

**Correctional Service Canada  
Technical Services Branch  
Electronics Systems**

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**ELECTRONICS ENGINEERING  
SPECIFICATION**

**PUBLIC ADDRESS SYSTEM  
FOR USE IN  
FEDERAL CORRECTIONAL INSTITUTIONS**

**AUTHORITY**

This Specification is approved by the Correctional Service of Canada for the procurement and Installation of Public Address (PA) systems in Canadian federal correctional institutions.

Recommended corrections, additions or deletions should be addressed to the Design Authority at the following address: Director, Engineering Services, Correctional Service of Canada, 340 Laurier Avenue West, Ottawa, Ontario, K1A 0P9

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## ABBREVIATIONS

The following abbreviations are used in this specification:

CER	Common Equipment Room
COTS	Commercial-Off-The- Shelf
CSA	Canadian Standards Association
CSC	Correctional Service Canada
DES	Director Engineering Services
EIA	Electronic Industries Association
GFE	Government Furnished Equipment
MCCP	Main Communications and Control Post
RFP	Request for Proposal
STR	Statement of Technical Requirements
SOW	Statement of Work
TES	Terminal Equipment Space

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## DEFINITIONS

The following definitions are used in this specification:

Design Authority	Director, Engineering Services (DES) - Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Works and Government Services Canada (PW&GSC) is responsible for all contractual matters associated with the system design and implementation.
Contractor	The company selected as the successful bidder.
Project Officer	A CSC employee or a contracted person designated by DES to be responsible for the implementation of the project.
Off-the-shelf	Equipment currently on the market with available field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

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## 1.0 INTRODUCTION

### 1.1 General

This specification defines the essential technical and functional requirements of the Correctional Service of Canada (CSC) for the procurement and installation of a Public Address (PA) system for federal correctional institutions.

### 1.2 Purpose

The purpose of the Public Address system is to provide a means for institutional staff members to make voice announcements within the institution, either on a selected, specific-area or a general, all-call basis. The primary uses of the PA system are to enable the staff to page a specific inmate or group of inmates and make high-priority announcements regarding emergency conditions such as fire, disturbance, etc.

The system described herein would be applicable to new institutions to be constructed. It could also be retrofitted into existing institutions whenever it becomes necessary to add a PA capability or replace existing obsolete equipment.

### 1.3 Commercial-Off-The-Self Equipment

The PA system shall use commercial off-the-shelf (COTS) equipment and proven designs to the maximum extent possible. All new equipment shall meet the specified lifespan requirements. New equipment designs shall be restricted to unique interfaces and common control console.

### 1.4 Technical Acceptability

The Correctional Service Canada (CSC) operational environment is unique for its diversity of locations, climate exposures and the physical restrictive construction techniques of penal institutions. Maintaining national security, the safety of staff and offenders alike is CSC's commitment to the government and public. Electronic security systems operating in this unique environment shall maintain very high standards of dependability and reliability.

The CSC Engineering Services Division has established technical specifications and equipment standards for specific electronic security systems which are based on very specific and restrictive operational performance criteria as detailed in its Electronic Engineering Standard. Technical acceptability of these systems means that the equipment complies with the pertinent CSC specifications and standards.

The technical acceptance process shall involve system and subsystem evaluation in accordance with the applicable CSC specifications in one of CSC facilities. CSC may when it deems necessary, request the supplier to arrange for a full site demonstration. CSC shall verify in depth any of the system technical specifications called up. CSC may rely on manufacturer's test results for specific areas of the specification where an independent test facility has conducted the test, and the facility is deemed acceptable to CSC.

It is the supplier's responsibility to make new developments in products available to CSC for evaluation. Equipment qualification is an ongoing process and can be initiated at any time by a vendor. Any vendor can have access to the CSC specifications and standards. Any new development or products should be submitted to the CSC Engineering Services Division, Technical Authority in a suitable time frame prior to any tendering process to allow for an acceptable evaluation period. The evaluation period may take up to sixteen (16) months.

**1.5 Equipment Procurement**

Any ordering of equipment/material before the approval of the PA system design report will be undertaken at the contractor's own risk. The Design Authority may authorize the procurement of certain long lead items at, or shortly after a preliminary design review of the proposed system.

**1.6 Quantity of Equipment**

The quantity and location of the Public Address equipment required for CSC institutions will be contained in the specification identified in the Statement of Technical Requirements (STR).

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2.0 **APPLICABLE DOCUMENTS**

The following documents of the issue in effect on the date of the Request for Proposal shall form a part of this specification to the extent specified herein.

