

NUREG-0274  
Five in a Series of  
Five Reports

# CATALOG OF PHYSICAL PROTECTION EQUIPMENT

Book 3

Volume VIII. General Purpose Communication Components

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The MITRE Corporation  
for  
U. S. Nuclear Regulatory Commission

725 336



# CATALOG OF PHYSICAL PROTECTION EQUIPMENT

## Book 3

### Volume VIII. General Purpose Communication Components

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Division of Safeguards, Fuel Cycle and Environmental Research  
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## Reports in the Series

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1. **Guidelines for the Development of a Methodology for Measuring Level of Effectiveness of Physical Protection Facilities at Fixed-Site Facilities**

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4. **Guide for the Evaluation of Physical Protection Equipment**

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5. **Catalog of Physical Protection Equipment**

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## ABSTRACT

A catalog of commercially available physical protection equipment has been prepared under MITRE contract AT(49-24)-0376 for use by the U. S. Nuclear Regulatory Commission (NRC). Included is information on barrier structures and equipment, interior and exterior intrusion detection sensors, entry (access) control devices, surveillance and alarm assessment equipment, contraband detection sensors, automated response equipment, general purpose displays and general purpose communications, with one volume devoted to each of these eight areas. For each item of equipment the information included consists of performance, physical, cost and supply/logistics data. The entire catalog is contained in three notebooks for ease in its use by licensing and inspection staff at NRC.

THIS CATALOG DOES NOT REPRESENT A QUALIFIED PRODUCTS LIST. INCLUSION OF ANY ITEM IN THE CATALOG DOES NOT CONSTITUTE AN ENDORSEMENT BY EITHER THE MITRE CORPORATION OR THE U. S. NUCLEAR REGULATORY COMMISSION.

## PREFACE AND ACKNOWLEDGEMENTS

The Catalog of Physical Protection Equipment presents information on currently used or currently available physical protection equipment that could be employed to safeguard special nuclear materials. The primary source of information was the responses of manufacturers and vendors to requests for literature and data, unless otherwise noted, and as discussed in the Final Report (NUREG-0271, MTR 3458). All equipment listed in the Catalog has been screened in accordance with the following general criteria, and only items meeting one or more of these criteria have been included:

- Equipment is commercially available off-the-shelf;
- Equipment is currently in use at commercial nuclear facilities licensed or to be licensed by NRC;
- Equipment is applicable for use at nuclear facilities licensed or to be licensed by NRC;
- Equipment can operate in the environmental conditions present at nuclear facilities,
- Equipment is not designed solely or primarily for residential use.

The final report describes the methodology and rationale used to create the Catalog of Physical Protection Equipment. Individuals seeking background information concerning the Catalog are directed to that report.

The Catalog of Physical Protection Equipment was edited and reviewed by W. L. Parlee; W. Haberman had overall responsibility for its preparation. Inputs to the Catalog were prepared by the following individuals, and their contributions are gratefully acknowledged:

Volume I.

L. I. Egelson	Sections 1, 4, 5, 6, 7, 8, 9, 10
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## ALARM SIGNALLING SYSTEMS

The basic objective of an alarm signalling system is to convey to a central monitoring facility that alarm/status information which has been generated by a remotely located sensor device. Equipment configurations and method of operation can vary considerably from installation-to-installation; however, some basic functional characteristics can be identified. One means of characterizing alarm signalling systems is by the techniques used to convey the alarm information. The following subparagraphs paraphrase definitions for four types of alarm signalling systems as specified in Underwriters Laboratories Standard UL-611.

### Direct Wire Systems

A direct wire system shall form one or more fully supervised protection circuits so arranged that an alarm will be initiated at the central station from the effect of an open circuit, short circuit, ground, or other significant change of resistance or current flow in the lines. Direct wire lines require an instrument, usually a milliammeter, in the individual receivers located in the central control panel to continuously monitor the line current that indicates the circuit condition. If more than one receiver is present, monitoring jacks in the other protection loops and a common current-measuring meter may be used.

### Transmitter Systems

A transmitter system shall provide for the connection of more than one subscriber's protection circuit to the central station by means of coded signals transmitted by a code transmitter via wire, telephone lines or radio.

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## Multiplex

Multiplexing is a method of signalling (transmitting protection circuit information) characterized by the simultaneous and/or sequential transmission and reception of multiple signals over a single communication channel with means (non-coded) of positively identifying each signal. The signalling may be accomplished over a wire path, radio or telephone lines.

## Combination Transmitter and Local Systems

Combination systems are systems provided with a grounding device at the subscriber's premises and in addition, employ a code transmitter to send alarm signals to the central station. Most systems fall in this category.

Alarm signalling systems are usually composed of five serially connected segments: The Central Station, which is connected to the remote Transmitters by means of the Communications Link; and the Sensor Devices, which are connected to the transmitters by the Initiating Lines (Figure 1). The sensor devices are described in Volume II (Intrusion Detection Components).

The Central Station is composed of various categories of equipment that provide the functional capability for alarm monitoring, remote test and reset, access and secure switching, and operation logging. An alarm signalling system might use all or only a few of the items that are discussed briefly below.

## The Processor/Computer

This element generally provides continuous monitoring of all analog and digital signals. It also annunciates non-normal conditions, initiates programmed start-stop operations, and

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permits operator signal selection, visual display selection, and command generation through the console keyboard. The processor consists of a power supply and several electronic logic cards containing transceivers (or repeaters), processor function cards, and memory for systems requiring programmed control or analog alarm limit comparison. A computer interface is also included for systems using a computer.

#### Annunciators

This element is used in one form or another by all systems to provide a visual display of the zone or building that has originated an alarm signal. Annunciators may also monitor the prime power applied to the alarm system, switchover to standby power, and whether an area is in a secure or access mode. They sometimes incorporate a single audible tone to draw attention to the fact that an alarm signal is being received on the annunciator. Annunciators are of two general types: the drop and the lamp. The drop type causes a metal flag to move into view behind a small window; the lamp type lights a light. Annunciators may incorporate a number of colored lamps to indicate specific alarm conditions or power failure.

#### Alarm Receiver

This is an element used by all systems to receive and process sensor alarm signals and responses from other monitoring and control devices. The receiver is an annunciator that also provides supervision of the alarm line. It may or may not include an audible alarm device. Various circuit and contact arrangements are usually available to provide auxiliary functions upon receipt of an alarm signal.

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## Printers

This element is often used in computer-controlled systems and some processor-controlled systems to record the change of state of sensors and to note changes in system control functions. Other central station receiving equipment may have built-in printers or may have optional connections to an external printer for logging all the activities of the alarm-signalling system.

Basically, all printers should provide hard copy, preferably in two colors, red for alarm conditions and black for a return-to-normal or normal condition. The printer should record the time, date, address of remote point, control command, and alarm type and condition. Printers use mnemonics (abbreviated words that are easily identifiable) to increase speed and capacity. The operator of the system must be thoroughly familiar with this method of communication. In large alarm systems, a "logging printer" (used to make itemized breakdowns of alarm system activity) may be used as a backup printer. For a thorough discussion of specific printers, see Catalog Volume VII (General Purpose Displays).

## Cathode Ray Tube (CRT) Display

This element is sometimes used in computer-based systems to provide visual alpha-numerical output of single-point data or messages (see Volume VII-1). The display outputs data received from the processor in standard ASCII code and has on, off, and erase controls. The data to be displayed is selected on the console keyboard. For a more complete description, see Catalog Volume VII (General Purpose Displays).

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### Video Monitors

These are sometimes provided as optional equipment with some alarm systems, but may also be part of a closed-circuit television (CCTV) system incorporating video cameras and monitors for surveillance and intrusion alarm source identification. Video switching may be provided for several monitors, and a number of cameras may be switched to the same monitor. Cameras may include some or all of the following capabilities: pan, tilt, zoom, focus and iris control. The CCTV controls are usually located at the control console. For a more complete discussion, see Catalog Volume IV (Surveillance Components).

### Intercom

This element is generally used in systems requiring constant communication with personnel in remote areas and provides two-way audio communications between the central station (or its backup) and the remote areas. It may also be used to audibly monitor remote areas, to page and communicate with personnel such as guards on tour and to provide for all-station announcements and paging. Intercoms may be of the push-to-talk type and/or use hands-off operation.

### Graphic Displays

This is an optional element used to display areas of concern from a random-access projector on a rear-projected viewing screen, using the console keyboard. For a more complete discussion, see the Catalog volume for General Purpose Display Components, Volume VII.

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### Access/Secure Control

This control enables an area within a protection loop to be put in a secure or accessible mode. Figure 2 is a schematic diagram of the basic protection loop, showing the connection of the access/secure control. The access/secure control unit, which may be located at the operator's console or at the controlled area, operates by a secure keyswitch. The access/secure control connects to a substitute EOLR (end-of-the-line resistor) when the access control unit is energized. This places a substitute EOLR across the protection loop at a selected point, disconnecting the remainder of the protection loop serving the area which is to be made accessible.

### Console Keyboard

This device provides another form of man-machine interface used to control a system by enabling the operator to manually select an address, to perform a manual command or demand function, and to select a system operating mode, such as displaying summaries or printing logs.

### Control Console and Operator's Terminal

In a less sophisticated alarm signalling system, a single control console is used and may be as simple as a tabletop model with built-in visual/audible display. It could possibly use a printer to handle the limited number of alarm signal points. In more sophisticated systems the main man-machine interface is the operator's terminal which may provide selection buttons to address the sensor device for test or other purposes, a series of function buttons, a key-operated lockout capability and a digital readout. This console is often a tool for on-site manual computer programming and system checkout.

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In a large computerized system one or more operator's control terminals or consoles may be used and assigned to control or communicate with a specific section of the alarm and control system. Each terminal would be under specific assignment by computer software for controlling building automation, supervision of sprinklers, elevators, etc., in addition to controlling the facility security system.

The Communications Link and Initiating Lines include the various types of communication media used to deliver sensor status signals to the transmitters (initiating lines) and from the transmitters to the receiving equipment located at the central station (signalling lines). Because of electrical variances between systems, the information presented here may only be valid for specific applications.

Alarm communication links (the signalling lines and the initiating lines) may fall into either of two classes of operation: Class A or Class B. They must also observe certain rules and regulations to maintain a given quality of communications operation as specified in the Interim Federal Specification. On the requirements for Class A operation, the National Fire Prevention Association standard for the installation, maintenance and use of proprietary protective signalling systems (NFPA 72D) states that "each signalling circuit and the services connected to it shall be capable of operating in their intended signalling services during a single break or single ground fault of any signalling line circuit conductor". Class B operation does not include the Class A emergency operating feature.

For the signalling line circuit to meet the Class A requirements, a redundant transmission path must be used, with an automatic switch-over capability to ensure uninterrupted transmission through a single fault, as specified.

For the initiating line circuit to meet the Class A requirements, a four (4)-wire direct current loop is used with a loop trans-

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fer relay (or circuit conditioning relay) to reestablish the circuit. Figure 3 shows the basic 2-wire loop, which does not have this capability unless the second alarm contact to occur happens to be electrically closer to the control panel than the first alarm contact in the circuit. Figure 4 shows how the 4-wire loop circuit functions through a single fault. Assume that there is a break in the wiring at point 'A'. One side of the alarm contacts becomes isolated from the end-of-line resistor (EOLR). A trouble signal results, but at the same time circuit conditioning relay contact 'A' closes. This action connects the alarm contacts that were previously isolated by the break to the EOLR. A subsequent alarm contact closure will short out the EOLR and cause an alarm to be annunciated.

Transmitters are alike in their basic function; they accept and transmit sensor status signals to the receiver, but vary widely in the number of inputs they can handle. They also differ in the method used to gather information from the system's many sensors and to process and transmit it to the central station receiver.

Alarm systems may also be characterized by the protection offered (Line Supervision) by electromechanical means to ensure that the system is in a state of readiness and to signal an alarm if it is not. Most circuits are self-checking in that any change from the normal will cause an alarm.

#### Signalling Line

Line supervision is accomplished by providing a dual transmission signal path over direct wire, coaxial cable or telephone lines, depending on system application. By alternating from one line to another, line operation may be assured.

The interrogate/respond operation of digital systems provides constant assurance that the transmission path is intact.

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On direct-wire systems "ring back" or "handshake" techniques are used on the transmission line to ensure that the receivers and transmitters are talking with one another.

Other types of alarm systems continually send tones, coded tones, random, or high speed, digital interrogate/respond-type signals for line supervision.

### Initiating Line

The two-wire loop with the end-of-line resistor is an accepted form of circuit supervision for many applications. Line supervision functions by monitoring the change of current or resistance in the loop circuit, and may have one or all of the following characteristics:

Break or cross sensitive -- A general type of line supervision, which detects a very high resistance for an open line and a very low resistance for shorted lines, is accepted by industry as being adequate for an alarm circuit, say, between a protected area and a police station.

Direct current supervision -- This method detects an increase or decrease in loop current as a percentage of its normal rated receiver input value. The normal current value is selected by adjusting the current limiting and end-of-line resistances. supervision sensitivity is the percentage of current change and normally ranges between 50 and 10 percent. The more sensitive, 10 percent, systems called high line supervision require receivers using a balanced Wheatstone bridge.

Single or double supervision is another consideration for line supervision. Single supervision means that a trouble signal will be given if there is either a break or a short in the circuit. Double supervision means that a trouble signal will

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be given if the power to the source of the first trouble signal is interrupted. This configuration requires two power sources, as an auxiliary means for maintaining the normal operation of the system following the trouble indication.

Direct wire lines are limited in length by the line resistance and the particular alarm system application, due to the level of electrical current limitations. These wire lines may be two- or four-wire, depending on the class of service required. Four-wire is needed for Class A operation. A dc "Break" and "Cross" circuit is usually accepted for a basic security alarm system. Alarm systems using coaxial cable for their signalling lines are usually systems that are installed within a single location. The transmission distance of alarm information on telephone lines is unlimited, since the entire Bell Telephone System is available.

Transmission lines of any type that are exposed to the elements (outside runs) degenerate in performance due to humidity and temperature. Lines to be extended between buildings should run through underground conduits or through protected raceways between buildings to reduce these effects.

Computers and processors should be located in an environmentally controlled area to operate under the temperature and humidity conditions specified by the equipment manufacturer.

Lightning and overvoltage protection should be installed on all cables and conductors extending between buildings, whether direct burial, underground conduit or overhead runs are used. Lightning arrestor networks should be installed at both ends. Both primary protection devices, such as a gas tube protector, and secondary protectors should be used to reduce voltages to non-destructive levels. Devices offering both fuse protection and gas discharge lightning protection for telephone lines are typical of the type that should be employed.

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To be tamper-resistant all alarm signal wiring should be kept within secure areas or else run through conduit and secured raceways in unprotected areas. Wiring between buildings should preferably be run underground. In addition, where alarm signal panels are mounted in unprotected areas, the panels themselves must be tamper-protected. UL-approved tamper-proof steel boxes and switches should be used.

It is unrealistic to consider any telephone or other off-premise line to be free of the possibility of compromise. Direct-wire systems are more susceptible to compromise by the use of resistors, batteries and other devices. The more sophisticated systems, using complex waveform and digital communication techniques, make compromise quite difficult even by the sophisticated intruder. Noise jamming is generally effective with time division multiplex systems, but is unlikely to be successful in compromising a tone (frequency division) multiplex system because of the narrowband channel filtering used and the band limiting done in telephone line interface units.

Noise warning devices are available from at least one manufacturer to monitor the incoming lines at the central station for attempts to compromise the system by introducing noise. This unit senses noise, sounds an audible/visual alarm, and cuts in an audio speaker which enables the operator to listen to what is being received.

Rechargeable storage batteries are generally used for standby operation and are installed in circuits incorporating a trickle charger to keep the battery ready for immediate service. When primary power fails, automatic transfer of power to the battery should provide at least 24 hours of continuous operation without recharging. If a second source of power is available from a standby generator, battery capacity may be reduced to 4 hours without recharge.

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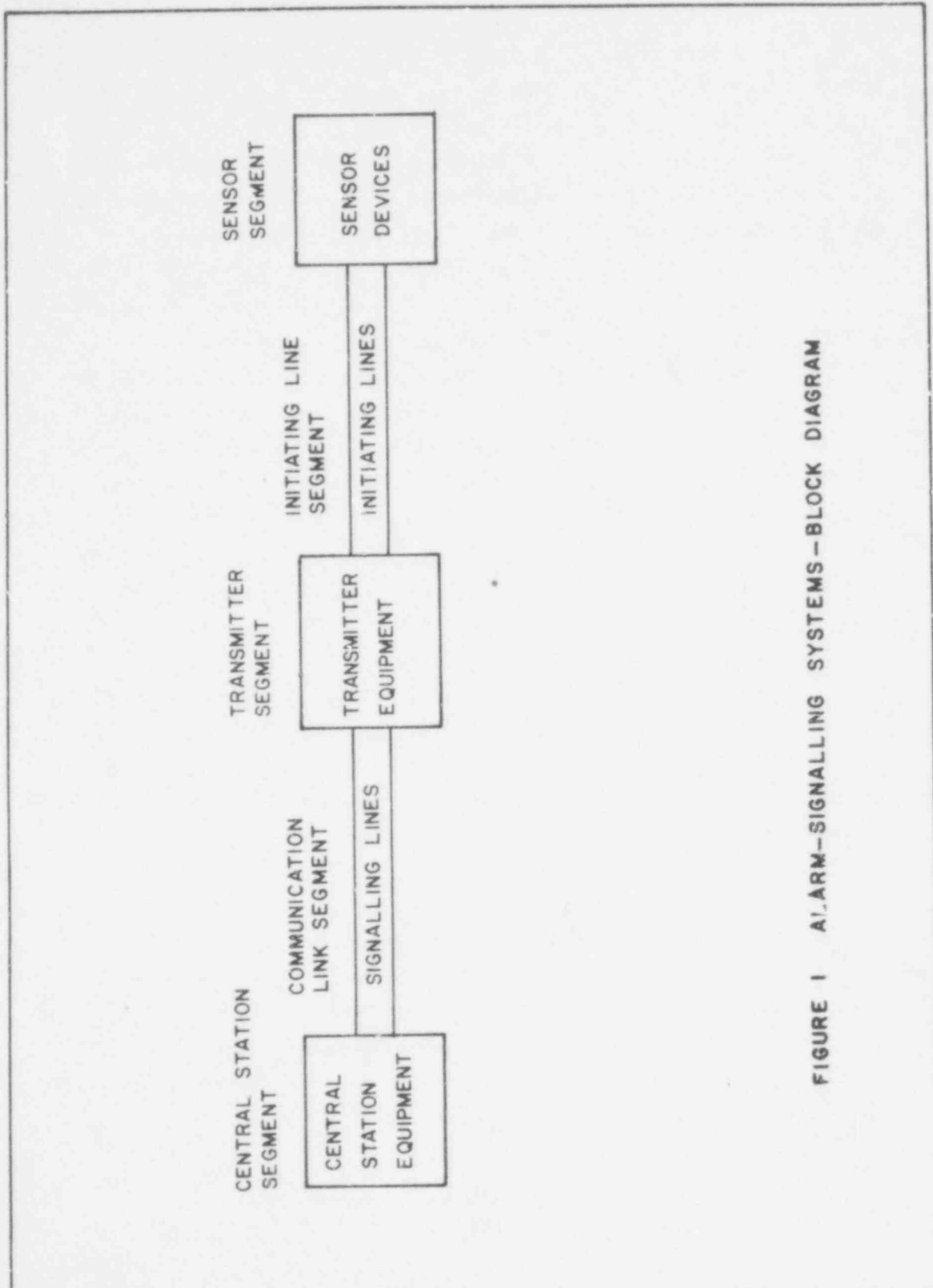


FIGURE 1 ALARM-SIGNALLING SYSTEMS - BLOCK DIAGRAM

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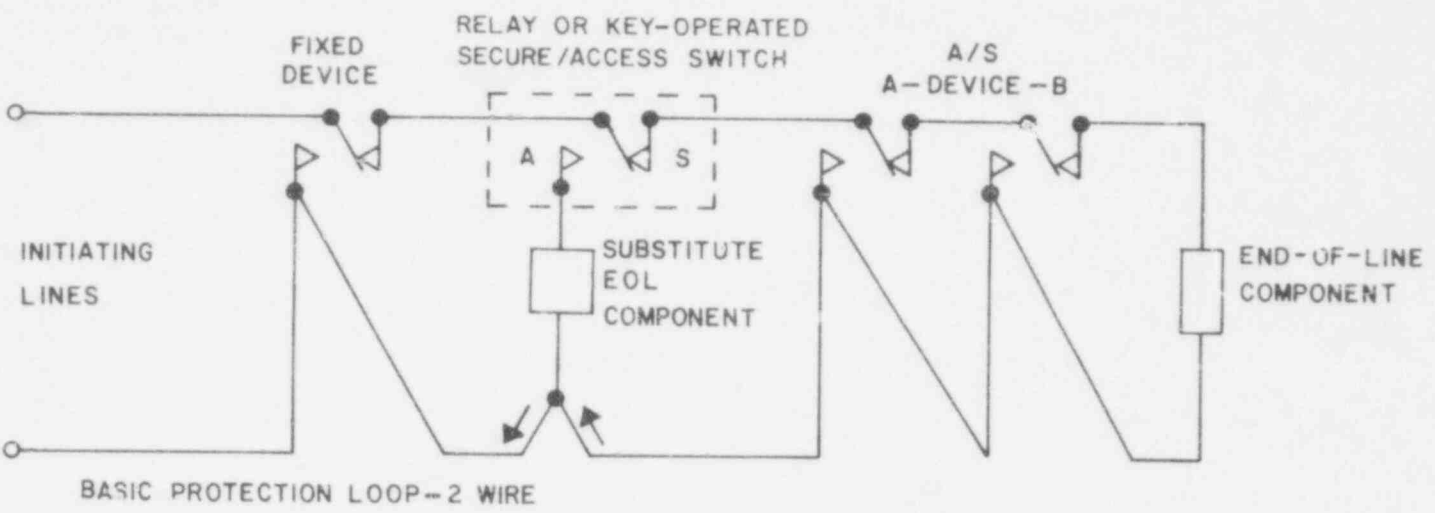
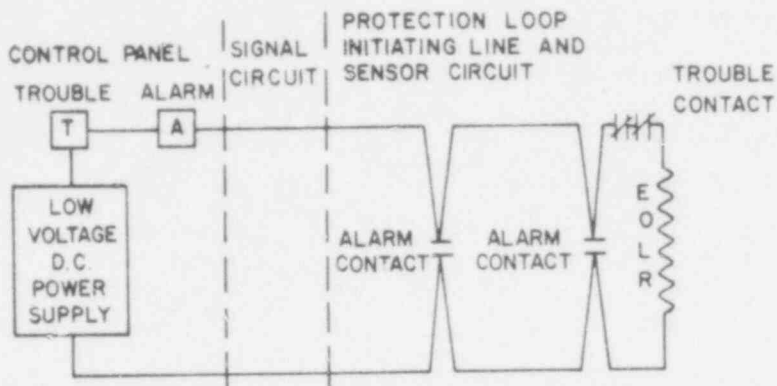


FIGURE 2 BASIC PROTECTION LOOP WITH ACCESS/SECURE CONTROL

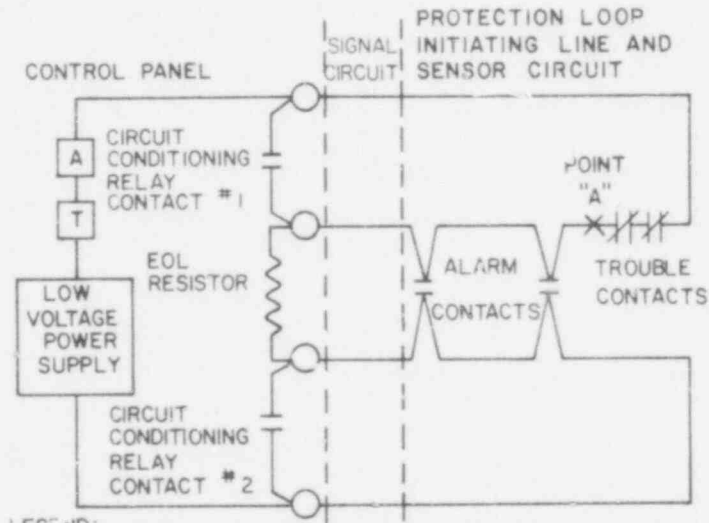
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LEGEND:

