/120 VAC source. Installation configurations will vary from site to site.



Prior to performing this procedure, the AC power connections should be installed by a licensed contractor.

Step	Action	Observation
1.	Once the S-IAD and SPSI have been mounted as per Procedure 2, route and secure the appropriate length of DC power and signal cable (Composite Cable 7PR 26AWG/1PR 18AWG) from the SPSI to the S-IAD on the mast, leaving enough cable at both end for connector termination.	
2.	Ensure the DC battery located in the SPSI is not connected to the battery terminals at this time.	
3.	Inside the SPSI locate the wire terminal connectors to the right side of the box.	 On the top left inside of the SPSI door cover is a silver square that is the alarm contact, DO NOT TOUCH with the human hand, as this will damage the sensor.  On the inside back wall of the SPSI are four white circles used for battery ventilation, DO NOT TOUCH with the human hand, as this will damage the material.
4.	Route the DC power and signal cable (Composite Cable 7PR 26AWG/1PR 18AWG) through the foam insert(s) hole located at the lower right rear corner of the SPSI and terminate into the appropriate terminal bus connectors going to the SIAD. ☞ Note: After inserting cable through foam insert, allow enough cable excess to strip the cable and terminate. The Technician MUST utilize the Insulated Cable Stripper (Part # 702ST108) to strip (approximately 3" to 4") the Composite Cable. This will prevent any unnecessary damage to the solid strand wires inside the cable. ☞ Note: Terminal bus connector diagram is located on inside of SPSI front panel door. Refer to Figure 1. ☞ Note: Ensure that no un-insulated electrical wires are exposed in the SPSI.	 View from bottom of SPSI
5.	Terminate the Composite Cable drain wires (2) to the grounding stud in the SPSI using a 16AWG #6 ring lug.	

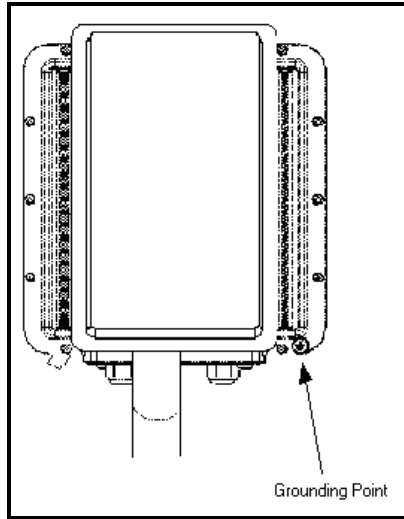
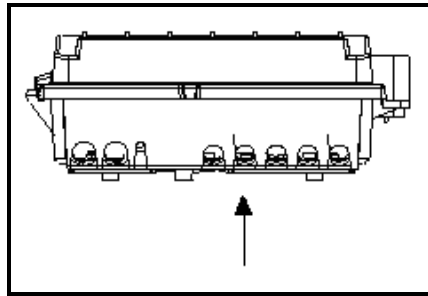
Step	Action	Observation
6.	At the S-IAD, feed the Composite Cable through the bottom of the S-IAD enclosure. ☞ Note: After inserting cable through the bottom of the S-IAD, allow enough cable excess to strip the cable and terminate. The Technician MUST utilize the Insulated Cable Stripper (Part # 702ST108) to strip (approximately 1" to 2") the Composite Cable. This will prevent any unnecessary damage to the wires inside the cable.	 View from bottom of S-IAD
7.	Terminate the Composite Cable to the Phoenix connector located directly above the opening into the S-IAD. DO NOT re-connect Phoenix connector to S-IAD until after voltage checks are complete in step 18. ☞ Note: For ease of installation, remove the Phoenix connector before trying to terminate. Termination diagram is located on the Phoenix connector.	
8.	At the S-IAD, use a multi-meter to measure the dc voltage on the Phoenix connector, positions 1 and 2	The voltage should be 0 VDC.
9.	Connect the 2 RF (Horizontal/Vertical) cables with SMA type connectors from the antenna to the S-IAD ensuring that the connectors are torque to 7-8 inch pounds.	
10.	At the power source selected, use a multi-meter to verify the presence of 110/120 VAC.	 The S-IAD should NOT be plugged into an overloaded power source. (i.e. microwave, refrigerator, toaster, etc all plugged into one AC outlet source)
11.	Route appropriate amount of 18AWG 2 conductors UV stable cabling and terminate to AC/DC converter using #6 terminal lugs.	 Ensure that the AC/DC converter is NOT connected to the power source (wall receptacle).
12.	Use a multi-meter to read the voltage across the battery terminals. If the results do not match the expected measurements, do not proceed. Begin troubleshooting or contact the next level of support for assistance.	The measurement should read between 12 VDC to 14 VDC, depending on the charge state and type of battery being utilized (12V 17Ah or 12V 7Ah).
13.	Connect the meter's black lead to the (-) negative terminal post and connect the red lead to the (+) positive terminal post.	

