

ANTENNA AND CABLE CONFIGURATIONS (POLE MOUNT)

EST offers different types of antennas for both indoor and outdoor configurations. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

Warning: *Only the tested cable lengths and antennas provided by EST meet the FCC maximum peak output power requirements. Any other combination of antennas or coax cables is not authorized. This device has been designed to operate in a pole mount configuration with the antennas listed below, and having a maximum gain of 6 dB in a multi-point system or 19dB in a point to point network. Antennas not included in this list or having a gain greater 6 dB in a multi-point system or 19dB in a point to point network are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.*

Part Number: AA01S

- Omni-directional, rubber duck, direct mount, unity gain antenna.
- Indoors and short range outdoor applications.
- There must be a minimum separation distance of 20 cm. from the antenna to the user. **See Warnings.**

Part Number: AA20DMEg

- Omni-directional direct mount antenna, 5 dBi gain.
- Indoor and outdoor applications.
- There must be a minimum separation distance of 20 cm. from the antenna to the user. **See Warnings.**

Part Number: AA20Eg

- Omni-directional external pole mount antenna, 6 dBi gain with 3-ft. integral feedline and connector.
- Outdoor applications.
- Antenna port B is not used in this configuration.
- There must be a minimum separation distance of 20 cm. from the antenna to the user. **See Warnings.**

Part Number: AA203Eg

- Directional pole mount antenna, 6 dBi gain with 3-ft. integral feedline and connector.
- Point to point and point to multi-point outdoor applications.
- Antenna port B is not used in this configuration.
- There must be a minimum separation distance of 20 cm. from the antenna to the user. **See Warnings.**

Part Number: AA204Eg

- Directional pole mount antenna, 19 dBi gain with 3-ft. integral feedline and connector.
- Point to point applications only.
- Maximum Output Power of 250mWatts (Power Level = Low Power)
- Antenna port B is not used in this configuration.
- There must be a minimum separation distance of 50 cm. from the antenna to the user. **See Warnings.**

Transmit/Receive
Antenna Port

Receive Only
Antenna Port



Notes:

Antenna Port A is a transmit and receive port for use in all applications.

Antenna Port B is a receive only port and is used for dual diversity antennas applications only. This port is not used for point to point applications.

Warnings:

Only pre-made coax cables from the factory used in conjunction with either the AA20Eg omni-directional and AA203Eg or AA204Eg directional antennas meet all FCC Section 15.247(b) EIRP maximum power requirements.

Use of the AA204Eg, directional antenna is limited to fixed point to point applications only. In accordance FCC Section 15.247(b)iii, this antenna must be professionally installed. The installer must ensure the system is used exclusively for fixed, point-to-point applications and the ESTeem Model 195Eg is set for 0.25 Watts output power (Power Level = Min).

ANTENNA AND CABLE CONFIGURATIONS (CABINET MOUNT)

Warning: Only the tested cable lengths and antennas provided by EST meet the FCC maximum peak output power requirements. Any other combination of antennas or coax cables is not authorized. This device has been designed to operate in a cabinet mount configuration with the antennas listed below, and having a maximum gain of 7 dB in a multi-point system or 11dB in a point to point network with the authorized ESTeem coax cables. Antennas not included in this list or having a gain greater than 7 dB in a multi-point system or 11dB in a point to point network with any other types or lengths of coax cable are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

Part Number: AA20E

- Omni Directional Building Mount Antenna, 6 dBd gain
- Feedline minimums: 25 ft. RG-8 Cable or 50 ft. Heliac Cable with AA228LMR and Lightning Arrestor (EST P/N: AA165).

Part Number: AA203ES

- Directional Building Mount Antenna, 7 dBd gain
- Feedline minimums: 25 ft. RG-8 Cable or 50 ft. Heliac Cable with AA228LMR and Lightning Arrestor (EST P/N: AA165).
- Point to point and point to multi-point applications

Part Number: AA204ES* (Point-to-point ONLY)

- Directional Building Mount Antenna, 11 dBd gain
- Feedline minimums: 25 ft. RG-8 Cable or 50 ft. Heliac Cable with AA228LMR and Lightning Arrestor (EST P/N: AA165).
- Point to point applications only. See Warning.

Warning:

Only pre-made coax cable systems (Cable, Lightning Arrestor and AA228LMR jumper cable) from the factory used in conjunction with either the AA20E omni-directional and AA203ES or AA204ES directional antennas meet all FCC Section 15.247(b) EIRP maximum power requirements.

Use of the AA204ES, directional antenna is limited to fixed point to point applications only. In accordance FCC Section 15.247(b)iii, the operator or installer is responsible for ensuring the systems is used exclusively for fixed, point-to-point applications.

COAXIAL CABLES

A 25-ft. length of RG-8 coax cable or 50-ft. length of 1/2" Heliac cable are the minimum cable lengths allowed for use with the above antennas (AA20E, AA203ES, AA204ES) when the Model 195Eg is set at Max Power. Listed below are representative cable losses in db/100 ft at the 2.4 GHz frequency range:

Feedline Type	Attenuation (dB/100 ft.) @ 2.4 GHz	Additional RF Losses	Attenuation (dB)
RG-8 (Solid)	7	AA228LMR (2.5' TNC-MRP/N-MRP) Jumper Cable	0.9
LMR 600	4.4	AA165 Lightning Arrestor	0.1
3/8" Heliac	6.5	All Coax Connector Terminations (2 for every coax cable)	0.2
1/2" Heliac	3.5		
7/8" Heliac	2		
1.25" Heliac	1.6		

In a severe noise environment it may be necessary to use a double shield type of coax cable such as RG-214/U in place of the RG-8. This cable must be purchased from the factory to meet FCC requirements.

Note: A -3 dB loss means you have lost 1/2 of your signal or transmitter power. A +3 dB gain means you have doubled (x2) your signal or transmitter power.

Example:

A 6 dB antenna will increase the radiated output power of a 1 watt transmitter to 4 watts {times 4 = 3 dB (x2) + 3 dB (x2)} and increase the received signal strength to receiver times 4.

WEATHER PROOFING COAX CONNECTIONS

1. Coat the threads of the connectors with silicone lubricant prior to assembly (See Note 1) and hand tighten. Care should be taken not to get any lubricant on the center conductor.
2. Wrap the connector assembly with a vapor barrier patch for weather proofing (See Note 2), ensuring to overlap onto the coax cable approximately 1 1/2 inches.
3. Apply an electrical coating (sealing agent) over the vapor barrier patch for added protection (See Note 3).