- T TROUBLE (BREAK) SENSITIVE DEVICE
- A ALARM (CROSS) SENSITIVE DEVICE

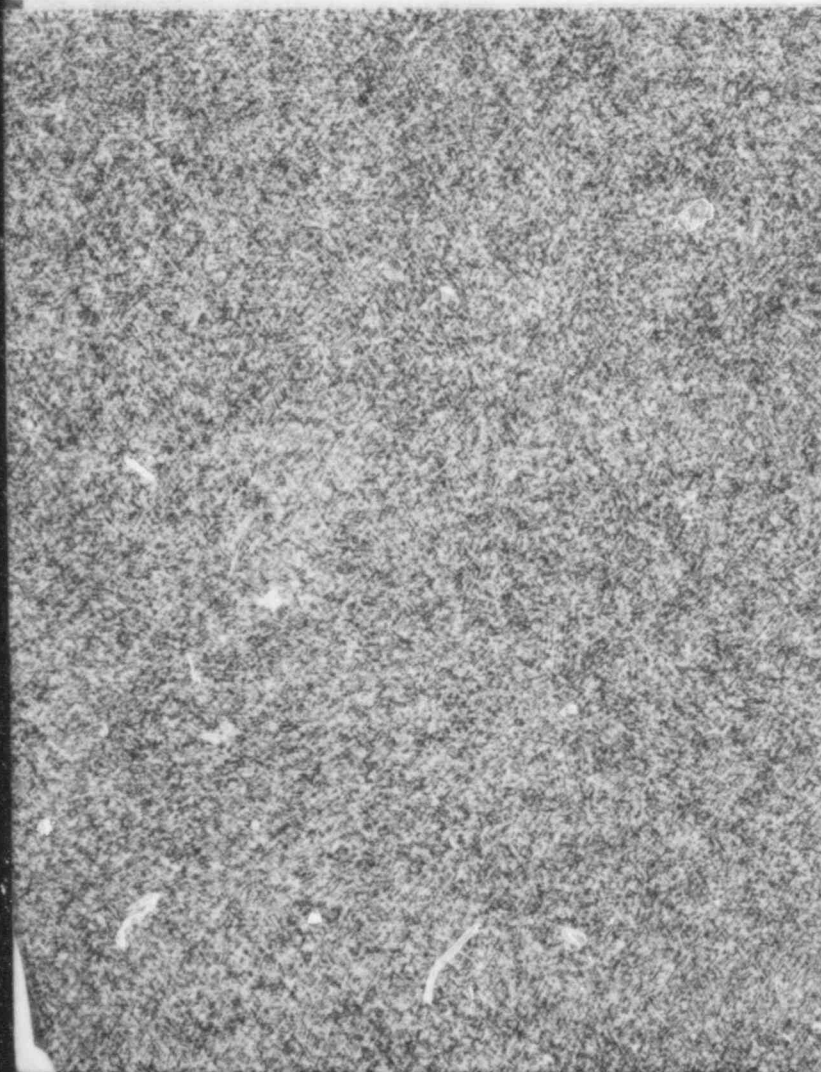
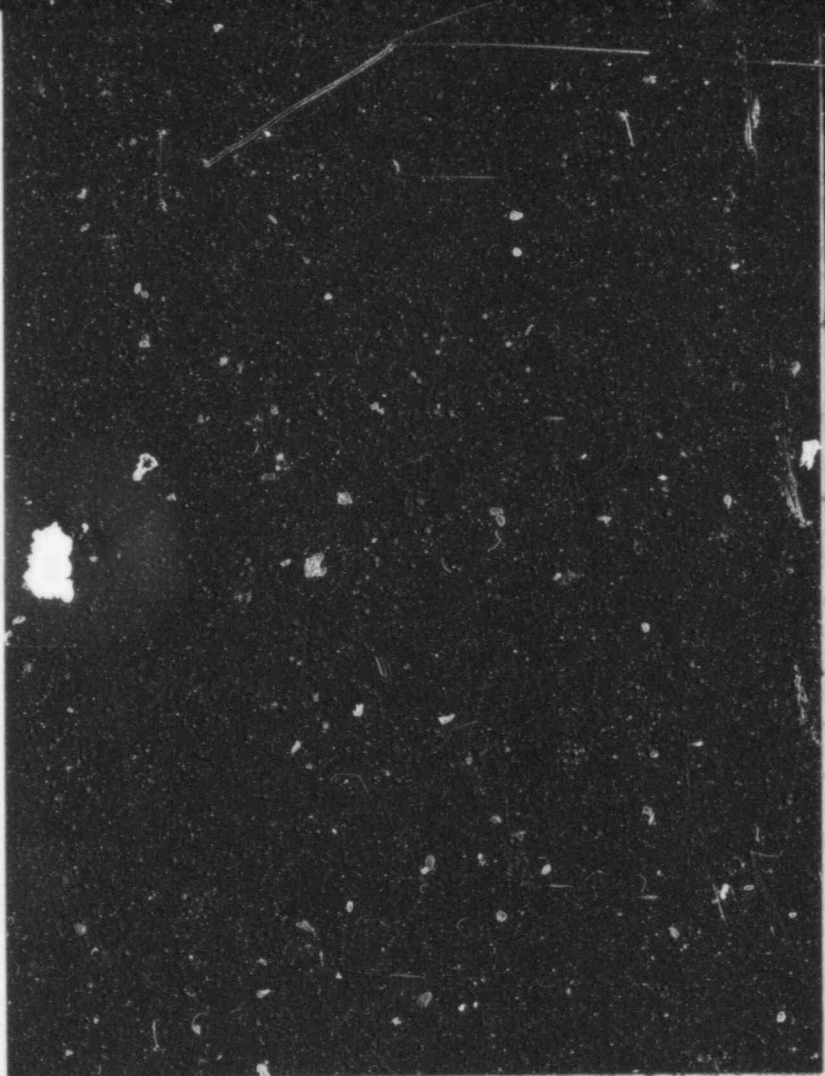
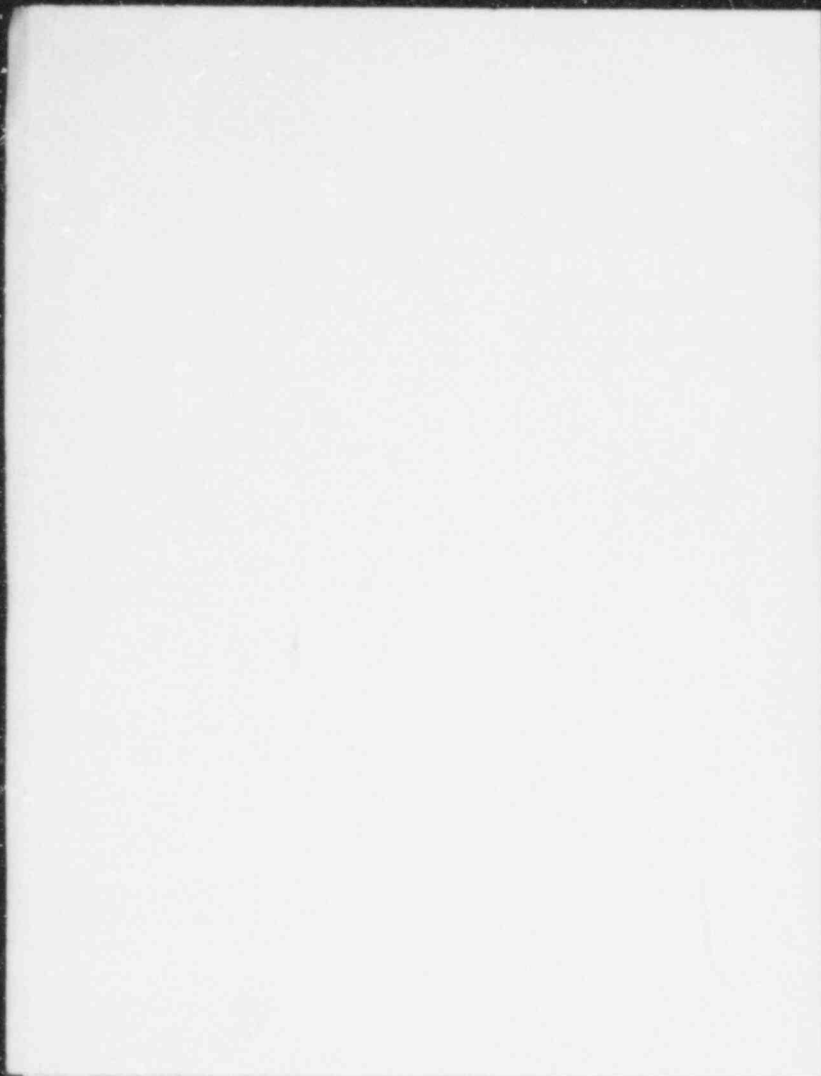
FIGURE 3 BASIC 2-WIRE LOOP FIRE DETECTION AND ALARM CIRCUIT



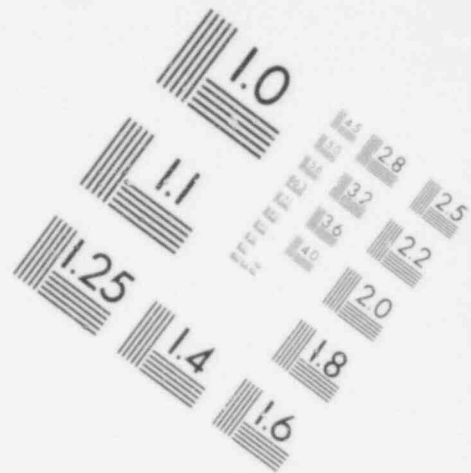
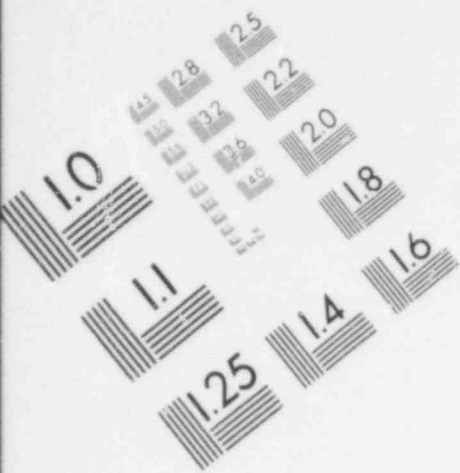
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- A ALARM (CROSS) SENSITIVE DEVICE

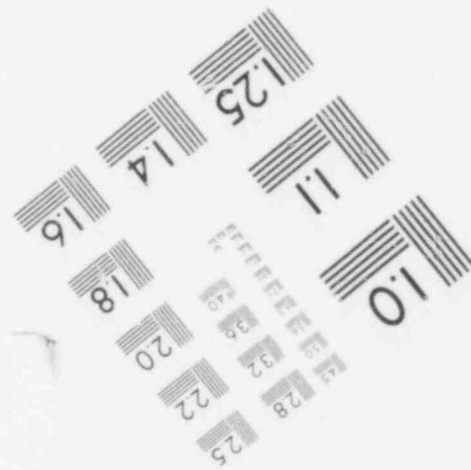
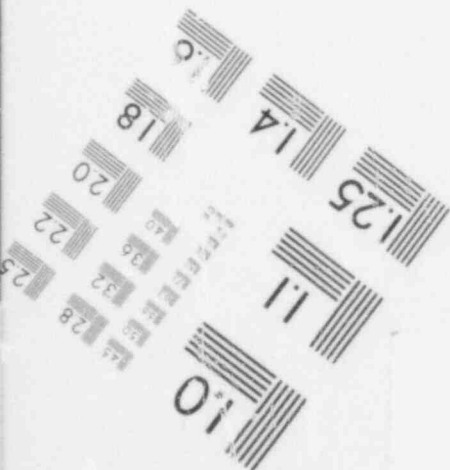
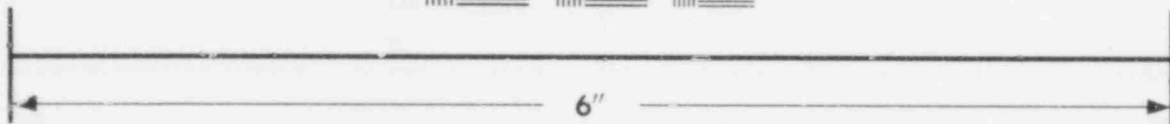
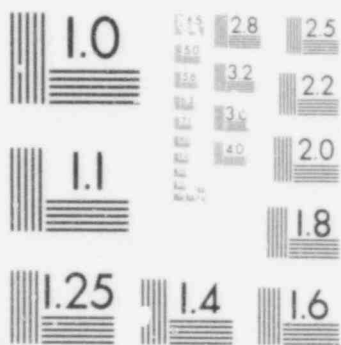
FIGURE 4 BASIC 4-WIRE LOOP FIRE DETECTION AND ALARM CIRCUIT



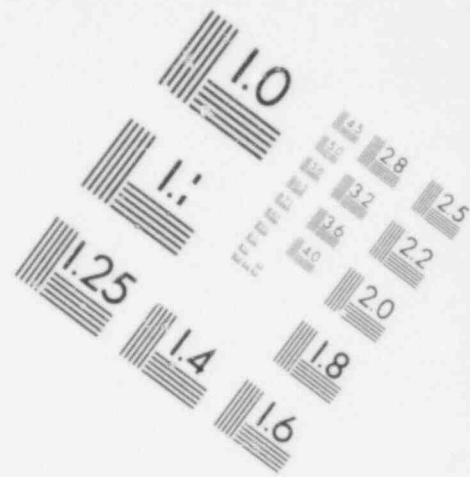
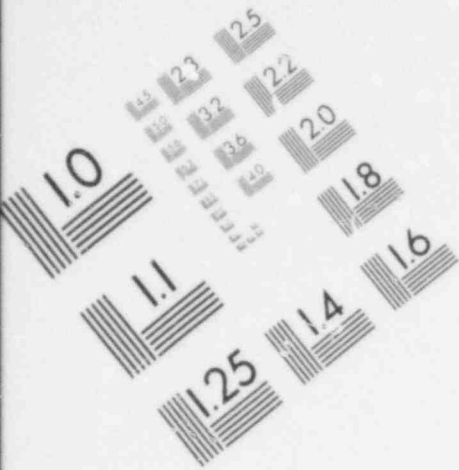




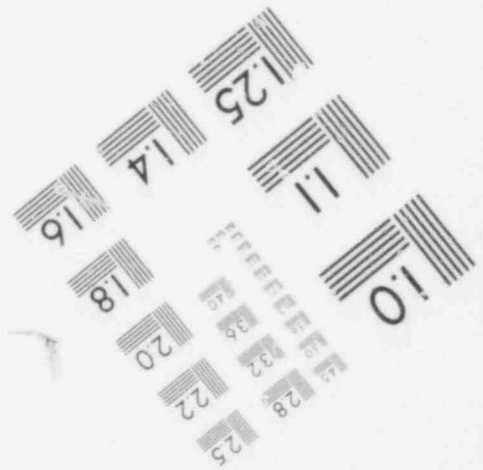
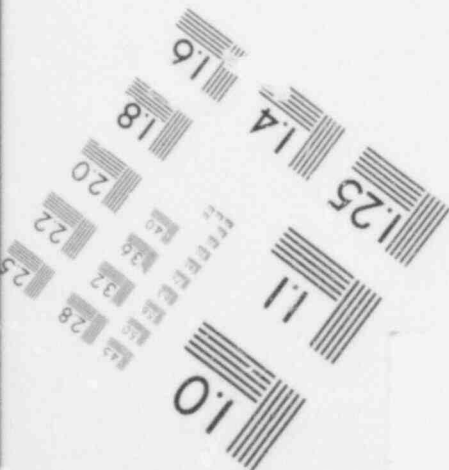
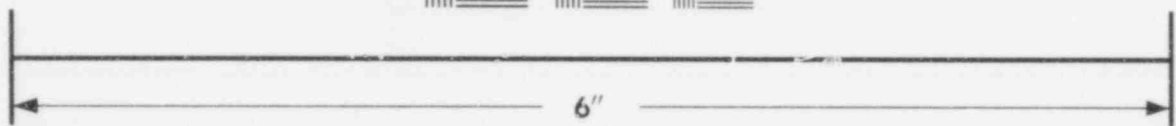
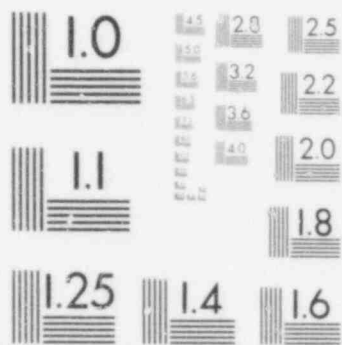
**IMAGE EVALUATION  
TEST TARGET (MT-3)**







**IMAGE EVALUATION  
TEST TARGET (MT-3)**



## ALARM SIGNALLING SYSTEMS

**Manufacturer** American Multiplex  
Systems, Div. Western  
Bureau of Investigation  
175 Freedom Ave.  
Anaheim, CA 92801  
(714) 870-5821

**Model** Minimax 200

**Reference Evaluation Guide Procedure No.** VIII-1.A      **NRC Identification No.**

### NARRATIVE DESCRIPTION

The Minimax 200 system automatically transmits the location of tripped alarm sensors through a single,  $\frac{3}{16}$  in (0.5cm) one-pair shielded cable over distances of up to one mile (1.6km) to a central monitoring station for alarm and display. It can handle a total of 256 individually addressable zones. The central multiplex terminal continually addresses the remote terminals to interrogate the sensors and immediately picks up the changes in zone state and causes an alarm and display if change is detected. The tape printout recorder is optional. The components that make up the Minimax 200 system are listed in the notes.

### PERFORMANCE DATA

#### Probability of Transmission

**Error and Sources:** Information not available.

**Capacity:** 256 individually addressable zones; see notes.

**Transmission Distance:** One mile per cable (a twisted, shielded, 20 gauge pair, connecting Central Multiplex Terminal (CMT) to Remote Multiplex Terminal (RMT)).

#### Resistance to Spoofing and

**Tampering:** Has self-checking feature for failures caused by tampering with the communication line or by terminal failure.

**Indoor/Outdoor Operation:** Indoor.

**Temperature:** Operating temp: 32 to 150F (0 to 65C) for RMT; for CMT, 32 to 120F (0 to 49C).

**Humidity:** Information not available.

#### Other Environmental

**Characteristics:** Information not available.

**Radio Requirements:** None.

**Interface:** Eight dry contact inputs for interface with sensor alarm circuitry that provide open or closed switch contacts when activated.

### PHYSICAL DATA

**Size:** Central Multiplex Terminal, 11x11x6 $\frac{1}{2}$  in (28x28x16.5cm).

Remote Multiplex Terminal, 4x2 $\frac{3}{4}$ x3 $\frac{1}{4}$  in (10.2x7x1.9cm).

**Weight:** Central Multiplex Terminal, 12lb (5.4kg).

Remote Multiplex Terminal,  $\frac{1}{2}$ lb (0.2kg).

**Power (Primary/Secondary):** Central Multiplex Terminal requires 115V ac, 60Hz, 1 phase 1A with battery back-up required. No power required for Remote Multiplex Terminal.

**Emplacement:** Desk top console.

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### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Operation, installation, maintenance manuals are available. Training at suppliers facility is available.  
**Parts and Repairs:** Parts stock maintained; 24 hour repair.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** One year factory warranty for parts and labor.  
**Government or Professional Standard:** UL-listed.  
**Lead Time:** 60 days.

### COST DATA

**Unit Acquisition Cost:** Central unit \$3,400. Remote, \$200. Printer, \$1,920.  
**Unit Installation Cost:** Information not available.  
**Training Cost:** None, if at plant.  
**Maintenance Cost:** Information not available.  
**Operation Cost:** Not available. However, one man operation for entire Minimax system is needed.

### NOTES

Some information in this data sheet is based upon a telephone conversation with a company representative.

Minimax 200 System — Consists of:

- 1 — CMT, Central Multiplex Terminal w/associated display console.
- 1 — DTC, Transmission Cable.
- 1 to 32 — RMT, Remote Multiplex Terminals.

**Display:** Displays location and zone of all alarms. Current status of zones indicated by green (operational) or red (alarm) symbols. Audibly annunciates alarm. Controls are provided for: manual selection of zone; sensor status; alarm clear which returns the display to normal unless an alarm still exists; and lamp test. Includes built-in system self-test features.

**Capacity:** 1 to 8 zones per RMT; 8 to 256 zones per system (32 RMT's).

**Sensor Wire:** Up to 200ft recommended.  
No. 28 to No. 12 gauge wire.

**Options Available:** Battery backup.  
Telephone line modem interface. Consists of one module within CMT.  
Printer and Printer Interface; prints location and zone number of alarm. Time reference is provided.

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## ALARM SIGNALLING SYSTEMS

**Manufacturer** BEI Electronics, Inc.  
(form. Baldwin Elecs. Inc)  
1101 McAlmont St.  
Little Rock, AR 72203  
(501) 375-7351

**Model** Baldwin Hawkeye

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Baldwin Hawkeye Radio Alarm Transmission System is a radio frequency method of reporting and processing alarm information. Alarm transmission is accomplished by attaching sensor and protective loop inputs to a remote Hawkeye Radio Alarm Transmitter, AT-103, which transmits coded alarm information via radio to the central station Receiver/Decoder Model 401. The receiver presents alarm information in both a visual indicator display and a tape print-out. A digital message insertion technique allows the operator to record the action taken on the same tape. The system will differentiate between alarm conditions of burglary, hold-up, fire, shoplifting, disturbance, medical emergency, equipment failure, etc. at the protected location or identify any of 9 different alarm conditions in single or multiple installations.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

Information not available.

**Capacity:**

The central station Receiver/Decoder 401 will accept 10 channels from each radio alarm transmitter, AT-103. The system will accommodate up to 1,000 remotely located transmitters.

**Transmission Distance:**

Nominal operating range is 10 to 12 miles (16 to 19km). With the use of directional transmitting antenna, range may be increased by approximately 50 percent.

**Resistance to Spoofing and Tampering:**

The Alarm Transmitter has a 24 hour self-test clock which initiates a daily coded test. The transmitter also serves as an alarm panel providing protective loop current, day and night circuit switching and provides an on premise alarm.

**Indoor/Outdoor Operation:**

Receiver, indoor. Transmitter, indoor and outdoor.

**Temperature:**

Transmitter - 10 to +150F (-23 to +66C).

**Humidity:**

Information not available.

**Other Environmental**

**Characteristics:**

Information not available.

**Radio Requirements:**

Time Division Multiplex D, pulse position modulated pulse train which frequency modulates an audio tone. This modulated tone is used to modulate the RF carrier for transmission. Coded RF transmissions from transmitter to receiver — operates in the 27MHz band. Requires FCC Class C Station License. Operator must hold a Class 2D FCC Radio Operator's License. Frequency selection 2 of 6 channels available. Transmitter is a two channel, solid state, crystal controlled unit. Alarm indications are alternately transmitted on each frequency.

**Interface:**

Interface with sensor alarm circuitry loops and with conventional telephone line.

### PHYSICAL DATA

**Size:** Model 401 Receiver, 7x15x19in (18x48x48cm),  
Model 103, 104 Transmitter, 5 $\frac{3}{4}$ x10 $\frac{3}{4}$ x13 $\frac{1}{4}$ in (15x26x86cm).  
**Weight:** Model 401 Receiver, not available; Model 103, 104 Transmitter, 14lb (6.3kg).  
**Power (Primary/Secondary):** 117V ac with 24V dc for standby battery. Automatic switchover to standby when main power fails. 72 hour standby operation capacity.  
**Emplacement:** Rack mount 19in (48cm) panel.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Manuals available. Training in-house.  
**Parts and Repairs:** Factory, within 5 days.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** 12 months for all equipment.  
**Government or Professional Standards:** Undergoing FM (Factory Mutual Research Corp.) examination.  
**Lead Time:** 27MHz available off-the-shelf. Other frequencies 8 to 10 weeks for delivery.

### LIFE CYCLE COSTS

**Unit Acquisition Cost:** \$12,900 for the basic system package (not including antennas).  
**Unit Installation Cost:** Included in acquisition cost.  
**Training Cost:** None.  
**Maintenance Cost:** Information not available.  
**Operation Cost:** Information not available.

### NOTES

Some information in this data sheet is based on a telephone conversation with a company representative.

#### Optional Equipment:

- Model 451 Standby Receiver/Decoder — in case of an outage of the 401 Receiver, the standby unit can quickly be connected without loss of alarm information.
- Model AT-104 Radio Alarm Trans. — up to 4 alarm channel inputs.
- Model AT-105 Radio Alarm Trans. — up to 3 alarm channel inputs.
- Model AT-107 Radio Alarm Trans. — up to 3 alarm channel inputs — utilizes remote RF Transmitter with 20ft (6m) of RG-58 coaxial cable.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Brash Industries  
P.O. Box 9250  
Marina Del Ray, CA 90291  
(213) 821-5076

**Model** Emergency Reporting System  
(ERS)

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Brash Industries ERS system is comprised of an ERS Receiver P/N 30008 and an ERS Transmitter P/N 20002. The Receiver detects incoming alarm messages, automatically answers, stores and compares alarm transmissions; time prints alarm information; actuates incoming alarm horn and light; releases the telephone line and transmitter readying itself for the next incoming alarm. The transmitter has multiple zone capability expandable to 99 alarm reporting zones with the use of add-on boards. Each 20013 board adds 8 zones. The system utilizes a direct dialing technique on voice grade telephone lines. It uses dial-tone detection prior to initiating calls. The Receiver installed printer prints out a record of the alarm location and specific zone information along with time and day of year.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

Information not available.

**Capacity:**

Total alarm capacity of the Receiver P/N 30008, is 99,000 different zones. Receiver can process 1000 transmitters with 99 zone capacity for each transmitter.

**Transmission Distance:**

Uses commercial telephone communication system.

**Resistance to Spoofing and**

**Tampering:**

Utilizes electronic "handshake" signals before data transmission and a termination signal after all data has been verified. Polled transmitter not recognizing proper coding disconnects itself from the telephone line, thus keeping the line clear.

**Indoor/Outdoor Operation:**

Information not available.

**Temperature:**

Transmitter does not operate below 0F (-17C).

**Humidity:**

Information not available.

**Other Environmental**

**Characteristics:**

Information not available.

**Radio Requirements:**

None.

**Interface:**

Signals are dual-tone frequencies combined to form a six character word that is automatically verified at the receiver for frequency, pulse width and parity. Uses standard dial telephone network.

### PHYSICAL DATA

**Size:**

Transmitter 20002, 5x13x17in (12.6x33x43cm).  
Receiver 30008, 19x10x20in (48x25x41cm).

**Weight:**

Transmitter, 16lb (7.2kg)  
Receiver, 35lb (16kg).

