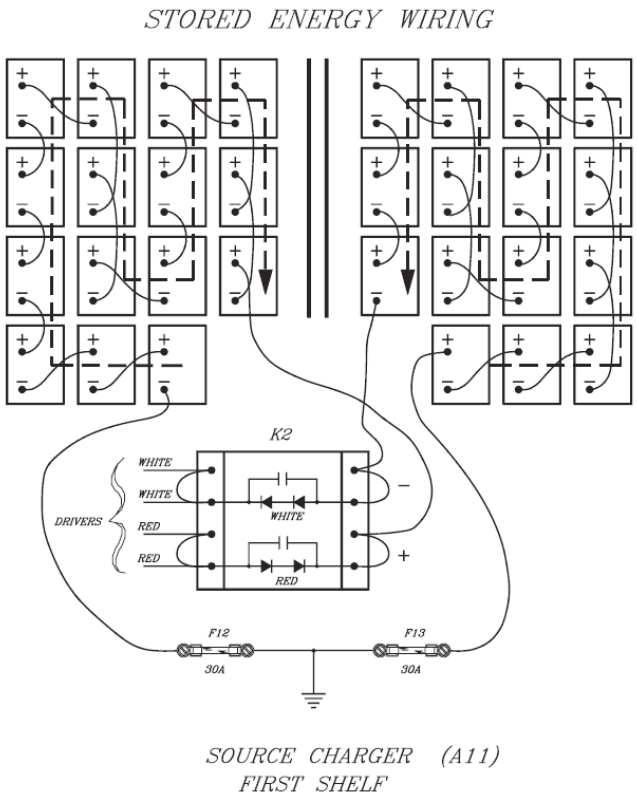
Bennett/HCMI Battery Connections

On a one shelf machine:
Fuse F1 on the charger board is the left bank and F2 is the right bank
R5 is F1 and R21 is F2. These are the adjustments pots for +210 vdc and -210 vdc or whatever your preferred set voltage is. 205 is probably about a minimum.
The batteries on the left side of the machine are anode and the batteries on the right side are cathode.
R34, the taller blue trimpot is to adjust the Vsense volatge.

SCHEMATIC 8-16
SOURCE CHARGER (A11) FIRST SHELF

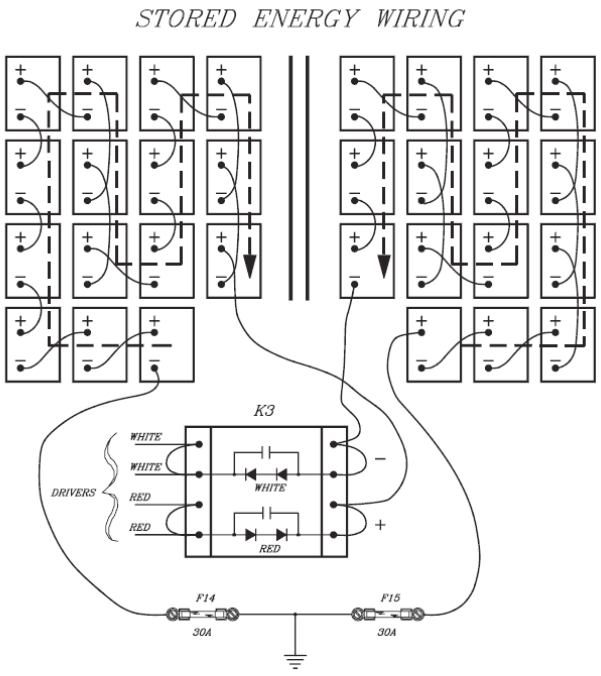


For a two shelf machine Anode batteries are on the top shelf and cathode batteries are on the bottom shelf.

The source charger board that has the wiring harness/plug A11 will be the bottom shelf of batteries.
The source charger board that has the wiring/harness plug A14 will be the top shelf of batteries.
R34, the taller blue trimpot in the middle of the board is to adjust the Vsense voltage, test point TP2

You can also check the set charge voltage at both ends of the fuse clips on the charger board.

