# *ESTEEM USERS MANUAL*

***for***

# *MODEL 192E*

**May 2001**

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Electronic Systems Technology, Inc., (hereinafter EST) expressly warrants its products as free of manufacturing defects for a period of one year from the date of sale to first user/customer.

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EST's liability shall be limited to refunding of purchase price, repair or replacement of product.

***IN NO EVENT SHALL EST HAVE LIABILITY FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL OR EXEMPLARY DAMAGES CAUSED DIRECTLY OR INDIRECTLY BY THE PRODUCT, INCLUDING BUT NOT LIMITED TO ANY INTERRUPTION OF SERVICES, LOSS OF BUSINESS OR ANTICIPATORY PROFITS. IN NO EVENT SHALL EST BE LIABLE FOR ANY DAMAGES WHATSOEVER IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT.***

In the event that a unit or part requires replacement or factory servicing, the following conditions apply:

a) Customer must obtain from EST an authorized RMA (Return Materials Authorization) number (call 509-735-9092 Customer Support) before shipment of product or parts to EST for any reason;

b) If the whole unit is shipped, it must be in its original carton and shipping components, or a carton and shipping components supplied by EST, or if parts only are shipped, they must be packaged and cushioned so as to prevent damage in transit and shipped freight prepaid;

## PRODUCT WILL BE CONSIDERED OUT OF WARRANTY IF:

a) If the product is damaged due to improper or abnormal use, abuse, mishandling, accident or improper maintenance or failure to follow operating instruction;

b) If the product is defective as a result of sand, dirt, or water damage;

c) If any factory-sealed enclosure has been opened or shows evidence of an attempt to be opened;

d) If defects or damage are caused by the use of unauthorized parts or unauthorized service;

e) If the product has had its serial numbers altered or removed.

Warranty repair form must be accompanied by proof of user's purchase of unit. Product must be shipped to the manufacturer at the following address:

Electronic Systems Technology
415 North Quay Street
Kennewick, Washington USA 99336

## ADDITIONAL SERVICE:

If EST releases an improvement update to firmware internal to the ESTeem unit during the 90 day period after the unit was purchased by the first user/customer, EST will update the applicable unit with the revised version at no charge other than for UPS handling and shipping to and from your location to the EST factory. Return of any such item must be accompanied with proof of purchase.

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# CHAPTER 2
# APPLICATION PROGRAMMING

## SYSTEM CONFIGURATIONS

The ESTeem Model 192E can be used in a variety of network system configurations. The ESTeem can stand alone as the center of a wireless infrastructure, can provide access from your wireless network to your wired LAN, or bridge between Ethernet segments on your network.

The Model 192E can also be configured as a repeater in the network to increase the range of the wireless infrastructure. The maximum communications range is based upon how you configure your wireless network. This section of the manual will describe the possible configurations of the wireless network.

## ACCESS POINT CONFIGURATION

In this network one of the ESTeem Model 192E modems is configured as the “Access Point”. This Access Point is then used to bridge wireless network to the cabled LAN network or act as the center point on a stand alone wireless network. When configured in this type of network, all wireless cards (ESTeem Model WLANC11) communicate only with the Access Point that serves the WLAN as a HUB. This type of network can extend the range of the wireless cards greater than they can directly communication with each other.

The Access Point is responsible for maintaining a logical link between the clients and providing the wireless clients with access to information on the wired LAN network. Figure 1 shows and example of the Model 192E in an Access Point Configuration.

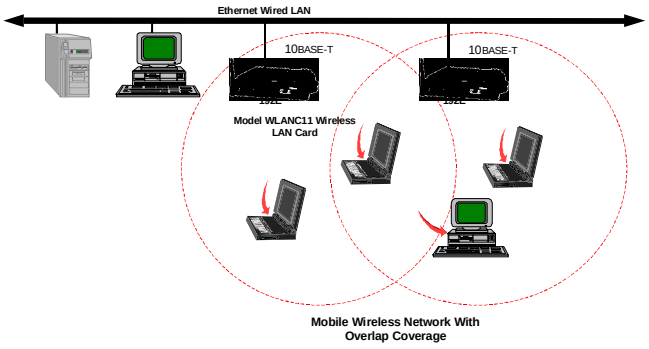


Figure 1: Access Point Network

## ETHERNET BRIDGING CONFIGURATION

The Ethernet Bridging network allows the Model 192E modems to provide links between two or more Ethernet segments on a network. Ethernet segments can be either single network clients such as computers or PLCs or ties into building LAN networks such as HUBs or switches.

