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SOUTHERN CALIFORNIA EDISON COMPANY  
P. O. BOX 800  
2244 Walnut Grove Avenue  
Rosemead, California 91770

SPECIFICATION NO. A10-1976  
(Revision of A10-1972)

METALLIC-RECTIFIER BATTERY CHARGERS  
FOR  
LEAD-ACID BATTERIES

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June 1, 1976

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LIST OF APPROVED MANUFACTURERS

Electric Products Company  
Gould, Inc.  
Lorain Products Corporation  
Mole-Richardson  
Power Conversion Products  
Ratelco, Incorporated  
Regco  
Theonics Company

APPROVAL OF SPECIFICATION TOGETHER WITH LIST OF MANUFACTURERS

*J. Sabath*  
ref J. SABATH  
CHIEF OF SUBSTATION DESIGN  
ENGINEERING

*S. H. Gold*  
S. H. GOLD  
CHIEF APPARATUS ENGINEER

*O. L. Renfro*  
O. L. RENFRO  
MANAGER OF SUBSTATIONS

*R. S. Currie*  
R. S. CURRIE  
MANAGER OF STEAM  
GENERATION

*H. F. Saliger, Jr.*  
H. F. SALIGER, JR.  
MANAGER OF MATERIAL SERVICES

SOUTHERN CALIFORNIA EDISON COMPANY  
Rosemead, California

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GENERAL AND TECHNICAL REQUIREMENTS

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SECTION 1

GENERAL AND TECHNICAL REQUIREMENTS

1.01 SCOPE

1.01.01 This Specification covers the requirements for metallic-rectifier battery chargers which may be required by the Southern California Edison Company and which are listed in Table 1.01.01, Page 1-2.

1.02 DEFINITION OF TERMS

1.02.01 Wherever used in this Specification the word "Edison" shall mean the Southern California Edison Company, and the word Manufacturer the successful Bidder on this Specification. The word "Apparatus" is used herein to include apparatus, equipment, materials, supplies, or whatsoever may be purchased hereunder, together with all the usual and appropriate fittings, attachments, appurtenances, and appliances.

1.02.02 Circles shown in the margins of this Specification are for Edison's use when preparing a Bid Proposal Request. Insofar as the Manufacturer is concerned, the circles in no way alter the meaning or intent of any paragraph or portion thereof; therefore, they shall in no way relieve him of his obligation to comply with the requirements of this Specification.

1.03 INSTRUCTIONS TO MANUFACTURERS

1.03.01 As noted elsewhere, this Specification is the revision of A10-1972. Manufacturers are advised to read all parts of this Specification (A10-1976).

1.03.02 Manufacturers shall quote only on apparatus which meets all of the requirements of this Specification.

1.03.03 Each Manufacturer shall furnish, as part of his Bid Proposal, all of the drawings and information called for in Section 3 of this Specification. Compliance with this requirement is mandatory.

TABLE 1.01.01

METALLIC-RECTIFIER BATTERY CHARGERS  
WHICH MAY BE REQUIRED BY EDISON

<u>Edison Material Code Number</u>	<u>Current Rating (Amperes)</u>	<u>Cells in Lead-Acid Battery</u>	<u>Nominal D-C Volts</u>	<u>(1)Nominal A-C Volts</u>	<u>Number of Phases</u>	<u>Type of Mounting</u>	<u>(2)Ampere-Hour Battery Rating (8-Hour Rate)</u>
<u>(3) CONSTANT VOLTAGE, MAGNETIC AMPLIFIER OR SCR-TYPE BATTERY CHARGERS</u>							
673-44309	12	24	52	120/135	1	Wall	160
673-45504	25	24	52	240/270	3	Floor	200
673-43004	6	60	130	120/135	1	Wall	60
673-44606	12	60	130	240/270	1	Wall	160
673-45702	25	60	130	240/270	3	Floor	200
673-45900	25	60	130	480/540	3	Floor	200
673-47005	70	60	130	240/270	3	Floor	400
673-47500	70	60	130	480/540	3	Floor	400
<u>(3) CONSTANT VOTAGE, MAGNETIC AMPLIFIER OR SCR-TYPE BATTERY CHARGERS FOR OPERATION OF OSCILLOGRAPHS</u>							
673-48201	10	3	6.5	120/135	1	Wall	100
673-48409	10	6	13	120/135	1	Wall	100
673-48607	15	6	13	120/135	1	Wall	100
673-48805	10	12	26	120/135	1	Wall	100

(1) The supply transformer shall have two voltage taps on the primary side to provide for normal operation at either of the supply voltages indicated. See Paragraph 1.09.01 regarding the use of tapless transformers.

(2) See Paragraph 1.08.02.

(3) See Paragraph 1.06.02.

