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USE OF THIS MANUAL

The **Trouble Shooting Guide** in the **VSC 2000 Instruction Manual** should be followed carefully before using this manual to ensure the fault observed is not a fault external to the VSC 2000.

This manual is intended as a guide to finding and repairing faults in the Zener VSC 2000. For the experienced service person it provides all the information necessary to isolate a faulty module and replace it.

This manual does not contain information regarding the repair of faulty modules as we recommend that all faulty modules be returned to Zener Electric or an authorised distributor for repair. This is because each module is complex and in order to be sure they function properly, they must conform to comprehensive test specifications, otherwise further damage could result.

Procedures described in this VSC 2000 service manual should only be performed by qualified personnel who have experience working safely with exposed high voltages and power electronic equipment.

The following pages list faults by their symptoms. It is impossible to list every symptom individually therefore it may be necessary to read the procedures for more than one symptom in order to determine the best course of action.

If you are directed to check a module, refer to the Checking Procedure for that module.

If you need to replace a module, refer to the Replacement Procedure for that module.

EQUIPMENT REQUIRED FOR SERVICING

A digital or analog multimeter with the following ranges:

- AC Volts up to 500 V range

- DC Volts up to 1000 V range

- Resistance 0 to 50,000 ohms ranges

- Diode Test Range

- AC current clamp meter (0 to 1.1 times motor name plate current)

A typically suitable multimeter is a Fluke 77.

A typically suitable clamp meter is a Iso-tech ICM39

An Electronic Insulation Tester (1000Vdc)

Slotted and Phillips head screwdrivers.

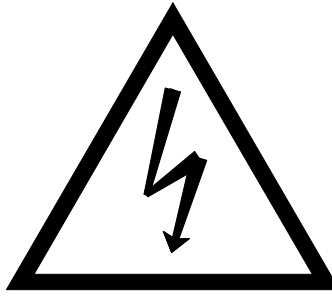
M4 (7mm AF), M5 (8mm AF) and M6 (10mm AF) Socket Drivers.

Appropriate footwear

Face shield or safety glasses

A good working knowledge of these tools is very important.

SAFETY WARNINGS



CAUTION RISK OF
ELECTRIC SHOCK

DANGER

HIGH ENERGY CIRCUITS

For safety, keep covers closed and properly secured or wear face shield if working inside the enclosure with power applied.

The VSC 2000 contains voltage levels in excess of 700 Vdc. Standard electrical safety guidelines are to be adopted at all times when ever AC power is applied to avoid electric shock or damage to the VSC 2000.

Before doing any work inside the VSC 2000, always be sure that the AC power supply is safely disconnected and that the DC Capacitor Modules are fully discharged.

It is essential that all components in the VSC 2000 are installed whenever the AC power supply is connected. **DO NOT OPERATE** the VSC 2000 with any components or modules removed unless directed to do so by the service procedure.

DEFINITION OF TERMS USED IN THIS MANUAL

In order to keep this procedure concise, we have used terms which may be unfamiliar. The following list defines these terms for our service procedure.

DC Bus	Also known as the DC link, this is simply the AC mains input supply rectified and filtered ready for the transistor inverter stage to convert back to a variable frequency, variable voltage AC supply.
Bus Voltage	This is the voltage level of the DC bus as measured on the output transistors . It is approx. 1.41 times the input line-to-line voltage. During motor regeneration (over-hauling loads) the DC Bus Voltage may rise above this nominal level. The Over Voltage protective circuit disables the VSC 2000 if this voltage rises above an internal preset level.
DCCT	Direct Current Current Transformer. This is a current sensing device which is able to sense DC current levels in a conductor, while still maintaining isolation.
Earth leakage	Earth Leakage is detected via the DCCT board. The current transformer senses an imbalance in the current flowing in the 3 output phases. Any imbalance indicates a fault current to Earth.
Input Voltage	The input voltage is the line-to-line voltage between terminals L1-L2, L2-L3, and L1-L3.
PCB	Printed Circuit Board

Frequently you will be asked to measure a voltage on a particular plug, socket or component network. The following definitions apply when measuring values in the VSC 2000.