This type of network can provide tremendous flexibility in your wireless network configurations and also provide a much greater range than available through the wireless card network as described in the Access Point section. Figure 2 shows an example of an Ethernet Bridging network.

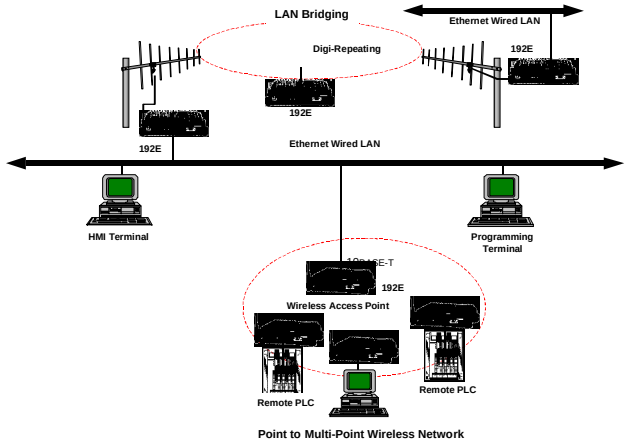


Figure 2: Ethernet Bridging Network

## COMBINED ACCESS POINT AND ETHERNET BRIDGING CONFIGURATION

As the name would imply, this type of network is a combination of an Access Point network and an Ethernet Bridging network. This type of network would prove both communication to a Building LAN network from a remote Model 192E and also provide wireless access to the network for the wireless cards. This type of network requires two ESTeem Model 192E modems and at least a three port Ethernet HUB. Figure 3 shows a combined network.

# CHAPTER 2
# APPLICATION PROGRAMMING

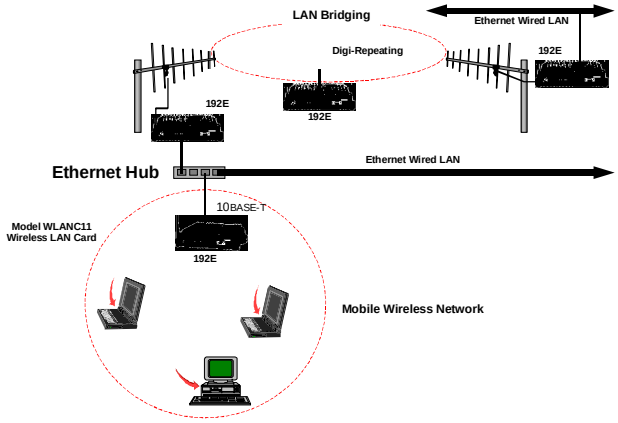


**Figure 3: Combination Network**

# CHAPTER 2
# APPLICATION PROGRAMMING

## SYSTEM CONFIGURATIONS

## ACCESS POINT CONFIGURATION

## ETHERNET BRIDGING CONFIGURATION

## COMBINED ACCESS POINT AND ETHERNET BRIDGING CONFIGURATION

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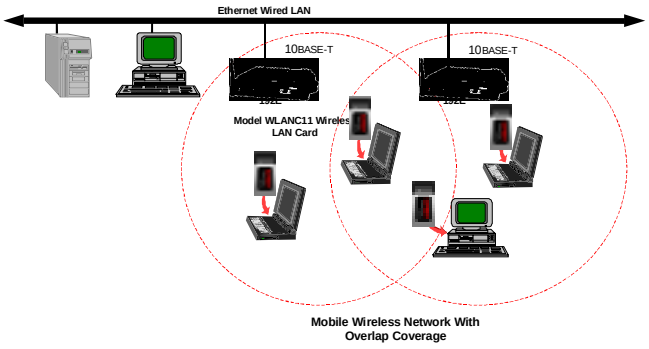


