



# Advisory Circular

---

**Subject:** Specification for L-821, Panels  
for the Control of Airport Lighting

**Date:** Draft

**AC No:** 150/5345-3H

**Initiated By:** AAS-100

**Change:**

1    1    **Purpose.**

2        This advisory circular (AC) provides the specified manufacturing requirements for  
3        panels used for remote control of airport lighting and auxiliary systems.

4    2    **Effective Date.**

5        Effective six months after the issue date of this AC, only that equipment qualified in  
6        accordance with the specifications herein will be listed in accordance with AC  
7        150/5345-53, Airport Lighting Equipment Certification Program.

8    3    **Cancellation.**

9        AC 150/5345-3G, *Specification for L-821 Panels for Remote Control of Airport*  
10       *Lighting*, dated September 29, 2010, is canceled.

11   4    **Application.**

12       The Federal Aviation Administration (FAA) recommends the guidelines and standards  
13       in this Advisory Circular for L-821 Airport Lighting Panels. In general, use of this AC  
14       is not mandatory. However, use of this AC is mandatory for all projects funded with  
15       federal grant monies through the Airport Improvement Program (AIP) and with revenue  
16       from the Passenger Facility Charges (PFC) Program. See Grant Assistance No. 34,  
17       “Policies, Standards, and Specifications,” and PFC Assurance No.9, “Standards and  
18       Specifications.”

19   5    **Principal Changes.**

20       The AC incorporates the following principal changes:

- 21       1. **Paragraph 3.4.5 - Changed “mandatory” Emergency Generator Control Switch to**  
22       **“optional”.**
- 23       2. Updated the format of the document (**including figures**) in this version, and made  
24       minor editorial changes throughout.

25           Hyperlinks (allowing the reader to access documents located on the internet and to  
26           maneuver within this document) are provided throughout this document and are  
27           identified with underlined text. When navigating within this document, return to the  
28           previously viewed page by pressing the “ALT” and “ ←” keys simultaneously.

29           Figures in this document are schematic representations and are not to scale.

30    **6           Use of Metrics.**

31           Throughout this AC, U.S. customary units are used followed with “soft” (rounded)  
32           conversion to metric units. The U.S. customary units govern.

33    **7           Where to Find this AC.**

34           You can view a list of all ACs at  
35           [http://www.faa.gov/regulations\\_policies/advisory\\_circulars/](http://www.faa.gov/regulations_policies/advisory_circulars/). You can view the Federal  
36           Aviation Regulations at [http://www.faa.gov/regulations\\_policies/faq\\_regulations/](http://www.faa.gov/regulations_policies/faq_regulations/).

37    **8           Feedback on this AC.**

38           If you have suggestions for improving this AC, you may use the Advisory Circular  
39           Feedback form at the end of this AC.

John R. Dermody  
Director of Airport Safety and Standards

## CONTENTS

Paragraph	Page
40 Chapter 1. SCOPE AND CLASSIFICATION. ....	1-1
41     1.1 Scope.....	1-1
42     1.2 Equipment Classification.....	1-1
43 Chapter 2. REFERENCED DOCUMENTS. ....	2-1
44     2.1 General.....	2-1
45     2.2 FAA Advisory Circulars.....	2-1
46     2.3 Federal Standards.....	2-1
47     2.4 Military Standards.....	2-1
48 Chapter 3. GENERAL EQUIPMENT REQUIREMENTS. ....	3-1
49     3.1 General Requirements.....	3-1
50     3.2 Location. ....	3-1
51     3.3 Panel Configurations.....	3-1
52     3.4 Panel Components. ....	3-2
53 Chapter 4. MODE 2, LAND AND HOLD SHORT OPERATIONS (LAHSO)	
54     CONTROL PANELS.....	4-1
55     4.1 LAHSO Lighting Systems. ....	4-1
56     4.2 General Requirements.....	4-1
57     4.3 Multiple LAHSO Systems on Separate Runways. ....	4-1
58     4.4 Multiple LAHSO Systems on the Same Runway.....	4-1
59 Chapter 5. MODE 3, STOP BAR CONTROL PANELS. ....	5-1
60     5.1 General Requirements.....	5-1
61     5.2 Stop Bar Panel Configuration. ....	5-2
62     5.3 Stop Bar Control Panel Design.....	5-2
63 Chapter 6. EQUIPMENT QUALIFICATION REQUIREMENTS.....	6-1
64     6.1 Qualification Procedures.....	6-1
65     6.2 Qualification Tests. ....	6-1
66 Chapter 7. PRODUCTION TEST REQUIREMENTS.....	7-1
67     7.1 Production Tests.....	7-1

**CONTENTS**

<b>Paragraph</b>	<b>Page</b>
68 Appendix A. Stop Bar Panel Push Button Descriptions .....	A-1
69 Appendix B. Terms.....	B-1
70 Appendix C. Approval of Alternative Panel Labeling. ....	C-1
71 Appendix D. Figures.....	D-1

72 **FIGURES**

73 Figure D-1. Abbreviations, Legend and Brightness Steps.....	D-1
74 Figure D-2. Typical Conventional Lighting Control Panel Layout I.....	D-2
75 Figure D-3. Typical Conventional Lighting Control Panel Layout II .....	D-3
76 Figure D-4. Sample Class W Control Panel Layout .....	D-4
77 Figure D-5. Sample Control Panel with Push Button Switches.....	D-4
78 Figure D-6. Sample Customized Lighting Control Panels .....	D-5
79 Figure D-7. Sample Back-lighted Facsimile Lighting Control Panel.....	D-6
80 Figure D-8. Typical Case Layouts .....	D-7
81 Figure D-9. Typical Wiring Diagram for Conventional Lighting Control Panels.....	D-8
82 Figure D-10. Typical Switch Connections for Lighting Control Panels .....	D-9
83 Figure D-11. Typical Switch Connections for Lighting Control Panels (cont.).....	D-10
84 Figure D-12. Typical Land and Hold Short Lighting Control Panel .....	D-11
85 Figure D-13. Typical Stop Bar Control Panel .....	D-12

86

87 **TABLES**

88 Table A-1. Stop Bar Panel Push Button Descriptions. ....	A-1
---	-----

89

90

**CHAPTER 1. SCOPE AND CLASSIFICATION.**91 1.1 **Scope.**

92 This specification sets forth the manufacturing requirements for panels to be used to  
 93 control various airport lighting and auxiliary systems.

94 1.2 **Equipment Classification.**

95 Three types, three classes, three styles, and three modes of panels are covered by this  
 96 specification.

97 1.2.1 Type.

98 Panels of the following types are covered by this specification:

Type	Description
<b>I</b>	Conventional panels. (See illustrations in Appendix D, <a href="#">Figure D-2</a> , <a href="#">Figure D-3</a> , <a href="#">Figure D-4</a> , <a href="#">Figure D-5</a> , and <a href="#">Figure D-6 Detail A</a> ).
<b>II</b>	Facsimile panels. (See illustrations in Appendix D, <a href="#">Figure D-6 Detail B</a> and <a href="#">Figure D-7</a> ).
<b>III</b>	Mimic or PLC based panel.

99 1.2.2 Class.

100 Panels of the following classes are covered by this specification:

Class	Description
<b>F</b>	Flush mounted panels. Class F panels consist of a top plate attached to a case which is installed in a console in the airport control station (desk, counter, etc.) with the top plate flush with the surface of the control station. A typical case is shown in Appendix D, <a href="#">Figure D-8</a> .
<b>S</b>	Surface mounted panels. Class S panels consist of a top plate and case for installation on an airport control station (desk, counter, etc.). A typical case is shown in Appendix D, <a href="#">Figure D-8</a> .
<b>W</b>	Wall or surface mounted panels. Class W panels consist of a top plate and a commercial outlet or pull box for mounting in an electrical vault or other convenient control point at a small airport. A typical panel top plate is shown in Appendix D, <a href="#">Figure D-4</a> .

101 1.2.3 Style.

102 Panels of the following styles are covered by this specification:

<b>Style</b>	<b>Description</b>
<b>1</b>	Unlighted.
<b>2</b>	Backlighted.
<b>3</b>	Touchscreen.

103 1.2.4 Mode.

104 Panels of the following modes are covered by this specification:

<b>Mode</b>	<b>Description</b>
<b>1</b>	Generic Panel. I.e. main lighting control panel. (See sample panels in <a href="#">Appendix D, Figure D-2</a> , <a href="#">Figure D-3</a> , <a href="#">Figure D-4</a> , <a href="#">Figure D-5</a> , <a href="#">Figure D-6</a> and <a href="#">Figure D-7</a> ).
<b>2</b>	Land and Hold Short Operations (LAHSO) Control Panel. (See illustration in <a href="#">Appendix D, Figure D-12</a> ).
<b>3</b>	Stop Bar Control Panel. (See illustration in <a href="#">Appendix D, Figure D-13</a> ).

105 **CHAPTER 2. REFERENCED DOCUMENTS.**106 2.1 **General.**

107 The following is a listing of documents referenced in this AC.

108 2.2 **FAA Advisory Circulars.**

109 Use the current versions of the following ACs:

110 AC 150/5340-30 *Design and Installation Details for Airport Visual Aids*111 AC 150/5345-28 *Precision Approach Path Indicator (PAPI) Systems*112 AC 150/5345-53 *Airport Lighting Equipment Certification Program*113 AC 120-57 *Surface Movement Guidance and Control Systems*

114 Electronic copies of FAA Advisory Circulars may be obtained from:

115 [www.faa.gov/airports/resources/advisory\\_circulars/](http://www.faa.gov/airports/resources/advisory_circulars/)116 2.3 **Federal Standards.**117 FED-STD-595C *Colors Used in Government Procurement*

118 Electronic copies of Federal standards and specifications may be obtained from:

119 [www.dsp.dla.mil](http://www.dsp.dla.mil)120 2.4 **Military Standards.**121 MIL-STD-810F *Environmental Engineering Considerations and Laboratory Tests*

122 Copies of Military Standards may be obtained from:

123 <https://www.atec.army.mil/index.html>

Page Intentionally Blank

124

**CHAPTER 3. GENERAL EQUIPMENT REQUIREMENTS.**

125 3.1

**General Requirements.**

126

The panels specified herein are intended for use in controlling various lighting and auxiliary systems as described in the documents listed in paragraph 2.2.

127

128 3.2

**Location.**

129

The panels are generally installed in airport traffic control towers (ATCT). Airports without ATCTs should install panels at a convenient control location such as a hangar, office, or electrical vault.

130

131

132 3.3

**Panel Configurations.**

133

Each control panel layout must clearly identify the “ON” and “OFF” position of each switch or push button, the system each switch or push buttons controls, and, where appropriate, the intensity of the lighting system. Panel layouts **may be configured to address** airport specific requirements. Panel lighting, including panel backlighting and illuminated switches, must be **visible** when direct sunlight falls on the panel. Some examples of typical panel layouts using different switches and arrangements are shown in Appendix D of this specification. The figures are provided to show examples.

