

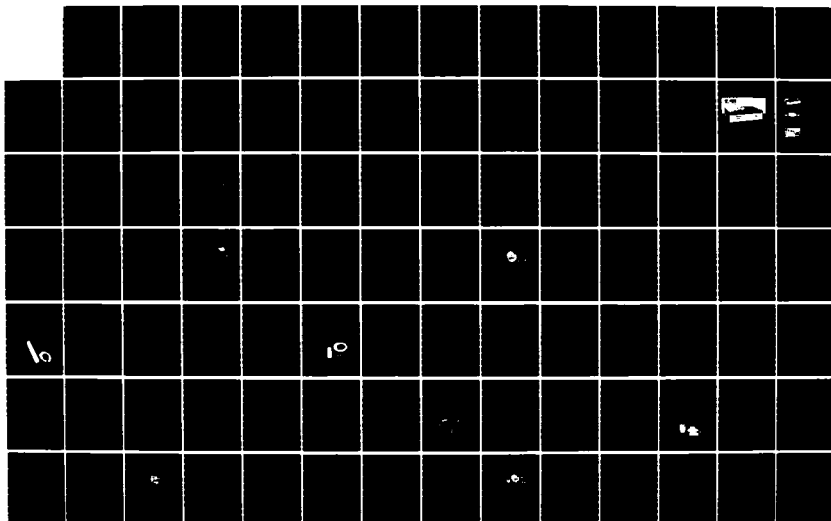
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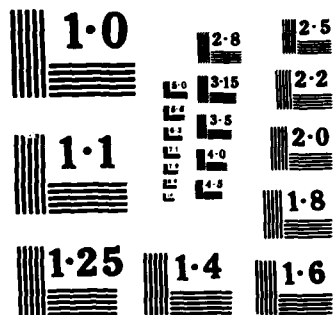
TACTICAL SENSORS FOR DISPERSED TNF (TACTICAL NUCLEAR
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MICROCOPY RESOLUTION TEST CHART

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TACTICAL SENSORS FOR DISPERSED TNF UNITS

Appendix 1—Tactical Sensory Survey

Science Applications International Corporation

P.O. Box 1303

McLean, VA 22101

30 June 1983

Technical Report

CONTRACT No. DNA 001-82-C-0057

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FIELD	GROUP	Intrusion Detection	
15	7	Sensors	
17	9	Tactical Sensors	
19 ABSTRACT (Continue on reverse if necessary and identify by block number) This Appendix presents the results of the tactical sensor survey conducted in the performance of contract DNA 001-82-C-0057. The Appendix includes a data sheet and relevant product literature for each tactical sensor or sensor system identified.			
20 DISTRIBUTION AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED UNLIMITED ☒ SAME AS RPT ☐ DTC USERS		21 ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
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SECTION I

INTRODUCTION

This Appendix contains the findings of a survey conducted to identify sensors and systems that are available and/or potentially useful for the defense of TNF units deployed in the field under tactical conditions.

Data sources were initially identified by consultations with security experts from the military, public, and private sectors; professional security organizations; and through professional publications including DNA security-related reports. Approximately 130 manufacturers and military sources of security equipment were identified and screened.

There is a very large number of intrusion detection sensors now available from military and commercial sources, but only a relative few show potential for tactical use. Most sensor R&D has been directed toward systems for use at fixed facilities. A large percentage of the sensors considered were restricted by design characteristics to indoor use, and could be eliminated immediately from further consideration. Those for outdoor use are usually designed to cover the area immediately adjacent to a fixed facility, and require extensive preparation of terrain. They may also require power levels not normally available under tactical conditions.

The research team was determined not to overlook any sensor which might show promise of being practical (even in a modified form) for tactical application. It was clear, however, that if the number of sensors included in the data base was to be kept at a useful level, a preliminary screening method must be devised. This was done by preparing a list of attributes that military experience dictates any system used by a tactical unit must possess (to a reasonable degree), and then considering each sensor with those attributes in mind. The attributes are:

- High mobility (preferably hand-held or easily man-portable),
- Recoverability (or expendability),
- Minimal emplacement and recovery time,
- Ruggedness,
- Easy maintainability,
- Minimum requirements for training and skill,
- All-weather capability,
- Day/night capability.

Every sensor or technology identified was first examined with those required attributes in mind. In every case, the sensor or technology was given the "benefit of the doubt"; that is, if there appeared to be any possibility that it could survive more detailed scrutiny, it was tagged for inclusion in the data base. However, those that were manifestly unadaptable to tactical use were eliminated. In this way the data base was reduced to 55 sensors and systems. Although this still resulted in a large category finally identified in the basic report as "non-applicable," it was the desire of the research team to err on the side of an overly large initial list, rather than risk the possibility of omitting some seemingly marginal candidate which might have proven useful.

Data Sheets were then prepared on all sensors which survived this initial screening. Data Sheet outline is shown in Table 1. The type data included on the sheets was selected to provide an immediate appreciation of the capabilities and limitations of the sensors (or systems) when viewed from the perspective of possible application to tactical sensor systems for use in the defense of TNF units in the field.

Table 1. Sensor System Data Sheet Outline

Name of Sensor
Developer

Availability Status
System Application

SYSTEM DESCRIPTION

Type of Sensor
Description
Principle of Operation
Transmission Mode

Signature
Add-on Capability
Cost

PORTABILITY

Weight of Each Container

Size of Each Container

POWER REQUIREMENTS

Power Requirements

EMPLACEMENT

Emplacement Mode
Estimated Emplacement Time

Estimated Retrieval &
Loadout Time

RUGGEDNESS

Ruggedness

EFFECTIVENESS/RELIABILITY

Detection Range
Transmission Range
 With Relay
Sensitivity
Remote Alarm Assessment
 Capability

Detection Probability
Functional Reliability
False Alarm Rate
Susceptibility to Nuisance/
 Environmental Alarms
Vulnerability to Spoofing
 or Tampering

Table 1. Sensor System Data Sheet Outline (Cont.)

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Mean Time for Repair (MTR)

Special Support Requirements

Maintenance Skills Required

Mean Time Between Failure (MTBF)

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Other Conditions

Temperature Range

Light

Humidity

Noise

Rain

Line-of-Sight

Snow

Foliage

Haze/Smoke/Fog

Soil Conditions

Wind

Other

The information included in the Data Sheets is based on manufacturers' product literature. Copies of pertinent product literature are included in this Appendix (with the Data Sheets) for ready reference to the additional detailed technical specifications, system descriptions, and photographs of hardware that they contain.

Many other information sources were explored during this project. They included discussions with manufacturers' representatives, test reports, military publications, discussions with military R&D organizations, project managers, and commodity managers. Those sources were used primarily to obtain more detailed data on those sensors/systems which were finally identified as having the most potential for use under tactical conditions. That data is not included in this Appendix. It is brought into use and identified specifically in appropriate Sections of the basic report.

The Data Sheets include cost information to the extent that it was readily available. Costs quoted are unit acquisition costs, not life-cycle costs. Cost is used only to provide a sense of the "affordability" of the systems considered, that is, the general magnitude of initial acquisition costs. Cost also provides one basis for judging whether certain sensors may be considered "expendable."

The primary use of the Data Sheets was to assist in identifying potentially valuable systems or system components. It should be noted that manufacturers' literature does not always describe products according to the same outline, nor measure performance against a common set of specifications. Hence, it is often difficult to draw direct comparisons between products. However, the descriptions of characteristics and capabilities compiled in the Data Sheets did prove sufficient to establish a basis for the selection process used in separating the sensors and systems into three Groupings which classify them as to potential usefulness in tactical applications. These Groupings are:

- New Systems in Production or Recently Deployed,
- Currently Fielded/Available Equipment,

-- Non-Applicable Systems.

These Groupings and the selection process used in forming them are described in Section 2 of the basic report. The process was essentially one of first selecting the general performance characteristics that a sensor must possess in order to be potentially useful in tactical applications, and then of comparing sensor description and technical information contained in the Data Sheets against those characteristics. The "performance characteristics" selected and used as the basis for this comparison are simply an extension of the "attributes" used in the initial screening. That is, they are a somewhat more specific and detailed listing of the qualities that common sense and military experience dictate that a sensor must possess in order to be useful in unit tactical defense. These performance characteristics are essentially qualitative, and not to be confused with the more refined "performance requirements" developed later in Section 4 of the basic report and used in the construction of conceptual sensor systems for use in tactical defense of TNF units. Note that the Data Sheet format is based on these performance characteristics.

SECTION 2

SUMMARY OF DATA

Data Sheets are grouped in seven categories based on the sensor technologies involved. The categories are:

- Seismic
- Magnetic
- Infrared
- Microwave
- Electromagnetic
- Miscellaneous sensors
- Multi-sensor systems.

This grouping is simply a convenience. It provides a means of identifying sensors and systems of interest and for comparing and selecting sensors. The grouping is not necessarily technically precise. The electromagnetic category became so large that a decision was made to break out a sub-set designated "microwave." That division has been rather arbitrary. Systems described in product literature as "microwave" and/or which operate on a radar principle are categorized in this Appendix as "microwave." Those involving surface or buried ("leaky") cable transmitters or described in product literature as "electrostatic", "electromagenetic," or "electromagnetic field" type systems have been left in the "electromagnetic" category.

Seven matrices (Tables 2 through 8) have been prepared, one for each of the seven categories listed above. These matrices compare the sensor descriptions and performance specifications contained in the Data Sheets against the general performance characteristics selected (see paragraph 1.0 above). The Data Sheets describe a sensor's performance in technical detail, as shown in the manufacturer's product literature. The matrices grossly summarize the sensor's estimated performance, in generally qualitative terms, as it pertains to each relevant performance characteristic.

SECTION 3

DATA SHEETS AND PRODUCT LITERATURE

Following the grouping system described, Data Sheets and the product literature upon which they are based have been assembled in this Appendix under the Sub-section headings listed below. Copies of product literature have been placed directly after the Data Sheet which they support. In the case of sensors or systems developed by the military, pages from appropriate Service documentation serve the purpose of manufacturers' product literature. Sub-section headings are:

- 3.1 Seismic Systems
- 3.2 Magnetic Systems

- 3.1 Seismic Systems
- 3.2 Magnetic Systems
- 3.3 Infrared Systems
- 3.4 Microwave Systems
- 3.5 Electromagnetic Systems
- 3.6 Miscellaneous Systems
- 3.7 Multi-sensor Systems.

Project Name Project Number Project Location Project Status	Project Manager Project Sponsor Project Stakeholders	Project Description Project Objectives Project Scope	Project Budget Project Timeline Project Risks	Project Deliverables Project Milestones Project Key Dates	Project Notes Project Comments Project History
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3.1 SEISMIC SYSTEMS - Data Sheets and Product Literature

Del Norte: Seismic Perimeter Intrusion Detection System (SP-2000)

GTE-Sylvania: Seismic Processor System (SPS-1)

Intrusion Detection Systems: Buried Seismic System

Intrusion Detection Systems: Portable Seismic System (SSP-10)

Sparton Southwest: Geophone Line Sensor

Sparton Southwest: Seismic Point Sensor (SPS)

Teledyne Geotech: Intrusion Signature Detector

Teledyne Geotech: Seismic Perimeter Intrusion Detector (SPID)

US Army: Disposable Seismic Intrusion Detector (DSID)

US Army: Military Seismic Intrusion Detector III (M-SID III)

US Army: Patrol Seismic Intrusion Detector II (PSID II)

US Army: Unattended Seismic Detector (USD)

SENSOR SYSTEM DATA SHEET

Name of Sensor SP-2000 Seismic Perimeter Intrusion Detection System

Developer Del Norte Technology, Inc.

Availability Status Commercially available

System Application Indoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Seismic

Description Seismic sensors (geophones) are interconnected in preconstructed arrays and linked by cable to indoor central processor unit.

Principle of Operation Seismic sensors arrays are buried or mounted in zone of surveillance. Vibrations created by intruder movement are detected and transmitted to central unit for processing, monitoring, and possible alarm activation.

Transmission Mode Hard-wire.

Signature Passive system. Low sensor visibility.

Add-on Capability System is modular design and can be expanded in single zone increments, as desired.

Cost

PORTABILITY

Weight of Each Container Processor: 7 lbs.

Size for Each Container Processor: 14" x 4" x 11"

POWER REQUIREMENTS

Power Requirements 110 VAC or 12 VDC. External plug-in transformer supplied for 110 VAC operation. +12 to 18 VDC internal battery back-up input.

EMPLACEMENT

Emplacement Mode Seismic sensors may be mounted (on perimeter fences, walls, rooftops) or buried (in turf, asphalt, gravel, concrete) indoors or outdoors. Processor is designed to be installed indoors.

Estimated Emplacement Time 30 min. to 2 hrs. (depending upon perimeter size)

Estimated Retrieval and Loadout Time Same as above.

RUGGEDNESS

Ruggedness Sensors designed for outdoor, fixed-site use. Processor (control unit) designed for indoor installation.

EFFECTIVENESS/RELIABILITY

Detection Range Fence: Vertical or horizontal -- up to 1,000 feet per sector.

Ground/gravel: Up to 300 feet per sector. Wall mount: Up to 500 feet per sector.

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability Up to 99%.

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms Wind may generate alarms if sensors are fence-mounted. (Fence processing board contains wind velocity monitor to reduce such effects.)

Vulnerability to Spoofing or Tampering Processor has no internal defense mechanism.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Processor unit: 0°C to + 55°C.

Humidity Sensors are encased in waterproof housing.

Rain Sensors are encased in waterproof housing.

Snow

Haze/Smoke/Fog

Wind Wind may generate alarms if sensors are fence-mounted. (Fence processing board contains wind velocity monitor to reduce such effects.)

Other Conditions

Light

Noise

Line-of-Sight

Foliage

Soil Conditions

Other

SOURCE Del Norte Technology, Inc. product literature, dated August 1981.

DEL NORTE Technology, Inc.

SP-2000 SEISMIC PERIMETER INTRUSION DETECTION SYSTEM



Seismic Sensors For:

☐ Fence	☐ Ground	☐ Pavement
☐ Wall	☐ Gravel	☐ Rooftop

The Del Norte SP-2000 Seismic Perimeter Intrusion Detection System offers you the ultimate in property protection at minimum cost.

With its advanced two-channel processor and high technology sensors, you get the most reliable low-maintenance detection system available.

As is the case with all Del Norte perimeter detection systems, the SP-2000 processor is designed to be installed indoors, in the secured area of your facility. Thus, the chances of anyone tampering with any of the system's control functions are virtually eliminated.

Intrusions are detected through a series of seismic sensors mounted on perimeter fences or walls, on rooftops or buried beneath turf, asphalt, gravel or concrete. Activity is transmitted by the sensors to the system's mainframe, where it is processed and monitored.

The SP-2000 will differentiate between normal environmental occurrences such as small animal traffic or

vehicle vibrations, and actual intrusions — people walking or crawling over a protected area, climbing over a wall, or cutting a security fence. You get exceptional reliability with an extremely low false alarm rate.

Seismic sensor arrays are constructed and tested at the factory to ensure correct spacing and cabling for each perimeter segment.

All sensors are environmentally housed, temperature compensated, water-proofed, and interconnected through long-life direct-buried cable.

On the SP-2000's front panel, you get local audible and visual alarm indicators, plus outputs for peripheral equipment that provide fault status and alarms for all sectors, at remote stations. This advanced system also offers normal zone monitoring, and a visual activity indicator for each sector to aid in sensitivity adjustment. Anti-tamper alarm, alarm inhibit, alarm reset, battery back-up input, and alarm contact closure are standard.

S P E C I F I C A T I O N S

SP-2000



Size: 14" x 4" x 11"
Weight: 7 lbs.
Power: 110 VAC or 12 VDC. External plug-in transformer supplied for 110 VAC operation.
Temperature: 0°C to 55°C
System Input: Seismic sensors, 2 sectors.
Fence: Vertical or horizontal — up to 1,000 feet each sector
Ground or gravel: Up to 300 feet each sector
Wall mount: Up to 500 feet each sector
System output: **Front panel** — visual activity indicator, alarm and fault lights for each sector. Pushbutton reset.
Rear panel — alarm and fault contact closure, alarm inhibit input (sector over-ride), audio output. Alarm and fault contact closure aux. output.
Inputs: Battery back-up input +12 to +18 VDC
 AC input: 110 VAC
 Seismic inputs



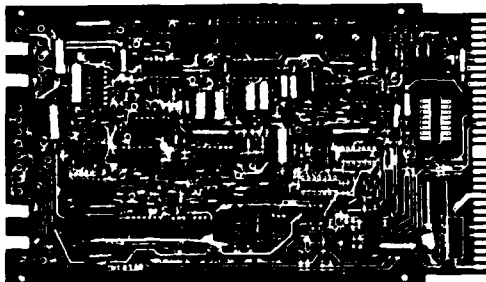
SENSOR — HEAVY DUTY-HIGH RELIABILITY:

Seismic geophone — waterproof with PVC housing and cable strain reliefs. Cable: 3#18GA with shield and FP-RES jacket. Armor: served steel wire with FP-RES PVC. Each array contains temperature compensation network within the encapsulated sensors. All arrays factory assembled and mounted on cable reels for transport. Available in all configurations.



SENSOR — LOW-COST:

Seismic geophone — waterproof with PVC housing and cable strain relief. Cable: 3#22GA with shield and polyethylene jacket. Arrays contain temperature-compensating networks with encapsulated sensors. All arrays factory assembled and tested, and cable-reel mounted for transport. Available in all configurations.



PROCESSING OPTIONS:

Fence: Dual frequency analog signal processor with differential rate-of-rise detector. Contains wind velocity monitor to reduce effects of wind-generated alarms. Each fence processing board capable of accepting signals from up to 1,000 feet of vertical or horizontal-mounted fence sensors.

Ground: Dual frequency analog signal processor with differential rate-of-rise detector. Each ground processor board capable of accepting signals from up to 300 feet of ground, asphalt or concrete-mounted sensors.

Gravel: Single frequency signal processor with differential rate-of-rise detector. Each gravel processor capable of accepting signals from up to 300 feet of gravel-mounted sensors.

Del Norte
SECURITY SYSTEMS

1100 Pamela Drive, PO Box 696, Euless, Texas 76039 (817) 267-3541
 WESTERN (805) 987-1088 CENTRAL (214) 672-3387 NORTHEAST (914) 226-4681
 SOUTHWEST (713) 492-1645 SOUTHEAST (404) 967-2698

SENSOR SYSTEM DATA SHEET

Name of Sensor Seismic Processor System (SPS-1)

Developer GTE Sylvania

Availability Status Commercially available

System Application Outdoor intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Seismic

Description System consists of 1-10 geophones connected to self-contained seismic processor. Processor(s) may be linked to central monitoring point via hard lines or RF transmitter.

Principle of Operation Personnel and/or vehicle activity is detected by emplaced miniature geophones which transmit alarm signal to a central processor for monitoring and response.

Transmission Mode Hard-wire or radio frequency transmitter (not supplied).

Signature Passive sensors; "active" RF transmission (if used). Low sensor visibility.

Add-on Capability Up to 10 geophones may be added to each processor.

Cost

PORTABILITY

Weight of Each Container Total system: Approximately 7 lbs.

Size for Each Container Case: 9" x 8" x 4.5"

POWER REQUIREMENTS

Power Requirements 8-16 V (12 V nominal). Four (D-size) alkaline battery cells (optional). Internal battery life = 6 months. Total current drain = 6 ma.

EMPLACEMENT

Emplacement Mode Sensors are emplaced on surface. Cables may be buried.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, temporary site use.

EFFECTIVENESS/RELIABILITY

Detection Range Personnel: 10-35 foot radius. Vehicles: 100-300 foot radius.

Transmission Range

With Relay

Sensitivity Adjustable.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated) Low.

Susceptibility to Nuisance/Environmental Alarms System is susceptible to, but discriminates against, alarms generated by rain, wind, and nearby loud noises.

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -32° to +70°C. Internal power: -20°C to +70°C.

Humidity

Rain System discriminates against false alarms generated by rain.

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise System discriminates against false alarms generated by wind noise, or other nearby loud noises.

Line-of-Sight

Foliage

Soil Conditions Soil conditions and makeup will affect sensor detection range.

Other

SOURCE GTE Sylvania product literature.



Systems

**Sylvania Systems Group
Western Division**

NEW

SEISMIC PROCESSOR SYSTEM

**Detects
personnel
and vehicles.**

**Discriminates
against other signals.**

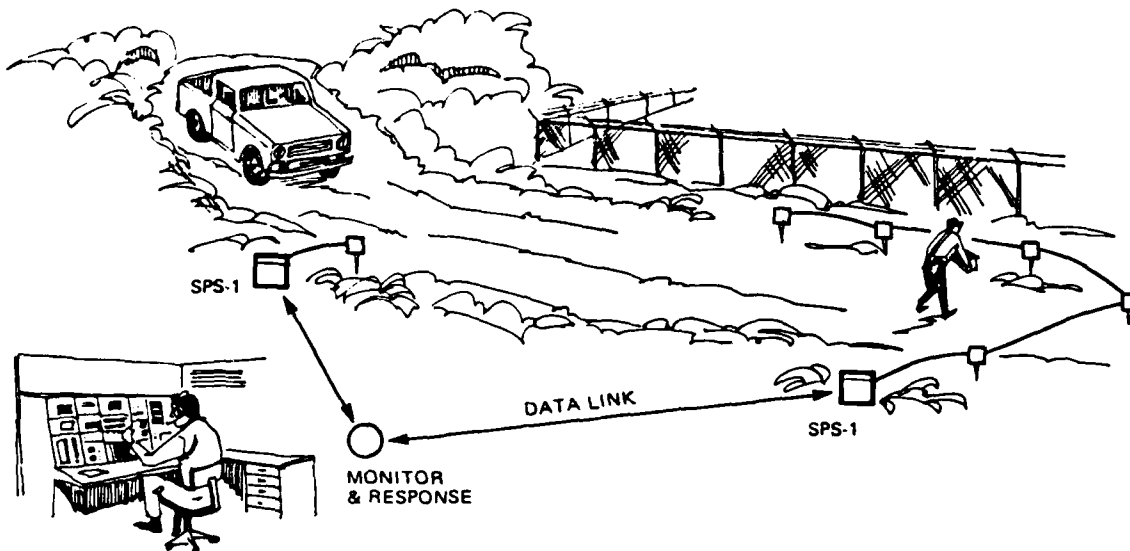
GTE Sylvania has developed a state-of-the-art Seismic Processor (SPS-1) which is designed to detect walking personnel and vehicles while discriminating against other signals (rain, aircraft, helicopters, wind noise, root noise, etc.)

- HIGH SENSITIVITY
- LOW FALSE ALARM RATE
- SOLID-STATE CIRCUITRY
- LOW CURRENT DRAIN
- OPERATES FROM BATTERY PACK OR EXTERNAL POWER

The SPS-1 is designed for high performance, long-term unattended operation in outdoor environments. Alarm signals may be returned to a central monitoring point via hard lines or an RF transmitter (not supplied).

- LIGHTWEIGHT
- RUGGED
- EASILY INSTALLED
- WATER-TIGHT CASE
- VARIABLE SENSITIVITY
- 10 GEOPHONE CAPABILITY

For further information,
contact your local representative



Specifications

Typical Detection Range (radius)

Personnel:

10-35 ft.

Note: Detection range will vary
depending upon soil makeup

Vehicles:

100-300 ft.

Deployment

Hand emplaced

Internal Adjustments

Sensitivity (Gain)

Transducers (geophones)

1 - 10 geophones

Operating Temperature

Internal power: -20°C to +70°C,

External power: -32°C to +70°C

Internal Battery Life

Up to 6 months

Battery Type

4 Alkaline cells (D-size) (optional)

External Supply Voltage

8 to 16 V (12 V nominal)

Total Current Drain

6 ma (nominal)

Alarm Output

Relay contacts

Case Dimensions

9" x 8" x 4.5"

Weight

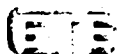
Approximately 7 pounds[

Surge Protection

Surge arrestor on all lines used for
external connection

Connectors

Waterproof MS type



Systems

Security Systems Group,
Western Division

SECURITY PRODUCTS

P.O. Box 100

Mountain View, California 94042

415/965-2210, 3125

TELEX 910-375-0348

SENSOR SYSTEM DATA SHEET

Name of Sensor Buried Seismic System

Developer Intrusion Detection Systems, Inc.

Availability Status Commercially available

System Application Indoor or outdoor perimeter, corridor, or area protection

SYSTEM DESCRIPTION

Type of Sensor Seismic

Description System consists of (buried) seismic detector sensors, discriminator sensors, a signal processor and a power supply. Each set of sensors is are connected on prefabricated arrays of 20 sensors per line with 12 foot centers.

Principle of Operation Seismic detectors respond to seismic energy generated by intruder(s) within their transmitting detection radius by signals to the signal processor. Discriminator sensors are installed between detector sensors and potential sources of alarms generated outside the protected area.

Transmission Mode Hard-wire.

Signature Passive system. Very low sensor visibility.

Add-on Capability System may be expanded with the addition of more detectors or control modules.

Cost

PORTABILITY

Weight of Each Container Processor: 18 lbs.

Size for Each Container Processor: 12" x 14" x 5". Power supply: 7½" x 3½". Sensor cables: 22 gauge cable (20 sensors per line with 12' centers).

POWER REQUIREMENTS

Power Requirements 115 VAC 50-65 Hz or 220 VAC 50 Hz. Batteries: Two 12V 1.5 AH rechargeable.

EMPLACEMENT

Emplacement Mode Sensors may be buried (in ground, asphalt, walls) or mounted (on buildings, beams, ceilings), indoors or outdoors.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for indoor or outdoor, fixed or temporary site use.

EFFECTIVENESS/RELIABILITY

Detection Range 10 foot radius per detector (Detection radius may vary depending upon quietness of monitored area.)

Transmission Range

With Relay

Sensitivity Non-adjustable. Sensitivity will vary depending upon relative quietness of area.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms Use of discriminator sensors reduces false alarms from ambient noise and vibrations generated outside area of surveillance.

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range +10° to +140°F (excluding batteries).

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise Noise generated outside area of surveillance may affect sensor detection sensitivity and range. Discriminator sensors are used to cancel these outside signals.

Line-of-Sight Line-of-sight is not required for intrusion detection.

Foliage

Soil Conditions

Other

SOURCE Intrusion Detection Systems, Inc. product literature.

BURIED SEISMIC SYSTEM

General Description and Specifications

Operation

The IDS buried Seismic System is an advanced system which has been in the field for over nine years. It is used for outdoor perimeter protection or for indoor applications. The system employs all-weather, pre-fabricated detector sensors that capture intruders within their radius. The sensors transmit, when activated, specific seismic signals to the Signal Processor. An alarm condition results when an intruder enters within their radius. The sensors transmit, when activated, specific seismic signals to the Signal Processor. An alarm condition results when an intruder enters within the omni-directional detection range of the seismic sensor. Discriminator sensors are used to screen or cancel out unwanted freeway, train, machinery, or other ambient noise and vibrations.

High Reliability

Detector sensors can be installed in dirt, concrete, asphalt, walls, or atop buildings, on beams, in ceilings, and under structural members, without detracting from their ability to detect and alarm. All weather, multi-environment, solid state modular system is capable of differentiating between an intruder and natural disturbances such as auto traffic, trains, aircraft, earthquakes and sonic booms, thereby preventing false alarms. The sensors are buried and therefore invisible.

System Layout

The array sensors may be placed to detect an intruder in one or a combination of patterns. The sensors may be aligned in a single or double string for PERIMETER protection, or in a cluster for either CORRIDOR or AREA protection. No line of sight is required. Excellent zoning for quick identification of intruder. Each sensor has a radius of effective sensitivity up to 10 feet. The coverage of the sensors will depend largely upon the relative quietness of the location. In remote areas the sensitivity can be greater than in urban environments. Sensor spacing of 12 feet is recommended.



U.S. PATENT PENDING

SIGNAL PROCESSOR-General: The SSP-1 to SSP-4 can be installed at any distance from the sensors. Each zone will handle up to 20 detector sensors on a single or multiple line(s). 40 detectors maximum can be used per zone (quiet area) though 20 is more ideal.

Size: 12 x 14 x 5 inches 16 gauge steel 18 lbs.

Power: 115 volts AC 50-65 Hz or 220 50 Hz

Batteries: (2) 12 volt 1.5 AH rechargeable.

Output Relay: DPDT (2-four C) contact 5A resistive

Input: A. DETECTOR Lineup to 20 detectors

B. Discriminator lineup to 20 sensors

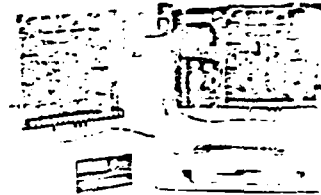
Operating Temperature: 10°F. to 140°F. excluding batteries

PWS-02 POWER SUPPLY:

Input: 115 volts 50-65 Hz or 220v 50 Hz
Size: 7 1/2 x 3 1/2"

Output:

1. +13.8 vdc at 800 ma (battery float charge)
2. -13.5 vec at 800 ma
3. +9 volts at 200 ma $\pm 5\%$
4. -9 volts dc at 200 ma $\pm 5\%$



U.S. PATENT PENDING

DETECTOR SENSORS (SEN-11): Used for concrete/asphalt, sub-floor, roof and earth installations. Prefabricated sensor lines are on 12 foot centers with 20 sensors per line. Cable is four conductor, shielded, 22 gauge with a polyurethane direct burial jacket.



U.S. PATENT PENDING

DISCRIMINATOR SENSORS (SEN-11): Either direct burial or concrete/asphalt. Installed between detector sensors and potential source of outside disturbances: such as trains, trucks, freeways, pumps, etc. The discriminator upon receiving the vibration before the detector sensors, will analyze and cancel the signal since it came from outside the protected area. Sensors are spaced 30'-40' from the detector sensor line and usually 50' apart (further apart in very quiet areas)



Intrusion Detection Systems, Inc.

2321 Verna Ct., Marina Business Park, San Leandro, CA 94577
Telephone (415) 352 8820 Toll Free (800) 227 0592 Telex 172 191

SENSOR SYSTEM DATA SHEET

Name of Sensor Portable Seismic System (SSP-10)

Developer Intrusion Detection Systems, Inc.

Availability Status Commercially available

System Application Outdoor, temporary site protection

SYSTEM DESCRIPTION

Type of Sensor Seismic

Description System consists of a self-contained signal processor unit connected to prewired sensors suited for repeated outdoor ground emplacement.

Principle of Operation Seismic sensors (geophones) are configured on prefabricated cable arrays. These geophones detect seismic energy generated by intrusions and transmit an alarm signal to the central processor unit. On receipt of alarm signal, the processor uses a sonalert and zone light to indicate an alarm condition.

Transmission Mode Hard-wire.

Signature Passive system. Low sensor visibility.

Add-on Capability External devices, such as dialers and alarm panels, may be interfaced with processing unit.

Cost

PORTABILITY

Weight of Each Container System (total): 19 lbs. (including batteries)

Size for Each Container Signal Processor: 16½" L x 7½" H x 12 5/8" D

POWER REQUIREMENTS

Power Requirements 115 VAC. Backup: 1.5 AH ± 12 V rechargeable gel/cel battery.

EMPLACEMENT

Emplacement Mode Sensors are spiked into ground surface. Cable may be buried.

Estimated Emplacement Time Rapid.

Estimated Retrieval and Loadout Time Rapid.

RUGGEDNESS

Ruggedness System is designed for outdoor, temporary site use. Processing unit requires protected (indoor) location.

EFFECTIVENESS/RELIABILITY

Detection Range Approximately 8-10 foot radius.

Transmission Range

With Relay

Sensitivity Adjustable (high/low setting).

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight

Foliage

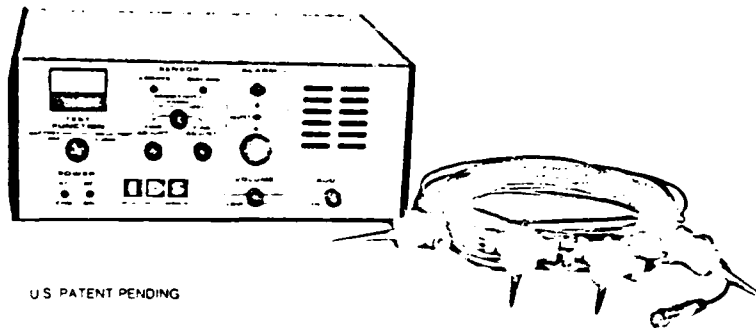
Soil Conditions

Other

SOURCE Intrusion Detection Systems, Inc. product literature.

PORTABLE SEISMIC SYSTEM

General Description and Specifications



U.S. PATENT PENDING

The SSP-10 Portable System is a self-contained Signal Processor which can be used as a One Zone Portable unit, or a Demonstrator, with additional pre-wired sensors. Contractors can use it to protect building sites and materials; military for protection of weapons; corporations during strikes for temporary protection of any site. The audio listen-in feature helps verify any alarms — a major step in outdoor security.

Sensors are equipped with special weather proof cases and spikes for simple quick installation and retrieval. Direct burial, rodent resistant cable is used to connect the detectors. Use it over and over again with ease and reliability.

The SSP-10 has its own rechargeable battery supply and can also be used with 115 vac.

All controls and indicators necessary for quick set up, easy adjustment, and operation are mounted on the front panel. Sonalert and zone light calls attention to the alarm condition. Constant vigilance is not needed.

A terminal strip on the back of the unit permits the user to interface the output relay (DPDT) to external devices such as dialers or alarm panels.

A BATTERY TEST function permits the battery voltage to be checked. Also, a WALK TEST function is provided to check ambient background level and to give an audible indication of each detected footstep.

An AUDIO listen-in feature permits the user to listen to both the ambient (background) noise and the intruder's footsteps.

Specifications

I. Mechanical

- A. Size: 16 1/2" L x 7 1/2" H x 12 5/8" D
- B. Weight: 19 lb (with batteries)
- A 6" x 5 1/4" x 9" hinged rear compartment is provided for limited storage.

II. Electrical

- A. Power
 - 1. 115 vac (plug in line cord) (provided)
 - 2. Backup: 1.5 AH $\pm$ 12 volt rechargeable Gel Cel. A float charge circuit maintains the batteries at 13.65 volts during operation.
 - 3. Battery drain: 190 ma (quiescent)
 - 4. Fuse: 1.5 A Slo-blo
- B. Inputs
 - 1. Array: 1 to 20 sensors (12, 15 or 20 centers)
 - 2. Discriminator: 1 to 10 sensors (50 centers)

C. Outputs

- 1. DPDT relay
- 2. Audible Alarm Output
- 3. Visual Alarm Output
- 4. Audible Walk Test Output
- 5. Audible Seismic

III. Operation

A. Indicators

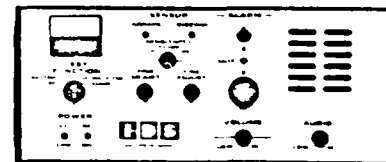
- 1. AC-CHG lamp
- 2. DC-ON lamp
- 3. Function meter
 - a. Battery Test
 - b. Level
- 4. ARRAY activity lamp
- 5. DISCRIMINATOR activity lamp
- 6. ALARM lamp
- 7. ALARM Sonalert

B. Controls

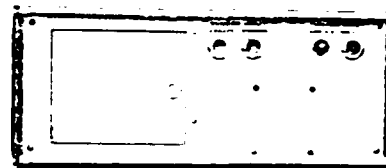
- 1. TEST FUNCTION switch
 - a. OFF
 - b. BATTERY Test
 - c. WALK TEST
 - d. AUDIO

B. Controls (cont.)

- 2. SENSITIVITY RANGE switch
 - a. Hi Sensitivity
 - b. Low sensitivity
- 3. ARRAY FIND adjust
- 4. DISCRIMINATOR FINE adjust
- 5. ALARM SELECT switch (audible-visual)
- 6. ALARM VOLUME control
- 7. AUDIO level control



U.S. PATENT PENDING



DOMESTIC PRICE LIST

January 1, 1982

Model No.	Description	Installer Price	List Price
SEISMIC PROCESSORS			
(1) SSP-110	Basic Seismic Processor	275.00	450.00
SSP-112	Extra Zone Boards ea.	240.00	395.00
SSP-114	Plug-in connectors Add'l per zone	18.00	28.00
(2) SSP-120	Seismic Signal Processor one zone with discriminator channel and plug-in board	495.00	795.00
SSP-122	Extra zone boards, each	320.00	495.00
SSP-123	6 Zone Rack Mount can - add	27.00	45.00
SSP-124	12 Zone Rack Mount can - add	35.00	55.00
SSP-125	Portable System with Audio Display	1095.00	1575.00
SEISMIC SENSORS			
(3) SEN-11	Sensors - Detectors or Discriminators	35.00	50.00
SEN-12	Sensors - Portable with case & spike	45.00	60.00
(4) CAB-11	2 Cond shielded direct burial	.22	.30
SPK-12	Splice Kits (6 splices each)	15.00	20.00
AUDIO LISTEN-IN			
(5) AUD-02	Audio Transmitter 2 Zone	350.00	575.00
AUD-04	Audio Transmitter 4 Zone	395.00	650.00
AUD-08	Audio Transmitter 8 Zone	695.00	1150.00
(6)	CST-02/04/08, same price as AUD		
(7) CSR-01	Central Station Receiver	295.00	495.00
(8) DIS-04	Audio Display Panel, 4 Zone	495.00	795.00
DIS-08	Audio Display Panel, 8 Zone	650.00	995.00
OPTIONS			
128	Remote Lights for Seismic on Switch Plate (2 Zones)	22.00	35.00
130	Walk Test Unit	85.00	125.00
136	Filters (special noise or machines)	75.00	100.00
138	Demonstrator and 2 Sensors	895.00	895.00
140	Detector Line (4 portable sensors with spikes on 20' centers, 100' tail and special plug)	225.00	375.00
142	Discriminator Line (2 portable sensors 50' apart, 100' tail and special plug)	125.00	185.00

NOTES:

- (1) SSP-110, 120 are in standard can. Battery & transformer excluded. SSP-110 basic unit has no discrimination channel. Each zone handles 20 detectors. SSP-120 can also handle up to 20 discriminators.
- (2) SSP-120 Units have 10 turn pots for fine sensitivity adjustments.
- (3) a. Detectors are PREFABRICATED LINES spaced every 12 feet (4m) or as ordered. Special orders, add 10%.
b. Discriminators are prefabricated on 50' (16m) centers.
c. Sensor range - approx. 8-10 foot radius (3m).
- (4) For 1000' or less multiply perimeter by 4 to determine approximate cable. (Use 5.5 for 2000 feet).
- (5) AUD (Audio transmitter) is used between SSP and DIS display panels. This multiplex tone coder uses just one cable for all zone annunciation and audio listen-in.
- (6) CST is used between SSP and digital dialer
- (7) CSR is used (one time only) at Central Station. It plugs into digital receiver. Use for many seismic clients.
- (8) Audio display panel is used at a guard position. It has a multiplex and tone decoder receiver.
- (9) Prices are F.O.B. San Leandro, California. All shipments are freight collect. Terms 30% deposit, balance C.O.D., or Net 10 if credit established.



Intrusion Detection Systems, Inc.

2321 Verma Ct., Marina Business Park, San Leandro, CA 94577-4298 • Phone (415) 352-8820 • Toll Free (800) 227-0592 • Telex 172-191 • Cable Address IDS CAL

FORM 6050
Revised 1/82

SENSOR SYSTEM DATA SHEET

Name of Sensor Geophone Line Sensor

Developer Sparton Southwest, Inc.

Availability Status Commercially available

System Application Outdoor area or perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Seismic

Description System consists of a central processing unit with ten standard geophones arrayed at 10-meter intervals.

Principle of Operation Geophones detect seismic stimuli created by personnel or vehicle traffic within the surveillance zone. Alarm signal is then transmitted to the processing unit.

Transmission Mode Hard-wire. System can be provided with an integral radio frequency transmitter.

Signature Passive system. Low sensor visibility (total concealment if buried).

Add-on Capability

Cost

PORTABILITY

Weight of Each Container

Size for Each Container Processor (cylinder): 8.6" diameter x 8.5" L. Geophones: 1½" x 2 3/4" x 5".

POWER REQUIREMENTS

Power Requirements 6 V (commercial) batteries.

EMPLACEMENT

Emplacement Mode Sensors are spiked into ground surface. Sensors and connecting cable may be buried, if desired.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, temporary site usage. System meets EIA standard RS-316-A for shock and vibration tolerance.

EFFECTIVENESS/RELIABILITY

Detection Range Areas of low seismic background noise: 15-meter radius per geophone; 300 meters per 10-geophone line. Spacings and coverage can be substantially greater for vehicle detection alone. Areas of high seismic noise require closer sensor spacing and thus result in reduced detection range.

Transmission Range

With Relay

Sensitivity Adjustable variable-gain capability.

Remote Alarm Assessment Capability Classification capability: vehicle/personnel discrimination or intrusion detection only.

Detection Probability 95% minimum (with correct classification)

Functional Reliability

False Alarm Rate (FAR) (estimated) Less than one per day.

Susceptibility to Nuisance/Environmental Alarms System is susceptible to false alarms from noise sources, but susceptibility is reduced due to line configuration.

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30° to +60°C.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise Seismic noise sources may generate false alarms.

Line-of-Sight Detection does not require a line-of-sight environment.

Foliage

Soil Conditions

Other

SOURCE Sparton Southwest, Inc. product literature.

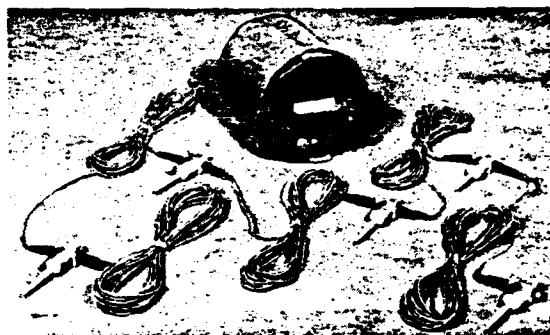


**SPARTON
SOUTHWEST INC.**
SUBSIDIARY OF SPARTON CORPORATION

GEOPHONE LINE SENSOR

PART NUMBER 110-5124-001

- PERIMETER SURVEILLANCE
- INDUSTRIAL SECURITY
- IDENTIFICATION OF VEHICLE OR PERSONNEL INTRUSION
- PASSIVE MONITORING
- LONG-TERM EMPLACEMENT



The Sparton Geophone Line Sensor is essentially a variation of the Sparton Seismic Point Sensor. Like the Sparton Seismic Point Sensor, it is a passive intrusion detector that produces alarm signals in response to seismic stimuli created by vehicles or personnel within the zone under surveillance. It does not depend upon a line-of-sight environment for operation; hence it can be concealed underground wherever convenient. The only installation restrictions are seismic coupling of the detectors with the ground.

The standard sensor configuration consists of ten geophone detectors at 10-meter intervals and a processing unit. Other configurations can be supplied on special order. The single-geophone Seismic Point Sensor has an intrusion sensitivity pattern that is circular in a horizontal plane. The use of a string of geophones in the Geophone Line Sensor creates a sensitivity pattern that can be much longer along the axis of the string than it is wide. This is particularly useful for monitoring intrusions across extended borders or around the perimeters of secured areas.

Specific advantages of the Geophone Line Sensor include substantial cost savings for extended

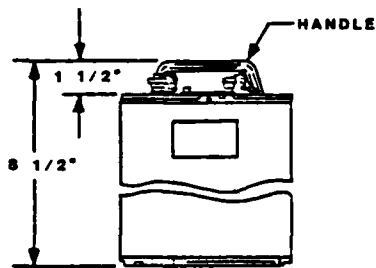
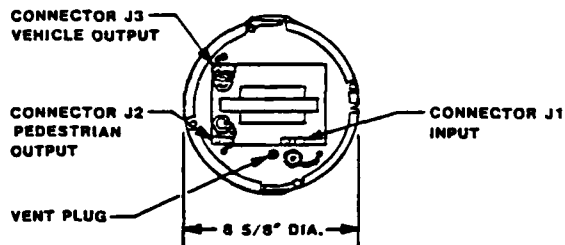
borders or boundaries and fewer false alarms in areas near seismic noise sources.

In open areas, where seismic background noise is relatively low, geophones can be placed as much as 30 meters apart, giving linear coverage of 300 meters with 10 geophones. Spacings and coverage can be substantially greater for vehicle detection alone. Areas of high seismic noise require closer sensor spacing and thus restrict range. The width of the sensitivity pattern can be reduced by reducing geophone spacing and the sensitivity of the processor unit proportionately.

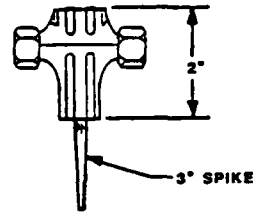
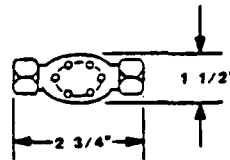
The processing unit is powered by standard commercially available 6-V batteries. It includes a manually adjustable variable-gain capability so that sensitivity can be adjusted to specific situations. Minimum unattended service life is one year of continuous operation.

The Geophone Line Sensor can classify intrusions into vehicular or pedestrian categories or provide detection only. It can provide direct-wire warnings or be provided with an integral transmitter.

GEOPHONE LINE SENSOR



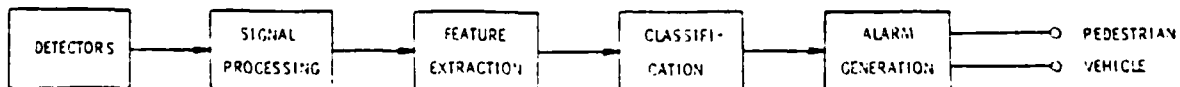
PROCESSOR HOUSING



DETECTOR HOUSING

CHARACTERISTICS

Size	Standard miniature geophones Processor (cylinder) 3.625-inch diameter x 8.5-inch length
Power Source	Commercial 6-V batteries
Probability of Detection and Correct Classification	95% minimum
False Alarm Rate	Less than one per day
Operating Life	One year (continuous duty, battery-limited)
Operating Temperature	-30°C to +60°C
Shock and Vibration	EIA Standard RS-316-A



SENSOR SYSTEM DATA SHEET

Name of Sensor Seismic Point Sensor (SPS)

Developer Sparton Southwest, Inc.

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Seismic

Description System consists of a single seismic detector and a processor unit. System is capable of detecting both vehicle and personnel intrusion.

Principle of Operation Sensor, in response to seismic stimuli created by personnel or vehicles within the surveillance zone, transmits alarm signal to processor unit. Processor accepts signal, processes it, and produces an output pulse which can be wired directly to alarm monitoring station (Model -001) or to internal radio frequency transmitter (Model -002).

Transmission Mode Model -001: Hard-wire. Model -002: Radio frequency.

Signature Passive system (except for radio-frequency transmission in -002 configuration). Low system visibility. (Degree of visibility depends on emplacement mode utilized.)

Add-on Capability

Cost \$1432 (Model -001); \$2056 (Model -002).

PORTABILITY

Weight of Each Container

Size for Each Container Geophone: 1½" x 3 ¾" x 5". Processor (cylinder): 8 5/8" diameter x 8½" length (length 10.5" with transmitter).

POWER REQUIREMENTS

Power Requirements 6 V (commercial) batteries.

EMPLACEMENT

Emplacement Mode Sensor may be buried, placed on the ground, moored underwater, or mounted above ground. (Detector must couple with ground.)

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, temporary site use. System meets EIA Standard RS-316-A for shock and vibration tolerance.

EFFECTIVENESS/RELIABILITY

Detection Range

Transmission Range

With Relay

Sensitivity Adjustable variable-gain capability.

Remote Alarm Assessment Capability Disturbance can be classified as either personnel or vehicular intrusion.

Detection Probability 95% minimum (with correct classification).

Functional Reliability

False Alarm Rate (FAR) (estimated) Less than one per day.

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range -30° to +60°C.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Detection does not require line-of-sight.

Foliage

Soil Conditions

Other

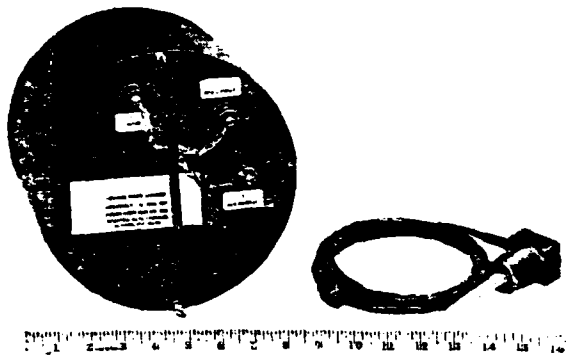
SOURCE Sparton Southwest, Inc. product literature.



SEISMIC POINT SENSOR

PART NUMBER 110-3604-001 OR 110-4773-002

- INDUSTRIAL SECURITY
- IDENTIFICATION OF VEHICLE OR PERSONNEL INTRUSION
- PASSIVE MONITORING
- LONG-TERM EMPLACEMENT
- PERIMETER SURVEILLANCE



The Sparton Seismic Point Sensor is a passive intrusion detector that produces alarm signals in response to seismic stimuli created by either vehicles or personnel within the zone under surveillance. The Seismic Point Sensor does not depend upon a line-of-sight environment for operation; hence it can be concealed underground, moored underwater, or mounted above ground wherever convenient. The only installation restrictions are seismic coupling of the detector with the ground.

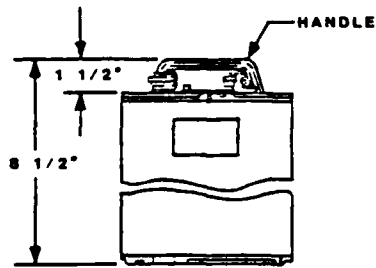
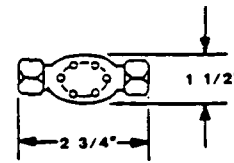
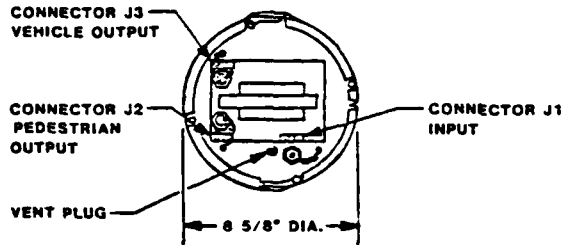
The sensor consists of a detector and a processing unit. The detector, which is a standard miniature geophone, has essentially an omnidirectional zone of coverage. The source of disturbances detected is identified and classified into two categories, *personnel intrusion* and *vehicular intrusion*.

The processing unit is powered by standard commercially available 6-V batteries. It includes a manually adjustable

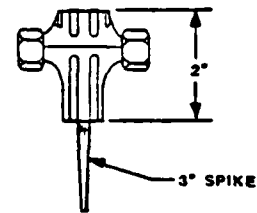
variable-gain capability so that sensitivity can be tailored to the specific situation. The sensor processor accepts the signals, processes them, and produces a standard output pulse in response to the stimuli related to the intrusion event. In the -001 configuration, the standard pulse output can be wired directly to an alarm monitoring station or fed from the sensor processor through a cable to a sensor transmitter, actuating a coded rf signal. In the -002 configuration, a sensor transmitter operating in the vhf range of 162 to 174 MHz is included in the processor housing.

The Seismic Point Sensor is ideally suited to applications where long-term burial is desirable. The detector and processing unit can be buried together or with as much as 200 feet separation for maximum flexibility. The size and shape of the sensor can be tailored to meet specific requirements. Minimum service life is one year of continuous duty.

SEISMIC POINT SENSORS



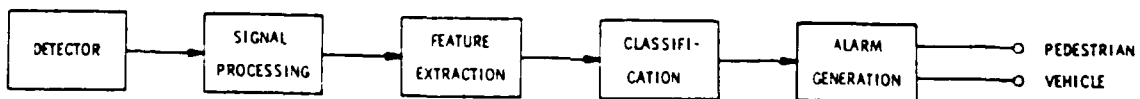
PROCESSOR HOUSING



DETECTOR HOUSING

CHARACTERISTICS

Size	Standard miniature geophone Processor (Cylinder) 8.625" diameter x 8.5" length (length 10.5" with transmitter)
Power Source	Commercial 6-V batteries
Probability of Detection and Correct Classification	95% minimum
False Alarm Rate	Less than one per day
Operating Life	One year (continuous duty, battery limited)
Operating Temperature	-30° to +60°C
Shock and Vibration	EIA Standard RS-316-A



SEISMIC POINT SENSOR

AVAILABLE CONFIGURATIONS

The Sparton Seismic Point Sensor may be ordered in either of two configurations, i.e., the basic sensor or the sensor with a self-contained transmitter.

110-3604-001. The Sparton Seismic Point Sensor is a passive intrusion detector that produces alarm signals in response to seismic stimuli created by either vehicles or personnel within the zone under surveillance. The source of disturbances detected is identified and classified into two categories: personnel intrusion and vehicular intrusion. The sensor consists of a detector and a processing unit. The detector, which is a standard miniature geophone, has essentially an omnidirectional zone of coverage. The processing unit is powered by standard commercially available 6-V batteries. It includes a manually adjustable variable-gain capability so that sensitivity can be tailored to the specific situation. The sensor processor accepts the signals, processes them, and produces a standard output pulse in response to the stimuli related to the intrusion event. This standard output pulse can be used to generate an alarm by activating a separate transmitter, audible alarm, or contact closure. This sensor is compatible with any device that utilizes an input pulse or contact closure to produce an alarm.

110-4773-002. This configuration of the Sparton Seismic Point Sensor includes a self-contained transmitter. The sensor consists of a processor/transmitter unit and a detector. The processor and the detector are identical to the 110-3604-001. The transmitter consists of an encoder, a transmitter, and an antenna. The encoder provides a digitized message that is used to modulate the transmitter. The encoder message can be ordered compatible with the Phase III format or the Immigration Department format. (The encoder may also be customized for other formats.) The transmitter operates on a selectable fixed frequency in the 162- to 174-MHz range.

PRICE INFORMATION

<u>PART NUMBER</u>	<u>1-10</u>	<u>11-50</u>	<u>51-100</u>	<u>101-250</u>	<u>251-500</u>	<u>501-1,000</u>
110-3604-001	1432	1400	1376	1328	1281	1224
110-4773-002	2056	2007	1956	1759	1703	1540

SENSOR SYSTEM DATA SHEET

Name of Sensor Intrusion Signature Detector

Developer Teledyne Geotech

Availability Status Commercially available

System Application Outdoor perimeter and area intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Seismic

Description System consists of a single tubular processor unit with a sub-miniature reflection geophone (one or more in series) attached by cable.

Principle of Operation Seismic energy generated by an intruder within the surveillance area is detected by geophone(s) and transmitted to processor unit for subsequent transmission, encoding, alarm, or annunciation, as desired.

Transmission Mode Hard-wire. Radio frequency transmission possible.

Signature Passive sensor. Low system visibility (total concealment if buried).

Add-on Capability Multiple sensors (to maximum of five) may be added to "shape" or increase area protected. (Optimum number of geophones used is dependent upon nature of environment.) Processor unit output is suitable for activation of a transmitter, encoder, alarm or annunciator. Data transmission and data reception display components available as accessories.

Cost

PORTABILITY

Weight of Each Container System: 6 lbs. (excluding batteries and geophone). Shipping weight: 8 lbs.

Size for Each Container Size: 3.5" diameter x 24" long. Volume = 251 cubic inches (approximate). Shipping volume = 1365 cubic inches.

POWER REQUIREMENTS

Power Requirements ± 9 V magnesium or alkaline battery (C size). Battery life = 1 year. Power drain = 150 ma.

EMPLACEMENT

Emplacement Mode System may be partially or totally buried.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed or temporary site use.

EFFECTIVENESS/RELIABILITY

Detection Range Personnel: 1-4 persons = 25-200 ft., 4 persons = 50-250 ft. Vehicles:
300-1500 ft.

Transmission Range

With Relay

Sensitivity Variable sensitivity. (Range adequate to obtain optimum self-adaptive operation over spectrum of environments.)

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms System discriminates against most seismic energy generated by other stimuli (e.g., wind, rain, earthquakes, aircraft).

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate) Greater than 7 years.
(estimate quoted from product literature)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain System discriminates against rain-generated stimuli.

Snow

Haze/Smoke/Fog

Wind System discriminates against wind-generated stimuli.

Other Conditions

Light

Noise System discriminates against most nearby loud noises, i.e., aircraft.

Line-of-Sight

Foliage

Soil Conditions

Other

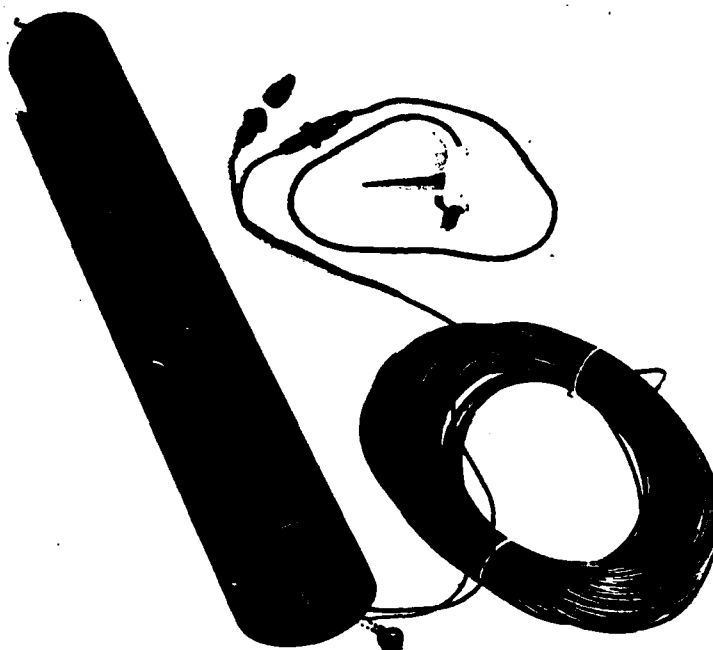
SOURCE Teledyne Geotech product literature, dated September 1973.

- High reliability outdoor surveillance
- Personnel/vehicle detection
- Virtual immunity to false alarms
- Adjustable sensitivity; self-adaptive circuitry
- 1 year operation on internal batteries
- Compatible alarm transmission/display devices available

intrusion signature detector

The Model IS-100 Intrusion Signature Detector® affords high reliability outdoor surveillance of areas and perimeters. This passive seismic detector is designed for direct burial facilitating total concealment. Unique low-cost analog circuitry exploits a proprietary seismic detection technique responding to intrusion-generated seismic energy and rejecting seismic energy generated by other stimuli (e.g. wind, rain, earthquakes, aircraft). This circuitry was developed utilizing technological skills obtained through more than 5 years experience in manufacturing and designing similar sensors for military applications. The IS-100 is ideal for unattended use as a sensor for surveillance of areas and perimeters in applications where no permissible cultural activity is expected to occur on the ground within its range.

Adjustable sensitivity provides for operation in a variety of environments and self-adaptive circuitry assures optimum performance as ambient conditions change. In most environments the area protected by a single IS-100 can be "shaped" or increased by using multiple sensor inputs.



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High reliability circuitry with a calculated MTBF of over 7 years minimizes the likelihood of failure and modular circuit design maximizes the ease of repair should failure occur. Current drain of 150 microamperes affords continuous operation of 1 year using internal battery power.

Satisfaction of the intrusion alarm criteria results in an output pulse suitable for transmission over a wire-link, activating an annunciator, or for transmission via radio data link.

The Intrusion Signature Detector® IS-100 accepts inputs from between 1 and 5 sub-miniature reflection geophones connected in series. The number of geophones that may be used for optimum performance in a given installation varies depending on the natural and cultural environment in which the unit is installed. The output of the IS-100 is suitable for activating a transmitter, encoder, local alarm, or other type of annunciator.

The IS-100 is shipped with an output cable. Sub-miniature geophones and cable extension assemblies are available as accessories. Other available accessories are data transmission components and data reception/display components.

The IS-100 is warranted against defective materials and workmanship for a period of 1 year.

SPECIFICATIONS

OPERATING CHARACTERISTICS

Input

Type	Sub-miniature reflection geophone
Number	1 or more in series
Natural Frequency	14 Hz
Impedance	3.3 k Ω

Output

Characteristics	
Non-Alarm State	0.0 to +0.5 Vdc
Alarm State	+4.5 Vdc into 10 k Ω load.

Controls

Type	Variable sensitivity (range adequate to obtain optimum self-adaptive operation over a broad spectrum of environments)

Power Requirements

Voltage	± 9 Vdc
Current	150 μ A maximum
Internal Battery	
Type	C size (alkaline or magnesium)
Life	1 year

PERFORMANCE CHARACTERISTICS (Representative Operating Environments)

Maximum Detection Range

Personnel	
1 to 4	25 to 200 feet (7.5 to 60 meters)
4 or more	50 to 250 feet (15 to 75 meters)
Vehicles	300 to 1500 feet (90 to 450 meters)

False Alarm Rate

All Natural Ambient Conditions and Aircraft	Essentially immune to stimuli other than those generated by intruders

PHYSICAL CHARACTERISTICS

Size	3.5 in. (8.9 cm) diameter (max.) 24 in. (61 cm) long

Volume	251 cu. in. (approximate)

Weight	6 lbs (2.7 kg) (excluding batteries and geophone)

Finish	Black anodized aluminum

Shipping Data

Weight	8 lbs (3.65 kg)
Volume	1365 cu. in. (.23 m ³)



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SENSOR SYSTEM DATA SHEET

Name of Sensor Seismic Personnel Intrusion Detector (SPID)

Developer Teledyne Geotech

Availability Status Commercially available

System Application Outdoor perimeter and area intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Seismic

Description System consists of a seismic tubular processor unit with a sub-miniature r geophone attached by a cable.

Principle of Operation Seismic energy generated by an intruder within the surveillance area is detected by sub-miniature geophones and transmitted to processor unit. Processor unit output may be used to activate an alarm or other type of annunciator.

Transmission Mode Hard-wire. Radio frequency transmission possible.

Signature Passive system. Low system visibility (total concealment if buried).

Add-on Capability Multiple sensors (up to five) may be attached in a series. (Optimum number of geophones used is dependent upon nature of environment.) Processor unit output is suitable for activation of a transmitter, encoder, local alarm, or other type of annunciator. Data transmission and data reception display components available as accessories.

Cost

PORTABILITY

Weight of Each Container Total system: 4 lbs. maximum (including internal batteries).

Size for Each Container Total system: 3 7/8" diameter x 11 1/2" long. Shipping volume: 990 cubic inches.

POWER REQUIREMENTS

Power Requirements + 11 to + 14 VDC batteries. Battery life = 1 year. Power drain = 150 ma.

EMPLACEMENT

Emplacement Mode System may be partially or totally buried.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed or temporary site use.

EFFECTIVENESS/RELIABILITY

Detection Range 1-4 persons = 50-200 ft.

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms System discriminates against seismic energy other than personnel-generated energy within the covered area (due to digital logic of system).

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain System discriminates against rain-generated stimuli.

Snow

Haze/Smoke/Fog

Wind System discriminates against wind-generated stimuli.

Other Conditions

Light

Noise System discriminates against most nearby loud noises, i.e., aircraft.

Line-of-Sight

Foliage

Soil Conditions

Other

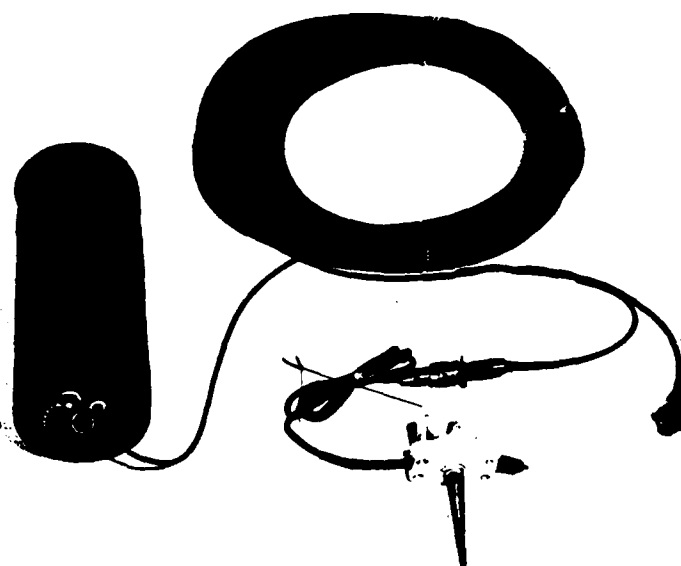
SOURCE: Teledyne Geotech product literature, dated September 1973.

- High reliability personnel detection
- Passive seismic detection allows total concealment
- Proven false alarm free outdoor surveillance
- Exterior area and perimeter surveillance
- Self-adaptive for optimum performance in a broad spectrum of changing environments
- Up to 1 year operation on internal battery
- Complete complement of compatible alarm transmission/display devices available

Outstanding performance in surveillance of areas or perimeters is achieved by patented intrusion-signal recognition logic unique in the industry. The Geotech IS-200 Seismic Personnel Intrusion Detector (SPID®) is designed expressly for exterior perimeter or area surveillance. Reliable false-alarm free personnel detection is obtained by combining passive seismic detection, highly effective in military applications, and digital logic. The low-power digital logic which "recognizes" personnel-generated seismic energy while rejecting seismic energy generated by other stimuli has resulted from more than 5 years experience developing intrusion sensors and signal recognition logic for a variety of military applications.

The seismic detection method is passive and the compact SPID® is designed for burial, facilitating total concealment. The logic circuitry is self-adaptive optimizing performance by providing the maximum useful detection range for

seismic personnel intrusion detector



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personnel over a broad spectrum of environmental conditions and virtual immunity to all other seismic energy, such as that induced by vehicles, aircraft, wind, and rain.

A current drain of 150 microamperes allows units to be operated continuously from internal battery power for periods exceeding 1 year.

Satisfaction of intrusion alarm criteria generates an output suitable for activating a local alarm, transmission over a telephone line or other wire-link, or for transmission via radio data link activating an annunciator. Optional circuitry for alarm transmission line-integrity is available for data-link management.

The IS-200 accepts inputs from between 1 and 5 sub-miniature reflection geophones connected in series. The number of geophones that may be used for optimum performance in a given installation varies depending on the environment in which they are installed. The output of the IS-200 is a 9-volt pulse suitable for activating a transmitter, encoder, local alarm, or other type of annunciator.

The instrument is shipped with one geophone and an output cable. Additional geophones and cable are available as accessories as are a variety of annunciator/data-link devices.

The IS-200 is warranted against defective materials and workmanship for a period of 1 year.

SPECIFICATIONS

OPERATING CHARACTERISTICS

Input

Type	Sub-miniature reflection geophone
Number	1 or more in series
Natural Frequency	14 Hz
Impedance	3.3 k Ω

Output

Characteristics

Non-Alarm State	0 to +0.5 Vdc
Alarm State	+4.5 Vdc into 10 k Ω load.

Power Requirements

Voltage	± 11 to ± 14 Vdc
Current	150 μ A max.
Internal Batteries	1 year operation

PERFORMANCE CHARACTERISTICS (Representative Operating Environment)

Maximum Detection Range

Personnel	
1 to 4	50 to 200 feet (15 to 60 meters)

False Alarm Rate

All Natural Ambient Conditions, Vehicles, and Aircraft	Essentially immune to stimuli other than seismic energy generated by personnel

PHYSICAL CHARACTERISTICS

Size	9.8 cm (3-7/8 in.) diameter (maximum)
	29.2 cm (11-1/2 in.) overall length

Weight	2 kg (4 lbs) maximum (including internal batteries)

Shipping Data

Weight	2.7 kg (6 lbs)
Volume	0.016 m ³ (990 in. ³)

OPTIONS

Output for Alarm Transmission Line Management*

Non-Alarm State	Periodic coded pulse
Alarm State	Inhibit coded pulse

*With this option, appropriate decoding circuitry is required.



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SENSOR SYSTEM DATA SHEET

Name of Sensor Disposable Seismic Intrusion Detector (DSID AN/GSQ-159 (V)).

Developer US Army

Availability Status Limited availability to selected military units. (No longer in production.)

System Application Outdoor perimeter surveillance

SYSTEM DESCRIPTION

Type of Sensor Seismic

Description DSID is a non-recoverable self-contained unit consisting of an internal geophone and RF transmitter.

Principle of Operation Seismic disturbance within surveillance zone is detected by internal geophone. When disturbance level exceeds preset amplitude level for specified time period, internal RF transmitter sends signal to Radio Frequency Monitoring Set (AN/USG-46) indicating intrusion detection and the DSID unit activated.

Transmission Mode Radio frequency (low-power)

Signature Passive sensor; "active" RF transmission. Low system visibility if buried.

Add-on Capability

Cost

PORTABILITY

Weight of Each Container 4.5 lbs.

Size for Each Container 5.9" x 4.5" x 3.2"

POWER REQUIREMENTS

Power Requirements 7V and 28V batteries. Battery life = 7 to 65 days using internal timer to limit mission life; 120 days if timer is not set.

EMPLACEMENT

Emplacement Mode System is designed to be buried.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, tactical (military) use. System is expendable.

EFFECTIVENESS/RELIABILITY

Detection Range Personnel: 30 meters (single intruder = 15 meters). Vehicle: 300 meters. Jeep: 40 meters.

Transmission Range

With Relay

Sensitivity Pre-set amplitude adjustment establishes alarm threshold.

Remote Alarm Assessment Capability RF transmission indicates the particular DSID unit activated.

Detection Probability 90% (for both personnel and vehicles)

Functional Reliability

False Alarm Rate (FAR) (estimated) 25 per 24 hr. period

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate) 625 days (SEAOPSS Sensor Data Sheet)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required System is expendable. Defective electronics or battery module may be replaced. No other testing or maintenance is performed.

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: +32° to +145°F. Storage temperature: -65° to +165°F.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight

Foliage

Soil Conditions

Other

SOURCE U.S. Army SEAOPSS Sensor Data Sheet.

S E A O P S S	SENSOR DATA SHEET	SENSOR: DSID
- 28V battery voltage drops below $20.0 \pm 1.0V$ - 7V battery voltage drops below $5.25 \pm 0.25V$ - transmitter remains energized for more than 2.0 seconds - the battery module is separate from the electronics module - the OFF/TEST/ARM switch is moved from the ARM position. DSID testing is limited to verifying that DSID transmits a proper Phase III message to the Radio Frequency Monitor Set AN/USG-46. If defective, the defective electronics or battery module is replaced. No other testing or maintenance is performed.		

SENSOR SYSTEM DATA SHEET

Name of Sensor Miniature Seismic Intrusion Detector III (MINISID III AN/GSQ-154)

Developer US Army

Availability Status Limited availability to selected military units. (No longer in production.)

System Application Outdoor perimeter surveillance

SYSTEM DESCRIPTION

Type of Sensor Seismic

Description System consists of a buried geophone and a processor unit.

Principle of Operation MINISID may be used in a seismic only or a dual mode. In the seismic mode, seismic waves are detected by a buried geophone. If the seismic signals fit the characteristic personnel or vehicle signature, and exceed a preset amplitude level for a specified time period, an intrusion alarm is generated. In the dual mode, an ancillary non-seismic sensor (either MAGID T-4 or AAU) is used to confirm initial seismic detection before an alarm signal is transmitted.

Transmission Mode Radio frequency.

Signature Passive sensor; "active" RF transmission. System has low visibility.

Add-on Capability MINISID III may be used in a dual mode with either US Army MAGID III or T-4 units (for magnetic detection) or with Army AAU unit (for audio detection) to increase detection reliability and reduce FAR.

Cost

PORTABILITY

Weight of Each Container 8 lbs.

Size for Each Container 8" x 8" x 3"

POWER REQUIREMENTS

Power Requirements One 28 V battery (Type BA-1546). Battery life = 90 days.

External Power Source External battery can be used to double MINISID III mission life.

EMPLACEMENT

Emplacement Mode System is placed on surface of ground. Geophone is buried.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, tactical (military) use. MINISID III can withstand shocks up to 40 g.

EFFECTIVENESS/RELIABILITY

Detection Range Personnel: 30 meters (single intruder: 24-80 meters). Vehicles: 90 meters.

Transmission Range

With Relay

Sensitivity Internal threshold control circuits automatically adjust alarm threshold level as ambient seismic background level changes. System does have variable gain capability (low/medium/high settings).

Remote Alarm Assessment Capability

Detection Probability 90% (for both personnel and vehicles)

Functional Reliability

False Alarm Rate (FAR) (estimated) For 24 hr. period, FAR equals: 24 @ low gain, 260 @ medium gain, 765 @ high gain. (FAR may be reduced significantly with simultaneous use of an ancillary sensor.)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering Automatic self-disable capability.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required (See (C) TM 5-6350-255-13)

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate) 285 days (SEAOPSS Sensor Data Sheet)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed Field level: Replacement of dead batteries and defective common modules. Depot level: Geophone replacement, repair of self-disabled unit, and troubleshooting.

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: +32° to +145° F. Storage temperature: -65° to +155° F.

Humidity

Rain Rain may cause false alarms.

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise Thunder, explosions, overflying aircraft and other noise sources may cause false alarms.

Line-of-Sight

Foliage Tree - root movement caused by wind may cause false alarms.

Soil Conditions

Other

SOURCE U.S. Army SEAOPSS Sensor Data Sheet.

S E A O P S S	SENSOR DATA SHEET			SENSOR: MINISID III		
	SENSOR TYPE: Seismic		DELIVERY MEANS: Hand-Emplaced		RECOVERY: Recoverable	
	OP TEMP: +32 to +145°F		STORAGE TEMP: -65 to +155°F		MISSION DURATION: 90 days	
	AVG FALSE ALARM RATE (24 HRS): 24 @ low gain, 260 @ medium gain, 765 @ high gain		MTBF: 285 days		POWER REQUIREMENTS: 28V battery	
				SELF-DISABLE: Yes		NOMENCLATURE: MINIATURE SEISMIC INTRUSION DETECTOR III AN/GSQ-154
TARGET AND DETECTION CHARACTERISTICS				SIZE AND WEIGHT		
TARGET TYPE:		DETECTION RANGE:	DETECTION PROBABILITY:	UNIT:	DIMENSIONS:	
Personnel		30 m	90%	MINISID	8 x 8 x 3 in.	8 lbs.
Vehicle		90 m	90%			
1 man		24-80 m				
				PROD LEAD TIME		UNIT COST
REFERENCE DOCUMENTS				12 months		
TM 5-6350-255-13, Technical Manual, Operator, Organization, and Direct Support Maintenance Manual Including Repair Parts and Special Tools List, Alarm Set, Anti-Intrusion Restricted Area, MINISID III, AN/GSQ-154(V) FSN 6350-182-7653(U), June 1970						
OPERATION AND DEPLOYMENT						
MINISID III is typically deployed along trails or roads to monitor personnel infiltration, troop movements, and vehicle movements. MINISID III can be deployed with the AAU, MAGID III or T-4, to increase detection reliability and reduce FAR. MINISID III mission life can be doubled by using an external battery power supply. A buried geophone detects seismic waves which are processed to determine characteristic signal features (signatures) that will uniquely identify personnel and vehicle intrusions. When the seismic signals exceed an amplitude threshold level within a specified time period, an alarm signal is transmitted with MINISID unit ID code in Phase III format to a monitoring receiver. MINISID III contains automatic threshold control circuits which adjust the threshold level as the ambient seismic background noise level changes.						
(OVER)						

S E A O P S S	SENSOR DATA SHEET	SENSOR: MINISID III
MINISID operates either in a seismic only or in a dual mode. In the seismic only mode, only the input information from MINISID's geophone is used to generate an intrusion alarm. In the dual mode, MINISID initially recognizes an intrusion based on seismic information. MINISID then confirms the intrusion using information from an ancillary non-seismic sensor. If the ancillary sensor does not detect an intrusion, then MINISID's seismic alarm is considered a false alarm and no alarm signal is transmitted. The ancillary sensors used with MINISID are: - MAGID III or T-4 for magnetic detection - AAU for audio detection Signature analysis features used in MINISID provide a good range versus detection probability discrimination. However, as gain is increased, FAR becomes very high because of ambient seismic noises. When used in conjunction with an ancillary sensor, FAR is significantly reduced. Typical MINISID false alarm sources are rain, thunder, tree-root movement caused by wind, overflying aircraft, passing animals, and explosions. MINISID automatically self-disables when any one of the following conditions occur: - battery voltage drops below 19V - attempt to move or disassemble armed MINISID - moving the arming switch without the proper security combination set. Field maintenance consists of replacing dead batteries and defective common modules. Geophone replacement, repair of a self-disabled MINISID and troubleshooting is performed at the depot level. GATE is used for predeployment testing and troubleshooting and maintenance. MINISID will operate after being subjected to shocks up to 40 g. During transportation, MINISID can withstand temperatures from - 65 to +155°F.		

SENSOR SYSTEM DATA SHEET

Name of Sensor Patrol Seismic Intrusion Detector Set (PSID AN/GSQ-151)

Developer US Army

Availability Status Limited availability to selected military units. (No longer in production.)

System Application Outdoor area or perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Seismic

Description A PSID set is a recoverable/expendable seismic sensor system consisting of four seismic detectors (geophones) and one hand-held receiver.

Principle of Operation Buried geophone receives seismic energy which, if it exceeds amplitude threshold level, causes seismic detector to transmit an alarm signal. Hand-held PSID receiver detects, processes, and signals alarm as an audible tone. Because each PSID set transmits a unique tone-coded alarm signal, the PSID set activated can be identified and the intruder located.

Transmission Mode Radio frequency.

Signature Passive sensor; "active" RF transmission. Low sensor visibility.

Add-on Capability PSID may be used with MAPR annunciator to monitor a defensive perimeter.

Cost

PORTABILITY

Weight of Each Container PSID (detector): 7 lbs.

Size for Each Container PSID (detector): 6" x 4" x 2"

POWER REQUIREMENTS

Power Requirements 9 V batteries. Mission life of PSID set = 1 day with carbon zinc batteries, 2 days with mercury batteries. Mission life of PSID receiver = 4 days with mercury batteries.

EMPLACEMENT

Emplacement Mode Geophone is buried. PSID set is camouflaged or hidden. PSID receiver is hand-held.

Estimated Emplacement Time Rapid.

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, tactical (military) use.

EFFECTIVENESS/RELIABILITY

Detection Range Personnel: 30-50 meters. Vehicles: 120-300 meters.

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability Detector-unique alarm pulse frequency and audio tone identify PSID set activated, and thus the location of the intruder.

Detection Probability 86% (for both personnel and vehicles)

Functional Reliability

False Alarm Rate (FAR) (estimated) High, due to simple amplitude threshold logic used. (PSID's high probability of detection generally outweighs its poor false alarm rate in patrol situations.)

Susceptibility to Nuisance/Environmental Alarms Typical sources of false alarms are natural seismic noises produced by wind, rain, earth movements, passing animals, low-flying aircraft, and explosions.

Vulnerability to Spoofing or Tampering No self-disable capability.

TRAINING REQUIREMENTS

Operator Training Required (See TC 32-7 and TM 5-6350-249-12)

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed Field level: Replacement of batteries, headsets, and antennas. Defective sets are destroyed.

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating Temperature: -22° to $+144^{\circ}\text{F}$. Storage temperature: -65° to $+165^{\circ}\text{F}$.

Humidity

Rain Rain-generated seismic energy may cause false alarms.

Snow

Haze/Smoke/Fog

Wind Wind-generated seismic energy may cause false alarms.

Other Conditions

Light

Noise Nearby explosions, thunder, low-flying aircraft, etc. may cause false alarms.

Line-of-Sight

Foliage

Soil Conditions

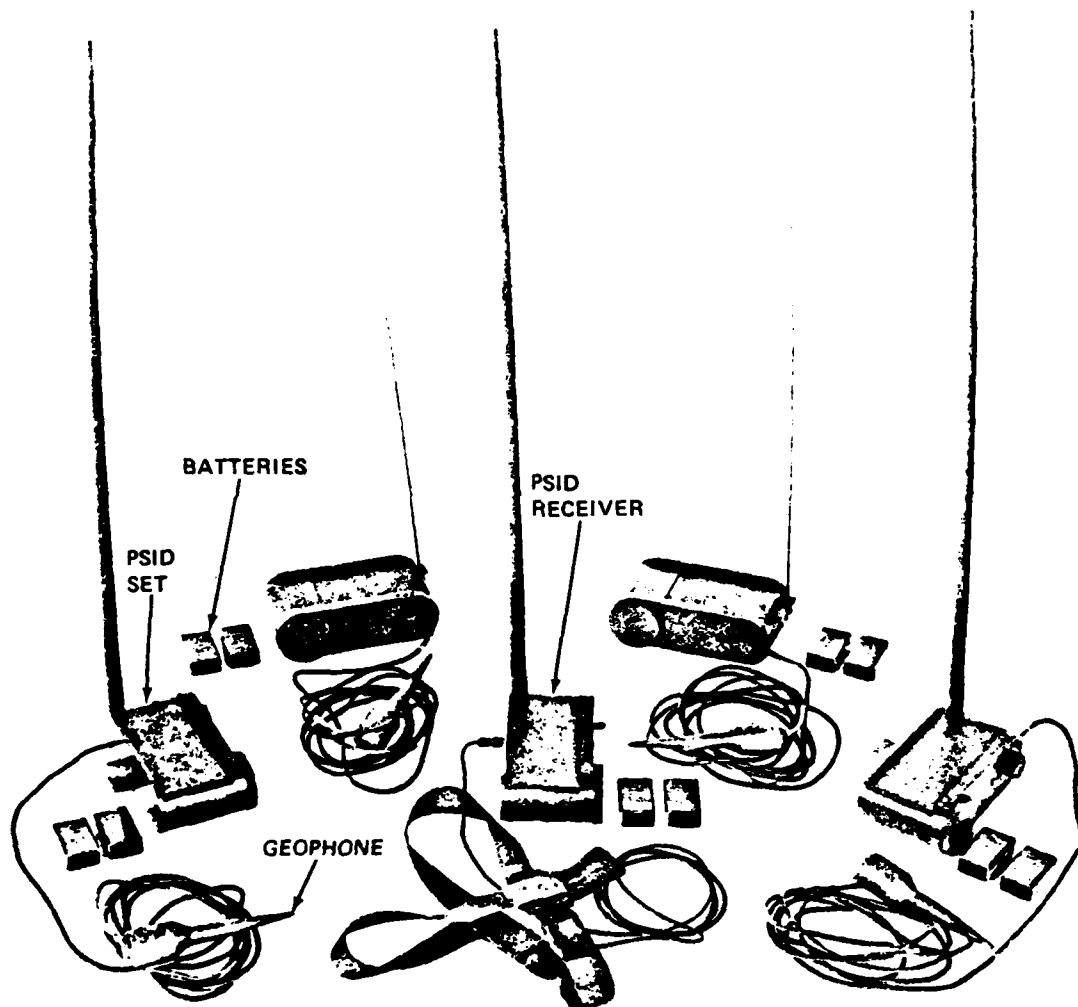
Other

SOURCE U.S. Army SEAOPSS Sensor Data Sheet.