ES/SOW-0101	Statement of Work for Electronic Systems for Correctional Service of Canada Institutions.
ES/SOW-0102	Statement of Work for Quality Control for installation of Electronic Systems in Federal Correctional Institutions.
EIA-310-C	Electronic Industry Association Standard for Racks, Panels and Associated Equipment



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### 3.0 REQUIREMENTS

#### 3.1 General

The contractor shall design, supply, install, test and provide documentation and training for a PA system in accordance with this specification and Statement of Work, ES/SOW-0101. The PA system may be interfaced with the institution telephone system or it may be a stand alone PA system.

##### 3.1.1 System Capacity

The control station(s) may be interfaced with the institution telephone system or may be installed as a stand alone system. In either case, the control station(s) shall be capable of selecting any number of zones simultaneously by actuating the desired zone-select switches. Similarly, the secondary control station(s) shall be capable of selecting more than one sub-zone at a time or ALL-CALL to enable all constituent sub-zones within the overall zone.

The system shall be of a modular design and it shall be possible at a future date to add more control stations and associated speaker equipment to the basic installed complement without requiring the existing hardware.

##### 3.1.2 Period of Operation

The Public Address system and all associated equipment shall be rated for and capable of 24 hours per day, seven days per week operation.

#### 3.2 System Configuration

The PA system shall be functionally divided into a number of zones and sub-zones covering designated sections of the institution. The area covered by each, together with the number and location of the various control stations will be given in the STR. Also included will be the quantity and location of the various hardware elements making up the complete PA system.

These system elements are, as follows:

- a. one or more Master Control Stations, each consisting of a master control panel and a microphone or an institution telephone set;
- b. one or more Secondary Control Stations, each consisting of a secondary control panel and a microphone or an institution telephone set;
- c. one or more loudspeaker assemblies, each consisting of a loudspeaker and matching transformer, an enclosure and a baffle plate or horn;
- d. common equipment (amplifiers, power supplies, switchers, etc.);

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- e. interconnecting wiring, cables, etc.; and
  - f. conduit, ducts, outlet boxes, etc.

The system shall be a constant-voltage type having tap selectable speaker transformers to permit the proper audio power output from each speaker.

### 3.3 System Elements Description

#### 3.3.1 Master Control Panel

The master control panel or the interfaced telephone set shall contain the necessary controls and annunciators to permit the operator to select any desired Public Address zone or to make ALL-CALL announcements into all zones simultaneously. It shall contain one illuminated, latching-type alternate-action switch for each desired Public Address zone, and one for ALL-CALL.

The required physical configuration of the master control panel or the telephone set and the number of zones to be accessed from it may vary with the particular application and will be specified in the STR.

#### 3.3.2 Microphone

A microphone shall be provided for each master and secondary control panel. It shall be a rugged unit capable of withstanding rough handling. The STR will specify the physical style to be supplied. It shall contain a Push-To-Talk (PTT) switch to enable the selected voice path. The switch shall be a non-latching type which automatically disables the microphone when released.

#### 3.3.3 Secondary Control Panel

The secondary control panel shall contain the necessary controls and annunciators to permit the operator to select the desired sub-zone or to make ALL-CALL announcements within his own local zone(s).

It shall contain one illuminated, latching-type, alternate-action switch for each local PA sub-zone plus one for local-area ALL-CALL. The panel shall also contain a small speaker to permit the operator to hear voice announcements made to his area from a master control station. A volume control shall be provided on the rear panel. The required physical configuration of the secondary control panel and the number of sub-zones to be accessed from it may vary with the particular application and will be specified in the STR.

#### 3.3.4 Loudspeaker Assemblies

The loudspeaker assembly will consist of the following items in the quantities specified in the STR: a loudspeaker and matching transformer, enclosure and baffle plate.

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Different types of loudspeaker assemblies may be required depending on the specific application: indoor ceiling/wall mounted (e.g., living unit), indoor wide area (e.g., gymnasium) and outdoor wide area (e.g., sports field).

The horn and driver assemblies for outdoor mounting shall be rugged weatherproof units capable of satisfactory operation under the environmental conditions defined in this specification.

All speaker assemblies shall have high resistance to damage and destruction due to deliberate physical abuse. The contractor shall submit a prototype sample of each proposed type of loudspeaker assembly for approval by the Design Authority prior to proceeding with procurement of system quantities.