**Power (Primary/Secondary):**

Transmitter, 117V ac to trickle charge ni-cad batteries through class 2 transformer;  
receiver, 12V dc, 2.6A.

**Emplacement:**

Transmitter, wall mount; receiver, desk top or rack mount.

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### SUPPLY/LOGISTICS DATA

<b>Documentation and Training:</b>	Installation, operation and maintenance manuals are available.
<b>Parts and Repairs:</b>	Parts readily available.
<b>Reliability:</b>	MTBF not available.
<b>Maintainability:</b>	MTTR not available.
<b>Warranty Information:</b>	Information not available.
<b>Government or Professional Standards:</b>	None.
<b>Lead Time:</b>	45 days.

### COST DATA

<b>Unit Acquisition Cost:</b>	Depends on size of system purchased; individual figures not available.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	Information not available.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

### NOTES

Some information in this data sheet is based upon telephone conversations with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Brash Industries  
P.O. Box 9250  
Marina Del Rey, CA 90291  
(213) 821-5076

**Model** Direct Wire System 420NE

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The 420NE Direct Wire System is a line monitoring and tone data transmission system. Operation is over unconditioned voice grade leased (dedicated) telephone lines. The system is comprised of a transmitter located at the premise to be protected and the receiver located at a central monitoring station. The transmitter is attached by either NO or NC contacts. An alarm indication at the receiver actuates the alarm horn and flashes zone indicating LED's. Zone status indications are also shown on the transmitter. An alarm indication occurs at the receiver within 5 seconds after the alarm trips.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:** Information not available.

**Capacity:** 4 zones.

**Transmission Distance:** Uses telephone unconditioned lines (Bell 3002), microwave radio or copper wire lines.

**Resistance to Spoofing and Tampering.**

A signal is continuously kept on the telephone line to reduce the effect of telephone line noise. Every 9 seconds, the receiver looks for a telephone line status signal.

**Indoor/Outdoor Operation:** Information not available.

**Temperature:** Information not available.

**Humidity:** Information not available.

**Other Environmental**

**Characteristics:** Information not available.

**Radio Requirements:** None.

**Interface:** Uses standard dial telephone network for communications link.

### PHYSICAL DATA

**Size:** Transmitter, 3x9x12in (7.6x22.8x30.5cm).

Receiver, 11x11x4in (28x28x10.2cm).

**Weight:** Transmitter, 8lb (3.6kg); Receiver, 6lb (2.7kg).

**Power (Primary/Secondary):** 117V ac powering class 11, 12V 20VA transformer which provide trickle charge for the standby ni-cad batteries.

**Emplacement:** Transmitter, wall mounted; receiver, desk top.



### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Supplies operation, installation and maintenance documentation available.  
**Parts and Repairs:** Readily available commercially.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** One year warranty.  
**Government or Professional Standards:** None.  
**Lead Time:** One week.

### COST DATA

**Unit Acquisition Cost:** Depends on number of units procured; not available for single units.  
**Unit Installation Cost:** Information not available.  
**Training Cost:** Information not available.  
**Maintenance Cost:** Information not available.  
**Operation Cost:** Information not available.

### NOTES

Some information in this data sheet is based upon a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Brash Industries  
P.O. Box 9250  
Marina Del Rey, CA 90291  
(213) 821-5076

**Model** Interrogated Security Loop  
System

Reference Evaluation Guide Procedure No. VIII-1.A NRC Identification No.

### NARRATIVE DESCRIPTION

The Brash industries Interrogated Security Loop System is comprised of an ISL Receiver P/N 30005 and an associated transmitter. The receiver is a console containing both alarm reporting systems and command control systems, utilizing dedicated communications channels. The interrogation of the communications loop provides constant information of the status of the transponders and the communications path. Within seconds after an alarm is detected the receiver automatically receives data from the transponder, compares it with multiple scan techniques, checks parity, and prints (built in printer) transponder number, zone tripped number, operational mode of transmitter, time and date of occurrence.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:** Information not available.

**Capacity:** There is a total of 2 alarm loops in a standard receiver and 99 transponders on a single loop. The maximum number of zones per transponder is 10. The maximum number of command functions generated at the receiver is 6 on and 6 off to control lighting, heating or energy systems.

**Transmission Distance:** Uses telephone lines, wire, (20 mi (32km) when copper wire is used), RF microwave.

**Resistance to Spoofing and Tampering:**

Handshake before data transmission; the receiver answers the incoming signal and initiates the dialog with a tone "Data Request Signal" which is decoded and commands the transmitter logic to send its data.

**Indoor/Outdoor Operation:**

Information not available.

**Temperature:**

Information not available.

**Humidity:**

Information not available.

**Other Environmental**

**Characteristics:** Information not available

**Radio Requirements:**

None.

**Interface:**

Baud rate is below 200 and is transmitted in half-duplex. The ISL System works over unconditioned voice grade lines (3002) of either 2 or 4 wire configuration. Band-width 1 to 2.5kHz.

### PHYSICAL DATA

**Size:** Transmitter, 11x11x4in (28x28x10.2cm).  
Receiver, 19x20x10in (48x51x25cm).

**Weight:** Transmitter, 12lb (5.4kg); receiver, information not available.

**Power (Primary/Secondary):** Transmitter, 12V ac, 20VA; receiver, 12V dc, 3A, standby, trickle charge lead acid battery.

**Emplacement:** Transmitter, wall mount; receiver, desk top or standard 19in (48cm) rack with 10in (25cm) high panel.

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### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Manuals for operation, installation and maintenance are available; no training is provided.

**Parts and Repairs:** Information not available.

**Reliability:** MTBF not available.

**Maintainability:** MTTR not available.

**Warranty Information:** 1 year warranty.

**Government or Professional Standards:** None.

**Lead Time:** 45 days.

### COST DATA

**Unit Acquisition Cost:** Depends on size of system purchased; individual figures not available.

**Unit Installation Cost:** Information not available.

**Training Cost:** Information not available.

**Maintenance Cost:** Information not available.

**Operation Cost:** Information not available.

### NOTES

Some information in this data sheet is based upon a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Compuguard Corp.  
5995 Penn. Circle So.  
Pittsburgh, PA 15206  
(412) 441-5100

**Model** System 20

Reference Evaluation Guide Procedure No. VIII-1.A      NFC Identification No.

### NARRATIVE DESCRIPTION

The System 20 is a general purpose central monitoring and control system used for building automation, energy conservation, fire and security monitoring. Functions include binary and analog monitoring and control. The system consists of Data Panels or Omnirelay Panels which connect to sensors and report to the Communication Processor. The Communication Processors in turn work with the central console. The system is expandable (per application) to include 512 Data Panels or Omnirelay Panels per Communication Processor and 16 Communication Processors per central console — up to 250,000 points (sensors) in full configuration. The central console allows control and supervision of the entire system, and receives and processes all alarm and status data. Alarms and changes of status conditions are reported within 10 seconds of detection.

### PERFORMANCE DATA

**Probability of Transmission  
Error and Sources:**

System 20 has self-diagnostic operation and line supervision. All analog monitoring and control information is digitized prior to transmission. Patented techniques allow the automatic correction of errors due to noise or interference under software control at the central console. Double scanning, redundant message transmission, and message voting result in data accuracy. Probability of transmission error not available.

**Capacity:**

Each Data Panel or Omnirelay Panel has 48 points; 512 Data Panels or Omnirelay Panels per Communication Processor and 16 Communications Processors per central console.

**Transmission Distance:  
Resistance to Spoofing and  
Tampering:**

Uses carrier communication on existing power lines or dedicated 2-wire lines.

**Indoor/Outdoor Operation:  
Temperature:**

Information not available.

**Humidity:**

5 to 130F (-15 to +55C).

**Other Environmental  
Characteristics:**

20 to 95 percent, non-condensing.

**Radio Requirements:**

Information not available.

**Interface:**

None.

Digital 2-way data transmission on existing power lines.

### PHYSICAL DATA

**Size:**

Central Console — 11x19x26in (28x48x63cm) or 11x3x11in (28x7.6x28cm).  
Omnirelay, Data Panel — 7x19x12in (18x48x30cm).

**Weight:**

Information not available.

**Power (Primary/Secondary):**

12V (from central console transformer stepdown of 110V ac  $\pm$  10 percent);  
back-up, 12V dc cell, 4 to 24 hours rechargerable (Auto restart after power failure).

**Emplacement:**

19in (48cm) Rack-mount.

## SUPPLY/LOGISTICS DATA

<b>Documentation and Training:</b>	Manuals are available. No-cost training of maintenance and operational personnel includes classroom, computer simulation and on-site training.
<b>Parts and Repairs:</b>	Factory trained service representatives in most major cities. Service plans available for on-going system maintenance and service.
<b>Reliability:</b>	MTBF on all equipment supplied (200khr MTBF). Computer MTBF, CC20-1103 (micro) 8khr; CC20-1103 (mini) 5khr.
<b>Maintainability:</b>	MTTR not available.
<b>Warranty Information:</b>	One year warranty.
<b>Government or Professional Standards:</b>	Compliance with NFPA requirements for Class A/Type 1 operation.
<b>Lead Time:</b>	Four to six months.

## COST DATA

<b>Unit Acquisition Cost:</b>	Cost of console, \$36,000. Data or Omnirelay Panels, \$4,000. Function cards, \$600 to \$1,000.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	Information not available.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

## NOTES

Some information in this data sheet is based upon a telephone conversation with a company representative.

### Peripherals:

Video Terminal CC2D-VT 50 and CC20-KD24. The KD24 also allows message blinking flashing and video inversion.

Printer Terminal CC20-LA36 and CC20-T133. T133 uses thermographic type paper.

Also: Slide graphic projectors;  
paper tape reader and punch;  
magnetic tape cassettes, disk cartridge, etc.

Optional Peripherals (3k to 20k);

Software Program;

Personal Security Option RFK-11 (Locates security officer who sends alarm via wrist alarm signaling device).

The Omnirelay Panel is a low cost carrier communications unit which can be expanded with plug-in functions.

Relay monitoring and control functions can be used for:

- Temperature setback/setforward
- Electricity sub-metering
- Smoke detection, fire alarm
- Access control
- Personal protection
- Nurse-call, doctor register

Data Panel monitoring and control functions can be used for:

- Automatic temperature control
- Programmed equipment start-stop
- Preventive maintenance scheduling
- Demand limiting
- Energy conservation

## INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Currier-Smith Corp.  
Microwave Asso.  
Burlington, MA 01803  
(617) 272-3000

**Model** Transmonitor I, II, I UT/X

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Transmonitor I system incorporates a four (4) zone input transmitter together with a central data receiver/printer R-4 capable of handling 1000, 4-zone transmitters or 4000 alarm devices. The Transmitter I system works over the Bell Switched Line Telephone System.

The Transmonitor II system is designed to provide 4 zones of pre-recorded data over the telephone line to the central data receiver/printer, R-4. It can be programmed to transmit voice or digital messages identifying four zones. Three of the zones can be programmed to report 4 preselected telephone numbers or to communicate with the central station receiver. The fourth zone is used to transmit an "all clear" supervisory message upon interrogation.

The Transmonitor I UT/X system incorporates a UT/10 transmitter capable of monitoring 10 zones. The receiver/recorder R-4 will therefore monitor 1000 (transmitter or alarm devices) x 10 zones or 10,000 individual signals.

### PERFORMANCE DATA

#### Probability of Transmission

##### Error and Sources:

Transmitter repeats dialing until the receiver acknowledges with a feedback signal to indicate proper connection. Receiver detects loss of telephone line connection. Data is continually sent by transmitter until acknowledged by receiver. Probability of transmission error not available.

#### Capacity:

Receiver/printer R-4 is capable of monitoring 1000 transmitters of 10 zones each and can accept and print as many as 10 simultaneous alarms.

#### Transmission Distance:

Operates on the Bell Telephone System network. Capable of serving widely separated and varied alarm devices.

#### Resistance to Spoofing and

##### Tampering:

The system automatically rejects noisy lines or attempted jamming and recycles until a proper connection has been made. Transmitter and receiver are self-monitoring for telephone line disconnection.

#### Indoor/Outdoor Operation:

Information not available.

#### Temperature:

Information not available.

#### Humidity:

Information not available.

#### Other Environmental

##### Characteristics:

Information not available.

#### Radio Frequency

##### Requirements:

None.

#### Interface:

Uses Bell Telephone System to communicate between transmitter and central station receiver/recorder, R-4.

### PHYSICAL DATA

**Size:** Transmonitor I-14x14x4in (35x35x10.2cm). Transmonitor II-15x7x12in (38x18x30cm). Transmonitor I UT/X-14x14x4in (35x35x10.2cm).  
**Weight:** Receiver-16¼x13x10½in (42x33x27cm).  
**Power (Primary/Secondary):** Transmitters not available; Receiver, 22lb (10kg.).  
**Emplace:** 17V ac ± 15 percent, 17 W standby; 160 W operating. No back-up's provided. Transmitter is wall mounted; receiver is a desk-top unit.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Complete documentation supplied. Training provided in-house or at site.  
**Parts and Repairs:** 24 hour turn around time on factory repairs.  
**Reliability:** Transmitter 99.9 percent availability; 10,000 hr MTBF.  
**Maintainability:** Information not available.  
**Warranty Information:** 2 year warranty.  
**Government or Professional Standards:** UL approval in negotiation. Meets FCC acceptance for non-interference on telephone lines.  
**Lead Time:** One to two weeks.

### COST DATA

**Unit Acquisition Cost:** Receiver, \$2,000. Transmitter, \$180.  
**Unit Installation Cost:** Customer or outside contractor performs installation. Cost not available.  
**Training Cost:** Figured on equipment procured per system. Cost not available.  
**Maintenance Cost:** Figured on equipment procured per system. Cost not available.  
**Operation Cost:** Figured on equipment procured per system. Cost not available.

### NOTES

Some information in this data sheet is based upon a telephone conversation with a company representative.

Transmonitor I	Transmonitor I UT/X	Transmonitor II
4 Zones	Highest Level of security. 10 Zones	4 Zones Tape Dialer 1. Priority channel. 2. Record battery voice and digital information.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer:** Delta Products, Inc.  
P.O. Box 1147  
Grand Junction, CO 81501  
(303) 141-9000

**Model:** 230, 10900, 11100

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

This system consists of a transmitter Model 230, receiver Model 10900, and a printer Model 11100. Each transmitter has a five zone capability. Four zones are activated either by normally-open or normally-closed relay contacts or applied voltage. Once activated the transmitter and receiver turn on and listen-in for audio picked up by a single microphone in the protected area.

### PERFORMANCE DATA

**Probability of Transmission**  
**Error and Sources:** Information not available.  
**Capacity:** 5 zones for sensors.  
**Transmission Distance:** Information not available.  
**Resistance to Spoofing and Tampering:** None.  
**Indoor/Outdoor Operation:** Information not available.  
**Temperature:** Information not available.  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Requirements:** None.  
**Interface:** Uses conventional telephone line for communications between transmitter and receiver.

### PHYSICAL DATA

**Size:** Transmitter, 12x12x3in (30x30x7.6cm).  
Receiver/Printer, 19x15x7in (48x38x18cm).  
**Weight:** Transmitter 3 lb (1.4kg); Receiver/Printer 38lb (17kg.).  
**Power (Primary, Secondary):** 115V ac, 12 Volt standby.  
**Emplacement:** Information not available.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Installation instructions available. No training is required.  
**Parts and Repairs:** Information not available.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** One year warranty.  
**Government or Professional Standards:** None.  
**Lead Time:** Information not available.

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### COST DATA

<b>Unit Acquisition Cost:</b>	Transmitter, \$275. Receiver/Printer, \$1845.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	Information not available.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

### NOTES

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Esterline Electronics Corp.  
3501 N. Harbor Blvd.  
Costa Mesa, CA 92626  
(714) 540-1234

**Model** 6400 Series, Modular  
Command

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

Modular Command System is a computer based monitor and control system that is completely modularized. The system manages energy, reports fire and unauthorized entry, supervises guard tours and regulates heating and air conditioning. The Modular Command System operates basically on two pairs of no. 22 twisted pair wires and monitors up to 512 points. It will operate on 2 or 4 wire dedicated telephone lines. Transponder modulation technique: PCM/TDM, FSK; Transmitter freq, 1070 and 1270 Hz; Receiver, 2025 and 2225 Hz. The system operates with a 222 Hz Baud rate. The processor uses a 16 bit word and employs random access memory. The system uses polling approach for communications between the transponders and the interrogator/annunciator. The polling rate is one every 3.9 seconds, assuming 512 points.

The Modular Command System can be altered or expanded in configuration to suit needs. System consists of: Annunciator 6413; Transponders 6412, 6416, 6417; and communications for up to 512 points. Interrogator 6401 and Transponder (same as above) for up to 512 points. Computerized system with 6516 computer processing unit and transponders.

The operator display includes the type of alarm as well as a message with instructions on how to process the alarm. Hard copy print-out is an available option.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

Information not available.

**Capacity:**

Interrogator 6401 has (central station) handles 64, 8-zone transponders.

Annunciator 6413 has 96 channels or alarm points

Computer Processing Unit 6516 handles 64, 8 zone transponders.

**Transmission Distance:**

Uses telephone system or microwave carrier.

**Resistance to Spoofing and**

**Tampering:**

Use of series closed-window bridge Model 6411; prevents entire trunk (8 devices) from being compromised from a single drop. Any change from system signal frequency gives alarm. Resistant to external jamming.

**Indoor/Outdoor Operation:**

Indoor.

**Temperature:**

32 to 120F (0 to 50C).

**Humidity:**

Up to 90 percent.

**Other Environmental**

**Characteristics:**

Information not available.

**Radio Requirements:**

In microwave configuration voice grade circuits 2500 Hz.

**Interface:**

Type 3002 voice grade dedicated unconditioned 2 or 4 wire splitband line, phone line interface. Transmit level — 0dBm into 600ohm lines.

### PHYSICAL DATA

**Size:** Transponder 6416 and 6417, 13.7x10.2x4.5in (35x26x11.5cm). Transponder 6412, 20.2x13.5x 11x34cm). Interrogator and Annunciator, not available.

**Weight:** Transponder 6416 --- 7lb (3kg). 6412 --- 42lb (19kg). 6417 --- 7lb (3kg).; Interrogator and Annunciator --- not available.

**Power (Primary/Secondary):** Models 6416 and 6417, 12V ac., 50 to 60Hz, 0.7A; backup, 12 Volt battery, 2.6 Ah, 120 mA load when all alarm zones activated.

**Emplacement:** Transponders, wall mounted; other units, console mounted.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Manuals provided. In-house training service for operators included in procurement cost.

**Parts and Repairs:** In plant repairs available; Esterline recommends certain spares; transponders are serviced same day, circuit boards require less than one week.

**Reliability:** Transponders MTBF 40,000 hours. Interrogators and annunciators 5,000 hours.

**Maintainability:** MTTR not available.

**Warranty Information:** Modular construction, 1 year warranty.

**Government or Professional Standards:** UL-listed.

**Lead Time:** 6 months.

### COST DATA

**Unit Acquisition Cost:** Computerized system, \$65 K to 70 K includes conduit, wire and training.

**Unit Installation Cost:** Esterline will install, cost not available.

**Training Cost:** Included in acquisition cost.

**Maintenance Cost:** Not available.

**Operation Cost:** Not available.

### NOTES

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Franklin Signal Corp.  
370 Third Avenue  
Clear Lake, WI 54004  
(715) 263-2446

**Model** 21, 31, 1A and 1B

**Reference Evaluation Guide Procedure No.** VIII-1.A      **NRC Identification No.**

### NARRATIVE DESCRIPTION

This Digital Alarm System consists of a central station and digital communicator. The central station is comprised of a Model 21 Receiver and a Model 31 Printer which receive alarm indications via telephone lines from a Model 1A or 1B digital communicator. Up to 1000 digital transmitters are automatically answered by the Model 21 Receiver. The receiver displays the 3 digit subscribers code and 1 digit alarm code. The printer constantly displays the date/time digitally and prints verified subscriber and alarm codes in red. Printer accepts inputs from 2 receivers. The Model 1A digital communicator is a two channel signalling device, and the Model 1B is a three channel transmitter. Alarm processing time, between 15-17 seconds.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

Information not available.

**Capacity:**

999 locations, 10 zones maximum capacity of Model 21. Two receivers can be used with one printer to permit increased alarm processing capacity.

**Transmission Distance:**

Uses telephone switched system.

**Resistance to Spoofing and Tampering:**

Receiver sends acknowledgement tone when it receives alarm signal from transmitter. Two consecutive messages are transmitted and compared; the transmitter will try again if it does not receive an acknowledgement. The Model 1A will try up to 12 times before final shut down.

**Indoor/Outdoor Operation:**

Information not available.

**Temperature:**

Information not available.

**Humidity:**

Information not available.

**Other Environmental**

**Characteristics:**

Information not available.

**Radio Requirements:**

None.

**Interface:**

The baud rate and frequency are selectable by jumper option to match the format of the following receivers: SESCOA, DC1, ADEMCO and Silent Knight. The Receiver is compatible with the following communicators: Franklin, SESCOA, and DC1. The communications link is conventional voice grade telephone line. Receiver can be connected directly to an incoming telephone line where permitted, or used with an SU6-AD coupler.

### PHYSICAL DATA

**Size:** See notes.

**Weight:** See notes.

**Power (Primary/Secondary):** See notes.

**Emplacement:** See notes.

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### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Complete documentation for operation, installation and maintenance available. No training is provided.

**Parts and Repairs:** Return to factory.

**Reliability:** MTBF not available.

**Maintainability:** MTTR not available.

**Warranty Information:** One year warranty on equipment.

**Government or Professional Standards:** Awaiting certification from FCC. Built to UL standards, but application not submitted as yet for UL-listing.

**Lead Time:** Off-the-shelf.

### COST DATA

**Unit Acquisition Cost:** Prices are for , 0 9 items: Model 21 Receiver, \$350.; Model 31 Printer, \$550.; Model 1A Digital Communicator, \$85.; Model 1B Digital Communicator, \$99.

**Unit Installation Cost:** Not available.

**Training Cost:** No training provided.

**Maintenance Cost:** Not available.

**Operation Cost:** Information not available.

### NOTES

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

Telephone no., subscriber no., pauses etc. are factory or dialer programmed on a plug-in "memory chip" using a program duplicator Model No. 51 (Franklin).

	21 Receiver	31 Printer	1A Digital Communicator	1B Digital Communicator
<b>Size:</b>	9 $\frac{1}{4}$ x3 $\frac{1}{4}$ x10 $\frac{1}{2}$ in (23x8x27cm)	9 $\frac{1}{4}$ x3 $\frac{1}{4}$ x13 $\frac{1}{2}$ in (23x8x32cm)	5x6x1 $\frac{1}{2}$ in (12.5x15x3.8cm)	5x6x1 $\frac{1}{2}$ in (12.5x15x3.8cm)
<b>Wt:</b>	6lb (2.7kg)	8lb (3.6kg)	1lb (0.45kg)	1lb (0.45kg)
<b>Power</b>	7V ac, 20 VA	Normal and Standby	Both units will accept 5.5 to 14V continuously applied. Voltage applied to either of the two input terminals activates the Model 1A or 1B and determines which channel (code no.) will be reported to the central station.	
<b>Prim/Sec.</b>	Class 11 transformer	from receiver.		
	Standby-6 V 26 AH Gel Cell Battery.			
<b>Emplacement:</b>	Desk top.	Desk top — 14 column-2 Color.		

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Guard/Aware, Inc.  
48 Westgate Drive  
Brockton, MA 02403  
(617) 588-2246

**Model** CU-10-CU-17,  
CU-20, CU-22.

Reference Evaluation Guide Procedure No. VIII-1.A NRC Identification No.

### NARRATIVE DESCRIPTION

The Guard/Aware security control systems are designed for limited applications in residential and commercial areas, for fire warning, hold up, and security. Control panels are designed to indicate alarm conditions by ringing bells or sirens and by optional connection to the police department. The units incorporate fully supervised exit and burglary loops using a third wire line.

### PERFORMANCE DATA

**Probability of Transmission Error and Sources:** Information not available.  
**Capacity:** Depends on the length of line and number of contacts installed with a 500 ohm total loop resistance (hundreds of feet).  
**Transmission Distance:** Maximum loop resistances vary with different models. Usually from 50 ohms for holdup circuit to 500 ohms for premise loop alarm circuits. CU-22 is 1000 ohms for panic loop.  
**Resistance to Spoofing and Tampering:** Information not available.  
**Indoor/Outdoor Operation:** Information not available.  
**Temperature:** Information not available.  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Requirements:** Information not available.  
**Interface:** Interfaces with any cable not exceeding 500 ohm loop resistance.

### PHYSICAL DATA

**Size:** See notes.  
**Weight:** See notes.  
**Power (Primary/Secondary):** See notes.  
**Emplacement:** See notes.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Instruction sheets provided; no training is provided.  
**Parts and Repairs:** 2 Weeks, one day on emergency.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** 1 year warranty.  
**Government or Professional Standards:** None.  
**Lead Time:** Off-the-shelf.

