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 (See 6.5)

MILITARY SPECIFICATION  
 ALARM SWITCHBOARDS, ALARM PANELS, REMOTE  
 SENTRY ALARM SWITCH,  
 SIGNAL UNITS, AND SPECIAL ALARM CONNECTION BOX, NAVAL SHIPBOARD

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers alarm switchboards, alarm panels, remote signal units, sentry alarm switch, and special alarm connection box for use with Naval surveillance and protective systems.

1.2 Classification.

1.2.1 Alarm switchboards. Alarm switchboards shall be of the following types, as specified (see 6.2.1):

Type	Line voltage, 60 hertz (Hz)	Supervisory voltage <sup>1/</sup>
IC/SCG	115 Volts (V)	220 Volts direct current (V d.c.)
IC/SFZ or S4FZ	115 V	120 V d.c.
IC/SM	115 V	5 + V d.c.; root mean square (rms), - 0 full-wave, rectified (unfiltered)

<sup>1/</sup>At the terminals for connection of external alarm sensing device, except for IC/SFZ or S4FZ switchboards. For IC/SFZ or S4FZ switchboards, it is voltage to power input terminals of two-line alarm unit.

1.2.1.1 Size. The size of the switchboard shall be designated by the full capacity of the enclosure (see 3.4.1.1 through 3.4.1.3 and 6.2.1). A typical designation of the actual number of circuits required is as follows:

Type	Size	Number of circuits required
IC/SM	20	18

1.2.2 Alarm panels. Alarm panels shall be of the following types, as specified (see 6.2.1):

Type	Number of lines	Line voltage (60 Hz)	Supervisory voltage
IC/B51	2	115 V	120 V d.c. <sup>1/</sup>
IC/B52	4	115 V	120 V d.c. <sup>1/</sup>
IC/BCG51	2	115 V	220 V d.c. <sup>2/</sup>
IC/BCG52	4	115 V	220 V d.c. <sup>2/</sup>

<sup>1/</sup>Voltage is measured at power input terminals of two-line alarm unit.

<sup>2/</sup>Voltage is measured at terminals for connection of external alarm sensing device.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Ship Engineering Center, SEC 6124, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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1.2.3 Audible and visual remote signals, sentry alarm switch.

1.2.3.1 Remote signal units. Remote signal units shall be of the following types, as specified (see 6.2.I):

IC/EA  
IC/EAP  
IC/EAW

1.2.3.2 Sentry alarm switch. The sentry alarm switch shall be a type IC/SW.

1.2.4 Special alarm connection box. The special alarm connection box shall be the type shown on Drawing SS-402-1701749.

## 2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

## SPECIFICATIONS

## MILITARY

- MIL-R-26/5 - Resistors, Fixed, Wire-Wound (Power Type) Styles RW70, RW74, RW78 and RW79.
- MIL-S-901 - Shock Test, H.I. (High-Impact); Shipboard Machinery, Equipment and Systems, Requirements for.
- MIL-I-983 - Interior Communication Equipment, Naval Shipboard; Basic Design Requirements For.
- MIL-A-15303 - Audible Signals: Alarms, Bells, Buzzers, Horns, Sirens, and Electronic, Shipboard.
- MIL-E-17555 - Electronic and Electrical Equipment, Accessories, and Repair Parts, Packaging and Packing of.
- MIL-R-39007/6 - Resistor, Fixed, Wire-Wound (Power Type) Established Reliability, Style RWR74.

## STANDARDS

## MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-461 - Electromagnetic Interference Characteristics Requirements for Equipment.
- MIL-STD-462 - Electromagnetic Interference Characteristics, Measurement of.
- MIL-STD-810 - Environmental Test Methods.
- MIL-STD-1399 - Interface Standard for Shipboard Systems.  
Section 103 - Electric Power, Alternating Current.

## DRAWINGS

## MILITARY

- 401-2274000 - Security Alarm Systems, Circuit PZ, Elementary Wiring Design.
- 401-2274001 - Types IC/SPZ and IC/S4PZ, Security Alarm Switchboard, Mechanical Assembly, 10-60 Line.
- 401-2274002 - Audible and Visual Remote Signal, Types IC/EA, IC/EAW and IC/EAP, and Sentry Alarm Switch Type IC/SW.
- SS-402-1701749 Torpedo Security Alarm Circuit "4PZ" Torpedo Room Connection Box Assembly and Detail.
- 815-1853037 - Electronic Audible Signal, Type IC/E3D2.
- 815-1853110 - Alarm Switchboard Guidance Wiring Diagram.
- 815-1853205 - Switchboard, Single Line Alarm Module, Type IC/M.
- 815-1853206 - Switchboard, Alarm, Type IC/SM, 10-50 Lines.
- 815-1853207 - Switchboard, Alarm, Type IC/SM, 60-120 Lines.
- 815-1853208 - Switchboard, Alarm, Type IC/SM, Systems Schematic Diagram and Connection to Sensor Circuits.
- 9000-S6504-73806 - Alarm Panel - 2 Circuits Type IC/B51, 115 Volts, AC-DC.
- 9000-S6504-73807 - Alarm Panel - 4 Circuits Type IC/B52, 115 Volts, AC-DC.
- 9000-S6504-73904 - Bell-Splashproof 115 Volts 60 Cycles, Type IC/B1S4.
- 9000-S6504-73905 - Buzzer-Watertight 115 Volts 60 Cycles, Type IC/Z1S4.
- 9000-S6504-74080 - Systems, Standards, Diagrams of Two Line Alarm Unit.
- 9000-S6504-74285 - Switchboard, Alarm, Type IC/S, 10 to 40 Lines.