S E A O P S S	SENSOR DATA SHEET				SENSOR: PSID	
	SENSOR TYPE: Seismic		DELIVERY MEANS: Hand-Emplaced		RECOVERY: Expendable	
	OP TEMP: - 22 to +144° F		STORAGE TEMP: - 65 to +165° F		MISSION DURATION: 1 or 2 days	
	AVG FALSE ALARM RATE (24 HRS):		MTBF:		POWER REQUIREMENTS: 9V batteries	
				SELF-DISABLE: No		NOMENCLATURE: PATROL SEISMIC INTRUSION DETECTOR SET AN/GSQ-151
TARGET AND DETECTION CHARACTERISTICS				SIZE AND WEIGHT		
TARGET TYPE:		DETECTION RANGE:		DETECTION PROBABILITY:		UNIT:
Personnel		30-50 m		86%		PSID set
Vehicles		120-300 m		86%		
						DIMENSIONS:
						6 x 4 x 2 in.
						WEIGHT:
						7 lbs.
				PROD LEAD TIME		UNIT COST
REFERENCE DOCUMENTS				12 months		
TM 5-6350-249-12 (NAVAIR 16-458-21, TO 31S9-4-12-1) Alarm Set, Anti-Intrusion AN/GSQ-151, FSN 6350-179-1557						
OPERATION AND DEPLOYMENT						
PSID is a rapidly deployable sensor system used by small patrols for ambush and counter ambush operations. When combined with a MAPR annunciator, PSID can be used to monitor a defensive perimeter. Four PSID sets are deployed in the tactical pattern that best fits the particular situation. The PSID set geophone is buried and the PSID set is camouflaged or hidden. When the detected seismic wave exceeds an amplitude threshold level, the PSID set transmits an alarm signal. Each PSID transmits a distinct PSID tone-coded audio identification alarm signal. The hand-held PSID receiver detects, processes, and applies the alarm signal as an audible tone to the operator's earpiece. The number of pulses and the tone identify the PSID set that generated the alarm and thus the location of the intrusion. PSID has a high FAR because of the simple amplitude threshold logic used.						

(OVER)

S E A O P S S	SENSOR DATA SHEET	SENSOR: PSID
Typical sources of false alarms are natural seismic noises produced by wind, rain, thunder, earth movements, passing animals, low-flying aircraft, and explosions. PSID's high average probability of detection (86 per cent) generally outweighs its poor FAR performance in patrol situations. PSID sets are recoverable and reuseable. However, they are expendable and can be discarded after one use. Maintenance is limited to replacement of batteries, antennas, and receiver headsets in the field. Defective PSID sets should be destroyed. The PSID sets have a mission life of one day when using carbon zinc batteries and two days when using mercury batteries. The PSID receiver has a mission life of about 4 days using a mercury battery.		



Patrol Seismic Intrusion Detector Set

SENSOR SYSTEM DATA SHEET

Name of Sensor Unattended Seismic Detector (USD AN/GSQ-133)

Developer US Army

Availability Status Limited availability to selected military units. (No longer in production.)

Current or Proposed Application Outdoor perimeter or area intrusion detection

SYSTEM DESCRIPTION

Type of System Seismic

Description USD uses five geophones connected by field wire (WD-1/TT) to common detector unit.

Principle of Operation Buried geophones detect seismic disturbance within monitored area and transmit signal to common detector. Detector alarm signal is then transmitted to remote monitor.

Transmission Mode Radio frequency.

Signature Passive sensor; "active" RF transmission. Low sensor visibility (total concealment if buried).

Add-on Capability

Cost

PORTABILITY

Weight of Each Container Total system: 38.5 lbs.

Size for Each Container Detector: 8.6" x 8.6" x 12"

POWER REQUIREMENTS

Power Requirements Mallory battery 303950. Battery life = 1 year.

EMPLACEMENT

Emplacement Mode Geophones are buried 12" - 30" deep, at up to 20-meter intervals, and connected to a common detector unit with WD-1/TT field wire. Detector and battery buried 2'-4' deep at up to 8 km distance.

Estimated Emplacement Time

Estimated Retrieval and Loadout time

RUGGEDNESS

Ruggedness System is designed for outdoor, tactical (military) use.

EFFECTIVENESS/RELIABILITY

Detection Range Single geophone: 10-20 meter radius. Linear trace: 20- x 100 meters.

Transmission Range Up to 8 km.

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (estimated)

Susceptibility to Nuisance/Environmental Alarms Electronic circuitry screens out seismic disturbances in ambient environment.

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required (See (C) TM 5-6350-232-15)

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise Nearby loud noises may generate false alarms, although system's electronic circuitry screens out seismic disturbances caused by explosions, aircraft, etc.

Line-of-Sight

Foliage

Soil Conditions

Other

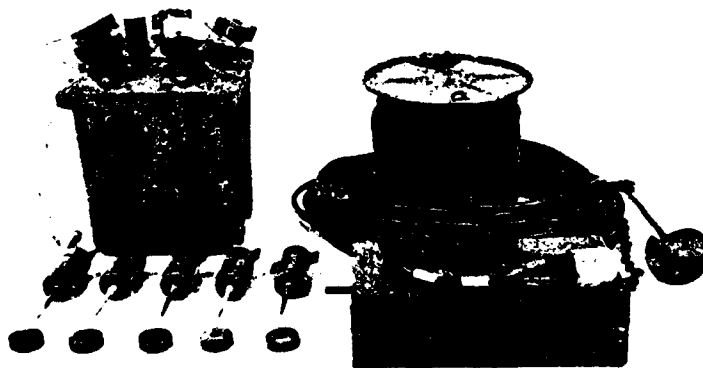
SOURCE US Army data sheet.

UNATTENDED SEISMIC DETECTOR (USD) AN/GSQ-133

TECHNICAL CHARACTERISTICS

PHYSICAL DIMENSIONS:	8.6" x 8.6" x 12"
WEIGHT:	38.5 pounds
TYPE SENSING:	Seismic
DETECTION RANGE:	20- x 100-meter linear trace (10 to 20 meters for each geophone)
TYPE OF BATTERY:	Mallory 303950
BATTERY LIFE:	1 year
DISABLE CRITERIA:	None
DELIVERY MEANS:	Hand emplaced
REFERENCE:	(C)TM 5-6350-232-15

The USD uses five geophones emplaced at 12- to 30-inch depths and up to 20 meter intervals, connected to a common detector unit with WD-1/TT field wire. The detector unit and battery are buried 2 to 4 feet deep. The detector unit is designed with electronic circuitry that screens out seismic disturbances caused by exploding munitions, aircraft overflights, thunder, etc. It may be remoted up to a distance of 8 kilometers from the monitor site.



USD AN/GSQ-133.

3.2 MAGNETIC SYSTEMS - Data Sheets and Product Literature

Sparton Southwest: Magnetic Point Sensor (Models 110-3099-001 and 110-4769-002)

Sparton Southwest: Magnetic Vehicle Direction Sensor (Models 110-3603-001 and 110-4771-002)

Teledyne Geotech: Magnetic Point Sensor (Model IS-355)

US Army: Multipurpose Concealed Intrusion Detector (MCID)

SENSOR SYSTEM DATA SHEET

Name of Sensor Magnetic Point Sensor (Models 110-3099-001 and 110-4769-002)

Developer Sparton Southwest, Inc.

Availability Status Commercially available

System Application Personnel intrusion detection and perimeter surveillance

SYSTEM DESCRIPTION

Type of Sensor Magnetic

Description System consists of a processing unit and one or two detectors.

Principle of Operation Detector senses movement of ferrous metal or magnetic-sensitive objects within zone of coverage and transmits a signal to the processor unit. Processor accepts signals, processes them, and produces an output pulse, which can be wired directly to an alarm or RF transmitter (Model-001), or be encoded and transmitted directly via radio frequency (Model-002).

Transmission Mode Model-001: Hard-wire. Model-002: Radio transmission frequency.

Signature Passive sensor; "active" RF transmission (Model-002 only). Very low system visibility.

Add-on Capability Additional detector will double detection range. Model-001 is compatible with any device that uses an input pulse to produce an alarm.

Cost Model -001: \$1575. Model 002: \$2213.

PORTABILITY

Weight of Each Container

Size for Each Container Detector (cylinder): 4" diameter x 3.25" length. Processor (cylinder): 8.6" diameter x 8" length (length 10.5" with transmitter).

POWER REQUIREMENTS

Power Requirements 6-V (commercial) batteries. Battery life = 1 year (continuous operation).

EMPLACEMENT

Emplacement Mode Sensor may be buried, installed at ground level, moored underwater, or pole-mounted. Detector and processing unit can be buried together, up to 15' apart, or up to 200' apart with use of extension cords.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed or temporary site use. System meets EIA Standards RS-316A for shock and vibration.

EFFECTIVENESS/RELIABILITY

Detection Range

Transmission Range

With Relay

Sensitivity System has adjustable variable gain capability.

Remote Alarm Assessment Capability

Detection Probability 95% minimum

Functional Reliability

False Alarm Rate (FAR) (estimated) Less than one per day.

Susceptibility to Nuisance/Environmental Alarms Use of two detectors results in reduction of the nuisance alarms due to processor's attenuation of the effects of long-range magnetic interference.

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30°C to + 60°C.

Humidity

Rain Unit is watertight.

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Detection does not depend on line-of-sight.

Foliage

Soil Conditions

Other

SOURCE: Sparton Southwest, Inc. product literature.

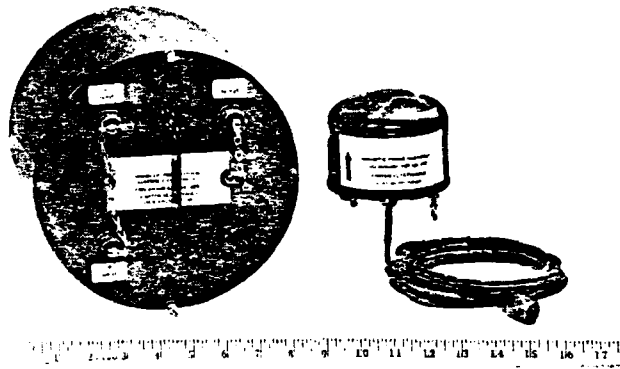


**SPARTON
SOUTHWEST, INC.**
SUBSIDIARY OF SPARTON CORPORATION

MAGNETIC POINT SENSOR

PART NUMBER 110-3099-001 OR 110-4769-002

- INDUSTRIAL SECURITY
- PASSIVE MONITORING
- PERIMETER SURVEILLANCE



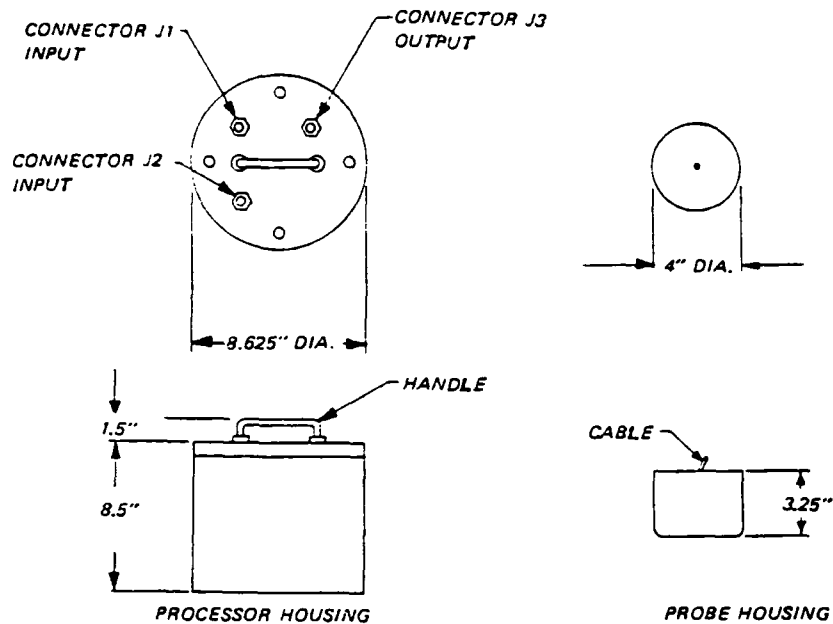
The Sparton Magnetic Point Sensor is a passive personnel intrusion detector that produces an alarm signal in response to movement of ferrous or other magnetic-sensitive objects. Unlike IR sensors, the Magnetic Point Sensor does not depend upon a line-of-sight environment for operation; hence it can be concealed underground, installed at ground level behind walls, moored underwater, or pole-mounted above ground wherever convenient. Since the sensor is sensitive only to movement of ferrous materials, a stationary iron or steel object within sensing range is not sensed and does not affect the ability of the sensor to detect movement within the zone under surveillance.

The sensor consists of a processing unit and one or two detectors. Each detector has essentially a hemispherical zone of coverage. Use of two detectors is desirable, as the range is doubled and the effects of long range magnetic interference such as magnetic storms or power-line transients are attenuated by the processor to reduce the possibility of nuisance alarms. Also contained in the detector is a low-noise preamplifier, which eliminates cable

noise or pickup as a source of alarms. The processing unit is powered by standard commercially available 6-V batteries. It includes a manually adjustable variable-gain capability so that sensitivity can be tailored to the specific situation. The sensor processor accepts the signals, processes them, and produces a standard output pulse in response to the intrusion event. In the -001 configuration, the standard pulse output can be wired directly to an alarm monitoring station or fed from the sensor processor through a cable to a sensor transmitter, actuating a coded rf signal. In the -002 configuration, a sensor transmitter operating in the vhf range of 162 to 174 MHz is included in the processor housing.

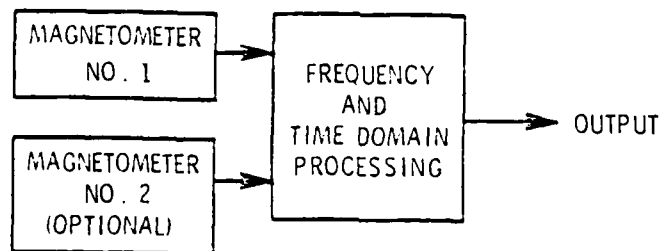
The Magnetic Point Sensor is ideally suited to applications where long-term burial is desirable. The detector and processing unit can be buried together or with as much as 15 feet separation for maximum flexibility and can be operated together with a 200 foot separation by means of extension cables. The size and shape of the sensor can be tailored to meet specific requirements. Minimum unattended service life is one year of continuous duty.

MAGNETIC POINT SENSOR



CHARACTERISTICS

Size	Detector (Cylinder) 4" diameter x 3.25" length Processor (Cylinder) 8.625" diameter x 8" length (length 10.5" with transmitter)
Power Source	Commercial 6-V batteries
Probability of Detection	95% minimum
False Alarm Rate	Less than one per day
Operating Life	One year (continuous duty, battery limited)
Operating Temperature	-30° to +60°C
Shock and Vibration	EIA Standard RS-316-A



MAGNETIC POINT SENSOR

AVAILABLE CONFIGURATIONS

The Sparton Magnetic Point Sensor may be ordered in either of two configurations, i.e., the basic sensor or the sensor with a self-contained transmitter.

110-3099-001. The Sparton Magnetic Point Sensor is a passive personnel intrusion detector that produces an alarm signal in response to movement of ferrous or other magnetic-sensitive objects within its range. The sensor consists of a processing unit and one detector. Use of two detectors is desirable, as the range is doubled and the effects of long-range magnetic interference such as magnetic storms or power-line transients are attenuated by the processor to reduce the possibility of false alarms. The processing unit is powered by self-contained standard commercially available 6-V batteries. It includes a manually adjustable variable-gain capability so that sensitivity can be tailored to the specific situation. The sensor processor accepts the signals, processes them, and produces a standard output pulse in response to the intrusion event. This standard output pulse can be used to generate an alarm by activating a separate transmitter, audible alarm, or contact closure. This sensor is compatible with any device that utilizes an output to produce an alarm.

110-4769-002. This configuration of the Sparton Magnetic Point Sensor includes a self-contained transmitter. The sensor consists of a processor/transmitter unit and one probe. An additional probe is available if more range is needed or common mode rejection is desired. The processor and the probe are identical to the 100-3099-001. The transmitter consists of an encoder, a transmitter, and an antenna. The encoder provides a digitized message that is used to modulate the transmitter. The encoder message can be ordered compatible with the Phase III format or the Immigration Department format. (The encoder may also be customized for other formats.) The transmitter operates on a selectable fixed frequency in the 162- to 174-MHz range.

PRICE INFORMATION

<u>PART NUMBER</u>	<u>1-50</u>	<u>51-100</u>	<u>101-250</u>	<u>151-500</u>	<u>501-1,000</u>
110-3099-001	1575	1552	1528	1475	1412
110-4769-002	2213	2161	2108	2002	1834

SENSOR SYSTEM DATA SHEET

Name of Sensor Magnetic Vehicle Direction Sensor (Models 110-3603-001 and 110-4771-002)

Developer Sparton Southwest, Inc.

Availability Status Commercially available

System Application Vehicle intrusion detection and perimeter surveillance

SYSTEM DESCRIPTION

Type of Sensor Magnetic

Description System is a passive sensor which determines directional movement of vehicle(s) within surveillance area. Sensor system consists of a processing unit and two detectors.

Principle of Operation A change in the magnetic field caused by the movement of ferrous materials within sensor detection range triggers detector to transmit alarm signal to the sensor processor. Processor accepts signals, processes them, and produces an output pulse which can be wired directly to an alarm or RF transmitter (Model-001), or be encoded and transmitted directly via radio frequency (Model-002).

Transmission Mode Model-001: Hard-wire. Model-002: Radio frequency.

Signature Passive sensor; "active" RF transmission (Model-002 only). Low system visibility.

Add-on Capability Model-001 is compatible with any device that utilizes an input pulse to produce an alarm.

Cost Model-001: \$1656; Model-002: \$2289

PORTABILITY

Weight of Each Container

Size for Each Container Detector (cylinder): 4" diameter x 3.25" length. Processor: 8.6" diameter x 8.5" length (length 10.5" with transmitter).

POWER REQUIREMENTS

Power Requirements 6-V (commercial) batteries. Battery life = 1 year (continuous operation).

EMPIACEMENT

Emplacement Mode System may be buried, installed at ground level, moored underwater, or pole-mounted. Detector and processing unit can be buried together or up to 15' apart, or up to 200' apart with use of extension cords.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed or temporary site use. System meets EIA Standard RS-316-A for shock and vibration.

EFFECTIVENESS/RELIABILITY

Detection Range

Transmission Range

With Relay

Sensitivity System has adjustable variable gain capability.

Remote Alarm Assessment Capability With two detectors, sensors can determine directional movement of sensed vehicles.

Detection Probability 95% minimum

Functional Reliability

False Alarm Rate (FAR) (estimated)

Less than one per day.

Susceptibility to Nuisance/Environmental Alarms System processor attenuates effects of long range magnetic interference, such as magnetic storms or power-line transients.

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30° to $+60^{\circ}\text{C}$.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Detection does not require line-of-sight.

Foliage

Soil Conditions

Other Effects of long-range magnetic interference, such as magnetic storms or power-line transients, are attenuated by system processor.

SOURCE: Sparton Southwest, Inc. product literature.

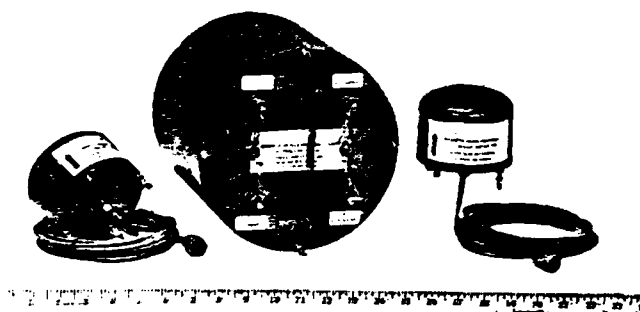


**SPARTON
SOUTHWEST** INC.
SUBSIDIARY OF SPARTON CORPORATION

MAGNETIC VEHICLE DIRECTION SENSOR

PART NUMBER 110-3603-001 OR 110-4771-002

- INDUSTRIAL SECURITY
- SENSING OF VEHICLE SPEED AND DIRECTION
- PASSIVE MONITORING
- PERIMETER SURVEILLANCE



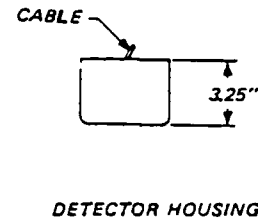
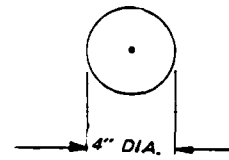
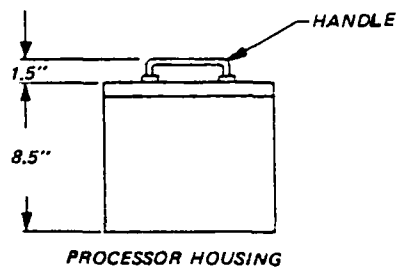
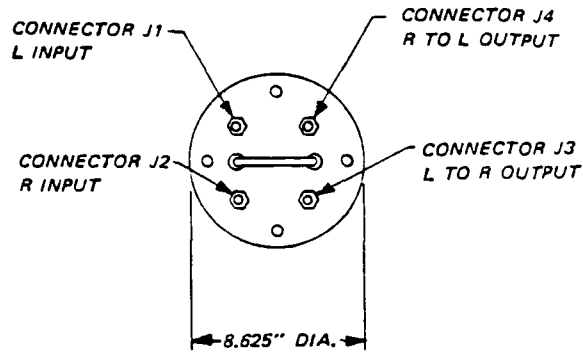
The Sparton Magnetic Vehicle Direction Sensor is a passive vehicular intrusion detector that produces alarm signals in response to magnetic stimuli created by the movement of vehicles within its range. The Magnetic Vehicle Direction Sensor does not require a line-of-sight environment for operation; hence it can be concealed underground, installed at ground level behind walls, moored underwater, or pole-mounted above ground wherever convenient. Since the sensor is sensitive only to movement of ferrous materials, a stationary iron or steel object within sensing range is not sensed and does not affect the ability of the sensor to detect movement within the zone under surveillance.

The sensor consists of a processing unit and two detectors. Each detector has essentially a hemispherical zone of coverage. Two detectors are used to determine the direction of movement of the sensed vehicle or vehicles within the area under surveillance. Each detector contains a low-noise preamplifier, which eliminates cable noise or pickup as a source of alarms. In addition, the effects of long-range magnetic interference such as magnetic storms or power-line transients are attenuated by the processor to re-

duce the possibility of nuisance alarms. The processing unit is powered by standard commercially available 6-V batteries. It includes a manually adjustable variable-gain capability so that sensitivity can be tailored to the specific situation. The sensor processor accepts the signals, processes them, and produces a standard output pulse in response to the intrusion event. In the -001 configuration, the standard pulse output can be wired directly to an alarm monitoring station or fed from the sensor processor through a cable to a sensor transmitter, actuating a coded rf signal. In the -002 configuration, a sensor transmitter operating in the vhf range of 162 to 174 MHz is included in the processor housing.

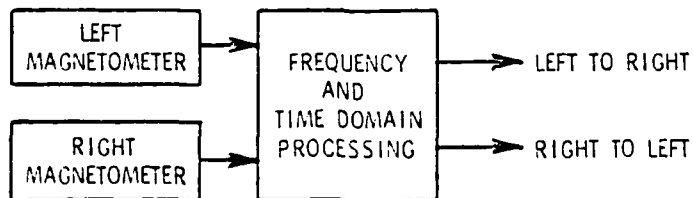
The Magnetic Vehicle Direction Sensor is ideally suited to applications where long-term burial is desirable. The detector and processing unit can be buried together or with as much as 15 feet separation. For maximum flexibility, they can be operated with a 200-foot separation by means of extension cables. The size and shape of the sensor can be tailored to meet specific requirements. Minimum unattended service life is one year of continuous duty.

MAGNETIC VEHICLE DIRECTION SENSOR



CHARACTERISTICS

Size	Detector (Cylinder) 4" diameter x 3.25" length Processor (Cylinder) 8.625" diameter x 8.5" length (length 10.5" with transmitter)
Power Source	Commercial 6-V batteries
Joint Probability of Detection and Direction Identification	95% minimum
False Alarm Rate	Less than one per day
Operating Life	One year (continuous duty, battery limited)
Operating Temperature	-30° to +60°C
Shock and Vibration	EIA Standard RS-316-A



MAGNETIC VEHICLE DIRECTION SENSOR

AVAILABLE CONFIGURATIONS

The Sparton Magnetic Vehicle Direction Sensor may be ordered in either of two configurations, i.e., the basic sensor or the sensor with a self-contained transmitter.

110-3603-001. The Sparton Magnetic Vehicle Direction Sensor is a passive vehicular intrusion detector that produces alarm signals in response to magnetic stimuli created by the movement of vehicles within its range. The sensor consists of a processing unit and two detectors. (Two detectors are used to determine the direction of movement of the sensed vehicle or vehicles within the area under surveillance.) The processing unit is powered by self-contained standard commercially available 6-V batteries. It includes a manually adjustable variable-gain capability so that sensitivity can be tailored to the specific situation. The sensor processor accepts the signals, processes them, and produces a standard output pulse in response to the intrusion event. This standard output pulse can be used to generate an alarm by activating a separate transmitter, audible alarm, or contact closure. This sensor is compatible with any device that utilizes an input pulse to produce an alarm.

110-4771-002. This configuration of the Sparton Magnetic Vehicle Direction Sensor includes a self-contained transmitter. The sensor consists of a processor/transmitter unit and two probes. The processor and the probes are identical to the 110-3603-001. The transmitter consists of an encoder, a transmitter, and an antenna. The encoder provides a digitized message that is used to modulate the transmitter. The encoder message can be ordered compatible with the Phase III format or the Immigration Department format. (The encoder may also be customized for other formats.) The transmitter operates on a selectable fixed frequency in the 162- to 174-MHz range.

PRICE INFORMATION

<u>PART NUMBER</u>	<u>1-10</u>	<u>11-50</u>	<u>51-100</u>	<u>101-250</u>	<u>151-500</u>	<u>501-1,000</u>
110-3603-001	1656	1625	1593	1530	1466	1405
110-4771-002	2289	2231	2173	2057	1888	1722

SENSOR SYSTEM DATA SHEET

Name of Sensor Magnetic Point Sensor (Model IS-355)

Developer Teledyne Geotech

Availability Status Commercially available

System Application Outdoor route surveillance

SYSTEM DESCRIPTION

Type of Sensor Magnetic

Description System consists of two pick-up units separated by 60 ft. of shielded cable with 40 ft. of cable for linkage to the processing unit.

Principle of Operation Magnetic point sensors (pick-up units) detect moving ferrous objects within detection range and transmit signal to processor unit. Processor unit conditions intrusion signal and creates a signal capable of activation of a local alarm or transmission over telephone line, wire link or radio data link.

Transmission Mode Hard-wire.

Signature Passive sensor. Very low system visibility (total concealment if buried).

Add-on Capability Single or omnidirectional detection capability possible when dual sensor pairs are used. System's output signal is suited for interfacing with central stations local alarms, or for transmission via telephone, wire, or radio data link.

Cost

PORTABILITY

Weight of Each Container Sensor: 2 lb. Processor: 5 lb. (excluding batteries). Total system (shipping weight): 20 lb.

Size for Each Container Sensor: .88" diameter x 21.12" length (volume = 12.7 in.³). Processor: 8.75" H x 8.75" W x 8.75" D (volume = .4 ft.³). Total system (shipping volume): 2 ft.³

Power Requirements $\pm$ 11 to $\pm$ 14 VDC. Two 12V (lantern type) batteries. Battery life = 1 year (continuous operation). Current drain = 600 ma.

EMPLACEMENT

Emplacement Mode System is designed for outdoor burial in earth or under any paved surface.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed or temporary site use.

EFFECTIVENESS/RELIABILITY

Detection Range Vehicle detection range averages 30 ft., depending on target size and rate of travel. (Dual sensor version can detect intrusion in either a single direction or an omnidirectional mode.)

Transmission Range

With Relay

Sensitivity Adjustable sensitivity, coupled with signal recognition circuits, allows for detection of targets ranging from small magnets to vehicles.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight

Foliage

Soil Conditions

Other

SOURCE Teledyne Geotech product literature, dated April 1982.

AD-A162 946

TACTICAL SENSORS FOR DISPERSED TNF (TACTICAL NUCLEAR
FORCE) UNITS APPENDI. (U) SCIENCE APPLICATIONS
INTERNATIONAL CORP MCLEAN VA P ANTSEN ET AL. 30 JUN 83

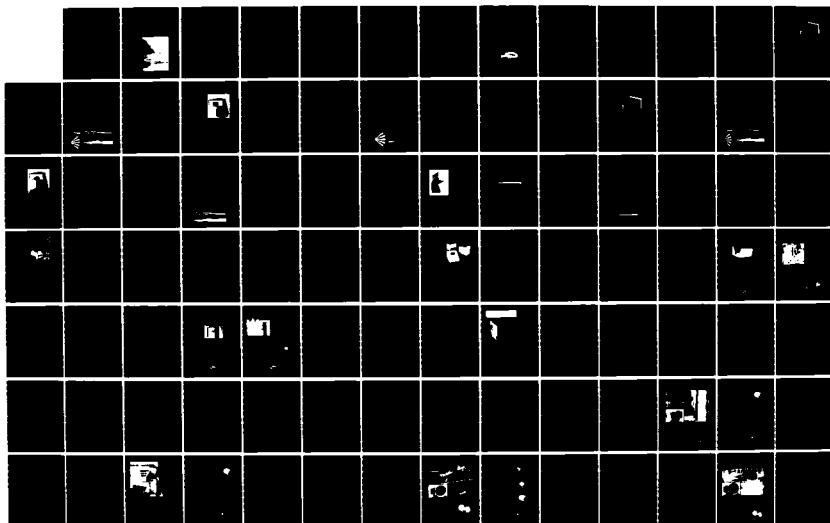
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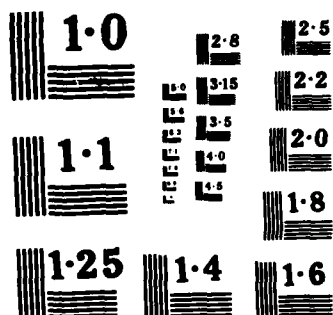
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NL





NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

- Reliable vehicular detection
- Passive pickup allows total concealment — no tuning of sensor required
- Unaffected by changing environmental conditions
- False-alarm-free outdoor surveillance
- Operation on internal batteries or external power supply
- Buriable housing

magnetic point sensor

The Magnetic Point Sensor, Model IS-355, provides high reliability, low cost surveillance of outdoor access routes. This passive magnetic detector is designed for direct burial in the earth or under any paved surface. This compact sensor coupled with signal recognition circuits and adjustable sensitivity provides for detection of targets ranging in size from bicycles and motorcycles to automobiles and other vehicles. Depending on target size and rate of travel, vehicles can be detected at a range of about 30 feet. This allows maximum flexibility of installation and camouflage. When buried in or alongside a runway, the Magnetic Point Sensor will detect small aircraft to an altitude of up to 50 feet.

The Magnetic Point Sensor Processor, Model IS-350, has internal strapping options in the processing electronics to permit the dual sensor version to detect intrusion in either a single direction or in an omnidirectional mode.

A current drain of 600 microamperes allows the unit to be operated continuously for one year from the internal batteries.

Processor output configurations include options suitable for interfacing with a variety of central stations, local alarms, or for transmission via radio data link.



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SPECIFICATIONS

SENSOR

Physical Characteristics

Two lumped parameter magnetic pickup units are housed in an environmentally sealed housing. Pickup units are separated by 60 feet of shielded cable and are provided with 40 feet of cable terminated in a 3-pin waterproof connector.

Diameter	2.22 cm (0.875 in.)
Length	53.65 cm (21.125 in.)
Volume	207.66 cm ³ (12.7 in. ³)
Weight	0.907 kg (2 lb)

Shipping Data Magnetic pickup units are packaged with Processor (see Processor "Shipping Data")

Physical Characteristics

Height	22.2 cm (8.75 in.)
Width	22.2 cm (8.75 in.)
Depth	22.2 cm (8.75 in.)
Volume	.011 m ³ (0.39 ft ³)
Weight	Approx 2.28 kg (5 lb) excluding batteries

SHIPPING DATA (Sensor Pair and Processor)

Volume	Approx 0.06 m ³ (2 ft ³)
Weight	Approx 9 kg (20 lb)

PROCESSOR

Operating Characteristics

Input	Lumped parameter Magnetic pair
Output	
Non-alarm	0 to +0.5 Vdc
Alarm state	4.5 Vdc $\pm$ 1 Vdc pulse (125 ms $\pm$ 20%) into 10 k Ω load or normally open/closed relay contact

Operating modes

Mode A	Output occurs whenever sensor pair is passed by ferrous vehicle
Mode B	Output occurs only when sensor pair 1 is passed before sensor pair 2

Controls Sensitivity

Power requirements

Voltage	$\pm$ 11 to $\pm$ 14 Vdc
Current	600 μ A nominal 30 mA maximum (when relay closes)

Internal batteries

Type	Two 12 V lantern batteries
Life	1-year operation (nominal)

OPTIONS

Single or dual sensor pair configuration
Separate battery housing



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MAGNETIC POINT SENSOR IS-355 AND IS-355-2

JIM SULLIVAN

MARCH 1, 1982

OPERATION

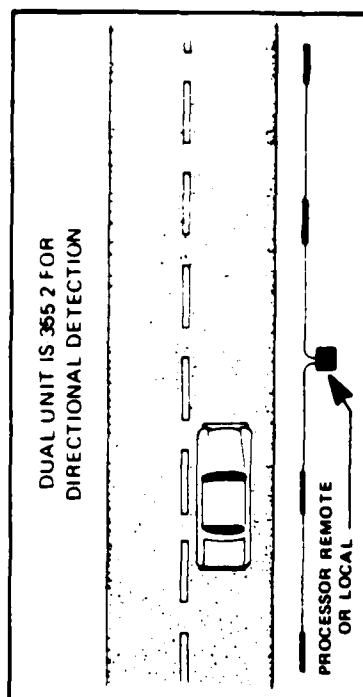
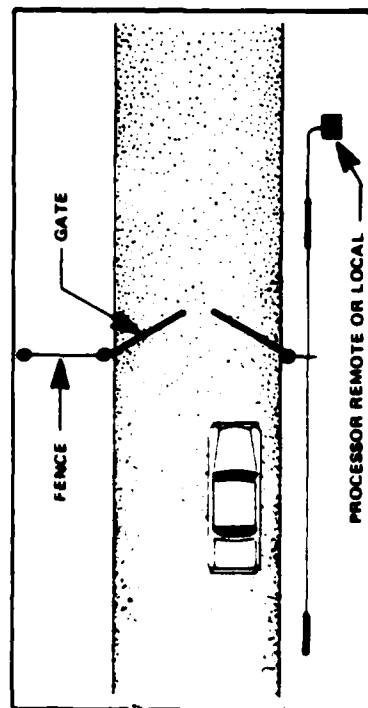
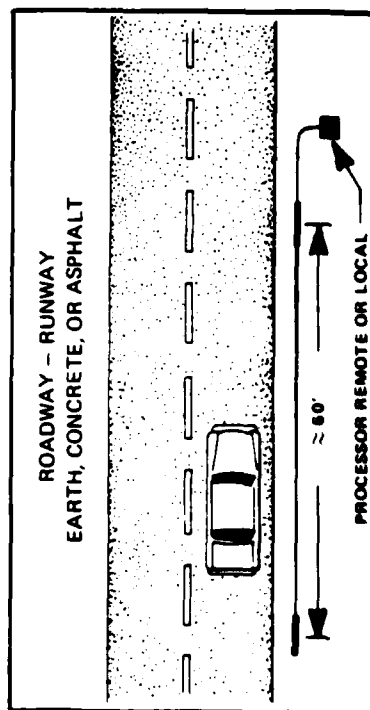
The Magnetic Point Sensor provides detection of moving ferrous objects passing over or near the concealed sensors. The standard Point Sensor, Model IS-355, detects intrusions in an omni-directional mode because of the sensitivity pattern. If required, a dual sensor version IS-355-2 can be utilized to determine in which direction a vehicle is traveling.

Signal recognition circuitry coupled with an adjustable sensitivity control provides for detection of moving targets ranging from small magnets to bicycles, snowmobiles, automobiles, and aircraft.

The point sensor processor is designed such that it can be installed either indoors or outdoors, depending upon the particular requirement. The processor conditions the intrusion signal and energizes an isolated relay. Normally open or normally closed contacts are provided that are suitable for energizing a local alarm, transmitting over a telephone line or other wire link, or for transmitting via radio data link.

APPLICATIONS

This passive magnetic detector is designed for direct burial in the earth adjacent to a roadway, driveway, sidewalk, or other surface for total concealment. Installation of the magnetic point sensor is simplified because the concrete or asphalt drive does not have to be disturbed and the unit is buried in earth approximately 2 to 3 inches below the surface alongside or adjacent to the roadway for total concealment. Typical applications of the point sensor are illustrated. The magnetic point sensor is also usable at airports or remote abandoned runways to detect low flying or landing aircraft.



MARCH 1982/SEC 501

SENSOR SYSTEM DATA SHEET

Name of Sensor Multipurpose Concealed Intrusion Detector (MCID), (Model T-15, DT-514/GSQ)

Developer US Army

Availability Status Limited availability to selected military units. (No longer in production.)

System Application Outdoor area or perimeter surveillance

SYSTEM DESCRIPTION

Type of Sensor Magnetic

Description System consists of a single strand of sensing wire connected by hard-wire to an annunciator.

Principle of Operation Sensor wire is buried 3-4" deep in uniform loop configuration. Wire detects moving ferrous metals. Detector sends alarm signal to annunciator for readout of activation signals.

Transmission Mode Hard-wire to annunciator. May be remoted using RF.

Signature Passive sensor. System has very low sensor visibility (total concealment if entire system is buried).

Add-on Capability

Cost

PORTABILITY

Weight of Each Container Total system: 7.5 lbs.

Size for Each Container Total system: 5" x 6" x 4"

POWER REQUIREMENTS

Power Requirements Mallory 303874 battery. Battery life = 2 years.

EMPLACEMENT

Emplacement Mode Sensing wire is buried 3-4" below the surface of the ground and is configured in uniform pairs of loops in either of two sizes, 1.5 meters x 1.5 meters or 1.5 meters x 4.5 meters.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, tactical (military) use.

EFFECTIVENESS/RELIABILITY

Detection Range 175-meter linear trace.

Transmission Range 8 km.

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering System has no disable capability.

TRAINING REQUIREMENTS

Operator Training Required ((C) TM 5-6350-250-10)

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight

Foliage

Soil Conditions

Other

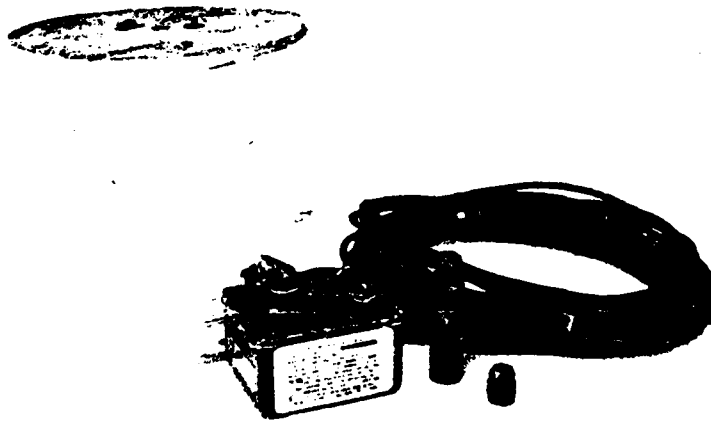
SOURCE: US Army literature.

**MULTIPURPOSE CONCEALED INTRUSION DETECTOR (MCID)
MODEL T-15, DT-514/GSQ**

TECHNICAL CHARACTERISTICS

PHYSICAL DIMENSIONS:	5.4" x 6" x 4.3"
WEIGHT:	7.5 pounds
TYPE SENSING:	Magnetic
DETECTION RANGE:	175-meter linear trace
TYPE OF BATTERY:	Mallory 303874
BATTERY LIFE:	2 years
DISABLE CRITERIA:	None
DELIVERY MEANS:	Hand emplaced
REFERENCE:	(C) TM 5-6350-250-10

The MCID is a magnetic sensor which uses a single strand of sensing wire configured in pairs of loops to detect moving ferrous metals. The wire is buried 3 to 4 inches below the surface of the ground and all loops are made uniform in either of two sizes, 1.5 meters by 1.5 meters or 1.5 meters by 4.5 meters. The detector is connected by hard wire to the annunciator for readout of its activation signals. It may be remoted up to a distance of 8 kilometers from the monitor site.



MCID Model T-15, DT-514/GSQ.

3.3 INFRARED SYSTEMS - Data Sheets and Product Literature

Peak Technologies, Inc.: Passive Infrared Intrusion Detector
(Models IR-31 and IR-1330)

Peak Technologies, Inc.: Passive Infrared Intrusion Detector
(Models IR-41 and IR-1335)

Peak Technologies, Inc.: Passive Infrared Intrusion Detector
(Models IR-1040)

Sparton Southwest: Passive Infrared Sensor (PIRS)

SENSOR SYSTEM DATA SHEET

Name of Sensor Passive Infrared Intrusion Detector (Models IR-31 and IR-1330)

Developer Peak Technologies, Inc.

Availability Status Commercially available

System Application Indoor area intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Infrared (passive)

Description IR-31 and IR-1330 are passive infrared intrusion sensors which use high stability pyroelectric sensing elements and high resolution mirrors to provide wide angle coverage. Each system consists of the sensing unit and requires an external power supply.

Principle of Operation Seven high resolution mirrors provide seven infrared view zones for each system. As moving intruder enters or leaves one of the zones, the pyroelectric sensing element responds to the change in infrared energy caused by the temperature difference, and converts temperature change to an electrical signal, which triggers an alarm.

Transmission Mode Hard-wire.

Signature Passive sensor (emits no signals or light beams). Physical appearance of system is designed for indoor facility environment.

Add-on Capability System is designed for multiple unit installations without mutual interference. Up to 10 units can be used with (SPS-301) power supply.

Cost

PORTABILITY

Weight of Each Container Shipping weight: 4 lbs.

Size for Each Container IR-31 unit: 3 7/8" H x 5 3/4" W x 3 1/2" D. IR-1330 unit:
5 1/2" H x 4 1/2" W x 4 3/4" D

POWER REQUIREMENTS

Power Requirements: 12 VDC @ 30 ma. Power source is PEAK SPS-301, which will operate up to ten infrared detectors.

EMPLACEMENT

Emplacement Mode Model IR-31 is designed for indoor, flush wall or surface mounting, approximately 4-7 ft. above floor level. Model IR-1330 system is designed for surface mounting, approximately 6-8 ft. above floor level.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness Systems are designed for indoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range 25 ft. x 36 ft. diameter under typical conditions (background temperature (24° C).

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: +5° to +122° F (-15° to +50° C).

System should be placed in a temperature-stable area. Sensor should not be aimed at objects subject to rapid heating or cooling.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind Sensor should not be located in the path of forced air from heating or cooling systems.

Other Conditions

Light Sensor is not affected by light, but some rays contain high levels infrared energy which will trigger unit.

Noise

Line-of-Sight Line-of-sight required for intrusion detection.

Foliage

Soil Conditions

Other

SOURCE Peak Technology product literature.

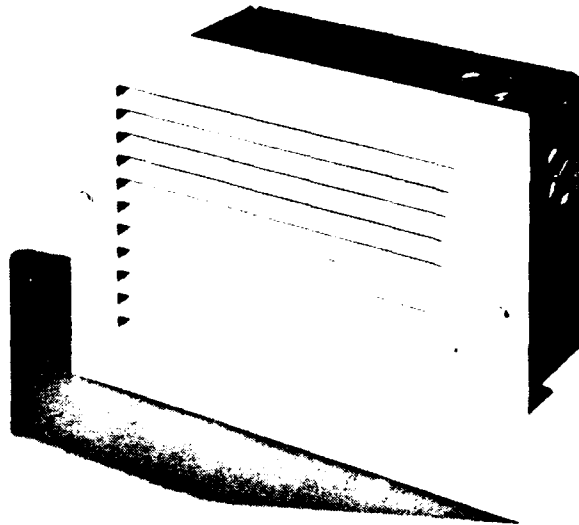
Passive Infrared Intrusion Detector

Model IR-31

PEAK
TECHNOLOGIES, INC.

FEATURES

- **Multibeam - 25 ft. X 36 ft.**
- **Ease of installation**
- **Rugged, compact housing**
- **Handsome styling**
- **Wide angle coverage**
- **Multi-unit application**
- **Flush or surface mounting**
- **No shielded cable required**



GENERAL

The IR-31 passive infrared intrusion detector features an advanced design, using a new, high stability pyroelectric sensing element. The unit is powered by a 12 volt DC supply, model SPS-301, which will operate up to ten infrared detectors. The optical system has seven high resolution mirrors, giving five main beams covering 85 degrees, and two downward beams for coverage under the unit. An intruder will be detected within the pattern when crossing any one of the seven view zones. Range is 25 feet or more under typical conditions. The detector is completely passive, and emits no signals or light beams. Any number will operate without mutual interference.

The detector works by sensing the difference in temperature between a moving object and the background. As a moving intruder enters or leaves one of the seven zones, the pyroelectric sensing element responds to the sudden change in infrared energy in that zone, caused by the temperature difference. An output signal from the sensing element is amplified and used to open a relay contact, thus sending in the alarm.

APPLICATION

The IR-31 is a versatile detector suitable for a wide variety of applications, particularly multiple unit installations. Each unit has a relay output and operates independently in the system. The detectors are compact, easily mounted, and blend with decor. The stability of the pattern and immunity to air turbulence make it an excellent choice for indoor protection of mercantile premises, offices, homes, schools, and other high value areas. The unit fits into an existing wall and resembles an ordinary heating vent. It may also be surface mounted.

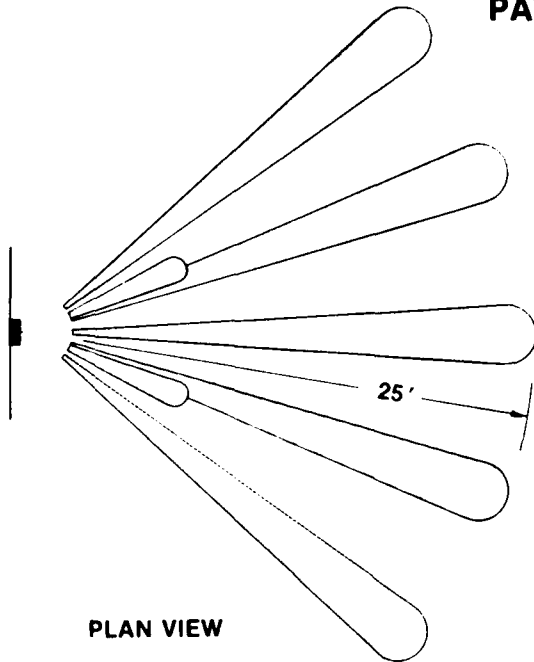
INSTALLATION

Installation requires no special wiring disciplines, and consists of mounting the detector at the side of the protected area, and connecting DC power and alarm circuits to system terminal blocks as shown below. Shielded wire is not required. There are no adjustments other than pattern position. A LED walk-test lamp on the front of the unit is provided for installation and subscriber testing.

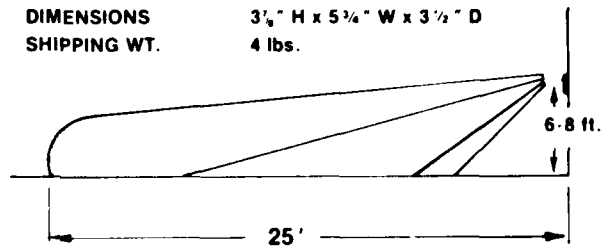
PATTERN

IR-31 SPECIFICATIONS

RANGE	As shown for typical conditions (24°C [75°F] background temp.)
POWER REQ'D	12 VDC @ 30 mA.
POWER SUPPLY	Model SPS-301
OUTPUT	Closed contacts, open in alarm. Max. ratings: 12V AC/DC @ 50 mA.
TEMP RANGE	-15°C to +50°C (5°F to 122°F)
DIMENSIONS	3 1/4" H x 5 1/4" W x 3 1/2" D
SHIPPING WT.	4 lbs.

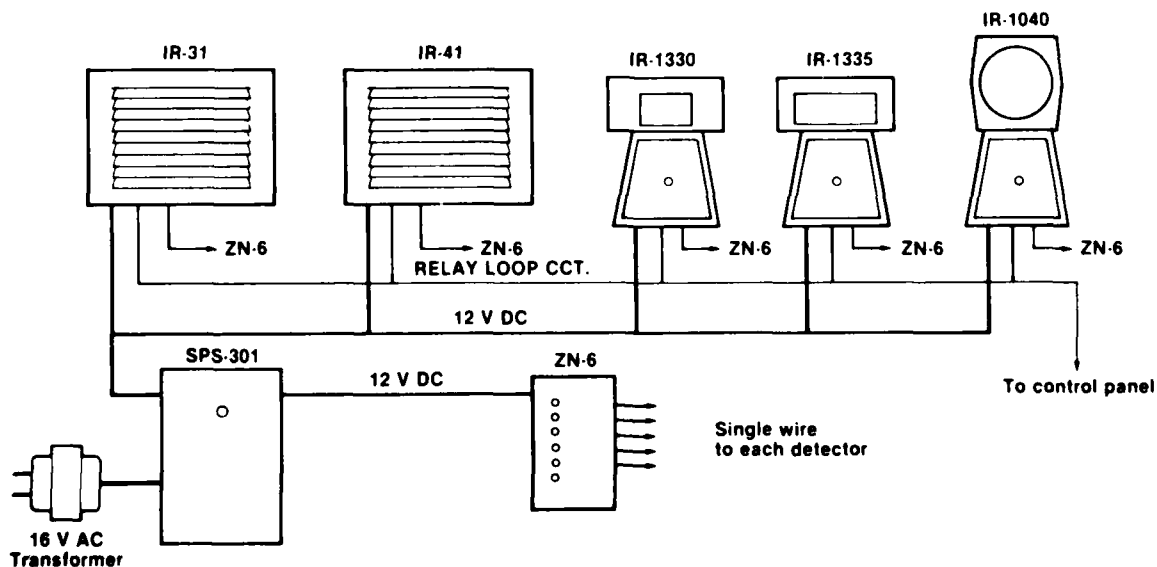


PLAN VIEW



SIDE VIEW

TYPICAL SYSTEM WIRING



PASSIVE INFRARED INTRUSION DETECTORS
MODELS IR-31 & IR-41

INSTALLATION GUIDE

SYSTEM The IR-31 and IR-41 are passive infrared intrusion detectors designed for "in the wall" mounting with the appearance of a small heating vent. The units operate from a 12 V DC supply, model SPS-301 with plug-in transformer. Up to ten units can be used per supply. Each detector has a relay output and operates independently in a multi-unit system.

OPERATION The patterns of the two models are as shown. Detection occurs when the intruder enters or leaves a zone. The temperature difference between the intruder and the background is sensed as a change in infrared energy caused by the motion of the intruder. This is converted to an electrical signal which opens a relay contact thus signalling an alarm.

MOUNTING HEIGHT AND LOCATION

Recommended mounting height: IR-31 wide angle unit 4 to 7 feet above floor level.
IR-41 long range unit 6 to 10 feet above floor level.

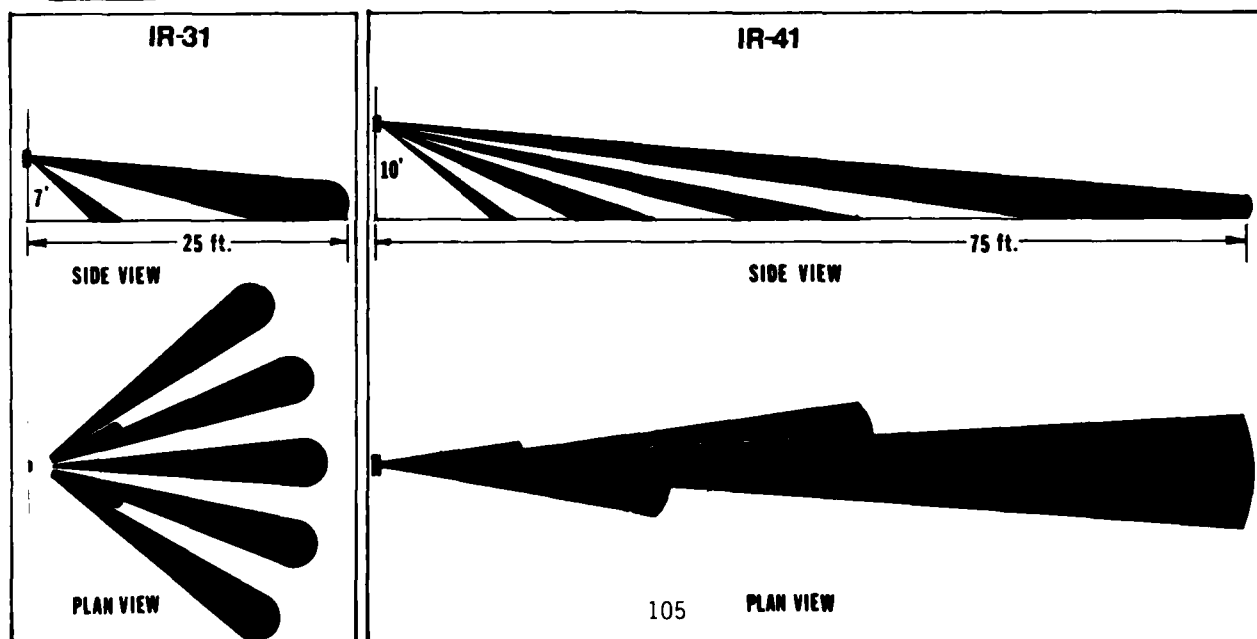
Location: Best position is at the side of the protected area so that the probable path of the intruder is across the pattern. Detection and correct aiming should be checked by walk-testing and observing the test light.

HAZARDS Since the units detect temperature changes, they should be placed in a temperature stable area. Following the general precautions given below will help to ensure a trouble-free installation.

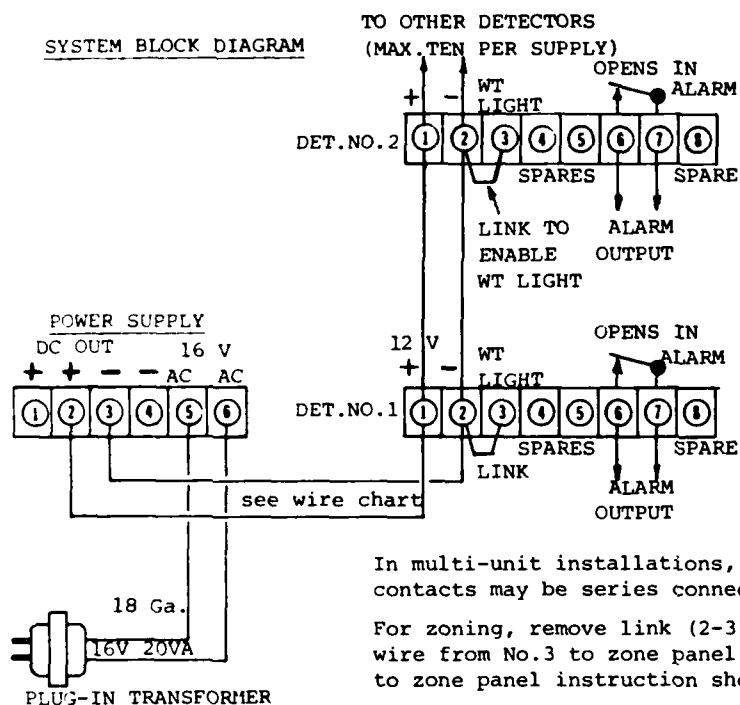
- 1) Avoid locating the unit in the path of forced air from heating or cooling ducts or space heaters.
- 2) Avoid extremely drafty locations, i.e., near open doors or windows or cracks in walls.
- 3) Do not install unit over radiators.
- 4) Avoid locations subject to direct sunlight.
- 5) Aim the unit at an angle to, rather than directly at windows.
- 6) Do not aim the head at objects subject to rapid temperature changes, such as heaters or fireplaces.

ZONE ANNUNCIATION The IR-31 and IR-41 may be used with the ZN-6 or ZN-10 zone panels in multi-unit systems. A single wire from each detector is required for annunciation.

PATTERNS



SYSTEM BLOCK DIAGRAM



WIRE CHART FOR 12 VDC WIRING

No. Units in Run	Maximum Length of Run		
	22 Ga.	20 Ga.	18 Ga.
1	500'	800'	1300'
2	250'	400'	650'
3	175'	275'	425'
4	125'	200'	325'
5	100'	150'	250'
6	85'	135'	220'
7	75'	115'	190'
8	65'	100'	160'
9	55'	90'	145'
10	50'	80'	130'

In multi-unit installations, alarm contacts may be series connected.

For zoning, remove link (2-3) and run wire from No.3 to zone panel. (Refer to zone panel instruction sheet.)

ALARM RELAY IR-31 ~ IR-41

MAXIMUM RATING: 24V AC/DC
@50 mA.

INSTALLATION OF HOUSING

1. Cut hole in wallboard with electric sabre-saw, following figure 1 exactly.
2. Place housing in opening and hold it against bottom edge of cutout. Using the flanges as templates, mark the wall with a pencil through the six holes as shown in figure 2. Mark the four slotted holes at the top of the hole in small section (see detail).
3. Remove box and drill through the four holes marked "A", with a 1/8" drill. The two holes marked "B" should be drilled just 1/4" deep to clear the front grille mounting screws.
4. Insert the 4 long screws in the 1/8" through-holes. Hold one of the strips inside the opening (do not drop) and turn the 2 screws into the tapped holes about 1/8" to hold the strip and screws in position for mounting the housing. Repeat operation with second strip.
5. Pull in required circuits and insert wires through plastic bushing in side of housing.
6. Slide housing into opening and fit the 4 screws through the large part of the slotted holes. (Long-nose pliers are helpful to hold the screws while positioning the housing.)
7. Terminate wiring on terminal block and slide detector into the plastic guides.
8. Attach front grille with 6-32 screws. Check that louvers are slanted downward.

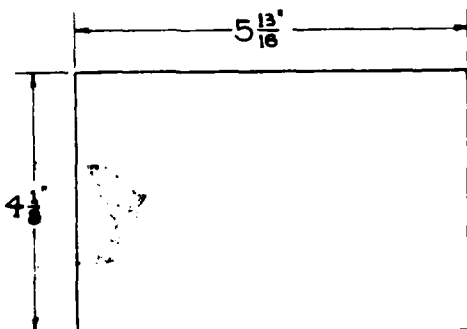


FIGURE 1 - CUTOUT

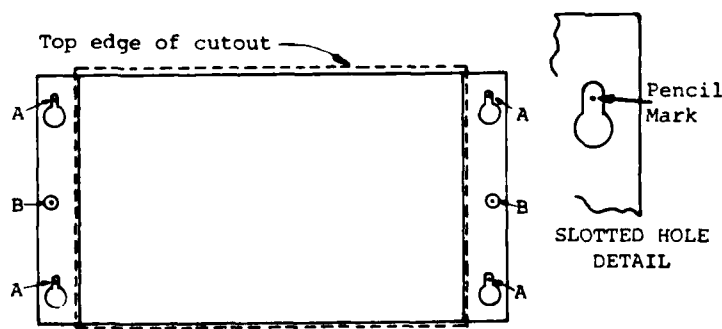


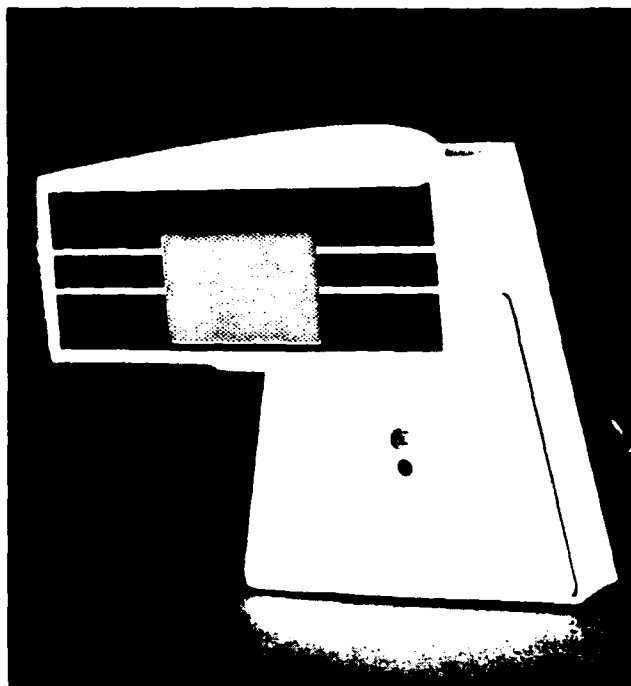
FIGURE 2 - MARKING

Passive Infrared Intrusion Detector Model IR-1330

PEAK
TECHNOLOGIES, INC.

FEATURES

- Multibeam 25 ft. X 36 ft.
- Ease of installation
- Rugged, compact, casting
- Handsome styling
- Wide angle coverage
- Multi-unit application
- Tampered ball joint
- No shielded cable required



GENERAL

The IR-1330 passive infrared intrusion detector features an advanced design, using a new, high stability, pyroelectric sensing element. The unit is powered by a 12 volt DC supply, model SPS-301, which will operate up to ten infrared detectors. The optical system has seven high resolution mirrors, giving five main beams covering 85 degrees, and two downward beams for coverage under the unit. An intruder will be detected within the pattern when crossing any one of the seven view zones. Range is 25 feet or more under typical conditions. The detector is completely passive, and emits no signals or light beams. Any number will operate without mutual interference.

The detector works by sensing the difference in temperature between a moving object and the background. As a moving intruder enters or leaves one of the seven zones, the pyroelectric sensing element responds to the sudden change of infrared energy in that zone, caused by the temperature difference. An output signal from the sensing element is amplified and used to open a relay contact, thus sending in the alarm.

APPLICATION

The IR-1330 is a versatile detector suitable for a wide variety of applications, particularly multiple unit installations. Each unit has a relay output and operates independently in the system. The detectors are compact, easily mounted, and blend with decor. The stability of the pattern and immunity to air turbulence make it an excellent choice for indoor protection of mercantile premises, offices, homes, schools, and other high value areas.

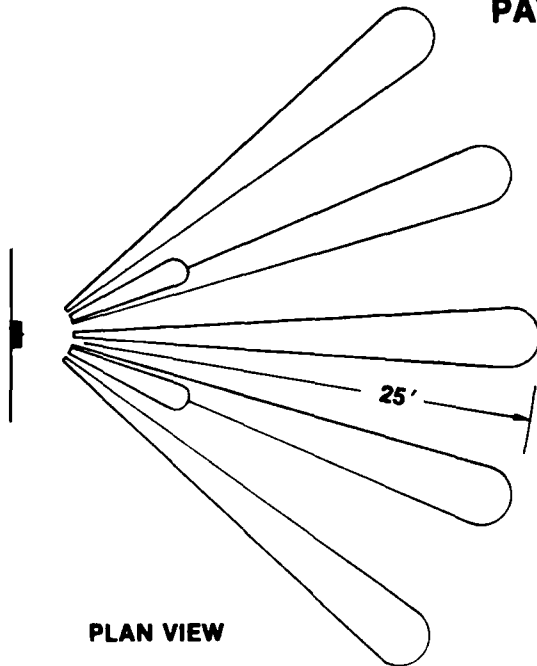
INSTALLATION

Installation requires no special wiring disciplines, and consists of mounting the detector at the side of the protected area, and connecting DC power and alarm circuits to system terminal blocks as shown below. Shielded wire is not required. There are no adjustments other than pattern position. A LED walk-test lamp on the front of the unit is provided for installation and subscriber testing.

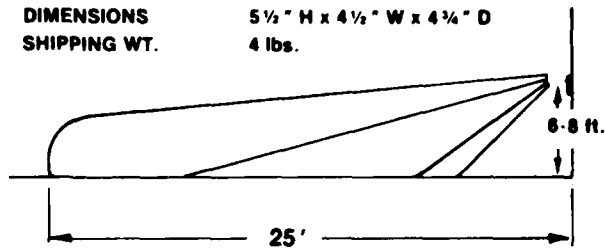
PATTERN

IR-1330 SPECIFICATIONS

RANGE	As shown for typical conditions (24°C [75°F] background temp.)
POWER REQ'D	12 VDC @ 30 mA.
POWER SUPPLY	Model SPS-301
OUTPUT	SPDT relay. Max. contact ratings: 130V AC/DC @ 100 mA.
TEMP RANGE	-15°C to +50°C (5°F to 122°F)
DIMENSIONS	5 1/2" H x 4 1/2" W x 4 1/4" D
SHIPPING WT.	4 lbs.

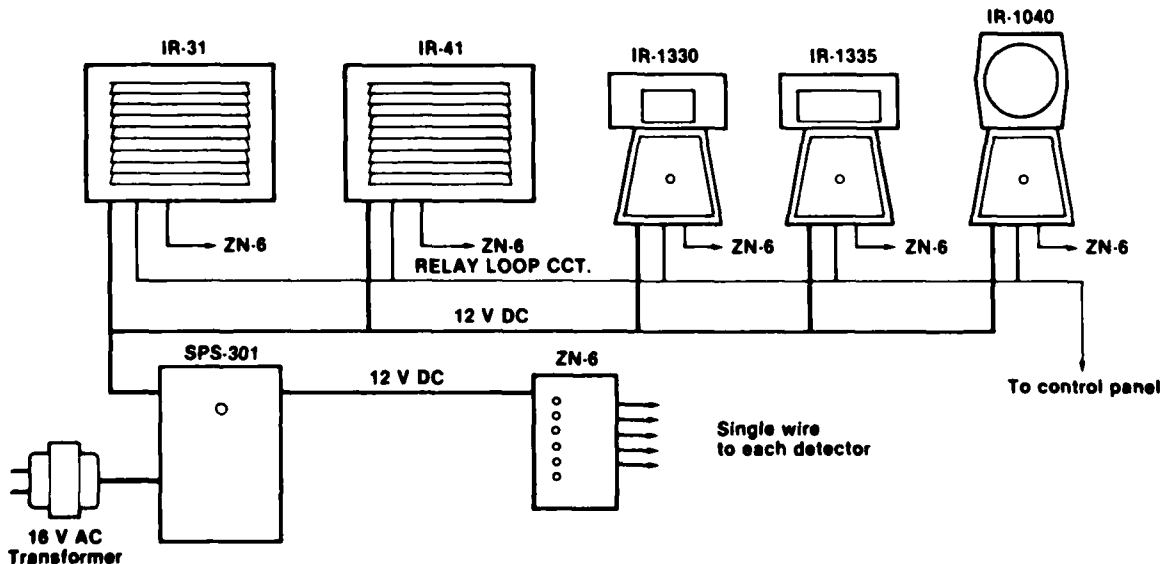


PLAN VIEW



SIDE VIEW

TYPICAL SYSTEM WIRING



PASSIVE INFRARED INTRUSION DETECTOR
MODEL IR-1330

INSTALLATION GUIDE

SYSTEM DESCRIPTION The IR-1330 is a compact, passive infrared intrusion detector designed to operate in a 12 V DC system. The IR-1330 is used with the model SPS-301 power supply which will operate up to ten detectors. The SPS-301 contains a 2.5 ampere-hour rechargeable battery and is powered by a 16 V AC 20 VA plug-in transformer. Each IR-1330 has a relay output and operates independently in the system.

OPERATION The pattern of the IR-1330 consists of 5 main zones which cover a 25 X 25 ft. area, as well as 2 downward directed zones local to the unit. The detector works by sensing the difference in temperature between the intruder and the background. When the intruder enters or leaves any zone, the temperature change is detected by an infrared sensing element, converted to an electrical signal and used to open or close a relay contact, thus signalling an alarm.

LOCATION & AIMING The detector should be mounted 6 to 8 feet above floor level, preferably located so the most likely direction of intruder motion is across the protective zones. The area of coverage is controlled by aiming the detector head slightly downward to cause the five zones to intersect the floor at the edge of the protected area. Setting the correct elevation angle is very important in achieving desired coverage. For best results, head orientation should be checked to find the exact zone positions by walk-testing. The relay and the LED walk-test lamp will operate to indicate an alarm. After each response, allow about ten seconds reset time before making another walk-test.

Since the unit detects temperature changes, it should be located in a temperature stable area. Avoid aiming it at objects subject to rapid heating or cooling, such as heaters, air conditioners, hot or cold air ducts and outlets, radiators, etc. Choose a mounting position out of the path of forced air from heating or cooling systems. The sensor is not affected by light, but some rays contain infrared energy which will trigger the unit. Avoid locations in direct sunlight, and do not aim the unit towards a window or at an angle where direct or reflected sunlight or vehicle headlights will strike the sensor. Do not mount directly above hot radiators.

DETECTOR MOUNTING Remove the terminal cover on the base by loosening the center screw. The base contains four holes for securing the unit to a wall or plywood panel with suitable screws. The head angle is adjustable by loosening the locking screw (located at the top center of the terminal compartment) with the wrench provided. After completing the wiring and adjustment of the head angle, re-tighten the locking screw and replace cover.

POWER SUPPLY & TRANSFORMER MOUNTING Remove the cover of the SPS-301 by releasing the two 1/4-turn fasteners and pulling the cover straight back. The power supply has four holes in the bottom surface for securing the unit to a wall or plywood panel. Choose a location near a 24 hour power outlet for the 16 VAC plug-in transformer (furnished with the supply) When installing the transformer, secure it to the center of the outlet box with a screw through the bracket on the transformer to prevent accidental unplugging.

WIRING For the 16 V AC circuit from the transformer to the supply input, use 18 ga. two conductor cable, 100 ft. maximum. For the 12 V DC circuit, refer to table II. See Table I, IR-1330 Terminal Connection Chart, and system block wiring diagram for connections (Page 2). CAUTION: Reversed polarity of 12 V DC wiring to detector will blow the fuse in the detector base. Re-check wiring before applying power to system. After power is switched on, allow at least two minutes for the detector to reach full operating sensitivity. For this reason it is recommended that unit be connected to an un-interruptable supply and left on continuously.

IR-1330 INSTALLATION GUIDE

Table I: IR-1330 TERMINAL CONNECTIONS

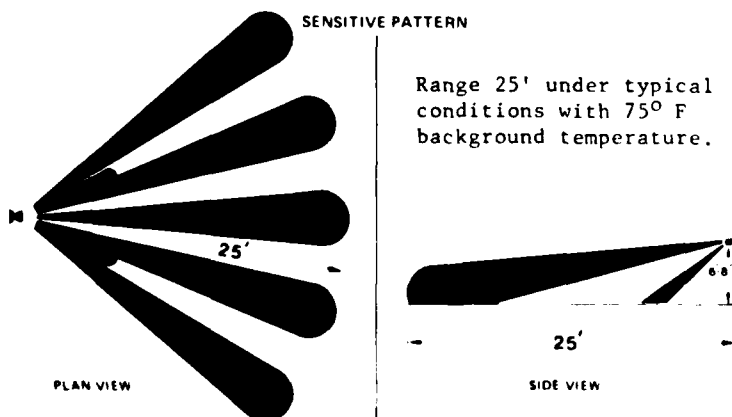
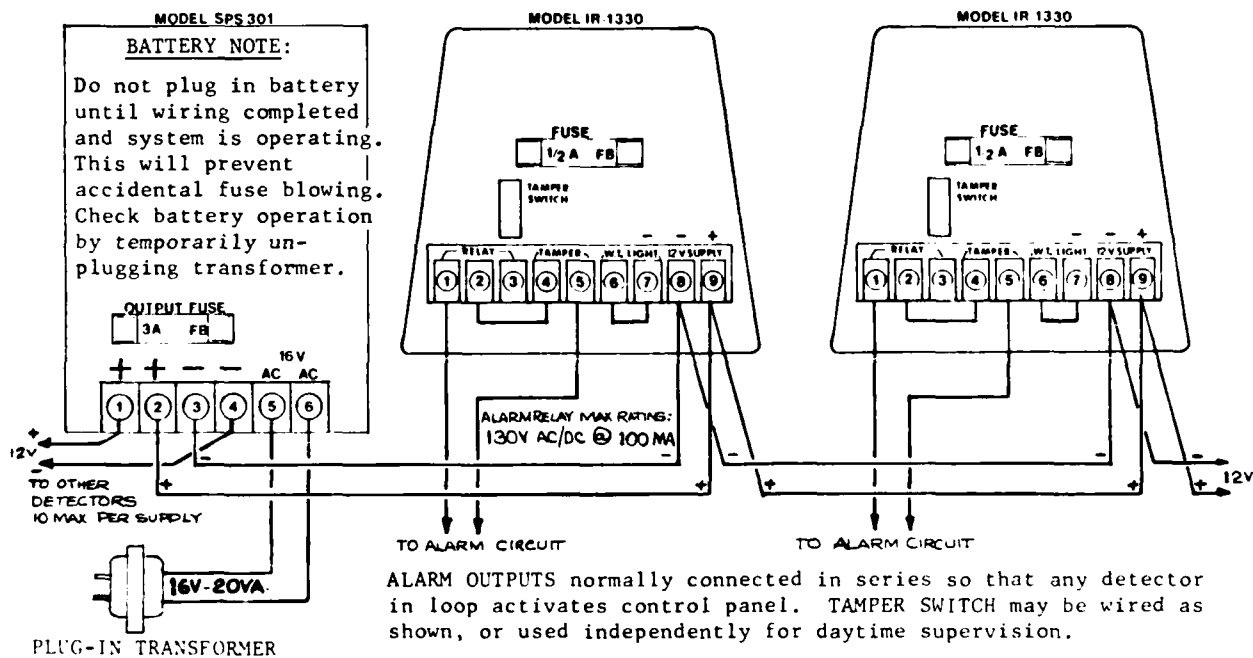
Terminal	Function
1,2,3	Alarm Relay. 1,2 opens in alarm (#2 common). 2,3 closes in alarm
4,5	Tamper Switch. Closed contacts which open when cover removed.
6,7	Walk-test lamp. Link 6-7 to enable, or connect to remote SPST switch
8	0 volts DC
9	+ 12 volts DC

} Power connection to SPS-301 power supply

Table II: 12 VOLT DC WIRING

No. Units in Run	Maximum Length of Run		
	22GA	20GA	18GA
1	500'	800'	1300'
2	250'	400'	650'
3	175'	275'	425'
4	125'	200'	325'
5	100'	150'	250'
6	85'	135'	220'
7	75'	115'	190'
8	65'	100'	160'
9	55'	90'	145'
10	50'	80'	130'

SYSTEM BLOCK DIAGRAM



SENSOR SYSTEM DATA SHEET

Name of Sensor Passive Infrared Intrusion Detector (Models IR-41 and IR-1335)

Developer Peak Technologies, Inc.

Availability Status Commercially available

System Application Indoor area, particularly aisle or corridor, intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Infrared (passive)

Description IR-41 and IR-1335 are passive infrared intrusion sensors which use high stability pyroelectric sensing elements and high resolution mirrors to provide long range coverage. Each system consists of a sensing unit and requires an external power supply.

Principle of Operation Four high resolution mirrors provide four view zones (main beam covers 75 ft. and remaining beams provide fill-in coverage beneath main beam) for each system. As moving intruder enters or leaves one of the zones, the pyroelectric sensing element responds to the change in infrared energy caused by the temperature difference, and converts temperature change to an electrical signal, which then triggers an alarm.

Transmission Mode Hard-wire.

Signature Passive sensors (emit no signals or light beams). Physical appearance of systems is designed for indoor facility environment.

Add-on Capability System is designed for multiple unit installations without mutual interference. Up to 10 units can be used with (SPS-301) power supply.

Cost

PORTABILITY

Weight of Each Container Shipping weight: 4 lbs.

Size for Each Container IR-41 unit: 3 7/8" H x 5 3/4" W x 3 1/2" D. IR-1335 unit:
5 1/2" H x 4 1/2" W x 4 3/4" D

POWER REQUIREMENTS

Power Requirements: 12 VDC @ 30 ma. Power source is PEAK SPS-301, which will operate up to ten infrared detectors.

EMPLACEMENT

Emplacement Mode IR-41 system is designed for indoor, flush wall or surface mounting, approximately 6-10 ft. above floor level. IR-1335 system is designed for surface mounting, approximately 4-10 ft. above floor level.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness Systems are designed for indoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range 75 ft. x 10 ft. diameter under typical conditions (24° C background temperature)

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: +5° to +122° F (-15° to +50° C).

System should not be aimed at objects subject to rapid heating or cooling.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind Sensor should not be located in the path of forced air from heating or cooling systems.

Other Conditions

Light Sensor is not affected by light, but some rays contain high levels of infrared energy which will trigger unit.

Noise

Line-of-Sight Line-of-sight required for intrusion detection.

Foliage

Soil Conditions

Other

SOURCE Peak Technology product literature.

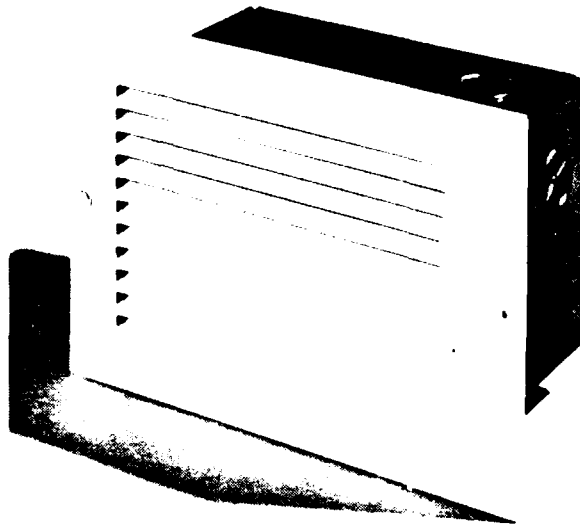
Passive Infrared Intrusion Detector

Model IR-41

PEAK
TECHNOLOGIES, INC.

FEATURES

- Unibeam - 75 ft. X 10 ft. Dia.
- Ease of installation
- Rugged, compact housing
- Handsome styling
- Three downward zones
- Multi-unit application
- Flush or surface mounting
- No shielded cable required



GENERAL

The IR-41 passive infrared intrusion detector features an advanced design, using a new high stability pyroelectric sensing element. The unit is powered by a 12 volt DC supply, model SPS-301, which will operate up to ten infrared detectors. The optical system has four high resolution mirrors. The main beam covers 75 feet, and the remaining beams provide fill-in coverage under the main beam. An intruder will be detected within the pattern when crossing any one of the four view zones. The detector is completely passive, and emits no signals or light beams. Any number will operate without mutual interference.

The detector works by sensing the difference in temperature between a moving object and the background. As a moving intruder enters or leaves one of the four zones, the sensing element responds to the sudden change in infrared energy in that zone, caused by the temperature difference. An output signal from the sensing element is amplified and used to open a relay contact, thus sending in the alarm.

APPLICATION

The IR-41 is a versatile detector, most suitable for aisle and corridor protection, particularly in multi-unit installations. Each unit has a relay output and operates independently in the system. The detectors are compact, easily mounted, and blend with decor. The stability of the pattern and immunity to air turbulence make it an excellent choice for indoor protection of mercantile premises, stock rooms, schools, and other high value areas. The unit fits into an existing wall and resembles an ordinary heating vent. It may also be surface mounted.

INSTALLATION

Installation requires no special wiring disciplines, and consists of mounting the detector at the side of the protected area, and connecting DC power and alarm circuits to system terminal blocks as shown below. Shielded wire is not required. There are no adjustments other than pattern position. A LED walk-test lamp on the front of the unit is provided for installation and subscriber testing.

IR-41 SPECIFICATIONS

RANGE

As shown for typical conditions (24°C [75°F] background temp.)

POWER REQ'D

12 VDC @ 30 mA.

POWER SUPPLY

Model SPS-301

OUTPUT

Closed contacts, open in alarm. Max. ratings:

12V AC/DC @ 50 mA.

TEMP RANGE

-15°C to +50°C
(5°F to 122°F)

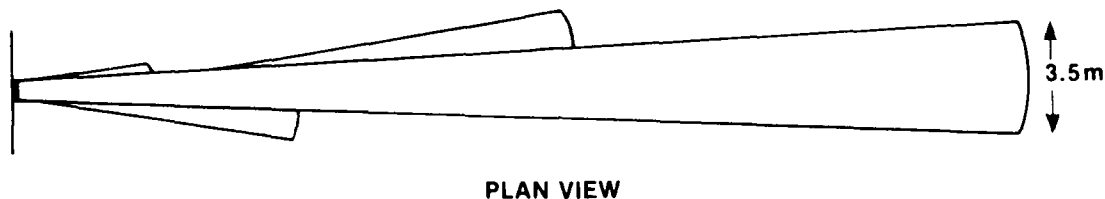
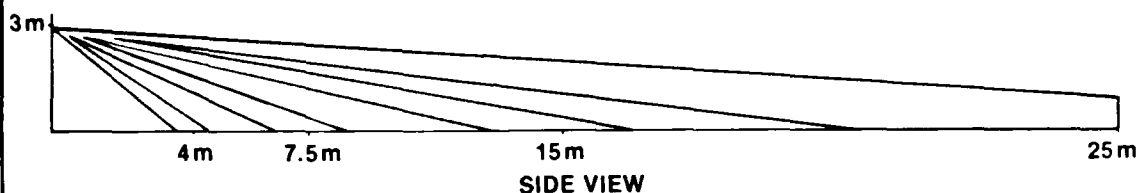
DIMENSIONS

3 1/8" H x 5 3/4" W x 3 1/2" D

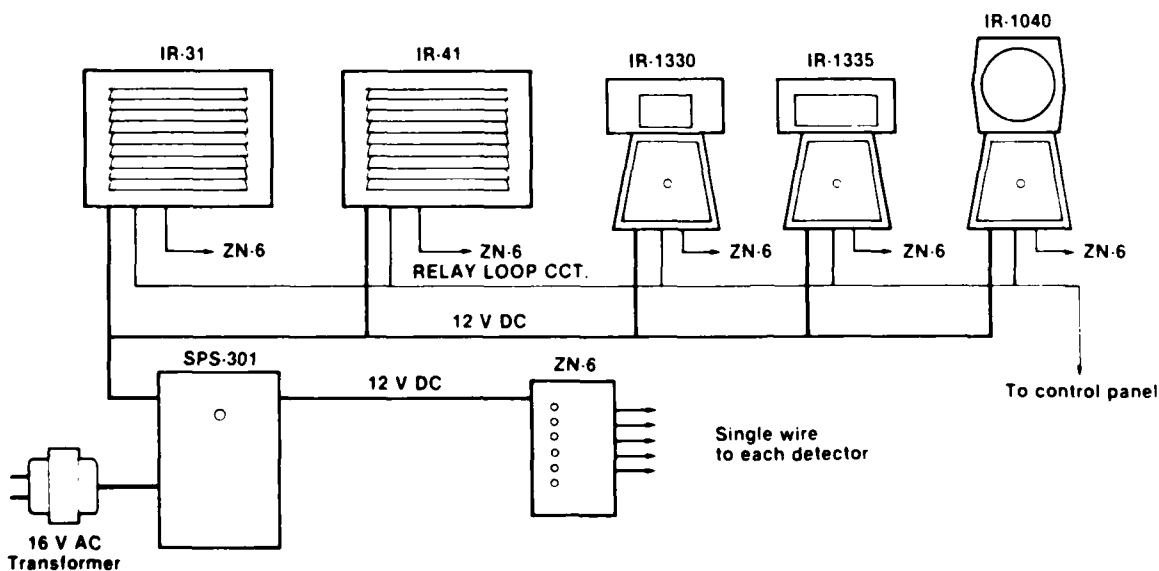
SHIPPING WT.

