OUTSIDE PLANT POWERING

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SCTE-ISBE San Diego Chapter

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ALPHA Technologies Services Inc

Accelerate the Deployment of Technology to Drive Business Results.
OUTLINE

Electrical/Electricity
Safety & Tools
Enclosure
Batteries
CableUPS
Monitoring
The building blocks
Types of Electricity: DC

One type is Direct Current. Batteries, fuel cells, and PV produce Direct Current (DC) is unidirectional flow of electrical charge. Current flows at a constant direction.
Types of Electricity: DC-Batteries

Electricity is the flow of electrons through a conductor.

A battery is made up of a Anode (- negative) and Cathode (+ Positive), and the electrolyte. Chemical reaction causes a build up of electrons at the anode.

The electrons want to flow to area less electrons
Types of Electricity: DC-Batteries

In a battery, the only place for electrons to flow is the cathode.

The electrolyte keeps the electrons from flowing from anode to cathode.

When a conductor(load) is connected, the electrons are allowed to flow from Negative(anode) to Positive(cathode) terminal.
Types of Electricity: DC-Batteries

The electrochemical process changes the chemicals in the anode and cathode resulting in reduction of electrons, and not having a flow of electrons.

This is when you have an outage.

When you charge a battery, the flow of electrons is change to restore the capacity of the battery.
BATTERIES

Valve Regulated Lead Acid Battery

The Valve opens when pressure is building up of hydrogen gas.

It is a liquid acid battery.

Overcharge or malfunction of the battery will cause electrolysis of water expelling hydrogen and oxygen gas release through the valve.

Normal oxygen gas produced in the positive plate is absorbed by the negative plate this suppresses the production of hydrogen.
BATTERIES

VRLA AGM

The electrolyte is absorbed in matted glass fibers.
The battery’s groups are packed tightly in the case partitions protecting energy producing components.
AGM batteries designs can have twice the cycle life.
AGM batteries excel for high current and extremely cold environments.
Each cell is 2 volts having 6 cells = 12
AGM Battery

AGM battery technology

- Cover with safety valve and central degassing
- Positive plate set
- Plate block
- Negative plate set
- Negative plate
- Negative grid
- Positive plate with Microglass fleece
- Positive plate
- Positive grid
Two ways connecting batteries

The two ways are series and parallel. Let's start with series configuration. In this configuration, three batteries are connected in series, (-) to (+).

When batteries are connected in series, the voltage is added of each battery. In this case, you add 12v+12v+12v=36
Parallel configuration

Positives and negatives are connected respectively. Battery voltage value stays the same but capacity increases.
BATTERIES

Batteries

Never mix and match batteries, brands, models and voltage value.
Types of Electricity: AC

Alternating current (AC) is the other one. Alternating Current periodically reverses direction many times a second at regular intervals. AC is what is delivered to businesses and residence.
HOW DO WE WORK WITH ELECTRICITY
Ohm’s Law

Everything we do with electricity, Ohm’s Law is there.

Ohm’s Law states that the potential difference (Voltage) across a conductor is proportional to the current going through it.
Ohm’s Law

I = Intensity of Current = Amperes
E = Electromotive Force = Volts
R = Resistance = Ohms
P = Power = Watts
A Series Circuit is a circuit that has only one path through which the electrons may flow.

- **Rule 1**: The total current is equal to the current in any other part of the circuit.
- **Rule 2**: The total Voltage is equal to the sum of the voltages across all parts of the circuit.
- **Rule 3**: The total resistance is equal to the sum of the resistance of all parts of the circuit.
Parallel Circuit

A Parallel Circuit is a circuit that has more than one path that electrons may flow.

- **Rule 1:** The total current is equal to the sum of the currents in all branches of the circuit.
- **Rule 2:** The total voltage across any branch is equal to the voltage across any other branch.
- **Rule 3:** the R total is found by applying Ohms Law to the total values of the circuit.
Safety

As always, follow Company Policy

Always wear safety glasses

- Before starting any type of work, wear your eyes are at risk
- Why? Particles or liquids can damage eyes
SAFETY

Personal Protective Equipment PPE CAT 1

- Hard hat
- Gloves
- Leather footwear
- Long sleeve shirt and pants
SAFETY & TOOLS