**Figure 1: Access Point Network**

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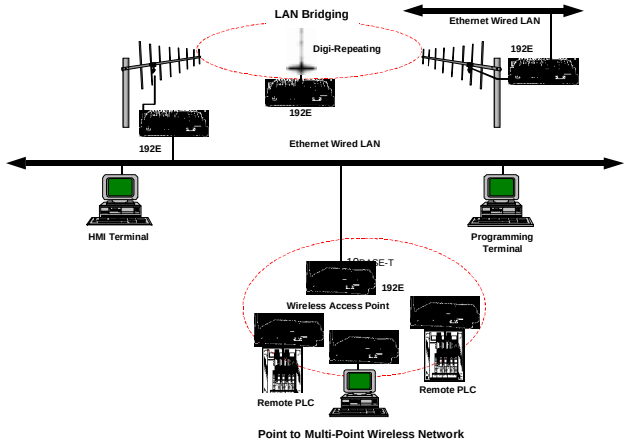


**Figure 2: Ethernet Bridging Network**

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# CHAPTER 2
# APPLICATION PROGRAMMING

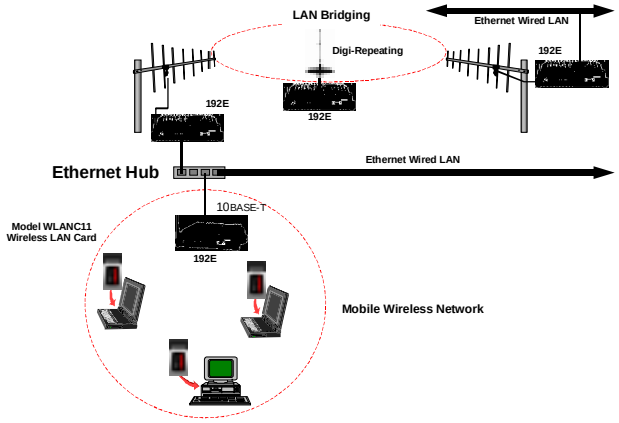



**Figure 3: Combination Network**

# CHAPTER 3
# INTERFACING

## SERIAL INTERFACE CONFIGURATION

## RS-232 PORT PINOUT TABLE

## ETHERNET INTERFACE

# CHAPTER 3
# INTERFACING

## SERIAL INTERFACE CONFIGURATION

The ESTeem Model 192E has a standard RS-232C, 9-pin Female connector for interfacing directly with the serial port on the computer. Use ESTeem part number AA062 to interface the Model 192E with a 9-pin serial port on a computer.

The serial port on the ESTeem Model 192E can be used to access the configuration menu in the ESTeem for system and network configuration. The ESTeem communications port operates at 19,200 bps, No Parity, 8 Data Bits and 1 Stop Bit (19,200,N,8,1). Configure your terminal program to match these settings.

## RS-232 PORT PIN-OUT TABLE

**ESTeem Model 192E**
**RS-232C Port Pin-Out Table**

| Pin No. | Function |
|---|---|
| **1** | Data Carrier Detect (DCD) |
| **2** | Receive Data (RxD) |
| **3** | Transmit Data (TxD) |
| **4** | Data Terminal Ready (DTR) |
| **5** | Signal Ground |
| **6** | Data Set Ready (DSR) |
| **7** | Request To Send (RTS Input) |
| **8** | Clear To Send (CTS) |
| **9** | Ring Line (RI) |

## ETHERNET INTERFACE

The ESTeem Model 192E's Ethernet Port is configured to directly interface with an Ethernet HUB using a straight through 10BaseT cable. If the ESTeem is connected to a network interface card (NIC), you will need to use 10BaseT reversing cable.

# CHAPTER 4
# ANTENNAS

## ANTENNA AND CABLE CONFIGURATIONS

## WEATHER PROOFING COAXIAL CONNECTORS

## GROUNDING

## LIGHTINING ARRESTORS

## MODEL 192E TYPICAL OUTDOOR ANTENNA INSTALLATION DIAGRAM

## MODEL 192E TYPICAL INDOOR ANTENNA INSTALLATION DIAGRAMS

## ESTEEM SWR MEASUREMENT BLOCK DIAGRAM

# CHAPTER 4
# ANTENNAS

## ANTENNA AND CABLE CONFIGURATIONS

EST offers three (3) different types of antennas for both indoor and outdoor configurations.