Step	Action	Observation
14.	Verify that the S-IAD and SPSI have been properly grounded in accordance with procedure 4.	
15.	Insert the AC/DC converter into the source (wall receptacle) to apply power to the S-IAD.	 The S-IAD should NOT be plugged into an overloaded power source. (i.e. microwave, refrigerator, toaster, etc all plugged into one AC outlet source)
16.	Use a multi-meter to measure the DC voltage at the terminal bus in the SPSI. Place the Red meter lead on TB1 15V+. Place the Black lead on TB1 15V-. The measurement should be 15VAC.	 Do not allow the meter leads to touch each other or it will short out the two terminals.
17.	At the S-IAD, use a multi-meter to measure the dc voltage at the Phoenix connector, positions 1 and 2.	The voltage should be in the 12VDC to 19VDC range. It is critical that the polarity and voltage are correct at this step.
18.	Remove the multi-meter leads from the Phoenix connector.	
19.	Disconnect power source.	
20.	Re-connect Phoenix connector to S-IAD, close bottom cover and re-apply power to the S-IAD.	
21.	End of procedure.	

Procedure 4. S-IAD Antenna and SPSI Box Grounding

The following procedure covers the proper techniques for grounding the S-IAD antenna and SPSI Box.

Step	Action	Observation
1.	Ensure that the S-IAD rooftop or wall mount is connected securely to the building structure.	
2.	If necessary, cut to length two 12 AWG solid strand copper ground cable(s) for both the S-IAD antenna and the SPSI Box to the single ground point and strip approximately ½ inch of insulation from both ends of each cable.	Refer to figure 2.

Step	Action	Observation
3.	At the S-IAD antenna, take one of the ground cables from step 2 and connect one end of the 12 AWG cable to the Panduit (LAMA6-14-Q) Ground Lug located at the base of the antenna.	 Grounding Point
4.	At the SPSI Box, take the other ground cable from step 2 and route the cable through an available foam insert(s) hole located at the bottom of the SPSI and terminate to the grounding stud on the SPSI circuit card using a Terminal Lug (6-10/12 AWG).	
5.	Since both the S-IAD and the SPSI Box's ground cables will be grounded to a single point ground connection, take the opposite ends of both 12 AWG ground cables and connect them to the earth ground or a cold water pipe using a Ground Clamp (2-10 AWG).	Refer to figure 2.
6.	If necessary, secure and dress ground cables.	
7.	End of procedure.	

Procedure 5. S-IAD Antenna Alignment

The following procedure will cover the alignment of the S-IAD antenna utilizing the Audible alignment tool. The S-IAD is aligned to the receive signal level coming from the Sector Antenna at the Base Station, using a piezo-electric audio indicator, the Audible.

The Audible signal will vary in strength throughout the alignment process. It is important that the technician concentrate on obtaining the strongest audible level in order to maximize the link to it's fullest.

There is only one style of S-IAD Mounting Bracket covered in this procedure.