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9000-S6504-74286 - Switchboard, Alarm, Type IC/S, 50 to 60 Lines.  
 9000-S6504-74287 - Switchboard, Alarm, Type IC/S, 80, 100 and 120 Lines.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

### 3. REQUIREMENTS

3.1 Qualification. Alarm switchboards, alarm panels, remote signal units, sentry alarm switches and special alarm connection boxes furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.4).

3.2 General features. The equipment shall be in accordance with the following paragraphs of MIL-I-983, in addition to the requirements specified herein. (Whenever a requirement of MIL-I-983 conflicts with a requirement of this specification, the requirement of this specification shall govern):

- General requirements
- Materials, general
- Substitution of (equal or superior) materials or parts
- Pungus - inert materials
- Toxic materials
- Wood
- Aluminum
- Magnesium
- Ferrous alloys
- Nonferrous material (except aluminum)
- Plastics
- Lubricants and lubrication
- Painting
- Protection against corrosion
- Washers
- Parts, electrical
- Electron tubes
- Electron tube or capacitor sockets
- Transistors (see 3.4.10)
- Capacitors
- Variable resistors
- Transformers and inductors
- Electrical tapes
- Batteries
- Enclosures - general
- Enclosures - degree of (Dripproof is applicable to alarm switchboards, remote signal units, sentry alarm switches, and special alarm connection boxes).
- Stiffening grooves
- Cable entrance
- Ventilation
- Size
- Threaded devices
- Rounded corners and edges
- Drilled and tapped holes
- Structural welding
- Temperature and humidity (switchboards and alarm panels)
- Accelerated life
- Salt spray
- Shock, (Type A, grade A, class 1 lightweight of MIL-S-901) vibration and inclination (vital vibration test required)
- Primary power supply circuits
- Power supply tolerances (normal power supply - 115 volts, 60 Hz a.c.) (see 3.3.8)
- Safety (personnel hazard)
- Electromagnetic interference
- Soldering
- Electrical parts mounting
- Electrical connectors
- Terminal boards and terminals
- Wiring
- Dielectric strength and insulation resistance clearances

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Interchangeability  
 Standardization  
 Repair parts (see 3.7)  
 Designation and marking  
 Workmanship

3.3 System operation. Equipments to this specification shall provide for operation: as specified hereinafter.

3.3.1 Circuits. The circuits for the switchboards shall conform to the following:

- (a) IC/SCG - Drawing 815-1853110, except as specified in 3.3.3.
- (b) IC/SFZ and S4FZ - Drawings 401-2274000 and 401-2274001.
- (c) IC/SM - Drawing 815-1853208 (except for the type IC/SM4, only two fused extension signal circuits shall be provided. One for supervisory failure alarm and one for an alarm condition alarm). A wiring diagram in accordance with MIL-I-983 shall be provided in each switchboard.
- (d) Remote signal units and sentry alarm switch - Drawing 401-2274002.
- (e) Special alarm connection box - Drawing SS-402-1701749.

3.3.2 IC/SFZ and S4FZ type alarm switchboards and IC/B type alarm panels. The line voltage shall be 115 V and supervisory voltage shall be 120 V d.c. A continuous supervisory current, not to exceed 0.012 ampere (A), shall flow through each alarm line. The circuit shall include a 7,000-ohm, 5-watt (W), or a type RW79 (conforming to MIL-R-26/5) or RWR 74 (conforming to MIL-R-39007/6), 6810-ohm current limiting resistor installed in the most remote sensing device in the circuit, such as a water switch, thermostatic switch, door switch or pressure operated switch and the current sensitive relays of the two-line alarm unit in the switchboard or panel.

3.3.2.1 Each line of the two-line alarm unit of Drawing 9000-S6504-74080 shall contain a drum type trouble target relay and alarm target relay connected in series.

3.3.2.2 The trouble supervisory target relay shall operate on the 0.012 A supervisory current and shall cause to show a gray target in this condition. The supervisory relay shall release on an open circuit, at which time it shall cause to show a yellow target indication and close a pair of contacts to sound the trouble alarm on the alarm switchboard.

3.3.2.3 Upon the occurrence of an alarm condition, the current limiting resistor of 3.3.2 is shorted by a switch in a remote sensing device, increasing the current through the two relays of 3.3.2.1 from approximately 0.012 to 0.043 A and thereby operating the alarm target relay. The alarm target normally gray shall then show a red indication and close a pair of contacts to energize the alarm generator on the switchboard and extension alarms and to energize the audible signal within the switchboard. The alarm target shall remain operated in the alarm position until the rotary switch of the two-line alarm unit is operated to its cut-out position, even if the short is removed from the line resistor.

