ESTEEM

Wireless Modems

ESTEEM USERS MANUAL
for
MODELS 192C/CHP/F/M/MHP

Firmware Versions 1.51 and above
September 2005

Electronic Systems Technology, Inc.

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

Congratulations on your purchase of the ESTeem Wireless Modem! This section of the manual will describe the basic functioning and programming of the ESTeem to get your wireless network up as soon as possible. It is recommended that any first time user of the ESTeem and those that are unfamiliar with its operation complete all steps in this section before proceeding.

Take a few minutes to inventory your equipment before you proceed. Report any missing or damaged items to Customer Support as soon as possible. We at Electronic Systems Technology, Inc. (EST) are constantly trying to improve our products and support system so if you have any comments or suggestions on improvement of this manual, please contact us at (509) 735-9092.

Figure 1: Installation Diagram

The completion of this section requires loading the ESTeem Utility program on your computer. The following section will describe the installation and use of this valuable utility program.

ESTEEM UTILITY

The ESTeem Utility is designed to assist the ESTeem user in programming and troubleshooting. The Utility covers basic operation, programming, PLC applications, and diagnostics of the ESTeem. The ESTeem Utility Program is designed to operate with Windows ®.

Installing ESTeem Utility Software From ESTeem Resourse Disk (AA109)

The ESTeem Resource Disk is stand-alone copy of the ESTeem Web site (Figure 2). Navigation of the Resource Disk is as simple as using your web browser. All technical documentation, User's Manuals and the ESTeem Utility Program is available on the disk.

1. Place the ESTeem Utility CD in your CD-ROM drive. The CD will auto load the ESTeem main page (Figure 1).
2. If the page does not auto load, open your web browser and set your address line to D:\1_default.html (Where D: is the drive letter for your CD-ROM drive).
3. From navigation menu on the left side of the page, select ESTeem Utilities (Figure 1).
4. Select the Windows version of the ESTeem Utility and click Download Windows Utility for Model 192 Series. When asked to Open or Save the file, press Open to view the contents of the Zip file.
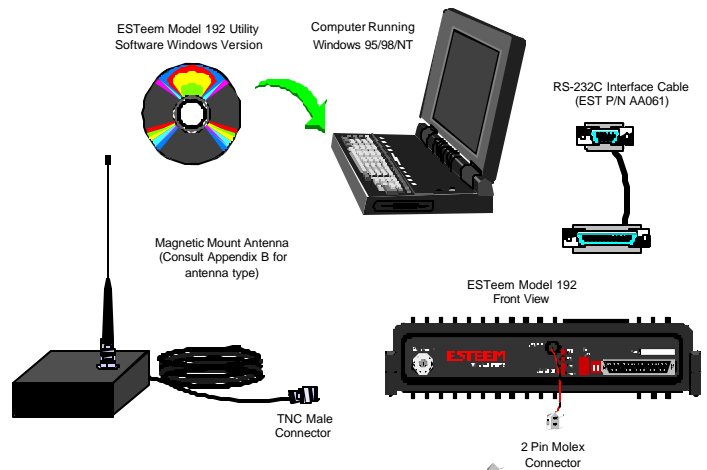

Figure 2: ESTeem Utility Setup Menu

Figure 3: ESTeem Utility Main Menu

5. Double Click on the Setup.exe file to start the Utility Installation or extract the files to a directory for later installation.

Running the Program

1. Select the ESTeem Utility Icon on Start>Programs menu. Figure 3 shows an example of the Main Utility Menu.

STARTING OUT

This section covers the basics setup and testing for the ESTeem wireless modem. If this is your first experience with the ESTeem wireless modems or you are unclear on how to set the frequency, squelch, or test communication, the ESTeem Starting Out section will guide you through the basics of wireless communication.

1. Select ESTeem Starting Out from the main menu. A window like the one in Figure 4 will be displayed. If this is your first time using the ESTeem wireless modems, select ESTeem Setup Guide for a complete description of all ESTeem functions. Proceed to step 2.
2. Step 1 – Installing External Power window will be displayed (Figure 5). Select either Find ESTeem or the model number of ESTeem you are programming. The power requirements for that product will be displayed. The ESTeem model AA174 power supply can be used with all ESTeem products. If you are using the ESTeem in a solar power application, press Calculate Solar Consumption button for the Amp/Hours required. Press Go to Step 2 to continue.
3. Step 2 – ESTeem Familiarization window will be displayed (Figure 6). This step will explain the connections to ESTeem Model 192 front panel. See Figure 1 for a setup diagram.
4. Press the Front Panel Description button and a window containing the ESTeem Model 192 front panel will appear (Figure 7). Press any one of the buttons for a complete description of the item's function. For example, press the Power LED button and the description of the power LED and its use will be displayed. Press Go To Step 3 button to proceed.

5. Step 3 – Serial Connection window will be displayed (Figure 8). This step will help configure the computer and the ESTeem to communicate with each other.
6. Press Display Cable Diagrams button and all serial pins to the ESTeem Model 192 will be displayed. Press OK to continue.

Note: *A standard 9-Pin serial port on a computer to ESTeem interface cable is the ESTeem AA061 (Figure 1).*

7. Press Change Port Settings. This window will configure the communications port on your computer to operate with the ESTeem modem. Select the operating parameters you wish or set to the default of 19,200,N,8,1. Click OK to continue.
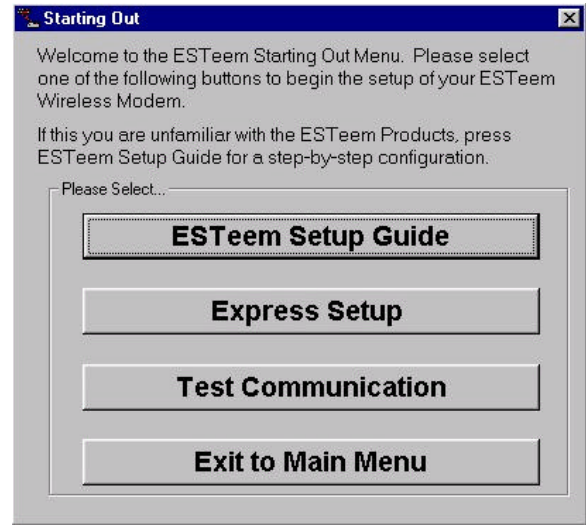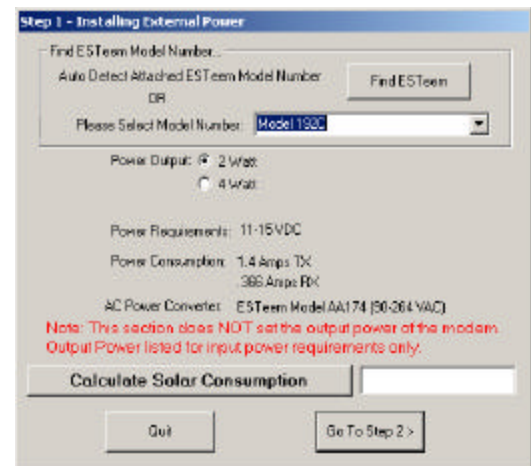

Figure 4: Starting Out Main Menu

Figure 5: Step 1 - Installing External Power
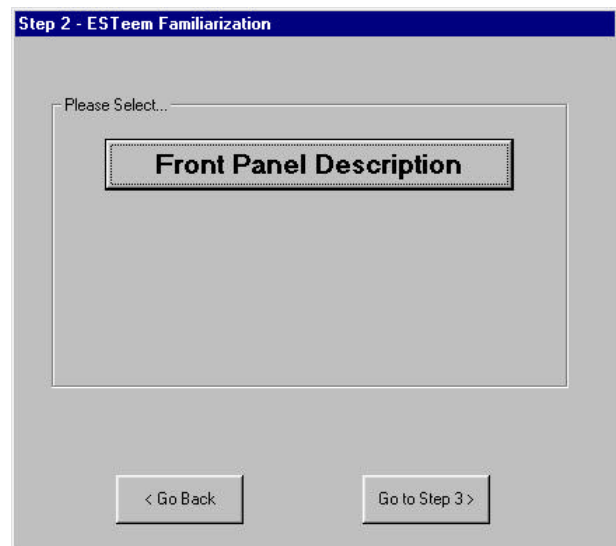
Figure 6: Step 2 – ESTeem Familiarization

8. Press <u>Set Serial Switches</u> button. This window will configure the ESTeem's RS-232/422/485 to operate at the setting selected in step 7 to match the computer port setting. Follow the on-line guide to configure the data rate.