4 lbs.

SENSITIVE PATTERN



TYPICAL SYSTEM WIRING



PASSIVE INFRARED INTRUSION DETECTORS
MODELS IR-31 & IR-41

INSTALLATION GUIDE

SYSTEM The IR-31 and IR-41 are passive infrared intrusion detectors designed for "in the wall" mounting with the appearance of a small heating vent. The units operate from a 12 V DC supply, model SPS-301 with plug-in transformer. Up to ten units can be used per supply. Each detector has a relay output and operates independently in a multi-unit system.

OPERATION The patterns of the two models are as shown. Detection occurs when the intruder enters or leaves a zone. The temperature difference between the intruder and the background is sensed as a change in infrared energy caused by the motion of the intruder. This is converted to an electrical signal which opens a relay contact thus signalling an alarm.

MOUNTING HEIGHT AND LOCATION

Recommended mounting height: IR-31 wide angle unit 4 to 7 feet above floor level.
IR-41 long range unit 6 to 10 feet above floor level.

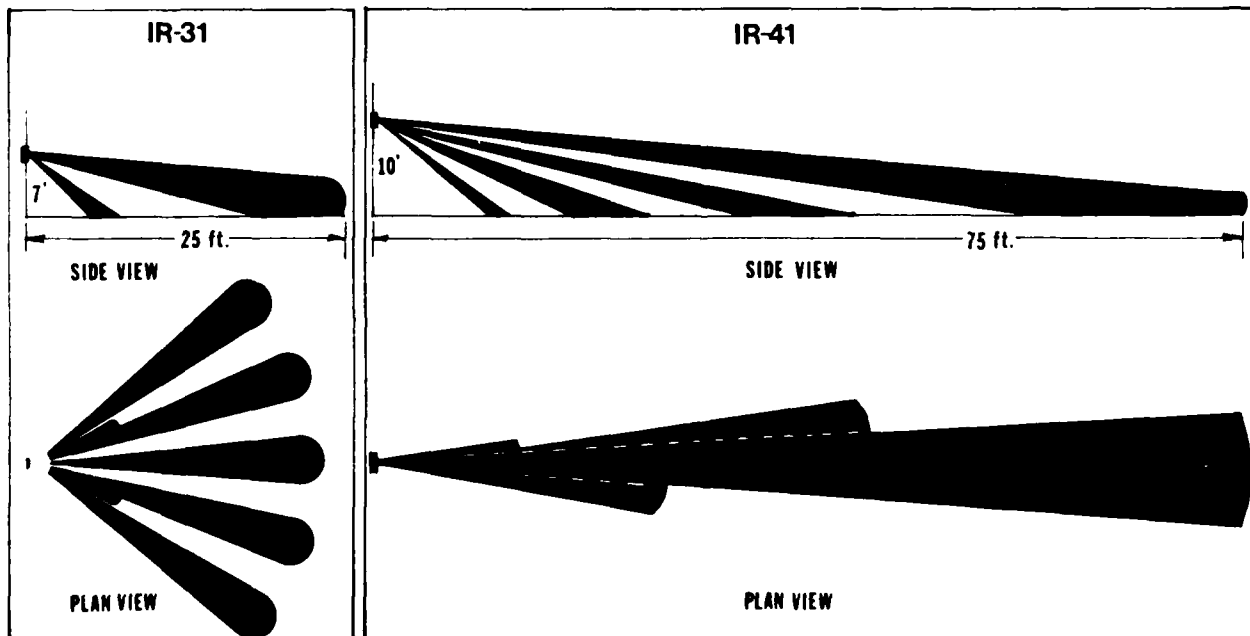
Location: Best position is at the side of the protected area so that the probable path of the intruder is across the pattern. Detection and correct aiming should be checked by walk-testing and observing the test light.

HAZARDS Since the units detect temperature changes, they should be placed in a temperature stable area. Following the general precautions given below will help to ensure a trouble-free installation.

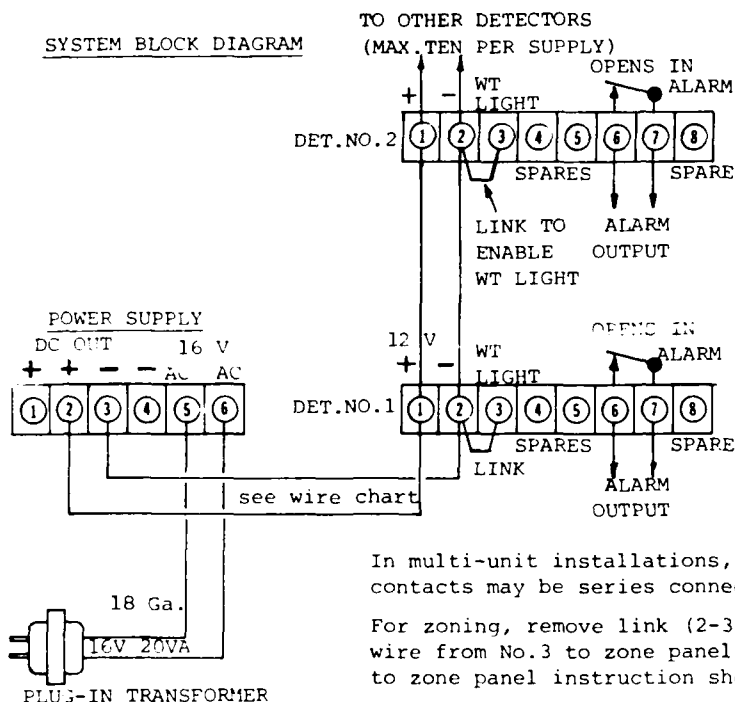
- 1) Avoid locating the unit in the path of forced air from heating or cooling ducts or space heaters.
- 2) Avoid extremely drafty locations, i.e., near open doors or windows or cracks in walls.
- 3) Do not install unit over radiators.
- 4) Avoid locations subject to direct sunlight.
- 5) Aim the unit at an angle to, rather than directly at windows.
- 6) Do not aim the head at objects subject to rapid temperature changes, such as heaters or fireplaces.

ZONE ANNUNCIATION The IR-31 and IR-41 may be used with the ZN-6 or ZN-10 zone panels in multi-unit systems. A single wire from each detector is required for annunciation.

PATTERNS



SYSTEM BLOCK DIAGRAM



WIRE CHART FOR 12 VDC WIRING

No. Units in Run	Maximum Length of Run		
	22 Ga.	20 Ga.	18 Ga.
1	500'	800'	1300'
2	250'	400'	650'
3	175'	275'	425'
4	125'	200'	325'
5	100'	150'	250'
6	85'	135'	220'
7	75'	115'	190'
8	65'	100'	160'
9	55'	90'	145'
10	50'	80'	130'

In multi-unit installations, alarm contacts may be series connected.

For zoning, remove link (2-3) and run wire from No.3 to zone panel. (Refer to zone panel instruction sheet.)

ALARM RELAY IR-31 - IF-41

MAXIMUM RATING: 24V AC/DC @50 mA.

INSTALLATION OF HOUSING

1. Cut hole in wallboard with electric sabre-saw, following figure 1 exactly.
2. Place housing in opening and hold it against bottom edge of cutout. Using the flanges as templates, mark the wall with a pencil through the six holes as shown in figure 2. Mark the four slotted holes at the top of the hole in small section (see detail).
3. Remove box and drill through the four holes marked "A", with a 1/8" drill. The two holes marked "B" should be drilled just 1/4" deep to clear the front grille mounting screws.
4. Insert the 4 long screws in the 1/8" through-holes. Hold one of the strips inside the opening (do not drop) and turn the 2 screws into the tapped holes about 1/8" to hold the strip and screws in position for mounting the housing. Repeat operation with second strip.
5. Pull in required circuits and insert wires through plastic bushing in side of housing.
6. Slide housing into opening and fit the 4 screws through the large part of the slotted holes. (Long-nose pliers are helpful to hold the screws while positioning the housing.)
7. Terminate wiring on terminal block and slide detector into the plastic guides.
8. Attach front grille with 6-32 screws. Check that louvers are slanted downward.

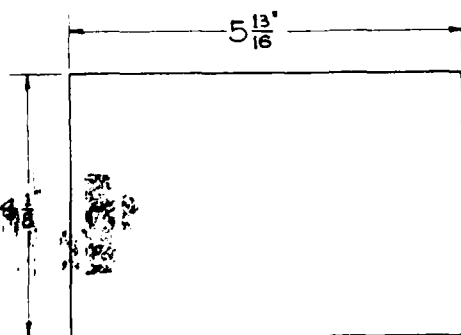


FIGURE 1 - CUTOUT

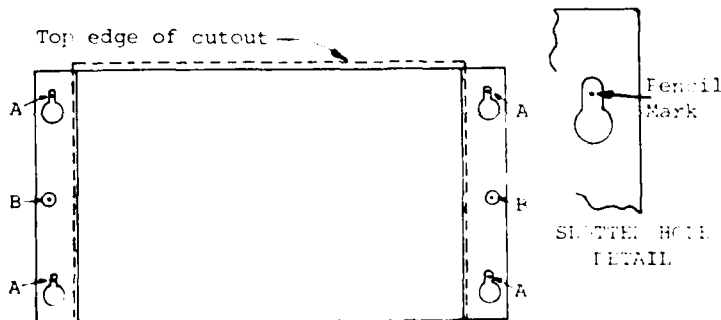


FIGURE 2 - MARKING

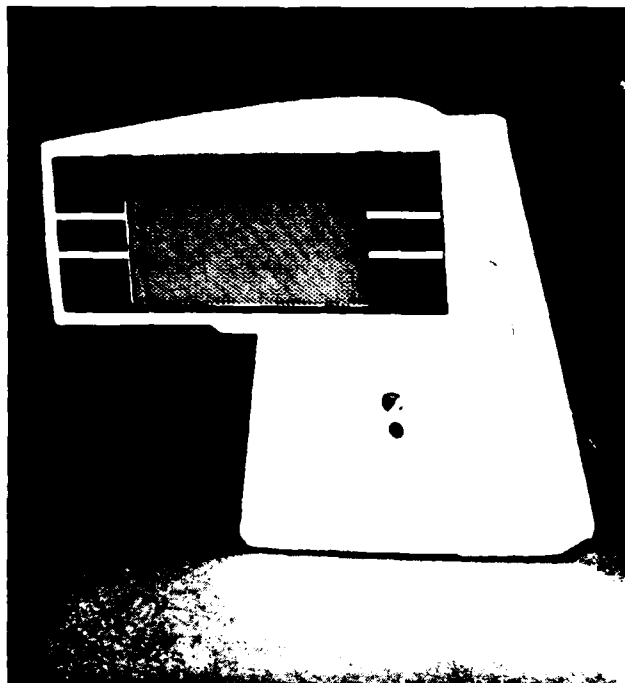
Passive Infrared Intrusion Detector

Model IR-1335

PEAK
TECHNOLOGIES, INC.

FEATURES

- Unibeam - 75 ft. X 10 ft. Dia.
- Ease of installation
- Rugged, compact, casting
- Handsome styling
- Three downward zones
- Multi-unit application
- Tampered ball joint
- No shielded cable required



GENERAL

The IR-1335 passive infrared intrusion detector features an advanced design, using a new, high stability pyroelectric sensing element. The unit is powered by a 12 volt DC supply, model SPS-301, which will operate up to ten infrared detectors. The optical system has four high resolution mirrors. The main beam covers 75 feet, and the remaining beams provide fill-in coverage under the main beam. An intruder will be detected within the pattern when crossing any one of the four view zones. The detector is completely passive, and emits no signals or light beams. Any number will operate without mutual interference.

The detector works by sensing the difference in temperature between a moving object and the background. As a moving intruder enters or leaves one of the four zones, the sensing element responds to the sudden change in infrared energy in that zone, caused by the temperature difference. An output signal from the sensing element is amplified and used to open a relay contact, thus sending in the alarm.

APPLICATION

The IR-1335 is a versatile detector, most suitable for aisle and corridor protection, particularly in multi-unit installations. Each unit has a relay output and operates independently in the system. The detectors are compact, easily mounted, and blend with decor. The stability of the pattern and immunity to air turbulence make it an excellent choice for indoor protection of mercantile premises, stock rooms, schools, and other high value areas.

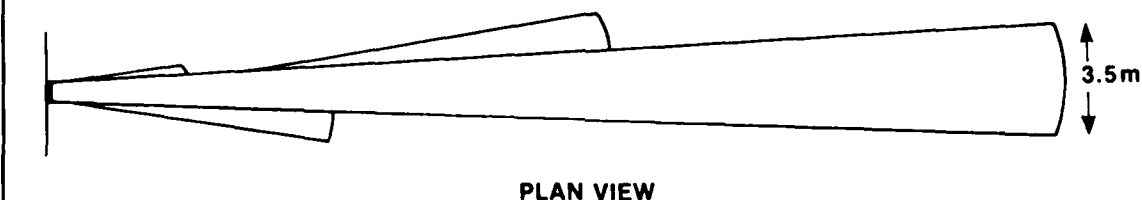
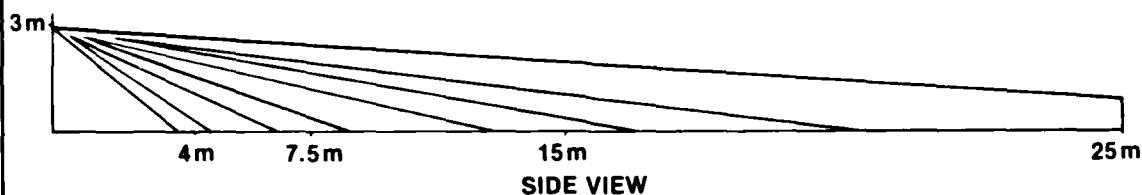
INSTALLATION

Installation requires no special wiring disciplines, and consists of mounting the detector at the side of the protected area, and connecting DC power and alarm circuits to system terminal blocks as shown below. Shielded wire is not required. There are no adjustments other than pattern position. A LED walk-test lamp on the front of the unit is provided for installation and subscriber testing.

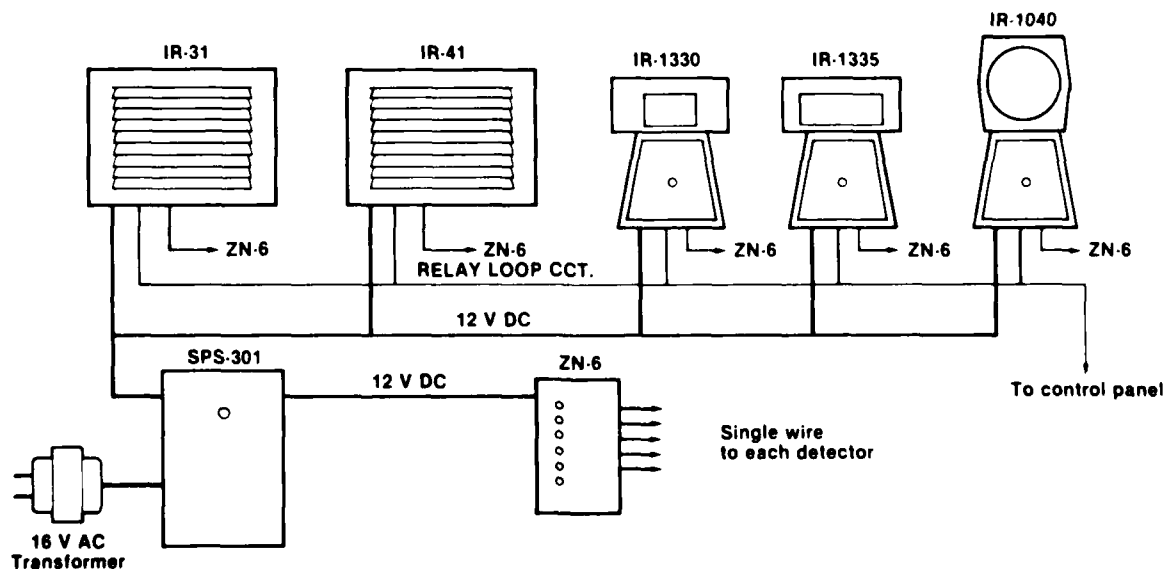
IR-1335 SPECIFICATIONS

RANGE	As shown for typical conditions (24°C [75°F] background temp.)
POWER REQ'D	12 VDC @ 30 mA.
POWER SUPPLY	Model SPS-301
OUTPUT	SPDT relay. Max. contact ratings: 130V AC/DC @ 100 mA.
TEMP RANGE	-15°C to +50C (5°F to 122°F)
DIMENSIONS	5 1/2" H x 4 1/2" W x 4 3/4" D
SHIPPING WT.	4 lbs.

SENSITIVE PATTERN



TYPICAL SYSTEM WIRING



PASSIVE INFRARED INTRUSION DETECTOR
MODEL IR-1335

INSTALLATION GUIDE

SYSTEM DESCRIPTION The IR-1335 is a compact, passive infrared intrusion detector designed to operate in a 12 V DC system. The IR-1335 is used with the model SPS-301 power supply which will operate up to ten detectors. The SPS-301 contains a 2.5 ampere-hour rechargeable battery and is powered by a 16 V AC 20 VA plug-in transformer. Each IR-1335 has a relay output and operates independently in the system.

OPERATION The pattern of the IR-1335 is a main zone approximately 75 feet long and 10 feet wide at maximum range. Three downward beams provide fill-in coverage under the main beam. When an intruder enters or leaves the pattern, the temperature change is detected and converted to an electrical signal and used to open or close a relay contact, thus signalling an alarm.

LOCATION AND AIMING The detector may be mounted 4 to 10 feet from floor level and aimed with the pattern level or slightly downward depending on mounting height. For example, the detector may be mounted 8 to 10 feet high and aimed downward to give spot coverage up to 75 feet away. The area of coverage in this case is determined by the height and downward angle. In either case, head orientation is critical and should be checked by walk-testing up to the maximum range desired. The relay and the LED walk-test lamp will operate to indicate an alarm. After each response, allow about ten seconds reset time before making another walk test.

Since the unit detects temperature changes, it should be located in a temperature stable area. Avoid aiming it at objects subject to rapid heating or cooling, such as heaters, air conditioners, hot or cold air ducts and outlets, radiators, etc. Choose a mounting position out of the path of forced air from heating or cooling systems. Do not mount unit directly above hot radiators. The sensor is not affected by light, but some rays contain high levels of infrared energy which may trigger the unit. Therefore it is best to avoid locations in direct sunlight, and the unit should not be aimed toward a window or at an angle where direct or reflected sunlight or vehicle headlights will strike the sensor.

DETECTOR MOUNTING Remove the terminal cover on the base by loosening the center screw. The base contains four holes for securing the unit to a wall or plywood with suitable fasteners or screws. The head angle is adjustable by loosening the locking screw (located at the top center of the terminal compartment) with the wrench provided. After completing the wiring and adjustment of the head angle, re-tighten the locking screw with the wrench and replace the terminal box cover.

POWER SUPPLY AND TRANSFORMER MOUNTING Remove the SPS-301 cover by releasing the two 1/4-turn fasteners and pulling the cover straight back. The power supply has four holes in the bottom surface for securing the unit to a wall or panel. Choose a mounting place near a 24 hour power outlet for the 16 V AC plug-in transformer (furnished with the supply). When installing the transformer, secure it to the center of the outlet box with a screw through the bracket on the transformer to prevent accidental unplugging.

WIRING For the 16 V AC circuit from the transformer to the SPS-301, use 18 ga. two conductor cable, 100 ft. maximum. For the 12 V DC circuit from the supply to the detectors, refer to Table II on the reverse side of this guide. For terminal connections to the IR-1335, see Table I and the system block diagram below.

CAUTION: REVERSED POLARITY OF THE 12 V DC WIRING TO THE DETECTOR WILL BLOW THE FUSE IN THE DETECTOR MOUNTING BASE. Recommended that all wiring be checked before applying system power. After turn-on, allow at least two minutes for detectors to reach full sensitivity. For this reason, the system should be connected to an un-interruptable supply and left on continuously.

IR-1335 INSTALLATION GUIDE

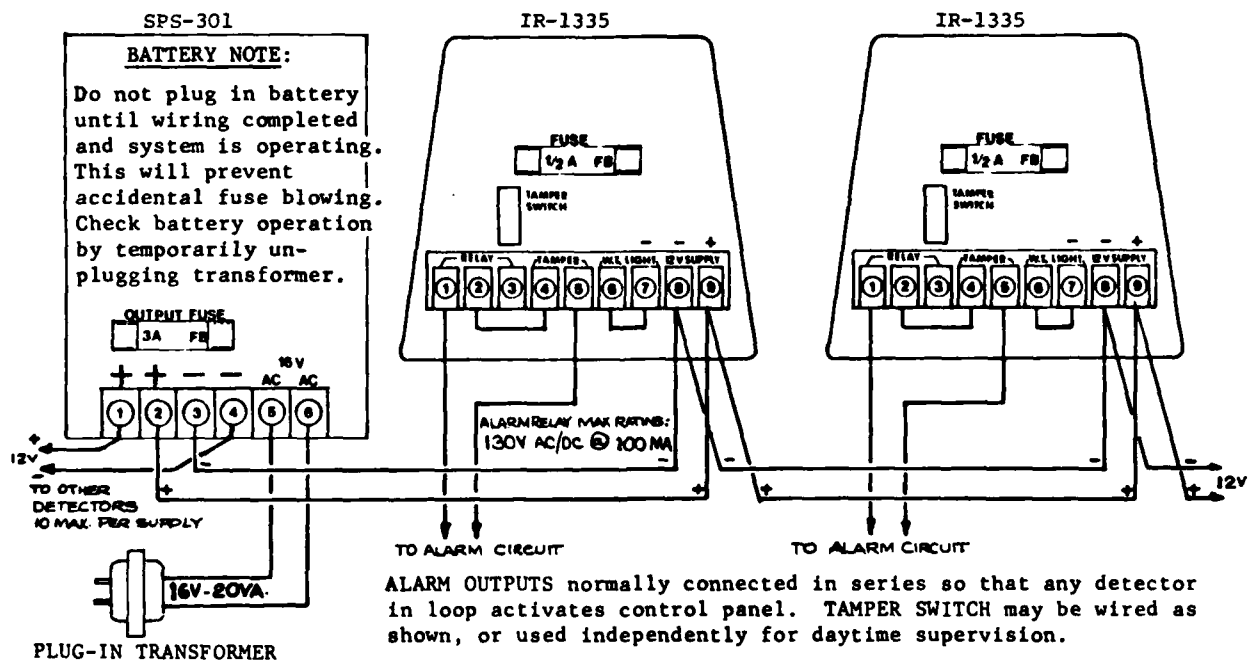
Table I: IR-1335 TERMINAL CONNECTIONS

Terminal	Function
1,2,3	Alarm Relay. 1,2 opens in alarm (#2 common). 2,3 closes in alarm
4,5	Tamper Switch. Closed contacts which open when cover removed.
6,7	Walk-test lamp. Link 6-7 to enable, or connect to remote SPST switch
8	0 volts DC
9	+ 12 volts DC

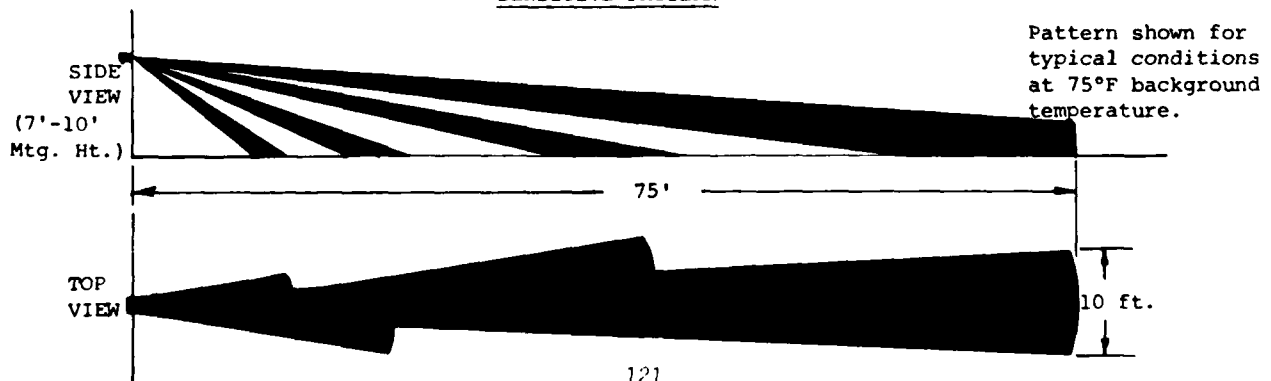
Table II: 12 VOLT DC WIRING

No. Units in Run	Maximum Length of Run		
	22GA	20GA	18GA
1	500'	800'	1300'
2	250'	400'	650'
3	175'	275'	425'
4	125'	200'	325'
5	100'	150'	250'
6	85'	135'	220'
7	75'	115'	190'
8	65'	100'	160'
9	55'	90'	145'
10	50'	80'	130'

SYSTEM BLOCK DIAGRAM



SENSITIVE PATTERN



SENSOR SYSTEM DATA SHEET

Name of Sensor Passive Infrared Intrusion Detector (Model IR-1040)

Developer Peak Technologies, Inc.

Availability Status Commercially available

System Application Indoor area or corridor intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Infrared (passive)

Description System is a wall-mounted passive infrared detection unit which uses a high stability pyroelectric sensing element and a high resolution mirror to provide long-range coverage. System consists of the sensing unit and requires an external power supply.

Principle of Operation A high resolution mirror provides one unibeam view zone. As a moving intruder enters or leaves zone, the pyroelectric sensing element responds to the change in infrared energy caused by the temperature difference, and converts this temperature change to an electrical signal, which then triggers an alarm.

Transmission Mode Hard-wire.

Signature Passive sensor (emits no signals or light beams). Physical appearance of system is designed for indoor facility environment.

Add-on Capability System is designed for multiple unit installations without mutual interference. Up to 10 detectors may be used with (SPS-301) power supply.

Cost

PORTABILITY

Weight of Each Container

Size for Each Container IR-1040 unit: 7" H x 4" W x 5 1/2" D

POWER REQUIREMENTS

Power Requirements 12 VDC @ 30 ma. Power source is Peak Model SPS-301, which will operate up to ten infrared detectors.

EMPLACEMENT

Emplacement Mode System is designed for indoor wall-mounting, approximately 3-4 ft. above floor level.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for indoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range 100 ft. L x 7 ft. diameter under typical conditions (24°C background temperature).

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: +5° to +122°F (-15° to +50°C).

System should be placed in a temperature-stable area. Sensor should not be aimed at objects subject to rapid heating or cooling.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind Sensor should not be located in the path of forced air from heating or cooling systems.

Other Conditions

Light Sensor is not affected by light, but some rays contain high levels of infrared energy which may trigger unit.

Noise

Line-of-Sight Line-of-sight required for intrusion detection.

Foliage

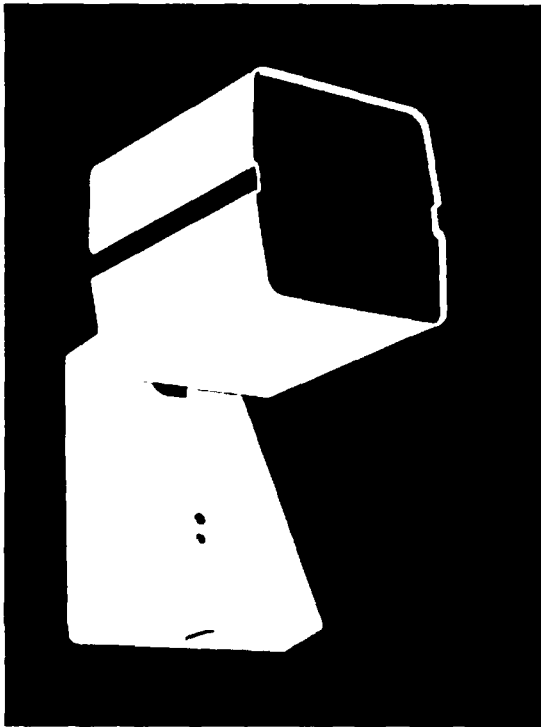
Soil Conditions

Other

SOURCE: Peak Technology, Inc. product literature.

Passive Infrared Intrusion Detector Model IR-1040

PEAK
TECHNOLOGIES, INC.



FEATURES

- Unibeam - 100 ft. X 7 ft. Dia.
- Ease of installation
- Rugged, compact housing
- Long range protection
- Handsome styling
- Multi-unit application
- Tampered ball joint
- No shielded cable required

GENERAL

The IR-1040 passive infrared intrusion detector features an advanced design, using a new, high stability pyroelectric sensing element. The unit is powered by a 12 volt DC supply, model SPS-301, which will operate up to ten infrared detectors. The optical system has a high resolution mirror, giving the unibeam pattern. An intruder will be detected when entering or leaving the pattern. Range is 100 ft. or more under typical conditions. The detector is completely passive, and emits no signals or light beams. Any number will operate without mutual interference.

The detector works by sensing the difference in temperature between a moving object and the background. As a moving intruder enters or leaves the pattern, the sensing element responds to the sudden change in infrared energy caused by the temperature difference. An output signal from the sensing element is amplified and used to open a relay contact, thus sending in the alarm.

APPLICATION

The IR-1040 is a versatile detector, most suitable for aisle and corridor protection, particularly in multi-unit installations. Each unit has a relay output and operates independently in the system. The detectors are compact, easily mounted, and blend with decor. The stability of the pattern and immunity to air turbulence make it an excellent choice for indoor protection of mercantile premises, stock rooms, schools, and other high value areas.

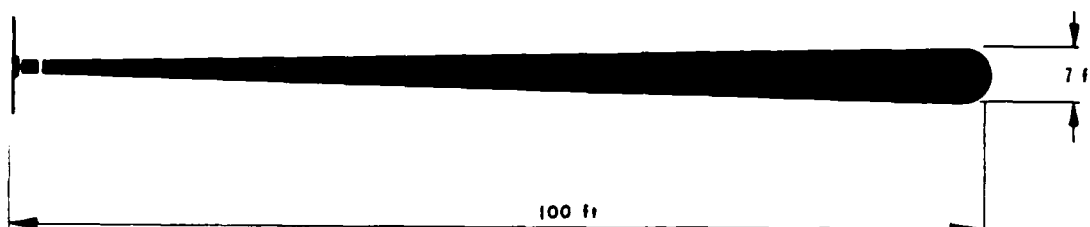
INSTALLATION

Installation requires no special wiring disciplines, and consists of mounting the detector at the side of the protected area, and connecting DC power and alarm circuits to system terminal blocks as shown below. Shielded wire is not required. There are no adjustments other than pattern position. A LED walk-test lamp on the front of the unit is provided for installation and subscriber testing.

IR-1040 SPECIFICATIONS

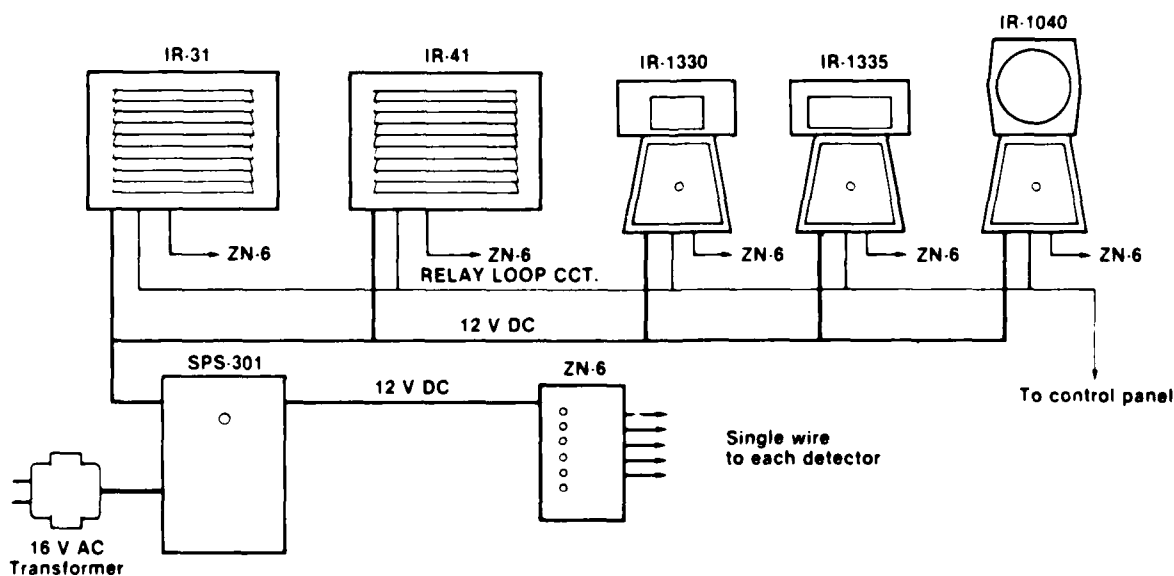
RANGE	As shown for typical conditions (24°C [75°F] background temp.)
POWER REQ'D	12 VDC @ 30 mA.
POWER SUPPLY	Model SPS-301
OUTPUT	SPDT relay. Max. contact ratings: 130V AC/DC @ 100 mA.
TEMP RANGE	-15°C to +50°C (5°F to 122°F)
DIMENSIONS	7" H x 4" W x 5½" D
SHIPPING WT.	4 lbs.

SENSITIVE PATTERN



PLAN VIEW

TYPICAL SYSTEM WIRING



PASSIVE INFRARED INTRUSION DETECTOR
MODEL IR-1040

INSTALLATION GUIDE

SYSTEM DESCRIPTION The IR-1040 is a compact, passive infrared intrusion detector designed to operate in 12 V DC system. The IR-1040 is used with the model SPS-301 power supply which will operate up to ten detectors. The SPS-301 contains a 2.5 ampere-hour rechargeable battery and is powered by a 16 V AC 20 VA plug-in transformer. Each IR-1040 has a relay output and operates independently in the system.

OPERATION The pattern of the IR-1040 is a single zone, approximately 100 feet long and 6 feet wide at maximum range. When an intruder enters or leaves the pattern, the temperature change is detected and converted to an electrical signal and used to open or close a relay contact, thus signalling an alarm.

LOCATION & AIMING Maximum coverage is obtained when the detector is mounted 3 to 4 feet high and aimed with the pattern level. In some applications, the detector may be mounted higher than 4 feet and aimed downward to give spot coverage up to 100 feet away. The area of coverage in this case is determined by the height and the downward angle. In either case, the head orientation is critical and should be checked by walk-testing up to the maximum range desired. The relay and the LED walk-test lamp will operate to indicate an alarm. After each response, allow about ten seconds reset time before making another walk-test.

Since the unit detects temperature changes, it should be located in a temperature stable area. Avoid aiming it at objects subject to rapid heating or cooling, such as heaters, air conditioners, hot or cold air ducts and outlets, radiators, etc. Choose a mounting position out of the path or forced air from heating or cooling systems. Do not mount directly above hot radiators. The sensor is not affected by light, but some rays contain infrared energy which will trigger the unit. Avoid locations in direct sunlight, and do not aim the unit towards a window or at an angle where direct or reflected sunlight or vehicle headlights will strike the sensor.

DETECTOR MOUNTING Remove the terminal cover on the base by loosening the center screw. The base contains four holes for securing the unit to a wall or plywood panel with suitable screws. The head angle is adjustable by loosening the locking screw (located at the top center of the terminal compartment) with the wrench provided. After completing the wiring and adjustment of the head angle, re-tighten the locking screw and replace cover.

POWER SUPPLY & TRANSFORMER MOUNTING Remove the cover of the SPS-301 by releasing the two $\frac{1}{2}$ -turn fasteners and pulling the cover straight back. The power supply has four holes in the bottom surface for securing the unit to a wall or plywood panel. Choose a location near a 24 hour power outlet for the 16 VAC plug-in transformer (furnished with the supply). When installing the transformer, secure it to the center of the outlet box with a screw through the bracket on the transformer to prevent accidental unplugging.

WIRING For the 16 V AC circuit from the transformer to the supply input, use 18 ga. two conductor cable, 100 ft. maximum. For the 12 V DC circuit, refer to table II. See Table I, IR-1040 Terminal Connection Chart, and system block wiring diagram for connections (Page 2). **CAUTION: REVERSED POLARITY OF 12 V DC WIRING TO DETECTOR WILL BLOW THE FUSE IN THE DETECTOR BASE.** Re-check wiring before applying power to system.

After power is switched on, allow at least two minutes for the detector to reach full operating sensitivity. For this reason, it is recommended that the unit be connected to an un-interruptable supply and left on continuously.

IR-1040 INSTALLATION GUIDE

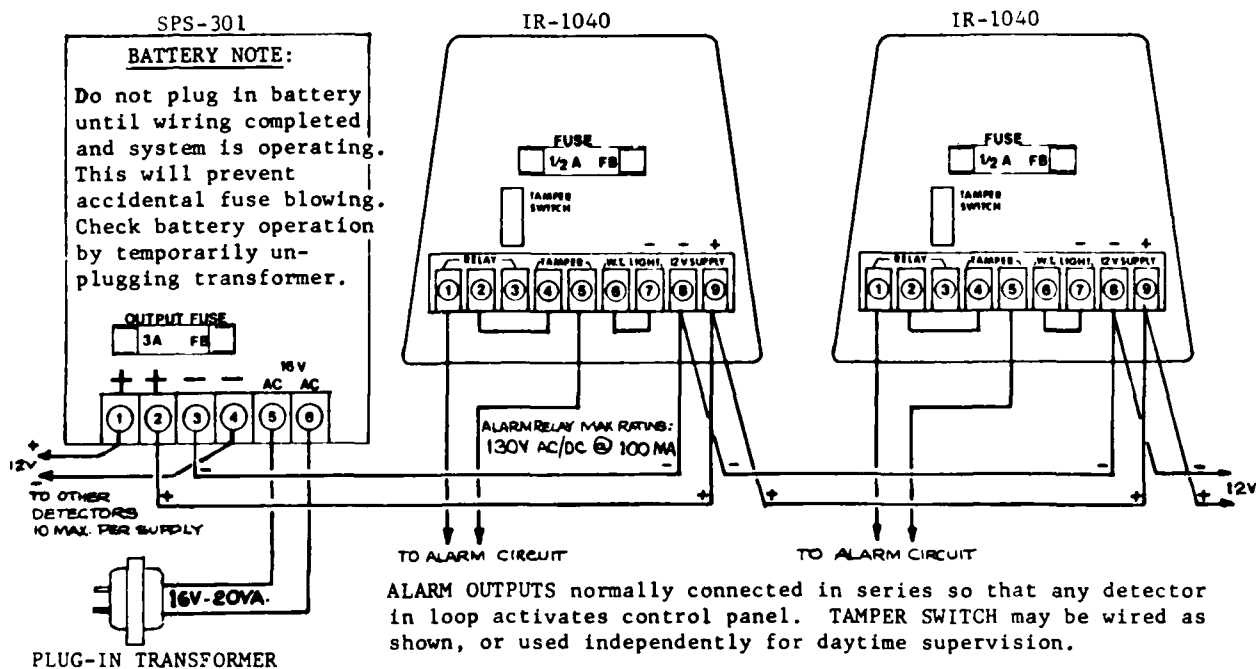
Table I: IR-1040 TERMINAL CONNECTIONS

Terminal	Function
1,2,3	Alarm Relay. 1,2 opens in alarm (#2 common). 2,3 closes in alarm
4,5	Tamper Switch. Closed contacts which open when cover removed.
6,7	Walk-test lamp. Link 6-7 to enable, or connect to remote SPST switch
8	0 volts DC
9	+ 12 volts DC

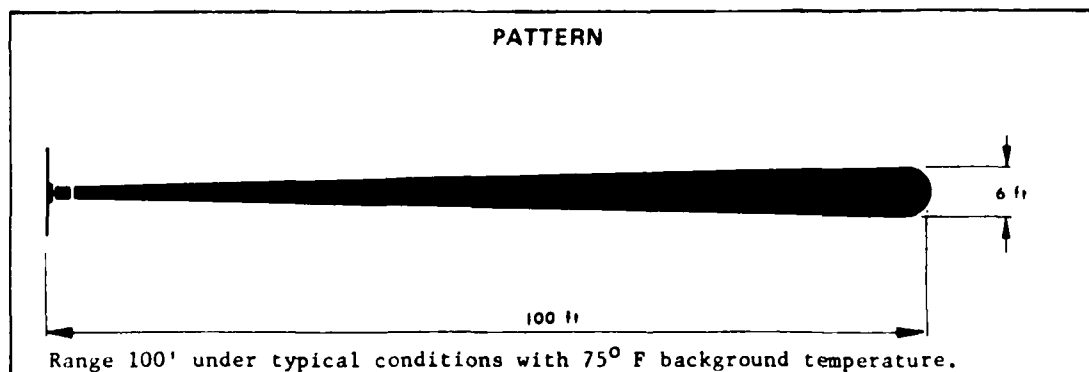
Table II: 12 VOLT DC WIRING

No. Units in Run	Maximum Length of Run		
	22GA	20GA	18GA
1	500'	800'	1300'
2	250'	400'	650'
3	175'	275'	425'
4	125'	200'	325'
5	100'	150'	250'
6	85'	135'	220'
7	75'	115'	190'
8	65'	100'	160'
9	55'	90'	145'
10	50'	80'	130'

SYSTEM BLOCK DIAGRAM



PATTERN



SENSOR SYSTEM DATA SHEET

Name of Sensor Passive Infrared Sensor System (PIRS) (Models 110-4000-001 and 110-4775-002)

Developer Sparton Southwest, Inc.

Availability Status Commercially available

System Application Perimeter surveillance and intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Infrared (passive)

Description Both systems consist of a passive infrared detector head and a processing unit (processor/RF transmitter unit for Model -002).

Principle of Operation Sensor detects the presence of an intruder by detecting infrared radiation and generating an alarm signal. The sensor processor accepts the signals, processes them, and produces a standard output pulse. In -001 configuration, the output may be directly connected to an alarm system or to an RF transmitter. In -002 configuration, an internal sensor transmitter transmits encoded signal.

Transmission Mode Model -001: Hard-wire (may be linked to RF transmitter). Model -002: Radio frequency (internal transmitter)

Signature Passive sensor (emits no beams); "active" RF transmission (Model -002 only).

Add-on Capability Model -001 is compatible with any device that utilizes an output pulse to produce an alarm. Model -002 encoder may be ordered compatible with Phase III format or Immigration Department format.

Cost

PORTABILITY

Weight of Each Container

Size for Each Container Detector (cylinder): 2" diameter x 3" length. Processor (cylinder): 8.6" diameter x 8.5" length (length 10.5" with transmitter).

POWER REQUIREMENTS

Power Requirements Processing unit: two (commercial) 6 V batteries. Battery life: 1 year.

EMPLACEMENT

Emplacement Mode System may be installed anywhere, provided detector head has unobstructed view of monitored area. Processor unit is sealed and designed for long-term burial if desired. Detector head and processor may be separated up to 15 ft., and separation of more than 200 ft. is possible using extension cables.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for indoor and outdoor fixed or temporary site use. System meets EIA Standard RS-316-A for shock and vibration.

EFFECTIVENESS/RELIABILITY

Detection Range 5.4° field of view.

Transmission Range

With Relay

Sensitivity Manually adjustable variable gain capability.

Remote Alarm Assessment Capability

Detection Probability 95% minimum.

Functional Reliability

False Alarm Rate (FAR) (estimated) Less than one per day.

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30° to $+60^{\circ}\text{C}$.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light Light may affect detection capability.

Noise

Line-of-Sight Line-of-sight required for intrusion detection.

Foliage

Soil Conditions

Other

SOURCE Spartan Southwest, Inc. product literature.



**SPARTON
SOUTHWEST INC.**
SUBSIDIARY OF SPARTON CORPORATION

PASSIVE INFRARED SENSOR

PART NUMBER 110-4000-001 OR 110-4775-002

- INDOOR/OUTDOOR OPERATION
- INDUSTRIAL SECURITY
- PERIMETER SURVEILLANCE
- PASSIVE — NO BEAMS OR RAYS
- MIRRORS NOT REQUIRED
- UNATTENDED OPERATION FOR MORE THAN ONE YEAR

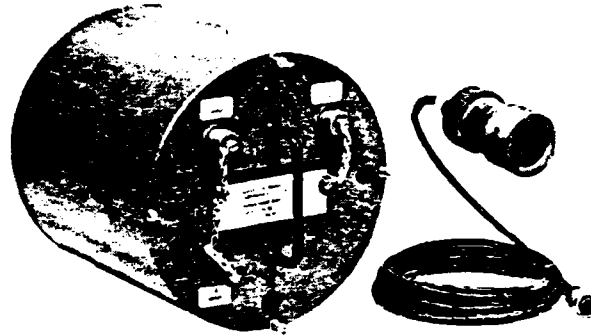


FIGURE 1: SPARTON PASSIVE INFRARED SENSOR (PIRS) COMPONENTS

The Sparton Passive Infrared Sensor (PIRS) is a surveillance device that senses the presence of an intruder by detecting infrared radiation and generating an alarm signal. The system response, 8–14 μm , coincides with a band of high human IR emissions and good transmission through the atmosphere. The probability of detection is thus improved and the possibility of false alarms from atmospheric effects or other infrared activity is reduced. The system, which is suitable for both indoor and outdoor use, is totally passive, emitting no beams and needing no auxiliary sources or mirrors. Installation is thus very simple as no careful focusing or alignment is necessary. Once the system is installed, there is no indication of its presence or operation. Power requirements are very low, 2 mW standby, thus the power source of two standard 6-V commercial batteries is sufficient for continuous unattended operation of more than one year.

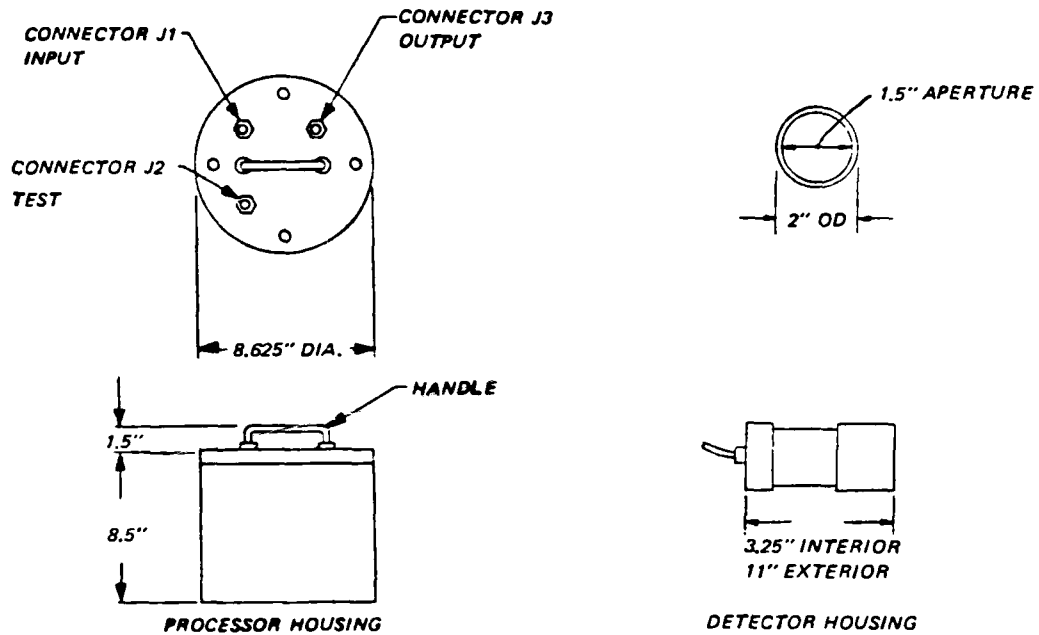
Two assemblies, a detector head and a processing unit, make up the basic PIRS system. The detector head includes a miniature thermopile detector, an internal lens to focus the incident radiation, and an 8- to 14- μm bandpass optical filter. The detector field of view is 5.4°. Also contained in the detector head is a low-noise preamplifier, which eliminates cable noise or pick-

up as a source of alarms. The detector head housing is made of polyvinyl chloride, whose dimensions are easily customized for maximum system performance in any given installation.

The processing unit includes a manually adjustable variable-gain capability so that sensitivity can be tailored to the specific situation. The sensor processor accepts the signals, processes them, and produces a standard output pulse in response to the intrusion event. In the -001 configuration, the output may be directly connected to an alarm system or to an rf transmitter. In the -002 configuration, a sensor transmitter operating in the vhf range of 162 to 174 MHz is included in the processor housing.

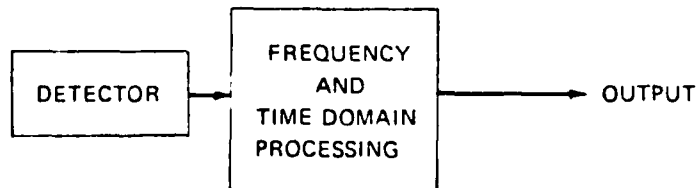
Because of the self-contained design of the PIRS, installation is very simple. As long as the detector head has an unobstructed view of the area to be monitored, the units may be placed anywhere. The processor unit is sealed and designed for long-term burial if desired. Separation of the detector head and the processor unit is a matter of convenience. The cables supplied as standard allow separation up to 15 feet, although separations of greater than 200 feet are feasible with extension cables.

PASSIVE INFRARED SENSOR



CHARACTERISTICS

Size	Detector (Cylinder) 2" diameter x 3.25" length (typical) Processor (Cylinder) 8.625" diameter x 8.5" length (length 10.5" with transmitter)
Power Source	Commercial 6-V batteries
Probability of Detection	95% minimum
False Alarm Rate	Less than one per day
Operating Life	One year (continuous duty, battery limited)
Operating Temperature	-30° to +60°C
Shock and Vibration	EIA Standard RS-316-A



PASSIVE INFRARED SENSOR

AVAILABLE CONFIGURATIONS

The Sparton Passive Infrared Sensor may be ordered in either of two configurations, i.e., the basic sensor or the sensor with a self-contained transmitter.

110-4000-001. The Sparton Infrared Sensor is a passive intrusion detector that senses the presence of an intruder by detecting infrared radiation and generating an alarm signal. The sensor consists of a processing unit and a single detector. The processing unit is powered by self-contained standard commercially available 6-V batteries. It includes a manually adjustable variable-gain capability so that sensitivity can be tailored to the specific situation. The sensor processor accepts the signals, processes them, and produces a standard output pulse in response to the intrusion event. This standard output pulse can be used to generate an alarm by activating a separate transmitter, audible alarm, or contact closure. This sensor is compatible with any device that utilized an output pulse to produce an alarm.

110-4775-002. This configuration of the Sparton Passive Infrared Sensor includes a self-contained transmitter. The sensor consists of a processor/transmitter unit and a probe. The processor and the probe are identical to the 110-4000-001. The transmitter consists of an encoder, a transmitter, and an antenna. The encoder provides a digitized message that is used to modulate the transmitter. The encoder message can be ordered compatible with the Phase III format or the Immigration Department format. (The encoder may also be customized for other formats.) The transmitter operates on a selectable fixed frequency in the 162- to 174-MHz range.

PRICE INFORMATION

<u>PART NUMBER</u>	<u>1-10</u>	<u>11-50</u>	<u>51-100</u>	<u>101-250</u>	<u>251-500</u>	<u>501-1,000</u>
110-4000-001	1495	1472	1447	1400	1353	1292
110-4775-002	2128	2077	2027	1979	1775	1609

3.4 MICROWAVE SYSTEMS - Data Sheets and Product Literature

Household Data Services: Videobeam Intrusion Detector (GD-1105-ID)

Omni-Spectra: Microwave Motion Detector (Model 160)

Omni-Spectra: Microwave Intrusion Link (Model 300)

Peak Technologies, Inc.: Microwave Intrusion Detector (MA 1070)

Racal: Checkpoint Radar System

Racon: Racon 13000

Racon: Racon 13000 Short

Racon: Racon 14000

Racon: Racon 14000-04

Racon: Racon 15000

Racon: Racon 17000

Shorrock, Inc.: Microwave Fence (Model 33)

SENSOR SYSTEM DATA SHEET

Name of Sensor Videobeam Intrusion Detector (GD-1105-ID)

Developer Household Data Services

Availability Status Commercially available

System Application Area or point intrusion detection and surveillance

SYSTEM DESCRIPTION

Type of Sensor Microwave.

Description System provides a microwave field disturbance alarm together with remote TV camera surveillance of area to verify alarm condition. System consists of a transmitting terminal, a receiving terminal, and a monitor console. A remote TV camera provides visual surveillance of land area around the transmitter.

Principle of Operation Transmitter establishes a security beam directed toward receiving terminal. Receiver senses intruder moving through the beam by detecting an increase or decrease in received beam energy and causes the monitor console to issue an alarm. TV camera near transmitter permits visual surveillance of the field around the transmitter.

Transmission Mode Radio frequency video signal is carried by the microwave beam.

Signature "Active" sensor (microwave emission). High system visibility.

Add-on Capability

Cost

PORTABILITY

Weight of Each Container Transmitter: 1.6 lb. Receiver: 3.5 lb. Monitor console: 3.2 lb.

Size for Each Container Transmitter: 2.75" x 3.25" x 7.5". Receiver: 5" x 5" x 8.5". Monitor console: 6.75" x 7.5" x 4.5"

POWER REQUIREMENTS

Power Requirements Current Required: 110/220 VAC, 50-400 Hz, battery, standby battery, or 12 VDC.

EMPLACEMENT

Emplacement Mode Transmitter and receiver are wall-mounted; monitor console is surface-mounted.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System designed for indoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Less than 10 meters to more than 1 km (alarm and video).

Microwave beam width is adjustable.

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability Remote TV camera allows visual surveillance of monitored area for verification of alarm.

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms Adjustable beam width allows system to ignore small animals and activity near the beam.

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind Interactive terminals are designed to compensate for changes in weather and other slowly varying characteristics.

Other Conditions

Light

Noise

Line-of-Sight Detection must occur within beam which travels in a straight line from transmitting terminal. (Beam can be directed through walls, doors, and windows.) Beam can however be directed around corners by using metal reflecting surfaces.

Foliage Beam can be directed through foliage.

Soil Conditions

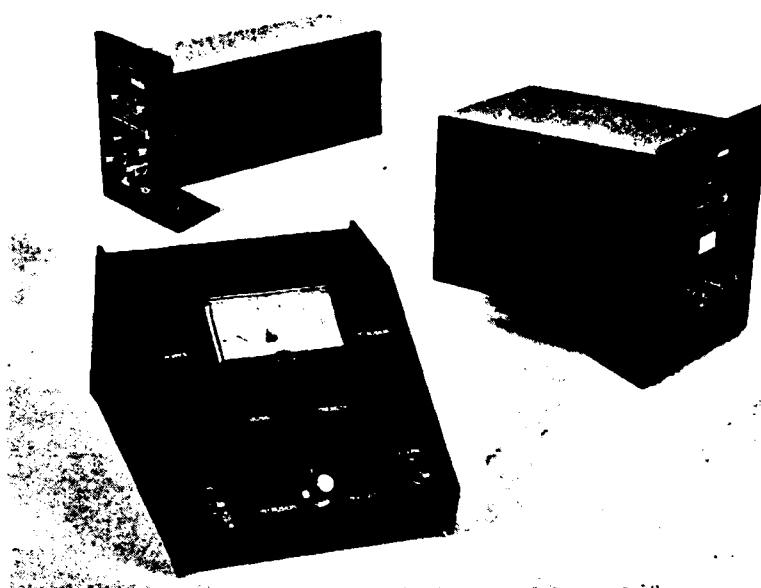
Other

SOURCE Household Data Services product literature.



GD-1105-ID VIDEOBEAM INTRUSION DETECTOR

- 1 km range
- low false alarm rate
- adjustable beamwidth
- TV surveillance without cables



The GD-1105-ID VIDEOBEAM Intrusion Detector provides a low-cost field disturbance alarm together with remote TV camera surveillance for verification of alarm conditions.

The system consists of a transmitting terminal, a receiving terminal, and a monitor console. The transmitter establishes a security beam directed toward the receiving terminal. The receiver senses an intruder crawling, walking, or running through the beam and causes the monitor console to issue an alarm. The GD-1105-ID does not use the Doppler principle but is a true energy sensing system. Intrusion beamwidth is adjustable to ignore small animals and activity near the beam to maintain a low false-alarm rate. The beam can be directed through walls, doors, windows, and foliage; corners can be included by using metal reflecting surfaces. A TV camera located near the transmitter permits visual surveillance of the field about the transmitter. The transmitter terminal can "steal" its power from the camera or it can be independently powered. Video is carried by the beam (no cable installation necessary); the receiver provides a signal suitable for a standard CCTV monitor.

The VIDEOBEAM system provides both a microwave anticipatory alarm and a remotely TV view of the surveillance field. HDS interactive terminals design compensates for changes in weather and other slowly varying characteristics.

12310 PINECREST ROAD • RESTON, VIRGINIA 22091
TELEPHONE (703) 620-6200 • TELEX 64585

HOUSEHOLD DATA SERVICES

SPECIFICATIONS

RANGE: Less than 10 m to more than 1 km, alarm and video.

ALARM MODES: Visual, Audible, Relay Contacts.

ALARM SENSITIVITY: Detects increase or decrease in received beam energy, adjustable from 0.1 dB to 6 dB.

INTRUSION VELOCITY: 0.2 mph to 20 mph

RF OUTPUT: 15mW at 10.525 GHz.

ANTENNAS: Internal 16-dB horns.

VIDEO IN AND OUT: 1 volt p-p into 75 ohms.

CURRENT REQUIRED AT 11 TO 16 VDC: 150 mA Transmitter (not including camera), 250 mA Receiver plus Monitor Console.

POWER SOURCE: 110/220 VAC, 50-400 Hz, Battery, Standby Battery, or 12V DC

MOUNTING: Transmitter and Receiver: 1/4 x 20 stud. Monitor Console: Desktop.

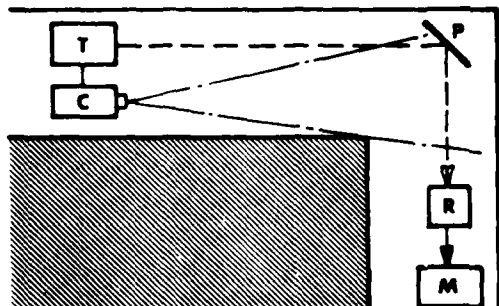
SIZE AND WEIGHT: Transmitter: 2.75 x 3.25 x 7.50 in., 1.6 lb.

Receiver: 5.00 x 5.00 x 8.50 in., 3.5 lb.

Console: 6.75 x 7.50 x 4.50 in., 3.2 lb.

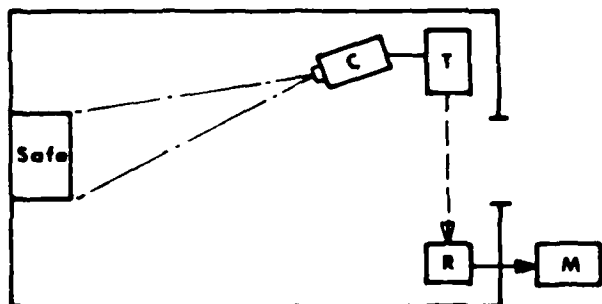
CONTROLS: Power On/Off, Audible Alarm On/Off, Intrusion Sensitivity.

TYPICAL TERMINAL ARRANGEMENTS



Passageway alarm with camera view of portion not visible from monitor console.

T = transmitter terminal
R = receiver terminal
M = monitor console
C = TV camera
P = reflector (can use existing metal surface such as pipe, fire extinguisher, etc.)



Secure room monitor. VIDEOBEAM alarms upon entering doorway with camera viewing safe, cash register, files, etc.

HDS

SENSOR SYSTEM DATA SHEET

Name of Sensor Microwave Motion Detector (Model 160)

Developer Omni-Spectra

Availability Status Commercially available

System Application Indoor area intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Microwave.

Description System consists of a microwave transmitter and a doppler receiver combined into a single unit.

Principle of Operation The transmitter radiates a controlled pattern of microwave energy into protected area. Motion created by an intruder causes amplitude and frequency changes in the reflected energy. This change is sensed by receiver and alarm is initiated.

Transmission Mode Hard-wire.

Signature "Active" sensor (microwave/emission).

Add-on Capability

Cost

PORTABILITY

Weight of Each Container Transmitter/receiver unit: 4 lbs. (including standby battery).

Size for Each Container Transmitter/receiver unit: 7 3/4" x 5 3/4" x 3 3/4".

POWER REQUIREMENTS

Power Requirements Power Consumption: 2.5 Watts. Supply Voltage: 115 VAC, 50/60 Hz to supply transformer. 120 VAC from transformer to Model 160. Standby power: 12 VDC rechargeable 1AH battery provides 4 hrs. standby power.

EMPLACEMENT

Emplacement Mode System is designed to be mounted indoors, directly on walls, at a height of 6-9 ft.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for indoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Detection pattern of system extends 0-35 ft. or 35-75 ft. from transmitter/receiver unit, depending upon range setting selected. (A variable range control allows precise selection of pattern reach within either of these settings.)

Transmission Range

With Relay

Sensitivity System detects and responds to motion generated by intruder; 2-4 seconds of continuous intruder activity are required to trigger alarm.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering Transmitter and receiver are completely enclosed in single metal case with standby batteries.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: 0° F to +120° F.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Microwave system will detect movement beyond range of sight, i.e. through walls, etc. Detection range may be adjusted to reduce area of surveillance to only areas within line-of-sight, if desired.

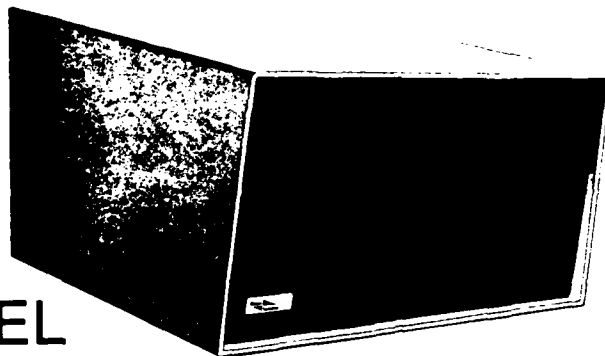
Foliage See above.

Soil Conditions

Other

SOURCE Omni-Spectra Security Products Division product literature.

MICROWAVE MOTION DETECTOR



MODEL 160

- Motion Level Indicator Light Lets You See What Detector Sees—No Guesswork During Setup
- Two Switch Selectable Ranges: Up to 35 Feet; Up to 70 Feet
- Attractive, Tamperproof Styling; No Visible Swivels or Brackets
- Opaque Front Panel—Conceals Antenna's Coverage Area

When you set up the Model 160 Motion Detector you "see" exactly what the unit senses. Any motion detected triggers a yellow "Motion Level Indicator Light" (visible behind the face plate). If the area you are protecting appears motion-free, yet the indicator continues to flicker, you may have penetrated a wall or window and are detecting unwanted motion outside the surveillance area. Re-aim the unit and/or adjust the "Range" control until the yellow indicator remains off. You are now assured that normal activity outside the protected area will not set off alarms.

In addition to the motion level indicator, which reacts to any motion, a red alarm indicator light is

also visible behind the face plate. Approximately two to four seconds of continuous motion are necessary to trigger the alarm light and alarm relay. An internal switch is provided to disable the yellow motion level indicator, or both indicator lights.

Another important feature of the Model 160 is an internal Range Control switch that provides two range settings: 0—35 feet or 35—70 feet. A variable range control allows precise setability of the maximum pattern reach within either of these settings.

Model 160 Microwave Motion Detector mounts directly on the wall with proper down angle built into the chassis. An internal lock-down swivel allows the protection pattern to be aimed as much as 25° left or right (50° total travel) during set up.

An opaque face plate hides the aiming point of the antenna. The terminal strip, switches and range control are physically isolated to prevent accidental damage to the electronics during installation. A tampered metal case conceals all controls and connection points. The removable case may be painted to match any decor at time of installation.

OTHER SECURITY PRODUCTS

All Weather Indoor/Outdoor Microwave Links establish a three-dimensional protection pattern, up to 500 feet long, between transmitter and receiver. Links will ignore rain, fog, vibration and blowing paper, but will alarm when interrupted by a human-sized object.

Model 300 - 500 foot range link
Model 305 - 150 foot range link

Motion Detectors provide space protection for a variety of indoor applications: corridors, cold storage lockers, computer rooms, large warehouse areas and small offices—among hundreds of uses.

Model 100 - 300 foot range Transceiver
Model 160 - 70 foot range Transceiver

Omni

Spectra

SECURITY PRODUCTS DIVISION

MODEL 160 MICROWAVE MOTION DETECTOR



OPERATION

Model 160 Microwave Intrusion Detector consists of a transmitter and doppler receiver combined into a single transceiver package. The transmitter radiates a controlled pattern of microwave energy into the protected area. Motion created by an intruder causes amplitude and frequency changes to occur in the reflected energy. This is sensed by the receiver and an alarm initiated.

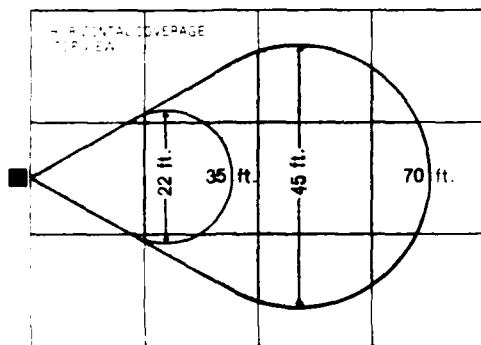
SPECIFICATIONS

Equipment Supplied... Model 160 Transceiver and BA40 rechargeable battery for 4-hour standby power. PT63 (12V, 15VA) transformer, optional

Range..... 0 to 70 feet
Switch Selectable..... 0 to 35 feet, 35 to 70 feet
Frequency..... 10.525 GHz
Temperature Range... 0° F to + 120° F
Supply Voltage..... 115 VAC, 50/60 Hz to supply transformer. 12VAC from transformer to Model 160

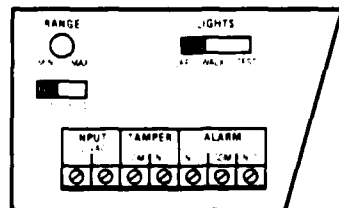
Power Consumption... 2.5 Watts
Standby Power..... 12VDC rechargeable 1AH battery provides 4 hour standby
DC Fuse..... 0.5 amp
Alarm Contacts..... SPDT 2 amp at 28 VDC
Tamper Contacts..... SPDT 2 amp at 28 VDC
Antenna Swivel..... Inside transceiver package
Swivel Adjustment... + 25° (50° total) travel
Mounting..... Directly to wall with two key slots
Mounting Height..... 6 to 9 feet recommended
Finish..... Textured baked enamel
Color..... Case, off-white; Face plate, smoked acrylic plastic
Dimensions..... 7-3/4" X 5-3/4" X 3-3/4"
Weight..... 4 pounds including standby battery

PATTERN



CONNECTIONS and CONTROLS

Accessible when case is removed



HOW TO ORDER

Specify model number and item description. Order optional accessories by model number and description. Specifications subject to change without notice.

OPTIONAL EQUIPMENT

PT63 TRANSFORMER
12V, 15VA



Omni

Spectra SECURITY PRODUCTS DIVISION

2826 SOUTH HARDY DRIVE • TEMPE, ARIZONA USA 85282
TEL (602) 966-1471 • TWX 910-950-1296

366-160 Printed in U S A

SENSOR SYSTEM DATA SHEET

Name of Sensor Microwave Intrusion Link (Model 300)

Developer Omni-Spectra

Availability Status Commercially available

System Application Indoor or outdoor area or perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Microwave.

Description System consists of a microwave transmitter and receiver located up to 500 ft. apart

Principle of Operation Microwave energy pattern is established between the transmitter and receiver. System reacts to changes in microwave signal amplitude received, and therefore reacts to intruders presence not motion. Changes in signal amplitude relate directly to an object's size and density, thus allowing the sensor to discriminate between objects.

Transmission Mode Hard-wire.

Signature "Active" sensor (microwave emission).

Add-on Capability Optional equipment includes a rechargeable battery (12.6V) and all-weather enclosure for power supply unit.

Cost

PORTABILITY

Weight of Each Container Transmitter, Receiver, and Power unit: 5 lbs. each. Total system (3 components) shipping weight: 20 lbs.

Size for Each Container Transmitter/Receiver unit: 10.6" diameter x 8.7" deep.

POWER REQUIREMENTS

Power Requirements Supply Voltage: 11.5 to 14.0 VDC. Power supply: (PS 40) 115 VAC, 50 W or (PS 41) 230 VAC, 50 W maximum input; output 13.6 VDC.

EMPLACEMENT

Emplacement Mode System may be mounted on walls, roof, or posts or on portable stands for temporary installations.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness Designed for extended indoor or outdoor temporary or fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range System provides for a 3-dimensional protection pattern up to 500 ft. long. Pattern width is field adjustable from approximately 5 to 15 ft. Pattern height varies in conjunction with pattern width.

Transmission Range

With Relay

Sensitivity Field adjustment can provide for alarm on larger or smaller intruders.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms Changes in signal amplitude received relate directly to object's size and density, allowing sensor to discriminate betweenm objects. Model 300 is pre-set to alarm on human-size intruders. Field adjustment can provide alarm on larger or smaller objects, as desired.

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -35° to +66° C.

Humidity

Rain System's detection capability not effected by rain.

Snow System's detection capability not effected by snow.

Haze/Smoke/Fog System's detection capability not effected by fog or dust.

Wind System is immune to most wind-blown debris. System's detection capability is not effected by vibration.

Other Conditions

Light

Noise

Line-of-Sight Required.

Foliage

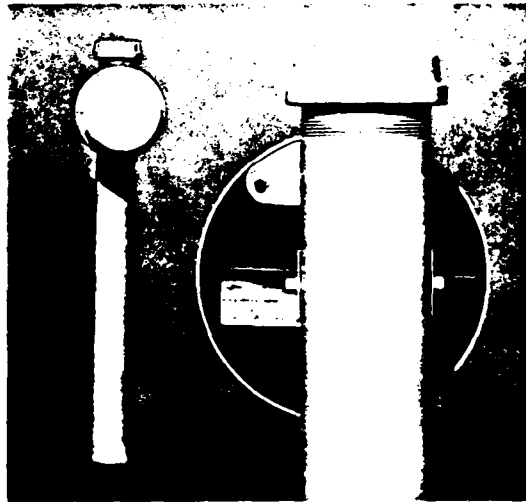
Soil Conditions

Other

SOURCE Omni-Spectra Security Products Division product literature.

MICROWAVE INTRUSION LINK

MODEL 300



- Unaffected By Vibration, Wind, Fog, Rain, Snow or Dust
- Field Adjustable Protection Pattern
- Thousands in Use in 26 Countries
- Reacts To Intruder's **Presence**, Not Motion
- Used In Portable Systems As Well As Permanent Installations

All weather outdoor protection is a practical reality with the rugged, UL listed Model 300.

Mounted on walls, roof, or posts—or on portable stands for temporary installations—these precision sensors can protect a single trap zone or an entire perimeter. The Model 300 provides an invisible, three dimensional protection pattern: length and height, **plus width**, and is immune to vibration, wind, fog, snow, sleet, dust and most wind blown debris.

The protection pattern can be adjusted easily in the field and the importance of this feature cannot be over-emphasized. It not only allows matching the

sensor to the initial installation, but provides the flexibility to adapt the Model 300 to changing site conditions and configurations.

Properly installed inside a perimeter fence, a Model 300 will detect someone approaching the fence from the inside (possibly to throw material over the fence) as well as an intruder who has scaled the fence and is attempting to penetrate the perimeter. Model 300's solid state electronics and antenna are mounted on a rugged, metal baseplate and covered by a molded butyrate radome. Swivel mount permits precise setup and provides firm lock against movement.

USING THE MODEL 300 INDOORS: Rows of roll-up loading dock doors that would require lacing and contacts can be protected by Model 300 Links running along the aisle inside the doors. The Link can be adjusted to provide a wide detection zone offering excellent protection, yet will not react to vibrations of the roll-up doors that frequently cause problems with other types of detection.

OMNI SPECTRA SECURITY PRODUCTS

Motion Detectors provide space protection for a variety of indoor applications: Protection of corridors, cold storage lockers, computer rooms, large warehouse areas and small offices are among hundreds of uses.

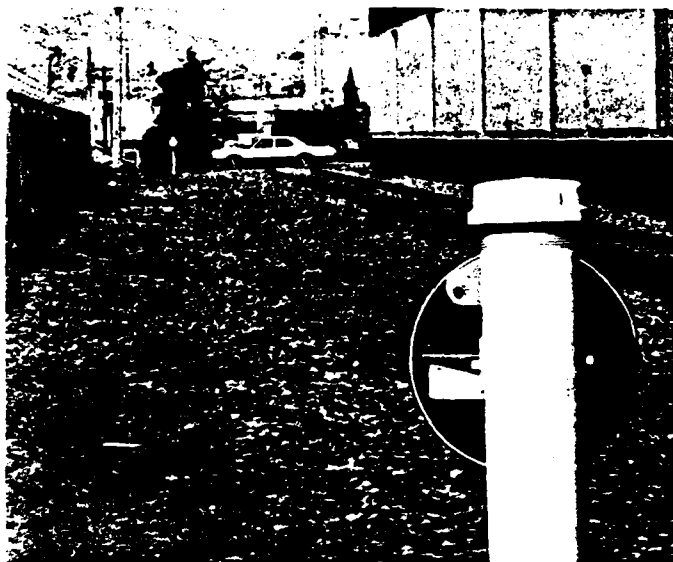
Model 100 — 300 foot range Transceiver
Model 160 — 70 foot range Transceiver

All Weather Indoor/Outdoor Microwave Links establish a three dimensional protection pattern between transmitter and receiver. Links will ignore rain, fog, vibration and blowing paper, but will alarm when interrupted by a human sized object.

Model 300 — 500 foot range link
Model 305 — 150 foot range link



MODEL 300 MICROWAVE INTRUSION LINK

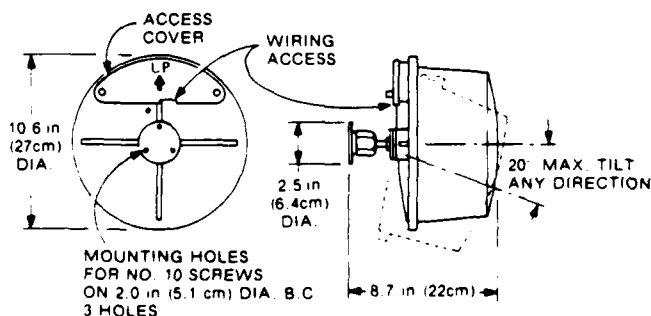


PATTERN



Each Model 300 Link provides a detection pattern up to 500 feet long. The detection pattern width is field adjustable from approximately 5 to 15 feet. Pattern height varies in conjunction with pattern width. A wide pattern is recommended to provide the largest possible detection zone and the pattern width adjustment (potentiometer) allows easy adaptation to the final installation situation.

DIMENSIONS



HOW TO ORDER

Specify Model 300, power supply model number, and operating frequency. Order optional accessories by model number and description. Specifications subject to change without notice.

OPERATION

Model 300 Intrusion Link consists of a transmitter and a receiver located up to 500 feet apart. Intrusion detection, using a modulated, amplitude sensitive system (not doppler), takes place within the invisible pattern of microwave energy existing between transmitter and receiver. Changes in signal amplitude at the receiver are directly related to the object's size and density, allowing the sensor to discriminate between objects. Model 300 is factory set to alarm on average sized humans walking, running or crawling on hands and knees through the pattern. Field adjustment can provide alarm on larger or smaller targets, depending on the specific application.

For detailed information on application and installation, please request the Model 300 Technical Manual.

SPECIFICATIONS

Equipment Supplied . . . Model 300T Transmitter, Model 300R Receiver, Swivel Mounts Included
Model PS40 Power Supply (PS41 When Specified).

Frequency Supplied at 10.525 GHz unless otherwise specified. Available at frequencies from 9.4 GHz to 10.8 GHz to meet specific regulatory requirements. NOTE: When ordering specify required frequency.

Range 50 feet (15 m) to 500 feet (150 m) max.

Temperature Range . . . -30° F (-35° C) to + 150° F (+ 66° C)

Supply Voltage 11.5 to 14.0 VDC

Supply Current 300T Transmitter: 500 mA max. at 13.6 VDC
300R Receiver: 150 mA max. at 13.6 VDC

Power Supply PS40, 115 VAC, 50 W max. input or PS41, 230 VAC, 50 W max. input, output 13.6 VDC

Alarm Relay SPDT 2.0 amp at 28 VDC

Tamper Switch SPDT 2.0 amp at 28 VDC

Weight 5 lbs. (2.3 Kg) each (3 components)

Shipping Weight 20 lbs. (9 Kg) complete system

OPTIONAL EQUIPMENT

 RM81 Link Performance Monitor assists in alignment, test and maintenance of Model 300 Links.	 BA20 12.6 volt, 20 amp-hour rechargeable jelly-lead acid battery
 BX10 Rugged All Weather Enclosure for PS40 or PS 41 and BA20 Mounts on 4" O.D. post.	 MB52 For mounting Model 300 on 4" O.D. post
 MB58 For mounting on 4" O.D. post. Locks direction setting	 MB51 Provides right angle mounting from wall

Omni

Spectra SECURITY PRODUCTS DIVISION

2626 SOUTH HARDY DRIVE • TEMPE, ARIZONA USA 85282
TEL. (602) 966-1471 • TWX 910-950-1296

376-300 Printed in U.S.A.

SENSOR SYSTEM DATA SHEET

Name of Sensor Microwave Intrusion Detector (MA 1070)

Developer Peak Technologies, Inc.

Availability Status Commercially available

System Application Indoor area (wide-angle) intrusion detection.

SYSTEM DESCRIPTION

Type of Sensor Microwave

Description System consists of a wall-mounted microwave transmitter/receiver.

System is suitable for a wide variety of applications, particularly in multiple unit installations.

Principle of Operation Detector emits microwaves in a floodlight type pattern, creating surveillance area. Intruder moving in area alters microwaves reflected back to detector (due to doppler effect). Change is detected by unit and used to open or close relay contact, thus initiating alarm.

Transmission Mode Hard-wire.

Signature "Active" sensor (microwave emission).

Add-on Capability System is compatible with other DC-operated Peak models which can be powered from common supply.

Cost

PORTABILITY

Weight of Each Container Shipping weight: 8 lbs.

Size for Each Container Unit: 3" x 6.5" x 7.8"

POWER REQUIREMENTS

Power Requirements Input Voltage: 12-14 VDC @ 200 mA. (System is powered from an accessory power supply, such as Peak Model SPS-301. Economy of operation and reliability enhanced with use of the DC system.)

EMPLACEMENT

Emplacement Mode Detector is intended to be wall-mounted at edge of detection area.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for indoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Maximum detection area is approximately 75' x 48' x 20'. Range may be adjusted for reduced area coverage.

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering Unit contains a tamper switch.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -10° to +50° C.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

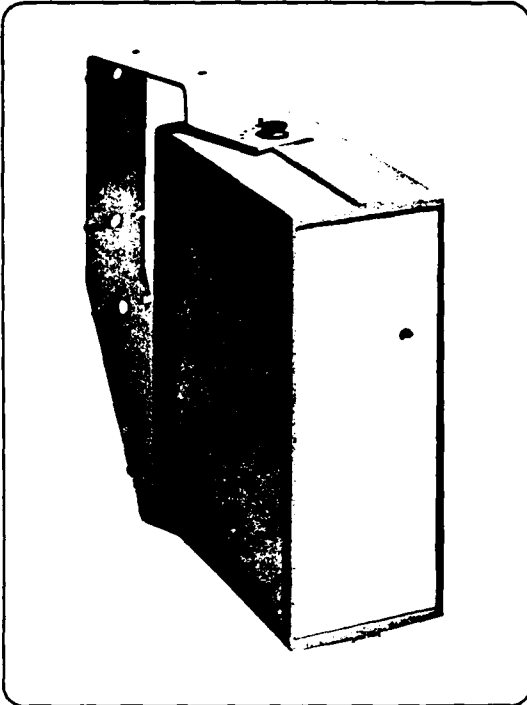
Line-of-Sight Required.

Foliage

Soil Conditions

Other

SOURCE Peak Technologies, Inc., product literature.



FEATURES

- Field proven
- Ease of installation
- Compact, rugged casting
- Handsome styling
- Blends with decor
- Vinyl finish
- Air turbulence immunity
- Range stability
- Dual pattern
- Wide angle coverage
- Dual tamper protection

GENERAL

The MA-1070 intrusion detector features a simplified design based on 12-volt DC operation. The unit comes with universal mounting bracket, and is powered from an accessory power supply such as the Model SPS-301. Economy of operation is obtained and reliability is enhanced by use of the DC system. The unit will detect the movement of an intruder into a volume of space as shown by the pattern on back of page (approx. 75 by 48 by 20 feet, same as MA-6600).

The detector works by invisibly illuminating an area with microwaves in a floodlight type pattern. Each object in the pattern reflects some of the transmitted energy back to the detector. Waves reflected from a moving intruder are changed from the transmitted waves due to the *doppler effect*. This change is detected and used to open or close a relay contact, thus sending in the alarm.