134

135

136

137

138

139

140

141

**Actual design** to the figures may not ensure that the panels comply with all applicable portions of this specification.

142 3.3.1

Type I, Conventional Panels.

143

Switching of airport lighting and auxiliary systems may be accomplished in several ways. Figures are provided in Appendix D of this AC to show some typical control panels. Other panel configurations will comply with this specification. The following table includes a description of the sample control panels illustrated in this AC:

144

145

146

Figure	Description
<u>Figure D-2</u> and <u>Figure D-6</u> Detail A	Panel layouts with toggle switches for system controls with the exception of some intensity setting controls. Some of the system intensity settings are controlled with the five-position rotary switches.
<u>Figure D-3</u> and <u>Figure D-4</u>	Panel layouts with rotary switches for runway and/or taxiway lighting systems controls, including intensity settings, and toggle switches for other system controls.
<u>Figure D-5</u>	Panel layout with all push button switches for system controls.

147 3.3.2

Type II, Facsimile Panels.

148

Type II panels will primarily be Class F (flush mounted) panels. The layout of airport operating surface being controlled must be engraved, painted, or overlaid by decal on the panel. Such surfaces include, but are not limited to, runways and taxiways. Other

149

150

151 methods of labeling panel plates may be acceptable but must be approved by the FAA  
152 or the third-party certification bodies listed in [AC 150/5345-53](#) providing certification  
153 of the particular panel. (Approval method is described in [Appendix C.](#)) Type II, Style 2,  
154 panel plates must have appropriate facsimile sections of the airport surface back-lighted.  
155 **because** the switch that controls a **given** system **must be** activated (turned “ON”). When  
156 the system is de-activated (turned “OFF”) the backlighting must not be illuminated.  
157 Individual lighting sections controlled by various switches must be color coded.  
158 [Appendix D](#), [Figure D-6 Detail A](#) and [Figure D-7](#) illustrate examples of the Type II,  
159 Style 2 panels. The shaded taxiways would appear in various colors and illuminate  
160 when the associated lighting circuit is activated.

### 161 3.3.3 Type III, Style 3 Touchscreen Panels.

162 Type III, Style 3 touch screen panels may be either a flush mount or mounted to a  
163 desktop stand. The touch screen panel must be designed for frequent use and resistant  
164 to failure **due to** scratches. The minimum acceptable touch screen size must be 12.1  
165 inches (307 mm) (measured diagonally) with a minimum physical resolution of **1366** by  
166 **768** pixels.

## 167 3.4 **Panel Components.**

### 168 3.4.1 Panel Plate.

169 Class F and S panel plates must be made of 0.094-inch (2.5 mm) steel or of other  
170 material of thickness or design that will provide like stiffness. The plate is to be  
171 attached to the case with a continuous hinge along its top edge. A latch must be  
172 mounted inside the case to provide support when the panel plate is open and at a near  
173 vertical position. No part of the plate or its attachments should project behind the plane  
174 of the back of the case during opening or closing. The panel plate for Class W panels  
175 may be a commercially available utility or outlet box cover that is usually attached to  
176 the case or box with screws. Therefore, for Class W, panels a latch and/or hinge is not  
177 required. (Not applicable to Type III, Style 3)

### 178 3.4.2 Case or Box.

179 Class F and S panels must have a suitable case made of not less than 0.078-inch (2 mm)  
180 (nominal) sheet steel or aluminum of equal rigidity (see [Figure D-8](#) for examples).  
181 Commercially available outlets or pull boxes may be provided in lieu of a manufactured  
182 case for Class W panel plates. A grounding lug, capable of handling no. 12 AWG or  
183 larger conductor, must be supplied in each case or box. (Not applicable to Type III,  
184 Style 3)

### 185 3.4.3 Switches.

186 Switches are used to turn “ON” and “OFF” airport lighting **power sources**, beacons,  
187 obstruction lights, lighted wind indicators, apron lights, emergency power generators,  
188 and various lighting systems. Additionally, switches are used to control the intensity of  
189 intensity controlled lighting systems. The switches may be wired, programmed, or  
190 ganged for simultaneous operation of several lighting system circuits. Switches must

191 have a contact rating of 125% of the load current and must be rated to meet the circuit  
192 voltage requirements. The life expectancy of the switches, at rated load, must be at  
193 least 25,000 operations. Switches must have screw, solder, or push-on type terminals.  
194 Typical switches are shown on panel layouts in [Figure D-2](#), [Figure D-3](#), [Figure D-4](#),  
195 [Figure D-5](#), [Figure D-6](#), [Figure D-7](#), [Figure D-12](#) and [Figure D-13](#).

#### 196 3.4.3.1 **Toggle Switches.**

197 Toggle switches must have either two or three positions and, for most  
198 applications, **have a** detent to provide positive-feel switching. Switches  
199 must be mounted to operate left to right and wired such that when the  
200 switch is in the **far-left** position the lighting system is either “OFF” or  
201 “ON” with the intensity set to the lowest intensity. Switches must be  
202 mounted on the panel plate with a hexagonal nut above and below the  
203 panel plate using an internal-tooth lock-washer and a locking ring or  
204 keyed punched panel to assure permanent mounting. (Not applicable to  
205 Type III, Style 3.)

#### 206 3.4.3.2 **Rotary Switches.**

207 Rotary switches, used for the control of lighting systems, must have three  
208 to six distinct positions with the appropriate number of poles to control the  
209 lighting system intensity. If required by the user, the rotary switch must  
210 provide a pole to turn the systems “OFF.” The switches must have a  
211 minimum angular throw of 30 degrees between detents and be equipped  
212 with a stop to prevent rotation past the last position. The switches must  
213 rotate between detents in either direction without stopping. (Not  
214 applicable to Type III, Style 3)

#### 215 3.4.3.3 **Push Button Switches.**

216 Momentary or alternate action push button switches may be used to  
217 control any or all functions of airport lighting and auxiliary systems. The  
218 use of push button switches for intensity control will require auxiliary  
219 relays or non-radio interference solid state circuitry. Switches must be  
220 wired so that when initially energized, the intensity setting of an intensity  
221 controlled lighting system is the lowest available intensity. When an  
222 intensity controlled lighting system is de-energizing, the intensity setting  
223 must automatically return to the lowest intensity. Illuminated push  
224 buttons should be **dimly** backlit in an “OFF” position, and glow noticeably  
225 brighter in the “ON” position. A sample panel illustrating push button  
226 controls is shown in [Appendix D](#), [Figure D-5](#). (Not applicable to Type III,  
227 Style 3)

#### 228 3.4.4 **Backlighting.**

229 Backlighting of facsimile panels, switches, or switch designations must be made with  
230 light sources with a life expectancy of at least 10,000 hours. A control to reduce the  
231 brightness of the panel backlighting up to 90 percent must be provided. This brightness  
232 control must not cause radio interference. A control must be provided on each panel to

233 test the panel lamps and illuminated switches. Monitor dimming control function must  
234 be provided on touchscreen.

235 3.4.5 Emergency Generator Control.

236 Airport main lighting control panels must include an optional emergency generator  
237 control switch that will transfer the power load from the main power supply to the  
238 emergency generator and a red pilot light that illuminates when the power load has been  
239 switched to the emergency generator.

240 3.4.6 Wire and Wiring.

241 The wire must have stranded copper conductors with adequate current capacity and a  
242 minimum rated insulation of 90° C. The wire size and insulation voltage rating must be  
243 suitable for the design voltage and load. For identification purposes, all wires must be  
244 either color coded or identified with wire markers. Wire markers must be fixed such  
245 that they cannot be accidentally removed and that they remain legible under normal  
246 conditions. All leads must be properly strained and long enough to allow the plate to be  
247 raised to the extent permitted by the latch. All panels must be wired with terminal  
248 connections in accordance with the applicable combination of components. [Figure D-9](#)  
249 shows the wiring diagram of the sample panel shown in [Figure D-2](#).

250 3.4.7 Terminal Blocks.

251 Terminal blocks must be pressure type and have a minimum rating equal to or greater  
252 than the rating of the wire. Each individual terminal must be identified with permanent  
253 marks in accordance with the wiring diagram furnished with the unit. Terminal blocks  
254 may be omitted in Class W panels.

255 3.4.8 Marking.

256 Switch designations must be marked in characters not less than 3/16 inch (0.5 cm) and  
257 not over 5/16 inch (0.8 cm) high, formed by engraving, etching, or stamping. Unlighted  
258 characters must be permanently marked. Markings must be a contrasting color from the  
259 marked surface, i.e. white surface with black marking, or black surface with white  
260 marking. Markings must be placed either on the panel or on a small separate plate  
261 securely fastened to the panel. When push button switches are used, the marking may  
262 be on the switch itself but must be visible when the push button is in the "ON" or  
263 "OFF" position. (Not applicable to Type III, Style 3)

264 3.4.9 Painting.

265 For Type F and S panels, the color and gloss of the case and panel plate must conform  
266 to Federal Standard 595, brown No. 30372. Apply a hard, paint finish having a smooth  
267 texture, i.e. powder coating, baked epoxy, etc. The finished surface of the panel must  
268 be suitable for indoor use and provide protection against circulating dust, falling dirt,  
269 and dripping non-corrosive liquids. An acceptable finish surface must be free of runs,  
270 sags, etc. For Class W panels, the commercially applied finish to the utility box and  
271 cover will be acceptable. (Not applicable to Type III, Style 3)

272 3.4.10 Wiring Diagram.

273 The manufacturer must supply three copies of a wiring diagram with each panel. The  
274 wiring diagram must show the color code or number identification of each wire and the  
275 proper connections.

276 3.4.11 Parts List and Installation Instructions.

277 A component parts list and installation instructions must be furnished with each control  
278 panel along with sufficient drawings or illustrations to indicate clearly the method of  
279 installation.

280 3.4.12 Nameplate.

281 A nameplate showing the following information must be attached to each panel:

- 282 a. Airport Lighting Control Panel.
- 283 b. Identification: FAA L-821.
- 284 c. Type \_\_\_\_, Class \_\_\_\_, Style \_\_\_\_, Mode \_\_\_\_.
- 285 d. Manufacturer's Part no. \_\_\_\_.
- 286 e. Manufacturer's name or trademark.
- 287 f. Date manufactured \_\_\_\_.

Page Intentionally Blank

288 **CHAPTER 4. MODE 2, LAND AND HOLD SHORT OPERATIONS (LAHSO) CONTROL**  
289 **PANELS.**

290 **4.1 LAHSO Lighting Systems.**

291 Land and hold short lighting systems are lights used to provide visual reference to pilots  
292 during LAHSO. The details of the lighting system are in [AC 150/5340-30](#). Control  
293 panels for the control of LAHSO lighting systems must comply with the applicable  
294 requirements in paragraphs [4.1](#), [4.2](#), [4.3](#) and [4.4](#) in addition to the other details in this  
295 AC which are not related to a specific panel.

