

CIVIL ENGINEERING DIVISION  
UNITED STATES COAST GUARD  
WASHINGTON D.C.

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SPECIFICATION FOR A  
12VDC, 110 WATT, SIX-PLACE LAMPCHANGER  
FOR MARITIME AIDS TO NAVIGATION,

SPECIFICATION NO. G-SEC-478

## 1. SCOPE.

1.1 General. This specification establishes the performance and test requirements for 12VDC, 110 watt, spring-wound, six-place lampchangers. The lampchangers are used to rotate a 12VDC, 3 watt to 110 watt, marine signal lamp into the focal position of a U. S. Coast Guard aids to navigation beacon.

1.1.1 Additional Information. The lampchangers are normally intended to hold and rotate lamps powered by: (1) 10 to 16 volt, air depolarized, primary-batteries; (2) secondary lead-acid batteries; or, (3) transformer-rectified DC power supplies. Under normal operational use, the lampchangers will be contained in beacon assemblies on buoys or fixed structures in or around the navigable waters of the United States. Although the lampchangers are mounted in a lantern assembly, they will nevertheless be exposed to all the elements of weather, including but not limited to rain, snow, salt-spray and wind, and on occasion will be totally immersed in water. The lampchangers will be exposed to extreme hot and cold temperatures while operating 12VDC 110 watt lamps. The lampchangers' electrical circuits and contacts must have a very low impedance for currents up to 10 amps.

1.2 Precedence. Any ambiguity or conflict between this specification, drawings, and / or applicable documents shall be resolved by using the following documents in the precedence shown:

- a. The wording of this specification.
- b. Drawings contained in or attached to this specification.
- c. Applicable documents.

1.3 Government Furnished Equipment (GFE). The following equipment shall be loaned to the contractor for use in qualification testing:

- (4) Focus fixtures
- (4) CG-481 High Wattage flashers
- (4) WK-681 Wiring Kits
- (10) 12 volt, 0.25 amp Marine Signal Lamps
- (10) 12 volt, 0.55 amp Marine Signal Lamps
- (10) 12 volt, 110 watt Marine Signal Lamps

## 2. APPLICABLE DOCUMENTS.

2.1 Government Documents. The following documents of the issues specified form a part of this specification to the extent referenced herein. Suffixes denoting the specific issue of each document will be omitted from future references to the document in this specification.

### 2.1.1 Military Specifications.

- a. MIL-P-116-J                      Preservation, Methods of  
24 Oct 91
- b. MIL-P-15024-E                  Plates, Tags, and Bands for Identification of Equipment  
29 Jan 93
- c. MIL-G-45204-C                  Gold Plating, Electroplating  
12 Mar 84

### 2.1.2 U. S. Coast Guard Specifications.

- a. G-ECV-481                      Specification for 12VDC, 110-Watt Solid State Flashers  
Jan 94                                  for Maritime Aids to Navigation (type CG-481)
- b. G-ECV-487                      Specification for 12VDC Marine Signal Lamps  
Jun 95

### 2.1.3 Military Standards.

- a. MIL-STD-202-F(12)              Test Methods for Electronic and Electrical Component  
12 Jul 93                                  Parts
- b. MIL-HDBK-454                  General Guidelines for Electronic Equipment  
Guideline 9                      (Workmanship)  
28 Apr 95

2.2 Drawings. The latest revisions of the following U.S. Coast Guard drawing form a part of this specification to the extent referenced herein.

- a. G-EOE-SK-1401-C              Marine Signal Lamp (12 Volt)  
25 Oct 85
- b. G-EOE-120006-E                12 Volt, Solid-State Flasher  
26 Apr 93

- c. G-EOE-120050-D            12-Volt, Six-Place Lampchanger  
31 Oct 85

2.3 Other Publications. The following documents of the issues specified form a part of this specification to the extent referenced herein. Suffixes denoting the specific issue of each document will be omitted from future references to the document in this specification.

- a. ASTM G82-83                Standard Guide for Development and Use of a Galvanic  
28 Nov 83                      Series for Predicting Galvanic Corrosion Performance.
  
- b. ANSI / ASQC C1-1985    American National Standard; Specification of General  
Nov 85                          Requirements for a Quality Program.