Notes:

1. *Dow Corning RTV-3140 or equivalent.*
2. *Suggested vendors:*
VAPOR-WRAP
Decibel Products
3184 Quebec St.
Dallas, TX 75356
214-631-0310

VYNIL-MASTIC, P/N 2200
3-M Company
Customer Service
512-984-1800
3. *SCOTCHKOTE, 3-M Company, or equivalent.*

ANTENNA DIVERSITY

The dual diversity antenna configuration on the ESTeem Model 195Eg allows the radio to operate more efficiently in areas with high reflections (such as indoors or in a city) and without direct line of sight (LOS) between the antennas. One of the most difficult conditions to control in a radio system is the effect of a destructive reflected radio signal called mutipathing. Multipathing occurs when waves emitted by the transmitter travel along a different path and interfere destructively with waves traveling on a direct line-of-site path. The phenomenon occurs because waves traveling along different paths may be completely out of phase when they reach the antenna, thereby canceling each other out. The dual diversity antenna configuration places a physical distance between the antennas where one reflected signal will be out of phase, but the second will be not. The ESTeem Model 195Eg will sample both antennas and select the best receive signal.

ANTENNA PORT SELECTION

The antenna ports on the Model 195Eg must be configured for either a single receive antenna (external mount antennas) or dual diversity antenna setup. To access the port configuration open ESTeem Web page using your computer's Web Browser as per instructions in Chapter 4. Select Advanced from the menu items and Radio Settings-wlan0 device (Figure 1).

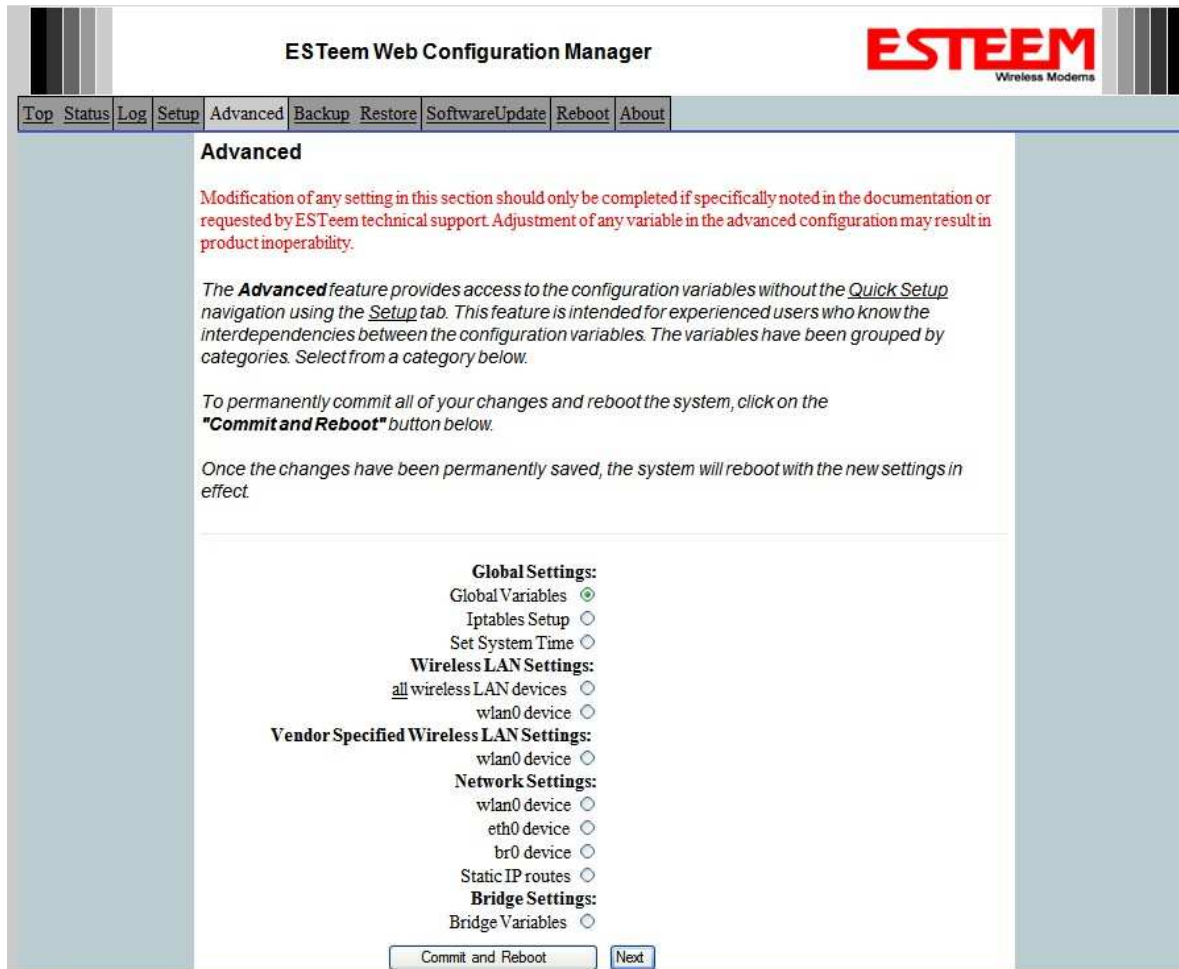


Figure 1: Advanced Settings Menu

Press the next button and Figure 2 will be displayed. The receive antenna is configured by selecting the wlan0_dot11CurrentRXAntenna drop down (Figure 2) and selecting the receive antenna. A value of 0 = Dual diversity (Both antenna Ports A & B will be used to receive). A value of 1 = Single receive source (Antenna Port A only).

EST195E Web Configuration Manager

Top Status Log Setup Advanced Backup Restore Software Update Reboot

Advanced - Wireless LAN Settings for the wlan0 Wireless LAN Device

The following is a list of those configuration variables under the **Wireless LAN Settings** category. These variables contain values for configuring the **wlan0** wireless LAN device hardware.

wlan0_MODE: Access Point
wlan0_SSID: T::ESTeem

wlan0_ChannelList:

wlan0_dot11CurrentTxAntenna: 1
wlan0_dot11CurrentRxAntenna: 0
wlan0_dot11RTSThreshold: 0

Select the operational mode for the **wlan0** device

Format:
T::textual SSID
--OR--
H::hex:hex:hex: ... :hex

Enter the list of frequencies, as a list of integers separated by a single comma, that will be scanned when the WLAN device is operating in a station mode. **NOTE:** if this field is empty, then **ALL** allowed frequencies will be scanned.