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### COST DATA

**Unit Acquisition Cost:** CU-10, \$50.00; CU-17, \$82.50; CU-20, \$125.00; CU-22, \$85.00. All options extra.

**Unit Installation Cost:** Information not available.

**Training Cost:** information not available.

**Maintenance Cost:** Information not available.

**Operation Cost:** information not available.

### NOTES

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

	CU-10	CU-17	CU-20	CU-23
<b>Size:</b>	11x11x4in (28x28x10cm).	12x14.5x3.5in (30x37x9cm).	12x14.25x35in (30x37x9cm).	11x11x3in (28x28x7.5cm)
<b>Weight:</b>	Not available.	Not available.	Not available.	Not available.
<b>Power:</b>	4 No. 6 cells	Use No. 1240 trans- former 12V ac $\pm$ 1 volt Standby 12V dc $\pm$ 1 volt.	Use No. 1240 trans- former, 12V ac $\pm$ 1 Volt Standby 12V dc $\pm$ 1 volt.	Use No. 1240 trans- former, 12V ac $\pm$ 1 volt Standby 12V dc +2, -1V dc.
<b>Emplace- ment</b>	Wall mounted.	Same.	Same.	Same.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** H.B. Engineering  
Div. Berk-Tek, Inc.  
P.O. Box 60, R.D. 1  
Reading, PA 19607  
(215) 378-1121

**Model** Twintron Multiplex System

Reference Evaluation Guide Procedure No. V.11-1.A NRC Identification No.

### NARRATIVE DESCRIPTION

The Twintron Multiplex System is a frequency division multiplex system utilizing a patented tone resonator and is compatible with telephone company practices. The system is comprised of a master panel, MP60, which includes the fault monitors and audio alarm circuits. It also contains a lamp test switch and will support one through sixty subscribers by addition of SRx5B plug-in modules. The master panel receives alarms via telephone company lines from a remote transmitter and control unit, STx5B/cut. Two zones are handled by the transmitter. A desk type printer (optional) with capacity to monitor 1000 subscribers is available. Other optional equipment is listed in the notes.

### PERFORMANCE DATA

**Probability of Transmission Error and Sources:** information not available.  
**Capacity:** Up to 60 subscribers on a single telephone line.  
**Transmission Distance:** Uses telephone company system lines.  
**Resistance to Spoofing and Tampering:** None.  
**Indoor/Outdoor Operation:** Information not available.  
**Temperature:** Information not available.  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Requirements:** Information not available.  
**Interface:** Interfaces with type 3002 voice grade telephone line.

### PHYSICAL DATA

**Size:** Master Panel MP-60, 19x3½x13in (48x9x33cm). Transmitter and Control Unit, 8x10x3½in (20x25x9cm).  
**Weight:** Information not available.  
**Power (Primary/Secondary):** Master Panel, 12V dc (not supplied). Transmitter and control unit, 12V dc; battery back-up is optional.  
**Emplacement:** Cabinet with 19in (48cm) rack mount (not supplied).

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Operating, installation and maintenance manual is provided.  
**Parts and Repairs:** Information not available.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** One year repair or replace.  
**Government or Professional Standards:** None.  
**Lead Time:** Two weeks.

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#### COST DATA

<b>Unit Acquisition Cost:</b>	Master Panel MP-60, \$500.; Plug-in Module SRx5B with STx5A/slave, \$225.00; Transmitter and Control Unit STx5B/cut \$275.00.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	Information not available.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

#### NOTES

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

#### Optional Equipment:

NWD-Noise Warning Device-provides visible and audible indication if noise present on panel line. Also serves as a calibrated receiver for signal loss measurements. Cost, \$100.00.

DAY/NITE-offers opening and closing feature to-subscriber. Cost, \$8.00 (toggle switch).

ACCESS-enables central station operator to access zones, useful in proprietary application.

Printer-desk type or 19in (48cm) rack mount panel prints date, time, system no., zone and customer programmable alarm code.

#### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer:** Honeywell  
2701 Fourth Ave. South  
Minneapolis, MN 55408

**Model:** Alpha 1000

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Alpha 1000 System is a fire management and security system and can serve as a building and energy management system. The CPU W1000 interfaces with a W1020 (DGP) data gathering processor, which incorporates a Model R136-32D receiver that receives alarm responses from remote encoding transmitters (T136-313). The remote transmitters encode up to six alarm responses. Four transmitters having 6 alarm status inputs each may be used and its standard maximum loading. If more than four carriers are used, a four-wire circuit must be used. End-to-end attenuation should be less than 20 dB. A 16 bit micro-computer is the heart of the central processing unit and uses a programmable polling technique.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

Information not available.

**Capacity:**

CPU I/O channels, 10 in any combination of 2-wire dc, 4-wire dc, 2-wire tone, 4-wire tone. Remote transmitters (T13C-313), 4 carriers with 6 alarm status inputs each.

**Transmission Distance:**

CPU-DC: 10,000 feet (3km) per channel; Tone: Up to 5mi (8km) using type 3002 dedicated transmission lines.

**Resistance to Spoofing and Tampering:**

Individual points from each DGP are dc supervised.

**Indoor/Outdoor Operation:**

Information not available.

**Temperature:**

CPU, 0 to 110F (-17 to +43C). Other data not available.

**Humidity:**

CPU, 0 to 85 percent. Other data not available.

**Other Environmental Characteristics:**

Information not available.

**Radio Requirements:**

None.

**Interface:**

Interfaces with any combination of connecting lines: 2-wire dc, 4-wire dc, 2-wire-tone, or 4-wiretone.

### PHYSICAL DATA

**Size:**

Ring Cabinet, 37 $\frac{1}{4}$ x24x10in (92x61x25cm).

**Weight:**

CPU 80lb (36kg).

**Power (Primary/Secondary):**

CPU-W1000 A, 100/120V ac 60Hz, 5A; W1000 B, 100/120/220/240V ac, 50-60Hz, 5A or 2.5A including W1008 Power Supply.

**Emplacement:**

Self-standing console.

#### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Complete detailed operator's manuals are provided. Minimum of 2 days on-site; hands-on training is provided.

**Parts and Repairs:** Replacement of worn parts — 24 hour emergency back-up by trained service specialists. Provides on-site technician to assist and supervise installation personnel or installation and testing and final adjustments by Honeywell.

**Reliability:** MTBF not available.

**Maintainability:** MTTR not available.

**Warranty Information:** Entire installation, 1 year warranty.

**Government or Professional Standards:** UL-listed. Factory Mutual Research Corp. for use in fire protection signalling systems.

**Lead time:** 60 Days.

#### COST DATA

**Unit Acquisition Cost:** Information not available.

**Unit Installation Cost:** Information not available.

**Training Cost:** Information not available.

**Maintenance Cost:** Information not available.

**Operation Cost:** Information not available.

#### NOTES

Some information contained in this data sheet was provided either during a telephone conversation or in a meeting with a company representative.

#### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Honeywell  
2701 Fourth Ave. South  
Minneapolis, MN 55408

**Model** Alpha 3000

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Alpha 3000 Fire and Security Alarm System is a single master protection system that combines the features of nine different alarm detection, command and control functions, or may be packaged to provide any combination. The Alpha 3000 Series System consists of a central console, a common cable trunk, remote data gathering panels and various remote protection devices as required. The central console consists of a central processor, operator's display/keyboard, and an alarm/logging printer. An optional intercom capability is available — 20 watt transmit amplifier for multi-station tone paging and a 4 watt receiver amplifier using the 0.3 to 3 kHz audible voice range over a 2 wire, 20 gauge, twisted-shielded cable. Up to 99 remote speaker groups may be used with as many as 10 in each group connected at the same time for all station paging. All remote security service activity is displayed and recorded at the central console. The data processor in the central console continuously scans and interrogates the protection network for alarm and status information. (System is not computer controlled.) All data transmission for alarm and command functions from central to remote panels and return are transmitted as half duplex, di-phase, multiplexed digital data. Visual displays and/or print-outs are used. The system is expandable and will handle up to 3900 points. Mini-computer and full programming is available as an add-on.

### PERFORMANCE DATA

#### Probability of Transmission

##### Error and Sources:

Double transmission of a 12 bit word, offers message security, immune to noise burst of 12 bits duration or less and transmission reliability of 99.975%

##### Capacity:

Total points — 3900 per channel; analog alarm addresses, 60; on-off programs, 6; programmed equipment load, 60. Interrogate/response at 50,000 bits-per-second.

##### Transmission Distance:

10,000ft (3km) per channel for dc.

##### Resistance to Spoofing and

##### Tampering:

Individual points from each data gathering panel are dc supervised. Interrogate/response operations makes it difficult to determine which location is the source of information.

##### Indoor/Outdoor Operation:

Indoor.

##### Temperature:

32 to 100F (0 to 38C).

##### Humidity:

90 percent.

##### Other Environmental

##### Characteristics:

Information not available.

##### Radio Requirements:

Not applicable.

##### Interface:

Dual coaxial cables provide redundant transmission paths; special telephone leased-line adapter required for high speed digital transmission system.

### PHYSICAL DATA

##### Size:

Central Console, 20½x60x41in (52x150x104cm).

##### Weight:

Information not available.

##### Power (Primary/Secondary):

120V ac, 60Hz, 40 amps.

##### Emplacement:

Self-standing console.

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#### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Complete detailed written operating manuals provided. Minimum course of two days for system operators as part of installation cost.

**Parts and Repairs:** Honeywell provides: replacement of worn parts; 24 hour emergency back-up by trained service specialists; On-site technician to assist and supervise installing personnel or installation; testing and final adjustments.

**Reliability:** MTBF not available.

**Maintainability:** MTTR not available.

**Warranty Information:** One year warranty. Honeywell also assumes full responsibility for operational continuity for a fixed fee.

**Government or Professional Standards:** UL-listed. Factory Mutual Research Corp. for use in fire protection signalling systems.

**Lead Time:** 60 days.

#### COST DATA

**Unit Acquisition Cost:** Information not available.

**Unit Installation:** Information not available.

**Training Costs:** Information not available.

**Maintenance Cost:** Information not available.

**Operation Cost:** Information not available.

#### NOTES

Some information contained in this data sheet was provided either during a telephone conversation or in a meeting with a company representative.

#### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Honeywell  
2701 Fourth Ave. South  
Minneapolis, MN 55408

**Model** W882A and B

Reference Evaluation Guide Procedure No. VIII-1 A NRC Identification No.

### NARRATIVE DESCRIPTION

The W882 A, B System is a high security alarm line monitoring system. Unit W882 A is the premises control unit and W882 B is the alarm monitor at the monitoring station. The two units signal to each other over an interconnecting copper wire path of less than 1100 ohms. The W882 A, B system is limited to control a single area or zone with an unlimited number of sensors of various types. Any sensor alarm activation will be received by the W882 B alarm monitor, but the individual sensor in alarm condition is not identified.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

Information not available.

**Capacity:**

Premises control unit W882 A provides 2 supervised local loops to which an unlimited number of sensors can be connected.

**Transmission Distance:**

Length of copper wire having a maximum resistance of 1100 ohms.

**Resistance to Spoofing and Tampering:**

Known defeat techniques used on dc lines, such as voltage or resistor substitution, will not be successful because of the random coded pulse train technique. W882 A has heavy duty metal construction, no conduit knockouts and cover tamper switch.

**Indoor/Outdoor Operation:**

Indoor.

**Temperature:**

32 to 122F (0 to 50C).

**Humidity:**

Information not available.

**Other Environmental**

**Characteristics:**

Information not available.

**Radio Requirements:**

Not applicable.

**Interface:**

Interface with dedicated wire line, line driver amplifier and matching network for serial stream-random data. Absolute maximum alarm-line resistance is 1100 ohms.

### PHYSICAL DATA

**Size:**

W882 A, 8 $\frac{1}{8}$ x10 $\frac{3}{16}$ in (20x26cm). W882 B, 2 $\frac{1}{8}$ x7x7 $\frac{7}{16}$ in (5.1x17.5x20cm).

**Weight:**

Information not available.

**Power (Primary/Secondary):**

21.6 to 27.6V dc with maximum line resistance of 1100 ohms and maximum capacitance of 0.25mF. W882 A premises control derives this 24V dc-floating power from the alarm receiver W882 B. Power consumed is 175 mA dc nominal during service operation.

**Emplacement:**

W882 A, wall mounted; W882 B, mounted in rack or console (front panel attached to a printed circuit board with edge connector).

### SUPPLY/LOGISTICS DATA

<b>Documentation and Training:</b>	Complete detailed operator's manual provided. Minimum course of two days for system operators is part of installation costs.
<b>Parts and Repairs:</b>	Honeywell provides. Replacement of worn parts. 24 hour emergency back-up by trained service specialists. On-site technician to assist and supervise installation personnel in installation, testing and final adjustments.
<b>Reliability:</b>	MTBF not available.
<b>Maintainability:</b>	MTTR not available.
<b>Warranty Information:</b>	Honeywell also assumes full responsibility for operational continuity for a fixed fee. One year warranty.
<b>Government or Professional Standards:</b>	UL-listed. Factory Mutual Research Corp. for use in fire protection signalling systems.
<b>Lead Time:</b>	60 Days.

### COST DATA

<b>Unit Acquisition Cost:</b>	Information not available.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	Information not available.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

### NOTES

1. A separate pair of wires are required for audio communications. However, audio communication can be provided on an intermittent basis on the alarm line between W882 A and W882 B if provision is made to disconnect the two units during the time communication is taking place.
2. Additional equipment required:
  - A. Mallory Co. Sonalert Model No. SC628 must be used.
  - B. Leadwire assembly Honeywell 14002113-001 required for field installation. (not part of device)
  - C. Power Source, choice of power supply, charger and batteries as supplied by Honeywell.

Some information contained in this data sheet was provided either during a telephone conversation or in a meeting with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** ITT Data Equipment and  
System Division  
East Union Avenue  
East Rutherford, NJ 07073  
(201) 546-3900

**Model** 400 Digitor

Reference Evaluation Guide Procedure No. VII-1.A NRC Identification No.

### NARRATIVE DESCRIPTION

The Digitor polling concept places a transmitter/receiver and a transponder counting circuit at each remote alarm monitoring station. The main central station feeds a pre-assigned number of pulses to the remote station. The transponder triggers a response upon receipt of a predetermined pattern of pulses with every transmission. Response location code number and condition are recorded along with date and time of occurrence. The system uses time division multiplex (TDM) with a basic timing speed of 5 baud with 100V dc pulses balanced to ground. Time required to scan 0 to 999 is 77.25 seconds with no print-out; 90 seconds with 50 print-outs.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

Information not available.

**Capacity:**

Maximum number of remote locations is 1000; maximum number of remote locations for wire line is 100, maximum number of channel status panels per system is 10.

**Transmission Distance:**

50mi (80km) by wire. Greater distances are possible with use of carrier transmission and optional carrier adapter (interface) equipment only.

**Resistance to Spoofing and Tampering:**

Any interruption or delay causes an alarm. Spoofing signals would have to be matched and timed to original signal and substituted. Compromising system is difficult without knowledge of signal pulses, timing and coding techniques used. Metal cabinets containing equipment are equipped with security locks.

**Indoor/Outdoor Operation:**

Indoor.

**Temperature:**

Console and Transponder, 32 to 120F (0 to 50C).

**Humidity:**

Up to 95 percent.

**Other Environmental**

**Characteristics:**

Information not available.

**Radio Requirements:**

Not applicable.

**Interface:**

Interface with dedicated wire. Output is a pulsed 100V dc line-to-line; balanced to ground.

### PHYSICAL DATA

**Size:**

Console consists of 2 bays of standard 19in (48cm) racks side-by-side 42in (107cm) total width. Transponder 481B Mark II is 15-<sup>3</sup>/<sub>16</sub>x18<sup>1</sup>/<sub>8</sub>x4<sup>5</sup>/<sub>16</sub>in (38x45x11.5cm).

**Weight:**

Console is 500lb (220kg.). Transponder 481B Mark II is 35lb (16kg.).

**Power (Primary/Secondary):**

117V ac  $\pm$  10 percent, 1 phase, 60 Hz. 300 VA for multiplex control unit; 120 VA for each channel status panel; 20 VA for each transponder. Emergency power, 2. 300Ah, 12V storage battery for multiplex control unit; 120Ah, 12V storage battery for central station; a 240Ah, 12V battery for each channel status panel.

**Emplacement:**

Fixed station, self-standing console.

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### SUPPLY/LOGISTICS DATA

<b>Documentation and Training:</b>	All maintenance, operational and installation documentation is supplied. Training is provided.
<b>Parts and Repairs:</b>	Estimates will be supplied on request for repair of parts or other components. Standard repair charges one FOB factory.
<b>Reliability:</b>	MTBF not available.
<b>Maintainability:</b>	MTTR not available.
<b>Warranty Information:</b>	90 days after installation and checkout.
<b>Government or Professional Standards:</b>	UL approved initially, at present not carrying approval.
<b>Lead Time:</b>	From stock due to quantities available.

### COST DATA

<b>Unit Acquisition Cost:</b>	Digitor Monotor Console 9400C, \$27,000 (not including panels). Transponder Mark II — \$325.00 (not including channel module, fire service, interface, etc.).
<b>Unit Installation Cost:</b>	\$50 to \$150. Depends on size of installation.
<b>Training Costs:</b>	Nominal.
<b>Maintenance Cost:</b>	Complete overhaul and replacement of all worn mechanical parts — \$1100.00.
<b>Operation Cost:</b>	Information not available.

### NOTES

Monitor Console Unit consists of:

1. Clock printer.
2. Channel status panels (1 to 10).
3. Multiplex control panel.
4. Power supply and charger inverter.

Optional Equipment

1. Additional transponders.
2. Day/night checkback units on open-secure units for transponders.
3. Remote-control cards for the transponders.
4. Additional channel status panels (up to total of 10).
5. Carrier adapters (master and remote units available).
6. Fire interface units.
7. Battery back-up system (spare).

Some information contained in this data sheet was provided either during a telephone conversation or in a meeting with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Johnson Controls, Inc.  
507 E. Michigan Street  
Milwaukee, WI 53201  
(414) 23F-9200

**Model** JC/80

Reference Evaluation Guide Procedure No. VIII-1.A-1      NRC Identification No.

### NARRATIVE DESCRIPTION

The JC/80 is a modularized computer automation system for buildings made up of different combinations of hardware and software modules so that the system can be tailored to any application. The system provides security, fire prevention and communications monitoring.

### PERFORMANCE DATA

#### Probability of Transmission

<b>Error and Sources:</b>	Information not available.
<b>Capacity:</b>	Information not available.
<b>Transmission Distance:</b>	Information not available.
<b>Resistance to Spoofing and Tampering:</b>	Information not available.
<b>Indoor/Outdoor Operation:</b>	Information not available.
<b>Temperature:</b>	Information not available.
<b>Humidity:</b>	Information not available.
<b>Other Environmental Characteristics:</b>	Information not available.
<b>Radio Requirements:</b>	Information not available.
<b>Interface:</b>	Information not available.

### PHYSICAL DATA

<b>Size:</b>	Information not available.
<b>Weight:</b>	Information not available.
<b>Power (Primary/Secondary):</b>	Information not available.
<b>Emplacement:</b>	Information not available.

### SUPPLY/LOGISTICS DATA

<b>Documentation and Training:</b>	Information not available.
<b>Parts and Repairs:</b>	Information not available.
<b>Reliability:</b>	MTBF not available.
<b>Maintainability:</b>	MTTR not available.
<b>Warranty Information:</b>	Information not available.
<b>Government or Professional Standards:</b>	UL-listed.
<b>Lead Time:</b>	Not available.

#### COST DATA

Unit Acquisition Cost:	Information not available.
Unit Installation Cost:	Information not available.
Training Cost:	Information not available.
Maintenance Cost:	Information not available.
Operation Cost:	Information not available.

#### NOTES

System has Operator "Doze" alarm feature.

#### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Walter Kidde & Co. Inc.  
Douglass Randall Div.  
6 Pawcatuck Ave.  
Pawcatuck, CT 02891  
(203) 599-1750

**Model** CORAL

Reference Evaluation Guide Procedure No. VIII-1.A NRC Identification No.

### NARRATIVE DESCRIPTION

CORAL (Computerized Operating Recording Alarm Logging System) is a general purpose computerized event processing system. It employs a central processor unit DEC PDP-11/03 with 8K words of storage for processing, display and logging at the central station. It provides for automatic or operator-initiated control of remotely actuated devices. Model DP-103 transponders (Data Gathering Panel) communicate between the sensors and the event processor.

The system is comprised of an event processor, the CPU-DEC PDP-11/03, a dual disk drive (RX-01) which provides working storage for the event processor, a CRT terminal, VT 50, used for annunciation and operator communication with the system, a hard copy terminal printer keyboard, LA-36, for logging events as well as CRT redundancy, and a TE-101A modem for each communication line in the system (see notes).

### PERFORMANCE DATA

#### Probability of Transmission

##### Error and Sources:

Information not available.

##### Capacity:

DP-103 Transponders handle 16 sensor circuits or zones and options available for either 5 or 10 remote control actuators. Circuit is fully supervised by the event processor. 64 DGP's can be connected to the event processor by a single dedicated wire pair or a leased voice grade telephone line.

##### Transmission Distance:

Information not available.

##### Resistance to Spoofing and

##### Tampering:

System continually monitors itself for system errors.

##### Indoor/Outdoor Operation:

Information not available.

##### Temperature:

Information not available.

##### Humidity:

Information not available.

##### Other Environmental

##### Characteristics:

Information not available.

##### Radio Requirements:

Information not available.

##### Interface:

Information not available.

### PHYSICAL DATA

##### Size:

Information not available.

##### Weight:

Information not available.

##### Power (Primary/Secondary):

Information not available.

##### Emplacement:

Information not available.

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### SUPPLY/LOGISTICS DATA

<b>Documentation and Training:</b>	Information not available.
<b>Parts and Repairs:</b>	Information not available.
<b>Reliability:</b>	Information not available.
<b>Maintainability:</b>	Information not available.
<b>Warranty Information:</b>	Information not available.
<b>Government or Professional Standards:</b>	Information not available.
<b>Lead Time:</b>	Information not available.

### COST DATA

<b>Unit Acquisition Cost:</b>	Information not available.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	Information not available.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

### NOTES

Other Kidde Alarm Signalling Equipment:

Sigmatic Series SG-300 Alarm Monitors monitor any N.O. or N.C. detectors. System comes complete with power supply and audio alarm panel SG-301. Power 117/24 V ac transformer; maximum detection circuit resistance is 500 ohms. System can be expanded to up to 100 zones by addition of 10 zone panels.

Sigmatic Series SG-400 Alarm and Control Panel is designed to be located at the central station to provide an indication of the status of doors. The SG-400 system comprises alarm and control units and audio panel, SG-301 which is common to any size system. System may be expanded to up to 50 zones by addition of 10 zone panels; maximum detection circuit resistance is 500 ohms. Uses 117/24 V ac transformer for up to 50 zones, and PS-117 power supply for over 50 zones. Each zone on monitor is connected to detection device by a 2-conductor cable.

The Coral System is expandable to include the following alarm, control and monitoring functions:

- Fire detection and alarm system.
- Sprinkler supervisory system.
- Security system.
- System of command functions.
- Watch-tour system.
- Equipment monitoring functions.
- Card reader access control system.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Walter Kidde & Co. Inc.  
Douglas Randall Div.  
6 Pawcatuck Ave.  
Pawcatuck, CT 02841  
(203) 599-1750

**Model** Dyna-Plex 11

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Dyna-Plex II is a completely solid state automatic sequential scanning system which monitors information from remotely located transmitters. Off-normal conditions or changes of state at protected locations are detected and reported to a central controller where they are annunciated. The Dyna-Plex II System is comprised of one each of a Model DP-104 multiplex controller, Model DP-105 audio alarm panel, Model DP-107 power control panel, and one or more Model DP-103 transmitters, Model DP-106 or DP-124 annunciators, optional Model DP-108 remote control panels. The central controller uses a coded polling technique to control and communicate with transmitters.

### PERFORMANCE DATA

**Probability of Transmission**  
**Error and Sources:** Information not available.  
**Capacity:** System is available with up to 64 transmitters on a common circuit providing 1024 total alarm inputs.  
**Transmission Distance:** Uses telephone lines.  
**Resistance to Spoofing and Tampering:** System is completely supervised, and errors or circuit fault conditions are detected and announced.  
**Indoor/Outdoor Operation:** Information not available.  
**Temperature:** 32 to 158F (0 to 70C).  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Requirements:** Not applicable.  
**Interface:** Interface with 2-conductor cable or leased voice-grade telephone circuit.

### PHYSICAL DATA

**Size:** See notes.  
**Weight:** See notes.  
**Power (Primary/Secondary):** See notes.  
**Emplacement:** See notes.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Operation and installation manuals are supplied. No training is provided.  
**Parts and Repairs:** Return to factory for repairs.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** One year to two year warranty.  
**Government or Professional Standards:** Submitted for UL-listing.  
**Lead Time:** One to two weeks.

### COST DATA

**Unit Acquisition Cost:** DP-103, 16 zones, \$1390.; DP-10F, \$1780.; DP-124, \$1200.; DP-105, \$336.; DP-108, \$360.  
**Unit Installation Cost:** Information not available.  
**Training Cost:** Information not available.  
**Maintenance Cost:** Information not available.  
**Operation Cost:** Information not available.

### NOTES

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

	DP-103	DP-104	DP-124	DS-120
<b>Size:</b>	3x3x14in (7.5x4.5x3.5cm)	5¼x19x12in (13x4.8x3.0cm)	5¼x19x6in (13x4.8x1.5cm)	3¼x19x7in (9x4.8x1.7cm)
<b>Weight:</b>	23lb (10.5kg)	10lb (4.5kg)	15lb (7kg)	Not available
<b>Power:</b>	110V ac	24V dc, PS-120	24V dc, PS 120	24V ac, 20A, 24 Battery Pack
<b>Emplacement:</b>	Wall Mounted	Rack Mount	Rack Mount	Rack Mount

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Walter Kidde & Co. Inc.  
Douglas Randall Division  
6 Pawcatuck Avenue  
Pawcatuck, CT 02891  
(203) 599-1750

**Model** MR-101, Series &  
MT-100 Series

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The MR-101 Series annunciators are designed to be located in a constantly attended central alarm monitoring station and are connected by a supervised 2-conductor cable (usually a leased telephone circuit) to a remote signalling location. Terminal units (MT-100 Series) (remote transmitting devices) are provided to accommodate any detection scheme requirement. These Terminal units have wiring provisions to operate a four-wire, supervised fire alarm circuit and a two-wire closed circuit for security alarms.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

Information not available.