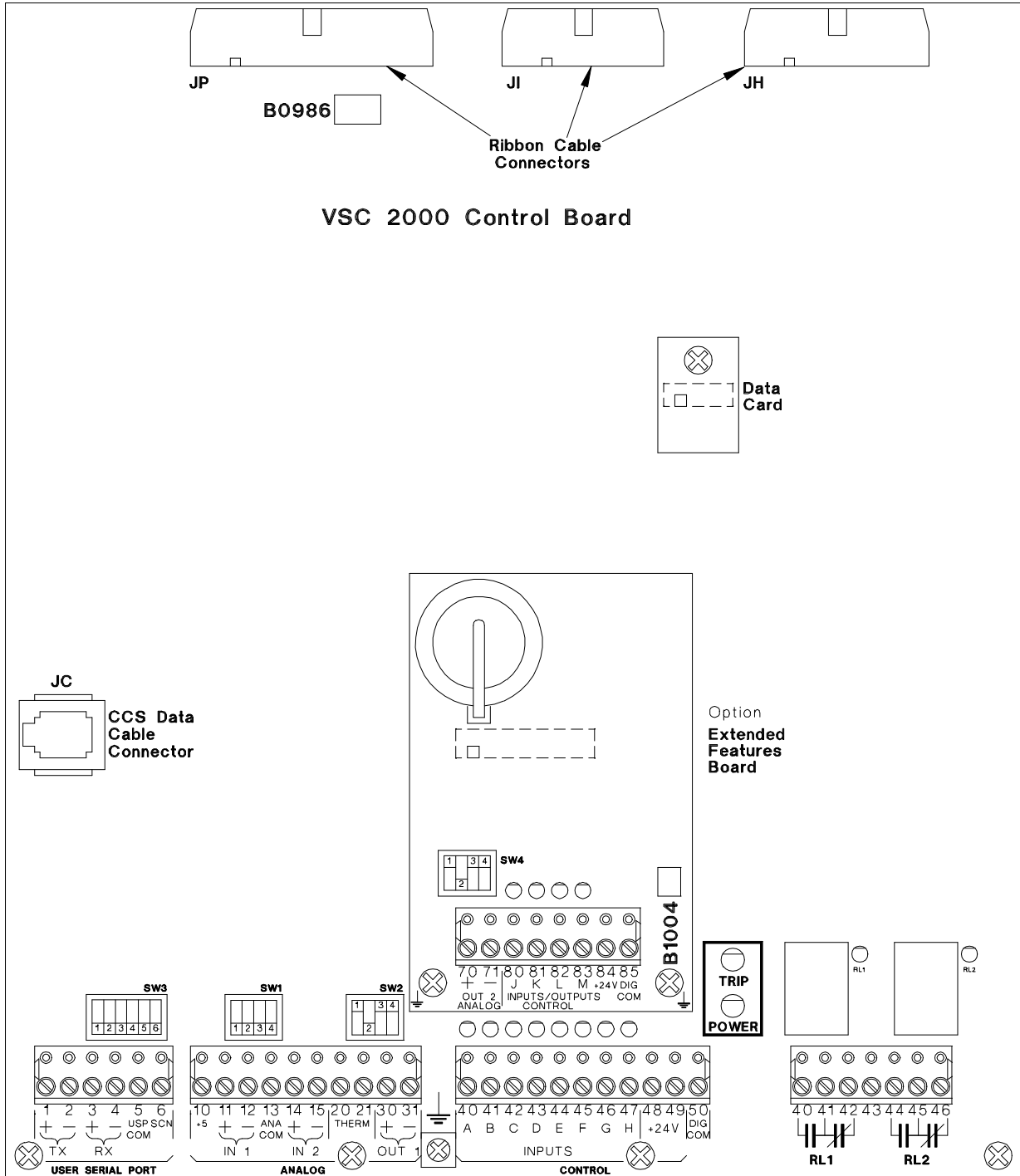
Plug	The part of the connector which is attached to the wires.
Socket	The part of the connector soldered into the PCB.
SIGNAL COM.	Control Board Power Ground. Use the screw head available on top of the Data Card as a convenient ground reference for measurements.
JS	Chassis Resistor connector on Power Interface board.
JF1 thru 5	Fan connectors on Power Interface board
JT1 thru 16	Temperature Sensor connectors on Power Interface board
L1, L2, L3	Supply Line inputs on Power Interface board
M1, M2, M3	Motor Output inputs on Power Interface board
U+/-, V+/-, W+/-	Gate drive output signals on Power Interface board
JI	DCCT Current Feedback connector on Control board.
JC	CCS (Control Station) connector on Control board.

Refer to the VSC 2000 Control Board Layout on page 7 and the Internal Wiring Diagrams at the back of this manual for the location of each of these connectors on the control board.

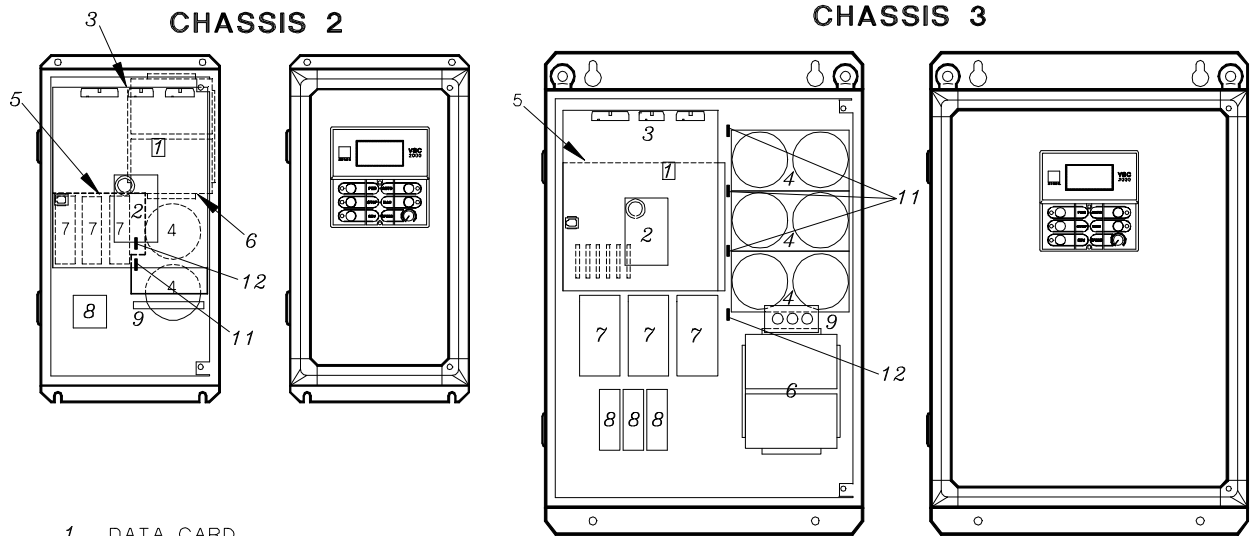
Where the fault finding procedure instructs you to check a module refer to the Checking Procedures at the end of the Fault Finding Procedure section.