**Part Number: AA01S**
Omni Directional Rubber Duck Antenna.
Unity Gain

**Part Number: AA20S**
Omni Directional Building Mount Antenna
5 dB gain

**Part Number: AA202S**
Directional Building Mount Antenna
13.9 dB gain

**Outdoor Fixed Base Configuration**
Lightning Protection
50' Heliax Cable

**Indoor Configuration**
25' RG-8 Cable

**Note:** *The cables and antennas are optimized with the ESTeem for maximum output power allowed by the FCC and IC.*

*Extreme care must be taken when attaching coax connectors to the antenna feedlines. If there is any error in making this connection the output of the transmitter will be greatly reduced.*

## COAXIAL CABLES

To minimize signal loss, the overall length of the coaxial cable should be as short as possible. To avoid corrosion select coaxial cable manufacturers with tinned copper braid, where possible. Listed below are representative cable losses in db/100 ft at the 2.4 GHz frequency range:

| Frequency (GHz) | RG-8 | ½" Heliax |
|---|---|---|
| 2.400-2.462 | - 8.0 | - 3.74 |

In a severe noise environment it may be desirable to use a double shield type of coax cable such as RG-214/U in place of the RG-8.

**Note:** *Pre-made coax cables can be purchased from the factory. A -3 dB loss means you have lost 1/2 of your signal. A +3 dB gain means you have doubled (x2) your signal.*

