

CHANGE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

6850.5C
CHG 2

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SUBJ: MAINTENANCE OF LIGHTED NAVIGATIONAL AIDS

1. PURPOSE. This change transmits revised pages to Order 6850.5C, Maintenance of Lighted Navigational Aids. The change incorporates maintenance and certification requirements for the dual mode high intensity approach lighting system, type FA-10700, removes the requirement to replace PAR-38 lamps after 1800 hours of operation, deletes references that are no longer used, and corrects documentation errors. This directive implements Configuration Control Decision (CCD) No. N16975, Lighted Navigational Aids Handbook Revision to Optimize Preventive Maintenance.

2. DISTRIBUTION. This directive is distributed to selected offices and services within Washington headquarters, regional Airway Facilities divisions, the William J. Hughes Technical Center, the Mike Monroney Aeronautical Center, and Airway Facilities field offices having the following facilities/equipment: ALS, LDIN, MAL, MALSR, ODALS, PAPI, REIL, SALS, SSALR, SSALS, VASI.

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CHAPTER 3. STANDARDS AND TOLERANCES

70. GENERAL.

This chapter prescribes the standards and tolerances for lighted navigational aids, as defined and described in Order 6000.15B, General Maintenance Handbook for Airway Facilities. References to the latest editions of Orders 6650.6, Maintenance of Radio Control Equipment for Plant Facilities; 6850.2, Visual Guidance Lighting Systems; 6950.17, Maintenance of Electrical Systems in Buildings; 6950.18, Maintenance of Electrical Distribution Systems; and 6650.5, Maintenance of Electrically Operated Remote Control Equipment; are in various sections of

this chapter. Two or three digit references such as 71, 115, and 345 are located in this handbook. Those such as 3.3.2.2.3 are in TI 6850.87, Dual Mode High Intensity Approach Lighting System (ALSF-2/SSALR) System Type FA-10700. References such as "Instruction book" are located in the applicable equipment instruction book. All key performance parameters and/or key inspection elements are clearly identified by an arrow (→) placed to the left of the applicable item. If a parameter is not listed for a specific equipment, the standards and tolerances specified in the manufacturer's instruction manual shall be used.

Section 1. APPROACH LIGHTING SYSTEMS

<i>Parameter</i>	<i>Reference Paragraph</i>	<i>Standard</i>	<i>Tolerance/Limit</i>	
			<i>Initial</i>	<i>Operating</i>
→71. LIGHT BAR LAMPS.				
a. ALSF-1.....				
(1) Overall system.....	294, 345	All lamps on	Same as standard	Less than 4 consecutive centerline light bars out as defined in 71a(2), and less than 6 lamps out in a loop
(2) Centerline bars.....		All lamps on	Same as standard	Less than 3 lamps out in 5-lamp bar
(3) Threshold bar.....		All lamps on	Same as standard	Less than 6 lamps out
(4) Wing bars.....		All lamps on	Same as standard	Less than 3 lamps out
(5) Terminating bar.....		All lamps on	Same as standard	Less than 6 lamps out
(6) 1000-foot bar.....		All lamps on	Same as standard	Less than 6 lamps out

Section 1. APPROACH LIGHTING SYSTEMS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
* b. ALSF-2/SSALR FA-9993/FA-10048.	294, 345			*
(1) Centerline bars, inner 1500-feet		All lamps on	Same as standard	Less than 3 consecutive light bars out as defined in 71b(3), and 20 percent or less (random) of lamps out
(2) Centerline bars, outer 1500-feet		All lamps on	Same as standard	Less than 3 consecutive light bars out, and 20 percent or less (random) of lamps out
(3) Centerline bar		All lamps on	Same as standard	Less than 3 lamps out in 5-lamp bar
(4) Side row bars		All lamps on	Same as standard	Less than 3 consecutive light bars out as defined in 71b(5), and 20 percent or less (random) of lamps out
(5) Side row bar		All lamps on	Same as standard	Less than 2 lamps out in 3-lamp bar
(6) Threshold bar		All lamps on	Same as standard	Less than 4 adjacent lamps out, and 20 percent or less (random) of lamps out
(7) 500-foot bar		All lamps on	Same as standard	Less than 4 adjacent lamps out, and 20 percent or less (random) of lamps out

Section 1. APPROACH LIGHTING SYSTEMS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
(8) 1000-foot bar		All lamps on	Same as standard	Less than 4 adjacent lamps out, and 20 percent or less (random) of lamps out
* b-1. ALSF-2/SSALR LAMPS AND FLASHERS, FA-10700.				
(1) ALSF-2.....	294. 345, 3.3.2.2.3-10			
(a) Centerline inner 1500 feet		All lamps on	Same as standard	¹ 2 consecutive bars out, or 14 random lamps out
(b) Centerline outer 1500 feet				
<u>1</u> 2400-foot runway		All lamps on	Same as standard	2 consecutive bars out, or 8 random lamps out
<u>2</u> 3000-foot runway		All lamps on	Same as standard	2 consecutive bars out, or 14 random lamps out
(c) Side row bars		All lamps on	Same as standard	¹ 2 consecutive bars out, or 9 random lamps out
(d) Threshold bar		All lamps on	Same as standard	3 adjacent lamps out, or 9 random lamps out
(e) 500-foot bar.....		All lamps on	Same as standard	3 random lamps out
(f) 1000-foot bar		All lamps on	Same as standard	3 random lamps out