When it is necessary to replace a module, refer to the Module Replacement Procedures at the end of this manual.

VSC 2000 Control Board Layout

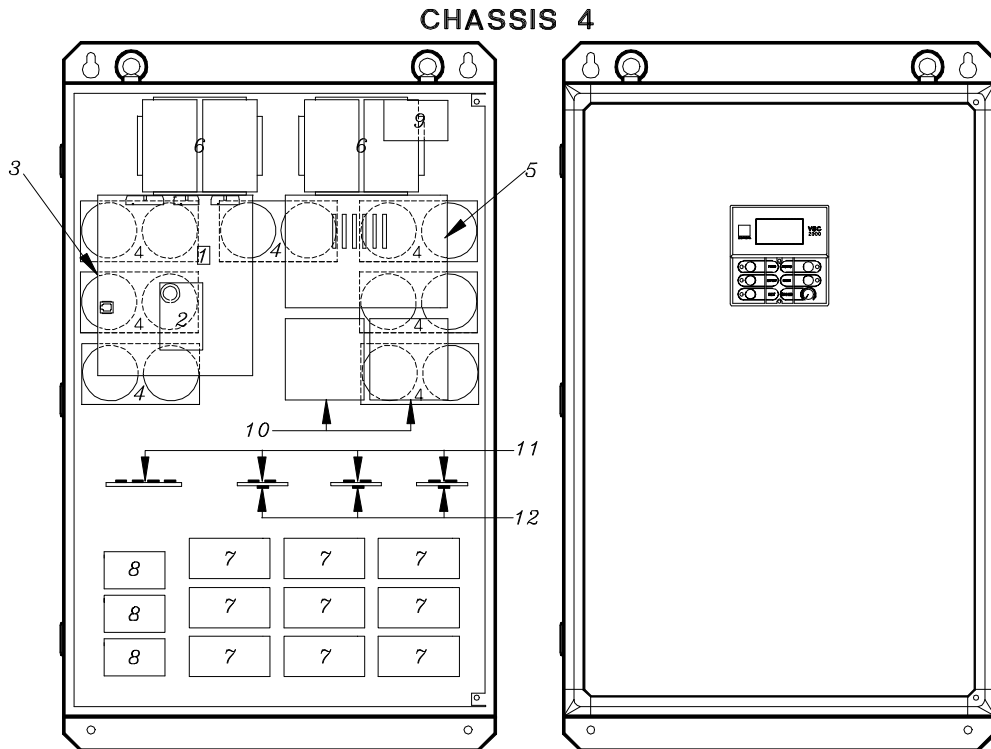


VSC 2000 Module Locations



- 1 DATA CARD
- 2 EXTENDED FEATURE CARD (OPTION)
- 3 CONTROL BOARD
- 4 CAPACITOR MODULES
- 5 POWER INTERFACE BOARD
- 6 DC BUSS CHOKE
- 7 IGBT MODULE
- 8 BRIDGE RECTIFIER
- 9 DCCT BOARD
- 10 SWITCH MODE POWER SUPPLY BOARD
- 11 VOLTAGE SHARING RESISTORS
- 12 SNUBBER RESISTORS

FOR CHASSIS 2 & 3, THE POWER INTERFACE BOARD IS LOCATED UNDER THE CONTROL BOARD.