Select the antenna to use for transmit

Select the antenna to use for receive

Enter how many octets in an MPDU below which an RTS/CTS handshake shall not be performed (0-2347)

Figure 2: Receive Antenna Settings Menu

ASSEMBLING THE AA195PM TWO HOLE OUTDOOR POLE MOUNTING KIT

The AA195PM mounting kit contains everything required for pole mounting and weatherproofing the ESTeem Model 195Eg for outdoor installations. The 195Eg with AA195PM mounting kit can be directly mounted to a round pole from 1.25" to a diameter of 2.25" OD. Any mounting structure greater than 2" requires hose clamp strapping run through the Pole Mount Brackets. The mounting kit requires the following assembly:

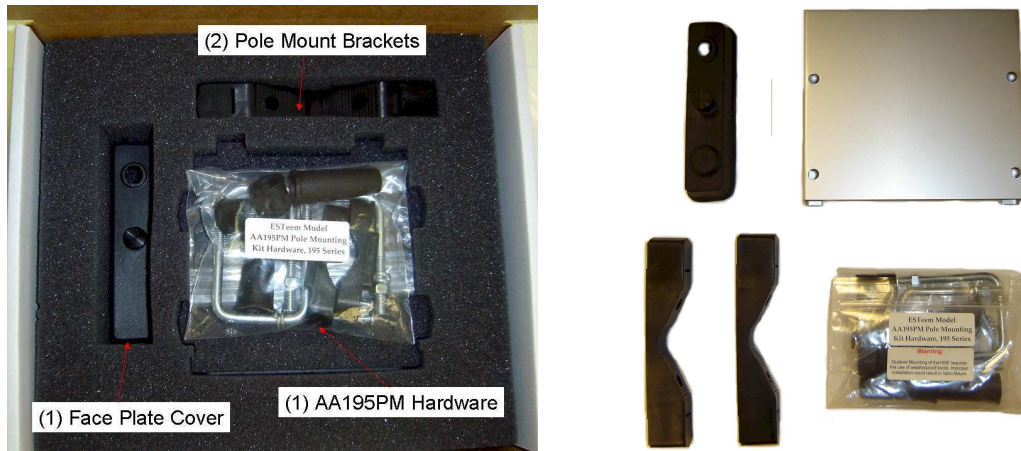


Figure 1: Packet Box Contents

1. If you purchased an AA195PM mounting kit with your Model 195Eg, the kit will be packed in the same packing box as the ESTeem (Figure 1).
2. Remove and inventory the two (2) Pole Mounting Brackets, one (1) Two-Hole Face Plate Cover (with single port cover installed), one (1) Heat Shield and (1) AA195PM Hardware bag from the packing box (Figure 1). Report any missing or damaged items to ESTeem Customer Support (509-735-9092 Phone) as soon as possible for replacement.

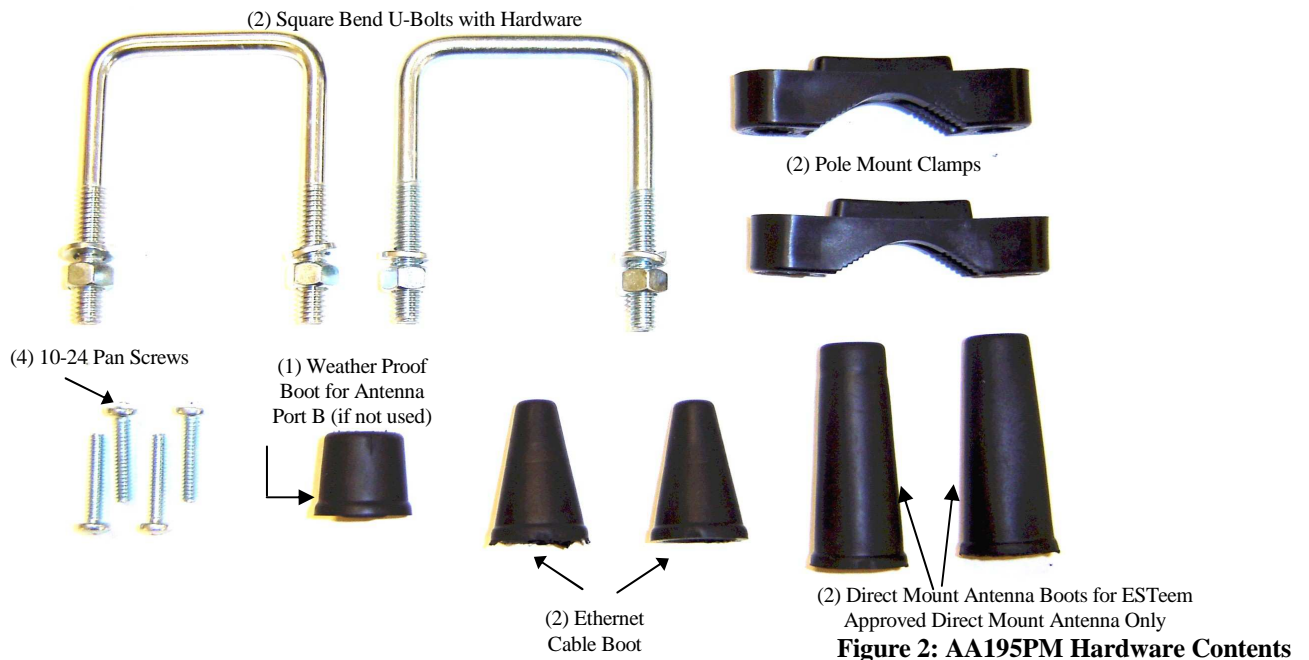


Figure 2: AA195PM Hardware Contents

3. Inventory the AA195PM Hardware bag for all the components listed in Figure 2.
4. Assemble the two Pole Mounting Brackets with the included U-bolts, hardware and Pole Mount Clamps. Reference Figure 3.

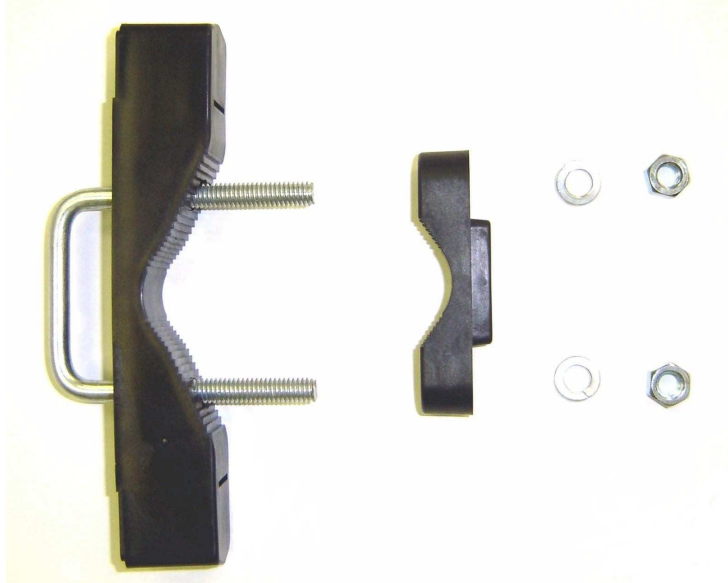


Figure 3: Pole Mount Assembly

5. Place the four supplied 10-24 x 1" Phillips Pan Head screws through the mounting holes of the Heat Shield and attach to the top of the ESTeem 195Eg (Figure 4).