¹ A 3-lamp bar is considered out when two or more lamps are out. A 5-lamp bar is considered out when three or more lamps are out. *

Section 1. APPROACH LIGHTING SYSTEMS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
(g) Flashers		All flashers on	Same as standard	2 random flashers out
(h) Flasher rate		120 flashes per minute	Same as standard	±2 flashes per minute
(i) Overall.....		All lamps on	Same as standard	27 lamps/flashers out
(2) SSALR	294, 3.3.2.2.5-6			
(a) Centerline		All lamps on	Same as standard	1 bar out
(b) Threshold bar		All lamps on	Same as standard	3 random lamps out
(c) 1000-foot bar		All lamps on	Same as standard	3 random lamps out
(d) Flashers		All flashers on	Same as standard	1 flasher out
(e) Flasher rate		120 flashes per minute	Same as standard	±2 flashes per minute
(f) Overall		All lamps on	Same as standard	11 lamps/flashers out *
c. MALS AND SSALS	306			
(1) Overall system.....		All lamps on	Same as standard	Less than 2 light bars out as defined in 71c(2), (3), (4), and 20 percent or less (random) of lamps out
(2) 5-lamp bar		All lamps on	Same as standard	Less than 3 lamps out
(3) Threshold bar (where existing).....		All lamps on	Same as standard	Less than 4 lamps out

Section 1. APPROACH LIGHTING SYSTEMS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
(4) 1000-foot bar		All lamps on	Same as standard	Less than 4 lamps out
→72. VERTICAL ANGULAR ALIGNMENT.				
* a. FA-9993/FA-10048	299, 308	Locally established vertical angle of lighted beam axis of light	Standard ±1°	Standard ±2°
b. FA-10700.				
(1) Flashers	6.2.8.5.1	6° or as installed	±1°	±2°
(2) Steady burning lights	6.2.9.3.1	As installed	±1°	±2°
→73. HORIZONTAL ANGULAR ALIGNMENT.	299, 308, 6.2.8.5.2, 6.2.9.3.2	Parallel to centerline of runway	Same as standard	Same as initial
→74. REGULATOR OUTPUT	295			
a. ALSF-1, ALSF-2, SSALR, SSALS, SSALF, ALL SYSTEMS EXCEPT DUAL MODE SYSTEMS.				
(1) Step 1		8.3 A	±0.2 A	±0.4 A
(2) Step 2		9.9 A	±0.2 A	±0.4 A
(3) Step 3		12.1 A	±0.2 A	±0.4 A
(4) Step 4		15.3 A	±0.2 A	±0.4 A
(5) Step 5		20.0 A	+0.0 A, -0.2 A	+0.0 A, -0.4 A

Section 1. APPROACH LIGHTING SYSTEMS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
b. ALSF-2/SSALR FA-9993/FA-10048/FA-10700 DUAL MODE SYSTEMS ONLY.				
(1) Step 1		8.5 A	±0.2 A	Same as initial
(2) Step 2		10.3 A	±0.3 A	Same as initial
(3) Step 3		12.4 A	±0.3 A	Same as initial
(4) Step 4		15.8 A	±0.4 A	Same as initial
(5) Step 5		20.0 A	+0.0 A, -0.4 A	Same as initial
→75. MALS VOLTAGE	307, Order 6950.17			
a. Control Cabinet Supply Voltage		120 V or 240 V	±3 percent	±5 percent (for exceptions see Order 6950.17)
b. Lamp Voltage (Measured at Transformer Output).				
(1) High step, 100 percent brightness		120 V	±3 percent	±5 percent
(2) Medium step, 20 percent brightness		75 V	±3 percent	±5 percent
(3) Low step, 4 percent brightness		50 V	±3 percent	±5 percent
c. Lamp Transformer Output (Line To Line).				
(1) High step, 100 percent brightness		240 V	±3 percent	±5 percent
(2) Medium step, 20 percent brightness		150 V	±3 percent	±5 percent
(3) Low step, 4 percent brightness		100 V	±3 percent	±5 percent
76. APPROACH LIGHTING SYSTEMS BRIGHTNESS STEPS (NOT APPLICABLE TO MALS).				
→ a. Change time from step 1 on initial turn on.				