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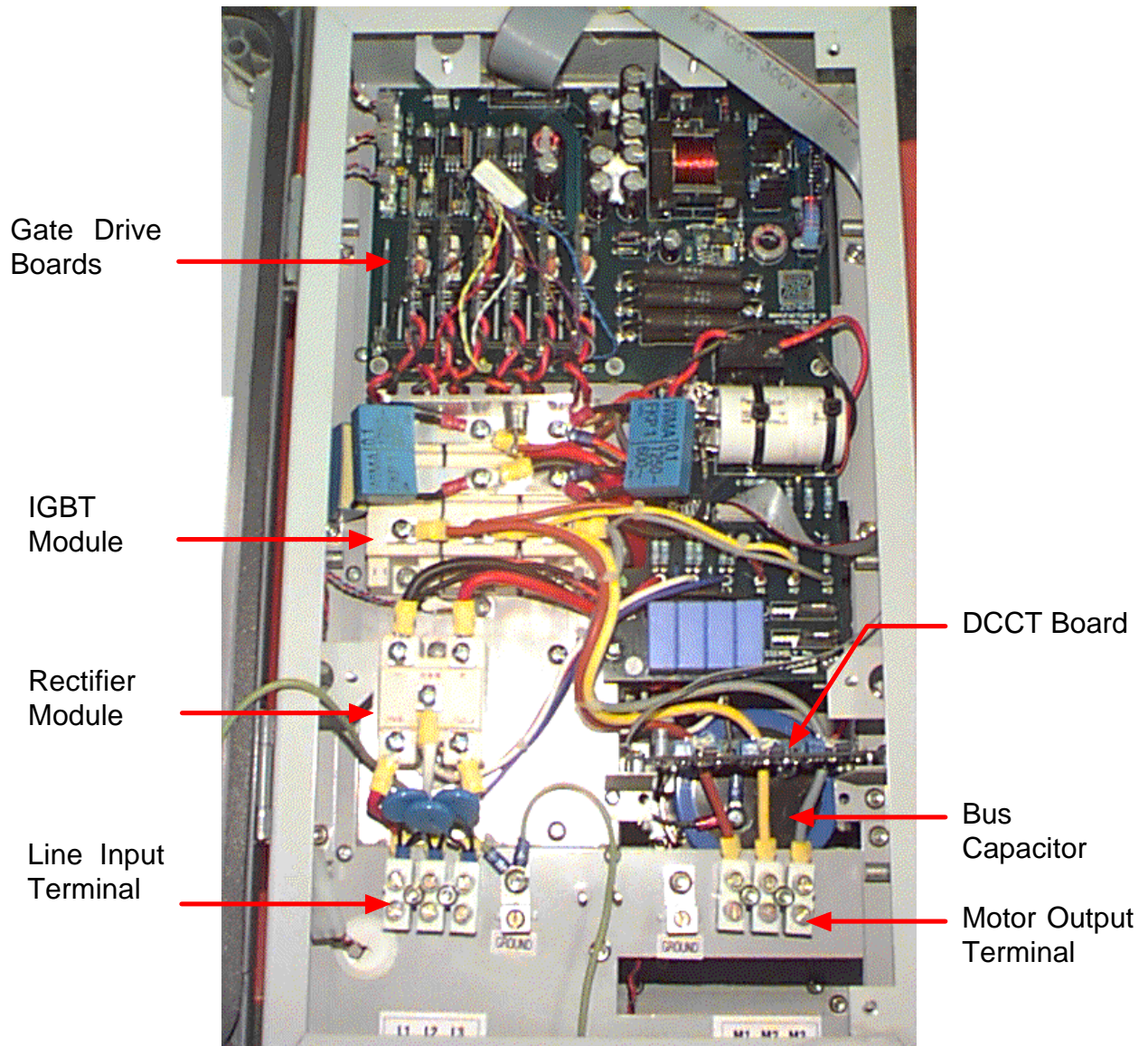


Photo 1: Chassis 2 internal view without control board.

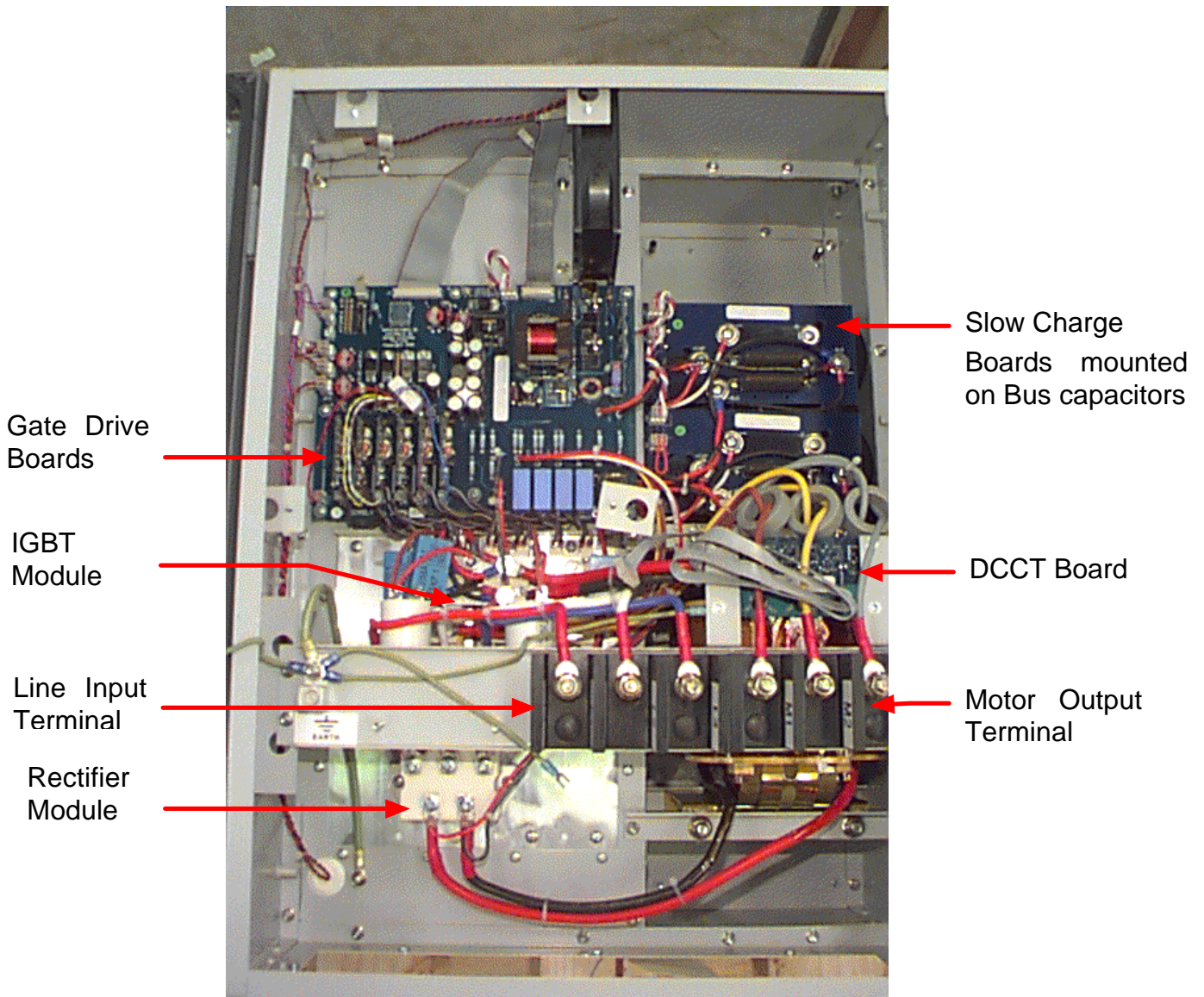


Photo 2: Chassis 3 internal view with control board removed.

