

APPROVAL REPORT

**MODEL FA-249-HA and FA-250-HA
MARINE SIGNAL LANTERN
USING MODEL APCL-5 FLASHCHANGER
Part Numbers 8087-0122, 8087-0123,
8087-0133, 8087-0136
FOR
HAZARDOUS (CLASSIFIED) LOCATIONS**

Prepared For:

**Automatic Power, Incorporated
213 Hutcheson Street
Houston, TX 77003**

**J.I. 3Z0A9.AX
(3611)**

October 12, 1995



Factory Mutual Research

1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood, Massachusetts 02062



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HAZARDOUS (CLASSIFIED) LOCATIONS

from

AUTOMATIC POWER INCORPORATED
213 HUTCHESON STREET
HOUSTON, TEXAS 77003

I INTRODUCTION

1.1 Automatic Power Inc. requested Factory Mutual Research Corporation (FMRC) Approval of the apparatus listed in Section 1.2 to be in compliance with the applicable requirements of the following standards:

| <u>Title</u> | <u>Approval Standard Number</u> | <u>Issue Date</u> |
|---|-------------------------------------|-------------------|
| Electrical Equipment for Use in Class I, Division 2, Class II, Division 2 and Class III, Division 1 and 2 Hazardous Locations | Class No. 3611 | April 1986 |
| Electrical Equipment for Use in Hazardous (Classified) Locations General Requirements | Class No. 3600 | March 1989 |
| Electrical and Electronic Test Measuring, and Process Control Equipment | Class No. 3810 | March 1989 |
| Enclosures for Electrical Equipment (1000 Volts Maximum) | 250-1991 (NEMA) | 1991 |

1.2 The following apparatus was evaluated as nonincendive for Class I, Division 2, Groups C and D hazardous indoor and outdoor (IP55) locations when used with the Model APCL-5 Flashchanger and will appear in the Approval Guide.

NI/1/2/CD

Marine Signal Lantern. Model FA-249-HA and FA-250-HA

II DESCRIPTION

2.1 The Model APCL-5 Flashchanger combines the flash characteristic board with the lampchanger into a single assembly capable of handling lamps rated up to 60 watts. The flashchanger is powered by a 12 volt battery. Built into the unit are 256 preprogrammed field selectable characters (adjustable by two hexadecimal switches). The flashchanger is voltage regulated to 12 volts RMS, plus or minus 2 percent, when the battery voltage is in excess of 12.2 Volts. It is designed to operate from power sources in the 10 to 30 volt voltage range. It has a built-in 20 amp shunt type solar charging regulator for single light solar systems, a built-in synchronizing feature for synchronizing multiple lights and has large screw type terminals to accept 3/8 inch wide lugs. The lampchanger circuitry has a built-in auto rotation limit and a built-in all lamp failure indication for telemetry monitoring. When a lamp burns out the stepper motor rotates the turret until contact is made with the next lamp and the motor stops. After a short delay power is applied to the new lamp. The prevents arcing of the lamp contacts. When all lamps have been examined and all have failed, the unit automatically shuts off and sets the monitor (open collector) output until the photocell goes through a transition, at which time the unit will examine all lamps again. If all lamps are still failed, the unit shuts down until another photocell transition has occurred. All units have a 20 Ampere maximum solar shunt regulator built in for 12 Volt systems only. This will eliminate battery overcharging where applicable. All units have a 25 Ampere rated Schottky blocking diode for the solar panel (Note: the solar panel was not included as part of the examination). Therefore, the blocking diode in the solar panel junction box can be omitted when the regulator is used. Additional description of the apparatus can be obtained from the manufacturer.

2.2 There are four versions of the flashchanger available. Part Number 8087-0122 is a 12 volt, 6 bulb flashchanger. Part Number 8087-0123 is a 12 volt, 4 bulb flashchanger. Part Number 8087-0133 is a 6 volt, 6 bulb flashchanger. Part Number 8087-0136 is a 6 volt, 4 bulb flashchanger.