**Capacity:**

10 zones per panel (system expandable by addition of annunciator panels).

**Transmission Distance:**

Uses telephone lines.

**Resistance to Spoofing and Tampering:**

System is self-monitoring and detects and annunciates system or signal line faults, utilizing a separate trouble indicator for each zone.

**Indoor/Outdoor Operation:**

Information not available.

**Temperature:**

32 to 158F (0 to 70C).

**Humidity:**

Information not available.

**Other Environmental**

**Characteristics:**

Information not available.

**Radio Requirements:**

Not applicable.

**Interface:**

Interfaces with supervised 2-conductor cable (usually a leased telephone circuit).

### PHYSICAL DATA

**Size:**

MR-101 Panel, 19x5.25x10in (49x13x25cm). Audio Alarm Panel SG-305, 19x3.5x4in (49x9x10cm).

**Weight:**

MR-101 Panel, 7lb (3.2kg.); Audio Alarm Panel SG-305, Information not available.

**Power (Primary/Backup):**

MR-101 Panel, 24 to 30V dc, 2 A. Audio Alarm Panel SG-305, 117/24V ac transformer (up to 30 zones).

**Emplacement:**

Information not available.



#### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Installation, maintenance, operations manuals are provided. No training is provided.

**Parts and Repairs:** Information not available.

**Reliability:** MTBF not available.

**Maintainability:** MTTR not available.

**Warranty Information:** One to two year warranty.

**Government or Professional Standards:** Listed by Factory Mutual Research Corp.

**Lead Time:** 60 to 90 days.

#### COST DATA

**Unit Acquisition Cost:** MR-101-10, \$2000.; SG-305 (audible alarm), \$370.; MT-100, \$85.; MT-101 \$85.; MT-102 \$140. (2-circuit with audio signal input and output.)

**Unit Installation Cost:** Information not available.

**Training Cost:** Information not available.

**Maintenance Cost:** Information not available.

**Operation Cost:** Information not available.

#### NOTES

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

#### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Walter Kidde & Co. Inc.  
Douglas Randall Division  
6 Pawcatuck Avenue  
Pawcatuck, CT 02891  
(203) 599-1750

**Model** SG-600 Series

Reference Evaluation Guide Procedure No. VIII-1.A NRC Identification No.

### NARRATIVE DESCRIPTION

The SG-600 Series annunciating systems are designed to be located at an alarm reporting station. Each alarm zone is represented on the monitor by a split lens lamp/switch which indicates alarm or silent conditions. The system components are: Sigmatic 3G-G10 (10 alarm zones) or Sigmatic 6-62D (20 alarm zones) alarm annunciators (one or more) and a power supply PS-120. Each alarm zone on the annunciator is connected to a detection device by a two-conductor wire pair and/or a dc telephone circuit. The annunciator can monitor any N.O. or N.C. detector.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:** Information not available.

**Capacity:** Model SG-610 (10 zones). Model SG-620 (20 zones).

**Transmission Distance:** Uses 2-conductor wire pair and/or dc telephone circuit. Maximum detection circuit resistance is 2500 ohms. Detection circuit voltage is 14V maximum for alarm.

**Resistance to Spoofing and**

**Tampering:** 2000 ohm supervisory system with 5000 ohm line resistance.

**Indoor/Outdoor Operation:** Information not available.

**Temperature:** 32F to 158F (0C to 70C).

**Humidity:** Information not available.

**Other Environmental**

**Characteristics:** Information not available.

**Radio Requirements:** None.

**Interface:** Interfaces with 2 conductor wire pair and/or dc telephone circuit.

### PHYSICAL DATA

**Size:** SG-600 Series Annunciators — 19x3½x7in (48x9x18cm).

**Weight:** 32lb (1.5kg.).

**Power (Primary/Backup):** 120V ac input; system power is 24V dc at 15 A. Backup is provided by a 24V battery and charger with automatic switchover.

**Emplacement:** Fits standard 19in (48cm) enclosures. Four standard size enclosures available to house up to 180 zones.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Installation, operations and maintenance manuals provided. No training is provided.  
**Parts and Repairs:** Service available from regional field representatives.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty information:** One year warranty.  
**Environment: Professional Standards:** None.  
**Lead Time:** Off-the-shelf.

### COST DATA

**Unit Acquisition Cost:** SG-610, \$770.; 620 Annunciator, \$970.; PS-120, \$500.; SG-6ST Supervisory, \$860.00.  
**Unit Installation Cost:** Information not available.  
**Training Cost:** Information not available.  
**Maintenance Cost:** Information not available.  
**Operation Cost:** Information not available.

### NOTES

Options:

(A long list of options is available.)

- Access/secure system option.
- Common auxiliary relay.
- Printer/recorder interface.
- Zoned auxiliary contacts.
- Slave annunciators.
- Reverse polarity options.

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Lake Jackson Industries  
1830 Massachusetts Ave.  
McLean, VA 22101  
(703) 538-4677

**Model** Mark V

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Mark V is a security system in which the subscribers (alarm indicators) are connected to the monitoring-receivers through leased telephone lines. The alarms are indicated both visually and aurally. The tones and coding of the alarms originate in the subscriber unit. Alarm indications are reset at the receiver only. Alarm tones: Nominal open,  $280 \pm 5$  Hz at  $0.26 \pm 0.1$  V rms; Nominal closed,  $340 \pm 5$  Hz at  $0.26 \pm 0.1$  V rms. Microphone level is 30 dBm into 600 ohm line in open position and 100 dbm when closed. The system will accept various types of sensors that work into 'open' or 'closed' dry contacts. For additional information see notes. 'closed' dry contacts. For additional information see notes.

### PERFORMANCE DATA

#### Probability of Transmission

**Error and Sources:** Information not available.  
**Capacity:** 1 to 18 sound channels in parallel (2 normally closed circuits).  
**Transmission Distance:** Uses voice grade telephone lines.  
**Resistance to Spoofing and Tampering:** Line supervision: the system employs full time monitoring using a single frequency signal tone. Any interruption of this tone switches the receiver to the alarm state, and any signal on the telephone line is reproduced in the speaker.  
**Indoor/Outdoor Operation:** Information not available.  
**Temperature:** Information not available.  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Requirements:** Not applicable.  
**Interface:** Voice grade telephone lines, nominal 600 ohms (lines must be isolated from ground). Has input level control to compensate for line loss. The voice operated alarm system illuminates a 'yellow' lamp at the receiver and reproduces the open microphone signal on a speaker. Hold-up and fire are closed resistances up to 1000 ohms. Entry alarms with contact resistance greater than 2000 ohms. No alarm if resistance is less than 1000 ohms.

### PHYSICAL DATA

**Size:** Subscriber Unit, SU-1, 7x12x2in (18x30x5.1cm).  
Receiver Unit RM-1B, 3.4x5.25x1.1in (9x13x28cm).  
**Weight:** Subscriber Unit, SU-1, 2½lb (1.2kg.); Receiver Unit RM-1B: Information not available.  
**Power (Primary/Secondary):** Subscriber Unit SU-1, 117V ac  $\pm 10\%$  60 Hz. Emergency power from self-contained batteries. Receiver Unit RM-1B, 14 to 18V dc, 200 mA, self contained power supply.  
**Emplacement:** Subscriber Unit SU-1 is wall mounted; Receiver Unit RM-1B, designed for mounting in pre-wired frame that fits standard 19in (48cm) rack.

#### SUPPLY/LOGISTICS DATA

<b>Documentation and Training:</b>	Operations and installation manuals available. Informal training is provided.
<b>Parts and Repairs:</b>	Parts are readily available.
<b>Reliability:</b>	MTBF not available.
<b>Maintainability:</b>	MTTR not available.
<b>Warranty Information:</b>	One year warranty.
<b>Government or Professional Standards:</b>	None.
<b>Lead Time:</b>	Three weeks.

#### COST DATA

<b>Unit Acquisition Cost:</b>	Subscriber unit, \$237.; receiver, \$200.; frame for 4 receivers, \$325.; microphone, \$12.50.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	\$15 per hour or \$125 per day.
<b>Maintenance Cost:</b>	Service charge \$15 per unit plus parts.
<b>Operation Cost:</b>	Information not available.

#### NOTES

##### Narrative Description (Cont.)

The major components of the Mark V System are:

Receiver, Model RM-1B.

Subscriber Unit, Model SU-1.

Microphone, Model MA-1.

Quad-Mount Frame (fits standard 19in (48cm) cabinet).

Sensors (other than microphones must be purchased from other manufacturers.

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

#### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Mesa Security Group  
6656 West 87th Place  
Los Angeles, CA 90045  
(213) 645-5509

**Model** SAR-01 & SAR-02

Reference Evaluation Guide Procedure No. VIII-1.A NRC Identification No.

### NARRATIVE DESCRIPTION

The Mesa SAR-01 unit is a general purpose security control panel designed to monitor standard contact closure inputs on command. It distinguishes between a fire/emergency input alarm which is continuously operational and security loop inputs which are actuated on user command. Adjustable security loops permit delayed or instantaneous activations.

The Model SAR-02 is similar to the first model but has additional features such as a bell test switch. Neither system indicates location of the sensor activations.

### PERFORMANCE DATA

**Probability of Transmission:**  
**Error and Sources:** Information not available.  
**Capacity:** Remote stations, unlimited without lamps (250 mA limit using LED for indicators).  
**Transmission Distance:** Distance is limited by amount of resistance in the connecting loop and in the attached sensors. The maximum amount of resistance allowed is 2000 ohms.  
**Resistance to Spoofing and Tampering:** Information not available.  
**Indoor/Outdoor Operation:** Information not available.  
**Temperature:** Information not available.  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Requirements:** Not applicable.  
**Interface:** Information not available.

### PHYSICAL DATA

**Size:** SAR-01, 8x11x3 $\frac{1}{4}$ in (20x28x8cm). SAR-02, 9x12x3 $\frac{1}{4}$ in (23x30x9.5cm).  
**Weight:** SAR-01, 8lb (3.6kg); SAR-02, 12lb (5.2kg).  
**Power (Primary/Secondary):** 15 to 23V ac; alternate, 9 to 14V dc.  
**Emplacement:** Wall mount.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** An instruction sheet is available; no training is provided.  
**Parts and Repairs:** Parts available commercially.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** One year warranty.  
**Government or Professional Standards:** None.  
**Lead Time:** Small quantities are available off-the-shelf.

#### COST DATA

<b>Unit Acquisition Cost:</b>	SAR-01, \$49.00; SAR-02 \$76.00
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	No training provided.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

#### NOTES

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

#### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Receptors Corp.  
4203 Spencer St.  
Torrance, CA 90503  
(213) 542-0501

**Model** Series 300

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Receptors Series 300 Proprietary Central Station Alarm System consists of a central station (Model 301 or 302), 64 remote input multiplex terminals (RMT), 64 remote control output terminals (ROT), printer, graphic displays and other optional peripheral equipment. It will operate with virtually all types of sensors (not included). The system employs a DEC PDP-11 minicomputer (optional). The Model 301 Central Station, provides an audible signal, two LED's identifying sensor number and RMT number. The Model 302 Central Station provides all functions of the 301 plus additional controls to operate remote control output terminals (see notes). Alarm signals received at the console are verified by a double scan of each RMT as well as a wave form test that ensures proper reception of the data being transmitted. A full system of 64 RMT's (512 sensors) will report on the status of each sensor once each second. However, in computerized system, simultaneous acceptance of data from all 4 transmission cables is done, thus quadrupling the reporting speed.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

Information not available.

**Capacity:**

Can be linked to as many as 512 individual sensors via a network of 64 remote input multiplex terminals of 8 zones each.

**Transmission Distance:**

5 miles (8 kilometers).

**Resistance to Spoofing and Tampering:**

The remote multiplex terminal 302-1C provides a guarded circuitry by using one of the other 8 inputs to report any alarm. The 302-1 employs a 1 megohm resistor in series or parallel with the signal source to detect tampering or malfunction. Each RMT alarm is verified by double scan and wave form comparison to ensure proper reception of data being transmitted.

**Indoor/Outdoor Operation:**

Indoor.

**Temperature:**

Up to 95F (35C) for the computer.

**Humidity:**

Information not available.

**Other Environmental**

**Characteristics:**

Information not available.

**Radio Requirements:**

Not applicable.

**Interface:**

Communicates with the remote multiplex input terminals (RMT) over 4-wire cable and with the remote control output terminal (ROT) over 2-wire cable. The central station will operate 16 remote input terminals or 16 remote output terminals per cable and can accommodate 4 cables of each type.



### PHYSICAL DATA

**Size:** Central Control Terminal 301: Desk top is 13x4.5x13in (33x11.5x33cm); rack mount is 19x4.5x13in (48x11.5x33cm) Remote multiplex terminal: 8.35x2x4.7in (23x5x12cm).

**Weight:** Information not available.

**Power (Primary/Secondary):** Central control terminal, 117V ac, 60Hz, 1.27 A max (other V ac and Hz available). Digital input terminals powered from central control terminals; output terminals require local ac. Analog input terminals and output terminals require local ac.

**Emplacement:** Rack mounted or desktop model.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Operation, installation and maintenance manuals supplied. Training is available either at the plant or at on site location.

**Parts and Repairs:** Overnight turn-a-round.

**Reliability:** MTBF not available.

**Maintainability:** MTTR not available.

**Warranty Information:** One year return-to-factory. Computer PDP-11 is DEC's responsibility.

**Government or Professional Standards:** UL-listing in progress; no government standards.

**Lead Time:** 60 days.

### COST DATA

**Unit Acquisition Cost:** CCT-301, \$2285.; CCT-302 Command \$3150; ROT, RMT terminals \$88.

**Unit Installation Cost:** Information not available.

**Training Cost:** Hourly basis. Rate not available.

**Maintenance Cost:** Usually based on 12 percent. per year of purchase price. Actually cost not available.

**Operation Cost:** Information not available.

### NOTES

The Model RMT Remote Multiplex Terminals provide for 8 sensor or status inputs.

The Model ROT 308 Remote Control Output Units provide 8 momentary delay closures, individually addressed, with either N.O. or N.C. contacts.

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Receptors Corp.  
4203 Spencer Street  
Torrance, CA 90503  
(213) 542-0501

**Model** Series 600

Reference Evaluation Guide Procedure No. VIII-1.A NRC Identification No.

### NARRATIVE DESCRIPTION

The Series 600 system uses the DEC LSI-11 microcomputer which serves primarily as a switchboard and display generator, in any mix of telephone or radio communication. Communications options available for use with the system include SSM-600 Signal Stream Multiplexing System, CPM-602 Command Polling Multiplex System, and RRM-603 Random Reporting Multiplexing. Interchangeable circuit cards provide a choice between 300 baud for voice grade unequalized channels and 1700 baud for higher grade channels. See notes for additional information.

### PERFORMANCE DATA

**Probability of Transmission Error and Sources:** Information not available.  
**Capacity:** Each Remote Multiplexing Terminal (RMT) interfaces with 8 sensors. Four telephone grade (2 twisted pair) wires share up to 16 terminals; up to 32 cables can be supported by a single computer configuration. 512 remote terminals of 8 inputs each are available to service 4096 independently monitored sensors.  
**Transmission Distance:** Up to 5 miles (8 kilometers), SSM-600.  
**Resistance to Spoofing and Tampering:** Information not available.  
**Indoor/Outdoor Operation:** Indoor.  
**Temperature:** Up to 95F (35C) for the computer.  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Requirements:** Information not available.  
**Interface:** Interface with voice grade telephone lines or with radio transmitter/receiver.

### PHYSICAL DATA

**Size:** Information not available.  
**Weight:** Information not available.  
**Power (Primary/Secondary):** 117V ac, 60Hz, 250mA(max).  
**Emplacement:** Floor mount.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Operation, installation and maintenance manuals supplied. Training provided at plant or on site.  
**Parts and Repairs:** Overnight turn-a-round.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** One year return-to-factory for repair.  
**Government or Professional Standards:** UL approval in progress.  
**Lead Time:** 90 days based on PDP-11 delivery from factory.

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### COST DATA

<b>Unit Acquisition Cost:</b>	Custom types, \$10 K to \$50 K.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	On an hourly basis, cost not available.
<b>Maintenance Cost:</b>	Usually based on 13 percent per year of total purchase price.
<b>Operation Cost:</b>	Information not available.

### NOTES

The SSM-600 Signal Stream Multiplex Communications system consists of remote input and output terminals and computer interface circuit cards. Can be used with remote terminals at distances up to 5 mi (8Km). Remote sensor terminals take power from communication lines. Each remote sensing terminal (RMT) can interface with 8 sensors. Four telephone grade (2 twisted pair) wires are shared by up to 16 terminals. Up to 32 cables can be supported by a single computer configuration. Thus 512 remote terminals of 8 inputs each or 4096 independent sensors are serviced by the simple system. Multiple computer systems can be used for larger numbers of terminals. Every sensor in the system can be monitored each 1/4 second.

The CPM-602 Command Polling Multiplex Communication system is a multipurpose system made up of circuit cards that tailor the system for a variety of services and data speeds. Communication can be by radio or telephone for long distances. Message security is provided through a combination of BCH code check character transmitted with data and waveform check.

The RRM-603 Random Response Multiplex Communications system provides low cost, one way only remotes for monitoring random events as security intrusions or other alarm or status conditions. The RRM-603 uses a compound modulation FSK and a tri-width coder/decoder, such that message integrity is determined by BCH code and waveform check. A transmission takes less than 1/2 second and will be repeated twice (optionally four times) at 2 minute intervals. The station code is switch settable so that all stations are interchangeable. The RRM 603 uses a compound modulation FSK and a tri-width such that message integrity is determined by BCH code and waveform check.

Some information contained in this sheet was provided during a telephone conversation with a company representative.

### INSTALLATIONS

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## ALARM SIGNALLING SYSTEMS

**Manufacturer** Receptors Corp.  
4203 Spencer Street  
Torrance, CA 90503  
(213) 542-0501

**Model** Series 700

Reference Evaluation Guide Procedure No. VIII-1.A NRC Identification No.

### NARRATIVE DESCRIPTION

In the Series 700 multiplex system all terminals are continuously maintained in complete synchronism down to a fraction of a bit. A patented signal stream multiplexing technique is used in which a synchronizing waveform generated by the Master Communicator (MSTR) is impressed on the communication line, and the transmitted data is interleaved with it forming a compound modulation waveform. The SSM 700 system reduces the speed of the SSM-600 for long-distance multiplexing over telephone facilities. Terminals located at remote locations monitor and display all activated sensors. A serial computer interface card (SER1) provides channel data interface with the computer (DEC PDP-11) as an option. The transmitted data rate is 100 bps (information bit is transmitted twice — bit rate is 50 bps). Information bits programmed for transmission of 8, 16, 32, 64 or 128 bits. Scan for 8 bits is 160 ms; for 16 is 320 ms; for 32 is 640 ms; for 64 is 1.28 sec; and for 128 is 2.56 sec.

### PERFORMANCE DATA

#### Probability of Transmission

**Error and Sources:** Information not available.  
**Capacity:** Up to 128 inputs from alarm devices.  
**Transmission Distance:** Telephone lines or radio.  
**Resistance to Spoofing and Tampering:** Information not available.  
**Indoor/Outdoor Operation:** Information not available.  
**Temperature:** Information not available.  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Requirements:** Information not available.  
**Interface:** Single twisted pair wire, telephone company facilities or radio.

### PHYSICAL DATA

**Size:** Housing and power supply depends on the size of the system procured.  
**Weight:** Depends on the system.  
**Power (Primary/Secondary):** Information not available.  
**Emplacement:** Floor mount.

### SUPPLY/LOGISTICS DATA

<b>Documentation and Training:</b>	Operation, installation and maintenance manuals supplied. Training provided at plant or on site.
<b>Parts and Repairs:</b>	Overnight turn-a-round.
<b>Reliability:</b>	MTBF not available.
<b>Maintainability:</b>	MTTR not available.
<b>Warranty Information:</b>	One year, return-to-factory for repair.
<b>Government or Professional Standards:</b>	UL approval in progress.
<b>Lead time:</b>	60 days.

### COST DATA

<b>Unit Acquisition Cost:</b>	Information not available.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	Information not available.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

### NOTES

Some information contained in this sheet was provided during a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Ring-Master, Inc.  
6901 Jericho Turnpike  
Syosset, NY 11791  
(516) 364-1060

**Model** Scanning I, Scanning II  
and Mini Scanning

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Scanning I and Mini Scanning are high speed surveillance systems built around a solid state scanner exchange. The former is expandable from monitoring 25 points to 999 points and on special order up to 10,000 points. The Mini-Scanning is expandable from 10 to 100 points only. Five printed circuit cards comprise the basic electronics package (common unit). This unit has a basic memory capacity of 64 A-priority and 64 B-priority alarms. Each alarm is stored until the cause of the alarm is found and serviced. The scan rate is 10 points per second. Both systems use small desk-top control panels that provide alarm information on a digital display. Light emitting diodes indicate alarms waiting to be displayed and their priority. The Scanning II system is a centralized, automatic measurement and control system offering voice communications. Also, the system is expandable. See notes for options on Scanning I and Mini Scanning systems.

### PERFORMANCE DATA

**Probability of Transmission Error and Source:** Information not available.  
**Capacity:** Scanning I and Scanning II, 25 to 10,000 units; Mini-Scanning, 10 to 100 units. A single control rack can handle 25 to 400 points.  
**Transmission Distance:** Limited by loop resistance and sensor resistance. Up to 10,000 sensors may be attached. Maximum loop resistance is 5K ohms.  
**Resistance to Spoofing and Tampering:** All alarm inputs have adjustable delays to protect against incorrect alarms caused by interferences.  
**Indoor/Outdoor Operation:** Information not available.  
**Temperature:** Information not available.  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Requirements:** Not applicable.  
**Interface:** One pair cable connects each alarm point and the 'common unit' through a 60 pin plug.

### PHYSICAL DATA

**Size:** Scanning I, Control Panel: 3.2x6.6x11.2in (9x17x30cm).  
**Weight:** 2.6lb (1.2 Kg).  
**Power (Primary/Secondary):** Information not available.  
**Emplacement:** Control panels, desk top.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** All system documentation and general manuals supplied. A training program is available.

**Parts and Repairs:** Recommend spare parts (not over-the-counter items).

**Reliability:** MTBF not available.

**Maintainability:** MTTR not available.

**Warranty Information:** One year.

**Government or Professional Standards:** Has not been subjected to standards in this country.

**Lead Time:** Six to nine months.

### COST DATA

**Unit Acquisition Cost:** Scanning I, (500 points), \$9,300. Mini-Scanning, \$3,200.

**Unit Installation Cost:** Information not available. Two to three days required for installation.

**Training Cost:** \$200. to \$300. per day, plus subsistence; depends on system equipment acquired.

**Maintenance Cost:** Information not available.

**Operation Cost:** Information not available (150W power consumption).

### NOTES

Scanning I	Mini-Scanning
Direct Connection to Common Unit for:	Can be combined with:
Maneuvering	Voice comm. (voice intercom panel)
Measuring	
Status Control	Specially designed for alarm/communications applications
Automatic Programs	
Automatic Printout	
Automatic Recording	
Internal Communication	
Others for custom-designed systems	

Some information contained in this data sheet was provided by a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Sentry Technology, Inc.  
222 Mt. Hermon Road  
Santa Cruz, CA 95066  
(408) 438-3311

**Model** Sentry System

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Sentry System consists of one or more Sentry 24 transmitter/controls and their associated sensors, remote controls, and audible alarms. The switched telephone network connects the protected premise with the central station receiver, a Sentry 9999 Central Receiver. When any alarm occurs the telephone line is seized by the transmitter/control, sounds a local alarm and generates a code for dialing the telephone number of the receiver. The received alarm condition is recorded on a printed paper tape along with status of inputs, restored status of inputs, address code, address code check, and event time.

### PERFORMANCE DATA

#### Probability of Transmission

##### Error and Sources:

Information not available.

##### Capacity:

The number of inputs to each transmitter is 2, 4 or 8 depending on input module selected. Central receiver has a 4-digit address capacity which means 9,999 Sentry transmitters can be used in any one system.

##### Transmission Distance:

Utilizes the switched telephone network, Bell System.

##### Resistance to Spoofing and

##### Tampering:

Line security from premise to local exchange may use line fault detection options available (i.e. line fault detector). Supervisory signals may be employed utilizing dual phone lines. Handshake of transmitter/receiver required before transmission of digital message takes place. Self-test module is available to initiate a test message once a day at a preset time and does not trip the local alarm or set any input circuit.

##### Indoor/Outdoor Operation:

Information not available.

##### Temperature:

-20 to +120F (-28 to +49C).

##### Humidity:

Information not available.

##### Other Environmental

##### Characteristics:

Information not available.

##### Radio Requirements:

Not applicable.

##### Interface:

Requires a KS .20445 L3 telephone coupler to connect to telephone lines.

### PHYSICAL DATA

##### Size:

Transmitter/control: 12x10x3½in (30x25x9cm). Receiver: 7x16¼x13½in (18x43x34cm).

##### Weight:

Transmitter/control is 9lb (4 kg); Receiver is 31lb (14 kg).

##### Power (Primary/Secondary):

12V ac, 0.75 A, 60 Hz; backup, internal long-life float charged battery will supply power for at least 24 hours. 110V ac, 17V A, 60 Hz; standby operation, internal float-charge batteries will supply power for 3 hours minimum.