9. Press <u>Test ESTeem</u> button. If the ESTeem serial interface cable and communication port are operating correctly the ESTeem Welcome Message will be displayed. This will confirm communication between the computer and the ESTeem. If you do not receive a welcome message, follow the on-screen troubleshooting guide that will be displayed. Press <u>Go to Step 4</u> button to proceed.

10. Step 4 – ESTeem Setup Parameters window will be displayed (Figure 9). This step will complete the setup for your ESTeem Model 192.

11. Press <u>Set Frequency</u> button. Select the operating frequency for your ESTeem Model 192 and press <u>Set Frequency</u> to continue. Set all ESTeems to the same frequency for operation within this section.

12. Press <u>Set Squelch/Antenna</u> button. This section will give you instructions on antenna placement and installation. Press the <u>Set Squelch</u> button and follow the on-line guide to configure the ESTeem squelch. Press <u>OK</u> to continue.

13. Press <u>Set Address</u> button. You must give each ESTeem a unique address in the system. Type in the address number and press <u>OK</u> to continue.7

14. Press <u>Complete Setup</u>. You have just configured all operating parameters within the ESTeem. If this is your first ESTeem you have programmed for testing, press the <u>Express Setup</u> button on the Staring Out Menu (Figure 4) to program subsequent ESTeem Modems. The Express Setup will allow you to quickly configure the remaining ESTeem modems without additional instruction. If you have at least two ESTeems programmed and wish to test communication, proceed to step 17.

15. Press <u>Test Communication</u> button. This section will allow you to test the radio frequency (RF) communications between two or more ESTeems. Two types of tests are listed in this window (Figure 10). If you have a computer attached to both ESTeems proceed to step 18 and if you only have one computer to test both ESTeems proceed to step 19.

16. The first test will be used if you have a computer attached to both ESTeems. Select the first of two items and press ENTER. Follow the instructions on the screen to establish a communication link between modems.

17. This second test will allow you to use the remote ESTeem as a digi-repeater for your local modem. This procedure is explained in the window and can test communication with only one computer.

18. You now have completed the basic programming and setup of your ESTeem modems. You have tested their operation with
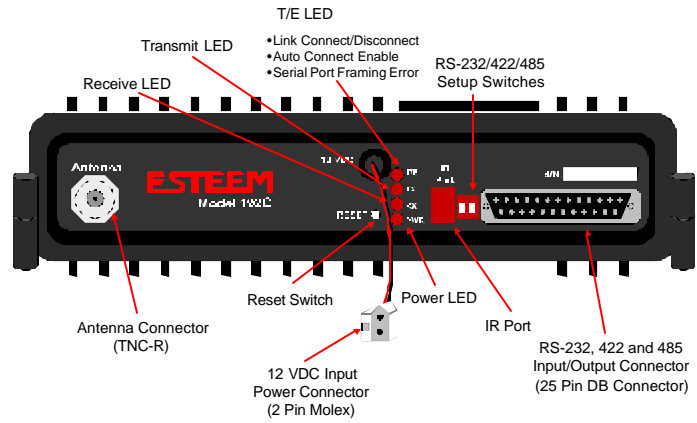
Figure 7: ESTeem Front Panel
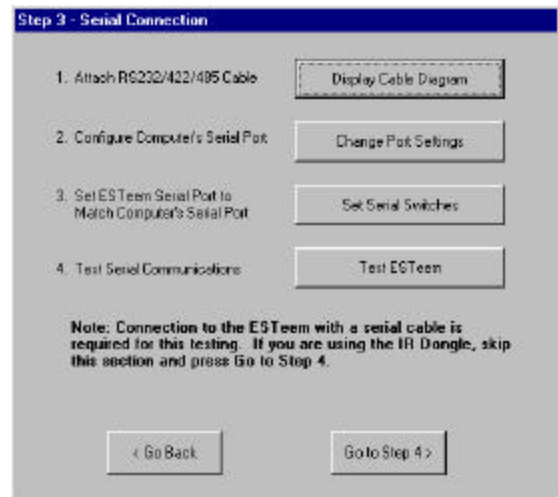
Figure 8: Step 3 – Serial Connection
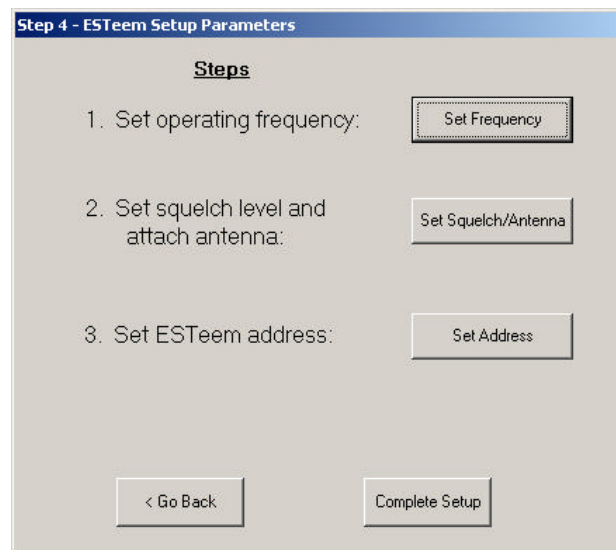
Figure 9: Step 4 – ESTeem Setup Parameters

each other and are now ready to proceed in programming them for your application. Press Exit to Main Menu and continue with the programming of the ESTeem for your application.

BASIC ESTEEM PROGRAMMING

Most of the ESTeem commands outlined in this section have been automatically input to the modem by the ESTeem Utility program. A few of the commands used most often in troubleshooting and programming are covered here. These commands can be programmed to the modem directly by the Terminal Emulation section of the utility or by any other terminal software package.

HELP Functions

Figure 10: Test Radio Communication

The ESTeem has over eighty software commands to aid the user in their application. The HELP command allow the user to list the various software commands and their respective values.

From the COMMAND mode, type HELP<cr>. Your display should list the following:

Help switches are:

ALL   (Lists all settings).
CHANGE   (List settings changed from factory default).
CONTROL (List settings dealing with control).
PLC   (List settings for PLCs).
RADIO   (List settings for ESTeem radio).
RS232   (List settings for RS-232/422/485)
SETUP   (List settings for control).
SYSTEM   (List settings for system).

These are the different software categories.

Example: HELP SETUP<cr>, will list all the programmable variables and their settings for the SETUP category.

You can interrogate a discrete software command by just typing the command followed by a <cr>.

Example: ADD<cr>, will list the current address saved in the connected ESTeem.

Note   *Appendix E of this manual will have the complete listing of software commands and categories for the factory default of the ESTeem.*

Saving A Program

A program is saved by typing in the SAVE command at the CMD: prompt. The programming variables that have been changed will be written to the non-volatile memory. The programming parameters will be loaded each time the modem is powered up or reset.

Restoring Factory Defaults

The ESTeem has a very simple procedure to restore the program variables in the unit to the factory default setting. When the FA<Enter> command is entered from the command mode the ESTeem will be configured from a variable table located in its EPROM. It is a good practice to restore the ESTeem to a factory defaults before any programming of the unit.