III EXAMINATION AND TESTS

3.1 A representative sample of the Model APCL-5 Flashchanger (P/N 8087-0122 representative of the worst case in the series) when used in conjunction with the Model FA-249-HA and FA-250-HA Marine Lantern was examined and tested by FMRC to determine the acceptability for use in the specified hazardous locations. The examination included circuit analysis, temperature measurements as well as a review of the manufacturer's documentation and the equipments physical construction. All were satisfactory and summarized in the following sections.

3.2 Nonincendive Examination - Standard Class 3611

3.2.1 Nonincendive equipment acceptability is based on the inability of the units to release sufficient electrical or thermal energy under normal operating conditions to cause ignition of specific hazardous atmospheres.

3.2.2 Switches SW1 and SW2 are operating in nonincendive circuits. Each switch has a 100 k Ω resistor in series with the Vcc (5 volts) preventing these components from causing spark ignition.

3.2.3 Potentiometer R5 has a minimum series resistance of 200 kOhms preventing these components from causing spark ignition.

3.2.4 The switches and potentiometers described above are not accessible during normal operation. The Model FA-249-HA and FA-250-HA Lantern requires the use of a tool to gain access to the circuitry.

3.2.5 The APCL-5 Flashchanger uses the same wattage bulbs, powered at the same voltage and current levels as the bulbs previously tested under FMRC J.I. 0G2A8.AE. The bulb is the hottest component in the flashchanger assembly. Previous temperature tests determined that a Temperature Code T2D is required on the label based on an ambient temperature rating of 40°C.

3.2.6 Temperature tests were conducted on a flashchanger assembly in a 23°C ambient temperature. The input voltage was varied between 10 Vdc and 30 Vdc. The bulbs were operated in steady state mode and using various flash characteristics. Temperature measurements were taken on the two p.c. board assemblies. The maximum measured temperature, based on an ambient temperature of 40°C, was 53°C recorded on voltage regulator U1 (LM2936) located on the Characteristic Board.

3.3 Protection From Fire, Shock and Injury Examination - Class 3810

3.3.1 Accessibility - The lantern has a tool removable cover which prevents operator access to the flashchanger live parts.

3.3.2 Surface Temperature - The transmitter was operated until surface temperatures stabilized. Temperature measurements verified that there were no accessible parts which exceeded the maximum allowed temperature rise of 35C°.

3.3.3 Spacings - Measurements verified that the field wiring spacings are greater than the minimum requirement of 3.2 mm. Basic spacings on the P.C.board were greater than the minimum requirement of 0.5 mm. This is satisfactory.

3.3.4 Flammability - The circuit boards used in the flashchanger assembly have a UL94V-0 rating. Fire tests were waived.

3.4 Outdoor Ratings (IP55 per IEC 144)

The Model FA-249-HA and FA-250-HA lanterns were previously tested for an IP55 rating under FMRC J.I. 1H5A6.AE. The same enclosure is used with the subject flashchanger. Additional testing was not required.

IV MARKING

Marking meets Standard Class 3611 requirements. Nameplate drawing S-4994-HA is attached to this report for reference.

5.2 Installation, use and maintenance should be in accordance with the manufacturer's documents and the National Electrical Code, ANSI/NFPA 70.

VI FACILITIES AND PROCEDURES AUDIT INSPECTION RESULTS

The manufacturing site was examined with regard to facilities and quality control procedures to ensure that they are capable of maintaining the same level of performance that produced the equipment which was examined and tested. Resultant findings were satisfactory.

VII MANUFACTURER'S RESPONSIBILITIES

7.1 The manufacturer shall provide the instruction manual to the end user.

7.2 On 100% of production, the lantern shall be subjected, without electrical breakdown, as a routine production line test, the application of a test voltage of 600 Vrms, 45 to 60 Hz, or 860 Vdc, applied between the input terminals and the ground terminal for one second. Alternatively, the test potential shall be 500 Vrms, at a frequency between 45 to 65 Hz, or 707 Vdc applied for one minute.

7.3 The documentation listed in Section VIII is applicable to this Approval and is on file at Factory Mutual Research Corporation. No changes of any nature shall be made unless notice of the proposed change has been given and written authorization obtained from Factory Mutual Research Corporation. The Approved Product - Revision Report, FMRC Form 797 shall be forwarded to Factory Mutual Research Corporation as notice of proposed changes.

