EMPACT SERIES
Communications & Control Equipment

Communications & Documentation Technologies

OPERATION AND INSTALLATION INSTRUCTIONS

RANS-DV™

DIGITIZED VOICE ALARM ANNOUNCEMENT SYSTEM

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Communications & Documentation Technologies

33408 Sandy Creek Lane, P.O. Box 776
Pine Valley, California 91962-0776
(619) 478-2600
FAX (619) 478-2555
Internet: http://www.cdtco.com
email: cdt@cdtco.com

Contents

SECTION 6

Maintenance 45

SECTION 7

Troubleshooting 47

Appendices

List of Figures

Appendix F

1.0 General Description

1.1 Purpose

The *Roving Alarm Notification System (RANS)* has been developed specifically to provide rapid alarm information to responding personnel. RANS provides rapid announcement to responding personnel regardless of their location. With RANS, on-station personnel can monitor a larger area because they are not tied to one control point.

RANS-DV receives alarm signals from a contact closure, RS-232 serial input, or from another alarm system or device. The remote alarm activates a electronically digitized voice message specifically tailored to provide precise alarm information in clearly spoken English (or another) language. The *RANS-DV* alarm output is configured for easy connection to:

- *RANS-DV* alarm receivers
- RANS-Ultima digital receivers
- A customer-owned “walkie-talkie” radio system
- A paging amplifier and loudspeakers
- An intercommunications system

1.2 Description

Alarm Encoder

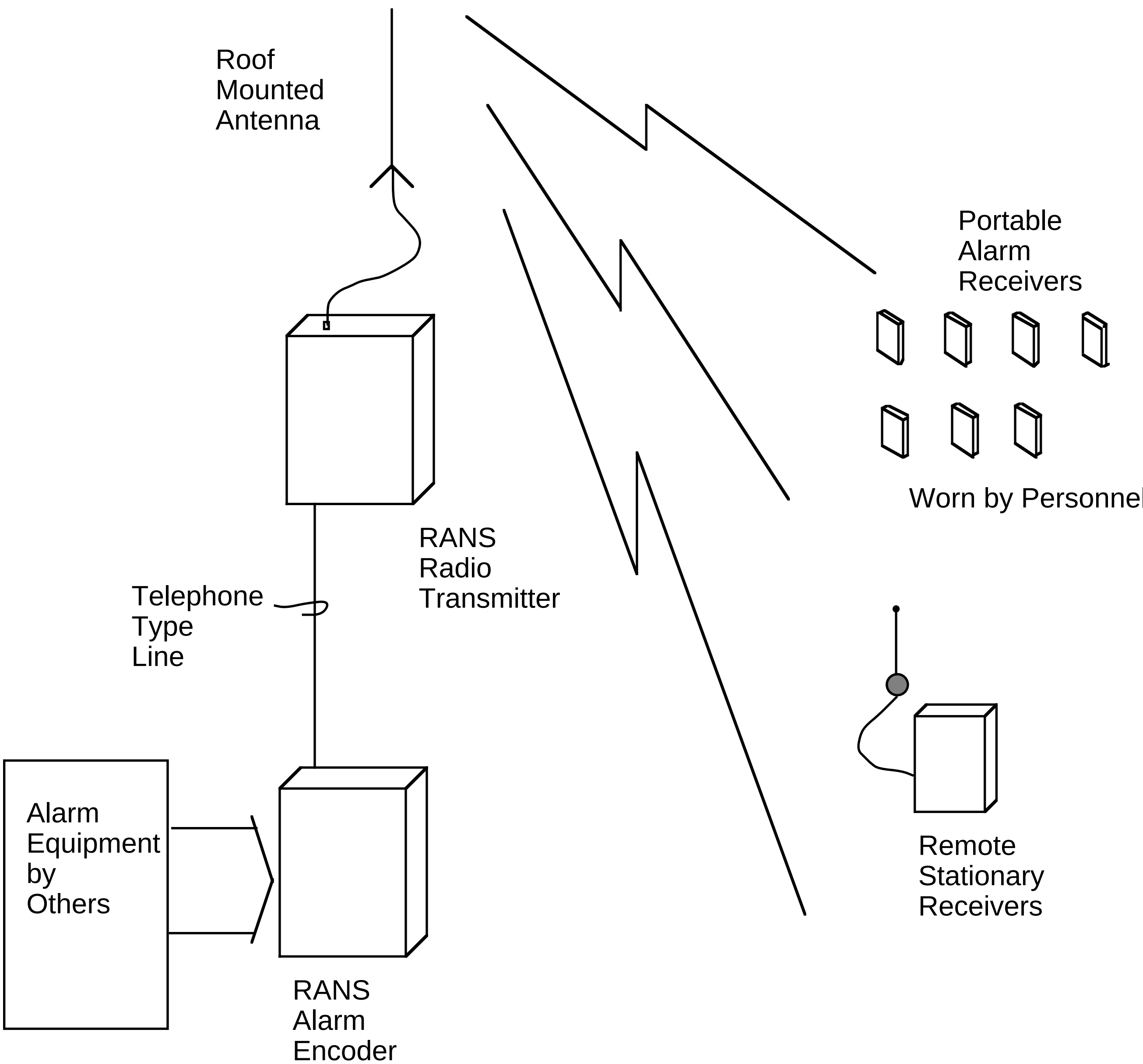
The *RANS-DV* alarm encoder can receive up to 256 alarm inputs from closed-contact-type alarms, solid state outputs, or RS-232 serial computer interface of other alarm equipment. When the encoder receives an alarm input, it searches for the alarm response and the audio message(s) that were preprogrammed for that alarm input.

Each alarm message is contained in a Read-Only Memory (ROM) plug-in chip. Alarm messages can be reconfigured and changed in the field without removing the system from service. Recommended alarm message length is between one and seven seconds; however, message length can be several minutes long. While longer message lengths are available, short, concise messages are normally the most effective. Announce tones and warning signals can be tailored to the alarm messages you select.

The exclusive RANS Digital Messaging system allows you to combine short phrases into complete messages, using simple control techniques.

You decide the alarm messages you wish to send. Each message is custom tailored to your requirements. Copies of all messages are retained at the factory for future reference. Changes to existing messages can be ordered by telephone and delivered overnight to the facility with no system down-time.

Figure 1-1 Typical *RANS-DV* Installation



The alarm encoder provides a variety of flexible outputs that allow connection to other radio and/or public address systems as well as to the RANS-Audio portable alarm receivers. Separate outputs are provided for the audio signals, and a closed contact keying output. Contact the factory for advice on special connection requirements.

Radio Transmitter

The radio transmitter provides a nominal 2-watt or 5-watt radio frequency output for communication to the RANS-Audio receivers or two-way radios. HF, VHF, UHF, or 900MHz frequencies are available. The radio transmitter is remotely located near the antenna and communicates to the alarm encoder via a two- or four-wire connection or a telephone line.

Portable Alarm Receiver

The *RANS-DV* alarm receiver functions like a voice message pocket pager. Each receiver has its own unique code but can also be called as a group for alarm messages. When an alarm is sent, the *RANS-DV* alarm receiver emits an alarm tone followed by the audio message. Alarm receivers can be configured for use as an audio paging system, as well as an alarm system. *RANS-DV* receivers are ruggedly constructed and can be provided with optional holsters for added protection. Battery chargers and storage racks are also available.

Alarm Messages: 256 alarm inputs provide up to 256 individual alarm messages. Each alarm message can have its own unique alarm message. Expansion from 64 to 256 closed contact inputs is accomplished with the addition of “piggy-back” input boards.

1.3 Specifications

Alarm Encoder

Alarm Inputs:
- Closed contacts or solid state input from other alarm systems.
- RS-232C serial data connection (furnished with sample interface software).

Outputs:
- Closed contact (24 VDC, .25 amp.) for keying external equipment.
- 8 ohm, 1 watt audio output to local loudspeaker.
- Output for remote digital volume control.
- 0 dBm, 600 ohm audio output.
- 0 dBm, 600 ohm data output.
- Current loop, 1500-ohm maximum loop resistance for operating external remote radio transmitter.

Control Signals:
Receiver audio from transmitter Carrier detect data from transmitter.
Indicators:
Green power-on LED
Red transmit LED
Red test LED
Power Req'd:
12 VAC provided by external UL-listed wall transformer.
Wall Enclosure:
10" W X 14" H X 4" D wall-mount enclosure with hinged cover.
Rack Mount Enclosure (optional):
19" W X 1-3/4" H X 14" D
Weight:
12 lbs. (wall), 3 lbs. (rack)
Temperature:
0 ± 55 degrees Celsius

Transmitter

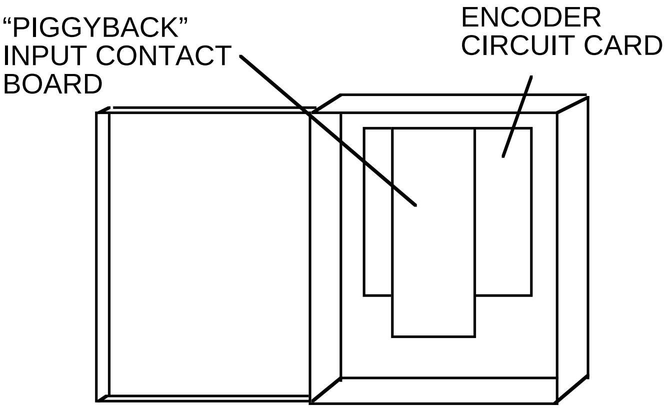
Frequency:
Available as: VHF; 148-174 MHz; HF 30-74 MHz;
UHF 406-420 MHz; UHF 450-470 MHz; 902-928 MHz.
Other frequency ranges on special order. Consult factory.
Power Output:
Typical 2 watts or 5 watts (optional), 50-ohm load.
Signal Input:
Current loop; 1500-ohm maximum loop resistance
Power Req'd:
12 VAC or 12 VDC, 1.5 amp, provided by UL-listed wall transformer.
Enclosure:
12" W X 12" H X 4" D CRS wall-mount enclosure, with hinged cover.
Weight:
16 lbs.
Temperature:
–25 ± 55 degrees Celsius

Portable Alarm Receiver

Frequency:
Available as: VHF 148-174 MHz; UHF 406-420 MHz; 450-470 MHz crystal controlled. Please consult factory for other frequencies.
Sensitivity:
12 dB SINAD, 12 microvolts per meter
Audio Level:
90 dB SPL average from 300 Hz to 3000 Hz at 12 inches.

Battery Life:
NiCad rechargeable battery, 1 week typical operation based on 3 alarm messages per day.
Dimensions:
3.5" X 2.6" X 1.0" with heavy duty wide belt clip.
Nylon holster optional.
Weight:
5.5 ounces with battery (w/o holster).