### 3.3.5 **Loudspeaker**

The loudspeaker shall be capable of satisfactorily handling the required power level and shall be compatible with the enclosure in which it is mounted.

### 3.3.6 **Enclosures**

The loudspeaker enclosure shall be physically rugged to prevent damage by deliberate abuse. It shall be free of mechanical resonances which would adversely affect the system performance or sound quality. The STR will specify whether the enclosures are Government Furnished Equipment (GFE) or to be supplied by the contractor. Physical protection shall be provided by the contractor to speaker assemblies mounted in areas where they may be subject to abuse by inmates.

### 3.3.7 **Baffle Plate**

The baffle plate for the speaker enclosure shall be heavy-gauge steel construction and shall be secured to the enclosure by tamper-proof screws. It shall be designed to adequately disperse the sound over the required area and shall protect the speaker from attempted forced entry of foreign objects such as pencils, piano wire, etc.

### 3.3.8 **Matching Transformer**

The matching transformer which is part of the loudspeaker assembly shall have a number of selectable taps to permit on-site selection of the proper power level to be delivered to each speaker.

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### 3.4 System Requirements

#### 3.4.1 Wires, Cables, Conduits, Ducts

The contractor shall supply all necessary terminations, cross connection cabinets, conduits, wire and cabling and any other items that may be required for the satisfactory completion of the specified system. All installation workmanship shall be performed in accordance with ES/SOW-0102, Statement of Work and all applicable national, provincial, and local electrical codes.

A wiring diagram shall be supplied in the Installation section of the Maintenance Manual to detail where module connections terminate and how wires are routed and terminated.

Conduits, cables, ducts, trays, etc. may be either Government Furnished Equipment or supplied and installed by the contractor depending on the particular institution. The determination will be made by the Design Authority and will be identified in the STR.

Connectors provided on the ends of any cable must mate with the corresponding connector on the equipment. Adapters from one type of connector to another are not acceptable.

#### 3.4.2 Control Equipment

The maximum feasible amount of common control equipment (power supplies, logic boards, amplifiers, etc.) shall be located in Terminal Equipment Spaces (TES) and Common Equipment Room (CER) provided for the purpose. These areas will be identified in the STR. It is preferred that only equipment such as lights, switches, actuators, etc. which the operator must access directly should be located in the Control Posts.

### 3.5 Design Requirements

#### 3.5.1 General

To the maximum practical extent, off-the-shelf equipment should be selected for use in the PA system. New designs should be restricted to common interface areas, control panels and consoles, or unique devices for which an off-the-shelf item does not exist.

A design objective is to minimize the number of wires required between all elements of the system.

A space-diversity approach to system planning shall be employed to ensure that loss of one interconnection routing does not impair the operational capability of the complete system.

#### 3.5.2 Wiring Supervision

Wiring shall be supervised in all PA system modes. An alarm shall occur if any system wiring is cut or shorted to other wires or if the system devices are tampered with by unauthorized people or environmental conditions.

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### 3.5.3 Sabotage, Tampering and Survivability

Elements of the system must operate in areas exposed to inmate access and shall have high resistance to damage, destruction, or conversion to other uses (including weapons). All interconnecting service must be secure against tampering or improper interference.

### 3.5.4 Power Failure

Loss or restoration of primary power to the system shall not produce spurious call annunciations. When power is returned after a power failure, the system shall resume normal operation without operator action.

### 3.5.5 System Failure

A PA system failure shall be deemed to have occurred when any required communications or any required control function cannot be performed.

### 3.5.6 Human Factors

Elements of the PA system which are used directly by staff (i.e., control panels, etc.) shall conform with accepted principles of good human factors design.

### 3.5.7 Existing Equipment

In most installations, control elements of the system will share console space with other electrical/electronic equipment such as door controls, lighting controls, etc. and will be operated by the same staff member. In such cases it is important that effort be made to coordinate the functional and operational design of the system according to accepted human engineering principles to ensure a uniform appearance and commonality of a layout to assist the operator in the performance of his duties.

### 3.5.8 Control Panels

Mounting space within control posts is usually limited and the problem of determining a suitable equipment mounting location is minimized if the control panels are small. Therefore, the designer should make maximum possible use of control devices which combine two or more functions into a single unit (e.g., a lighted push-button instead of a separate light and an unlit push-button).

The system may use EIA standard display and control panels or video display units. The design of either display and control method shall be in accordance with the ES/STD-0802 or ES/STD-0803, Standards.

