

MIL-P-8944A

~~11 December 1970~~

SUPERSEDING

MIL-P-8944 (ASG)

15 April 1968

## MILITARY SPECIFICATION

### PANELS, AIRPORT LIGHTING CONTROL, GENERAL SPECIFICATION FOR

This specification has been approved by the Department of the Air Force and by the Naval Air Systems Command.

#### 1. SCOPE

1.1 Scope. This specification covers control panels used in airport lighting installations.

1.2 Classification. Control panels shall be of the following classes, as specified (see 6.2):

- Class I - Basic airport lighting systems only 1/  
(MS23007-1, -11)
- Class II - Class I plus runway centerline, touchdown zone, taxiway centerline and taxiway edge brightness lighting (MS23007-2, -22)
- Class III - Class II plus optical landing system and approach flash monitor lights (MS23007-3, -33)

1/ Basic airport lighting includes beacons, obstruction lighting, wind direction indicators, approach, runway edge, and taxiway lights.

#### 2. APPLICABLE DOCUMENTS

- \* 2.1 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

##### Federal

PPP-B-601	Box, Wood, Cleated Plywood
PPP-B-636	Box, Fiberboard

FSC 6210

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Military

MIL-M-14 Molding Plastics and Molded Plastic Parts, Thermosetting  
 MIL-P-116 Preservation, Methods of

STANDARDSMilitary

MIL-STD-100 Engineering Drawing Practices  
 MIL-STD-129 Marking for Shipment and Storage  
 MIL-STD-130 Identification Marking of US Military Property  
 MIL-STD-808 Finishes, Protective, and Codes, for Finishing Schemes for  
 Ground and Ground Support Equipment  
 MIL-STD-831 Test Reports, Preparation of  
 MIL-STD-889 Metals, Definition of and Protection for Dissimilar  
 MIL-STD-1186 Cushioning, Anchoring, Bracing, Blocking, and Waterproofing,  
 with Appropriate Test Methods  
 MS23007 Panel Assemblies, Airport Lighting Control  
 MS24509 Circuit Breaker - Trip-Free, Aircraft Toggle, 3 through 35 Amps,  
 Type I, Size C  
 MS24510 Circuit Breaker - Trip-Free, Aircraft, Push-Pull, 3 through  
 35 Amps, Type I, Size C  
 MS25002 Switch, Rotary, 28/115 Volts  
 MS91528 Knob-Control, Plastic (Round, Concentric, Pointer, Spinner,  
 Spinner Slip Clutch, Bar, Tactile, Knob Lock Pointer, and  
 Control Locks)

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

2.2 Other publication. The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on the date of invitation for bids or request for proposal shall apply.

National Fire Protection Association

Pamphlet 70 National Electrical Code (Electric Wiring and Apparatus)

(Application for copies should be addressed to the National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts 02110.)

## 3. REQUIREMENTS

\*\* 3.1 Preproduction. This specification makes provisions for preproduction testing.

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### 3.2 Materials

- \* 3.2.1 Dissimilar metals. Unless protected against electrolytic corrosion, dissimilar metals shall not be used in intimate contact with each other. When used, dissimilar metals shall be in accordance with MIL-STD-889.
- \* 3.2.2 Fungus-proof materials. Materials that are nutrients for fungi shall not be used where it is practical to avoid them. When used, they shall be treated with a fungicidal agent acceptable to the procuring activity.

3.3 Use of commercial parts. Bolts, nuts, washers, cotter pins, lockrings, and similar fastening devices used for assembly, may be selected from commercial sources, provided military or other standard parts are not specifically required by this specification or associated standards. If such commercial parts are used, they shall be replaceable by military standard (MS) parts without alteration. The corresponding MS part numbers are to be referenced in the parts list, and on the contractor's drawings.

3.4 Design and construction. Unless otherwise specified (see 6.2), the design of the control panel shall be as specified herein and in accordance with the applicable MS (see 1.2). Each panel shall be so designed and constructed that no part will work loose in service. Each panel shall withstand the normal strains, jars, vibrations, and other conditions incident to shipping, storage, installation, and service.

- \* 3.4.1 Optional design. Minor changes in the design of the panel may be made provided performance and interchangeability are not affected and the design changes are approved by the procuring activity.

3.4.1.1 Design conditions. The panel shall be designed for continuous operation in the control tower or airport lighting vault at an ambient temperature from  $-20^{\circ}$  to  $+55^{\circ}\text{C}$  and 90 to 125V, 60 Hz.