### 3. REQUIREMENTS.

3.1 Design and Construction. The lampchanger shall hold six 12VDC, 3 watt to 110 watt, single contact, candelabra base lamps with a prefocus collar (marine signal lamps) in a turret. Only the lamp in the operating (uppermost) position shall burn when voltage is applied between the “L” and “-” terminals. The turret shall rotate a new lamp into position whenever the appropriate electrical signal is received by the stepping mechanism. The turret shall advance only one position at a time. Power to change lamps shall be stored in a spring by winding the lamp turret. Each time the stepping mechanism is actuated, it shall allow the turret to rotate under spring tension to bring the next lamp into the operating position. The spring tension shall not be so great as to damage the lamp filament as the turret rotates. The total permissible rotation of the lampchanger turret between stops shall not exceed 360 degrees. The stepping mechanism shall also be capable of manual actuation. It shall be possible to manually rotate the turret backwards from the second through the sixth positions to any other position preceding the operating position. The lampchanger shall have a life expectancy of at least five years in a marine environment with a lamp burning continuously in the operating position, and with multiple rotations through all lamp positions. The design should emphasize simplicity and reliability, consistent with the state of the art and the limitations on size stated herein.

3.2 Workmanship. In addition to any specific requirements listed herein, the workmanship of the lampchangers shall conform to Guideline 9 of MIL-HDBK-454.

3.3 First Article Testing. Lampchangers from Contractors who have not previously provided items under this specification shall be subject to the first article test requirements described in Section 4, below. The Contractor shall be required to submit a First Article Test Plan before commencement of first article testing.

3.3.1 First Article Test Report. Upon completion of the first article tests, the Contractor shall submit to the Contracting Officer a test report documenting, at a minimum, test equipment used with calibration certificate(s), the test procedure description and complete test data sheets.

3.4 Environment. Unless otherwise specified herein, each lampchanger shall operate as specified in the following environments.

3.4.1 Ambient Temperature. From -25°F through +200° F.

3.4.1.1 Material Temperatures. Temporary lampchanger turret material temperatures of 500° F for 10 minutes shall not affect the performance or appearance of the lampchanger.

3.4.2 Humidity. From 0% through 100% relative humidity.

3.4.3 Salt Air. Each lampchanger shall be constructed of material so as to be resistant to corrosion from continuous exposure to salt air.

3.4.4 Shock and Vibration. Each lampchanger shall be ruggedly constructed to withstand the shock and vibrations incident in transport to and service on lighted structures.

3.4.5 Ultraviolet Radiation. UV radiation exposure for an interval of three years that is typical of the Florida coast shall not cause any deterioration of the lampchanger's appearance or performance.

3.5 Mechanical Properties. The limiting dimensions of the lampchanger are shown in Drawing EOE 120050. The lampchanger must be capable of being directly mounted on top of a CG-481 High Wattage flasher conforming to Specification G-ECV 481 using the 4 mounting holes provided. The exterior of the lampchanger shall be free from protrusions and sharp edges that may catch the clothing or cut servicing personnel.

3.5.1 Lamp Turret. The lampchanger shall rigidly support six 12-volt marine signal lamps (Drawing SK-1401) in a turret. The lamps are described by Specification G-ECV 487. The lamps shall be spaced at 60 degree intervals about the turret, and the filament of the operating (uppermost) lamp shall be vertical. The notch in the prefocus collar of the lamps shall be oriented in the turret as specified in Drawing EOE 120050. No other orientation of the lamp shall be possible when it is locked in place. The lamp locking arrangement shall be such that lamps can be easily installed and removed by servicing personnel. The entire facet of turret position number 1 shall be colored red. The red marking shall be readily visible with a lamp in place.

3.5.2 Lamp Focal Position. The distance from the base of the lampchanger to the center of the ideal operating lamp, defined as the focal height, shall be  $5\text{-}3/4" \pm 1/32"$ . The error between the centerline of the ideal operating lamp, as defined in Drawing SK-1401, and the centerline of the lampchanger, with respect to the four mounting holes in the base, as defined in Drawing EOE 120050, shall not be greater than  $\pm 1/32"$ . The tolerances of an ideal lamp are zero.

3.5.3 Strength of Turret and Stepping Mechanism. The turret, lamp collar locks and stepping mechanism shall be designed and constructed so that an attempted rotation of the turret (with lamps) by hand in any direction will not damage the lampchanger. No portion of the lampchanger shall be damaged by a  $20 \pm 1$  in-lb torque applied to the turret.

