



Application Note AN-5

AURATEK for Fast Deployable Portable Applications

Revision 1: January 2003

Introduction

The overall increase in the need for security has fostered a demand for effective electronic detection that is rapidly deployed and portable. Applications where people and assets that need protection and that are not in stationary locations require such systems. These applications exist in the military, with police forces, for V.I.P. limousine protection, helicopters and airplanes, and with construction companies to protect assets at construction sites. Sensors used for these temporary applications must provide the same level of performance as sensors used for stationary applications. See Figures 2 and 3 on page 3 for typical sensor configuration.

General Requirements for Rapid Deployment, Portable Applications

ENCLOSURE meets the difficult challenge of being a rapidly deployable, portable sensor by addressing the following general requirements:

Portable - To be effective for these applications, a sensor must be of suitable dimensions and weight to make it easily transportable. ENCLOSURE comes in a weather proof battery powered portable version (the PSP-300) which weighs only 8.16 Kg (18 lbs) and is the size of a small suitcase. The sensor cable usually comes in a reel for rapid deployment. A 100 m (330 feet) length weighs approximately 20 kg (45 lbs) including the reel.

Easy Operation - In rapid deployment applications, a system must be able to be set up quickly and it must be simple to operate. ENCLOSURE can be set up in

minutes by simply stringing out the sensor cable on the ground to define the protected area, connecting the sensor cable to the Processor Unit, connecting the Antenna to the Processor Unit and turning on the system. Once the system is turned on, the operator has ENCLOSURE functioning with a minimum of adjustments. All adjustments are made via a few buttons and an LED bar graph. There are no complicated software routines involving keyboard and display required to make these adjustments. Calibration can be done easily and in all weather conditions.

Effective in any terrain - For rapid deployment applications, the sensor cable must avoid any blind spots in the perimeter protection by following the terrain as it may be required to protect people or assets in any type of terrain and in any shape of perimeter.

Ease of covertness - In many rapid deployment portable applications, it is important that the sensor be covert to give the people being protected advanced warning of intruders and to increase the chance of capture since the intruders will not know they have been detected.

Not Affected by the Environment - Rapidly deployed, portable sensors may be used anywhere, therefore, they must be unaffected by the environment. Their operation cannot be affected by cold or hot temperatures, rain, fog, snow, wind or blowing leaves. To address all these environmental conditions, a rapid deployment, portable sensor must be rugged, weatherproof and reliable.

Self contained - Since the sensor can be deployed anytime, anywhere, it must be a complete “turn key” system. The system should not require additional materials to make it operational if it is to be a truly portable system.

Flexibility in alarm annunciation - The sensor should be capable of reporting an alarm by interfacing to a variety of wireless commercially available products such as wireless modems, radios, pagers, cellular phone lines, etc.

Typical Installations for ENCLOSURE as a Rapid Deployment, Portable Sensor

When ENCLOSURE is used in rapid deployment, portable applications it can be called on to provide protection in any terrain and in any configuration.

Figure 1 and 2 show the two most common configurations for this application, they are:

Linear Configuration - The sensor cable is strung out in a linear fashion to provide protection from intruders approaching from a specific direction.

Loop Configuration - The sensor cable is looped around to protect people and/or assets forming a closed protection zone.

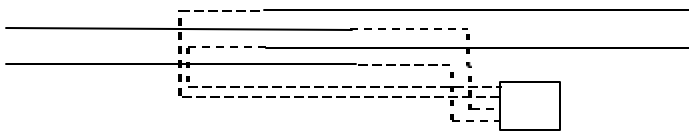


Fig. 1

Linear configuration, transmitting in one cable and receiving in the other cable

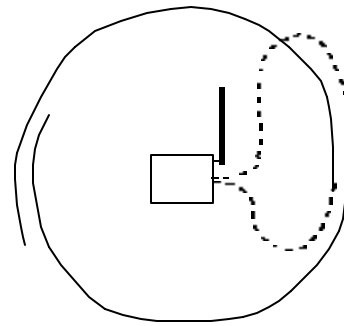


Fig. 2

Loop Configuration, receiving from small whip antenna and transmitting in the sensor cable

ENCLOSURE provides the following zone lengths for the following rapid deployment, portable applications:

50 m (165 feet) for surface or buried applications, in a clear zone free of metal objects and 30 m (100 feet) for wall or rooftop or other non-clear zone applications.

The minimum bending radius is 2.0 m (6.6 feet) without affecting the detection field.

Terrain and Environmental Considerations for using ENCLOSURE as a Rapid Deployment Portable Sensor

Tall Grass - As a rapid, portable sensor, ENCLOSURE is often utilized in tall grass and covered with it to make it covert. It is designed to perform in such environments.

Soil - ENCLOSURE can operate in any type of soil. It does not need to be buried to a specific depth, it simply needs to be covered to make it invisible.

Gravel - The sensor can operate very effectively when it is covered with loose gravel for covertness. If heavy equipment is going to pass over the sensor cable, the sensor cable should be buried in a non metallic conduit.

Sand - Like soil, ENCLOSURE provides excellent detection capabilities when buried in sand. Also, like soil, the sensor does not need to be buried to a specific depth.

Beach - ENCLOSURE can be utilized to protect beach fronts. It can be buried under the sand or pebbles found at the beaches. The cable should be kept a minimum distance of 1.0 m (3.3 feet) from the water line as tides and waves will cause nuisance alarms.

Running Water - For running water in non-metallic conduit, the sensor cable could be run right above the water. For surface running water, the sensor cable should cross the water a minimum distance of 30 cm (1 foot) above it. This can be accomplished by suspending the cable above the water or by putting it on a log that runs across the running water. The sensor cable should be kept at a minimum distance of 1.0 m (3.3 feet) if it is running parallel to running water.

