26 January 2001

The attached documents are being provided to Switching Power Magazine for information purposes. This magazine is writing a feature article on the International Space Station Electrical Power System, focusing on the switching power processors. These units include the DC-DC Converter Unit (DDCU), the Bi-directional Charge/Discharge Unit (BCDU) and the Sequential Shunt Unit (SSU).

These diagrams are high-level schematics/block diagrams depicting the overall functionality of each unit.

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Remote Bus Isolator (RBI)

Fault Isolator (FI)

Battery Power I/O

Control Bus Out (2)

0.15 Ohms
750.0 uFd

+ 30.0 Vdc & Rtn
+ 5.0 Vdc & Rtn
+ 15.0 Vdc & Rtn
- 15.0 Vdc & Rtn

BSCCM (G)

Power Supply 'A'

BSCCM (H)

Power Supply 'B'

Address Data to Battery 'A'
BSCCM (6 Bits & Rtns)

Battery Monitor Input A & Rtn

Heater On - Battery A-1
Heater On - Battery A-2
Drain Off A

RT Address Data (5 Bits, Parity & Rtns)

Local Data Interface (LDI)

Commands:
A = RBI Close
B = RBI Open
C = Pulse Enable
D = FI Active
E = Heater
F = Heater
G = BSCCM
H = BSCCM
I = DC Current
J = Battery Charge Voltage SP
K = Battery Charge Voltage SP
L = Battery Charge Voltage SP

Dual 1553 Bus

(Last Updated - July 2023)
BCDU Error Signal Control and Interaction

BCDU-3
- Volt Feedback
- Setpoint
- Error Bus
- Closed Charging OR Slave OR Off
- -15V

BCDU-2
- Volt Feedback
- Setpoint
- Error Bus
- Closed Charging OR Slave OR Off
- -15V

BCDU-1
- Volt Feedback
- Setpoint
- Error Bus
- Closed Charging OR Slave OR Off
- -15V

Err
in1

Err
in2

Err
in1

Err
in2

Err
in1

Err
in2
How Error Signal Relates to Power Flow

BCDU Power Stage

130V - 180V Source Voltage

Voltage Setpoint from Host Computer

Outer Voltage Control Loop

(Duty Cycle) * (156V)

70V - 125V Battery Voltage

-0.10 ohms

Duty Cycle

Inner Current Control Loop

Error +2.5

Duty Cycle +.75

-2.5

0

6.5 mV/Amp

4x

6.5 mV/Amp

8x

-1x

Charge Setpoint from Host Computer

Closed When Charging or Slave or Off

1A

-0.95A

-2.5V

-15V

From Other BCDU

-1/8x

To Other BCDUs

-1/8x

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FILE: ERROR-SIG.VSD
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