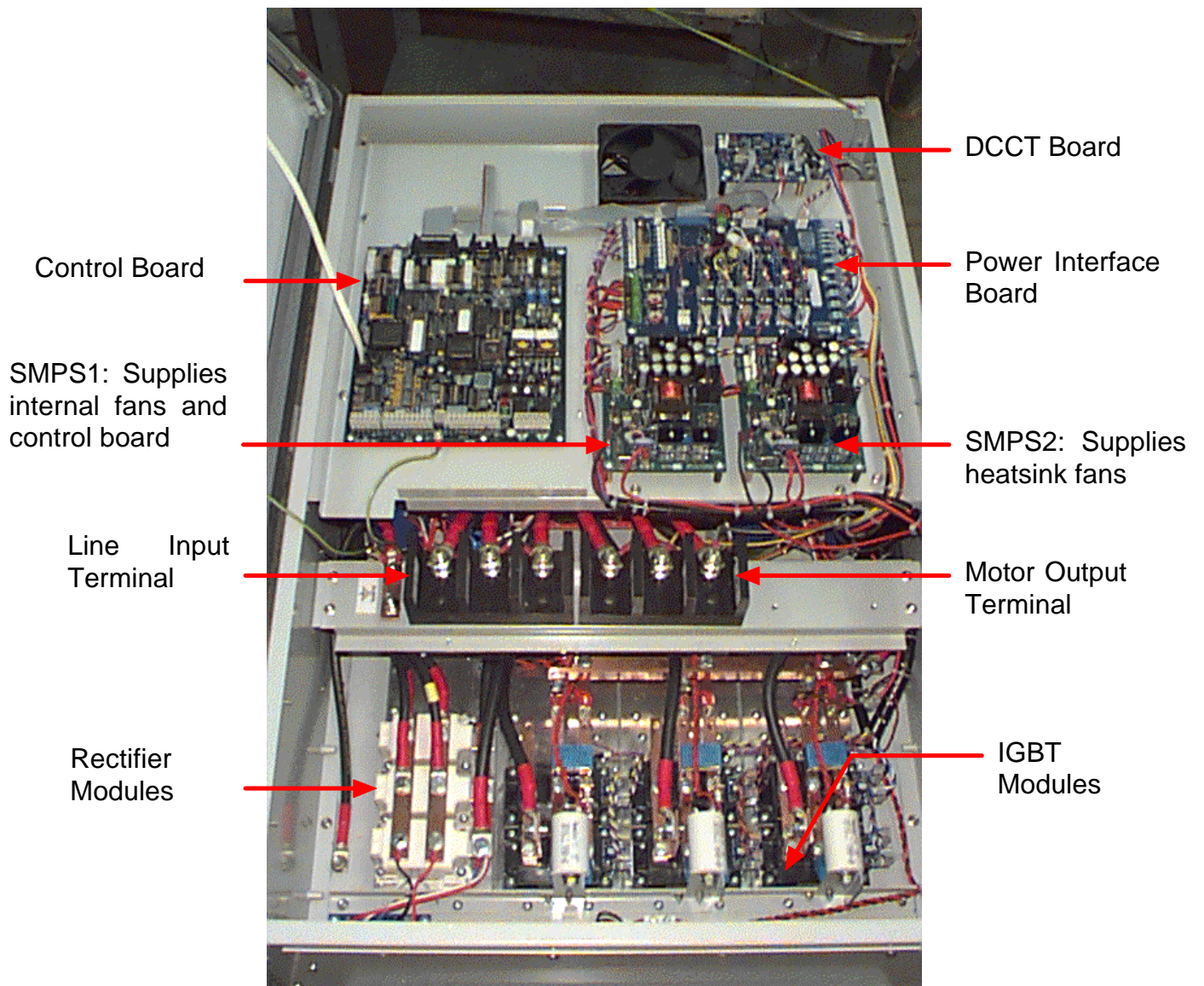
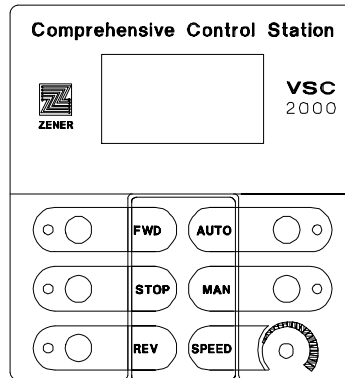


Photo 3: Chassis 4 internal view with covers removed.

SET UP FOR SERVICING

For ease of servicing we recommend that you use the MANUAL mode of operation by pressing the MAN push-button on the CCS front panel. You can then use the FWD and STOP push-buttons and the SPEED pot to operate the VSC 2000 during tests.

Note : To allow Manual operation the enable terminals must be linked (terminals 40 to 48) on Control Inputs.



**CCS front panel with Touch Screen,
Push-Buttons and Speed reference Pot.**

In each step of the service procedures a "Status Line" will be given as shown below:

Power Supply Off VSC Stopped Speed = 0%

It is important that you observe this line and use the settings as indicated throughout the procedure to obtain the correct result at each step.