##### Environment:

Wall mount.



### SUPPORT/LOGISTICS DATA

**Documentation and Training:** Illustrated installation instructions, terminal connections, and field critical operation manual are supplied. No training provided.  
**Parts and Repairs:** Dealers and installers responsible for maintenance.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** One year on all equipment.  
**Government or Professional Standards:** UL and Factory Mutual approved, GSA listed.  
**Lead Time:** Five days.

### COST DATA

**Unit Acquisition Cost:** 4 zone transmitter, \$229.; receive: \$3190.  
**Unit Installation Cost:** Information not available.  
**Training Cost:** Information not available.  
**Maintenance Cost:** Information not available.  
**Operation Cost:** Information not available.

### NOTES

Optional Equipment  
Line fault detector Model 105A  
Guard monitoring system Model 109A

Some information contained in this sheet was provided during a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Silent Knight Security  
Systems, Inc.  
2930 Emerson Ave. S.  
Minneapolis, MN 55408  
(612) 827-2681

**Model** Silent Knight 1900 & 900

**Reference Evaluation Guide Procedure No.** VIII-1.A      **NRC Identification No.**

### NARRATIVE DESCRIPTION

The Silent Knight Multiplex System is a monitoring and control system used for multi-point supervision from a central location. The multiplex system is basically a processor (or scanner) and a number of multiplex transmitters connected to the processor. Two systems are available; the 1900 proprietary system and the 900 non-proprietary, using leased telephone lines. The 1900 uses the Model 1906 transmitter (self-contained) and the 900 (long line) uses the Model 906 transmitter. The Silent Knight Multiplex System, besides monitoring and reporting, provides an optional remote control function from processor to transmitter. The various components in the multiplex systems are listed in the notes. The Model 913 processor sequentially scans each transmitter at the rate of 4 per second.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

Information not available.

**Capacity:**

The processor will monitor 10 lines with 10 transmitters on each line. Each 906 transmitter handles 4 channels on a different tone frequency. Tone range is 360 Hz to 2700 Hz.

**Transmission Distance:**

906 transmitter uses telephone network and the 1906 transmitter (a single channel transmitter) is used in proprietary systems where line lengths will not exceed 5000ft (1500 meters).

**Resistance to Spoofing and Tampering:**

Information not available.

**Indoor/Outdoor Operation:**

Information not available.

**Temperature:**

A quality control assurance program provides temperature cycling of components for two days. -40 to +220F (-40 to +150C).

**Humidity:**

Information not available.

**Other Environmental**

**Characteristics:**

Information not available.

**Radio Requirements:**

Not applicable.

**Interface:**

Telephone lines (voice grade 3002 half-duplex, conditioned).

### PHYSICAL DATA

See notes

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## SUPPLY/LOGISTICS DATA

### Documentation and Training

<b>Manuals:</b>	Installation and operation manuals supplied. No training provided.
<b>Parts and Repairs:</b>	Comes with spares for replacement. Bad parts returned to factory for service.
<b>Reliability:</b>	MTBF not available.
<b>Maintainability:</b>	MTTR not available.
<b>Warranty Information:</b>	One year warranty.
<b>Government or Professional Standards:</b>	FCC certification — digital dialers no. 100, 100-S, 105, 105-S, 106, 106-S, 756 and 756-A.
<b>Lead Time:</b>	Information not available.

### COST DATA

<b>Unit Acquisition Cost:</b>	850 Receiver, \$500.; 802 Printer, \$600.; 913 Processor, \$2500.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	Information not available.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

### NOTES

	906 Transmitter	850 Receiver	1906 Transmitter	913 Processor in Cabinet
<b>Size:</b>	11 <sup>7</sup> / <sub>8</sub> x11 <sup>1</sup> / <sub>4</sub> x3in (30x29x7.5cm)	7x10 <sup>1</sup> / <sub>2</sub> x8 <sup>1</sup> / <sub>4</sub> in (18x26x21cm)	Information not available	13 <sup>1</sup> / <sub>8</sub> x21 <sup>5</sup> / <sub>8</sub> x14 <sup>3</sup> / <sub>4</sub> in (33x54x37cm)
<b>Weight:</b>	11lb (5 kg)	13lb (6 kg)	6oz (170g)	36lb (16kg) (cabinet)
<b>Power</b>	117V ac 60 Hz	750 mA, 12V dc	9 to 14V dc	750 mA, 12V dc
<b>(Primary/</b>	Class II transformer;	(inactive)	at 25 to 30 mA	(inactive)
<b>Secondary):</b>	12V Gell-Cell standby	2 <sup>1</sup> / <sub>2</sub> A, 12V dc (active)		1 <sup>1</sup> / <sub>2</sub> A 12V dc (active)
<b>Emplacement:</b>		Desk-top		Cabinet or rack mounted
<b>Silent Knight Multiplex Systems:</b>				
	900 System		1900 System	
	906 Transmitter(s) 10 max/line (in a 7*0, 712, or 956/A)		1906 Transmitter(s) 10 max/line (for use in proprietary system)	
	913 — 100 processor		910 Power supply(s) 10 max/line 913 — 100 processor	

#### Optional equipment

If a visual numeric display and/or printed copy of all incoming alarms is desired, an 850 receiver and 802 printer can be connected to the processor for both the 900 and 1900 systems.

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Symtec, Inc.  
28390 Thirteen Mile Road  
Farmington Hills, MI 48024  
(313) 358-2999

**Model** Symtec M-1

Reference Evaluation Guide Procedure No. VIII-1.A NRC Identification No.

### NARRATIVE DESCRIPTION

The Symtec M-1 digital RF transmission system consists of two parts, a transmitter and receiver. In addition to three terminals on the transmitter, which take inputs from normally open or closed contacts, there is an optional internally mounted reed switch available, which may be activated by any standard reed switch magnet activator within a distance of  $3/16$  in. The system utilizes for the receiver a simple loop antenna concept which completely surrounds the area to be protected. Transmitters monitoring various types of alarm sensors may be located up to 30 feet away from the receiver loop antenna. The antenna loop may be of any size or shape. The loop can also be used with N.C. devices connected to it in series to detect fire, etc. The transmitter has its own self-contained antenna.

### PERFORMANCE DATA

#### Probability of Transmission

##### Error and Sources:

Information not available.

##### Capacity:

Depends on number of transmitters used. System will accept any number of reed switches in parallel.

##### Transmission Distance:

Transmitter to receiver loop antenna is 30 feet (48m) maximum. Recommended wire is 18 gauge PVC insulated.

#### Resistance to Spoofing and

##### Tampering:

The antenna is supervised by the system receiver.

#### Indoor/Outdoor Operation:

Information not available.

#### Temperature:

32 to 150F (0 to 70C).

#### Humidity:

0 to 90 percent.

#### Other Environmental

##### Characteristics:

Information not available.

#### Radio Requirements:

Two systems may be as close as 10 feet (3m) without cross signaling.

#### Interface:

Information not available.

### PHYSICAL DATA

#### Size:

Transmitter:  $1\frac{1}{4} \times 4 \times 1$  in (3.2x10x2.5cm). Receiver:  $4 \times 1\frac{1}{2} \times 6$  in (10x3.7x15cm).

#### Weight:

Information not available.

#### Power (Primary/Secondary):

Transmitter, 9V dc battery EV no. 1222 or 216. Receiver, 12V ac or dc at 1W, 12 volt battery TW-1-x.

#### Placement:

Loop antenna must not come in contact with hazardous voltages.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Training and documentation are provided.  
**Parts and repairs:** Parts and service personnel available.  
**Reliability:** MTBF not available, MTTF approximately 15 years for all components except the battery.  
**Maintainability:** MTTR not available.  
**Warranty information:** 90 days all components except battery.  
**Government or Professional Standards:** M-1 transmitter conforms to FCC requirement, Section 15.  
**Lead time:** 30 days.

### COST DATA

**Unit Acquisition Cost:** 1 receiver and 10 transmitters, \$175. Prices vary with number of transmitters. \$2 for latch-in relay and LED \$10. Basic System: 1 transmitter and 1 non-latching receiver, \$29.95.  
**Unit Installation Cost:** No installation cost.  
**Training Cost:** Extra but minimal; cost not available.  
**Maintenance Cost:** Information not available.  
**Operation Cost:** Information not available.

### NOTES

M-1 System options:

Total security package includes: (brings radio link capability to hardwire hardware)

- power supply
- entry and exit delay
- self-test display
- addition of key switch, box, bell and misc. hardware

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Teledyne Geotech  
3401 Shiloh Road  
Garland, TX 75041  
(214) 271-2561

**Model** Mini-Base Station  
Model 1S-450

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Mini-Base Station, Model 1S-450 is a compact self-contained central terminal capable of accepting messages (sensor address) from either a wire-line source or a VHF radio source by selection of the appropriate interface circuit card. The station includes a digital printer, an audible alert, and time-of-day display. The unit will decode and print up to 799 different sensor addresses. A sensor transmitter, Model 1S-402A is a self-contained encoder designed to transmit to the base station, via wireline or VHF radio transmitter, a preselected binary-coded address message when either of its two independent inputs are energized. The VHF transmitter portion, housed with electronics, utilizes the transmitter portion of a G.E. PR-36 2-way radio.

### PERFORMANCE DATA

**Probability of Transmission Error and Sources:** The probability of detecting errors greater in magnitude than a burst of errors falling with a 6-bit interval, is greater than 95%.

**Capacity:** 799 different sensor addresses.

**Transmission Distance:** Limited to line of sight with radio and depends on conditions of the environment. A 50 foot cable is supplied for hardwiring.

**Resistance to Spoofing and Tampering:** False alarms minimized by using polynomial error detecting technique. The 6-bit error code is capable of detecting with certainty any 1-bit error or burst of errors enclosed within a 6-bit interval. Radio transmissions susceptible to jamming.

**Indoor/Outdoor Operation:** Information not available.

**Temperature:** Information not available.

**Humidity:** Information not available.

**Other environmental Characteristics:** Information not available.

**Radio Requirements:** FCC licensed VHF, 132 to 174 MHz at 5W.

**Interface:** Information not available.

### PHYSICAL DATA

**Size:** Receiver: 11x14½x16¼in (28x37x41cm)  
Transmitter: 8¾x8¾x8¾in (22x22x22cm).

**Weight:** Receiver is 24¼lb (11 kg); Transmitter is 5lb (2.3 kg) without battery.

**Power (Primary/Secondary):** 110V ac or +12V dc; back-up is provided by 12V dc battery.

**Emplacement:** Receiver, desk-top; transmitter, buried in ground.

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#### SUPPLY/LOGISTICS DATA

<b>Documentation and Training:</b>	Operation and maintenance manuals provided. No training is provided.
<b>Parts and Repairs:</b>	Information not available.
<b>Reliability:</b>	MTBF not available.
<b>Maintainability:</b>	MTTR not available.
<b>Warranty Information:</b>	One year warranty.
<b>Government or Professional Standards:</b>	FCC licensed.
<b>Lead Time:</b>	90 to 120 days.

#### COST DATA

<b>Unit Acquisition Cost:</b>	Receiver, \$4975.; transmitter, \$1475.
<b>Unit Installation Cost:</b>	Labor, \$30 per hr. 25 percent of actual cost plus transportation and per diem.
<b>Training Cost:</b>	Information not available.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

#### NOTES

##### Optional Equipment

Auxiliary Map Display 1S-455, may be programmed to illuminate LED indicators corresponding to any set of 96 sensor addresses.

Some information contained in this sheet was provided during a telephone conversation with a company representative.

#### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** TIE Security Systems  
Glidden Street  
Newcastle, ME 04553  
(207) 563-3806

**Model** 847 and 848

Reference Evaluation Guide Procedure No. VII-1.A

NRC Identification No.

### NARRATIVE DESCRIPTION

The Model 847 TIE Transmitter/Receiver Alarm System is a mini-modular multiplex system which can send alarms over any voice grade telephone line from any distance (carrier, microwave, hardwire, etc.). The transmitter will transmit three indications (e.g., normal, alarm, and trouble) over the phone lines. The receiver then indicates these signals with relay outputs. Up to five pairs, each with 3 types of indications, may be sent over a single telephone line in either direction at one time. Two Model 848 TIE Transmitter/Receiver pairs can be connected in a synchronized interrogate/respond mode. This is a high-security-tamper-proof mode of operation.

### PERFORMANCE DATA

**Probability of Transmission**  
**Error and Sources:** Information not available.  
**Capacity:** 5 channels per telephone line.  
**Transmission Distance:** Uses phone lines for unlimited distance.  
**Resistance to Spoofing and Tampering:** Stringent synchronization is required.  
**Indoor/Outdoor Operation:** Information not available.  
**Temperature:** Information not available.  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Requirements:** Not applicable.  
**Interface:** Signal level 0dBm; signal frequencies 500, 750, 1150, 2750 Hz  $\pm$  5%; system interfaces with voice grade (3002) telephone lines.

### PHYSICAL DATA

**Size:** Transmitter 2 $\frac{1}{2}$ x3 $\frac{1}{4}$ x $\frac{7}{8}$ in (6.4x8x2.2cm). Receiver 3 $\frac{1}{2}$ x4x $\frac{7}{8}$ in (8x10x2.2cm).  
**Weight:** Transmitter 2 $\frac{1}{4}$ lb (1 kg). Receiver  $\frac{1}{4}$ lb (0.1 kg).  
**Power (Primary/Secondary):** Transmitter, 6 to 16V dc, 20 mA (max); no back-up.  
Receiver, 6 to 16V dc, 40 mA (max); no back-up.  
**Emplacement:** Cabinet.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Instruction sheet supplied. No training provided.  
**Parts and Repairs:** No repairs, relay is the only replaceable part.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** One year warranty.  
**Government or Professional Standards:** None.  
**Lead Time:** Two weeks.

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### COST DATA

<b>Unit Acquisition Cost:</b>	Model 847: 1-4 pair, \$185.; Model 848: 1-4 pair, \$195.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	Information not available.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

### NOTES

Some information contained in this sheet was provided during a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Varitech Security Systems, Inc.  
1220 Broadway  
New York NY, 10001  
(212) 695-4460

**Model** Alarm Detecting and  
Reporting System

Reference Evaluation Guide Procedure No. VII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The system consists of a desk-top control console and a remotely located modular cabinet containing 'nests' and location interfacing printed circuit card assemblies. The capacity of each modular 'nest' is ten location card assemblies with each card containing ten locations for a total of up to 100 locations. Ten 'nests' may be utilized per system for a total of 1000 monitoring locations. An audible signal annunciates status change, and visual identification is noted on a numerical digital electronic readout. The console with a printer capability records date, time, location and alarm condition for all events. The Varitech system will interface with law enforcement/computer systems for information retrieval and statistical analysis.

### PERFORMANCE DATA

**Probability of Transmission Error and Sources:** Information not available.  
**Capacity:** Up to 1000 direct leased line locations (expandable to meet customer requirements).  
**Transmission Distance:** Uses telephone lines for unlimited distance.  
**Resistance to Spoofing and Jampering:** False alarm reduction and increased line supervision is achieved with centralized power source.  
**Indoor/Outdoor Operation:** Information not available.  
**Temperature:** Information not available. Console designed for indoor use.  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Requirements:** Not applicable.  
**Interface:** Direct wire mode: Normal line, 5 mA; alarm current 10 mA; telephone line reverse polarity — min. line current, 5 mA.

### PHYSICAL DATA

**Size:** Display Console with printer: 21x9x14in (53x23x35cm). Standard Cabinet 22x84x24in (56x213x61cm).  
**Weight:** Console is 40lb (18kg).  
**Power (Primary/Secondary):** 9 V, 10A (supplied).  
**Emplacement:** Cabinet can be located 100 feet or more from console.

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### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Operating, installation and maintenance manuals are provided. No training is provided.

**Parts and Repairs:** Factory service.

**Reliability:** MTBF not available.

**Maintainability:** MTTR not available.

**Warranty Information:** One year warranty.

**Government or Professional Standards:** UL-listed.

**Lead Time:** Information not available.

### COST DATA

**Unit Acquisition Cost:** Console \$2456.; printer \$2711.; 400 cabinet, \$357.50.; 1000 cabinet, \$549.50.

**Unit Installation Cost:** Information not available.

**Training Cost:** None.

**Maintenance Cost:** Information not available.

**Operation Cost:** Information not available.

### NOTES

Some information contained in this sheet was provided during a telephone conversation with a company representative.

### INSTALLATION

## ALARM SIGNALLING SYSTEMS

**Manufacturer:** Wells-Fargo Alarm Service  
1004 6th Street N.W.  
Washington, DC 20001  
(202) 737-5300

**Model:** MC-3

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

The Wells-Fargo MC-3 system is comprised of an MC-3 monitor cabinet and five MR-1 monitor racks each housing ten MP-1 monitor panels. The system is capable of monitoring up to 50 zones in the proprietary intrusion alarm system. The MP-1 monitor panel generates both visual and audible alarms. AS-1 or AS-2 access/secure modules in the control unit, (basic access/secure CU-3) receive alarm signals from any type of detectors and transmits a complex waveform via the signal circuit line to the monitor panels. Other Wells Fargo control units that may be used with associated equipment for specific alarm applications are: CU-1 capacitance control unit, CU-2 vibration detection control unit, CU-4 ultrasonic control unit with separate transducers and CU-7 ultrasonic control unit with transceiver transducers.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:** Information not available.

**Capacity:** 50 zones.

**Transmission Distance:** Information not available.

**Resistance to Spoofing and Tampering:**

MP-1 panel detects attempts to compromise the signal circuit lines linking the secured area to the monitoring station. Class A security in this case employs a complex waveform ac signal over a dc carrier for signal line supervision.

**Indoor/Outdoor Operation:**

**Temperature:** Information not available.

**Humidity:** - 10 to 135F (- 23 to 58C).

**Other Environmental**

**Characteristics:** Information not available.

**Radio Requirements:** Not applicable.

**Interface:** Interfaces with direct wire pair.

### PHYSICAL DATA

See notes.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Operators, installation and maintenance manuals are provided. Training in-house at Washington office is provided at no cost. California office training is charged.

**Parts and Repairs:** Site maintenance by competently trained personnel.

**Reliability:** MTBF not available.

**Maintainability:** MTTR not available.

**Warranty Information:** One year warranty.

**Government or Professional**

**Standards:** DIA 50-3; Army Provost Marshall office spec.

**Lead Time:** 120 days.

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### COST DATA

**Unit Acquisition Cost:** Information not available.  
**Unit Installation Cost:** Information not available.  
**Training Cost:** Cost for training in California office not available.  
**Maintenance Cost:** Information not available.  
**Operation Cost:** Information not available.

### NOTES

	Monitor Rack MR-1	MC-3 Monitor Cabinet	MP-1 Monitor Panel
<b>Size:</b>	6.69x18.44x15.56in (17x45x40cm)	78.5x23.5x24in (2000x60x61cm)	5.25x1.56x7.25in (13x4x18cm)
<b>Weight:</b>	26.5 ounces (700g)	366lb (165kg)	13 ounces (300g)
<b>Power</b> (Primary/ Backup):	102 to 132V ac, 60 Hz; 6V: 22.5 Ah battery provides 12 hr standby	Not Applicable	115V ac, 60 Hz Batt pack for standby
<b>Emplacement:</b>	Rack mounted	Self-standing	Mounted in cabinet.

Wells-Fargo also carries other alarm system equipment and wells equipment piecemeal to other vendors or engineers.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Womack Telcom Systems, Inc.  
513 Wilson St.  
Danville, VA 24541  
(804) 797-3495

**Model** Monitor and Detection System

Reference Evaluation Guide Procedure No. VIII-1.A      NRC Identification No.

### NARRATIVE DESCRIPTION

This digital circuit monitor sends a signal over a single coaxial cable to 200 test points every six seconds. Each test point (detector) operates on a different crystal controlled frequency in the 200 to 400 kHz range, in 1 kHz increments. The detector is highly frequency selective and totally passive. The detector polled rings back on its assigned frequency if no alarm is indicated, allowing the control processor to continue polling other stations. Digital readout on circuit monitor identifies detector with alarm situation. The system scans 100 detectors every 3 seconds.

### PERFORMANCE DATA

**Probability of Transmission Error and Sources:** Information not available.  
**Capacity:** 200 alarm devices using switch opening or closure.  
**Transmission Distance:** Coaxial cable, length up to 5000ft (1.5 km).  
**Resistance to Spoofing and Tampering:** Information not available.  
**Indoor/Outdoor Operation:** Information not available.  
**Temperature:** 32 to 160F (0 to 70C).  
**Humidity:** Information not available.  
**Other Environmental Characteristics:** Information not available.  
**Radio Frequency Requirements:** Transmit 200 to 400 kHz range in 1 kHz increments. Not susceptible to outside interference.  
**Interface:** Information not available.

### PHYSICAL DATA

**Size:** Monitor: 12x12x12in (30x30x30cm).  
**Weight:** 15lb (6.8kg).  
**Power (Primary/Secondary):** 110V ac; battery for 2 hours backup power.  
**Emplacement:** Desk-top.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:** Operating instructions are provided. No training is provided.  
**Parts and Repairs:** All parts commercially available.  
**Reliability:** MTBF not available.  
**Maintainability:** MTTR not available.  
**Warranty Information:** One year.  
**Government or Professional Standards:** None.  
**Lead Time:** Three months.

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#### COST DATA

<b>Unit Acquisition Cost:</b>	Monitor, \$1,250.
<b>Unit Installation Cost:</b>	Information not available.
<b>Training Cost:</b>	Information not available.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

#### NOTES

Some information contained in this data sheet was provided during a telephone conversation with a company representative.

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## ALARM SIGNALLING SYSTEMS

**Manufacturer** Datacom, Inc.  
Box 278  
Fort Walton Beach, FL 32548  
(904) 244-6121

**Model** Model 7214

Reference Evaluation Guide Procedure No. VIII-1.A NRC Identification No.

### NARRATIVE DESCRIPTION

This device is composed of a set of modules for use in annunciating sensor alarms. One module for each group of up to 15 sensors is required. Line supervision is provided. One main frame rack can accommodate up to 15 modules. Controls for lamp test, audio test, audio alarm reset, alarm test, and tamper test are provided on the main frame rack. Subframe modules have an access/secure switch. Each module indicates access/secure, alarm, and tamper with dual light indicators.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

Information not available.

**Capacity:**

One channel per sensor group. A new alarm cannot be accommodated until existing alarm is reset. Up to 15 channels (15 sensors each). One alarm per channel (visual); one alarm per main frame (auditory).

**Transmission Distance:**

Depends on wire size from sensors. Typical wire size, no. 22 awg.

**Resistance to Spoofing and**

**Tampering:**

Line supervision provided to monitor loop current.

**Indoor/Outdoor Operation:**

Indoor.

**Temperature:**

0 to 140F (-18 to +60C)

**Humidity:**

0 to 90 percent.

**Other Environmental**

**Characteristics:**

Information not available.

**Radio Requirements:**

Not applicable.

**Interface:**

Switch closure inputs (either N.O. or N.C. may be accommodated).

### PHYSICAL DATA

**Size:**

Each module: 5¼x1x4in (13x2.5x10cm).

**Weight:**

0.5lb per module (0.4 kg).

**Power (Primary/Secondary):**

110V ac; batteries optional.

**Emplacement:**

Intended for sheltered/indoor use, 19in (48cm) rack mount.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:**

Manuals are available. No special training necessary to install, operate or repair.

**Parts and Repairs:**

Parts are commercially available.

**Reliability:**

MTBF is 10,000 hours, based on calculations.

**Maintainability:**

MTTR not available.

**Warranty Information:**

Negotiable (typically 90 days).

**Government or Professional**

**Standards:**

None.

**Lead Time:**

110 days.

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### COST DATA

<b>Unit Acquisition Cost:</b>	Main frame with battery, \$2541; LMU, \$156 each.
<b>Unit Installation Cost:</b>	Depends on cable distance: typically \$100 to \$1000.
<b>Training Cost:</b>	None.
<b>Maintenance Cost:</b>	Information not available.
<b>Operation Cost:</b>	Information not available.

### NOTES

Some information in this data sheet is based upon a telephone conversation with a company representative.

### INSTALLATIONS

## ALARM SIGNALLING SYSTEMS

**Manufacturer** Teledyne/Geotech  
3401 Shiloh Rd.  
Garland, TX 75040  
(214) 271-2561

**Model** IS-402A

Reference Evaluation Guide Procedure No. VIII-1.A

NRC Identification No.

### NARRATIVE DESCRIPTION

The sensor transmitters are self-contained encoders designed to transmit, via wire or VHF radio transmitter, a preselected binary-coded address message when either of two independent inputs are energized. May be used with any sensor that provides the proper output.

### PERFORMANCE DATA

**Probability of Transmission**

**Error and Sources:**

A 6-bit error code is generated using a polynomial and is capable of detecting with "certainty", any 1-bit error or a burst of errors enclosed within a 6-bit interval. The probability of detecting errors of greater magnitude is better than 95%.

**Capacity:**

Can accept two independent inputs.

**Transmission Distance:**

Up to 50mi (80km), depending on terrain, transmission environment.

**Resistance to spoofing and**

**Tampering:**

Information not available on spoofing; radio transmission can be jammed.

**Indoor/Outdoor Operation:**

Information not available.

**Temperature:**

Operating temperature: -4 to +94F (-20 to +60C) (excluding batteries).

**Humidity:**

0 to 100 percent relative.

**Other Environmental**

**Characteristics:**

Can withstand submersion in 12in (30cm) water for 24 hours without visible signs of leakage.