Section 1. APPROACH LIGHTING SYSTEMS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
* (1) FA-9993/FA-10048	Instruction book	Delay from step 1. Refer to instruction book for specified time.	Same as standard	Same as initial
(2) FA-10700	TI 6850.87, Table 3-14(5)	3.5 seconds	Same as standard	Same as initial
b. Automatic reduction from brightness step 5 to step 4.	298, TI 6850.87, Table 3-14 (6), (7)	15 minutes	±2 minutes	Same as initial
→77. FILTERS	345	All in place	Same as standard	Same as initial
→78. SEQUENCE FLASHING LIGHTS.				
a. ALSF-1	294	All lamps on	Same as standard	Less than 3 lamps out
b. ALSF-2	294	All lamps on	Same as standard	Less than 3 lamps out
c. ALSF-2/SSALR Dual Mode System.				
(1) ALSF-2	294	All lamps on	Same as standard	Less than 3 lamps out (not consecutive)
(2) SSALR	294	All lamps on	Same as standard	Less than 2 lamps out
d. MALSF, MALSR, SSALF, and SSALR..	306	All lamps on	Same as standard	Less than 2 lamps out
e. Flashing Rate	300	120 flashes per minute	±2 flashes per minute	Same as initial
f. Unit Input Voltage	Order 6950.17	240 V or 120 V	±3 percent	±5 percent (for exceptions see Order 6950.17)
g. Vertical Angular Alignment ALSF-1,, ALSF-2, MALSF, MALSR, SSALF, SSALR.	299, 308, Order 6850.2	All flashers aimed at 6° or as installed	±1°	±2°

Section 1. APPROACH LIGHTING SYSTEMS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
* →79. REMOTE CONTROL FUNCTIONS.....	306, 315, Order 6650.5	Operational	Same as standard	Same as initial *
→80. OBSTRUCTIONS.....	348	No obstruction	Same as standard	Same as initial
→81. MONITOR SETTING.				
a. ALSF-1.				
(1) Incandescent.....	296	Alarm with 6 lamps out, each loop	Standard +0, -2 lamps	Same as initial
(2) Flashers	297	Alarm with 3 lamps out	Same as standard	Same as initial
b. ALSF-2.				
(1) Incandescent.....	296	Alarm with 6 lamps out each loop	Standard +0, -2 lamps	Same as initial
(2) Flashers	297	Alarm with 3 lamps out	Same as standard	Same as initial
c. ALSF-2/SSALR Dual Mode System FA-9993/FA-10048.				
(1) ALSF-2.				
(a) Incandescent	296b, Instruction book	CAUTION - 5 lamps out per loop	Same as standard	Same as initial
		FAILURE - 6 lamps out per loop	Same as standard	Same as initial
(b) Flashers	296b, Instruction book	CAUTION - 2 random units out	Same as standard	Same as initial
		FAILURE - 2 consecutive units out, 3 random units out	Same as standard	Same as initial

Section 1. APPROACH LIGHTING SYSTEMS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
(2) SSALR.				
(a) Incandescent.....	Instruction book	CAUTION - 2 lamps out per loop	Same as standard	Same as initial
		FAILURE - 3 lamps out per loop	Same as standard	Same as initial
(b) Flashers.....	Instruction book	CAUTION - 1 unit out	Same as standard	Same as initial
		FAILURE - 2 units out	Same as standard	Same as initial
* d. ALSF-2/SSALR, FA-10700 Monitor Setting.				
(1) ALSF-2.....	3.3.2.2.3			
(a) Centerline (inner 1500 feet).				
<u>1</u> Caution.....		2 consecutive bars out, or 13 random lamps out	Same as standard	Same as initial
<u>2</u> Failure.....		3 consecutive bars out, or 15 random lamps out	Same as standard	Same as initial
(b) Centerline (outer 1500 feet).				
<u>1</u> Caution.				
<u>a</u> 2400-foot runway.....		2 consecutive bars out, or 7 random lamps out	Same as standard	Same as initial
<u>b</u> 3000-foot runway.....		2 consecutive bars out, or 13 random lamps out	Same as standard	Same as initial

*

Section 1. APPROACH LIGHTING SYSTEMS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
2 Failure.				
a 2400-foot runway		3 consecutive bars out, or 9 random lamps out	Same as standard	Same as initial
b 3000-foot runway		3 consecutive bars out, or 15 random lamps out	Same as standard	Same as initial
(c) Side row bars.				
1 Caution		2 consecutive bars out, or 9 random lamps out	Same as standard	Same as initial
2 Failure		3 consecutive bars out, or 10 random lamps out	Same as standard	Same as initial
(d) Threshold bar.				
1 Caution		3 adjacent lamps out, or 8 random lamps out	Same as standard	Same as initial
2 Failure		4 adjacent lamps out, or 10 random lamps out	Same as standard	Same as initial
(e) 500-foot bar.				
1 Caution		3 random lamps out	Same as standard	Same as initial
2 Failure		4 random lamps out	Same as standard	Same as initial
(f) 1000-foot bar.				
1 Caution		3 random lamps out	Same as standard	Same as initial