3.5.4 Terminals, Terminal Insulators and Screws. There shall be three external 8-32 wire clamp screw terminals with a minimum surface area of  $11/32"$  in diameter located in the area specified in Drawing EOE 120050. All terminals shall be enclosed in slotted insulators sized to accept  $11/32"$  wide spring spade and hook lugs for a number 8 stud. The terminal insulators shall be molded of dielectric materials in accordance with the color code given in paragraph 3.5.5. With one of the above lugs in place, the top of the terminal screws shall not project above the top of the insulators. Terminal screws shall have at least  $3/8$  inch of thread. The terminal screws, inserts, and pressure plates shall be made of 300-series stainless steel or nickel-plated brass.

3.5.5 Terminal Arrangement and Markings. The three terminals shall be marked reading from left to right or top to bottom, as indicated below. The terminals shall be permanently and prominently marked “F,” “L,” and “-” and shall be identified by separate and distinctive colored insulators, as listed below, for the life of the lampchanger.

<u>Terminal</u>	<u>Meaning</u>	<u>Color</u>
“F”	Input terminal for positive voltage to lampchanger’s stepping mechanism supplied from flasher’s “F” terminal.	Blue
“L”	Input terminal for positive, time-coded voltage supplied from the flasher’s “L” terminal.	Red
“-”	Input terminal for negative lead from flasher’s “-” terminal.	White

3.5.6 Materials. Materials shall be selected to insure the highest reliability and longevity of the lampchanger. Electrical contacts between the frame and turret shall be gold plated in accordance with MIL-G-45204C(3), Type II, Grade C, Class 1 (minimum thickness of 0.00005 inch). The turret’s electrical contact with the solder contact at the bottom of the lamp base shall be gold plated in accordance with MIL-G-45204C(3), Type II, Grade C, Class 1 (minimum thickness of 0.00005 inch). Materials used shall be galvanically compatible to minimize electrolytic action. Use of dissimilar metals in intimate contact shall be avoided, with the sole exception of stainless steel threaded inserts in combination with an aluminum frame and / or turret. Guidelines for developing a predictive model for galvanic corrosion performance are outlined in ASTM G82. Nickel-plated brass turret contacts for the lamp collars are allowed. All materials shall be ultraviolet resistant.

3.5.6.1 Frame. The lampchanger shall have a rigid, solid metal L or U shaped frame with a metallic weight of at least 1/2 lb.

3.5.6.2 Turret. The turret shall be either metal, a high temperature ceramic, or a high temperature thermo-set plastic. All first article qualification tests of this specification must be passed regardless of the material selected. The turret shaft and pivot shall be either stainless steel or nickel-plated brass. The electrical contacts that touch or that will physically touch the lamp and the lamp locking mechanism are part of the turret for the purposes of this requirement.

3.5.6.3 Thermal Stability of the Lampchanger. The lampchanger’s mechanical and electrical performance shall conform to this specification when the lampchanger supports an operating 12VDC, 110 watt lamp at an ambient temperature of 200° F for the life of the lampchanger. Neither the lampchanger nor any of its constituent components shall deform under this operating condition.

3.5.6.4 Thermal Stability of the Turret. The turret, when lamped without power and held in an ambient temperature of 500° F for 10 minutes after the turret stabilizes at this temperature, shall meet the mechanical and electrical requirements of this specification before, during and after being subjected to the 500° F temperature for 10 minutes. The locating pins shall not pull out when operating lamps at the highest ambient temperatures.

3.6 Electrical Properties. Only the lamp in the operating position shall burn whenever power is supplied between the “L” and “-” terminals. When a pulse of power is supplied between the “F” and “-” terminals, a stepping mechanism (paragraph 3.6.2) shall allow the turret to rotate to bring the next lamp into the operating position.

3.6.1 Lamp Circuit. The lamp circuit shall consist of the “L” terminal, a lamp in the operating position, the “-” terminal, and electrical wiring and contacts as necessary. The resistance of the circuit, less the lamp resistance, shall not exceed 0.010 ohms while operating under an ambient temperature of 200° F and after carrying an intermittent (30 sec. on and 10 sec. off) current of 10 amps for 13 hours. The entire circuit shall be electrically isolated from the lampchanger frame with a minimum resistance of 500 kΩ. The lamp circuit shall be capable of operating 12-volt lamps with applied positive voltages at the “L” terminal from 10 to 14 volts DC. The applied voltage may be either steady or time-coded pulses as short as 0.3 seconds in length.