Table 1.01.01

#### 1.04 SERVICE CONDITIONS

1.04.01 Unless otherwise specified in the Bid Proposal Request, battery chargers shall be suitable for continuous operation in protected areas where the ambient temperature may reach 50°C. In areas where the ambient temperature exceeds 50°C, chargers will be ordered for operation at 60°C ambient temperature.

1.04.02 The battery chargers will, in general, be connected to an unregulated station light and power source. Therefore, the battery chargers shall have transformers with primary windings suitable for the input voltages specified herein. See Subsection 1.10.

1.04.03 The normal floating load on the battery chargers will not be constant, and may be from 5% to 60% of the current rating of the battery charger at 2.17 volts per cell. The batteries will be periodically given an equalizing charge of 2.33 volts per cell. The duration of the equalizing charge may be from 8 to 24 hours.

#### 1.05 CONFORMANCE TO NATIONAL STANDARDS

1.05.01 The battery chargers covered by this Specification shall conform to the applicable portions of the following standards referred to herein.

1. ANSI S1.4-1971, Sound level meters.
2. ANSI S1.2-1962, Physical Measurements of sound.
3. NEMA RI 1-1968, Safety Code for Semiconductor Rectifier Equipment.
4. NEMA RI 2-1966, General-Purpose and Communication Battery Chargers.
5. NEMA MR20-1958, Parts 5 and 6 Cathodic Protection Units.

#### 1.06 OUTPUT VOLTAGE AND OUTPUT VOLTAGE CONTROL

1.06.01 The output voltages which are required by Edison are:

- a. Floating Charge: 2.17 volts per cell.
- b. Equalizing Charge: 2.33 volts per cell.

1.06.02 Automatically Controlled Battery Chargers: All battery chargers shall be controlled automatically and shall be of the magnetic-amplifier type or, if approved by Edison, they shall be of the silicon-controlled-rectifier (SCR) type. The output voltage between 10% load and full load shall be controlled as follows:

- a. Battery Chargers for General Applications: The output voltage shall be controlled between  $\pm .5$  percent when variations of  $\pm 10$  percent occur in the rated a-c supply voltages.

1.06.03 The battery chargers with automatically controlled output voltages are listed in Table 1.01.01. The automatic voltage regulating requirements of the battery chargers are as follows:

- a. It shall prevent overload tripping of the battery chargers during operation of Edison's power circuit breakers. Circuit breaker operation may require currents from the battery up to 700 percent of the charger current rating for periods up to one second.
- b. The battery chargers shall return, without hunting, to  $\pm .5$  percent of the required constant voltage following the above-mentioned overload conditions.

#### 1.07 TRANSIENT VOLTAGE SURGE

1.07.01 As specified in ANSI C37.90a-1974 the charger shall be designed to withstand the proposed IEEE "Surge Withstand Capability Test" of 1.5 MHz 2.5-kV (crest) pulses without failure of the charger. No component shall fail nor shall any misoperation take place as a result of the test.

#### 1.08 RIPPLE VOLTAGE

##### 1.08.01 Definitions:

- a. Ripple Voltage: Ripple voltage is defined as one-half the peak-to-peak amplitude of the voltage pulsation as measured with an oscilloscope.
- b. Percent Ripple Voltage: The percent ripple voltage, when determined with a combined battery and resistive load, shall be defined as 100 times the ratio of the ripple voltage divided by the average voltage.
- c. Average Voltage: Average voltage is defined as the voltage measured with a permanent magnet moving-coil-type meter.

1.08.02 Unless otherwise specified in the Bid Proposal Request, the percent ripple voltage for all battery chargers at rated load shall be not more than 2 percent. Table 1.01.01 lists the ampere-hour capacity of the battery which will be normally connected to each battery charger.



## 1.09 SOUND LEVEL

1.09.01 The average sound level of the battery chargers, when measured at a distance of one foot from the cabinet, shall be not more than 60 decibels. The sound level measurements shall be made with an American National Standards Institute-approved sound level instrument and "A" weighting. See American National Standard S1.4-1971, Sound Level Meters; and American National Standard S1.2-1962, Physical Measurement of Sound.

## 1.10 COMPONENTS

### 1.10.01 Power Transformers Which May be Furnished:

- a. Tapped Transformers: Two taps shall be provided on the primary of each power transformer to provide for normal operation at either of two supply voltages. The nominal a-c supply voltages are listed in Table 1.01.01.
- b. Tapless Transformers: In lieu of furnishing transformers with taps as specified above in "a", the Manufacturer may furnish either of the following:
  1. Tapless transformers may be furnished if auto-transformers (Variac or equal) of the proper rating are connected in the primary circuit of the transformers. Auto-transformers must be an integral part of the battery chargers.
  2. Tapless transformers without auto-transformers as specified above in "b.1" may be furnished provided that:
    - A. They are of the proper voltage rating.
    - B. They are designed to operate continuously at full output over the voltage ranges specified in this Specification: Example - for the battery charger specified under Material Code 673-45504 of Table 1.01.01, the voltage rating of the transformer shall be 255 volts and it shall be capable of operating over the range of 216 volts to 297 volts.
    - C. The temperature rise shall not exceed the requirements of Paragraph 1.11.01.
    - D. Over the entire voltage range, the battery charger shall meet all of the requirements of this Specification.