Figure 1-2   Encoder Unit



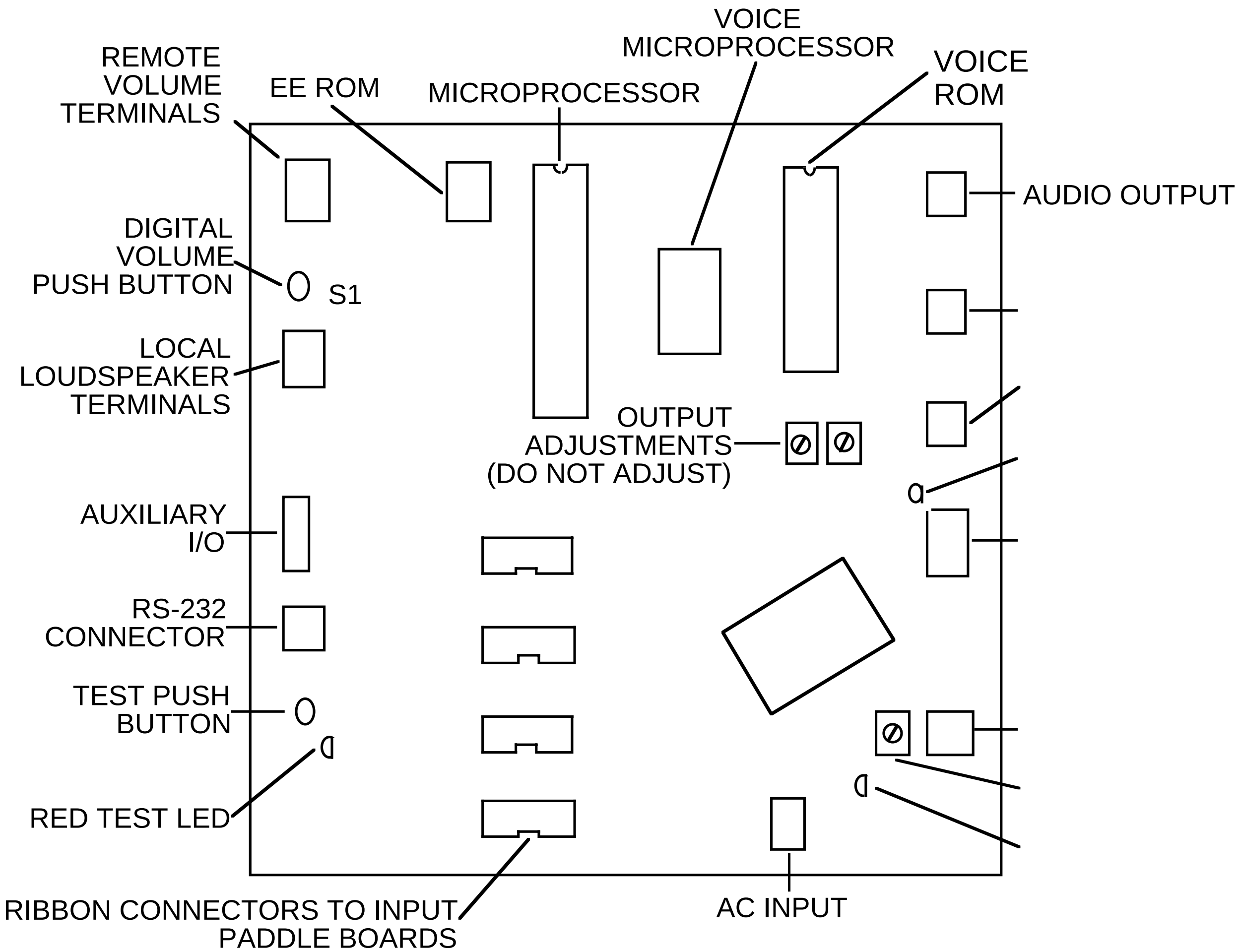


Figure 1-3 Encoder Input "Piggyback" Board

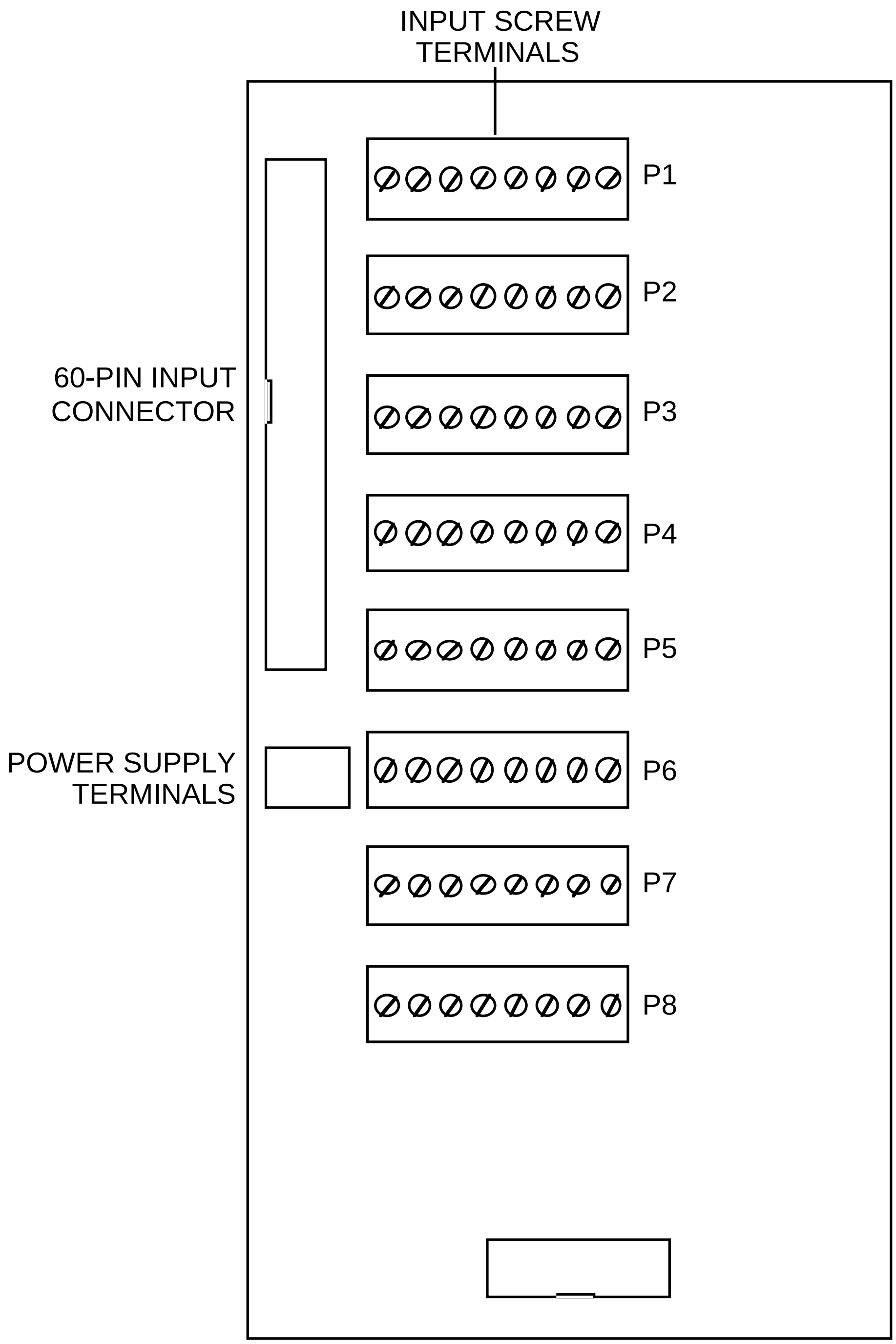
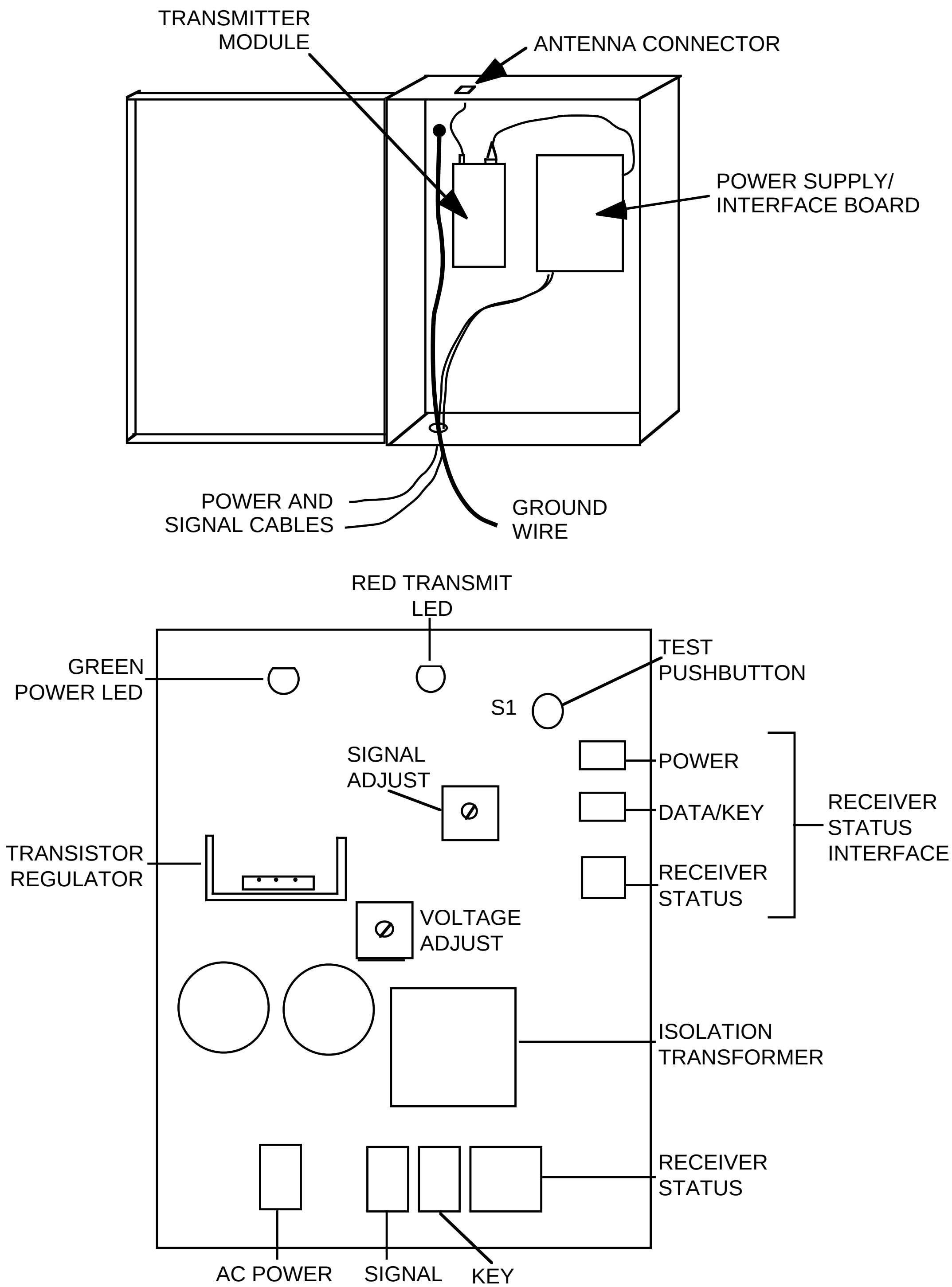


Figure 1-4 Radio Transmitter Unit



2.0 Theory of Operation

2.1 Concept

2.1.1 The *RANS-DV* Alarm announcement system has been developed to provide an easy-to-understand English (or other) language message when an alarm occurs. The audio alarm message can quickly notify the responding personnel that an alarm has occurred and the nature of the problem.

2.1.2 Modern state-of-the-art microprocessor technology allows the voice messages to be stored in solid state memory and produce custom alarm messages for each alarm input. The *RANS-DV* encoder has storage capacity for up to 16 minutes of messages. Each RANS encoder contains a voice message phrase listing customized to your facility. The messages phrases can be used individually or combined to produce more detailed alarm messages. All alarm message programming is contained in electrically erasable memory which enables field programming and changes using a PC computer and software.

2.1.3 The *RANS-DV* encoder contains built-in test features that allow a complete system test in the field with no special test equipment.

2.1.4 The *RANS-DV* encoder provides a variety of outputs that enable connection to many different alarm transmission systems.

2.1.4.1 A high-level audio signal is provided for connection to audio and/or intercommunications systems by others.

2.1.4.2 A digital data output is provided for operation with the RANS-Ultima portable alarm receiver.

2.1.4.3 A relay output is provided for operation of external equipment during alarm conditions.

2.1.5 Input alarm connections can be made using either closed contacts or an connected to paddle boards that are connected to the *RANS-DV* encoder with ribbon cable. There can be up to four paddle boards with 64 inputs each for a total of 256 inputs.

2.1.6 The *RANS-DV* system includes Channel Alert capability which monitors the radio frequency channel for the presence of interference signals. If interference signals are present during alarm transmission, the system waits for the radio channel to clear before sending the alarm message. Channel interference affecting alarm system operation is logged in the encoder system memory for future reference.

2.2 Operation

(See Figure 2-1)

2.2.1 Alarm inputs are received from the closed contact alarm inputs or the RS-232C serial connection. The closed contact input responds to a grounded input terminal or a “logic low” condition. The RS-232 serial alarm inputs must follow a protocol that is furnished at no charge by the factory.

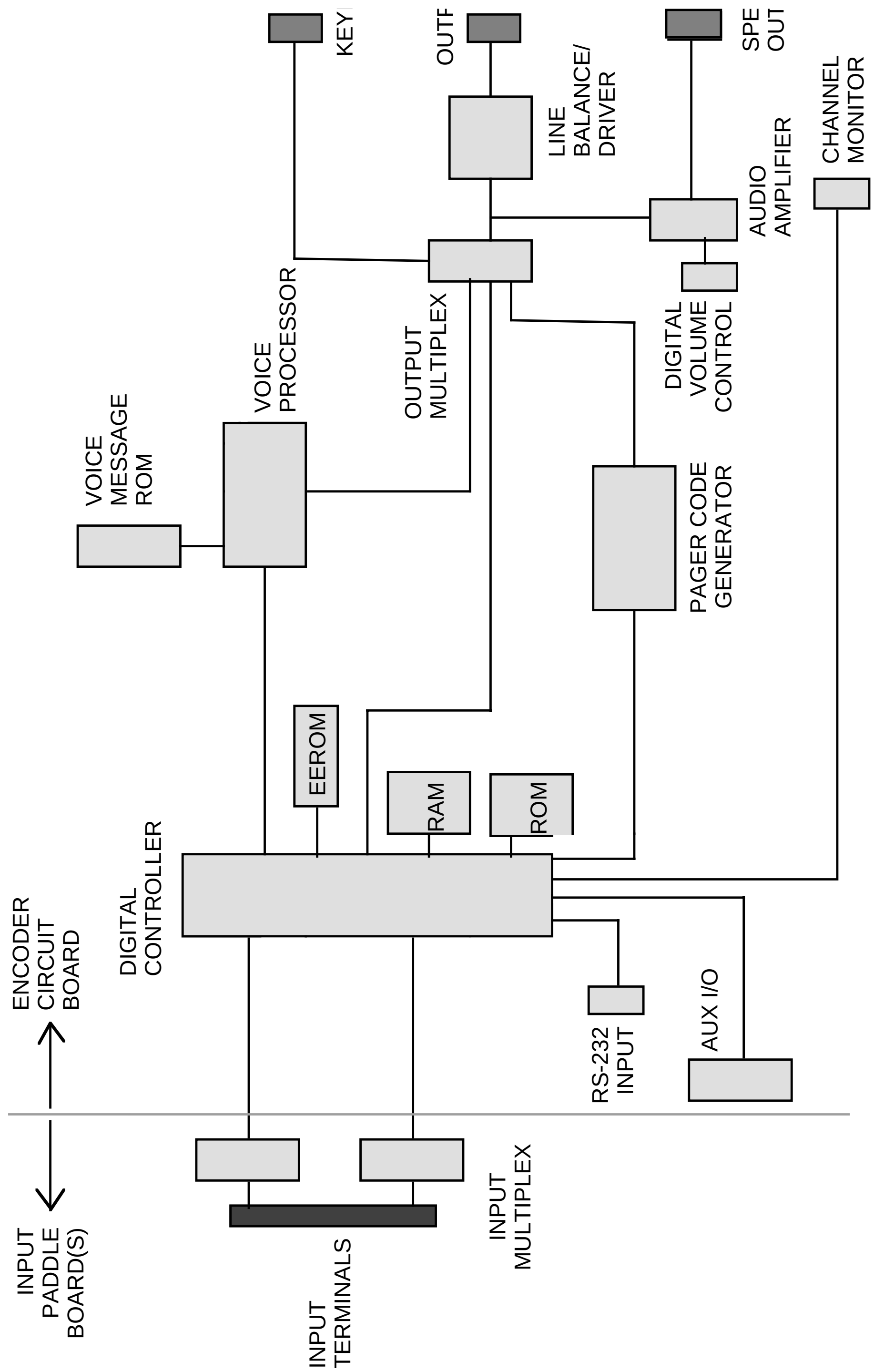
2.2.2 The operation of the *RANS-DV* encoder is controlled by two state-of-the-art micro-controllers, one controls all alarm activity and the other controls the production of true speech from the system memory. The microprocessor continuously scans the alarm inputs looking for any change in alarm status.

2.2.3 When an alarm is discovered, the microcontroller looks into electrically erasable memory to see the appropriate alarm response for this input. The microcontroller then selects the correct alarm message or messages and transmits the message(s) to the output. When the encoder is programmed to operate with the *RANS-DV* portable alarm receivers, the microcontroller also sends an address signal to the code generator, which generates the activation codes for each alarm receiver.

2.2.4 The receiver identification codes (if appropriate) and the audio alarm message are sent to the audio output, and the microcontroller sends a signal to activate the keying output.

2.2.5 When the *RANS-DV* Encoder is used with the RANS Portable Alarm Receivers or as an independent radio transmitter, the output signal is sent to the RANS Radio Transmitter. The combined alarm signal is transmitted to the portable alarm receivers and radios tuned to that frequency.

Figure 2-1 *RANS-DV* Block Diagram



2.2.6 The channel alert capability allows the monitoring of the radio channel at all times. In this mode, the transmitter unit also contains a radio receiver. The receiver audio and carrier detect signals are sent to the encoder microprocessor. The microprocessor continuously monitors the receiver. If interference is detected, the microprocessor activates a “wait and transmit” program, and records the occurrence for future reference.

2.2.7 The *RANS-DV* system contains several test modes allowing field system testing without special test equipment.

2.2.8 On power up (power applied to the encoder unit) the encoder tests the operation of both microprocessors. If the operation is correct, the system produces two test messages: “Testing System” and “System Test OK.”

2.2.9 The test button can be pressed at any time. Upon activation the system produces alarm tones and receiver activation tones (if applicable), including keying of the radio transmitter (if connected).

2.2.10 The test button is also used to activate special factory test features that are described in special factory test procedures.