Standing Water - ENCLOSURE can operate in the presence of standing water. However, if there are ripples on the surface of the water of 2.5 cm (1 inch) high, the ripples will induce noise which can reduce the probability of detection.

Elevated Areas - ENCLOSURE can be utilized to protect elevated areas such as cliffs and rock faces. When utilized in such applications the sensor cable should be secured by small rocks or pieces of wood so that the wind does not cause it to move. The cable can move ± 5 cm (± 2 inches) without causing nuisance alarms. To run between two elevations, a section of non-detection cable could be inserted (e.g. RG-11 triple shield) to bridge the elevations sections.

Snow - Snow is invisible to the sensor and does not affect its ability to detect. Snow is only a problem if it is piled more than 1.0 m (3.3 feet) above the detection zone which can be used as a bridge to climb over the detection zone.

Trees - ENCLOSURE can be utilized in wooded areas and can be serpentine through the trees to create a detection zone. For this application, the zones

should be kept short (under 30m (100feet)). If trees are wet from rain and move due to wind, additional noise is induced which reduces the probability of detection. Individual trees present no problem for ENCLOSURE whether they are dry or wet.

Birds - Birds are too small to generate an alarm. Technically speaking, bird's wings are completely transparent to radio waves as their density is very low, close to that of air.

Animals - Small animals (e.g. cats, squirrels, ground-hogs, snakes, etc.) will not cause nuisance alarms. Larger animals with a mass comparable to humans (e.g. deer or large dogs) will cause alarms.

Interconnections

a) Processor Unit

A recommended place for the portable Processor Unit is within the protected perimeter.

If the sensor is being used to protect a remote site, the Processor Unit should be hidden (e.g. covered with leaves, branches, grass etc.). The comes in a gray color to minimize its visibility, but sand finish is also available on special order.

b) Lead-in-cable

The same medium used to cover the sensor cable can be used to cover the lead-in cable to make it covert. Contrary to the sensor cable, the lead-in cable can be run directly on any metal surface.

c) Antenna

Passive mode - The (reference) antenna should be placed as high as possible to avoid blockage of the FM signals by large nearby objects. Line-of-sight is not required for the system to receive the FM signals. It is sufficient to raise the reference antenna 2.0 to 2.5 m (6.6 to 8.2 feet). It can be placed on a large rock, on a hill, a cliff or on the roof of a truck or trailer. A tripod is available as an option. NOTE: Passive mode must be designed by the manufacturer.

Active mode - The (receiving/transmitting) antenna must have line of sight with the sensor cables. If the antenna is transmitting to the sensor cables, it should be located in the middle of the zone. If the sensor cable is transmitting to the antenna, the antenna should be located at 3/4 the length of the zone. In either case, a minimum setback distance of 15 m (50 feet) from the sensor cable is required. The minimum height of the antenna should be 5 m (17 feet).

The ability to handle many zones in a rapid deployment portable application can be very useful for a wide range of applications. See Figures 2 and 3.

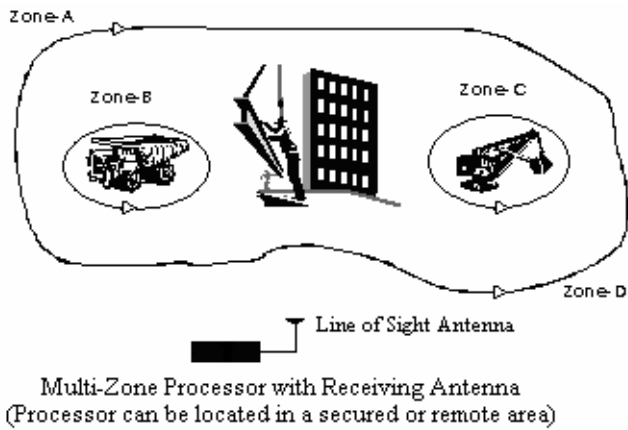


Fig. 2

Typical construction site where zone A and zone D could be permanent zones and zone B and C could be temporary zones that change daily.

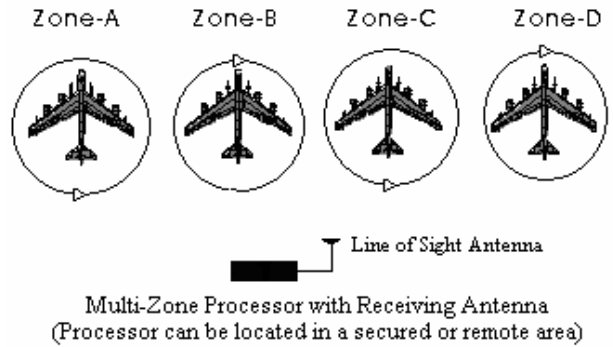


Fig. 3

Typical air force security, where each zone is deployed fast once the aircraft are grounded.

Wireless Alarm Annunciator

Once detected, an alarm must be communicated for action to be undertaken. The Portable Processor Unit incorporates (as an option) a wireless RS-232 and/or 4 wireless relays to communicate the alarm and the system status. The wireless link uses a spread-spectrum technique in the 920 MHz range to obtain a 2.0 Km (1.2 miles) radius coverage. Longer ranges can be achieved using licensed products.

Also available is a vocal annunciator which hold four different 15 second messages. Upon an alarm the vocal annunciator will transmit a vocal message via hand held radio. The vocal Annunciator integrates with any two way radio with microphone input activation.

Consult the manufacturer for more details.

Conclusion

In summary, it is portable, quickly set up, simple to operate, suitable for all terrain, covert and is not affected by the environment. As such, ENCLOSURE meets all the general requirements that make it ideal as a rapid deployment portable sensor.

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