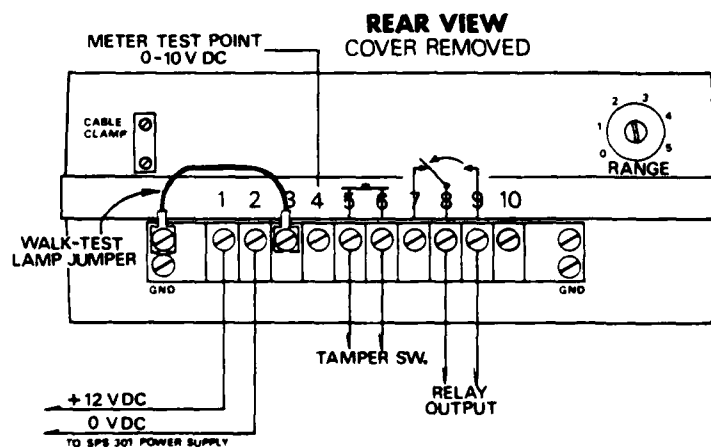
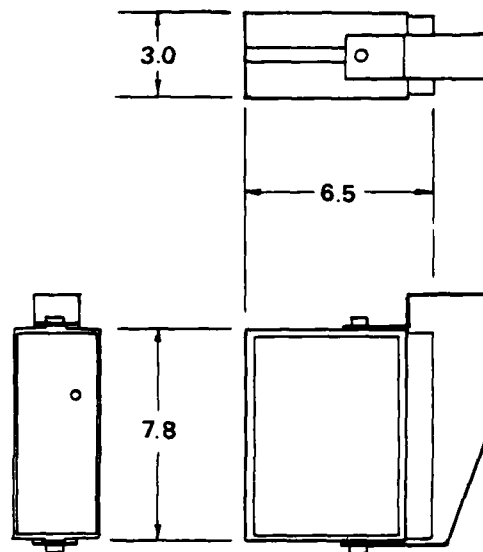
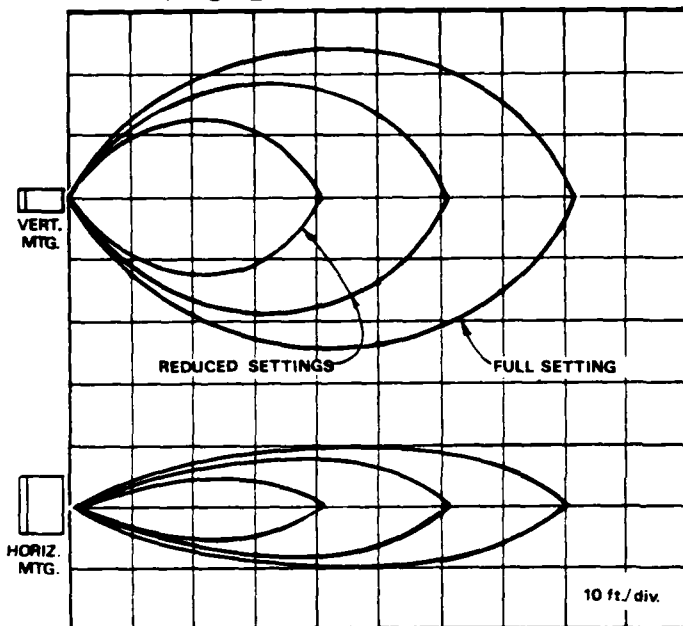
APPLICATION

The MA-1070 is a versatile detector, suitable for a wide variety of applications, particularly in multiple unit installations. It is compatible with other DC operated models in the Peak line, such as the MA-1070L and MA-1400, which can be powered from a common supply. The units are compact, light weight, easily installed, and blend well with decor. The stability of the pattern and immunity of air turbulence make it an excellent choice for indoor protection of mercantile premises, offices, homes, and other high value areas. The very wide angle coverage provides good protection at the sides of the unit, for maximum security.

INSTALLATION

Installation requires no special wiring disciplines, and consists of mounting the detector at the edge of the protected area, and making electrical connections to the rear terminal block as shown below. Shielded wire is not required. Two useful installer aids are provided, a LED walk-test lamp on the front of the unit, and a meter test point on the rear terminal block. The meter test feature facilitates a simple and fast installation, by enabling the installer to visualize exactly what the detector 'sees'. Setting the range control is the only adjustment.

PROTECTIVE PATTERN (MA-1070)



MA-1070

Input Voltage	12-14 VDC @ 200 mA
Operating Frequency	10.525 GHz
Temperature Limits	-10°C to +50°C
Dimensions	3.0" X 6.5" X 7.8"
Shipping Weight	8 lbs.
Finish	Textured vinyl, light beige

SENSOR SYSTEM DATA SHEET

Name of Sensor Checkpoint Radar System

Developer RACAL

Availability Status Commercially available

System Application Outdoor, temporary area intrusion detection (primarily designed to protect parked aircraft)

SYSTEM DESCRIPTION

Type of Sensor Microwave

Description System is a portable, free standing microwave sensor which uses a Doppler radar technique to detect intruders within prescribed radius of sensor.

Principle of Operation Sensor transmits a microwave signal uniformly in all directions. Any moving object near the sensor will reflect a Doppler - shifted signal back to the sensor. This Doppler shift is detected, processed, and used to generate an alarm.

Transmission Mode Radio frequency or hard-wire.

Signature "Active" sensor (microwave emission).

Add-on Capability Monitor unit can monitor up to 12 sensors transmitting on the same radio frequency.

Cost

PORTABILITY

Weight of Each Container 15 kg. (including battery).

Size for Each Container 1070 mm height x 325 mm width at base.

POWER REQUIREMENTS

Power Requirements Power source: Removable 16-cell N-Cd battery, 7UAH capability. Battery is rechargeable.

EMPLACEMENT

Emplacement Mode System is designed for emplacement on smooth, level surfaces. Some terrain preparation may be required if unit is employed on other than concrete surface.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for temporary outdoor, area protection.

EFFECTIVENESS/RELIABILITY

Detection Range 20 meters radius; 360° field of view.

Transmission Range

With Relay

Sensitivity Sensor will detect a person walking upright towards the sensor at a distance of 20 meters in any direction from the sensor.

Remote Alarm Assessment Capability each sensor assigned individual identity code

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -20° to +50° C.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind Tilting of system occurs at 50+ mph.

Other Conditions

Light

Noise

Line-of-Sight Required. (See remark under "Other," below.)

Foliage Wind-generated movement of nearby foliage may trigger alarms. (Foliage should be at least 100 meters away.) If deployed on grass, grass must be cut very short -- less than 2 inches in length.

Soil Conditions

Other Certain types of building materials, such as wood and glass, are very transparent to microwaves and may allow sensor to detect movement outside of protected area. Large solid objects may cause "shadows", areas in which sensor cannot detect movement.

SOURCE RACAL product literature.

CHECKPOINT RADAR SYSTEM

INTRODUCTION

CHECKPOINT was developed in direct response to an approach by an airline company that was the victim of a hijack incident

THE PROBLEM

During the subsequent interrogation of the hijackers it was determined that the guns used were placed on board the aircraft the previous night while it was parked and unattended; thus exonerating the passenger and baggage checks which are now standard at most major airports but, confirming the suspicion that the terrorist still intends to involve aircraft in his attempts to further his cause.

Because of its vulnerability, the parked unattended aircraft must now be considered a prime target for terrorist attacks; the threats being of two types:

- The threat of weapons being hidden on board the aircraft for use by hijackers who will have passed through the security check.
- The threat of a delayed action or remotely controlled device being placed on board the aircraft so that it can be held to ransom or destroyed once airborne and full of passengers.

POSSIBLE SOLUTION

The conventional counters to the above threats are:

- To mount a guard on all parked aircraft; this is expensive and involves the human factor which is not always reliable.
- To screen all personnel moving within the vicinity of the aircraft; this is already tried but current friend or foe identification techniques are not foolproof.
- To search all aircraft immediately prior to loading; this is time consuming and after a period of uneventful searches the efficiency of these searches will deteriorate.

CHECKPOINT has been developed to help protect parked aircraft, it will detect the approach of unauthorised personnel and advise the security force of this approach.

NB: During discussions with military personnel it became apparent that their airfields, missile sites and arms dumps are also potential targets for terrorists trying to obtain weapons, and protesting idealists trying to publicise their cause. CHECKPOINT may be used to counter these activities.

1 GENERAL DESCRIPTION

- 1.1 CHECKPOINT is a portable battery powered Doppler radar sensor designed to detect intruders within a prescribed radius of the sensor. It is primarily intended for the safeguarding of aircraft parked unattended on tarmac or concrete surfaces.
- 1.2 The sensor operates by transmitting a microwave signal uniformly in all directions. Any moving object near to the sensor will cause a signal to be reflected back to the sensor with a Doppler shift in frequency. This Doppler shift is detected, processed and used to generate an alarm. The alarm may be implemented in a number of ways depending upon the user's requirement. The two most common options are:
 - (a) Opening or closing relay contacts to control floodlights, switch on sirens or provide remote indication by landline.
 - (b) A radio telemetry link to provide an alarm indication to a remote point. The remote point must be provided with a Monitor Unit. Such a unit can handle several sensors on the same radio link frequency. Each sensor is assigned an identity code which is flagged up on the Monitor Unit whenever that sensor alarms.
- 1.3 Sensors are provided with removable batteries so that operation may be maintained on a continuous basis. An automatic charger is provided as part of the package so that batteries can be recharged at the correct rate and to the correct level.

2 CONTROLS

2.1 All controls are located on the underneath surface of the base. There is one control and a connector:-

- (a) ON/OFF/TEST keyswitch.
- (b) Connector PL1.

2.2 Keyswitch

The key may be removed in either of three positions. These positions are:

(a) Test

In this position an internal sonalert is brought into operation. This sonalert will operate (producing a bleep-bleep-bleep sound) whenever the sensor alarms on detecting an intruder. The duration of the alarm is 1-2 seconds. The sonalert will also operate should the battery be flat. In this case it will operate continuously. When first switching on the sensor into the TEST position, it is likely that the sonalert will operate for 1-2 seconds. This is quite normal and should be ignored.

(b) ON

This is the normal operating mode for the sensor. The sonalert is switched out so there are no audible indications. However, by placing the ear to the sensor it is possible to hear the relay click, on alarm.

(c) OFF

Normal position when not in use.

2.3 Connector PL1

This provides access to the relay contacts when a local alarm is to be used (lights, siren, etc). Connections should be made to the following pins, as required, using the spare mating connector provided:

Pin B - common.

Pin A - normally short-circuit to pin B but going open/

open-circuit for the duration of the alarm.

Pin C - normally open-circuit to pin B but going
short-circuit for the duration of the alarm.

If the local alarm facility is not being used, then
the weatherproof cap should be securely screwed in
position.

3 DEPLOYMENT

- 3.1 The Checkpoint sensor is primarily intended for the safeguarding of aircraft parked on tarmac or concrete surfaces. Because it is a detector of movement, the following points must be noted for satisfactory operation:
- .1 The three feet must make firm contact with the ground, so that there is no possibility of the sensor rocking.
 - .2 The unit must not be placed near objects which are liable to move in the wind, ie. trees, bushes, wire fences. Such objects should ideally be at least 100m away.
 - .3 If the sensor is to be deployed on grass, ensure that the grass is cut very short, ie. less than 50mm in length (2 inches).
 - .4 The unit should not be placed near fluourescent lights.
 - .5 Certain types of building materials, such as wood and glass, are very transparent to micro-wave signals. It is possible therefore that the sensor may 'see' movements of people on the other side of walls or windows and cause an alarm.
 - .6 Large solid masses, such as aircraft under-carriages may cause 'shadows', ie. areas in which the sensor will not detect movement. This is overcome by deploying another sensor to cover any shadows of the first.
 - .7 Propellers or turbine blades 'windmilling' may cause alarms. In the case of turbine blades, the sensor should be positioned so that there is no line of sight to the blades.
- 3.2 When deploying the sensor ensure that the battery is charged, the connector SK2 is screwed firmly in place and the battery is secured by means of the four Dzus fasteners.
- 3.3 Set the sensor in position and set the keyswitch in the TEST position then verify the sonalert operates whenever there is movement in the vicinity.
- 3.4 Set the keyswitch to ON and remove the key. Note that when the operator retires from the sensor it will keep alarming until the operator has moved out of detection range.

4 RECHARGING OF BATTERY

- 4.1 Switch off sensor and lay it on its side.
- 4.2 Turn the four Dzus fasteners 90° anti-clockwise, withdraw the battery and unscrew the connector SK2.
- 4.3 Connect the battery to the CE-750 automatic charger using the special lead provided.
- 4.4 Rotate the 'SET HOURS' knob on the charger to the required charging time; the battery is now on charge and will time itself out automatically.
- 4.5 To charge a battery from a fully flat state, charge at 700 mA for 14 hours.

The required charging time will depend upon the running time of the battery since its last charge. Approximate times are given below for guidance purposes:

<u>Running Time</u>	<u>Charging Time</u>
10 hours	2.5 hours
20 hours	5.0 hours
30 hours	7.0 hours
40 hours	9.5 hours
50 hours	12.0 hours
60 hours	14.0 hours

- 4.6 If the sensor has been used under cold conditions then the battery should not be charged immediately but should be left in a warm room for a short period. Failure to do this may result in the battery overheating and consequent damage. As a guideline, the following times should be used:

<u>Outside Temperature</u>	<u>Waiting Time</u>
10°C and above	None
0°C to 9°C	at least 1 hour
-10°C to -1°C	at least 2 hours
-20°C to -11°C	at least 3 hours

5 REMOTE MONITOR UNIT (RADIO LINK OPTION)

5.1 General Description

The Remote Monitor Unit operates by receiving encoded radio signals from the transmitter built into the sensor. Up to 12 sensors may be monitored with one unit and all the transmitters must have the same radio frequency.

The Monitor Unit is a modular system comprising:

- (i) Battery powered Monitor Unit.
- (ii) Battery Pack.

For carrying purposes a shoulder strap can be provided.

5.2 Monitor Unit

Operation

- (i) The Monitor Unit contains the radio receiver, decoding circuits and alarm indicators. The antenna for the receiver is mounted on the top of the unit and can be removed for carrying or storage purposes. The Monitor Unit must be left switched on for the entire time that sensors are deployed. Any sensor generating an alarm will be flagged up as:-
 - (a) A lamp illuminating against that sensor's code number.
 - (b) A pulsating whistle from the transducer.
- (ii) Once the operator has been alerted to an alarm the 'Reset Alarm' button may be pressed to cancel the audible tone. The identity of the alarming sensor will be indicated by the illuminated lamp on the display. This lamp may be cancelled at any time by pressing the 'Reset Display' button.
- (iii) If several sensors alarm in succession, their identities can be stored on the display. However, operation of the 'Reset Display' control will clear the whole display.

- (i) LOW/OFF/HIGH. Switch: This is a toggle switch on top of the unit and when in either of the 'on' positions (ie. HIGH or LOW) the 'ON' lamp will be lit.
 - LOW: audible alarm is quiet.
 - HIGH: audible alarm is loud.
- (ii) BATT: When the battery is exhausted this lamp will light and the audible alarm will sound continuously (this will correspond to a battery voltage of $17.6 \pm .5V$).
- (iii) RESET ALARM: Depress this switch to cancel the audible alarm.
- (iv) RESET DISPLAY: Depress this switch to cancel the display.
- (v) SONALERT: This produces the audio alarm which is an intense whistle of 3.5 kHz pulsating at a nominal rate of 5 Hz.

5.3 Battery Pack

Description

Connection of the battery supply through to the Monitor is provided by a pair of contact studs. The battery pack is retained in position by a star shaped knob on the underside of the pack.

The battery has a capacity of .5AH and can power the Monitor for a minimum period of 12 hours.

Charging

The battery is charged using the CE-750 charger, via the adaptor cable provided.

To charge the battery, first ensure that the interface cable is correctly connected to the charger:- red lead to '+' terminal, blue lead to '-' terminal.

Unscrew the battery from the Monitor. Place the battery in the adaptor. Set timer control on charger to 10 hours. Set current control to 70 mA.

6 GENERAL SPECIFICATION

6.1 Electrical

- .1 Doppler radar with carrier frequency in the range 1.4 to 1.7 GHz.
- .2 Bandwidth - 12 MHz.
- .3 Power output - 10 mW.
- .4 Radiation - isotropic in the horizontal plane.
- .5 Power source - removeable 16-cell Ni-Cd battery, 7 AH capacity.
- .6 Relay contact capacity - 1A for non-inductive load.

6.2 Mechanical

.1 Dimensions

1070 mm overall height
325 mm overall width at base

- .2 Weight (including battery) 15 kg.
- .3 Operating temperature range:- -20°C to $+50^{\circ}\text{C}$.
- .4 Maximum windspeed before tilting occurs - 50mph.

6.3 Ancillary Equipment

- .1 Constant current automatic battery charger type CE-750, supplied with connecting lead.
- .2 Interface connector, SK2 - AB Connectors Ltd type SB4-AM-12SEO plus right angle back shroud.

6.4 Detection Capability

To detect a person walking upright towards the sensor at a nominal distance of 20 metres in any direction from the sensor

SENSOR SYSTEM DATA SHEET

Name of Sensor Racon 13000

Developer Racon, Inc.

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Microwave

Description System is an "active" microwave intrusion detector, consisting of a microwave transmitter, receiver, standby batteries and transformers.

Principle of Operation Transmitter unit and receiver generate a microwave detection zone along protected perimeter. Intrusion is detected through the loss of transmitted signal (beam break), dynamic multipath, or frequency jamming or tampering.

Transmission Mode Hard-wire.

Signature "Active" sensors (microwave emission). System has visible signature in outdoor environment.

Add-on Capability

Cost

PORTABILITY

Weight of Each Container Transmitter: 11 lbs. Receiver: 11 lbs.

Size for Each Container Transmitter: 4½" W x 6½"H x 22"L. Receiver: 4½"W x 6½"H x 22"L.

POWER REQUIREMENTS

Power Requirements Class 2 power input: 16.5 VAC, 15 V-A Min. Standby battery life: 4 hrs. at 25° C (transmitter); greater than 10 hrs. at 25° C (receiver).

EMPLACEMENT

Emplacement Mode Transmitter and receiver are designed for pole-mounting.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Detection zone range: 200-350 ft. depending upon model. Zone width is field adjustable from 1-40 ft. depending upon zone length.

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms Nuisance alarms from power fluctuations and random movement minimized through signal processing circuitry.

Vulnerability to Spoofing or Tampering Unit is completely enclosed in aluminum housing with built-in standby power supplies.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30° to $+60^{\circ}$ C. Temperature changes do not affect system operation.

Humidity Humidity does not affect system operation.

Rain Rain does not affect system operation.

Snow Snow does not affect system operation.

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

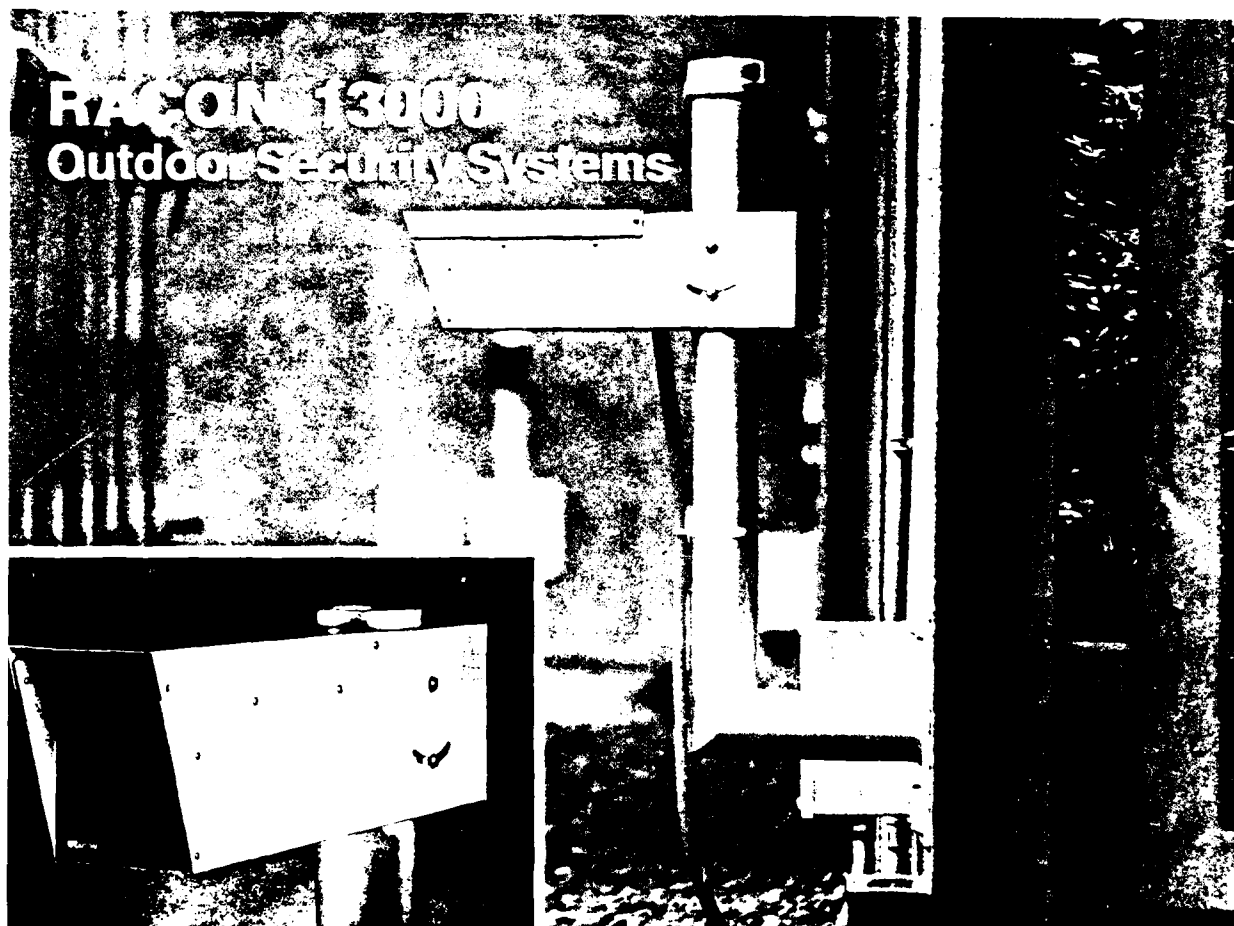
Line-of-Sight Required.

Foliage

Soil Conditions

Other

SOURCE Racon, Inc., product literature, 4 May 1981.



FEATURES

- **Multi-range security systems**

Numerous ranges and models available to optimize applications

Model	Max. Range
13000-04	200 feet (safeguard unit)
13000-01	200 feet
13000-02	350 feet

- **Protection zone width**

Field adjustable, 1 to 40 feet depending on zone length

- **Detection methods**

Beam break, dynamic multipath and frequency jamming

- **Simple installation**

Transmitter and receiver install easily on 3/4" inch O.D. posts

- **Tamperproof**

Completely enclosed in rugged aluminum enclosure with built-in standby power supplies

- **Signal processing**

Nuisance alarms from power fluctuations and random movement minimized through signal processing circuitry. Temperature changes, humidity, rain or snow do not affect operation

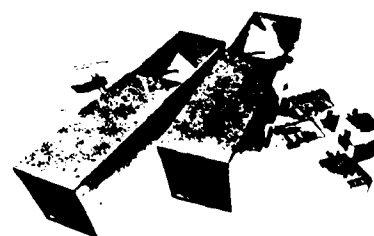
- **Warranty**

One year limited factory warranty

The 13000 transmitter and receiver are RFI and line surge protected. It comes complete with transmitter receiver, standby batteries, D.C. transformers, mounting hardware and installation, operation manuals.

DESCRIPTION

The RACON 13000 microwave motion system is available in various range configurations to best meet the particular application. The 13000-01 is designed for line sensor applications up to 200 feet. The 13000-02 features a longer range of 350 feet. The Model 13000-04, with a 200' range, is available for Nuclear safeguard and military applications. This unit is fully and permanently tested with track record documentation.



SERIES 13000

SPECIFICATIONS

SYSTEM SPECIFICATIONS

*Frequency

10 525 GHz $\pm$ 25 MHz

Antenna Pattern

Single lobe, approx. 30° both horizontal and vertical

Operating Temperature

-30° to 60° C

Class 2 Power Input

16.5 VAC 15 V A Min

Battery Charger

Voltage regulated, taper current float charger, 14 VDC, .8 A Max

Size (Rec. or Tx.)

4 1/2" W x 6 1/2" H x 22" L
(11.4 x 16.5 x 56 cm)

Weight

11 lb (5 kg)

Mounting

Designed for mounting to 3 1/2" (8.9 cm) O.D. pipe

System part Number and Range

10021-001-01

200 feet Max (61 M)

(Safeguards Model)

10021-001-04

200 feet Max (61 M)

10021-001-02

350 feet max (107 M)

TRANSMITTER SPECIFICATIONS

Microwave Output

25 V/meter Max at 75 feet

Modulation

Class A2

Modulation Frequencies

3.5, 5, 8 or 13 KHz (field selectable)

Power "ON" Indicator

LED

Battery Standby Life

4 hours at 25° C

Tamper Circuit

Normally closed (28 VDC, 1 Amp)

Transmitter Part Numbers

10021-101-01

10021-101-04

10021-101-02

RECEIVER SPECIFICATIONS

Band Pass Filter

Greater than 60 db adjacent RF band rejection

Demodulation

Class A2 Phase Lock Loop

Demodulation Frequencies

3.5, 5, 8 or 13 KHz (field selectable)

LED Indicators

Both "ON" channel and alarm out

Alarm Output

Both "ON" and "OFF" contacts (1A, 28 VDC)

Tamper Output

N/C (1A, 28 VDC) Pull/to cheat

Detection Method

Both loss of signal and dynamic multipath detection

Multipath Detection Sensitivity

Field adjustable potentiometer

Detection Monitoring

Test points for voltmeter

Zone alignment

Test points for voltmeter

Battery Standby Life

Greater than 10 hours at 25° C

Receiver Part Number

10021-100-01

10021-100-04

10021-100-02

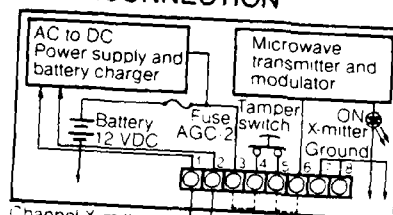
*Optional export frequencies available

TYPICAL COVERAGE PATTERNS

(Symmetrical horizontal and vertical)
13000-01-04, each square equals 10 feet. (-02), each square equals 17.5 feet. Coverage width is adjustable up to maximum shown.

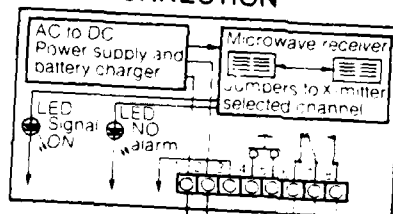


TRANSMITTER INTERCONNECTION



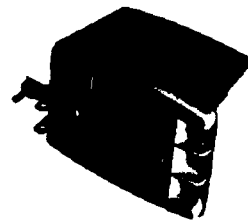
Channel X-mitter by moving small jumper on circuit board to match receiver selection

RECEIVER INTERCONNECTION



Input power
16.5 VAC
15 V A min

ACCESSORIES

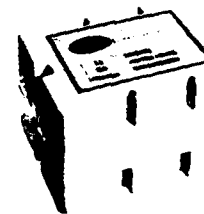


Model 1620

Replacement transformer, Class 2 power, 115VAC-16.5V AC, 20 VA rating (UL listed)
Part No. 01008-004-01.

Model 1618

Optional transformer, Class 2 power, 230V AC — 16.5V AC, 18 VA rating.
Part No. 01008-003-02.



Model 1225

Replacement battery, rechargeable 12 Volt, 2.5 amp-hour rating.
Part No. 01014-001-01.
(Used with (-01), (-02), & (-04))

Specification subject to change without notice

IRACON INC.
quality microwave products

12628 Interurban Ave. S
Seattle, WA 98168
206 241-1110 Telex 32-1202

SENSOR SYSTEM DATA SHEET

Name of Sensor Racon 13000 Short

Developer Racon, Inc.

Availability Status Commercially available

System Application Indoor or outdoor area/corridor security

SYSTEM DESCRIPTION

Type of Sensor Microwave

Description System consists of a microwave transmitter/receiver, standby batteries, and transformers.

Principle of Operation Sensor transmitter establishes a protection zone by emitting microwave beam. Receiver detects intruder by sensing beam interruption, dynamic multipath or frequency jamming.

Transmission Mode Hard-wire.

Signature "Active" sensor (microwave emission).

Add-on Capability

Cost

PORTABILITY

Weight of Each Container Transmitter/receiver unit: 11 lbs.

Size for Each Container Transmitter/receiver unit: 4½"W x 6½"H x 13"L

POWER REQUIREMENTS

Power Requirements 16.5 VAC, 15 V-A Min. Rechargeable 12V 2.5 amp-hour/rating replacement battery. Standby battery life: 4 hrs. at +25° C (transmitter), 10 hrs. at +25° C (receiver).

Internal Power Source

External Power Source

EMPLACEMENT

Emplacement Mode System is designed to be wall-mounted (with accompanying hardware).

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for indoor or outdoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range 200 ft. length; field adjustable 1-40 ft. zone width, depending on zone length

Transmission Range

With Relay

Sensitivity Field adjustable potentiometer (for dynamic multipath detection only)

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms Nuisance alarms from power fluctuations and random movement minimized through signal processing circuitry.

Vulnerability to Spoofing or Tampering System is completely enclosed in aluminum casing with built-in standby power supplies.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30° to $+60^{\circ}$ C. Temperature changes do not affect system operation.

Humidity

Rain Rain does not affect system operation.

Snow Snow does not affect system operation.

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Required.

Foliage

Soil Conditions

Other

SOURCE Racon, Inc., product literature, 4 May 1981.

RACON 13000 SHORT

Indoor / Outdoor Security System



FEATURES

- **200-foot bistatic system**
Model Max. Range
(-23) 200 feet
- **Protection zone width**
Field adjustable 1 to 40 feet
depending on zone length.
- **Detection methods**
Beam break, dynamic multipath and
frequency jamming.
- **Simple installation**
Transmitter and receiver installed
easily with convenient swivel wall
mount bracket.
- **Tamperproof**
Completely enclosed in rugged
aluminum enclosure with built-in
standby power supplies.

- **Signal processing**
Nuisance alarms from power
fluctuations and random movement
minimized through signal processing
circuitry. Temperature changes,
humidity, rain or snow do not affect
operation.
- **Warranty**
One year limited factory warranty.

The 13000 transmitter and receiver
are RFI and line surge protected. It
comes complete with transmitter, re-
ceiver, standby batteries, Class 2
transformers, mounting hardware and
installation/operation manual.

DESCRIPTION

The Racoon 13000-Short microwave
indoor / outdoor system is an
adaptation of the popular 13000
outdoor microwave systems. This
system offers the same features,
reliability and proven field performance
as the larger version. The 13000-Short
covers up to 200 feet.

This unit is also 100% environmen-
tally tested with traceable documen-
tation.

SERIES 13000 SHORT

SPECIFICATIONS

SYSTEM SPECIFICATIONS

***Frequency**
10.525 GHz $\pm$ 25 MHz

Antenna Pattern
Single lobe approx. 30° both horizontal and vertical

Operating Temperature
-30° to 60° C

Class 2 Power Input
16.5 VAC 15 VA Min

Battery Charger
Voltage regulated, taper current float charger (14VDC 8A Max)

Size (Rec. or Tx.)
4 1/2" W x 6 1/2" H x 13" L
11.4 x 16.5 x 33 cm

Weight

11 lb (5 kg)

Mounting

Wall mount

System part Number and Range

10021-001-23
200 feet Max (61 M)

TRANSMITTER SPECIFICATIONS

Microwave Output
25 V meter Max at 75 feet

Modulation

Class A2

Modulation Frequencies
3.5, 8 or 13 KHz (field selectable)

Power "ON" Indicator
LED

Battery Standby Life
4 hr. Min at 25° C

Tamper Circuit

Normally closed (28VDC 1Amp)

Transmitter Part Number

10021-101-23

RECEIVER SPECIFICATIONS

Band Pass Filter
Greater than 60 db adjacent RF band rejection

Demodulation

Class A2 Phase-Lock-Loop

Demodulation Frequencies
3.5, 8 or 13 KHz (field selectable)

LED Indicators

Both "ON" channel and alarm out

Alarm Output

Both N/C and N/O contacts (1A 28 VDC)

Tamper Output

N/O 1A 28VDC; Pull to earth

Detection Method

Both loss of signal and dynamic multipath detection

Multipath Detection Sensitivity

Field adjustable potentiometer

Detection Monitoring

Test points for voltmeter

Zone alignment

Test points for voltmeter

Battery Standby Life

Greater than 10 hours at 25° C

Receiver Part Number

10021-100-23

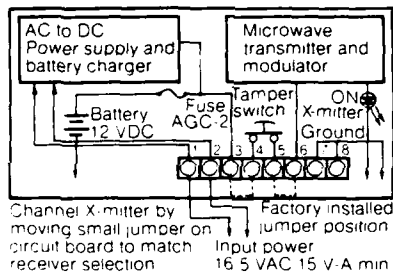
*Optional export frequencies available

TYPICAL COVERAGE PATTERNS

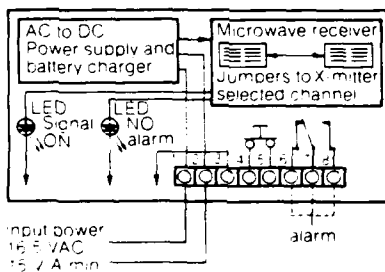
(Symmetrical horizontal and vertical)
13000-23, each square equals 10 feet.
Coverage width is adjustable up to maximum shown.



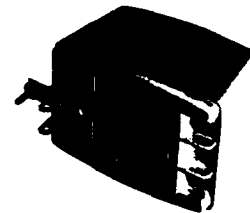
TRANSMITTER INTERCONNECTION



RECEIVER INTERCONNECTION



ACCESSORIES

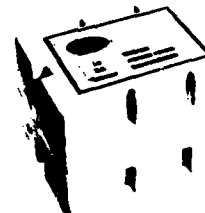


Model 1620

Replacement transformer, Class 2 power 115VAC-16.5V AC, 20 VA rating (UL listed).
Part No. 01008-004-01.

Model 1618

Optional transformer, Class 2 power. 230V AC — 16.5V AC 18 VA rating.
Part No. 01008-003-02.



Model 1225

Replacement battery, rechargeable 12 Volt 2.5 amp-hour rating.
Part No. 01014-001-01.

Specification subject to change without notice.

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SENSOR SYSTEM DATA SHEET

Name of Sensor Racon 14000

Developer Racon, Inc.

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Microwave

Description System consists of a microwave transmitter unit, receiver unit, transformer and rechargeable batteries.

Principle of Operation Transmitter and receiver units generate microwave detection zone along protected perimeter. Intrusion is detected through the loss of transmitted signal (beam break), dynamic multipath or frequency jamming or tampering.

Transmission Mode Hard-wire.

Signature Active sensor (microwave emissions). System has visible signature in outdoor environment.

Add-on Capability

Cost

PORTABILITY

Weight of Each Container Transmitter unit: 35 lbs. Receiver unit: 35 lbs.

Size for Each Container Transmitter unit: 24" diameter x 11" deep. Receiver unit: 24" diameter x 11" deep.

POWER REQUIREMENTS

Power Requirements Input power: 16.5 VAC, 50-60 Hz, 20 VA Max. Standby battery life: 4 hrs. at 25°C (transmitter); 10 hrs at 25°C (receiver)

EMPLACEMENT

Emplacement Mode Transmitter and receiver are designed for pole-mounting.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Adjustable zone coverage from 25 to 1500 feet in length. System provides narrow microwave beam pattern and therefore is well-suited for applications where limited protection zone space is available, i.e., width constraints.

Transmission Range

With Relay

Sensitivity Detection sensitivity is field adjustable for settings from a crawling to a stand-up intruder.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms Nuisance alarms from power fluctuations and random movement are minimized through signal processing circuitry.

Vulnerability to Spoofing or Tampering Unit is completely enclosed in metal case housing

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30° to $+60^{\circ}$ C. Temperature changes

Humidity Humidity does not affect system operation.

Rain Rain does not affect system operation.

Snow Snow does not affect system operation.

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Required.

Foliage

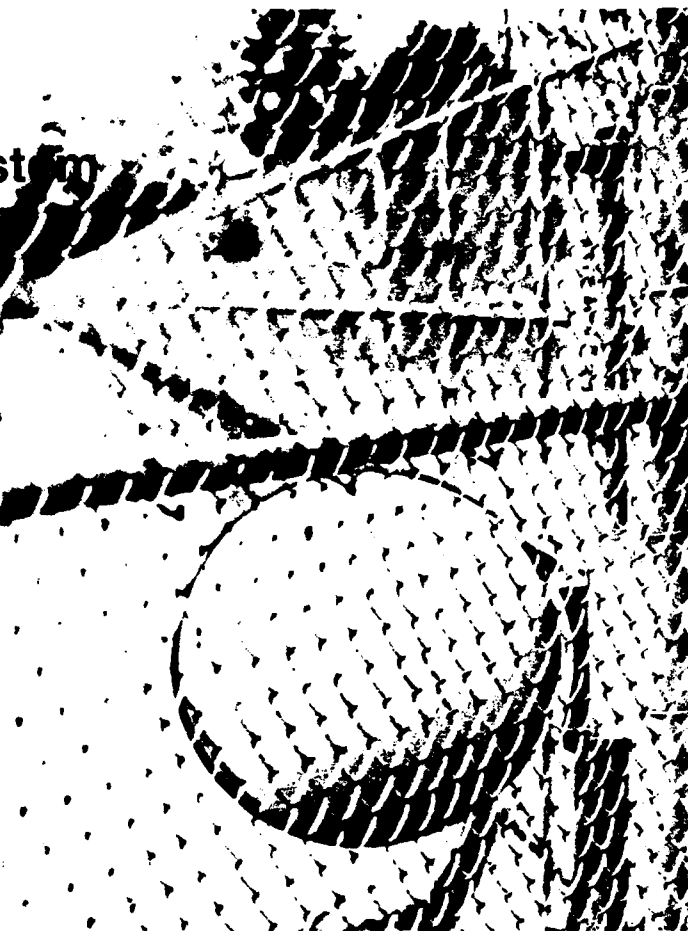
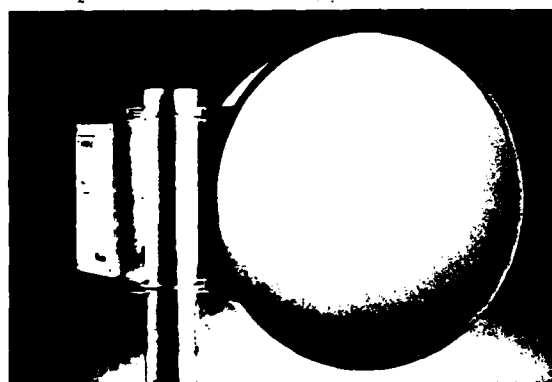
Soil Conditions

Other

SOURCE Racon, Inc., product literature, 4 May 1981.

RACON 14000

Outdoor Security System



FEATURES

- **Long range security**
Automatic zone compensation 25 to 1500 feet
- **Pencil beam pattern**
3 1/2" antenna pattern provides narrow beam for applications of width constraints
- **Detection methods**
Beam break, dynamic multipath and frequency jamming
- **Tamperproof**
Circuitry completely enclosed in rugged metal case
- **Signal processing**
Nuisance alarms from power fluctuations and random movement minimized through signal processing circuitry. Temperature changes, humidity, rain or snow do not affect operation
- **Cost effective**
Microwave intrusion detection has the lowest cost volumetric per foot coverage available

- **Warranty**
One year limited factory warranty

DESCRIPTION

The field proven, (over five years), RACON 14000-01 is an advanced outdoor high security microwave intrusion detection system that offers the most reliable and lowest cost per foot line sensor protection available. The transmitter and receiver can be adjusted for coverage zones from 25 to 1500 feet. Detection sensitivity is field adjustable for settings from a crawl to a standup intruder. The 14000 series is ideal where limited protection zone space is available. A built-in charger maintains standby batteries.

The RACON 14000-01 comes complete with transmitter, receiver, Class 2 transformers, rechargeable batteries, mounting hardware, installation and operation manual.



SERIES 14000

SPECIFICATIONS

SYSTEM SPECIFICATIONS

Range

1500' Max (457 M)

*Frequency

10.525 GHz $\pm$ 25 MHz

Subcarrier Frequencies

3, 5, 8 or 13 KHz (Field selectable)

Antenna Pattern

Single lobe, approx. 3.5° horizontal and vertical both transmitter and receiver

Detection Methods

Loss of transmitted signal (beam break), dynamic multipath detection, frequency jamming or tampering

Operating Temperature

-30°C to 60°C

Input Power

16.5 VAC 50-60 Hz, 20 VA Max (** remote Class 2 16.5 VAC to 115 VAC transformers provided)

Battery Charger

Built-in transmitter and receiver. Voltage regulated, taper current float charger. 14 VDC, 8 amp Max.

Dimensions

Approx. 24" diameter $\times$ 11" deep (61 $\times$ 28 cm) for transmitter or receiver

Weight

35 lb (16 kg) for transmitter or receiver

Mounting

Designed for attaching to 3 1/2" (8.9 cm) O.D. pipe (15" (38 cm) post to zone centerline offset)

Color

Beige and dark brown

System Part Number

10006-001-01

TRANSMITTER SPECIFICATIONS

FCC Certification

Part 15 FCC license not required

Microwave Output

25 W (Meter at 100 feet Max)

Modulation

Class A2, field selectable subcarriers

Battery Standby

4 hours typical at 25°C

Power "ON" Indicator

LED

Transmitter Current

450 ma Max at 14 VDC (800 ma Max during battery recharge)

Tamper Circuit

Provisions for disabling microwave transmitter, separate reporting

Transmitter Part Number

10006-106-01

RECEIVER SPECIFICATIONS

Band Pass Filter

Greater than 60 db, adjacent RF band rejection

Zone Alignment/Threshold Setting

Test points for voltmeter/oscilloscope

Battery Standby

10 hours typical at 25°C

Demodulation

Class A2, phase-lock-loop

Receiver Current

150 ma Max (800 ma Max during battery recharge)

Operating Channel Indicator

LED

Detection Sensitivity

Field adjustable for crawler to standing intruder

Alarm Circuit Output

Hermetically sealed, normally closed (1A, 28 VDC Max)

Tamper Circuit Output

Normally closed, (1A, 28 VDC Max). Provisions for series alarm output or separate reporting

Receiver Part Number

10006-106-01

*Optional export frequencies available

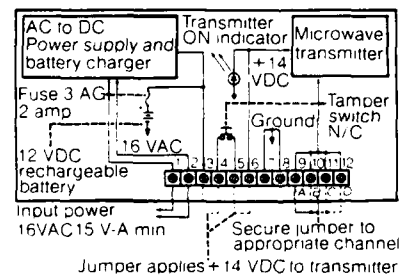
**Optional 16.5 VAC to 230 VAC transformers available

TYPICAL COVERAGE PATTERNS

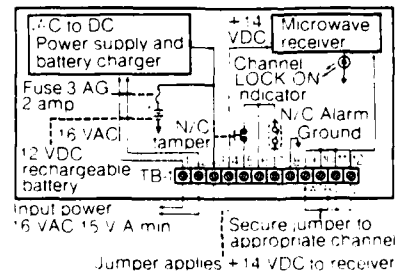
(Symmetrical horizontal and vertical). Each square equals 50 feet (40 ft. width at 1500 ft. separation).



TRANSMITTER INTERCONNECTION



RECEIVER INTERCONNECTION



ACCESSORIES



Optional

Conducted Line Filter

Ideal for power generating facilities and substation applications

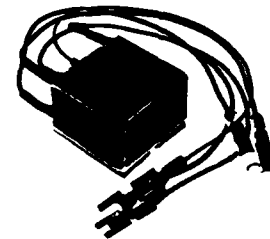
Part No. 10006-110-01



Model 1225

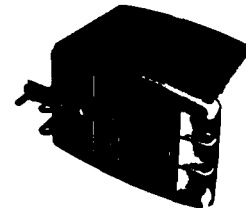
Replacement battery, rechargeable 12 Volt 2.5 amp-hour/rating.

Part No. 01014-001-01.



Optional reversing relay kit

For normally open alarm circuit application. Part No. 10006-108-01.



Model 1620

Replacement transformer, Class 2 power. 115V AC — 16.5V AC, 20 VA rating (UL listed).

Part No. 01008-004-01.

Model 1618

Optional transformer, Class 2 power. 230V AC — 16.5V AC, 18 VA rating.

Part No. 01008-003-02.

Specification subject to change without notice

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Seattle, WA 98168
206-241-1110 Telex. 32-1202

SENSOR SYSTEM DATA SHEET

Name of Sensor Racon 14000-04

Developer Racon, Inc.

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Microwave

Description System is an outdoor bi-static line sensor system consisting of a microwave transmitter unit, a receiver unit, batteries, and remote transformers.

Principle of Operation Transmitter unit and receiver unit generate a microwave detection pattern. Intrusion is detected through the loss of transmitted signal (beam break), dynamic multipath, or frequency jamming or tampering.

Transmission Mode Hard-wire.

Signature "Active Sensor" (microwave emission).

Add-on Capability Special models are available for extreme temperature climates, and specific foreign and U.S. military/government compliances.

Cost

PORTABILITY

Weight of Each Container Transmitter: 35 lbs. Receiver: 35 lbs.

Size for Each Container Transmitter: 24" diameter x 11" deep. Receiver: 24" diameter x 11" deep.

POWER REQUIREMENTS

Power Requirements Input power: 16.5 VAC, 50-60 Hz, 20 VA Max. Standby battery life: 4 hrs. at 25° C (Transmitter); 10 hrs. at 25° C (Receiver).

EMPLACEMENT

Emplacement Mode Transmitter and receiver are designed for pole-mounting. Terrain preparation for drainage is desirable.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Up to 400 ft.

Transmission Range

With Relay

Sensitivity System capable of detecting a person moving at slow crawl (at less than 4 inches per second) at distances up to 400 feet.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30° to $+60^{\circ}$ C

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Required.

Foliage

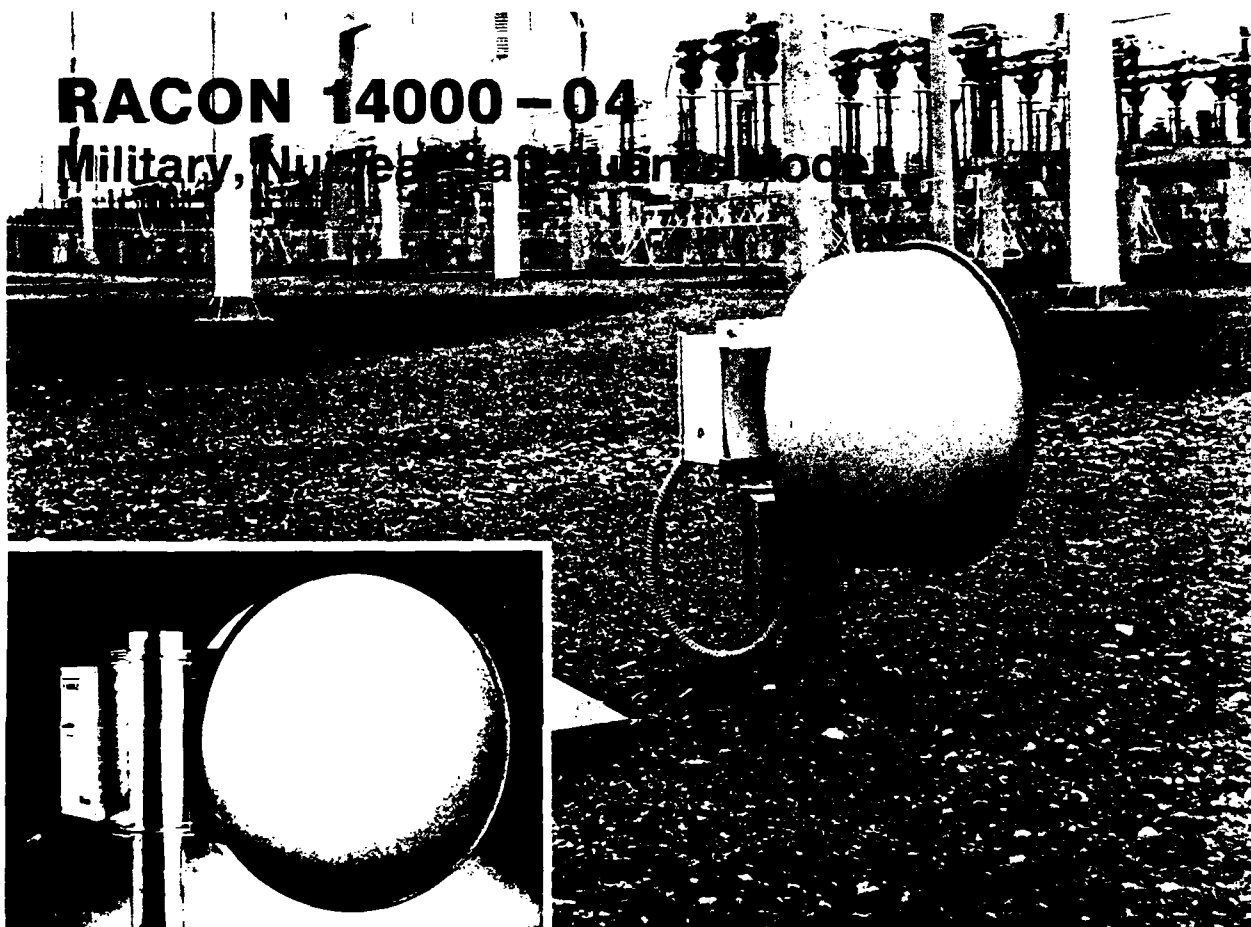
Soil Conditions

Other

SOURCE Racon, Inc., product literature, 4 May 1981.

RACON 14000-04

Military, Nuclear and Safeguards Model



FEATURES

- **Nuclear "safeguards"** — Used by military, nuclear industry and other applications of high security requirements
- **High reliability performance** — 100% production tested at -70°C , -30°C and room temperatures
- **Traceable quality control documentation** — Each system is supplied with a serial numbered test data report
- **Longest "safeguards" proven zones** — Certified crawl performance at distances up to 400' (120 M)
- **Slow crawl detection** — Detects movement at less than 4" (10 cm) per second
- **Optimum antenna detection** — Unattended parabolics provide a controlled protection zone
- **Worldwide proven performance** — Reliable operation over 5 years of international life expectancy
- **Versatility** — Proven performance in tracked and reflector applications

- **Reliable RFI operation** — Dependable operation in 540 KVA power stations
- **Warranty** — One year limited factory warranty

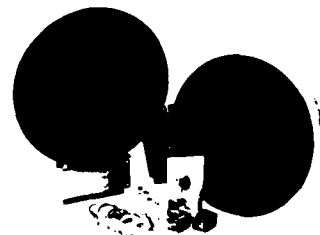
DESCRIPTION

The highly reliable RACON "safeguard" 14000-04 is the most advanced outdoor bistatic line sensor system available. Each transmitter and receiver "safeguards" system comes with test documentation, batteries, low level automatic battery disconnects, remote Class 2 transformers, conducted line filters, special tamper protection and an installation and operation manual.

Each RACON "safeguard" system is subjected to a completely documented and traceable acceptance test program. The systems are 100% tested at high and low temperature extremes and are operationally hardened to high temperatures for reliable detection capability. Special models are available for extreme color

hot climates, specific military colors, and/or designed to meet foreign government technical compliances.

Typical applications for this unit are conventional and unconventional munitions manufacturers and storage outlets, nuclear power generation facilities, prison installations, oil and mining industry sites, border control crossings, sensitive government applications, etc. RACON's customer service department is available to assist in your system engineering, field commissioning and training requirement needs.



SERIES 14000

SPECIFICATIONS SYSTEM SPECIFICATIONS

Range

Up to 400' (120 M) separation

Typical "Safeguards" Crawl Detection
12" (30 cm) sphere

Mounting Height

24" (60 cm) (to center of antenna)

Inline Zone Overlap

66" (20 M) between systems

Inline Zone Offset

32" (80 cm) from zone centerline

Ground Preparation

Graded for drainage, $\pm 3"$ (8cm) variations.
 $\frac{1}{2}"$ (1.5cm) to 1" (3cm) crushed rock a
minimum of 4" (10cm) deep or pavement
is recommended.

Detection Speed

Less than 4" (10 cm) per second

Detection Offset

20" (6 M) Min

*Frequency

10 525 GHz $\pm$ 25 MHz

Subcarrier Frequencies

3.5 8 or 13 KHz

Antenna Pattern

Single lobe, approx. 3.5 horizontal and
vertical, both transmitter and receiver

Detection Method

Loss of transmitted signal (beam break)
dynamic multipath detection, frequency
jamming or tampering

**Operating Temperature

-30°C to 60°C

Input Power

16.5 VAC 50-60 Hz 20 VA Max

*** Remote Class 2 16.5 VAC to 115
VAC (transformers provided)

Battery Charger

Built-in transmitter and receiver voltage
regulated taper current float charger
14 VDC 8 Amp Max

Dimensions

Approx. 24" diameter x 11" deep
161 x 28 cm for transmitter or receiver

Weight

35 lb (16 kg) for transmitter or receiver

Mounting

Designed for attaching to 3/4" (8.9cm)
O.D. pipe, 15" (38 cm) post to zone
center, best result

****Color

Beige and dark brown

*****System Part Number

10006-01-000

14000-01-000 (transmitter only)

14000-01-001 (receiver only)

14000-01-002 (both)

TRANSMITTER SPECIFICATIONS

FCC Certification

Part 15, FCC, Class A, Part 15.247

Microwave Output

25 W Meter at 100' (30 M) Max

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Modulation

Class A2, field selectable subcarriers

RF Bandpass Filters

Greater than 60 db adjacent band
rejection

Power "ON" Indicator

LED

Battery Standby

4 hours typical at 25°C

Transmitter Current

450 ma Max at 14 VDC (800 ma Max
during battery recharge)

Tamper Circuit

Provisions for disabling transmitter or
separate reporting

*****Remote System Test

Optional N/C input for remote ON/OFF
of transmitter

RECEIVER SPECIFICATIONS

RF Bandpass Filter

Greater than 60 db adjacent Band
rejection

Zone Alignment/Threshold Setting

Test points for voltmeter / oscilloscope

Demodulation

Class A2, synchronous phase-locked-loop

Battery Standby

10 hours typical at 25°C

Receiver Current

150 ma Max (800 ma Max during
battery recharge)

Operating Channel Indicator

LED

User Adjustments

Subcarrier selectivity, PLL selectivity

Alarm Circuit Output

Hermetically sealed N/C
14-28 VDC Max

Tamper Circuit Output

Separate mechanical and optional
magnetic switches provide high tamper
security N/C (7A 20VDC MAX)

*****Remote System Test

Optional N/C input for remote ON/OFF
of receiver

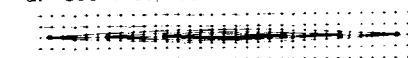
*****Remote System Test

*****Remote System Test

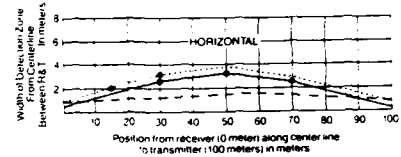
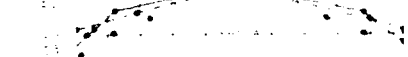
TYPICAL COVERAGE PATTERNS

(Symmetrical horizontal and vertical)

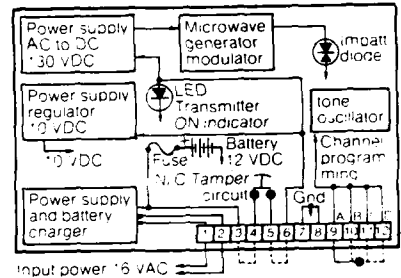
Each square equals 50 feet (40 ft. width
at 1500 ft. separation)



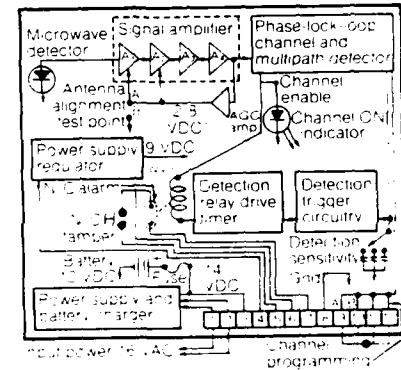
Typical "safeguards" vertical and
horizontal detection envelopes (30 cm
sphere)



TRANSMITTER INTERCONNECTION



RECEIVER INTERCONNECTION



ACCESSORIES

Model 1225

Replacement battery, rechargeable 12 Volt,
2.5 amp-hour rating, Part No. 01014-001-01

Model 1620

Replacement transformer, Class 2 power,
115VAC-16.5V AC, 20 VA rating (UL listed),
Part No. 01008-004-01

Model 1618

Optional transformer, Class 2 power,
230V AC-16.5V AC, 18 VA rating,
Part No. 01008-003-02

Optional reversing relay kit - Remote
system test kit - For normally open alarm
circuit application or provides remote
systems test input capability
Part No. 10006-108-01

Specification subject to change without notice

RACON INC.
quality microwave products

12628 Interurban Ave. S.
Seattle, WA 98168
206-241-1110 Telex 32-1201

AD-A162 946

TACTICAL SENSORS FOR DISPERSED TNF (TACTICAL NUCLEAR
FORCE) UNITS APPENDI. (U) SCIENCE APPLICATIONS
INTERNATIONAL CORP MCLEAN VA P ANTSEN ET AL. 30 JUN 83

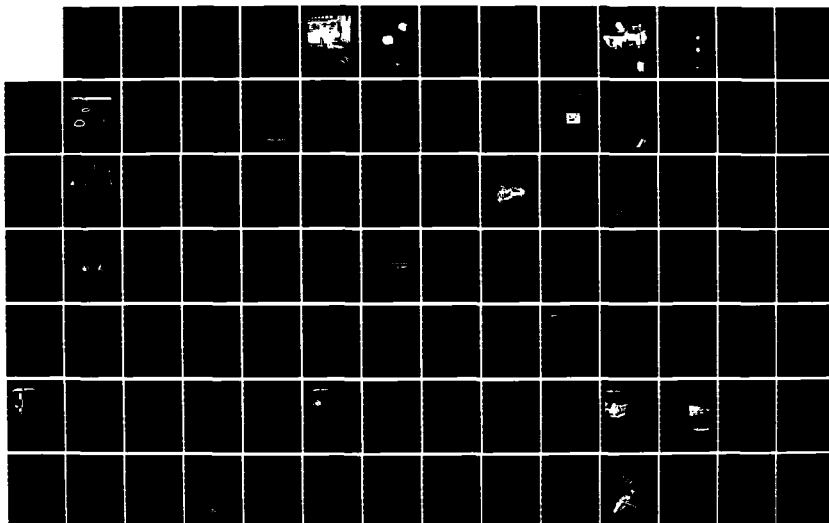
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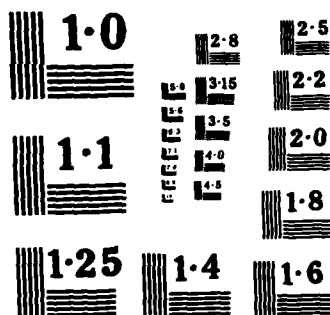
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DNA-TR-84-306-AP-1 DNA001-82-C-0057

F/G 15/3

NL





NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

SENSOR SYSTEM DATA SHEET

Name of Sensor Racon 15000

Developer Racon, Inc.

Availability Status Commercially available

System Application Indoor area intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Microwave

Description System consists of a wall-mounted microwave transmitter/receiver powered by a remote DC supply. System is suitable for multiple unit applications, individual room protection, or discrete risk area surveillance.

Principle of Operation Detector/receiver unit generates microwave pattern covering desired area. Intruder disrupting microwave pattern generates alarm signal.

Transmission Mode Hard-wire.

Signature "Active" sensor (microwave emission).

Add-on Capability

Cost

PORTABILITY

Weight of Each Container Unit: 7 lbs.

Size for Each Container Unit: 6½" x 5" x 3¾".

POWER REQUIREMENTS

Power Requirements Power input: +10.5 to +15 VDC; 180 ma Max. Normal installations require operation from existing 12 VDC power supplies or use of optional 12 VDC power supplies commercially available.

EMPLACEMENT

Emplacement Mode System is intended to be wall-mounted.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for indoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Adjustable coverage up to 50 ft. length x 20 ft. width.

Transmission Range

With Relay

Sensitivity Adjustable detection sensitivity (digital 1, 2, 4 or 8 step selection).

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering Unit is enclosed in a tamperproof, die cast casing.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Required.

Foliage

Soil Conditions

Other

SOURCE Racon, Inc., product literature. 4 May 1981.



FEATURES

- **DC operation** — Remote DC supply saves battery costs
- **Economical** — Cost effective microwave totally covers an area and immediately detects an intruder
- **Adjustable coverage** — Separate sensitivity and coverage controls provide optimum intruder detection
- **Digital processing** — Provides nuisance alarm protection and creep walk detection
- **Tamperproof** — The unit is enclosed in a tamperproof rugged die cast case with fiberglass radome
- **Warranty** — One year limited factory warranty

DESCRIPTION

The RACON Model 15000 is ideal for multiple unit applications, for individual room protection or for precisely trapping risk areas. The standard unit provides adjustable coverage up to 50 feet maximum.

Common RFI problems have been eliminated by enclosing the entire sensor in a metal die cast case for shielding and by providing a second circuit board to filter all connected lines.

Normal installations require operation from existing 12 VDC power supplies or use of optional 12 VDC power supplies commercially available. The RACON 15000 comes complete with mounting bracket and installation instructions.



MODEL 15000

SPECIFICATIONS

*Frequency

10 525 GHz $\pm$ 25 MHz

FCC Certification

Part 15, FCC license not required

Microwave Output

25V/meter at 100 ft Max

Range

Adjustable up to 50' L $\times$ 20' W
(15.2 $\times$ 6.1M)

Detection Sensitivity

Digital 1, 2, 4 or 8 step selection

Alarm Contact

Both normally closed and normally open outputs. (1 Amp; 28VDC)

Alarm Duration

5 second opening or closing, auto reset

Tamper Contact

Normally closed, pull to cheat

Walk Test

LED indicator with remote meter and audible alert test points

Alarm Indicator

LED indicator

Power Input

+10.5 to +15VDC, 180 ma Max

Mounting

Universal bracket provided

Dimensions

6 1/2" $\times$ 5" $\times$ 3 1/4" (16.5 $\times$ 12.7 $\times$ 8.3 cm)

Weight

7 lb (3.2 kg)

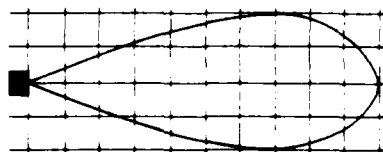
Part Number

10019-001-01

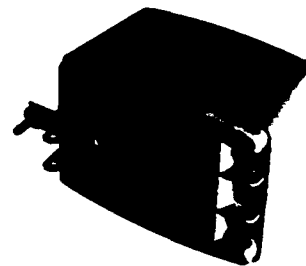
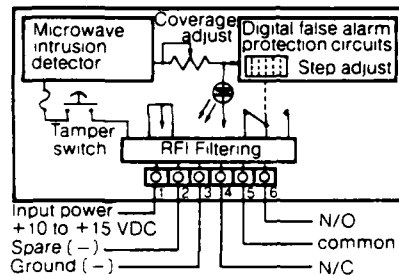
*Optional factory export frequencies available

TYPICAL HORIZONTAL COVERAGE PATTERN

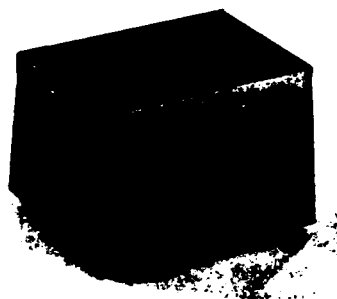
Each Square Equals 5 Feet
(Vertical Slightly Smaller).



DETECTOR INTERCONNECTION



OPTIONAL EQUIPMENT



Model RPS 1612 (-01)

12VDC power supply.
16.5VAC (50-60Hz) input.
Operates up to four 15000 sensors
Includes 4.5 AH battery with
model 1620 transformer
Part No. 10020-001-01

Model RPS 1612 (-02)

Same as (-01) above,
except comes with 9 AH battery and
model 1620 transformer
Part No. 10020-001-02

Model RPS 1612 (-03)

Same as (-01) except
without battery or transformer
Part No. 10020-001-03

Model 1620

Transformer, Class 2 power.
115VAC — 16.5VAC, 20 VA
rating (UL listed)

Part No. 01008-004-01.

Model 1618 (Not Shown)

Transformer, Class 2 power.
230VAC — 16.5VAC, 18 VA rating
Part No. 01008-003-02.

Specifications subject to change without notice

RACON[®] INC.
quality microwave products

12628 Interurban Ave. S
Seattle, WA 98168
206-241-1110 Telex 32-1202

SENSOR SYSTEM DATA SHEET

Name of Sensor Racon 17000

Developer Racon, Inc.

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Microwave.

Description System is a bi-static microwave outdoor line sensor for intermediate range protection. (It may also be used for temporary site protection.) System consists of a transmitter, receiver, standby batteries, and transformers.

Principle of Operation Transmitter unit and receiver unit generate a microwave detection zone along protected perimeter. Intrusion is detected through loss of transmitted signal, (beam break), dynamic multipath, or frequency jamming.

Transmission Mode Hard-wire.

Signature "Active" sensor (microwave emission).

Add-on Capability

Cost

PORTABILITY

Weight of Each Container Transmitter: 20 lbs. Receiver: 20 lbs.

Size for Each Container Transmitter: 13"W x 13"H x 13"L. Receiver: 13"W x 13"H x 13"L.

POWER REQUIREMENTS

Power Requirements Input power: 16.5 VAC, 20 VA Max (50-60 Hz). Batteries: .9 Amp-hour standard. Battery standby life: 1.5 hrs. typical at 25° C (Transmitter); 4 hrs. typical at 25° C (Receiver).

EMPLACEMENT

Emplacement Mode Transmitter and receiver are designed for pole-mounting.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed or temporary site use.

EFFECTIVENESS/RELIABILITY

Detection Range Adjustable zone coverage of 20-500 ft. in length and 1-40 ft. in width.

Transmission Range

With Relay

Sensitivity Detection sensitivity is field adjustable. Also adjustable multipath detection sensitivity capability.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms Nuisance alarms from power fluctuations and random movement are minimized through signal processing.

Vulnerability to Spoofing or Tampering Unit is completely enclosed in aluminum housing.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30° to $+60^{\circ}$ C. Temperature changes do not affect system operation.

Humidity Humidity does not affect system operation

Rain Rain does not affect system operation.

Snow Snow does not affect system operation.

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Required.

Foliage

Soil Conditions

Other

SOURCE: Racon, Inc., product literature. 4 May 1981.

RACON 17000

Outdoor Security System



FEATURES

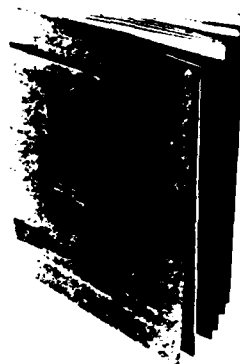
- **Midrange security**
Adjustable zone compensation 20 to 100 feet
- **Protection zone width**
Field adjustable 1 to 40 feet (depending on zone length)
- **Detection methods**
Beam break, dynamic path and background sensing
- **LED diagnostics**
Rapid visual status alignment and trouble shooting
- **Tamperproof**
Intruder-proof sealed enclosure with tamper and tamper alarm
- **Signal processing**
Visual alarms from power fluctuations and random movement monitored through signal processing circuitry. Temperature changes, humidity, rain or snow do not affect operation
- **Warranty**
One year limited factory warranty

DESCRIPTION

The RACON 17000 is a greenfield, high performance, outdoor security system. It is designed for perimeter protection applications such as with houses, estates and large venues. Because of its compact size it is ideal for portable applications such as construction sites.

It comprises a transmitter probe, power supply, receiver, status LED, zone, tamper, tamper alarm, tamper alarm and tamper alarm width. Detection is achieved by the detection of a beam break, dynamic path and background sensing. The system is designed for use in all weather conditions. Temperature and humidity, rain or snow do not affect operation. LED indicators and tamper alarm diagnostics provide warning.

The 17000 comes complete with transmitter/receiver, standby batteries, Class 2 transformers, mounting hardware and installation/operation manual.



MODEL 17000

SPECIFICATIONS

SYSTEM SPECIFICATIONS

Range

500' Max (152 M)

*Frequency

10.525 GHz $\pm$ 25 MHz

Subcarrier Frequencies

2.5, 3.4, 4.6, 6.2 KHz (field selectable)

Antenna Pattern

Single lobe approx. 8 1/2° horizontal and vertical

Operating Temperature

-30°C to 60°C

Input Power

16.5 VAC 20 VA Max (50-60 Hz)

Batteries

9 amp-hour standard. Low battery voltage disconnect circuitry standard (2.5 AH and 4.5 AH optional)

RF/Conducted Line Filtering

Integral with design

Detection Methods

Loss of transmitted signal (beam break)
Dynamic multipath detection, Frequency jamming

Dimensions

13" W x 13" H x 13" L (33 x 33 x 33 cm)
both transmitter and receiver

Weight

20 lb (9.1 kg) each system (both transmitter and receiver)

Mounting

Designed for 3.5" (8.9 cm) O.D. pipe

Packaging

All aluminum enclosure with integral shroud

System Part Number

*0038-001-01

TRANSMITTER SPECIFICATIONS

Microwave Output

250V/meter Max at 100 feet

Modulation

100% pulsed impatt diode

User Adjustments

Subcarrier channel

Tamper Circuit

Self-tamper sensing (optional relay output)

AC Power Fail Relay (optional)

NC/NO 1A, 28 VDC

Remote Test

Standard

Transmitter Current

300 ma Max battery drain

Battery Standby Life

* 5 hours typical at 25°C (9 AH battery)

Power "On" Indicator

LED

Transmitter Part Number

*0038-102-01

RECEIVER SPECIFICATIONS

Band Pass Filter

>60 db adjacent RF band rejection

LED Indicators

Beam break alarm, multipath indication
jamming alarm, Non-alarm condition

User Adjustments

Subcarrier channel, Range control
Multipath detection sensitivity

Alarm Duration

5 to 30 seconds, adjustable

Alarm Relay

N/C or N/O contacts rated at 1A
28 VDC, 3A, 110 VAC

Tamper Relay

N/C or N/O contacts rated at 1A
28 VDC, 3A, 110 VAC

Zone Alignment

Test points for voltmeter

Receiver Current

200 ma

Battery Standby Life

4 hours typical at 25°C (9 AH battery)

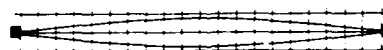
Receiver Part Number

*0038-103-01

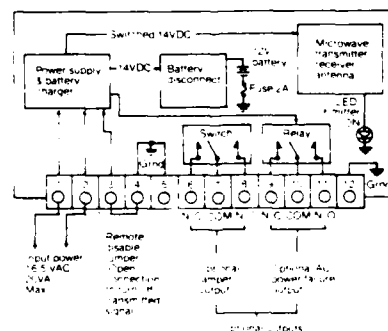
*Optional export frequencies available

TYPICAL COVERAGE PATTERN

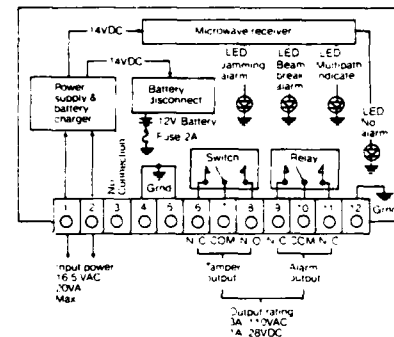
(symmetrical horizontal and vertical).
Each square equals 25 feet. Coverage width is adjustable up to maximum shown.



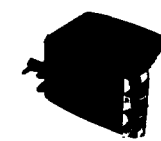
TRANSMITTER INTERCONNECTION



RECEIVER INTERCONNECTION



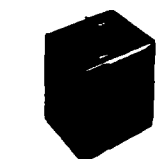
ACCESSORIES



Model 1620
Replacement transformer, Class 2 power, 115V AC — 16.5V AC, 20 VA rated (UL listed).
Part No. 01009-004-01

Model 1618

Optional transformer, Class 2 power, 230V AC — 16.5V AC, 18 VA rating
Part No. 01008-003-02



Model 6009*
Replacement battery, rechargeable 6 volt, 9 amp-hour rating

*Contact factory for 2.5 and 4.5 AH battery duration

Specification subject to change without notice

RACON INC.
quality microwave products

12628 Interurban Ave. S
Seattle, WA 98168
206 241-1110 Telex 32-1202

SENSOR SYSTEM DATA SHEET

Name of Sensor Microwave Fence (Model 33)

Developer Shorrock, Inc.

Availability Status Commercially available

System Application Outdoor perimeter intruder detection

SYSTEM DESCRIPTION

Type of Sensor Microwave

Description System consists of a microwave receiver and transmitter mounted above ground. System may be configured in multiple unit arrays to create a microwave "fence".

Principle of Operation Microwave beam is emitted from the transmitter. Intrusion is detected when intruder causes received signal (which is the sum of the direct signal and reflected signals from the ground, etc.) to change sufficiently either by an increase or a decrease in signal level.

Transmission Mode Hard-wire.

Signature "Active" sensor (microwave emission). System has high visibility.

Add-on Capability Many zones may be used to create a total perimeter system. Units may be stacked to increase height of coverage (transmitters must be synchronized) or may be mounted vertically. Also, reflectors or multiple receivers may be used to increase coverage.

Cost

PORTABILITY

Weight of Each Container Shipping weight (receiver, transmitter, and cables): 21 lbs.

Size for Each Container Transmitter: 24" length x 5" diameter. Receiver: 24" length x 5" diameter.

POWER REQUIREMENTS

Power Requirements Transmitter/Receiver power requirements: 14 to 35 VDC or 12 to 24 VAC RMS, 50/60 Hz; 100 mA current maximum at 24 VDC.

EMPLACEMENT

Emplacement Mode System can be rigidly mounted on building roofs, walls or attached to standard 3 inch pipe mounted in concrete for permanent field installation. System should be mounted 3-4 ft. above ground level. Unit may be mounted vertically to achieve a wide horizontal and narrow vertical detection zone, or may be stacked to increase height of coverage. Shielded cable is designed for direct burial.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness Designed for outdoor, fixed site use. Field proven (military). See product literature

EFFECTIVENESS/RELIABILITY

Detection Range Range for single transmitter/receiver zone is up to 1000 ft.; but for optimum detection, zone lengths greater than 300 ft. are not recommended. Zone lengths can be optimized for particular security requirements. Zone width (for 100 meter zone length) equals 4.5 meters; zone height equals 2.2 meters approximately.

Transmission Range

With Relay

Sensitivity Adjustable sensitivity range. System is able to detect movement at speeds under 1.5 cm/second.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability (See MTBF data below.)

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms False alarm rate due to wind-induced movement of adjacent fences, etc. is extremely low due to antenna configuration.

Vulnerability to Spoofing or Tampering Anti-tamper features including "tamper" circuits to detect unauthorized entry into equipment. System responds to either an increase or decrease in signal strength and is therefore safeguarded against this form of countermeasure, i.e., electronic capture.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate) MTBF is calculated as being in excess of 34,000 hrs. at 20° C ambient for one set of equipment (using Royal Signals and Radar Prediction method No. 250).

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating/storage temperature: -40° C to +70° C.

Humidity System detection capability not affected by humidity.

Rain System detection capability not affected by rain.

Snow System detection capability not affected by snow.

Haze/Smoke/Fog

Wind Wind-generated false alarms, due to movement of nearby fences, etc. are reduced due to use of an antenna configuration which produces a narrow angle in the horizontal plane.

Other Conditions

Light

Noise

Line-of-Sight Line-of-sight required between transmitter and receiver.

Foliage Area between transmitter and receiver must be free of vegetation.

Soil Conditions

Other Terrain between transmitter and receiver must be reasonably flat for optimum detection.

SOURCE Shorrock, Inc., product literature.

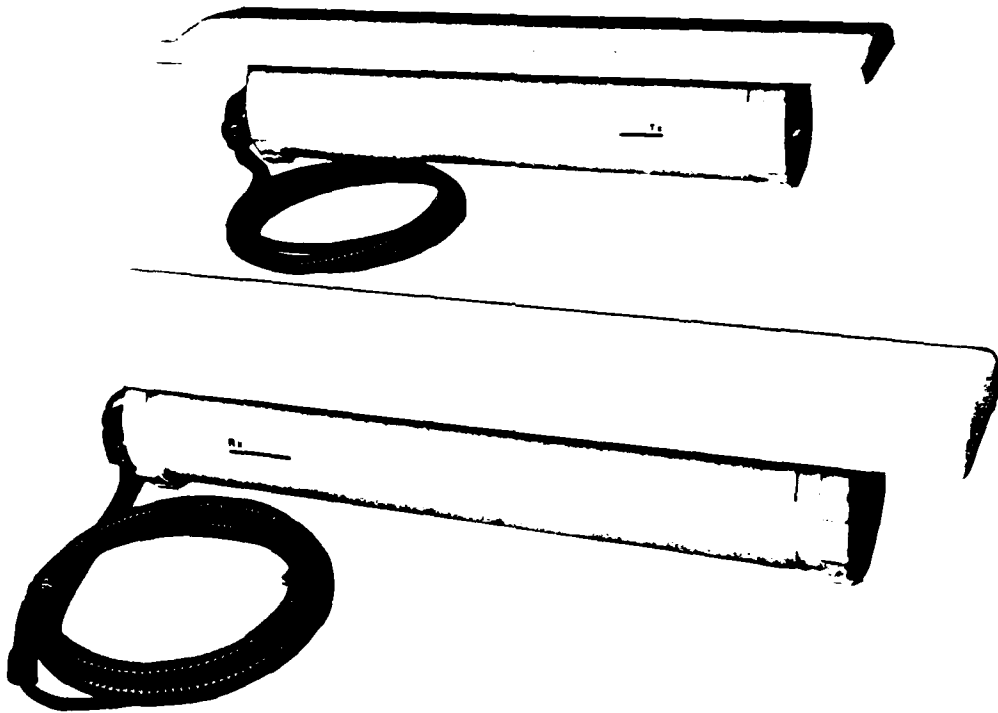
Shorrock Inc.

a subsidiary of The Greyhound Corporation



Microwave Fence

MODEL 33



General

The Shorrock Model No. 33 Microwave Fence is a bi-static system using a microwave transmitter/receiver.

The Microwave Fence System will provide an above ground perimeter detection system, with units deployed to give optimum zone lengths. Zone length is an important factor in attaining optimum detection capability and ease of perimeter segment identification. Zone lengths can be optimized for particular security requirements.

The Shorrock Microwave Fence includes an antennae configuration which is all important because it produces a narrow angle in the horizontal plane significantly reducing the reflection effects from adjacent metal fences and also resulting in extremely low false alarm rates induced by wind causing movement of adjacent fences.

The patented antennae design and electronic processing circuitry provides the Shorrock Model 33 the ability to detect movement at speeds below 1.5 cm/sec.

In the Shorrock Model 33, the received signal is the sum of the direct signal and reflected signals from the ground and adjacent structures. Detection of an intrusion results when an intruder causes sufficient change in the received signal level.

It is important to note that the receiver responds to both an increase and decrease of received signal level, because if any increase is not detected, the receiver can be captured by a suitably imposed transmitter and the sensor nullified.

The Shorrock Model 33 Microwave Fence responds to an increase and decrease in signal and so safeguards against this form of countermeasure.

MICROWAVE FENCE / Model 33

Features

- Range up to 1000 ft.
- All weather operation—not affected by fog, rain, snow, hail, etc.
- Simple installation—simple alignment using audio signal output.
- Easy maintenance.
- Single sensitivity control.
- Anti tamper features.
- Radio frequency interference resistant.
- Detects both signal increase and decrease—receiver therefore not prone to being electronically captured.
- F.C.C. Certified.
- Fully supervised.

Applications

To provide perimeter intrusion detection at Prisons, Nuclear Power Plants, Military Installations, School Bus Lots, etc. Can be rigidly mounted on building roofs, walls, posts, or generally in any location allowing line of sight transmission from the transmitter to the receiver. Care should be taken when covering areas over water. Generally, the transmitter and receiver, which comprise the intrusion detection system, are mounted at a height of 3 to 4 feet above the ground level. They may be wall mounted or attached to a standard 3 inch diameter pipe mounted in concrete for a permanent field installation. The surface between the transmitter and receiver should be reasonably flat and free of vegetation. For certain applications, the unit may be mounted vertically instead of horizontally in order to achieve a wide horizontal and narrow vertical detection pattern.

Range for a single transmitter/receiver zone is up to 1000 feet, but for optimum detection of a prone crawler, individual zone lengths of greater than 350 feet are not recommended. A total perimeter system may consist of many microwave zones.

STACKING UNITS Units may be stacked to increase the height of coverage. Transmitters must be synchronized, with one acting as master, the other as a slave. Provisions are made in the transmitters to accomplish this.

REFLECTORS Reflectors can be used to provide full coverage up to the side of a building. These can be fabricated from steel or a combination of plate glass and wire mesh. Reflectors must be rigidly fixed in position after alignment. Another alternative is the use of multiple receivers to increase coverage.

Technical Data

APPROXIMATE DIMENSIONS

Transmitter: Length: 0.6 metres (24 inches).
Diameter: 0.12 metres (5 inches).

Receiver: Length: 0.6 metres (24 inches).
Diameter: 0.12 metres (5 inches).

WEIGHT (PACKED)

Includes Receiver, Transmitter, and connecting cables with flexible conduit. 9½ kg. (21 lbs.)

TEMPERATURE RANGE

Operation: -40° C to +70° C.

STORAGE

-40° C to +70° C.

TRANSMITTER

Oscillator: Gunn Effect Diode
Frequency: 10.525 GHz USA.
Mean Power Output: 0.5W
EIRP typical.
Modulation: Pulsed.

TRANSMITTER ANTENNA

Microstrip in corner reflector, 4° half power inclusive angle in azimuth. 35° half power inclusive angle in vertical. Polarization: Vertical.

TRANSMITTER POWER REQUIREMENTS

14 to 35V DC or 12- 24V AC
RMS, 50/60 Hz 100 mA current maximum at 24V DC (typically 55mA).

TRANSMITTER TAMPER SWITCH

Fitted behind removable end cap.

RECEIVER ANTENNA

Microstrip in corner reflector, 4° half power inclusive angle in azimuth. 35° half power inclusive angle in vertical. Polarization: Vertical
Detector: Schottky barrier diode.

RECEIVER TAMPER SWITCH

Fitted behind removable end cap.

ALARM OUTPUT

Hermetically sealed relay with two sets of change over contacts. One set of contacts has a 22K termination resistor between the NO and NC contacts.
Contact Rating: 100 VA or 60 Watts, 220 Volts maximum, 2 Amps maximum.

RECEIVER POWER REQUIREMENTS

14-35V DC, 12-24V AC RMS
50/60 Hz., 70 mA maximum at 24V DC (40mA typical).

RANGE

Maximum Receiver—Transmitter separation 1000 feet
Recommended Receiver—Transmitter separation for optimum detection characteristics is 50 to 350 feet over flat ground.
Range Adjustment—Automatic within the processing circuitry.

CONTROLS

Single sensitivity control, with an adjustment range graduated from 1 (minimum sensitivity) to 10 (maximum sensitivity)—corresponding to a sensitivity adjustment of from ±5.6dB to ±0.8dB received signal change.

DETECTION PATTERN

Because of the narrow azimuth beam angle, penetration into the beam is more readily detected since, for a given target size, a greater signal change is received than would be the case if a wider azimuth angle system were used.

This narrow angle also allows the unit to be utilized close to structures, including perimeter fences.