3.0 Installation

3.1 General

3.1.1 A **CDT** *EMPACT* series *RANS-DV* system installation generally consists of the following components:

- Encoder Unit, which receives alarm information from other alarm system(s) and formats the correct annunciation messages for transmission to the announcement system.

  The system may or may not include a transmitter and portable alarm receivers depending on the type of installation.

- Transmitter unit, which receives a formatted alarm signal from the Encoder Unit and provides a radio frequency output.
- The roof-mounted antenna and mast, which receives the radio frequency transmitter output.
- Portable alarm receivers carried by roving officers.

3.1.2 The key to a successful installation is proper initial planning and attention to the details of installation. The following installation procedure provides a guideline for successful field installation of a complete *RANS-DV* system.

> **PLEASE NOTE: Before attempting field installation, the complete *RANS-DV* system should be interconnected and tested in your shop. Use the procedures shown in the Initial Setup and Adjustment Section for shop testing and alignment before installation.**
>
> **This manual covers the installation of the encoder unit as well as the transmitter, antennas, and receivers. If your system does not include all of these items, utilize only the appropriate parts of this manual.**

3.2 Initial Planning

Initial installation planning includes the general layout of the complete system and a determination of where each piece of equipment will be installed. The placement of equipment is very important for the correct operation of the RANS system. This is particularly true when choosing the antenna location. Proceed with your installation planning as follows:

3.2.1

Locating the Encoder Unit. *(See Figure 1-2)*

3.2.1.1 The RANS encoder unit must interface to the outputs of the alarm equipment that will generate the alarms to be sent to the portable alarm receivers. The output of the encoder unit will connect to the RANS transmitter unit, which normally is remotely mounted near the antenna.

3.2.1.2 The RANS encoder should be located within 15 feet of the alarm system. If distances are further than 15 feet, shielded wiring should be used. The encoder should also be located within 15 feet of a standard power outlet.

3.2.1.3 The encoder is provided in a wall-mounted enclosure suitable for wall or telephone backboard type mounting. Rack mount version is also available. Consult the factory for further information. Mount the encoder securely, utilizing four screws in the rear panel mounting holes. Refer to paragraph 3.4.1 for wiring and connection information.

3.2.2

Locating the Antenna and Transmitter *(Refer to Figures 1-4 and 2-1 and Appendices B and C)*

The location and mounting of the antenna is very important to the proper operation of the system. Typically, the two items that can improve transmission coverage are the antenna height and transmitter power.

The antenna must be located on a tall building to provide the height required for good signal coverage. If possible, the antenna should be mounted on the tallest building in the facility. Because the typical radio frequencies are in the VHF and UHF regions, the best operation will occur if the primary operational area of the portable alarm receivers is in a line-of-sight with the transmitter antenna.

The antenna should be mounted on a minimum 20-foot mast. The mast should be constructed of rigid galvanized pipe or other weather resistant metal piping sold for use as antenna mast. The mast can be either one piece or a multi-section mast. Multi-section masts are often easier to erect, especially on a pitched roof.

Provide a suitable guy wire for each mast section in accordance with acceptable antenna mast-mounting practices. Four sets of guy wires should be located 90 degrees apart. In no case should there be less than three sets of guy wires located 120 degrees apart. Each mast section should have its own set of guy wires. Figure 3-1 shows a typical antenna and mast installation. Appendices B and C provide specific antenna installation information.

The transmitter must be located inside the building adjacent to the antenna location and as close to the antenna as possible. At VHF and UHF frequencies, a considerable amount of signal loss can occur in the antenna connecting cable. For this reason, the recommended cable length from transmitter to antenna is 25 feet. The maximum recommended cable length is 40 feet.

The antenna cable must enter the building using a suitable weatherhead or other acceptable roof penetration. The cable must enter the building without crimping or damaging the cable by excessively tight bends. Additionally, the roof must not leak at the penetration.

Locate the transmitter on a vertical surface, such as a telephone backboard. If a telephone backboard is not available, locate the transmitter on a sturdy vertical surface. It may be necessary to install a mounting surface in an area near the base of the antenna.

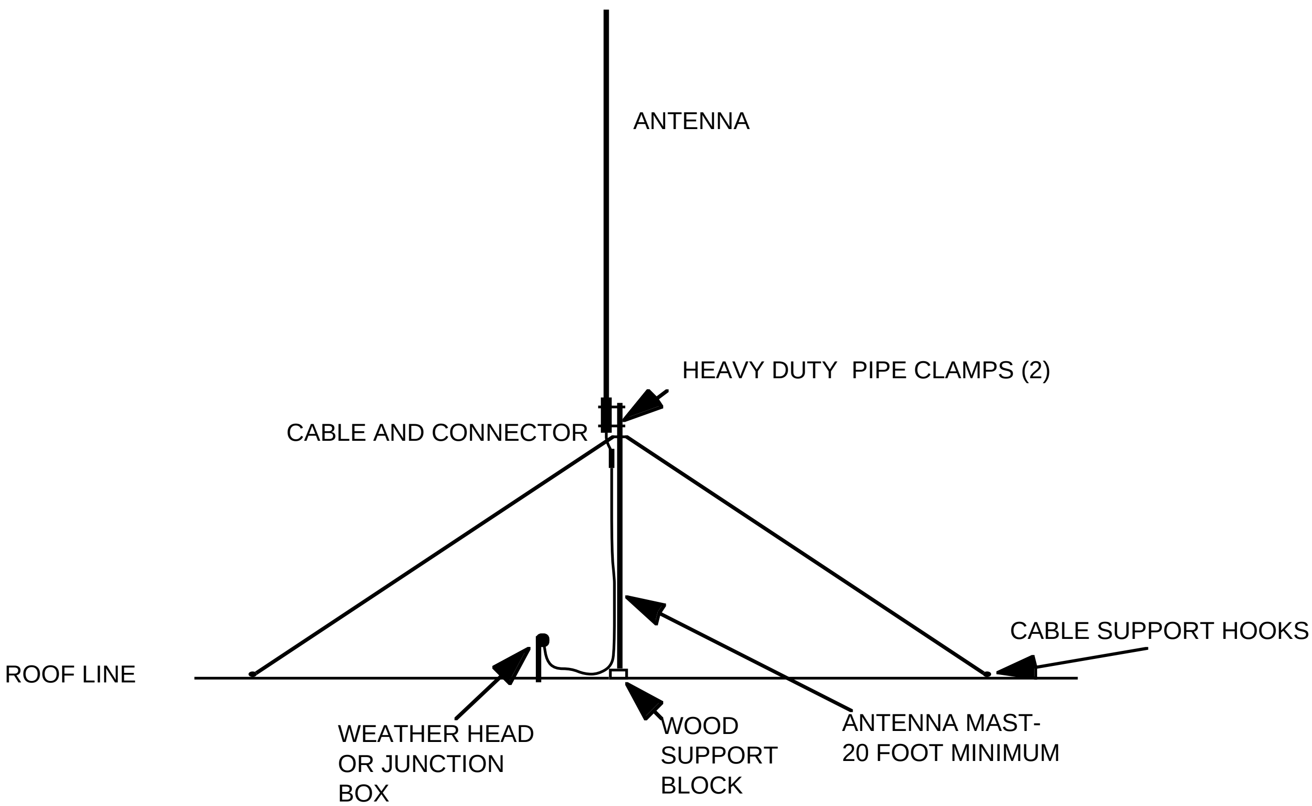
Locate the transmitter unit with sufficient space above the unit to allow connection of the cable and an RF power meter if necessary. Allow 18 inches minimum for cable and test power meter.

The transmitter unit **MUST** have a minimum 10-gauge ground wire running from the transmitter enclosure ground lug to a cold water pipe or independent ground rod. Grounding is very important for lightning protection. It is best to provide a good ground for the antenna mast also. Lightning arrestors are available. Consult factory for details.

The transmitter should be located near a standard AC outlet. If a standard outlet is not available within 15 feet of the transmitter location, power can be run from AC outlets at further distances by increasing the size of the power wiring from the wall-mounted transformer to the transmitter unit as noted below. Refer to paragraph 3.4.2 for further wiring and connection information.

DISTANCE	WIRE SIZE
0-15 FEET	18 AWG
16-40 FEET	16 AWG
41-80 FEET	14 AWG

Figure 3-1 Transmitter and Antenna Installation Guidelines



INSTALLATION NOTES:

1. Antenna mast shall be a rigid galvanized pipe or other galvanized pipe sold for antenna installation. Minimum diameter shall be 1 1/4 inch.

2. Install antenna in strict accordance with the antenna manufacturers instructions and recommendations.

3. Guy antenna in 4 directions with guy wires at 90 degrees to one another. Make the angle of the guy wires to the roof as low as possible. The angle of the guy wires to the roof must not exceed 45 degrees.

4. Provide weather sealed connector boot or moisture proof seal over cable connectors. Fasten cable to mast using U/V resistant plastic cable ties, or equal. Seal all roof penetrations and fastening locations in an approved manner to preclude roof leaks.

3.3 Mounting

3.3.1

Mounting the Encoder Unit

The encoder unit is mounted using the four mounting holes located in the corners of the enclosure.

Make a paper template of these mounting holes or measure and transfer the dimensions to the mounting surface.

Drill and tap the mounting holes before positioning the encoder unit. Mount the encoder with #10 or other suitable hardware.

If special conduit connections or access holes must be added to the enclosure, carefully remove the encoder unit circuit board before working on the cabinet.

CAUTION: METAL FILINGS, WOOD CHIPS AND EXCESSIVE DIRT AND DUST CAN AFFECT THE ENCODER OPERATION. ALSO, AVOID EXCESSIVE POUNDING AND VIBRATION.

3.3.2

Mounting the Transmitter Unit

Follow the instructions provided above for the encoder unit.

3.3.3

Mounting the Transmitter Antenna

The mounting and installation of the transmitter may be the most important part of the RANS installation. Not only is the antenna a very important part of the transmission pattern, but it is also located outdoors where it can be affected by weather and lightning.

Special care must be taken with the antenna installation. Guy wires and other attachments must be made to solid building members. Mounting cables and attachments must be strong enough to withstand the loading caused by the winds in the area. All electrical connections must be correctly made then wrapped with waterproof material to protect from moisture and cold weather. Any plastic parts used (i.e., ty-raps, fasteners, etc.) must be U/V protected.

Appendix B contains general antenna installation and safety information. Review this information before mounting and connecting your antenna.

Appendix C contains copies of the installation information for the most common types of antennas used with the RANS system. This information should also be packed with the antenna. If the information in Appendix C does not show your antenna or if the antenna you purchased does not have installation information packed with it, please contact the factory.

3.4 Wiring and Connections

3.4.1 Connecting the Encoder Unit

There are two methods of connecting alarm inputs to the RANS encoder: closed contacts and serial computer input.

Closed Contacts

Closed contact input terminals are provided on a multi-terminal paddle board. When the number of alarm inputs is 64 or less, the paddle board is normally mounted “piggyback” on the encoder board. See Figure 1-2. When more than one paddle board is required (i.e., 65 to 256 inputs), the input paddle boards are mounted adjacent to the encoder board and each connected by a ribbon cable.

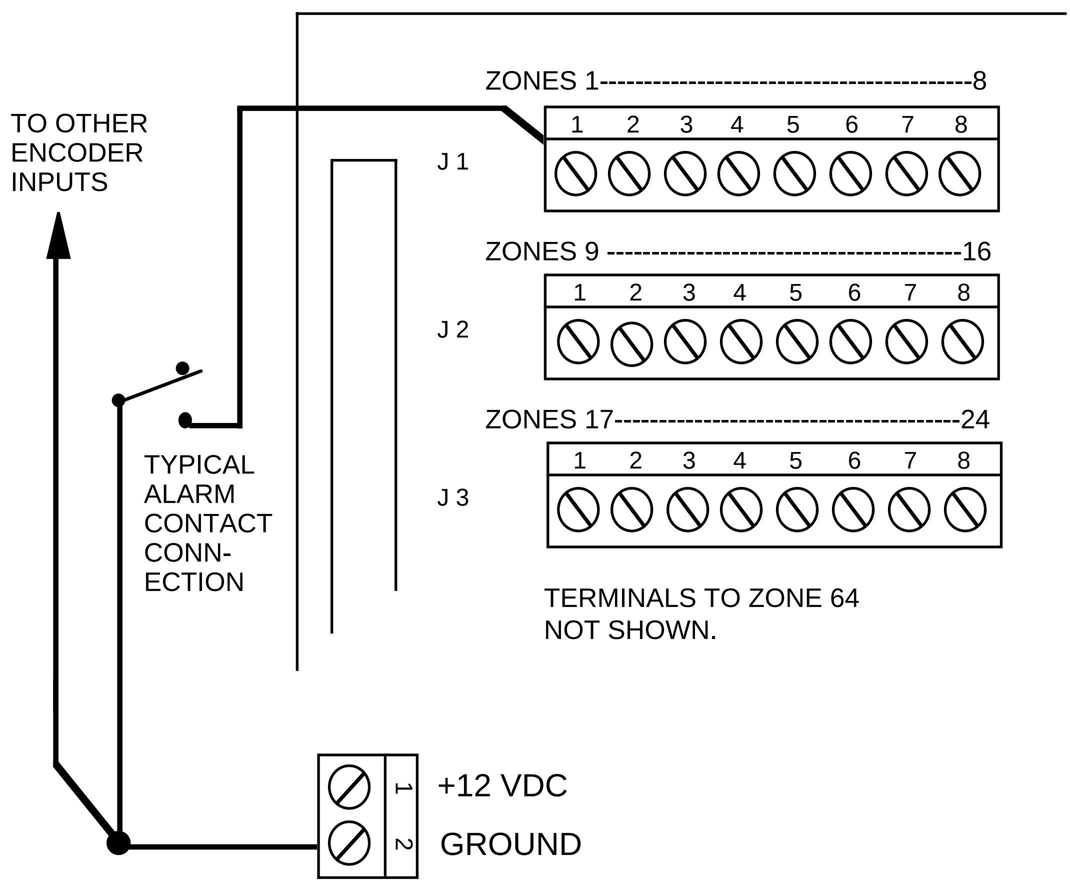
Figure 3-2 shows the numbering of each screw terminal and the typical input wiring connection. In order to operate properly, no external voltage should be applied by the alarm equipment and alarm switching must be dry contacts only. The multi-pin IDC connector is provided for connecting equipment that can provide alarm outputs on a ribbon cable. Figure 3-3 identifies the function of each connector pin.

RS-232C Connection

The RS-232 connection is provided by the cable harness and DB-9 connector connected to the encoder board mounted multi-pin header, P25. The circuit board header allows the use of other DB type or special connectors, if necessary. Contact the factory for details.

