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Rev (-)

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Service Information Letter
For
8162 Series Alkaline Battery Packs used in
Helicopter Emergency Egress Lighting (HEEL)
Systems

Assigning a usable life to 8162 series 7.5 VDC non-rechargeable alkaline battery packs is difficult for LSI to assess as we have no control or knowledge of how the end user manages their battery maintenance and HEEL system test regimens.

LSI can definitively say the standard shelf life is listed on the battery pack label. When not installed and stored under ambient room conditions, that time is approximately (7) years. If it's installed on an aircraft in a cool or room ambient condition, and it's never activated or tested, the life will also be approximately (7) years.

Other than shelf life there's no definitive length of time for the useful life for an installed 8162 Series battery packs. Life varies depending on:

- **Storage conditions:** The battery pack contains alkaline batteries which prefer colder, less humid environments. Heat and humidity shorten battery life. Under optimal conditions, the battery cell vendor provides a seven year shelf life from the original date of manufacture of the individual battery cell. All cells within a given battery pack are from the same manufacturing batch, so they all have the same life expectancy.
- **In service usage rates:** Preflight and maintenance testing vary widely between different aircraft operators. The more in-service usage the battery is subject to, the shorter the life. For this scenario, LSI suggests testing once a day before first flight. Individual operators may choose test preflight every time, many times per day. Other operators may choose to test once a week or less. Battery longevity should be determined by each operators maintenance and safety policies.

For these reasons it's difficult to give a specific life expectancy. LSI has however developed some general guidance suggestions:

LSI conducted a performance test of an 8162 Series battery pack mated to an 8080 Series power supply powering a mid-sized, 20 in² lit area, HEEL system. This is a typical size for a sliding door installation. System size (hence power consumption) is rated in square inches of electroluminescent lighting. The mating 8080 Series power supply is designed to power 9-32 in² of electroluminescent lighting. The test and its results can be found in *Appendix A*, Document No. 95700.

The following assumptions and determinations were made:

- a. All lights in a standard commercial HEEL system are designed to produce (17) foot-Lamberts (fL) for (10) minutes, per LSI's agreement with the UK CAA. This meets the requirements of CAA Leaflet 11-18, *Helicopter Emergency Escape Facilities*.
- b. Figure 2 in Doc. 95700 demonstrates that (17) fL is reached at about **105 minutes** of run (activation) time. This is based on a 62% load (20 in² of EL lights) powered by the 8080-2 power supply and 8162-2 battery pack.

Higher loading (up to 32 in²) will shorten run time, lower loading (down to 9 in²) will lengthen run time.

- c. Subtract (10) minutes for the statutory (10) minute run time. Now you're at **95 minutes** of run time above (17) fL.
- d. Subtract a conservative (arbitrary) safety factor and lower the estimate by (20) minutes. Now you're at **75 minutes** of run time above (17) fL.
- e. Assume a (10) second push-to-test is performed preflight once daily:
 - **75 minutes** = 4,500 seconds.
 - 4,500 sec/10 sec = 450 tests.
 - If the aircraft is flown 300 days a year, and the system is tested once a day, the battery should be replaced every 1.5 years or (18) months or at the end of the shelf life, whichever comes first. This ensures the system should never provide less than (17) fL for (10) minutes during that period.

Each carrier/operator should assess their own requirements using a similar formula.

Appendix B shows the test results of an 8162 Series battery pack mated to an 8080 Series power supply powering maximum sized, 32 in² lit area (the highest load scenario). The run time to (17) fL was 78-81 minutes. As in the example above, the same process can be extrapolated for various sized system configurations and usage rates.

Appendix A



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BRIGHTNESS TEST, HEEL SYSTEM POWER SUPPLY LSI P/N 8080-2 & 8162-2

LSI Document # 95700 Rev -

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PROPRIETARY

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1.0 INTRODUCTION

The purpose of this document is to determine the brightness output over time for an LSI HEEL System.

2.0 REFERENCE DOCUMENTS

2.1 LSI Part Drawing

8162-2	Battery Pack, 7.5 VDC
8080-2	Power Supply, 7.5 VDC
8226-1	Electrical Load, EL, PL
8189-1	Light, HEEL, Solid Lit, 16.5" Long, Button, Round Ends

3.0 TEST SETUP & DESCRIPTION

The HEEL System components are listed in Table 1 and are connected per Figure 1. The equipment utilized is listed in Table 2. A load of approximately 20 sqin of electroluminescent lamp area will be utilized which is in the middle of the range for the noted power supply.