The following figures relate to a typical system having a Receiver-Transmitter separation of 100 metres, with a 30 cm diameter metal sphere target and with the units mounted 60 cm from the ground level and the sensitivity control set to maximum. Width of detection zone at center: 4.5 metres approximately
Height of detection zone at center: 2.2 metres approximately
Minimum detectable speed: Lower than 1.5 cm/sec

MICROWAVE FENCE / Model 33

Technical Data

E.C.M. CAPABILITY

"CAPTURE"

Since the unit responds to both increase and decrease in received signal level, the unit is not prone to being "captured" by a clandestine transmitter.

E.M.I. "ELECTRICAL INTERFERENCE"

The equipment meets the requirements of the following:

US.MIL.Std. 461A Method CS01—conducted susceptibility power line tests from 30 Hz to 50 KHz.

US.MIL.Std. 461 Method CS02—conducted susceptibility power line tests from 50 Hz to 400 KHz.

US.MIL.Std. 461 Method CS06—conducted susceptibility power line pulse test.

US.MIL.Std. 461 Method RS03—radiated susceptibility electric field from 14 KHz to 10 GHz (with 3 volts/metre upper limit 50MHz to 1.2 GHz)

RELIABILITY

Using Royal Signals and Radar Establishment Reliability Predication method No. 250 the Mean Time Between Failure (MTBF) is calculated as being in excess of 34,000 hours at 20° C ambient for one set of equipment.

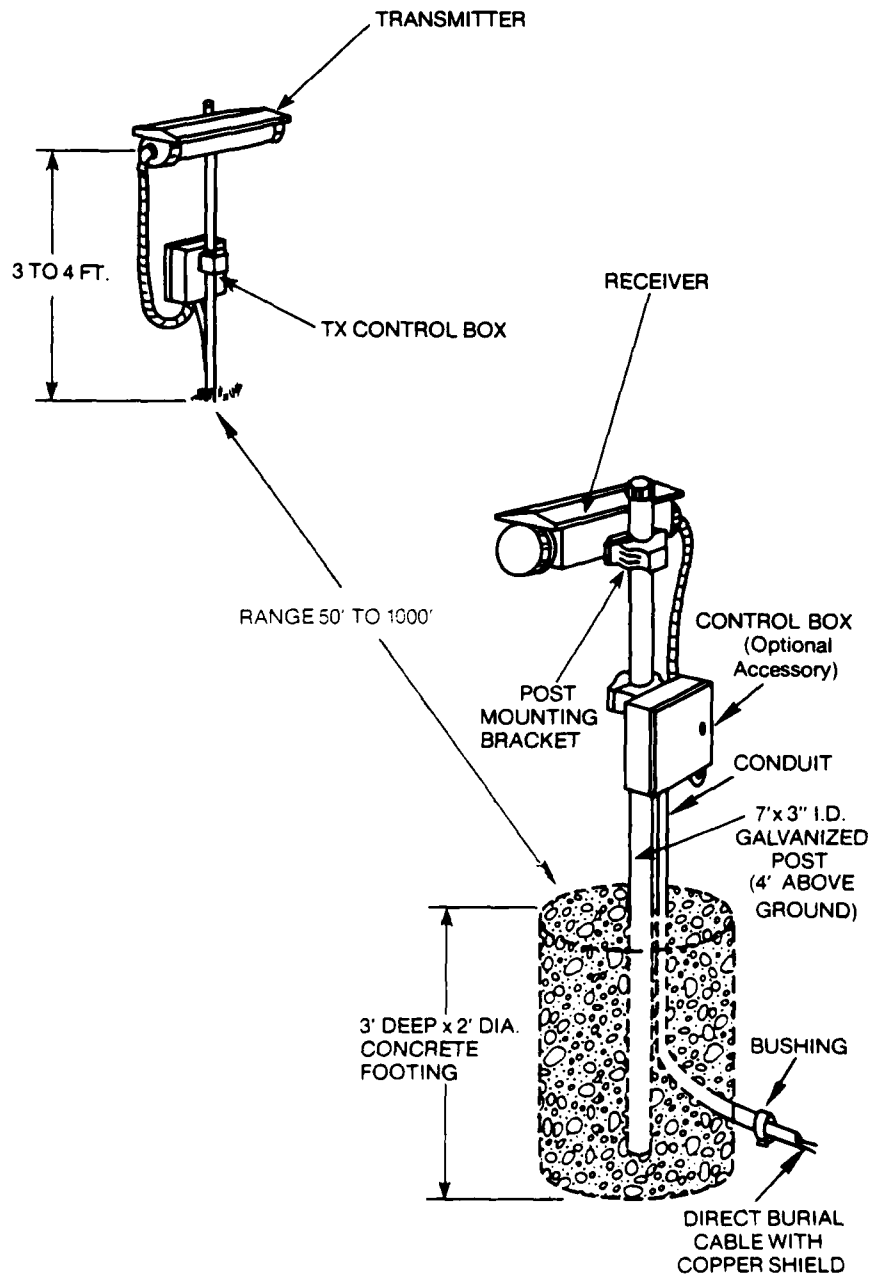
APPROVALS

F.C.C. Certified.

TESTING

Testing and evaluation has been conducted by many agencies, including the U.S. Dept. of Energy, Sandia Labs., U.S. Army, MERADCOM.

Typical Installations



MICROWAVE FENCE / Model 33

Guide Specifications

Perimeter Microwave Sensors shall be Shorrock Model 33 Microwave Fences.

Each microwave sensor shall consist of a transmitter and receiver correctly aligned with respect to each other to project a modulated microwave beam which, if interrupted, will initiate an alarm signal because of signal strength variation of the received microwave signal. The transmitter and receiver for the perimeter detection system shall be located with respect to each other so that the beam pattern will detect a human being crawling on his stomach parallel to the beam. The maximum range, including offset, shall not exceed 350 feet.

Transmitter, receiver, power supply unit, transformer, and other auxiliary components required for the complete unit shall be for outdoor use for satisfactory operation in ambient temperature range of -40°C to $+70^{\circ}\text{C}$. Power supply for both receiver and transmitter shall be 24 volts A.C. or D.C. and shall be obtained by either transformer or power supply unit mounted on the receiver and transmitter mounting post. Input power to transformer or power supply shall be nominal 120 volts A.C., 60 Hz supplied from emergency power supply branch circuit or from uninterruptable power supply.

In the event of failure of normal power source, no intrusion or tamper alarm shall result from this failure during transfer time from normal power source to emergency power source.

Each transmitter—receiver unit shall be modular in construction for ease of maintenance and the mean time to repair shall be demonstrated to be less than thirty minutes. It shall be possible to change the total transmitter-receiver module, including antenna without altering the alignment of the transmitter or receiver housing.

Each transmitter shall contain a normally closed "tamper" circuit to detect unauthorized entry into equipment. Receiver shall contain "tamper" circuit, identical to transmitter, plus two normally closed "alarm" circuits and two normally open "alarm" circuits. Internal alarm and tamper switches shall be isolated contacts. Alarm contacts shall be rated at 2 amps, 220 volts maximum.

Special Equipment

Microwave Fences that meet Class 1 Division II Group D of the National Electrical Code are available for use in hazardous locations.

Optional Accessories and Test Equipment

1. Transmitter Test Unit which consists of an X Band receiver with horn antenna and earphone output. Test unit is a useful aid in aligning transmitter and receiver units.
2. Receiver Junction Boxes. Nema 4 galvanized and painted junction boxes with U.L. approved locks are available for a variety of applications. Specify Power Input, Local or Central Standby, Walk Test Light, Supervisory Networks, Power Fail Monitor. Box is fitted with tamper switch and terminal strips are provided for all field connections.
3. Transmitter Junction Boxes. Nema 4 galvanized and painted junction boxes with U.L. approved locks are available for a variety of applications. Specify Power Input, Local or Central Standby, Supervisory Networks, Power Fail Monitor. Box is fitted with tamper switch and terminal strips are provided for all field connections.

Shorrock Inc.

Parkway Industrial Center
7235 Standard Drive, Hanover, MD 21076
Telephone: (301) 796-8520/Telex: 87-456

This company reserves the right to alter specification and equipment without notice

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3.5 ELECTROMAGNETIC SYSTEMS - Data Sheets and Product Literature

Control Data: GUIDAR

Control Data: Perimeter Intrusion Radar (SPIR)

Israel Aircraft Industries: Magbelt

Israel Aircraft Industries: Magstaf

Stellar Systems: Sentrax

Stellar Systems: Differential E-Field (Model DEF-700)

Stellar Systems: E-Field (Models EF-30 and EF-32)

Stellar Systems: H-Field Buried Line Field Disturbance Sensor

Stellar Systems: Rapid Deployment Intrusion Detection System (RDIDS-1A)

US Army: Electromagnetic Intrusion Detector (EMID III)

SENSOR SYSTEM DATA SHEET

Name of Sensor Guided Radar Perimeter Intrusion Detection Sensor (GUIDAR)

Developer Control Data

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Electromagnetic ("leaky" coaxial cables)

Description System consists of a processor/display unit and coaxial cables buried along the protected perimeter. The processor/display unit contains the transmitter, receiver, and digital processing electronics and is housed indoors. Cables consist of passive lead-in and trailer sections and an active "leaky" section.

Principle of Operation A detection zone is created between buried, "leaky," coaxial cables deployed around the protected area. The cables create an electromagnetic field which, when penetrated by an intruder, creates an alarm condition.

Transmission Mode Hard-wire.

Signature "Active" sensor (electromagnetic emission). Sensors have no visible signature; display unit designed for indoor facility.

Add-on Capability Multiple segments (800 meter) may be used for longer perimeter protection. Line amplifier unit needed for add-on segments. Remote control/display unit provides operational control/display interface from a remote location up to 100 meters from the processor/display unit.

Cost

PORTABILITY

Weight of Each Container Display unit: 110 lbs.

Size for Each Container Transducer cables: 800 mtrs. length (maximum) per segment; 1.6 cm diameter (maximum). Processor display unit: 15" x 20" x 28". Line amplifier unit: 13" x 15" x 7". Remote control/display unit: 15" x 20" x 8".

POWER REQUIREMENTS

Power Requirements 115V $\pm$ 5% 60Hz $\pm$ 5%, single phase 300, VA maximum (230 V 50 Hz optional).

EMPLACEMENT

Emplacement Mode Cables are buried in either a 2- or 3-cable configuration at a depth of approximately 25 cm., provided cables are protected from vehicular traffic above. In concrete or asphalt, shallower burial is acceptable. Processor/display unit is normally installed in a building up to 200 meters inside the perimeter. Line amplifier units are usually pole-mounted outdoors up to 22 meters inside the perimeter.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use. Processor/display unit must be housed indoors.

EFFECTIVENESS/RELIABILITY

Detection Range Detection zone extends 15 ft. to each side of cable center line. Basic unit provides 1600 meter perimeter coverage. Coverage can be extended to 8000 meters with the addition of 800-meter "add-on" cable segments.

Transmission Range

With Relay

Sensitivity Detection threshold value for desired target is automatically computed for each range cell following initiation measurement. Computation is then used to manually set threshold level.

Remote Alarm Assessment Capability Display panel visually and audibly indicates location of intrusion. Detection resolution: 33 1/3 meters. Display resolution: 100 or 66 2/3 meters (optional).

Detection Probability Greater than 99%.

Functional Reliability

False Alarm Rate (FAR) (estimated) Less than 1 per 32 days per 100 meters (product literature)

Susceptibility to Nuisance/Environmental Alarms System will reject small targets (less than 1% probability of detection for a 10-lb. animal). Digital processing system is very effective in rejecting false alarms.

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Display unit: 0° to $+35^{\circ}\text{C}$. Transducer cable installation temperature: -40° to $+55^{\circ}\text{C}$.

Humidity Processor/display unit: 0 to 95% non-condensing

Rain Processor will detect and automatically compensate for heavy rainfall.

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight

Foliage

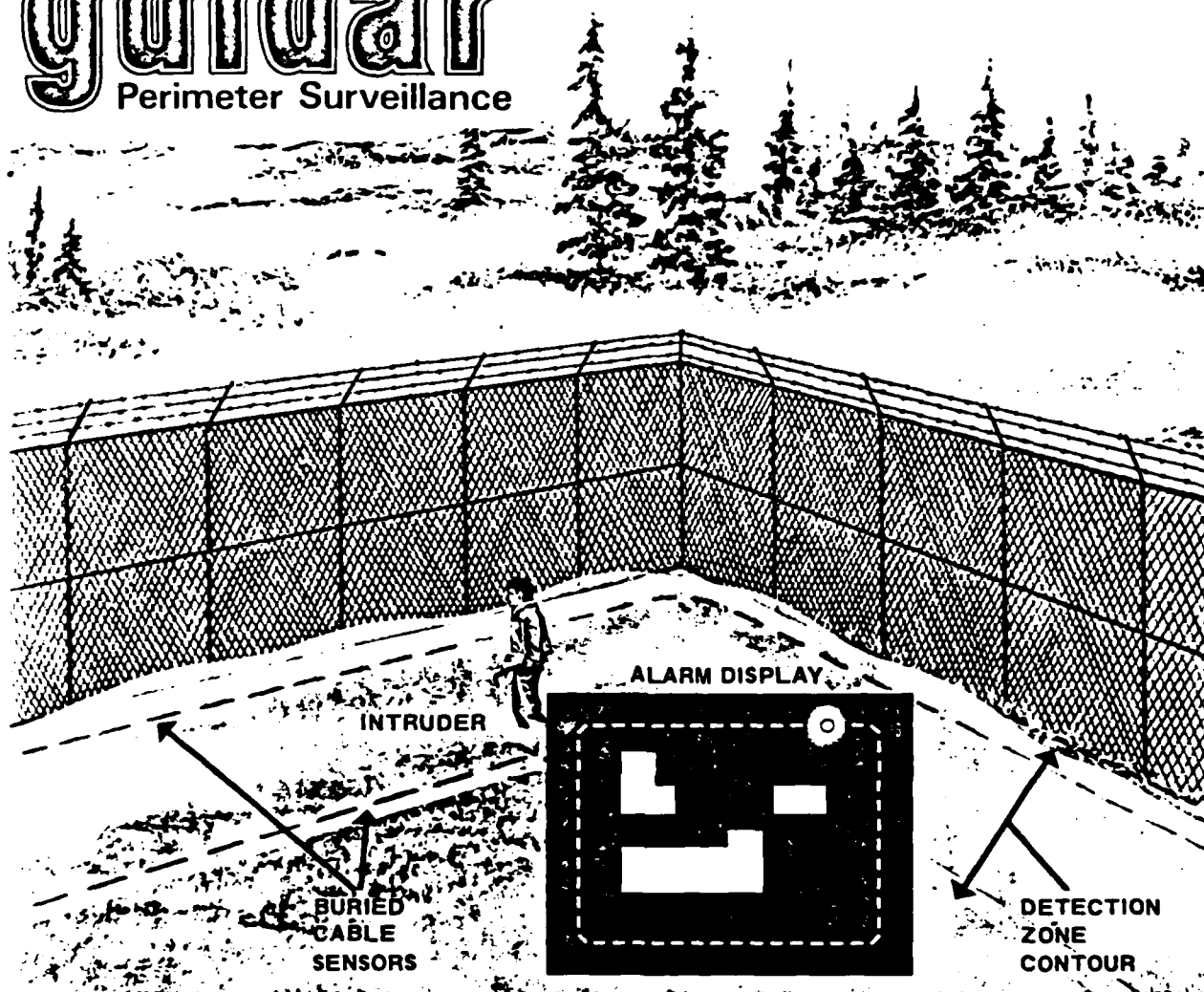
Soil Conditions

Other No special terrain preparation required prior to cable installation or operation. Cable burial required.

SOURCE Computing Devices Company (a division of Control Data Canada, Ltd.) product literature.

guidar

Perimeter Surveillance



INTRODUCTION

GUIDAR is a perimeter surveillance sensor designed to detect and locate intruders over long outdoor perimeters. It operates on a unique new principle of "guided radar" whereby a detection zone is created between "leaky" cables deployed around the protected area. The cables produce an "electromagnetic fence" which, when penetrated by an intruder, creates an alarm condition.

GUIDAR FEATURES:

- Detection and location for long perimeters (up to 3200 m per segment)
 - Multiple segment compatibility for longer perimeters
- Easy installation in virtually any terrain
 - Single access point for power and data
- Immunity to environmental conditions and changes
- Discrimination between intruders and small animals, birds, etc
- Well contained detection zone
- Automatic self testing for confidence in system operation
- Digital design for reliability, stability and ease of maintenance
- Covert operation for "sensitive" perimeters
- Multiple intruder detection capability

PERIMETER INTRUSION DETECTION

Theft, terrorism, civil disobedience — the unprecedented increase in these activities creates a need for improved security of all types — including the use of electronic sensors to aid human guard forces.

A variety of perimeter sensors have been developed to detect intruders by monitoring changes in seismic, acoustic, optical, infra-red or electromagnetic information. All of these approaches suffer, in varying degrees, from an inability to discriminate genuine intrusions from false alarms created by environmental effects or small animals. With a high false alarm rate, the sensor becomes a confusing liability rather than a benefit to the user.

GUIDAR is a patented new sensor which overcomes the restrictions of installation environment. The active guided radar detection technique does not depend on physical characteristics of the intruder that are duplicated in, or affected by the installation environment. In addition, GUIDAR's advanced digital signal processing effectively discriminates against small animal targets. The net result is a dramatic improvement in false alarm performance when compared to other sensor technologies.

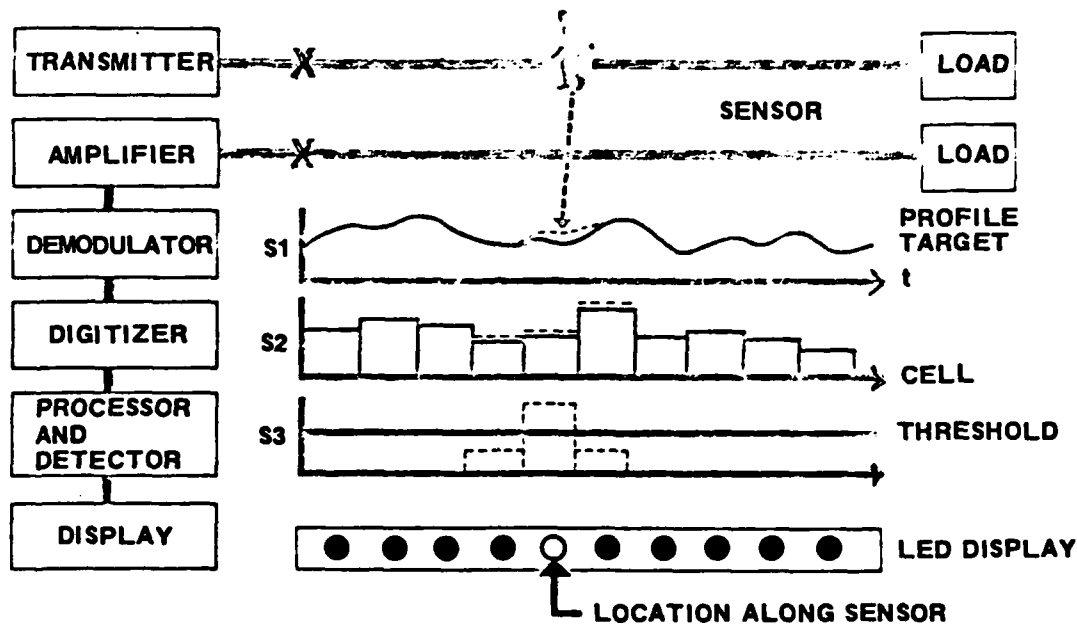
GUIDAR CABLE TRANSDUCER

The key to GUIDAR operation is the use of "leaky" coaxial cables to distribute the radar detection zone.

The cable consists of a solid inner conductor surrounded by a foamed polyethylene dielectric and a corrugated copper outer conductor. Holes milled in the outer conductor in a special pattern allow energy to couple between the inside and outside of the cable. In effect, an RF signal travelling inside the cable sets up a travelling wave outside the cable and vice versa. The size and pattern of the holes determines the extent of this coupling — a parameter defined as coupling loss.

The rugged construction and tough jacket over the outer conductor ensure long cable life in any environment.

TYPICAL
CABLE



THEORY OF OPERATION

As illustrated, a transmitter is connected to one cable transducer and a receiver is connected to a second cable transducer. A short pulse of VHF energy causes a surface wave to propagate along the outside of the transmit cable. A portion of this surface wave couples into the receiver cable and produces a continuous VHF return signal at the receiver. The time-varying amplitude of the demodulated return signal is a "profile" that remains stationary after the cable installation is completed.

When an intruder enters the field of coupling between cables, he causes a disturbance in the

profile which can be reliably detected by MTI processing. The detected return signal (S1) is digitized into range cells (S2), stored in the processor, and subtracted from the next return signal to produce the difference data (S3). The presence of the intruder is detected when a difference occurs between this data (S3) and a calibrated threshold.

Location of the intruder is determined by the time delay between the start of the transmitted pulse and the reception of the profile disturbance. Results are relayed to the operator by both audible and visual means.

PROCESSOR/DISPLAY UNIT

The PROCESSOR/DISPLAY UNIT contains the transmitter, receiver, and digital processing electronics. For perimeters up to 1600 m, a basic set of electronic modules is required. For perimeters up to 3200 m, a processor extension package is plugged in. The Processor/Display Unit is normally housed in a building or shelter up to 200 m inside the perimeter.

CABLE TRANSDUCER

CABLE TRANSDUCER SEGMENT consists of passive lead-in and trailer sections and an active "leaky" section that may be up to 800 m long. Actual length of each section and the number of segments required depends on the particular installation configuration.

TERMINATOR UNIT(S)

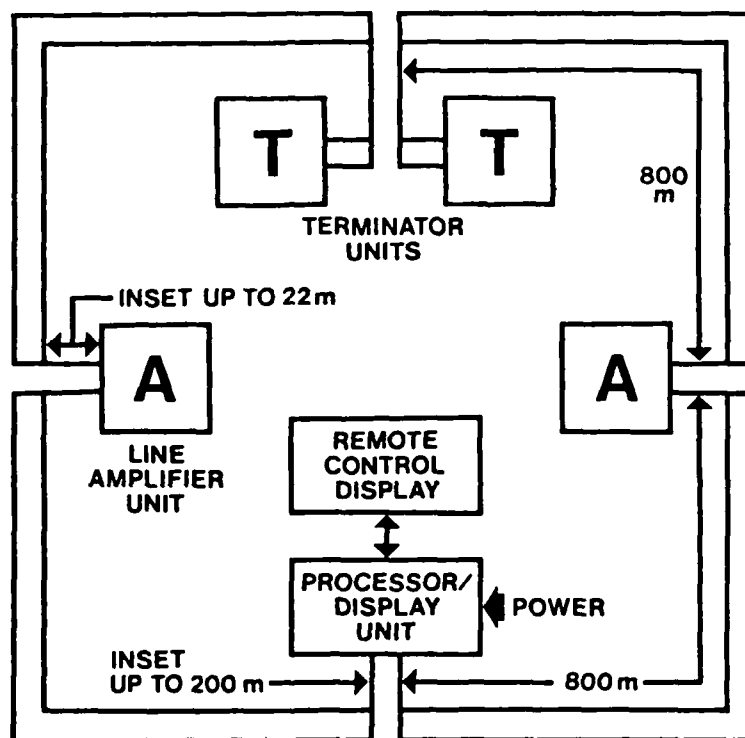
TERMINATOR UNIT provides a passive load for each signal path in the sensor configuration and connects the transmit and receive cables for automatic self-testing. Installation is similar to the Line Amplifier Unit.

LINE AMPLIFIER UNIT(S)

LINE AMPLIFIER UNIT amplifies the transmitted signal for "add-on" 800 m cable segments. This unit is designed for outdoor installation (typically post-mounted) and can be located up to 22 m inside the perimeter. Power for the amplifier is supplied over the cable for ease of installation.

REMOTE CONTROL/DISPLAY UNIT

REMOTE CONTROL/DISPLAY UNIT provides operational control/display interface from a remote location up to 100 m from the Processor/Display Unit.
— A variety of custom interfaces are available for customer-furnished displays.



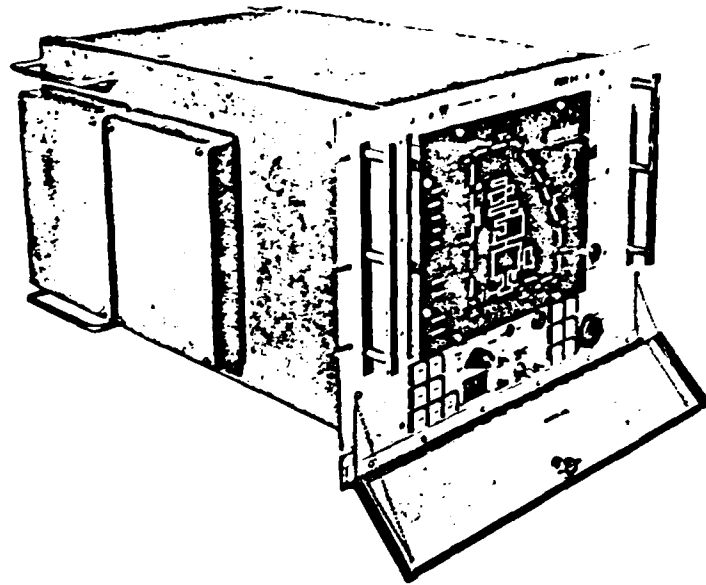
SYSTEM CONFIGURATION

Because of its modular design, GUIDAR can be configured to meet the requirements of any military or industrial installation regardless of topography or length of perimeter. A typical configuration for a 3200 m perimeter is shown above.

PROCESSOR/DISPLAY UNIT

The Processor/Display Unit is enclosed in a front access slide-out chassis designed to fit a standard equipment rack. For desk-top mounting, a short rack is available as an option.

The display control panel on the front of the processor unit is required during installation and maintenance of GUIDAR and may also be used as the operational display in the absence of other external displays. The perimeter is described by a mimic board of lamps, each lamp representing 100 m (66 m or 33 m representations are also available as options). When an intrusion occurs, an audible alarm is initiated and an indicator lamp flashes at the appropriate location on the mimic board.



OPERATIONAL CONTROLS

- **ALARM ACKNOWLEDGE** switch permits operator to silence alarm. Alarm indicator lamp remains lit (steady).
- **LAMP CLEAR** switch restores mimic board to non-alarm status after appropriate response has been taken.
- **LAMP TEST** switch provides verification that all lamps are operational.
- **HORN DISABLE** key disables audible alarm during installation and setup procedures.

The processor is divided into two sections; each independently processes data from the left - and right - 1600 m transducer cables (sides A and B). Separate status lamps are provided for each side.

STATUS LAMPS

- **RAIN** switched on automatically to indicate processor has

detected and is compensating for heavy rainfall.

- **JAM** switched on automatically to indicate processor has detected jamming (deliberate or accidental) and to alert operator.
- **RUN** on during normal operation.
- **FAIL** switched on automatically when processor detects a failure during automatic self testing.
- **TEST** indicates that processor is in TEST mode.
- **BAT FAIL** indicates the status of an external power source.

NON OPERATIONAL CONTROLS
Secondary controls and maintenance test points are located behind a tamper-proof cover plate. These controls communicate with the microprocessor during installation, start-up and maintenance operations. A rotary switch is used

for mode selection: OFF, WARM-UP, NORMAL, TEST, CALIBRATE and MASK.

TEST MODE enables the display of internal failure diagnostic routines on the alarm indicator display. One of seven alarm lamps will light depending on the failure detected.

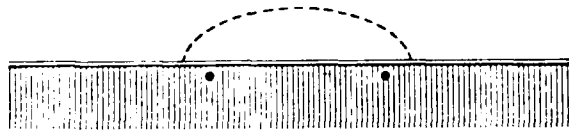
CALIBRATE MODE enables the setting of detection thresholds. In this mode, the detection response to a person walking along the length of the sensor is measured. This data is then used to automatically compute a threshold value for each range cell.

MASK MODE enables the field programming of up to six combinations of range cells. In NORMAL mode any one of these combinations is selected by pressing the appropriate numbered MASK key. Access is then permitted through the selected cells without causing alarms.

BURIED CABLE

Buried 2- or 3- cable configurations offer the advantage of covert deployment. A burial depth of about 25 cm provides a stable installation. In concrete or asphalt, shallower burial is acceptable provided that cables are protected from vehicular traffic over them.

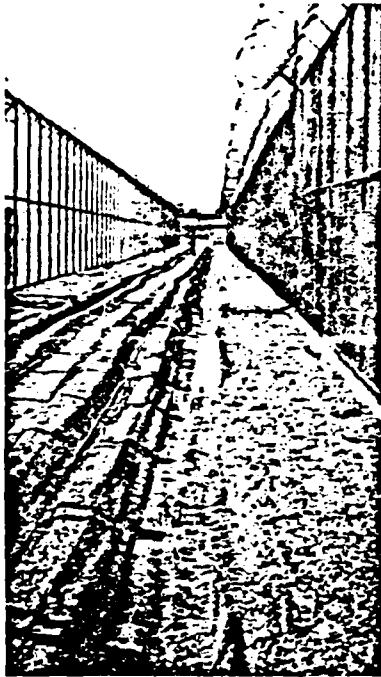
- Simple compared to other perimeter sensors.
- No special preparation of terrain required.
- Tolerance on depth and cable separation not critical.



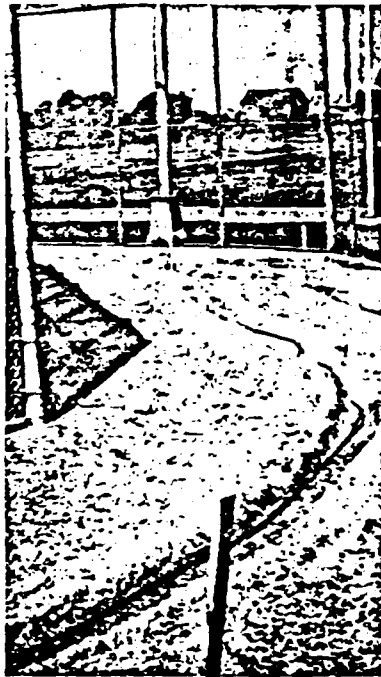
DEPLOYMENT

GUIDAR can be deployed in a number of different cable configurations in any terrain. The choice will depend on the desired detection zone, concealment requirements and other site-dependent variables. Typical configurations with approximate detection zones are illustrated.

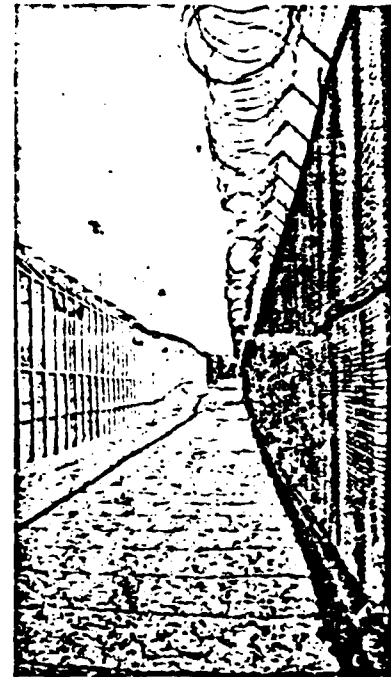
SYSTEM COMPONENT	PERIMETER LENGTH									
	0 - 800 m	800 - 1600 m	1600 - 2400 m	2400 - 3200 m	3200 - 4000 m	4000 - 4800 m	4800 - 5600 m	5600 - 6400 m	6400 - 7200 m	7200 - 8000 m
Processor/Display Unit	1	1	1	1	2	2	2	2	3	3
Extension Processor Modules	nil	nil	1	1	1	1	2	2	2	2
Line Amplifier Unit	nil	1	1	2	2	3	3	4	4	5
Terminator Unit	1	1	2	2	3	3	4	4	5	5
Transducer Segments (2 cable system)	2	4	6	8	10	12	14	16	18	20
Transducer Segments (3 cable system)	3	6	9	12	15	18	21	24	27	30
Remote Control / Display Unit	Quantity 1 Optional				Quantity 2 Optional				Quantity 3 Optional	
Processor/Display Mounting Rack	Quantity 1 Optional				Quantity 2 Optional				Quantity 3 Optional	



Cable trenching is a **SIMPLE** low-tolerance operation.



GUIDAR fits **ALL TERRAIN** conditions — corners, hills, etc.



GUIDAR is **COVERT** in the buried configuration.

PERFORMANCE

GUIDAR has been installed and tested under a wide variety of configurations, installation media and environmental conditions. Many thousands of data points have been collected and analyzed utilizing computer-based analysis techniques. In particular, digital tape recordings of "raw data" made during conditions of rapid environmental changes have been used to develop processing algorithms which are very effective in rejecting false alarms.

Although specific performance varies somewhat with installation environment, GUIDAR typically

provides the following:

- High Probability of Detection (PD)
 - greater than 99%
- Low False Alarm Rate (FAR)
 - less than 1 per 32 days per 100 m
- Small Target Rejection
 - less than 1% PD for a 10 lb animal
- Detection Zone Containment
 - 15 ft each side of cable centre line

SPECIFICATIONS*

PROCESSOR/DISPLAY UNIT (PDR-1)

PROCESSING CAPACITY

3200 m (2 miles) of perimeter (with expansion processor package)

1600 m (1 mile) of perimeter (basic unit)

DETECTION RESOLUTION

33 1/3 m

ALARM INDICATIONS

Up to 32 alarm zones on Mimic Display (LEDs)

Audible alarm (Horn)

DISPLAY RESOLUTION

100 or 66 2/3 m (optional)

OTHER CONTROLS & DISPLAYS

Status indicators, operating, calibration and maintenance.

SITE ADAPTATION

Via pre-wired plug defining frequency, lead-in length, perimeter length, display resolution, display mode.

MASK ZONES

Up to six selectable, field programmable cell combinations

SERIAL DIGITAL DISPLAY INTERFACE

Optional with remote display.

PARALLEL DISPLAY OUTPUT (OPTIONAL)

One pair of pins for each alarm and status signal
open (non alarm) 1400 ohms $\pm 5\%$ closed (alarm)
less than 200 ohms

MAINTENANCE FEATURES

Semi-automatic calibration, continuous self test, manual diagnostics, external test connections

POWER REQUIREMENTS

115 V $\pm 5\%$ 60 Hz $\pm 5\%$ single phase 300 VA
maximum (230 V 50 Hz optional)

OPERATING FREQUENCY

57, 63 or 69 MHz (field programmable)

DIMENSIONS

38 x 50 x 78 cm (15 x 20 x 28 in.)

WEIGHT

50 kg (110 lb)

MOUNTING

19 in. rack mounting or in table-top rack (optional)

OPERATING TEMPERATURE

0 to +35°C

HUMIDITY

0 to 95% non condensing

* Subject to change without notice

EXPANSION PROCESSOR PACKAGE (EPP1)

Plug in circuit card modules for processing up to
1600 m of transducer pair.

TRANSDUCER CABLE (HDF1)

ACTIVE LENGTH

up to 800 m per segment (as required)

LEAD-IN LENGTH

up to 200 m (as required)

TRAILER LENGTH

22 m

DIAMETER

16 cm maximum

BENDING RADIUS

12.5 cm (minimum)

INSTALLATION TEMPERATURE RANGE

-40 to +55°C

LINE TERMINATOR UNIT (LTU 1-1)

OPERATING TEMPERATURE

-50 to +50°C

POWER

not required (powered over cable)

DIMENSIONS

33 × 38 × 18 cm (13 × 15 × 7 in.)

MOUNTING

Normally post mounted

LINE AMPLIFIER UNIT (LAU 1-1)

OPERATING TEMPERATURE

-40 to +55°C

POWER

not required (powered over cable)

DIMENSIONS

33 × 38 × 18 cm (13 × 15 × 7 in.)

MOUNTING

Normally post mounted

REMOTE CONTROL/DISPLAY UNIT (DIZ 1)

ALARM INDICATORS

up to 32 alarm zones on mimic display (LED's)

audible alarm (horn)

DISPLAY LOCATION

up to 100 m from processor display unit

CONTROLS

operating and mask selection

POWER

not required (powered over line)

DIMENSIONS

38 × 50 × 20 cm (15 × 20 × 8 in.)

For further information, we invite you to contact
one of the following Control Data sales offices:

U.S. EASTERN REGION

● **Northeastern Region**

60 Hickory Drive
Waltham, MA 02154
(617) 890-4600

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Rockville, MD 20852
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Los Angeles, CA 90045
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(408) 734-7427

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Tel. Hastings (0424) 53481/5

SENSOR SYSTEM DATA SHEET

Name of Sensor Perimeter Intrusion Radar (SPIR)

Developer Control Data

Availability Status Commercially available

System Application Outdoor, short perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Electromagnetic ("leaky" coaxial cables)

Description SPIR is a microprocessor-based, buried-line, intrusion sensor designed to complement the CDC GUIDAR system (see preceding Data Sheet) in providing more cost-effective coverage over short perimeter segments. System consists of a processor (containing the transmitter, receiver, and digital microprocessor electronics), "leaky" coaxial cables, a transmitter, and an antenna cable).

Principle of Operation Transmitter generates a CID signal which is alternately switched between the two transmitter cables. The receiver detects the signal which is coupled into the receive cables, and processed by the microprocessor. The digital MTI radar processor measures a change in the electromagnetic environment created by the introduction of a human target and creates an alarm condition.

Transmission Mode

Signature "Active" sensor (electromagnetic emission).

Add-on Capability System may be installed in multiple 500 foot segments.

Cost

PORTABILITY

Weight of Each Container Processor: 15 lbs.

Size for Each Container Processor: 10" x 10" x 13". Transducer cable: 0.27 inches diameter, 2000 feet maximum per processor.

POWER REQUIREMENTS

Power Requirements 120 VAC, 50/60 HZ or 12 VDC, 6 VA maximum.

EMPLACEMENT

Emplacement Mode Cables are normally buried approximately 5 feet apart and 9 inches deep in soil. Shallow burial is permitted in asphalt or concrete.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for continuous outdoor, fixed site use. (Processor is ruggedized, sealed, and desiccated.)

EFFECTIVENESS/RELIABILITY

Detection Range Detection zone extends up to 1000 ft. length (two 500-foot zones) x 12.5 ft. width (from center of cables). Detection zone between pair of cables equals area 10 ft. wide x 3 ft. high.

Transmission Range

With Relay

Sensitivity Semi-automatic calibration mode is used to compute the optimum threshold level for each zone.

Remote Alarm Assessment Capability

Detection Probability Greater than 99%.

Functional Reliability

False Alarm Rate (FAR) (estimated) Less than 1 per month

Susceptibility to Nuisance/Environmental Alarms Environmental effects do not affect the electromagnetic coupling and are therefore not detected. Changes in coupling created by moisture content of burial medium and intrusion by small animals are rejected by the threshold setting and velocity filtering combined.

Vulnerability to Spoofing or Tampering System has an automatic fail/tamper monitor which provides full supervision of the cables and processor unit.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature (Processor): -50° to $+65^{\circ}\text{C}$. (Cable): -55° to $+71^{\circ}\text{C}$.

Humidity System will function in up to 100% humidity (not immersible).

Rain Falling rain is not detected by system operation.

Snow Snow is not detected by system operation.

Haze/Smoke/Fog Fog is not detected by system operation.

Wind Wind is not detected by system operation.

Other Conditions

Light

Noise

Line-of-Sight

Foliage

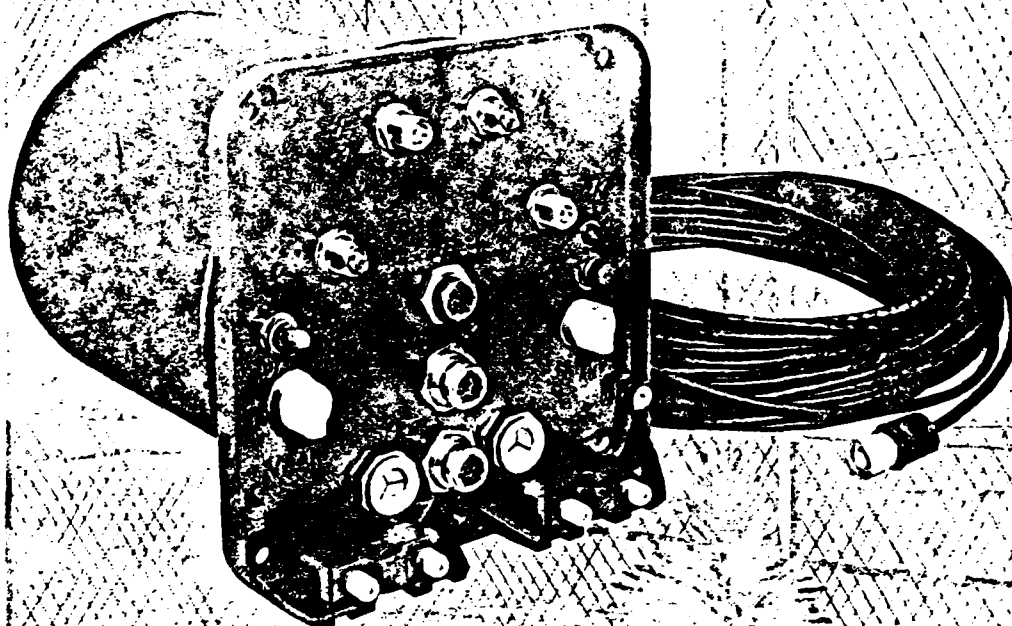
Soil Conditions

Other Environmental effects such as seismic, acoustic or pressure changes do not affect system's detection capability.

SOURCE Computing Devices Company product literature.



PERIMETER SENSOR

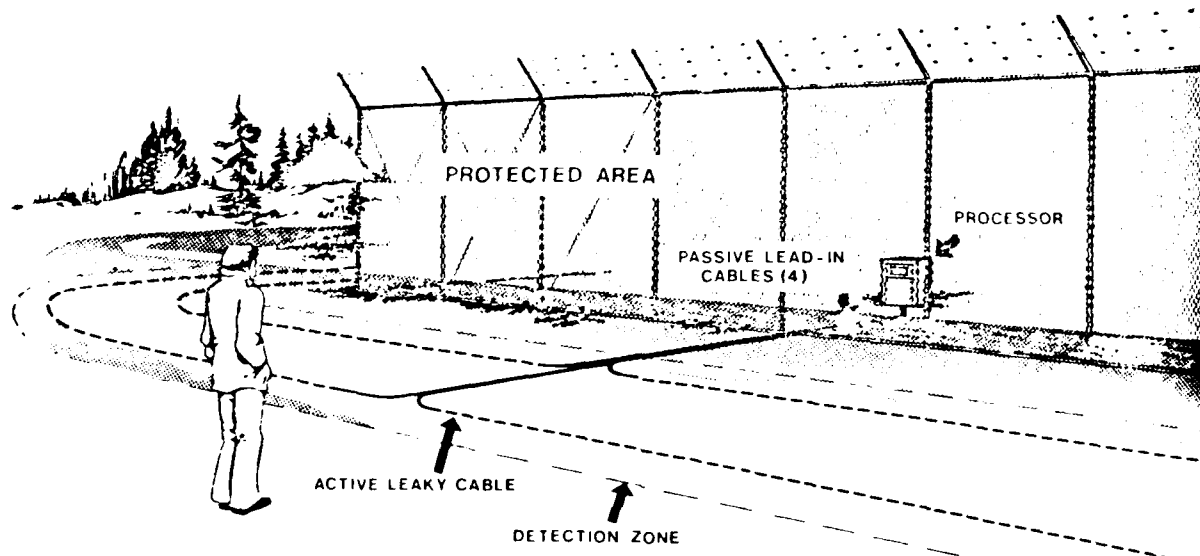


PERIMETER INTRUSION RADAR

COMPUTING DEVICES COMPANY
a division of Control Data Canada, Ltd



SPIR is a microprocessor-based, buried-line, intrusion sensor. It complements Computing Devices' Guidar product by providing cost-effective Guided Radar coverage over short perimeter segments up to 1000 ft (300 m) in length. SPIR is easily installed in multiple segments to provide superior detection and false/nuisance alarm performance in virtually any environment.



SPIR CONCEPT

SPIR creates a detection zone between a pair of 'leaky' cables buried around the protected area. When activated, an electromagnetic coupling between the cables produces a 'radar fence', typically 10 feet (3m) wide and 3 feet (1m) high which, when penetrated by an intruder, creates an alarm condition.

The active GUIDED RADAR technique senses physical characteristics of the human intruder which are not duplicated in the installed environment. This factor, coupled with advanced digital signal processing, effectively discriminates between a valid target and the environment or small animals. The net result is a dramatic reduction in false/nuisance alarms when compared to other sensor technologies.

Each SPIR sensor provides intrusion detection coverage for 1000 feet (300 m) of perimeter using two 500-foot (150 m) detection zones. Multiple SPIR sensors can be used to accommodate perimeters greater than 1000 feet (300 m).

Cables are normally buried approximately 5 feet (1.5 m) apart and 9 inches (25 cm) deep in soil. Shallow burial is permitted in asphalt or concrete.

FEATURES/BENEFITS

Superior False/Nuisance Alarm Performance

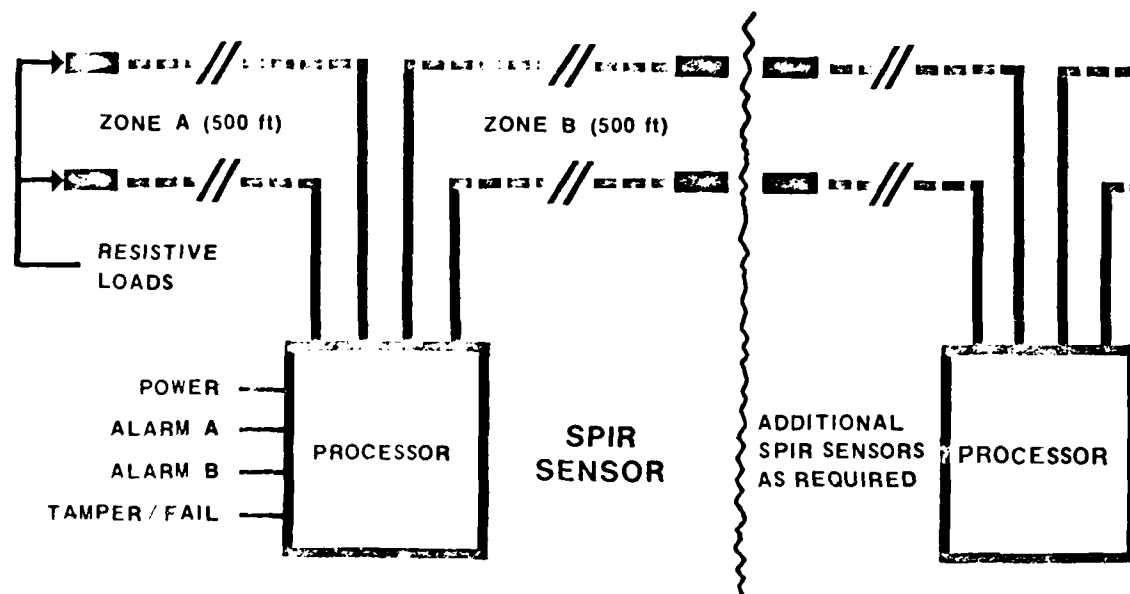
- Tolerant of environmental conditions and variations
- Rejects small animal targets
- Well defined detection zone
- Digital signal processing for target discrimination and stability

Easily Installed

- Little preparation in most terrains
- Ruggedized design for continuous outdoor operation
- Low power requirements
- Multiple segment capability for longer perimeters

Easily Maintained in Operation

- Semi-automatic calibration feature
- Automatic self-testing for malfunctions and tampering



CABLE TRANSDUCER

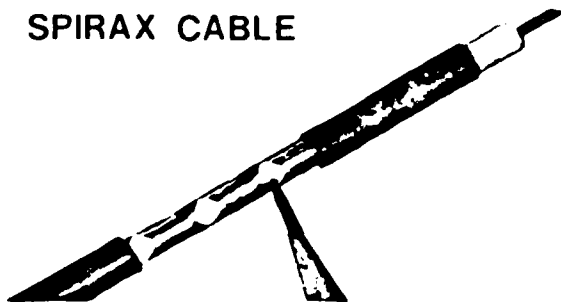
The key to SPIR operation is the use of 'leaky' coaxial cables to distribute the radar detection zone along a desired perimeter.

The cable consists of a solid inner conductor surrounded by a foamed polyethylene dielectric. The outer conductor is formed by a patented manufacturing technique such that apertures in the outer conductor allow a controlled amount of energy to couple between the inside and outside of the cable and vice versa.

In SPIR, one cable in each zone acts as a transmitter which is energized by a CW signal. The second cable acts as a distributed receive antenna.

A complete SPIR cable consists of a non-leaky lead-in section, an active detection section and a termination resistor. The rugged construction and a tough outer jacket ensure long life in any environment.

SPIRAX CABLE



PROCESSOR

The processor unit contains the transmitter, receiver and digital microprocessor electronics.

The transmitter generates a CW signal which is alternately switched between the two transmitter cables. The receiver detects the signal which is coupled into the receive cables. This signal is then demodulated and digitized for sampling by the microprocessor which performs digital filtering and change detection processing.

The digital MTI radar process measures a change in the electromagnetic environment between the cables created by the introduction of a human target. Other environmental effects such as seismic, acoustic or pressure changes, snow, falling rain, wind, fog, blowing sand, etc., do not affect the electromagnetic coupling and are therefore not detected. Changes in coupling created by changes in moisture content of the installed medium and by small animals and birds are rejected by a combination of threshold setting and velocity filtering.

The guesswork is removed from the threshold calibration process by a semi-automatic calibration mode. In this mode, the processor measures the detection sensitivity to a human target walking between the cables. This data is then used to compute the optimum threshold for each zone.

An additional feature of the process is an automatic fail/tamper monitor which provides full supervision of the cables and the processor unit.

SPIR 2-1

SPECIFICATION SUMMARY

PROCESSOR TYPE SPX 2-1

Dimensions: 10 x 10 x 13 inches
(25.4 x 25.4 x 33.0 cm) maximum

Weight: 15 pounds (6.8 kg) maximum

Power: 120 V ac, 50/60 Hz or 12 V dc
6 VA maximum

Operating Temperature: - 50°C to + 65°C

Frequency: 59 MHz $\pm$ 1%

Humidity: To 100% (non immersion)

Construction: Ruggedized, sealed, desiccated enclosure compatible with outdoor use.

Alarm Interface: Separate outputs for Zone A, Zone B.

Conforming to Spec. No. BISS-INF-10100A

or Solid State Switch, normal resistance 1400 ohms; switches to less than 100 ohms on alarm

Fail/Tamper Interface: Single output

Conforming to BISS-INF-10100A

or Solid State Switch, normally 1400 ohms; switches to open circuit on Fail/Tamper alarm

TRANSDUCER CABLE

PART No. 907588-001

Active Length: 500 feet (150 m) maximum per zone (two zones (1000 ft) per sensor)

Lead-in Length: 200 feet (61 m) maximum

Diameter: 0.27 inch (0.686 cm) nominal

Termination: 56 ohms ($\pm$ 5%) termination kit supplied with cable segment

Operating Temperature: - 55°C to + 71°C operating

TYPICAL PERFORMANCE

Probability of Detection (PD): Greater than 99%

False Alarm Rate (FAR): Less than 1 per month

Small Target Rejection: Less than 1% PD for a 10-pound (4.5 kg) animal

Detection Zone Containment: 12.5 feet (4 m) from cables

Specifications subject to change without notice

COMPUTING DEVICES COMPANY

P.O. Box 8508, Ottawa, Canada, K1G 3M9. Telephone (613) 596-3810. Telex 053-4139.

For further information, contact
Security Systems Marketing. Telephone (613) 596-2846. TWX 610-563-1632.

Control Data Corporation Government and Military Marketing
6003 Executive Boulevard, Rockville Maryland 20852, U.S.A.
Telephone (301) 468-8497.

SENSOR SYSTEM DATA SHEET

Name of Sensor Magbelt -- Buried Electromagnetic Transceiver Line Sensor

Developer Israel Aircraft Industries, Ltd.

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Electromagnetic ("leaky" coaxial cables)

Description System is an underground concealed security system which uses buried "leaky" coaxial cables to create an electromagnetic field to detect intruders. System consists of a sensor processing unit, three leaky coaxial cables, a transmitter module, and end-of-line modules.

Principle of Operation An electromagnetic field is created between parallel transmitter and receiver cables. An attempt to breach the field triggers an alarm in the signal processor.

Transmission Mode Hard-wire.

Signature "Active" sensor (electromagnetic emission). Cables have very low visibility.

Add-on Capability Each processor unit and transmitter module serves two adjacent zones, each 30-130 meters long. Up to 1000 zones may be used per system.

Cost

PORTABILITY

Weight of Each Container

Size for Each Container Processor: 12" x 10" x 5". Transmitter: 10" x 8" x 4".

POWER REQUIREMENTS

Power Requirements Operating voltage to processor: 9-15 VDC or 12-18 VAC. (Operating voltage to transmitter is supplied from processor unit.). Processor standby battery life = 24 hrs.

EMPLACEMENT

Emplacement Mode Coaxial cables are designed for direct burial (above ground adaptation possible).

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Zone length equals 30-130 meters. Two zones per processor unit; up to 1000 zones per system. Distance between sensor lines is from 1.5 to 3.0 meters.

Transmission Range

With Relay

Sensitivity Detection sensitivity may be remotely controlled

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -40° to $+70^{\circ}\text{C}$.

Humidity System operates in 0-95% humidity.

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight

Foliage

Soil Conditions

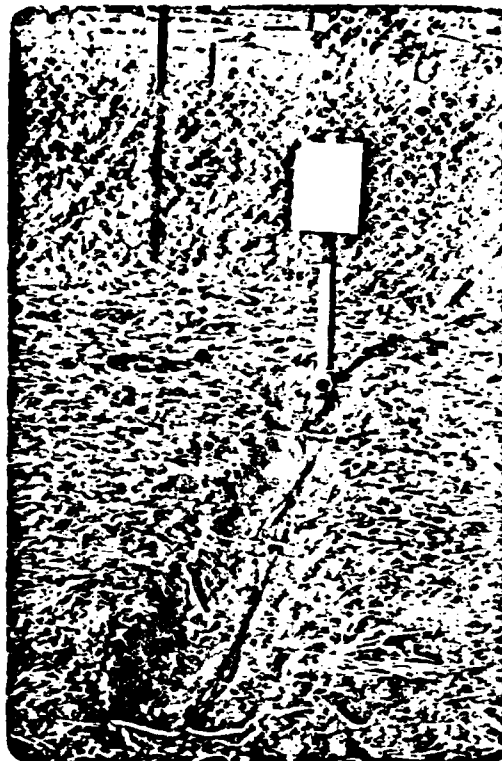
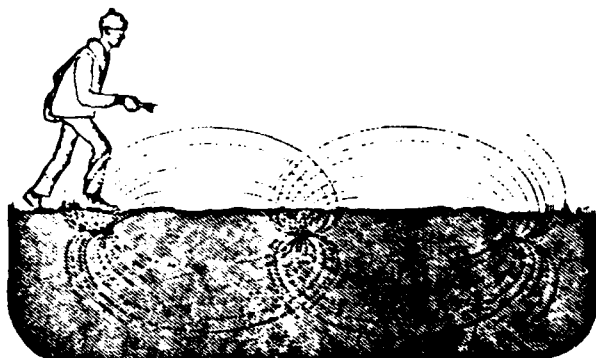
Other

SOURCE Israel Aircraft Industries, Inc., product literature.

MAGBELT

Buried Electromagnetic Transceiver Line Sensor

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LTD



- Underground concealed security system with the possibility for above ground operation.
- High sensitivity with low false alarm rate.
- Unique and innovative (patent pending) processing of the electromagnetic field:
 - Suppresses sensitivity to movement of nearby objects;
 - Induces high sensitivity to the slowest penetration.
- Detection sensitivity of all zones can be remotely adjusted.
- Microprocessor based sensor.
 - For real time processing;
 - Assures secure digitally coded communication with central unit;
 - Performs automatic self testing.
- A smart sensor—a member of MAGAL'S integrated security system family.

DESCRIPTION

MAGBELT is an underground concealed security system with the possibility of adaption for above ground operation.

An electromagnetic field screen activates an alarm signal if an attempt is made to breach the field.

Unlike other systems based on the same principle, MAGBELT is not affected by environmental interference and will only react when the magnetic field is penetrated.

The sensitivity of the microprocessor-based sensor can be remotely controlled by the MAGIPLEX Control Unit, responding to changing threat conditions while minimizing false alarms.

The system consists of the following components:

- A sensor processing unit.
- Three leaky coaxial cables.
- A transmitter module.
- End-of-line modules.

Each sensor processor unit and transmitter module serves two adjacent zones 30 meters to 130 meters long.

Sheltered in a weatherproof housing, the sensor processing unit feeds signals to a central MAGAMUX type monitoring and control unit.

SPECIFICATIONS

- Distance between sensor lines: 1.5 - 3m.
- Zone length: 30 - 130 meters.
- Number of zones per sensor processor unit: 2
- Number of zones per system: up to 1000
- Report capability:

With compatible central controller - coded digital serial messages are:

- Pre-alarm
- Jamming
- Tamper
- Battery low
- Mains power failure
- Sensor failure
- Sensitivity setting

Without central controller - dry N.C. relay per zone.

- Sensor processor unit's specifications:

Dimensions: 12" x 10" x 5"

Operating voltage: 9-15 Vdc or 12-18 Vac

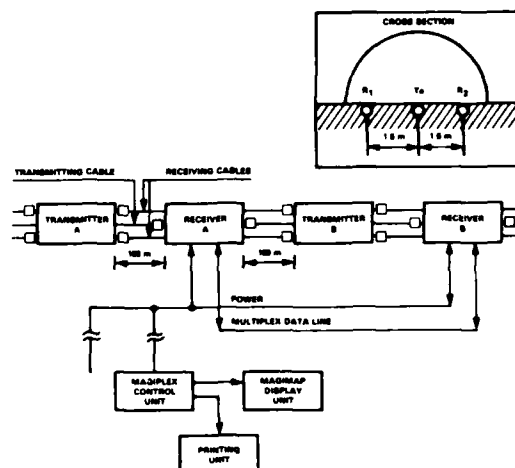
Stand-by battery: 24 hours minimum operation

Temperature range: -40°C to 70°C

Humidity: 0 to 95%

Tamper switch reporting

Weatherproof housing



Magbelt System - Typical Layout

- Transmitter module specifications:

Dimensions: 10" x 8" x 4"

Operating voltage: supplied from sensor processor unit

Temperature range: -40°C to 70°C

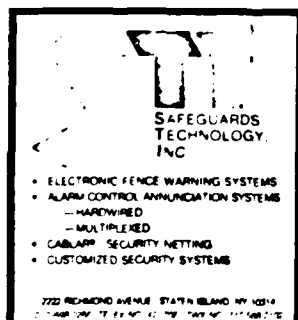
Weatherproof housing

APPLICATIONS

- Medium and high security sites.
- Installations where invisible protection is required.
- Gate areas.
- Airfields.

MAGAL SECURITY DTR-90 INTRUSION DETECTION SYSTEM: TAUT-WIRE FENCE
PRODUCT FAMILY MAGAMUX: 1000 ZONES MONITORING AND CONTROL

MAGSTAF: ELECTROSTATIC FIELD SENSOR
MAGBELT: BURIED ELECTROMAGNETIC TRANSCIEVER
LINE SENSOR
MAGILINE: FENCE DISTURBANCE DETECTION LINE



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SENSOR SYSTEM DATA SHEET

Name of Sensor Magstaf

Developer Israel Aircraft Industries, Ltd.

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Electromagnetic (electrostatic field)

Description System consists of parallel transmitting and receiving cables connected to a sensor unit (processor) and monitoring and control units.

Principle of Operation Cables, connected to the sensor unit (processor) establish an electrostatic field. An attempt by intruder to penetrate the field is instantly detected by the sensor and an alarm signal is transmitted to the central monitoring and control system.

Transmission Mode Hard-wire

Signature Passive sensor system but with high visibility.

Add-on Capability Up to 1000 zones may be used per system. (10 to 130 meters per zone.)

Cost

PORTABILITY

Weight of Each Container

Size for Each Container Processor: 12" x 10" x 5"

POWER REQUIREMENTS

Power Requirements Operating voltage: 9 to 15 VDC or 12 to 18 VAC. Standby battery yields 24 hr. minimum operation.

EMPLACEMENT

Emplacement Mode System may be installed in a stand alone, wall- or fence-mounted configuration.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Zone length is 10 to 130 meters. (One sensor processing unit serves two adjacent zones. Up to 1000 zones per system possible.)

Transmission Range

With Relay

Sensitivity Sensitivity can be remotely adjusted by the (MAGAMUX) control unit.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering Tamper switch included in system.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -40 to +70 C.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight

Foliage May cause false alarms (i.e., onset of rain on a very porous burial medium).

Soil Conditions

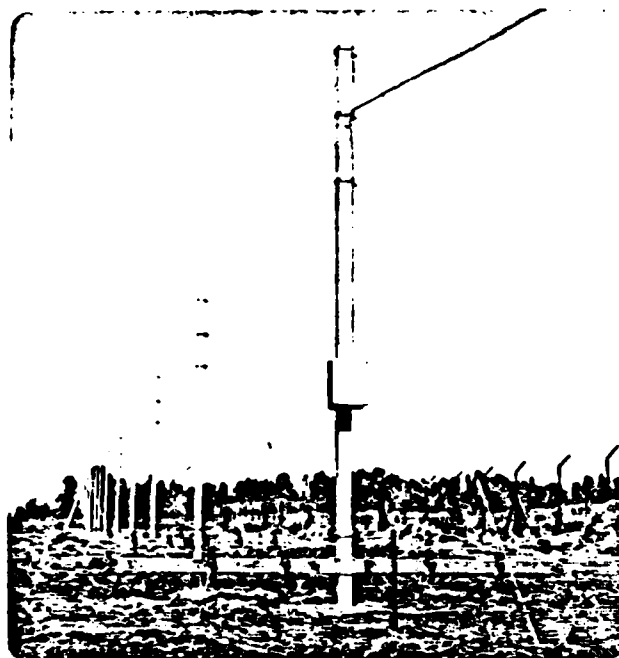
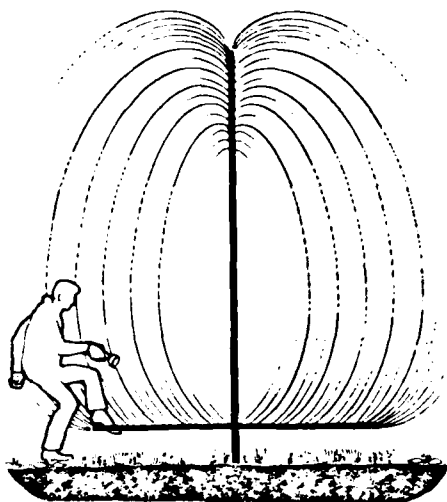
Other

SOURCE Israel Aircraft Industries, Ltd., product literature.

MAGSTAF

Electrostatic Field Sensor

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- High sensitivity.
- High but well confined detection volume.
- Minimum false alarm rate achieved through sophisticated signal processing.
- Unique field shaping and (patent pending) and processing of the electrostatic field:
 - Suppresses sensitivity to movement of nearby objects.
 - Induces high sensitivity to the slowest penetration.
- Detection sensitivity of all zones can be remotely adjusted.
- Microprocessor based sensor:
 - For sophisticated processing;
 - Assures secure digitally coded communication with central unit;
 - Performs automatic self testing.
- Pre-alarm reporting.
- A smart sensor—A MEMBER OF MAGAL's integrated security system family.

DESCRIPTION

The MAGSTAF system is an outdoor electrostatic screen which activates an alarm signal at the same instant an attempt

is made to breach the field. Unlike other systems based on the same principal, MAGSTAF is not sensitive to environmental interferences, but will react when the electrostatic field is penetrated. These features are the result of special wire configuration and sophisticated data processing performed by a local microprocessor.

A pre-alarm condition can be optionally indicated.

One sensor unit serves two adjacent zones. The length of each zone is from 10 to 130 meters.

Sheltered in weatherproof housing, the sensors, using multiplex techniques, send digitally-coded signals to a central monitoring and control MAGAMUX type system.

The sensitivity of the microprocessor based sensor can be remotely adjusted by the MAGIPLEX control unit. The advantage of this type of sensitivity adjustment allows for the setting of a suitable level of sensitivity according to the changing threat conditions thus minimizing false alarms.

MAGSTAF can be installed in one of the following configurations:

- Stand alone.
- Wall mounted units
- Fence mounted units

APPLICATIONS

The MAGSTAF system is designed to protect all kinds of security facilities with emphasis on TOP SECURITY sites as diverse as:

- Nuclear Power Stations
- Oil Refineries and Storage Depots
- Ammunition Depots

SPECIFICATIONS

- Sensor structure dimensions (customized):

Width: From 1.5 meters to 3.0 meters

Height: From 2.0 meters to 5.0 meters

- Zone Length: 10 to 130 meters
- Number of zones per sensor processing unit: 2
- Number of zones per system: up to 1000

- Report methods: When connected to the MAGAMUX System, the following digitally coded messages are provided:

- Pre-alarm
- Tamper
- Battery low
- Main power failure
- Sensor failure
- Sensitivity setting

- When not connected to the MAGAMUX System, the sensor provides a dry N.C. relay output only.

- Processor Unit Specification:

- Dimensions: 12" x 10" x 5"
- Operating Voltage: 9 to 15 Vdc or 12 to 18 Vac
- Standby battery: 24 hour minimum operation
- Temperature range: -40°C to +70°C
- Humidity: 0% to 95%
- Tamper switch
- Weatherproof housing

**MAGAL SECURITY DTR-90 INTRUSION DETECTION SYSTEM: TAUT-WIRE FENCE
PRODUCT FAMILY MAGAMUX: 1000 ZONES MONITORING AND CONTROL
MULTIPLEX SYSTEMS**

**MAGSTAF: ELECTROSTATIC FIELD SENSOR
MAGBELT: BURIED ELECTROMAGNETIC TRANSCEIVER
LINE SENSOR
MAGILINE: FENCE DISTURBANCE DETECTION LINE**



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SENSOR SYSTEM DATA SHEET

Name of Sensor Sentrax

Developer Senstar

Availability Status Commercially available

System Application Outdoor, long and short perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Electromagnetic ("leaky" coaxial cables)

Description Sentrax is an underground concealed security system which uses "leaky" coaxial cables to create an electromagnetic field to detect intruders. System consists of a transceiver module, a cable set, a control module, and an operator terminal. (Sensor interface cards and a printer are optional components.)

Principle of Operation A single transceiver module, receiver and signal processor is time multiplexed between two perimeter detection sectors. The rf signal is transmitted along one cable causing an external surface wave to propagate along the cable set. An intrusion disturbs this surface wave and creates a reflected wave on the receive cable. This reflected wave is processed by the microprocessor which determines if an alarm signal should be sent.

Transmission Mode Hard-wire.

Signature "Active" sensor (electromagnetic emission). Sensor (cables) are buried.

Add-on Capability Up to 16 transceiver modules can be cascaded for a maximum length of 4800 M (3 miles) per control module. Sentrax can also be used to supply secure data and power for additional sensors.

Cost

PORTABILITY

Weight of Each Container Cable: 90 lbs. per 100 meters.

Size for Each Container Cables: .3" diameter (with polyethelene jacket = .4").

Tranceiver: 8" x 10" x 4". Printer: 14" x 16" x 8".

POWER REQUIREMENTS

Power Requirements 115V/60 HZ or 230V/50 HZ

EMPLACEMENT

Emplacement Mode System cables may be buried in soil, concrete, or asphalt (burial depth will vary from 4 to 10 inches depending upon medium). Cables should be spaced approximately 6.6 feet apart in a confined area and 9.8 feet apart in an open area.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use. Transceiver, control module, and operator terminal require indoor environment.

EFFECTIVENESS/RELIABILITY

Detection Range Zone 3.3 ft. height x 9.8 ft. width x up to 150 mtrs. length (2 zones per unit).

Transmission Range

With Relay

Sensitivity System is designed to detect intruder at speeds of .07 to 23 ft./second.

Remote Alarm Assessment Capability

Detection Probability 99% for human intruder weighing 75 lbs. or greater (traveling at a rate of .07 to 23 feet per second).

Functional Reliability

False Alarm Rate (FAR) (estimated) Less than one per month per sector.

Susceptibility to Nuisance/Environmental Alarms 95% probability of rejecting animals of 7 kg. (15 lbs) and less. Large standing objects or standing water may generate false alarms in wind.

Vulnerability to Spoofing or Tampering Tamper switch is present on transceiver. System may be "jammed" by large radio signals at exact operating frequency.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate) Approximately 20,000 hrs. (based on military standard assessment criteria).

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Tranceiver (exterior environment) = -50° to $+70^{\circ}$ C. Control module (interior environment) = 0° to $+40^{\circ}$ C.

Humidity

Rain

Snow Snow coverage greater than 2.5 ft. may affect detection capability. (However, detection zone tends to increase as the ground freezes.)

Haze/Smoke/Fog

Wind System's detection capability may cause large nearby objects or standing water to generate false alarms.

Other Conditions

Light

Noise System's detection capability is not affected by acoustic activity.

Line-of-Sight

Foliage

Soil Conditions Rapid changes in dielectric properties of medium surrounding the cables may cause false alarms (i.e. onset of rain on a very porous burial medium).

Other

SOURCE Senstar Corporation product literature.

SECTION 3

SENTRAX - FOUNDATION FOR EXTERIOR SECURITY

A. PRODUCT APPLICATIONS

The SENTRAX system may be employed on the perimeter or boundary of any facility or area as either a stand-alone intrusion detector or in conjunction with other detection equipment or systems. Typically, but at the discretion of the user, the system will be deployed so the transceiver modules (TMs) and cable sets (CSs) are located immediately outside any barriers used at the facility/area to be protected, or inside when prison application is involved. The control modules (CMs) are housed in a protective shelter or environment within the confines of the area or facility. The operator terminal (OT), normally co-located with the CM, is available in either a table-top or stand-alone mounting for installation in the customer's security center.

SENTRAX is adaptable to a wide variety of applications where perimeter security is required. These requirements include the detection of threats ranging from vandalism to sophisticated terrorist activities. Regardless of the threat it must be realized that SENTRAX is only one component in a total security system. Detection of intruders without assessment and response capability has a very limited function. In summary, to achieve maximum benefit from SENTRAX it must be an integral component in a total security system.

The SENTRAX system may be employed on the perimeter or boundary of any facility or area as either a stand-alone intrusion detector or in conjunction with other detection equipment or systems. Typically, but at the discretion of the user, the system will be deployed so cable sets (CS) are located immediately outside any barriers used at the facility/area to be protected, or inside when prison application is involved, with the transceiver modules (TM) and control modules (CM) housed in a protective shelter or environment within the confines of the area or facility. The operator terminal (OT), normally co-located with the CM, is available in either a table-top or stand-alone mounting for installation in the customer's security center.

SENTRAX is adaptable to a wide variety of applications where perimeter security is required. These requirements include the detection of threats ranging from vandalism to sophisticated terrorist activities. Regardless of the threat it must be realized that SENTRAX is only one component in a total security system. Detection of intruders without assessment and response capability does not perform a useful function. In summary, to achieve maximum benefit from SENTRAX it must be an integral component in a total security system.

SENTRAX has applications in a large number of industries. A few examples are:

1. Power Industry
2. Oil and Gas Industry
3. Petro-Chemical and Chemical
4. Defense Systems Engineering and Manufacturing
5. Natural Resources Mining and Production
6. Transportation

In addition there are a large number of government applications including

1. Military Bases, Munition Dumps etc.
2. Penetentiaries
3. Embassies
4. Boarder Crossings
5. Communication Centers

Specific application notes will be provided as SENTRAX is introduced to each application area.

B. SENTRAX CONFIGURATIONS

SENTRAX is a very modular system which can be readily adapted to meet the needs of specific applications. A few techniques for configuring the SENTRAX modules to meet various requirements are illustrated in FIGURES 3-1, 3-2, 3-3.

1. Stand Alone TM (3-1a)
2. Cascaded Long Perimeter (3-1b)
3. Cascaded Two Sector Perimeters (3-2a)
4. Cascaded One Sector Perimeters (3-2b)
5. Cascaded Three Cable Long Perimeter (3-3a)
6. Cascaded Four Cable Long Perimeter. (3-3b)

A brief discussion of each of these configurations follows:

1. Stand Alone TM

This is intended for very small independent perimeters. Power is supplied directly to the TM and a relay closure alarm output is provided.

2. Cascaded Long Perimeter

This is the basic means of connecting a long perimeter SENTRAX system as described in the brochure. Up to 16 TMs can be cascaded each providing two sectors of detection capability. Each sector can be up to 150 meters (490 feet) long.

3. Cascaded Two Sector Perimeters

This is intended for relatively close groupings of sites with perimeters less than 300 meters (980 feet) long. The various sites are connected by a pair of non leaky coaxial cables. Each site is divided into two sectors.

4. Cascaded One Sector Perimeters

This is intended for relatively close groupings of small perimeters which are shorter than 150 meters (490 feet). In this way one TM can cover two sites with a single sector of detection at each site.

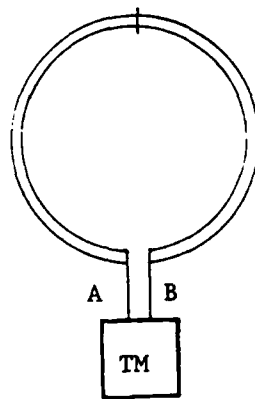
5. Cascaded Three Cable Long Perimeter

This is identical to item 2 above with the exception that a third cable is added to each section. Normally the middle cable is the transmit cable and the two outside cables are connected by means of an rf transformer to produce a detection zone which is roughly twice as wide as in a basic SENTRAX system.

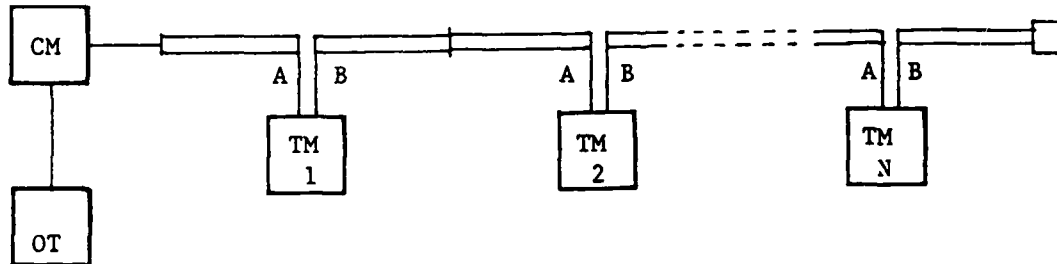
6. Cascaded Four Cable Long Perimeter

In this case two basic SENTRAX cascaded sensors are installed in parallel. This more than doubles the detection zone width, provides total redundancy and enables the user to determine the direction of intrusion.

- NOTES:
1. The single lines between CM and TMs in these diagrams denotes a pair of non leaky coaxial cable. The leaky cable transducers are shown individually.
 2. The OT can be operated remotely from the CM using standard data transmission techniques.
 3. If required, custom interface circuit cards can be made available to permit use of other display units.
 4. To increase the system reliability, an option is provided whereby two CMs can be used in parallel.

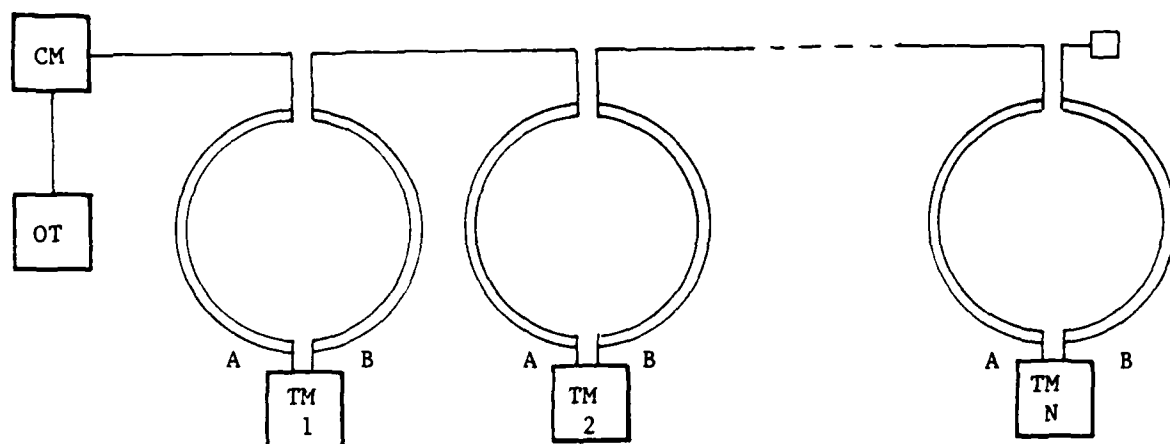


(a) STAND ALONE TM

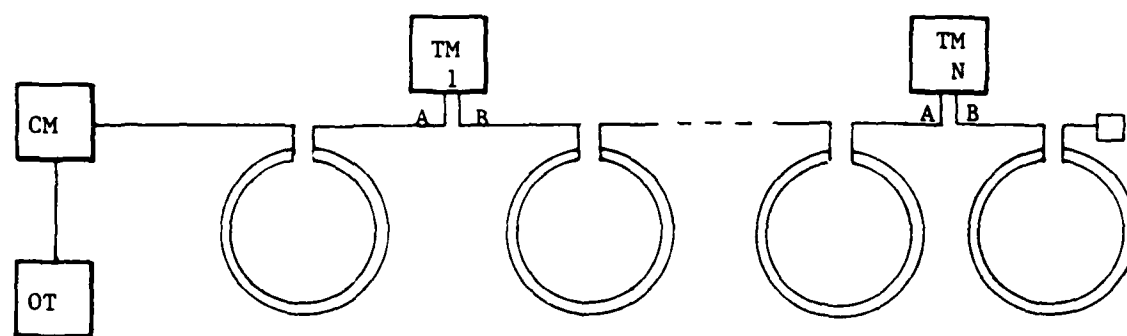


(b) CASCADED LONG PERIMETER

FIG. 3-1

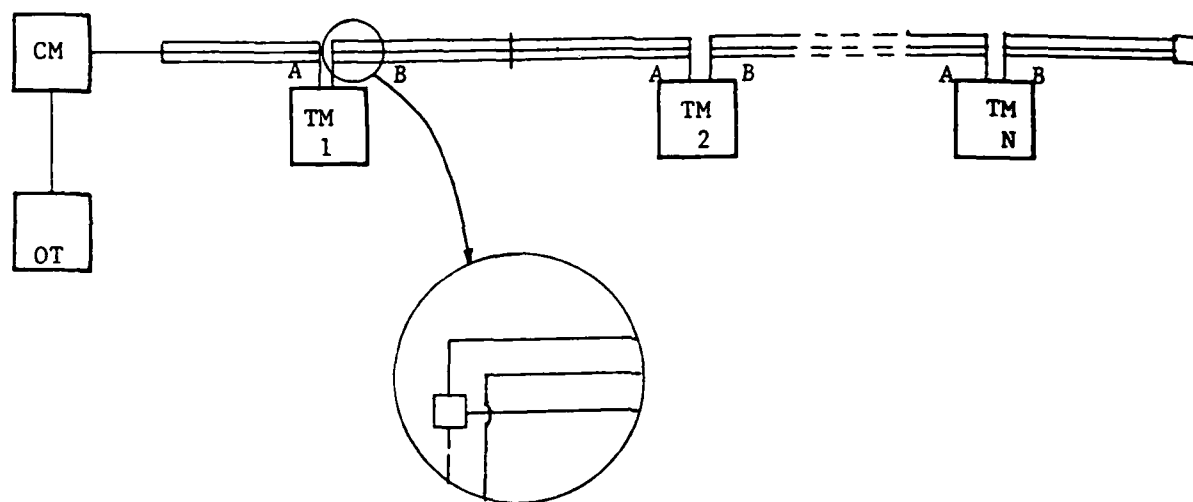


(a) CASCADED TWO SECTOR PERIMETERS

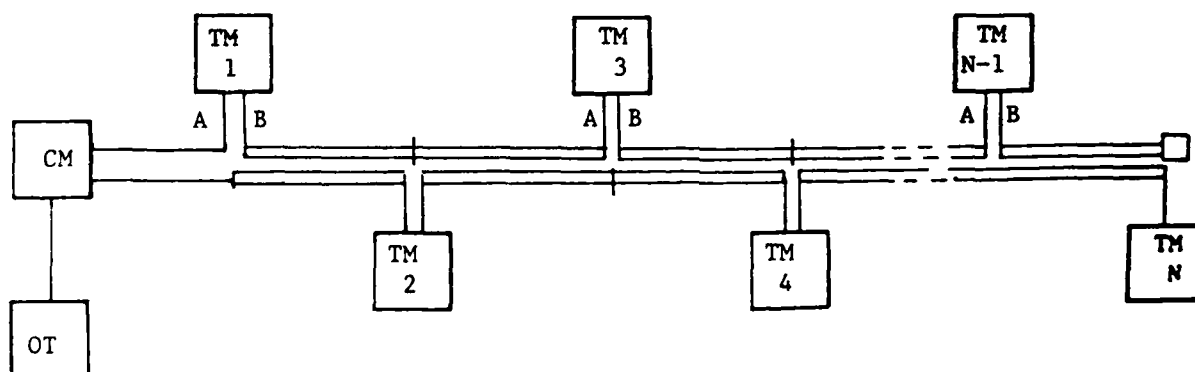


(b) CASCADED ONE SECTOR PERIMETERS

FIG. 3-2



(a) CASCADED THREE CABLE LONG PERIMETER



(b) CASCADED FOUR CABLE LONG PERIMETER

FIG. 3-3

C. INSTALLATION CONSIDERATIONS

SENTRAX is a buried line sensor providing covert operation. It can be used in the following burial mediums:

1. soil ranging from heavy clay to sand
2. sodded soil
3. concrete with or without reinforcing
4. asphalt

Burial depths and spacings recommended for each of these burial mediums are provided in Table 1.

There are a number of additional factors which should be considered to achieve optimal performance.

1. The perimeter should be graded so as to avoid bodies of standing water.
2. The cables should be at least 1 meter (3.3 feet) from any metallic pipes, culverts, wires, etc. crossing the perimeter. This does not preclude the use of SENTRY with reinforced concrete where the reinforcing is close to the cables provided that the reinforcing is uniform within each sector length.)
3. The cables should be separated from any fence or parallel conductors by at least the cable spacing. (Clearly this is not possible in the case of reinforced concrete in which case the uniform nature of the reinforcing allows the sensor to operate normally.)
4. Sharp corners are to be avoided wherever possible due to the "overshoot" caused by surface wave radiation. This is particularly true when SENTRY is used in proximity to a fence which could be located in the "overshoot" field. Under these conditions one may be subject to nuisance alarms caused by motion on the fence.
5. Whenever possible the boundary between sectors should be colocated with significant changes in burial mediums such as soil to concrete or concrete to asphalt etc.
6. There should be an overlap of at least 3 meters (10 feet) at the start of each sector to allow the surface wave to "start-up".
Note: There is a minor overlap at the rf decoupler due to the decay of the surface wave.