SCHEMATIC 8-17
SOURCE CHARGER (A14) SECOND SHELF



Bennett SE (Stored Energy) Generators

It is important that the condition of all 30 batteries are good. All 60 batteries if you have a two shelf unit.

If the batteries are having any problems charging, shorted or acting as more of a “load” than as a battery. This will damage a good, working charger board. D9 & D6 will indicate how hard the charger board is working. If either of the LED's are on constant (no flashing) for an extended length of time, it indicates the charger board is working hard to charge the batteries.

If the LED's are full on, back the set charging down and slowly bring them up. Adjust R5 and R21 counter clockwise until you at least see some flashing of the LED's. Monitor the voltage of each bank of 15 batteries and slowly bring the voltage up to 210 vdc by adjusting R5 and R21 (the blue trim pots).

If the pots won't adjust the voltage or LED flash rate, see troubleshooting on the last page.

Many times new batteries will require some charging. They almost never arrive with a full charge. 210 vdc is sufficient voltage per bank of 15 batteries. Monitor the heat from resistors R3 & R19. DO NOT let the charger board overheat as this will damage the 208088 charger board. Some batteries may be bad and will need to be replaced. This is even true of brand new batteries. Out of 30 or 60 new batteries it is possible to have one or two bad batteries. Sometimes they are bad out of the box, sometimes they don't fail for a couple of weeks, sometimes it may take a few months. Case in point, an X-Ray service company recently found they had 4 bad batteries out of a bank of 15 batteries. These were brand new batteries! It is just the nature of the batteries and can happen. I'm not saying it always happens every time, but it CAN happen.

Very important, do not use any other brand or type battery other than the original:

Enersys (Hawker) Cyclon 0819-0020 D-Cell 12 Volt/2.5 Amp Hour Sealed Lead Acid Battery

We don't sell the batteries, but there at least two suppliers here in the U.S. and the pricing is about the same from either of them. The charger boards were designed around this type/brand battery. They have a different internal resistance when compared to any other batteries. Different batteries, batteries with a higher Amp Hour rating will cause the charger board to fail. Maybe not immediately, but given some time it will for certain.

How to load test a battery

You'll need a dc voltmeter, a pair of alligator jumper leads and something to use as a load across the battery. A collimator bulb will work, like an FCS, DZE, etc.

First measure the battery voltage. If it's mid to low 11's or something, I would discard it. 15 batteries at 12 volts = 180 vdc. That's about the lowest voltage a bank should be sitting at. And that's somewhat low. Anything much less than that, the charger board has to try to make up the difference at turn on and that's what causes the boards to overheat and eventually will start to blow fuses on the charger board. Typically it does this because during exposure when the generator can't draw enough current from the batteries, it will next try to draw it from the charger board which it can't. That's why the fuses start to intermittently blow on the charger board and gradually gets worse as the state of the batteries degrade. The charger board can also become so over worked over time that it gives up, may short and will blow a fuse immediately when replaced.

Typical volatge of 15 batteries on an SE, about 185-195 with generator off for measurement, of course. Next, connect the collimator bulb and the voltmeter leads across the batteries term at the same time. Notice the starting voltage and how the battery voltage drops under load. About one minute connected to the battery is normally long enough. It should only drop a few tenths of a volt. Maybe from 12.5 to about 12.3, 12.2 or something like that. If you see it start to drop and just continues dropping, it's no good. It should somewhat stabilize at a particular voltage and try to remain there. Like from 12.5 to maybe 12.2 and it will remain there under load, say for a minute or so. I have seen batteries with a voltage of over 13 volts drop to 10 volts under load. That's a bad battery for certain. Also always check the female, spade push-on connectors to each battery. Sometimes they become corroded and to be replaced. Sometimes the metal of the connector itself gets spread apart and doesn't make good connection to the battery.