Power Supply On	Mains AC supply IS connected to L1,L2,L3.
Power Supply Off	Mains AC supply IS NOT connected to L1,L2,L3.
VSC Stopped	Stop LED is ON.
VSC Started	FWD or REV LED is ON.
Speed = 0% to 100%	Setting of speed control potentiometer. 0% = zero speed, Pot Counter Clockwise 100% = full speed, Pot Clockwise

FAULT FINDING PROCEDURES

Over Voltage (also applies to Under Voltage) Trip, when VSC Stopped

Power Supply On VSC Stopped Speed = 0%

A over voltage trip will occur when the DC bus voltage exceeds:

400Vdc on A (240Vac) series controllers

800Vdc on G (480Vac) series controllers

1000Vdc on J (600Vac) series controllers

Check Supply Voltage

- Measure the Input Voltage at L1, L2, L3 and check that it is within the nameplate voltage specification of the VSC 2000.

If Ok check internal causes:

Check input/bus voltage sensing as follows:

- From the CCS menu select Meter Readouts
- Check the DC bus voltage reading, Vdc. It should be approx. 1.4 x Input voltage.
- If not measure the DC Bus voltage on the DC bus bars on the Output IGBTs. It should be approx. 1.4 x Input voltage. If the DC bus voltage is wrong, check the Input Rectifiers.
- If the CCS reading is wrong do the following checks:
- Measure the voltage at pin 7 on IC 55 on the Control Board with respect to the SIGNAL COMMON on the Control board. (See Definition of Terms).
- This should equal the measured DC bus V/ 100 for A series (240Vac) controllers.
V/ 200 for G series (480Vac) controllers.
V/ 250 for J series (600Vac) controllers.

If not, check the Power Interface board and it's wiring for damage and replace it if necessary.

- If the voltage at PIN 7 is correct, replace the Control Board following the procedure "Control Board replacement".

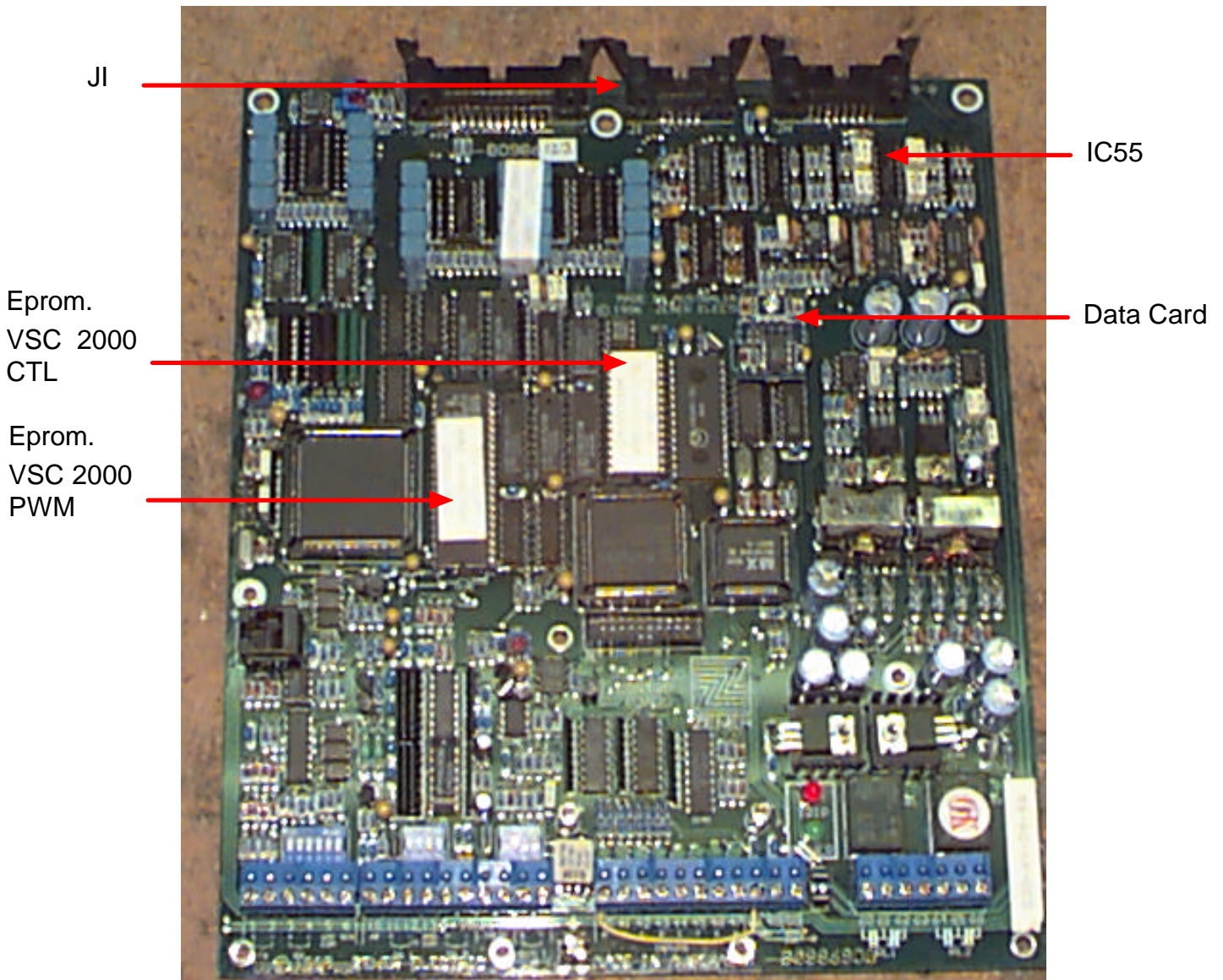


Photo 4: VSC 2000 Control Board.