Section 1. APPROACH LIGHTING SYSTEMS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
* 2 Failure		4 random lamps out	Same as standard	Same as initial
(g) Flashers.				
1 Caution		2 random flashes out	Same as standard	Same as initial
2 Failure		3 random flashers out, or 2 adjacent flashers out	Same as standard	Same as initial
(h) Flasher rate failure		±3 flashes per minute	Same as standard	Same as initial
(i) Overall.				
1 Caution		27 lamps/flashers out	Same as standard	Same as initial
2 Failure		28 lamps/flashers out	Same as standard	Same as initial
(2) SSALR	294, 345; 3.3.2.2.5			
(a) Centerline.				
1 Caution		1 bar out	Same as standard	Same as initial
2 Failure		2 consecutive bars out	Same as standard	Same as initial
(b) Threshold bar.				
1 Caution		3 random lamps out	Same as standard	Same as initial
2 Failure		4 random lamps out	Same as standard	Same as initial

*

Section 1. APPROACH LIGHTING SYSTEMS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
(c) 1000-foot bar.				
1 Caution.....		3 random lamps out	Same as standard	Same as initial
2 Failure.....		4 random lamps out	Same as standard	Same as initial
(d) Flashers.				
1 Caution.....		1 random flasher out	Same as standard	Same as initial
2 Failure.....		2 random flashers out	Same as standard	Same as initial
(e) Flasher rate failure.....		±3 flashes per minute	Same as standard	Same as initial
(f) Overall.				
1 Caution.....		10 lamps/flashers out	Same as standard	Same as initial
2 Failure.....		12 lamps/flashers out	Same as standard	Same as initial
82. ALSF-2 POWER TRANSFER..... (CATEGORY II AND III).	360	1 second or less	Same as standard	Same as initial

**Section 2. VISUAL APPROACH SLOPE INDICATOR AND
PRECISION APPROACH PATH INDICATOR (Continued)**

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→103. RED FILTERS	Instruction book	All filters on	Same as standard	At least two filters on with lamp behind missing filter disconnected
→104. OBSTRUCTIONS	348	No obstruction	Same as standard	Same as initial
* →105. REMOTE CONTROL FUNCTIONS. 106.-114. RESERVED.	Order 6650.6	Operational	Same as standard	Same as initial *

Section 3. RUNWAY-END IDENTIFIER LIGHTS

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
→115. LAMP OPERATION	329	All on	Same as standard	Same as initial
* →116. REMOTE CONTROL FUNCTIONS.	Order 6650.6	Operation	Same as standard	Same as initial *
→117. VERTICAL ALIGNMENT.				
a. With Baffles	330	3°	±1°	Same as initial
b. Without Baffles	330	10°	±1°	±2°
c. ODREIL	Instruction book	Lights plumb	Same as standard	Same as standard
→118. HORIZONTAL ALIGNMENT.				
a. With Baffles	330	10°	±1°	±2°
b. Without Baffles	330	15°	±1°	±2°
→119. FLASHING RATE.				
a. REIL	300, Instruction book	120 flashes per minute	±2 per minute	Same as initial
b. ODREIL	Instruction book	60 flashes per minute	±1 per minute	Same as initial

Section 3. RUNWAY-END IDENTIFIER LIGHTS (Continued)

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
120. INPUT VOLTAGE	331, Order 6950.17	120 V, 240 V, or set transformer tap for the applied voltage	±3 percent	±5 percent (for exceptions see Order 6950.17)
121. OBSTRUCTIONS	348	No obstruction	Same as standard	Same as initial
122.-129. RESERVED.				

Section 4. OBSTRUCTION LIGHTS

Parameter	Reference Paragraph	Standard	Tolerance/Limit	
			Initial	Operating
130. FIXED OBSTRUCTION LIGHTS	335	All lamps on	Same as standard	Same as initial
→131. FLASHING HAZARD BEACON FREQUENCY (300MM CODE BEACON)	336	26 flashes per minute	±14 flashes per minute	Same as initial
→132. ROTATING HAZARD BEACONS FLASHING FREQUENCY	336	12 to 40 flashes per minute	Same as standard	Same as initial
→133. FLASHING FREQUENCY OF HIGH-INTENSITY, WHITE OBSTRUCTION LIGHTS	336	40 flashes per minute	±2 flashes per minute	Same as initial
→134. LAMP SOCKET VOLTAGE	Order 6950.17	Rated lamp voltage	±3 volts	±5 volts (for exceptions see Order 6950.17)
135. FUSES FOR TRANSFORMER AND FEEDER	Order 6950.18	Not to exceed 200 percent of transformer rating	Same as standard	Standard +0.0, -25 percent
136. ROTATING HAZARD BEACONS	433			
→ a. Beacon Drums.				
(1) 36-inch		6 revolutions per minute	Same as standard	Same as initial
(2) 24-inch		12 revolutions per minute	Same as standard	Same as initial
→ b. Lampchanger.				
(1) Contacts with series coil energized		3/32 inch	±1/32 inch	Same as initial