Figure 4: Heat Shield Attachment

6. Attach the two Pole Mounting Brackets to the ESTeem Model 195Eg with the 10-24 x 1" Phillips Pan Head screws through

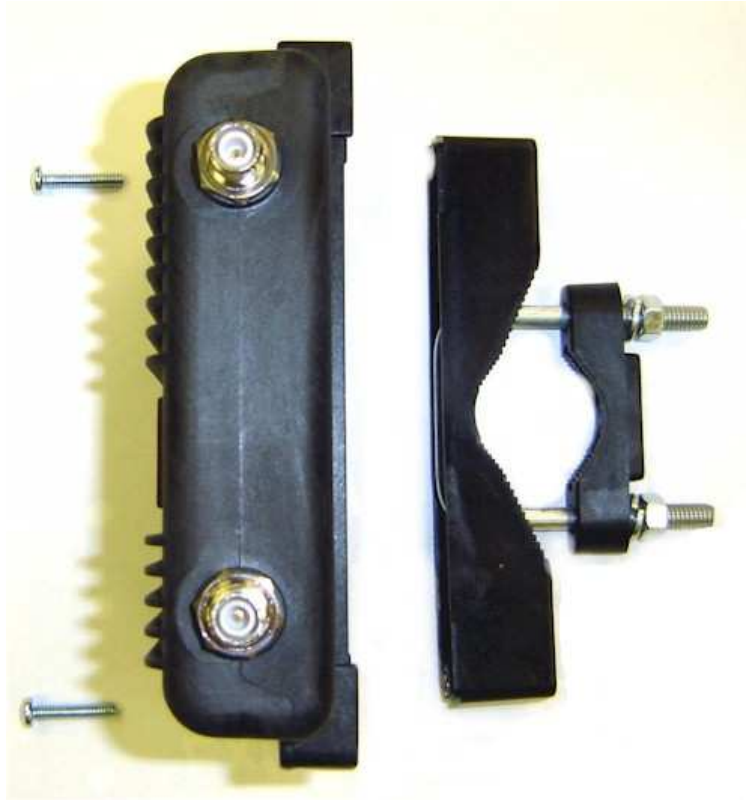


Figure 5: Pole Mount Connection to Case
(Heat Shield Removed for Detail)

the top of the heat shield. Reference Figure 5 (Heat Shield removed for detail).

7. Assemble the outdoor rated CAT-5e Ethernet cable (Not Provided) with the supplied Ethernet Cable Boot (Figure 6).



Ethernet Cable Boot

Figure 6: Ethernet Cable Assembly

8. Feed the CAT-5e Ethernet connector(s) through the Face Plate Cover and secure the Ethernet Cable Boot to the cover. Reference Figure 7. *NOTE: The Ethernet cable boot must be installed before the RJ-45 end is installed. If using the ESTeem AA09.1 outdoor Ethernet cable, verify that the Ethernet cable boot end is routed toward the ESTeem 195Eg.*

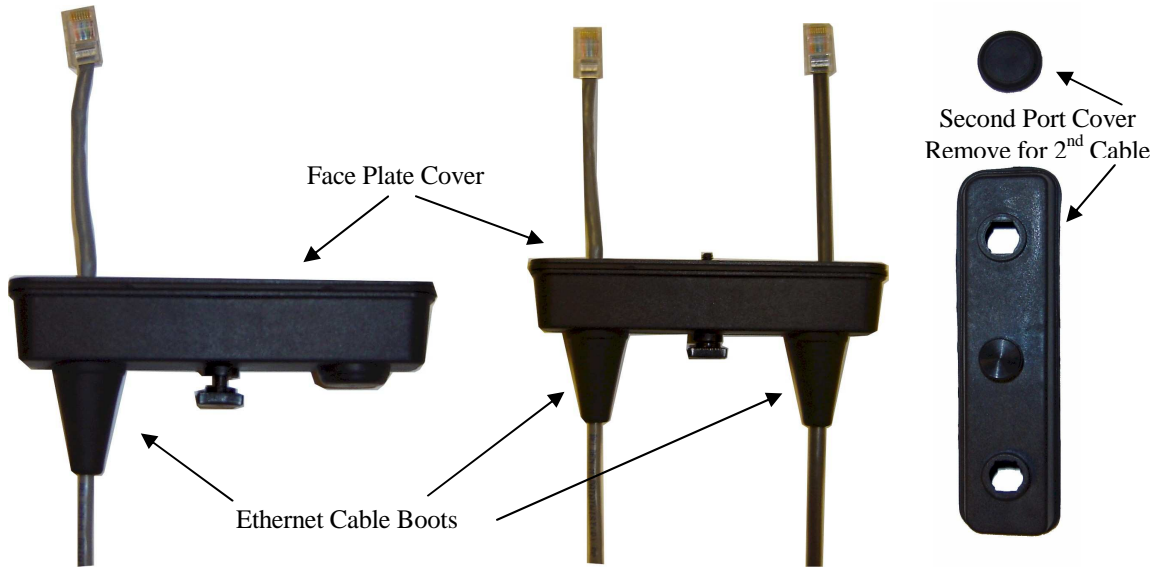


Figure 7: Ethernet Cable Routing

9. Route the CAT-5e Ethernet cable through the molded strain-relief fins in the Face Plate Cover (Figure 8) to secure the cable and provide strain-relief for the connector. If a second Ethernet cable is installed, remove the second port cover and route cable.

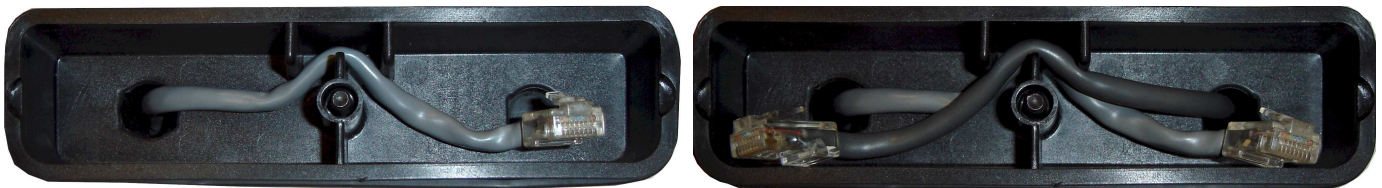


Figure 8: Face Plate Cover Strain Relief

10. Plug the CAT-5e Ethernet cable to the Model 195Eg's Ethernet port and secure the Face Plate Cover with the attached thumb screw. Verify that the weatherproof seal on the Face Plate Cover is sealed against the outer rim of the Model 195Eg. Reference Figure 9.