1.10.02 Isolating Transformers: Each battery charger shall be equipped with an isolating transformer, or equivalent device or circuit, to isolate a ground on the a-c supply and to prevent it from being carried into the d-c circuit. The d-c circuit shall be ungrounded.

1.10.03 Reverse Current Limiter: The battery chargers shall be designed so that the reverse current shall not exceed 0.2 percent of the current rating of the battery chargers. See Paragraph 1.10.05.

1.10.04 Capacitors: It is mandatory that capacitors used in battery charger circuits shall have voltage ratings of at least those listed below:

- a. Dry Electrolytic: 1-1/2 times working voltage.
- b. Oil-filled Paper: 1-1/2 times working voltage.
- c. Dry Paper: 2 times working voltage.

1.10.05 Rectifier Cells:

- a. Metallic rectifier cells shall operate with natural convection cooling.
- b. Silicon diode rectifiers in battery chargers used with batteries having 3, 6, 12, 24, or 60 cells shall have a peak inverse voltage rating of not less than the following values:

<u>No. of Cells</u>	<u>Nominal d-c Voltage Rating of the Battery Charger (d-c Volts)</u>	<u>Minimum PIV Rating of Silicon Diode Rectifiers (d-c Volts)</u>
3	6.5	26
6	13	52
12	26	104
24	52	208
60	130	500

- c. Copper-oxide rectifier cells are not acceptable.

1.10.06 Switches: A manual toggle-type switch shall be provided to change from the floating charge of 2.17 volts per cell to the equalizing charge of 2.33 volts per cell.

1.10.07 Circuit Protection: Protection for the battery charger input and output circuits shall be furnished as follows:

- a. For the a-c input to the battery chargers the Manufacturer shall furnish either of the following unless otherwise specified in the Bid Proposal Request:

1. A 2-pole, a-c, thermal-magnetic circuit breaker for single-phase power input or a 3-pole, a-c, thermal-magnetic circuit breaker for 3-phase power input.
  - A. Each shall have suitable voltage and current ratings to serve as a manual disconnecting device and also to automatically interrupt the a-c power inputs during abnormal conditions.
  - B. The circuit breakers shall meet the latest requirements of Underwriter's Laboratories Bulletin No. 489, Standard For Branch Circuit and Service Circuit Breakers, and also correspond to the National Electric Code ratings for conductor current-carrying capacities.
2. A dead-front, fused, 2-pole toggle switch for single-phase power input or a 3-pole switch for 3-phase power input.
  - A. Each shall have suitable voltage and current ratings to serve as a manual disconnecting device and, under abnormal conditions, to automatically interrupt the a-c input to the battery charger.
  - B. Cartridge fuses of the "slow-blow" type shall be used. The Manufacturer shall select "slow-blow" fuses that will perform their function before damage occurs to any other part(s) of the charger.
  - C. The fuse holders shall be mounted inside the cabinet in a location where the fuses are readily accessible for replacement.
  - D. A spare set of fuses shall be furnished with each battery charger.
- b. For the d-c output of the battery chargers the Manufacturer may furnish either of the following unless otherwise specified in the Bid Proposal Request:
  1. A 2-pole, d-c, thermal-magnetic circuit breaker of suitable voltage and current ratings to serve as a manual disconnecting device and also to automatically interrupt the d-c output of the battery charger on overload.
    - A. The circuit breakers shall meet the latest requirements of Underwriters' Laboratories Bulletin No. 489, Standard for Branch Circuit and Service Circuit Brakers; and they shall also correspond to the National Electrical Code ratings for conductor current-carrying capacities.

2. A dead-front, fused, 2-pole toggle switch of suitable voltage and current ratings to serve as a disconnecting device and also to automatically interrupt the d-c output of the battery charger on overload.
  - A. Cartridge fuses of the "slow-blow" type shall be used.
  - B. The fuse holders shall be mounted inside the cabinet in a location where the fuses are readily accessible for replacement.
  - C. A spare set of fuses shall be furnished with each battery charger.

1.10.08 Meters: All battery chargers shall be equipped with a flush-mounted d-c voltmeter and a flush-mounted ammeter connected to the battery charger side of the d-c disconnecting device.