### 3.5 Details of components

3.5.1 Chassis and flange. The chassis and flange shall be constructed in accordance with MS23007. The chassis and flange shall be so fabricated of sheet steel that the flange may be securely attached to the outer case or mounted in an airport control tower console, when required. The dimensions and mounting holes shall be within the tolerances shown on MS23007. A lug shall be provided inside the chassis for attachment of a No. 8 (AWG) grounding wire. To facilitate entrance of necessary cables into the chassis at installation, the bottom and back of the chassis may be open, skeleton in construction, or provided with suitable and sufficient openings.

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3.5.2 Top panel. A metal top panel shall be securely fastened to the chassis by means of a continuous piano hinge. The hinge and pin shall be fabricated of corrosion-resistant steel and shall be not less than 1/8 inch thick and 1-1/2 inches wide with a pin 1/8 inch in diameter. Control components, cards, and plastic covers shall be mounted and positioned on the panel as shown on MS23007.

3.5.2.1 Top panel support. The top panel shall be provided with a positive latching support to hold the control panel up and away from the chassis to permit installation, inspection, and maintenance. The support shall be placed on the left side and shall not interfere with any items on the panel assembly. The support shall allow the panel to open and latch at a minimum of 125° with respect to the frame.

3.5.2.2 Plastic covers. Individually removable transparent plastic covers shall be provided for each card installed on the panel. Material, size, and installation shall be as shown on MS23007.

3.5.3 Outer case. When applicable, a readily removable outer case shall be provided for each control panel. The case shall be constructed of sheet steel and shall conform to MS23007. Six knockouts for 1-inch conduit shall be provided in the back and bottom of the case to permit cable entry to the panel chassis. Spacing of the knockouts shall permit the use of 1-inch conduit bushings and lock nuts.

3.5.4 Runway selector switch. The runway selector switch shall be a rotary, snap-action switch of the enclosed type in accordance with MS25002-4 and modified to accommodate the switch positions and circuitry as shown on MS23007. It shall be double-pole, eight-position, no "off", with contact positions 45° apart. The switch shall be rated at not less than 5 amps, 125V ac, 60 Hz. The runway selector switch shall be mounted on the top panel as shown on the MS, and the markings shall be as specified. Eight unmarked index points shall be provided for numbering the blank spaces at installation. A control knob in accordance with MS91528 with dull black finish shall be provided with the switch.

3.5.5 Brightness selector switches. The brightness selector switches shall be of the rotary, snap-action enclosed type, single-pole, five-position, no "off", with contact positions 45° apart in accordance with MS25002-1 modified to accommodate the switch positions and circuitry as shown on MS23007. The switches shall be rated at not less than 5 amps, 125V ac, 60 Hz. The brightness selector switches shall be mounted on the top panel as shown on the MS, and the markings shall be as specified. A control knob in accordance with MS91528 with dull black finish shall be provided with each switch.

3.5.6 Circuit breakers. Circuit breakers shall be push-pull type in accordance with MS24510-15 and toggle type in accordance with MS24509-5, and shall be mounted as shown on MS23007.

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3.5.7 Push-pull switches. Single-pole, single-throw taxiway switches shall be provided for installation on the field facsimile but shall not be mounted on the panel. The taxiway switch leads shall be connected to proper terminals on the terminal blocks. The switches shall be of the push-pull snap type, rated at not less than 3 amps, 125V ac, 60 Hz and shall be in accordance with MS23007. Sufficient threads shall be provided in the switch body and in the adapter to permit secure mounting. The switches shall be provided with leads at least 36 inches long. Insulated sleeves shall be used at the switch terminal and shall be firmly secured.

3.5.8 Terminal boards. Terminal points shall consist of 300-V, 10-amp minimum sectional terminal boards as required. Terminal boards shall be suitable for mounting on channel, and shall be contact screw and clamp type, accommodating up to No. 12 AWG wire. Terminal boards shall accommodate marking strips, and each terminal board shall be marked with its terminal designations as shown on MS23007. Terminal boards shall be mounted on channel inside the chassis for all external leads and internal connections required at installation. Barrier compound material of boards shall be in accordance with MIL-M-14, type CFG.

3.5.8.1 Termination points. Terminal board installation shall provide for the following number of terminal points (connections) for the class selected:

- a. Class I lighting system requires 69 terminal points, including spares
- b. Class II lighting system requires 100 terminal points, including spares
- c. Class III lighting system requires 107 terminal points, including spares.

3.5.9 Warning buzzer. A warning buzzer as shown on MS23007 shall be mounted on the underside of the top panel, below the circuit breakers.