Tools: Multimeter

Multimeter
# SAFETY & TOOLS

## Tools

### Multimeter

<table>
<thead>
<tr>
<th>Switch Position</th>
<th>Measurement Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>mV</td>
<td>DC mV 0.1 mV to 600 mV. Temperature −40 °C to +400 °C. −40 °F to +752 °F.</td>
</tr>
<tr>
<td></td>
<td>Beeper turns on at &lt;25 Ω and turns off at &gt;250 Ω. Diode test. Displays Ω above 2.4 V.</td>
</tr>
<tr>
<td>A</td>
<td>AC A from 0.300 A to 10 A. DC A from 0.001 A to 10 A. &gt;10.00, display flashes. &gt;20 A, Ω is displayed.</td>
</tr>
<tr>
<td>Hz</td>
<td>Frequency of ac A 2 Hz to 30 kHz.</td>
</tr>
<tr>
<td>Ω</td>
<td>Ohms from 0.1 Ω to 50 MΩ.</td>
</tr>
<tr>
<td>Hz</td>
<td>Farads from 1 nF to 9999 µF.</td>
</tr>
<tr>
<td>mA</td>
<td>AC mA from 3.00 mA to 400 mA. DC mA from 0.01 mA to 400 mA. Frequency of ac mA 2 Hz to 30 kHz.</td>
</tr>
</tbody>
</table>

Note: AC voltage and current AC-coupled, true-rms, up to 1 kHz.
Tools: Multimeter

- Vdc millivolts
- Vdc
- Vac
- Ohms
- Continuity
- AC milliamps
- AC
Tools: Multimeter

What does “True RMS” mean.

  - Calculates the equivalent direct current (dc) value of an ac waveform
  - Can accurately measure both pure sine wave and non-sinosoidal wave
  - More computers, HVAC, Solid States, variable speed motors drives, etc

<table>
<thead>
<tr>
<th>Multimeter type</th>
<th>Response to sine wave</th>
<th>Response to square wave</th>
<th>Response to single phase diode rectifier</th>
<th>Response to 3 Ø diode rectifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average responding</td>
<td>Correct</td>
<td>10 % high</td>
<td>40 % low</td>
<td>5 % to 30 % low</td>
</tr>
<tr>
<td>True-rms</td>
<td>Correct</td>
<td>Correct</td>
<td>Correct</td>
<td>Correct</td>
</tr>
</tbody>
</table>
Tools: Load Tester

Before using a load tester

- Make sure battery doesn’t have loose parts
- Check case is not cracked, bulging, or caved in
- Terminals are clean and corrosion free
Tools: Load Tester

A load tester is used to determine if the battery is good. Before using a load tester there are a few things to think about:

1. Wear safety glasses, face shield, gloves, apron,
2. Battery is fully charged?
3. Are all interconnections disconnected?
4. Perform Open Circuit test (check voltage)
Tools: Conductance meter

Conductance is a measurement of the battery’s ability to produce a current.

In order to measure conductance, the tester creates a small signal that is sent through the battery, then measures a portion of the AC current response.

As a battery ages, the surface of the plate can sulfate or shed active material and affects the performance. Conductance is a measure of the available plate surface and determines how much power can supply.
Tools: Conductance Meter

Why use conductance tester

- Extremely safe
- Does not discharge
- Testing is passive and repeatable
- Clear, quick, and accurate testing
ENCLOSURES

Broadband Enclosures
Types of Enclosures
Introduction

When choosing a enclosure, ask yourself if this is for a project in a commercial or residential location.

As changes take place with utility requirements, certain enclosures are not allowed due to their rating.

For commercial sites, the requirement has change to 42 kair or higher.

For residential sites, a standard enclosure equipped with 10kair is sufficient.
What is KAIC/KAIR

KAIC stands for Kilo Ampere Interrupting Capacity.
K or Kilo stands for thousand
This is the current that a fuse or circuit breaker is able to interrupt without being destroyed or causing an unacceptable arc.
KAIC/KAIR: Fuse

Branch circuit fuses are tested without any additional conductors.

- For example, a fuse that has an interrupting capacity of 300,00 A is tested at 300,000 A and therefore rated for 300,000A
- Fuses are tested after a bus bar rated for that value at a given voltage. Bus bar is replace with the fuse and tested.
- A major point is that fuses are capable of interrupting equal or greater its rated capacity.
KAIC/KAIR: Circuit Breakers

Circuit breaker are different because circuit breakers are tested with other conductors impedance making interrupting rating is less than rated.