Clearly it may not be possible to meet all of these conditions in a particular site. If these conditions are not met, it does not mean that SENTRY will not work but simply that the performance may be suboptimal.

From a reliability point of view, there are a number of practical installation details to consider.

1. If there is vehicular traffic over the cables, they should be protected from mechanical damage.
2. In soil with a lot of rock content it is desirable to place a few centimeters of sand around the cables to avoid mechanical damage.
3. Care must be taken if the cables are installed in fresh asphalt to avoid melting the outer jacket. Polyethylene has a melting point of 80°C (176°F).

TABLE 1

RECOMMENDED INSTALLATION DETAILS

TYPE OF MEDIUM	BURIAL DEPTH	
	Centimeters	Inches
Soil	25 $\pm$ 2.5	10 $\pm$ 1
Sod	20 $\pm$ 2	8 $\pm$.8
Concrete	5 $\pm$ 2.5	2 $\pm$ 1
Asphalt	10 $\pm$ 5	4 $\pm$ 2

APPLICATION TYPE	CABLE SPACING	
	Meters	Feet
Confined Area	2 $\pm$.2	6.6 $\pm$.7
Open Area	3 $\pm$.3	9.8 $\pm$ 1.0

4. Careful records should be kept of where the sensor is installed to avoid inadvertent damage during the installation of other equipment.
5. The number of splices and field installed decouplers should be minimized.
6. Cables coming up to the TMs should be protected by conduit to avoid inadvertent or deliberate damage.
7. Each TM unit should be properly grounded using a ground rod to minimize the possibility of damage caused by lightning.

Like all other electronic security equipment the reliability of SENTRAX will be largely dependent on the care taken during installation.

From a security point of view there are a number of installation considerations:

1. With the TMs mounted on the secure side of the perimeter outside the detection zone the sensor is covert.
2. In open areas the wider cable spacing of 3 meters (9.8 feet) is recommended to achieve the largest detection zone. This will ensure that no one can jump over the sensor having the benefit of a run at the sensor.
3. In confined areas such as between fences, narrower cable spacings are recommended. The minimum spacing adequate to prevent jumping is recommended.
4. The cables should be installed so that any roads or walkways are outside the range of containment.
5. If snow coverage exceeds .75 meters (2.5 feet) one should consider removing the snow or recalibrating the sensor to maintain the desired Pd. The fact that the detection zone tends to increase as the ground freezes tends to compensate for snow coverage.

In conclusion, SENTRAX performance can be optimized by tailoring the installation to meet the perceived threat.

SENSOR SYSTEM DATA SHEET

Name of Sensor Differential E-Field (Model DEF-700)

Developer Stellar Systems

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Electromagnetic (electrostatic field)

Description The DEF-700 is a free-standing electromagnetic system which employs a multi-dimensional electrostatic field to detect human intrusion into monitored area. System consists of a "fence" of poles 8 to 9 feet high, spaced approximately 40 feet apart, and supporting 6 parallel wires. (See drawing in product literature attached.) Sensor electronic modules and a central processor unit are also included.

Principle of Operation A differential E-Field is applied to the bottom portion of the fence and a 4-wire balanced phase E-Field applied to the top portion of the fence. An intruder approaching the fences sequentially interrupts the differential E-Field, the E-Field, and the field created by overlap of those fields. As the fields are interrupted, the sensor module produces a signal proportional to the relative motion in each field. These signals are then processed by a difference multiplier to screen out nuisance alarms, and indicate direction of intruder movement.

Transmission Mode Hard-wire.

Signature Passive sensor (electrostatic field). System is highly visible.

Add-on Capability

Cost

PORTABILITY

Weight of Each Container Control unit: Approximately 30 lbs.

Size for Each Container Control unit: 14"H x 12"W x 6"D

POWER REQUIREMENTS

Power Requirements Operating Voltage: 16 VAC; Class 2 transformer for 110-125 VAC supplied with unit. Battery charger and standby are built into the control unit for the four-hour gelled electrolyte standby battery.

EMPLACEMENT

Emplacement Mode System is installed as a free-standing fence (in a cleared zone).

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Maximum zone length - 500 ft. Maximum field width: approximately 8 feet centered on fence line.

Transmission Range

With Relay

Sensitivity Continuously variable potentiometers provide sensitivity control.

Remote Alarm Assessment Capability System determines whether intrusion occurred inside or outside of sensor, direction of penetration, and fence segment penetrated.

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms System is immune to false alarming generated by small animals or external interference.

Vulnerability to Spoofing or Tampering Tamper switch prevents undetected opening of processor unit and sensor modules.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -40°C to $+70^{\circ}\text{C}$.

Humidity System conforms to MIL + STD -202.

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight

Foliage

Soil Conditions

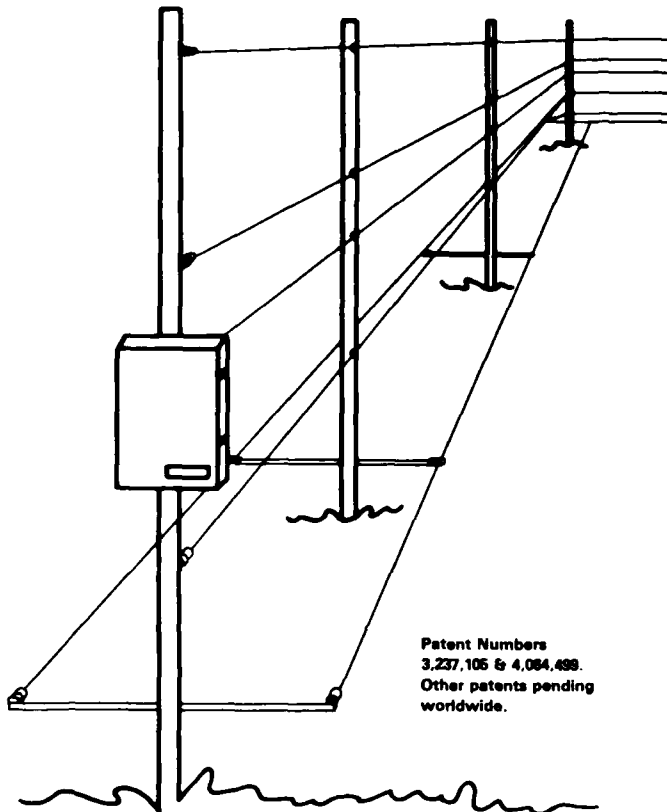
Other

SOURCE Stellar Systems product literature.

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PRODUCT DATA



DIFFERENTIAL E-FIELD™

High Security Outdoor Perimeter Protection

Model DEF-700

- High external interference immunity
- High immunity to small animals
- Improved crawl/roll detection
- Senses direction of intrusion
- High reliability design for high risk applications
- Operational burn-in at elevated temperatures
- Tested in hot, room and cold temperatures
- Follows land contours, minimum site leveling
- Around corner operation and installation
- Well defined coverage, adjustable detection pattern
- Minimum effects from extreme weather
- No critical alignment problems

The Stellar System's Differential E-Field is a significant advance in the art of intrusion detection. It utilizes two E-Field sensor zones illuminated by a common field, and processed by linear techniques to yield a single output which takes the form of $V_O = K (A) (B) (A - B)$. In configurations up to nine feet high, the differential E-Field is applied to the bottom portion of the fence and a 4-wire balanced phase E-Field is applied to the top portion of the fence. (See the diagram on the reverse side of this sheet.) In traversing the field, an intruder moving from A to B first interrupts field A, then A and B together, then B alone. As each field is interrupted, the E-Field sensor modules produce a signal proportional to the relative motion in that field. The signals are then processed by the difference multiplier which offers the following:

- **External Interference Immunity**
Since the two sense wires are equal distance from ground level, any external interference is coupled-in equally. Given equal signals, the difference term $(A - B)$ would go to zero and result in zero output.
- **Immunity to Large Moving Objects Outside Detection Zone**
Because of the product term $(A) (B)$, the condition exists that for an alarm both A and B must detect mass motion or output is zero. This allows objects to move, undetected, near one sense wire because the other zone shows zero mass-motion. In other words, detection occurs within the area defined by the two sense wires A and B.
- **Direction of Intrusion**
It can be seen that a normal intruder would be detected on one side prior to the other. This information is processed and is used to indicate from which side the intrusion occurred (in or out).
- **Improved Crawl/Roll Detection**
The processor passes through a maximum when one side detects twice that of the other. This condition can be represented by $2A = B$. The process $V_O = AB (A - B)$ now becomes $V_O = 2A^2 (A) = 2A^3$. It is obvious that at this point the system is much more sensitive to crawl-under or roll-under than a standard E-Field.
- **Small Animal Immunity**
A rabbit-sized animal does not disturb both fields sufficiently at any one point or time to cause signals of an alarm level.

Model DEF-700

APPLICATIONS

Differential E-Field is well suited for very high-risk government or industrial facilities where high probability of detection (PD) and very low nuisance alarm rate (NAR) are an absolute must. It also finds application in zones or perimeters where small animals and ground maintenance is a problem.

Differential E-Field should be used in areas where high probability of detection (PD) to slow crawling intruders and high resistance to external electrical or electromagnetic interference must be achieved. Also where the direction of intrusion is desirable.

SPECIFICATIONS

Control Unit:

Model DEF-700 Single Zone Control Unit

Coverage:

Maximum zone length is 500 feet (150 meters)

Operating Channels:

For 60 Hz power line A, B, C, and D; for 50 Hz power line U, V, W, X, Y, and Z; other channels are available

Outputs:

1. Intrusion Alarm, Form C Relay
2. Direction, one Form C Relay each "IN" and "OUT"
3. Supervision Alarm, Form C Relay
4. Output for audible Sonalet for test

Sensitivity Control:

Continuously variable potentiometers, one for differential section of fence, one for 4WBP section

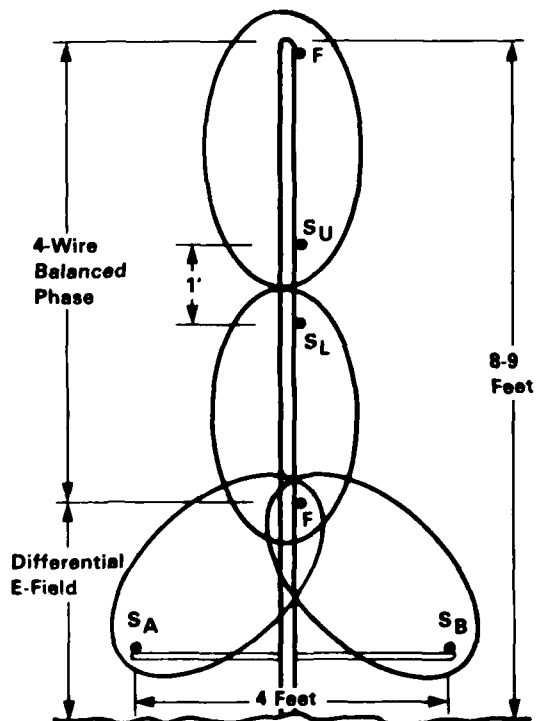


FIGURE 1
Configuration of Differential E-Field

Relay Contacts:

Reed type, Form C, non-inductive load, 3 Watt at 250 mA and 28 VDC

Supervision:

Available when 2348 or 2352-type Terminators are used; continuous AC and DC monitoring of signals for opens, shorts or grounding of E-Field wires

Optional Remote Test Terminator (P/N 2352):

Tests all functions of an EFF zone (electronics, signal transmission and annunciator) from a remote location by application of 12 VDC at 10 mA

Operating Voltage:

16.5 VAC; Class 2 transformer for 110 to 16.5 VAC supplied with unit

Tamper Switch:

Integral to unit; prevents undetected opening of enclosure door

Battery Charger and Standby:

Built into Control Unit for the 4-hour standby battery supplied with the unit; battery is gelled electrolyte type

Power Requirements:

110-125 VAC, 50/60 Hz, single zone 100 mA; 16-20 VAC, 50/60 Hz (to Terminals 4 & 5), single zone 700 mA at 16.5 VAC

Operating Temperature:

-40°C to +70°C; -40°F to +185°F

Preconditioning:

Each unit is subjected to a five day (120 hour) operational burn-in at temperature in excess of 60°C

Testing:

Each unit is functionally tested and data is recorded for operation at -30°C, +25°C and +70°C; all temperatures are $\pm 10^\circ\text{C}$

Humidity: Conforms to MIL-STD-202

Conformal Coating:

All printed circuit boards are conformally coated or potted

Standard Enclosure:

Steel, NEMA 12, 14" high x 12" wide x 6" deep; shipping weight approximately 30 pounds

Options:

NEMA 4 Stainless Enclosure (III); Lighting Arrestor Package (III)

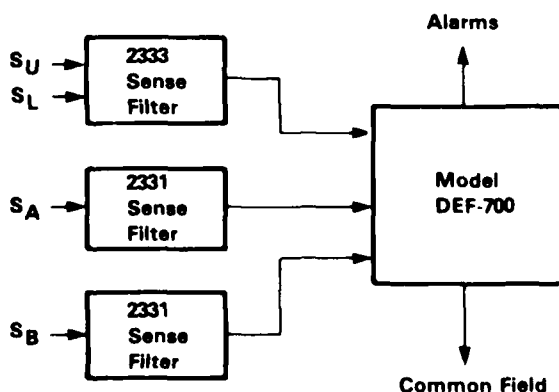


FIGURE 2
Block Diagram of Differential E-Field

SENSOR SYSTEM DATA SHEET

Name of Sensor E-Field (Models EF-30 and EF-32)

Developer Stellar Systems

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection (to detect a human in fenced-in areas)

SYSTEM DESCRIPTION

Type of Sensor Electromagnetic (electrostatic field)

Description System consists of field generator and parallel transmitting and sensing wires, either in a free-standing, fence- or wall-mounted configuration. (See figures in product literature attached.)

Principle of Operation The field generator 'excites' a long field wire and parallel 'sensing' wires. E-Field signals received along the sensing wires are monitored by a control unit. An intruder within a few feet of fence alters the level and character of the E-signal received. If the altered E-signal exhibits the identified "signature" of a human being, an alarm is generated by the signal processor in the control unit.

Transmission Mode Hard-wire.

Signature Passive sensor. System has high visibility.

Add-on Capability System may be installed in either a 3- or 4-wire configuration. System is available with either single zone (EF-30) or dual zone (EF-32) control units.

Cost

PORTABILITY

Weight of Each Container

Size for Each Container Control Unit: 14"H x 12"W x 6"D

POWER REQUIREMENTS

Power Requirements 110/125 VAC, 50/60 Hz (using 120/16 VAC transformer). 16-20 VAC, 50/60 Hz. An eight-hour gelled electrolyte standby battery is internal to control unit.

EMPLACEMENT

Emplacement Mode System may be mounted on a fence, roof, or wall, or may be free-standing.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range System detection coverage varies with configuration. 3-wire, mounted: 20' radius x 500' length; 3-wire, free-standing: 4' radius x 500' (single zone); or 750' (dual zone); 4-wire mounted: 20' radius x 500' length; 4-wire, free-standing: 4' radius x 500' length

Transmission Range

With Relay

Sensitivity System has a continuously variable potentiometer adjustment.

Remote Alarm Assessment Capability Zone-by-zone detection provides penetration information (location and type of activity (i.e. climbover' or 'cut through')).

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms System is impervious to disturbances on opposite side of fence or of wall. System also screens signals to accept only human "signatures"

Vulnerability to Spoofing or Tampering Integral tamper switch prevents undetected opening of modules.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -40° to $+70^{\circ}$ C.

Humidity

Rain Heavy rain has no effect on system detection range or pattern.

Snow

Haze/Smoke/Fog Thick fog has no effect on system detection range or pattern.

Wind

Other Conditions

Light

Noise

Line-of-Sight

Foliage

Soil Conditions

Other

SOURCE Stellar Systems product literature.

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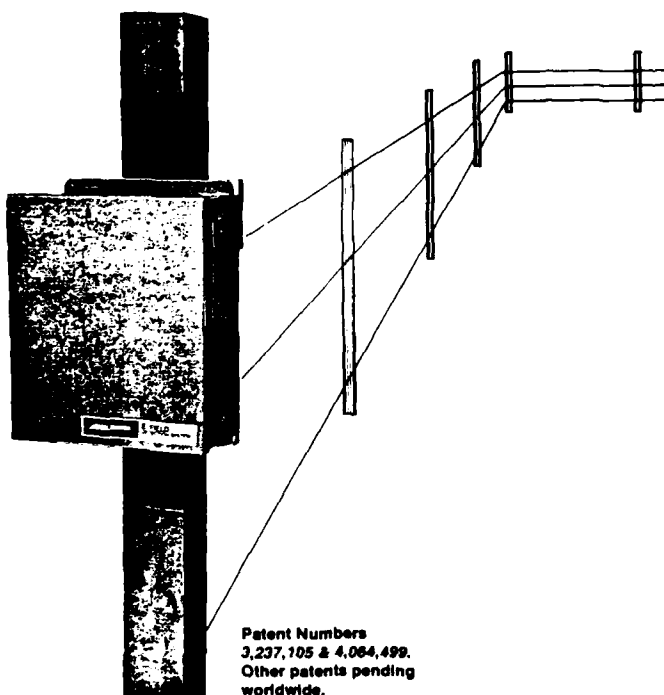
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PRODUCT DATA

E-FIELD™ Outdoor Perimeter Protection

Models EF-30 and EF-32

- For correctional and other high-risk facilities
- Follows land contour; minimum site leveling
- Around corner operation and installation
- Well defined coverage; adjustable detection pattern
- Minimum effects from extreme weather conditions, birds or windblown objects
- Operates close to chain link fence
- High animal immunity
- Single and dual end feed; minimal trenching required
- Hi-reliability construction
- Separate supervision and motion alarm relay outputs



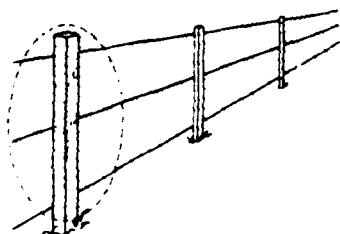
Patent Numbers
3,237,105 & 4,064,499.
Other patents pending
worldwide.

DESCRIPTION

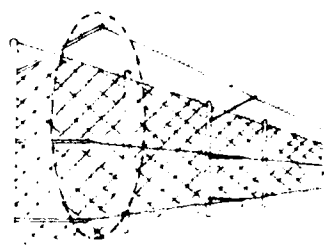
E-Field™ is an entirely new type of motion detection technology. Developed by Stellar Systems, it is the result of years of research and testing. Basically the system consists of a field generator, which excites a long field wire, and sense wire(s) running parallel to the field wire. The sense wire(s) is connected to an amplifier in the EFF Control Unit where E-Field signals received are monitored and analyzed. Although no energy is radiated, when an intruder walks within a few feet of the E-Field fence, he momentarily alters the level and character of the E-signal received. This processed signal activates an alarm relay.

The single zone (EF-30) and dual zone (EF-32) Control Units are designed to detect a compound signal form consisting of: E-Field amplitude change (mass of intruder), rate change (movement of intruder), and preset time disturbance (time intruder is in pattern). These parameters form the "signature" of a human being. When they all exist simultaneously, an alarm is generated by the signal processor in the Control Unit.

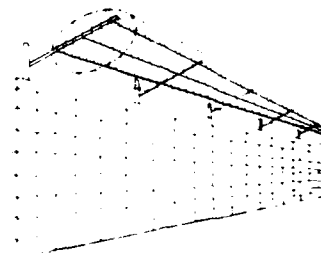
Stellar E-Field perimeter systems are primarily designed to detect a human intruder in fenced-in areas. This zone-by-zone detection provides guards and supervisors with specific penetration information (place, climb-over, cut-through, etc.), while being completely impervious to disturbances on the opposite side of the fence or wall on which the EFF is mounted. E-Field systems are fully supervised and monitored for "line shorts," "opens," or "grounds."



FREE STANDING EFF,
Three Wire or Four Wire



FENCE MOUNTED EFF,
Three Wire or Four Wire



WALL OR ROOF EFF,
Three Wire

SPECIFICATIONS

Model EF-30 Single Zone Control Unit:

Complete with Control Unit baseplate and enclosure, matching sense filter, standby battery and remote 110 to 16.5 VAC transformer for a single zone. When links having separate control units are operated in close proximity to each other, different frequencies are used in adjacent zones or sequentially around the perimeter.

Model EF-32 Dual Zone Control Unit:

Complete with Control Unit baseplate and enclosure, matching sense filter, standby battery and transformer for controlling two separate zones. A common field generator drives two adjacent zones. Separate sense filter circuits monitor each zone independently.

Coverage:

System Type	Min. Distance from Chain Link Meters (feet)	Max. Span Length Per Zone Meters (feet)	
		Single Zone	Dual Zone
3-Wire, Fence-Mounted Roof/Wall	0.5 (20")	150 (500')	150 (500')
3-Wire Free-Standing	1.2 (4')	150 (500')	230 (750')
4-Wire, Fence-Mounted Free-Standing	0.5 (20") 1.2 (4')	150 (500')	150 (500')

Operating Channels:

For 60Hz Power Line: A, B, C, and D
For 50Hz Power Line: U, V, W, X, Y and Z
(Other channels are available)

Sensitivity Control:

Continuously variable potentiometer adjustment.

Supervision:

Continuous AC and DC monitoring signals open, shorting, or grounding of E-Field fence when 2348 or 2352 Terminator is used; separate supervision relay provided.

Alarm & Supervision Relay Contacts:

Form "C," non-inductive load, 3 Watt at .25 Amp and 28 VDC; reed-type relay; EF-32 has one alarm relay for each zone.

Audible Alarm:

An output is provided to drive a test meter with Sonalert (Model 2391) for system testing.

Tamper Switch:

Integral to unit; prevents undetected opening of enclosure door.

Battery Charger and Standby:

Built into Control Unit for the 8-hour standby battery; battery is gelled electrolyte type; optional 24-hour standby battery and charger for mounting in separate enclosure is available if required.

Power Requirements:

	Single Zone	Dual Zone
110/125 VAC, 50/60Hz (Using 120/16 VAC transformer)	50mA	55mA
16-20 VAC, 50/60Hz (To Terminals 4 & 5)	350mA max. at 16.5 VAC	400mA max. at 16.5 VAC

Operating Temperature: -40°C to +70°C; -40°F to +158°F

Hi-Reliability Construction:

High reliability and wide temperature range components are utilized throughout.

Preconditioning:

Each unit is subjected to a five day (120 hour) operational burn-in at temperature in excess of 60°C.

Conformal Coating:

All printed circuit boards are conformally coated or potted.

Standard Enclosure:

Steel, NEMA 4, 14" high X 12" wide X 6" deep; shipping weight approximately 26 pounds; optional stainless steel enclosure available.

Optional Remote-Test Terminator (P/N 2352):

Tests all functions of an EFF zone (electronics, signal transmission and annunciator) from remote location by application of 12 VDC at 10mA. (110 VAC Model available.)

Spare Units:

E-626 Single Zone Spare; replaces any EF-30; supplied with four plug-in crystals; does not include battery or enclosure E-627 Dual Zone Spare; replaces any EF-32; supplied with four plug-in crystals; does not include battery or enclosure.

Options:

NEMA 4 Stainless Enclosure (II); Lightning Arrestor Package (III); 24-Hour Emergency Battery (IV).

COMPARISON CHART OF DIFFERENT EQUIPMENT FOR A TYPICAL INSTALLATION

Condition	E-Field Fence	Micro Wave	Infrared Multi-Beam	Notes:
-30° to +150° F operation	YES	YES	YES	*Beam Spreads
Uniform detection range	YES	NO*	NO*	
Coverage in thick fog or heavy rain, without change in range or pattern	YES	NO	NO	
Fully supervised	YES	YES	YES	
False alarms by windblown objects and dust	NO	YES	YES	
Follows land contour	YES	NO	NO	
Around corner operation without additional equipment	YES	NO	NO	
Operation within 20" of the chain link fence at full range	YES	NO	NO	
Single and dual end feed, no trenching	YES	NO	NO	
Remote location of electronics	YES	NO	NO	
Low current and low voltage operation	YES	NO	NO	

Specifications subject to change without notice.

SENSOR SYSTEM DATA SHEET

Name of Sensor H-Field Buried Line Field Disturbance Sensor

Developer Stellar Systems

Availability Status Not yet commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Electromagnetic ("leaky" coaxial cables)

Description System consists of a buried transmitter cable, one or two buried receiver cables, a transmitting unit and a receiving unit or a combined transmitting/receiving unit (for a multi-zone perimeter).

Principle of Operation The transmitter generates a continuous signal down the transmitting cable, which "leaks" the signal to establish a field along the zone. Disturbances in the field caused by an intruder are detected by the receiving cable and receiving unit. Processing circuitry compares the intruder signature against its human signature parameters. If a human signature is identified, an alarm is sounded.

Transmission Mode Hard-line.

Signature "Active sensor (electromagnetic emission). Sensor System has very low visibility.

Add-on Capability

Cost

PORTABILITY

Weight of Each Container

Size for Each Container Processor: 12" x 14" x 6.25"

POWER REQUIREMENTS

Power Requirements Power requirements: 15-18 VAC, 50/60 Hz or 12 VDC. 12 VDC standby rechargeable gel-cell type battery included.

EMPLACEMENT

Emplacement Mode Cables are buried 4 to 6 inches below the earth or paved surface and approximately 42 inches apart. Transmitting and receiving units are typically mounted above ground at remote distance from the detection cables.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Maximum zone is length 400 ft. Detection width equals 7 ft. with one receiver cable and 14 ft. with two receiver cables.

Transmission Range

With Relay

Sensitivity Detection sensitivity is uniform at all points and adjustable using potentiometer.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms System has high immunity to environmental and nuisance (small animal) false alarms.

Vulnerability to Spoofing or Tampering tamper switch

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -35°C to $+70^{\circ}\text{C}$

Humidity System performs effectively in relative humidity up to 95%.

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise System is insensitive to acoustic changes.

Line-of-Sight Line-of-sight is not necessary for system operation.

Foliage System is insensitive to movement of grass or shrubs.

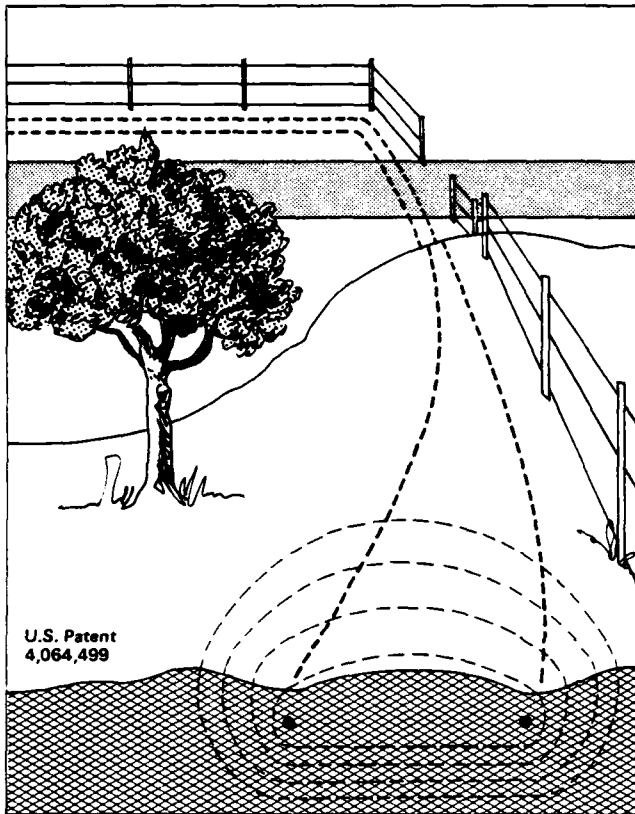
Soil Conditions

Other System is insensitive to seismic and pressure changes.

SOURCE Stellar Systems product literature. March 1980. (Note: This is preliminary data on a system not yet available.)

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stellar systems



PRELIMINARY DATA

H-FIELD™ Buried Line Field Disturbance Sensor Models HFX-1, HFR-1, HFXR-1

- Perimeter protection designed for high risk facilities
- High security sensor invisible to intruders
- Real time perimeter intrusion detector
- Minimum effects from extreme weather
- High immunity to animals
- Insensitive to seismic, acoustic and pressure changes
- Self-adjusting to stationary objects
- Follows land contour; not line-of-sight
- Grading or leveling not required around perimeter
- Can be buried under paved driveways or roads
- Separate supervisions and intrusion alarm relay outputs
- Insensitive to movement of grass and shrubs

DESCRIPTION:

Stellar System's H-Field Buried Line Field Disturbance Sensor System consists of two or three coaxial cables buried 4 to 6 inches below the surface and approximately 42" apart. These cables utilize a leaky shield which allows electrical energy to be radiated or received. The three cable system provides a wider detection pattern.

One of the parallel underground cables is a transmitter and the other one or two cables is a receiver. In a single zone system, the cables are connected to an HFX-1 transmitting unit at one end and an HFR-1 receiving unit at the other end.

For a multi-zone perimeter, the parallel cables are connected to HFXR-1 combined transmitting/receiving units at intermediate points along the perimeter. These intermediate units are both the end point of one zone and the start point of another zone. In a multi-zone H-Field system, all transmitting and receiving units operate at the same frequency. The transmitting and receiving units are typically mounted above ground at a remote distance from the detection cables.

The transmitter generates a continuous signal which is sent down the transmitting cable. Because this cable "leaks", a field is set up along the zone. Some of this field is coupled to the receiving cable and a receiver unit. Disturbances of the field caused by an intruder are detected and produce an alarm.

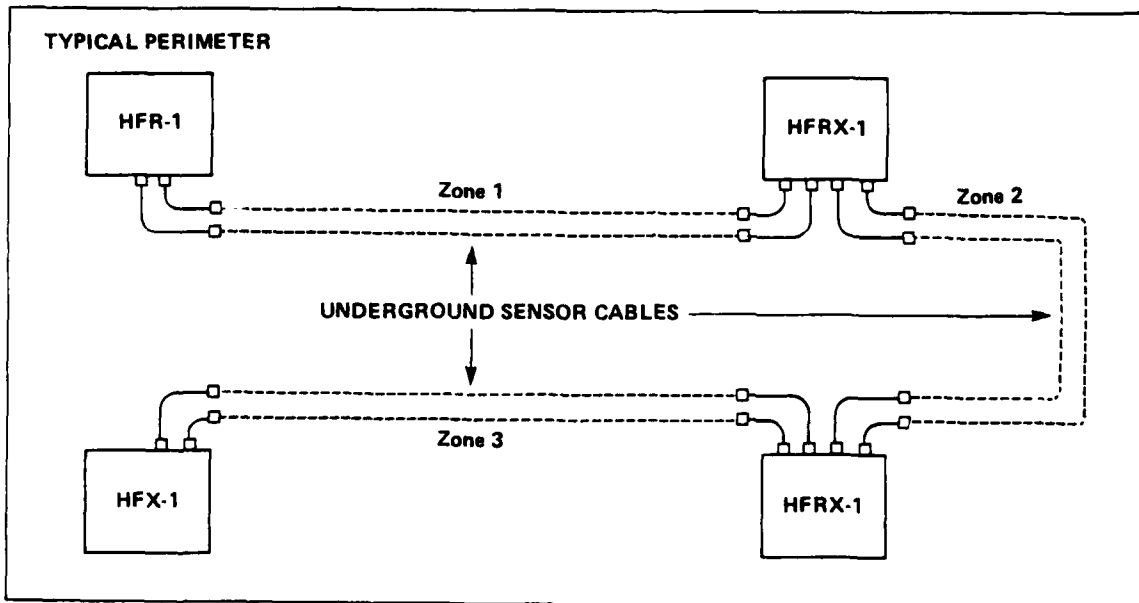
There are three conditions that must be met simultaneously before the processing circuitry will initiate an alarm signal.

1. The change in Field amplitude at the receiving cable must exceed a preset level. This is dependent on the mass of the intruder and its proximity to the Field.
2. The frequency of the intruder's movements must be at a rate typical of human body movement.
3. The moving object must create this particular change in the Field for a preset length of time. This is dependent on the length of time the intruder is in the pattern.

These parameters form the signature of a human being in the Field. When they all exist simultaneously, the alarm is sounded. Detection sensitivity is uniform at all points along the zone. The detection pattern width is seven (7) feet for

DESCRIPTION (Continued)

normal human movements. A second receiver cable can be added (similar to a 3-wire E-Field) to increase the pattern width to almost fourteen (14) feet. Basically, the system operation is almost identical to the familiar Stellar E-Field, except transmit and receive lines are horizontal and underground. Both transmit and receive cables are fully supervised. Installation involves minimal ground preparation to assure adequate drainage around the cables.



SPECIFICATIONS

MAXIMUM ZONE LENGTH:
400 feet

OPERATING POWER REQUIREMENTS, AC:

15 to 18 VAC, 50/60 Hz, current:

Model HFR-1 200 mA rms

Model HFX-1 235 mA rms

Model HFRX-1 435 mA rms

NOTE: If a standby battery is used add approximately 150 mA to each of the above current requirements to allow for charging current into a discharged battery.

OPERATING POWER REQUIREMENTS, 12 VDC:

12 VDC, current;

Model HFR-1 120 mA

Model HFX-1 120 mA

Model HFRX-1 240 mA

BUILT-IN BATTERY CHARGER:

Designed to float-charge a 12V Gel-Cell standby battery at 13.8V, current limited at 180 mA.

OPERATING FREQUENCY:

Approximately 60 MHz; user to specify exact frequency desired to avoid interference with other equipment operating within protected areas.

ALARM AND SUPERVISION RELAY CONTACTS:

Form "C", 2 watts at 0.25 Amp, or 28 VDC maximum non-inductive load.

TAMPER SWITCH:

1-pole, 2-position, mounted on enclosure for desired use.

CONNECTORS:

Coaxial cable Type N; other connections via barrier strip terminals.

CONTROLS:

Potentiometer for sensitivity adjustment; switch for long- or short-zone length.

ENVIRONMENTAL:

Operating Temperature: -35°C to $+70^{\circ}\text{C}$.

Relative Humidity: to 95%.

ENCLOSURE:

Weatherproof NEMA-type enclosure; 12" x 14" x 6.25" plus mounting flanges.

ACCESSORIES:

1. Direct Burial Ported Coaxial Cable, Stellar P/N 8100 (order as required - 500 ft. increments).
2. Motion Meter/Sonalert, Stellar P/N 2391 (not included).
3. 115 VAC/16.5 VAC Transformer, 50/60 Hz (included).
4. Standby Battery, rechargeable Gel-Cell type, -hour, 12 VDC (included).
5. Non-Leaky coax cable for connecting from control unit to zone (order as required in 1000' increments).

STELLAR SYSTEMS

A Subsidiary of The Wackenhut Corporation

231 Chaucot Avenue, San Jose, California 95131 • Phone (408) 946-6460 • Telex 346 436

31 Fairmount Avenue, P.O. Box 536, Chester, New Jersey 07930 • Phone (201) 879-6243

SENSOR SYSTEM DATA SHEET

Name of Sensor Rapid Deployment Intrusion Detection System (RDIDS-1A)

Developer Stellar Systems

Availability Status Commercially available

System Application Temporary perimeter protection

SYSTEM DESCRIPTION

Type of Sensor Electromagnetic ("leaky" coaxial cables)

Description System consists of a Portable H-Field Disturbance Sensor and a Long Range Wireless Alarm Monitoring System. The Portable Sensor consists of a dolly-mounted reel containing two coaxial cables 900 feet in length and a RDIDS-1A transceiver control unit.

Principle of Operation The two "leaky" coaxial cables which are connected to the transceiver unit are laid in parallel configuration encompassing the protected area. The transceiver sends a continuous wave signal down the "transmitter" cable, which "leaks," thus creating a detection field. Disturbances in the field caused by an intruder are detected by the "receiver" cable and transceiver unit. Processing circuitry compares the intruder signature against its human signature parameters. If a human signature is identified, an alarm is sounded.

Transmission Mode Radio frequency (450-470 MHz)

Signature "Active" sensor (electromagnetic signal emission). Portable unit has distinctive visual signature.

Add-on Capability As many as five RDIDS may be deployed in close proximity to each other.

Cost

PORTABILITY

Weight of Each Container 195 lbs. (Portable Sensor).

Size for Each Container 5'6" long x 3' high x 2'8" wide (Portable Sensor). 5 1/4" high x 17" wide x 13" deep (Wireless Alarm Monitoring System).

POWER REQUIREMENTS

Power Requirements Sensor: 15-18 VAC, 50/60 Hz from 110-116 VAC stepdown transformer. System may also be powered by a 12 VDC vehicle battery. Alarm Monitoring System: 110/22/ VAC, 50/60 Hz.

EMPLACEMENT

Emplacement Mode Cables are placed on top of ground approximately 50 inches apart.

Estimated Emplacement Time Less than 30 minutes.

Estimated Retrieval and Loadout Time Less than 30 minutes.

RUGGEDNESS

Ruggedness System is designed for outdoor, temporary site protection.

EFFECTIVENESS/RELIABILITY

Detection Range Maximum zone length is 900 ft., adjustable in two 450 ft. lengths.

Detection pattern is 2.5 meters wide and 1.5 meters high. Maximum area coverage equals 64,000 sq. ft.

Transmission Range RDIDS may be remoted up to 30 miles (line-of-sight) from receiver/annunciator panel.

With Relay

Sensitivity Detection sensitivity is uniform at all points along the zone and may be adjusted using a potentiometer.

Remote Alarm Assessment Capability System will only alarm for intruder meeting human signature parameters.

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -35°C to $+70^{\circ}\text{C}$.

Humidity System operates in relative humidity up to 95%.

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Line-of-sight is required for radio transmission.

Foliage

Soil Conditions

Other

SOURCE Stellar Systems product literature. April 1981.

231 Charcot Avenue
San Jose, California 95131, U.S.A.
Telephone (408) 946-6460, Telex 346-436

stellar systems

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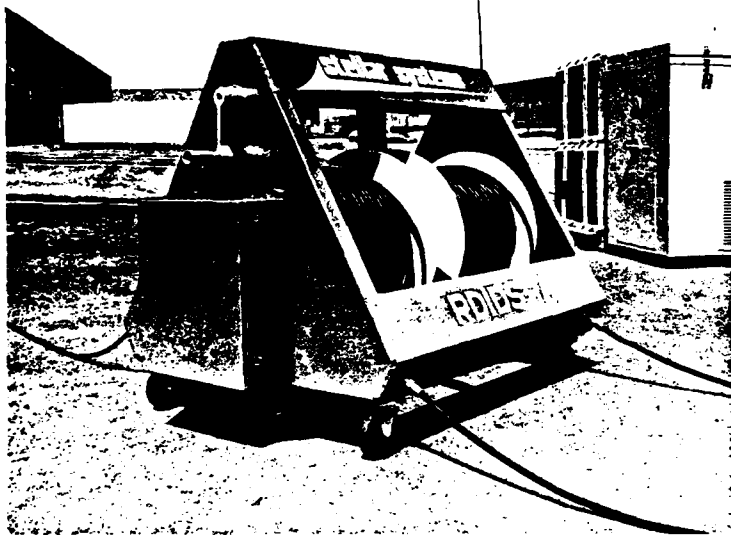
Product Data

RDIDS-1A

Rapid Deployment Intrusion Detection System

FEATURES

- Portable self-contained intrusion detection system
- Can be set-up or removed in less than 30 minutes
- Long-range wireless monitoring capability
- Temporary perimeter protection for:
 - sensitive material storage
 - aircraft on jetways
 - stationary vehicles subject to attack
 - nuclear facilities
 - arsenals and ammunition dumps
 - buildings at times when high security is required



DESCRIPTION

Stellar Systems' RDIDS-1A consists of a self-contained, portable H-Field™ Field Disturbance Sensor and a Long Range Wireless Alarm Monitoring System which may be deployed in less than 30 minutes. There may be as many as five RDIDS-1A's in close proximity to each other. The maximum number of RDIDS-1A's which may be used in any particular installation depends on the particulars of the site in question. RDIDS-1A may be remotored up to 30 miles (line of sight) from the receiver/annunciator panel, which is capable of monitoring up to five RDIDS-1A's. Each RDIDS-1A channel will indicate:

1. Alarm	3. Access
2. Normal	4. Trouble

The RDIDS-1A has an independent power source capable of 24-hour operation. Also included is a 110-16 VAC stepdown transformer to use when main power is available. It may also be powered by a 12 VDC vehicle battery, or directly from an aircraft when using Stellar Systems' Model VC-1 28 to 12 VDC Voltage Converter.

The H-Field™ Field Disturbance Sensor consists of two specially designed "leaky" coaxial cables laid on top of the ground approximately 50 inches apart. These cables form an enclosed perimeter to encompass an aircraft parked on a jetway, or sensitive material storage areas as defined by NRC 5.44 for nuclear facilities, or DOD 5100.76M arms/ammunition arsenals and similar applications (see photos on reverse side).

These cables utilize a specially designed "leaky" shield which allows electrical energy to be radiated or received. The parallel cables are connected to the RDIDS-1A transceiver control unit so as to keep it in the protected field. Due to signal coupling characteristics, the transmitter coaxial cable is deployed toward the inside of the perimeter while the receiver cable is deployed toward the outside. This cable arrangement offsets the detection field approximately 1 meter past the receiver cable for an overall detection width of 2.5 meters. The transmitter generates a continuous wave signal in the 60 MHz frequency range for conduction down the transmitting cable. Because this cable "leaks," a field is set up along the zone. Some of this field is coupled to the receiving cable and receiver unit. Disturbances of the field caused by an intruder are detected and produce an alarm.

The following conditions must be met simultaneously before the processing circuitry will initiate an alarm signal:

1. The change in Field Amplitude and Phase at the receiving cable must exceed a preset level; this is dependent on the mass of the intruder and its proximity to the Field.
2. The frequency of the intruder's movements must be at a rate typical of human body movements.
3. The moving object must create this particular change in the Field for a preset length of time; this is dependent on the length of time the intruder is in the pattern.

(Continued on reverse side)

These parameters form the "signature" of a human being in the Field. When all of the above conditions exist simultaneously, the alarm is initiated. Detection sensitivity is uniform at all points along the zone. The detection pattern is 2.5 meters wide and 1.5 meters high for normal movements. The Stellar Systems' RDIDS-1A is capable of providing a maximum area coverage of 64,000 square feet with a 900 foot cable circumference. Each cable consists of two 450 foot lengths which are joined together by a simple interconnect. If smaller area coverage is desired, the first 450 foot section of cable is merely disconnected.

SPECIFICATIONS

GENERAL

Maximum Zone Length:

900'; adjustable in two 450' lengths

Power Requirements:

15 to 18 VAC, 50/60 Hz, 600 mA from transformer; or 12 VDC at 300 mA

NOTE: If a Standby Battery is used, add approximately 300 mA to each of the above current requirements to allow for charging current into a discharged battery.

Built-in Battery Charger:

Designed to float-charge a 12 VDC Gel-Cell Standby Battery at 13.8 VDC

H-Field Operating Frequency:

Approximately 60 MHz; five frequencies available

Connections:

Coaxial cable type N; other connections via barrier strip terminals

Controls

Potentiometer for sensitivity adjustment; range switch for long or short zone length

Environmental:

Operating temperature -35°C to $+70^{\circ}\text{C}$; relative humidity to 95%

Dimensions & Weight:

5'6" long x 3' high x 2'8" wide; 195 pounds

LONG-RANGE WIRELESS ALARM MONITORING SYSTEM

Frequency Range:

450-470 MHz standard; other ranges available for special applications

Circuitry:

Completely solid state; meets or exceeds all applicable FCC specifications and those of many other countries

Alarm Receiver/Annunciator:

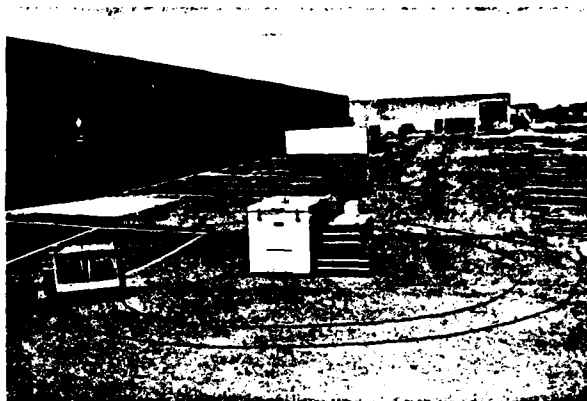
- A. Technology:
Crystal controlled, triple conversion, superhetrodyne
- B. Sensitivity:
0.2 microvolt for better than 10^{-5} error rate before parity check
- C. Adjacent Channel Rejection:
Greater than 100 dB at 30 Hz and beyond
- D. Power: 110/220 VAC, 50/60 Hz
- E. Input: 50 Ohm, Type N connector
- F. Auxiliary I/O: For repeater operation
- G. Size:
5'4" (13.3cm) high x 17" (43.3cm) wide x 13" (33cm) deep
- H. Mounting: Rack or tabletop

Alarm Transmitter:

- A. Input: 1 alarm, 1 trouble
- B. RF Output:
2 Watts standard, other power levels are available
- C. Emission Type: 15F2
- D. Spurious & Harmonics: -46 dB
- E. Frequency Stability:
 $\pm 0.0005\%$ from -30°C to $+60^{\circ}\text{C}$

ACCESSORIES

- 1. Motion Meter/Sonalert, Stellar P/N 2391 (not included)
- 2. 115 - 16.5 VAC Transformer, 50/60 Hz (included)
- 3. Stellar VC-1 DC-DC Voltage Converter, 28 VDC to 12 VDC (not included)
- 4. Remote Motion Meter/Sonalert, Stellar P/N 2393 (not included)



RDIDS-1A sensor cables encircle sensitive materials in storage.



RDIDS-1A sensor cables encircle an aircraft parked on a jetway.

STELLAR SYSTEMS

Main Plant: 231 Charcot Ave., San Jose, CA 95131
Phone: (408) 946-6460 Telex: 346-436

SENSOR SYSTEM DATA SHEET

Name of Sensor Electromagnetic Intrusion Detector (EMID III). Also referred to as:
Electromagnetic Detecting-Transmitting Set (AN/GSQ-160).

Developer U.S. Army

Availability Status Limited availability to selected military units. (No longer in
production.)

System Application Perimeter and area personnel and vehicle intrusion detection.

SYSTEM DESCRIPTION

Type of Sensor Electromagnetic.

Description System is an expendable/recoverable hand-emplaced electromagnetic
sensor.

Principle of Operation System radiates a continuous electromagnetic (radio
frequency) signal on two frequencies. A target moving within range of sensor causes
a change in the difference between the two radiated frequencies. System senses
change and sends alarm signal either directly to a monitoring facility or through a
SARS III relay set.

Transmission Mode Radio frequency.

Signature "Active" sensor (electromagnetic emission). System has low visibility.

Add-on Capability

Cost

PORTABILITY

Weight of Each Container 15 lbs.

Size for Each Container 7.5" x 7" x 5.5"

POWER REQUIREMENTS

Power Requirements BA-1549/U Battery Battery life: Continuous use -- 45 days;
night only use -- 90 days.

EMPLACEMENT

Emplacement Mode System is designed for surface emplacement. It is particularly
suited for use in swampy and marshy areas where seismic sensors may not operate.

It is submersible and may be employed in areas subject to periodic flooding.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, tactical (military) use.

EFFECTIVENESS/RELIABILITY

Detection Range System detects the following targets at the following ranges:

Personnel: 20-120 ft.; Boats: 80-100 ft.; Vehicles: 20-120 ft.

Transmission Range

With Relay EMID is compatible with SARS III relay system.

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated) One per 24-hour period

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering SYstem will self-disable on tamper.

TRAINING REQUIREMENTS

Operator Training Required (See TM 11-5840-352-14)

Maintenance Training Required (See TM 11-5840-352-14)

MAINTAINABILITY

Degree of Operator Skill Required (See TM 11-5840-352-14)

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate) 5000 hrs. (SEAOPPS sensor data sheet)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Storage temperature: -65° to $+165^{\circ}$ F. Operating temperature: -32° to $+145^{\circ}$ F.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Line-of-sight is required for intrusion detection and alarm transmission.

Foliage

Soil Conditions System is especially suited for use in swampy areas where seismic sensors may not operate.

Other

SOURCE U.S. Army SEAOPPS Sensor Data Sheet.

S E A O P S S	SENSOR DATA SHEET				SENSOR: EMID III	
	SENSOR TYPE: Electromagnetic		DELIVERY MEANS: Hand-Emplaced		RECOVERY: Expendable	
	OP TEMP: +32 to +145°F		STORAGE TEMP: -65 to +165°F		MISSION DURATION: 45 days	
	AVG FALSE ALARM RATE (24 HRS): 1		MTBF: 5000 Hrs (EST)		POWER REQUIREMENTS: BA-1549 Battery	
					SELF-DISABLE: Yes	
NOMENCLATURE: ELECTROMAGNETIC DETECTING- TRANSMITTING SET AN/GSQ-160						
TARGET AND DETECTION CHARACTERISTICS				SIZE AND WEIGHT		
TARGET TYPE:		DETECTION RANGE:	DETECTION PROBABILITY:	UNIT:	DIMENSIONS:	WEIGHT:
Personnel		20-120'		EMID III	7.5" x 7" x 5.5"	15 lbs.
Boats		80-100'				
Vehicles		20-120'				
				PROD LEAD TIME		UNIT COST
REFERENCE DOCUMENTS				18 months		
TM 11-5895-752-15						
OPERATION AND DEPLOYMENT						
The primary mission of the EMID III is to detect the movement of personnel, powered and unpowered small boats and vehicles, with very low false alarm rates. The unit is capable of continuous, or night only, operation, and self-disable on tamper or end of battery life. The EMID III was developed as an independent, noncommandable, hand-emplaced sensor using Phase III common modules.						
(OVER)						

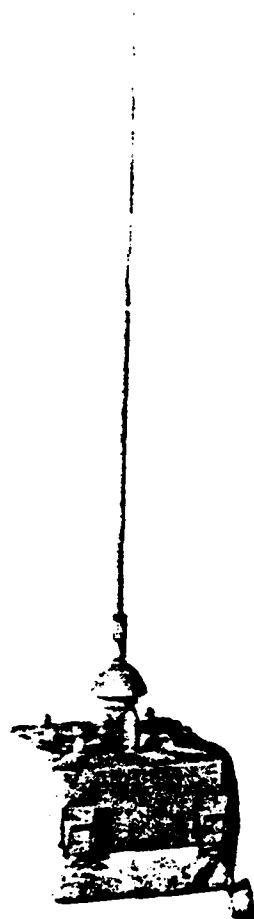
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SENSOR DATA SHEET

SENSOR:

EMID III

The EMID III is hand-emplaced along trails or waterways to detect the movement of personnel, boats, or vehicles. It radiates a continuous signal at two frequencies. A target moving within range of the sensor causes a change in the difference between the two radiated frequencies. Detection of the change causes the sensor to transmit a Phase III ID message. Range permitting, the EMID III can transmit directly to a monitoring facility using a Radio Frequency Monitor Set, AN/USQ-46. If not, the range can be extended using a SARS III relay system. Level of employment is contingent upon mission of using unit.



Electromagnetic Detecting-Transmitting Set

3.6 MISCELLANEOUS SYSTEMS - Data Sheets and Product Literature

US Army: Anti-intrusion Alarm Unit (AAU)

Stellar Systems: Ground Bug

Teledyne Geotech: Buried Line Intrusion Detector (BLID)

US Army: Balanced Pressure System (BPS)

Resdel Engineering Corp.: Intrusion Sensor (Models RD-102 & RD-102E)

Israel Aircraft Industries: Intrusion Detection System DTR-90

Israel Aircraft Industries: Magiline
(Fence Disturbance Detection Line)

Stellar Systems: E-Flex (Model E-4)

SENSOR SYSTEM DATA SHEET

Name of Sensor Anti-Intrusion Alarm Unit (AAU)

Developer U.S. Army

Availability Status Limited availability to selected military units. (No longer in production.)

System Application Outdoor perimeter (personnel and vehicle) intrusion detection.
System is an ancillary sensor to MINISID III.

SYSTEM DESCRIPTION

Type of Sensor Acoustic

Description System consists of external microphone and a logic case (processor type unit).

Principle of Operation Three consecutive seismic transmissions by the MINISID III within 26 seconds activates the microphone of the AAU. A 15-second audio transmission of the background noise is then transmitted along with MINISID coded alarm information to a monitoring receiver.

Transmission Mode (Audio transmission) via radio frequency.

Signature Passive sensor, "active" signal transmission (burst of radio transmission sent on alarm). System has low visibility.

Add-on Capability System is an ancillary sensor to MINISID III.

Cost

PORTABILITY

Weight of Each Container Electronics assembly: 5.7 lbs. Battery package: 3 lbs.

Size for Each Container Electronics assembly: 10.9" x 3" diameter. Battery package: 6.2" x 3" diameter.

POWER REQUIREMENTS

Power Requirements 28V batter (BA - 1546 Type). Battery life: 45 days minimum.

EMPLACEMENT

Emplacement Mode The AAU microphone is emplaced on the ground, in a bush or tree. The electronics assembly is usually buried or on the surface.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor tactical (military) use. The AAU is capable of withstanding shock up to 40 g.

EFFECTIVENESS/RELIABILITY

Detection Range Personnel: 30 meters. Vehciles: 100 meters. (Detection range is same as that of human ear.)

Transmission Range See MINISID III.

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering System has no self-disable capability.

TRAINING REQUIREMENTS

Operator Training Required See AAU PMO Manual, (C) TM 5-6350-255-13.

Maintenance Training Required See AAU PMO Manual, (C) TM 5-6350-255-13.

MAINTAINABILITY

Degree of Operator Skill Required See AAU PMO Manual, (C) TM 5-6350-255-13.

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate) 5000 hrs. (U.S. Army SEAPPS data sheet)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed Dead batteries and microphone cables are replaceable in the field.

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating and storage temperature: -32° to +145°F.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light System may be used as a day/night or night-only sensor.

Noise

Line-of-Sight

Foliage

Soil Conditions

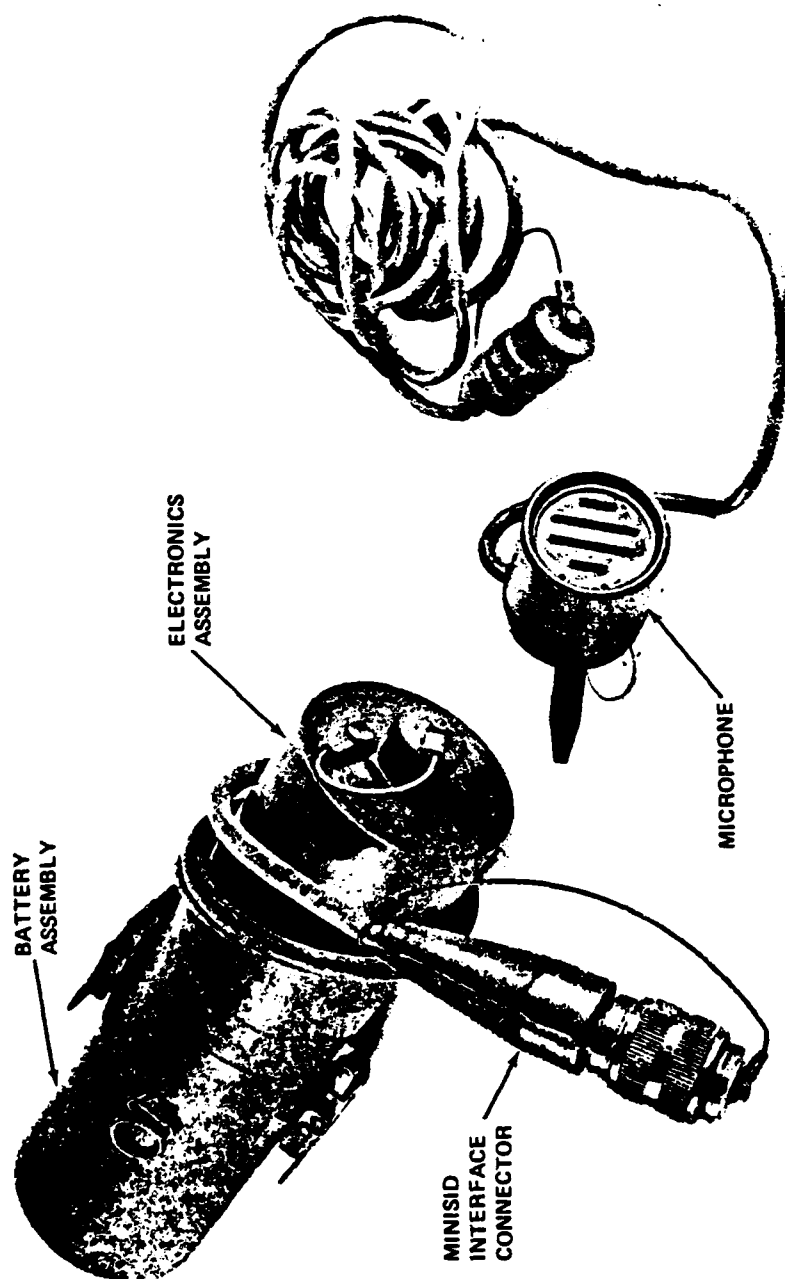
Other

SOURCE: US Army SEAOPSS data sheets.

S E A O P S S	SENSOR DATA SHEET				SENSOR: AAU (MINISID ANCILLARY)	
	SENSOR TYPE: Acoustic		DELIVERY MEANS: Hand-Emplaced		RECOVERY: Recoverable	
	OP TEMP: +32 to +145° F		STORAGE TEMP: +32 to +145° F		MISSION DURATION: 30 days	
	AVG FALSE ALARM RATE (24 HRS): Not Applicable		MTBF: 5000 Hrs (EST)		POWER REQUIREMENTS: 28V battery	
					SELF-DISABLE: No	
TARGET AND DETECTION CHARACTERISTICS				SIZE AND WEIGHT		
TARGET TYPE:		DETECTION RANGE:		DETECTION PROBABILITY:		
Personnel		30 m				
Vehicles		100 m				
				UNIT:		DIMENSIONS:
				Electronics assembly		10.9 x 3 in. dia
				Battery package		6.2 x 3 in. dia
						WEIGHT:
						5.7 lbs.
						3 lbs.
				PROD LEAD TIME		UNIT COST
REFERENCE DOCUMENTS				12 months See Note 1		
TM 5-6350-263-13 Detector, Alarm Anti-Intrusion, Restricted Area, AAU, DT-383/GSQ, FSN 6350-133-7870(U) and Battery Power Supply, PP-6570/GSQ-154(V), FSN 6350-182-7927(U), August 1970 PIMO, Technical Manual, Operating Instructions SACH CHI-DAN KY THUAT PIMO, Cach Dieu-Hanh, AAU, DT-383/GSQ and Battery Power Supply, PP-6570/GSQ-154(V), August 1970						
OPERATION AND DEPLOYMENT						
The AAU provides audio detection of personnel or vehicle intrusion. Each time MINISID senses an intrusion, a detect signal is sent to the AAU. If the AAU receives three detect signals during a 26 second period, the AAU's microphone is activated. Audio background noise is then transmitted with MINISID coded alarm information as a 15 second burst of audio information to a monitoring receiver. The AAU microphone is emplaced on the ground, in a bush or tree. A day/night sensor mounted in the microphone assembly provides the option of using the AAU only at night or on a 24-hour basis. The AAU electronics assembly is generally buried or camouflaged. The AAU is capable of withstanding shock up to 40 g and can withstand -65 to +160° F temperatures during transportation. Dead batteries and defective AAU microphone cables are replaceable in the field.						

(OVER)

S E A O P S S	SENSOR DATA SHEET	SENSOR: AAU (MINISID ANCILLARY)
NOTE 1: Item not available from inventory. Twelve month lead time necessary to award contract and receive first item. (These notes apply for all items in this brochure)		



Anti-Intrusion Alarm Unit

SENSOR SYSTEM DATA SHEET

Name of Sensor Ground Bug

Developer Stellar Systems

Availability Status Commercially available

System Application Outdoor or indoor area or perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Pressure (strain-sensitive cables)

Description System consists of one or two buried sensing cables and a control unit.

Principle of Operation Strain-sensitive cables are buried along, or in a pattern through, the protected area and connected to the control unit. In response to the mechanical strain produced by an intruder walking over the cable, one or two of the buried sensor cables generate electrical signals.

Transmission Mode Wire/cable.

Signature Passive sensor. Sensor has no visible signature.

Add-on Capability Single or dual zone detection.

Cost

PORTABILITY

Weight of Each Container Control unit (shipping weight): 26 lbs.

Size for Each Container Control unit: 14" high x 12" wide x 6" deep.

POWER REQUIREMENTS

Power Requirements Operating power: 16-19 VAC, 50/60 Hz via Model 2365 16 VAC transformer (included); or 11 to 14 VDC at 85 mA; or via 12 VDC gelled electrolyte standby battery (included).

EMPLACEMENT

Emplacement Mode Sensor cables may be buried outdoors (2" to 6" below the ground and 15" to 25" apart), indoors (laid under carpeting or on top of ceiling panels) or attached to walls as a penetration detector or to movable objects for detection of burglary attempts.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for indoor or outdoor, fixed sit use.

EFFECTIVENESS/RELIABILITY

Detection Range Detection length equals up to 2500 ft. for single-zone, dual-cable configuration, or up to 5000 ft. for dual-zone, single-cable configuration.

Transmission Range

With Relay

Sensitivity System has adjustable sensitivity control which allows the number of intruder-generated impulses required to trigger alarm to be set from one to three.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms Minimum nuisance alarm susceptibility with single-zone, dual-cable configuration as intruder must be sensed by both cables in a preset time interval.

Vulnerability to Spoofing or Tampering System has tamper switch to indicate when cover door is open.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30° to +65°C.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Not required.

Foliage

Soil Conditions

Other

SOURCE: Stellar Systems product literature. March 1981.

AD-A162 946

TACTICAL SENSORS FOR DISPERSED TNF (TACTICAL NUCLEAR
FORCE) UNITS APPENDIX (U) SCIENCE APPLICATIONS
INTERNATIONAL CORP MCLEAN VA P ANTSEN ET AL. 30 JUN 83

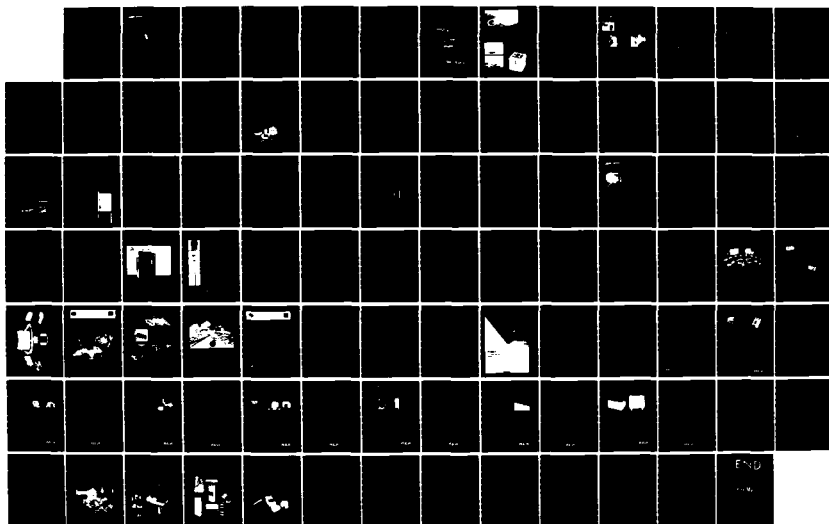
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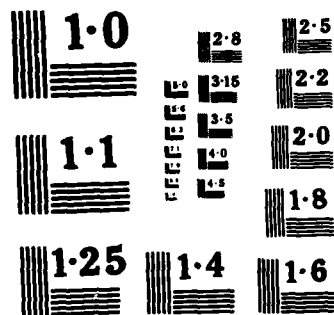
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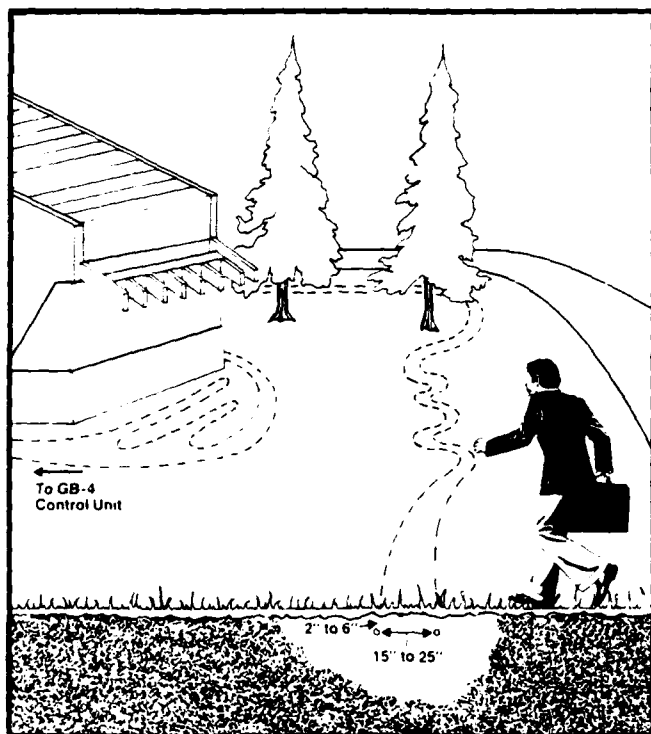
NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

231 Charcot Avenue
San Jose, California 95131, U.S.A.
Telephone (408) 946-6460, Telex 346-436

stellar systems

A Wackenhut Company

PRODUCT DATA



GROUND BUG™

Buried Line, Strain-Sensitive Sensor

FEATURES

- Hidden intrusion detection sensor for outdoor and indoor applications
- Line or area sensing within the same zone
- Passive, no energy radiated
- Follows land contours, not line-of-sight
- Simple installation
- Single Control Unit for zones up to 2500 feet long

Patent Number 3,956,743.
Other patents pending worldwide.

DESCRIPTION

Stellar Systems' GROUND BUG™ buried line sensor utilizes the proven E-FLEX™ technology to produce a buried sensor that can be used as either an area or line sensor. For these applications, one or two special sensing cables are buried 2" to 6" below the ground. These cables generate an electrical signal in response to the mechanical strain produced by an intruder walking over the cable. The sensing cables can also be used to protect the interiors of buildings.

GROUND BUG™ buried cables are completely invisible and no energy is radiated. Not only does this make defeat by a sophisticated intruder very difficult, but it also maintains the beauty of outdoor areas while still providing a high level of intrusion detection. Cables can be laid out to provide either line or area protection.

INSTALLATION

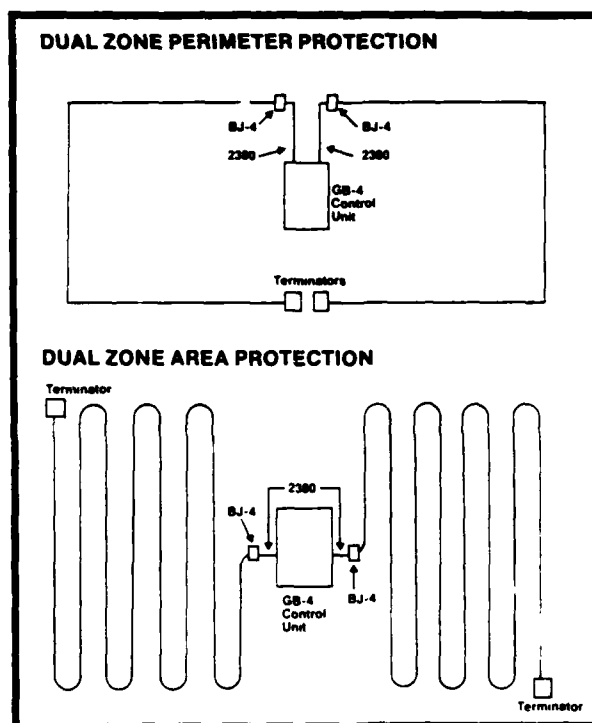
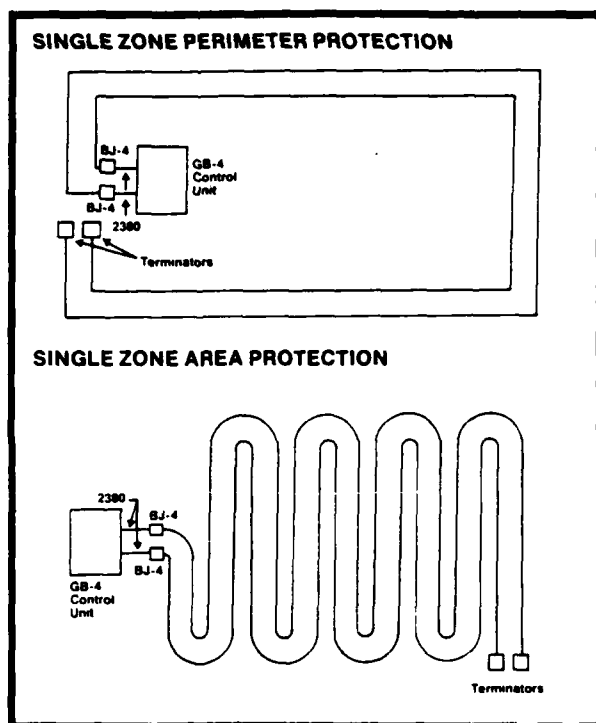
Installation of the GROUND BUG™ is simple. The ground is prepared by trenching or slitting. The cables are then laid and buried. Connection of the cables, alarm annunciation circuits and power to the Control Unit completes the installation. GROUND BUG™ can be installed in either a single-zone, dual-cable configuration having a detection length of up to 2500

feet; or a dual-zone, single-cable configuration having a detection length of up to 5000 feet. The single-zone, dual-cable configuration insures minimum nuisance alarm from external noise sources since an intruder must be sensed by both cables in a preset time interval.

A single sensitivity control is provided which permits optimum adjustment of sensitivity for any application. The number of intruder-generated impulses required to produce an alarm can be set in the range of one to three. This permits further optimization of the detection characteristics to meet the requirements of the application.

APPLICATIONS

The GROUND BUG™ is especially well suited where intrusion detection is required, but the visibility of other sensors is detrimental to the appearance or security of the facility. Typical situations are corporate office buildings, commercial buildings, car lots, equipment storage lots and industrial facilities. The GROUND BUG™ is also useful indoors. When laid under carpeting or on top of ceiling panels, it provides wide area protection with no visibility. It can also be attached to walls as a penetration detector—or to moveable objects for detection of burglary attempts.



SPECIFICATIONS

Operating Power:

16 to 19 VAC, 50/60 Hz via Model 2325 16 VAC transformer (included); or 11 to 14 VDC at 85 mA; or via 12 VDC gelled electrolyte standby battery (included)

Operating Temperature: -30°C to +65°C

Outputs:

ALARM RELAY #1: Form C, indicating IMPULSE alarm stimulus to Zone 1

ALARM RELAY #2: Form C, indicating IMPULSE alarm stimulus to Zone 2

SUPERVISION RELAY: Form C, indicates an alarm if the sensing cable is cut or shorted

All relay contacts rated at 3 Watts at 0.25 Amps, or 28 VDC maximum, resistive load

Sensing Cable:

Strain-sensitive cable buried at approximately 6" depth along, or in a pattern through, protected area; maximum length 2500 feet (765 meters)

Test Points:

TP-1: used with Stellar 2391 Motion Meter to indicate the presence of signals from Sense Cable #1

TP-2: used with Stellar 2391 Motion Meter to indicate the presence of signals from Sense Cable #2

SONALERT #1: used with Stellar 2391 Motion Meter to indicate IMPULSE alarms in Zone #1 during testing

SONALERT #2: used with Stellar 2391 Motion Meter to indicate IMPULSE alarms in Zone #2 during testing

Tamper Switch:

Mounted in main enclosure to indicate when cover door is open

CONTROLS

Sensitivity:

Used to adjust desired detection sensitivity

Count:

A three-position switch used to select the desired number of impulses to constitute a IMPULSE alarm.

Single/Dual-Zone Selector:

Zone selector switch for single- or dual-zone operation

Enclosure:

Steel NEMA 4, epoxy painted, 14" high x 12" wide x 6" deep (35.5cm x 30.5cm x 15.3cm); shipping weight approx. 26 pounds (11.8kg); stainless steel enclosure optional

ACCESSORIES

Standard Terminator, BT-4:

Used at far end of sensing cable for cable supervision

Remote Test Terminator, BST-4:

Same as BT-4 with added remote test feature: the BST-4 requires application of +12 VDC to generate a system remote test signal.

Junction Box, B.J.-4:

Required when making splices in sensing cable

Motion Meter, 2391:

Recommended for adjusting and testing system performance

Ground Bug Cable Types:

#2380: Insensitive Feed Cable

#2383: High Sensitivity Sensor Cable

STELLAR SYSTEMS

Main Plant: 231 Charcot Ave., San Jose, CA 95131
Phone: (408) 946-6460 Telex: 346-436

SENSOR SYSTEM DATA SHEET

Name of Sensor Buried Line Intrusion Detector (BLID)

Developer Teledyne Geotech

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Pressure

Description System consists of a sensor line (an array of pressure-sensitive sensors) and a processor unit (two channel).

Principle of Operation Sensor line is placed in a potential intruder pathway. An intruder stepping near the sensor line changes the pressure field around sensor(s), causing it to generate a signal. Processor compares signal to predetermined criteria, and if criteria are met, an alarm signal is generated.

Transmission Mode Hard-wire.

Signature Passive sensor. System has no visible signature.

Add-on Capability System can be used simultaneously with other sensor systems, such as microwave.

Cost

PORTABILITY

Weight of Each Container Sensor line (shipping weight): 35 lb. for 100 sensor line. Processor (shipping weight): 15 lb.

Size for Each Container Sensor: .9" radius x .5" H. Sensor line: 330 feet (standard), under 330 feet (optional). Processor: 9" H x 9" W x 9" L.

POWER REQUIREMENTS

Power Requirements +12 VDC and -12 VDC from internal batteries. Optional power supply uses internal rechargeable batteries and requires 12-14 VAC.

EMPLACEMENT

Emplacement Mode Sensors may be buried in soil (3" deep), under asphalt/concrete (1" deep), brick walls or other potential intruder pathways.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Detection zone is 330 feet long x 4 feet wide. (Using one standard sensor line.)

Transmission Range

With Relay

Sensitivity Sensor voltage output (alarm signal) is proportionnal to pressure change detected by sensors. Sensors will detect digging activity as far away as two feet.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms System has a high rejection rate of nuisance and environmental false alarms due to sensor line characteristics and signal processing.

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required SYstem requires no periodic maintenance.

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise System has a high rejection rate of false alarms due to noise stimuli generated outside of detection area, e.g., nearby traffic, thunder, etc.

Line-of-Sight

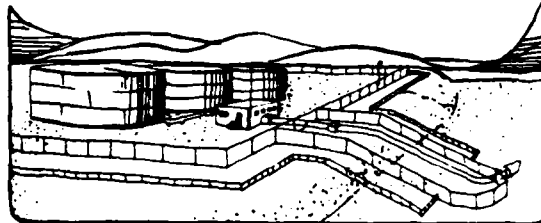
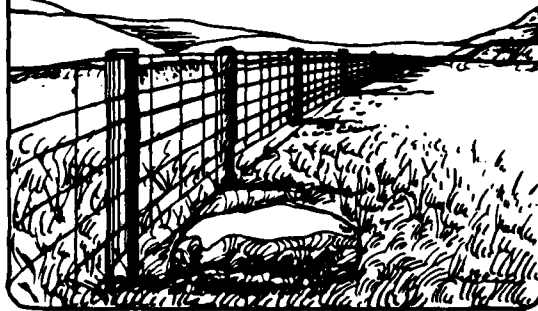
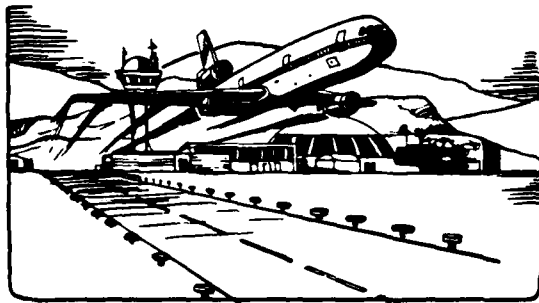
Foliage

Soil Conditions

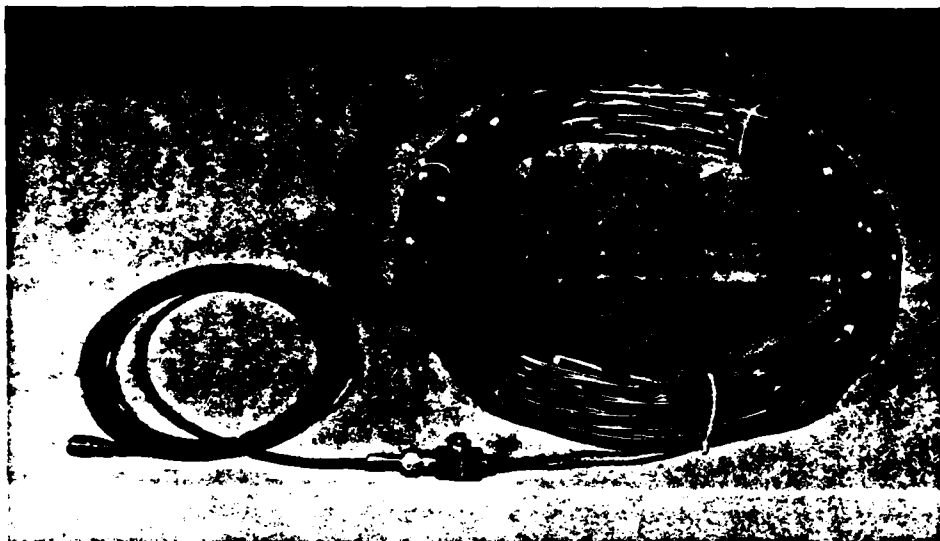
Other EMP: System is highly immune to electromagnetic interference at all frequencies. Seismic: System rejects ground movement outside detection zone.

SOURCE: Teledyne Geotech product literature.

perimeter intrusion detection
with *BLID*®
the BURIED LINE INTRUSION
DETECTOR



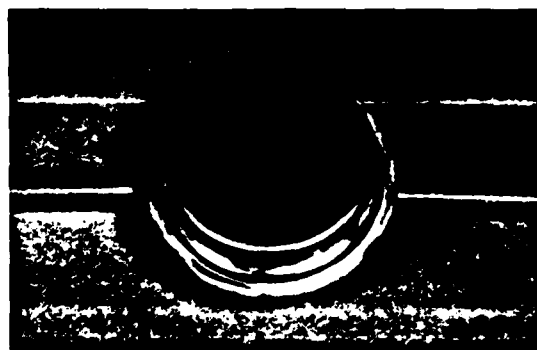
 TELEDYNE GEOTECH



**BLID
SENSOR LINE
IS-730**

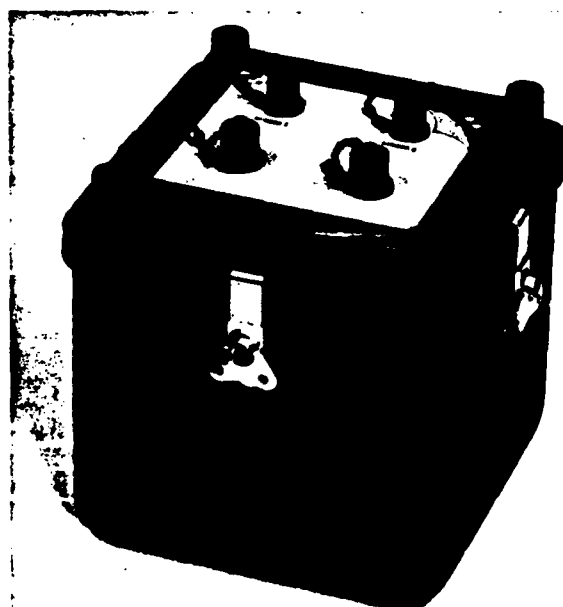
WHAT IS A BLID?

A BLID is a Buried Line Intrusion Detector built by Teledyne Geotech to provide highly-reliable remote surveillance of outdoor perimeters. It consists of two parts: a Sensor Line, Model IS-730, and a Processor, Model IS-701.



**TYPICAL SENSOR
(TWICE ACTUAL SIZE)**

**BLID PROCESSOR
IS-701**



HOW DOES A BLID WORK?

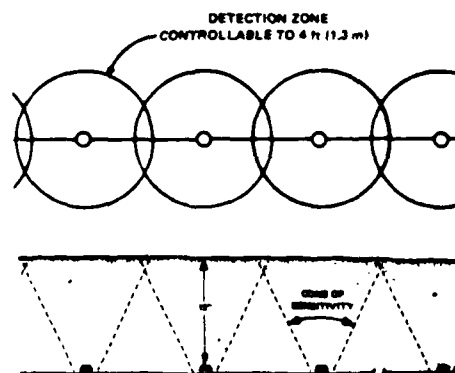
The BLID sensor line is an array of passive, pressure-sensitive sensors which may be buried in the earth, in a concrete slab, in the mortar of a brick wall, or in other potential intruder pathways. When an intruder steps near the sensor line, he changes the pressure field around one or more of the sensors, causing it to generate a signal. The BLID processor amplifies this signal, examines its amplitude and frequency characteristics, and generates an alarm whenever the signal meets a set of predetermined criteria. This processing, together with the sensor line characteristics, provides the BLID with an extremely high sensitivity to an intruder and a high rejection of signals generated by nearby traffic, power line surges, lightning, thunder, atmospheric pressure changes, small animals, and distant seismic disturbances.

BLID FEATURES

- Detects intruders in sensitive zone up to 330 feet (100 meters) long and 4 feet (1.3 meters) wide.
- Rejects ground movements generated outside sensitive zone.
- All-metal construction
- Hermetically sealed
- Electrically balanced
- Isolated from ground currents
- Totally concealed
- Highly immune to electromagnetic interference at all frequencies
- Passive sensors - radiates no signals

BLID HAS A CONTROLLABLE DETECTION ZONE

The alternated polarities of the individual sensors in a BLID line together with the frequency characteristics of the sensors and processor combine to make the BLID very sensitive to intruder movements within the detection zone while discriminating against activity outside that zone. BLID sensor lines have been operated within 30 feet of a highway and within 50 feet of a railroad track.