## 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.*

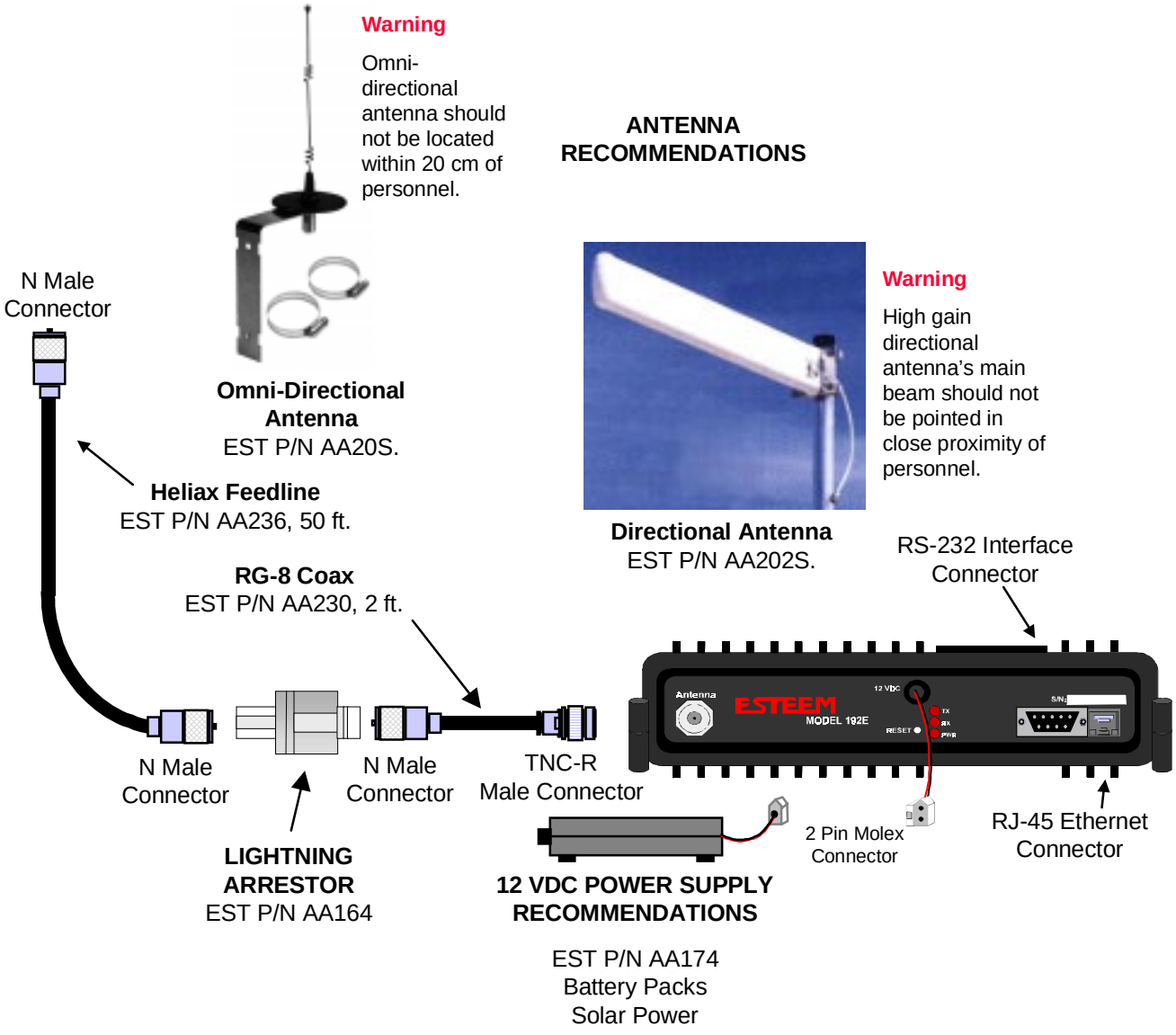
## GROUNDING

All building mount antennas require attachment to a good earth ground for optimum efficiency. Contact a reputable local communications shop for procedures for your area.