- For example, when the test circuit is calibrated for the rated circuit breaker interrupting rating test, the circuit breaker is not in the circuit.
- After the circuit breaker is placed in the circuit and additional conductors are permitted, this results in significant lower short-circuit current making a 22 kaic having a 9.9kaic.
Standard enclosure

All enclosures are equipped with a high magnetic breaker. This gives the breaker 10x interrupting capacity for a half a cycle. The HM breakers are design for high inrush currents that a device would cause.
65kaic & 10kaic
Meter Base

EUSERC- Electric Utility Service Equipment Requirement Committee is an organization promotes uniform electric service requirement among member utility. It was created in California then other states have accepted EUSERC Meter base.
Grounding enclosures is for safety. Grounding method depends on soil type, available space, local codes, National Electric Code (NEC) requirements and other site specific characteristics.

1 = #6 bare copper wire, 2 = .5x8’ Copper rod

Connection made with Burndy connector (P/N YGHR58C2W-3 or equivalent)

Terminate at enclosure ground

Terminate at service entrance ground

#6 AWG

Two 8’ ground rods 6’ apart (min.)

Note: May require additional ground rods to meet NEC minimum grounding standard (25 ohms or less).

#2 AWG
Grounding

Normally, 5 ohms is recommended between enclosure and ground rod, but should not exceed 25 ohms. This can be measured with a ground tester. Always comply with local and national codes.
installation

As we have learned how to connect batteries, we can use that knowledge to install batteries into the enclosure.
BATTERIES

1. To power supply
   - Red
   - Black
   - (String -) 0V

2. PTS

3. AB/C/D NEG
   - Black, Pin 5

4. A3
   - NEG(-)
   - POS(+)

5. A2
   - NEG(-)
   - POS(+)

6. A1
   - NEG(-)
   - POS(+)

7. Vbatt 3A 36V
   - Red, Pin 9

8. Vbatt 2A 24V
   - Orange, Pin 4

9. Vbatt 1A 12V
   - Brown, Pin 10

Fig. 2.6 Battery Wiring Diagram

Fig. 2.7 Precision Temperature
Uninterruptable Power Supply

Is a device that provides back up power when utility fails or drops to an unacceptable voltage level.

There are a few types of UPS’s

- On-line UPS
- Line interactive UPS
- Standby UPS
Standby UPS

This UPS monitors the input voltage and when the input fails, then it transfer to inverter. The inverter will only turn on when input fails. When utility returns, the inverter turns off and switches to utility.
Line interactive UPS

It is a Standby UPS with automatic voltage regulator or a tap changing transformer. Input voltage can change so the AVR will continue to regulate input. This will insure the UPS will not keep transferring to back-up.
On-Line UPS

Used for critical equipment under control environment.
Ferroresonant Standby UPS
Ferroresonant UPS

• Transformer Module feature
  – Current limiting
  – Regulated AC Power
  – Power Condition – Free of spikes, surges, sags and noise
  – Saturates transformer core initial powering
Ferroresonant UPS

<table>
<thead>
<tr>
<th>Power Supply Load</th>
<th>Permitted Duration of Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>918</td>
<td></td>
</tr>
<tr>
<td>&gt;125%</td>
<td>&gt;150%</td>
</tr>
<tr>
<td>113% to 125%</td>
<td>125% to 150%</td>
</tr>
<tr>
<td>108% to 113%</td>
<td>115% to 125%</td>
</tr>
<tr>
<td>&lt;108%</td>
<td>&lt;115%</td>
</tr>
</tbody>
</table>
CABLEUPS

1. Smart AlphaGuard (SAG)
   1. Green LED
   2. Red LED
2. APPS Card
   1. Utility monitoring
   2. Battery Estimated Run Time
   3. Battery Estimated Life
3. Main Output
4. Secondary Output
   1. Option – DOC
   2. Bonded with Main – no DOC
CABLEUPS

1. Power Cord
   1. Tie Wrap

2. Handle
3. SAG
4. APPS
5. Outputs
• 3 Screws
  – Panel Forward
• Panel Held at Bottom
• May be open Hot
• D are snap
• E 2 screws
• F Ribbon Cable
A. Snap
B. Screw
C. Ribbon Connector
• DOC Removal
  – 3 screws
  – 2 stand-offs
CABLEUPS