**Radio Requirements:**

RF output into 50 ohms: high, 4.5W minimum; low, 1.0W, nominal.

**Interface:**

Format as follows: preamble intervals, synchronization 1-bit; sensor address, 11 bits BCD; error code, 6 bits; battery status, 1-bit. Message rate is 400 bps nominal, and duration is 65ms, maximum.

### PHYSICAL DATA

**Size:**

8.7x8.7x8.7in (22.2x22.2x22.2cm).

**Weight:**

5lb (2.268 kg), approximately.

**Power (Primary/Secondary):**

Two Burgess-type TW-2 batteries.

**Emplacement:**

Can be buried if desired.

### SUPPLY/LOGISTICS DATA

**Documentation and Training:**

Operating characteristics and installation instructions available. Instructions available for training.

**Parts and Repairs:**

Service available.

**Reliability:**

MTBF not available.

**Maintainability:**

No maintenance necessary.

**Warranty Information:**

One year.

**Government or Professional**

**Standards:**

None.

**Lead Time:**

Small quantities in stock; 120 to 150 days for large quantities.

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### COST DATA

Unit Acquisition Cost:	\$1,475.
Unit Installation Cost:	\$1. to \$20.
Training Cost:	None.
Maintenance Cost:	Replace batteries: \$5. to \$50.
Operation Cost:	None.

### NOTES

Some information contained in this data sheet was obtained by a telephone conversation with a company representative.

### INSTALLATIONS

## UHF PORTABLE VOICE COMMUNICATION

Portable UHF voice communications equipment is available in three configurations, portable (handheld transceivers), vehicular (mobile transceivers), and Mobile/portable combinations.

These units are designed to operate within the UHF band. For specific operational application, radio units are required to operate on channels which fall within the frequencies assigned by the Federal Communications Commission (FCC) to the type of radio service being performed, in this case Power Radio Service.

The better-quality transceivers, in which both receiver and transmitter elements are incorporated, have aluminum frames and a high-impact polycarbonate case. All switches have rubber-sealed gaskets, permitting use in severe weather conditions.

Such transceivers use the latest integrated plug-in circuit modules, increasing the equipment reliability and facilitating maintenance. Power is supplied from a twist-lock battery pack which is usually attached to the base of the radio unit.

The transmitter segment frequency-modulates the carrier with the operator's voice and provides means to propagate the signal into free space via a built-in antenna. The antenna is typically omnidirectional. When the transmitter segment is keyed, the integral receiver segment is automatically disconnected from the antenna by the antenna switching relay. This action protects the receiver from damage by the transmitter's high-output signal, since both the transmitter and receiver segments normally share the same built-in antenna.

The receiver segment normally operates in a standby mode. Until the receiver is disconnected by the action of the antenna

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switching relay, it is ready to receive all incoming signals on its assigned frequency. Receivers equipped with Continuous Tone Coded Squelch (CTCS) circuitry will respond only to transmissions with the proper tone code, except when they are operating in the squelch "override" mode.

Mobile transceiver radio units, designed for operation in mobile vehicles, receive power directly from the vehicle's power system. These radio units are usually capable of operating at higher radio frequency (RF) power output than handheld units. This higher power, together with the more efficient vehicle-mounted antennas, provide a greater operating range than is possible with the handheld units. In all other respects their operation and electronic construction is similar to handheld units. However, their protective enclosures are constructed more ruggedly, using sheet steel with aluminum extrusions, and they are waterproofed.

The combination handheld and mobile transceivers are very versatile units, ruggedly constructed to operate in a dual environment as either a handheld portable or vehicle-mounted mobile radio unit. When used as a portable, the radio unit is self-contained with its built-in battery and antenna; when installed in its vehicle-mounted cradle, the unit operates from the main vehicle power system and uses the vehicle-mounted antenna, while the built-in battery automatically recharges. Electrical and mechanical construction is similar to that previously described for handheld units.

Some radio networks employ "repeaters" to extend the range of communications. The repeater employs one frequency for receive and another for transmit; typically a repeater station communicates with the base station on its own unique frequency, and with the handheld/vehicular stations on the standard network frequency.

Some networks provide for communications with telephone subscribers through a Radiotelephone Common Carrier (RCC) service con-

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sisting of a base station equipped with appropriate telephone system interface. (Many RCCs offer "repeater" service for extended handheld/vehicular to handheld/vehicular service. One manufacturer offers a special variation which allows direct telephone interface through the base-station transceiver associated with the plant security.)

Manufacturers provide a variety of optional functions in order to provide a specific service or to extend the capabilities of the basic radio unit.

The choice of functions offered is:

Number of Channels - Up to 6 selectable channels

RF Power Output - Up to 10 watts (handheld units)  
- Up to 50 watts (mobile units)

Continuous Tone Coded Squelch - Opens receiver on receiving a specific (CTCS) tone from the net transmitter

Part 91 (Subpart F, Power Radio Service) of the FCC rules covers the authorizations required for operating a radio station in a power generating facility. The operator of the fixed master or base station must be licensed for any of the specified frequencies. However, the operators of handheld or vehicular units working in the radio net do not require a license. Radios operating on frequencies assigned to power radio service are not capable of direct communication with the LLEA or with public safety radio services.

The operating range of a UHF radio system depends on the type of terrain, RF output power, antenna efficiency and environmental factors, and is more susceptible to obstacle interference than VHF. The prediction of nominal range performance requires certain assumptions; a reasonable set is as follows:

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1. The base station antenna is located 100 feet above the local terrain, uses low-loss transmission coaxial cable, and incorporates a high-gain antenna.
2. There is average ground conductivity, a smooth earth and "typical urban" man-made noise conditions.

Under these conditions, the operating ranges for a 2-watt handheld radio, operating with a 70-watt base station using a 10-dB antenna are:

1.4 miles	Portable-to-portable
11 miles	Portable-to-base
22 miles	Base-to-portable

For 2-watt vehicular radios operating in the same net, assuming the same operating conditions, the range will be:

2.7 miles	Portable-to-mobile
14 miles	Mobile-to-base
28 miles	Base-to-mobile
5.5 miles	Mobile-to-mobile

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## UHF PORTABLE VOICE COMMUNICATIONS

<i>Manufacturer</i>	Aerotron, Inc. P.O. Box 6527 Raleigh, NC 27628 (919) 876-4620	Aerotron, Inc. P.O. Box 6527 Raleigh, NC 27628 (919) 876-4620	E. F. Johnson Company 299 10th Ave. S.W. Waseca, MN 56093 (507) 835-6222
<i>Model</i>	TRACER II 82T1, 84T1	PAC I 80PH1, 80PH2, 80PH4	FM-545, 545H
Evaluation Guide Procedure VIII-2.A		NRC Identification No.	

### NARRATIVE DESCRIPTION

Personal portable radio is all solid state and utilizes dual phase locked loop circuitry to automatically track the other transmitter for system stability. Available with or without tone squelch. Utilizes plug-in circuit modules.

PAC I is a fully solid state modular FM portable radio, employing plug-in circuit modules. 3 models available with different RF power output.

The FM-545 incorporate all solid state construction and dual phase locked loop to keep receiver on frequency when station drifts. Meets EIA standards RS-152-A and RS-204 for vibration and shock.

### PERFORMANCE DATA

<b>Receiver</b>			
<b>Modulation Accep. Sens. (20dB Quiet Select. (EIA Sinad)</b>	±7.5kHz	±5kHz	±7.5kHz
<b>Intermodulation</b>	0.5μV/0.35μV sinad	0.5μV/0.35μV sinad	.5μV/.35μV sinad
<b>Spur/Image Reject</b>	>70dB	70dB	-70dB
<b>Freq. Stability</b>	-60dB	60dB	-60dB
<b>Squelch Sens.</b>	-60dB min/ -40dB min	60dB/60dB	-60dB
<b>Audio Output (5% Dist)</b>	±0.0002%	±0.0008%	±0.0005%
<b>Multi-freq. Spread</b>	0.25μV	0.25μV	0.25μV
<b>Transmitter</b>			
<b>RF output</b>	600mW at 8% dist.	600mW at 8% dist.	600mW at 8% dist.
	-----	3.0MHz	1MHz
	82T1, 2W/84T1 — 4W	Adjustable on all models	545 — 2W
		Models	545H — 4W
		80PH1 — 0.2 to 0.4W	
		80PH2 — 1.0 to 2.0W	
		80PH4 — 2.0 to 4.0W	
<b>Modulation Emission</b>	±5kHz		±5kHz for 100% at 1kHz
<b>Spur emissions</b>	16F3	16F3	20F3
<b>Harmonics</b>	>46dB below carrier	46dB below carrier	46dB (2W) - 49dB (4W)
<b>Hum &amp; Noise</b>	>46dB below carrier	46dB below carrier	46dB (2W) - 49dB (4W)
<b>Freq. Stability</b>	50dB		
<b>Audio Distortion</b>	±0.0005% (30 to 60C)	±0.0005%	±0.0005%
<b>Audio Response</b>	<5% at 1000Hz	5% at 1000Hz	5%
<b>Chan. Spread</b>	Within +1 to -3dB of EIA	Within +1 to -3dB of EIA	-----
	-----	-----	5MHz



**General**

<b>Frequency Range</b>	450 to 512 MHz	450 to 700 MHz	450 to 512 MHz
<b>No. of Channels</b>	Up to 6 channels	Up to 6 channels	Up to 6 channels
<b>Channel Spread</b>	-----	6.0MHz	-----
<b>Channel Spacing</b>	-----	-----	-----
<b>RF Impedance</b>	-----	-----	-----

**PHYSICAL DATA**

<b>Size</b>	6.8x2.58x1.5in (17x6.6x3.8cm)	6.8x2.58x1.5in (17x6.6x3.8cm)	6.8x2.6x1.5in (17x6.6x3.8cm)
<b>Weight</b>	21oz (0.6kg) w/battery	22oz (0.6kg) w/battery	21oz (0.6kg) w/battery
<b>Temperature</b>	-21 to +140F (-30 to +60C)	-21 to +140F (-30 to +60C)	-21 to +140F (-30 to +60C)
<b>Controls</b>	ON-OFF, VOL, SQUELCH	ON-OFF, VOL, SQUELCH PUSH-TO-TALK	
<b>Battery/Life Cycle</b>	12.5V dc/8hr; 10% tr-10% rec	12.5V dc/Std: 8hr; heavy duty: 11hr; alkaline: 35hr; 10% tr-10% rec (2W); 5% tr-5% rec (4W)	12.5V dc/8hr 10% tr-10%rec

**LOGISTICS/SUPLY DATA**

<b>Documentation</b>	Oper., maint. & install.	Oper., maint. & install.	Units sold thru dealers Oper., maint. & install. available
<b>Parts &amp; Repairs</b>	Change modules		
<b>Reliability</b>	MTFB not available	MTFB not available	MTFB not available
<b>Maintainability</b>	MTTR not available	MTTR not available	MTTR not available
<b>Warranty</b>	90 day equip.; 1 year spec. parts	90 day equip.; 1 year spec. parts	1 year parts & labor
<b>Lead Time</b>	8 weeks	8 weeks	3 to 9 weeks, depends on crystal availability
<b>FCC Certification</b>	Rules 21, 89, 91 & 93.	Rules 21, 89, 91, 93 & 95A	Rules 15, 21, 89, 91 & 93.

**COST DATA**

<b>Price</b>	82T1, \$671; 84T1, \$786.	545, 6ch, \$1071; 545H, w/6 ch, \$1186
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**NOTES**

<b>Options</b>	Battery chargers complete line for 2, 4, 8, 12 units, external spxr & mike.	Numerous accessories and options
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**INSTALLATIONS**

## UHF PORTABLE VOICE COMMUNICATION

<i>Manufacturer</i>	E. F. Johnson Company 299 10th Ave., S.W. Waseca, MN 56093 (507) 835-6222	Multitone Electronics Inc. 1 Cornell Parkway Springfield, NJ 07081 (201) 467-1800	Federal Signal Corp. 136th and Western Ave. Blue Island, IL 60406 (312) 468-4500
<i>Model</i>	FM 590	TR-300 Series	HVP-45, 45A Voice Patrol
Evaluation Guide Procedure VIII-2.A		NRC Identification No.	

### NARRATIVE DESCRIPTION

<p>The FM 590 is a small UHF handheld unit. Features state of the art hybrid microcircuitry, monolithic crystal filters, helical resonators and temperature compensated TCX crystals. Cast alum. I-beam frame.</p>	<p>Provides comm. between handheld units or base sta., with integrated networks of handheld and mobile radios and can be used with multitone paging system over extensive distances. Utilizes plug-in modules, snap-on batt.</p>	<p>The unit has automatic signal lock to compensate for drift of <math>\pm 5</math>KHz. Plug-in circuit modules can be changed without tools. Rugged case with alum. frame. This unit may be used with the R128 vehicular comm. center for combination mobile/portable use.</p>
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### PERFORMANCE DATA

Receiver			
Modulation Accep.	$\pm 7.5$ kHz	$\pm 7.5$ kHz	$\pm 7.5$ kHz
Sens. (20dB Quiet)	$.5\mu\text{V}/.35\mu\text{V}$ sinad 12dB	$.5\mu\text{V}/.35\mu\text{V}$ sinad 12dB	$.5\mu\text{V}/.35\mu\text{V}$ sinad -12dB
Select. (EIA Sinad)	-70dB	$\geq 70$ dB	$> 70$ dB
Intermodulation	-77dB	-60dB	-60dB
Spur/Image Reject	-60dB	$\geq 60$ dB	-60dB min/-40dB
Freq. Stability	$\pm 0.0005\%$		$\pm 0.0005\%$
Squelch Sens.	$0.25\mu\text{V}$	$0.25\mu\text{V}$	$0.25\mu\text{V}$
Audio Output (5% Dist)	500mW at 5% dist	600mW at 8% dist	600mW at 8% dist
Multi-freq. Spread	5MHz w/6dB degradation 1MHz w/0dB degradation	1MHz	1MHz
Transmitter			
RF Output	1.25W	2.0 or 4.0W	2.0 or 4.0W
Modulation	$\pm 5$ kHz FM 100% at 1kHz	$\pm 5$ kHz	$\pm 5$ kHz
Modulation	20F3	16F3	16F3
Spur Emissions	-50dB	$> 46$ dB below carr (2W) (-49dB for 4W)	46dB below carrier
Harmonics	-50dB	46dB below carr (2W) (-49dB for 4W)	46dB below carrier
Hum & Noise	-40dB		
Freq. Stab.	$\pm 0.0005\%$	$\pm 0.0005\%$	-0.0005%
Audio Distortion	$< 10\%$	$< 5\%$ at 1000Hz	5% at 1kHz
Audio Response		with +1 to -3dB of std EIA	Within +1 to -3 of std EIA
Chan. Spread	5MHz	5MHz	5MHz

**General**

<b>Frequency Range</b>	450 to 512MHz	406 to 420; 450 to 512MHz	450 to 512MHz
<b>No. of Channels</b>	1 channel	Up to 6 channels	Up to 6 channels
<b>Channel Spread</b>			
<b>Channel Spacing</b>	25kHz		
<b>RF Impedance</b>	-----	-----	-----

**PHYSICAL DATA**

<b>Size</b>	7x2 <sup>3</sup> / <sub>4</sub> x1 <sup>1</sup> / <sub>4</sub> in (18x6x3cm)	6.8x2.58x1.5in (17x6.6x3.8cm)	6.8x2.58x1.5in (17x6.6x3.8cm)
<b>Weight</b>	15.5oz (0.4kg)	21oz (0.6kg) w/batt	21oz (0.6kg) w/batt
<b>Temperature</b>	-21 to 140F (-30 to +60C)	-21 to +140F (-30 to +60C)	-21 to +140F (-30 to +60C)
<b>Controls</b>			ON-OFF, VOL, SQUELCH
<b>Battery/Life Cycle</b>	7.5V dc/8hr; 5% tr - 5% rec	12.5V dc/8hr; 10% tr - 10% rec, 2W	12V dc/8hr; 10% tr - 10% rec

**LOGISTICS/SUPPLY DATA**

<b>Documentation</b>	-----	Oper & install. maint. extra	All manuals
<b>Parts &amp; Repairs</b>	-----	-----	10 days to 2 wks
<b>Reliability</b>	MTBF not available	MTBF not available	MTBF not available
<b>Maintainability</b>	MTTR not available	MTTR not available	MTTR not available
<b>Warranty</b>	1 year parts & labor	1 year parts & labor	
<b>Lead Time</b>	3-9 weeks	8-10 weeks	8-10 weeks
<b>FCC Certification</b>	Rules 15, 21, 89, 91, 93, 95A	Rules 21, 89, 91 & 93	Rules 21, 89, 91 & 93

**COST DATA**

<b>Price</b>	FM 590, \$710	VHF, \$752; UHF, \$784	HVP-45, \$692; HVD-45A, \$817
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**NOTES**

<b>Options</b>	Call Guard tone squelch, belt holster, 2 unit rapid battery charger	External mike, tone coded squelch, vehicular comm center R128
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**INSTALLATIONS**

## UHF PORTABLE VOICE COMMUNICATION

*Manufacturer* IEC Electronics Corp.  
105 Norton Street  
Newark, NY 14513  
(315) 331-7742

*Model* LE-100 Series

Evaluation Guide Procedure VIII-2.A NRC Identification No.

### NARRATIVE DESCRIPTION

The LE-100 Series hand-held transceiver is a modular solid state FM set which operates in the VHF and UHF bands on up to 12 channels. Throw-away or rechargeable battery packs are optional. Capabilities may be expanded by LE-600 TRI-Comm System conversion kits.

### PERFORMANCE DATA

<b>Receiver</b>	
Modulation Accep.	$\pm 7.5$ kHz
Sens. (20dB Quiet)	$0.5\mu$ V
Select (EIA Sinau)	60dB
Intermodulation	60dB
Spur/Image Reject	50dB
Freq. Stability	0.0005%
Squeich Sens.	$0.25\mu$ V
Audio Output	500mW
(5% Dist)	
Multi-freq. Spread	
<b>Transmitter</b>	
RF Output	2W standard
Modulation	$\pm 5$ kHz
Emission	16F3
Spur Emissions	-50dB
Harmonics	-50dB
Hum & Noise	-55dB
Freq. Stability	0.0005%
Audio Distortion	5% dist
Audio Response	Within -1, +3dB/octave preemphasis
<b>Chan. Spread</b>	
<b>General</b>	
Frequency Range	LE-100 -4, 450 to 512MHz LE-100 -L, 400 to 420MHz
No. of Channels	Up to 12 channels
Channel Spread	10MHz
Channel Spacing	25kHz
RF Impedance	50ohms

#### PHYSICAL DATA

**Size** 7 $\frac{1}{2}$  x 7 $\frac{7}{8}$  x 2in  
(18x7.5x5cm)  
**Weight** 24oz (0.7kg)  
**Temperature** -21 to +140F  
(-30 to +60C)  
**Controls** ON-OFF, VOL, CHN SEL,  
SQUELCH, and PUSH-  
TO-TALK  
**Battery/Life Cycle** 8hr; 10% tr — 10% rec

#### LOGISTICS/SUPPLY DATA

**Documentation** \_\_\_\_\_  
**Parts & Repairs** Repairs to factory  
**Reliability** MTBF not available  
**Maintainability:** MTTR not available  
**Warranty** 1 year parts, 90 day labor  
**Lead Time** 8 weeks  
**FCC Certification** Rules 21, 89, 91 & 93

#### COST DATA

**Price** LE-100 basic unit, \$595

#### NOTES

**Options** LE-600 TRI-Comm System  
permits LE-100 to become  
a mobile or base station.  
LE-600 vehicle sys. \$220  
basic unit prices. LE-600  
Office Sys \$388. Tone  
squelch. Various ants.  
Battery charges

#### INSTALLATIONS

## VHF PORTABLE VOICE COMMUNICATIONS

Portable VHF voice communications equipment is available in three configurations, handheld transceivers, mobile transceivers (vehicular), and mobile/handheld combinations. These units are designed to operate within the Very High Frequency (VHF) high and low band. For specific operational application, radio units are required to operate on channels which fall within the frequencies assigned by the Federal Communications Commission (FCC) to the type of radio service being performed, in this case Power Radio Service.

The better-quality transceivers, in which both receiver and transmitter elements are incorporated, have aluminum frames and a high-impact polycarbonate case. All switches have rubber-sealed gaskets, permitting use in severe weather conditions.

Such transceivers use the latest technology, integrated plug-in circuit modules, increasing the equipment reliability and facilitating maintenance. Power is supplied from a twist-lock battery pack which is usually attached to the base of the radio unit.

The transmitter segment frequency-modulates the carrier with the operator's voice and provides means to propagate the signal into free space via a built-in antenna. The antenna is typically omnidirectional. When the transmitter segment is keyed, the integral receiver segment is automatically disconnected from the antenna by the antenna switching relay. This action protects the receiver from damage by the transmitter's high-output signal, since both the transmitter and receiver segments normally share the same built-in antenna.

The receiver segment normally operates in a standby mode. Until the receiver is disconnected by the action of the antenna switching relay, it is ready to receive all incoming signals on

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its assigned frequency. Receivers equipped with Continuous Tone Coded Squelch (CTCS) circuitry will respond only to transmissions with the proper tone code, except when they are operating in the squelch "override" mode.

Mobile transceiver radio units, designed for operation in mobile vehicles, receive power directly from the vehicle's power system. These radio units are usually capable of operating at higher radio frequency (RF) power output than handheld units. This higher power, together with the more efficient vehicle-mounted antennas, provide a greater operating range than is possible with the handheld units. In all other respects their operation and electronic construction is similar to handheld units. However, their protective enclosures are constructed more ruggedly, using sheet steel with aluminum extrusions, and they are waterproofed.

The combination handheld and mobile transceivers are very versatile units, ruggedly constructed to operate in a dual environment as either a handheld portable or vehicle-mounted mobile radio unit. When used as a portable, the radio unit is self-contained with its built-in battery and antenna; when installed in its vehicle-mounted cradle, the unit operates from the main vehicle power system and uses the vehicle-mounted antenna, while the built-in battery automatically recharges. Electrical and mechanical construction is similar to that previously described for handheld units.

Some radio networks employ "repeaters" to extend the range of communications. The repeater employs one frequency for receive and another for transmit; typically a repeater station communicates with the base station on its own unique frequency, and with the handheld/vehicular stations on the standard network frequency.

Some networks provide for communications from portable or mobile units to a telephone subscriber through a Radiotelephone Common Carrier (RCC) service consisting of a base station equipped with appropriate

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telephone system interface. (Many RCCs offer "repeater" service for extended handheld/vehicular to handheld/vehicular service. One manufacturer offers a special variation which allows direct telephone interface through the base-station transceiver associated with the plant security.)

Manufacturers provide a variety of optional functions in order to provide a specific service or to extend the capabilities of the basic radio unit.

The choice of functions offered is:

Number of Channels - Up to 6 selectable channels

RF Power Output - Up to 10 watts (handheld units)  
- Up to 50 watts (mobile units)

Continuous Tone Coded Squelch - Opens receiver on receiving a specific (CTCS) tone from the net transmitter

Part 91 (Subpart F, Power Radio Service) of the FCC rules covers the authorizations required for operating a radio station in a power generating facility. The operator of the fixed master or base station must be licensed for any of the specified frequencies. However, the operators of handheld or vehicular units working in the radio net do not require a license. Radios operating on frequencies assigned to power radio service are not capable of direct communication with the LLEA or with public safety radio services.

The operating range of the VHF radio system depends on the type of terrain, RF output power, antenna efficiency, and environmental factors. The prediction of nominal range performance requires certain assumptions; a reasonable set is as follows:

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1. The base station antenna is located 100 feet above the local terrain, uses low-loss transmission coaxial cable, and incorporates a high-gain antenna.
2. There is average ground conductivity, a smooth earth and "typical urban" man-made noise conditions.

Under these average conditions the following are operating ranges for a 2-watt handheld radio operating with a 90-watt base station using a 6-dB antenna are:

1.5 miles	Portable-to-portable
14 miles	Portable-to-base
26 miles	Base-to-portable

Increasing the handheld radio power to 6 watts would increase the operating range as follows:

1.7 miles	Portable-to-portable
14.75 miles	Portable-to-base
26 miles	Base-to-portable (remains the same)

For 2-watt vehicular radios operating in the same net, assuming the same operating conditions, the range will be:

2.8 miles	Handheld portable-to-mobile
17 miles	Mobile-to-base
30 miles	Base-to-mobile
5.8 miles	Mobile-to-mobile

## VHF PORTABLE VOICE COMMUNICATIONS

<i>Manufacturer</i>	Aerotron, Inc. P.O. Box 6527 Raleigh, NC. 27628 (919) 876-4620	Aerotron, Inc. P.O. Box 6527 Raleigh, NC. 27628 (919) 876-4620	Aerotron, Inc. P.O. Box 6527 Raleigh, NC. 27628 (919) 876-4620
<i>Model</i>	TRACER II 62MI, 65MI	PORTABLE PACKSET 63TI, 65TI, 610TI	MOBILE/PORTABLE 'COMPANION' 64TT825, 74TT850
Reference Evaluation Guide Procedure No. VIII-2.A		NRC Identification No.	

### NARRATIVE DESCRIPTION

Utilizes dual-phase locked-loop circuitry to automatically track the other transmitter for system stability. All solid-state, plug-in modules.

Compatible with all hi-band VHF 2-way radio systems. All solid-state, plug-in modules.

In mobile operation, uses vehicle power, producing 25W, RF, 5W audio (through permanently mounted audio system). When removed from vehicle, switches to internal battery producing 8W RF, 750mW audio (through speaker/mike). Lo-band capability.