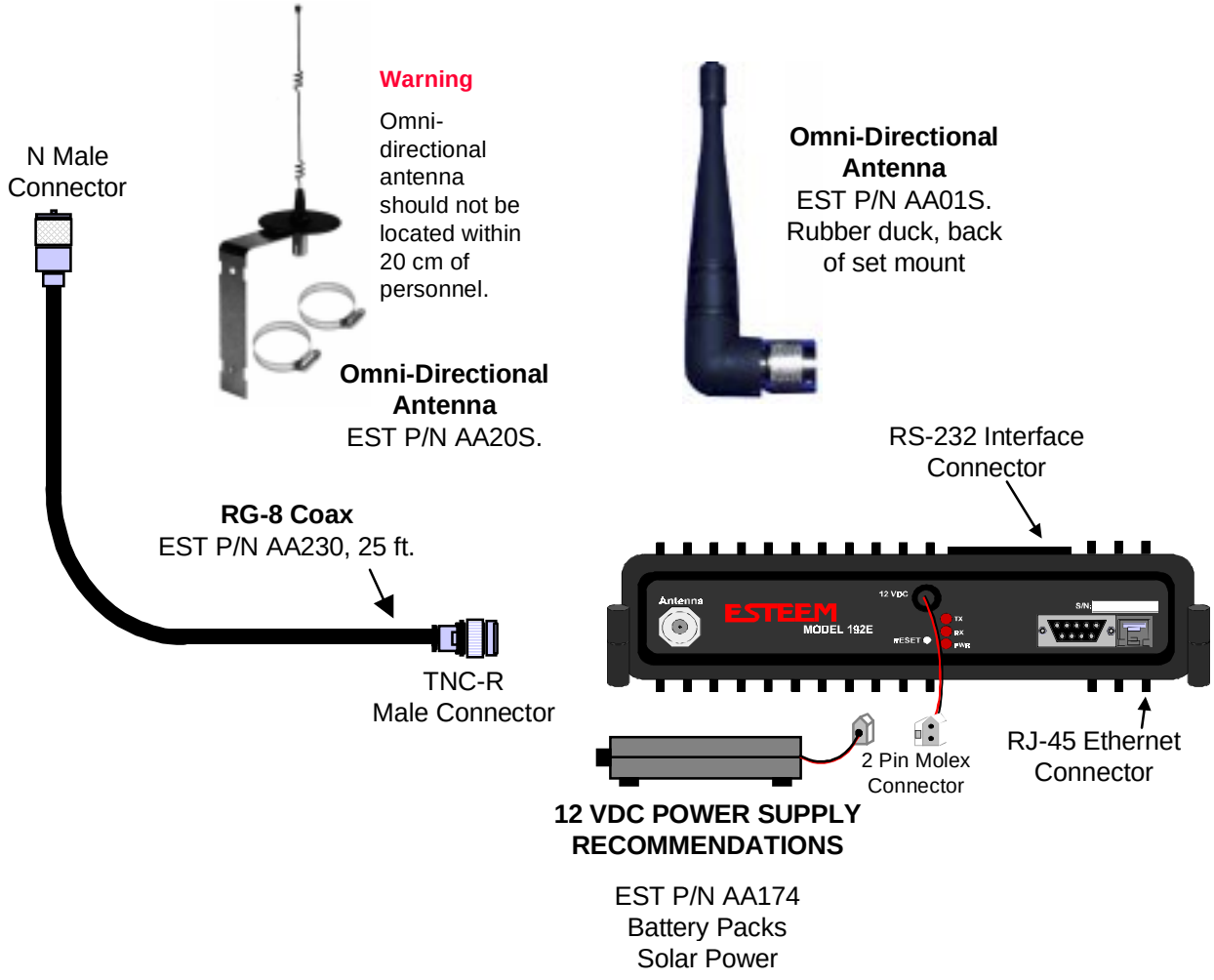
## LIGHTNING ARRESTORS

Lightning arrestors should be used on all external building mount antennas for personal protection and to minimize damage to the transceiver during lightning storms. The units should be installed as per manufacturers instructions provided with the device.

# Model 192E
# Outdoor Fixed Base Site Diagram

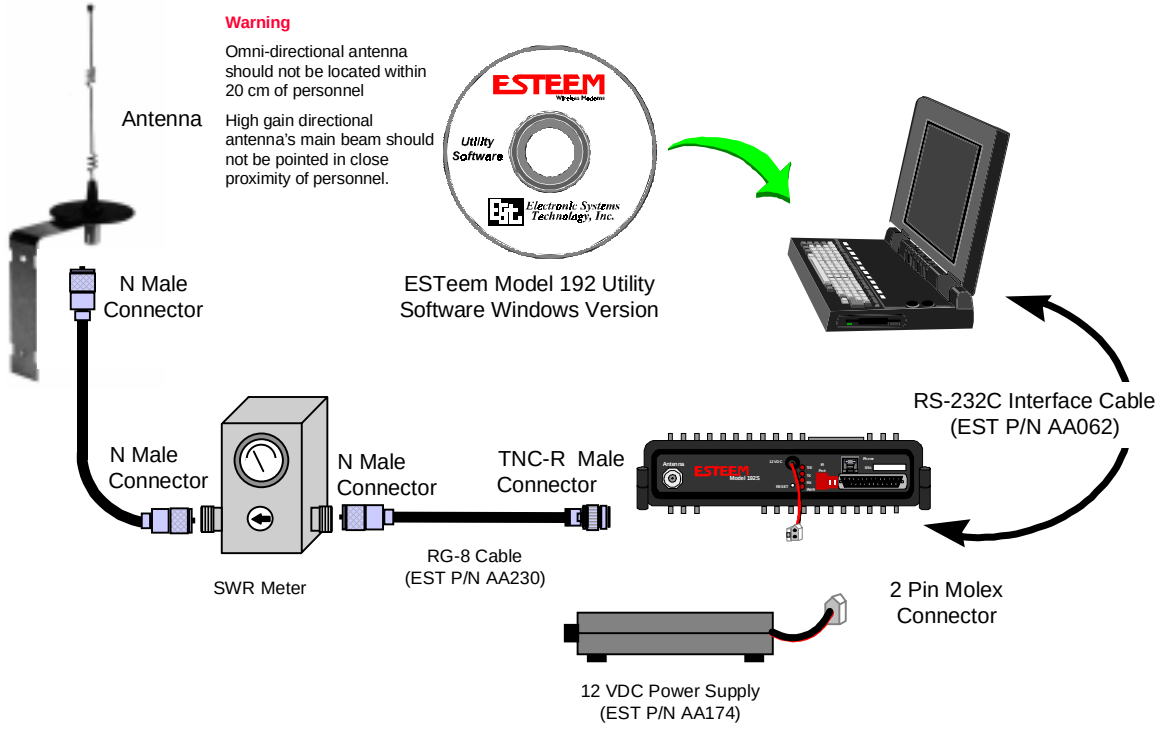


# Model 192E Indoor Equipment Diagram



# CHAPTER 4
# ANTENNAS

## ESTeem SWR Measurement Block Diagram




**Programming the ESTeem Model 192E For SWR Measurements**

1. Configure the hardware as per the above diagram.
2. Install the ESTeem Utility on the PC hard drive as per instructions with the software.
3. From Utility Main Menu (Figure 1) select the Terminal Emulation Mode.
4. In the Terminal Emulation Mode press the Enter key to display the Model 192E configuration menu.
5. Select the Turn Transmitter ON option.
6. When the testing is completed, select Turn Transmitter OFF option on the configuration menu.