Figure 9: Face Plate Cover Installed on ESTeem

11. Attach the antenna connector boots as show in Figure 10 for either dual attached antennas or external antennas. You are now ready to mount the ESTeem Model 195Eg

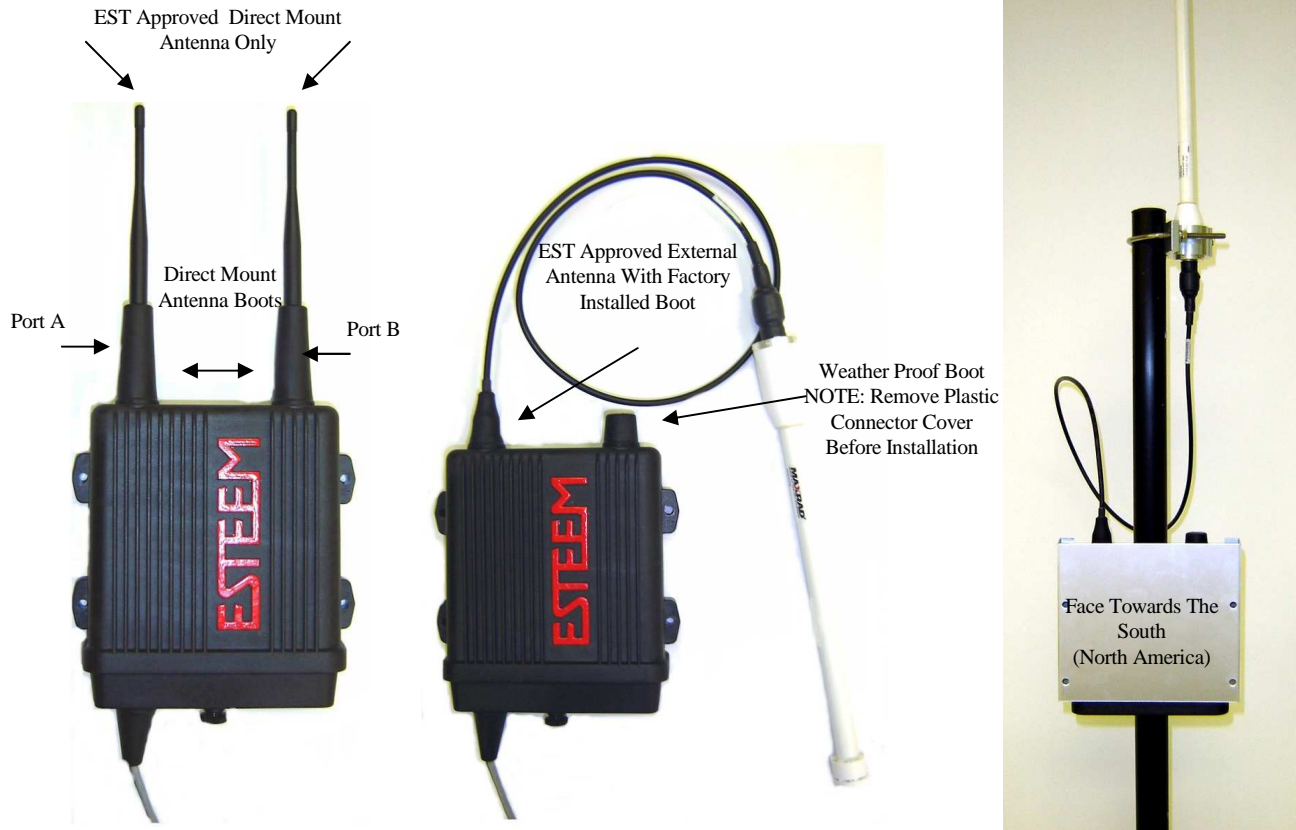


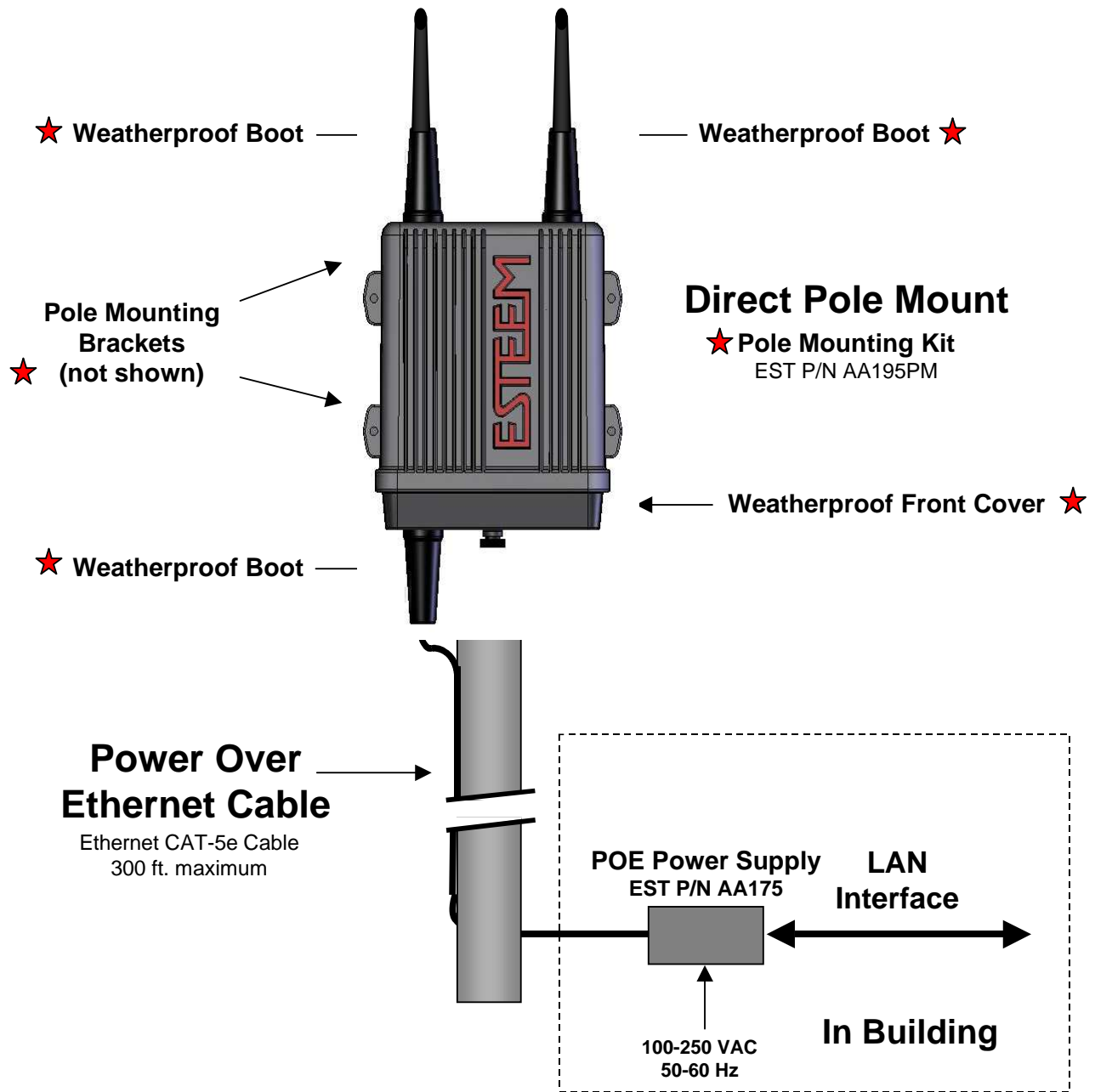
Figure 10: Completed AA195PM Mounts

Caution: Outdoor mounting of the 195E requires the use of weatherproof boots. Improper installation could result in radio failure.