• Loosen 2 front screws
• Remove Inverter
• Select output
Inverter module

- Inverter module
  1. Screen
  2. 4 Buttons 4 Menus
     1. Power Menu
     2. Battery Menu
     3. Communications Menu
     4. APPS Menu
  3. Output LED
  4. Alarm LED
  5. Test Button
  6. Local Remote Indicator (LRI)
  7. Temperature Connection
  8. Battery Breaker
  9. Battery Cable Connection
CABLEUPS

Display

• Power Supply Model

• Output Voltage/Current

• Menus
  – OK
  – ALM
• Power Menu
  – Normal Operation
  – Additional Information
  – Setup Menu
• Battery Menu
  – Battery Configuration
  – Charger Information
• Communication
  – Transponder Info
  – Levels
• APPS Menu
### PWR CNFG
- **Normal Operation**
- **Additional Information**
- **SetUp Menu**

### Top Left Letter Blinking
- **Access Menu/Parameters**

### Power Configuration
- **Use up/down button**
- **Select parameters**

---

#### Power Config Menu

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELFTST</td>
<td>OFF</td>
<td>ON / OFF</td>
</tr>
<tr>
<td>TEST INTERVAL</td>
<td>30 DAYS</td>
<td>0 - 365 DAYS</td>
</tr>
<tr>
<td>TEST COUNTDOWN</td>
<td>10 MIN</td>
<td>5 - 180 MINUTES</td>
</tr>
<tr>
<td>TEST INHIBIT</td>
<td></td>
<td><em>ON</em> / OFF</td>
</tr>
<tr>
<td>DISCHARGE LVL</td>
<td>TiMED</td>
<td>TiMED: 10 - 50%</td>
</tr>
<tr>
<td>FREQUENCY RANGE</td>
<td>2.0HZ - 1.0HZ</td>
<td></td>
</tr>
<tr>
<td>ALPHADOC OPTION</td>
<td>AUTO</td>
<td>NO / YES</td>
</tr>
<tr>
<td>ALPHADOC FW</td>
<td>V3.X.X.X</td>
<td></td>
</tr>
<tr>
<td>DOC WARR</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Power Info Menu

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLTAGE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CURRENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POWER</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