296 **4.2 General Requirements.**

297 The control panel for **Land and Hold Short Lighting Systems** must be located in the  
298 ATCT. The panel must contain an "ON/OFF" push button and a red fault indicator  
299 lamp for each LAHSO lighting system controlled at the panel. The LAHSO controls  
300 may be located on the airport's main lighting control panel. The fault light must  
301 illuminate if any one of the faults defined in [AC 150/5340-30](#) occurs. If the LAHSO  
302 panel is a dedicated panel separate from the main lighting control panel, panel  
303 backlighting must comply with paragraph [3.4.4](#) of this AC and lighting system intensity  
304 controls must not be provided on the LAHSO panel.

305 **4.3 Multiple LAHSO Systems on Separate Runways.**

306 A control panel used to control multiple LAHSO lighting systems installed on separate  
307 runways must provide one push button on the control panel for each system. A typical  
308 panel layout for this configuration is shown in [Appendix D, Figure D-12 Detail A](#).

309 **4.4 Multiple LAHSO Systems on the Same Runway.**

310 A control panel used to control multiple LAHSO lighting systems installed on the same  
311 runway must provide one push button for each **LAHSO lighting** system and a master  
312 switch. The master switch must be a separate "ON/OFF" push button which turns the  
313 LAHSO control panel "ON" and "OFF". When the master switch is "ON", push  
314 buttons controlling the systems must be energized, and when the master switch is  
315 "OFF", push buttons controlling the systems must be de-energized. The push buttons  
316 used to activate the LAHSO lighting systems must be interlocked allowing only one  
317 LAHSO lighting systems to be operating at any given time. The interlock design must  
318 not allow simultaneous operations of controlled LAHSO lighting systems controlled  
319 from the same panel. Thus, when a push button for a LAHSO lighting system on a  
320 control panel is pressed and locked in the "ON" position the associated system is  
321 activated, all other LAHSO lighting system controlled from the same panel must  
322 become inactive. However, the interlock must not de-activate a lighting system when  
323 another system push button has been partially depressed and released prior to locking in  
324 the "ON" position. A typical panel layout for this configuration is shown in  
325 [Appendix D, Figure D-12 Detail B](#).

Page Intentionally Blank

326

**CHAPTER 5. MODE 3, STOP BAR CONTROL PANELS.**

327 Control panels for the control of stop bar lighting systems must comply with the  
328 applicable requirements in **paragraphs 5.1** through **5.3.4.3** in addition to the other details  
329 in this AC which are not related to a specific panel.

**330 5.1 General Requirements.**

331 The control panel **for stop bar lighting systems** must be located in the ATCT. The stop  
332 bar control panel must be a dedicated panel separate from the main airport lighting  
333 control panel. The panel must include an “ON/OFF” switch for each stop bar to be  
334 controlled from the panel. Each switch on the panel must be clearly labeled to indicate  
335 the function of the switch. The panel must be activated and de-activated with a master  
336 control switch specified in **paragraph 5.1.1**.

**337 5.1.1 Master Controls.**

338 A master control switch must be located on the main lighting control panel to transition  
339 the applicable taxiway centerline lights, taxiway edge lights, runway guard lights,  
340 clearance bars, and stop bars to the appropriate **Surface Movement Guidance and**  
341 **Control System (SMCGS)** settings for low visibility operations. (See SMCGS  
342 operations in **Appendix B** for more information on low visibility operations.) The  
343 master control switch must also activate the associated stop bar control panels. If the  
344 airport is approved for low visibility operations that do not require stop bars, it is  
345 recommended that the master switch be installed. The master control switch must  
346 transition the various applicable taxiway centerline lights, taxiway edge lights, runway  
347 guard lights, clearance bars, and stop bars to the appropriate SMCGS settings when  
348 switched. For example, the switch settings may be “No SMCGS”, “Below 1200 RVR”,  
349 and/or “Below 600 RVR”. When the switch is in the “No SMCGS” position, the  
350 applicable taxiway centerline lights, taxiway edge lights, runway guard lights, clearance  
351 bars, and stop bars must conform to the setting on the main lighting control panel, and  
352 all associated stop bars and stop bar control panels must be de-energized. The  
353 appropriate SMCGS setting for the applicable lighting systems should be outlined in the  
354 airport’s SMCGS plan.

**355 5.1.2 Stop Bar Controls.**

356 The stop bar control panel must have a separate stop bar control switch to activate or  
357 de-activate each controlled stop bar on the airfield. A single stop bar control switch  
358 must be for each runway on the panel to temporarily de-activate the uncontrolled stop  
359 bars on the applicable runway. The stop bar control switches must be push buttons that  
360 comply with **paragraph 5.3.1**.

361 5.2 **Stop Bar Panel Configuration.**

362 5.2.1 Dimensions.

363 The minimum dimensions for the panel must be 4 inches × 12 inches (100 mm × 300  
364 mm) and the maximum dimensions must be 12 inches × 16 inches (300 mm × 400 mm).

365 5.2.2 Location.

366 The exact location of control panels is site specific with respect to operations, space,  
367 etc. The local air traffic facility should be consulted about the appropriate location for  
368 the control panel.

369 5.2.3 Display.

370 The stop bar control panel must include a diagram of the airport where the stop bars are  
371 located. The diagram must be limited to relevant portions of the airport surface  
372 movement area; runways and associated taxiways must be included. Where  
373 appropriate, designated taxi routes for low visibility operations should be included on  
374 the diagram. The diagram should allow for inclusion of additional stop bar controls and  
375 displays, if possible. Each stop bar position should be represented on the panel by three  
376 lights (per paragraph 5.3.2) which will indicate the “ON/OFF” status of the actual stop  
377 bar. A time delay may exist between actual status of airfield lights and panel lights in  
378 accordance with control methods described in AC 150/5340-30. The panel must also  
379 include an alert control in the upper right-hand corner. The alert control must be a  
380 single push button, backlit red. Where applicable, lead-on lights will be represented by  
381 one green panel light located on the diagram for each segment of lead-on lights in a  
382 position relative to their position on the airfield. A typical panel is shown in  
383 Appendix D, Figure D-12 and the panel push button functions are described in  
384 Appendix A, Table A-1.

385 5.3 **Stop Bar Control Panel Design.**

386 5.3.1 Push Buttons.

387 Push buttons must be used to control stop bar lighting systems and must be located on  
388 the stop bar control panel. The push buttons should be softly backlit in an “OFF”  
389 position and glow noticeably brighter in the “ON” position. All push buttons, with the  
390 exception of “ALERT”, “SENSOR OVERRIDE”, “UC STOPBARS”, and “LAMP  
391 TEST”, must be alternate action push buttons with tactile feedback. The “ALERT”,  
392 “SENSOR OVERRIDE”, “UC STOPBARS”, and “LAMP TEST” push buttons must be  
393 momentary action push buttons with tactile feedback. The push button controls and the  
394 panel layout should be designed to minimize the possibility of inadvertent activation;  
395 protective raised edges on at least two opposite sides, such that the push button will not  
396 be activated if a flat object weighing 2 pounds is dropped on it from a height of 3  
397 inches. The ranges below are general guidelines for such controls; however, actual  
398 values to be used in a particular control tower are to be determined by the system  
399 designer/engineer. Air Traffic Control (ATC) personnel at the airport must be

400 consulted prior to final design and installation to verify that the control panel will meet  
401 the ATC requirements identified at that particular airport. The ranges are as follows:

402 Push Button Dimensions: Minimum 3/8 inch (9.5 mm) - Maximum 1 inch (25  
403 mm).

404 Lamp to Button Separation: Minimum 1/2 inch (13 mm) - Maximum 2 inches (50  
405 mm).

406 Button to Button Separation: Minimum 1/2 inch (13 mm)

407 Resistance: Minimum 10 oz. (2.8 N) - Maximum 40 oz. (11 N).

408 Displacement Height: Minimum 5/64 inch (2 mm) - Maximum 1/4 inch (16  
409 mm).

#### 410 5.3.2 Panel Illumination.

411 All panel lights must be light emitting diodes (LED) or lamps with a minimum lamp life  
412 of 5,000 hours. The intensity must provide a noticeable difference between “ON” and  
413 “OFF” under typical ATCT lighting conditions and when viewed between 0 degrees  
414 and 45 degrees from vertical. When the panel is activated, diagrams, indicator lamps,  
415 and push buttons must be backlit. Backlighting must not be more than 30% of the panel  
416 full lighting intensity. A panel lighting intensity switch must be provided to vary the  
417 panel intensity between 50% and 100% intensity.

#### 418 5.3.3 Labeling.

419 The panel labels must be in a simple, unadorned font and must be located in consistent  
420 locations relative to each control/display. The relationship between the label and its  
421 associated control/display should be clear by virtue of their relative locations. All  
422 movement areas represented on the panel must be labeled according to the airport  
423 nomenclature on the airport layout charts and signs. If necessary, to clarify the  
424 relationship between controls and displays, a line can be drawn around each associated  
425 pair of controls and stop bar indicators in a contrasting, neutral color. The stop bar alert  
426 control will be clearly labeled. The minimum character height is to be 0.18 inch (.7  
427 mm). All characters should be capital letters and clearly viewed from 19.7 inches (.5  
428 m) - 39.4 inches (1 m).

#### 429 5.3.4 Panel Functions.

430 Control push buttons on the stop bar control panel must comply with the applicable  
431 functional descriptions in this section and [Table A-1](#) in [Appendix A](#).

##### 432 5.3.4.1 **Controlled Stop Bars.**

433 Panel functions of the panel buttons and status indicator lights are  
434 described in [Appendix A](#), [Table A-1](#). [AC 150/5340-30](#) contains more  
435 information on the normal operations of stop bars and the performance of  
436 the stop bar sensors.

## 437 5.3.4.2

**Uncontrolled Stop Bars.**

438 When the panel is initially energized, the uncontrolled stop bars must be  
439 energized. The uncontrolled stop bars must be de-energized when the  
440 “UC STOP BARS” push button is pushed and must become re-energized  
441 automatically in 30 seconds. If the push button is pushed again before the  
442 30 second delay has expired, the uncontrolled stop bars must become re-  
443 energized. The uncontrolled stop bars must be electronically monitored if  
444 the status of uncontrolled stop bars is indicated with panel lights on the  
445 control panel (as shown in [Figure D-12](#)).

## 446 5.3.4.3

**Alert.**

447 Each stop bar control panel must have an alert function, which indicates  
448 system malfunctions as described in the section of [AC 120-57](#) that  
449 specifies the monitoring and visual inspection of lighting aids. This  
450 function must be a red push button. To signal an alert condition is present,  
451 the alert push button must be lighted and blinking, the appropriate red  
452 (stop bar) or green (lead-on) panel lights must be blinking, and an audible  
453 tone must sound. If the monitoring system is unable to detect and/or  
454 indicate which stop bar is malfunctioning, the alert push button must be  
455 lighted and blinking, and an audible tone must sound. A depression of this  
456 push button will indicate acknowledgement of the alert, and the push  
457 button will stop blinking and remain lighted and the tone must cease.  
458 When the problem is corrected, the alert push button along with the stop  
459 bar and lead-on panel lights must return to normal status.