3.6.1.1 Lamp Circuit Capacity. The lamp circuit shall be conservatively rated to carry cold current surges typical of a 10 ampere lamp when the lamp is continuously flashed once every second with a 0.6 second on time.

3.6.2 Stepping Mechanism. A stepping mechanism shall cause the turret to rotate by one position whenever the “F” terminal receives a positive 8 to 18 volt DC signal from 0.25 to 5.0 seconds in duration. This pulse will normally be supplied by the “F” circuit of a solid state flasher. The resistance of the stepping circuit, between the “F” and “-” terminals shall be greater than 15 ohms. The entire circuit shall be electrically isolated from the lampchanger frame with a minimum resistance of 500 kΩ. The stepping mechanism shall cause the turret to advance within 0.4 seconds after the applied voltage is removed from the “F” terminal. The stepping mechanism shall be capable of easy manual activation from the exterior of the lampchanger for the purpose of testing lamps. The stepping mechanism manual activator shall be located in the space indicated on Drawing EOE 120050 Note 3, and designed to be activated by personnel wearing heavy winter gloves.

3.6.3 Sixth Lamp Position. There shall be a 56 ohm  $\pm$  5%, 3 watt resistor in the turret in parallel with the sixth lamp position.



3.7 Nameplate. A nameplate conforming to MIL-P-15024, TYPE G, or a two mil metallized silver coated polyester nameplate shall be affixed to the side of the lampchanger. The information required on the nameplate is illustrated in the example below:

CG-6PHW LAMPCHANGER

TYPE	110W
FEATURE	HW-6P
MANUFACTURED BY:	(VENDOR'S NAME)

CONTRACT NUMBER

PROPERTY OF U.S. COAST GUARD

3.8 Compatibility. The lampchanger, when lamped with any 12VDC marine signal lamp (up to 110 watts) shall be compatible with any solid state flasher that meets the requirements of Specification G-ECV 481.

#### 4. QUALITY ASSURANCE PROVISIONS.

4.1 Quality System. The contractors quality assurance program shall meet the minimum requirements of ANSI / ASQC C-1.

4.2 Contractor's Calibration System. The contractor shall maintain a calibration and maintenance system to control the accuracy of measurement and test equipment used in the fulfillment of this specification. The system shall include, as a minimum, prescribed calibration intervals and the source of calibration. A monitoring system to this requirement shall be readily available to the Coast Guard Inspector. Calibration shall be traceable to the National Institute of Standards and Technology.

4.3 Classification of Inspections. The inspection requirements specified herein are classified as follows:

- a. First Article Testing: 4.6 through 4.8;
- b. Production Inspection: 4.9.

#### 4.4 Responsibility.

4.4.1 First Article Testing Responsibility. All tests and inspections of the first article units shall be the responsibility of the Contractor and will be conducted at a facility acceptable to the Government. A First Article Test Plan shall be submitted to the Contracting Officer not later than 30 days prior to the commencement of first article testing. At a minimum this plan shall include:

- a. A chronological listing of the tests to be performed;
- b. Location of the test facility;
- c. A complete listing of all equipment to be used;
- d. Detailed test procedures for each test, including wiring diagrams of test setups and pass/fail criteria;
- e. All other pertinent information necessary to fully describe the test; and
- f. Test data sheets shall be provided with the test plan and shall be used to record observed performance data.

After approval of the First Article Test Plan by the Government, the Contractor shall notify the Contracting Officer three weeks prior to the start of first article testing. A Government representative may witness the first article tests.

4.4.2 Production Inspection Responsibility. The contractor shall conform to all requirements of the Federal Acquisition Regulations (FAR) Part 52.246-1; Contractor Inspection Requirements, and Part 52.246-2; Inspection of Supplies, Fixed Price. The Contractor shall notify the Contracting Officer two weeks prior to the start of production testing. A Government representative may witness any and all production inspections.

4.4.3 Certification. Certification of the gold plating (3.5.6), and turret material (3.5.6.2) shall be submitted prior to first article testing and each production inspection.

4.4.4 Inspections. The first article testing and production inspections required by paragraphs 4.6 through 4.9 are not intended to supplant any controls, examinations, inspections, or tests normally employed by the Contractor to assure the reliability of this product. The Contractor shall maintain an inspection system which ensures that each item offered to the Government conforms to the contract requirements. The inspection system shall be documented and available for review by the Contracting Officer's Representative. The Contractor shall maintain records of all tests and inspections. The records shall clearly indicate deficiencies revealed and the corrective action taken. The Government reserves the right to perform any and all of the tests and inspections set forth in this specification to insure the compliance products offered.

