

Correctional Service Canada
Technical Services Branch
Electronics Systems

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ELECTRONICS ENGINEERING
STANDARDS

CONTROL AND DISPLAY PANEL
ELECTRONIC SYSTEMS

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1.0 **SCOPE**

This standard defines the requirements of Correctional Service Canada (CSC) for Control and Display panels for use at federal correctional institutions.

2.0 **GENERAL**

Control and Display panels interface the various electronic security systems to the operator in the Control Posts. The Control and Display panel annunciates real time events, displays system status and allows the operator to fully supervise, manage and control the systems as required. These panels are mounted in locations on consoles according to functional priority and ease of operators visual monitoring of indicators and controls.

3.0 **ENVIRONMENTAL CONDITIONS**

The system shall meet all requirements over the following operating range:

- 3.1 Temperature: 0° C to 50° C; and
- 3.2 Humidity: up to 95% non-condensing.

4.0 **POWER REQUIREMENTS**

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

- 4.1 Voltage: 120 VAC \pm 10%;
- 4.2 Frequency: 60 Hz \pm 1.5%;
- 4.3 Power: not to exceed 25 watts; and
- 4.4 Transients: input power fluctuations up to five times nominal voltages for up to 100 msec durations shall not cause damage to the unit.

Following any power failure, the system shall return to the operating mode which was in use prior to the power failure.

5.0 MECHANICAL REQUIREMENTS

The maximum dimensions for the equipment shall be within the following limits:

- 5.1.1 Height: 500 mm;
- 5.1.2 Width: 480 mm; and
- 5.1.3 Length: 500 mm.

6.0 DESIGN REQUIREMENTS

- 6.1 Rack-mount panels shall conform to EIA RS-310-C Rack Standards, designed to be mounted on the surface of a console.
- 6.2 Panel exterior surfaces shall be painted grey, colour 501-212, in accordance with Canadian Government Specification Board Standard Paint Colours, 1-GP-12c (1965), to match the console. Other colours may be used if specified or approved by CSC.
- 6.3 Indicator lights shall follow the standards listed in MIL-STD-1472c as follows:
 - a. Indicator lights shall indicate equipment response, not just switch activation.
 - b. Lamps with lifetimes of more than 25000 hours shall be used; the LED type is preferred.
 - c. Indicator light bulbs shall be replaceable from the front panel without the use of special tools, and without interfering with the circuit function.
 - d. Flashing indicators shall flash between 3 and 5 flashes per second, and will have duty cycles of between 40% and 60%.
 - e. Flasher circuits shall be designed so that if the flasher fails, the lamps will illuminate and burn steadily when the circuit is activated.
 - f. If more than one light on a panel is flashing at the same time, all of these lights shall flash in unison.

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- 6.4 The following indicator light colour shall indicate the associated functions:
- a. FLASHING RED shall be used only to denote emergency conditions which require operator action to be taken without undue delay to avert possible personnel injury, equipment damage, or both.
 - b. RED shall be used to indicate an acknowledged emergency situation; to alert the operator that part of the system is inoperative; or to indicate that part of the system is a nonstandard state requiring caution.
 - c. YELLOW shall be used to alert the operator to conditions requiring attention, or to indicate that the system is in a standard state, such as unlocked cell doors, requiring caution.
 - d. GREEN shall be used in contrast to red or yellow to indicate the system is in a safe state.
 - e. WHITE shall be used to indicate system conditions which do not have safe or dangerous implications.
- 6.5 Various systems shall use audible signals to alert the operator as follows:
- a. Audible signals shall be clearly audible at any position the operator will occupy while on duty.
 - b. Frequency of a signal shall be between 500 and 5000 Hz, and preferably between 500 and 3000 Hz.
 - c. The operator shall be able to test each signal.
 - d. Volume of the signal shall be adjustable, either by the operator or by an internal adjustment to the module. The operator shall not be able to disable the signal by making it inaudible.
- 6.6 The following basic classes of audible signals shall be used on the console. They must be easily distinguished.
- a. **'Confirmation'** - a short tone, usually about 0.5 seconds, used to acknowledge an operator action. The same tone shall be used to confirm all console operations for which an audible confirmation is required.