Caution: Always mount the 195Eg vertically with the antenna ports on top.

Model 195E Series with Direct Mount Dual Diversity Antennas

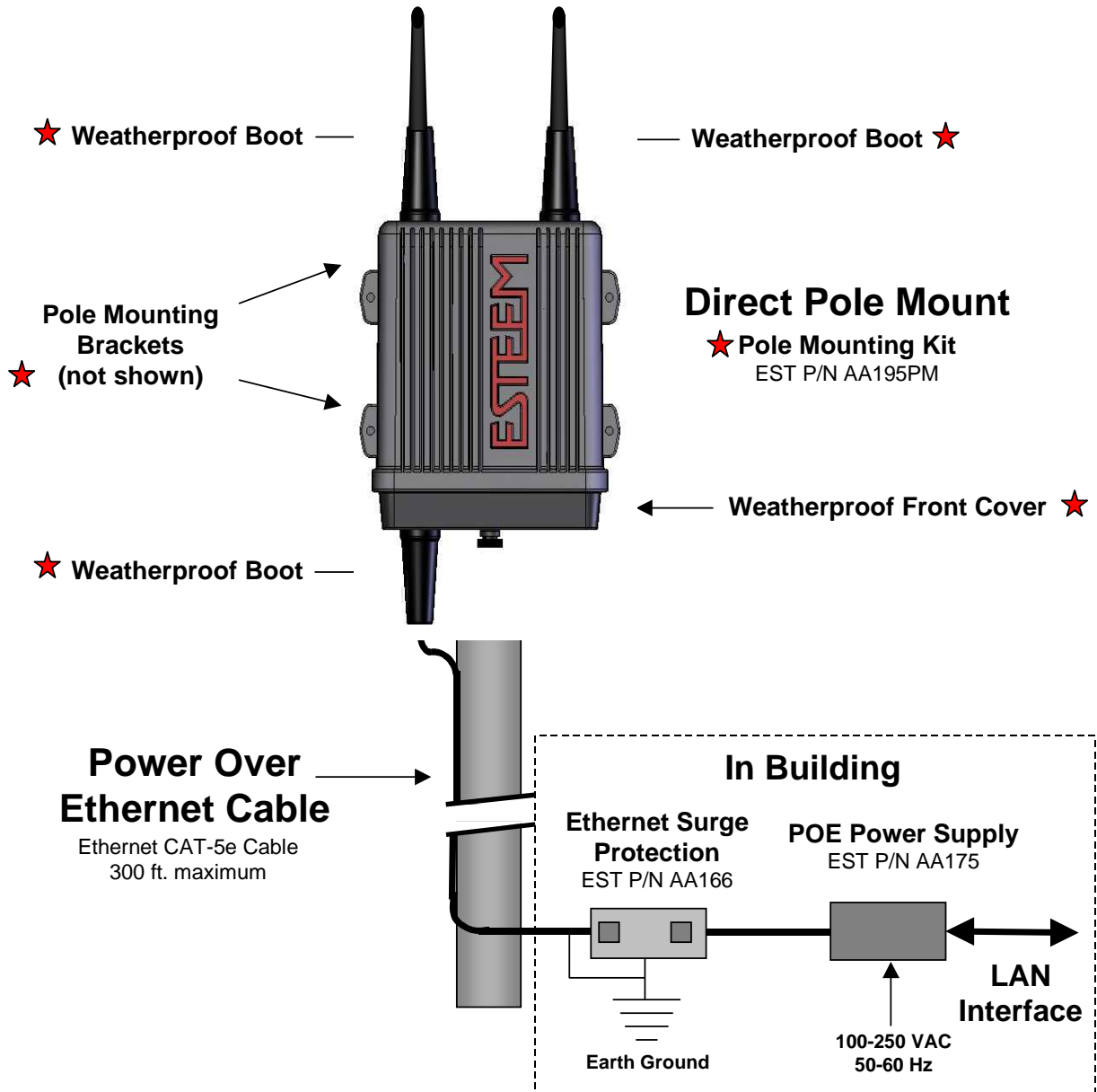
Case Mount Omni-Directional
Dual Diversity Antennas
EST P/N AA01S or AA20DMEg



Caution: Always mount the 195Eg vertically with the antenna ports on top.

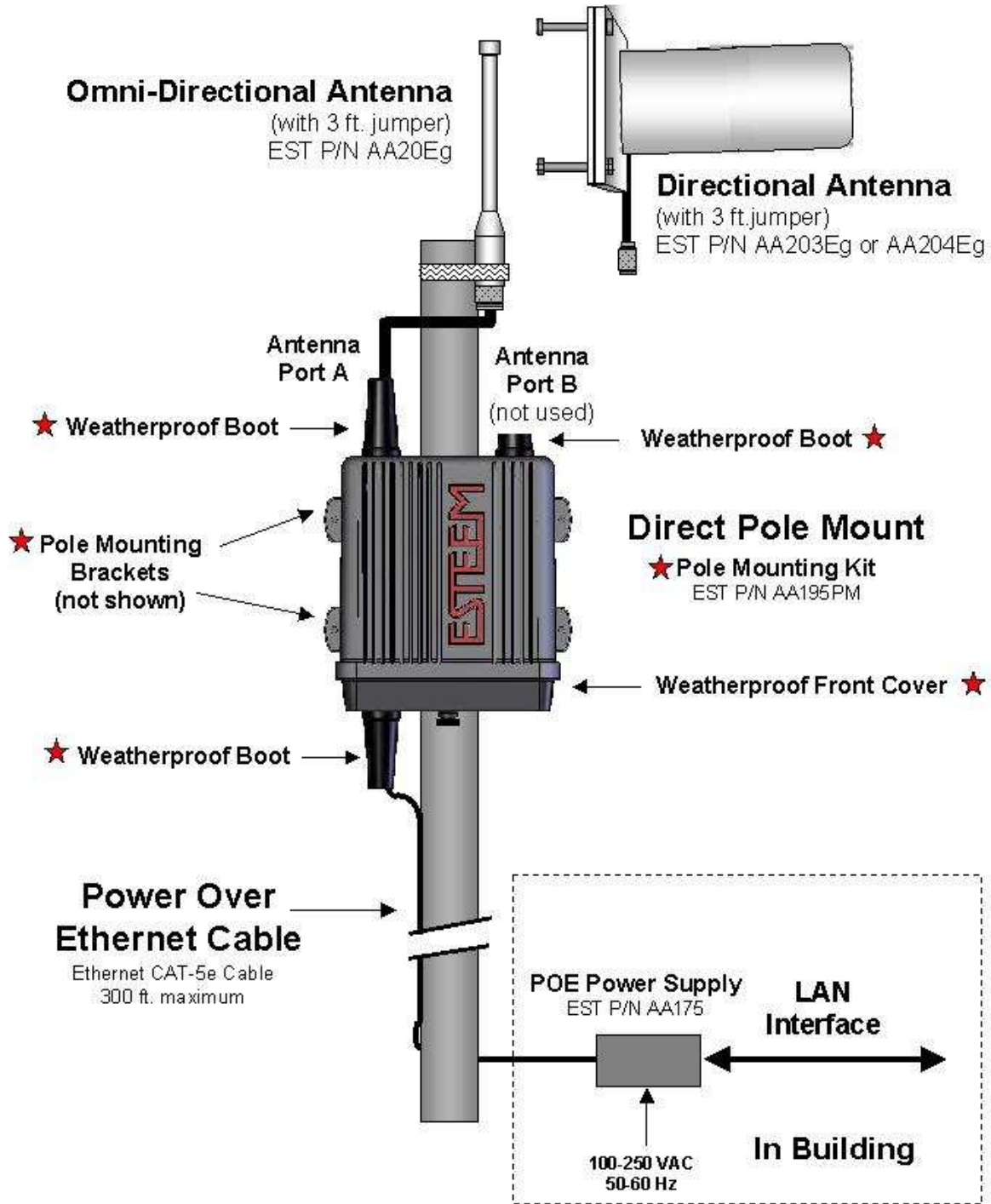
Model 195E Series with Direct Mount Dual Diversity Antennas and Surge Protection