4.4.5 Failure Responsibility. If a lampchanger fails to pass production acceptance inspection, the Contractor shall take corrective action on the materials or process, or both as warranted, on all items or portions thereof which were similarly manufactured and which are subject to the same cause for failure. Depending on the type and number of failures, the inspection may be discontinued at the option of the Coast Guard until all corrective action has been taken. After all corrective action has been taken, the inspection shall be continued or repeated, depending on the reason for which the inspection was interrupted, at the option of the Coast Guard. Acceptance shall be withheld until reinspection has shown that the corrective action was successful and the equipment or portion thereof satisfactorily passes all inspections.

4.4.6 Resubmitted Lots. If an inspection lot is rejected, the manufacturer may rework the lot or screen out defective items and resubmit it for reinspection. Resubmitted lots shall be kept separate from new lots.

4.5 First Article Test Sequence. Ten lampchangers shall be submitted for first article testing. All ten first article units shall be subjected to the Routine Tests (4.6). At the conclusion of the Routine Tests, four lampchangers shall be subjected to the Laboratory Tests (4.7) and the other six lampchangers shall be subjected to the Accelerated Life Test (4.8).

4.5.1 First Article Acceptance. The acceptance/rejection criteria for the first article tests are provided in paragraphs 4.6.4, 4.7.5, 4.7.6.2, 4.7.6.4, 4.7.6.6, 4.7.6.9, 4.7.6.11, and 4.8.4, below. The first article lampchangers must successfully meet all of these acceptance criteria for the Contractor to receive authorization to begin production. Upon failure to meet any of the acceptance criteria, the Contractor shall take corrective action on the materials or processes or both, as warranted, prior to recommencing

the first article tests. The extent of retesting required as a result of a failure is at the sole discretion of the Contracting Officer. Failure to successfully complete the first article testing in the time set forth in the contract shall be grounds for termination of the contract.

4.6 Routine Tests. Each first article lampchanger submitted for approval and each production lampchanger in an inspection lot submitted for acceptance shall be subjected to the following routine tests.

4.6.1 Initial Visual Inspection. Each lampchanger shall be visually inspected to see that it meets the requirements of paragraphs 3.1, 3.2, 3.5, 3.5.1, 3.5.2, 3.5.3, 3.5.4, 3.5.5, 3.5.6, 3.5.6.1, 3.5.6.2, 3.6.2, 3.6.3, and 3.7.

4.6.2 Electrical Tests. Verify conformance to requirements of paragraphs 3.6 through 3.6.3.

4.6.2.1 Isolation of the Lampchanger Frame. Place 18 volts DC between each terminal and the frame for at least 5 seconds, note the current flow and calculate the resistance. The resistance shall not be less than 500K ohms between any terminal and the frame. The positive connection for this test is made to the terminals and the negative connection is made to the mounting holes in the frame.

4.6.2.2 Operation Check. With the turret loaded with 12 volt, 110 watt lamps, wind the turret to the first lamp position. Apply steady and 1.0 second time coded pulses of 10 and 14 VDC between the "L" and "-" terminals to verify that the lampchanger complies with 3.6.1. Advance the turret and repeat for each turret position. Rewind the turret and apply 0.25 and 5.0 second pulses of 8.0 and 18.0 VDC between the "F" and "-" terminals to verify that the lampchanger complies with 3.6.2. The turret shall advance one lamp position, starting from the first position, each time a pulse is applied.

4.6.2.3 Resistor Check. Advance the lampchanger to the sixth position. With no lamp in place, apply 14VDC  $\pm$  1% to the "L" and "-" terminals. Measure the current, and verify that the resistance of the resistor in parallel with the sixth lamp position is 56 ohm  $\pm$  5%.

4.6.3 Lamp Position. Check the alignment and positioning of the operating lamp as specified in 3.5.2. Measure the focal height and horizontal positioning (radially about the centerline) of the operating lamp in each position. A pass/fail test fixture may be used for this test.

4.6.4 Acceptance/Rejection Criteria. Failure of any first article lampchanger to meet all of the requirements of the Routine Tests (4.6) shall constitute a failure of the first article tests and shall be reason for withholding approval of production. Failure of any production lampchanger to comply with all aspects of the Routine Tests (4.6) shall be reason to reject that lampchanger.