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- b. **'Warning'** - a short tone, usually about 0.5 seconds, used to warn the operator that an action cannot be carried out because of conflict or error, or that a nonstandard action has been initiated. The same warning tone shall be used for all console operations for which a warning tone is specified.
 - c. **'Annunciation'** - continuous tone used to indicate a nonhazardous request for action by the operator. More than one such tone may be used for different console functions.
 - d. **'Alarm'** - continuous tone warning for a dangerous situation. More than one such tone may be used for different console functions.
- 6.7 The following requirements for push buttons are based on MIL-STD-1472C:
- a. A positive tactile indication of button activation shall be provided.
 - b. Dimensions and spacing shall be as defined in the individual panel standards.
- 6.8 Switches with adjacent edges separated by less than 13 mm shall have barriers between them to prevent unintentional actuation.
- 6.9 Grouped switches designed for sequential operation, for example numeric keypads, require barriers only if adjacent edges are separated by less than 6 mm.

7.0 CELL LIGHTS AND POWER

The following design will be used for the cell lights and power control panel:

- 7.1 One illuminated push button for each cell. Each button will be labelled with a cell identification. The buttons will be white and illuminated by a white light.
- 7.2 Two white indicator lamps for each cell push button, arranged above it, one labelled 'lights', the second labelled 'power'.
- 7.3 One illuminated push button for each group of cells. The group will be defined by lines enclosing the individual cell push buttons. This button will also have an associated pair of 'light' and 'power' indicators.
- 7.4 Six push buttons; 'ON', 'OFF', 'NEUTRAL' for lights, 'ON', 'OFF' for cell power, and 'TEST'.
- 7.5 Individual cells will be selected by pushing the appropriate buttons; the buttons of the selected cells will be illuminated as they are selected.

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- 7.6 If a selected cell button is pressed again, the cell will be deselected, and the button illumination turned off.
- 7.7 If a group cell button is depressed, it will be illuminated. Any cells previously selected will be deselected, then all cells in the group will be selected. The group cell button will be illuminated but the individual cell buttons in the selected group will not be illuminated.
- 7.8 A group may be deselected by pressing the group button again; individual cells cannot be removed from a selected group.
- 7.9 When the cell light buttons are pressed, the action will be taken for lights in all selected cells. The actions are:
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|-----------|----------------------------------------------------------|
| 'ON' | all lights will be turned on. |
| 'OFF' | all lights will be turned off. |
| 'NEUTRAL' | cell lights will be controlled by hall or cell switches. |
- 7.10 When the cell power buttons are pressed, the action will be taken for power to all selected cells:
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|-------|-------------------------------------------------|
| 'ON' | power will be turned on to all selected cells. |
| 'OFF' | power will be turned off to all selected cells. |
- 7.11 The light and power buttons will have no effect on unselected cells, they will remain in their previous state.
- 7.12 The indicator lamps for each cell will be illuminated if the power or lights for that cell are in the 'ON' or 'NEUTRAL' state.
- 7.13 While the 'TEST' button is pressed, all indicator lights on the panel will be illuminated. This will have no effect on the state of the controlled systems.

8.0 OTHER LIGHTING

Each set of lights to be controlled shall have a separate section on a panel with the following controls:

- 8.1 Two white push buttons, labelled 'OFF', and 'ON'. The 'ON' button shall be illuminated with a white light.

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- 8.2 If a dimmer is required, a rotary dimmer control shall have a pointer in it, and a position scale. The scale shall have at 10 divisions, and the brightness of the controlled lamps will have an approximately linear relationship with scale positions.
 - 8.3 'OFF' push button turns the lights off.
 - 8.4 'ON' push button turns the lights on. It is illuminated if the lights are on.
 - 8.5 The dimmer dims the lights as it is turned counterclockwise. Its setting is retained when the lights are turned on or off. The dimmer shall turn through between 300 and 350 degrees going from full bright to full dim; and will be labelled as shown in the figure.
 - 8.6 The dimmer setting is retained when the lights are turned off, so the lights shall still be dimmed when they are turned back on.