- a. All meters shall be of the 2 percent accuracy class.
- b. All meters shall be scaled to be compatible with the service.
- c. All meters shall have an external zero adjustment.

#### 1.11 TEMPERATURE RISE

1.11.01 The temperature rise of materials and components of each battery charger shall conform to NEMA MR 1-2.08, 1958. In addition to the classes of insulating materials stated in MR 1-2.08, Class F insulation may be used. Maximum allowable temperature for Class F insulation is 145°C.

1.11.02 The manufacturer shall state in his Bid Proposal the class(es) of insulating materials used in the transformers and reactors, and the temperature rise of each of these components at full load. See Paragraph 3.02.02.g.

#### 1.12 CABINETS

1.12.01 The battery charger cabinets shall be of sheet steel and conform to NEMA MR 1-2.03, 1958. Panels shall be hinged to permit easy access for testing and adjusting. Cabinets shall have sufficient structural strength to support the fully equipped panel when in the fully open position. Outer corners and edges other than those at the floor shall be rounded.

1.12.02 Except as specified in subparagraphs a, b, and c, the cabinets shall provide adequate natural cooling by means of screened louvers located, as required, in the sides, front, and rear of the cabinets. Top ventilation and cooling fans are not acceptable.

- a. When floor-mounted cabinets are to be furnished, the Bid Request will specify which surfaces (front, rear, sides) if any, shall not have ventilating louvers because of adjacent obstructions.
- b. Wall-mounted cabinets shall not have ventilating openings in the rear.
- c. If specifically approved by Edison in writing, a Manufacturer may furnish screened ventilating openings in the top provided that the top is covered with a "drip shield" to prevent foreign objects from falling into the charger.
  1. Top ventilation shall not exclude the use of front, rear, and side louvers as may be required for adequate, natural ventilation. The limitations specified above shall apply.
  2. The drip shield shall be of sheet metal of sufficient thickness to withstand buckling or permanent deformation even though workmen may use it as a table top for small tools, drawings, etc.
  3. The drip shield shall be rigidly supported.
  4. The four corners of the drip shield shall be rounded. The radius shall be approximately 1/2-inch. All edges shall be rounded.
  5. The drip shield shall be painted in the same manner and color as the cabinet.

1.12.03 Floor-mounted cabinets shall conform to the following requirements:

- a. Vertical outer surfaces shall extend to the floor such that conduit and wiring will not be exposed.
- b. The bottom of the cabinet shall be furnished with a base suitable for supporting the battery charger when installed over a trench or pit such that conduit and wiring can enter through the bottom of the cabinet.

1.12.04 The previously referred to thermal-magnetic breakers, fused and unfused switches, and meters shall be mounted on the front of the cabinet so as to be fully visible and accessible when all doors or swinging panels, or both, are in the normally closed position.

### 1.13 PAINTING

1.13.01 Before painting, all surfaces shall be thoroughly cleaned and made free of all scale, corrosion, and foreign substances.

1.13.02 The surfaces shall be painted with priming and finishing coats of paint. The finishing coats of paint applied by the Manufacturer shall be suitable for the direct application of a coat of blue-green paint by Edison. The paint which will be applied by Edison is Edison No. 235; this corresponds to Fuller-O'Brien Company Metalac 37-G-552 (PCS 1037) or 37-G-584 (PCS 1078).

### 1.14 NAMEPLATES

1.14.02 The nameplates shall contain the following:

- a. Seller's name.
- b. Model, type and serial number.
- c. Frequency.
- d. A-c voltage rating.
- e. A-c current rating.
- f. Number of phases.
- g. D-c voltage rating.
- h. D-c current rating.
- i. Number of cells.
- j. Percent ripple voltage.
- k. Ambient operating temperature.

### 1.15 TESTS

1.15.01 Tests of the characteristics of the battery chargers furnished to Edison shall be made in accordance with the rectifier unit tests described in Parts 5 and 6 of NEMA MR 20-1958. Two certified copies of the test results shall be transmitted to Edison's Chief Apparatus Engineer. Tests made on essentially duplicate units are acceptable.

### 1.16 PACKING AND SHIPPING

1.16.01 The battery chargers shall be carefully protected against the normal rough handling of shipment. Transformers, capacitors, rectifier stacks, etc. shall be braced and securely fastened.