460

**CHAPTER 6. EQUIPMENT QUALIFICATION REQUIREMENTS.**461 6.1 **Qualification Procedures.**

462 Procedures for qualifying equipment to be furnished under the Federal grant assistance  
463 program for airports are contained in AC 150/5345-53.

464 6.2 **Qualification Tests.**

465 The following tests must be conducted on each panel to be qualified.

466 6.2.1 Examination.

467 In this examination, use a check list to certify that the material used, dimensions,  
468 component parts, calibration, quantities, etc., are in accordance with the requirements of  
469 this specification as it applies.

470 6.2.2 Operation.

471 Connect the panel to a test board consisting of pilot lights to check each component and  
472 switch for proper operation. Panels must demonstrate compliance to all applicable  
473 operational requirements.

474 6.2.3 Dielectric.

475 Subject all terminals on the terminal block to a potential of at least 500 volts rms, 60  
476 Hz, applied between the terminal and the grounded case for a period of one minute.  
477 Any breakdown of the insulation will be cause for rejection.

478 6.2.4 Humidity/Temperature.

479 Subject all panels to a humidity test per MIL-STD-810F, Method 507.4, HUMIDITY,  
480 Procedure. Test Exceptions: The equipment must be subjected to two cycles (96 hours  
481 total) per Figure 507.4-1, Aggravated temperature-humidity cycle. The maximum  
482 temperature must be 104°F ( $\pm 2^\circ$ ) (40°C). In addition, maintain the maximum relative  
483 humidity (RH) at 85% ( $\pm 4\%$ ). Failure of the equipment to operate as specified or any  
484 deterioration in material must be cause for failure.

Page Intentionally Blank

485

**CHAPTER 7. PRODUCTION TEST REQUIREMENTS.**486 7.1 **Production Tests.**

487 The following tests must be conducted on each production panel.

488 7.1.1 Examination.489 In this examination, use a check list to certify that the material used, dimensions,  
490 component parts, calibration, quantities, etc., are in accordance with the detail  
491 requirements of this specification, as it applies, and the purchase order.492 7.1.2 Operation.493 Connect the panel to a test board consisting of pilot lights to check each component and  
494 switch for proper operation. Panels must demonstrate compliance with all applicable  
495 operational requirements.496 7.1.3 Dielectric.497 Subject all terminals on the terminal block to a potential of at least 500 volts rms, 60  
498 Hz, applied for a period of one minute between the terminal and the grounded case. No  
499 breakdown of the insulation will be acceptable.

Page Intentionally Blank

500

**APPENDIX A. STOP BAR PANEL PUSH BUTTON DESCRIPTIONS**

501

The following table describes the functions and characteristics of the controls shown on the typical stop bar control panel shown in [Figure D-13](#). The table also describes the system and panel status operations associated with the system sensors. The sensors are described in detail in [AC 150/5345-28](#).

502

503

504

**Table A-1. Stop Bar Panel Push Button Descriptions.**

Activation or De-Activation <sup>1</sup>	Appearance	Function	Airfield Lighting and Panel Light Status <sup>2,3</sup>
<b>ALERT<sup>4</sup> (Red)</b>			
AUTOMATIC	Blinking	Indicates the system is malfunctioning. Malfunctions are defined in <a href="#">AC 120-57</a> .	<i>Related Stop Bar – Blinking Related Lead On – Blinking</i>
MANUAL	Illuminated	Indicates acknowledgment of the malfunction.	<i>Related Stop Bar – Blinking Related Lead On – Blinking</i>
AUTOMATIC	Un-illuminated	Indicates the system malfunctions have been corrected.	<i>Related Stop Bar – Blinking Related Lead On – Blinking</i>
<b>GO (Green)</b>			
MANUAL	Back-lighted	Turns “OFF” associated Stop Bar	<i>Stop Bar – “OFF” Lead On (segment 1) – “ON” Lead On (segment 2) – “ON”</i>
AUTOMATIC (sensor) Or MANUAL	Illuminated	Turns “ON” associated Stop Bar	<i>Stop Bar – “ON” Lead On (segment 1) – “OFF” Lead On (segment 2) – “ON” Lead On (segment 2) – “OFF” when aircraft clears sensor #2  Stop Bar – “ON” Lead On (segment 1) – “OFF” Lead On (segment 2) – “OFF”</i>

Activation or De-Activation <sup>1</sup>	Appearance	Function	Airfield Lighting and Panel Light Status <sup>2,3</sup>
<b>LAMP TEST<sup>3</sup> (White)</b>			
Manual	Illuminated	Illuminates all push buttons and indicator lights on the panel to full intensity.	Airfield Lighting – unchanged Panel lights – full intensity
<b>SENSOR OVERRIDE<sup>3</sup> (White)</b>			
Manual	Illuminated	Overrides sensor commands when pressed along with the GO push button.	<i>Stop Bar – “OFF”</i> <i>Lead On (segment 1) – “ON”</i> <i>Lead On (segment 2) – “ON”</i>
MANUAL Or AUTOMATIC (timed)	Back-lighted	Resets the associated Stop Bar.	<i>Stop Bar – “ON”</i> <i>Lead On (segment 1) – “OFF”</i> <i>Lead On (segment 2) – “OFF”</i>
<b>UC STOPBARS (Yellow)</b>			
Manual	Illuminated	All associated uncontrolled stop bars turned “OFF”.	<u><i>Controlled Stop Bars</i></u> <i>Stop Bars – unchanged</i> <i>Lead On (all) – unchanged</i>  <u><i>Uncontrolled Stop Bars</i></u> <i>Stop Bar – “OFF”</i> <i>Lead On (segment 1) – “ON”</i> <i>Lead On (segment 2) – “ON”</i>
AUTOMATIC (timed) or MANUAL	Back-lighted	All associated uncontrolled stop bars turned “ON”.	<u><i>Uncontrolled Stop Bars</i></u> <i>Stop Bars – “ON”</i>  <u><i>Uncontrolled Stop Bars</i></u> <i>Stop Bar – “ON”</i> <i>Lead On (all) – unchanged</i> <i>Sensor #1</i>
<b>Sensor #1</b>			
Aircraft Crossing		Turns “OFF” segment 1 of Lead on lights.	<i>Stop Bar - “ON”</i> <i>Lead On (segment 1) - “OFF”</i> <i>Lead On (segment 2) - “ON”</i> <i>Sensor #2</i>

Activation or De-Activation <sup>1</sup>	Appearance	Function	Airfield Lighting and Panel Light Status <sup>2,3</sup>
<b>Sensor #2</b>			
Aircraft Crossing		Turns “OFF” segment 2 of Lead on lights.	<i>Stop Bar - “ON”</i> <i>Lead On (segment 1) - “OFF”</i> <i>Lead On (segment 2) - “OFF”</i>

506 **Note 1:** First letter CAPITAL indicates Activation and ALL CAPITAL LETTERS  
 507 indicate De-activation.

508 **Note 2:** Italics indicate a change in lighting status.

509 **Note 3:** A time delay may exist between airfield lighting changes and panel indicator  
 510 changes, per AC 150/5340-30.

511 **Note 4:** Momentary action push buttons

Page Intentionally Blank

512

**APPENDIX B. TERMS.**

- 513 1. Airport Grant Assistance Program. Programs that provide funding for airport  
514 planning and development projects at airports in the National Plan of Integrated  
515 Airport Systems (NPIAS).
- 516 2. Alert Control. A single red back-lighted push button control, that when pressed  
517 indicates that the controller has acknowledged the “ALERT” and is aware that a  
518 malfunction has occurred.
- 519 3. Alternate Action (push buttons or toggle switches). When pushed in (push buttons)  
520 or toggled (toggle switches), the circuit locks in position. An additional push or  
521 toggle locks the circuit in the alternate position.
- 522 4. Controlled Stop Bars. Stop Bars controlled individually by controls located on the  
523 stop bar control panel.
- 524 5. Conventional Panel. Panels with switches and characters identifying the lighting  
525 system each switch controls.
- 526 6. Facsimile Panel. Panels that include a graphic layout of the airport surface for the  
527 lighting systems controlled from the panel.
- 528 7. Main Lighting Control Panel. The lighting control panel usually located in the  
529 airport traffic control tower which controls the airport lighting systems that do not  
530 require a dedicated panel.
- 531 8. Momentary Push Button. Push buttons which close the circuit and turn “ON” the  
532 system simultaneous with the manual push of the button.
- 533 9. RVR. Runway Visual Range.
- 534 10. Stop Bar. Stop bar lights consist of elevated and in-pavement red fixtures that are  
535 installed at the runway holding position or ILS critical area holding position  
536 marking. Stop bars may be controllable by ATC and will include a system of in-  
537 pavement green taxiway centerline/lead-on lights at locations where aircraft will  
538 enter or cross a runway.
- 539 11. Surface Movement Guidance and Control System (SMCGS). A SMGCS system  
540 consists of the provision of guidance to, and control or regulation of, all aircraft,  
541 ground vehicles and personnel on the movement area of an aerodrome. Guidance  
542 relates to facilities, information and advice necessary to enable the pilots of aircraft,  
543 or the drivers of ground vehicles to find their way on the aerodrome, and to keep the  
544 aircraft or vehicles on the surfaces or within the areas intended for their use.  
545 Control or regulation means the measures necessary to prevent collisions and to  
546 ensure that the traffic flows smooth and freely.
- 547 12. Tactile Feedback. Providing a tangible reaction as a result of action, for example a  
548 “click” feel.
- 549 13. Uncontrolled Stop Bars. Stop bars designated by the SMCGS plan to remain “ON”  
550 during SMCGS operation below 1200 RVR which are not individually controlled by

551 ATC. Uncontrolled stop bars are turned “ON” and “OFF” by the SMCGS Master  
552 switch, located on the main lighting control panel, and may be temporally turned  
553 “OFF” from the stop bar control panel when a special need arises.

554

**APPENDIX C. APPROVAL OF ALTERNATIVE PANEL LABELING.**

555 The manufacturer must submit to the Federal Aviation Administration, Airport  
556 Engineering Division, AAS-100, 800 Independence Avenue SW, Washington, DC  
557 20591 and, if applicable, the certification body providing the initial qualification of the  
558 panel, a request for approval of the alternative panel labeling method not mentioned in  
559 this specification. Requests must include a complete description of the labeling method,  
560 typical drawings, and other detailed information. The third-party certification body will  
561 then evaluate the alternative labeling, with the necessary input from the FAA, to  
562 determine if it is acceptable. All alternate methods receiving approval will be shared  
563 with each of the approved third-party certification bodies.