Case Mount Omni-Directional
Dual Diversity Antennas
EST P/N AA01S or AA20DMEg



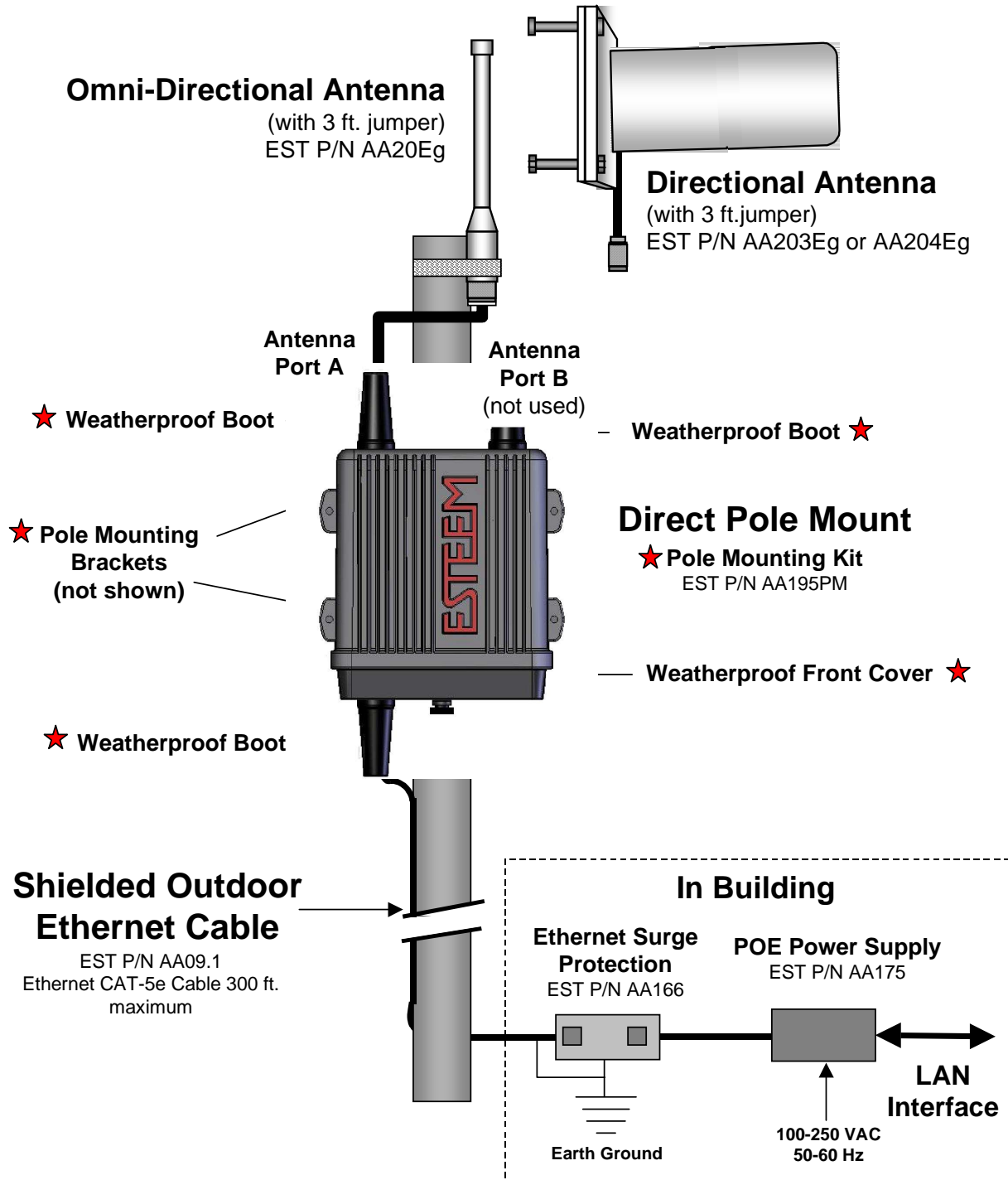
Caution: Always mount the 195Eg vertically with the antenna ports on top.

Model195E Series with External Mount Antennas



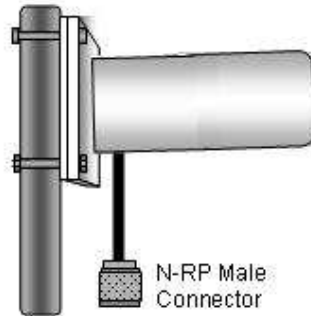
Caution: Always mount the 195Eg vertically with the antenna ports on top.

Model195E Series with External Mount Antennas and Surge Protection



Caution: Always mount the 195Eg vertically with the antenna ports on top.

Model 195Eg Cabinet Mount Hardware Diagram



Directional Antennas

For Point to Point Applications use EST Part No. AA204ES

For Point to Multi-point Application use EST Part No. AA203ES

Pole mounting brackets included.

Caution

To comply with the FCC exposure compliance requirements, a separation distance of at least 19 cm must be maintained between the antenna and all persons.

NOTES

1. Vapor wrap all external antenna coax connections with vinyl wrap (EST Part No. AA241) and apply Scotchkote Electrical Coating (EST Part No. AA242).
2. Contact EST for recommendations regarding antenna mounting hardware and installation tips.
3. Ground antenna structure, base and lightning arrester.