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### 3.6 Operational Requirements

#### 3.6.1 General

The PA system shall provide satisfactory sound distribution within each designated area of the institution. The equipment shall produce high speech intelligibility throughout the area covered by the system at all normal microphone distances and shall be entirely free of audible transients as circuits are selected and de-selected and microphones are switched.

CSC experience has shown that in acoustically "live" environments (long reverberation time) better intelligibility will be obtained by using a larger number of low-power speakers instead of a few high-power ones.

The microphone input circuit shall employ automatic level control with a minimum of 40 dB limiting range. The outdoor speaker system shall provide satisfactory sound coverage over the area(s) defined in the STR. The contractor shall provide design calculations prior to commencement of installation to demonstrate that his planned configuration will provide the required coverage.

#### 3.6.2 Secondary Control Station

The secondary control station shall be able to make a PA announcement to a particular sub-zone or zone by:

- a. momentarily depressing the associated push-button selector switch on the secondary control panel causing it to become illuminated steady ON, then
- b. depressing the microphone Push-to-Talk (PTT) switch to activate the voice circuit.

Releasing the PTT switch will remove the microphone from the voice circuit but will leave the zone/sub-zone selector actuated and the push-button illuminated.

Where a sub-zone consists of more than one speaker assembly, all shall be selected by a single push-button selector.

When the announcement is complete, momentarily depressing the push-button selector causing the illuminated push-button to extinguish and the associated voice circuit to be released.

Other secondary annunciation panels shall not receive the audio message from the first panel. It shall not be possible for a secondary station to preempt a call in progress originating at a master station.

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### 3.6.3 Master Control Station

The master control station shall be able to make PA announcements into any one of the zones, but not address a specific sub-zone. The method of performing this is identical to that described above for the secondary control panel.

The master control panel shall have the capability to override (preempt) an announcement in progress originating from any secondary panel. When this occurs, the priority message shall be heard on the monitor speaker at the secondary station and the voice message from the secondary station shall be cut off. When a system contains more than one master control station the STR will define the required precedence of preemption capability.

### 3.7 Environmental Requirements

The PA system shall operate over the following indoor environmental conditions:

- 3.7.1 Temperature: 0° C to +50° C;
- 3.7.2 Humidity: 0 to 90% relative, non-condensing; and.
- 3.7.3 Location: sheltered environment.

The PA system shall operate over the following outdoor environmental conditions:

- 3.7.4 Temperature: -40° C to +55° C;
- 3.7.5 Humidity: up to 100% relative condensing; and
- 3.7.6 Location extremes of wind, driving rain, ice loading, blown sand and dust, sun exposure.

### 3.8 Power Requirements

The system shall use VAC power within the following limits:

- 3.8.1 Voltage: 120 VAC  $\pm$ 10%;
- 3.8.2 Frequency: 60 Hz  $\pm$ 1.5%;
- 3.8.3 Transients: up to 5 times nominal voltage for up to 100 msec durations. Changes in the input power or any fluctuations within the above limits shall not cause damage to the unit; and
- 3.8.4 Power: power consumption shall not exceed 100 watts.

**3.9 Installation Requirements**

The system shall be installed at the site in accordance with the ES/SOW-0101, Statement of Work and the ES/SOW-0102, Statement of Work.

**3.10 Documentation Requirements**

All final system documentation shall be provided in accordance with the ES/SOW-0101, Statement of Work.

**3.11 Support Requirements**

The system maintenance and spares support shall be provided in accordance with the ES/SOW-0101, Statement of Work.

**3.12 Training Requirements**

Operator training and maintenance training on the system shall be in accordance with the ES/SOW-0101, Statement of Work.



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#### 4.0 **QUALITY ASSURANCE**

##### 4.1 **General**

The system Quality Assurance programme shall be provided as detailed in the ES/SOW-0101, Statement of Work.

All on-site installation work, test plans and system acceptance testing shall be conducted in accordance with the ES/SOW-0101, Statement of Work.

#### 5.0 **DELIVERY**

Delivery requirements for the system documents, drawings, plans, manuals, etc. (where applicable) shall be in accordance with the ES/SOW-0101, Statement of Work.

Delivery requirements of the system equipment shall be in accordance with the ES/SOW-0102, Statement of Work.

#### 6.0 **INTERFERENCE**

Performance of the system shall not be affected by the use of standard electronic equipment used at the institution. Distance limits of standard electronic equipment shall be in accordance with ES/SOW-0101, Statement of Work.

#### 7.0 **SAFETY**

All system electrically powered elements shall meet the applicable Canadian Safety Association (CSA) standards.