Figure 1: ESTeem Utility Main Menu

# APPENDICES

## APPENDIX “A” FCC INFORMATION (USA Only)

## APPENDIX “B” SPECIFICATIONS

### ESTeem Specifications
### Antenna Specifications

# APPENDIX A
# FCC LICENSING

## INFORMATION TO USERS

This equipment complies with FCC Part 15.

## Other Information

**Model 192E**

Direct Sequence
FCC Type Acceptance No: ENPESTEEM192E

# APPENDIX A
# FCC LICENSING

## FEDERAL COMMUNICATIONS COMMISSION FIELD OFFICES

ALASKA
1011 E. Tudor Rd.
Rm 240 Box 2955
Anchorage, AK 99510

CALIFORNIA
7840 El Cajon Blvd
Suite 405
La Mesa, CA 92041

3711 Long Beach Blvd
Suite 501
Long Beach, CA 90807

323A Battery St
San Francisco, CA 94111

COLORADO
Executive Tower
1405 Curtis St
Suite 2925
Denver, CO 80202

FLORIDA
919 Federal Bldg
51 SE First Ave.
Miami, FL 33130

1211 N. Westshore
Suite 601
A.D. P. Building
Tampa, FL 33607

GEORGIA
Massell Bldg. 440
1365 Peachtree NE
Atlanta, GA 30309

HAWAII
7304 Prince Kuhi
Federal Building
Honolulu, HI

HAWAII
300 Almoana Blvd.
P.O. Box 50023
Honolulu, HI

ILLINOIS
3935 Federal Bldg
230 S. Dearborn
Chicago, IL 60604

LOUISIANA
1009 Edw Hebert Bldg.
600 South Street
New Orleans, LA 70130

MARYLAND
1017 Geo. Fallon
Building 31
Hopkins Plaza
Baltimore, MD

MASSACHUSETTS
1600 Customhouse
165 State Street
Boston, MA 02109

MICHIGAN
1054 Federal Building
231 W LaFayette
Detroit, MI 48225

MINNESOTA
691 Federal Building
316 N Robert St.
St. Paul, MN

MISSOURI
Brywood Office Tower
6800 E. 63rd Street
Kansas City, MO

NEW YORK
1307 Federal Building
111 W. Huron
Buffalo, NY 14202

201 Varick Street
New York, NY 10014

OREGON
1782 Federal Building
1220 SW 3rd Avenue
Portland, OR 97204

PENNSYLVANIA
Room 404
2300 E. Lincoln H
Langhorne, PA

PUERTO RICO
747 Federal Building
Carlo Chardon Ave.
Hato Rey, PR 00918

TEXAS
Cabeli Building
1100 Commerce
Dallas, TX 75242

5636 Federal Building
515 Rusk Avenue
Houston, TX 77002

VIRGINIA
Military Circle
870 N. Military Hwy.
Norfolk, VA 23502

WASHINGTON
3256 Federal Building
915 Second Avenue
Seattle, WA 98174

# APPENDIX B
# SPECIFICATIONS

## Model 192E Specifications

### LED INDICATORS

- Power On
- Receiver Carrier Detect
- Transmitter Enable

### I/O – CONNECTORS

- RS-232C - 9 Pin Sub D Female
- RJ-45 10BaseT Connection
- Antenna Output – TNC-R
- Input Power - 2 Pin Molex Female

### DATA INPUT

- RS-232 Asynchronous
- 19,200 baud Fixed Data Rate
- 8 data bits
- No parity
- One Stop Bit

### FREQUENCY OF OPERATION

- 2.4 to 2.462 GHz.
- Frequency selectable in 11 frequency zones

### RF DATA RATE

- 1-11 Mbps RF data rate

### TRANSMITTER

- 1 Watt RF output
- 100% duty cycle
- 50 ohms output impedance
- Protocol activated keying
- 10 µsec typical latency
- Direct sequence spread spectrum

### RECEIVER

- Double conversion superheterodyne
- -93 dBm 8E-2 Frame Error Rate
- 80 dB Image Rejection
- > 35 dBm Adjacent Channel Rejection