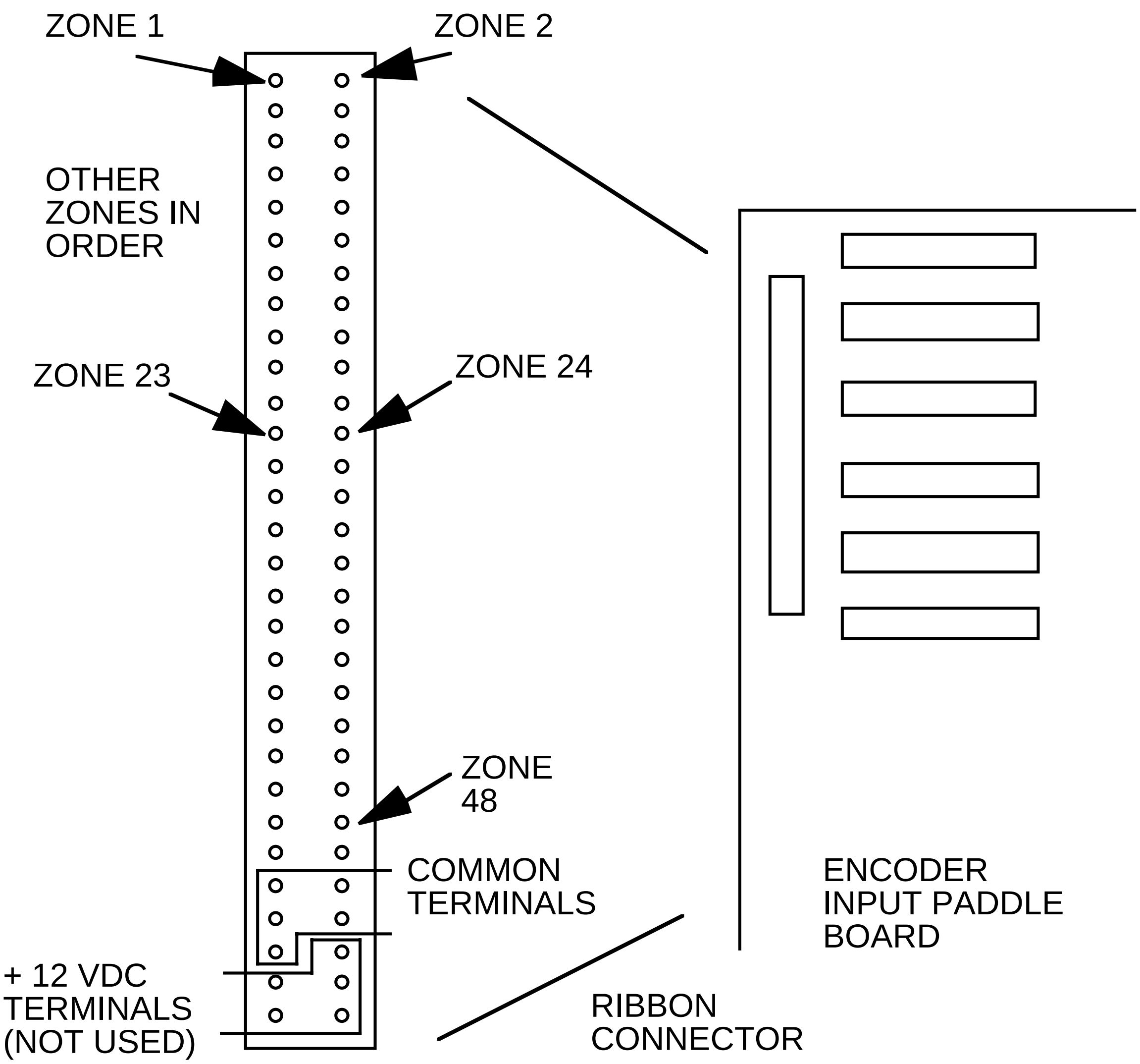
Connection from the encoder connector to the computer system providing the alarms is normally accomplished with a standard serial cable (null modem not required). Refer to Appendix E for serial port protocol information.

Figure 3-2 Encoder Closed Contact Input Wiring Connections



CAUTION: SYSTEM ISOLATION IS REMOVED IF INTERNAL ENCODER POWER IS USED TO ACTIVATE INPUTS

Figure 3-3 Ribbon Cable Connections



Encoder Power Supply and Output Connections

The encoder power is provided by the wall-mounted transformer furnished with the unit. The wiring from the wall-mounted transformer to the encoder should be a minimum 18-gauge, 2-conductor twisted cable. The wiring distance should not exceed 15 feet, or a larger conductor size should be used. See paragraph 3.2.2.

The encoder output is a 3-conductor shielded connection for the transmitted output signal and an additional 2-conductor shielded connection if the Channel Alert function is utilized. A 5-conductor shielded cable can be used for all connections if available. The wire should be a minimum 20- or 22-gauge twisted pair cable. The polarity of all wires is important, so observe all connections carefully. Figure 3-4 shows all encoder output wiring connections.

3.4.2 Connecting the Transmitter Unit

Connecting the transmitter unit consists of connecting the antenna, signal input, power, and earth ground.

The transmitter is connected to the antenna transmission cable by the Type N female bulkhead connector located on the top of the transmitter unit. The transmission cable is normally shipped from the factory with the mating connectors already installed. Simply screw the connector in place and hand tighten. Be careful that the transmission cable does not contain any tight bends that could affect performance. Avoid cable bends that are less than one foot in radius. Carefully bend cable and position cable connector in line with the transmitter connector **BEFORE** screwing connector in place. Leave a sufficient service loop to allow the temporary installation of an RF power meter if required in the future. Refer to Figure 3-5.

The 3-conductor shielded and 2-conductor shielded incoming signal lines are connected to the transmitter input circuit board via board-mounted, captive-screw-type connectors. Polarity of all wires is important to proper operation. Refer to Figure 3-6.

The 2-conductor power supply cable is connected to the transmitter input circuit board via board-mounted, captive-screw-type connectors. Polarity of the two wires is not important to proper operation. Refer to Figure 3-6.

The earth ground connection is very important for lightning protection. Connect the earth ground to the terminal located inside the transmitter cabinet. See Figure 3-5. Installation of a lightning arrestor should be considered for all installations.

Figure 3-4   Encoder Unit Power and Output Wiring

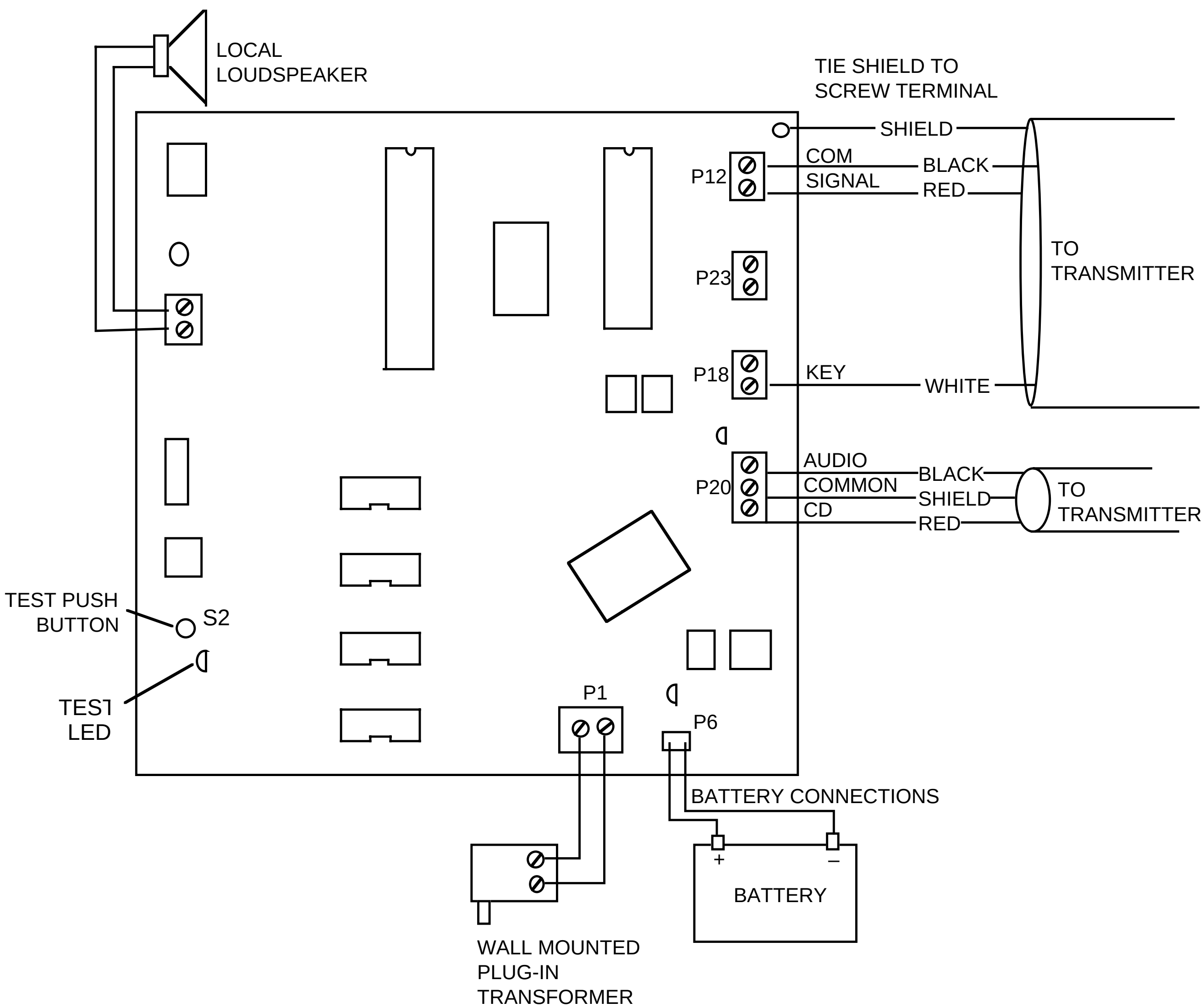


Figure 3-5 RF Transmission Cable Connection

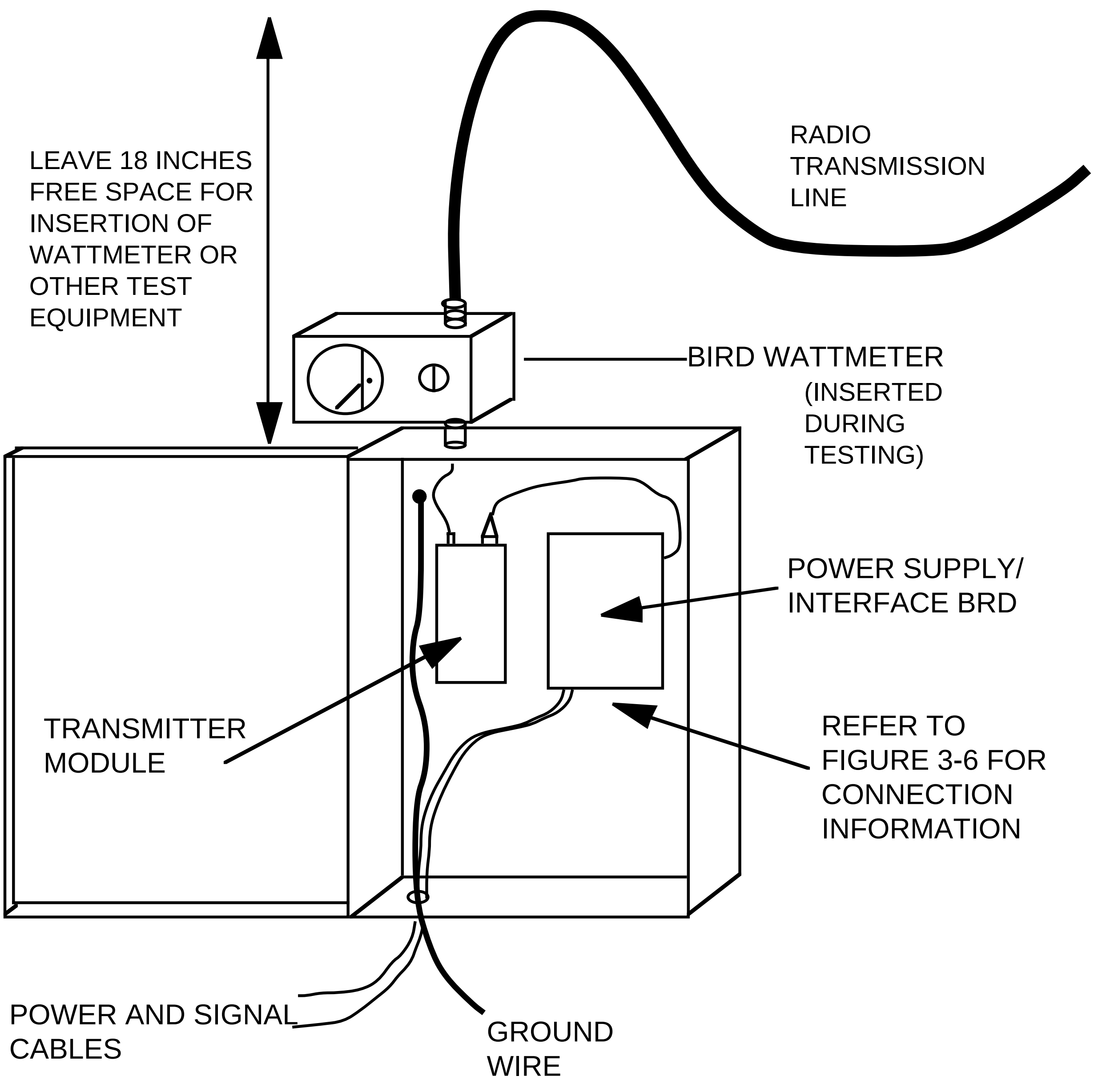
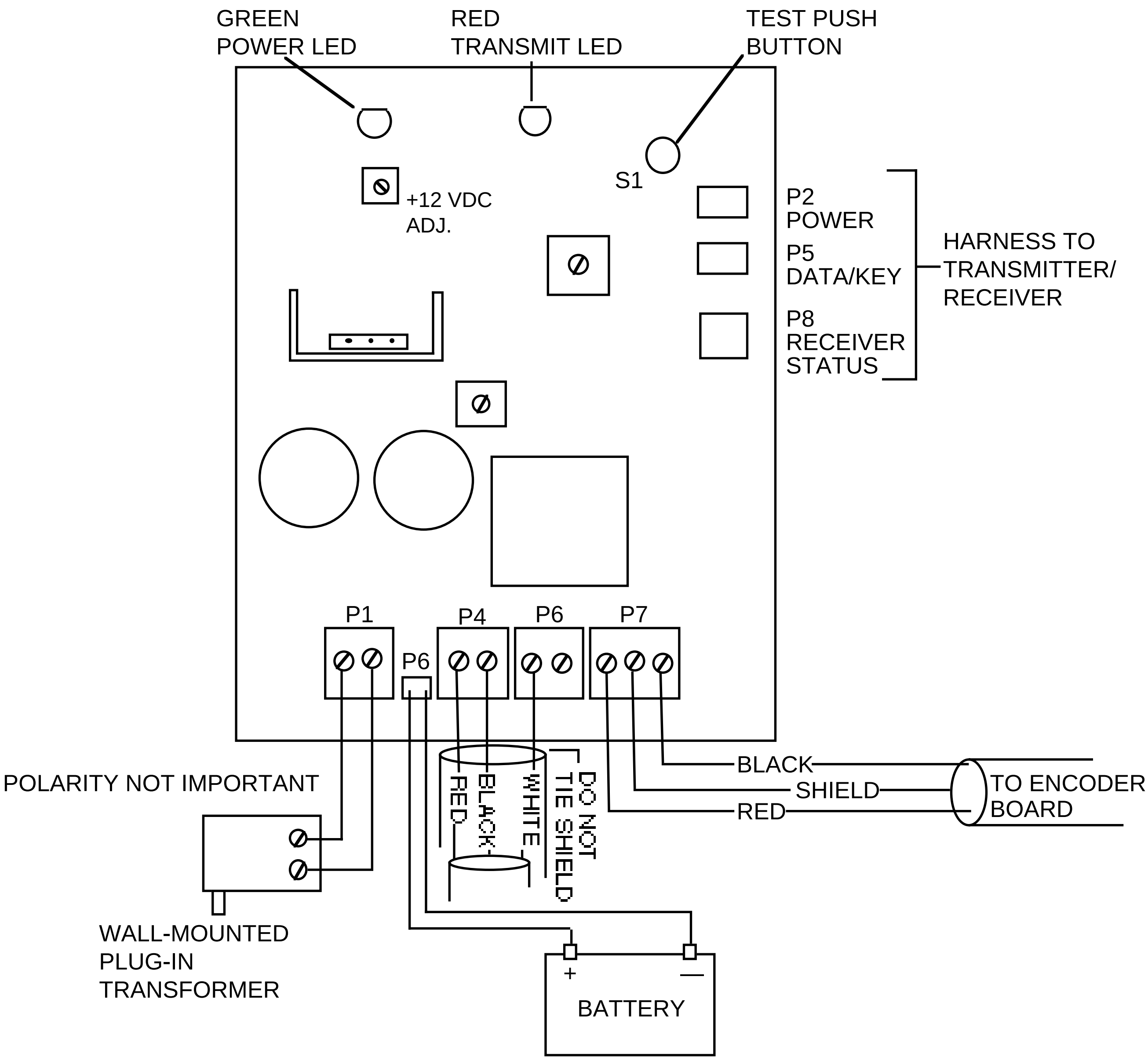