VIII DOCUMENTATION

The following documentation is applicable to this Approval and is on file at Factory Mutual Research Corporation.

| <u>Document No.</u> | <u>Revision</u> | <u>Title</u> |
|---------------------|-----------------|--|
| S-4994-HA | 7 | Nameplate, FA 249, FA 250 and FA 251 Class I, Div. 2, Group D |
| L-2445-S | 1 | Fabrication Drawing Flashchanger Nameplate |
| 6381 0410 | 11-22-94 | Bill of Material, |
| 6381 0411 | 11-28-94 | Bill of Material, |
| L-2499-HA | - | FA-249 155mm Lantern Assembly for Class I, Div. 2, Groups C & D Locations |
| X-2035-HA | - | FA 250 155mm Lantern Assembly for Class I, Div. 2, Groups C & D Locations |
| X-1989-P | 1 | Assembly Drawing APCL-5, 6 Place Flashchanger |
| X-1990-P | 1 | Assembly Drawing APCL-5, 4 Place Flashchanger |
| S-6224-S | - | Flashchanger Motor Nameplate |
| M-3711-S | 6 | Airpax K82200 Series Specification Sheet |
| 6381-0401 | 06-23-93 | APCL 5, 6 and 4 Place Lampchanger, Bill of Material |
| L-2481-P | - | Parts Layout P.C.B. Assembly 9045 0868 for APCL-5, or APCL-10 Flashchanger |
| L-2480-C | 1 | Complete Schematic for APCL-5/APCL-10 Series Units (P.C.B. Assembly 9045 0868) |

| <u>Document No.</u> | <u>Revision</u> | <u>Title</u> |
|---------------------|-----------------|---|
| M-3711-S | 6 | Airpax K82200 Series Specification Sheet |
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| L-2480-C | 1 | Complete Schematic for APCL-5/APCL-10 Series Units (P.C.B. Assembly 9045 0868) |

IX CONCLUSION

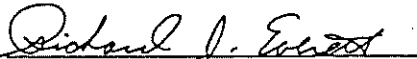
The apparatus listed in Section 1.2 meets FMRC requirements. Approval is effective when the Approval Agreement is signed and received by FMRC.

EXAMINATION AND TESTS BY: R. J. Everett

ORIGINAL TEST DATA: Project Data Record 3Z0A9.AX

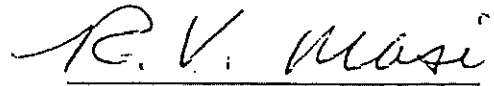
ATTACHMENTS: Nameplate Drawing S-4994-HA

WRITTEN BY:



Richard J. Everett, Engineer
Instrumentation Section
Approvals Division

REVIEWED BY:



R. V. Masi, Project Engineer
Instrumentation Section
Approvals Division



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1151 Boston Providence Turnpike
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CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

I. Nonincendive Version

APCL-5. Flashchanger.

NI/II/2/BCD/T*; $-20\text{ }^{\circ}\text{C} \leq T_a \leq T_{\text{ambient}}$

NI/II/2/IIB+H₂/T**; $-20\text{ }^{\circ}\text{C} \leq T_a \leq T_{\text{ambient}}$

| <u>Flashchanger P/N</u> | <u>Feature</u> | <u>Input</u> | <u>Regulated Out</u> | <u>Lamps</u> |
|-------------------------|---------------------------|--------------|----------------------|--------------|
| 8087-0171/1-ab | Selectable, RS-232 | 10-30VDC | 12V | 6 |
| 8087-0181-ab | Selectable, RS-485 | 5-15VDC | 6V | 6 |
| 8087-0182-ab | Selectable, RS-232 | 10-30VDC | 12V | 6 |
| 8087-0183-ab | Selectable, RS-485 | 10-30VDC | 12V | 6 |
| 8087-0204-ab | Selectable, RS-232 | 5-15VDC | 6V | 6 |

a = Flashbulb options, as follows:

| <u>Bulb P/N</u> | <u>Rated Input</u> | <u>Envelope Dia.</u> | <u>Bulb</u> |
|----------------------|--------------------|----------------------|-------------|
| <i>API 4060-0044</i> | 12V/0.77A | S8 | Clear |
| <i>API 4060-0093</i> | 12V/0.55A | S8 | Clear |
| <i>API 4060-0095</i> | 12V/1.15A | S8 | Clear |
| <i>API 4060-0097</i> | 12V/2.03A | S8 | Clear |
| <i>API 4060-0098</i> | 12V/3.05A | S11 | Clear |
| <i>API 4060-0148</i> | 12V/0.5A | S8 | Clear |
| <i>API 4060-0179</i> | 12V/3.0A | S8 | Clear |
| <i>API 4060-0180</i> | 12V/1.0A | S8 | Clear |
| <i>API 4060-0182</i> | 12V/2.0A | S8 | Clear |
| <i>API 4060-0200</i> | 12V/0.25A | S8 | Clear |
| <i>API 4060-0332</i> | 12V/1.15A | S11 | Frosted |
| <i>API 4060-0333</i> | 12V/2.03A | S11 | Frosted |
| <i>API 4060-0334</i> | 12V/0.55A | S11 | Frosted |
| <i>API 4060-0335</i> | 12V/0.77A | S11 | Frosted |
| <i>API 4060-0337</i> | 12V/3.05A | S11 | Frosted |

b = Flashbulb Signal options, as follows:

| <u>Duty Cycle</u> | <u>Cycle Time</u> | <u>T-Code*</u> | <u>T-Code**</u> | <u>Tambient</u> |
|-------------------|-------------------|----------------|-----------------|-----------------|
| 100 % | continuous | T2D | T2 | 40 °C |
| 50 % | 10 s | T3C | T3 | 70 °C |
| 50 % | 10 s | T4 | T4 | 50 °C |
| * 30 % | 1 s | T6 | T6 | 50 °C |

*Note: Maximum lamp size rated input = 0.77A.

| <u>Flashchanger P/N</u> | <u>Feature</u> | <u>Input</u> | <u>Regulated Out</u> | <u>Lamps</u> |
|-------------------------|---------------------------|--------------|----------------------|--------------|
| <i>8087-0191-ab</i> | <i>Selectable, RS-485</i> | 10-30VDC | 12V | 4 |
| <i>8087-0201-ab</i> | <i>Selectable, RS-232</i> | 10-30VDC | 12V | 4 |
| <i>8087-0282-ab</i> | <i>Selectable, RS-485</i> | 5-15VDC | 6V | 4 |
| <i>8087-0285-ab</i> | <i>Selectable, RS-232</i> | 5-15VDC | 6V | 4 |

a = Flashbulb options, as follows:

| <u>Bulb P/N</u> | <u>Rated Input</u> | <u>Envelope Dia.</u> | <u>Bulb</u> |
|----------------------|--------------------|----------------------|-------------|
| <i>API 4060-0085</i> | 6.2V/0.25A | S8 | Clear |
| <i>API 4060-0086</i> | 6.2V/0.46A | S8 | Clear |
| <i>API 4060-0088</i> | 6.2V/0.92A | S8 | Clear |
| <i>API 4060-0202</i> | 6.2V/1.4A | S8 | Clear |

b = Flashbulb Signal options, as follows:

| <u>Duty Cycle</u> | <u>Cycle Time</u> | <u>T-Code*</u> | <u>T-Code**</u> | <u>Tambient</u> |
|-------------------|-------------------|----------------|-----------------|-----------------|
| 100 % | continuous | T2D | T2 | 40 °C |
| 50 % | 10 s | T3C | T3 | 70 °C |
| 50 % | 10 s | T4 | T4 | 50 °C |
| * 30 % | 1 s | T6 | T6 | 50 °C |

*Note: Maximum lamp size rated input = 0.77A.

Special Conditions of Use:

1. Shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application, including a tool removable cover.
2. Consideration to the heating condition of the flashbulb is to be taken for determining the Temperature Class of the final assembly enclosure to which the equipment is installed.

II. Nonincendive Version

APCL-5. Flashchanger.