3.5.10 Wiring. Wiring shall be in accordance with MS23007. All wires shall have stranded conductors and flame-retardant synthetic insulation and jacket with insulation rating of 600V. All wires shall be No. 16 AWG, except wiring to the circuit breakers and bus shall be No. 12 AWG, and wiring to taxiway switches used on the facsimile shall be No. 18 AWG. All wiring, except those connected to the taxiway switches, shall be properly formed and cabled. The cable length shall be sufficient to permit opening top panel to a minimum of 125° with respect to the frame. Wire shall be in accordance with National Electrical Code, type T.

### 3.6 Performance

3.6.1 Control panel, mechanical. When panels are tested as specified in 4.6.2.1, all dimensions shall be as specified on MS23007. There shall be no sticking or slipping of the top panel latch.

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3.6.2 Control panel, electrical. When panels are tested as specified in 4.6.2.2, there shall be no malfunction of switches, lights, circuit breakers, or damage to the wiring.

3.6.3 Insulation resistance. When panels are tested as specified in 4.6.3, there shall be no arcing or burning of the insulation and no damage to any component of the panel.

3.6.4 Taxiway switches. When switches are tested as specified in 4.6.4, they shall be capable of operation without mechanical or electrical damage to the switch or any panel component.

### 3.7 Operational markings

3.7.1 Installation instructions. Installation instructions, a panel wiring diagram for the class of panel furnished, and a figure illustrating a typical complete field facsimile shall be furnished with each panel.

3.7.2 Instruction card. A laminated plastic airfield lighting instruction card shall be furnished with each panel. The card shall be a minimum size of 7-7/8 by 7-7/8 inches, shall have rounded corners of 1/4-inch radius minimum, and shall have two tubular rivets located near the top and bottom center of the card. The rivets shall be of a size to accommodate No. 10 screws. The paper used shall be of a quality suitable for the purpose and a gray color matching the cards installed on the panel. The following information and the data shown in table I shall be included on the card, using a letter size of not less than 12 points.

3.8 Part numbering of interchangeability parts. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The item identification and part number requirements of MIL-STD-100 shall govern the manufacturer's part numbers and changes thereto.

3.9 Finishing. Cleaning and painting shall be in accordance with finish code FF-908, type 1 of MIL-STD-808, except the finish shall be in accordance with a high grade commercial black lusterless wrinkle finish enamel.

3.10 Identification of product. Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130, except that serial and contract numbers need not be included.

3.11 Workmanship. All components, including parts and assemblies shall be fabricated and finished in a thoroughly workmanlike manner. Particular attention shall be given to neatness and thoroughness of soldering, wiring, marking of parts and assemblies, welding, brazing, painting, riveting, machine screw assemblies, and freedom from burrs and sharp edges.

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TABLE I. Recommended Brightness Control Position

Visibility Condition	Medium Intensity Runway	High Intensity Runway	Approach or Overrun
Day, 1 mile or less	5 <u>1/</u>	5	5
Day, 1 to 3 miles	5 <u>1/</u>	4	4
Day, over 3 miles	Off	Off	Off
Night, 1/4 mile or less	5 <u>1/</u>	5	5
Night, 1/4 to 1/2 mile	5 <u>1/</u>	4	5
Night, 1/2 to 1 mile	4	3	4
Night, 1 to 3 miles	3	2	3
Night, over 3 miles	2	1	2

1/ Use runway having high intensity light, if possible.

- (1) Do not leave lights on position 5, except when actually needed for landing or takeoff.
- (2) Do not change brightness during landing or takeoff.
- (3) Brightness settings are for pilot's benefit, and should be changed in accordance with any radio request from pilot of approaching aircraft.
- (4) For twilight, or very dark days, intermediate settings between the day and night recommendations may be used at the discretion of the control tower operator.
- (5) During snow, frost, or icing conditions, lights may be operated continuously on position 3 or 4 to facilitate snow removal and melt ice on lenses.
- (6) For additional information see T.O. 35F5-3-1-1.

3.12 Cleaning. All components shall be thoroughly cleaned. Loose, spattered, or excess solder; metal chips; and other foreign material shall be removed.

#### 4. QUALITY ASSURANCE PROVISIONS

- \* 4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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.

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\* 4.2 Classification of tests. The inspection and testing of the panel shall be classified as follows:

- a. Preproduction testing . . . . . See 4.4
- b. Acceptance tests . . . . . See 4.5.

4.3 Test conditions. Unless otherwise specified, all tests shall be performed at room temperature (approximately 25°C).

\* 4.4 Preproduction testing (see 6.2)

\* 4.4.1 Test sample. The test sample shall consist of one panel representative of the production equipment.

\* 4.4.2 Test report. Upon completion of the preproduction tests, a test report shall be prepared in accordance with MIL-STD-831 and three complete copies of the report furnished to the procuring activity.