### POWER REQUIREMENTS

- 11-16 VDC @ 700 ma Transmit
  300 ma Receive

### SIZE

- 2.45 in. Height
  8.16 in. Width
  9.37 in. Length

### WEIGHT:

- 4.6 lbs.
- Rugged die cast aluminum case

### ENVIRONMENT

- -30° to 50° C
- 95% Non-condensing

### WARRANTY

1 Year

# APPENDIX B
# SPECIFICATIONS

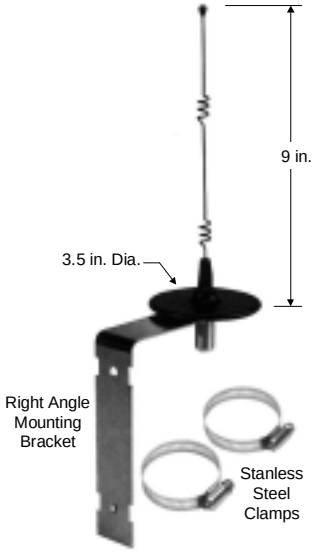
## Model 192S Antennas

| | |
|---|---|
| **Model No:** | AA01S |
| **Antenna Type:** | Omni-Directional, right angle rubber duck, ½ wave |
| **Applications:** | Back of ESTeem Model 192S mount. |
| **Frequency:** | 2400 to 2485 MHz |
| **Polarization:** | Vertical |
| **Impedance:** | 50 ohms |
| **Gain:** | 3 dBd |
| **VSWR:** | < 1.5 |
| **Front To Back Ratio:** | n/a |
| **Horizontal Beamwidth:** | n/a |
| **Vertical Beamwidth:** | n/a |
| **Antenna Material:** | Rubber duct whip. |
| **Mounting Hardware:** | n/a |
| **Antenna Connector**: | TNC-R Male |
| **Antenna Envelope:** | 4 in. length by 1.5 in width |
| **Weight:** | .08 lbs. |

**Model AA01S**

**Warning**
Omni-directional antenna should not be located within 20 cm of personnel

| | |
|---|---|
| **Model No:** | AA20S |
| **Antenna Type:** | Omni Directional, 5/8 Wave over 5/8 Wave over ¼ Wave. |
| **Applications:** | Fixed base or mobile mount. |
| **Frequency:** | 2400 to 2485 MHz |
| **Polarization:** | Vertical |
| **Impedance:** | 50 ohms |
| **Gain:** | 5 dBd |
| **VSWR:** | < 1.5 |
| **Front To Back Ratio:** | n/a |
| **Horizontal Beamwidth:** | n/a |
| **Vertical Beamwidth:** | n/a |
| **Antenna Material:** | Stainless steel whip. All other hardware anodized metal. |
| **Mounting Hardware:** | Stainless steel clamps for mounting to ¾ in. to 1½ in. pipe with right angle mount of direct panel mount.. |
| **Antenna Connector**: | N Female. |
| **Antenna Envelope:** | 9 in. length by 3.5 in. width |
| **Weight:** | .4 lbs. |




**Model AA20S**

# APPENDIX B
# SPECIFICATIONS

## Model 192S Antennas

| | |
|---|---|
| **Model No:** | AA202S |
| **Antenna Type:** | Directional, 15 element yagi in sealed UV stable radome |
| **Applications:** | Fixed base. |
| **Frequency:** | 2400 to 2500 MHz |
| **Polarization:** | Linear |
| **Impedance:** | 50 ohms |
| **Gain:** | 13.9 dBd |
| **VSWR:** | < 1.5 |
| **Front To Back Ratio:** | 18 dB |
| **Horizontal Beamwidth:** | 34 degrees |
| **Vertical Beamwidth:** | 30 degrees |
| **Antenna Material:** | Stainless hardware with one piece copper radiating element. Advanced microwave substrate. All other hardware anodized metal. |
| **Mounting Hardware:** | Stainless steel U bolts for mounting to 1.5 in. to 2.2 in. diameter pipe. |
| **Antenna Connector**: | N Female on UltraLink® Pigtail |
| **Maximum Power Input:** | 50 Watts |
| **Antenna Envelope:** | 26 in. length by 4.0 in. height by 1.5 in. width |
| **Windload (RWV):** | 125 mph |
| **Wind Load ½ in. Ice:** | 100 mph |
| **Wind Surface Area:** | 0.4 $ft^2$ |
| **Weight:** | 1.25 lbs. |

**Warning**
High gain directional antenna's main beam should not be pointed in close proximity of personnel.

**Model AA202S**