To ensure the modem is in the COMMAND MODE set it back to the factory default by performing the following:

1. Set both switches (#1&2) on the RS-232 setup switches to the OFF position.

2. Reset the ESTeem.

3. Verify the computer's Comm port is configured for 19,200,N,8,1.

4. Type FA<Enter> and the ESTeem welcome message should be displayed. The characters may not be echoed on the screen.

5. Type SA<Enter> to save the factory default table.

The ESTeem has three major modes of operation, Command, Converse, and Transparent. This chapter of the manual describes each one of these modes.

COMMAND MODE

The COMMAND Mode (CMD: prompt) is the default mode that the ESTeem initially enters on power-up or after a hardware or software reset. From this mode the user can command or program the ESTeem. In this mode the user may access the various program commands to configure the ESTeem for the specific application. These values can be stored in nonvolatile memory within the ESTeem by the use of the SAVE command. The ESTeem reads these setup parameters stored in memory on power-up or RESET.

When programming in the COMMAND Mode, the user need only enter enough characters to uniquely identify the respective command.

> Example: CMD:ADD 15 <Enter>

This enters the source address of the ESTeem to the decimal value of 15. The first three letters ADD were enough for the ESTeem to uniquely identify the command for ADDress. The number of characters that need to be typed varies depending upon the command being entered. In some cases, four or even more letters may have to be entered in order for the identification to be uniquely determined. Up to ten multiple commands can be written on the same line if separated by a colon.

Example: CMD:ADD 15:SETC 2:SAVE <Enter>

CONVERSE MODE

This mode allows bi-directional communication from the input/output device attached to the ESTeem to a destination ESTeem and its respective input/output device. The ESTeem will automatically switch to the CONVERSE Mode after the initial CONNECT has been made.

When the ESTeem is in the CONVERSE Mode the * prompt will be displayed. The ESTeem will remain in the CONVERSE Mode until the radio link has been broken or by typing a control character defined by the user with the COMMAND variable.

The factory default for the COMMAND variable is CTRL C. You can return to the CONVERSE Mode from the COMMAND Mode by typing CONV <Enter>.

When you are in the CONVERSE Mode the echoing of the character comes from the ESTeem if ECHO = ON (factory default) has been programmed in the ESTeem.

Transmitting Data

The ESTeem will transmit data from the CONVERSE Mode if one or more of the following conditions have been met.

1. The ESTeem transmit buffer has been filled. The size of the transmit buffer is defined in the ESTeem by the PACKLEN variable. This variable is programmable from 1 to 2000 bytes. Factory default is 2000.

2. The ESTeem receives a SENDPAC (send packet) character from the RS-232C input data stream. The SENDPAC variable can be defined from 0 to 255 by the user. Factory default is 13 (carriage return). The SENDPAC character is also transmitted by the ESTeem. In file dump applications the SENDPAC character can be programmed to be the EOF (end of file) character transmitted from the sending device (i.e.; CTRL Z, CTRL G, etc.).

3. Termination control timer. The termination control timer is enabled by the TERMC (on/off) command. When enabled, the termination timer starts from the time the last transmit buffer has been updated in the RS-232C port. If the termination timer expires before another character is received or transmitted, the contents of the ESTeem transmit buffer will be transmitted. The waiting time of the timer is defined by the TERMT variable (termination time). The programming range of the TERMT variable is 10-65,535ms. Factory default values are TERMC = OFF and TERMT = 50. It is noted that when the termination timer is used, the SENDPAC variable is usually programmed to be a character that is non occurring in your data stream (i.e.; SENDPAC = 255) so that premature transmission does not occur.

TRANSPARENT MODE

The TRANSPARENT Mode allows the ESTeem to pass all data characters (O-255 or 0-FF hex) using 8 data bits.

To program the ESTeem in the TRANSPARENT mode the TRANSPARent command must be enabled and switch Bit 2 to ON (RS-232C Setup Switch). The TRANSPARent command will defeat the SENDPAC and COMMAND variables and put the ESTeem in the transparent mode when Bit 2 is ON.

The transmission of the data packets can only be accomplished by enabling the termination control commands (TERMC and TERMT) or the PACKLEN buffer being filled. The value of TERMT should be slightly longer than the maximum delay encountered during RS-232C transmission. If this time is set to short, the ESTeem will truncate your data stream improperly.

When using the TRANSPARENT Mode, data flow control is by hardware handshaking only. Hardware handshaking is initiated by enabling hardware flow control (XHF = ON).

The SETCON (Set Connect command) must be used to define the node that you want to communicate with while in the TRANSPARENT Mode. When the TRANSPARENT Mode is enabled you can not communicate to the ESTeem in the COMMAND Mode unless you use the Hardware Mode Control line (see explanation this chapter).

To remove the ESTeem from the TRANSPARENT Mode the user must perform the following:

1. Switch Bit 2, Off on the RS-232C Setup Switch.

2. Reset the ESTeem from the front panel switch.

3. Type TRANS OFF <Enter>.

SEMI-TRANSPARENT MODE

This mode should be utilized when sending a non-ASCII file and there is a possibility that the SENDPAC character could be contained in the transmitted data set. Perform the following prior to programming the ESTeem to initialize the unit to factory default settings:

1. Turn Bit 2, OFF on the RS-232C Setup Switch.

2. Reset the ESTeem.

3. TYPE FA <Enter>. Please note the characters may or may not be echoed by the CRT.

```
      ESTeem

------------------------
ADD        xxx        xxx = your address
SETC       yyy        yyy = destination address
TERMC      ON
TERMT      10
SENDP      255
EDIT       OFF
XSF        ON
SAVE
```

If EDIT is off, and SENDPAC = 255, the SENDPAC character is disabled. This character when received will not cause packet transmission and will be passed as normal data. The TERMC and TERMT commands are used to transmit the contents of the ESTeem transmit buffer.

Software flow control in this example is enabled (factory default XSF = OFF) therefore the ESTeem will pass all characters except the data flow control characters for Xon/Xoff.

HARDWARE MODE CONTROL

The MODECON (Mode Control) command is provided in the ESTeem to change the mode of the ESTeem modem from COMMAND Mode to CONVERSE (or TRANSPARENT Mode) via a hardware control line. The hardware line is located on pin 19 of the RS-232C connector. If MODEC = ON, a "low or 0" on pin 19 (-3 to -15 vdc) will put the ESTeem in the COMMAND Mode and a "high or one" on pin 19 (+3 to +15 vdc) will put the ESTeem in the CONVERSE or TRANSPARENT Mode. The factory default is OFF.

Listed in this chapter are the major ESTeem features and programming examples on how to use them. These features are individual building blocks to solve your application needs. Remember your particular application may require one or more of these features enabled.

DIGI-REPEATING

The Repeater feature allows an ESTeem to relay its respective transmission or packet through a maximum of three ESTeems to increase the operating range of the unit. Any ESTeem in your radio network can function as a repeater for any other ESTeem. This is independent of the fact that the ESTeem being used as a repeater is linked or connected to another node, therefore an ESTeem can function as a repeater, operational node, or both at the same time. The data that is digi-repeated through ESTeem will not output through the repeating ESTeem's RS-232C port.

To specify one or more ESTeems as repeaters, the CONNECT command has been expanded to except up to three added addresses as follows:

CONN r1,r2,r3,da

r1   =   Address (1 to 254) of first ESTeem repeater.
r2   =   Address (1 to 254) of second ESTeem repeater.
r3   =   Address (1 to 254) of third ESTeem repeater.
Da   =   Address (1 to 255) of destination ESTeem.

Note: *Address 255 is used for Global.*

When transmitting packets through other ESTeems, the source ESTeem will automatically adjust it's FRACK time to allow additional time for the packet to reach its destination and for the returned acknowledgment. Frack time takes into account the packet size and the number of repeaters specified. The ACK still comes from the destination ESTeem, not the first or any repeater.