3.3.3 IC/SCG type alarm switchboards and IC/BCG type alarm panels. The circuits and operating characteristics shall be the same as on the referenced IC/S switchboard drawings and the same as for the IC/B types of panels respectively (see 3.3.2) with the following exceptions:

- (a) Line voltage shall be 115 V, 60 Hz, single phase, a.c. only.
- (b) Supervisory voltage across terminals FL or FR and FFL or FFR of each two-line alarm unit shall be 220 V d.c. and filtering shall be provided to maintain a superimposed ripple of from 3 to 6 V rms.
- (c) Alarm current shall be 0.014 A.
- (d) Supervisory current shall be 0.0055 A.

3.3.3.1 A continuous supervisory current of 0.0055 A shall be maintained in each circuit. A 40,000-ohm, 2 to 5-W current limiting resistor shall be installed across the contacts of the most remote triggering device in each circuit to provide for the supervisory features of the alarm switchboard or alarm panel.

3.3.3.2 Type IC/SCG alarm switchboards and IC/BCG alarm panels shall be capable of operating type IC/CG or IC/CGD carbon dioxide gas detectors.

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3.3.4 IC/SFZ and IC/S4PZ types of alarm switchboards, remote signal units, sentry alarm switch, special alarm connection box. The IC/SFZ and IC/S4PZ switchboards shall be as shown on Drawing 401-2274000 and 401-2274001. The remote signal units and sentry alarm switch shall be as shown on Drawing 401-2274002. The special alarm connection box shall be as shown on Drawing SS-402-1701749. All components shall conform to the applicable requirements specified hereinafter for the different equipments and shall also conform to the electrical and mechanical features specified on the above referenced drawings relative to:

- (a) Protective cover.
- (b) Electronic audible signal (IC/E3D2) (see Drawing 815-1853037).
- (c) Protective locking devices (electrical and mechanical).
- (d) Relays.
- (e) Electronic circuitry.
- (f) Overall construction.
- (g) Quality control of all materials and components.
- (h) Electrical components and wiring.
- (i) Materials

3.3.5 IC/SM type alarm switchboards. The line voltage for IC/SM alarm switchboards shall be 115 V, 60 Hz and the supervisory voltage shall be  $5 \frac{+1}{-0}$  V d.c. rms, full wave, rectified (unfiltered).

3.3.5.1 A continuous supervisory alarm current, not to exceed 1.2 milliamperes (mA), shall flow through each alarm line module. The circuit for the determination of the normal supervisory current shall include a 7000-ohm, plus or minus 5 percent, 1/2 to 5-W current limiting resistor, or a type RW79 (conforming to MIL-R-26/5) or RWR 74 (conforming to MIL-R-39007/6) 6810-ohm resistor, installed in the most remote sensing device in the circuit, such as a water switch, thermostatic switch, door switch or pressure operated switch. The single line alarm module shall not trigger a supervisory alarm for supervisory current as low as 0.3 mA, but shall trigger an alarm condition alarm/primary alarm for 4.0 mA and higher current flow.

3.3.5.2 Each remote sensing device in an alarm circuit shall be monitored by a type IC/M module, constructed in accordance with Drawing 815-1853205. Each module shall include one set of electrically isolated, normally open contacts which shall close on alarm condition. They shall be suitable for making and breaking an external resistive load of 3A at 28V d.c. and shall not be in a completed circuit when the module is operated in the test mode. Upon receipt of an alarm sensor closure, momentary or otherwise, each module shall latch-in and shall not clear even though the sensor may, in the meantime, open. The switch shall be moved to the STANDBY position and back to NORMAL to reset the circuit to normal providing the sensor is open. An alarm condition cleared indication shall be given in the STANDBY switch position alerting the operator to return the switch to NORMAL. The following requirements shall be considered mandatory with regard to display and operation: (A permanently installed type of information plate in accordance with MIL-I-983 shall be provided on the front of the switchboard in a readily apparent location to identify for an operator the following visual display and audible outputs of the switchboard.) Lights, when required hereinafter to flash, shall flash at about 80 times per minute.

- (a) Normal (No-alarm condition). Upper light on steady, lower light out. (Switch in normal position).
- (b) Alarm condition. Upper light flashing, lower light out with circuitry completed for wailing audible tone. (Switch in normal position).
- (c) Standby (alarm condition existing). Switch turned to standby (30 degrees right from NORMAL position). Upper and lower lights on steady, audible tone circuit open.
- (d) Standby (Switch in STANDBY position with alarm condition cleared). Upper light out, lower light flashing, circuit completed for wailing audible tone. (Operator shall return switch to normal position to silence the audible tone).
- (e) Supervisory failure. Upper light out, lower light on steady, the circuitry completed to steady audible tone. (Switch in normal position). To silence audible alarm, the operator shall switch to cut-out position.
- (f) Cut-out. With the switch in the cut-out position (30 degrees left from NORMAL position, both sides of the line shall be opened and the upper light shall be out and the lower light shall be on steady. Audible tone circuit shall be open.
- (g) Test condition. With the switch in the test (60 degrees left from NORMAL) position, the line resistor shall be shorted out for testing operation of the switchboard. The indications shall be the same as 3.3.5.2(b).
- (h) Power failure. Upper and lower lights shall be out. (The module shall have no function to establish connections for an audible alarm, but the switchboard shall make connections for a pulsating, yelping sound).