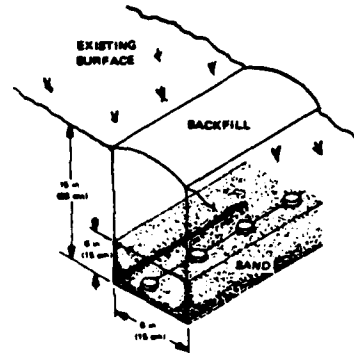


BLID IS EASY TO INSTALL



● ● ● ● IN SOIL

- Dig trench 6 in. (15 cm) wide by 15 in. (38 cm) deep
- Pour in sand 3 in. (7.5 cm) deep
- Lay in BLID sensor line
- Cover with 3 in. (7.5 cm) sand
- Backfill to original level



● ● ● ● IN FRESH CONCRETE

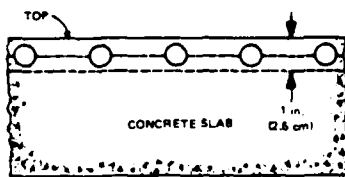


Bury BLID line
1 in. (2.5 cm) deep

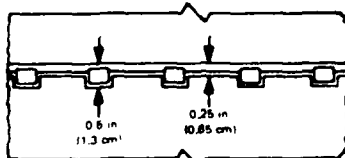


Finish concrete surface

● ● ● ● IN EXISTING CONCRETE



SIDE VIEW

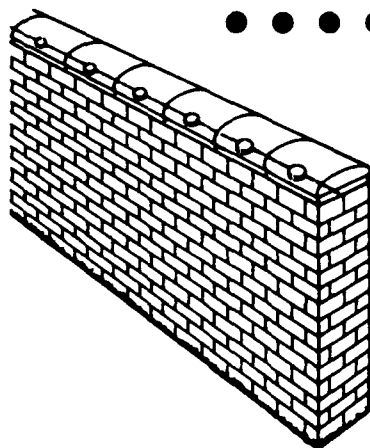


TOP VIEW

- Cut slot 0.25 in. (0.65 cm) wide by 1 in. (2.5 cm) deep with diamond saw.
- Widen slot to 0.5 in. (1.3 cm) at each sensor location.
- Put sensor line in slot.
- Pour flexible epoxy in slot to cover sensor line and bond it to the concrete.

● ● ● ● UNDER ASPHALT

- Bury BLID in soil before applying asphalt paving
or
- Cut a slot through existing pavement into the soil below, install the BLID in the soil, cover the BLID with sand, and refill the slot with asphalt.

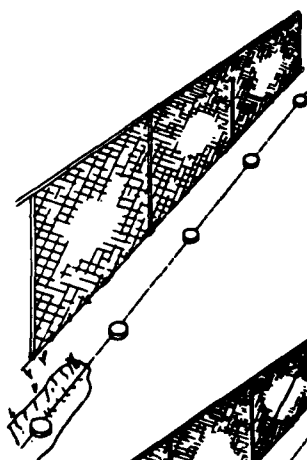


● ● ● ● IN A BRICK OR STONE WALL

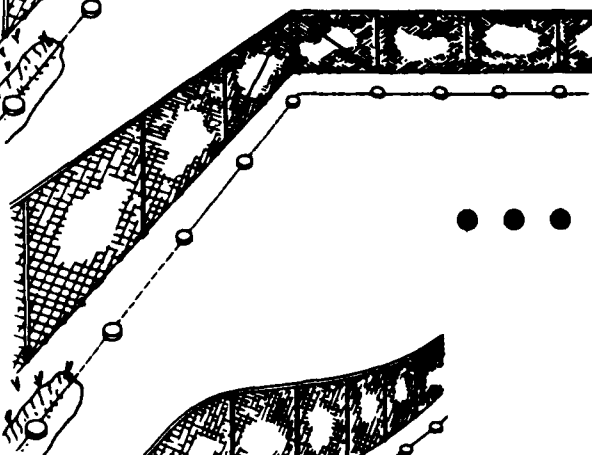


- Bury BLID in mortar just below coping or bricks along top of wall.
- BLID will detect all attempts to scale wall.

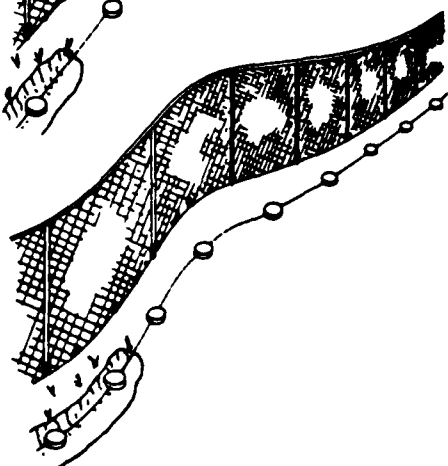
**BLID HAS NO TERRAIN OR PERIMETER
SHAPE LIMITATIONS - IT CAN BE USED:**



● ● ● IN A STRAIGHT LINE

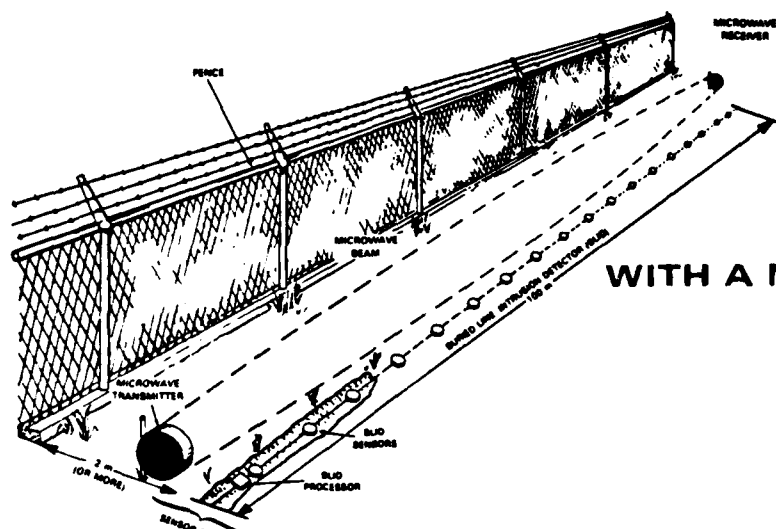


● ● ● AROUND CORNERS

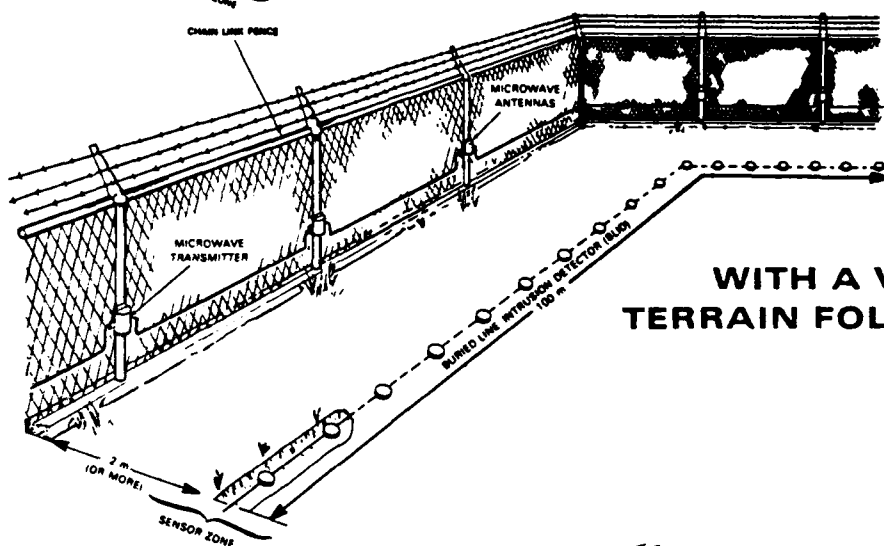


● ● ● OVER UNEVEN TERRAIN

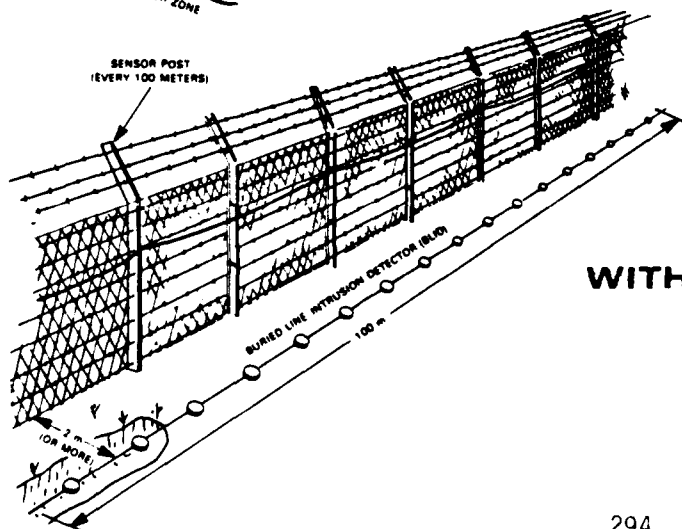
USE BLID WITH OTHER SENSORS



WITH A MICROWAVE SENSOR



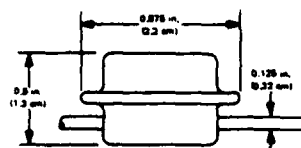
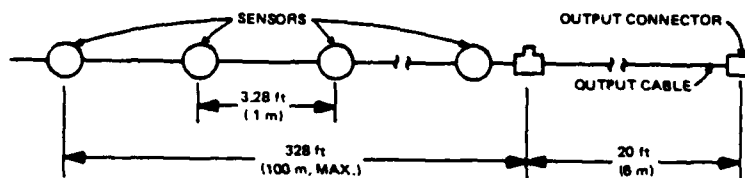
**WITH A VOLUMETRIC
TERRAIN FOLLOWING SENSOR**



WITH A FENCE SENSOR

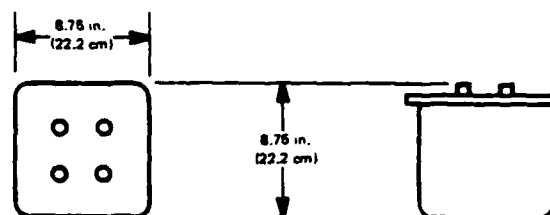
BLID OPERATING CHARACTERISTICS/ SPECIFICATIONS

BLID SENSOR LINE MODEL IS-730

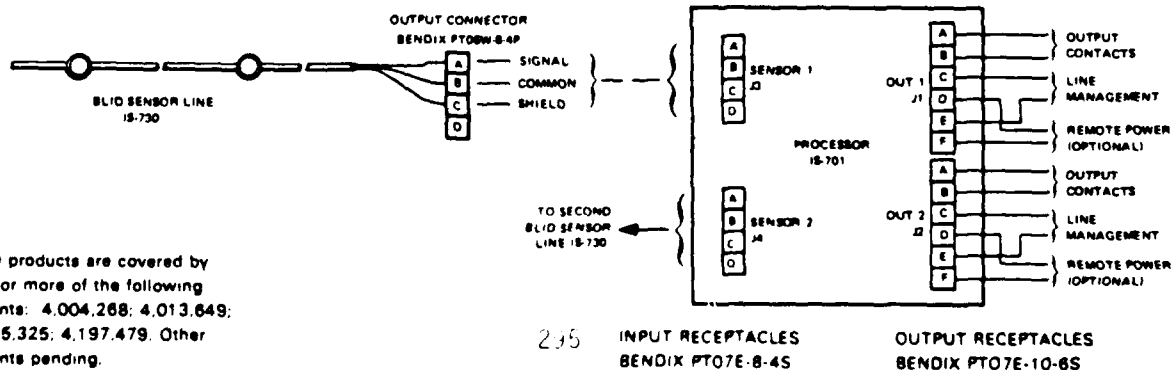


Input	Pressure change
Output	Voltage proportional to pressure change. A 200 lb man walking over one sensor of a 100 sensor line buried 12 inches (30 cm) deep in sand will produce a 1 mV output.
Sensors	Piezoceramic. 100 in standard line; up to 100 in optional line.
Resistance	More than 100 megohms (typically 1000 to 5000 megohms between signal conductor and shield.)
Capacitance	Approximately 0.0083 μ F per sensor
Shipping weight	35 lb (15.9 kg) for 100 sensor line

BLID PROCESSOR MODEL IS-701



Channels	Two, independent of each other
Input resistance	275 k Ω , each channel
Minimum detectable signal	20 μ V p-p at 2 Hz
Filter passband	0.4 to 2.7 Hz
Output	Alarm condition produces relay operation. Contacts may be normally open or normally closed. Operation period is 125 ms long. Optional alarm output is 125 ms long 4.5 Vdc pulse.
Power required	+12 Vdc and -12 Vdc at 600 μ A from internal batteries Optional power supply uses internal rechargeable batteries and requires 12-14 Vac.
Shipping weight	15 lb (6.8 kg)



REMEMBER THESE FACTS WHEN PLANNING YOUR SECURITY SYSTEM:

BLID IS TOTALLY CONCEALED

No false panels or masking devices are needed to hide it.

BLID IS MAINTENANCE FREE

No periodic adjustments are needed. All BLID electronic and mechanical components are stable over a wide range of environmental conditions.

BLID WILL DETECT SHALLOW TUNNELING

It will detect digging activity as far as 2 feet (60 cm) below or away from the line.

BLID IS EASY TO INSTALL

It is rugged and lightweight, and conforms easily to all installation path contours.

BLID IS AN OUTSTANDING COMPLEMENT TO OTHER SENSORS

It is unaffected by radiation from or by presence of other sensors. It does not interfere with operation of other sensors.

BLID IS DESIGNED TO OPERATE IN HIGH ELECTROMAGNETIC INTERFER- ENCE (EMI) ENVIRONMENTS

Its all-metal housing and balanced electrical construction provide high immunity to EMI at all frequencies.

BLID HAS AN ALMOST UNLIMITED LIFETIME

Its sensor line is housed in an all-metal structure, filled with an inert gas, and hermetically sealed. Its electronic circuits are built with conservatively-rated, high-quality components.

BLID PERFORMS IN CONCRETE

This unique capability provides detection of intruders crossing sidewalks and roads or scaling walls and other barriers. Its high sensitivity provides detection of intruder movements within 2 feet (60 cm) of the line.

BLID OFFERS THE MOST PERFORMANCE PER DOLLAR

No other detector offers the high local sensitivity, discrimination against remote noise, high immunity to EMI, and maintenance-free operation at such low cost.

WE WILL ASSIST YOU - CALL US!

Call Marty Gudzin for additional information about application of the BLID to your security problem.



TELEDYNE GEOTECH

3401 SHILOH RD. P.O. BOX 401676, GARLAND, TEXAS 75040-1676
TEL (214) 271-2561 TELEX 732394

SENSOR SYSTEM DATA SHEET

Name of Sensor Balanced Pressure System (BPS) AN/GSQ-134

Developer U.S. Army

Availability Status Limited availability to selected military units. (No longer in production.)

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Pressure

Description System consists of two water filled sensor hoses 100 meters long connected to a detector and solenoid unit.

Principle of Operation Sensor hoses are buried in parallel trenches. The weight of an intruder moving across sensor hoses creates an imbalance in water pressure in one of the buried hoses. Electrical transducers detect this change and cause an alarm activation.

Transmission Mode Hard-wire.

Signature Passive sensor. System has no visible signature.

Add-on Capability

Cost

PORTABILITY

Weight of Each Container 85 lbs.

Size for Each Container Detector: 13.5" x 15" diameter. Solenoid assembly: 7.5" x 7" diameter. Sensor hoses: 104.5 meters long (two each per system).

POWER REQUIREMENTS

Power Requirements BA-1583 battery (self-contained). Battery life = 12-18 months.

Internal Power Source

External Power Source

EMPLACEMENT

Emplacement Mode Sensor hoses are buried in parallel trenches 12-18" deep, 4-6' apart and 100 meters in length. Detector and solenoid units are buried at opposite ends of the trenches in holes 18-24" wide and 4-6' deep. (Recommended method of emplacement involves earth-moving equipment.)

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor tactical (military) use.

EFFECTIVENESS/RELIABILITY

Detection Range 100 meters (trace)

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering System has no self-disable capability.

TRAINING REQUIREMENTS

Operator Training Required See TM 5-6350-230-15.

Maintenance Training Required See TM 5-6350-230-15.

MAINTAINABILITY

Degree of Operator Skill Required See TM 5-6350-230-15.

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight

Foliage

Soil Conditions

Other

SOURCE: U.S. Army data sheet.

BALANCED PRESSURE SYSTEM (BPS) AN/GSQ-134

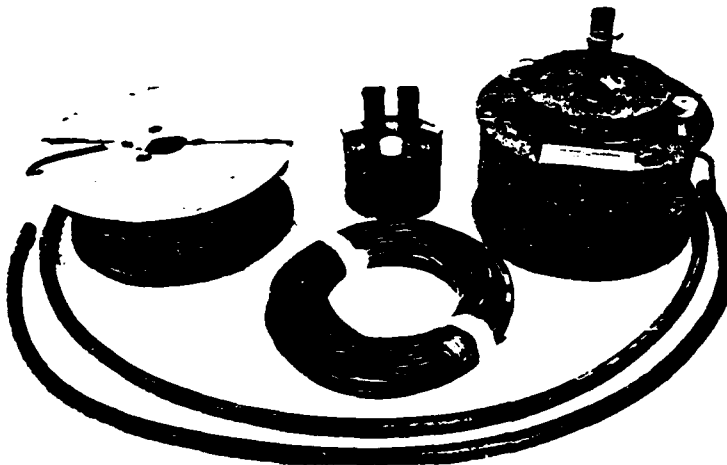
TECHNICAL CHARACTERISTICS

PHYSICAL DIMENSIONS:

DETECTOR – 13.5" x 15" in diameter
SOLENOID ASSEMBLY – 7.5" x 7" in diameter
SENSOR HOSES – 104.5 meters (two each)

WEIGHT:	85 pounds
TYPE SENSING:	Pressure changes
DETECTION RANGE:	100 meters (trace)
TYPE OF BATTERY:	BA-1583
BATTERY LIFE:	12 to 18 months
DISABLE CRITERIA:	None
DELIVERY MEANS:	Recommended method of emplacement involves use of earth moving equipment
REFERENCE:	TM 5-6350-230-15

The two sensor hoses are filled with water and buried in parallel trenches 12 to 18 inches deep, 4 to 6 feet apart, and 100 meters long. The detector and solenoid assembly units are buried at opposite ends of the trenches in holes 18 to 24 inches wide and 4 to 6 feet deep. As intruders move over the emplaced hoses, their weight exerts detectable pressure which creates an imbalance of water pressure in one of the hoses. The electrical transducers detect these minute changes and cause an activation.



BPS AN/GSQ-134.

SENSOR SYSTEM DATA SHEET

Name of Sensor Intrusion Sensor (Model RD-102)

Developer Resdel Engineering Corp.

Availability Status Commercially available.

System Application Perimeter and object protection

SYSTEM DESCRIPTION

Type of Sensor Proximity

Description System consists of a sensor unit with two sensing leads.

Principle of Operation One of the sensor's sensing leads is attached to the object of interest and the other connection is connected to the ground. Sensor alarms when intruder closely approaches or makes slightest contact with object. (Sensor detects changes in the earth's field distribution caused by intruder movement.)

Transmission Mode Hard-wire.

Signature Passive sensor

Add-on Capability Single sensor will handle multiple interconnected objects or up to 1400 meters of fenced area. Outputs are included for activation of any type of self-powered alarm status monitor, e.g., bell, siren, dialer.

Cost

PORTABILITY

Weight of Each Container 12 lbs. (including batteries).

Size for Each Container 10" x 8" x 4".

POWER REQUIREMENTS

Power Requirements Self-contained batteries: 12 VDC NEDA type 926 and 22.5 V NEDA Type 215. Battery life = up to 250 days continuous operation.

EMPLACEMENT

Emplacement Mode System is attached to object of interest (one sensing lead is attached to the object, the other to the ground). The object must be completely insulated from ground. Waterproofed enclosure version of system may be buried.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor or indoor fixed or temporary site protection.

EFFECTIVENESS/RELIABILITY

Detection Range Detection range is adjustable from direct contact up to 4 meters. Perimeter protection of up to 1400 meters (4600 ft.). Area protection of up to .930 sq. meters (10,000 sq. ft.)

Transmission Range

With Relay

Sensitivity Sensor sensitivity is adjustable. (See detection range, above.)

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight

Foliage

Soil Conditions

Other

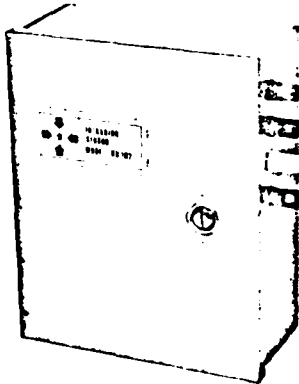
SOURCE: Resdel Engineering Corp., Data Sheet 346, Rev. #1.

INTRUSION SENSOR

DATA SHEET

346

REVISION #1



MODELS RD 102 AND RD 102E

NOT A

- CAPACITIVE
- IMPEDANCE
- MAGNETIC
- VIBRATION
- ACOUSTIC
- SEISMIC
- OPTICAL
- RF
- ULTRASONIC
- MICROWAVE

DEVICE

The Resdel Model RD-102 is a general purpose proximity sensor which works by detecting changes in the earth's field distribution caused by intruder motion.

This unique sensor is readily adapted to solving many public, private, industrial, and Government perimeter and object protection problems.

Any metallic fence or object which can be insulated from ground can be completely protected. Installation simply requires connecting a sensing lead to an object of interest and another connection to ground. The sensor will trip when an intruder closely approaches or makes the slightest contact with the object.

A single sensor will handle multiple interconnected objects or up to 1400 meters of fenced area. Outputs are included for activation of any type of self-powered bell, siren, dialer, or other alarm status monitor.

A unique low current design of integrated circuits provides long operating life from self-contained batteries. The Model RD-102E is available in a special, waterproof enclosure for underground concealment installation.

FEATURES

Simple Installation
No Adjustment Necessary
Fully Automatic
Versatile
Self-contained
No Detectable Radiation
Low Nuisance Rate

APPLICATIONS

Parked Vehicles, Aircraft
Fenced Areas
File Cabinets, Safes, Displays
Interior-Exterior Doors, Windows
Storage Areas
Secured Compounds
Plant Facilities and Institutions



RESDEL ENGINEERING CORPORATION

P.O. BOX 840, 300 EAST LIVE OAK AVENUE, ARCADIA, CALIF. 91006, TELEPHONE (213) 445-5955 OR 684-2600, TWX: 910-582-3219

SPECIFICATIONS

DATA SHEET

MODEL RD-102 AND MODEL RD-102E

Sensing Range	Adjustable from direct contact up to 4 meters (varies depending upon installation)
Protected Perimeter or Object Dimensions	
Linear Sense Wire Length	Up to 1400 meters (4600 feet)
Single or Multiple Object Surface Area	Up to 930 square meters (10,000 sq. feet)
Controls	On-Off; Sensitivity
Outputs	a. N.O. relay contact closure 20 VA capacity b. +12V @ 1 MA maximum Through use of jumpers, the user can select outputs "a" or "b"; output duration is approximately 500 milliseconds
Connections & Terminals (RD-102 only)	
a. Sense	Binding Post (external)
b. Output	Binding Post (external)
c. Ground (2)	Binding Post (external)
Connections & Terminals (RD-102E only)	
a. Sense	Special moistureproof terminal and attached 8' wire
b. Output	Bendix PT07E-10-6S Connector; Pin A output, Pin B ground, Pins C & D tied together
c. Ground	Pin B in output connector
Power Requirement	Self-contained batteries 12V DC NEDA type 926 and 22.5V NEDA type 215
Battery Life	Up to 250 days continuous operation
Size	.25M H x .20M W x .10M D (10 in. x 8 in. x 4 in.)
Construction (RD-102 only)	16 gage steel finished in gray hammertone enamel. Continuous hinged door is secured with a flush latch. Holes are provided in back for wall mounting.
Construction (RD-102E only)	Waterproof housing is 14 gage steel finished in gray hammertone enamel. Neoprene gasketed cover is secured by lift-off hinges and captive screw clamps.
Weight	5.4 kilograms (12 pounds) including batteries

*SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

KESDEL ENGINEERING CORPORATION, ARCADIA, CALIFORNIA

SENSOR SYSTEM DATA SHEET

Name of Sensor Intrusion Detection System (DTR-90)

Developer Israel Aircraft Industries Ltd.

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Vibration (electronic fence).

Description System consists of modular sensor posts, sensing wire, and control and display units. System can be incorporated on most types of wire fences, stone or brick walls, and gates.

Principle of Operation Sensor detects intruder attempting to deflect, cut, climb over, or crawl through fence, sounds an alarm, and gives a visual indication of intruder location.

Transmission Mode Hard-wire.

Signature Passive sensor. System has high visibility due to mounting structure.

Add-on Capability Size and number of sensors adjustable to user needs.

Cost

PORTABILITY

Weight of Each Container

Size for Each Container Sector length: Minimum of 3 meters. Fence height is adaptable to existing fence or custom-specified.

POWER REQUIREMENTS

Power Requirements

EMPLACEMENT

Emplacement Mode Sensor posts are mounted along a perimeter fence, wall, or gate.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use. System has been fielded and proven in varied environments and terrain.

EFFECTIVENESS/RELIABILITY

Detection Range

Transmission Range

With Relay

Sensitivity Cutting barbed wire or application of force between 5-20 kg will trigger alarm.

Remote Alarm Assessment Capability Visual indication of intruder location. System has adjustable intrusion location resolution (sector length) which can be set from tens of meters up to 500 meters or more.

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated) Typically 1/3 per month per 1 km.

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering Removal of sensor post covers or cutting control cable will trigger alarm.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -35° to $+65^{\circ}\text{C}$. Sensor self-adjust feature operates from -10° to $+65^{\circ}\text{C}$.

Humidity

Rain Rain will not trigger false alarms.

Snow

Haze/Smoke/Fog

Wind System is capable of withstanding high winds without triggering false alarms.

Other Conditions

Light

Noise

Line-of-Sight System has no line-of-sight requirements.

Foliage

Soil Conditions

Other Radio transmissions will not trigger false alarms.

SOURCE: Israel Aircraft Industries, Ltd., product literature.

DTR 90 electronic fence

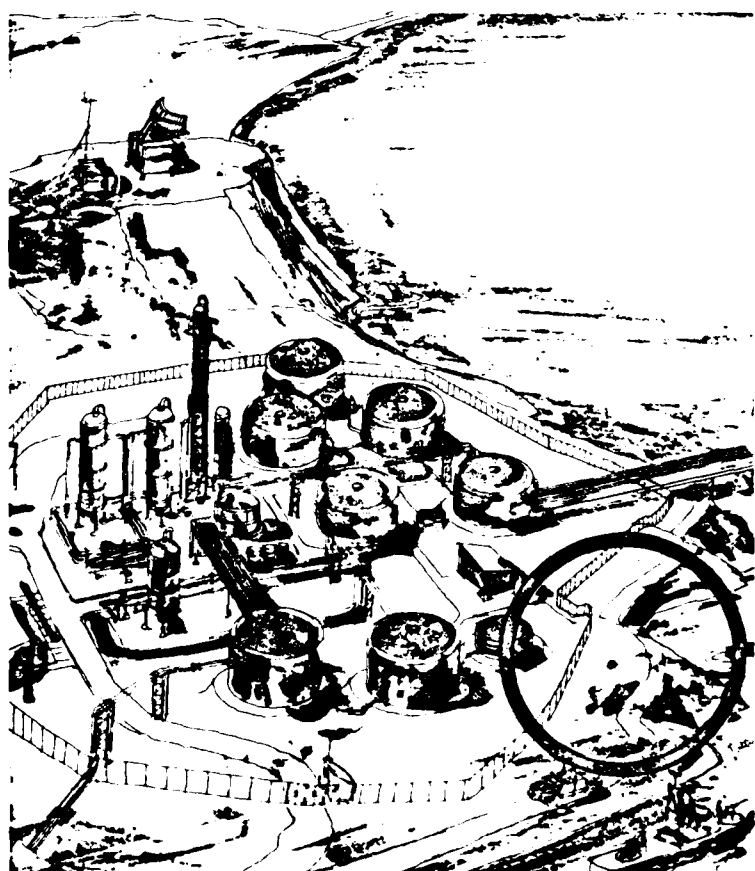
The DTR 90 Intrusion Detection System detects intrusions through physical barriers, sounds an alarm, and gives a visual indication of the intrusion location.

The DTR 90 System protects hundreds of kilometers of frontiers and security sensitive installations in many countries all over the world. Its effectiveness and reliability have been proven over many years of operation in varied environments and terrain.

Alarm will be set off by:

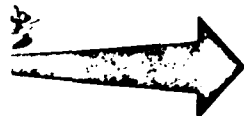
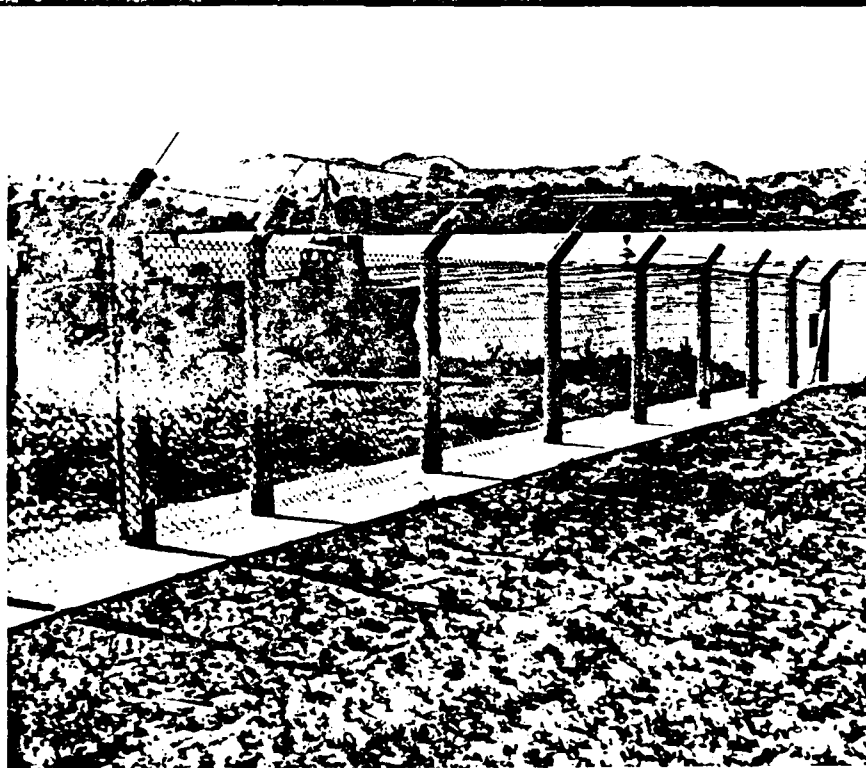
- Deflecting
- Clipping
- Climbing over
- Crawling through

Innocent activity near the fence will not activate the system.



- HIGH FLEXIBILITY OF INSTALLATION
ALLOWS INCORPORATION ON MOST TYPES
OF WIRE FENCES, STONE OR BRICK WALLS
AND ON VARIOUS TYPES OF GATES.
- INTRUSION LOCATION RESOLUTION
(SECTOR LENGTH) MAY BE SET FROM
SEVERAL TENS OF METERS UP TO 500
METERS OR MORE.
- NOT LIMITED BY NATURE OF TERRAIN.
- NO "LINE OF SIGHT" REQUIREMENTS.
- PRACTICALLY NO FALSE ALARMS.
- LOW COST PER KILOMETER.
- WORLD-WIDE PATENTED SENSOR.

No competitive system offers a lower field-proven false alarm rate. Animals won't trigger the IAI security fence. Neither will lightning, temperature changes, soil erosion, precipitation, or radio transmissions. People will. And they will get caught.



Specifications

FENCE MONITORING SYSTEM

SECTOR LENGTH	Minimum 3 meters
FENCE HEIGHT	Adaptable to existing fence or custom specified.
SENSITIVITY	Cutting barbed wire or application of minimum force between 5 and 20 kg will trigger alarm.
OPERATING TEMPERATURE	-35°C to +65°C usable range. Sensor self-adjust feature operates from -10°C to +65°C.
RELATIVE HUMIDITY	95 percent.
TAMPERPROOFING	Removal of sensor post covers or cutting control cable trigger alarm.
WEATHER RESISTANCE	Withstanding high winds without triggering false alarms.
CORROSION RESISTANCE	Coating in all metal parts.
F.A.R.	Typically 1/3 per month per 1 km.

CONTROL AND DISPLAY UNITS

DTM-51	10 ZONE, line monitoring control unit.
DTM-151	Military version of DTM-51.
MAP-51	Map display unit for DTM control unit
YEFET-4/R	4 ZONE adapter unit between fence and user specified system.
YEFET-4	Field controller for multiplex system.
MAGIPLEX-1	Control unit for a multiplex system.
MAGIMAP	Map display unit for MAGIPLEX multiplex system.

APPLICATIONS

NATIONAL BORDERS
INDUSTRIAL PLANTS
MILITARY INSTALLATIONS
REMOTE UNMANNED RELAY STATION
PUMPING STATIONS
OIL REFINERIES AND STORAGE DEPOTS
NUCLEAR POWER STATIONS
PUBLIC GAS COMPANIES

Specifications subject to
change without notice.

Designed & Manufactured by TEUD, Israel Aircraft Industries Ltd.



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STI
SAFEGUARDS
TECHNOLOGY
INC.

- ELECTRONIC FENCE WARNING SYSTEMS
- ALARM CONTROL ANNUNCIATION SYSTEMS
 - HARDWIRED
 - MULTIPLEXED
- CABLAPP SECURITY NETTING
- CUSTOMIZED SECURITY SYSTEMS

2222 RICHMOND AVENUE, STATEN ISLAND, NY 10314
CABLES: ISRAELVIA, TELETYPE: ISRAIR, FAX: 212-620-4400

SENSOR SYSTEM DATA SHEET

Name of Sensor Magiline (Fence Disturbance Detection Line)

Developer Israel Aircraft Industries, Ltd.

Availability Status Commercially available

System Application Outdoor, perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Vibration (fence disturbance).

Description System consists of a control unit (microprocessor-based), lightning arrestor, and sensor lines. Sensors are built into a cable (shielded conductor) and spaced from 1.5 to 3 meters apart. This sensor line (cable) is 2.5 kilometer long.

Principle of Operation Contact with sensor line or vibration pick-up by sensors will generate an alarm signal.

Transmission Mode Hard-wire.

Signature Passive system. System has high visibility.

Add-on Capability Up to 4 lines (each 1.5 miles long) can be connected to control center. System is fully compatible with other IAI accessory systems.

Cost

PORTABILITY

Weight of Each Container

Size for Each Container Control unit: 1.7" x 17" x 6". Sensor lines: 1.5 miles long each.

POWER REQUIREMENTS

Power Requirements Operating Voltage: 5.5 - 7.5 VDC or 220/110 VAC. Back-up battery assures continued operation during irregular electrical power supply conditions.

EMPLACEMENT

Emplacement Mode Sensor lines re mounted directly on existing fence. The standard configuration is two lines.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, fixed site use.

EFFECTIVENESS/RELIABILITY

Detection Range Distance between sensors: 1.5 - 3 meters. Zone length = 10 meters and up (user defined). Number of zones per control unit: Up to 512. Maximum perimeter controllable per control unit: 5 km.

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required Microprocessor-based control unit allows for operation by non-skilled personnel.

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Control unit: -10° to $+60^{\circ}\text{C}$. Sensor line: -35° to $+80^{\circ}\text{C}$.

Humidity Control unit can operate in humidity of 0 to 95%. Sensor lines can operate in humidity of 0-100%.

Rain Sensors are encased in watertight housing.

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight System has no line-of-sight requirements.

Foliage

Soil Conditions

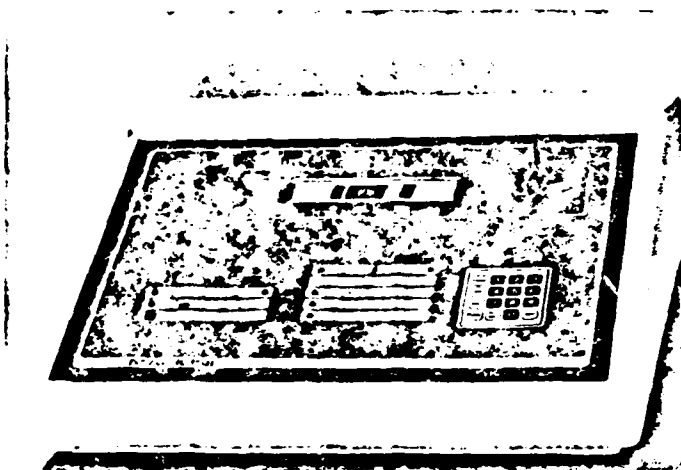
Other

SOURCE: Israel Aircraft Industries, Ltd., product literature.

MAGILINE

Fence Disturbance Detection Line

ISRAEL
AIRCRAFT
INDUSTRIES
LTD



- An innovative (patent pending) approach to disturbance detection methods.
- A large number of sensors evenly distributed over a small detection area provides homogeneous sensitivity.
- Economically prefabricated single-shielded sensor cables which can be quickly installed on existing fences, saving labor and time.
- High and accurate resolution of intrusion location.
- Microprocessor-based Control Unit:
 - Provides software programmable detection logic.
 - Offers various levels of sensitivity through advanced signal processing.
 - Allows for operation by non-skilled personnel.
 - With automatic self-test.
 - Detects bypass and tamper attempts.

DESCRIPTION

MAGILINE introduces a new approach to vibration detection techniques designed to overcome the high false alarm rate and related problem of existing vibration sensors.

MAGILINE introduces a new approach to vibration detection techniques. It is designed to overcome the high false alarm rate and related problem of existing vibration sensors.

The density and layout of the sensors, plus the sophisticated processing of the signals by a central unit, make the MAGILINE the most cost effective disturbance detector on the market.

High and accurate resolution is achieved without expensive multiconductor cables.

Data processing is performed at the control unit by a microcomputer enabling a sophisticated analysis of events, thus significantly upgrading the immunity of the system.

A further improvement is the patented method to frustrate bypass or tamper attempts.

The MAGILINE consists of a control center, lightning arrestor and sensor lines.

CONTROL STATION

The control station is designed for manual operation, or optionally by remote control when connected to the MAGAMUX system.

A station can control a perimeter of up to five kilometers.

A back-up battery assures continued operation during irregular electrical power supply conditions.

SENSOR LINES

Depending upon the security level required up to four lines, each 2.5 kilometers (1.5 miles) long can be connected to the control center.

The line is a shielded conductor incorporating the patented sensors. The sensors are spaced from 1.5 meters to 3 meters apart during manufacture, thus eliminating the need for special wiring during installation in the field.

SPECIFICATIONS

● MAGILINE Control Unit:

- Dimensions: 1.65" x 17" x 6.0"
 - Operating voltage: 5.5 - 7.5 Vdc or 220/110 Vac
 - Temperature range: -10°C to +60°C
 - Humidity: 0 to 95%
 - Accessory output: N.C. relay contact
 - Status of zone:
 - unacknowledge alarm
 - alarm
 - tamper
 - access
 - secure
 - Number of zones: up to 512
 - Zone length: from 10 meters and up
 - Alarm generating logic: software programmable (classified)
- ### ● Sensor Line:
- Temperature range: -35°C to +80°C
 - Humidity: 0 to 100% (watertight)
 - Standard configuration: 2 lines
 - Distance between sensors: 1.5m to 3 meters

OPTIONS

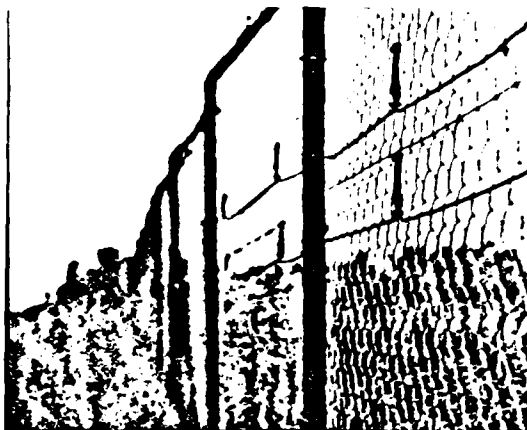
- Zone length: user defined
- System configurations: single sensor line, 3 or 4 sensor lines.

OPTIONAL ACCESSORIES

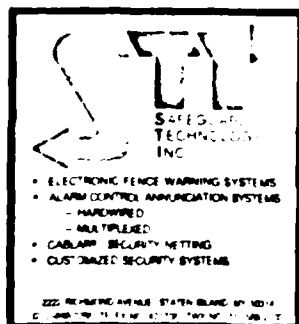
- Magimap: a map display
- Magiprint-2: a serial input printer to print out all system status changes.
- Interface to central station: a serial port interfacing to Magamux display and control system.
- Other sensors: accessories for interfacing sensor line to other N.O. or N.C. contacts, relays or switches.

APPLICATIONS

- Industrial plants and storage areas
- Car parking areas
- As an auxiliary system for high security sites.



MAGAL SECURITY DTR-90 INTRUSION DETECTION SYSTEM: TAUT-WIRE FENCE
PRODUCT FAMILY MAGAMUX: 1000 ZONES MONITORING AND CONTROL
MULTIPLEX SYSTEMS
MAGSTAF: ELECTROSTATIC FIELD SENSOR
MAGBELT: BURIED ELECTROMAGNETIC TRANSCIEVER
LINE SENSOR
MAGILINE: FENCE DISTURBANCE DETECTION LINE



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SENSOR SYSTEM DATA SHEET

Name of Sensor E-Flex (Model E-4)

Developer Stellar Systems

Availability Status Commercially available

System Application Outdoor perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Vibration (strain-sensitive cable)

Description System consists of electronic control unit and a small diameter shielded sensor cable.

Principle of Operation A small electric signal is generated when cable is stressed by movement or disturbed by vibration within certain characteristic frequency bands. Signals are then received and processed by control unit to provide "cut-through" or "climb-over" alarm outputs.

Transmission Mode Hard-wire.

Signature Passive sensor. System has high visibility due to mounting structure (fence).

Add-on Capability

Cost

PORTABILITY

Weight of Each Container Control unit enclosure (shipping weight): Approximately 26 lbs.

Size for Each Container Control unit enclosure: 14' high x 12" wide x 6" deep. Cable diameter = .2" (outdoor cable). .15" (indoor cable).

POWER REQUIREMENTS

Power Requirements Operating power: 16-19 VAC, 50-60 Hz via model 2325 16 VAC transformer (included). Standby battery: 12 V gelled electrolyte (included).

EMPLACEMENT

Emplacement Mode System may be mounted on outdoor or indoor (chain link) fences, external or internal walls, ceilings, window frames or doors. Attaches to any permanent object.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for indoor or outdoor, fixed site or permanent object use.

EFFECTIVENESS/RELIABILITY

Detection Range Maximum length of cable per control unit = 1000 ft.

Transmission Range

With Relay

Sensitivity Adjustable gain sensitivity settings allow control over the amount of flexing needed to trigger an alarm.

Remote Alarm Assessment Capability Separate alarm outputs (discrimination) for "cut-through" and "climb-over" intrusions.

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms Signal processing reduces false alarms from natural or random sources.

Vulnerability to Spoofing or Tampering Cable is fully supervised against shorting on cutting when terminator is used and the control unit is tamper-proofed. Tamper switch in control unit indicates when cover is open.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30° to $+65^{\circ}\text{C}$.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind System eliminates false alarms from extraneous cable vibration generated by wind, etc.

Other Conditions

Light

Noise

Line-of-Sight No line-of-sight limitations.

Foliage

Soil Conditions

Other System has an inherent high resistance to external electrical interference.

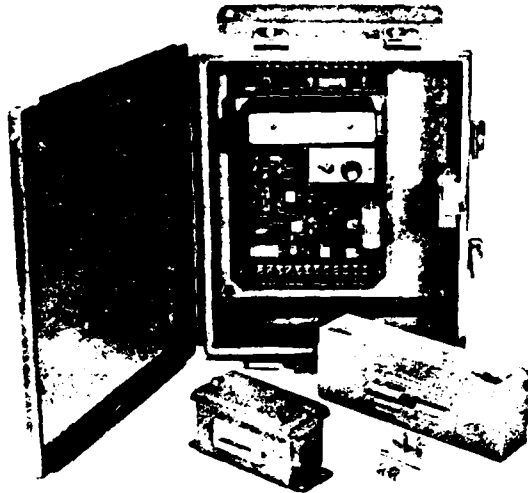
SOURCE: Stellar Systems product literature. 12 April 1979.

231 Charcot Avenue
San Jose, California 95131, U.S.A.
Telephone (408) 946-6460 Telex 346 436

stellar systems

PRODUCT DATA

E-FLEX™ Outdoor & Indoor Security System



Patent Number
3,956,743
Other patents pending
worldwide.

Model E-4

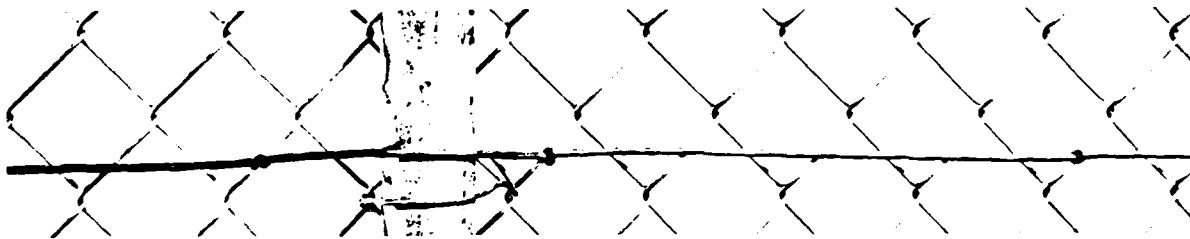
- Electronically discriminates between cutting through and climbing-over chainlink fence.
- Separate alarm outputs for cut-through and climb-over to help determine the type of response to the intrusion.
- Unique signal processing.
- Special plastic coated cable.
- Signal generated by cable flexing, or vibration pickup.
- Separate sensor cable for indoor and outdoor use.
- Single control unit drives up to 1,000 feet of cable.
- Fully supervised.

GENERAL:

E-Flex™ is a new & unique type of intrusion detection system for perimeter & other types of security. Utilizing signals generated by cable flexing or vibrations picked up, specific characteristic signatures are detected, discriminated and separate outputs are provided for CUT-THROUGH & CLIMB-OVER. Installation is quick and simple - for both outdoor (chain link fence) and indoor applications. One E-4 control unit can monitor up to 1000 ft. of sensor cable allowing perimeters to be monitored with fewer zones. Inexpensive tie-wrap mounting of the sensor cable (approximately every 2 ft.) to chain link fences keeps the installation costs low.

The unique signal processing coupled with the sensor cable to match your application reduces and/or eliminates false alarms from natural or random sources: E-Flex is insensitive to extraneous vibrations.

E-Flex is a primary security sensor system for indoor or outdoor medium security areas (the less sophisticated or casual intruder) and a back-up or redundant system to a high risk primary sensor such as Stellar System's E-Field. It can provide protection on outdoor chain link fences; indoor chain link fences (fences dividing secure areas from general use areas); internal walls, ceilings, window frames and doors - of all types of materials. It attaches to any permanent object subject to tampering, cutting, general vandalism or removal by unauthorized personnel.



Typical Chain Link Fence Sensor Wire Installation

DESCRIPTION

The Model E-4 E-Flex Protection System utilizes a new sensor technology (patented) to offer protection to any perimeter fence or structure (interior or exterior) which can utilize the minute flexing of a cable and/or discreet vibration signatures to produce an alarm. This would include such areas as perimeter fences, walls of all types, and ceilings where movement or climbing and cut-through protection is required.

Because of the simple shielded cable sensor used, it can be installed on a chainlink fence, interior or exterior walls. Installation is quick and inexpensive! No special care or treatment of the cable is required at the terminator end. Simply dress back ground shield, expose center conductor, and attach to appropriate terminal strip points in the terminator ET-4.

The E-4 system consists of an electronic control unit and a small diameter shielded E-Flex sensor cable. A special and very small electric signal is generated when the cable dielectric is stressed by movement or disturbed by vibrations in certain characteristic frequency bands. These signals are processed by the control unit to provide CUT-THROUGH and CLIMB-OVER alarm outputs. A sensor cable up to 1,000 feet can be connected to each control unit. The cable is then attached to fences, zigzagged on walls and ceilings or other structures to detect the abnormal pressure and/or vibrations when an attempted intrusion occurs.

Unique signal processing achieves a high order of detection probability while eliminating false alarms from extraneous cable vibration (wind, etc.) or direct mechanical pick up from non-intruder sources. Since the alarm signal is generated by changes internal to the cable, the system has an inherent high resistance to external electrical interference. Separate alarm count and gain sensitivity settings allow control over the amount of flexing (signal) necessary to cause an alarm. The cable is fully supervised against cutting and shorting when ET-4 Terminator is used and the control unit is tamper proofed.

SPECIFICATIONS

Operating Power:

16 to 19 volt AC, 50-60 Hz via model 2325 16 Vac transformer (included). 12 volt gelled electrolyte standby battery (included).

Operating Temp:

-30 to +65°C ambient.

Outputs:

Alarm Relay #1: Form C, indicating CUT-THROUGH alarm.
Alarm Relay #2: Form C, indicating CLIMB-OVER alarm.

Supervision Relay: Form C, indicates an alarm if the sensing cable is cut or shorted.

All relay contacts rated at 3 watts at 0.25 amperes or 28V dc maximum, resistive load.

Sensing Cable:

Coaxial cable attached at approximately one foot intervals along the protected fence. Maximum length is 1000 feet (305 meters)

Test Points:

TP-1 (terminal 10): Used with Stellar 2391 Motion Meter to indicate the presence of signals received from the sensing cable.

Terminal 20 (sonalert #1): Used with Stellar 2391 Motion meter sonalert to indicate CUT-THROUGH alarms for test purposes:

Terminal 19 (sonalert #2): Used with Stellar 2391 motion meter sonalert to indicate CLIMB-OVER alarms for test purposes.

Tamper Switch:

Mounted in main enclosure to indicate when cover is open.

CONTROLS

Sensitivity:

Used to adjust desired detection sensitivity.

Count:

A four position switch used to select the desired number of impulses to constitute a CUT-THROUGH alarm.

Integration Time:

Trimpot on PC board used to adjust the desired duration of intruder activity necessary to constitute a CLIMB-OVER alarm.

Enclosure:

Steel NEMA 4, Epoxy painted, 14" high x 12" wide x 6" deep.(35.5 cm high x 30.5 cm wide x 15.3 cm deep.)
Shipping weight approximately 26 pounds (11.8kg).
Optional in stainless steel.

ACCESSORIES:

Standard Terminator ET-4:

Used at far end of sensing cable to provide cable supervision.

Remote Test Terminator EST-4:

Same as ET-4 with added remote test feature. EST-4A application of +12 Vdc generates a system remote test signal. EST-4B Operates on 110 Vac.

Junction Box EJ-4:

Required when making splices in the sensing cable.

Motion Meter 2391:

Recommended for adjusting and testing system performance.

Hose Clamps:

For attaching terminators and junction boxes to poles.

E-Flex Cable:

2362 OUTDOOR, chain link fence sensor cable, nominal diameter 200 inches.

2363 INDOOR, high sensitivity sensor cable, nominal diameter 150 inches.

3.7 MULTI-SENSOR SYSTEMS - Data Sheets and Product Literature

Del Norte: CIRCE

US Army: Magnetic Intrusion Detector T-4 (MAGID) DT-509/GSQ

US Army: Platoon Early Warning System (PEWS) AN/TRS-2(V)

US Army: Remotely Monitored Battlefield Sensor System (REMBASS)

Racal-SES: Covert Local Area Sensor System for
Intrusion Classification (CLASSIC)

SENSOR SYSTEM DATA SHEET

Name of Sensor Commercial and Industrial Remote Counter-Intruder Equipment (CIRCE)

Developer Del Norte Technology, Inc./Marconi Avionics Ltd.

Availability Status Commercially available

System Application Indoor/outdoor perimeter or remote area intrusion detection.

SYSTEM DESCRIPTION

Type of Sensor Seismic; Infrared (active)

Description Seismic sensor (geophone) and infrared sensor arrays are coupled to central control unit (CIRCE unit).

Principle of Operation Seismic vibrations from moving intruder are detected by geophone and signal is sent to control unit. Interruption by moving intruder of the infrared transmitter and receiver beams also causes signal to be sent to control unit. Depending on system programming, alarm signal is generated by control unit upon receipt of one, or more than one, sensor signal.

Transmission Mode Hard-wire (or communications network).

Signature Seismic sensors are passive and have low visibility. Infrared sensors are "active" (emitting infrared beam) and highly visible. Control unit is also highly visible.

Add-on Capability Systems are modular and can be expanded in increments of single zone, as required, to a maximum of eight sensor zones per system, three of which may be active infrared.

Cost

PORTABILITY

Weight of Each Container CIRCE unit: 35 lbs.

Size for Each Container CIRCE unit: 23.6" x 15.74" x 9.84". Infrared pillar: 8' tall.

POWER REQUIREMENTS

Power Requirements 110 VAC (1 amp with 4 hour battery backup)

EMPLACEMENT

Emplacement Mode Seismic sensors may be buried (ground, gravel, pavement) or mounted (fences, walls). Infrared pillars and control unit are free-standing.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness Seismic sensors are designed for outdoor, fixed site use. Infrared sensors and processor are designed for indoor installation.

EFFECTIVENESS/RELIABILITY

Detection Range System can monitor: 8 fence sectors up to 1,000' long; 8 ground sectors each up to 300' long; 8 wall sectors up to 500' long; 3 infrared sectors each up to 350'; or combination of these.

Transmission Range

With Relay

Sensitivity Use of both seismic and infrared sensors simultaneously provides more accurate and sensitive intrusion detection. System may also be programmed to alarm only if more than one of the sensors are activated.

Remote Alarm Assessment Capability

Detection Probability

Functional Reliability System has internal self-test capability.

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms Both seismic and infrared differentiate between nuisance environmental alarms and actual intruders.

Vulnerability to Spoofing or Tampering Anti-tamper switches present on infrared pillars. System also has a built-in fault detector.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range CIRCE unit: 0°C to +55°C (+32° to +130°F). Infrared pillars are thermostatically controlled (optional low temperature insulation available).

Humidity Sensors are encased in waterproof housing. Infrared sensors are sealed against moisture.

Rain

Snow

Haze/Smoke/Fog

Wind Wind-generated movement may affect seismic sensors if they are fence-mounted.

Other Conditions

Light

Noise

Line-of-Sight Line-of-sight is required for intruder detection by infrared sensor.

Foliage

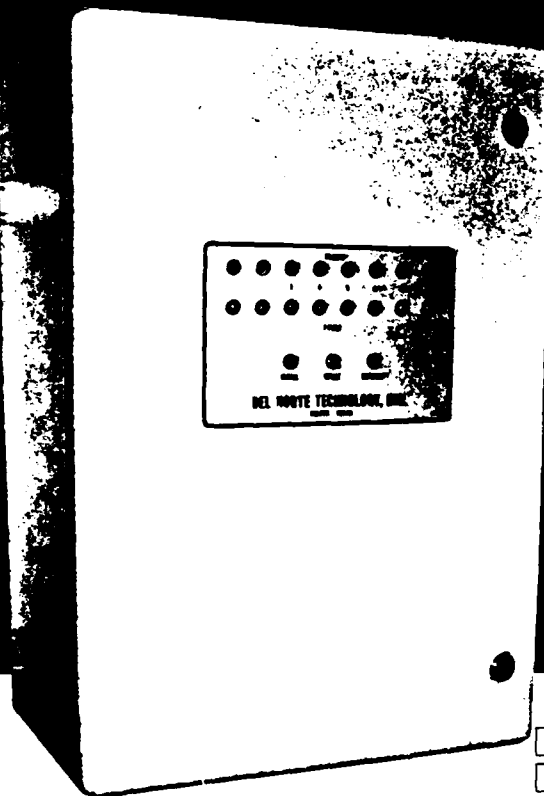
Soil Conditions

Other

SOURCE: Del Norte Technology, Inc., product literature.

Del Norte Technology, Inc.

CIRCE SEISMIC AND INFRARED PERIMETER INTRUSION DETECTION SYSTEM.



☐ Fence	☐ Gravel
☐ Wall	☐ Pavement
☐ Ground	☐ Rooftop
	☐ Active IR

The Commercial and Industrial Remote Counter-Intruder Equipment (CIRCE) system consists of rugged, reliable seismic and infrared sensors coupled with advanced alarm processing.

Seismic sensors, called geophones, are constructed in arrays best suited to your physical plant requirements. They are installed around the perimeter of your property in sectors, on fences, walls, or in the ground or gravel. Vibrations set up by a person walking, running or crawling are detected and transmitted to a central control unit. The system is designed to differentiate between those caused by passing trains, high winds, small animals and aircraft, and those of an actual intruder. This technology dramatically reduces the false alarm rate. Sensors in each sector are interconnected by armored, shielded cable suitable for direct burial. Also, the entire system is tamperproof.

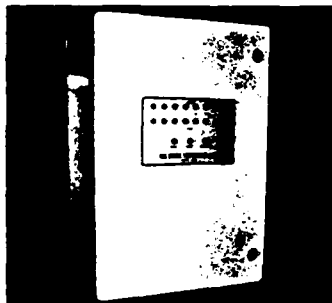
Infrared beams, which may be used in conjunction with seismic sensors, also are connected to the central control unit. Signals are processed in a manner similar to those of the seismic system. Interruption of the transmitter and receiver beams causes an

alarm condition. Like the seismic sensors, the infrared system is designed to differentiate between signals caused by falling leaves, birds and other objects passing through the field, and those of actual intruders.

Using these sensors simultaneously provides the most accurate and sensitive intrusion detection system you can buy. When the correct pattern from either sensor is identified, an alarm state automatically is generated. The central control unit then sends signals that set off alarms.

The CIRCE also can be programmed to set off an alarm only when more than one of the sensors are disturbed. This is particularly valuable when remote sites are being protected and false alarms are not tolerable.

Alarms can take many forms, depending on your requirements. These alarms may be used locally or transmitted to remote monitoring facilities by either hard wire or multiplex modem communications networks.



CIRCE

SPECIFICATIONS

Perimeter intrusion detection system capable of accepting up to eight sensor zones, three of which may be active infrared. Contains four-hour battery back-up and internal test system. Provides local alarm and fault indicators with mains battery change-over indicator. Front panel reset to clear alarm conditions. Switch selectable sensor ANDing for each sector. Following external outputs furnished for each sector: Alarm (relay and open collector), fault (open collector), audio, alarm inhibit, alarm reset, and anti-tamper indication.

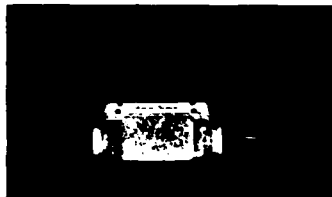
Size: 23.6" X 15.74" X 9.84"

Weight: 35 lbs.

Power: 110VAC — 1 amp with 4-hour battery backup standard

Temperature: 0°C to 55°C (+ 32°F to 130°F)

System Capability: Can monitor eight fence sectors each up to 1,000 feet long, or eight ground or gravel sectors each up to 300 feet, or eight wall sectors each up to 500 feet, or three infrared sectors each up to 350 feet, or a combination of the above.



SENSOR — HEAVY-DUTY HIGH RELIABILITY

Seismic geophone — waterproof with PVC housing cable strain relief. Cable: 3/18 AWG with shield and FP-RES PVC jacket. Armor: served steel wire with FP-RES PVC jacket. Each array contains temperature compensating network within the encapsulated sensors. All arrays factory assembled, tested, and mounted on cable reels for transport. Available in all configurations.



SENSOR — LOW-COST

Waterproof with PVC housing and cable strain relief. Cable: 3/22 AWG with shield and polyethylene jacket. Arrays contain temperature compensating networks with encapsulated sensors. All arrays factory assembled, tested, and mounted on cable reels for transport. Available in all configurations.



SEISMIC PROCESSING OPTIONS

Fence: Dual frequency analog signal processor with differential rate-of-rise detector. Contains wind velocity monitor to reduce effects of wind-generated alarms. Each fence processing board capable of accepting signals from up to 1,000 feet of vertical or horizontal-mounted fence sensors.

Ground: Dual frequency analog signal processor with differential rate-of-rise detector. Each ground processor board capable of accepting signals from up to 300 feet of ground, asphalt or concrete-mounted sensors.

Gravel: Single frequency signal processor with differential rate-of-rise detector. Each gravel processor capable of accepting signals from up to 300 feet of gravel-mounted sensors.



INFRARED PILLARS

Eight foot infrared pillar with one IR transmission panel. Contains four active pulsed infrared receivers and one pulsed transmitter. Unit equipped with termination boxes and adjustment and balanced controls. Steel housing is environmentally sealed for moisture protection with a thermostatically controlled heater. All panels and lids equipped with anti-tamper switches. Optional low-temperature insulation available. Requires one 6-pair cable to interconnect between pillars and processing unit.

DEL NORTE
SECURITY SYSTEMS

1100 Pamela Drive, PO Box 696 Euless, Texas 76039 (817) 267-3541
WESTERN (805) 987-1088 CENTRAL (214) 672-1387 NORTHEAST (914) 226-4661
SOUTHWEST (713) 492-1645 SOUTHEAST (404) 967-2698

SENSOR SYSTEM DATA SHEET

Name of Sensor Magnetic Intrusion Detector T-4 (MAGID DT-509/GSQ)

Developer U.S. Army

Availability Status Available to selected military units

System Application Ancillary sensor to MINISID

SYSTEM DESCRIPTION

Type of Sensor Magnetic; Magnetic/Seismic

Description MAGID T-4 operates as an ancillary to MINISID either in a seismic/magnetic detection mode (using only one solenoid) or in a magnetic only detection mode (using an auxiliary solenoid).

Principle of Operation In its magnetic detection mode, MAGID T-4 detects local geomagnetic field changes caused by movement of ferromagnetic materials through its surveillance area. In its magnetic/seismic mode, the MAGID T-4 solenoid is connected to MINISID. Both magnetic and seismic alarms must be generated to activate MINISID transmitter. In the magnetic mode only, an auxiliary solenoid is connected to the MAGID T-4 solenoid. Because they are deployed 8 feet apart, each solenoid detects a different magnitude of change for the same intruder. The difference between the sensed changes is compared to detection criteria, and if met, MINISID transmits an alarm signal.

Transmission Mode Hard-wire.

Signature Passive sensor. Very low system visibility (when buried or submerged).

Add-on Capability MAGID T-4 is an ancillary system to MINISID.

Cost

PORTABILITY

Weight of Each Container MAGID T-4: 2.5 lbs. Auxiliary solenoid: 2.5 lbs.

Size for Each Container MAGID T-4: 12" x 3" diameter. Auxiliary solenoid: 12" x 3" diameter.

POWER REQUIREMENTS

Power Requirements 28 V (from MINISID battery).

EMPLACEMENT

Emplacement Mode System may be buried or submerged.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor (all-weather, all-terrain), tactical (military) use.

EFFECTIVENESS/RELIABILITY

Detection Range Armed personnel: 3 meters. Vehicle: 10 meters (2½ ton truck: 15-20 meters).

Transmission Range

With Relay

Sensitivity

Remote Alarm Assessment Capability

Detection Probability 95%

Functional Reliability

False Alarm Rate (FAR) (estimated) .2 per 24 hr. period

Susceptibility to Nuisance/Environmental Alarms Low. Distant magnetic disturbances affect both solenoids equally and do not generate an intrusion alarm. In the magnetic/seismic mode, both magnetic and seismic alarm criteria must be met in order to generate alarm.

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required (See TM 5-6350-260-10.)

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate) 1,250 days (SEAOPSS Sensor Data Sheet).

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed Depot level only.

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -25° to $+155^{\circ}\text{F}$.

Humidity

Rain System is encased in waterproof housing. System may be submerged underwater for the life of the sensor.

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise Noise sources which generate magnetic noise in conjunction with seismic noise may generate false alarms.

Line-of-Sight

Foliage

Soil Conditions

Other

SOURCE: SEAOPSS Sensor Data Sheet.

S E A O P S S	SENSOR DATA SHEET				SENSOR:	
					MAGID T-4	
					(MINISID ANCILLARY)	
	SENSOR TYPE:		DELIVERY MEANS:		RECOVERY:	
	Magnetic		Hand-Emplaced		Expendable	
OP TEMP:		STORAGE TEMP:		MISSION DURATION:		NOMENCLATURE: MAGNETIC INTRUSION DETECTOR T-4 DT-509/GSQ
- 25 to +155° F		- 65 to +155° F		30, 45 or 60 days		
				28V from MINISID battery		
AVG FALSE ALARM RATE (24 HRS):			MTBF:		SELF-DISABLE:	
0.2			1,250 days		No	
TARGET AND DETECTION CHARACTERISTICS				SIZE AND WEIGHT		
TARGET TYPE:		DETECTION RANGE:		DETECTION PROBABILITY:		UNIT:
Walking personnel with rifle		3 m		95%		MAGIC
Vehicle		10 m		95%		Auxiliary solenoid
2-1/2 ton truck		15-20 m				
				PROD LEAD TIME		UNIT COST
REFERENCE DOCUMENTS				12 months		
TM 5-6350-260-10						
OPERATION AND DEPLOYMENT						
MAGID T-4 operates as an ancillary to MINISID either in a seismic/magnetic detection mode or in a magnetic only detection mode. MAGID T-4 detects local geomagnetic field changes caused by ferromagnetic materials carried by personnel or vehicles passing through its surveillance area. When alarm criteria are met, MAGID T-4 sends an alarm pulse by wire to MINISID. In the magnetic seismic mode only the MAGID T-4 solenoid is connected to MINISID. In this mode, both magnetic and seismic alarms must be generated to activate the MINISID transmitter. In the magnetic only mode, an auxiliary solenoid is connected to the MAGID T-4 solenoid. The MAGID T-4 and auxiliary solenoids each detect changes in the local geomagnetic field. Because they are deployed eight feet apart, the magnitude of the change is different at each solenoid for a valid target. The difference between the sensed changes is compared to detection criteria, and when these criteria are met, MINISID transmits an intrusion alarm.						

(OVER)

S E A O P S S	SENSOR DATA SHEET	SENSOR: MAGID T-4 (MINISID ANCILLARY)
In the magnetic only mode, the changes in the geomagnetic field caused by a local intruder are sufficient to generate an intrusion alarm whereas distant magnetic disturbances generally affect both solenoids equally and thus do not generate an intrusion alarm. MAGID T-4 units, MINISID, and all connecting cables are buried to provide camouflage and to prevent shifting motions which could generate false alarms. MAGID T-4 is buried as close as possible to the road, trail, or area monitored. If necessary, MAGID T-4 can be submerged in up to 28 feet of water for the life of the sensor. The MAGID T-4/MINISID system has a low FAR. In the magnetic/seismic mode, an alarm is not generated until both magnetic and seismic intrusion alarm criteria have been met. The lack of correlation between magnetic and seismic false alarm sources eliminates most non-target generated false alarms. Sources that generate magnetic noise or magnetic noise in conjunction with seismic noise can cause false alarms. Possible sources of these types are lightning storms and the magnetic and seismic noises produced by an urban environment. MAGID T-4 is tested on GATE prior to field deployment. Maintenance is performed only at the depot level where GATE testing facilities or equivalent are available.		

SENSOR SYSTEM DATA SHEET

Name of Sensor Platoon Early Warning System (PEWS) (AN/TRS-2(V))

Developer Developed by U.S. Army PM-FIREFINDER/REMBASS. Manufactured by International Signal and Control Corp. and Electronic Systems International, Inc.

Availability Status To USAREUR 1981

System Application Outdoor area or perimeter intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Seismic/Magnetic

Description System is a battery operated portable sensor/receiver set composed of 2 receivers, 10 detectors (sensors), 2 ground rods, 2 wirelines, 2 headsets, and 2 carrying cases with straps.

Principle of Operation Sensors detect seismic disturbance or movement of ferrous and other magnetic-sensitive objects within a 10-meter radius. Detector analyzes the intruder and initiates a coded transmission to the monitoring receiver. The activation is presented on the receiver display as the detector identification number and classification of intrusion (personnel or vehicle). Multiple activations are retained in receiver memory.

Transmission Mode Hard-wire (WD-36) or radio frequency link (RF power output - 250 MW (typical); 20 kHz bandwidth).

Signature Passive sensor; "active" radio frequency transmission (138-153 MHz band). Sensors have very low visibility.

Add-on Capability Up to 10 detectors may operate per channel. Up to 8 channels can be operated per system.

Cost

PORTABILITY

Weight of Each Container Receiver: 2.5 lbs. Detector: 1.09 lbs. Total package (less batteries and carrying case): 19.8 lbs. Wire: 4-5 lbs./mile.

Size for Each Container Receiver: 7.5" x 4.5" x 1.5". Detector: 5.2" x 3.5" x 1.25". Wire: 1 cubic foot per mile.

POWER REQUIREMENTS

Power Requirements Detector: One 9 VDC (type BA-90) battery. Receiver: Two 9 VDC (type BA-90) batteries. Battery life: 150 hrs. between charges.

EMPLACEMENT

Emplacement Mode Detectors are surface-emplaced. Receivers are hand-held.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, tactical (military) use. System meets requirements of MIL-P-49115A for operational capabilities, and MIL-STD-810/461 for temperature, humidity, altitude, immersion, shock, vibration, dust, fungus, salt fog, and EMI.

EFFECTIVENESS/RELIABILITY

Detection Range Personnel/Vehicles: 10 meters

Transmission Range Data link range is 1500 meters minimum (approximately one mile) using either radio frequency or field wire transmission.

With Relay

Sensitivity Receiver sensitivity equals .4 uV minimum @ 40 KHz band width, maximum.

Remote Alarm Assessment Capability Detectors are field-coded by deployment area and identification number. Activations are shown on receiver LED display as detector identification number and type of intrusion (personnel or vehicle).

Detection Probability At 10 meters: 1 person - 75%; 2-3 persons -- 85%; 5/4 ton vehicle @ 10mph -- 85%; Tracked vehicle @ 5mph -- 85%.

Functional Reliability System will classify target (at 10 meters) correctly more than 85% of the time.

False Alarm Rate (FAR) (estimated) Two per 24 hour period of continuous operation.

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -25° to $+125^{\circ}\text{F}$. Storage temperature: -70° to $+160^{\circ}\text{F}$.

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

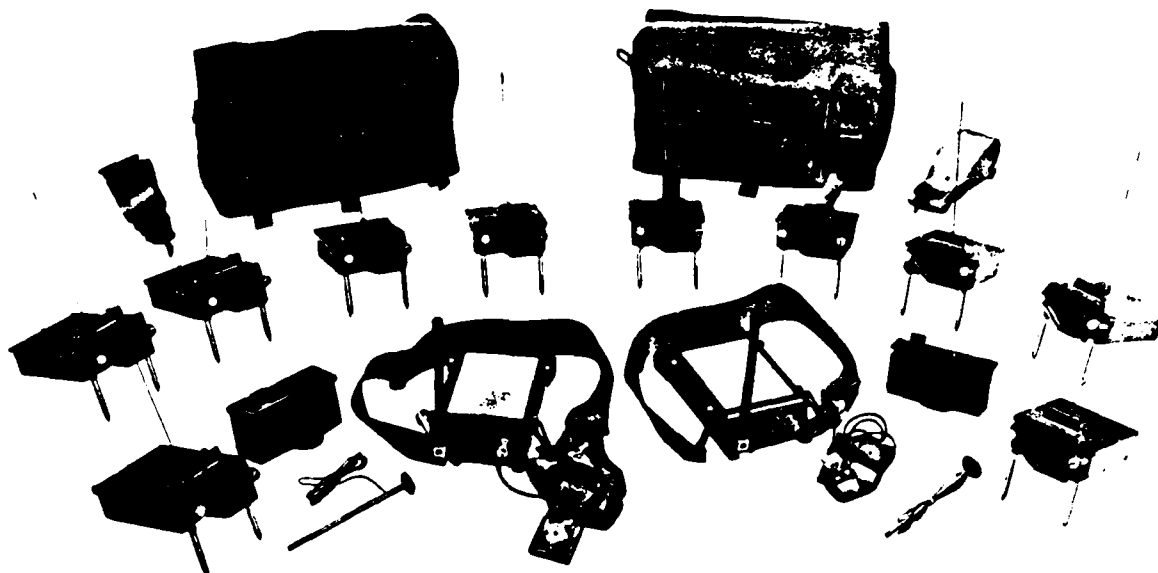
Line-of-Sight

Foliage

Soil Conditions

Other

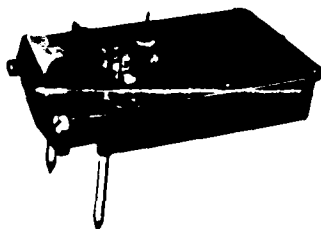
SOURCES: International Signal and Control Corp. product literature; Electronic Systems International, Inc., product literature. January 1980.



PEWS is a lightweight, self-powered, portable intrusion detection sensor system developed by the U.S. Army, PM-FIREFINDER/REMBASS and manufactured by International Signal & Control Corporation, Lancaster, Pennsylvania. The detectors are designed for hand emplacement and unattended operation in remote areas. The PEWS system consists of ten (10) Detectors, two (2) Receivers, two (2) Wire Links, and two (2) carrying bags with straps. The battery operated (9vdc) system weighs less than 23 pounds (10.4kg) total and operates in ranges of about one (1) mile (1.5km) in either an RF or Wire Link (field wire) mode. The PEWS operates in discreet pre-

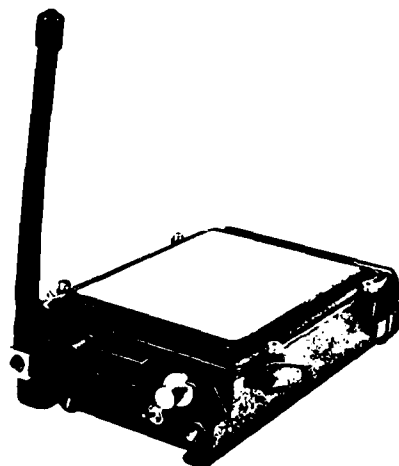
determined frequency channels within the 138-153 MHz band and utilizes both seismic and magnetic sensing devices.

The compact, easily concealed Detectors are field-coded by deployment area (1-8) and Detector identification number (1-16). When activated, the Detector analyzes the intrusion and initiates a coded transmission to the monitoring Receiver. The activation(s) are presented on the Receiver LED Display as a Detector ID number and type intrusion of either personnel (P) or vehicle (C). Multiple activations are retained in the Receiver memory.



- Detection Range in excess of 32 feet (10 meters)
- Classifies Personnel or Vehicles
- Seismic — Magnetic Sensors
- RF or Field Wire transmission
- Transmits Detector Area, I.D., and Classification
- Code Plug for field coding Detector Area and I.D.
- Built-in Self-test
- Operates on one (1) 9vdc battery
- Weighs approx. one (1) pound (.5kg)
- Size approx. 7.0" (7.8 cm) x 3.5" (8.9 cm) x 1.25" (3.2 cm)

- Area Select Switch monitors Areas 1-8
- LED displays Detector I.D. and Target Classification
- Built-in memory for multiple activations
- RF or Field Wire reception
- Audible Detector activation alarm (headset)
- Operates on two (2) 9vdc batteries
- Wire Link Adapter for use with field wire
- Weighs approx. 2.2 pounds (1kg)
- Size approx. 7.5" (19 cm) x 4.5" (11.4 cm) x 1.5" (3.8 cm)
- Self test for LED and low battery indication



- Probabilities of Detection
 - 1 person 75% @ 10 meters (32 feet)
 - 2-3 persons 85% @ 10 meters (32 feet)
 - Vehicle, 5/4 ton @ 10 mph 85% @ 10 meters (32 feet)
 - Vehicle, Tracked @ 5 mph 85% @ 10 meters (32 feet)
 - Classification 85% between Personnel (P) and Vehicles (C)
- Range
 - Field Wire Mode 1,500 meters (~ 1 mile) minimum
 - Radio Frequency (RF) Mode 1,500 meters (~ 1 mile) minimum
- Operating Frequencies — RF Mode
 - Discreet, preset channels in 138-153 MHz range
- Meets Stringent Environmental, EMI, Military Specifications

CASE, PLATOON EARLY WARNING SYSTEM
CY-7524/TRS-2(V)

RECEIVER, RADIO
R-1808(V)/TRS-2(V)

RECEIVER GROUND
STAKE

DETECTOR
ANTI-INTRUSION
DT-577(V)/TRS-2(V)

HOLDING
ASSEMBLY

INTERFACE
WIRE LINK
MX-9738/TRS-2(V)

TECHNICAL MANUAL

CARRYING STRAP

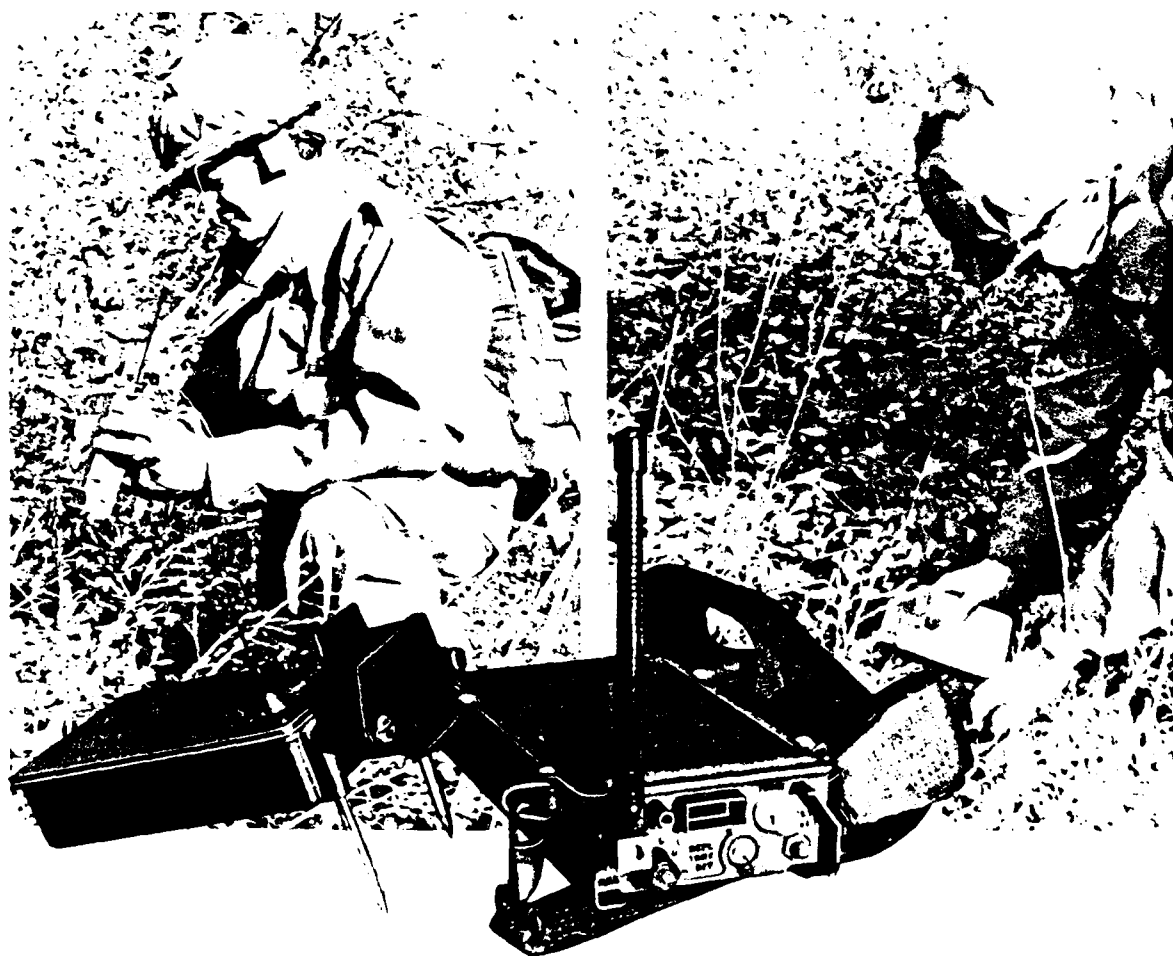
ANTENNA

HEADSET ASSEMBLY

PLATOON EARLY WARNING SYSTEM (PEWS) AN/TRS-2(V)



AN/TRS-2(V) Platoon Early Warning System (PEWS)



Brief Description

PEWS is a battery operated, compact, lightweight, tactical early warning system operationally consisting of a network of hand emplaced unattended ground detectors and remotely located monitoring receivers. The individual detectors sense movement within a range of 10 meters and, by sampling seismic and magnetic disturbances, classify it as a "personnel" or "vehicular" type of intrusion. The classification message is then transmitted — a distance of up to 1500 meters — to the monitor by either an RF link or a hard-wired data link.

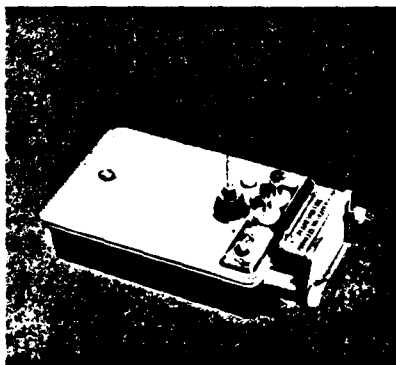
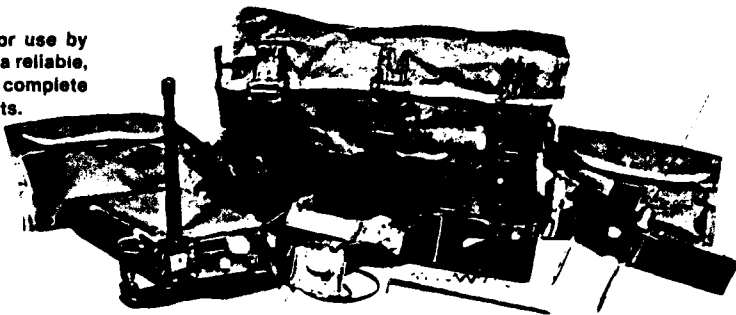
Applications

- Provide early warning of approaching personnel and vehicles to platoon sized units.
- Interdiction/Ambush.
- Provide a means for alerting security personnel of intrusions into an area.
- Augment listening posts, outposts and other forward/rear security forces.
- Permit surveillance of areas impossible to cover with line-of-sight dependent devices.

Platoon Early Warning System (PEWS)

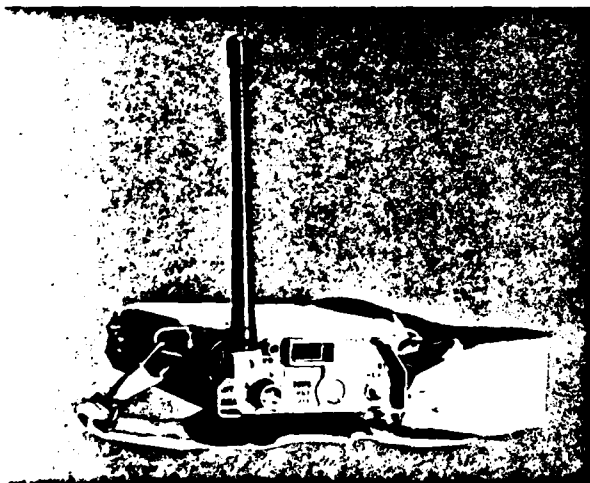
The AN/TRS-2(V) PEWS is an early warning system for use by patrols, platoons or squads in a defensive position. It is a reliable, lightweight, weatherproof, battery operated system. A complete PEWS system is composed of the following components.