For testing purposes, you can loop back a connection to yourself by placing your source address in the destination address of the repeater string. Any data transmitted will repeat through the repeater address and display back on the screen.

Example:

CONN r1,Sa

r1   =   Address (1 to 254) of first ESTeem repeater.
Sa   =   Address of local ESTeem.

Any ESTeem command in this manual that uses an address string can be configured to use the Digi-repeating feature.

Example:

SETC r1,r2,r3,da

GLOBAL BROADCAST

Global broadcast is the ability of one ESTeem to transmit it's message to more than one ESTeem at one time. All ESTeems within radio range will receive the message whether or not they are connected to another ESTeem or in command or converse mode. You can put your ESTeem in Global by connecting or programming the SETC to address 255. Address 255 is a non-assignable unit address and is used by the ESTeem CPU to access this special mode. When the ESTeem is in Global, the standard ACK protocol from the receiving ESTeem is disabled, but the 32 bit CRC error checking on the received ESTeem is still operational. When you perform CONN 255 <Enter> from the COMMAND MODE the ESTeem will immediately go to the CONVERSE MODE (* is displayed). All messages sent will be transmitted globally to all ESTeems in radio range.

In the ESTeem you have a GLOBAL (on/off) command. When GLOBAL = On, you can receive Global transmissions. If GLOBAL = Off you will not display Global transmissions from other ESTeems.

Note: *Factory default is ON.*

By using the repeater function you can transmit Global messages from another ESTeem using the Digi-repeating feature.

Example:

CONN 10,20,30,255<Enter>
SETC 10,20,30,255<Enter>
By adjusting these commands you can route from unit 10 to 20, 20 to 30, and go Global at unit 30.

You can enable global transmissions in one or more ESTeem's in your network. This will allow global communications between all ESTeems within radio range.

AUTO TRANSMIT

The Auto Transmit feature of the ESTeem allows the user to transmit a data packet without filling up the PACKLEN (packet length) buffer or defining a special control character using the SENDPAC (send packet) variable. The Auto Transmit feature is a timer that is enabled in the ESTeem that monitors traffic in and out of the RS-232C port. If there are characters in the RS-232C buffer, the termination control timer starts from the time the last receive or transmitted character is updated in the buffer. If the termination time expires before another character is received or transmitted, the received characters are transmitted.

To enable this feature perform the following from the COMMAND MODE:

TERMC (on/off) =   On. Enable termination control.

TERMT (10-65535) =   One unit number equals 1ms.

TERMC is the termination control command. TERMT is the termination time command. Factory default for TERMC = Off and TERMT = 50.

AUTO CONNECT

The Auto Connect feature allows the user to program the ESTeem to perform a CONNECT to another ESTeem when data is sent to the RS-232C communications port.

To enable this feature perform the following from the COMMAND MODE:

SETCON (1-255) =   Address of destination ESTeem.

Remember, you can use the Repeater routing (r1,r2,r3,da) or put the ESTeem in Global (address 255). SETCON is the set connect command.

SA   SAVE command. This will save the SETC variable to the non-volatile memory so that it will not be lost when the ESTeem is RESET.

Bit 2 (on/off) =   On. Bit 2 is located on the RS-232C SETUP SWITCH on the front of the ESTeem. The ESTeem must be RESET after the Bit has been changed to be read by the ESTeem CPU.

RESET ESTeem   RESET is located on the front panel OFF/ON switch. The T/E light on the front panel of the ESTeem should now flash at a two times per second rate.

MULTI-CONNECT

The actual polling of the ESTeem must originate from the host device connected to the ESTeem using the CONNECT command to originate the initial connect and the COMMAND character to return from the CONVERSE mode to the COMMAND mode. The first time around the pole a CONNECT data packet (RF transmission) will be initiated. When a link is established, it is held internally in the ESTeem connect table. The next time around the pole to the same address, the link status will be checked in the ESTeem table. If the address indicates a link has already been established, then only data and its corresponding ACK will be transmitted to that node. This greatly increases polling time by eliminating the usual CONNECT/DISCONNECT sequence each time except when communication is first established.

The MULTID command allows the user to send data to a specific ESTeem address from the CONVERSE Mode by specifying the ESTeem address routing before the data packet. This feature will also display the address of the sending ESTeem on any received data.

Example Of Transmitted Data:

[001]DATA   Routes data to an ESTeem addressed 1.

[100,200,250,1]DATA Routes data to an ESTeem addressed 1 via ESTeems addressed 100, 200, and 250.

The above example replaces the CONNECT command from the COMMAND Mode.
Received data packets will have the address of the ESTeem that sent the data at the beginning of the data packet.

Example Of Received Data:

[004]RECEIVED DATA   Data received from ESTeem addressed 4.

[030,100,244,004] Data received from ESTeem addressed 4 via ESTeems addressed 30, 100, and 244.

MULTID (on/off) = On   Enables this feature. Factory default = OFF.

REMOTE PROGRAMMING

The Remote Programming feature allows the user to remotely program ESTeems in his network. When a connection has been made with the remote ESTeem the RPG: prompt will be displayed showing that you are now in the COMMAND mode of that remote ESTeem.

To enable this feature perform the following from the COMMAND MODE:

PROG (1-254)   Address of destination ESTeem.

Note: *You can also use the Repeater routing (r1,r2,r3,da) to reach the destination ESTeem. (r1 = address of first repeater, r2 = address of second repeater, etc. da = destination address).*

To end a remote programming session, hold Control and type C (^C) and you will return to the COMMAND prompt of your ESTeem. There is a Watch Dog Timer that will automatically disconnect you from remote programming if there is no activity for thirty seconds.

The REMPROG (on/off) feature is used to defeat the ability of your ESTeem from being remotely programmed. If REMPROG = OFF another ESTeem cannot remotely program your unit. Factory default = ON.

SECURITY

The Security feature allows the user to lock out programming of the ESTeem. REMEMBER TO STORE YOUR CODE NUMBER IN A SAFE PLACE.
To enable this feature perform the following from the COMMAND MODE:

SECURITY (1 to 100,000)   Entering a security number enables the security feature.

SAVE   To enter the security code permanently into the ESTeem memory.

Note*:   When enabled, the ESTeem will output a "Security On" message.*

To disable the security feature perform the following from the COMMAND mode.

SECURITY (1 to 100,000)   Entering your security number disables the security feature.

SAVE   To remove the security code permanently from the ESTeem memory.

Note: *When disabled, the ESTeem will output a "Security Off" message.*

HARDWARE RING LINE (Factory Option)

When the ESTeem establishes a CONNECT or link with another ESTeem (T/E Light on solid), pin 22 at the ESTeem RS-232C will change from a -15 vdc voltage state to a +15 vdc voltage state. The RING software command allows the user to change the output from a latched state to a pulsed state. To change the state of this line program the following from the COMMAND mode. Factory default = LATCH.

RING = Latch. Pin 22 is high when the ESTeem T/E light is on solid.

RING = Pulse. Pin 22 is pulsed (positive 250 ms.) when the ESTeem T/E light is on solid.

PACKET MONITOR

The PACKM [ON/OFF] command places the ESTeem in a special packet monitor mode. When this feature is enabled the ESTeem is placed in a receive only mode and will not function as a normal ESTeem. The ESTeem will monitor and report the status of all message traffic within the network in the following format, the actual packet message will not be outputted.

SA-xxx, DA-xxx, Type Code, R1-Repeater Status, R2-Repeater Status, R3-Repeater Status, Data Bytes Sent

xxx = ESTeem Address
DA = Destination ESTeem
SA = Source ESTeem
R1 = Address of first ESTeem repeater.
R2 = Address of second ESTeem repeater.
R3 = Address of third ESTeem repeater.

