

Technical Support Bulletin: S3-FRPT-01

Field Replacement of Power Transistors in BVS-S3

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This procedure outlines the steps required to replace the power transistors on the BVS-S3 Load Plate Assembly. The Load Plate Assembly is the aluminum plate mounted in the upper half of the BVS cabinet. The power transistors are under the cover in the middle of the load plate.

Note: Before performing this replacement, refer to BTECH Technical Support Bulletin: S3-FTLD-1, Field Testing the S3 Load Drive PCB. If the results are good, proceed with this replacement. If not, contact BTECH Technical Support.

ELECTROCUTION HAZARD!

This procedure involves working with high voltage. The voltage sensing leads and load current leads carry full battery voltage. Battery Voltage can be as high as 600Vdc depending on the battery system! If you are not trained to work with high voltage equipment, do not attempt to use this procedure!

Tools Required:

Screwdriver with a 1/8" (3.2mm) flat blade
5/16" Nut driver
#1 Phillips screwdriver
Small wire stripper
Small wire cutter
DC Voltmeter

Parts included in kit:

4 Power transistors, (pre-wired)
4 Insulators
4 Large orange wire nuts
4 Small gray wire nuts
2 Sets of mounting hardware
Dual Load Board
Instructions

Follow the steps below and refer to the attached drawing when replacing the power transistors in your BVS-S3.

1. Turn **OFF** the **NICAD** battery switch and move the **RUN/STANDBY** switch to the **STANDBY** position. These switches are located on the top of the right-hand side of the chassis. Unplug the AC step-down transformer from the duplex outlet in the cabinet.
2. Unplug **ALL** of the black load current lead connector(s) from the sockets located at the top left-hand side of the cabinet. **NOTE: The button on the connector must be depressed to release the latch!**
3. **CAUTION: The plugs to be disconnected in this step carry battery voltage! Verify that no bare wires are exposed where the wires are inserted into the plugs and the wires are not loose. If bare wire is visible, avoid contact with the exposed wire(s)!** Carefully remove the orange 16 and 17 pin plugs from the sockets on the top of the chassis. Remove only enough connectors to gain full access to the load plate cover in the middle of the load plate. **NOTE: Pry up the front left corner of the plug with a thin blade screwdriver to release the connector. Once the front of the plug is raised, the wires can be used to pull the plug from the socket.**
4. Remove six screws holding the load plate cover and set the cover and screws aside.

5. There may be a total of 2 or 4 power transistors mounted to the load plate but you will need to remove all of them and mount 4 new ones. The existing power transistors may be oriented in a vertical or horizontal direction, but the replacements should only be oriented vertically. Making changes on only one side at a time will prevent wires from becoming mixed up and subsequently damaging the new parts. NOTE: If there are two metal-cased FETs, the load plate cannot be repaired on site and must be returned to the factory for repair.
6. Cut any cable ties around the wires to the power transistors. Loosen the screw(s) holding the white wire(s) in the green terminal block on the upper left edge of the printed circuit board. The violet wire that connects the gold-colored resistor with one of the power transistors on the left side must be cut within $\frac{1}{4}$ " (6mm) of the power transistor terminal. Also the black wire that runs through the hole in the load plate must be cut within $\frac{1}{4}$ " (6mm) of the power transistor terminal. Strip both the violet and black wires $\frac{3}{8}$ " (10mm) from the end.
7. Remove the screw(s) holding the power transistor(s) on the left side. Remove power transistor(s) from the insulator. Set the screw(s), lock washer(s) and flat washer(s) aside for reuse. Peel the gray insulator(s) off the plate and be sure the surface of the plate where the new insulator will be placed is clean and smooth.
8. Peel the new insulator off the backing strip and stick it to the plate, oriented vertically, with the hole centered over the hole in the plate.
9. Mount new transistors with the screws and washers. The flat washers must be against the transistor and the lock washer under the screw head. Tighten to 10 IN LBS (1.1 N m) If a torque wrench is not available, tighten the screw so the transistor is firmly secured to the plate with the lock washer fully compressed. Do not over tighten!
10. If the PC board in the system is not 9100018-32 or 9100053-01, then the PC board must be replaced. To replace the board, remove the 4 nuts from the 4 corners of the board with a $\frac{5}{16}$ " nut driver. Also remove the wires from the terminal block at the bottom of the board. Insert the wires in the same sequence in the bottom terminal block of the new board. Position the new board on the load plate and tighten the nuts.
11. Bend the white wire as shown and insert it into the "WT" terminal of the green terminal block on the PC board and secure with the screw.
12. Bend the black wires as shown and insert the stripped ends into the large orange wire nut and twist clockwise until tight.
13. Bend the violet wires as shown and insert the stripped ends into the small gray wire nut and twist clockwise until tight.
14. Repeat steps 7 through 13 to replace the power transistor(s) on the right side.
15. Reinstall the load plate cover and plug in the orange connectors that were removed.
16. Plug the AC step-down transformer into the duplex outlet in the cabinet and wait for the display to show the time.
17. Turn **ON** the **NICAD** battery switch and move the **RUN/STANDBY** switch to the **RUN** position.
18. Plug all of the black load current lead connector(s) into their respective sockets located at the top left-hand side of the cabinet and test at the terminal strip to see if the required DC voltages are present. See table below for voltages. If not, replace the 9A load current fuse(s) as necessary.