- 2 Receivers R-1808(V)/TRS-2(V)
- 10 Detectors DT-577(V)/TRS-2(V)
- 2 Ground Rods
- 2 Wirelinks MX-9738/TRS-2(V)
- 2 Headsets
- 2 Carrying Cases CY-7524/TRS-2(V)



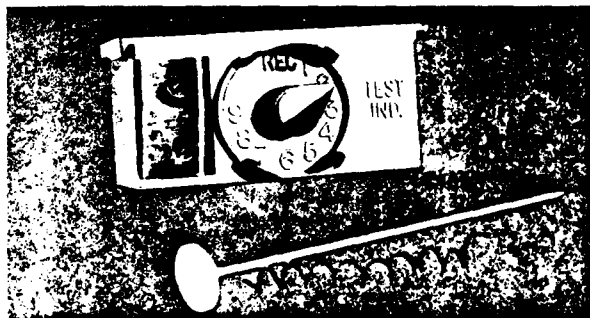
Detector

The Detector is a small, lightweight, battery powered, weather-proof unit which senses seismic and magnetic disturbances, classifies the type of intrusion (personnel or vehicle) and sends the coded information to a monitor Receiver by RF or wire transmission. The Detector has a self-test capability in both the RF and wire mode. The Detector is hand emplaced in the ground and has two holding stakes which screw into the bottom to help secure it in position and enhance ground coupling for seismic disturbances. A field programmable code plug is provided to program the area and detector identification codes for a specific mission.



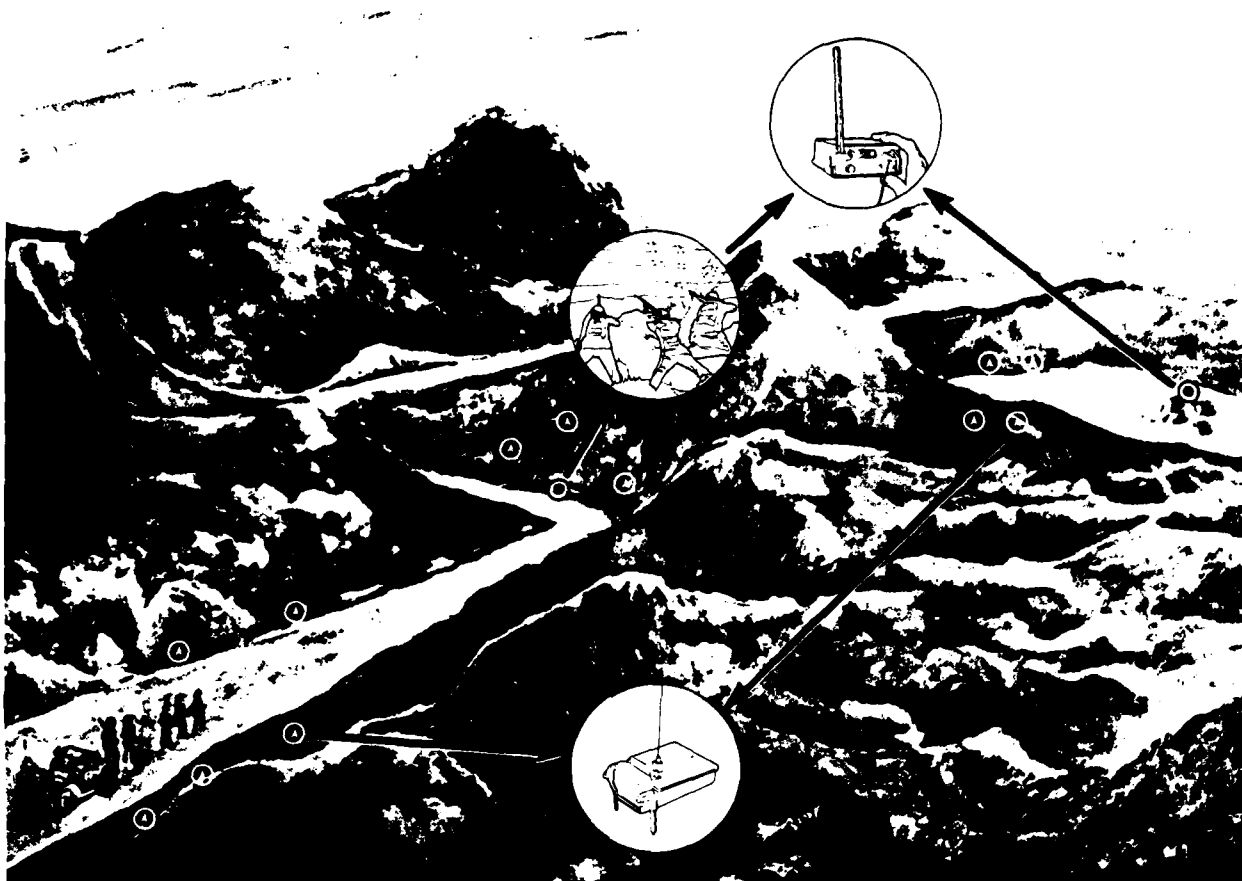
Receiver

The Receiver is a lightweight, portable, battery powered, weather-proof unit which receives coded RF or wire transmissions from remotely located Detectors. Whenever an intrusion message is received from a given area, an audible alarm is sent to the operator's headset and the digital display informs the operator of the sensor ID number and type of intrusion (personnel or vehicle). The receiver has a built-in self-test capability.



Wirelink

The Wire Link plugs into the bottom of the Receiver when wire mode is used. Up to nine pairs of wires from remotely located Detectors may be connected to terminals on the bottom of the Wire Link. The Wire Link has the capability to test the wires from the Detectors for either open or short circuit conditions. A grounding rod is supplied to protect personnel from lightning during wire link operation.



PEWS Tactics

The layout of Detectors and/or multiple PEWS systems will depend upon the intended application. It should be remembered that PEWS is not the only surveillance asset available to a unit. PEWS are employed to greatest advantage during tactical operations such as defense in sector, anti-personnel ambushes, and anti-armor ambushes.

During a defense in sector, PEWS are best employed in areas which are not covered by other surveillance assets and areas where line-of-sight does not exist for battalion ground surveillance radars or other observation devices. The PEWS would be deployed to provide early warning to riflemen and to crew-served weapons positions that an intruder is approaching their sector.

An anti-armor or anti-personnel ambush is normally conducted as part of a defense in sector, possibly protecting an exposed flank, or in a delaying action. Personnel would be located on terrain overlooking a suspected or known route the enemy would take. Detectors would be deployed to detect movement into the ambush's kill zone and around the ambush's kill zone to detect movement of enemy forces who escaped the ambush. A few Detectors may also be employed to provide flank security for the platoon.

PEWS Capabilities

- Environment Day Night World Wide
- Detection Range
 - Personnel 10 Meters
 - Vehicles 10 Meters
- Classification Automatic Between Person and Vehicle
- Emplacement Hand
- Mission Life 150 Hours (between battery charges)
- False Alarms Low
- Data Link Radio/Wire (1500 Meters)

Detector Operational Parameters

Target Detection (Persons)	Probability of Detection
• 1 Person Walking @ 10 Mtrs.	> 75%
• 2-3 Persons Walking @ 10 Mtrs.	> 85%
Target Detection (Vehicles)	
• 5/4 ton Truck @ 10 MPH @ 10 Mtrs.	> 85%
• Tracked Vehicles @ 5 MPH @ 10 Mtrs.	> 85%

PEWS meets all specifications of MIL-P-49115A.



Electronic Systems International Inc. SECURITY SYSTEMS



Specifications

General

Frequency Band	139-153 MHz
Data Link Range	1500 mtrs
Target Detection Range	10 mtrs
Number of Channels/System	Up to 8
Number of Sensors/Channel	1 to 10
Temperature Range	-25° to +125°F (operating) -70° to +160°F (storage)
Weight (less batteries, carrying case)	19.8 lbs. (9.0 kg)
Field Wire	WD-36
PEWS System meets requirements of MIL-P-49115A for operational capabilities and MIL-STD-810 and MIL-STD-461 for temperature, humidity, altitude, immersion, shock, vibration, dust, fungus, salt fog and EMI.	

Receiver — R-1808(V)/TRS-2(V)

Sensitivity	0.4uV min @ 40 KHz bandwidth, max.
L.O. Frequency Stability	± 30 PPM
Display Functions	Display Area, Sensor ID, Target Classification, low battery indicator
Alarms	Visual and audible
Error Detection	Odd parity
Target Classification (@ 10 mtr)	classify properly > 85% of time
False Alarms	2/24 hour period of continuous operation
Power Consumption	6mA @ 9 VDC (display off) 25 mA @ 9 VDC (display on)
Battery	BA-90 (2 req'd.)
Size	7.5" (190.5) x 4.5" (114.3) x 1.5" (38.1)
Weight	2.5 lbs. (1.14 kg)

Detector — DT-577(V)/TRS-2(V)

RF Power Output	250 mW (typical) 100 mW (min @ 5.5 VDC)
Bandwidth	20 kHz
Frequency Stability	± 40ppm (-25°F to +125°F)
Modulation	PCM/FSK
Modulation Deviation (F1 & F2)	± 8 KHz (min) ± 14 KHz (max)
Tone Generator	F1 = 1500 Hz ± 30 Hz F2 = 1800 Hz ± 45 Hz
Data	10 Bit Word Marker 1 Bit Area 3 Bits Sensor ID 4 Bits Parity 1 Bit Target Class 1 Bit
Bit Rate	30 BPS (min) 37 BPS (max)
Power Consumption	1 mA @ 9 VDC (standby) 200 mA @ 9 VDC (transmit)
Battery	BA-90 (1-req'd.)
Test Switch	Activate encoder transmitter to test RF transmission
Size	5.2" (133.4) x 3.5" (88.9) x 1.25" (31.8)
Weight	1.09 lbs. (0.49 kg)



Electronic Systems International Inc.

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Tel. (717) 299-3626, Telex 84-8438 Cable: INTERSIC

This data sheet is issued to provide outline information only. We reserve the right to vary from the data provided in this publication without notice.

0015-1/80

SENSOR SYSTEM DATA SHEET

Name of Sensor Remotely Monitored Battlefield Sensor System (REMBASS)

Developer RCA (for U.S. Army)

Availability Status To be made available to selected military units in 1987

System Application Outdoor area and perimeter surveillance and intrusion detection

SYSTEM DESCRIPTION

Type of Sensor Seismic/Acoustic; Magnetic; and Infrared (passive)

Description System consists of seismic/acoustic, magnetic, and passive infrared sensors, and two types of receivers (a man-portable, visual display receiver and a vehicle-portable, hard-copy print receiver).

Principle of Operation Sensors respond to seismic and/or acoustic, infrared or magnetic-sensitive stimuli produced by intruder. Sensors process raw data and provide detection and/or classification information. Information is transmitted by FM radio directly or through repeaters to the receiver. Receiver decodes, displays, and records signal.

Transmission Mode Radio frequency. (Seismic/acoustic sensor: 8 Hz to 135 Hz bandwidth. Magnetic sensor: .04 Hz to 1.0 Hz.)

Signature Passive sensors; "active" RF transmissions. System has low visibility.

Add-on Capability (1) Repeaters can be used to overcome line-of-sight obstacles or to extend range. (2) Display can be temporary (visual) or hard-copy print. (3) System can be deployed with one or many sensors; the numbers and types of sensors employed are limited only by the system's operational capability to integrate them.

Cost

PORTABILITY

Weight of Each Container Sensors: 10 lbs. (with battery). Sensor Monitoring Set (SMS): 43.9 lbs.

Size for Each Container Sensors: 8.27" long x 7.38" wide x 5.0" high. Portable Monitoring Set: 13.28" long x 4.75" wide x 3.45" deep. Sensor Monitoring Set: 21.62" long x 17.62" wide x 8.0" high.

POWER REQUIREMENTS

Power Requirements Seismic/acoustic sensor: BA 5590 lithium organic battery. Magnetic and infrared sensors: BA 5590/U lithium organic battery. (Minimum

battery life for seismic/acoustic sensor is 1 month (3 months with intermittent stimulations; for magnetic sensor is 3 months; for infrared sensor is 7 months.) Portable Monitoring Set: BA 5598 lithium organic battery (Minimum battery life is 90 hrs.) Sensor Monitoring Set: 5590 lithium organic battery (Minimum battery life is 15 hrs.). AC/DC power supply operating from 120 VAC, 240 VAC, 24 VDC, or 116 VDC.

EMPLACEMENT

Emplacement Mode Sensors are designed for surface emplacement. Portable Monitoring Set is designed to be man-portable. Sensor Monitoring Set is designed to be either man- or vehicle-portable.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time Sensors are expendable or recoverable.

RUGGEDNESS

Ruggedness System is designed for outdoor, tactical (military) use.

EFFECTIVENESS/RELIABILITY

Detection Range Seismic/acoustic sensor: Personnel - 50 meters, vehicles - 250+ meters. Magnetic sensor: Armed personnel - 4 meters, wheeled vehicles - 15 meters, tracked vehicles - 25 meters. Infrared sensor: Personnel - 3-20 meters, (@ .1 to 24 meters/second) vehicles - 3-50 meters (@ 1.66 to 40 meters/second). Infrared field of view: 2 beams, 1.5° wide x 5.6° high; 3° between beam centers.

Transmission Range

With Relay

Sensitivity Seismic/acoustic sensor has gain control to adjust detection/classification range. Magnetic sensor threshold detection level is 0.4 gamma (AK-47 Rifle @ 5 meters). Infrared sensor will detect temperature differential of as little as 1.5°C.

Remote Alarm Assessment Capability Seismic/acoustic sensor has personnel/vehicle discrimination capability. Magnetic and infrared sensors have directional classification capability.

Detection Probability

Functional Reliability Seismic/acoustic sensor classification accuracy is approximately 80%.

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering Opening of enclosure, altering of controls, or physical movement of sensor triggers transmission shut-down and frequency erasure.

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range

Humidity

Rain

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

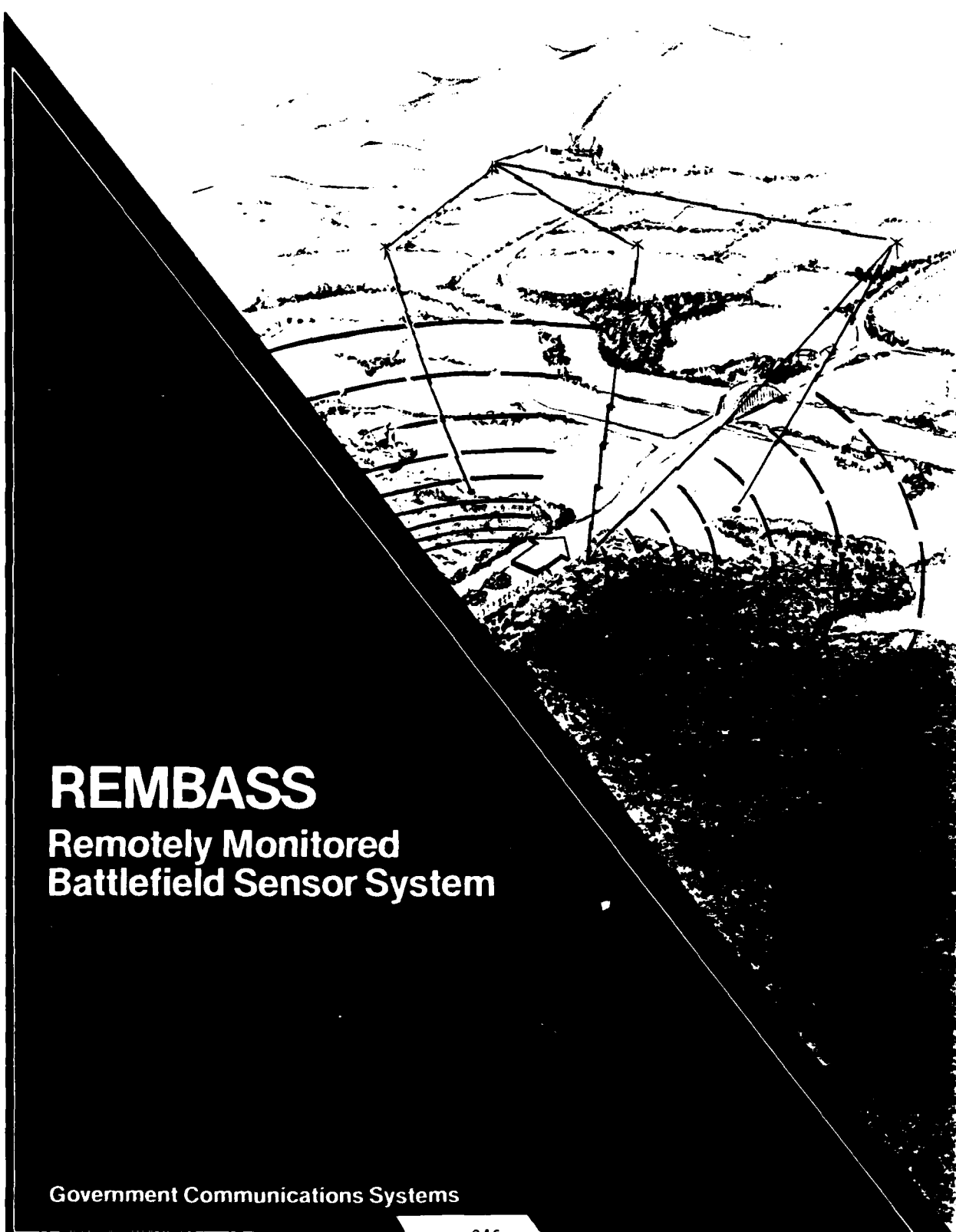
Line-of-Sight Line-of-sight required for target detection by infrared sensor. Line-of sight is necessary for RF transmission.

Foliage

Soil Conditions

Other

SOURCE RCA (Government Systems Division) product literature.



REMBASS

**Remotely Monitored
Battlefield Sensor System**

Government Communications Systems

System Description

REMBASS (Remotely Monitored Battlefield Sensor System) is an unattended ground sensor system that will detect and classify intruding personnel and vehicles. This system is intended to provide Divisions, Brigades and Battalions with information on activities in areas forward of the Forward Edge of the Battle Area (FEBA) and for rear area protection within the division zone. REMBASS is being developed for the U.S. Army Electronics Research and Development Command (ERADCOM), Ft. Monmouth, NJ, by RCA.

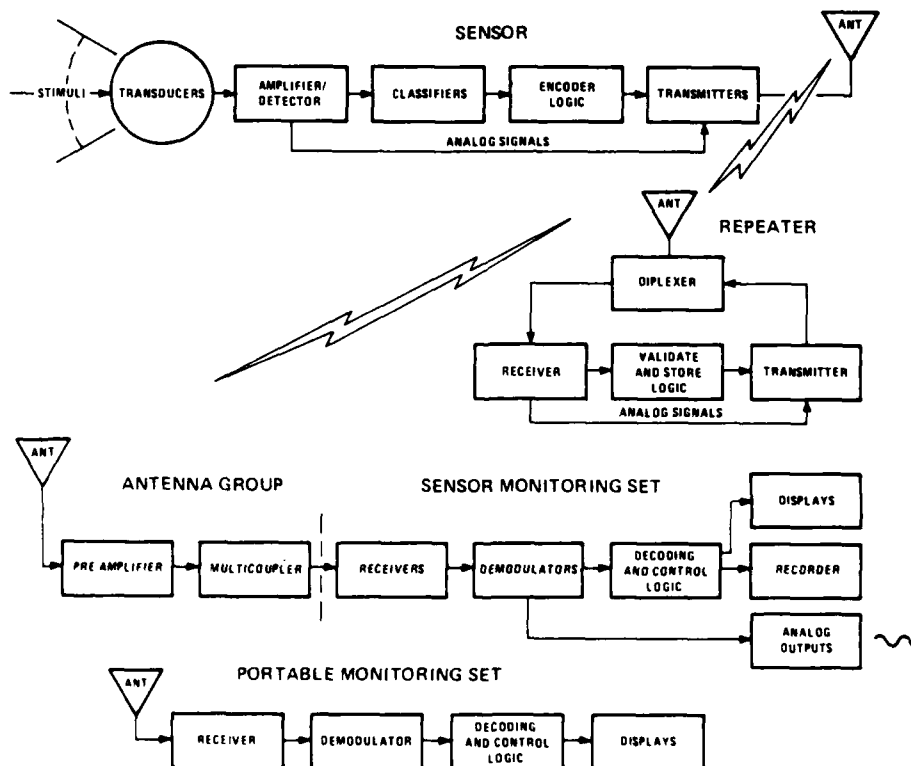


REMBASS utilizes remotely monitored sensors emplaced along likely avenues of enemy approach. These sensors respond to seismic and/or acoustic, infrared, or other mechanical energy and magnetic field changes produced by enemy activities (e.g., moving tracked vehicles, wheeled vehicles and personnel). Sensors process the raw signals and provide detection and/or classification (wheeled versus tracked vehicle, or personnel present) information. This information is incorporated in short digital messages and transmitted by an FM radio transmitter internal to the sensor. The sensor communicates with the receiver either directly or through repeaters. Messages at the receiver are demodulated, decoded, temporarily displayed, and recorded to provide a time-phased record of sensor activations.

RCA's Government Communications Systems is responsible for the overall system, data link, and monitoring sets while the sensors and repeaters are being engineered by RCA's Automated Systems, Burlington, MA.

System Capability

REMBASS will provide field commanders with a vital all-weather, day/night, real-time early warning (alerting), surveillance, and target development capability. It will be used in both offensive and defensive roles and is designed to operate in world-wide terrain and climatic conditions. Because of its emplacement flexibility and wide range of applications, a battlefield commander may select various combinations of equipments for any given mission.



REMBASS SYSTEM BLOCK DIAGRAM

REMBASS Subsystems

REMBASS includes seven types of sensors, for emplacement by hand, aircraft, or artillery. These sensors remain passive until activated by the passing of intruders. Some of them incorporate classifiers which automatically discriminate between personnel, wheeled vehicles and tracked vehicles.

Information from these sensors is transmitted over a VHF data link to manned monitoring sets, either directly or via repeaters. These repeaters may also be emplaced by hand or by aircraft, or used in a helicopter as an airborne relay.

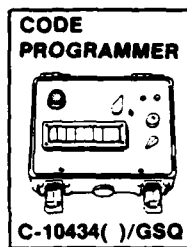
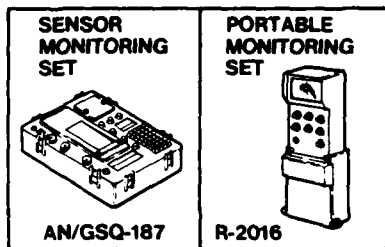
Two monitoring sets are provided for REMBASS. One is a portable unit that an operator can carry with him. The other is a larger unit complete with hard copy recorder for semi-fixed installations. Records of sensor reports, in time-ordered sequence, can be generated at sensor monitor stations. These records, as well as audio signals, are available for analysis by system operators. The operators are able to estimate location, speed, direction of travel, convoy size, and class of targets.

	TYPE	DESIGNATION	TECHNIQUE	DELIVERY METHOD			SENSOR CHARACTERISTICS					
				HAND	ARTILLERY	AIRCRAFT	TARGETS CLASSIFIED	TARGET DETECTION CAPABILITY	TARGET DIRECTION	DETECTION RANGE	SENSOR RESPONSE (SEC)	SENSOR OUTPUT
SENSOR SUBSYSTEM	CLASSIFICATION SENSORS	DT 562	SEISMIC/ ACOUSTIC	X			P W T	P W T		T W :500M P:50M	(1) REPORT EVERY 10 SEC	D V P W T
		DT 567	SEISMIC/ ACOUSTIC			X	P W T	P W T		T W :500M P:50M	(1) REPORT EVERY 10 SEC	D V P W T
		DT 570	SEISMIC/ ACOUSTIC		X		P W T	P W T		T W :500M P:50M	(1) REPORT EVERY 10 SEC	D V P W T
	MAGNETIC DETECTION	DT 561	PASSIVE MAGNETIC	X				PA W T	X	PA: 5M W:15M T:25M	2-10 SEC DEPENDS ON TARGET SPEED	D
	INFRA-RED	DT 565	PASSIVE IR	X				P W T	X	P:20M T W:50M	≈ 2.5	D
	STRAIN CABLE	DT 573	PRESSURE SENSITIVE CABLE	X			P W T	P W T		PROXIMITY OF CABLE	≈ 2.5	D P W T
	ANALOG	DT 563	SEISMIC TRIGGER ACOUSTIC DATA	X				W T		0-500M	≈ 30	AUDIO ≈ 15 SEC
DATA TRANSMISSION SUBSYSTEM	HAND EMPLACED AIRCRAFT MOUNTED	RT 1175	DIGITAL AND ANALOG XMSN	X								
	IMPLANT	RT 1200	DIGITAL XMSN			X						
	CANOPY HANGUP	RT 1201	DIGITAL XMSN			X						
MONITORING SUBSYSTEM	SENSOR MONITORING SET & ANT GROUP	AN/GSQ 187 & OE 239	THERMAL PRINTER & TEMPORARY VISUAL DISPLAY									
	PORTABLE MONITORING SET	R 2016	TEMPORARY VISUAL DISPLAY									

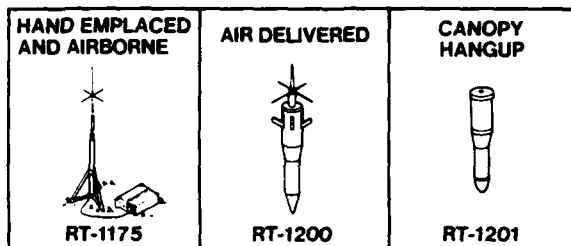
LEGEND
 D DETECT ONLY
 V PERSONNEL
 W WHEELED VEHICLE
 T TRACKED VEHICLE
 PA ARMED PERSONNEL
 A VEHICLE

SUBSYSTEM CONFIGURATIONS

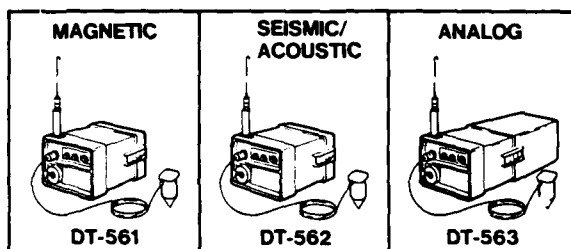
MONITORS



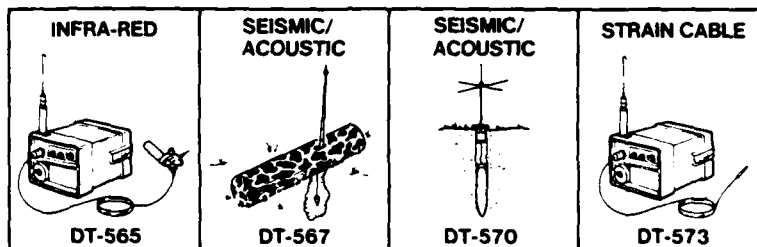
REPEATERS



SENSORS



SENSORS



Specifications furnished by RCA are believed to be accurate and reliable. However, all Specification data is subject to change without notice.

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SYSTEMS DIVISION

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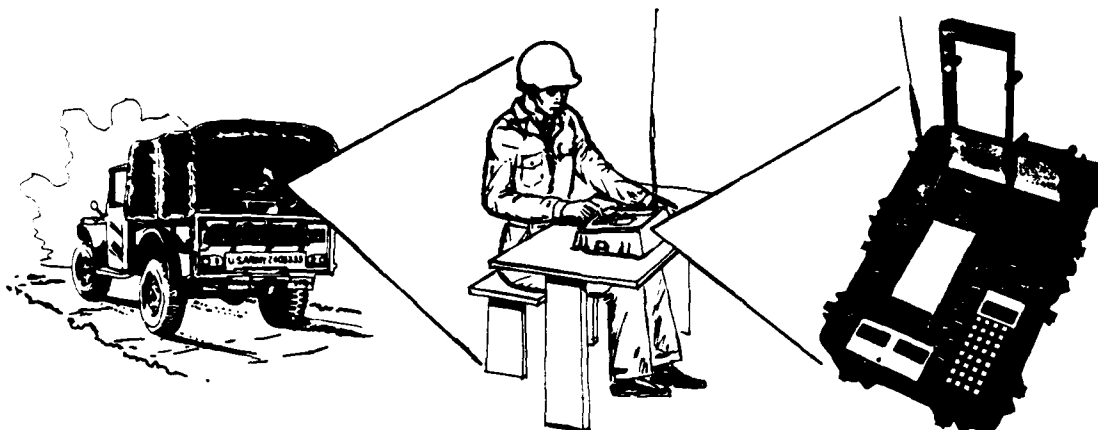
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Manager
International Field Operations
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SENSOR MONITORING SET (SMS) AN/GSQ-187



DESCRIPTION

The Sensor Monitoring Set (SMS) AN/GSQ-187 is a fully synthesized dual channel receiver/message processor developed under contract to the U.S. Army ERADCOM as part of the REMBASS System. The SMS receives, decodes, displays, and records REMBASS sensor information. It features temporary visual displays, hard copy (paper) printer, and is field operable with batteries or with a yet to be developed AC/DC power supply. It may be made man-transportable via pack frame M-1972.

The SMS operates with its own antenna or with the yet to be developed remote OE-239 ()/GSQ-187 Antenna Group.

All operator functions are executed from a keypad; including built-in test routines.

The Set can output all received messages serially in real time to an external processor, imaging receiver or recording device via a connector on the front panel.

OPERATING MODES

The SMS is designed to provide the flexibility needed to best utilize the deployed sensor complement. In normal operation, remote sensors (and repeaters) are initialized in terms of frequency, ID numbers and lifetime. (A record is also kept of their locations).

To initialize the SMS, the RF frequency(s) in use are entered via the keyboard. Next, the ID number(s) associated with each sensor are entered, along with the RF channel (A or B) the SMS expects to receive that sensor's transmission on, and the printer column assigned to each sensor ID number. (Typically, the column assignments might relate to the sensor locations to simplify analysis of the permanent record).

Up to 64 ID codes may be assigned within the system, and any 2 of the 600 available receive channels may be selected, depending on the local electromagnetic environment and spectrum allocations. ID numbers may be patched to one or more of the 60 printer columns or to one of the 10 TVD's. Through a keyboard patching operation, any of the TVD's may be dedicated to a given ID code. It will then be

FEATURES:

- Contains a built-in, frequency synthesized, 2-channel digitally-tuned receiver.
- Handles up to 64 different sensor ID codes.
- Receives sensor data simultaneously on two keyboard selected channels and prints messages in up to 60 print columns.
- Creates permanent records with built-in low-current drain thermal printer.
- Has rugged liquid crystal temporary displays for set-up even in bright sunlight.
- Includes integral display heaters and display and printer bed illumination for all weather, day or night operation.
- Functions under microprocessor control with routines human-engineered for rapid familiarization.
- Has built-in 4-function calculator for field computation of target velocity, direction.
- Performs self-test routines for simplified fault-diagnosis.
- Fully self-contained with long-life battery supply and integral rugged carrying case.

activated only when that code is received.

The SMS includes an energy storage capacity to keep the memory circuits alive when power is interrupted for an interval of up to ten minutes. It also has the capability of eliminating one or more specific target classifications from one or more sensors while displaying other classification messages from those sensors. This eliminates the display of alarms which are of no interest for a specific mission.

A self test capability is included to test signal flow of test messages from the output of the receivers to the printer and to the display including the fonts, enabled display segments, and all elements of the printhead. The self test is under the control of the SMS microprocessor.

SMS includes a four (4) function calculator using the keypad and keyboard display. It is also capable of receiving acoustic information which is available at a jack on the front panel.

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HARDCOPY RECORDER

Type	MILTOPE TPX 32055 4" paper chart recorder, microprocessor-controlled 5 x 7 dot matrix with thermal printhead
Operating Position	Any angular orientation between horizontal and vertical
Paper	4" wide x 30' long, NCR 1351 or equivalent
Format	60 positions (columns), each can be assigned a different sensor ID number
Paper Speed	15 in/hour, 30 in/hour
Characters Printed	Automatically selected by sensor type in use: T(tracked), W(wheeled), P(personal), (detect only)*
Max Print Rate Per Channel	One character every 10 seconds at 30 in/hour
Illumination	Electroluminescent panel beneath printer bed, variable level
Cover	High impact Lexan
Field Adjustments	None

* The two ID numbers of differentiating sensors are assigned to separate columns of the printer to indicate direction of target movement

TEMPORARY VISUAL DISPLAY (TVD)

Type	Custom liquid crystal modules with integral LSI decoding logic and drive circuitry
Heaters	Automatic with built-in thermistor sensors and integral heating elements in modules
Characters	Ten groups of three characters each (in two modules), arranged to display two digit ID numbers**and one alpha-numeric character for classification (target type).
Character Size	Approximately 0.5" (1.27 mm)
Display Duration	Following activation, display group remains on for six seconds. Next activation is displayed on the next available group (proceeding from left to right)
Illumination	Continuously variable tungsten edge lighting

**Via keypad operation, individual TVD's may be set up to display either sensor ID number or printer column assigned to that sensor ID number

Specifications

PHYSICAL PARAMETERS

Overall Size	21 62" L x 17 62" W x 8 00" H (54 91cm) x (44 75cm) x (20 32cm)
Weight	43 9 lb (19 91kg)

PERFORMANCE AND CHARACTERISTICS

Power Source	(1) BA5590 U Lithium Organic Battery or AC/DC power supply operating from 120 VAC 240 VAC 24 VDC or 116 VDC source
Minimum Battery Operating Life	15 Hours
Antenna	Panel mounted whip antenna or yet to be developed DE-239 antenna group (remote)
Keypad Functions	RF frequency select Sensor ID number to strip chart column patching Test routines Control of printout of sensor classifications

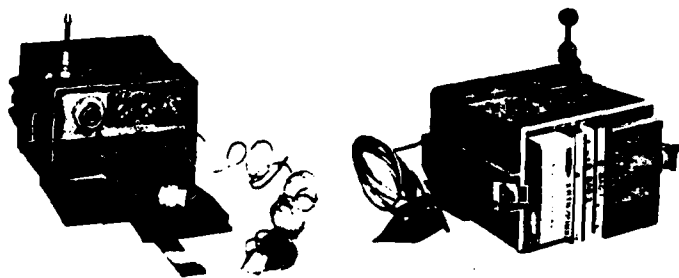
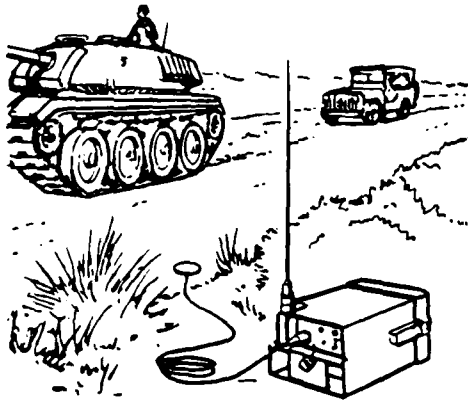
Audible Alarm (Tones)	Receipt of each message when printer is in slow speed Acoustic signal alert Low battery alert
Receivers	Two receivers with synthesizer for simultaneous dual channel operation 600 Channels per receiver Keypad channel selection
Calculator Functions and Display	Four (4) function calculator Liquid crystal (8) digit display of same design as TVD modules Functions executed from keypad All keypad functions, controls and responses shown on calculator display
Portability	Pack frame M-1972 vehicle or handcarried
External Connectors	Headset jack for acoustic signals Connector for external processing or record keeping of REMBASS messages, imaging or other applicable data

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MAGNETIC SENSOR

DT-561 ()/GSQ



DESCRIPTION

The Anti-Intrusion Sensor (DT-561 ()/GSQ) is an expendable/recoverable hand-emplaced magnetic detecting sensor developed under contract to U.S. Army ERADCOM as part of the REMBASS System. It features communications compatibility with the REMBASS monitoring sets (either directly or through radio repeaters) and provides output data indicating the presence and direction of motion of tracked vehicles, wheeled vehicles, armed personnel, and other metallic objects. This information allows counts to be made of individual objects passing into or out of a surveillance area.

FEATURES:

- Built-in transmitter with precision digital frequency synthesizer.
- Automatic external loading of sensor ID and transmitter frequency via REMBASS Code Programmer C-10434 ()/GSQ.
- Sensitive, Dual-Axis Magnetometer for directional discrimination.
- Completely self-contained design with built-in long-life battery.
- Tamper-proof enclosure with automatic transmitter shut-off and internal memory erase.
- Common module construction for interchangeability of modules within the REMBASS Hand-Emplaced Sensor family.
- Highly portable, rugged, light-weight design.

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REA

Specifications

PHYSICAL PARAMETERS

Overall Size 8.27" L x 7.38" W x 5.0" H (21.0cm) x (18.7cm) x (12.7cm) Weight 10 lbs. (4.5 kg)

PERFORMANCE AND CHARACTERISTICS

Power Source BA-5590/U. Lithium Organic Battery Minimum Battery Life 3 Months (Operating)

Battery Load Transducer/Unique Electronics 3 AH/30 Days Detector Two-Axis, Brown-type Ring Core Magnetometer

Encoder/Transmitter (1,000 Transmissions/Day) 0.3 AH/30 Days Response Bandwidth (3 dB) 0.04 Hz to 1.0 Hz

TOTAL 3.3 AH/30 Days Threshold Detection Level 0.4 gamma (AK-47 Rifle @ 5m)

Target	Moment Req'd To Exceed Threshold (cgs units)	Detectability	
		Speed (mph)	Range (m)
Armed Personnel	1414	0.6-15	4
Wheeled Vehicles	0.38×10^5	2.6-67	15
Tracked Vehicles	1.77×10^5	4.5-112	25

Directional Discrimination By processing outputs of dual-axis detectors and assignment of two separate sensor ID codes.

Sensor Output Target detection signal transmitted with appropriate ID code as part of digital message.

Tamper-Proofing Enclosure opening, altering of controls, or physical movement of the box triggers transmitter shut-down and frequency and ID code erasure. Automatic reset via Code Programmer C-10434 ()/GSQ.

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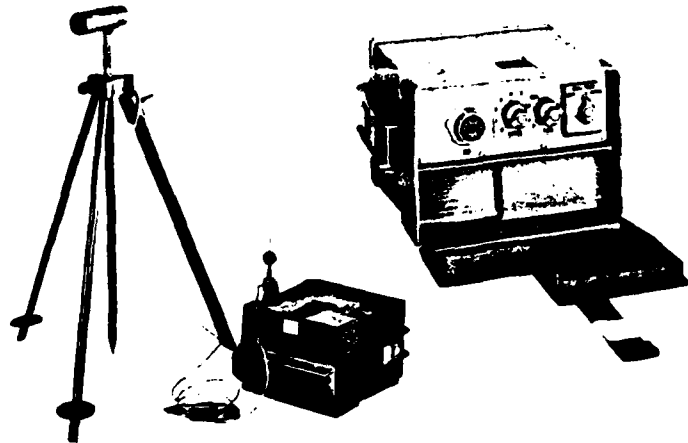
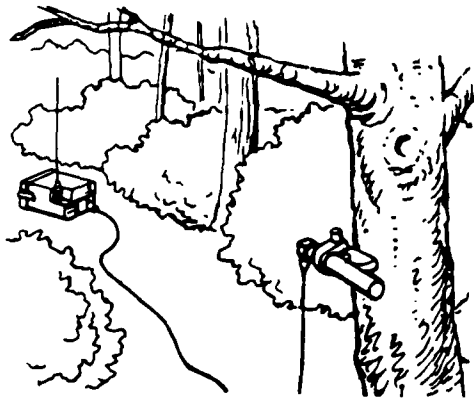
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GSD/SCN 303-79

RCA Government
Systems Division

IR SENSOR

DT 565 ()/GSQ



DESCRIPTION

The IR Sensor (DT-565 ()/GSQ) is an expendable/recoverable hand-emplaced passive Infrared (IR) detecting sensor developed under contract to the U.S. Army, ERADCOM as part of the REMBASS System. It features communications compatibility with the REMBASS monitoring sets (either directly or through radio repeaters) and provides output data indicating detection and direction of movement of targets. The sensor provides information for counting objects passing through the sensor detection zone at velocities ranging from 0.1 to 40 meters/sec. As little as 1.5°C temperature differential of the target against the background will cause a "detect" signal to occur.

FEATURES:

- Built-in transmitter with precision digital frequency synthesizer.
- Automatic external loading of sensor ID's and transmitter frequency via REMBASS Code Programmer C-10434 ()/GSQ.
- High sensitivity, dual field of view IR sensor for directional discrimination.
- Completely self-contained design with built-in long-life battery.
- Tamper-proof enclosure with automatic transmitter shut-off and internal memory erase.
- Common module construction for interchangeability of modules within the REMBASS Hand-Emplaced Sensor family.
- Highly portable, rugged, light-weight design.

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Specifications

PHYSICAL PARAMETERS

Overall Size	8.27" L x 7.38" W x 5.0" H (21.0cm) x (18.7cm) x (12.7cm)	Weight	10 lbs. (4.5 kg)

PERFORMANCE AND CHARACTERISTICS

Power Source	BA-5590/U. Lithium Organic Battery	Detection Capability	Range	Target Velocity
Battery Load			3 meters	0.1 to 2.4 m/sec
Transducer/Unique			50 meters	1.66 to 40 m/sec
Electronics	1 AH/30 Days	Detection Range	3 to 20 meters for Personnel	
Encoder/Transmitter			3 to 50 meters for Vehicles	
(1,000 Trans-		Detection		
missions/Day)	0.3 AH/30 Days	Threshold	$\Delta T \approx 1.5^{\circ}C$	
TOTAL	1.3 AH/30 Days	Directional		
Minimum Battery Life	7 Months (Operating)	Discrimination	By processing outputs of dual element detector and assignment of two separate sensor ID codes.	
Wave Length	8-13 Microns	Sensor Output	Target detection signal transmitted with appropriate ID code as part of digital message.	
Detector	Lithium Tantalate (LiTaO3).	Tamper-Proofing	Enclosure opening, altering of controls, or physical movement of the box triggers transmitter shut-down and frequency and ID code erasure. Automatic reset via Code Programmer C-10434 ()/GSQ.	
Field of View	2 Beams. 1.5° Wide x 5.6° High (27 mrad x 98 mrad) 3° Between Beam Centers			

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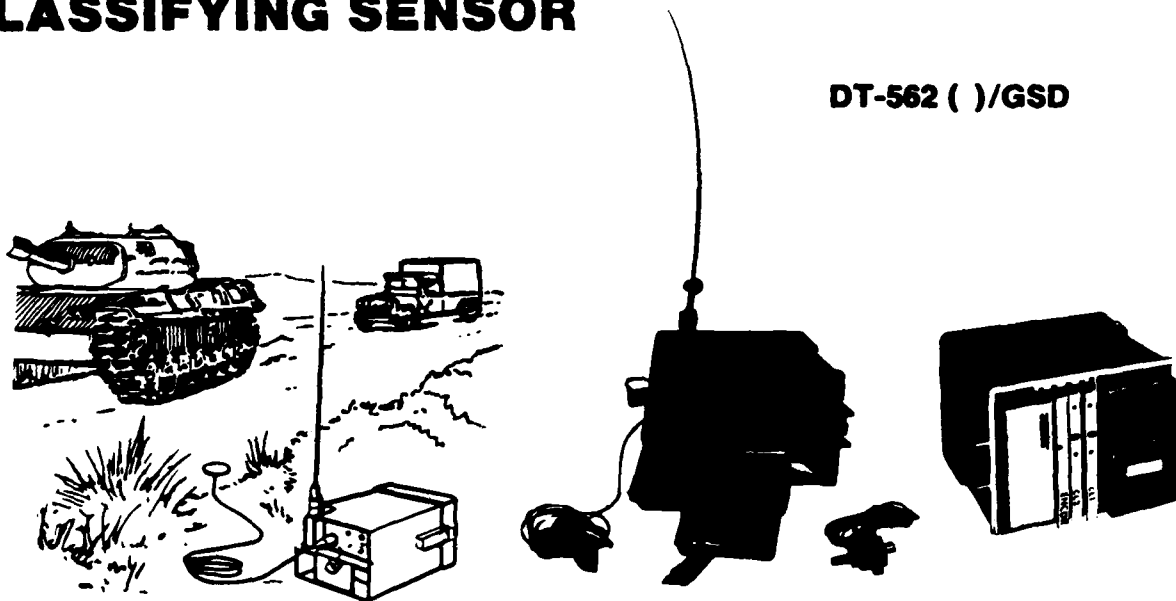
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GSD/SCN 305-79

RCA Government
Systems Division

SEISMIC/ACOUSTIC CLASSIFYING SENSOR

DT-562 ()/GSD



DESCRIPTION

The Anti-Intrusion Sensor (DT 562 ()/GSQ) is an expendable/recoverable hand-emplaced classification sensor developed under contract to U.S. Army ERADCOM as part of the REMBASS System. It provides output data indicating the presence and classification of targets (personnel, wheeled vehicles and tracked vehicles) and features communication compatibility with REMBASS monitoring sets (either directly or through radio repeaters). This information allows the operator to know the type or class of target passing into or out of a surveillance area.

The classification algorithm is implemented in advanced low power technology using a custom LSI CMOS arithmetic module, a CMOS microprocessor and CMOS LSI memory devices. Army field tests with live targets indicate classification accuracies of approximately 80% which is operationally acceptable to field commanders. The sensor will transmit a classification approximately every ten (10) seconds while the target is within the detection range.

FEATURES

- Ruggedized seismic and acoustic transducers to acquire target signatures.
- CMOS microprocessor and memory devices to process signature data with low power drain.
- ADAPTIVE turn-on function for operation in quiet and noisy environments.
- Gain control to adjust detection/classification range.
- Nuisance rejection; i.e., no transmissions of transducer stimuli other than targets of interest (personnel, tracked vehicle and wheeled vehicle).
- Built-in transmitter with precision frequency synthesizer.
- Automatic external loading of sensor ID and transmitter frequency via REMBASS Code Programmer C-10434 ()/GSQ.
- Automatic selection of operating mode (dormant or classifying) dependent upon target activity.

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REA

Specifications

PHYSICAL PARAMETERS

Overall Size 8.27" L x 7.38" W x 5.0" H Weight 10 lbs. (with battery) (4.5 kg)
(21.0cm) x 18.7cm) x 12.7cm)

PERFORMANCE AND CHARACTERISTICS

Transducers	Geophone and Microphone	Battery Load
Power Source	BA 5590 Lithium Organic Battery	a) Transducer/Unique Electronics 3.0AH
Minimum Battery Life (@ 3.3AH)	30 Days (3 Months with intermittent stimulations)	b) Transmitter/Encoder (1,000 trans-missions/day) 0.3AH
Response Bandwidth (3db) - 8Hz to 135 Hz		TOTAL 3.3AH

Target	Detection/Classification Range At All Speeds
Personnel	50 Meters
Tracked Vehicle	500 Meters
Wheeled Vehicle	500 Meters

Monitors Printout/Display	The monitors furnish an LCD display and/or hard copy printout of the classification messages and ID from each sensor as follows:	Sensor Output	Target detection/classification transmitted with appropriate ID code as part of digital message.												
	<table border="0"> <tr> <td>Transmitted Message</td> <td>Display</td> </tr> <tr> <td>Detection</td> <td>-</td> </tr> <tr> <td>Personnel</td> <td>P</td> </tr> <tr> <td>Wheel Vehicle</td> <td>W</td> </tr> <tr> <td>Track Vehicle</td> <td>T</td> </tr> <tr> <td>Vehicle</td> <td>V</td> </tr> </table>	Transmitted Message	Display	Detection	-	Personnel	P	Wheel Vehicle	W	Track Vehicle	T	Vehicle	V	Tamper-Proofing	Enclosure opening, altering of controls or physical movement of the box triggers transmitter shut-down and frequency and ID code erasure. Reset requires use of Code Programmer C-10434 ()/GSQ.
Transmitted Message	Display														
Detection	-														
Personnel	P														
Wheel Vehicle	W														
Track Vehicle	T														
Vehicle	V														

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GSD/SCN-301-81

RCA Government
Systems Division

PORTABLE MONITORING SET (PMS)

R-2016 ()/GSQ



DESCRIPTION

The Portable Monitoring Set (PMS) R-2016 ()/GSQ is a battery operated single channel receiver and message processor designed for use with the REMBASS sensors. Developed under contract to the U.S. Army ERADCOM, the PMS features a built-in frequency synthesized receiver capable of operating on any one of 600 channels, an audible alarm to indicate arrival of a sensor message, and a highly reliable liquid crystal display which indicates the identity of the reporting sensor and classification of the target it has sensed.

The PMS receives and decodes digital messages transmitted in the REMBASS format. Its primary application is for use in field verification of sensor operation during initial emplacement. It is designed to operate in conjunction with the other elements of the REMBASS system.

FEATURES:

- Rugged, high reliability liquid crystal visual display.
- Six second display of sensor ID and target classification.
- Up to ten sensor messages displayed simultaneously.
- High visibility display viewable in complete darkness, in sunlight and high glare areas.
- Fully synthesized 600 channel receiver with front panel frequency selection.
- Receives and decodes REMBASS messages.
- Built-in test checks entire decoder and message display system.
- Headset jack on the front panel for listening to acoustic information from REMBASS analog sensors.
- Ninety-hour battery life under normal operating conditions.

**Government
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RCA

Specifications

PHYSICAL PARAMETERS

Overall Size	13.28" L x 4.75" W x 3.45" D (33.72 cm) x (12.07 cm) x (8.75 cm)	Weight	6.25 lb (2.84 kg) less antenna

PERFORMANCE AND CHARACTERISTICS

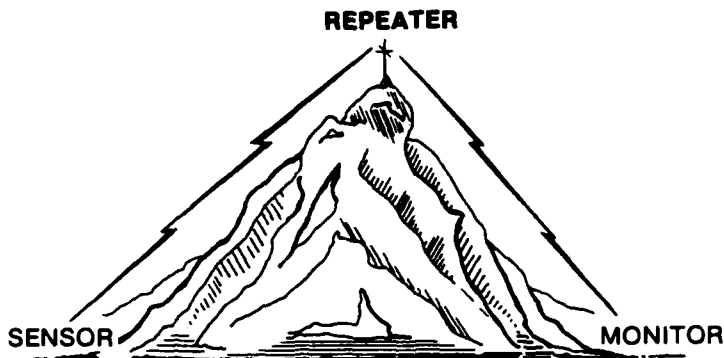
Power Source	(1) BA5598 U Lithium Organic Battery, lower front panel battery compartment	Temporary Visual Display (Con't.)	Character Size	Approx. 0.5" (1.27 mm)
Minimum Battery Operating Life	90 Hours		Display Duration	Following activation, display group remains activated for 6 seconds. Successive activations are displayed left to right.
Antenna	Chassis Mounted Whip Antenna			
Audible Alarm (Tone)	On receipt of each message			
Receiver	600 Channel Receiver/Synthesizer Receives and decodes REMBASS messages		Illumination	Continuously variable Tungsten edge lighting
Temporary Visual Display	Type Custom liquid crystal module with integral LSI decoding logic and drive circuitry.	Controls		Three rotary frequency selection switches Mode Switch (Off/On/Test) Acoustic Signal Volume Display Light Intensity Audible Tone Volume
	Heater Automatic with built-in thermistor sensor and integral heater element in module.	Operating Modes		Self-test Mode: Checks signal flow from Receiver Output to Display Operating Mode: received sensor information displayed for (6) seconds.
	Characters 10 Groups of 3 characters each (in 2 modules) arranged to display 2 digit ID numbers and one alpha- numeric character for classification (target type)	Maintenance:		Electronics assembly including receiver/ synthesizer, power module and control module are mounted on the removable rear panel for ease of maintenance and module replacement.
		Portability		"D" rings provided for carrying strap.

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be accurate and reliable. However, all Specification
data is subject to change without notice.

RADIO REPEATER

RT-1175()/GSQ



DESCRIPTION

The Radio Repeater, RT-1175()/GSQ, is an expendable/recoverable, hand-emplaced, single channel FI-F2FM radio relay set developed as part of the REMBASS equipment group under contract to the U.S. Army, ERADCOM. Operating unattended on battery power, it intercepts the encoded radio message from either a REMBASS sensor or another like repeater. It then decodes the message, verifies bit integrity, re-encodes, and retransmits the message on the new frequency. The repeater provides system flexibility in the REMBASS communication link to operate over and around terrain features that may block the line-of-sight radio path from a sensor to a remote monitor-display set. For extra long or circuitous communication links, several repeaters can be cascaded to reach the sensor monitoring point. The repeater can be operated from an airborne platform to provide a long range transmission capability of 150Km or more under line-of-sight conditions. A simultaneous transmit/receive capability has been included to handle continuous signals.

FEATURES

- Precision digital frequency synthesizer in both receiver and transmitter.
- Automatic external loading of operating frequency channels and mission life codes via REMBASS Code Programmer, C-10434 ()/GSQ.
- Peak message rate processing capability.
- Large capacity message buffer.
- Completely self-contained unit with long life, replaceable batteries.
- Tamperproof enclosure with automatic transmitter shut-off and internal memory erase.
- Common major module construction for interchangeability of subassemblies with the REMBASS Hand-Emplaced Sensor family.
- Highly portable, rugged, easy-to-deploy design.
- Software controlled processing allows addition of new message type in the future.
- Internal duplexer allows real time retransmission of long digital and analog messages via a single antenna.

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SPECIFICATIONS

PHYSICAL PARAMETERS

EQUIPMENT GROUP

- Monopole Antenna and Coaxial Cable
- Collapsible Mast
- Electronics Unit
- Coaxial Cable Extension

ANTENNA

Construction	One piece assembly with 20-inch (50.8 cm) stainless steel radiator and four 16-inch (40.6 cm) beryllium copper, fold-down, ground plane radials.
Preattached Cable Length	16.4 ft. (5 meters)
Weight	12 oz (340 grams)
Volume (Stowed)	2 inch diameter (5.08 cm) by 24 inches (60.9 cm) long

MAST

Construction	4 concentric sliding tube system with ring locking mechanism. Tripod base support with adjustable leg lengths to compensate for terrain contour.
Fully Erected Height	14 feet (4.26 meters)
Weight	15 lbs (6.8 kg)
Volume (Stowed)	8 inches (20.3 cm) diameter by 40 inches (101.6 cm) long.

ELECTRONICS UNIT

Construction	Two section aluminum housing with four closing latches.
Overall Dimensions	8.75 inches by 12.00 inches by 16.00 inches. (22.2 cm) by (30.5 cm) by (40.6 cm).
Weight	27 pounds (12.24 kg) without batteries.

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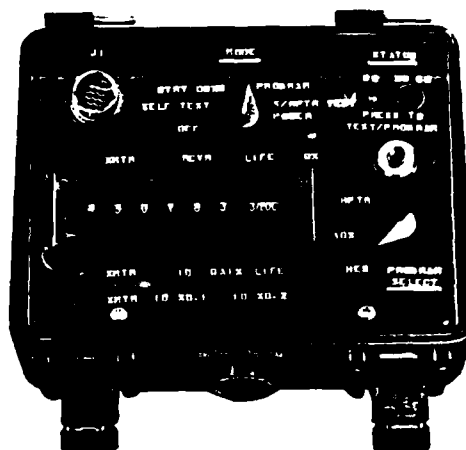
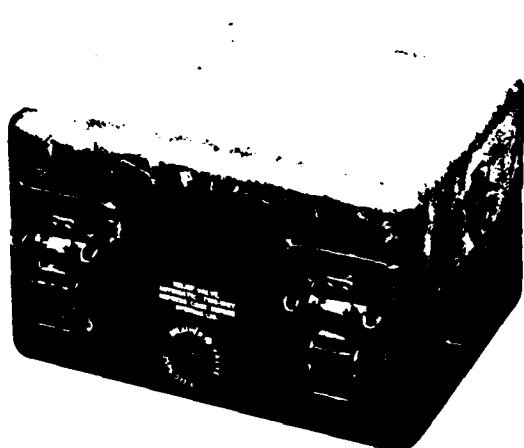
PERFORMANCE AND CHARACTERISTICS

Power Source	BA-5590/U Lithium Organic Battery - requires 2 to 6 batteries, depending on length of mission.
Operating Battery Life	30 day (minimum)
Frequency Bands	2
Frequency Channels	160 per frequency band
RF Output Power	2 watts minimum
Receiver Sensitivity	-111dBm
Range	15 Km minimum for ground deployment mode 150 Km minimum for airborne mode
Message Rate	25 per second (for random, non-overlapping digital messages)
Message Handling	Digital Mode - Store and forward Hybrid Mode - Store and forward plus 15 second real time analog transmission.
Memory Capacity	768 bytes (6144 bits) configured in a revolving message buffer
Duty Cycle	Receiver and Processor - 100 per cent Transmitter - active only for message retransmission
Programmable Mission Life	Automatic shut-down after 7.5, 15 or 30 days operation or end of battery life
Tamper Proofing	Enclosure opening, altering of controls, or physical movement of electronics unit triggers transmitter shut-down and frequency channel code erasure. Automatic reset via Code Programmer C-10434 ()/GSQ.

Specifications furnished by RCA are believed to be accurate and reliable. However, all Specification data is subject to change without notice.

CODE PROGRAMMER

C-10434 ()/GSQ



DESCRIPTION

The Code Programmer (C-10434 ()/GSQ) is a light-weight, portable device designed to manually load frequency, ID, and other parameters into the memory of REMBASS Sensors and Repeaters. It was developed under contract with the U.S. Army ERADCOM as part of the REMBASS System and features single cable interface with all programmable REMBASS System elements. The Code Programmer is a low-current drain device and operates by drawing power from the unit being loaded. REMBASS units may be programmed repeatedly with the device and it may be left connected to the unit for extended periods of time without affecting the operating life of the unit's battery.

In addition to loading parameters into REMBASS Sensors and Repeaters, the Code Programmer performs battery preconditioning and testing, activates the air/artillery sensors and repeaters for predeployment test, and performs a code programmer self-test.

Operating variables which the programmer loads are stored in CMOS memories in the sensors and are retained until the memory is disabled due to end of battery life, tampering, or completion of programmed operating life.

FEATURES:

- Loads all REMBASS parameters into sensor and repeater memories.
- Preconditions and tests batteries in units being programmed.
- Automatically activates and tests air/artillery-deployed sensors and repeaters.
- Uses power from unit being loaded - no internal battery.
- Provides positive visual indication of proper load.
- Interfaces with a single cable to all programmable REMBASS subsystems.
- Performs self-test, and go - no-go battery condition and memory tests for units being loaded.
- Housed in a rugged, light-weight enclosure with cable storage in cover.

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Specifications

PHYSICAL PARAMETERS

Overall Size 9 3/4"W x 7 3/4"D x 5 3/4"H Weight 7 lbs.
 (23.81cm) x (19.68cm) x (13.65cm) (3.18Kg)

PERFORMANCE AND CHARACTERISTICS

Power Requirement Power obtained from unit being programmed or tested.

Programming Parameters Programmer is capable of loading the parameters shown in the table below into the internal memories of the various REMBASS Sensors and Repeaters:

TYPE	*	UNIT	PROGRAMMING PARAMETERS					
			XMIT FREQ	ID #1	ID #2	GAIN	LIFE	RCV FREQ
SEISMIC/ACOUSTIC	A	DT-567	X	X		X	X	
SEISMIC/ACOUSTIC	B	DT-570	X	X		X	X	
MAGNETIC	H	DT-561	X	X	X			
SEISMIC/ACOUSTIC	H	DT-562	X	X				
ANALOG	H	DT-563	X	X				
INFRARED	H	DT-565	X	X	X			
STRAIN CABLE	H	DT-573	X	X				
REPEATER	H	RT-1175	X				X	X
REPEATER (SPIKE)	A	RT-1200	X				X	X
REPEATER (CANOPY HANG-UP)	A	RT-1201	X				X	X

* A: Aircraft delivered; B: Artillery delivered; H: Hand-Emplaced

Load Verification Go- No- Go visual indication

Interface Cable REMBASS standard 25 pin connectors, 3 foot cable length

Programming Procedure

- 1 Set program data switches on front panel.
- 2 Place mode switch in "Program." push "Load" button.
- 3 Observe "Go" indicator. Do not deploy if a "No-Go" indication is received

Test Mode

so immediate sensor operation can be achieved. In this mode, the code programmer loads the battery and provides a "Go" indication if the battery voltage increases to the specified minimum limit. Under some conditions it may be necessary to repeat the sequence before a "Go" indication will be received.

When placed in the Sensor/Repeater test power mode, the code programmer will activate the unit allowing a short functional test to be performed. All sensors which are functioning correctly will transmit a test message during this time to verify that the correct operating frequency and ID code has been received.

Preconditioning of Batteries Preconditioning is used to remove the accumulated film from battery electrodes

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RCA Government
 Systems Division

SENSOR SYSTEM DATA SHEET

Name of Sensor Covert Local Area Sensor System for Intrusion Classification (CLASSIC)

Developer RACAL-SES Ltd. (England)

Availability Status Commercially available

System Application Outdoor area and perimeter intrusion detection and surveillance

SYSTEM DESCRIPTION

Type of Sensor Seismic; Infrared (passive)

Description Basic system consists of sensor units (with attachable transducers for seismic and passive infrared detection), monitor units, and relay units.

Principle of Operation Transducer detects seismic or infrared stimuli and passes signal to sensor unit, where the information is classified. A tone-coded message is then transmitted via RF to the monitor unit for audible alarm or visible display.

Transmission Mode Radio frequency (VHF/FM short-burst transmission)

Signature Passive sensors, "active" RF transmission. System has low visibility.

Add-on Capability (1) Relay unit can be used to extend sensor transmission range or to eliminate line-of-sight problems, or assist transmission in areas of poor direct radio propagation. (2) Up to 8 sensors may be used with each monitor unit. (3) Accessories are available including alternative antennas, transducers, and a hard-copy printer.

Cost

PORTABILITY

Weight of Each Container Sensor, relay, monitor unit (including battery pack): 2.6 lbs.

Size for Each Container Sensor unit or monitor unit (including battery pack): 95mm wide x 230 mm high x 42 mm deep. Relay: 95 mm wide x 260 mm high x 42 mm deep.

POWER REQUIREMENTS

Power Requirements Sensors, monitor, or relay units: Systems use standard battery unit MA 2758, which uses 10 "AA" standard manganese alkaline or similar cells. (Rechargeable and heavy duty battery units available.) Battery life: Sensors - 90 days @ 20°C (based on 4 alarms/hr.); Relay - 14 days @ 20°C; Monitor - 7 days (based on 16 alarms/hr.).

EMPLACEMENT

Emplacement Mode Sensor units are designed for surface emplacement and are camouflaged. Portable monitoring unit is hand-held.

Estimated Emplacement Time

Estimated Retrieval and Loadout Time

RUGGEDNESS

Ruggedness System is designed for outdoor, tactical (military) use.

EFFECTIVENESS/RELIABILITY

Detection Range 1-8 meters.

Transmission Range Up to 7 km (dependent upon radio path and frequency)

With Relay 7 km per relay unit.

Sensitivity Seismic sensor units have a 3-level sensitivity setting.

Remote Alarm Assessment Capability Seismic sensor has a personnel/vehicle classification capability.

Detection Probability

Functional Reliability

False Alarm Rate (FAR) (estimated)

Susceptibility to Nuisance/Environmental Alarms

Vulnerability to Spoofing or Tampering

TRAINING REQUIREMENTS

Operator Training Required

Maintenance Training Required

MAINTAINABILITY

Degree of Operator Skill Required

Special Support Requirements

Mean Time Between Failure (MTBF) (and basis for estimate)

Mean Time for Repair (MTR) (and basis for estimate)

Maintenance Skills Required

Where Maintenance Performed

ENVIRONMENTAL CONSIDERATIONS

Climatic Conditions

Temperature Range Operating temperature: -30° to $+60^{\circ}\text{C}$. Storage temperature: -30° to $+65^{\circ}\text{C}$.

Humidity All units completely sealed against moisture intrusion.

Rain All units completely sealed against moisture intrusion.

Snow

Haze/Smoke/Fog

Wind

Other Conditions

Light

Noise

Line-of-Sight Line-of-sight is required for infrared detection and for alarm signal RF transmission.

Foliage

Soil Conditions

Other

SOURCE Racal-SES Corp. product literature.

CLASSIC

Remote Ground Sensor System RGS 2740

Remote detection, classification
and display

One Monitor receives and
displays information from up to 8
Sensors

Extremely high confidence level
with low false alarm rate

Light-compact-fully sealed

Easily deployed in tactical
environments

Excellent discrimination
between types of targets —
personnel, wheeled or tracked
vehicles

Range up to 7 km. Increased
range with optional Relay

Low Power consumption — long
battery life



CLA

Covert Local Area Sensor Syst

RGS 2740

The basic 'CLASSIC' system consists of two main units; the Sensor and the Monitor.

SENSOR UNITS, up to eight of which may be used with each monitor, are designed to be hand emplaced at strategic points where there is the likelihood of personnel and/or vehicle intrusion. Each Sensor is coupled to a transducer, either a geophone or an infra-red detector. The unit contains signal processing circuitry which classifies the input and broadcasts a tone coded message by means of a built-in VHF FM transmitter.

The **MONITOR UNIT** receives the VHF FM signal, decodes the data and presents the information on an LED display to show Sensor identification, type and frequency of intrusion.

To extend the range of the Sensor transmission, a Relay Unit is available to receive and retransmit signals from the Sensor Unit. It is of particular value in areas of poor direct radio propagation.

'CLASSIC' is a modular System incorporating a range of optional accessories, including alternative Antennas and Battery Units, Transducers/Pressure Pad Switches and a Hard Copy Printer to meet the requirements of a wide range of Ground Sensor applications.



SENSOR TA 2741 SEISMIC TRANSDUCER MA 2743

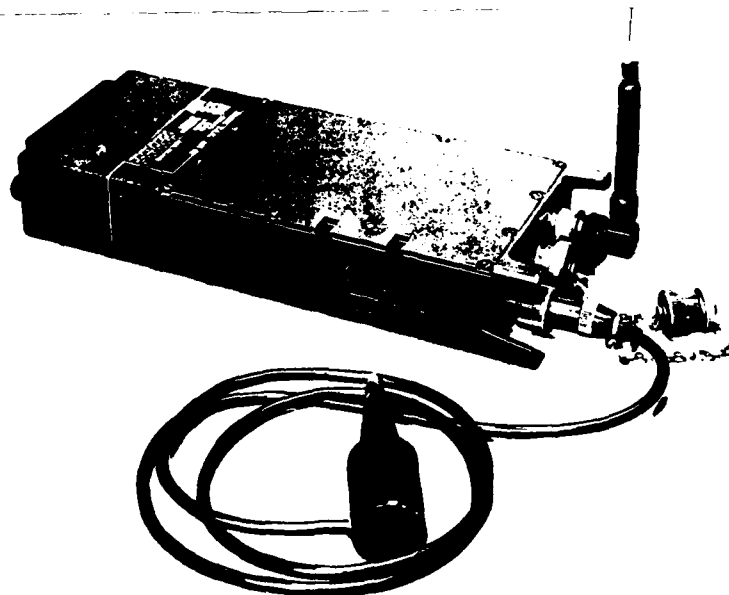
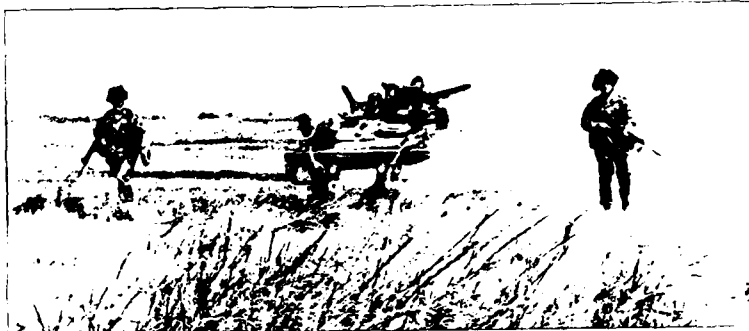
The standard Seismic Transducer MA 2743, is encased in a rugged sealed housing and fitted with a 1 metre cable and plug.

Seismic data is detected by the MA 2743 Transducer and passed to the TA 2741 Sensor Unit where special processing circuitry classifies the information. After classification, a tone coded message is fed to the Sensor's VHF FM transmitter for a short, burst transmission.

The unit has only two switches, one to select High, Medium or Low Personnel seismic sensitivity and the other to determine the two part code A and B classifying modes as follows:

SETTING	CODE A
OFF	
1	Personnel (seismic)
2	Wheeled Vehicles (seismic)
3	Personnel (seismic)

SETTING	CODE B
1	Tracked and Wheeled Vehicles (seismic)
2	Tracked Vehicles (seismic)
3	Infra-red (or optional trip wire etc.)
TEST	



INFRA-RED TRANSDUCER MA 2744

The optional Infra-red Transducer consists of a sensitive, passive infra-red detector and lens assembly and

associated active circuitry. Power for the MA 2744 is provided by the Sensor Unit and a 2 metre length of cable connects the Transducer to the Sensor.

SSIC em For Intrusion Classification

RELAY RTA 2745

The RTA 2745 Relay comprises a transmitter and receiver for single frequency working with a common antenna.

The unit is 'transparent' in operation and no adjustments are required on deployment. The main modules and components are identical to those used in the Sensor and Monitor Units ensuring a high degree of logistic commonality.



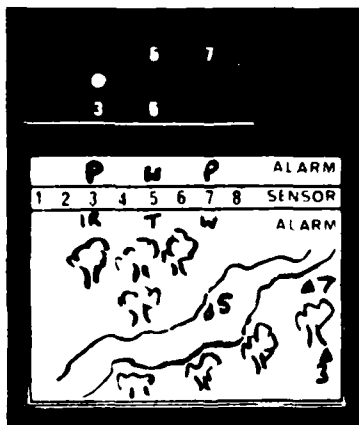
MONITOR RA 2746

The RA 2746 comprises a receiver, a tone decoder and an LED display.

On receipt of a Sensor Unit transmission, an audible alarm alerts the operator. The Sensor's identification and alarm mode is displayed on a matrix of three LED's for each of the eight possible Sensors. Two LED's indicate that Mode A, and/or Mode B signals have been received and latch. The third flashes each time a signal is being received. In this way, an indication of activity at a known Sensor location can be determined. Modes A and B are stored in the display memory.



Battery unit



The display is inhibited after approximately 8 seconds to avoid excessive battery drain, whereupon a recall push button enables further viewing if required. A second depression clears the display memory should the need arise. Two other controls on the unit are for display brightness and volume adjustments, a headset is also provided for periods of silent watch.

A user's 'Map' panel enables a diagram of a tactical deployment to be sketched. This, in conjunction with the display gives a rapid means of indicating the level, type and location of intrusion.

Antenna

External supply and periphery interface

Push button display control

Audible alarm

Display brightness

Display

Alarm volume

User's map panel



Previous wheeled vehicle alarm from Sensor 5, stored in monitor memory.

IR alarm just received (indicated by centre LED flashing). The absence of a personnel alarm (top row), verifies a secretive intrusion at Sensor 3.

Previous personnel alarm from Sensor 7, stored in monitor memory.

Previous tracked vehicle alarm from Sensor 5, stored in monitor memory.

Ancillaries

ANTENNAS

AE 2751/2752/2753/2754

A range of antennas has been developed by Racal-SES to suit the varied environments in which 'CLASSIC' is designed to operate.

The Low Profile Antenna AE 2751, is for use with the Sensor and Relay Units where conditions allow the antennas to be camouflaged by the surrounding undergrowth or foliage. The AE 2751 Quarter-Wave Monopole is constructed of thin spring-steel and connects directly into the Sensor and Relay Units.

Where deployment allows the antenna to be sited to best advantage, the AE 2752 Half-Wave Dipole provides greater efficiency. It is designed to be elevated and is supplied with 5 metres of connecting cable for use with the Sensor, Relay and Monitor Units.

The AE 2753 Helical Whip Antenna is designed for direct connection to the Monitor Unit when the unit is being hand held.

For static operations, the AE 2754 Quarter-Wave Monopole is available. This antenna has ground plane radials and a 2.9 metre sectional support mast with 10 metres of RF feeder cable. The AE 2754 may be used with the Monitor and Relay Units to provide increased range.

POWER SUPPLIES

MA 2758/MA 2757/MA 2756

MA 2758

The Standard Battery Unit MA 2758, is a sealed battery pack designed to accommodate 10 'AA' standard Manganese Alkaline or similar cells and can be simply fitted to the base of the Monitor, Sensor or Relay Units, even in dark or poor weather conditions. Battery replacement is simple and only two captive screws retain the cover.

MA 2757

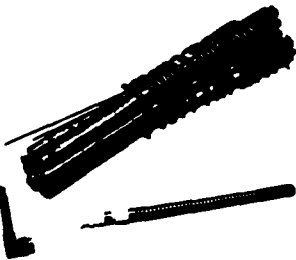
The MA 2757 Rechargeable Battery Unit is similar to the Standard Unit but is fitted with 'wired in' type 'AA' Nickel Cadmium cells and can be recharged by the MA 2759 Universal Battery Charger or similar chargers.

MA 2756

The MA 2756 Heavy Duty Battery Unit is available to provide extended operational life by up to five times that of the Standard Battery Supply. This unit accommodates 10 'D' size Manganese Alkaline cells and is connected to the appropriate 'CLASSIC' unit by a lead and plug assembly.

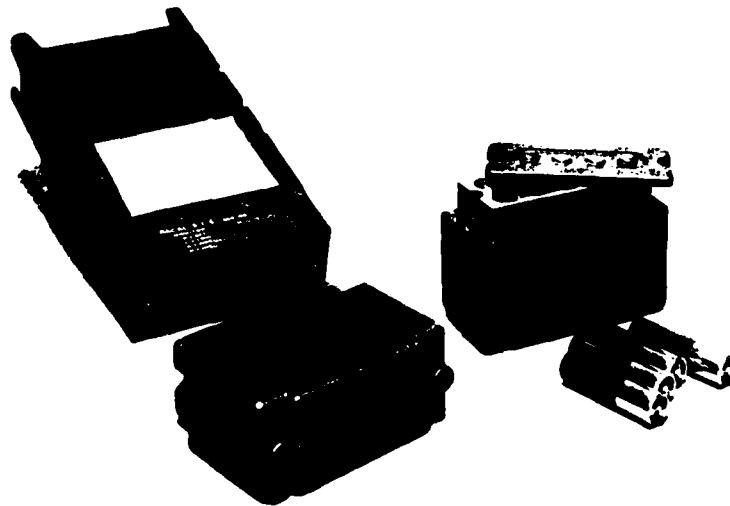
ACCESSORIES

- The MA 2759 Universal Battery Charger permits up to 10 MA 2757 Rechargeable Battery Units to be simultaneously recharged from any suitable 12/24V DC or 110/240V AC supply.
- The MA 2761 is a Headset Assembly designed for use with the Monitor Unit.
- A range of carrying harnesses is designed to enable individual 'CLASSIC' units, or a complete system to be safely transported. Custom designed harness assemblies can be supplied to suit 'in service' types of webbing harnesses.
- Hard Copy Printer MA 2762. The facility to attach a hard copy printer to the Monitor Unit, permits a comprehensive 'log' of events to be recorded by time, sensor, classification etc. and enables unattended monitoring to be carried out with post event analysis when desired.



Antennas AE 2751, AE 2753 and AE 2754

Battery Packs MA 2757 & MA 2758



Technical Information

TA 2741 SENSOR UNIT

Operating Frequency

Frequencies in the following standard ranges can be supplied to order:

- i) 142-156 MHz
- ii) 148-162 MHz
- iii) 160-174 MHz
- iv) Alternative frequency bands down to 68 MHz are available to special order

RF Connector

Type TNC

Modulation

FM deviation 5 kHz peak

Channel Spacing

25 kHz

Transmit Power

1.5 Watts nominal

Transmit Range

Up to 7km (dependent upon radio path and frequency)

Mode

(When used with the appropriate transducer units)

SETTING	CODE A
OFF	
1	Personnel (seismic)
2	Wheeled Vehicles (seismic)
3	Personnel (seismic)

SETTING	CODE B
1	Tracked and Wheeled Vehicles (seismic)
2	Tracked Vehicles (seismic)
3	Infra-red (or optional trip wire etc.)
TEST	

Sensitivity

Seismic (Personnel)

A 3 position switch allows the range of incoming seismic data to be set

SETTING	POOR GROUND	AVERAGE GROUND	GOOD GROUND
LOW	1-3 m	1-8 m	2-20 m
MEDIUM	1-5 m	2-16 m	4-40 m
HIGH	3-12 m	4-32 m	8-80 m

Seismic (Vehicles)

Usually for deployment alongside routes a typical range of 2-7 mtrs applies

Note

These ranges are supplied for guidance only. Actual figures obtained in use will depend upon the many influencing factors existing in the field

Battery Life

Typically 90 days @ 20°C (based on 4 alarms/hour) with MA 2758

Facilities

- i) 5 position MODE switch
- ii) 3 position SENSITIVITY switch (personnel seismic only)
- iii) Seismic Transducer connector
- iv) I.R. Transducer connector/external 12V DC supply

Construction

Fully sealed aluminium cast case with thick film circuits on printed circuit boards and plug in RF modules

RTA 2745 RELAY UNIT

Operating Frequency

As TA 2741 Sensor Unit

RF Connector

Type TNC

Modulation

FM deviation 5 kHz peak

Channel Spacing

25 kHz

Transmit Power

1.5 Watts nominal

Transmit Range

Up to 7km (dependent upon radio path and frequency)

Receiver Sensitivity

0.3µV rms p.d. min. for normal operation

Battery Life

Typically 14 days @ 20°C (based on 4 alarms/hour) with MA 2758

Construction

As Sensor Unit

RA 2746 PORTABLE MONITOR UNIT

Operating Frequency

As TA 2741 Sensor Unit

RF Connector

Type TNC

Modulation

FM deviation 5 kHz peak

Channel Spacing

25 kHz

Receiver Sensitivity

0.3µV rms p.d. min. for normal operation

Audio Alarm

Built in audio alarm with headset socket for 'silent' monitoring

Visual Display

Matrix of 8 x 3 LED's to display stored and real time activity from up to 8 Sensor Units

Facilities

- i) Push switch for RECALL and RESET functions
- ii) Alarm Volume — ON/OFF
- iii) Display brightness
- iv) Power ON/OFF
- v) Connector for external 12V DC supplies and Periphery equipment interface
- vi) Headset socket

Battery Life

Typically 7 days (based on 16 alarms/hour) with MA 2758

Construction

As Sensor Unit

MA 2758 STANDARD BATTERY PACK

Output

15 Volts DC nominal

Batteries

10 — 'AA' size standard manganese alkaline or similar cells

Construction

Sealed aluminium case to fit Sensor, Relay and Monitor Units

MA 2756 HEAVY DUTY BATTERY PACK

Output

15 Volts DC nominal

Batteries

10 — 'D' size standard manganese alkaline cells

Construction

Sealed aluminium case with lead and connector for use with Sensor, Relay and Monitor Units

Reserve the right to vary in detail from the description and specification in this publication.

Technical Information

MA 2757 RECHARGEABLE BATTERY PACK

Output
15 Volts DC nominal

Batteries
10 — 'AA' Nickel Cadmium cells.

Construction
Sealed aluminium case to fit Sensor, Relay and Monitor Units.

MA 2758 BATTERY CHARGER UNIT

Output
15 Volts DC nominal

Input
i) 110/240V AC
ii) 12/24V DC

Construction
Rugged case for tactical/field operation.

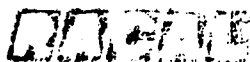
ENVIRONMENTAL

Immersion/Humidity
All units are completely sealed and may be buried for long periods without damage

Temperature
-30°C to +60°C (operational)
-30°C to +65°C (storage)

WEIGHTS AND DIMENSIONS

	TYPICAL WEIGHTS		DIMENSIONS		
	kg	lb	Width	Height	Depth
TA 2741 Sensor Unit (inc. battery pack)	1.20	2.64	95mm	230mm	42mm
RA 2746 Monitor Unit (inc. battery pack)	1.20	2.64	95mm	230mm	42mm
RTA 2745 Relay Unit (inc. battery pack)	1.20	2.64	95mm	260mm	42mm
MA 2743 Seismic Transducer	0.07	0.15	28mm	92mm	28mm
MA 2744 Infra-red Transducer	0.18	0.40	95mm	70mm	42mm
MA 2761 Headset Assembly	0.07	0.15	—	—	—
MA 2756 Heavy Duty Battery Pack (inc. cells)	1.80	3.96	185mm	75mm	80mm
MA 2757 Rechargeable Battery Pack (inc. cells)	0.25	0.55	95mm	75mm	42mm
MA 2758 Standard Battery Pack (inc. cells)	0.25	0.55	95mm	75mm	42mm
MA 2759 Universal Battery Charger	3.70	8.14	290mm	162mm	90mm
AE 2751 Low Profile Antenna	0.15	0.33	2mm	560mm	2mm
AE 2752 Half-Wave Dipole Antenna	0.22	0.48	130mm	20mm	40mm
AE 2753 Helical Whip Antenna	0.06	0.13	15mm	230mm	15mm
AE 2754 Quarter-Wave Monopole Antenna	0.50	1.10	130mm	500mm	130mm
MA 2762 Hard Copy Printer & Interface	3.50	7.70	170mm	63mm	232mm



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Lawrence Livermore National Lab
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Los Alamos National Lab
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Field Command, Defense Nuclear Agency
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ATTN: ECJ-5
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US Forces Korea
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ATTN: US Doc Ofc For Pol, Nuc Concepts
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US Army Forces Command
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US Army Intelligence Center & School
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US Army Material Command
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ATTN: DRCDE-DM, Spec Mun Sys Dev
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US Army Mobility Equip R&D Cmd
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US Army Nuclear & Chemical Agency
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USA Missile Command
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V Corps
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VII Corps
ATTN: AETSGB-I
ATTN: AETSGB-O
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XVIII Airborne Corps & Ft Bragg
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59th Ordnance Brigade
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Naval Surface Weapons Center
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Plans Div, Plans & Policies Department
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ATTN: PM-23, CPT Alderson

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ATTN: AF/RDQI

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ATTN: AFXOXM, Plns, Frc Dev Mun Plns

Pacific Air Forces
2 cy ATTN: XPXN, Maj Golohugh

Pacific Communications Div
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Strategic Air Command
ATTN: SAC/SIP

Tactical Air Command
ATTN: LGW
ATTN: TAC/SMD-G
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US Air Forces in Europe
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ATTN: USAFE/DOC, C2
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ATTN: USAFE/XPX, Plns

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Office of Military Application
GTN
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ATTN: OMA, DP-22

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NATO

US Mission NATO
ATTN: DG, NICSMA

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Ketron, Inc
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