\* 4.4.3 Preproduction tests. The preproduction tests shall consist of all the tests described under 4.6.

\* 4.5 Acceptance tests. The acceptance tests shall consist of the individual tests.

4.5.1 Individual tests. Each panel shall be subjected to the following tests as described under 4.6:

- a. Examination of product . . . . . See 4.6.1
- b. Control panel tests . . . . . See 4.6.2
- c. Dielectric withstanding voltage . . . . . See 4.6.3.

4.6 Test methods

4.6.1 Examination of product. Each panel shall be examined to determine compliance with this specification with respect to materials, workmanship, finish, and marking.

4.6.2 Control panel tests

4.6.2.1 Mechanical. Each panel shall be inspected to determine that the mounting dimensions and spacing between the switches and circuit breakers are in accordance with MS23007. The opening and latching of the top panel shall be inspected for proper operation.



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4.6.2.2 Electrical. Each panel shall be operated to determine that all electrical units function properly and that all wiring connections are properly made.

4.6.3 Dielectric withstanding voltage. The panel shall withstand, without damage, a potential of 1,500V ac rms at commercial frequencies or 2,000V dc, applied between each terminal of each switch and circuit breaker and the grounded metal parts for a period of 1 minute.

4.6.4 Taxiway switches. It shall be demonstrated by the switch manufacturer that switches supplied meet the requirements of MS23007. Two representative switches from each manufacturer of switches to be supplied on the order shall pass a life test of 10,000 operating cycles with a connected inductive load of 3 amps, 80 percent power factor, 125V, 60 Hz. Test data certifying the above shall be included in the test report.

4.7 Inspection of preparation for delivery. The inspection of the preservation, packaging, packing, and marking for shipment and storage shall be in accordance with section 5 herein.

## 5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. Preservation and packaging shall be level A or C, as specified (see 6.2).

5.1.1 Level A. Airport lighting control panels shall be preserved and packaged one each in accordance with method II of MIL-P-116. Unit containers shall conform to PPP-B-636.

5.1.2 Level C. Airport lighting control panels shall be preserved and packaged in a manner which will afford protection against corrosion, deterioration, and physical damage during shipment from the supply source to the first receiving activity for immediate use. This level may conform to the supplier's commercial practice when such meets the requirements of the level.

5.2 Packing. Packing shall be level A, B, or C, as specified (see 6.2).

5.2.1 Level A. Airport lighting control panels, preserved and packaged as required by the contract or order, shall be packed in wood cleated-plywood shipping containers conforming to PPP-B-601, overseas type. As far as practicable, shipping containers shall be similar in shape and size, shall contain identical quantities, and shall be of minimum cube and tare consistent with the protection required. Container closure and strapping shall be in accordance with the appendix to PPP-B-601.

5.2.2 Level B. Level B shall be the same as level A, except the shipping containers shall conform to PPP-B-601, domestic type.

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5.2.3 Level C. Airport lighting control panels shall be packed in a manner which affords adequate protection against damage during direct shipment from the supply source to the first receiving activity for immediate use. This level shall conform to applicable carrier rules and regulations and may be the supplier's commercial practice when such meets the requirements of this level.

5.3 Physical protection. When level A or B packing applies (5.2.1 or 5.2.2) individually preserved and packaged panels shall be cushioned, blocked, and braced within the shipping container in compliance with MIL-STD-1186.

5.4 Marking. In addition to any special marking required by the contract or order (see 6.2), interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129.

## 6. NOTES

6.1 Intended use. The control panel is intended to provide control of airport lighting circuits in control towers and lighting vaults.

\* 6.2 Ordering data. Procurement documents should specify:

- a. Title, number, and date of this specification
- b. Class and MS part No. (see 1.2)
- c. Components (if any) in addition to those specified for the class ordered (see 3.4)
- d. Location and conditions for preproduction testing (see 4.2)
- e. Selection of applicable levels of preservation, packaging, and packing (see 5.1 and 5.2)
- f. Special markings (see 5.4).

\* 6.3 Identification of changes. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This has been done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:  
Navy - AS  
Air Force - 11

Preparing activity:  
Air Force - 11

Reviewer activities:  
Navy - AS  
Air Force - 82

Project No. 6210-F400

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 22-R255
<p><b>INSTRUCTIONS:</b> This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.</p>		
SPECIFICATION		
ORGANIZATION		
CITY AND STATE		CONTRACT NUMBER
MATERIAL PROCURED UNDER A <input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO (If "yes", in what way?)		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity - Optional)		DATE

DD FORM 1426  
JAN 66

REPLACES EDITION OF 1 OCT 64 WHICH MAY BE USED.

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