Type Codes

I = Information
DISC = Disconnected
RR = Receive Ready
UA = Unnumbered Acknowledge
RNR = Receive Not Ready
FRMR = Frame Reject
REJ = Reject
DM = Disconnected Mode
UI = Unnumbered Information
SABM = Set Async. Balance Mode

Repeater Status

P = Pending
D = Done

USING THE INFRARED COMMUNICATIONS PORT

The infrared (IR) communications port will allow you to program and interrogate the ESTeem without disconnecting the serial cable from the back of the modem. The IR port is located on the front panel of the ESTeem, above the T/E light.

To communicate from a computer to the ESTeem through the IR port you will need a copy of the ESTeem Utilities (Version 4.0 or higher) and an ESTeem IR Communication Dongle (ESTeem P/N AA300).

Connect the dongle directly to the serial port of the computer. The dongle requires initialization from the ESTeem Utilities. From the Terminal Emulation screen press the F3 function key to initialize the dongle. If the modem is not in the COMMAND mode, press CTRL-C to display the CMD: prompt.

3 ft. Range

IR Communications Dongal
(EST p/n AA300)
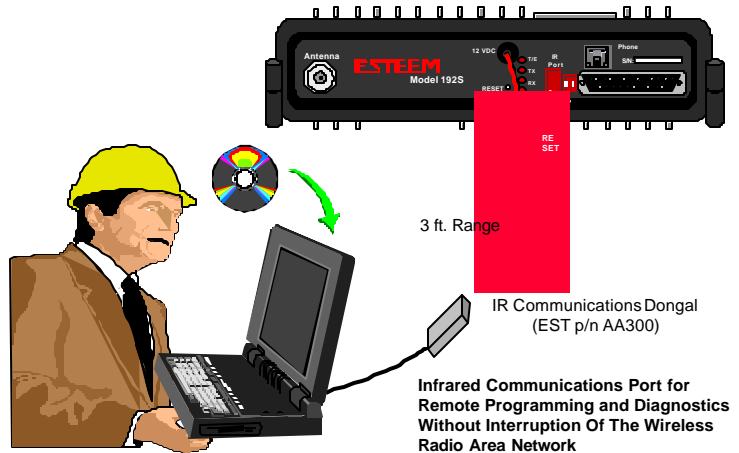
Infrared Communications Port for Remote Programming and Diagnostics Without Interruption Of The Wireless Radio Area Network

Figure 1: Using The IR Port

Note: *With Switch 2 (RS-232 Setup) in the On position the ESTeem defaults the IR port to the command mode.*

The IR dongle has a range of approximately three feet, directly in front of the port. The dongle is powered by the serial port and requires no additional power sources.

Note: *Only one of the three communications ports (RS-232/422/485 connector, IR port or Remote Programming) can be in the Command mode at a time. When either the IR or the Phone port switch to converse mode, the RS-232/422/485 port is blocked from receiving any data.*

UPDATING FLASH MEMORY

The ESTeem Model 192 stores its operating system in flash memory that can be updated without returning the modem the to the factory. To upload the latest operating file, please contact Customer Support at 509-735-9092 or e-mail support@esteem.com to request the latest flash memory update file for your product.

Once you receive the flash file from Customer Support, conduct the following steps to update the memory:

1. Open the ESTeem Utilities and select <u>Terminal Emulation</u>.
2. Verify that both switches (Bits 1 and 2) are in the down (OFF) position and reset the modem.
3. Select *Terminal Setup>Port* from the menu items and configure the computer serial port for 19,200,N,8,1.

Note: *The flash update can not be loaded through the Infrared Dongle or remote programming. You must connect directly to the ESTeem serial port.*

4. Set the modem to factory defaults by entering FA <Enter> at the command prompt (CMD:).
5. Select *ESTeem Setup>Update Flash Memory* from the menu and the Utility will read information about the connected modem and ask for the location of the flash file (Figure 2). Browse to the location of the flash update file on the computer and select <u>Open</u>.
6. Once the upload has been completed, re-program the modem for operation.
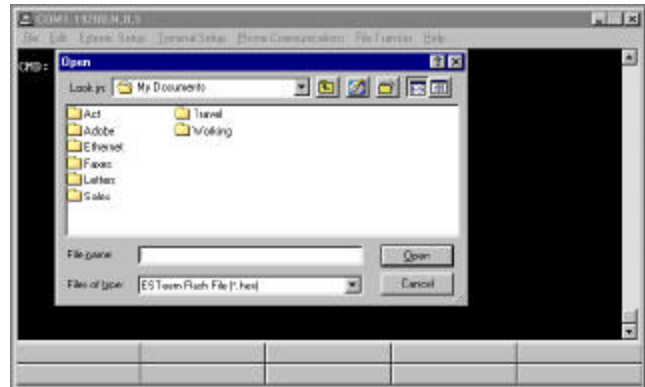
Figure 2: Updating Flash Memory

Listed below are different application programs to aid the user in programming the ESTeem.

TRANSPARENT AUTO-CONNECT

This mode is used for a dedicated point to point application. The ESTeem will initiate the radio link when data is received by the RS-232/422/485 port.

Perform the following prior to programming the ESTeem(s) to initialize the unit to factory default settings:

1.   Turn Bit 2 OFF on the RS-232C Setup Switch.
2.   Reset the ESTeem.
3.   TYPE FA <Enter>. Please note the characters may not be echoed by the CRT.


```
 ESTeem A                      ESTeem B
-----------------------------   -------------------------------
ADD        xxx          ADD        yyy
SETC       yyy          SETC       xxx
TERMC      ON           TERMC      ON
TERMT      10           TERMT      10
XHF        ON *         XHF        ON *
DISACK     ON *         DISACK     ON *
TRANS  ON              TRANS  ON
SAVE                   SAVE
Bit 2  ON              Bit 2  ON (RS-232 Switch)
Reset ESTeem           Reset ESTeem
```

Notes:
- *Turn DISACK ON only if you want to defeat the acknowledge packet.*
- *xxx and yyy represent an ESTeem address which is user definable from 1 to 254.*

TRANSPARENT AUTO-CONNECT GLOBAL

This mode is usually used for a point to multi-point applications when a customers devices include their own addressing protocol to communicate between devices. The ESTeem packet addressing and acknowledge protocol is defeated. All ESTeems will receive the data transmission. The 32 bit CRC error checking on received data is still enabled. This program is used in all ESTeems, the only difference is the unit addresses.

Perform the following prior to programming the ESTeem(s) to initialize the unit to factory default settings:

1. Turn Bit 2 OFF on the RS-232C Setup Switch
2. Reset the ESTeem.
3. TYPE FA <Enter>. Please note the characters may not be echoed by the crt.

ESTeem A

```
---------------------------------------------------
ADD          xxx   (xxx = ESTeem address)
SETCON       255
TERMC        ON
TERMT        10
XHF          ON *
TRANS  ON
SAVE
Bit 2        ON (RS-232 Switch)
Reset ESTeem
```

Note*:   Only hardware flow control can be used in this mode.*

INTERACTIVE TERMINAL APPLICATION

This program is used to connect a mainframe to a remote terminal. This setup is a typical point to point configuration with the AUTO-CONNECT feature enabled.

Perform the following prior to programming the ESTeem(s) to initialize the unit to factory default settings:

1. Turn Bit 2 OFF on the RS-232C Setup Switch.
2. Reset the ESTeem.
3. TYPE FA <Enter>. Please note the characters my not be echoed by the crt.

