BATTERY BANKS

1. GENERAL:

JEA utilizes a 125 volt DC system for the control and operation of its transmission and distribution substations. JEA has standardized on lead acid type battery banks to supply this 125 volt DC requirement for its substations. There are two major types of battery banks used for substation applications; lead acid and nickel cadmium. The nickel cadmium battery banks are about twice the cost of lead acid for the same size bank. The major advantage that nickel cadmium batteries have over lead acid is their performance in poor climatic conditions. Since all JEA substation battery banks are installed in climate controlled control houses, the additional cost is not justified. The lead acid battery banks have proven to be a very reliable, and maintenance free battery for the JEA for many years. The following is the standard design of substation battery banks being purchased:

Type:	Lead Calcium
Voltage Rating:	125 volt nominal, (129 volt, fully charged)
Bank Size:	60 cell
Cell Size:	2.15 volt (fully charged), 1.75 volt (discharged)
Typical Bank Sizes:	150Ah and 200Ah
Physical Design:	Two tier, stepped rack system

The substation battery banks are sized and purchased by the substation engineering activity. Battery banks are purchased direct from pre-approved battery bank manufacturers. Battery banks are purchased for individual substation projects and for replacement of deteriorated existing banks throughout the system as needed. Lead acid battery banks are purchased as close to their required need date as possible. It is not recommended to store a lead acid battery bank more than 6 months without charging. Battery banks purchased for new substation projects are typically delivered as soon as the control house is complete and ready for the bank to be installed.

BATTERY CHARGER

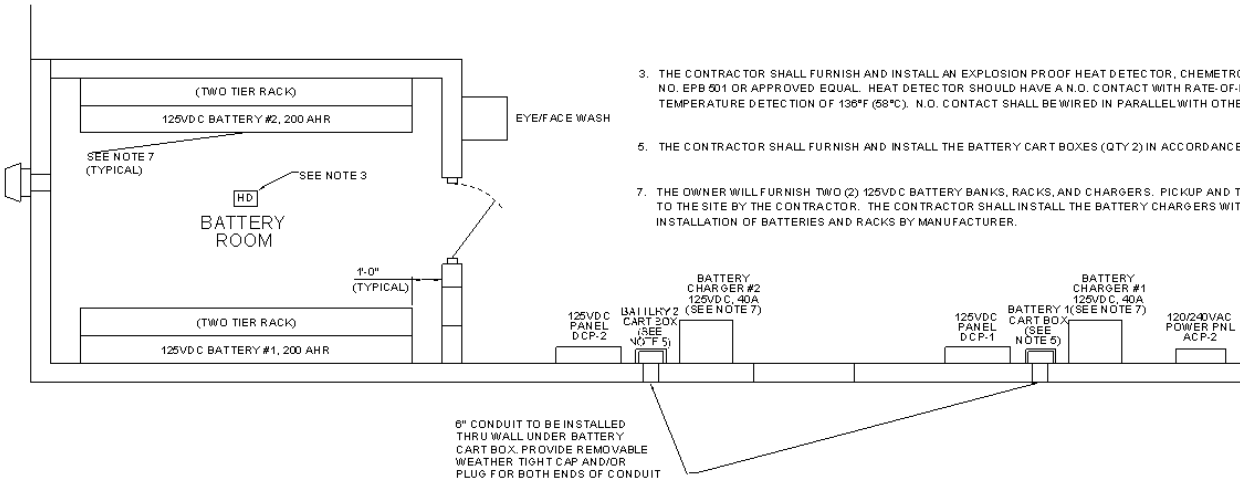
1. GENERAL:

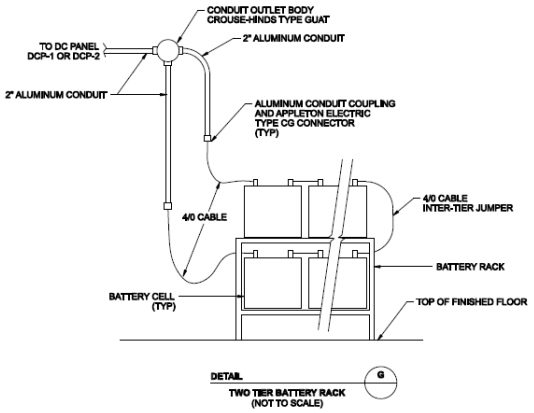
JEA has standardized on the battery charger used for all substation battery banks. The battery charger is maintained in the JEA inventory and available for use as a replacement for existing chargers or new installations as necessary. The specification on the battery charger is as follows:

Voltage Requirement:	208/240VAC
Voltage Output:	130VDC
Current Output:	25 amps DC
Type:	Wall mounted

2. INSTALLATION:

TYPICAL LAYOUT:





TECHNICAL SPECIFICATIONS
LEAD ACID BATTERY BANKS

1. GENERAL

1.1. JEA utilizes a 125 volt DC system for the control and operation of its transmission and distribution substations. JEA has standardized on lead acid type battery banks to supply this 125 volt DC requirement for its substations.

1.2. REFERENCES

American National Standards Institute; ANSI 61
Underwriter's Laboratories (UL) listings and approvals; UL Bulletin 94
Institute of Electrical and Electronic Engineers; IEEE 450,484,485
National Electrical Code (NEC)
National Fire Protection Agency (NFPA)

1.3. BATTERY

The battery shall be a heavy-duty lead-calcium, stationary type, multi-cell, designed primarily for the utility industry. The battery shall have a proven design and expected float service life of twenty years.

1.3.1. BATTERY CONSTRUCTION:

Each battery will be shipped charged and wet to each site. The cell must use flooded flat plate calcium technology.

Cell Construction - Internal and External

a) Positive plate thickness of at least .28 in. and negative thickness of .14 in. Minimum weight 130 lbs
b) Sediment space of at least 1 in.
c) Container must be transparent styrene acrylonitrile copolymer
d) The post seals must be of the slide-lock or equivalent, to prevent jar covers from cracking as posts expand.
e) Plates must be suspended as follows; Positive: Bridge Hung and Negative: Bottom Supported.
f) Flame arrestors must be supplied and be of the fused alumina type.
g) Specific Gravity of each cell is 1.215.
h) Electrolyte level lines: each container shall be permanently marked with high and low electrolyte level lines on all four sides of each cell
i) Plate Alloy: standard Flat plate construction - calcium grid alloys)
j) Separators: separators shall be constructed of microporous rubber with "Vitrex" glass fiber retainers

The number of cells and minimum Amp Hour capacity of each cell will be as listed in section 2 and shall comply with the parameters as set forthin the paragraph above.

1.4. RACK

Rack: (installed batteries must fit comfortably on this rack). Seismic Zone 0, 2-tier rack with rail covers.
Metallic-zinc finish, plastic channel rail insulation, steel angle with two coats of acid-resisting ASA #61 gray paint for frames and braces.
Each rack must support the number of cells listed in section 2, for each site, and shall comply with the parameters as set forth in the paragraph above.

1.5. BATTERY CHARGER

The battery charger shall be sized to continuously carry the load demand as required in the plans, and have sufficient reserve capacity as deemed appropriate for the application.

1.5.1. GENERAL

a) The battery charger shall provide a continuous regulated DC output derived from an AC source. The output shall be suitable to maintain the battery in a fully charged state, while supporting any additional DC loads as defined in the plans. The battery charger shall also have the ability to automatically or manually provide an equalizing charge as required for recharging the battery after discharge**.**

b) The battery charger shall be of a design that employs microprocessor technology to control and define all critical operational, calibration, regulation and alarm functions.

1.5.2. OPERATION

a) Battery charger shall automatically determine the appropriate DC output, in terms of either voltage or current required for maintaining the battery and load either by pre-programming or in-field re-programming, via the touch panel controls.

b) The battery charger shall automatically know and respond to any alarm options or remote sensing options installed according to the manufacturer's instructions without further operator action.

c) The battery charger shall display, via a 1% digital display and associated LED indicators, all functions important to operation.

d) During float operation, the digital display shall alternate between DC voltage and DC current indications as designated by the appropriate LED being lit for the respective indication.

e) During equalize operation, the digital display shall alternate between DC voltage and DC current indications as designated by the appropriate LED being lit for the respective indication. If the unit is employing a timer, either automatic or manual the LED indicators shall indicate timer function while the Digital display indicates the hours remaining for equalize charge.

f) Error and message codes, indicating certain self-diagnostic anomalies and operating conditions shall be indicated by the digital display, as required.