The power supply sensor wires (blue/white and orange/white) will be shorted together, which will allow the power supply to provide a VAC output causing the lights to illuminate. A brightness measurement will be taken every 3 minutes on one lamp only until the battery pack is fully discharged.

Table 1 HEEL System Components						
P/N	S/N	W/O	DOM	Description	QTY	Lit Area (sqin)
8162-2	413	460447	01/13/2004	Battery Pack 7.5 VDC	1	N/A
8080-2	113	388274	01/21/2004	Power Supply Input: 7.5 VDC Output: 120 VAC, 700 Hz Rated: 9 – 30 sqin Lit Area	1	N/A
8226-1	N/A	388517	01/16/2004	Electrical Load	1	12.64
8189-1	N/A	286866	02/05/2004	Fiberglass Encapsulated Electroluminescent Light	2	7.34
TOTAL LIT LOAD (sqin)						19.98

Table 2 Equipment List	
Description	Model
Photometer	PR1530

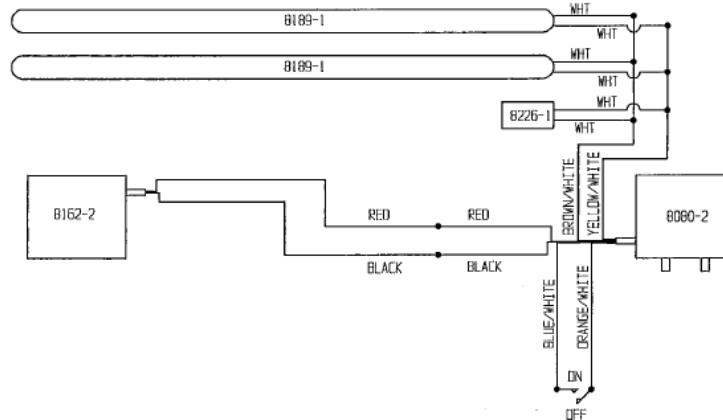
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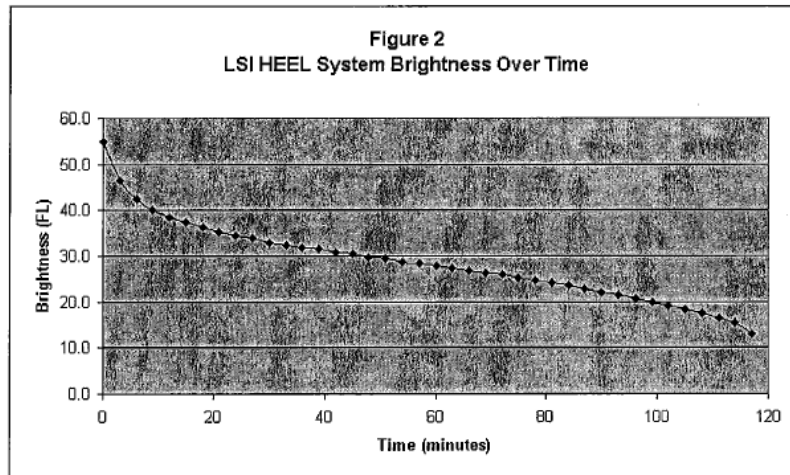
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FIGURE 1 – ELECTRICAL CONNECTIONS



4.0 TEST DATA

The plot of brightness over time is included in Figure 2.



5.0 TEST CONCLUSION

The LSI HEEL System described in Table 1 discharged for a period of approximately 117 minutes. The starting brightness was 54.9 foot-lamberts (FL) and the brightness at the end of the test was 13.0 FL.

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Appendix B

Brightness vs. Time P/N 8080-2 & P/N 8162-2 32 in² max load	
TIME (MIN)	BRIGHTNESS (fL)
0	47.1
3	41.3
6	38.9
9	37.4
12	36.2
15	35.1
18	34.3
21	33.6
24	32.9
27	32.3
30	31.6
33	31
36	30.4
39	29.8
42	29.2
45	28.6
48	27.9
51	27.3
54	26.6
57	25.9
60	25.2
63	24.4
66	23.6
69	22.7
72	21.7
75	20.4
78	18.6
81	16.4
84	14.3
87	11.9
90	6
93	4.5
96	3.8
99	3.1