ESTeem At Mainframe		ESTeem At Terminal	
-------------------------		------------------------	
ADD	xxx	ADD	yyy
SETC	yyy	SETC	xxx
TERMC	ON	TERMC	ON
TERMT	10	TERMT	10
XSF	OFF	XSF	OFF
XHF	ON *	XHF	ON *
DISACK	ON *	DISACK	ON *
TRANS ON		TRANS ON	
SAVE		SAVE	
Bit 2 ON		Bit 2 ON (RS-232 Switch)	
RESET ESTeem		RESET ESTeem	

Notes:
- *Turn DISACK ON only if you want to defeat the acknowledge packet.*
- *Only hardware flow control can be used in this mode.*
- *xxx and yyy represent an ESTeem address which is user definable from 1 to 254.*

PROGRAMMABLE LOGIC CONTROLLERS

EST has available complete Engineering Reports for each PLC manufacturer make which will be provided at no charge by calling EST Customer Support on 509-735-9092. All Engineering Reports are also available on the ESTeem Utility Resource Disk (EST P/N AA109) in Adobe™ PDF format.

DTE vs. DCE

The ESTeem is configured as a Data Communication Equipment (DCE) device. The following signals are available at the RS-232C connector located at the rear of the unit.

	Pin		Description
	1	FG	Shield Ground
	2	TXD	Transmit Data (Input)
	3	RXD	Receive Data (Output)
DCE	4	RTS	Request To Send (Input)
	5	CTS	Clear to Send (Output)
	7	SG	Signal Ground
	8	DCD	Data Carrier Detect (Output)
	12	RTS	Request To Send (Output)
	20	DTR	Data Terminal Ready (Input)
	22	Ring	Ring Indicator (Output)

The important thing to remember is that for the ESTeem to communicate with an external device, the data output from pin 3 of the ESTeem RS-232C connector must be connected to the data input of the device you are connected to; otherwise, the ESTeem won't work. Likewise, the data input to pin 2 of the ESTeem must be connected to the data output of the device you are connected to. Normally, if the equipment you are connecting to looks like a terminal or computer (DTE), its input, Receive Data (RXD), will be on pin 3 its output, Transmit Data (TXD), will be on pin 2. Therefore, the ESTeem can be connected directly.

If the device you are connecting to is configured as a modem (DCE), its output will be on pin 3. If this configuration is connected to the ESTeem, damage may result to the ESTeem or the connecting device. In this case, you can purchase a null connector that internally reverses pins 2 and 3.

Whatever your situation may be, it is always best to check the manual on your particular device and connect accordingly.

Purchase or fabricate a RS-232C shielded cable for your ESTeem. The ESTeem requires a standard male 25 pin D connector on one end of the cable for proper connection.

Remember to install the small retaining screws on either side of the cable connector. Tightening these screws keeps you from accidentally losing connection with your ESTeem.

Notes:
- *The ESTeem requires a shielded RS-232 cable. This is to prevent unwanted electrical noise from entering the ESTeem and also to prevent any electrical noise from getting out of the ESTeem.*
- *Remember -- always use a shielded RS-232C cable.*
- *Pins 9, 10, 14, & 16 are used for RS-422/485 interfacing and should be left open if not used.*

FLOW CONTROL

The ESTeem can be enabled to support SOFTWARE or HARDWARE flow control.

Software Flow Control

Software flow control is enabled by the XSFLOW (on/off) command in the ESTeem. When XSFLOW is ON the ESTeem will respond to <XOFF>, (stop) and <XON>, (off) commands from the RS-232 port. The factory default setting is OFF. The default value for START is 17 (CTRL Q) and for STOP is 19 (CTRL S).

Hardware Flow Control

Hardware flow control is enabled by the XHFLOW (on/off) command in the ESTeem. The factory default value is OFF.

When XHFLOW is enabled (on) the control signal lines, Request To Send (RTS, pin 4), Data Carrier Detect (DCD, pin 8), and Clear To Send (CTS, pin 5) are available to the user at the RS-232C connector. The CTS and RTS signals are used to control the flow of data into and out of the ESTeem.

The CTS signal on pin 5 is used to control the data into the ESTeem. When CTS is set (high on pin 5) the modem is ready to receive data. When CTS is reset (low on pin 5) the ESTeem is not ready to receive data.

The RTS signal is used to control data out of the ESTeem. RTS is set (high on pin 4), by the user to indicate to the ESTeem that the user is ready to receive data. When reset, the user is not ready to receive data. (NOTE: Low = On, High = Off).

MEMORY BUFFERS

The ESTeem has a 4000 byte buffer on the TRANSMIT SIDE (outgoing data) and a 4000 byte buffer on the RECEIVE SIDE (incoming data).

Transmit Buffer

The outgoing data buffer will hold two data blocks before the ESTeem will enable its RS-232C hardware/software flow control on data coming into the modem if the network is busy. A data block in this example is a block of data that is defined by the PACKLENGTH or SENDPAC character which ever occurs first.

Therefore, if PACKLENGTH = 10 the modem will input a maximum of 20 bytes before it enables its hardware/software handshake line (two 10 byte packets). In another example, if PACKLENGTH = 2000 but the data block is terminated by the SENDPAC character before the input buffer reaches the full 2000 bytes, the buffer will still hold only two data blocks if the network is busy.

In order to utilize the 2000 bytes storage for small data packets (bar code readers, etc.), program the modem using the following guidelines:

PACKLENGTH	= 2000	SENDPAC	= 255
TERMC	= ON	TERMT	= 10

Note: *Set the TERMT time greater than the pause between data bursts.*

By programming the above parameters the ESTeem will buffer the incoming data packets and automatically transmit the data when the 2000 byte buffer is filled or the TERMT time limit is met. This will allow the customer to use two blocks of 2000 or 4000 bytes before the modem enables the respect hardware/software control.

Receive Buffer

If the device that the receiving ESTeem is outputting data to, enables its respective hardware or software control, the modem will store 4000 bytes of data before flow controlling off the transmitting ESTeem.

DATA TERMINAL READY (DTR)

A software switch, DTR_ENAB (ON/OFF) is provided in the ESTeem for monitoring the status of a device connected to pin 20 of the RS-232C connector. The factory default setting is OFF. When this command is enabled the ESTeem will monitor the DTR signal on pin 20. If the DTR line being supplied to the ESTeem, from the user, is at a SPACE (high) condition then the ESTeem is enabled. If the DTR line is at a MARK (low) condition then the ESTeem is disabled.
This signal is normally used by the ESTeem modem as an indication that connection is made to a device that is on line and ready to transmit/receive data.

RS-422/485 CONFIGURATION

The ESTeem will support the requirements of the EIA Standard RS-422/485. This is a four (4) wire interface consisting of the TRANSMIT DATA (-), TRANSMIT DATA (+), RECEIVE DATA (-), AND RECEIVE DATA (+) or a two (2) wire interface using B (+) and A (-). These signals are available at the 25 pin RS-232C connector on the modem.

	Pin		Description
DCE (4-Wire)	9	BTR (-)	TRANSMIT DATA (-)
	10	BTR (+)	TRANSMIT DATA (+)
	14	BRX (+)	RECEIVE DATA (+)
	16	BRX (+)	RECEIVE DATA (-)
DCE (2-Wire)	14	(+)	HALF-DUPLEX B (+)
	16	(-)	HALF-DUPLEX A (-)

This interface is designed to provide unipolar differential drive to twisted pair or parallel wire transmission lines.

Note: *The ESTeem is configured at the factory for RS-422 interfacing. RS-485 (either 4 or 2 wire mode) requires internal jumper configuration. Please contact EST Customer Support at 509-735-9092 for instruction.*

The ESTeem can be factory configured RS-485 interfacing prior to shipment. Call EST Customer Support on 509-735-9092 for further details.