Step	Action	Observation
1.	The S-IAD should already be mounted to the antenna mast as outlined in Procedure 2, and be oriented in the direction of the Base Station Sector Antenna utilizing the Signal Acquisition Tool in Procedure 1. Retrieve the Engineering specifications for the sector antenna coordinates.	
2.	Verify with the Engineering specifications the correct downstream frequency for the S-IAD and set the (TBA) at the correct downstream frequency for that site.	
3.	Connect the (TBA) to the S-IAD and monitor the audible signal level on the (TBA) as the S-IAD alignment is being performed. It is very important that the S-IAD be aligned deliberately and accurately. It is very easy to misalign the S-IAD by setting the S-IAD to point to a side lobe. Misalignment will greatly degrade the link. Ensure that the S-IAD is not lined up on a side lobe.	 Do not stand in front of the S-IAD or handle the S-IAD by the antenna.  Exercise caution when aligning the S-IAD. Ensure that no tools and parts are allowed to drop from the roof.
4.	On the Mounting Bracket, loosen the four azimuth adjustment bolts, which attach the U-bracket to the mast.  Maintain positive control of S-IAD while loosening bolts. Unbalanced weight of S-IAD may cause technician to lose balance and fall.	

Step	Action	Observation
5.	Adjust the azimuth by moving S-IAD in either a clockwise or counterclockwise motion while listening to the audible tone for the expected output. The audible level will vary in strength as the S-IAD is adjusted. Optimizing the signal level will require that the S-IAD to be rotated on the right and left edge of travel. Slowly move the S-IAD all the way through the right edge of travel. Once the right edge of travel is reached, slowly turn the S-IAD back to the left. Notice that the audible level will vary up and down as the S-IAD is rotated.	The azimuth adjustment allows for a maximum of 360 degrees of rotation depending on how the antenna mast was mounted.
6.	Repeat steps 3 through 5 until the strongest audible level is obtained.	
7.	Tighten the four azimuth adjustment bolts on the Mounting Bracket while listening to the audible level. The signal level should still be at maximum.	
8.	At the base of the Antenna Mount loosen the two bottom outside 7/16" nuts on the Elevation Adjustment Pipe.  Maintain positive control of S-IAD while loosening bolts. Unbalanced weight of S-IAD may cause technician to lose balance and fall.	The elevation adjustment allows for a maximum of 90 degrees of movement.
9.	Optimizing the signal level will require that the S-IAD be rotated on the upper and lower edge of travel. Slowly move the S-IAD all the way through the upper edge of travel. Once the upper edge of travel is reached, slowly move the S-IAD downward. Notice that the audible level will vary in strength as the elevation of the S-IAD is adjusted.	
10.	Repeat steps 8 and 9 until the strongest audible level is obtained.	
11.	Tighten the bolts on the Elevation Adjustment Pipe while listening to the audible level. The signal level should still be at maximum.	
12.	Remove (TBA) test leads from the S-IAD.	
13.	Verify that all "Heyco" weatherproof connectors are securely tightened.	
14.	At the SPST ensure that the door enclosure is secured and the "Heyco" weatherproof connectors are securely tightened.	
15.	End of procedure.	