Figure 3-6 Transmitter Unit Power and Output Wiring



4.0 Initial Setup and Adjustment

4.1 General

4.1.1 The RANS system is not a complicated installation, and there are no required field adjustments. However, it is very important that the system be set up and tested in your shop before installing the equipment at the project site.

4.1.2 The typical RANS installation consists of an encoder in the control area and a transmitter and antenna near or on the roof. Troubleshooting the distributed system can be difficult and time consuming. Testing in your shop is much more convenient and cost effective.

4.1.3 This procedure is set up to be used in your shop or in the field. It is recommended that this procedure be first used in the shop. When the equipment is installed in the field, paragraphs 4.4 through 4.7 of this procedure can be used to check out the installed system.

4.1.4 It is further recommended that you obtain the following special test equipment to test the frequency and output power of your completed installation. This equipment is available as a “loaner” kit from **CDT**. Refer to brochures and price list.

- Frequency scanner or receiver adjusted to receive the operating frequency of your installation.
- RF power meter such as a Bird Model 43 Thruline wattmeter with a 5-watt plug-in element of the correct frequency range.
- Appropriate adapters to connect power meter to transmission line.

4.2 Overview of Setup Procedure

4.2.1 The bench setup consists of assembling all equipment in your shop, interconnecting the equipment, and running tests.

4.2.2 For best results, the encoder unit should be placed in one area and the transmitter and antenna located in another area at least 35-50 feet away. The Personal Alarm Receivers can be placed on the bench near the encoder.

4.3 Beginning Procedures

4.3.1 Locate and inventory all components needed for the system installation including test equipment.

4.3.2 Check each unit for physical damage. Check for loose parts and connectors.

4.3.3 Open the encoder unit and place on the bench. Connect the wall-mounted power supply and the 50-foot, or longer if required, piece of 20- to 22-gauge cable(s) for connection to the transmitter unit. *(See Figure 3-4.)*

> **NOTE: DO NOT power any unit until the complete system is connected and checked.**

4.3.4 Open the transmitter unit and place on a bench in the remote location. Connect the wall-mounted power supply and the other end of the 50-foot cable(s) coming from the encoder unit. *(See Figure 3-6.)*

4.3.5 Assemble the antenna using the instructions contained with the antenna or the appropriate Appendix.

4.3.6 Carefully unpack and uncoil the antenna cable. This cable is normally terminated at the factory and ready for installation. If, for some reason, the cable is not terminated or not supplied for your installation, an antenna transmission line must be fabricated for your installation. Use only low loss RG-8, Belden 9913, or RG-213/U, Belden 8267, or an acceptable equivalent. Install connectors in accordance with the appropriate information in Appendix D.

4.3.7 Connect the antenna transmission cable between the antenna and the connector on the RF power meter. Connect the other side of the RF power meter to the transmitter unit. *(Refer to Figure 3-5.)* Set the power meter to read the forward power. For this test, the antenna can be hung on a string or stood in the corner away from excessive metalwork.

4.3.8 Unpack each personal alarm receiver and place on the bench. Be sure each receiver has a fully charged battery.

4.3.9 You are now ready to begin bench testing.

4.4 Initial Power Up

4.4.1 Power up and test the transmitter and then the encoder unit. Then power up and test each of the portable receivers.

4.4.2 It is recommended that the tests be completed in the order shown. If problems occur and you call the factory, it is best to know what tests have been completed.

4.5 Initial Transmitter Testing

4.5.1 Apply power to the transmitter unit by plugging in the wall-mounted power transformer.

4.5.2 The green LED on the top edge of the circuit board will light, showing that the power supply is operating correctly. *(See Figure 1-2.)*

4.5.3 Press the manual test pushbutton located on the circuit board. *(See Figure 1-2.)* The transmitter should be transmitting carrier only and the red “key” LED on the circuit board top edge will light. The indication on the power meter should be between 1.8 and 2.2 watts for the 2-watt transmitter, or 4.5 and 5.5 watts for the 5-watt transmitter. Release the manual test pushbutton.

4.5.4 Reverse the “slug” in the power meter to read reflected power. Momentarily key the transmitter. The reflected power should read almost zero. If the reflected power is more than one-half watt, there is a problem with the antenna or transmission line. The problem, however, could also be caused by the temporary location of your antenna. Relocate your antenna to an open area outside and repeat tests from 4.5.3 above. If the problem recurs, check each of the connections. If in doubt, contact the factory.

4.5.5 Tune your receiver/scanner to the transmitter frequency. When the transmitter is keyed, the presence of the carrier should be evident by the carrier “quieting” heard on the scanner.

4.5.6 This completes the tests of the transmitter unit and you can proceed to the encoder.

4.6 Initial Encoder Testing

4.6.1 Apply power to the encoder unit by plugging in the wall-mounted power transformer.

4.6.2 The green power LED on the lower right of the circuit board should light, indicating that the power supply is operating correctly. See Figure 1-3.

4.6.3 Measure the power supply voltage by placing voltmeter probes on the +12V and GND terminals. The voltage should be 12 VDC ± 0.5 volts.

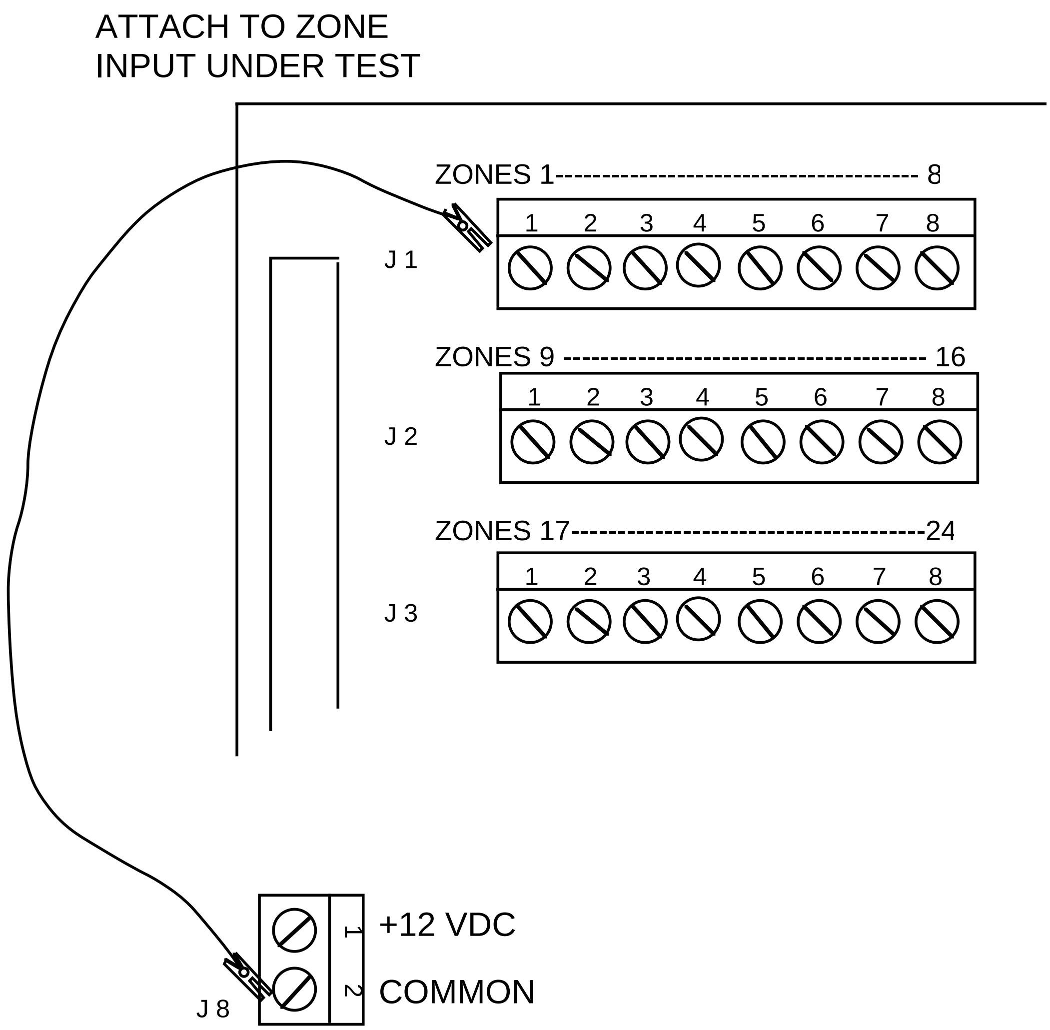
4.6.4 If your encoder is equipped with the optional monitor speaker, set the volume control using the push button level control S1. If your unit does not have the optional monitor speaker, you can also listen for the audio output using a frequency scanner (if your system is using a transmitter) or any 8-ohm loudspeaker or headphone connected to the loudspeaker terminals. *(See Figure 1-2.)*

4.6.5 Press the red system test button, S2, located on the lower left side of the circuit board. The test button is set up to transmit a test signal when pressed. The following should occur:

Momentarily press and release the button once:

- The red transmit LED on the encoder board should light.
- The voice message should be heard from the monitor loudspeaker.
- The red transmit LED in the transmitter unit should light (if transmitter in system).

Figure 4-1 Alarm Input Test Jumpers



- The RF power meter should indicate power output just as in paragraph 4.5.3 above (if transmitter in system).
- The receiver/scanner should receive the paging tones and the test audio message: “testing system,” “system test OK.”

4.6.6 Provide an alarm input on one of the alarm contacts of the encoder board. See Figure 4-1 for method of activating test alarm inputs using jumper wire.

CAUTION: If you are performing this test while connected to the external alarm equipment, do not use the jumper connections shown in Figure 4-1. Provide alarm input from the external alarm equipment or from the input connections in accordance with Figure 3-3.

- The red transmit LED on the encoder board should light.
- The voice message should be heard from the monitor loudspeaker.
- The red transmit LED in the transmitter unit should light (if transmitter in system).
- The RF power meter should indicate power output just as in paragraph 4.5.3 above (if transmitter in system).
- The receiver/scanner should receive the paging tones and the audio message (if transmitted).

4.6.7 The action in paragraph 4.6.6 should reoccur each time an encoder alarm input is activated. If the system does not check out as indicated above, proceed as follows:

4.6.7.1 Check the power supply voltages at both the encoder and the transmitter units. The voltage should be 12 VDC ± 0.5 VDC.

4.6.7.2 If the encoder transmit LED lights but the transmitter LED does not, check the wiring connections between the encoder and transmitter.

4.6.7.3 Go back to paragraph 4.5 and retest the transmitter unit. If the transmitter tests good again, the encoder may be defective. Contact the factory for assistance.

4.6.8 This completes the initial tests of the encoder unit and the connection to the transmitter and the antenna. You can proceed to test the portable alarm receivers.

4.7 Portable Alarm Receiver Testing

4.7.1 Turn on each portable alarm receiver and turn the volume to the approximate midpoint. Turn on and test each receiver one at a time so that each receiver can be evaluated without hearing the other receivers.

4.7.2 Appendix A contains the portable alarm receiver operation instructions. Read Appendix A before proceeding.

4.7.3 Press the red system test pushbutton on the encoder to send the test message. Verify that the alarm transmission is properly sent and the quality is good.

4.7.4 Using the method of paragraph 4.6.6 above, send alarms from several or all of the alarm zones in the system. Verify that the alarm transmission is properly sent and the quality is good.

4.7.5 This completes the system tests. Disassemble the test system, repackage and prepare for system installation at the project site.

4.8 Changing or Moving Voice and ROM Chips

4.8.1 Occasionally, a voice chip or programming integrated circuit "chip" must be changed in the field. The removal and installation is not difficult. Removal and installation can be easily accomplished using a conventional integrated circuit removal tool available at most electronic supply stores.

4.8.2 If a circuit change is required, contact the factory for supplemental instructions covering circuit removal and replacement.

5.0 System Startup and Testing

5.1 General

5.1.1 This section covers the start-up and testing of the field installed system.

5.1.2 This section assumes that the system has been tested in the shop in accordance with Section 4.0 and each piece of equipment has been installed in accordance with Section 3.0.

5.2 Applying Power and Initial Testing

5.2.1 Power-up and test the transmitter and antenna in accordance with paragraph 4.5. The RF power meter should be used for this test and the forward and reflected power recorded on the form inside the transmitter enclosure for future reference when servicing. The use of a portable receiver/scanner can aid your testing.

5.2.2 Power-up and test the encoder (in conjunction with the transmitter) in accordance with paragraph 4.6.

5.2.3 Power-up and test each Portable Alarm Receiver in accordance with paragraph 4.7.

5.2.4 Walk the perimeter or the area that will be normally patrolled by the roving officers. Send periodic alarm transmissions to verify that alarms are reliably received in all areas.