GENERAL CONDITIONS

SECTION 2  
(Seller)

- 2.01 Title:** Title will pass to Edison at point of shipment F. O. B. carrier.
- 2.02 Notice of Shipment:** At the time Apparatus or Material is delivered to the carrier for shipment, the Seller shall immediately notify Edison's Traffic Manager, furnishing him with car or truck numbers and the value of all shipments of \$25,000 or more.
- 2.03 Insurance:** Edison will maintain insurance on the Apparatus or Material during shipment. Failure of the Seller to provide timely notice of shipment as required in Paragraph 2.02 may result in Seller's liability for any loss or damage not chargeable to the carrier.
- 2.04 Freight:** Show all freight charges as a separate item on invoices and apply sales or use tax against the price of Apparatus or Material only.
- 2.05 Taxes:** Edison is a public utility regulated by the Public Utilities Commission of the State of California, and the tangible personal property covered by this Specification is purchased for storage or use in the transportation of persons or property, the transmission of communications, or in the generation, transmission or distribution of electricity, and is exempt from local City or County Use Tax under provisions of applicable City or County ordinances adopted pursuant to Part 1.5 of Division 2 of the California Revenue and Taxation Code. (See California State Board of Equalization Rules Nos. 2202, 2203, and 2205.) Edison will pay all applicable sales or use taxes imposed by Federal, State, Municipal or other local authority or by any foreign government upon the sale contemplated herein or promptly reimburse the Seller for all such taxes required to be paid and actually paid by the Seller, except that Edison shall not be obligated to pay, and shall promptly be reimbursed by the Seller if it does pay, any additional amounts of sales or use taxes levied or assessed against Seller or Edison by reason of any failure of Seller to comply with the provisions of Paragraph 2.04 - Freight, or of other provisions of the covering purchase order, which results, or is alleged by applicable taxing authorities to result, in the passage of title to the Apparatus or Material at a point other than as specified in the purchase contract.
- 2.06 Changes:** No changes shall be made in this Specification or in any referenced Edison Specification unless authorized in writing by Edison's Purchasing Agent. Should any conflict prevail between this Specification and any Appendix thereto, the Appendix shall prevail. Edison shall have the right to make reasonable changes at any time to the aforesaid Specifications, including drawings which are a part thereof, or which may be made a part thereof by reason of the changes.
- 2.07 Standard Products:** The Seller's standard Apparatus or Material is acceptable provided that it meets all of the requirements of this Specification. Alternate proposals may be submitted.
- 2.08 Standards of Design and Workmanship:** All components shall be manufactured, fabricated, assembled and finished with workmanship of the highest quality, and in accordance with the best recognized correct practice, using new materials of first class quality, and suitable for the conditions specified. Unless stated elsewhere in this Specification:
- Testing procedures for all materials used in the manufacture of Apparatus or Material shall conform to the latest standards of the American Society for Testing and Materials.
  - All electrical design, materials, tests, and construction shall conform to the latest applicable standards of the American National Standards Institute, the Institute of Electrical and Electronic Engineers, and the National Electrical Manufacturers Association, unless specifically excepted by this Specification. In case of conflicting requirements of these standards, they shall apply in the sequence that they are here listed.
  - All structural steel design shall conform to the latest standards of the American Institute of Steel Construction, Inc.
- If the Seller has any reason for deviating from the above standards, he shall state in his proposal exactly the nature of the deviation and his reason for doing so. The finished Apparatus or Material shall be complete in all respects and shall fully conform to the description set forth in this Specification and in the covering Purchase Order.
- 2.09 Compliance with Codes and Statutes:** The Seller's Work shall comply with the applicable requirements of all statutes, ordinances, codes and standards of legally constituted authorities having jurisdiction. The Seller shall obtain certificates of compliance where required.
- 2.10 Patents:** The Seller shall, at his own expense, defend all suits or proceedings instituted against Edison, its officers, agents, or employees, based upon any claim that the Apparatus or Material or any part or use thereof constitutes an infringement of any patent of the United States covering the Apparatus or Material, or any part thereof, or the process intended to be performed thereby and will pay all awards of damages assessed against Edison, its officers, agents, or employees, in any such claim, suit or proceeding, and will indemnify and save harmless Edison against any losses, expenses (other than expenses of Edison's own Law Department), and damages resulting from any such claim, suit or proceedings or incurred in obedience to a decree resulting from any such claim, suit or proceeding, or pursuant to a compromise thereof approved by the Seller, provided that Edison, promptly upon service of process upon it, gives to the Seller notice in writing, or by telegram, of the institution of such suit or proceeding, and permits the Seller, through counsel chosen by it, and satisfactory to Edison, to defend the same, and gives the Seller all needed information, assistance and authority to enable the Seller so to do. If, in any such suit, a temporary restraining order, or preliminary injunction be granted, the Seller will make every reasonable effort, by giving a satisfactory bond, or otherwise to secure the suspension of such restraining order or temporary injunction. If, in any such suit, the Apparatus or Material, or any part thereof, or the process performed thereby, be held to constitute an infringement, and its use be permanently enjoined, the Seller will at once make every reasonable effort to secure for Edison a license, authorizing the continued use of the Apparatus or Material, or of such part or process. If the Seller be unable to secure such license within a reasonable time, it will, at its own expense, and without impairing performance requirements, either replace the Apparatus or Material with non-infringing Apparatus or Material, or modify the Apparatus or Material or the process performed thereby, to avoid infringement. If unable to do either of the above things, the Seller will remove the Apparatus or Material and refund the money paid therefor, in addition to indemnifying and saving harmless Edison, as aforesaid.