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3.3.6 Alarm switchboards and alarm panels (all types except IC/SM). For purposes of test, trouble isolation, and line cut-out, each line shall be provided with a rotary switch having three positions as follows:

- (a) Normal (down) position. - Both sides of line closed.
- (b) Off-supervisory test and cut-out (22-1/2 degree left) position. - Both sides of the line open and trouble signal circuit open or for testing the operation of the trouble target relay and trouble signal. The trouble signal circuit contacts shall open after opening of the line contacts during the movement of the rotary switch from the normal to the cut-out position.
- (c) Test alarm test (45 degree left) position. - Thermostatic switch, water switches or pressure operated switches line resistor shorted out for testing operation of the alarm target relay and alarm signals. In addition, provide one set of electrically isolated, normally closed contacts on the rotary switch which shall be wired in series with the auxiliary contacts of the alarm relay (see 3.4.7) and shall open when the rotary switch is in the alarm test position only. These contacts shall be mechanically designed to fully open prior to the closing of the auxiliary contacts to prevent automatic triggering of remote operated systems (such as CO<sub>2</sub> systems) when the rotary switch is turned to alarm test position.

3.3.6.1 The rotary switch for each line of the two-line alarm unit and the silent test switch of the switchboard shall be latching in all positions.

3.3.7 A pilot light on the switchboard or panel (except for IC/SM type switchboard) shall indicate that the system is energized.

3.3.7.1 One ground detector light shall be provided on switchboards only for indicating positive grounds and one light to indicate negative grounds.

3.3.8 The alarm switchboards and alarm panels shall be designed for operation from a normal source of power conforming to type I 115 V alternating current (V a.c.) 60 Hz, single phase, of section 103 of MIL-STD-1399. A rectifier shall be provided to supply energy for the line circuits, lamp flasher (switchboards only), ground detector lamps (switchboards only) and pilot lamp. Audible alarms of the IC/SCG switchboard shall be energized from the 115 V 60 Hz supply. Audible alarms of the IC/SM, IC/SPZ and IC/S4PZ switchboards shall be from a speaker supplied inputs by the type IC/E3D2 signal generator.

3.3.9 For alarm switchboards, except IC/SM type switchboards, provision shall be made for energizing four external alarm circuits. These circuits shall be individually fused at the alarm switchboard.

3.3.10 Endurance. All switchboards and alarm panels shall be tested for endurance in accordance with 4.6.2.

3.3.11 Two-line alarm unit (Drawing 9000-S6504-74080). The alarm relay external circuit contacts for an alarm condition of the two-line alarm unit used in type IC/SCG, IC/SPZ and IC/S4PZ switchboards or in type IC/BCG or IC/B alarm panels shall be suited for making and breaking a resistive load of 100 watts at 115 V a.c.

3.3.12 Electromagnetic interference. Alarm switchboards and alarm panels shall conform to the electromagnetic interference requirements for class C of MIL-STD-461.

3.4 Alarm switchboards, remote signal units, sentry alarm switch.

3.4.1 Sizes (full capacities).

3.4.1.1 Type IC/SCG switchboards. Type IC/SCG switchboards shall conform to Drawings 9000-S6504-74080, 9000-S6504-74285, 9000-S6504-74286, 9000-S6504-74287, and 815-1853110. The IC/SCG switchboard shall be furnished in the following sizes (full capacities) as specified (see 6.2.1):

10, 20, 30, 40, 50, 60, 80, 100, or 120 lines

3.4.1.2 Types IC/SPZ and IC/S4PZ. Types IC/SPZ and IC/S4PZ switchboards shall conform to Drawings 401-2274000 and 401-2274001 and shall be furnished in the following sizes (full capacities), as specified (see 6.2.1):

10, 20, 30, 40, 50, or 60

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3.4.1.3 Type IC/SM switchboards. Type IC/SM switchboards shall conform to Drawings 815-1853205, 815-1853206, 815-1853207, and 815-1853208, and shall be furnished in the following sizes (full capacities), as specified (see 6.2.1):

4, 10, 20, 30, 40, 50, 60, 80, 100, or 120

3.4.1.4 Remote signal units and sentry alarm switch. Remote signal units and the sentry alarm switch shall be in accordance with Drawing 401-2274002.

3.4.2 Enclosure. All switchboards, remote signal units and sentry alarm switches shall be enclosed in a dripproof steel or dripproof aluminum cabinet. Except on 80 to 120 line type IC/SCG switchboards, each panel shall be arranged to hinge out from the left side, so that all parts shall be accessible from the front of the cabinet. Terminal strips for connecting the ship cables shall be provided in the rear of the enclosure. All flexing cables to hinged panels shall be designed with a maximum amount of slack to distribute bending over the longest practical length of cable. The type of conductors, and the method of cabling the conductors shall be specifically designed for flexing service.

### 3.4.3 Mounting.

3.4.3.1 Mounting (four to 40 lines). Ten, 20, 30, and 40 line, types IC/SCG, IC/SM, IC/SPZ, or IC/S4FZ switchboard cabinets shall be arranged for bulkhead mounting. The four-line IC/SM4 switchboard shall be arranged for bulkhead mounting.