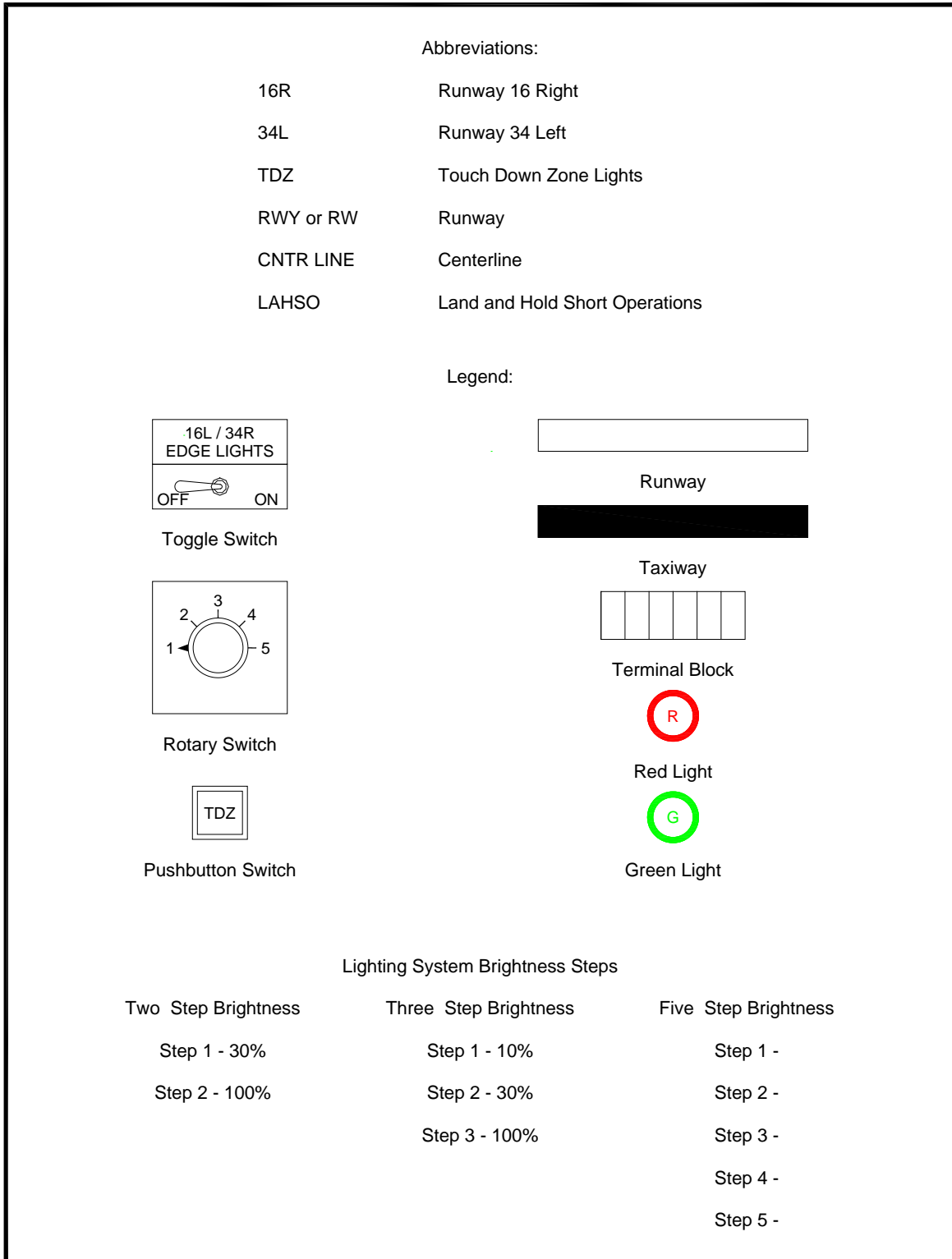
Page Intentionally Blank

564

**APPENDIX D. FIGURES**

565

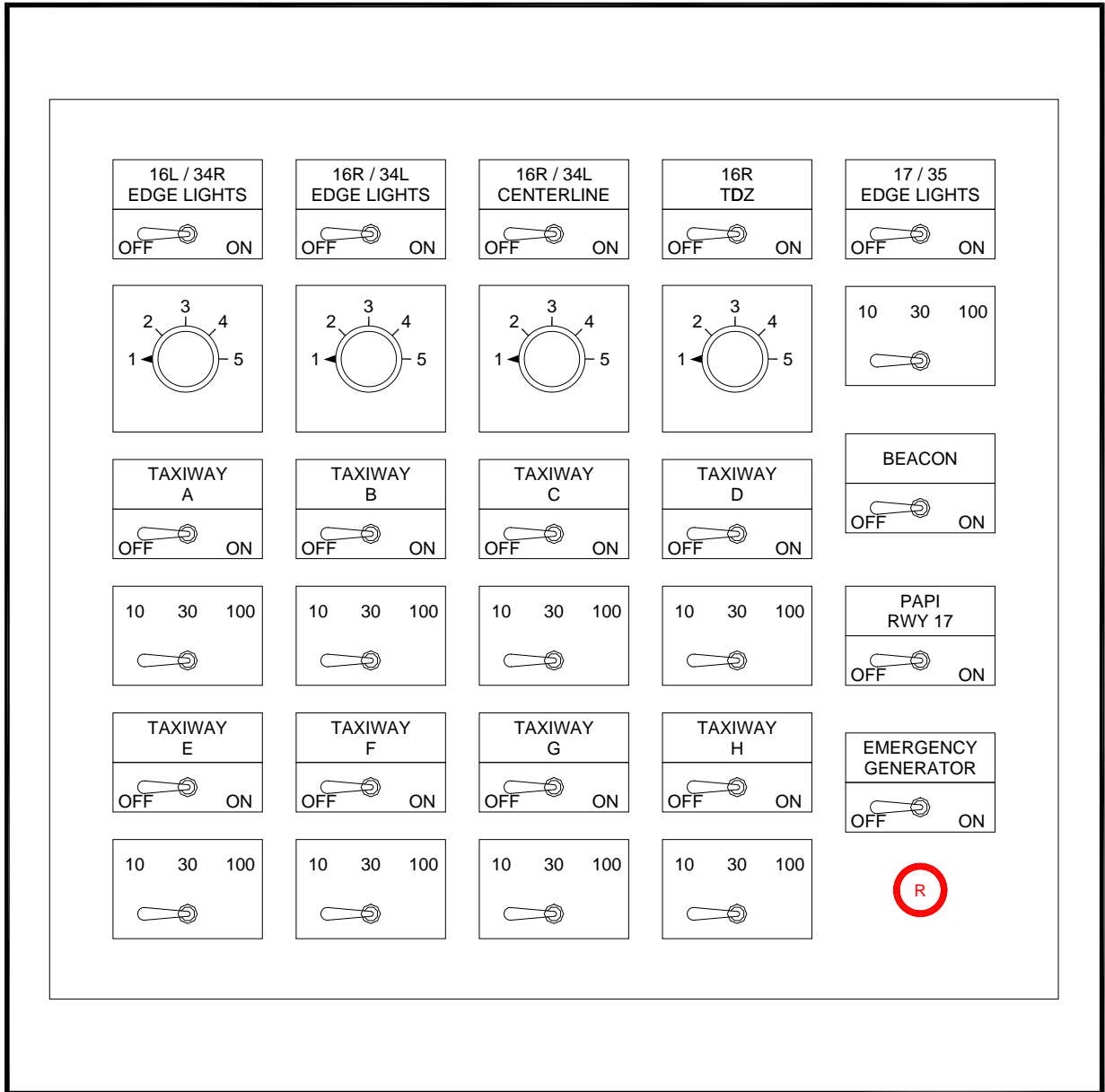
**Figure D-1. Abbreviations, Legend and Brightness Steps**



566

567

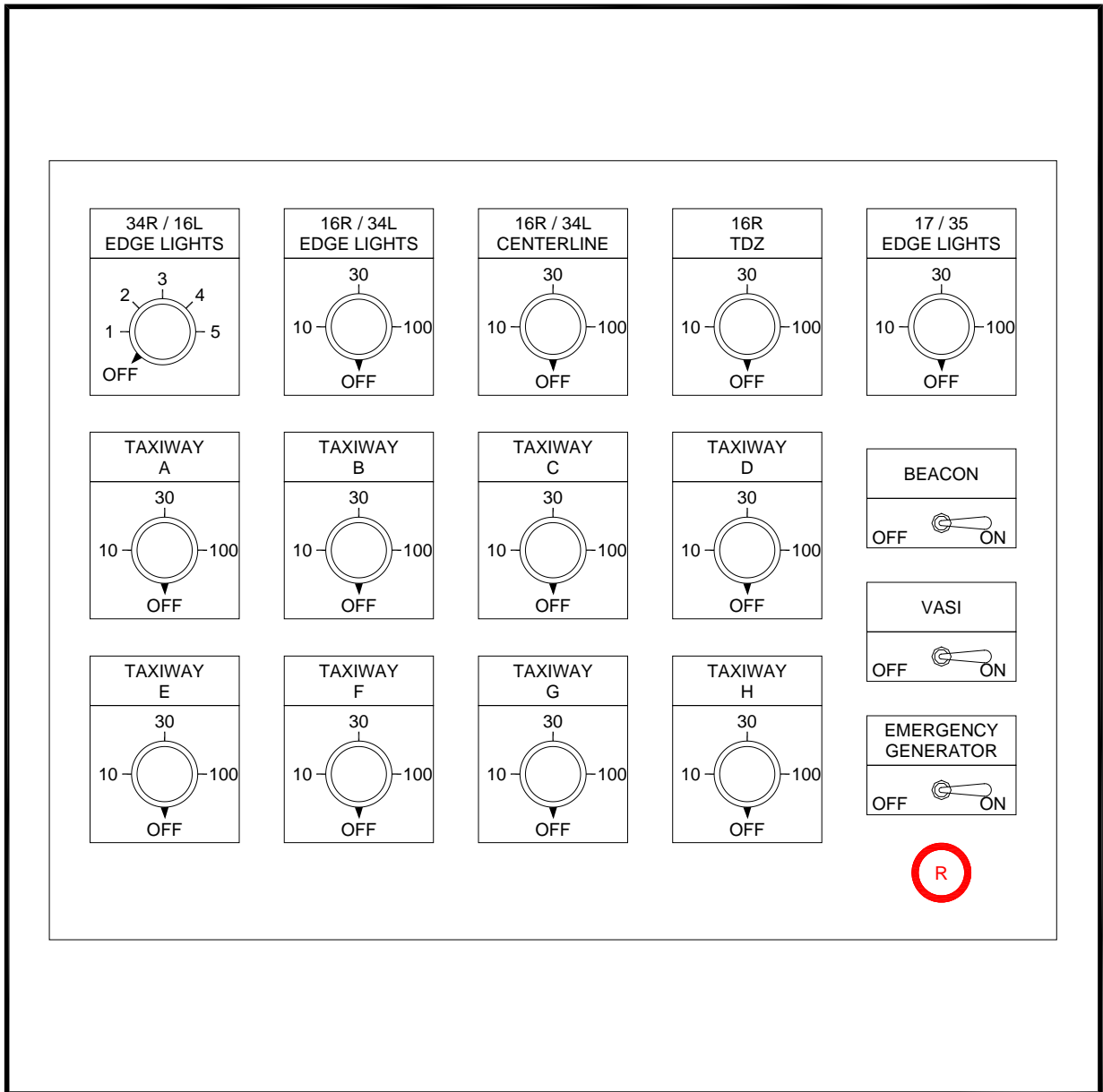
**Figure D-2. Typical Conventional Lighting Control Panel Layout I**