5.3 Final Testing

5.3.1 At the completion of initial testing, if the system demonstrates proper operation, you should be ready for final testing and acceptance with the owner's representative.

5.3.2 Proceed with testing in a logical manner. The RANS system can be tested in conjunction with the other alarm systems being installed at the same time.

5.3.3

Record the acceptance of all tests and obtain an acceptance signature from the owner's representative.

5.4 Operator Training

5.4.1

Following final testing and acceptance, at least one operator training session should be conducted. As you are aware, many of the first service calls on any system are from operators who do not understand the system operation. An informed operator and maintenance technician are your best spokespersons.

5.5 Maintenance Training

5.5.1

Following final testing and acceptance, at least one maintenance training session should be conducted. The maintenance training should be conducted in association with the operator training. Maintenance training should be conducted "hands-on" with the equipment. Copies of this manual should be provided to the maintenance personnel during maintenance training.

6.0 Maintenance

6.1 General

6.1.1 The RANS system, once installed, is part of the total security system and should be tested as part of the complete system. Refer to the manuals for the alarm system connected to the RANS to determine how testing should be conducted.

6.2 Cleaning/ Adjustment

6.2.1 Special cleaning and adjustments are normally not required. However, the antenna installation should be visually inspected each month and whenever severe changes in weather or lightning occurs.

6.3 Special Requirements

6.3.1 The facility management may have requirements and procedures that require additional maintenance and testing beyond those listed herein.

6.3.2 If questions arise about maintenance and testing, please contact your factory representative.

7.0 Troubleshooting

7.1 Systematic Testing

7.1.1 Problems sometimes occur due to equipment failures. However, in most cases, problems are caused by human or installation-related items, such as:

- Shipping damage.
- Distributed wiring or connections.
- Physical damage.
- Lightning damage.

7.1.2 Always look for the simplest problem first. For example, always check for power supply voltages before starting any further testing.

7.1.3 When approaching a system malfunction, look first for a related activity that could have caused the problem. This will help you go directly to the possible problem areas and/or obtain more accurate factory assistance. Examples are:

- Recent maintenance actions or installations of other equipment in the same area or equipment rooms.
- Water or lightning damage.

7.2 Problem Identification and Resolution

7.2.1 Figure 7-1 is provided to help you find and resolve system defects.

7.2.2 If a problem occurs, test by following the procedures provided in paragraphs 4.5 through 4.7.

7.3 Repair

7.3.1 Perform system repairs by using good commercial practice. It is recommended that repairs be performed by personnel who have received factory training. Improper repairs or system damage caused by untrained personnel can affect the warranty.

7.3.2 Isolate defective components by swapping field connections with known good components or by using spare components reserved for maintenance actions. Repairs to circuits contained inside the equipment are not recommended in the field unless authorized by a factory technician.

7.3.3 Return components thought to be defective to **CDT** for repair in accordance with the repair procedure. Include information describing the nature of the problem with the component to be repaired. This will shorten the factory repair time.

7.4 Warranty

7.4.1 **CDT** makes no warranty, expressly or by implication except as set forth below. **CDT** warrants that the products delivered hereunder will be in substantial conformity with applicable specifications and will be free from defects in material or workmanship. **CDT**’s obligation under this warranty shall be limited to (at its option) repairing, replacing, or granting a credit at the prices invoiced at the time of shipment for any of said products which shall, within one year after shipment, be returned to the factory of origin transportation charges prepaid, and which are, after examination, disclosed to **CDT**’s satisfaction to be thus defective. This warranty shall not apply to any of such products which shall have been repaired or altered, except by **CDT**, or which shall have been subjected to physical or electrical abuse or misuse.

7.4.2 THE WARRANTIES STATED HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, AND **CDT** NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY. **CDT** SHALL NOT BE LIABLE FOR SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE WITH RESPECT TO ANY PRODUCTS OR SERVICES RENDERED HEREUNDER. NO PRODUCT IS WARRANTED TO BE FIT FOR ANY PARTICULAR USE OR APPLICATION.

FIGURE 7-1
TROUBLESHOOTING GUIDELINES

SYMPTOM	POSSIBLE CAUSE	RECOMMENDED SOLUTION
One of the portable alarm receivers does not work but the others do	Battery bad	Check battery Recharge or replace
	Receiver defective	Return for repair.
All portable alarm receivers are not receiving any alarm inputs	Transmitter or encoder bad	Proceed to tests of the transmitter and encoder
Transmit LED on transmitter does not light when transmit button is pressed	No power to transmitter	Check for AC power
	Power supply defective	Test for +12VDC at trans-mitter power terminals
Transmitter trans-mits LED lights but the transmitter does not transmit	Transmitter module defective	Check with power meter and frequency scanner.

FIGURE 7-1
TROUBLESHOOTING GUIDELINES

SYMPTOM	POSSIBLE CAUSE	RECOMMENDED SOLUTION
Encoder power LED does not light	No AC power	Check for AC voltage at wall transformer
	Wall mounted power transformer defective	Check for 12 VAC at encoder power terminals
	Encoder power supply defective	Check for +12VDC at the power supply terminals. See para 4.6.3
Encoder transmit LED does not light when encoder test transmit button is pressed	Power supply defective	Check +12VDC power supply as noted above.
	ICs loose in sockets	Check all ICs for loose or broken connections
	Piggyback boards loose or connections broken	Verify each is correctly installed and firmly seated
	Encoder board defective	Return to factory for repair.
Encoder transmit LED lights and Transmitter LED lights but alarms are not transmitted	Alarm input wiring loose or broken	Check alarm input wiring using ohmmeter
	Plug-in boards loose in sockets or broken	Check for loose or broken connections
	Encoder board defective	Return to factory for repair.

Appendix Contents

A—Portable Alarm Receiver

Operating Instructions

Introduction

The portable alarm receiver is easily carried in a pocket, on a belt, or in a holster. It delivers clean and crisp alarm tones and voice alarm messages. Options include: Silent Vibrator Alert, Manual Monitor, Monitor (automatic monitor), and Group Call.

Controls

Your portable alarm receiver is standard without an ON/OFF switch and is automatically “on” when a battery is installed. After the battery has been installed, the Reset/Monitor button (round), which is near the volume control on the top of the pager, must be pressed and released. When the optional combination slide switch is used, reset/monitor functions are initiated by depressing the switch in any position except “off.”

To Receive an Alarm Tone and Voice Message

With the portable alarm receiver in the “ALT” (alert) position, set the volume control at mid-range until an alarm is received, then set the volume to the desired level. An alarm is preceded by a one-second alert tone, followed by the alarm voice message. The alarm receiver will automatically reset after the programmed time-out period, approximately 10 seconds. The reset/monitor switch allows the user to shorten the message (reset) by quickly depressing and releasing the button. The message time may also be extended (monitoring) by holding the button down to listen to the radio channel. A portable alarm receiver with the monitor-option, can be reset only (shorten the message time).

Monitor Option

An alarm received while in the “ALT” mode will automatically be switched to the monitor mode until reset. Manually switching the slide switch to the “MON” position will also activate the monitor mode. If the alert tone is heard but no message is heard, push and hold the reset button down until the message is heard. This will temporarily override the squelch and allow the alarm messages to be heard.

Vibrator Option

A portable alarm receiver with this option will vibrate silently when a call is received if the slide switch is in the “VIB” position. If desired, the audio message can be heard by quickly moving the slide switch to “ALT” and holding the button down to monitor the channel. With the monitor, normal tone and voice alarms can be heard in the “ALT” or “MON” positions.

Symptoms of a Weak Battery

Your portable alarm receiver has a low battery alarm. This consists of a low frequency tone (about 700 Hz.) which may be heard when the reset switch is pressed and released. It will also be heard mixed with normal alert tone. Other symptoms of a weak battery are the following:

- An extended alert tone
- Inability of the pager to decode alarm messages
- Low audio volume
- Poor voice quality
- A buzzing sound in the audio
- Audio comes on without apparent cause

If any of these symptoms are present, check your portable alarm receiver with a battery that is known to be good.

Battery Replacement

To change the battery, lay the receiver face down with the clip up and the bottom of the receiver toward you. Raise the foot of the clip and slide the battery compartment cover toward you to expose the battery. The battery or batteries can be jarred loose by holding the receiver in one hand and gently tapping the receiver against the other hand. Replace the battery, observing the correct polarity, as indicated on the battery and compartment label. Using any battery or components other than those specified by **CDT** may void your portable alarm receiver warranty. **WARNING: CHARGE ONLY NICKEL CADMIUM BATTERIES!**

Maintenance

ASIDE FROM BATTERY MAINTENANCE, cleaning terminals, and checking battery, no other maintenance is required.

Lifeguard Battery Saving

Your portable alarm receiver is designed with a patented battery saving circuit which allows for maximum battery life.

Service

In the event your portable alarm receiver should have a problem requiring service, be sure to note the exact nature of the difficulty when returning for repair. RETAIN THE ORIGINAL SHIPPING CARTON FOR RETURNING THE PAGER to eliminate shipping damage.

Replacement Batteries

Contact the factory for replacement battery information.

B—Standard Antenna Installation Information

YOU, YOUR ANTENNA, AND SAFETY

WARNING

INSTALLATION OF THIS PRODUCT NEAR POWER LINES IS DANGEROUS!

FOR YOUR SAFETY, FOLLOW THE INSTALLATION INSTRUCTIONS

Each year hundreds of people are killed, mutilated, or receive severe permanent injuries when attempting to install or remove an antenna. In many of these cases, the victim was aware of the danger of electrocution but did not take adequate steps to avoid the hazard.

For your safety, and a proper installation, please READ and FOLLOW the safety precautions that follow — THEY MAY SAVE YOUR LIFE.

Save these instructions for future reference. The same precautions will apply when dismantling an antenna.

GENERAL SAFETY DIRECTIONS

1. If you are installing an antenna for the first time, please, for your own safety as well as others, seek PROFESSIONAL ASSISTANCE. Consult your dealer. He can explain which mounting method to use for the size and type antenna you are about to install.

2. Select your installation site with safety, as well as performance, in mind (see page 2 for 'Site Selection'). REMEMBER: ELECTRIC POWER LINES, PHONE LINES AND GUY WIRES LOOK ALIKE. FOR YOUR SAFETY, ASSUME THAT ANY OVERHEAD LINES CAN KILL YOU.

3. Call your electric power company. Tell them your plans and ask them to come look at your proposed installation. This is little inconvenience, considering YOUR LIFE IS AT STAKE.

4. Plan your installation procedure carefully and completely before you begin. Successful raising of a mast or tower is largely a matter of coordination. Each person should be assigned to a specific task, and should know what to do and when to do it. One person should be designated as the "boss" of the operation to call out instructions and watch for signs of trouble.

5. When installing your antenna, REMEMBER:
   DO NOT use a metal ladder.
   DO NOT work on a wet or windy day. especially during electrical storms or when there is thunder and lightening in the area.
   DO dress properly — shoes with rubber soles and heels, rubber gloves, long sleeve shirt or jacket.

6. If the assembly starts to drop, get away from it and let it fall. REMEMBER: The antenna, mast, cable and metal guy lines are excellent conductors of electrical current. Even the slightest touch of any of these parts to a power line completes an electrical path through the antenna and the installer — THATS YOU!

7. If any part of the antenna system should come in contact with a power line, DON'T TOUCH IT OR TRY TO REMOVE IT YOURSELF. CALL YOUR LOCAL POWER COMPANY. They will remove it safely.

8. If an accident should occur with the power lines: DON'T grab hold of the person in contact with the antenna and power line or you too will be electrocuted. Use a DRY board, stick or rope to push or pull the victim away from the antenna. If the victim has stopped breathing, administer artificial respiration — and stay with it. Have someone call for medical help.

SITE SELECTION

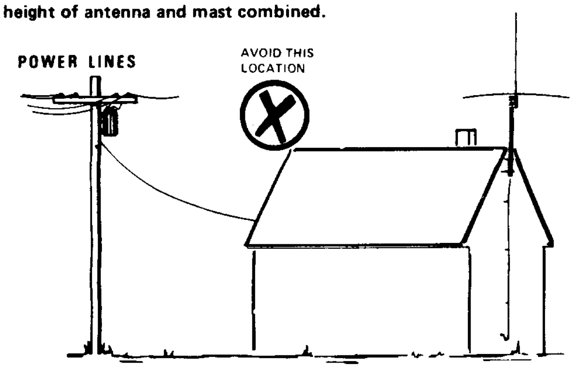
Before attempting to install your antenna, think where you can best place your antenna for safety and performance. To determine a safe distance from wires, power lines and trees:

1. **Measure the height of your antenna.**
2. **Add this length to the length of your tower or mast.**
3. **Then, double this total for the minimum recommended safe distance.**

If you are unable to maintain this safe distance, STOP! GET PROFESSIONAL HELP. Select an alternate location.

Most antennas are supported by pipe masts attached to the chimney, roof or side of the house. Antennas can also be attached to self-supporting towers or masts or towers and masts supported by guy lines. Generally, the higher the antenna is above ground, the better it performs. Good practice is to install your vertical antenna about 5 to 10 feet above the roof line and away from power lines and obstructions. Remember that the FCC limits your antenna height to 60 feet. If possible, find a mounting place directly above your set, where the antenna wire can take a short, vertical drop on the outside of the house for entry through a wall or window near the set. Your dealer carries a complete line of installation hardware.

The safe distance from power lines should be at least twice the height of antenna and mast combined.

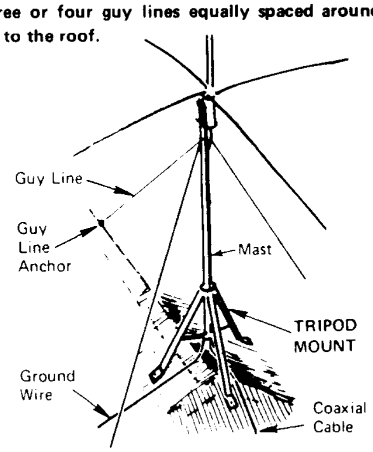


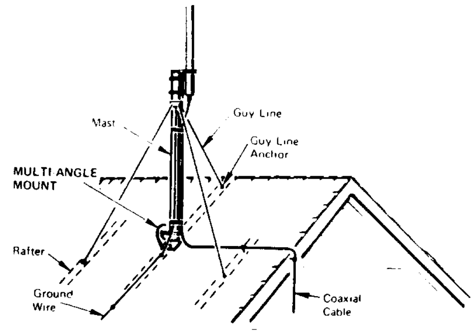
CHOOSE A PROPER SUPPORT AND MOUNTING METHOD

There are three types of supporting structures commonly used in antenna installations; roof, free standing and side-of-house mounts. Illustrations of these devices and various mounting methods follow.