CHAPTER 4. PERIODIC MAINTENANCE

170. REQUIRED MAINTENANCE ACTIVITIES.

a. General. This chapter establishes all the maintenance activities that are required for lighted navigational aids on a periodic, recurring basis, and the schedules for their accomplishment. The chapter is divided into two sections. The first section identifies the performance checks (i.e., tests, measurements and observations) of normal operating controls and functions which are necessary to determine if operation is within established tolerances/limits. The second section identifies other tasks that are necessary to prevent deterioration and/or to ensure reliable operation. Refer to the latest edition of Order 6000.15, General Maintenance Handbook for Airway Facilities, for additional general guidance, and Orders 6950.17, Maintenance of Electrical Systems in Buildings; 6950.18, Maintenance of Electrical Distribution Systems; and 6950.22, Maintenance of Electrical Power and Control Cables, for specific procedures referenced in the various sections of this chapter. Two or three digit references such as 71, 115, and 345 are located in this handbook. Those such as 3.3.2.2.3 are in TI 6850.87, Dual Mode High Intensity Approach Lighting System (ALSF-2/SSALR) System Type FA-10700. *

b. Supplemental Maintenance Instructions. For visual approach slope indicator (VASI), precision approach path indicator (PAPI), runway-end identifier lights (REIL), medium intensity approach lighting systems (MAL S, MALSF, MALSR), omnidirectional approach lighting systems (ODALS), obstruction lights, short simplified approach lighting systems (SSALS, SSALF, SSALR), and lead-in lights (LDIN), sector managers shall:

(1) Arrange to obtain the regular visual checks from any reliable source available. This may be accomplished by an FAA maintenance technician while in the area for other work requirements, pilot reports, airport manager reports, fixed base operator reports, etc.

(2) Where required, negotiate an agreement (preferably written) with non-FAA personnel to visually check the facility operational status and immediately report any burned out lamps to the proper FAA office.

(3) Take appropriate action to correct any out-of-tolerance conditions.

Section 1. PERFORMANCE CHECKS Subsection 1. ALSF CATEGORY-I SYSTEMS (ALSF-1, SSALS, SSALF, SSALR)

<i>Performance Checks</i>	<i>Reference Paragraph</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
* 171. MONTHLY..... Make visual operational checks of all lights, including flashers, on all brightness steps.	71	294; 3.3.2.2.3-10
172. QUARTERLY.		
a. Record meter readings.....	74	295; 6.2.5
b. Check ALS monitor circuit to tower.....	81	296a(1), 296b(1), 296b(2)
c. Check SFL monitor	81	297
d. Check SFL flash rate	78e	300; 3.3.2.2.5
e. Check brightness step changing time	76a	Instruction book; TI 6850.87, Table 3-14(5) *

Section 1. PERFORMANCE CHECKS (Continued)
Subsection 1. ALSF CATEGORY-I SYSTEMS
(ALSF-1, SSALS, SSALF, SSALR) (Continued)

<i>Performance Checks</i>	<i>Reference Paragraph</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
173. ANNUALLY.		
* a. Check ALS 15-minute timer for brightness step 5 at the tower	76b	298; TI 6850.87, Table 3-14(6), (7)
b. Check ALS monitor for each loop	81	296b(2) *
c. Check vertical and horizontal alignment of all light fixtures.....	72, 73	299
174. RESERVED.		

Subsection 2. ALSF-2 CATEGORY-II AND III SYSTEMS AND
ALSF-1 ON CATEGORY-II SYSTEMS

<i>Performance Checks</i>	<i>Reference Paragraph</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
175. WEEKLY.		
* a. Make visual operational checks for all lights, including flashers, on all brightness steps.	71	294; 3.3.2.2.3-10 *
b. Check ALS monitor circuit to tower.....	81	296a(1) 296b(1)
176. MONTHLY.		
a. Check ALS monitor for each loop	81	296a(2) 296b(2)
* b. Record meter readings.....	74	295; 6.2.5
177. QUARTERLY.		
a. Check brightness step changing time	76a	Instruction book; TI 6850.87, Table 3-14 (5)
b. Check SFL monitor	81	297
c. Check SFL flash rate	78e	300; 6.2.8.3
178. ANNUALLY.		
a. Check vertical and horizontal alignment of all light fixtures.....	72, 73	299; 6.2.8.5.1, 6.2.8.5.2, 6.2.9.3.1, 6.2.9.3.2 *
b. Check ALS 15-minute timer for brightness step 5 at the tower	76b	298
179.-180. RESERVED.		

Section 1. PERFORMANCE CHECKS (Continued)
Subsection 6. REIL

<i>Performance Checks</i>	<i>Reference Paragraph</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
193. SEMIANNUALLY.		
a. Make visual operation checks of all lights. Check and clean..... exterior as required.	115	329
b. Check both fixtures for damaged or misaligned lights	117, 118	330
c. Record input voltage at power control cabinet.....	120	331, Order 6950.17
d. Check device that shuts down REIL..... if one flasher fails (if applicable).	NA	332
e. Check flasher rate.....	119	300
* 194. ANNUALLY Check remote control functions.	116	329

Subsection 7. OBSTRUCTION LIGHTS

<i>Performance Checks</i>	<i>Reference Paragraph</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
195. WEEKLY Check for burned-out lamps on installations with single obstruction light fixtures.	130	335
196. MONTHLY Check for burned-out lamps on installations with double obstruction light fixtures.	130	335
197. ANNUALLY.		
a. Check frequency of flashing and/or rotating beacon.....	131, 132, 133	336
b. Check operation of automatic control devices and alarm circuits	145	337, 431, 432
c. Check focusing and aiming of lamps.....	151, 152, 153, 154	338, 434
198.-201. RESERVED.		