568

569

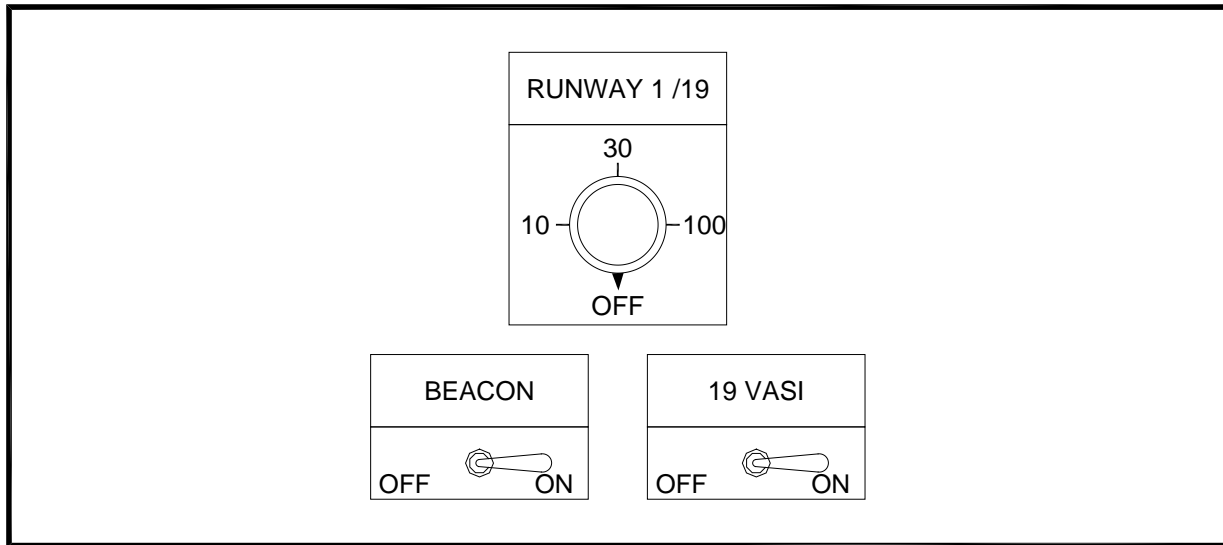
**Figure D-3. Typical Conventional Lighting Control Panel Layout II**



570

571

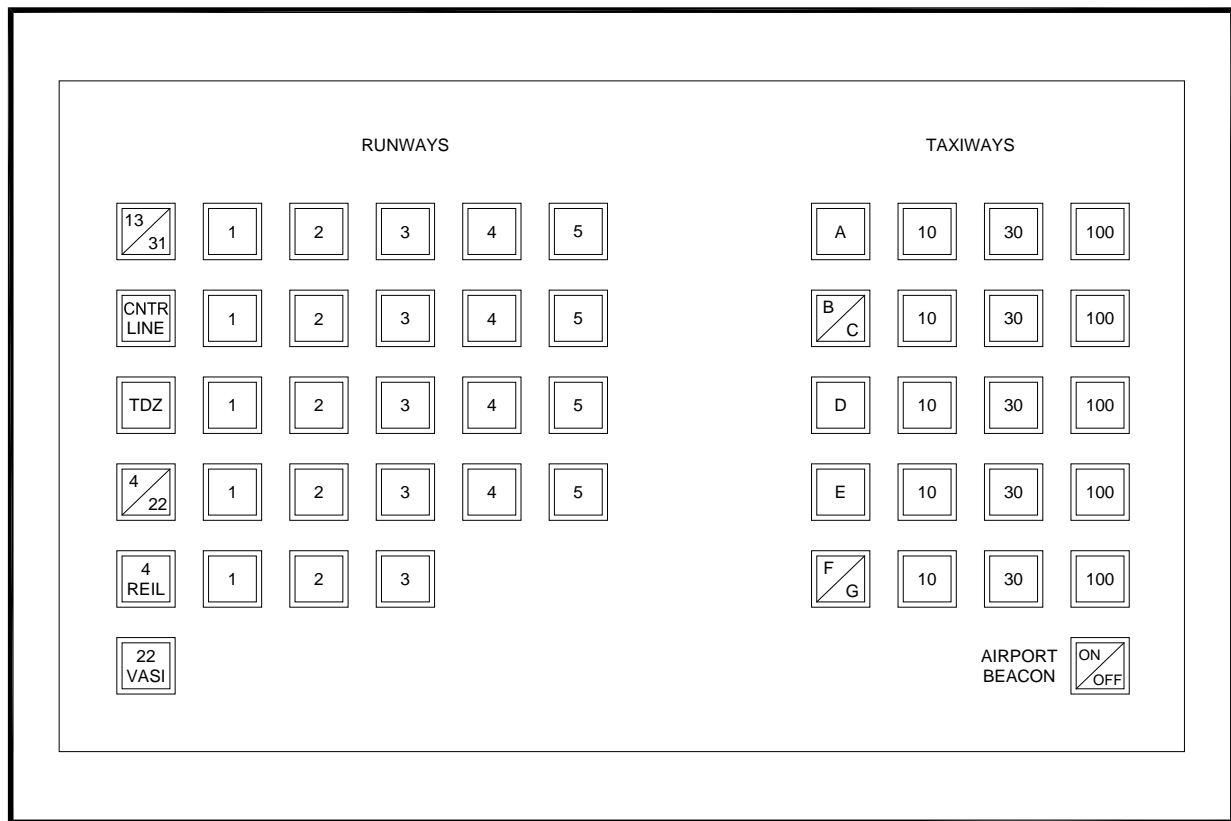
**Figure D-4. Sample Class W Control Panel Layout**



572

573

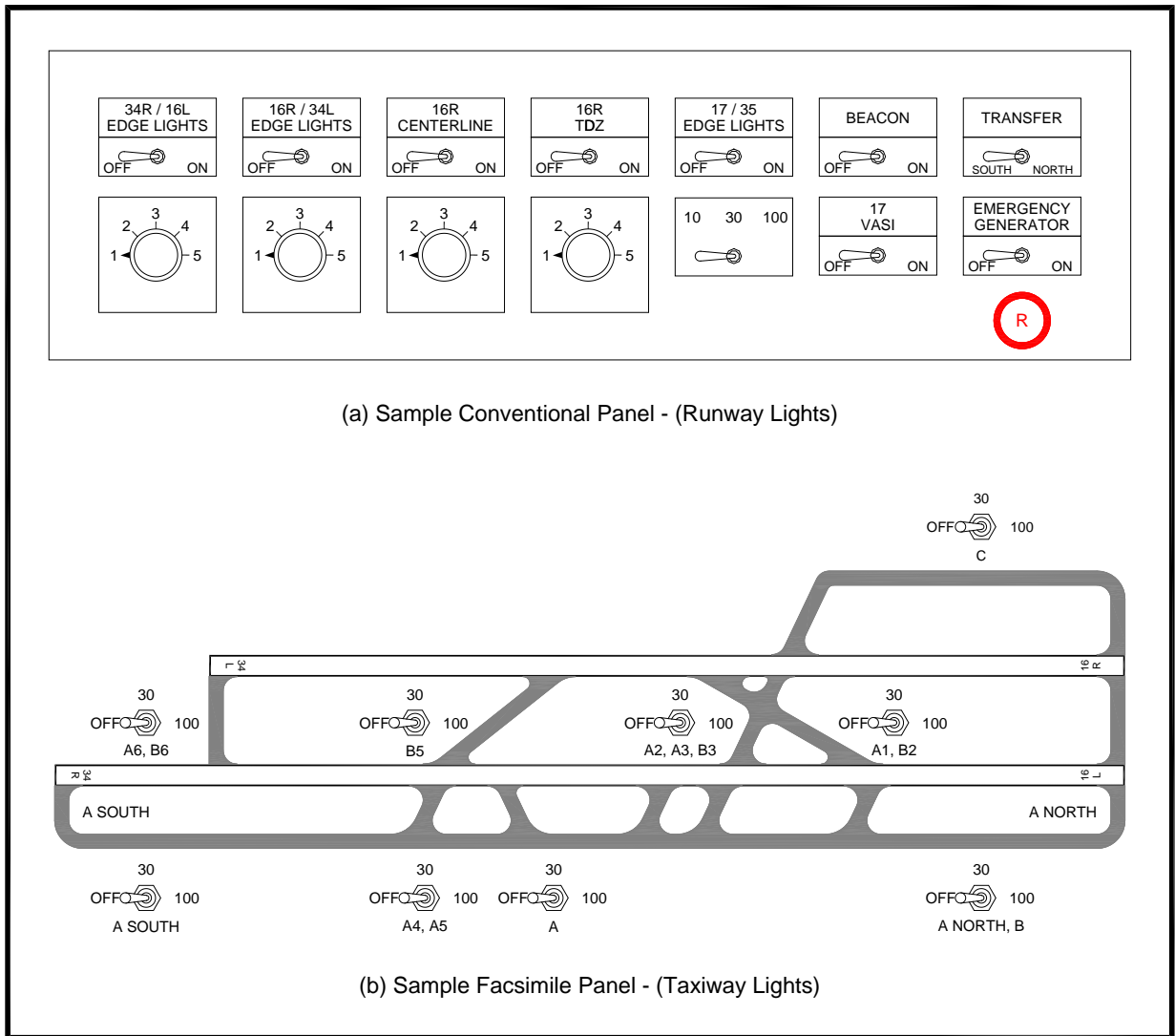
**Figure D-5. Sample Control Panel with Push Button Switches**