3.4.3.2 Mounting (50 or more lines). Switchboard cabinets for 50 or more lines, types IC/SCG, IC/SPZ and IC/S4FZ, shall be arranged for securing to a deck and shall be provided with structural padeyes to facilitate diagonal bracing from the top of the cabinet to a bulkhead. IC/SM type switchboard cabinets for 50 or more lines shall be arranged for bulkhead mounting.

3.4.4 Alarm section. The common alarm section of the switchboard shall have the following parts mounted on or in the face of the panel:

<u>Type IC/SCG</u>	<u>Type IC/SM</u>
(a) Alarm bell. (see 3.4.8)	(a) Audible speaker type IC/E3D2. (see 3.4.8)
(b) Trouble buzzer. (see 3.4.8)	(b) Module lamp dimmer control.
(c) Switchboard identification plate.	(c) Ground lights (two).
(d) Pilot light.	(d) Switchboard identification plate.
(e) Test light.	(e) Silent alarm switch.
(f) Alarm test light.	(f) Silent alarm lamp.
(g) Trouble test light.	(g) Main power fuse indicator.
(h) Ground lights (two).	(h) Extension alarm blown fuse indicator.
(i) Extension alarm blown fuse indicators.	
(j) Silent alarm and trouble test switch.	

3.4.5 For IC/SCG type switchboards, line unit panels shall be of unit construction and shall mount 5 to 10 two-line units as required. For IC/SM type switchboards, line unit panels shall be of a unit construction capable of holding 10 plug-in modules conforming to Drawing 815-1853205.

3.4.6 Parts mounted on the line unit panels, which require openings in the panels, shall fit with small clearances.

### 3.4.7 Relays and relay contacts.

3.4.7.1 Relays. Relays shall operate satisfactorily, shall make firm, low resistance contact, and shall retain their setting in any position in accordance with the operating requirements of the circuit under any service condition including vibration and shock.

3.4.7.2 Relay contacts. For type IC/SCG switchboards, the extension signal relay contacts shall be capable of making and breaking a resistive load of 3 A at 28 V, d.c. For type IC/SM switchboards, the extension signal relays shall be as required on Drawing 815-1853208.

3.4.8 Audible signals. Audible signals used on the switchboard shall be signals that conform to MIL-A-15303. The type IC/SCG switchboard alarm signal shall be a type IC/B1S4 bell conforming to Drawing 9000-S6504-73904, and the trouble signal shall be a type IC/Z1S4 buzzer conforming to Drawing 9000-S6504-73905. For the IC/SM type switchboard, the IC/E3D2 three-tone audible signal generator conforming to Drawing 815-1853037 shall be incorporated.

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3.4.9 Transformers, rectifiers, and fuses for all sizes of switchboards shall be suitable for continuous duty with 30 percent of the alarm lines carrying normal supervisory current and with 70 percent of the alarm lines carrying alarm condition current and with module lights adjusted for full bright lighting. Under such a load, the supervisory voltage of 3.3.2, 3.3.3, or 3.3.5, as applicable, shall be maintained. For IC/SM switchboards, the common board circuitry shall be suitable for continuous duty with full-bright lighting for all modules in NORMAL (no alarm) condition and shall be similarly suitable for continuous duty with 30 percent of the modules in the NORMAL (no alarm) condition while 70 percent of the modules are in the Standby (alarm condition existing) situation.

3.4.10 IC/SCG type alarm switchboards shall be furnished with a transistorized voltage regulated power supply to maintain the voltage parameters specified in 3.3.3.

3.5 Alarm panels. The line voltage shall be 115 V, 60 Hz and the supervisory voltage shall be 120 V d.c. for types IC/B51 and IC/B52 and 220 V d.c. for types IC/BCG51 and IC/BCG52.

3.5.1 Alarm panels shall be supplied in two-line and four-line sizes. Panels shall be in accordance with Drawings 9000-S6504-73806 and 9000-S6504-73807, and as specified in 3.5.1.1 through 3.5.1.4.

3.5.1.1 Enclosure. All components shall be enclosed in a brass cabinet. The terminal strip for connecting the ship cables shall be provided on the bottom inside surface of the enclosure. All flexing cables between line units and ship cable terminal strip shall be designed with a maximum amount of slack to distribute bending over the longest practical length of cable. The type of conductors, and the method of cabling the conductors shall specifically be designed for flexing service.

3.5.1.2 Two and four-line enclosures shall be arranged for bulkhead or panel mounting as required.

3.5.1.3 Enclosures shall provide for mounting one or two, two-line units as required. Two-line units shall be in accordance with 3.3.2, 3.3.3, and 3.3.11.

3.5.1.4 Provision shall be made for operating remote visual indicators or control circuits from individual alarm lines.

3.5.2 Relays. Panel relays shall operate as specified in 3.4.7.

3.5.3 Parts. Parts mounted on the covers which require openings in the covers, shall fit with small clearances.

3.5.4 Transformers and rectifiers shall be designed for continuous duty with all lines carrying alarm condition current.

<u>Panel size</u> Lines	<u>Rectifier suitable for</u> Lines
Two	Four
Four	Four

3.5.5 IC/BCG type alarm panels shall require automatic loading of the internal power supply (with resistors) to maintain the voltage parameters specified in 3.3.3 for remaining alarms lines in service as alarm line switches are turned to the OFF position.