9.0 CELL DOOR CONTROL

A cell door control panel will be used to control the locks as follows:

- 9.1 The control panel shall be arranged to have four buttons for each cell labelled 'OPEN', 'CLOSE', 'GROUP' and 'STOP', as well as two buttons labelled 'GROUP OPEN' and 'GROUP CLOSED'.
- 9.2 The buttons shall be arranged in a format that mimics the facility layout. They will be separated sufficiently to prevent accidental keying.
- 9.3 The 'OPEN' button shall unlock and open the associated cell door. The button shall illuminate red, and remain illuminated as long as the cell remains unlocked. The 'OPEN' button shall flash red while the cell door is not in a fully open position.
- 9.4 The 'CLOSE' button shall close and lock the associated cell door. The button shall illuminate green and remain illuminated as long as the cell remains closed and locked. The 'CLOSE' button shall flash green while the cell door is not in a locked position.
- 9.5 The 'GROUP' button will act as a toggle switch to select and de-select the cell doors to be included or excluded from the group-type action. The 'GROUP' button shall illuminate amber when the door has been selected to be included in the 'GROUP' function.
- 9.6 The 'GROUP CLOSE' button shall close and lock all group selected cells with the appropriate indications as outlined above.

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- 9.7 The 'GROUP OPEN' button shall unlock and open all group selected cells with the appropriate indications as outlined above.
 - 9.8 The 'STOP' button shall interrupt the closing or opening of the doors. When selected, the 'STOP' button shall illuminate red.

10.0 **OTHER DOORS**

The system may have to control doors other than cell doors; for example fire doors or doors between sections of the institution. The control panel for these shall be designed in the same way as the cell control doors. There shall be a separate panel or region on a panel for each type of door controlled.

11.0 **MOVEMENT CONTROL BARRIERS**

Controls for control barriers shall be placed on a single panel as follows:

- 11.1 For each barrier controlled, three illuminated push buttons, labelled 'OPEN', 'STOP', and 'CLOSE'. The 'OPEN' and 'CLOSE' buttons shall be white with white illumination, the 'STOP' button shall be red, with red illumination.
- 11.2 A push button to disable any interlocks on the barriers. This button shall be red, with red illumination. It shall have a cover which must be lifted before the switch is pressed.
- 11.3 A test push button. If possible, the placement of the controls shall reflect the physical location of the barriers.
- 11.4 Pushing 'OPEN' shall open the associated barrier. The switch shall flash as the barrier opens, when it is fully open the switch shall light continuously, and remain lit as long as the barrier is open. There shall be audible confirmation at the start of the action.
- 11.5 Pushing 'CLOSE' shall close the barrier. The switch shall flash as the barrier closes, when it is fully closed, the switch shall light continuously, and remain lit as long as it is closed. There shall be audible confirmation at the start of the action.
- 11.6 If the barrier is moving, then pushing the 'STOP' switch shall immediately stop the motion. There shall be audible confirmation of the action. The light on the open or close switch shall turn off, and the stop switch shall light up and remain lit until the 'OPEN' or 'CLOSE' buttons are pressed, and motion resumes.

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- 11.7 If the barrier is not moving when the stop switch is pressed, no action shall be taken, the barrier shall remain in its previous state, and the switch lights shall not change. There shall be an audible warning.
 - 11.8 If an attempt is made to open a barrier which is interlocked and unable to open, then an audible warning shall sound and no action shall be taken.
 - 11.9 If the interlock disable switch is pressed, all interlocks shall be disabled, and all barriers may be opened. When the switch is pressed, an audible warning shall sound and the switch shall be illuminated.
 - 11.10 The interlock can be reenabled by pressing the disable switch again, with the barriers in a legal position. There shall be an audible confirmation of this action. If the barriers are not in a legal position, there shall be an audible warning and no action shall occur.

12.0 **FIRE ALARMS**

The system may monitor a number of fire alarms and shall be displayed on a single panel as follows:

- 12.1 The panel shall have a set of indicator lights; one red light for each alarm.
- 12.2 Each light shall be labelled with the identification of location of the associated alarm. If possible, the lights shall mimic the alarm placement in the institution.
- 12.3 There shall be a single 'ACKNOWLEDGE' push button on the panel, clearly separated from the indicator lights.
- 12.4 There shall be a single 'TEST' push button on the panel.
- 12.5 When fire alarm is triggered, the associated panel light shall start flashing.
- 12.6 There shall be an audible alarm.
- 12.7 The operator acknowledges the alarm by pressing the 'ACKNOWLEDGE' button.
- 12.8 When the alarm is acknowledged, the light stops flashing and burns continuously, and the audible alarm stops.
- 12.9 The alarm must be reset from the site of the alarm, it cannot be reset from the console.