- 2.11 Force Majeure:** The Seller shall not be liable for delay in delivery or failure to manufacture due to causes beyond its reasonable control, such as acts of God, acts of civil or military authority, practices established by civil or military authorities having jurisdiction, fires, strikes, floods, epidemics, quarantine restrictions, war, riot, delays in transportation, shortages and inability due to causes beyond his reasonable control to obtain necessary labor, materials or manufacturing facilities. In the event of any delay attributable to any of the foregoing causes, the date of delivery shall be extended for a period equal to the time lost by reason of the delay, providing the Seller has taken reasonable steps to proceed with the fulfillment of the Contract.
- 2.12 Inspection, Testing and Expediting:** Edison or Edison's designated representative shall be allowed access to the Seller's shops and those of the Seller's suppliers to inspect workmanship, to expedite manufacture and fabrication of the Apparatus or Material and to obtain other desired information. When specified, the Seller shall furnish to Edison or Edison's designated representative, certified shop and mill test reports at no additional cost. The Seller shall inform Edison of the progress of the work and shall give Edison advance notice of five working days of appropriate times for inspections and tests. Specified tests will be approved by Edison. When specific inspections or tests are required, work on the Apparatus or Material involved shall not proceed beyond that point until Edison has made or waived such inspections or tests.
- 2.13 Shipping, Packing and Piece Marking:** The Apparatus or Material shall be shipped in assembled units, insofar as is consistent with good shipping practices. When items must be disassembled for shipment they shall be match-marked. All units and their containers shall be piece marked and show the Purchase Order number. Machined and other unpainted surfaces shall be fully protected from impact and weather damage with all holes, nozzles and openings plugged or covered and, where appropriate, provision shall be made to prevent the potential collection of condensation.
- 2.14 Acceptance:** Edison will not accept the Apparatus or Material until sufficient tests have been made to support a determination that the Apparatus or Material meets all of the requirements of this or other referenced Edison Specifications. Such tests shall be made within six (6) months from the date the Apparatus or Material is completely installed ready for use. The conditions of any test shall be mutually agreed upon and the Seller shall be notified of and may be represented at all tests that may be made. If inspection or tests show the Apparatus or Material or any part thereof not to be as represented or contracted for, the Seller shall have a reasonable time within which to correct the Apparatus or Material at his own expense. Acceptance of the Apparatus or Material will be confirmed in writing by Edison's Purchasing Agent.
- 2.15 Right to Use Work Requiring Correction:** After the Apparatus or Material has been installed, if it, or any part thereof, or the process performed thereby, should require correction, Edison shall have the right to use such Apparatus or Material until such time as it is convenient to Edison that the Apparatus or Material be removed from service for correction.
- 2.16 Warranty:** The Seller warrants that the Apparatus or Material and all parts thereof to be delivered hereunder (hereinafter called "warranted items") shall be of the kind and quality described herein, shall perform in the manner specified in the Specification and shall be fit for the purpose for which supplied. The Seller shall correct without delay and at its own expense any failure to comply with its warranties hereunder, which is discovered in the warranted items within one year after being placed in commercial operation or not more than 18 months after shipment, whichever is first, by correcting the defective part or parts, including any required correction in defective design, or by installing a non-defective replacement therefor, at the job-site. The direct costs of removal and installation of the defective parts or equipment shall be at the Seller's expense. When the Seller contracts to install the warranted items or supplies technical direction of installation by contract, said one year period shall run from one year from the date of completion of installation and acceptance thereof, provided that acceptance is not unreasonably delayed by Edison. In the event the Seller shall correct any such defect hereunder, with respect to the warranted items corrected, said one year period shall run for one year from the date of completion of installation and acceptance thereof, provided that acceptance is not unreasonably delayed by Edison.
- 2.17 Assignment:** The Purchase Contract of which these General Conditions are a part shall not be assigned by the Seller by operation of law or otherwise without the prior written consent of Edison. The Purchase Contract shall not be deemed an asset of the Seller, and, at the option of Edison, and upon five days notice, shall terminate in the event of any voluntary or involuntary receivership, bankruptcy, or insolvency proceedings affecting the Seller.
- 2.18 Default:** Time is of the essence. If the Seller fails to perform any of its obligations hereunder, Edison shall be entitled to all remedies provided by law and without limitation to recover any replacement or repair costs. If the Seller fails to give Edison adequate assurance of performance after written demand therefore when reasonable grounds for insecurity arise, then Edison shall be entitled to cancel the Contract in whole or in part, without liability for any cancellation or other charges or for any of the Apparatus or Material unshipped at the time of such cancellation. In the event of any such cancellation, Edison may procure the Apparatus or Material elsewhere similar to that which should have been shipped hereunder and the Seller shall be liable for the difference between the cost of such procured Apparatus or Material and the contract price together with all damages suffered by Edison. Edison may withhold any moneys otherwise payable to Seller and apply the same to the payment of any sums which Seller may owe to Edison. Edison's failure to notify Seller of a rejection of the Apparatus or Material or to specify with particularity any defect in the Apparatus or Material after rejection or acceptance thereof will not bar Edison from any remedies for breach which it may otherwise have.
- 2.19 Non-Discrimination:** During the performance of this Contract, the Seller agrees to comply with all applicable provisions of Executive Order No. 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor as they may apply to Equal Employment Opportunity.
- 2.20 Civil Rights:** During the performance of this Contract, the Seller agrees to comply with Title VI (Section 601) of the Civil Rights Act of July 2, 1964 (78 Stat. 241), and to be bound by the regulations of the Department of the Interior for the effectuation thereof, as set forth in 43 CFR 17.