4.7 Laboratory Tests. Upon successful completion of the routine tests, four (4) first article units shall be subjected to a series of laboratory tests. For the purpose of these tests, DC power will be provided by a regulated, DC electronic power supply. Voltage pulses will be provided through a relay. Each lampchanger offered for the laboratory tests shall be operated with a 12 volt, 110 watt lamp powered by 12VDC in an ambient temperature of 200° F for 72 hours before the laboratory tests start.

4.7.1 Strength of Turret and Stepping Mechanism. With the turret in the number one position apply a  $20 \pm 1$  inch-lb torque to the turret in an attempt to rotate it in the direction of the spring force. Perform this test using a focus fixture in both the number 1 and number 6 turret positions. In the number 1 position, rotation shall be attempted in both clockwise and counter-clockwise directions. To insure that the requirements of paragraph 3.5.3 are met, test the lampchanger for proper operation by repeating the operational checks specified in paragraph 4.6.2.2. Re-check the horizontal positioning of each lamp (4.6.3) to insure that no permanent deformation has resulted.

4.7.2 Electrical Resistance. Measure the resistance of the lamp circuit for all six turret positions and of the stepping mechanism circuit at  $-10 \pm 5^\circ$  F and  $200 \pm 5^\circ$  F, and insure compliance with the requirements of paragraphs 3.6.1 and 3.6.2. Calculate the lamp circuit resistance by installing a 12 volt, 110 watt lamp in the operating position, applying 12.0 VDC between the “L” and “-” terminals and measuring the total current drawn by the circuit and the voltage both at the above terminals and across the lamp. The voltage difference divided by the total current is the lamp circuit resistance. For the sixth lamp position, correct the measured resistance by accounting for the resistor placed in parallel with the lamp circuit.

4.7.3 Electrical Performance. Perform the following electrical tests at  $-10 \pm 5^\circ$  F and  $200 \pm 5^\circ$  F.

- a. Lamp Circuit. Insure that both 12VDC, 0.55 A and 110 watt lamps operate at full luminous output when a 3.0 second pulse of 10.0 and 14.0 VDC is applied between the “L” and “-” terminals. Check for all six turret positions.
- b. Stepping Mechanism. Insure that the stepping mechanism will progress through all six positions when a 0.3 second pulse of 8.0 and 18.0 VDC is applied between the “F” and “-” terminals. This test shall be done when the turret is loaded with 0.55 amp and 110 watt lamps.

4.7.4 Relamping Time. With the turret loaded with 0.55 amp and 110 watt lamps apply 12.0VDC to the “L” and “-” terminals and a 3.0 second pulse of 12.0VDC to the “F” and “-” terminals. Measure the time required for a new lamp to reach each operating position after the F-pulse is removed (3.6.2).

4.7.5 Acceptance/Rejection Criteria. Failure of more than two horizontal positioning errors occurring in 4.6.4 and 4.7.1 or any failure in 4.7.2 through 4.7.4 shall constitute a failure of the first article tests and shall be reason for withholding approval of production.

#### 4.7.6 Environmental Tests.

4.7.6.1 Vibration. The four units selected for laboratory testing shall be tested in accordance with MIL-STD-202F, Method 204D, using Test Condition D with the duration reduced to three cycles (each cycle 20 minutes long) and the maximum amplitude to 5-Gs in each of three mutually perpendicular directions. Samples shall be attached to a rigid fixture capable of transmitting all the vibration conditions. During the vibration cycling the turret will be in the number 5 position with an external 0.25 ampere lamp load and with 14.0 volts DC applied between the “L” and “-” terminals. During the cycle in which the lampchanger is mounted up-right, measure any discontinuities in the lamp circuit.

4.7.6.2 Acceptance/Rejection Criteria. Discontinuities in the lamp circuit exceeding 10 milliseconds or rotation of the turret during vibration shall constitute a failure of the first article tests and shall be reason for withholding approval of production.

4.7.6.3 Shock. The four units selected for laboratory testing shall be tested in accordance with MIL-STD-202F, Method 213B. Samples shall be rigidly mounted and subjected to three blows of 11 milliseconds, 20-Gs peak acceleration, sawtooth pulse in each of six directions detailed in Figure 1. The turret shall be filled with 12 volt, 0.25 ampere lamps. When the lampchanger is mounted in direction 2, as detailed in Figure 1, 12.0 VDC shall be applied between the “L” and “-” terminals. With the turret in the 2nd position, during the last 2 drops in which the lampchanger is mounted in direction 2, discontinuities in the lamp circuit shall be measured.