3.6 Technical data. The contractor shall prepare a technical manual and engineering drawings in accordance with the data ordering document included in the contract (see 6.2.2).

3.6.1 Drawings. In addition to the drawing content required by the data ordering document (see 6.2.2) maintenance drawings shall be prepared which shall provide all information required to accomplish the maintenance concept specified in the contract. Maintenance drawings shall include, as applicable, but shall not necessarily be limited to: assembly and disassembly information; installation information; test point and lubrication point locations; special tool and support equipment requirements; preventive maintenance procedures; inspection, test checkout, operation and overhaul information; parts breakdowns; schematics; and tube bend information.

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3.7 Repair parts. Repair parts shall be furnished as follows:

- (a) Repair parts shall be supplied to each ship for all alarm systems on the ship.
- (b) Switchboards - For IC/SCG type switchboards, one complete two-line unit in accordance with Drawing 9000-S6504-74080, and 3.3.3 for each 40 lines and fraction thereof installed. For IC/SM type switchboards, one module type IC/M in accordance with Drawing 815-1853205 for each switchboard up to 20 lines. For switchboards having more than 20 lines, one module for each 20 lines and fraction thereof.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- (a) Qualification inspection (see 4.3).
- (b) Quality conformance inspection (see 4.5).

4.3 Qualification inspection. Qualification inspection shall be conducted at a laboratory satisfactory to the Naval Ship Engineering Center. Qualification inspection shall consist of the examination and tests shown in table I. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.4 and 6.4.1).

TABLE I. Qualification inspection.

Test	Requirement paragraph	Test reference
General examination	3.2	MIL-I-983
Operating	3.3	4.6.1
Supply line voltage variation <sup>1/2/</sup>	3.2, 3.3.8	MIL-I-983
Electromagnetic interference <sup>1/</sup>	3.3.12	4.6.5
Endurance <sup>1/</sup>	3.3.10	4.6.2
Temperature <sup>1/2/</sup> and humidity <sup>1/</sup>	3.2	MIL-I-983 and 4.6.8
Accelerated life <sup>1/3/</sup>	3.2	MIL-I-983 and
Dielectric strength and insulation resistance clearances	3.2	MIL-I-983
Enclosure (Dripproof) <sup>4/</sup>	3.2, 3.4.2	MIL-I-983
Salt spray	3.2	MIL-I-983 and 4.6.7
Vibration (vital)	3.2	MIL-I-983
Shock	3.2	4.6.4

<sup>1/</sup> Test is not applicable to remote signal units, sentry alarm switch, special alarm connection box.

<sup>2/</sup> See 4.6.6 for transformer and rectifier load tests required during test.

<sup>3/</sup> Inclination angle - 60 degrees.

<sup>4/</sup> Test is not applicable to alarm panels.

4.3.1 Samples for qualification. One bulkhead-mounted or one deck-mounted alarm switchboard, one four-line alarm panel, one remote signal unit or one sentry alarm switch, and one special alarm connection box of each type for which qualification approval is desired shall be submitted for qualification tests. Qualification of any one type of remote signal unit or of the sentry alarm switch shall qualify all types of remote signal units and the sentry alarm switch.

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4.3.1.1 Extension of qualification approval. If a manufacturer desires qualification for various types and capacities of switchboards or alarm panels, qualification approval may be extended as follows:

## Approval extended to

IC/B52	IC/B51
IC/BCG52	IC/BCG51
IC/SCG	IC/BCG51 and IC/BCG52 panels
IC/SM50	IC/SM, all capacities except IC/SM4 which shall be qualified separately
IC/SFZ	IC/S4FZ

4.4 Sampling for quality conformance.

4.4.1 Lot. A lot shall consist of all equipment of the same type and size offered for delivery at one time and produced on the same facilities, using identical materials and manufacturing and assembly procedures.

4.4.2 Sampling for group A inspection. A random sample of equipments shall be selected from each inspection lot in accordance with Inspection Level II of MIL-STD-105 with an AQL of 3.5 percent defective.

4.4.3 Sampling for group B inspection. A random sample of equipments shall be selected from each inspection lot in accordance with Inspection Level II of MIL-STD-105 with an AQL of 7.5 percent defective.

4.5 Quality conformance inspection.

4.5.1 Group A inspection. The samples selected in accordance with 4.4.2 shall be subjected to the group A examination and tests shown in table II.

TABLE II. Quality conformance inspection.

Inspection <sup>1/</sup>	Requirement paragraph	Test reference
<u>Group A</u>		
General examination	3.2	MIL-I-983
Operating	3.3	4.6.1
Dielectric strength and insulation resistance clearances	3.2	MIL-I-983
<u>Group B</u>		
Supply line voltage variation <sup>2/3/</sup>	3.2, 3.3.8	MIL-I-983
<u>Group C</u>		
Endurance <sup>2/</sup>	3.3.10	4.6.2
Electromagnetic interference <sup>2/</sup>	3.3.12	4.6.5
Temperature <sup>2/3/</sup> and humidity <sup>2/</sup>	3.2	MIL-I-983 and 4.6.8
Accelerated life <sup>2/4/</sup>	3.2	MIL-I-983 and 4.6.3
Enclosure (Dripproof) <sup>5/</sup>	3.2, 3.4.2	MIL-I-983
Salt spray	3.2	MIL-I-983, 4.6.7
Vibration (vital)	3.2	MIL-I-983
Shock	3.2	4.6.4

<sup>1/</sup> Tests shall be performed, in general, in the order listed.