SPECIFICATION NO. A10-1976  
(Revision of A10-2972)

METALLIC-RECTIFIER BATTERY CHARGERS  
FOR  
LEAD-ACID BATTERIES

SECTION 3

DRAWINGS AND INFORMATION TO BE FURNISHED

3.01 DRAWINGS TO BE FURNISHED WITH THE BID PROPOSAL

3.01.01 Each Manufacturer shall submit as part of his Proposal three sets of outline drawings and preliminary schematic wiring diagrams of each type of battery charger covered by the Bid Request. All components shall be identified. Voltages, voltage ratings, capacitances, resistances, etc. shall be shown.

3.02 INFORMATION TO BE FURNISHED WITH THE BID PROPOSAL

3.02.01 The following information shall be furnished with each Proposal:

- a. Kind of semiconductor rectifier.
- b. The PIV rating of the semiconductor rectifier cells.
- c. Operating temperature of the rectifier stacks at full load at an ambient temperature of 50°C (or 60°C when units are so ordered under subsection 1.04.01).
- d. Type, voltage rating, and working voltage of all capacitors. See Paragraph 1.10.04.
- e. Type of device which will be furnished for adjustment of the output voltage of the charger. See Subsection 1.06.
- f. Type of meters (d-c voltmeter and d-c ammeter) which will be furnished.
- g. The class of insulation material and the temperature rise of transformers and reactors at full load at an ambient temperature of 50°C (or 60°C when units are so ordered under subsection 1.04.01).
- h. Percent voltage regulation.
- i. Percent ripple voltage of charger as defined herein. See Paragraph 1.08.
- j. Conversion efficiency at 100%, 75%, 50%, and 25% of current rating at 2.17 volts per cell.



- k. Power factor at 100%, 75%, 50%, and 25% of current rating at 2.17 volts per cell.
- l. Sound level of the battery charger. See Paragraph 1.09.
- m. Weight of the battery charger.

### 3.03 DRAWINGS TO BE FURNISHED FOR REVIEW

3.03.01 After his Proposal has been accepted, the Manufacturer shall, as soon as possible but in no case later than 21 calendar days, furnish for review three sets of drawings of the apparatus. In the interest of safety, it is imperative that the drawing paper be of nonconducting material. The drawings shall show voltages, voltage ratings, capacitances, resistances, etc. Each set shall be complete and shall include a copy of the transmittal letter, a drawing list which gives the Manufacturer's drawing number and title of all drawings which he intends to furnish in fulfillment of his contract, one set of operating instructions, and one print of each drawing. The letter of transmittal, drawing list, operating instructions, and each drawing shall be clearly identified with Edison's purchase order number.

3.03.02 The transmittal of all drawings for review shall be made to:

Southern California Edison Company  
Engineering Drawing/Document Management (EDM)  
Engineering and Construction Department  
P.O. Box 800  
Rosemead, California

3.03.03 Within fifteen calendar days after their receipt, Edison will return to the Manufacturer, with or without comments, one set of the drawings furnished for review. Comments, if any, will be in writing. The review of drawings may be waived by Edison only through its Manager of Procurement. The review or waiver of review of drawings shall in no way relieve the Manufacturer of his obligation to furnish apparatus in conformance with this Specification.

3.03.04 For the purpose of establishing elapsed time between Edison's notification to the Manufacturer that his Proposal has been accepted and the date by which drawings for review are to be furnished, Edison will consider the date of first oral or written notification of acceptance to be the first day of elapsed time. If the Manufacturer has any reason why such notification shall not constitute an acceptance on his part, he shall so state in his Proposal and specify the conditions under which acceptance will be made.