1.5.3. PROTECTIVE DEVICES

a) The charger shall employ a circuit breaker as standard for each AC input and DC output protection.

b) AC input transient over voltage protection shall be accomplished via a MOV (metal-oxide varistor) on the AC input terminals.

c) DC external transient over voltage protection shall be via a MOV (metal-oxide varistor) on the DC bus. This shall be located on the output terminals of the battery charger.

d) The charger shall be protected against damage in the event that the battery is connected in reverse.

e) Protection from oscillatory surges (SWC) as defined by ANSI C37.90-1978. Battery charger shall operate correctly during and after application of oscillatory surges.

f) Output current limit shall be adjustable from 50% to 110% of rated output.

g) The battery charger shall protect itself from a short circuit in the output side electronically so as to limit the current output. When the short is corrected the battery charger will automatically return to normal charger operation. During a short circuit of the output an error code shall be provided as indication. The error code shall be removed when the output voltage rises above 2.0VDC.

1.5.4. **CONTROLS**

The following controls shall be located on the front panel, using touch sensitive switches to initiate all adjustments.

a) Charge mode key (selects float or equalize mode)
b) Equalization method key (selects timer method, manual, automatic, or manual timer)
c) Edit/Enter key
d) Meter mode key (selects Volts, Amperes, hours, or alternating display)
e) Up key (increases parameter value in Edit mode)
f) Down key (decreases parameter value in Edit mode)
g) AC circuit breaker
h) DC circuit breaker
i) Lamp test key

1.5.5. INDICATORS

Standard front panel indicators shall include the following:

a) Digital meter, 1% accuracy, 4-digit, 7-segment.
b) The digital meter shall indicate the following;
c) - DC Volts
d) - DC Amperes
e) - Equalize hours remaining
f) - Error and message codes
g) DC Volts meter indicator (red LED)
h) DC Amperes meter indicator (red LED)
i) Equalize Hours Remaining indicator (red LED)
j) AC on indicator (green LED)
k) Float mode indicator (green LED)
l) Equalize mode indicator (yellow LED)
m) Manual equalize timer indicator (yellow LED)
n) Manual equalize indicator (yellow LED)
o) Automatic equalize indicator (yellow LED)

1.5.6. ALARMS

Standard Front Panel Primary Alarm indicators shall include the following:

a) High voltage DC alarm indicator (red LED)
b) Low voltage DC alarm indicator (red LED)
c) DC output failure alarm indicator (red LED)
d) Positive ground fault indicator (red LED)
e) Negative ground fault indicator (red LED)
f) AC failure alarm indicator (red LED)

1.5.7. Current limit shall be factory set at 110% of rating. This shall also be the limit available from the battery charger. Field adjustments may be made over a range from 50% to 110% of rating. The current limit shall be displayed directly in amperes and is adjustable in 0.01A increments (0.1A increments for charger ratings of 30A and higher).

1.5.8. Parallel operation of 2 or more chargers with the same DC voltage rating shall be a standard feature of the filtered charger with random load sharing.

1.5.9. Operating environment shall be 0-50 deg C, storage at -40 to 70 deg C, RH 5 - 95% non-condensing, elevation to 1,000 meters.

1.5.10. CONSTRUCTION:

a) Input and output shall employ 10-32 stud terminals with solderless compression terminals, Accepting:
#12-6 AWG. (6A to 25 Adc ratings)
#14-1/0 AWG. (30-100Adc ratings)
Alarm function terminals - compression terminal block for #22-14 AWG.
Enclosure shall be steel 18 GA for the outer skin, 16 GA for the door and 14-16 GA for the chassis. Shall employ adequate knock-outs for top, bottom, and right side conduit entry.9.4 - Finish will be ANSI-61 gray, baked powder epoxy.

1.5.11. SERVICEABITY:

The battery charger shall be serviceable by a technician using standard hand tools. Addition of any and all options including but not limited to filtering, alarm capabilities, battery eliminator, remote temperature compensation, and medium and high interrupting breakers, shall be able to be added in the field by the customer without any special training, using standard hand tools.