Figure 1 - SPSI Termination Points

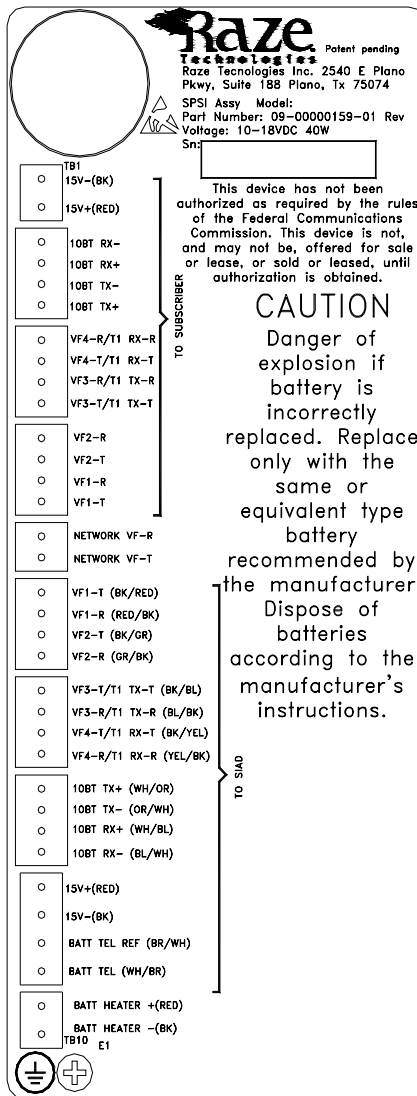
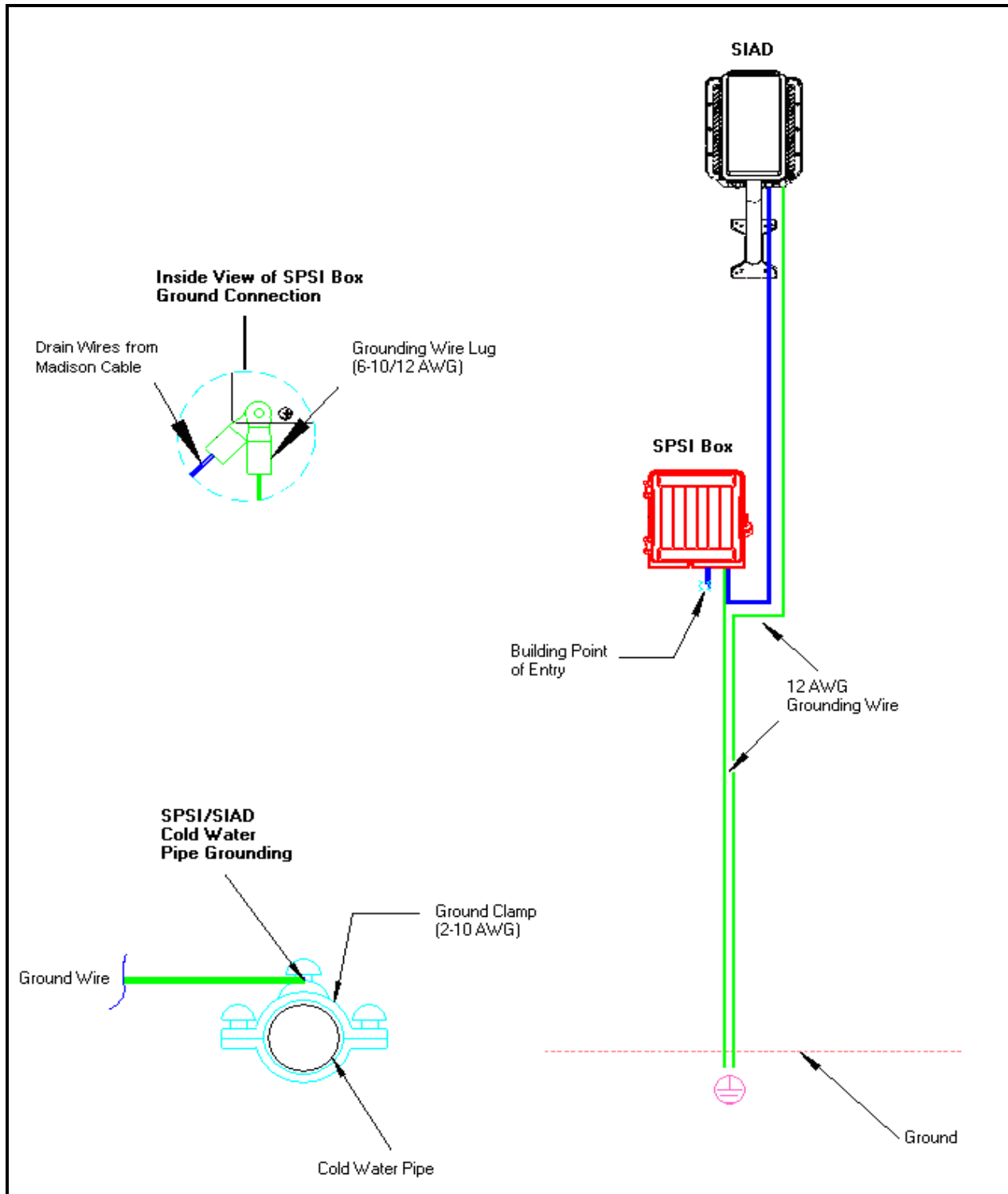


Figure 2 - S-IAD/SPSI Grounding



5.0 Acronyms

Ah	Amp Hours
ESD	Electrostatic Discharge
ISM	Installation Safety Manual
NEC	National Electric Code
NID	Network Interface Device
RMA	Return Materials Authorization
SPSI	S-IAD Power and Signal Interface
VAC	Volts Alternating Current
VDC	Volts Direct Current