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If half of the charger board or all of the charger board appears dead, check for +15 and -15 on the Regulated Power supply board on the back wall of the generator cabinet (208084 or A284).

If those are present and the LED's won't light at all or if adjusting the pots makes no difference to change the charging voltage then the charger board is probably bad.

A very, very fast flashing LED usually indicates either a blown fuse on the charger board or may indicate the charger board itself has a problem.

Always check the large 30 amp fuses down at the batteries also.

How Long Should The Batteries Last?

The manufacturer originally said 5-7 years. I've seen them last 6 years and as short as 3 years. It can be difficult to say. It is important on any battery generator to make sure it is turned on periodically to keep the batteries charged and in a good state. If it's a slow week for using the machine or not at all, turn the machine on at least 2-3 times per week and let it do the one hour automatic shut down, this will help. I would go a step beyond, turn the machine on and make a couple of warm-up exposures especially if not taking X-Rays for any other purpose in a week's time.

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563-320-3458 phone
Email: x2engineering@msn.com
www.xraypartsdepot.com

HFQ 300SE Generators with 30 batteries
(Or 1000 series with 30 batteries)

SOURCE CHARGER CALIBRATION P/N 208088 (A11 and A14)
FOR SE SYSTEMS ONLY

Note: A fully charged system is required to set R5, R21 and R34 to proper settings. A14 is not used in HFQ-300SE.

HFQ-300 SE SYSTEMS

1. Connect the DVM to GND and A11-TP3. Adjust R5 to read between +204 and +206 VDC. D6 should be flashing.
2. Connect the DVM to GND and A11-TP4. Adjust R21 to read between -204 and -206 VDC. D9 should now be flashing.
3. Turn the key switch on the OCP twice and press **CALIB**. Note the displayed SES voltage in the lower portion of the center LCD.
4. Connect positive and negative leads of the DVM to A11 TP3 and TP4, respectively. Verify that the measured voltage is 410 ± 2 VDC.
5. If the actual voltage measured on the DVM is equal to or within ± 2 volts of the SES voltage displayed on the OCP, turn the key switch twice to return to normal operating mode. If not, adjust A11-R34 until the actual measured voltage and displayed voltage are within ± 2 volts.

HFQ 600SE Generators with 60 batteries
(or 1000 series generators with 60 batteries – two shelf)

HFQ-300SE (WITH SES-HD OPTION) AND HFQ-600SE SYSTEMS

1. Connect the DVM to GND and A11-TP3. Adjust R5 to read between +204 and +206 VDC. D6 should be flashing.
2. Connect the DVM to GND and A11-TP4. Adjust R21 to read between -204 and -206 VDC. D9 should now be flashing.
3. Connect the DVM to GND and A14-TP3. Adjust R5 to read between +204 and +206 VDC. D6 should be flashing.
4. Connect the DVM to GND and A14-TP4. Adjust R21 to read between -204 and -206 VDC. D9 should now be flashing.
5. Turn the main circuit breaker off. Wait until D6 and D9 LEDs extinguish and disconnect A11 J1. Turn the main circuit breaker back on.
6. Connect the DVM to GND and A14-TP2. Adjust A14-R34 to read +4.8 volts. Turn the main circuit breaker off. Wait until A14 D6 and D9 LEDs extinguish, replace A11 J1. Turn the main circuit breaker back on.
7. Turn the key switch on the OCP twice and press **CALIB**. Note the displayed SES voltage in the lower portion of the center LCD.
8. Connect positive and negative leads of the DVM to A11 TP-3 and TP-4, respectively. Verify that the measured voltage is 410 ± 2 VDC.
9. If the actual voltage measured on the DVM is equal to or within ± 2 volts of the SES voltage displayed on the OCP, turn the key switch on the OCP twice to return to normal operating mode. If not, adjust A11-R34 until the voltage on the OCP is within ± 2 volts of the measured voltage on the DVM.