RS-232C/422/485 Configuration Tables

On the front plate of the ESTeem is a two position RS-232 Setup switch labeled SW. The switch positions are defined as follows:

RS-232C/422/485
SETUP SWITCH TABLE

BIT 1	OFF	Default baud rate 19.2K, N, 8, 1
BIT 1	ON	Use software to select baud rate
BIT 2	OFF	Enter Command Mode upon initialization
BIT 2	ON	Enter Conversation Mode upon initialization

Note: **The ESTeem is configured at the factory for RS-422 interfacing. RS-485 (2 or 4 wire) requires internal jumper configuration. Please contact EST Customer Support at 509-735-9092 for instruction*

ESTeem RS-232C/422/485 Port Pin-Out Table	
Pin No.	**Function**
1	Shield Ground
2	Transmit Data (TxD)
3	Receive Data (RxD)
4	Request To Send (RTS Input)
5	Clear To Send (CTS)
6	Data Set Ready (DSR)
7	Signal Ground
8	Data Carrier Detect (DCD)
19	Mode Control
20	Data Terminal Ready (DTR)
22	Ring Indicator (RI)
12	Request To Send (RTS Output)
9*	RS-422/485 Transmit Data (-)
10*	RS-422/485 Transmit Data (+)
14*	RS-422/485 Receive Data (+)
16*	RS-422/485 Receive Data (-)

RS-232C/422/485 COMRATE Tables

The ESTeem Model 192 uses the COMRATE software command to set the communication port speed when Bit 1 on the RS-232 Setup Switches is in the ON position. The ESTeem Utility Program will calculate the required COMRATE value and download to the ESTeem in <u>Step 3</u> of the <u>Starting Out</u> Menu or by selecting *ESTeem Setup>Configure ESTeem Serial Port* from the <u>Terminal Emulation</u> menu. If you would like to manually enter the command to set the serial port speed on the modem please use the following table as a guideline:

19,200	9,600	4,800	2,400	1,200	600	
0	1	2	3	4	5	**N,7,1**
8	9	10	11	12	13	**N,7,2**
16	17	18	19	20	21	**E,7,1**
24	25	26	27	28	29	**E,7,2**
32	33	34	35	36	37	**N,8,1**
40	41	42	43	44	45	**N,8,2**
48	49	50	51	52	53	**E,8,1**
56	57	58	59	60	61	**E,8,2**
80	81	82	83	84	85	**O,7,1**
88	89	90	91	92	93	**O,7,2**
112	113	114	115	116	117	**O,8,1**
120	121	122	123	124	125	**O,8,2**

EST offers different types of antennas ranging from ¼ wave to 5/8 wave in physical size. The user choice is dependent on the application.

Communications in the VHF and UHF bands are normally over **_"Line of Sight (LOS)"_**. Looking from the antenna of one wireless modem you must be able to see the antenna of the wireless modem you wish to communicate with. If a large object obstructs the line of sight view it is unlikely that satisfactory communications will result. This means you must relocate the antennas or use the REPEATER FEATURE and a second modem to go over or around the object.

The Model 192C, CHP, F, and M products are allowed by the FCC to use high gain directional antennas.

It is noted that a ¼ wave antenna that does not have ground plane radials requires a ground plane to operate at maximum efficiency. This can simply be a conducting surface under the antenna that is a ¼ wavelength in diameter. For the Model 192C (450-470 MHz) this is approximately 6.5 inches. A conducting surface can be anything from the rooftop of an automobile to a file cabinet.

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/100ft at the VHF and UHF frequencies:

Frequency (MHz)	RG-58u	LMR 195	RG-8 (solid)	LMR600	1/2" Heliax
150-174	-5.2	-4.4	-1.7	-0.964	-0.88
402-420	-8.4	-7.8	-2.9	-1.72	-1.36
450-470	-9	-7.8	-3	-1.72	-1.45

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

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._

Keep the antenna feedline as short as possible to minimize losses.

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.

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 a 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.
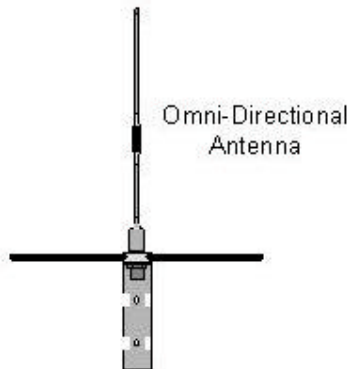
LIGHTNING ARRESTORS

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.
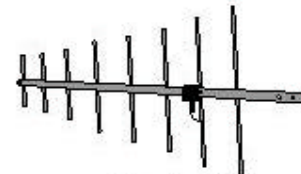
REFERENCE MATERIAL

The ideal reference book for antennas and transmission lines is the "**The Radio Amateur's Handbook**", by the Headquarters Staff of the American Radio Relay League.

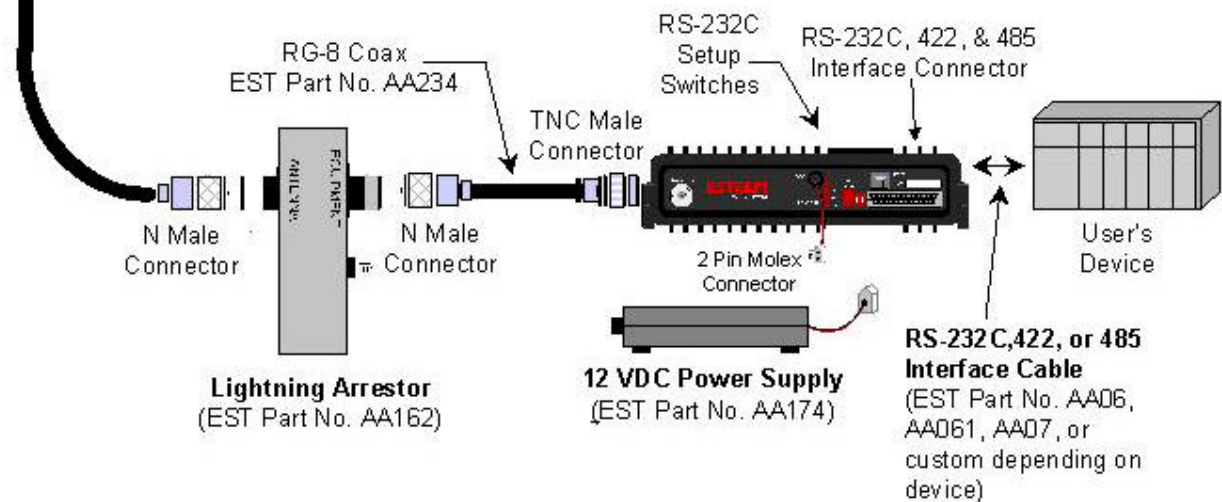# Model 192C/F Outdoor
Fixed Base Hardware Diagram

Omni-Directional
Antenna

**ANTENNA
RECOMMENDATIONS**

1. Omni-Directional (EST P/N AA20C/F or ASP700).

2. Directional (EST P/N AA202C/F).

Directional
Antenna

NOTES

1. Use coax cable runs as short as practical to minimize cable losses.

2. Vapor wrap all external antenna coax connections with vinyl wrap (EST Part No. AA241) and apply Scotchkote Electrical Coating (EST Part No. AA242).