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- 12.10 If the 'TEST' button is pressed, all lights shall light up and the audible alarm shall sound for as long as the button is pressed.
 - 12.11 If more than one alarm has been triggered, the acknowledge button shall acknowledge all such alarms.

13.0 **MECHANICAL SYSTEMS**

A number of mechanical systems, such as fans shall be controlled from a single pane as follows:

- 13.1 Each system shall have a pair of white push buttons, labelled 'ON' and 'OFF'. The 'ON' button shall be illuminated.
- 13.2 There shall be a 'TEST' button located away from the other buttons, as indicated.
- 13.3 Each pair of buttons shall be labelled showing the function of the controlled device.
- 13.4 The device is turned on and off using the appropriate buttons.
- 13.5 If the device is in the 'ON' state, then the 'ON' push button shall be illuminated.
- 13.6 The 'TEST' button shall turn on all the lights, but have no effect on the state of the system.

14.0 **INMATE CALL SYSTEM PRIMARY ANNUNCIATION PANEL**

The inmate call system shall be monitored from a single panel as follows:

- 14.1 There shall be one push button per cell, the "Cell Call" button, with split yellow and white illumination areas.
- 14.2 There shall be one white "ACKNOWLEDGE" button and one yellow "DISABLE" button, arranged as shown in the figure.
- 14.3 There shall be a single "TEST" button, arranged as shown.
- 14.4 There shall be a "Push to Talk" (PTT) switch as indicated.
- 14.5 When an inmate triggers his call the white region on the associated button shall start to flash, and there shall be a continuous audible annunciation.

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- 14.6 The operator shall acknowledge the call by pressing the "ACKNOWLEDGE" button. The audible annunciation shall stop, but light shall continue flashing.
 - 14.7 The operator can then listen to the inmate by pressing the call button. The light shall stop flashing and burn continuously.
 - 14.8 The operator can talk to the inmate by pressing the PTT button.
 - 14.9 When the call is finished the operator can cancel the call by pressing the associated "CALL" button again. The light shall go off.
 - 14.10 If a call has been triggered and not yet cancelled then triggering it again shall have no effect.
 - 14.11 The operator can disable the call system for an inmate by pressing the "DISABLE" button and the cell button simultaneously. The yellow portion of the cell button shall light up and any calls shall be ignored.
 - 14.12 Pressing the cell button and the "DISABLE" button a second time shall restore the call system to normal operation.
 - 14.13 If the "DISABLE" and cell buttons are pressed while a call is being processed it shall disable the system from further calls, but shall not cancel the current call.
 - 14.14 If an intercom is included in the system the operator can listen to any cell at any time by pressing the associated cell button. The white region in the button shall illuminate. Listening is stopped by pressing the button again.
 - 14.15 If more than one cell call is triggered all calls shall be acknowledged by the "ACKNOWLEDGE" button.

15.0 **INMATE CALL SYSTEM SECONDARY ANNUNCIATION PANEL**

Back up monitoring for the ICS is provided by a secondary panel. This panel shall monitor zones, where each zone is controlled by one or more primary panels at a single location.

- 15.1 There shall be one split illumination light with yellow and white illumination areas for each zone.
- 15.2 There shall be one white 'ACKNOWLEDGE' button and one white 'TEST' button arranged.

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- 15.3 If a call is not acknowledged at the primary panel for a zone, then after a preset length of time, the secondary panel yellow 'CALL' light for that zone shall flash and there shall be an audible annunciation.
 - 15.4 The secondary panel operator can acknowledge the call by pressing the 'ACKNOWLEDGE' button. The audible annunciation shall stop and light shall burn steadily.
 - 15.5 The light shall be extinguished when the call is cancelled from the primary panel.
 - 15.6 If any cells in a zone are disabled, the white 'disabled' light on the corresponding secondary panel zone shall be illuminated.