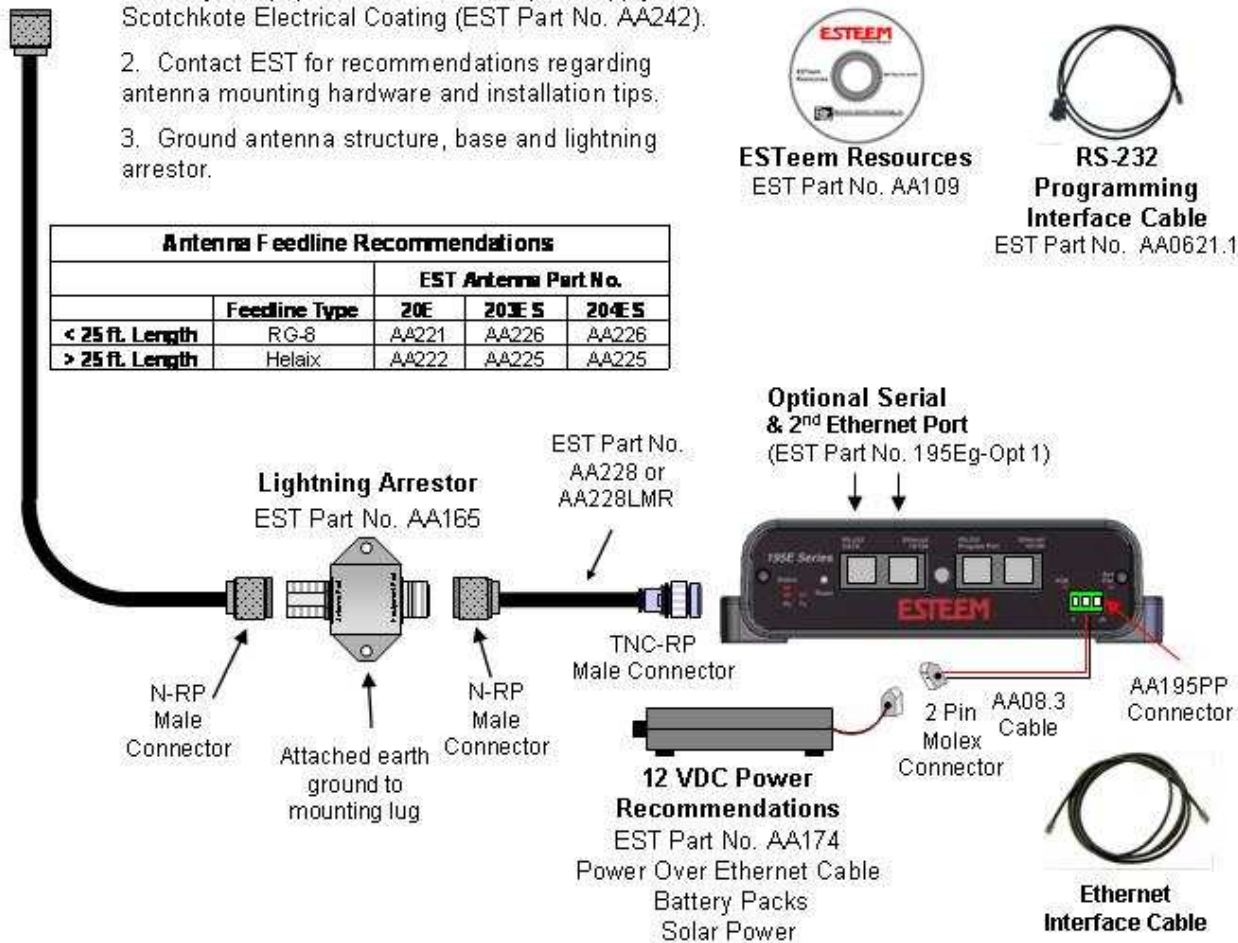


ESTeem Resources
EST Part No. AA109

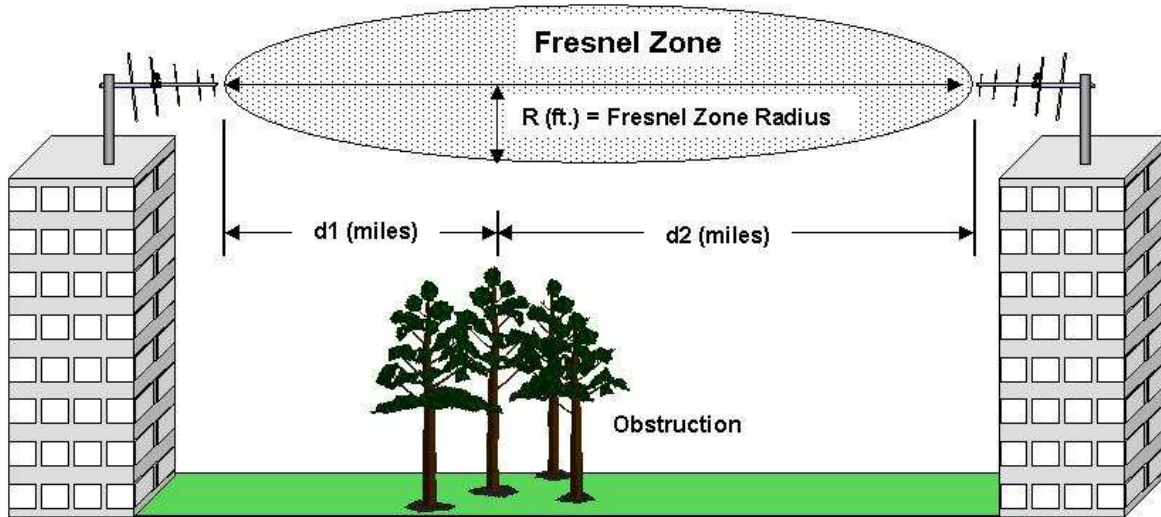


RS-232 Programming Interface Cable
EST Part No. AA0621.1

Antenna Feedline Recommendations				
		EST Antenna Part No.		
	Feedline Type	20E	20E S	20E S
< 25 ft. Length	RG-8	AA221	AA226	AA226
> 25 ft. Length	Helaix	AA222	AA225	AA225



FRESNEL ZONE



The Fresnel zone shows the ellipsoid spread of the radio waves around the visual line-of-sight after they leave the antenna (see figure above). This area must be clear of obstructions or the signal strength will be reduced due to signal blockage. Typically, 20% Fresnel Zone blockage introduces little signal loss to the link. Beyond 40% blockage, signal loss will become significant. This calculation is based on a *flat earth*. It does not take into account the curvature of the earth. It is recommended for RF path links greater than 7 miles to have a microwave path analysis done that takes the curvature of the earth and the topography of the terrain into account.

$$\text{Fresnel Zone Radius} = 72.1 \text{ SQRT} [(d_1 d_2) / (F(d_1 + d_2))]$$

Units

Fresnel Zone Radius in feet.

d_1 and d_2 in statute miles

F in GHz