3. Contact EST for recommendations regarding antenna mounting hardware and installation tips.

4. Ground antenna structure, base and lightning arrestor.

Antenna Feedline Recommendations

		EST Antenna Part No.		
	Feedline Type	**20C/F**	**202C/F**	**ASP700**
< 50 ft. Length	RG-8	AA235	AA235	-
> 50 ft. Length	Helaix	AA238	AA238	AA240

RG-8 Coax
EST Part No. AA234

RS-232C
Setup
Switches

RS-232C, 422, & 485
Interface Connector

TNC Male
Connector

N Male
Connector

N Male
π Connector

2 Pin Molex
Connector

User's
Device

Lightning Arrestor
(EST Part No. AA162)

12 VDC Power Supply
(EST Part No. AA174)

**RS-232C, 422, or 485
Interface Cable**
(EST Part No. AA06, AA061, AA07, or custom depending on device)

Model 192CHP Outdoor
Fixed Base Hardware Diagram
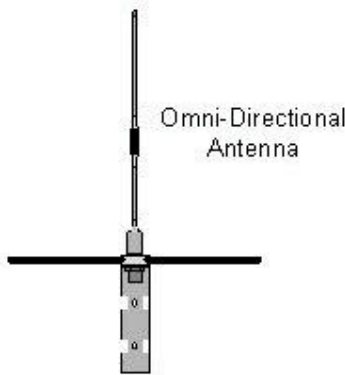
Omni-Directional
Antenna

Directional
Antenna

ANTENNA RECOMMENDATIONS

1. Omni-Directional (EST P/N AA20C/F or ASP700).

2. Directional (EST P/N AA202C/F).

NOTES

1. Use coax cable runs as short as practical to minimize cable losses.

2. Vapor wrap all external antenna coax connections with vinyl wrap (EST Part No. AA241) and apply Scotchkote Electrical Coating (EST Part No. AA242).

3. Contact EST for recommendations regarding antenna mounting hardware and installation tips.

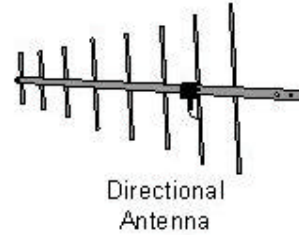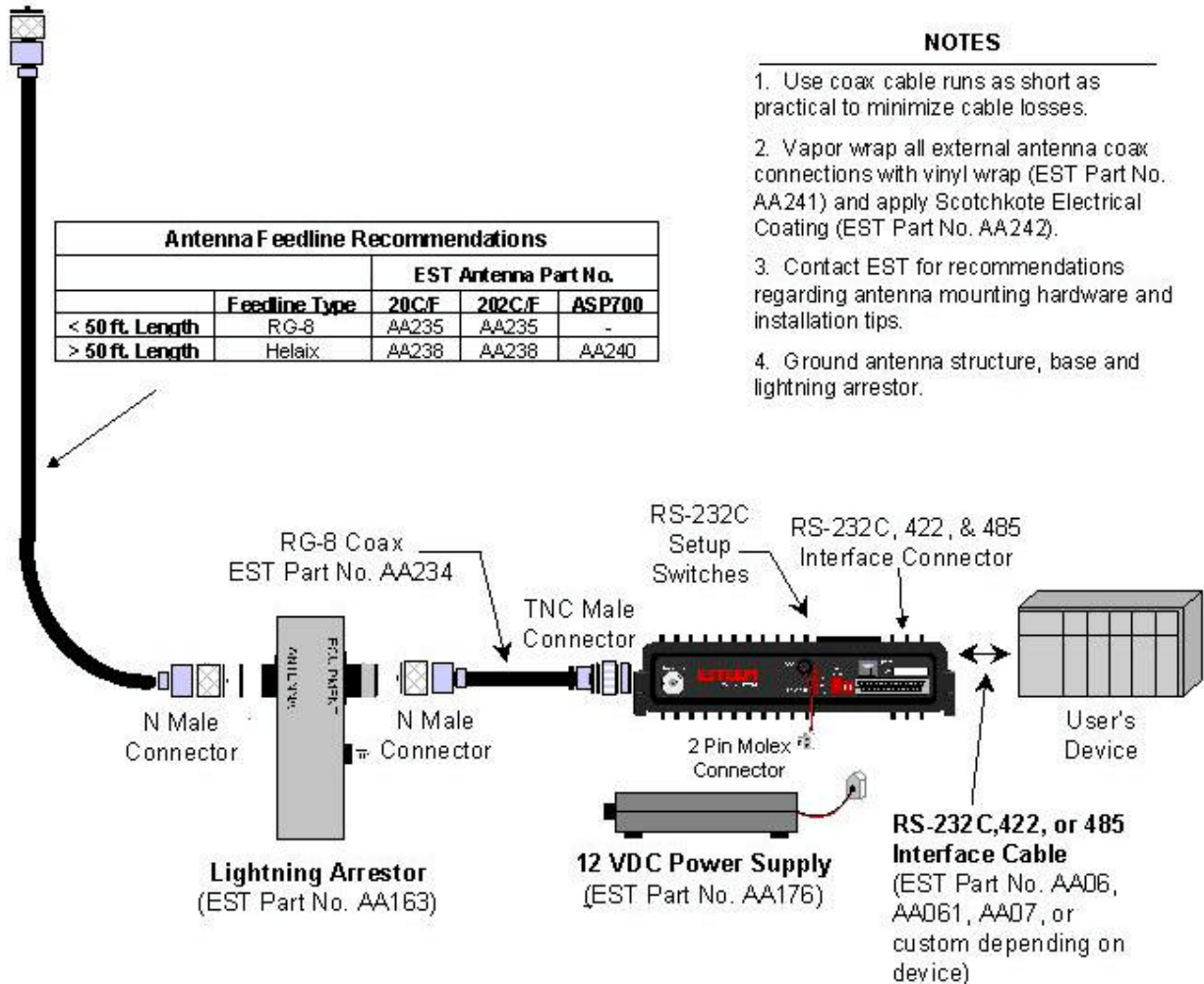4. Ground antenna structure, base and lightning arrestor.

Antenna Feedline Recommendations

		EST Antenna Part No.		
	Feedline Type	20C/F	202C/F	ASP700
< 50 ft. Length	RG-8	AA235	AA235	-
> 50 ft. Length	Helaix	AA238	AA238	AA240

RG-8 Coax
EST Part No. AA234

RS-232C Setup Switches

RS-232C, 422, & 485 Interface Connector

TNC Male Connector

N Male Connector

N Male Connector

2 Pin Molex Connector

User's Device

Lightning Arrestor
(EST Part No. AA163)

12 VDC Power Supply
(EST Part No. AA176)

RS-232C, 422, or 485 Interface Cable
(EST Part No. AA06, AA061, AA07, or custom depending on device)

Model 192M
Outdoor Fixed Base Hardware Diagram

Omni-Directional
Antenna

ANTENNA RECOMMENDATIONS
1. Omni-Directional (EST P/N AA20M or ASP682).

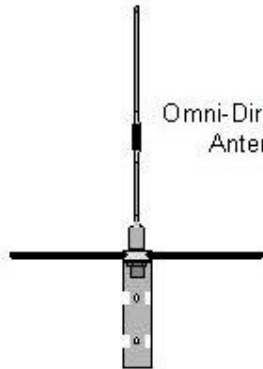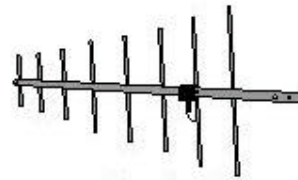2. Directional (EST P/N AA202M).

Directional
Antenna

NOTES

1. Use coax cable runs as short as practical to minimize cable losses.

2. Vapor wrap all external antenna coax connections with vinyl wrap (EST Part No. AA241) and apply Scotchkote Electrical Coating (EST Part No. AA242).

3. Contact EST for recommendations regarding antenna mounting hardware and installation tips.

4. Ground antenna structure, base and lightning arrestor.

Antenna Feedline Recommendations				
		EST Antenna Part No.		
	Feedline Type	20M	202M	ASP682
< 50 ft. Length	RG-8	AA235	AA237	-
> 50 ft. Length	Helaix	AA238	AA236	AA240

RG-8 Coax
(EST Part No. AA234)

RS-232C
Setup
Switches

RS-232C, 422, & 485
Interface Connector

TNC Male
Connector

N Male
Connector

N Male
Connector

2 Pin Molex
Connector

User's
Device

Lightning Arrestor
(EST Part No. AA162)

12 VDC Power Supply
(EST Part No. AA174)

**RS-232C, 422, or 485
Interface Cable**
(EST Part No. AA06, AA061, AA07, or custom depending on device)