Section 2. OTHER MAINTENANCE TASKS
Subsection 1. ALSF CATEGORY I SYSTEMS
(ALSF-1, SSALS, SSALF, SSALR)

<i>Maintenance Task</i>	<i>Reference Paragraph</i>		
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>	
202. MONTHLY. Visually check for damaged or misaligned lamps, and cleanliness.	71, 72, 73, 77	345	
203. QUARTERLY. Check the approach line-of-sight clearance for vegetation and other obstructions.	80	348	
204. ANNUALLY.			
a. Check all light supports for rigidity, proper guy tensions,..... and obvious misalignment.	NA	346	
* b. Check oil level in regulators (if applicable).....	NA	347	*
c. Check all structures for rot and corrosion.....	NA	NA	
d. Clean substation compartments. (Observe safety precautions.).....	NA	NA	
e. Check for water in LB-1 light bases.....	NA	349	
* f. Check operation of oil circuit breaker mechanism (if applicable)	NA	350	*
g. Check all lightning arrestors, ground connections, electrical connections, and safety devices associated with power distribution equipment at terminal poles, substations and transformer pads.	NA	351	
h. Open and clean all ALS open, flush fixtures, including flasher units, to maintain full light output. Clean all glass-ware, reflectors, color filters, surface lights and flashers.	NA	352	
i. Check all main power switching equipment.....	NA	Order 6950.18	
j. Inspect all relays.....	NA	353	
k. Service timer motor and timer contacts	NA	354	
l. Check number and elevation angle data at each station	NA	355	
205. EVERY 3 YEARS.			
a. Check insulation resistance and continuity of all main power and control cables. Record all measurements and compare with previous readings. Use FAA Form 6000-8 or equal.	Order 6950.22	Order 6950.22	

Section 2. OTHER MAINTENANCE TASKS (Continued)
Subsection 1. ALSF CATEGORY I SYSTEMS
(ALSF-1, SSALS, SSALF, SSALR) (Continued)

<i>Maintenance Task</i>	<i>Reference Paragraph</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
b. Measure and record insulation and conductor resistance of ALS series loop. Compare measurements with previous readings. Use FAA Form 6000-8 or equal.	Order 6950.22	Order 6950.22
* c. Check accuracy of regulator loop ammeters.....	NA	356; 6.2.3.5, 6.3.3
d. Check dielectric strength and condition of insulation oil in the regulators (if applicable).	NA	347 *
206. AS REQUIRED.		
a. Change all PAR-56 incandescent lamps after 400 hours of operation on brightness 5.	NA	357
b. Change all flasher lamps in accordance with manufacturers instructions.	NA	357
207.-214. RESERVED.		

Subsection 2. ALSF-2 CATEGORY-II AND -III SYSTEMS

<i>Maintenance Task</i>	<i>Reference Paragraph</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
215. MONTHLY.		
a. Check for damaged or misaligned lights,..... abnormal intensity, and cleanliness.	71, 72, 73, 77	345, 352
b. Check approach line-of-sight clearance for vegetation and other obstructions	80	348
216. ANNUALLY.		
a. Check all light supports for rigidity, proper guy tensions, and obvious misalignment.	NA	346
* b. Check oil level in regulators (if applicable).....	NA	347 *
c. Check all structures for rot and corrosion.....	NA	NA

Section 2. OTHER MAINTENANCE TASKS (Continued)
Subsection 2. ALSF-2 CATEGORY-II AND -III SYSTEMS (Continued)

<i>Maintenance Task</i>	<i>Reference Paragraph</i>		
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>	
d. Clean substation compartments. (Observe safety precautions.).....	NA	NA	
e. Check for water in LB-1 light bases.....	NA	349	
* f. Check operation of oil circuit breaker mechanism (if applicable)	NA	350	*
g. Check all lightning arrestors, ground connections, electrical connections, and safety devices associated with power distribution equipment at terminal poles, substations, and transformer pads.	NA	351	
h. Open and clean standard open based ALS flush fixtures, including flasher units, to maintain full light output. Clean all glassware, reflectors, color filters, surface lights and flashers.	NA	349, 352	
i. Check all main power switching equipment.....	NA	Order 6950.18	
j. Inspect all relays.....	NA	353	
k. Service timer motor and timer contacts	NA	354	
l. Check number and elevation angle data at each station	NA	355	
m. Check power transfer for Category II conditions.....	82	360	
n. Visually inspect electrical connections for signs of overheating.....	NA	NA	
217. EVERY 3 YEARS.			
a. Check insulation resistance and continuity of all main power..... and control cables. Record all measurements and compare with previous readings. Use FAA Form 6000-8 or equal.	Order 6950.22	Order 6950.22	
* b. Check accuracy of regulator loop ammeters.....	NA	356; 6.2.3.5, 6.3.3	
c. Check dielectric strength and condition of insulation oil in the regulators (if applicable).	NA	347	*
d. Measure and record conductor and insulation resistance of dual mode ALS series loop cable. Compare measurements with previous readings. Use FAA Form 6000-8 or equal.	Order 6950.22	Order 6950.22	