*Displayed only if AlphaDOC with N+1 option is installed*
** ACTIVE ALARMS **

INPUT FAILURE
N+1 IN USE

ESC

**ACTIVE ALARM**

OUTPUT FAIL
PWR MENU <ENTR>
ENTR  

ESC
<table>
<thead>
<tr>
<th>Active Alarm</th>
<th>Alarm Type</th>
<th>Alarm Category</th>
<th>Probable Cause of Alarm</th>
<th>Corrective Action</th>
<th>Standby Desired</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELF TEST FAIL</td>
<td>Major</td>
<td>PWR</td>
<td>Output voltage failed or batteries less than 1.65VDC during Self Test.</td>
<td>1. Check Batteries 2. Check Inverter</td>
<td>NO</td>
</tr>
<tr>
<td>LINE ISOLATION</td>
<td>Major</td>
<td>PWR</td>
<td>Line isolation has failed and Inverter operations are suspended.</td>
<td>1. Replace Power Supply as soon as possible</td>
<td>YES</td>
</tr>
<tr>
<td>OUTPUT FAILURE</td>
<td>Major</td>
<td>PWR</td>
<td>The AC output has failed due to a bad Inverter or Transformer, or an unstable Transformer.</td>
<td>1. Apply load &gt;1.5A 2. Output Overloaded 3. Check Inverter 4. Check Battery String</td>
<td>NO</td>
</tr>
<tr>
<td>OUTPUT OVERLOAD</td>
<td>Major</td>
<td>PWR</td>
<td>The output is overloaded or shorted.</td>
<td>1. Output Short Circuit 2. Check Output Current</td>
<td>NO</td>
</tr>
<tr>
<td>OUTPUT 1 TRIPPED</td>
<td>Major</td>
<td>PWR</td>
<td>Output 1 Alpha DCC hardware protection module is engaged and overloaded.</td>
<td>1. Over Current 2. Check Settings</td>
<td>NO</td>
</tr>
<tr>
<td>OUTPUT 2 TRIPPED</td>
<td>Major</td>
<td>PWR</td>
<td>Output 2 Alpha DCC hardware protection module is engaged and overloaded.</td>
<td>1. Over Current 2. Check Settings</td>
<td>NO</td>
</tr>
<tr>
<td>CHARGER FAILURE</td>
<td>Major</td>
<td>PWR</td>
<td>Charger has failed to shut down, possible battery over temperature condition exists.</td>
<td>1. Re-seat Inverter 2. Perform Self Test</td>
<td>NO</td>
</tr>
<tr>
<td>INVERTER TEMP</td>
<td>Major</td>
<td>PWR</td>
<td>Inverter heat sink has exceeded set temperature. (Standing operation suspended until temperature drops to a safe level.)</td>
<td>1. Check Inverter 2. Check FDB 3. Check Enclosure Ventilation</td>
<td>NO</td>
</tr>
<tr>
<td>CONFIG ERROR</td>
<td>Major</td>
<td>PWR</td>
<td>The Power Supply is improperly configured and operation is suspended anti error is corrected.</td>
<td>1. Wrong Input Voltage or Frequency 2. Wrong Battery String</td>
<td>NO</td>
</tr>
<tr>
<td>INVERTER ALARM</td>
<td>Major</td>
<td>PWR</td>
<td>No output detected with good batteries for 30 seconds OR inverter is disconnected from FDB.</td>
<td>1. Re-seat Inverter 2. Replace Inverter</td>
<td>YES</td>
</tr>
<tr>
<td>N+1 IN USE</td>
<td>Major</td>
<td>PWR</td>
<td>Redundant in use</td>
<td>1. Check Output 2. Check Connections</td>
<td>NO</td>
</tr>
<tr>
<td>INPUT FAILURE</td>
<td>Minor</td>
<td>PWR</td>
<td>Utility AC input has failed.</td>
<td>1. Utility Failure 2. Check Input Lonteran 3. Input Connections</td>
<td>NO</td>
</tr>
<tr>
<td>INPUT OVER CURRENT</td>
<td>Minor</td>
<td>PWR</td>
<td>AC input current exceeds threshold setting.</td>
<td>1. Reduce Output Load 2. Check Input Current Limit Setting</td>
<td>NO</td>
</tr>
<tr>
<td>SURGE MOV FAIL</td>
<td>Minor</td>
<td>PWR</td>
<td>The MOV board surge protection has failed and needs to be replaced.</td>
<td>1. Replace MOV board</td>
<td>NO</td>
</tr>
<tr>
<td>ALPHA DCC OPTION</td>
<td>Minor</td>
<td>PWR</td>
<td>I/O has failed between XMS and DCC.</td>
<td>1. Check Ribbon Cable 2. Replace DCC</td>
<td>NO</td>
</tr>
<tr>
<td>INVERTER ENABLE</td>
<td>Minor</td>
<td>PWR</td>
<td>System controller has disabled the inverter</td>
<td>1. Check Inverter</td>
<td>YES</td>
</tr>
<tr>
<td>CHARGER ENABLE</td>
<td>Minor</td>
<td>PWR</td>
<td>System controller has disabled the charger</td>
<td>1. Check Charger</td>
<td>NO</td>
</tr>
<tr>
<td>APP OPTION</td>
<td>Minor</td>
<td>PWR</td>
<td>I/O has failed between XMS and APP</td>
<td>1. Check Ribbon Cable 2. Replace APP</td>
<td>NO</td>
</tr>
<tr>
<td>INV EEPROM ERROR</td>
<td>Minor</td>
<td>PWR</td>
<td>There has been an error reading the EEPROM on the inverter board.</td>
<td>1. Replace Inverter</td>
<td>NO</td>
</tr>
<tr>
<td>HW COMPATIBILITY</td>
<td>Minor</td>
<td>PWR</td>
<td>There is a hardware incompatibility between the Main micro board and the inverter board.</td>
<td>1. Check Micro Board 2. Check Inverter Bn</td>
<td>NO</td>
</tr>
<tr>
<td>PB EEPROM ERROR</td>
<td>Minor</td>
<td>PWR</td>
<td>There has been an error reading the EEPROM on the PB.</td>
<td>1. Replace Power Supply</td>
<td>NO</td>
</tr>
</tbody>
</table>
CABLEUPS

BATTERY INFO MENU

- BATT CONFIG <ENTR>
  - Pressing enter goes to the Battery Configuration menu shown below.