Over Voltage Trip when VSC Enabled

Power Supply Off VSC Stopped Speed = 0%

Check the DC bus smoothing circuit:

- Locate the Capacitor Module(s) and the slow charge relay(s) on them. If the VSC 2000 is a chassis 2 size, the slow charge relays are located on the Power Interface board.
- Turn on the AC Power Supply and check that ALL the relays energise approximately 2 seconds after power is applied.
- Check relays are energised by measuring for closure of the relay contacts with the multimeter, ie zero volts across the relay contacts (terminals Bus+ and Cap+).

If any of the relays do not energise replace the Cap Charge board (power interface board on chassis 2) immediately or further damage may result.

Under Voltage Trip

Power Supply On VSC Stopped Speed = 0%

Under voltage trips will occur when the DC bus voltage falls below:

239Vdc for A (240Vac) series controllers

397Vdc for G (480Vac) series controllers

505Vdc for J (660Vac) series controllers

- Follow the procedure "Over Voltage trip".

Over Current Trip on Power Up.

Power Supply On VSC Stopped Speed = 0%

The over current trip circuit consists of the control card and DCCT board. This trip will normally occur when excessive current to the motor is sensed.

Whenever the controller (hence the transistor gate drivers) is disabled no motor current should flow. If an over current occurs in this state:

- Select *Meter Readouts* from the CCS menu and check the Amps which should be zero. If not follow the procedure "Checking the DCCT board".
- If the DCCT voltages are correct replace the Control board.

Over Current Trip when VSC Enabled.

Power Supply On VSC Started Speed > 0%

Check the VSC 2000 output for voltage balance:

Power-down the VSC 2000 and disconnect motor wiring from terminals M1, M2, M3.

Power-up the VSC, enable and run at 100% speed.

If the VSC 2000 trips:

- Follow the procedure "Checking the DCCT board".
- If the DCCT board tests to be OK, replace the Control board.

If it does not trip, measure M1, M2, M3 for voltage balance.

If out of balance:

- Follow the procedure "Checking the IGBT Modules".
- Follow the procedure "Checking the Input Rectifier Modules".
- If all are OK replace the Power Interface board.

If outputs are not out of balance:

- With VSC disabled select **METER READOUTS** on the CCS and **Amps** reading which should be zero.
- If not, follow the procedure "Checking the DCCT board".
- If the VSC 2000 still trips, replace the Control board.

Early Current Limit

The Current Limit setpoint is customer adjustable. If the VSC 2000 displays early current limit, ensure the correct motor settings are entered in the VSC 2000 and the motor is within the specified range for the size of VSC 2000 controller used. This is typically from 0.5 to 1.5 times the controller's continuous rated current.

Early current limit may be caused by any of the following:

- Check input voltage on L1, L2, L3 for balance +/- 3%.
- Check output current on M1, M2, M3 for balance. If out of balance follow the procedure "Checking Output Imbalance".
- Select *Meter Readouts* on the CCS. If the Amps reading does not agree with measured motor current readings then follow the procedures to "Checking the Input Rectifier Modules" and "Checking the Capacitor Modules".
- Follow the procedure "Checking the DCCT board".

Ground Fault Trip

Power Supply Off VSC Stopped Speed = 0%

The ground fault circuit is located on the Control board and DCCT board. The sum of all three motor currents at any one instant (as sensed by the DCCT) will be zero unless there is a ground fault.

- Disconnect the motor from the motor output terminals M1, M2, M3. Use an Insulation Tester (1000 V) to check the motor cables and the motor insulation to ground (earth).
- Follow the procedure "Checking the DCCT board".
- If the VSC 2000 still trips on Ground Fault replace the Control board.

Note: Variable Speed Drives with excessive motor cable lengths may have ground fault trips due to the capacitance of the motor cabling. Due to the high switching frequencies in the output voltage waveform, the motor cable capacitance causes some current to flow to earth and this may result in ground fault trips with longer (>40m) cables. This can be reduced by selecting the lowest **AUDIBLE FREQUENCY** of 2 kHz for output switching frequency, or if necessary by fitting chokes on the output to reduce the dV/dt of the power waveform.

This phenomenon can also disrupt the operation of external earth leakage devices.

Over Temperature Trip

Power Supply On VSC Stopped Speed = 0%

The over temperature trip circuit consists of the Power Interface board and Temperature Sensors located on each heatsink.