NI//2/CD/T2D; -20°C ≤ Ta ≤ +40°C

| Flashchanger P/N | Regulated Out | Lamps |
|------------------|---------------|---------|
| 8087-0122 | 12 V | 6-Place |
| 8087-0123 | 12 V | 4-Place |
| 8087-0133 | 6 V | 6-Place |
| 8087-0136 | 6 V | 4-Place |
| 8087-0140 | 12 V | 6-Place |
| 8087-0142 | 12 V | 4-Place |
| 8087-0146 | 6 V | 6-Place |
| 8087-0148 | 6 V | 4-Place |
| 8087-0156 | 12 V | 6-Place |
| 8087-0168 | 12 V | 4-Place |
| 8087-0171 | 12 V | 6-Place |

Special Conditions of Use:

1. Shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application, including a tool removable cover.

Equipment Ratings:

I. Nonincendive Version

Nonincendive for use in Class I, Division 2, Groups B, C & D, and Class I, Zone 2, Group IIB+H₂ Hazardous (Classified) Locations

II. Nonincendive Version

Nonincendive for use in Class I, Division 2, Groups C & D Hazardous (Classified) Locations
 FM Approved for:

Automatic Power Inc.
 P.O. Box 230738
 213 Hutcheson Street
 Houston, TX 77223-0738
 USA



This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

| | |
|------------|------|
| Class 3600 | 1998 |
| Class 3611 | 2004 |
| Class 3810 | 2005 |

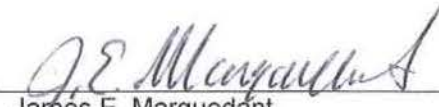
Original Project ID: 3Z0A9.AX

Approval Granted: October 12, 1995

Subsequent Revision Reports / Date Approval Amended

| Report Number | Date | Report Number | Date |
|---------------|-------------------|---------------|------|
| 3010631 | March 26, 2001 | | |
| 3029397 | September 7, 2007 | | |
| 100316 | March 19, 2010 | | |
| 100316 | April 9, 2010 | | |

FM Approvals LLC


James E. Marquedant
Group Manager, Electrical

8 April 2010
Date

ATEX Conformity Certificate

Epsilon Certificate Number:

Epsilon 05ATEX1407

This certificate is issued for the following equipment:

FA-249-EX Marine Lantern

Manufactured and submitted by:

AB Pharos Marine Limited
Steyning Way
Hounslow
Middlesex
TW4 6DL

The equipment shall be designed and constructed in accordance with the specification set out in the schedule herein and documents referred to therein.

This Certificate is issued subject to the conditions of Epsilon Compliance and any additional conditions as may be prescribed.

This Certificate does not imply that the equipment meets all statutory requirements in any particular industry or circumstance.


Directive:

ATEX Directive, 94/9/EC

Standard:

EN50021: 1999

Coding:

CE  II 3 G EEx nL IIB T3

Project Number:

ETS1038

Issue Date:

20th October 2005

Report Number:

ETS(A)1038/A/3

On Behalf of Epsilon Compliance



S L D'Henin
Certification Manager



This certificate may only be used in its entirety and without change



ATEX Conformity Certificate Schedule

Epsilon Certificate Number:

Epsilon 05ATEX1407

Equipment Description:

The FA-249-EX Series Marine Lantern comprises of a highly efficient 155mm dia. acrylic Fresnel lens and a robust precision moulded Lexan plastic base.

An "O" ring sealed bolted hinge base and lens ring assembly provides access to the lanterns internal components.

The base and lens are further secured and sealed by 3 base mounted clamps.

The base is fitted with IP66cable glands.

Drawings:

| Number | Sht | Rev | Date | Title |
|---------|--------|-----|----------|------------------------------------|
| Wc50140 | 1 of 1 | 1 | 25/05/05 | FA-249 zone II NAMEPLATE |
| Xc75007 | 1 of 1 | 1 | 22/04/05 | FA-249-EX Zone II General Assembly |

Conditions of Certification:

1. The Lantern is certified for use with a flashing sequence with a duty cycle less than or equal to a Morse Code "U".

Special Conditions of Certification:

None



This certificate may only be used in its entirety and without change