574

575

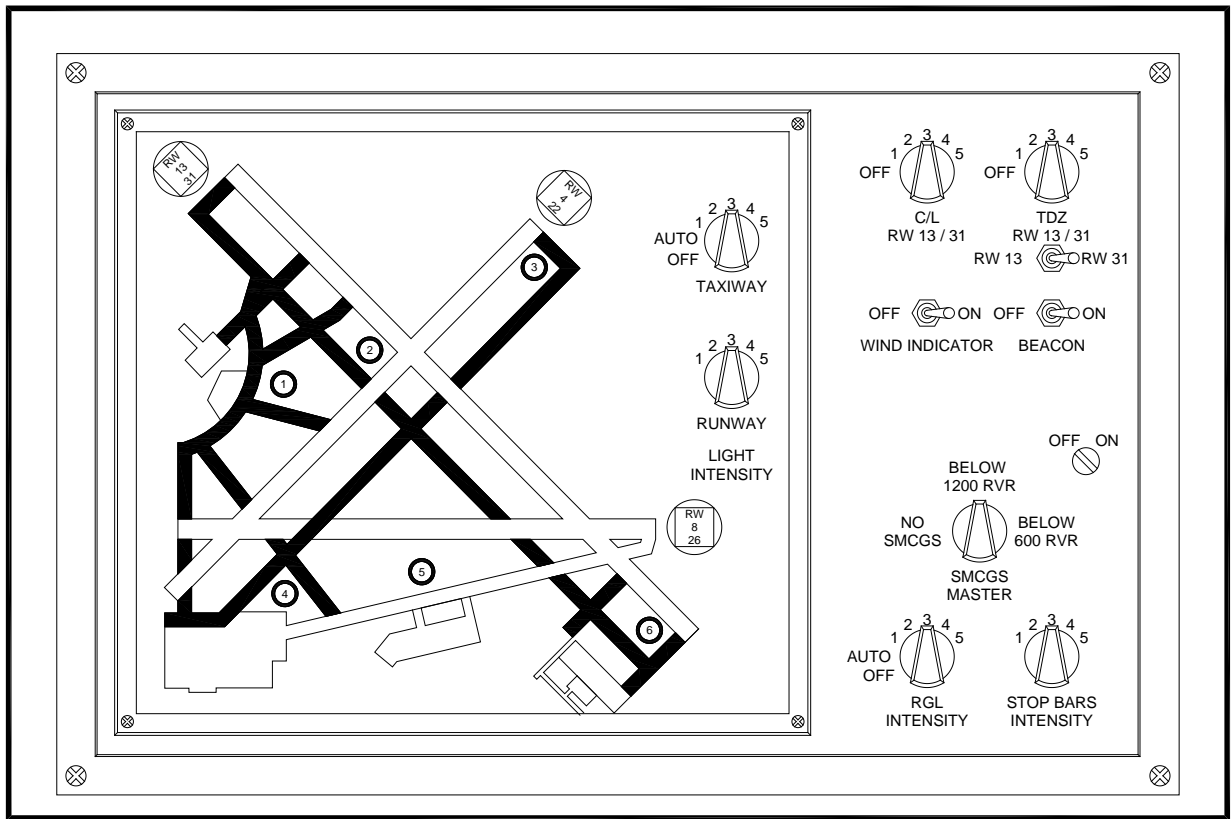
**Figure D-6. Sample Customized Lighting Control Panels**



576

577

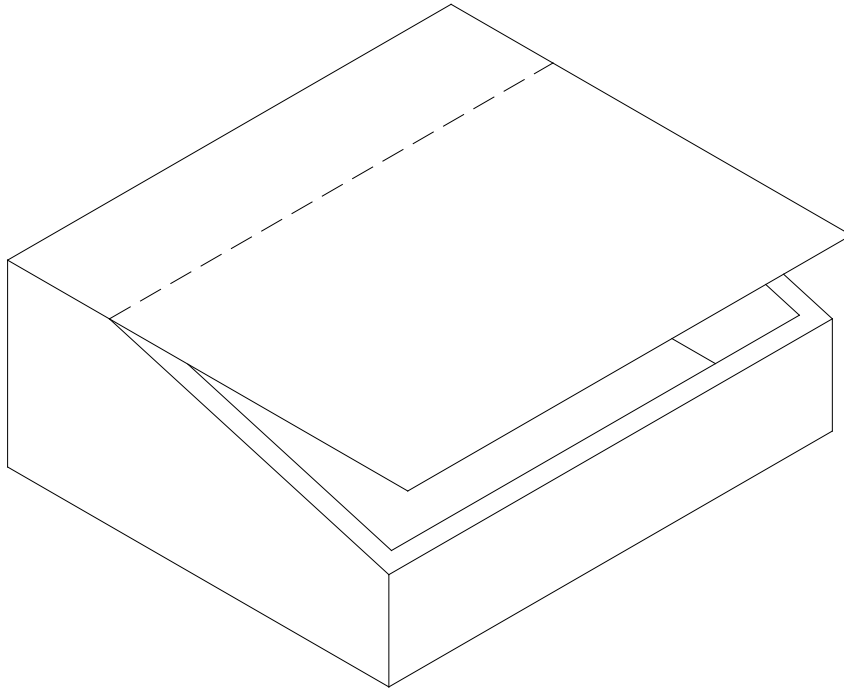
Figure D-7. Sample Back-lighted Facsimile Lighting Control Panel



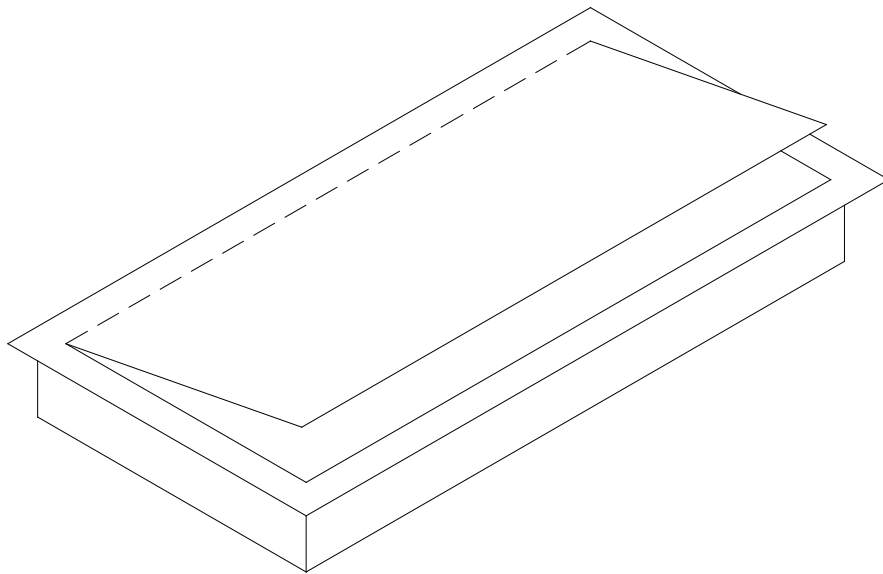
578

579

**Figure D-8. Typical Case Layouts**



(a) Type "S" - Surface Mounted Case



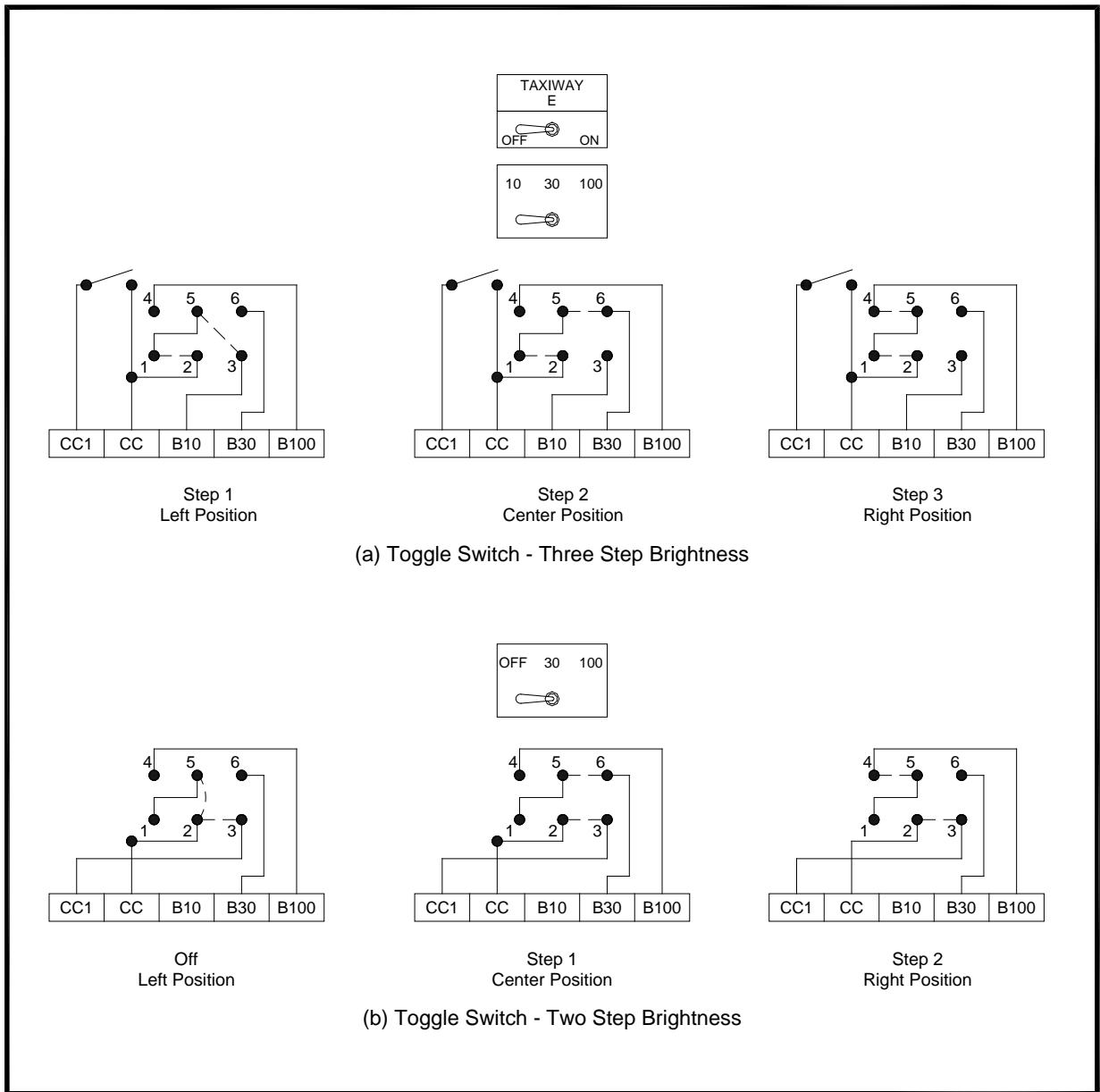
(b) Type "F" - Flush Mounted Case

580



583

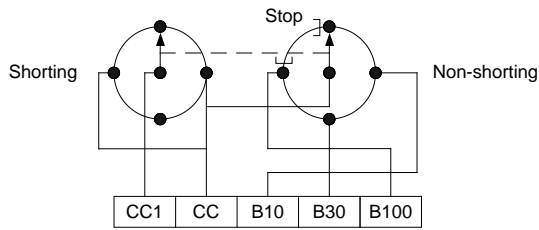
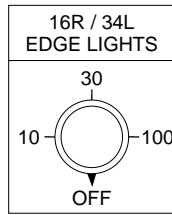
**Figure D-10. Typical Switch Connections for Lighting Control Panels**



