Correctional Service Canada
Technical Services Branch
Electronics Systems

ES/STD-0402
Revision 1
4 February, 2002

ELECTRONICS ENGINEERING STANDARDS

BURIED LINE SENSOR PERIMETER INTRUSION DETECTION SYSTEM

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10 SCOPE

This standard defines the requirement of the Correctional Service of Canada (CSC) for buried line motion detection systems (MDS) in perimeter intrusion detection systems (PIDS) at federal correctional institutions.

2.0 GENERAL

Buried line PIDS are designed to detect attempts to penetrate a perimeter around a facility. They are required to operate in the outdoor environment and must perform reliably in all weather conditions. The MDS must effectively detect changes in the electromagnetic detection field caused by an intruder passing through. While the motion detection system must have a high probability of detection (Pd) rate for all intrusion attempts, it must have a low nuisance alarm rate (NAR) caused by birds and small animals. The buried sensor is typical between two fences that form an isolation zone.

3.0 ENVIRONMENTAL REQUIREMENTS

The MDS shall have a high Pd and low NAR over the following environmental conditions in any combination once the system has adapted:

3.1 Temperature: -40° C to 55° C (outdoor equipment);
0° C to 40° C (indoor equipment);

3.2 Humidity: 0 to 100% non-condensing (outdoor equipment);
20 to 95% non-condensing (indoor equipment);

3.3 Ground frost or freezing conditions;

3.4 Rainfall up to 25 mm/hour;

3.5 Hail stones up to 2 cm in diameter;

3.6 Temperature changes causing quick ground freezing or thawing conditions;

3.7 Snowfall up to 30 cm/hour;

3.8 Snow accumulation up to 50 cm;

3.9 Lightning strikes outside a radius of 1 km; and

3.10 Any site specific phenomena as may be expected and/or published in other documents.

4.0 POWER REQUIREMENTS

The system shall be powered from standard commercial VAC power within the following range:

4.1 Voltage: 120 VAC ±10%;

4.2 Frequency: 60 Hz ±1.5%

4.3 Power: not to exceed 100 watts; Following any power failure, the system shall return to the operating mode which it was in use prior to the power failure; and

4.4 Transients: power fluctuations up to five times nominal voltages for up to 100 msec durations shall not cause damage to the unit.

5.0 MECHANICAL REQUIREMENTS

The weight and dimensions for the equipment shall be application specific within the following limits:

5.1 All indoor signal processing and distribution equipment shall be mounted in standard Electronic Industry Association (EIA) 19 inch racks;

5.2 All outdoor fence mounted signal processing and distribution equipment shall be housed in weatherproof, tamer-proof enclosures;

6.0 DESIGN REQUIREMENTS

6.1 Ported coax (leaky cable) sensors shall detect and annunciate any disturbances in the electromagnetic field between the transmit cable and the receive cable as an intruder approaches the zone.

6.2 The detection pattern shall be elliptical in shape, three to five feet above the ground and six to fifteen feet wide depending on cable spacing and soil composition.

6.3 The detection pattern shall also extend below the ground.

6.4 The sensor shall detect an intruder weighing a certain mass attempting to walk, run, crawl or jump the detection zone.

6.5 The sensitivity of the sensors shall be adjustable within the signal processor.

6.6 A remote testing of the sensor units shall be provided at the alarm annunciation panel.

6.7 Tamper or sensor failure alarms shall be annunciated at the annunciation panel.

7.0 TECHNICAL REQUIREMENTS

7.1 Detection sensitivity shall be uniform over the entire length of the zone with no “dead” spots.

7.2 Remote testing of the sensing element shall be provided.

7.3 Sensitivity of the sensor shall be adjustable both from within the signal processor and remotely from the maintenance console.

7.4 Tamper devices shall be provided inside all equipment boxes and enclosures with removable covers, housings or other accessible units to detect unauthorized opening or tampering.

7.5 All outside enclosure penetrations shall be from the bottom unless the system design requires penetrations from other directions.

7.6 All outdoor mounted equipment shall be housed in weatherproof enclosures equipped with tamper switches.

7.7 All covers required to be removed for maintenance shall be secured by security screws.

7.8 All wiring for system control shall be continuously supervised in the access or secure mode. An alarm shall occur if any system wiring is cut or shorted or if the system devices are tampered with.

7.9 All test points on system equipment shall be clearly labelled and easily accessible for calibration and maintenance;

7.10 All equipment shall be modular with plug-in circuit cards and assemblies. All plug-in cards shall be well identified and standard extender boards provided;

7.11 The Mean Time Between Failure (MTBF) shall be at least 10,000 hours;

8.0 FUNCTIONAL REQUIREMENTS

8.1 The MDS shall detect and annunciate an alarm for an intruder having a mass of 45 kg or more crossing the detection zone at a rate .03 m/sec to 8 m/sec. Time is measured from the first point of contact with the detection field to the end of the detection field.

8.2 The MDS shall provide continuous coverage of the specified detection zone with a statistical probability of detection (Pd) of 98% with a confidence level of 95%.

8.3 The MDS shall detect and annunciate an alarm for walking, running, crawling, rolling or jumping through the detection zone.

8.4 The MDS shall detect and annunciate an alarm for any tampering with system enclosures and/or cutting of signal cables.

8.5 The MDS shall interface with the PIDS Integration Unit for alarm annunciation, display and data logging purposes.

9.0 INTERFERENCE

The MDS performance shall not be affected by the presence or use of standard CSC electronic equipment. The system shall work at the following limits:

9.1 CB transceivers at 1 metre or more;

9.2 VHF or UHF Transceivers at 1 metre or more;

9.3 Commercial radio and/or television receiving and distribution equipment at 5 metres or more; and

9.4 Personal computer and/or computer work stations at 5 metres or more.

The MDS operation shall not interfere with any standard electronic equipment used at the institutions.

10.0 SAFETY

The MDS shall be CSA approved.