3.03.05 Failure to comply with the requirements for transmittal of drawings for review, in whole or in part, may result in the evaluation of future Proposals submitted by the Manufacturer.

### 3.04 FINAL DRAWINGS

3.04.01 Within 21 calendar days after the review of the drawings or the waiver of the same, and unless otherwise specified in the Bid Proposal Request, the Manufacturer shall furnish for each type of battery charger on a purchase order the following final drawings as part of the fulfillment of his contract:

- a. Eight complete sets of all drawings. The drawings shall be in the form of high-quality, blue-line or black-line prints suitable for microfilming. In the interest of safety, it is imperative that the drawing paper be of nonconducting material.

3.04.02 Each set of final drawings shall be complete and shall include a copy of the transmittal letter, a drawing list which gives the Manufacturer's drawing number and title of all drawings which he is furnishing in fulfillment of his contract, and one print of each drawing. The letter of transmittal, drawing list, and each drawing shall be clearly identified with Edison's purchase order number.

3.04.03 The transmittal of final drawings shall be made directly to Edison's Engineering Drawing/Document Management Group (See Paragraph 3.03.02).

3.04.04 If after the transmittal of final drawings the Manufacturer ascertains that any drawing submitted requires revision, he shall, without delay, deliver to Edison complete sets of all revised drawings in the quantities and form specified above in Paragraph 3.04.01.

3.04.05 Failure to comply with the requirements for transmittal of final drawings, in whole or in part, may result in additional expense to Edison and may result in the evaluation of future Proposals submitted by the Manufacturer.

### 3.05 INSTRUCTION BOOKS

3.05.01 After completion of final design and assembly, and concurrent with shipment of the apparatus, the Manufacturer shall furnish nine complete instruction books for each item on the purchase order. Eight instruction books shall be transmitted directly to Edison's Engineering Drawing/Document Management Group (See Paragraph 3.03.02). One copy of the instruction book shall accompany each battery charger.

3.05.02 A schematic diagram of the battery charger shall be secured to the inside of the cover or door. It shall not interfere with the ventilation of the battery charger.



DEPARTMENT OF ENERGY  
SAN FRANCISCO OPERATIONS OFFICE

CONTRACTOR REQUEST FOR PATENT CLEARANCE  
FOR RELEASE OF UNCLASSIFIED DOCUMENT

Prime Contract No. DE-AC03-77SF10501
Subcontract No. NA
Report No. (STMPD 491) DOE/SF/10501 014
Date of Report June 1976
Name & Phone No. of DOE Technical Representative Mike Lopez (415) 273-4264

TO: Roger S. Gaither, Asst. Chief for Prosecution  
Office of Patent Counsel/Livermore Office  
P.O. Box 808, L-376  
Livermore, California 94550

FROM: Southern California Edison Company  
P.O. Box 800  
Rosemead, CA 91770

1. Document Title: Metallic-Rectifier Battery Chargers for Lead Acid Batteries

2. Type of Document:  Technical Report,  Conference Paper,  Journal Article,  Abstract or Summary,  
 Copy of Oral Presentation,  Other (please specify): \_\_\_\_\_

3. In order to meet a publication schedule or submission deadline, patent clearance by (Routine) would be desired.

**SENDER IS TO CHECK BOX #4 OR #5 BELOW.**

4. I have reviewed (or have had reviewed by technically knowledgeable personnel) this document for possible inventive subject matter (Subject Inventions) and that no inventions or discoveries (Subject Inventions) are deemed to be disclosed in this document except as stated below:

- a. Attention should be directed to pages \_\_\_\_\_ of this document.
- b. This document describes matter relating to an invention:
  - i. Contractor Invention Docket No. \_\_\_\_\_
  - ii. A disclosure of the invention was submitted to DOE on \_\_\_\_\_ (date)
  - iii. A disclosure of the invention will be submitted shortly \_\_\_\_\_ (approximate date)
  - iv. A waiver of DOE's patent rights to the contractor:
    - has been granted,  has been applied for; or  will be applied for \_\_\_\_\_ (date)

5. This document is being submitted, but no review has been made of this document for possible inventive subject matter.

**Please provide copy of clearance to So. Calif. Edison Co.**  
% Joyce Wells Room 497 P.O. Box 800  
Rosemead CA 91770

Reviewing/Submitting Official: Name (Print/Type) Bill von KleinSmid  
Title Solar One Program Director  
Signature William von Klein Smid Date 9-25-84

TO: INITIATOR OF REQUEST  
FROM: ASSISTANT CHIEF FOR PROSECUTION  
Office of Patent Counsel/Livermore Office

- No patent objection to above-identified release.
- Please defer release until advised by this office.

Signed Harold M. Dixon Date Mailed 10/9/84