Section 2. OTHER MAINTENANCE TASKS (Continued)
Subsection 2. ALSF-2 CATEGORY-II AND -III SYSTEMS (Continued)

<i>Maintenance Task</i>	<i>Reference Paragraph</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
218. AS REQUIRED.		
a. Change all PAR-56 incandescent lamps after 400 hours of operation on brightness 5.	NA	357
b. Change all sequenced flasher lamps after 900 hours of..... operation on high brightness or in accordance with the manufacturers technical instruction manual.	NA	357
* c. Open and clean sealed type ALS flush fixtures if the need is observed during maintenance tasks.	NA	352
219.-225. RESERVED.		

Subsection 3. MEDIUM-INTENSITY APPROACH LIGHTING SYSTEMS (MALS, MALSF, MALSR)

<i>Maintenance Task</i>	<i>Reference Paragraph</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
226. MONTHLY.		
a. Visually check for damaged or misaligned lights or mirrors	71, 72, 73, 77	345
b. Check the approach line-of-sight clearance for vegetation and other obstructions.	80	348
227. ANNUALLY.		
a. Check all structures for rot or corrosion. Check all light..... supports for rigidity, guy tensions, and obvious misalignment.	NA	346
b. Inspect and clean, if required, interior of all cabinet-..... mounted flashing units.	NA	NA
c. Check safety devices, ground connections, lightning arrestors, and safety conditions of power distribution equipment terminal poles, light supports, and sub-station transformer pads.	NA	351
d. Clean exterior of lamp fixtures as required	NA	345

Section 2. OTHER MAINTENANCE TASKS (Continued)
Subsection 3. MEDIUM-INTENSITY APPROACH LIGHTING SYSTEMS
(MALS, MALSF, MALS) (Continued)

<i>Maintenance Task</i>	<i>Reference Paragraph</i>	
	<i>Standards and Tolerances</i>	<i>Maintenance Procedures</i>
e. Check for cleanliness and condition of all glassware and reflectors.	NA	345
* f. Open and clean lighting fixtures (including flasher units) to maintain full light output. This may be scheduled for partial accomplishment semiannually.	NA	NA
g. Check fuseholders, circuit breakers, and contacts.....	NA	Order 6950.17
h. Inspect all relays.....	NA	353
i. Service timer.....	NA	354
228. EVERY 3 YEARS. Check conductor and insulation resistance of all power and..... control cables. Record all measurements and compare with previous readings. Use FAA Form 6000-8 or equal.	Order 6950.22	Order 6950.22
229. AS REQUIRED.		
* a. Withdrawn-CHG 2		
b. Change all PAR-56 (threshold) lamps after 400 hours of..... operation on maximum brightness.	NA	358
c. Change all sequenced flasher lamps after 900 hours of..... operation on high brightness or in accordance with the manufacturer instruction manual.	NA	358
d. Open and clean sealed type ALS flush fixtures if the need is observed during maintenance tasks.	NA	352
230.-236. RESERVED.		

354. FLASHER MASTER TIMER.

a. Purpose. This check is a visual inspection of the motor driven flasher master timer contacts and associated components.

b. Procedure.

(1) Inspect the timer motor and look for excessive bearing wear, indications of overheating, loose electrical connections, or mounting hardware.

(2) Inspect the timer contacts and look for burned contacts, loose electrical connections or mounting hardware, and sluggish operation.

(3) Inspect the overall flasher master timer for obvious defects.

(4) Make necessary repairs or adjustments.

355. WARNING AND IDENTIFICATION SIGNS.

a. Purpose. This is a visual check to insure that all approach light stations are properly identified with the appropriate station number and the proper elevation angle.

b. Procedure. Visually inspect each of the approach light stations to verify that each station is properly identified according to the following standards.

(1) Approach Lighting Stations. Approach lighting stations shall be fitted with a numbered identification sign as shown in figure 2-9. Sequenced flashers and medium-intensity approach lighting stations shall be numbered either by signs or stenciling. Except for equipment with signs already attached, warning signs (FAA standard drawing C-4676) shall be placed on each ALSF-1 and ALSF-2 end structures, and/or in other locations as required due to design location of the approach light stations, and on such intermediate structures as will assure that the distance between the signs will be no more than 500 feet. High-voltage signs (FAA standard drawing C-4850) shall be conspicuously placed on each structure.

(2) ALSF-1 and ALSF-2 Installations. Each 100-foot station shall be numbered consecutively from the runway threshold (station 0+00) to the last light station numbered. The as-built facility drawings will show the correct light bar numbering.

(3) SSALS, SSALF, SSALR, MALS, MALSF, and MALSR installed prior to August 31, 1979. Begin numbering at the runway threshold with number 1, and the next light station number 2 and so on, continuing to and including the last or outermost unit. Systems installed

after August 31, 1979, shall be numbered as indicated in paragraph (2).