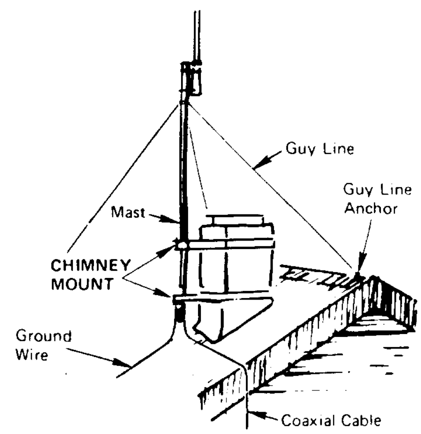
ROOF MOUNT for flat or peaked roofs

A tripod mount will accept a five to ten foot 1¼" diameter steel mast for CB omni-directional antennas. One clamp-type bracket is used with three or four guy lines equally spaced around the mast and anchored to the roof.





The swivel feature of the multi-angle mount makes a convenient CB omni-directional antenna mount. One clamp-type bracket is used with three or four guy lines equally spaced aroung the mast and anchored to the roof.



The chimney is often an easy and convenient mounting place. But, the chimney must be strong enough to support the antenna in high winds. Do not use a chimney that has loose bricks or mortar.

A good chimney mount makes use of a five or ten foot 1¼" diameter steel mast and a heavy duty two-strap clamp-type bracket. Install the upper bracket just below the top course of bricks and the lower bracket two to three feet below the upper bracket. For maximum strength, space the brackets as far apart as possible and use guy lines.

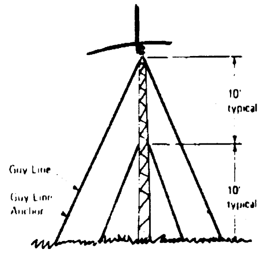
Follow suitable mounting methods and limitations described in the instructions supplied with the mount.

On all roof mounts, apply roofing compound around the base of brackets, screws and anchors for moisture sealing.

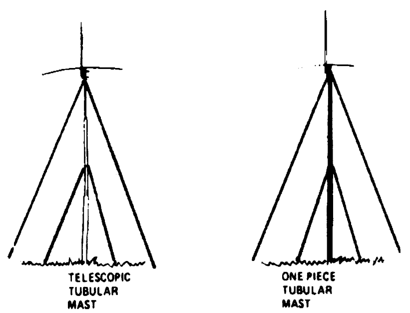
Make guy wire attachments through roof and into rafters for strength.

The safe distance from power lines is at least twice the height of the antenna and mast combined.

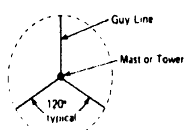
FREE STANDING MOUNTS
with guy lines or alongside a structure



The one-peice mast, telescopic tubular mast and tower allows the antenna to be mounted away from structures. However, for added strength, a mast or tower may be erected next to a structure and attached to it.



The minimum safe diameter mast for this antenna is specified on the antenna assembly instructions. Guy lines should be equally spaced (see below) in at least three directions. Use at least three guy wires for each 10-foot length of mast.

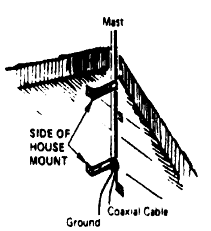


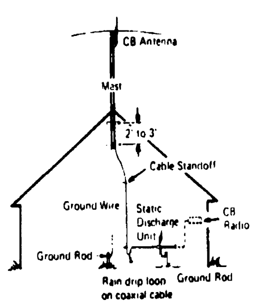
TOP VIEW

Follow suitable mounting methods and limitations described in the instructions supplied with the tower or mast.

The safe distance from power lines is at least twice the height of the antenna and mast combined.

SIDE OF HOUSE MOUNT





Where roof overhang is not excessive, the side of the house provides a convenient mounting. Position the brackets over a stud if possible, one above the other, and space two or three feet apart. For metal siding, first mark mounting holes; then, drill pilot holes through the siding to accept mounting screws

Follow suitable mounting methods and limitations described in the instructions supplied with the mount.

The safe distance from power lines is at least twice the height of the antenna and mast combined.

GENERAL INSTALLATION DIRECTIONS FOR MAST MOUNTED ANTENNAS

1. **Additional material needed to complete installation is described in antenna assembly instructions.**

2. **Assemble the antenna on the ground at the installation site. Keep the assembly instructions that come with the antenna separate from other instructions (for mount, cable, etc.).**

3. **On the ground, clamp antenna to mast, pull enough coaxial cable and connect to antenna.**

4. **Various methods of raising an antenna (or mast), such as "walking up" or the use of an "X frame" can be found in manuals and handbooks available at most dealers. To insure that a mast does not fall the "wrong way" if it should get away during installation or take-down, durable non-conductive rope should be secured at each ten foot level as the mast is raised. The boss stands in a position where he can yank or pull the ropes if the need arises to deflect the falling mast away from hazards (such as power lines) into a "safe fall" (such as a yard or driveway). The ropes are tied taut at the base of the mast after installation and in place at the various levels.**

5. **Install selected mount following instructions supplied with it. Note any limitations and follow recommended installation procedures.**

6. **When using guy lines:**

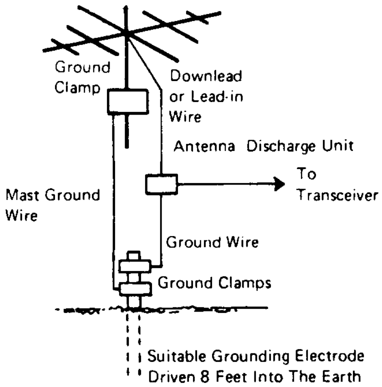
   Install guy anchor bolts
   Estimate length of guy wire and cut.
   Attach guy line ring to mast.
   Attach guy lines to mast and anchor securely.

7. **Carefully take antenna and mast assembly to mounting bracket and insert. Tigthen clamp bolts. In case of guyed installation, it will be necessary to have at least a second person hold the mast upright while the guy lines are attached and tightened to the anchor bolts.**

8. **Install self-adhering "DANGER" label, packaged with antenna, on the mast.**

9. **Install ground rod to drain off static electricity buildup and connect ground wire to mast and ground rod. Use special ground rods – not a spare piece of pipe.**

EXAMPLE OF ANTENNA GROUNDING AS PER NATIONAL ELECTRICAL CODE INSTRUCTIONS



1. **Use No. 10 AWG copper or No. 8 AWG aluminum or No. 1 AWG copper-clad steel or bronze wire, or larger as ground wires for both mast lead-in. Securely clamp the wire to the bottom of the mast.**
2. **Secure lead-in wire from antenna to antenna discharge unit and mast ground wire to house with stand-off insulators spaced from 4 feet (1.22 meters) to 6 feet (1.83 meters) apart.**
3. **Mount antenna discharge unit as close as possible to where the lead-in wire enters the house.**
4. **Drill a hole in wall near set just large enough to permit entry of cable.**
5. **Push cable through hole and form a rain drip loop close to where it enters house. (Careful! There are wires in that wall!)**
6. **Put a small amount of caulking around cable where it enters house to keep out drafts.**
7. **Install static electricity discharge unit. The grounding conductor shall be run in as straight a line as practicable from the antenna mast and/or the antenna discharge unit to the grounding electrode.**
8. **Connect antenna cable to set.**

You should not attempt to raise or lower a mast in excess of 30 feet in heigth/length (not including the antenna proper) in a fully extended condition. Thirty to fifty foot tubular masts must be raised or lowered a section at a time with the base or outer section secured in place with guy lines. GET PROFESSIONAL HELP.

Keep this installation instruction booklet for future reference when removing the antenna. Remember, use similar cautions when disassembling – the same electrical hazards exist. IF YOU ARE IN DOUBT – GET COMPETENT PROSSIONAL ASSISTANCE.

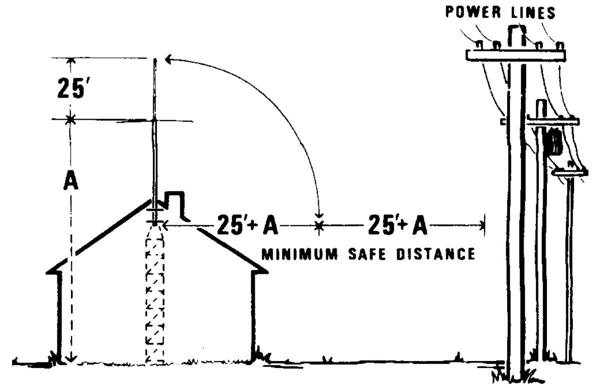
ANTENNA REMOVAL

FOR YOUR SAFETY, READ THE FOLLOWING DIRECTIONS BEFORE STARTING TO REMOVE AN ANTENNA

CHECK FOR SURROUNDING HAZARDS

Most important, CHECK FOR LOCATION OF POWER LINES. Their closeness to the antenna may not have been considered when it was put up or new lines may have been installed after the antenna was.

Remember, whatever the length of the antenna and mast is combined – DOUBLE IT – that's the safe distance ANY power line must be from the antenna. Refer to the illustration below.



IF POWER LINES ARE NOT AT LEAST THIS SAFE DISTANCE FROM THE ANTENNA – STOP ! CONTACT YOUR POWER COMPANY OR PROFESSIONALS THAT DO THIS TYPE OF WORK.

Are there other antennas nearby or on the same mast that may get in the way?

Are there other objects that may interfere with antenna removal such as trees, air conditioning units, chimneys, dormers, etc.

CHECK THE CONDITION OF THE ANTENNA

The condition of the antenna has changed since it was put up. The weather may have caused rust and corrosion. Some parts may be weak, cracked or broken.

If possible, inspect radials, elements, brackets, etc. and remove any broken or loose pieces that may unexpectedly fall off during disassembly and cause injury.

CAREFULLY DISASSEMBLE AND REMOVE ANTENNA

DO NOT remove an antenna on a windy day or during bad weather. Especially during electrical storms or when there is thunder and lightening in the area.

Have at least one other person to assist you, two would be even better.

Hand tools usually required are pliers, screw driver and adjustable wrench. However, since each situation is different, other equipment may be needed. Use penetrating oil to loosen any rusted screws and nuts.

Disconnect all cables from equipment and power sources first. Then disconnect all cables at the antenna.

If any radials or elements can be easily removed whille the antenna is still mounted, do so.

Be carefull not to let the antenna, parts or tools fall that could cause damage or injury.

Most antennas are not heavy, but they can be difficult to handle. Use strong rope (nylon or hemp) securely attached to the antenna to help control it while it is being removed.

Remember, if you are unsure about what to do or are doubtful about whether you can handle the job – STOP – get professional help.

C—Base Station Antennas

ASP-680
ASP-682
ASP-700
ASP-685
ASP-970
ASP-3682
ASP-3700

VHF or UHF Fiber Glass COLLINEAR GAIN BASE STATION ANTENNA

This antenna has been tuned by the factory to operate satisfactorily in the frequency range marked on its mounting support when properly installed.

The use of PTFE or similar lubricant on the threaded portions of the clamp and connectors, prior to assembly, will give protection from weather and ease future disassembly.

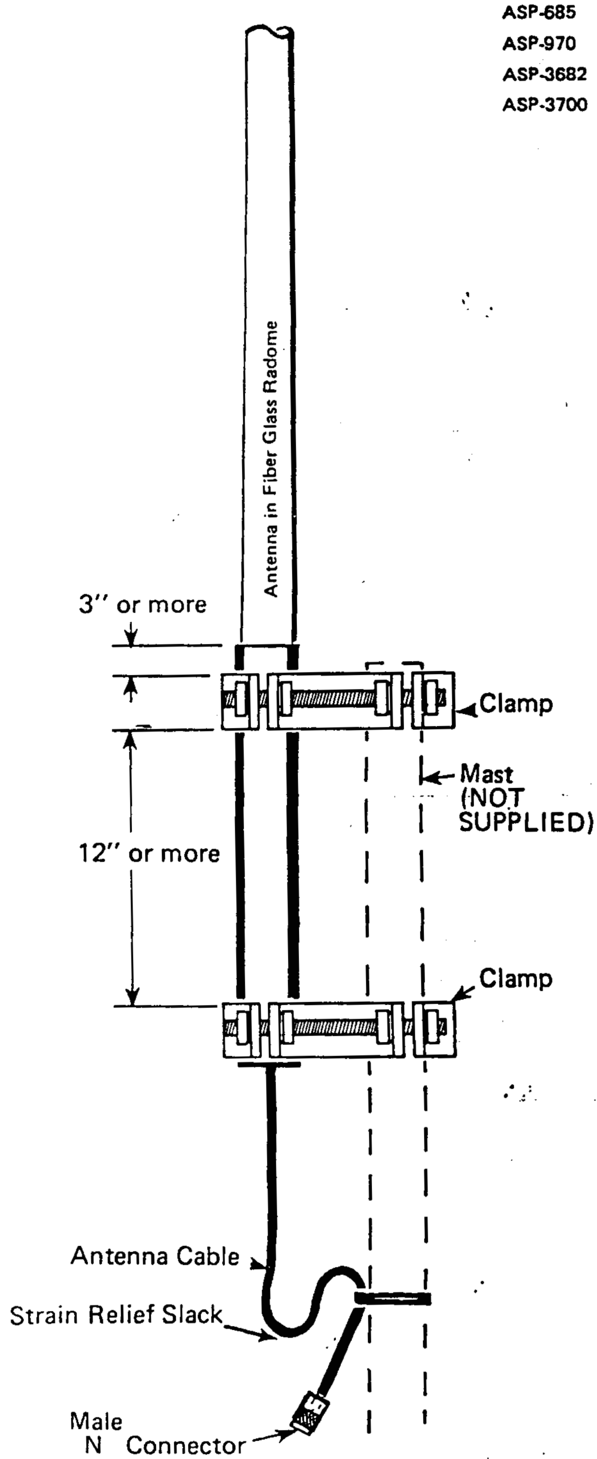
Attach the antenna securely to the mast or tower using the clamps supplied. Install the top clamp 3 inches or more from the bottom of the fiber glass radome. Leave at least 12 inches between the top and bottom clamps.

To prevent weakening of the installation,do not overtighten clamps, as evidenced by deformation of the tubing or clamp hardware.

The 50 ohm antenna pigtail terminates in an N male connector.After attaching the 50 ohm feed cable (not supplied),weatherproof connections refer to information on reverse page.

Secure the cable to the mast or tower leaving slack to prevent strain on connection.

This is a shunt-fed antenna and will show a dc short from the center of the coaxial cable to shield.



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the antenna specialists co.
a member of The Allen Group Inc.
30500 Bruce Industrial Parkway, Cleveland, Ohio 44139-3996 U.S.A.
TEL NO 216-349-8400

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WEATHERPROOFING COAXIAL CONNECTIONS

- Wrap other type connection such as a Pigtail connector to an antenna in the same manner as decribed below.