4.7.6.4 Acceptance/Rejection Criteria. Discontinuities in the lamp circuit exceeding 10 milliseconds or rotation of the turret when mounted in more than 1 of the 6 possible directions shall constitute a failure of the first article tests and shall be reason for withholding approval of production.

4.7.6.5 Transient Temperature. The turrets from the four units selected for laboratory testing shall be subjected to ambient temperatures of  $500 \pm 5^{\circ}$  F for a period of 10 minutes, after the turret has stabilized at the test temperature, to verify compliance with the requirements of paragraph 3.5.6.4. After cooling to ambient room temperature, the four lampchangers shall be reassembled and subjected to the Routine Tests, outlined in paragraphs 4.6 through 4.6.4, above.

4.7.6.6 Acceptance/Rejection Criteria. Failure of any lampchanger to meet all of the requirements of the Routine Tests (4.6) following the Transient Temperature Test shall constitute a failure of the first article tests and shall be reason for withholding approval of production.

4.7.6.7 Humidity. The four units selected for laboratory testing shall be tested in accordance with MIL-STD-202F, Method 103B, using Test Condition B. During exposure the lampchangers shall not be energized nor the lamps installed.

4.7.6.8 Humidity Test Evaluation. Following the Humidity Test (4.7.6.7), the lampchangers shall be thoroughly scrubbed and washed with fresh (tap) water to remove any evidence of residue and air blasted clean and dry. The following tests shall be conducted after a 4 hour air drying of the lampchangers:

- a. Isolation of the Lampchanger Frame, as outlined in paragraph 4.6.2.1, above;
- b. Operation Check, as outlined in paragraph 4.6.2.2, above.

4.7.6.9 Acceptance/Rejection Criteria. Failure of more than one test point in the humidity test evaluation (4.7.6.8) out of a total of 44 test points shall constitute a failure of the first article tests, and shall be reason for withholding approval of production. One lampchanger at one input voltage and one pulse width, for all six turret positions, evaluated against one requirement is defined as one test point.

4.7.6.10 Salt Spray (Corrosion). The four units selected for laboratory testing shall be tested in accordance with MIL-STD-202F, Method 101D, in a 5% salt solution (by weight) with a 48 hour exposure time (test Condition B). After exposure, the interior and exterior shall be thoroughly inspected for evidence of extreme corrosion. Measure the resistance of the resistor in parallel with the sixth lamp position in accordance with the procedures outlined in paragraph 4.6.2.3.

4.7.6.11 Acceptance/Rejection Criteria. Extreme corrosion, failure of the nameplate to remain attached to the frame, evidence of terminal marking degradation or failure of the resistor in the sixth lamp position to be  $56 \text{ ohms} \pm 5\%$  shall constitute a failure of the first article tests, and shall be reason for withholding approval of production.

4.8 Accelerated Life Test. The remaining six first article lampchangers which were not subjected to laboratory tests shall be subjected to an accelerated life test. The test will consist of: (1) a lampchanger burn in test, and (2) operating the lampchanger through 150 complete cycles at room temperature.

4.8.1 Test One. With 12VDC power applied each lampchanger shall be loaded with 110 watt lamps and operated continuously for six days (one day in each turret position) at an ambient temperature of  $140 \pm 5^\circ$  F.

4.8.2 Test Two. With no power applied between the “L” and “-” terminals, the turret shall be wound to the number 1 position and 0.3 second on/0.7 second off pulses of 18.0 VDC applied between the “F” and “-” terminals. When the turret has reached the number 6 position, the 18 volt pulses shall be turned off. The turret shall be rewound to the number 1 position and the process repeated for a total of 150 complete cycles.

4.8.3 Evaluation. After completion of the tests outlined in paragraphs 4.8.1 and 4.8.2, above, the following tests shall be conducted on the lampchangers:

- a. Lamp Position Inspection, as outlined in paragraph 4.6.3, above;
- b. Operational Check, as outlined in paragraph 4.6.2.2, above.

4.8.4 Acceptance/Rejection Criteria. More than one failure during the Lamp Position Inspection (4.6.3) or any failure during the Operation Check (4.6.2.2) shall constitute a failure of the first article tests and shall be reason for withholding approval of production.