- BATT VOLTS
  - Displays combined string voltage.

- CHARGER CURR
  - Displays BATT Current for Inverter Mode.

- CHARGER MODE
  - Displays current Charge Mode: OFF/FLOAT/REFRESH.

- IND BATT V
  - Not displayed if no D$M3 or SAG installed.

- BATT TEMP
  - Displays battery temperatures (°C).

- APPS INFO <ENTR>
  - Pressing enter goes to the APPS/INFO menu or APPS Tab.*

- SAG INFO <ENTR>
  - Pressing enter goes to the SAG INFO menu shown at right.
  * Displays only if App Card is installed.

BATTERY CONFIG MENU

<table>
<thead>
<tr>
<th>Default</th>
<th>Range</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATT MHOS</td>
<td>0-2550</td>
<td>Hidden if no APPS card is installed</td>
</tr>
<tr>
<td>BATT DATES</td>
<td>User programmable</td>
<td></td>
</tr>
<tr>
<td>BATT MODEL</td>
<td>OTHER</td>
<td>AlphaCell models listed at right</td>
</tr>
<tr>
<td>NUM BATT STRINGS</td>
<td>1-14</td>
<td></td>
</tr>
<tr>
<td>BATT CAPACITY</td>
<td>100AH</td>
<td>0&quot;, 1-1000</td>
</tr>
<tr>
<td>FLOAT</td>
<td>2.27/2.35</td>
<td></td>
</tr>
<tr>
<td>ACCEPT</td>
<td>2.49/2.45</td>
<td></td>
</tr>
<tr>
<td>REFRESH</td>
<td>2.43/2.50</td>
<td></td>
</tr>
<tr>
<td>REST ENABLE</td>
<td>OFF</td>
<td>On/Off</td>
</tr>
<tr>
<td>TEMP COMP</td>
<td>5.0mV</td>
<td>0-5.0mV per cell</td>
</tr>
<tr>
<td>EOD TYPE</td>
<td>STRING</td>
<td>Individual Battery EOD only if sense harness is connected Will display STR over for STRING override mode</td>
</tr>
<tr>
<td>EOD VOLT</td>
<td>1.75/1.80</td>
<td></td>
</tr>
<tr>
<td>REFRESH ENABLE</td>
<td>ON</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>SAG OPTION</td>
<td>Auto</td>
<td>Auto-recognize SmartAlphaGuard (SAG)</td>
</tr>
<tr>
<td>SAG PV 1.0/0.0</td>
<td>AUTO</td>
<td>Hidden if no SAG connected</td>
</tr>
<tr>
<td>SAG #/# #/#</td>
<td>AUTO</td>
<td>Hidden if no SAG connected</td>
</tr>
<tr>
<td>HEATER #/# #/#</td>
<td>NO</td>
<td>YES/NO</td>
</tr>
</tbody>
</table>

* BATT CAPACITY should only be set to "0" when no batteries are present to disable NO BATT Alarm.
• Three stage charger mode
  – Bulk
    • Constant Current 1A – 10A
    • 80% rated battery capacity (2.40 Vdc)
  – Accept
    • Constant Voltage 2.40 Vdc (2.20 Vdc – 2.45 Vdc)
    • Temperature compensated Longer battery life
    • Approximately 6 hours 100%
  – Float
    • Default 2.27 Vdc (2.10 Vdc – 2.35 Vdc)
    • Temperature Compensated
    • Continue charge to keep batteries ready
NOTE: COMM-FAULT Menu appears only if there is no RF connection or RF interruption occurs.