### PERFORMANCE DATA

#### Receiver

<b>Modulation Accept.</b>	± 7.5kHz	± 7.5kHz (other filters avail.)	± 5kHz (± 2.5kHz avail. Hi-band)
<b>Sens. (20dB Quiet Select. (EIA sinad))</b>	0.5μV/0.35μV sinad >70dB	<0.35μV, 12dB sinad 70dB (EIA 2 sig method)	0.35μV/0.35μV sinad 80dB, ± 5kHz (EIA 2 method)
<b>Intermodulation</b>	-60dB	-----	-----
<b>Spur/Image Reject</b>	-60dB, min/-40dB, min.	-70dB, min.	-85dB
<b>Freq. Stability</b>	± 0.002%	± 0.001% ref. 77F (25C)	± 0.001%
<b>Squech Sens.</b>	0.25μV	<0.25μV	0.15μV
<b>Output (-5% dist.)</b>	600mW at 8% dist.	750mW or 2W at 10% dist.	750mW at 6% dist.

#### Audio Response

Within +1 to -3dB of EIA std.

Within +1 to -3dB of EIA std.

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#### Channel Spacing

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#### Transmitter

##### RF Output

Model 62MI, 2W

Model 63TI, 2.2W at 13V dc

Mobile, 25W

Model 65MI, 5W

Model 65TI, 5.0W at 13V dc  
Model 610TI, 10.0W at 13Vdc

Portable, 8W

##### Modulation

± 5kHz

± 5kHz

± 5kHz (± 2.5kHz avail. HI-BAND)

<b>Emission</b>	16F3	16F3	16F3 (8F3 avail. Hi-band)
<b>Spur. Emissions</b>	>46dB below carrier	>50dB below carrier	>63dB below carrier
<b>Harmonics</b>	>46dB below carrier	>50dB below carrier	>63dB below carrier
<b>Hum &amp; Noise</b>	-----	>50dB	- 50dB at 2/3 system deviation
<b>Freq. Stab.</b>	±0.0005%	±0.0005%	±0.0005%
<b>Audio Dist.</b>	<5% at 1kHz	6% at 1kHz	-----
<b>Audio Response</b>	Within +1 to -3dB of EIA std.	Within +1 to -3dB of EIA std.	-----
<b>General</b>			
<b>Frequency Range</b>	150.8 to 174MHz	132 to 174MHz	74TT850, lo band (30 to 50MHz) 64TT825, 150.8/162MHz, 162/174MHz
<b>No. of Channels</b>	Up to 6 channels	Up to 5 channels	1 standard, 5 optional
<b>Channel Spread</b>	-----	-----	-----
<b>Temperature</b>	-21 to +140F (-30 to +60C)	-21 to +140F (-30 to +60C)	-21 to +140F (-30 to +60C)
<b>RF Impedance</b>	-----	-----	-----

**PHYSICAL DATA**

<b>Size</b>	6.8x2.6x1.5in (17x6.6x3.8cm)	3 <sup>3</sup> / <sub>4</sub> x7 <sup>1</sup> / <sub>4</sub> x4in (9.6x20x10cm) Mod. 63T1 3 <sup>3</sup> / <sub>4</sub> x7 <sup>3</sup> / <sub>4</sub> x5 <sup>1</sup> / <sub>4</sub> in (9.6x20x13cm) Mod. 65T1	6.5x9x2in (16.5x23x5cm)
<b>Weight</b>	1.3lb (0.6kg) w/battery	6.75lb (2.7kg) w/battery	Mobile, 14lb (6.2kg) Portable, 7.3lb (3.3kg) w/battery
<b>Controls</b>	ON-OFF, VOL, SQUELCH	-----	-----
<b>Battery/Life Cycle</b>	12.5V dc/8hr; 10% tr — 10% rec	13V dc/8hr; 10% tr — 10% rec	12.5V dc/8hr; 10% tr — 10% rec

**LOGISTICS/SUPPLY DATA**

<b>Documentation</b>	-----	-----	-----
<b>Parts &amp; Repairs</b>	Change modules	Change modules	-----
<b>Reliability</b>	MTBF not available	MTBF not available	MTBF not available
<b>Maintainability</b>	MTTR not available	MTTR not available	MTTR not available
<b>Warranty</b>	90 days equipment 1 year specified parts	90 days equipment 1 year specified parts	90 days equipment 1 year specified parts
<b>Lead Time</b>	8 weeks	8 weeks	8 weeks
<b>FCC Certification</b>	Rules 21, 89, 91, 93	Rules 21, 89, 91, 93	Rules 21, 89, 91, 93

**COST DATA**

<b>Unit Acquisition</b>	Mod 62MI, \$640, Mod. 65MI, \$755	Mod 63TI, \$640, Mod. 65TI, \$715	Mod 64TT825, \$899 Mod 74TT850, not available
<b>Installation</b>	Not applicable	Not applicable	Mobile, not available Portable, not applicable
<b>Maintenance Operation</b>	Information not available Replace battery	Information not available Replace battery	Information not available Replace battery

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### NOTES

#### Optional Equip.

Chargers for 2, 4, 8,  
and 12 units. External  
speaker & mike. Holster.  
Test kit. Tone Squelch.

Built-in charger. Whip  
or spring antenna.  
Tone squelch. Handset.

Many available

### INSTALLATIONS

## VHF PORTABLE VOICE COMMUNICATIONS

<i>Manufacturer</i>	E. F. Johnson Co. Waseca, MN 56093 (507) 835-6222	E. F. Johnson Co. Waseca, MN 56093 (507) 835-6222	Multitone Electronics, Inc. 1 Cornell Parkway Springfield, NJ 07081 (201) 467-1800
<i>Model</i>	FM-540, 543	FM-485, 547	TR-20C
Reference Evaluation Guide Procedure No. VIII-2 A		NRC Identification No.	

### NARRATIVE DESCRIPTION

Built with IC's, adjacent channel rejection filter, plastic case. Four-way use: 1. Handheld, self-contained speaker/mike. 2. Belt-worn, separate mike. 3. Mobile, mount rack. 4. Base station, 117V ac.	Transistorized, adjacent channel rejection filters, squelch, die-cast frame. three-way use: 1. Handheld, self-contained speaker/mike. 2. Belt-worn, separate mike. 3. Base station, 117V ac.	Plug-in circuit modules, slide-in battery with quick-release lever, Lexan case.
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### PERFORMANCE DATA

<b>Receiver</b>			
<b>Modulation Accept</b>	± 7kHz	± 7kHz	± 5kHz (NB), Hi & Lo band or ± 15kHz (WB) Hi-band
<b>Sens. (20dB quiet)</b>	0.5μV, 0.35μV, 12dB sinad	EIA-sinad, 0.35μV	0.5μV, 0.35μV, 12dB sinad
<b>Select. (EIA sinad)</b>	-60dB	EIA sinad, -70dB	(HB), 80dB below carrier, (LB), 70dB below carrier
<b>Intermodulation</b>	-60dB	-60dB sensitivity	-----
<b>Spur/Image Reject.</b>	-60dB	-60dB	70dB below carrier
<b>Freq. Stability</b>	± 0.0015%	± 0.0015%	± 0.001%
<b>Squelch Sens.</b>	0.25μV	0.25μV	< 0.25μV
<b>Output (&lt; 5% Dist.)</b>	750mW at 10% dist.	750mW at < 10% dist.	750mW at < 10% dist.
<b>Audio Response</b>	6dB per octave deemphasis		
<b>Channel Spacing</b>			
<b>Transmitter</b>			
<b>RF Output</b>	1.5W	1.5W	2.2W or 4W
<b>Modulation</b>	± 5kHz for 100% at 1kHz	± kHz for 100% at 1kHz	± 5kHz (NB), ± 15kHz (WB)
<b>Emission</b>	20F3	20F3	F3
<b>Spur. Emissions</b>	-45dB	-50dB	> 47dB below carrier
<b>Harmonics</b>	-45dB	-50dB	> 47dB below carrier
<b>Hum &amp; Noise</b>	-45dB	-50dB	> 50dB below carrier at 2/3 sys. dev.
<b>Freq. Stab.</b>	± 0.0015%	± 0.0015%	± 0.005% (LS), 0.002%
<b>Audio Dist.</b>	< 5%	< 5%	6% at 1kHz
<b>Audio Response</b>	-----	+ 1 to -3dB from 6dB/octave	+ 1 to -3dB preemphasis 300 to 3kHz

<b>General</b>			
Frequency Range	132 to 174MHz	150 to 174MHz	132 to 174MHz (available in Lo-band, 25 to 50MHz)
No. of Channels	Mod. 540, 1 or 2; Mod. 543, 1	1 or 2 channels	Up to 5 channels
Channel Spread	0.4%, rcvr. + Xmitter	-----	-----
Temperature	-21 to +140F (-30 to +60C)	-21 to +140F (-30 to +60C)	-21 to +140F (-30 to +60C)
RF Impedance	-----	50 ohms	-----

#### PHYSICAL DATA

Size	8 $\frac{1}{2}$ x3 $\frac{3}{8}$ x1 $\frac{1}{16}$ in (21x9x5cm)	23x9.2x4in (60x23x12cm)	1 $\frac{3}{4}$ x3 $\frac{3}{8}$ x8 $\frac{1}{16}$ in (4.5x8.5x2.1cm)
Weight	Mod. 540, 1.75lb (0.8kg) Mod. 543, 1.875lb (0.8kg)	-----	2.1lb (0.9kg)
Controls	-----	-----	-----
Battery/Life Cycle	Information not available	10V dc/8hr; 5% tr — 5% rec	15V dc/10 hr; 10% tr — 10% rec

#### LOGISTICS/SUPPLY DATA

Documentation	Manuals available	Manuals available	Manuals available
Parts & Repairs	Service centers, many locations	Service centers, many locations	-----
Reliability	MTBF not available	MTBF not available	MTBF not available
Maintainability:	MTTR not available	MTTR not available	MTTR not available
Warranty	1 year parts & labor	1 year parts & labor	1 year parts & labor
Lead Time	3 to 9 weeks	3 to 9 weeks	8 to 10 weeks
FCC Certification	Rules 21, 89, 91, 93	Rules 21, 89, 91, 93 (DOC120)	Rules 21, 89, 91, 93

#### COST DATA

Unit Acquisition	Mod. 540, \$435 Mod. 543, price not available	Mod. 485, Mod. 547, 2 channel, \$485 1 channel, \$435	\$657
Installation	Not applicable	Not applicable	Not applicable
Maintenance	-----	-----	-----
Operation	Replace battery	Replace battery	Replace battery

#### NOTES

Optional Equip.	Many available	External mike. Earphone. flexible antenna. Carrying case. Chargers. Call guard.	Gutter mount antenna. Speaker/mike.
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#### INSTALLATIONS

## VHF PORTABLE VOICE COMMUNICATIONS

<i>Manufacturer</i>	Multitone Electronics, Inc. 1 Cornell Parkway Springfield, NJ 07081 (201) 467-1800	Federal Signal Corp. 136th and Western Ave. Blue Island, IL 60406 (312) 468-4500	Federal Signal Corp. 136th and Western Ave. Blue Island, IL 60406 (312) 468-4500
<i>Model</i>	TR-300 SERIES, MULTITONE	VOICE PATROL II	HVP7-HVP-7A, HVP-7B, VOICE PATROL
Reference Evaluation Guide Procedure No. VIII-2.A		NRC Identification No.	

### NARRATIVE DESCRIPTION

<p>Provides communication between individual handheld units or with base station, with integrated networks of handheld and mobile radios. Can be used with multitone paging system when 2-way communication over extensive distances is required. Utilizes plug-in ckt. modules, snap-on batt. for easy changes.</p>	<p>A combination handheld radio and mobile radio when used with the speaker amp. assembly. The unit comes in either hi- or lo-band models with 2 channels standard or up to 5 chnls. std. (optional).</p>	<p>Fully compatible with all hi- and lo-band VHF-FM radio comm. systems. Has rechargeable batts. Extremely rugged and weatherproof.</p>
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### PERFORMANCE DATA

<b>Receiver</b>			
<b>Modulation Accept. Sens. (20dB quiet)</b>	± 7.5kHz 0.5μV/0.35μV 12dB sinad	± 5kHz min. 0.5μV/0.35μV - 12dB sinad	(NB) ± 5kHz (WB) ± 15kHz 0.5μV/0.35μV - 12dB sinad
<b>Select. (EIA sinad)</b>	- 70dB	- 80dB, ± 20kHz (20dB quiet)	80dB down
<b>Intermodulation Spur/Image Reject.</b>	- 60dB > - 60dB	HB (> - 75dB) (LB - 70dB)	> 70dB below carrier
<b>Freq. Stability</b>	> ± 0.0002%	± 0.001% HB; 0.002% LB	± 0.0025%
<b>Squeal Sens.</b>	0.025μV	0.15μV	0.18μV
<b>Output (&gt;5% Dist.)</b>	600mW at 8% dist.	Mobile/portable - 5W 6% dist. Port. - 750mW 6% dist.	750mW at 10% dist.
<b>Audio Response</b>			
<b>Chnl. Spacing</b>		HB - 1%; LB - 0.7%	(NB) 30kHz; (WB) 60kHz
<b>Transmitter</b>			
<b>RF Output</b>	2 or 5W	Portable M./Port. 2.5W Std. HB - 25W 5W (option) LB - 50W	HVP-7 HVP-7A HVP-7B 2.2W 4W 1 or 2.2W 2.2W
<b>Modulation</b>	± 5kHz	± 5kHz	(NB) ± 5kHz (WB) ± 15kHz
<b>Emission</b>	16F3	16F3	F3
<b>Spur. Emissions</b>	> 46dB below carrier	65dB below carrier	> 47dB below carrier
<b>Harmonics</b>	> 46dB below carrier	65dB below carrier	> 47dB below carrier
<b>Hum &amp; Noise</b>		> 50db at 2/3 sys. deviation	> 50db at 2/3 sys. deviation

<b>Freq. Stab.</b>	±0.0005%	HB ±0.0005%; LB ±0.002% ±0.0005%	
<b>Audio Distortion</b>	<5% at 1000Hz	<10% at 2/3 sys. dev. at 1kHz <6% at 2/3 sys. dev.	
<b>Audio Response</b>	Within +1 tr. -3dB of EIA Std.	EIA Std.	Within +1, -3dB of EIA Std.
<b>General</b>			
<b>Freq. Range</b>	132 to 174MHz	HB, 150 to 174MHz LB, 30 to 50MHz	132 to 174MHz
<b>No. of Channels</b>	Up to 6 channels	1-2 channels Std., 5 max.	1 or 5 channels
<b>Channel Spread</b>	1%		
<b>Temperature</b>	-21 to +140F (-30 to +60C)	-21 to +140F (-30 to +60C)	-21 to +140F (-30 to +60C)
<b>RF Impedance</b>	_____	_____	_____

#### PHYSICAL DATA

<b>Size</b>	6.8x2.58x1.5in (17x6.6x3.8cm)	Portable	Mobile/Port.	
		8 1/8x3 3/8x 2 1/8in (21x8.6 x5.2cm)	6 3/4x12x7in (19x30 x17cm)	1 3/4x3 3/8x8 1/16in (4.5x8.5x2.1cm)
<b>Weight</b>	21oz (0.6kg) w/Batt.	36oz (1kg) w/Batt.	15lb, 9 1/2oz (7kg)	23oz (0.7kg) radio only
<b>Controls</b>	ON-OFF, VOL, SQUELCH, PIT			
<b>Battery/Life Cycle</b>	12.5V dc/8hr; 10% tr — 10% rec	Port. 12V dc	Port/Mobile, 13.8V dc	15V dc/10hr; 10% tr — 10% rec

#### LOGISTICS/SUPPLY DATA

<b>Documentation</b>	Opr, Install., Maint. Man. Extra	All Supplied		
<b>Parts &amp; Repairs</b>	Ret. to factory or dealer	Ret. to factory or dealer	Ret. to factory or dealer	
<b>Reliability</b>	MTBF not available	MTBF not available	MTBF not available	
<b>Maintainability</b>	MTTR not available	MTTR not available	MTTR not available	
<b>Warranty</b>	1 year parts and labor	1 year parts and labor		
<b>Lead Time</b>	8 to 10 weeks	8 to 10 weeks		
<b>FCC Certification</b>		Rules 21, 89, 91 & 93	Rules 21, 89, 91 & 93	

#### COST DATA

<b>Unit acquisition</b>	\$752	\$611	HVP-7, \$571; HVT-7A, \$605; HVP-7B, \$588
<b>Installation</b>	Not applicable	Not applicable	Not applicable
<b>Maintenance</b>	_____	_____	_____
<b>Operation</b>	_____	_____	_____



### NOTES

#### Optional Equip.

Spring or gutter mt.  
ant. Spkr-mike. Various  
batt. chargers

Mobile/Portable use:  
Mobile/Portable amp.  
Assembly for specific  
mobile install.  
Like TR70 trunion mt.;  
spkr-mike-RP-100

Tone coded squelch,  
ext. mike-spkr.  
Headset, Pacific  
Pantronics; 4 choices  
ant.; carrying case

### INSTALLATIONS

## VHF VOICE COMMUNICATIONS

<i>Manufacturer</i>	Federal Signal Corp. 136th and Western Ave. Blue Island, IL 60406 (312) 468-4500	Federal Signal Corp. 136th and Western Ave. Blue Island, IL 60406 (312) 468-4500	Federal Signal Corp. 136th and Western Ave. Blue Island, IL 60406 (312) 468-4500
<i>Model</i>	HP-11, HP-11A, VOICE PATROL	HVP-15 VOICE PATROL	MP72, MP74, DUTY PATROL
Reference Evaluation Guide Procedure No. VIII-2.A		NRC Identification No.	

### NARRATIVE DESCRIPTION

<b>Narrative Description</b>	Fully compatible with all hi- and lo-band VHF-FM radio comm. systems. Has rechargeable batts. Rugged and weatherproof.	The unit is designed with automatic signal lock to automatically compensate for freq. drift of up to $\pm 5$ kHz when tracking the transmitter freq. The unit may be used with the R128 vehicular comm. ctr. for a combination mobile/portable use.	The Dual-Duty mobile/portable gives the option of handheld comm. when inserted back in the vehicle holder. The unit may also be used as a base station with optional adapters.
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### PERFORMANCE DATA

<b>Receiver</b>				
<b>Modulation Accept.</b>	± 5kHz or ± 15kHz spec. app.	± 7.5kHz	± 5kHz	
<b>Sens. (20dB Quiet)</b>	0.35 $\mu$ V/0.25 $\mu$ V — 12dB sinad	0.5 $\mu$ V/0.35 $\mu$ V — 12dB sinad	0.35 $\mu$ V/0.25 $\mu$ V — 12dB sinad	
<b>Select. (EIA Sinad) Intermod</b>	80dB below carrier	>70dB	-80dB	
<b>Spur/Image Reject. Freq. Stab.</b>	≥ 70dB below carrier ± 0.0025%	60dB -60dB min/40dB min	-85dB (HB) 0.0025% (LB) 0.001%	
<b>Squelch Sens. Output (&gt;5% Dist.)</b>	0.15 $\mu$ V 750mW at 10% dist.	0.25 $\mu$ V 600mW at 8% dist.	0.15 $\mu$ V Port — 750mW/vehicle — 5W	
<b>Audio Response</b>				
<b>Chnl. Spacing</b>	20kHz/40kHz spec. application	1%		
<b>Transmitter</b>				
<b>RF Output</b>	HVP-11    HVP-11A 2.2W      4.0W	2.0 or 5.0W	MP-72    Port. MP-74    dW	Vehicle 25W 50W
<b>Modulation</b>	± 5kHz or 15kHz (spec. appl.)	± 5kHz	± 5kHz	
<b>Emission</b>	F3	16F3	16F3	
<b>Spur. Emissions</b>	>47dB below carrier	>46dB below carrier	-63dB	
<b>Harmonics</b>	>47dB below carrier	>46dB below carrier		
<b>Hum &amp; Noise</b>	>40dB at 2/3 sys. dev.		-50dB	

<b>Freq. Stab.</b>	±0.002%	±0.0005% (25C REF)	MP-72, 0.0005%/MP-74 0.002%
<b>Audio Distortion</b>	<6%	<5% at 1kHz	
<b>Audio Response</b>	Within +1, -3dB of std. EIA	Within +1, -3dB of std. EIA	
<b>General</b>			
<b>Freq. Range</b>	25 to 50MHz	132 to 174MHz	MP-72, 132 to 174MHz MP-74, 30 to 50MHz
<b>No. of Chnl.</b>	1 or 5 channels	Up to 6 channels	Up to 5 channels max.
<b>Chnl. Spread</b>			
<b>Temperature</b>	-21 to +140F (-30 to +60C)	-21 to +140F (-30 to +60C)	-21 to +140F (-30 to +60C)
<b>RF Impedance</b>	_____	_____	_____

**PHYSICAL DATA**

<b>Size</b>	1 3/4 x 3 3/8 x 8 1/16 in (4.5 x 8.5 x 2.1 cm)	6.8 x 2.58 x 1.5 in (17 x 6.6 x 3.8 cm)	In Vehicle 2 1/2 x 8 3/4 x 1 1 3/4 in (6.3 x 22 x 30 cm)	Port. 1 7/8 x 6 1/2 x 9 3/4 in (4.8 x 17 x 25 cm)
<b>Weight</b>	1.5 lb (0.7 kg) radio only	1.3 lb (0.6 kg) w/batt.	14 lb (6.1 kg)	7.3 lb (3.3 kg)
<b>Controls</b>				
<b>Battery/Life Cycle</b>	15V dc/10hr; 10% tr — 10% rec	12V dc/8hr; 10% tr — 10% rec	13.8V dc/8hr; 10% tr — 10% rec	

**LOGISTICS/SUPPLY DATA**

<b>Documentation</b>			
<b>Parts &amp; Repairs</b>			
<b>Reliability</b>	MTBF not available	MTBF not available	MTBF not available
<b>Maintainability</b>	MTTR not available	MTTR not available	MTTR not available
<b>Warranty</b>			
<b>Lead Time</b>			
<b>FCC Certification</b>	Rules 21, 89, 91, 93	Rules 21, 89, 91, 93	Rules 21, 89, 91, 93

**COST DATA**

<b>Unit Acquisition</b>	HP-11, \$559; HP-11A, \$633	2W, \$660; 5W, \$785 less battery	MP-72, \$927; MP-74, \$966
<b>Installation</b>	_____	_____	_____
<b>Maintenance</b>	_____	_____	_____
<b>Operation</b>	_____	_____	_____

**NOTES**

<b>Optional Equip.</b>	Mike-spkr. R168 Dual headset w/mike, R169, ant. assortment, test kit \$167, batt charger R152	External mike Tone coded squelch or R128-vehicular comm. ctr.	Base station accessories Batt chargers
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**INSTALLATIONS**

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## VHF VOICE COMMUNICATIONS

*Manufacturer* IEC Electronics Corp.  
105 Norton Street  
Newark, NJ 14513  
(315) 331-7742

*Model* LE-100 SERIES

Reference Evaluation Guide Procedure No. VIII-2.A NRC Identification No.

### NARRATIVE DESCRIPTION

This handheld transceiver is a self-contained unit with 6 modules which plug into interconnecting mother boards. The units are solid state FM radio sets which operate in the VHF and UHF bands with up to 12 channels. Throw-away or rechargeable battery packs are optional. Capabilities may be expanded by conversion kits. FCC approved.

### PERFORMANCE DATA

#### Receiver

Modulation Accept.  $\pm 7.5$ kHz  
Sens. (20dB Quiet)  $0.35\mu\text{V}$   
Select. (EIA Sinad) 70dB  
Intermod 60dB  
Spur/Image Reject. 60dB  
Freq. Stab. 0.0005%  
Squelch Sens.  $0.18\mu\text{V}$   
Output (>5% Dist.) 500m.  
Audio Response Within +2, -10dB of EIA std.

#### Chnl. Spacing

#### Transmitter

RF Output 2W std. or (6 or 1½W optional VHF)  
Modulation  $\pm 5$ kHz  
Emission 16F3  
Spur Emissions -50dB  
Harmonics -50dB  
Hum & Noise -55dB  
Freq. Stab. 0.0005%  
Audio Distortion 5% at 1kHz  
Audio Response Within -1, -3dB std. EIA

**General**

**Freq. Range** LE-100-1, 150 to 174MHz  
LE-100-E, 132 to 150MHz  
**No. of Channels** 1 to 12 channels  
**Channel Spread** Up to 6 channels  
**Temperature** -21 to +140F  
(-30 to +60C)  
**RF Impedance** 50 ohms

**PHYSICAL DATA**

**Size** 8½x27/8x2in (22x7.3x5.1cm)  
**Weight** 24oz (0.7kg)  
**Controls** ON-OFF, VOL, CHN SEL,  
SQUELCH and PTT  
**Battery/Life Cycle** 8hr; 10% tr — 10% rec

**LOGISTICS/SUPPLY DATA**

**Documentation**  
**Parts & Repairs**  
**Reliability** MTBF not available  
**Maintainability** MTTR not available  
**Warranty**  
**Lead Time**  
**FCC Certification**

**COST DATA**

**Unit Acquisition** LE-100, \$595  
**Installation** \_\_\_\_\_  
**Maintenance** \_\_\_\_\_  
**Operation** \_\_\_\_\_

**NOTES**

**Optional Equip.** LE-600 TRI-Comm. sys.  
permits LE-100 to become a  
mobile or base station  
LE-600 vehicular \$220.  
LE-600 office sys. \$388.  
Tone squelch; various ants.;  
battery chargers

**INSTALLATIONS**

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

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PENALTY FOR PRIVATE USE, \$300

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COMMISSION



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