4.9 Production Inspections. The Contractor shall maintain an inspection system to ensure each item offered to the U. S. Coast Guard for acceptance or approval conforms to the contract requirements. The inspection system shall be documented and available for review by the Contracting Officer's designated representative. All items shall meet all of the requirements of this specification. The inspection set forth in this specification shall become a part of the Contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the Contractor of the responsibility for ensuring that all deliverables submitted to the U. S. Coast Guard for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable process to ascertain conformance to requirements. However, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the U. S. Coast Guard to accept defective material.

4.9.1 Inspection Lot. A lot shall be all of the lampchangers from an identifiable production period from one manufacturer and one plant and submitted for acceptance at one time. An inspection sample lot shall be subjected to the Routine Tests, outlined in Section 4.6, above.

4.9.2 Sampling. The inspection sample size shall be determined using the following table:

<u>Inspection Lot Size</u>	<u>Sample Lot Size</u>
16 to 50	3
51 to 150	5
151 to 500	8
501 to 3200	13
3201 to 35000	20

4.9.3 Acceptance/Rejection Criteria. Failure of any unit in the sample lot, as outlined in paragraph 4.6.4, above, may be cause for rejection of the entire lot.

4.9.4 Failure Responsibility. If a lot fails to pass production inspection, the contractor shall take corrective action on the materials or process, or both as warranted, on all items or portions thereof which were similarly manufactured and which are subject to the same cause for failure. Depending on the type and number of failures, the inspection may be discontinued at the discretion of the Government inspector until all corrective action has been taken. After all corrective action has been taken, the inspection shall be continued or repeated, depending on the reason for which the inspection was interrupted. Acceptance shall be withheld until reinspection has shown that the corrective action was successful and the equipment or portion thereof satisfactorily passes all inspections.

4.9.5 Resubmitted Lots. If an inspection lot is rejected, the manufacturer may rework the lot or screen out defectives and resubmit it for inspection. Resubmitted lots shall be kept separate from new lots.

SPECIFICATION FOR 12VDC, 110 WATT, SIX-PLACE LAMPCHANGERS

SPECIFICATION NUMBER: G-SEC-478

MAY 1997

Prepared by:

Reviewed by:

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G. J. HERNAEZ, LTJG, USCG  
Project Engineer

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H. R. CLEVELAND  
Chief, Signal & Power Team

Approved by:

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L.E. JAEGER, CDR, USCG  
Chief, Ocean Engineering Division

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Date

## **NOTES TO THE CONTRACTING OFFICER**

The following is provided to assist you in preparing the solicitation:

1. Bidders List
2. Delivery Schedule
3. Shipping
4. Sample CBD Notice

### **BIDDERS LIST**

ACSI  
2245 Valwood Parkway  
Dallas, TX 75234  
(214) 241-3655

Automatic Power Inc.  
P.O. Box 230738  
213 Hutcheson St.  
Houston, TX 77223-0738  
(713) 228-5208

C-R Control Systems, Inc.  
P.O. Box 798  
Woodstock, VT 05091-0798  
(802) 457-2313

Tideland Signal Corp.  
4310 Directors Row  
P.O. Box 52430  
Houston, TX 77052-2430  
(713) 681-6101

Vega  
Heriot Dr.  
Porirua, New Zealand  
+64-4-374393

### **DELIVERY SCHEDULE**

First Article units: 120 days after award.

Production units: 90 days after acceptance of First Article units.

## **SHIPPING**

All units will be shipped F.O.B. (Freight On Board) destination to:

Commanding Officer  
USCG Engineering Logistics Center  
Gateway Commerce Center  
Warehouse Bldg 2  
6751 Alexander Bell Dr.  
Columbia, MD 21046  
M/F: APA Commodity M

## **SAMPLE CBD NOTICE**

The following is submitted for publication in the Commerce Business Daily. It is suggested that these words be used as there are a lot of manufacturers of lampchangers, however only a few are capable of supplying these high wattage versions. This should eliminate unnecessary mailings of the solicitation package:

12VDC, 110 Watt, Six-Place Lampchanger for U.S. Coast Guard marine aids to navigation. The lampchangers shall meet the requirements of specification G-SEC-478. The lampchangers will be used on floating and fixed aid structures. The solicitation is for approximately 520 lampchangers. First article units are required within 120 days after award, production units 90 days after acceptance. It is anticipated that the IFB will be issued o/b XXXXXXX. IFB DTCG23-97-#-##### applies. Refer inquiries to XXXXXXX at 202-###-####.