**COMM GENERAL**
- CM MAC ADDRESS: 00:90:A:0:04:59
- CM IP ADDRESS: 192.168.203.101
- CM IPv6 ADDR POSTFIX*: 111:222.333.3434
- CPE MAC ADDRESS**: 00:90:A:0:04:5A
- CPE IP ADDRESS**: 192.168.200.100
- CM RECEIVE POWER: -12.0dBmV
- CM TRANSMIT POWER: 34.5dBmV
- DOWNSTREAM SNR: 33.8dB

* Menu item available if DSM5 is provisioned in IPv6 mode
** Menu item available if DSM3 is provisioned in Dual-IP mode

**COMM - EXTENDED**
- DSM MODEL/CONFIG: DSM3X CW-88
- DSM FIRMWARE VERSION: 4.4.0.0_03.02 NA
- SYSTEM NAME: ABC123 CABLE
- SYSTEM CONTACT: JOHN DOE
- SYSTEM LOCATION: 123 BAKERVIEW
- COMMON LOGICAL ID: 12345-7677 ALPHANAY
- DOCSIS CONFIG FILE: ALPHA_DS33.COM
- DSM SERIAL NUMBER: A0499
- SYSTEM DEVICES: 37*
  - IP1-1 SAG-1 DOC-1
  - SYSTEM DEVICES 67*
    - XMS3-APP-1 BTQ-1
    - SYSTEM DEVICES 77*
      - M1L-1
      - CABLEWARE SERVER IP: 192.168.200.151

* Menu item will populate for only Cableware configured units

**COMM - DIAGNOSTICS**
- CABLE MODEM STATUS: OPERATIONAL
- SYSTEM UPTIME: 3 DAYS 03H:16M:59S
- DOWNSTREAM FREQUENCY: 300.00MHz
- DOWN MODULATION TYPE: 268 QAM
- UPSTREAM FREQUENCY: 15.00MHz
- T3 TIMEOUTS: 03800
- T4 TIMEOUTS: 51
- CODEWORD ERROR RATE: 8.20%
- MICROREFLECTIONS: 5 DBC
- CM RESET: 10
- CM LOST SYNC: 5
- LAST SNMP QUERY: Date/Time

NOTE: System Device menu items are internal.Alpha diagnostic codes. The System Devices menu items will populate based on the option cards (SAG, APP, DOC) installed and the number of external devices added to a power system such as multiple XMs and/or AlphaGen.
CABLEUPS

DOCSIS® 3.0 and EuroDOCSIS
Status Monitoring
Universal Transponder
CABLEUPS

Status monitoring software
Maintenance

The cableups is remotely monitor but this doesn’t mean we don’t visit the site. Physically inspecting a cableups system will prevent any outages. Always inspect batteries. Perform a self test to ensure cableups works properly. Measure output voltages to ensure optimum output is still reached. Measure output amperage to ensure cableups is not reaching a overload state.
CABLEUPS

Maintenance

Inspect enclosure doors and condition of enclosure.
Inspect enclosure is secure to pedestal.
Very all locks work properly.
Inspect grounding on enclosure.
Remove any dust, debris, or any signs of rodent.
Inspect shelves.
### CABLEUPS

#### Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Model Number</th>
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<td>Annual Retorque Inch-Pounds / Nm</td>
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#### Parameter

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### Site Data

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### Transponder Data

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### Power Supply #1 Data

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<td>Self-Test Duration (min)</td>
<td>Self-Test Interval Days</td>
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<td>Event Log Cleared</td>
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<td>Events Time</td>
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<td>Output Voltage (VAC)</td>
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### Battery Data

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<th>Date Code (MMYY)</th>
<th>ID #</th>
<th>Voltage No Load (VDC)</th>
<th>Voltage Under Load (VDC)</th>
<th>Battery Temperature (°F / °C)</th>
<th>Battery Resistance (ohms)</th>
<th>Meter Reading</th>
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**Battery Separable Present:**
- **String A Total:**
- **String A Fused:**
- **String B Total:**
- **String B Fused:**

**CHARGER INFO**

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<thead>
<tr>
<th>Charger Mode</th>
<th>Current (A)</th>
<th>Accept (V/C)</th>
<th>Current Limit (A)</th>
<th>Temp Comp (°C/°C)</th>
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<tbody>
<tr>
<td>Float (V/C)</td>
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THANK YOU
Header

Body
• Bullet 1
  • Bullet 2
    • Bullet 3
      • Bullet 4
        • Bullet 5
Header

Body
• Bullet 1
  • Bullet 2
    • Bullet 3
      • Bullet 4
        • Bullet 5
Divider slide
Body

- Bullet 1
  - Bullet 2
    - Bullet 3
    - Bullet 4
    - Bullet 5

Body

- Bullet 1
  - Bullet 2
    - Bullet 3
    - Bullet 4
    - Bullet 5
Thank You!

Accelerate the Deployment of Technology to Drive Business Results.