16.0 **FIXED POINT SECURITY ALARMS**

A number of Fixed Point Security Alarms (FPSA) may be monitored from a single panel as follows:

- 16.1 Each FPSA location shall have an illuminated red push button on the panel.
- 16.2 Each button shall be labelled to indicate its location.
- 16.3 There shall be an 'ACKNOWLEDGE' push button in the lower right-hand corner of the panel.
- 16.4 There shall be a 'TEST' push button on the panel.
- 16.5 When an FPSA is triggered, the associated button on the panel shall start flashing and an audible alarm shall sound.
- 16.6 The operator responds by pressing the 'ACKNOWLEDGE' button. The light shall stop flashing and burn continuously and the audible alarm shall stop.
- 16.7 The FPSA can be reset by pressing the illuminated button; this shall turn off the light.
- 16.8 The 'TEST' button turns on all the lights on the panel, and sounds the audible alarm, but has no other effect on the system.

17.0 **RADIO CONTROLS**

- 17.1 The panel contains two identical sets of controls located side by side, typically one shall be for the local radio network, the second for the regional network.

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- 17.2 The controls of the two systems must be identical, mirror image arrangements should not be used. See MIL-STD-1472c 5.1.2.1.1.4.
 - 17.3 The volume control shall be continuously adjustable, with volume increasing with clockwise rotation.
 - 17.4 The minimum setting of the volume control shall be limited to an audible level, i.e., it shall not be possible to inadvertently disable the system with it.
 - 17.5 The frequency control shall have positive click stops at each available channel; channel number shall increase with positive rotation.
 - 17.6 The two systems shall each have their own microphone and speaker.
 - 17.7 The microphones shall stand on the desk and have cords of adequate length to reach any position on the desk that the operator might require.
 - 17.8 The microphones shall include a built in push-to-talk (PTT) switch.
 - 17.9 The microphones shall be designed to respond optimally to frequencies between 200 and 6100 Hz.
 - 17.10 The dynamic range of the microphone shall be great enough to admit variations in signal input of at least 50 dB.
 - 17.11 The transmit and receive lights shall be yellow.
 - 17.12 The speaker shall be designed for optimum reproduction of frequencies between 200 and 6100 Hz.
 - 17.13 In order to allow aural identification of the active speaker, the speakers for two or more systems shall be mounted at least 175 mrad (10 degrees) apart in the horizontal plane frontal quadrant, ranging radially from $\pi/4$ rad (45 degrees) left to $\pi/4$ rad (45 degrees) right of the operator's normal forward facing position.
 - 17.14 The received signals shall be heard on the loudspeaker. The receive light shall be illuminated during the reception.
 - 17.15 Transmission shall be enabled using the push to talk switch on each microphone.
 - 17.16 When the operator presses the PTT switch on the microphone, the transmit light for the associated system shall light up, indicating that the transmitter is functioning properly.
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18.0 FACILITY ALARMS

The MCCP may be required to monitor a large number of alarms of various types, such as mechanical, fixed point security, fire, and portable personal alarms. These can all be monitored from one or more facility alarm panels.

- 18.1 The alarms shall be grouped by type.
- 18.2 Each alarm shall have an illuminated red push button on the panel.
- 18.3 Each button shall be labelled to indicate the location of the alarm.
- 18.4 There shall be an 'ACKNOWLEDGE' push button in the lower right-hand corner of the panel.
- 18.5 There shall be a 'TEST' push button on the panel.
- 18.6 When an alarm is triggered, the associated button on the panel shall start flashing and an audible alarm shall sound.
- 18.7 The operator responds by pressing the 'ACKNOWLEDGE' button. The light shall stop flashing and burn continuously and the audible alarm shall stop.
- 18.8 The alarm can be reset by pressing the illuminated button; this shall turn off the light, provided the alarm has also been reset at its origin if required.
- 18.9 The 'TEST' button turns on all the lights on the panel and sounds the audible alarm, but has no other effect on the system.

19.0 PIDS INTEGRATION UNIT (PIU)

The PIU is a system which combines the information from a number of devices and displays it on an integrated video display terminal. The PIU controls the following systems:

Motion Detection System (MDS).

Fence Disturbance System (FDS).

Perimeter Intrusion Detection System (PIDS)

Closed Circuit Television (CCTV).

Supplementary Intrusion Detection System (SIDS) CCTV.

Video Display Unit (VDU).

Public Address (PA) System.

20.0 **TELEPHONES**

The console may have one or more telephones, either mounted on the console or sitting on the desk. The following requirements shall be met by these:

- 20.1 The handset shall be designed for optimum reproduction of frequencies between 200 and 6100 Hz.
- 20.2 The handset cord shall be long enough to reach the operator in any normal operating position.