1. BEGINNING AS SHOWN IN FIG. 1 BY OVERLAPPING HALF-WIDTH. WRAP SEALANT TAPE OVER ENTIRE CONNECTION.

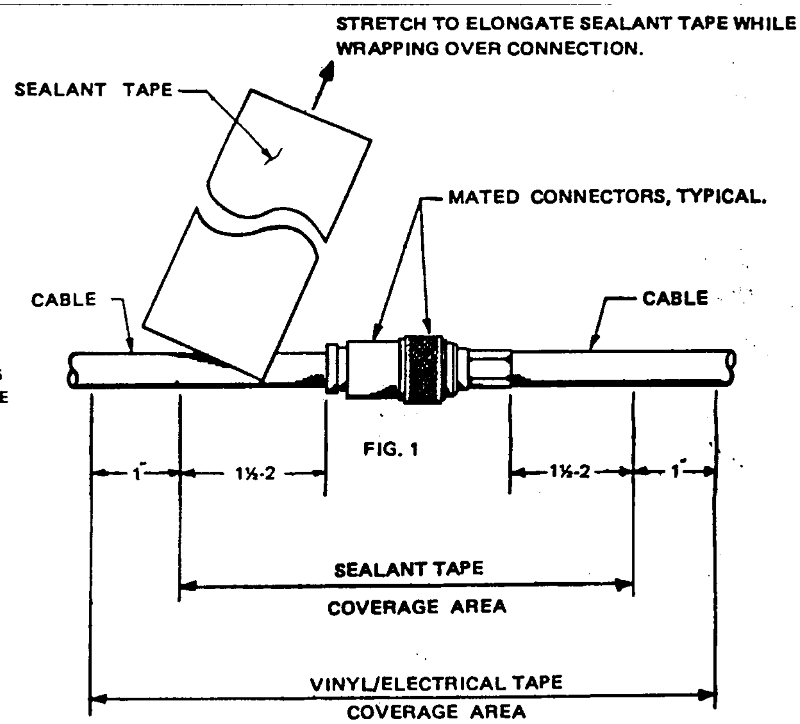


FIG. 1

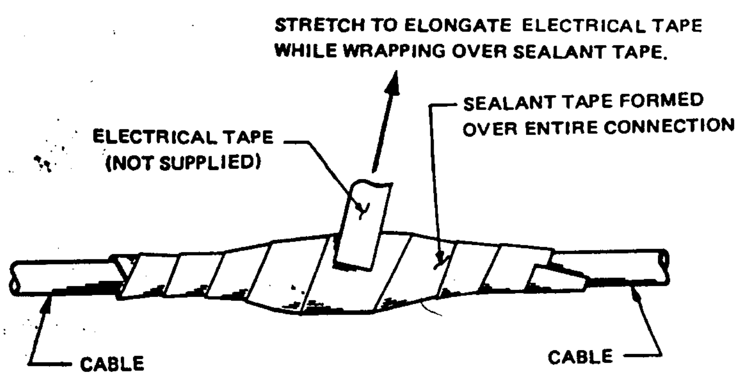


FIG. 2

2. GENTLY PRESS ON THE SEALANT TAPE FORMING IT TO THE CONNECTION, ITSELF AND THE CABLE JACKETS, AS SHOWN IN FIG. 2.

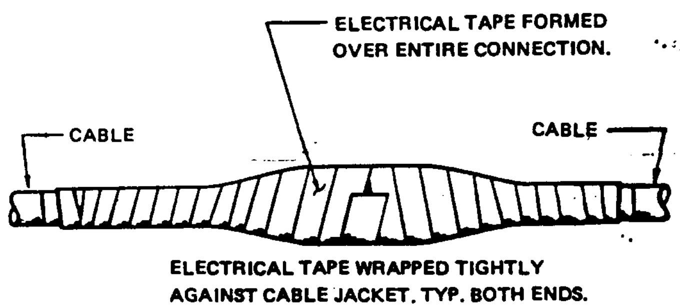


FIG. 3

3. BY OVERLAPPING HALF-WIDTH, WRAP ELECTRICAL TAPE (NOT SUPPLIED) OVER THE ENTIRE SEALANT TAPE CONNECTION; WHILE STRETCHING TAPE, BEGIN AT CENTER OF FORMED SEALANT TAPE AND WRAP TOWARDS ONE END APPROXIMATELY ONE INCH BEYOND END OF SEALANT TAPE. INSURE TIGHT ELECTRICAL TAPE COVERAGE ONTO CABLE JACKET WITHOUT BREAKING ELECTRICAL TAPE, REVERSE DIRECTION AND WRAP TO OTHER END, AGAIN EXTENDING APPROXIMATELY ONE INCH BEYOND END OF SEALANT TAPE INSURE TIGHT COVERAGE ONTO CABLE JACKET. REVERSE DIRECTION AGAIN AND WRAP ELECTRICAL TAPE TO CENTER OF CONNECTION AND STOP.

D—RF Connector Installation

The following information is provided to properly terminate the RF connectors that may be needed for a Mobile Map Plus installation.

This information applies directly to connectors made by Amphenol. Connectors manufactured by other manufacturers may differ slightly. Consult the assembly instructions for the connector you are using.

Information is provided on the following connectors:

BNC; MIL-CLAMP I & II

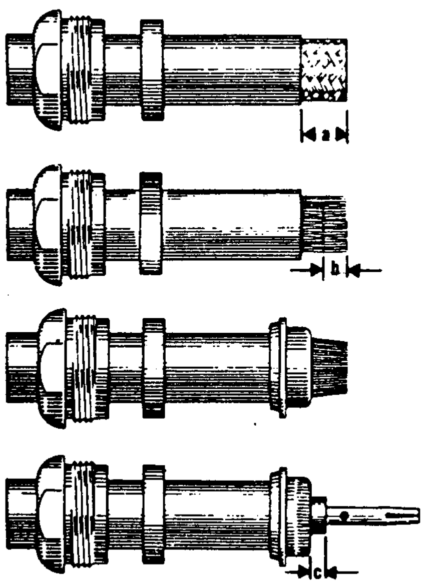
Type N; MIL-CLAMP I & II

UHF; UG Standard

If you are not experienced with installing radio frequency connectors, refer this portion of your installation to a qualified technician.

MIL-CLAMP® I & MIL-CLAMP® II

N ASSEMBLY INSTRUCTIONS



Stripping dims. ±1/64(0.4) Inches (millimeters)	a	b	c (ref.)
MIL-CLAMP I 35250 35275	9/32(7.1) 29/64(11.5) 9/16(14.3)	5/32(4.0) 3/16(4.8) 11/64(4.4)	.045(1.2) .130(3.3) .272(6.9)
MIL-CLAMP II	—	—	—
82-4352-1, 82-4356-1, 82-4360-1, 82-4364, 82-4357 & 82-4369	9/32(7.1)	5/32(4.0)	.045(1.2)
82-4352, 82-4356, 82-4360, 82-4365 & 82-4368	23/64(9.1)	15/64(6.0)	.045(1.2)

Place nut and gasket, with "V" groove toward clamp, over cabl and cut off jacket to dim. a.

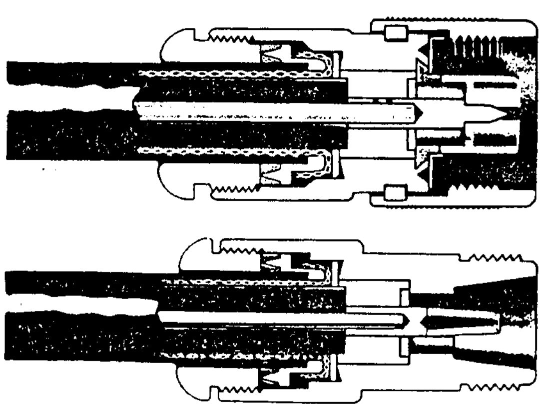
Comb out braid and fold out. Cut off cable dielectric to dim. as shown.

Pull braid wires forward and taper toward center conducto Place clamp over braid and push back against cable jacket.

Fold back braid wires as shown, trim to proper length and for over clamp as shown. Solder contact to center conductor.

Insert cable and parts into connector body. Make sure sha edge of clamp seats properly in gasket. Tighten nut.

NOTE: For armored cable slide cap over armor first. Push arm and cap back out of way and proceed with assembly as directe above using armor clamp in place of standard clamp nut. Wh assembly is complete straighten bulge in armor and trim so can be clamped between nut and cap.



E—Supplemental Information

RS-232 Input Interface for RANS System

Introduction

The RS-232 serial alarm input interface is available on the RANS-DV Roving Alarm Notification System. The circuitry is built into the encoder circuit boards but must be selected in software to operate. When the serial interface is selected in software, the discrete (closed contact) inputs are disabled.

Connection

Connection is made to the 10-pin male header on the encoder circuit board using a DB type connector and harness (normally DB-9 female). A standard 9-pin serial cable can be used to connect to the serial port of the host computer system. All other connections to the encoder circuit board remain the same.

Communication Protocol

The alarm communications consist of an individual byte for each alarm input sent to the alarm encoder. The serial input buffer has a capacity of 16 individual alarms. Alarms are contained in a first-in first-out buffer (fifo) and sent out in the order that they are received into the buffer. The communications protocol consists of 9600 baud, 8 bits, no parity, and 1 stop bit. The operation for each alarm transmission is as follows:

- Host computer sends an RTS (request-to-send).
- The alarm encoder returns a CTS within 100 msec. maximum if the encoder input buffer is not full. The host program should contain a time out of greater than 100 msec. A time out of 1 second is recommended to avoid hangups.

Typical time to return CTS is 0-5 msec.

- Host computer sends the alarm data byte

  The alarm date byte consists of 8 bits:

  — The first bit is a status bit

    A zero in the first bit indicates the byte contains an alarm to be sent.

— The next seven bits are the binary number of the alarm input number. For example,

00000111	indicates an alarm in zone 7
00001010	indicates an alarm in zone 10

If the first bit is a 1, a control instruction is sent. For example:

— If the first bit is a 1 followed by all zeros, the input buffer is reset and all alarm transmissions are aborted. Note: Any voice message transmissions in progress will be completed.

- The input register will accept up to 16 alarms at any time. As alarms are transmitted, locations in e input register are freed for use by new alarms. If the buffer is full (16 alarms), a CTS is not returned until the next alarm is sent and a "place" is available in the buffer.

Sample Software

Included with the serial alarm input interface is sample software for testing or assisting in setting up the serial interface. The software program is written in Qbasic which is available with MSDOS 5.0 and later. The program name is RS232 and will load after Qbasic. The Com port is defaulted to COM 1, but can be changed if necessary in the program. Running the program will allow you to selectively send alarms to the encoder from the PC.

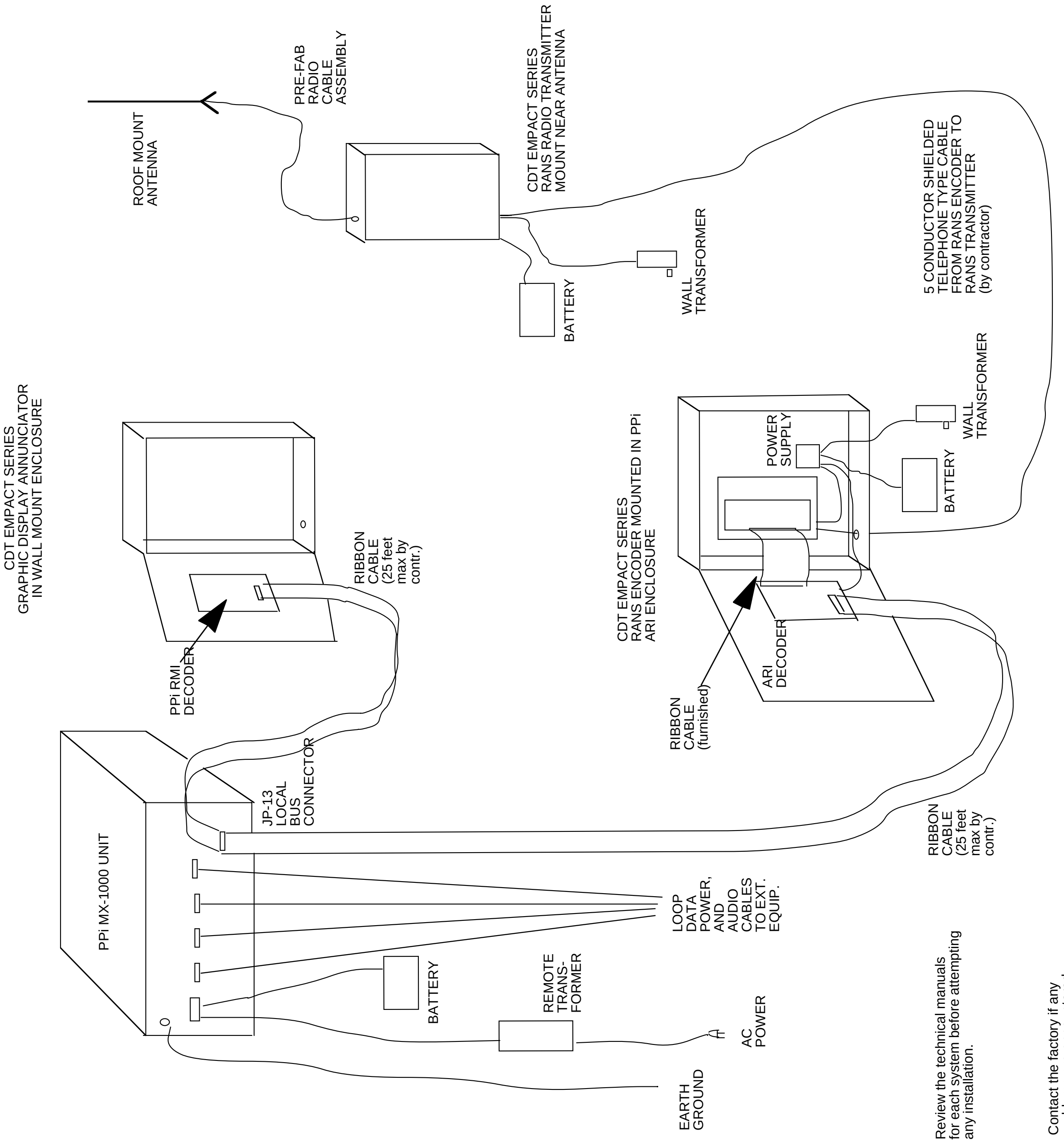
If you have any questions, please contact the factory.

F—Connection to the Perimeter Products MX-1000

The *RANS-DV* encoder can be easily connected to the Perimeter Products MX-1000 using the MX-1000 ARI Decoder Circuit Board. The *RANS-DV* encoder is mounted in the same enclosure as the MX-1000 ARI decoder, and the two units are connected by a ribbon cable. The connection to the MX-1000 is reduced to a ribbon cable from the MX-1000 to the ARI decoder.

Figure F-1 shows the interconnection of the MX-1000 to the *RANS-DV* encoder. In this configuration, the ARI decoder and the *RANS-DV* encoder can be powered by one wall-mounted, plug-in transformer power supply.

If you desire this interconnection, please contact the factory. The ARI/RANS encoder can be assembled and tested at the factory. If field installation is required, detailed installation instructions are available.



Review the technical manuals for each system before attempting any installation.

Contact the factory if any problems are encountered.

FIGURE F-1

INTERCONNECTION OF PPi MX-1000 TO CDT RANS-DV AND GRAPHIC ANNUNCIATOR SYSTEMS