1.5.12. ALARMS, SELF-DIAGNOSTICS AND ERROR CODES

The charger shall be capable of automatic self diagnostics, and indicate any anomaly by means of an error code on the digital display. Error and message code definitions shall be

posted within the battery charger.

a) Primary Alarms (standard with all AT10.1 models) shall provide an alarm sensing capability for all the following:
b) High voltage DC alarm indicator (red LED)
c) Low voltage DC alarm indicator (red LED)
d) DC output failure alarm indicator (red LED)
e) Positive ground fault indicator (red LED)
f) Negative ground fault indicator (red LED)
g) AC failure alarm indicator (red LED)
h) Summary alarm contact (one Form-C)

1.5.13. Control Panel shall be a touch sensitive type, permanently laminated for protection, thereby eliminating the need for engraved functional nameplates.

1.5.14. DOCUMENTATION

a) A standard drawings, consisting of an outline, internal layout, schematic and wiring diagram may be provided as needed.
b) A manual, completely describing the installation, operation, and maintenance of the charger along with all accessories and options shall be included with charger. The charger shall have provision for storing the manual in a convenient permanent pocket.

1.5.15. OPTIONAL ACCESSORIES

a) DC output filter, consisting of one inductor and a one or two section capacitor capable of limiting the output ripple with battery connected to 30 mV rms when measured at the battery terminals in accordance with NEMA PE5 (output ripple may be 20% higher on units operating at 50 Hz).
b) Battery Eliminator filter, consisting of one or more capacitors installed within the battery charger enclosure. The filter reduces the output ripple voltage to 30 mVrms for applications from 12 through 48 Vdc and 100 mV rms for 130 Vdc (output ripple may be 20% higher on units operating at 50 Hz). The ripple voltage is measured at the charger terminals.
c) Auxiliary Relay PC Board (optional for all AT10.1 models) provides 2 sets of Form C contacts for each alarm function listed in Section 11.2, plus an additional summary alarm contact, Form C.
d) Auxiliary alarm terminal block with barrier type terminals.

1.5.16. Fail Safe Operation featuring a separate circuit from the micro controller to detect a low dc voltage condition and enable the common alarm on the main board to change state. This uniquely protects the battery due a failure of the microprocessor.

1.5.17. Float voltage; the battery float voltage will be: 2.17 - 2.26 vpc for calcium alloy cells

1.5.18. ACCESSORIES:

The following accessories must be included:

All inter-cell, inter- tier, inter-step, end-to-end inter rack, back-to-back inter-rack connectors, terminal lugs, and terminal plates with every battery string. Across-aisle inter-rack cables are not included. Portable Hydrometer, Hydrometer Holder-Wall Mount, Thermometer, No-Oxide Grease, Cell Number Set, and a Cell Lifting Device for each battery string. Flame arrestor supplied for each cell. Installation and operating instructions for each site. Stainless steel grade 316 connector nuts, bolts and lugs for inter-tier cables.

1.6. The battery and charger will have a service life of a minimum of 20 year service life, under normal conditions. The charger will have a MTBF of 30,000 hours. Made in the USA and approved via Alpha and Beta test site for more than 3 years. The product must have a 20-year warranty and a 20-year life expectancy. One (1) year complete and 19 years pro-rata WARRANTY

1.7. The product must be industry proven and must have been released and used in the field. A manufacturer with ISO 9000 certification is preferred.

2. CHARACTERISTICS

Type:	Lead Calcium
Voltage Rating:	125 volt nominal, (129 volt, fully charged)
Bank Size:	60 cell
Cell Size:	2.15 volt (fully charged), 1.75 volt (discharged)
Typical Bank Sizes:	200Ah
Physical Design:	Two tier, stepped rack system

3. INSTALLATION / RESPONSIBILITIES:

Substation battery banks are sized and purchased by the substation engineering activity. Battery banks are purchased direct from pre-approved battery bank manufacturers. Battery banks are purchased for individual substation projects and for replacement of deteriorated existing banks throughout the system as needed. Lead acid battery banks are purchased as close to their required need date as possible. It is not recommended to store a lead acid battery bank more than 6 months without charging. Battery banks purchased for new substation projects are typically delivered as soon as the control house is complete and ready for the bank to be installed.

4. APPROVED MANUFACTURER'S AND PRODUCT:

4.1. BATTERY: ALPINE POWER SYSTEM, ENERSYS MODEL 3CC-9MGP

4.2. RACK: ALPINE POWER SYSTEM, UTILITY RACK 2 TIER, MODEL UC002T132A

4.3. CHARGER: See latest Oracle listing