<sup>2/</sup> Test is not applicable to remote signal units, sentry alarm switch, special alarm connection box.

<sup>3/</sup> See 4.6.6 for transformer and rectifier load tests required during test.

<sup>4/</sup> Inclination angle - 60 degrees.

<sup>5/</sup> Test is not applicable to alarm panels.

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4.5.2 Group B. The samples selected in accordance with 4.4.3 shall be subjected to the group B tests shown in table II.

4.5.3 Group C. Group C tests will be required by the Naval Ship Engineering Center only when the basic design of the equipment or the material of a vital part has been changed. One complete equipment shall be selected and subjected to the group C tests shown in table II.

4.5.4 Rejection. The results of each test shall be compared with specification requirements. Failure to conform to this specification for any group A, B, or C test shall be counted as a defect and the equipment shall not be offered for delivery except under the criteria of section 6 of MIL-STD-105.

4.5.5 Quality conformance (group A and B) inspection report. The contractor shall prepare quality conformance inspection reports in accordance with the data ordering documents included in the contract (see 6.2.2).

#### 4.6 Test procedures.

4.6.1 Operating test. The operating test shall consist of connecting a resistor (6810-, 7000-, or 40,000-ohm as applicable) in turn to each line unit for checking supervisory circuits and of short circuiting the above resistor and of opening one side of each alarm line to check the alarm operation for a primary alarm condition and for a supervisory failure condition. The operating test shall include a test of each line unit switch for operation in each position and shall include a test of each switchboard control and alarm device. All alarm contacts and audible and visual signals shall be actuated for proper operation. To be acceptable, the alarm switchboard, alarm panel, remote signal unit, sentry alarm switch, or special alarm connection box shall perform within the limits specified in this specification for the entire operating test. The operating test of Drawing SS-402-1701749 shall be performed on the special alarm connection box.

#### 4.6.2 Endurance test.

4.6.2.1 All switchboards and alarm panels, except IC/SM switchboards. Except for IC/SM type, switchboards and alarm panels shall be energized with normal operating voltage. Resistors shall be placed across the line terminals of 10 lines of a switchboard and across four lines of a panel to simulate the system under supervised condition. After the switchboard or alarm panel has been energized continuously for 4 hours, and while energized, the rotary switches of the four associated lines shall be operated to the alarm test position and back to the normal position at a rate of 1 second in each position, for a period of 15 minutes each half hour, for 4 hours. Each pair of primary alarm contacts of two two-line alarm units shall be connected to a resistive load of 115 watts at 115 V a.c. during the above switching operation and shall demonstrate their ability to handle such a load without damage. For the IC/SCG switchboard, the extension signal relay shall demonstrate similar ability to make and break a resistive load of 3A at 28 V d.c. during these test, no derangement, damage or failure of operation shall occur and the temperature rise in the relay coils shall not exceed 17°C (30°F) above ambient temperature.

4.6.2.2 IC/SM switchboard. The IC/SM switchboard shall be energized with normal operating voltage. Resistors shall be placed across the line terminals of at least four lines to simulate the system under supervised condition. After the switchboard has been energized continuously for 4 hours, and while energized, the rotary switches of two operating line modules shall be operated to the alarm test position and back to normal position at a rate of approximately 1 second in each position for a period of 15 minutes each half hour for 4 hours. The other two lines shall be operated the same number of times by the shorting of their end-of-line resistors, and shall have their external alarm circuit contacts connected to a resistive load of 3 A at 28 V d.c. During these tests, no derangement, damage, or failure of operation shall occur.

4.6.3 Accelerated life test for all switchboards and alarm panels. During each 50-hour test period, an alarm condition shall be simulated on each module or line (alternately primary alarm and supervisory alarm; that is the first 50 hours primary alarm, second 50 hours supervisory alarm, third 50 hours primary alarm). This alarm shall run continuously for a period of 15 minutes after which the modules shall be reset to the normal position. The IC/E3D2 alarm may be operated in the audible or silenced mode. Throughout the accelerated life test, the switchboard or alarm panel shall be operate energized and as follows: For testing an IC/SM switchboard, at least four IC/M modules shall be operated connected to end-of-line resistors. For testing IC/SCG or IC/SP2 or IC/S4P2 switchboards, at least ten lines shall be operated connected to end-of-line resistors. For testing alarm panels, all lines shall be operated connected to end-of-line resistors. The inclination test portion of the accelerated life test may be abbreviated to 5 to 10 hours for each direction of inclination. During the accelerated life test, no derangement or damage or failure of operation shall occur.

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4.6.4 Shock. In shock testing the IC/SCG, SFZ or S4FZ type switchboards, five two-line alarm units shall be actual equipment, while the remaining lines may consist of weight compensated plates. The shock test shall be in accordance with MIL-I-983 for all types of switchboards and alarm panels. In shock testing the alarm panels, one complete type IC/B52 or IC/BCG52, as applicable, unit shall be tested. For the IC/SM switchboard, three modules shall be actual equipment while the remaining lines shall consist of weight compensated plates. To pass this test, the switchboard and alarm panel (immediately after the shock), shall be capable of normal operation and shall not have suffered any part or assembly coming adrift.