WIRE COLORS

BLACK TO RED
BLACK TO ANY OTHER
THAN RED

VOLTAGE READING

FULL DC BATTERY VOLTAGE
APPROX. ½ DC BATTERY VOLTS. VOLTAGE TO ANY OTHER COLOR
SHOULD NOT DIFFER BY MORE THAN +/- 2 VOLTS DC.

Please call **BTECH Inc.** Technical Support if any questions arise.

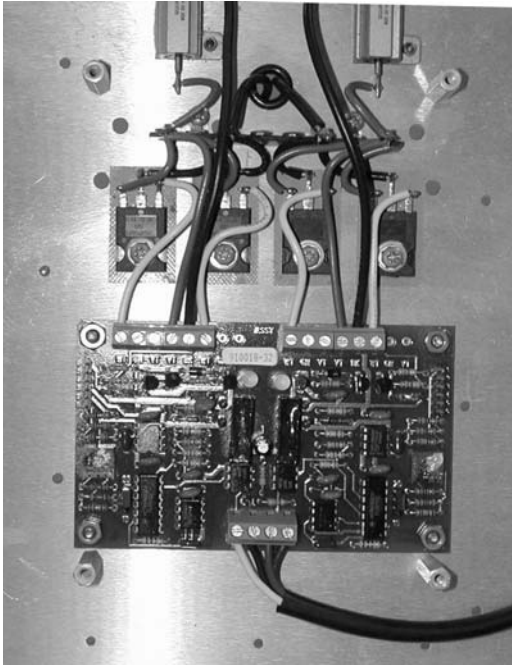


FIGURE 1A:
Dual Load Board – 9100018-32

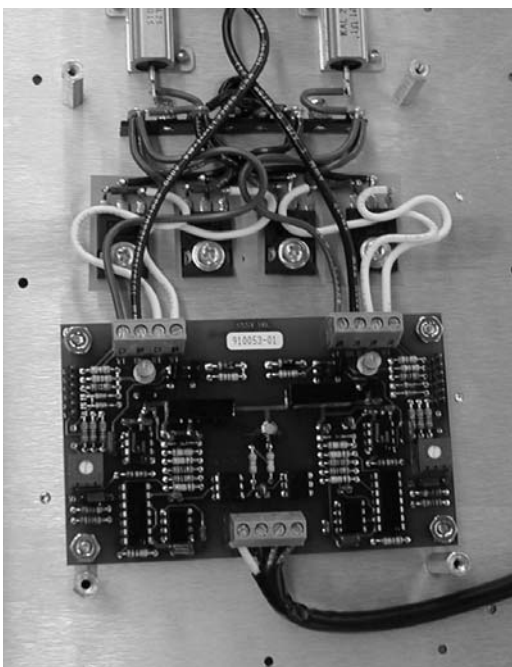


FIGURE 1B:
Dual Load Board – 9100053-01