(4) Flashing Light Systems. Flashers are numbered beginning with the outermost flasher as number 1 and proceeding in consecutive order to the innermost flasher. However, when flashers are an integral part of an ALS, they should be identified by reference to the number of the approach light station on which they are installed.

NOTE: All flashers installed after August 31, 1979, shall be numbered as indicated in paragraph (2).

(5) Rigid Structures. Rigid structures shall be identified as shown in figure 2-9. The sign shall be located on the access road or ladder side of the structure, either on the platform or the vertical structure support, preferably within 6 feet of the ground level. The sign shall have black lettering on a white background.

(6) Frangible Assemblies. The station number and elevation settings shall be stenciled on the side of the lampholder of the outer lamp assembly facing the access road or substation side of the light lane. The configuration of the sign shall be similar to that shown in figure 2-9 with minimum size 1-inch black lettering on a white background. A separate identification showing the required information sign may be attached to the vertical supporting column in lieu of stenciling.

(7) Flush Type Installation. The station number shall be stenciled on the concrete pad between the fourth and fifth lamp assembly facing the access road or the substation side of the light lane.

356. AMMETER.

a. Purpose. This procedure validates the accuracy of the loop current ammeters.

b. Procedure.

(1) Obtain a known calibrated root-mean-square (RMS) ammeter with sufficient range to measure the loop current. Loop current, as measured on the panel mounted meter, may be reduced by a 25/5 current transformer. Check manufacturer's instructions for specific current transformer ratio.

CAUTION: Do not open the meter circuit when the power is on.

(2) With system off, install the known calibrated meter in series with the panel mounted meter.

(3) Operate the system on all brightness steps and compare the meter readings. Meters should agree within the manufacturer's specified tolerance.

357. HIGH-INTENSITY APPROACH LIGHTING SYSTEM GROUP LAMP REPLACEMENT.

a. Purpose. This procedure restores the ALS to its original brilliance and reduces the frequency of lamp failures as a result of exceeding the lamp's rated life expectancy.

b. Procedure.

(1) Group lamp changes for 300W Q20A PAR-56 and PAR-56/2 or 500W Q20A/PAR-56/1 and 56/3 lamps shall be programmed after 400 hours of operation on brightness step 5. Care should be taken to replace all lamps in the system before 450 hours of operation on step 5.

(2) Maintain an accurate record of flash tube replacements to include the reading of the flasher elapsed time meter, date of flash tube installation, and station number. Replace flash tubes on an individual basis.

(a) Elevated Flashers, Single Intensity. Replace flash tube after 500 hours of operation.

(b) Flush/Frangible Flashers, Single Intensity. Replace flash tubes after 1000 hours of operation.

(c) Elevated Three Intensity Flashers. Replace flash tubes after 900 hours and before 950 hours of operation on high brightness.

(d) Other Flashers. If above steps are not applicable to a specific system, follow manufacturer's flash tube replacement schedule.

358. MEDIUM INTENSITY APPROACH LIGHTING SYSTEM GROUP LAMP REPLACEMENT.

a. Purpose. This procedure restores the ALS to its original brilliance and reduces the frequency of lamp failures as a result of exceeding the lamps rated life expectancy.

b. Procedure.

* (1) Withdrawn-CHG 2 *

(2) Group lamp replacement for all PAR-56 type threshold lights shall be programmed after 400 hours of operation on high brightness. Care should be taken to change all PAR-56 type threshold lamps before 450 hours of operation on high brightness.

(3) Sequenced flasher lamps shall be replaced after 900 hours and before 950 hours of operation on high

brightness, or in accordance with the manufacturer's technical instruction manual.

359. ODALS/LDIN/REIL GROUP LAMP REPLACEMENT.

a. Purpose. This procedure restores the system to its original brilliance and reduces the frequency of lamp failures as a result of exceeding the lamps rated life expectancy.

b. Procedure.

(1) Replace all ODALS flash tubes after 500 hours of operation on high brightness per manufacturer's instruction book, TI 6850.47 ODALS Omnidirectional Approach Lighting System.

(2) Replace all LDIN/REIL sequenced flasher lamps in accordance with the manufacturer's technical instruction manual.

(3) Replace ODREIL flash tubes per manufacturer's technical instruction manual.

360. ALSF-2 POWER TRANSFER OPERATION CHECK.

a. Purpose. This check verifies ALSF-2 transfer requirements for category II and III operating conditions.

b. Procedure.

(1) Coordinate with air traffic control before beginning tests.

(2) Both power sources, commercial and standby engine generator (E/G), must be available.

(3) Start the E/G and place the ALSF-2 load on the E/G.

(4) Simulate a power failure to the E/G by loss of fuel or other means, and determine if the power transfer to commercial source is made within the time specified in chapter 3.

(a) If the transfer is not within tolerance, the E/G transfer switch shall be checked in accordance with the latest edition of Order 6980.11, Maintenance of Engine Generators.

(b) To determine the transfer time.

1 Connect a recording oscilloscope to the output (load side) of the E/G transfer switch.