4.6.5 Electromagnetic interference. Tests shall be conducted in accordance with MIL-STD-462 to determine conformance with 3.3.12.

4.6.6 Transformer and rectifier load test for alarm switchboards and alarm panels. The transformer and rectifier shall be loaded according to 3.4.9 or 3.5.4 during the temperature test portion of the temperature and humidity test and during the supply line voltage test and shall meet the supervisory voltage requirement of 3.3.2, 3.3.3, 3.3.5, or 3.5 as applicable, and shall not sustain any failure or impairment of operation.

4.6.7 Salt spray test. The salt spray test shall be applied to finishes and coatings on parts and frame and enclosure structures as finally assembled for use. Sample corner structures and any other critical sections may be used for the test. The test will not be applied to the complete equipment. To pass the test, after completion of the test and cleaning, the metal of parts and structures shall not be visible through the finish or coating.

4.6.8 Humidity. The five-cycle (120-hour) humidity test of procedure IV of MIL-STD-810 (upper temperature  $149^{\circ}\text{F} \pm 9^{\circ}\text{F}$ ) shall be conducted in the manner specified in MIL-STD-810.

4.7 Preparation for delivery. The packaging, packing, and marking shall be inspected for compliance with section 5 of this specification.

## 5. PREPARATION FOR DELIVERY

(The preparation for delivery requirements specified herein apply only for direct Government procurements. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.3).

5.1 Preservation-packaging, packing and marking. The equipment and accessories, repair parts, manuals and data shall be preserved-packaged level A or C; packed level A, B, or C, as specified (see 6.2.1) and marked in accordance with MIL-E-17555.

## 6. NOTES

### 6.1 Intended use.

#### 6.1.1 Switchboards.

6.1.1.1 Types IC/SCG and IC/BCG switchboards. Types IC/SCG and IC/BCG switchboards are intended for use with combustion gas and smoke detectors, type IC/CG or IC/CGD.

6.1.1.2 Types IC/SFZ and IC/S4FZ alarm switchboards. Types IC/SFZ and IC/S4FZ alarm switchboards are intended for use with security systems. The switchboard combines features of both IC/S and IC/SM type of alarm switchboards; however, added features are employed to render the circuitry and mechanical components tamper-resistant.

6.1.1.3 Type IC/SM. Type IC/SM alarm switchboards are for uses not specifically requiring the IC/SCG, IC/BCG, IC/SFZ or IC/S4FZ (see 6.1.1.1 and 6.1.1.2).

6.1.2 Alarm panels. Alarm panels are intended for use in alarm systems where only two or four lines are required. Where a larger number of lines is required, a type IC/SM or type IC/SCG alarm switchboard should be used.

### 6.2 Ordering data.

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6.2.1 Procurement requirements. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type and quantity of switchboards and number of lines per switchboard required (see 1.2.1 and 3.4).
- (c) Type and quantity of alarm panels and remote signal units required (see 1.2.2 and 1.2.3.1).
- (d) Quantity of sentry alarm switches and special alarm connection boxes required (see 1.2.3.2 and 1.2.4).
- (e) Inventory control point for repair parts.
- (f) Levels of preservation-packaging, packing, and marking required (see 5.1).

6.2.2 Data requirements. When this specification is used in a procurement which incorporates a DD Form 1423 and invokes the provisions of 7-104.9(n) of the Armed Services Procurement Regulations, the data requirements identified below will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of ASPR-7-104.9(n) are not invoked, the data specified below will be delivered by the contractor in accordance with the contract requirements. Deliverable data required by this specification is cited in the following paragraphs:

<u>Paragraph</u>	<u>Data Requirement</u>	<u>Applicable DID</u>	<u>Option</u>
3.6	Manual, Technical, Standard Basic Issue	DI-V-2044	Type I of MIL-M-15071
3.6	Drawing, Engineering and Associated Lists Level 3(Production)	DI-E-7015	Type: Installation Design activity designation: By contractor. Drawing number: By contractor Delivery of hard copy: To procuring activity.
3.7	Provisioning Parts List	DI-V-2078	Option 4
4.5.5	Report Test/Inspection	DI-T-23473	

(Copies of data item descriptions required by the contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

6.3 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in Section 2 do not apply when material and parts are procured by the supplier for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.4 With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List QPL 17196 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts of orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Department of the Navy Washington DC, 20362 and information pertaining to qualification of products may be obtained from that activity.

6.4.1 Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6". Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

6.5 Changes from previous issue. The "#" symbol is not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

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# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

*(See Instructions – Reverse Side)*

1. DOCUMENT NUMBER

2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

 VENDOR USER MANUFACTURER OTHER (Specify): \_\_\_\_\_

b. ADDRESS (Street, City, State, ZIP Code)

## 5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

## 6. REMARKS

7a. NAME OF SUBMITTER (Last, First, MI) – Optional

b. WORK TELEPHONE NUMBER (Include Area Code) – Optional

c. MAILING ADDRESS (Street, City, State, ZIP Code) – Optional

8. DATE OF SUBMISSION (YYMMDD)

(TO DETACH THIS FORM, CUT ALONG THIS LINE.)