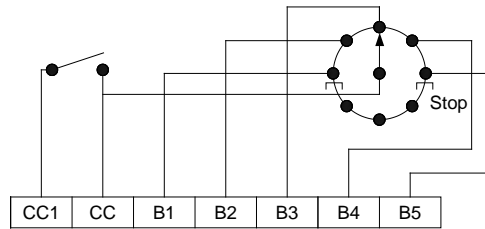
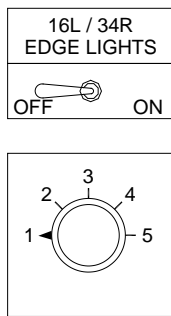
584

585

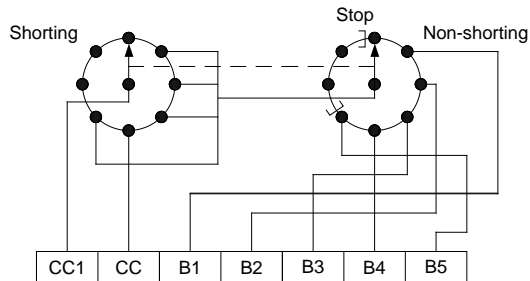
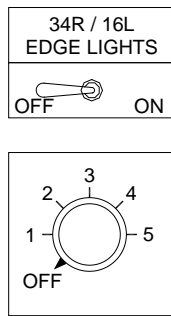
Figure D-11. Typical Switch Connections for Lighting Control Panels (cont.)



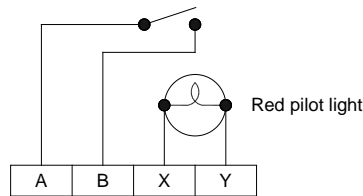
(c) Rotary Switch - Three Step Brightness



(d) Toggle / Rotary Switch - Combination 5 Step Brightness



(e) Rotary Switch - Five Step Brightness

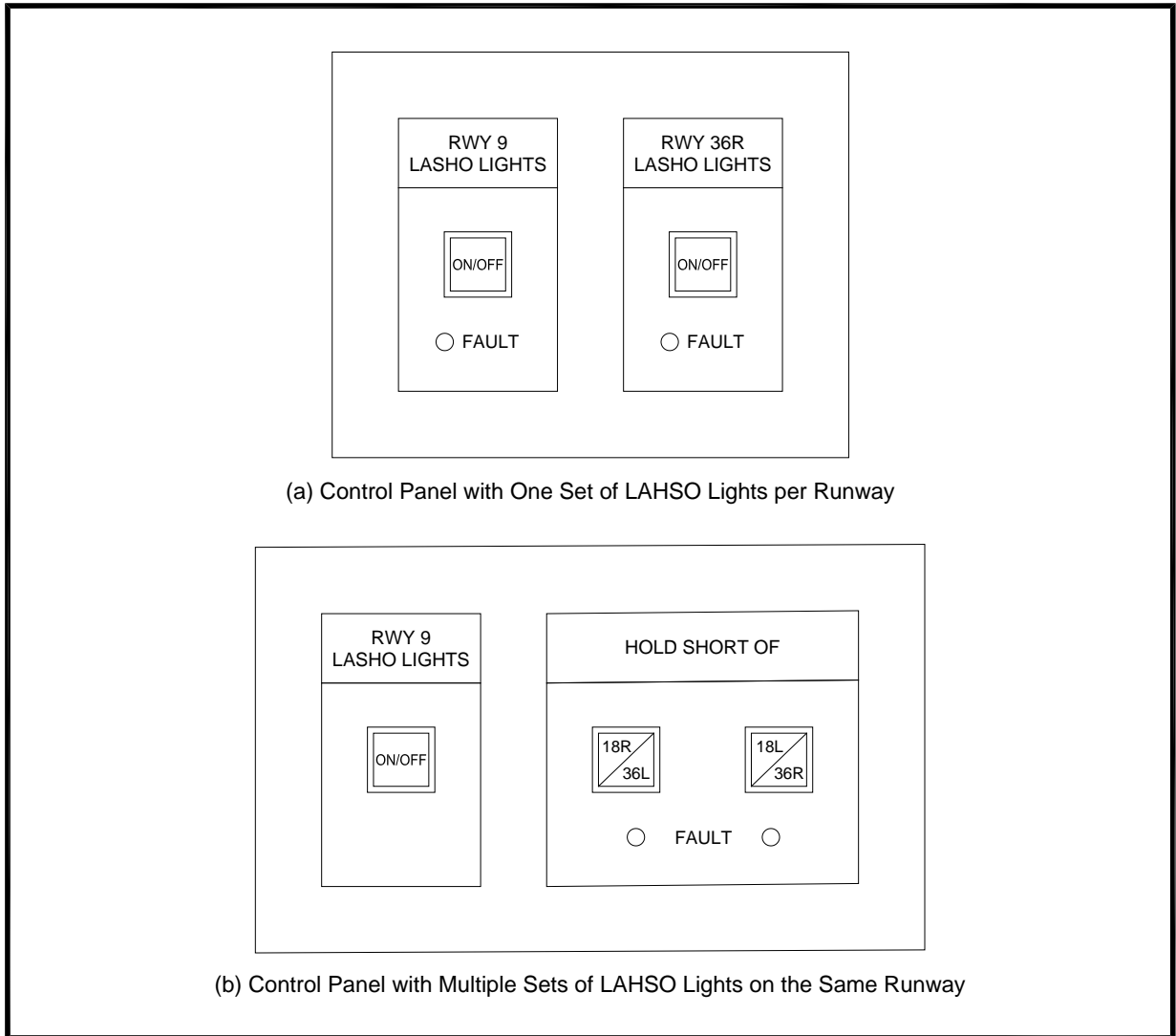


(f) Standby Power Control and Indicator

586

587

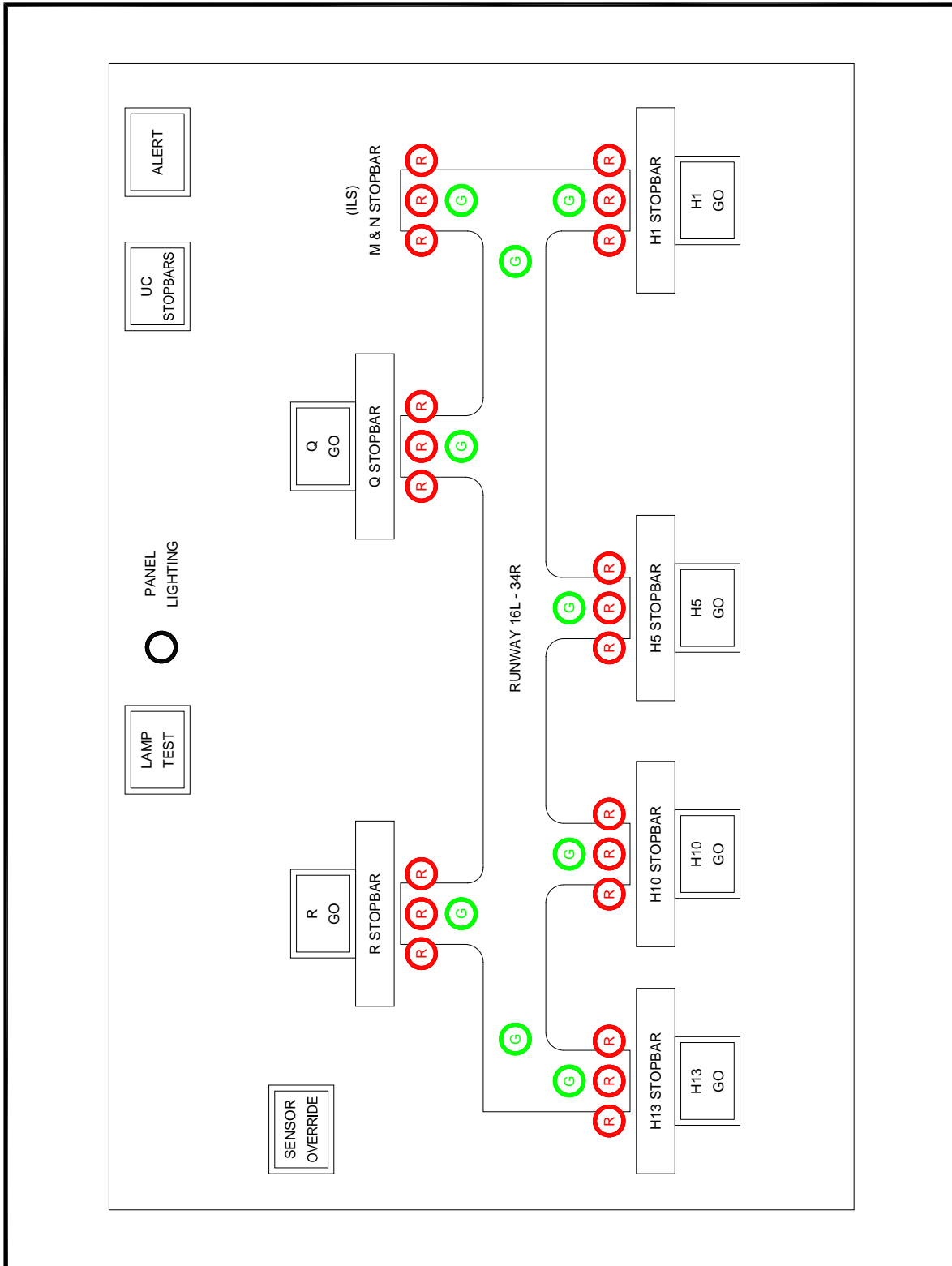
**Figure D-12. Typical Land and Hold Short Lighting Control Panel**



588

589

Figure D-13. Typical Stop Bar Control Panel



590

## Advisory Circular Feedback

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by (1) mailing this form to Manager, Airport Engineering Division, Federal Aviation Administration ATTN: AAS-100, 800 Independence Avenue SW, Washington DC 20591 or (2) faxing it to the attention of the Office of Airport Safety and Standards at (202) 267-5383.

Subject: AC 150/5345-3H

Date: \_\_\_\_\_

*Please check all appropriate line items:*

An error (procedural or typographical) has been noted in paragraph \_\_\_\_\_ on page \_\_\_\_\_.

Recommend paragraph \_\_\_\_\_ on page \_\_\_\_\_ be changed as follows:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

In a future change to this AC, please cover the following subject:  
*(Briefly describe what you want added.)*  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Other comments:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I would like to discuss the above. Please contact me at (phone number, email address).  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Submitted by: \_\_\_\_\_

Date: \_\_\_\_\_

Page Intentionally Blank