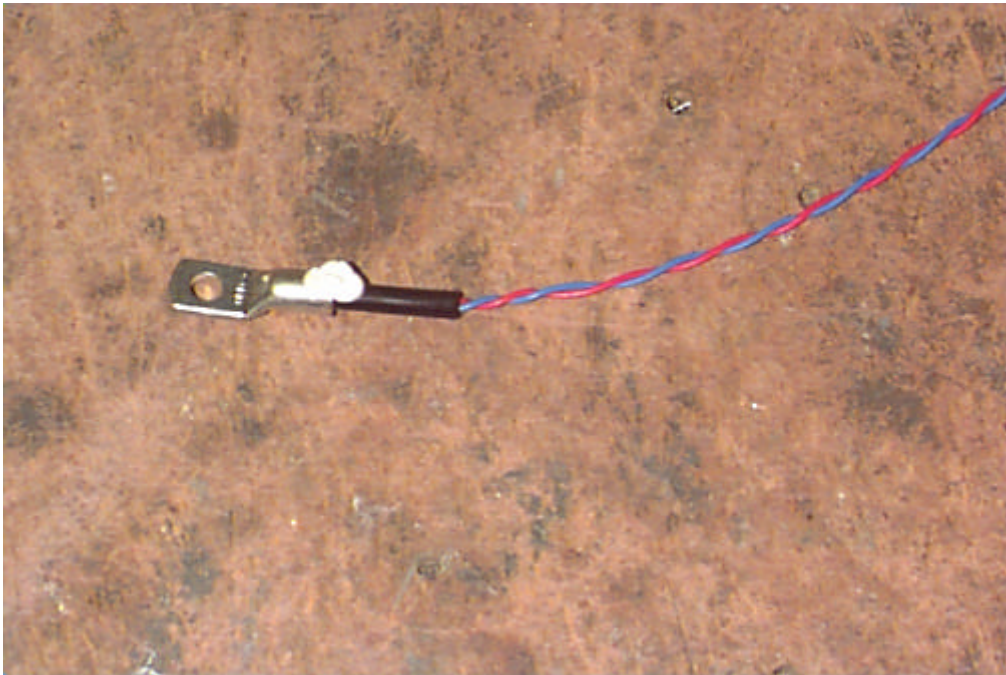


Photo 5: VSC 2000 Temperature Sensor.

- Check that all the fans, external and internal, are operating properly and that the vents and heatsinks openings are not blocked with any foreign matter. If the VSC 2000 is in an enclosure, check all filters and grills for blockages and check that the enclosure fan(s) (if fitted) are operating.
- Each fan in the VSC 2000 can be tested via the CCS using the *Service* menu as described in the **VSC 2000 User's Manual**. Turn the fans on via the CCS to confirm operation. Replace any non-operable fans, or fans that are noisy or not running at full speed.
- Use the CCS **THERMAL DISPLAY** menu to check the temperatures registered by of each of the sensors. The heatsink temperature trip point is 90 °C. If any sensor is showing 127 °C then it is faulty and should be replaced.

Charge Relay Fault

The Slow Charge Relay is located on the Power Interface board on chassis 2 controllers or on the Slow Charge boards for all other controllers.

- Follow the procedure "Checking the Capacitor Modules", if OK replace power interface card.

Fuses Blow On Application of Input Power

This indicates an excessive current draw on power up which may be caused by an internal short circuit or damaged slow charge circuit.

- Follow the procedure "Checking the Input Rectifier" and replace as necessary.
- Follow the procedure "Checking the IGBT" and replace as necessary.

If there is any damage to the transistor module(s) then the Power Interface board must be replaced as a precautionary measure.

- Follow the procedure "Checking the Capacitor Modules" and replace as necessary.

Problems with the CCS

- Ensure that the EPROM in the CCS is the correct revision level to suit those in the Control board. Refer to Application note IM 10005.
- If the CCS is flashing replace the CCS. If the CCS continues to flash replace the Control board.
- If the CCS is blank check the +24 volt supply (located on customer terminal strip).
- If the +24 volt on the Control board is OK, check the CCS cable, if OK replace the CCS.
- If the 24 volt supply is not present, replace the Power Interface board for chassis 2 and 3, or the Power Supply board (SMPS 1) in chassis 4.

CHECKING THE DCCT BOARD

The Direct Current Current Transformer (DCCT) is used to sense motor current.

Measure the current feedback signals from the DCCT at J1 on the on the Control board. With respect to SIGNAL COMMON, J1 pins 5,7,9 on the right hand most side at the back of the connector should each be 2.5 V +/- 0.1 V dc.

If not, replace the DCCT board.

CHECKING OUTPUT IMBALANCE

Output imbalance trip indicates motor current and/or voltage is out of balance.

- Check motor current balance (within 10%).
- Check motor voltage balance (motor connected or disconnected).

If the output voltage balance is OK:

- Follow the procedure "Checking the DCCT".

If voltage is balanced and currents are not check motor cables and windings.

If unable to check motor current and voltage balance due to "Output Imbalance Trip".

- Power down the VSC 2000 and disconnect the motor.
- Power up and enable the VSC 2000 and run to 50hz. Measure M1, M2, M3 for voltage balance.

If out of balance by more than 5%:

- Follow the procedure "Checking the IGBT Modules".
- Replace the Power Interface Board.
- Follow the procedure "Checking the Input Rectifier Module".

CHECKING THE CAPACITOR MODULES

The DC bus capacitors are used to smooth ripple on the DC bus. This configuration incorporates a slow charge circuit used on "power up" and capacitor voltage share resistors. The voltage share resistors are also used to discharge the DC bus capacitors.

WARNING - IF THE CAPACITOR MODULE'S DISCHARGE CIRCUIT HAS FAILED, THE VOLTAGE ON THE CAPACITORS WILL NOT DISCHARGE TO A SAFE LEVEL.
IF THERE IS MORE THAN ONE CAPACITOR MODULE IN THE VSC 2000, MEASURE THE VOLTAGE ON EACH ONE TO BE SURE THAT THEY HAVE ALL DISCHARGED BEFORE DOING ANY WORK INSIDE THE VSC 2000.

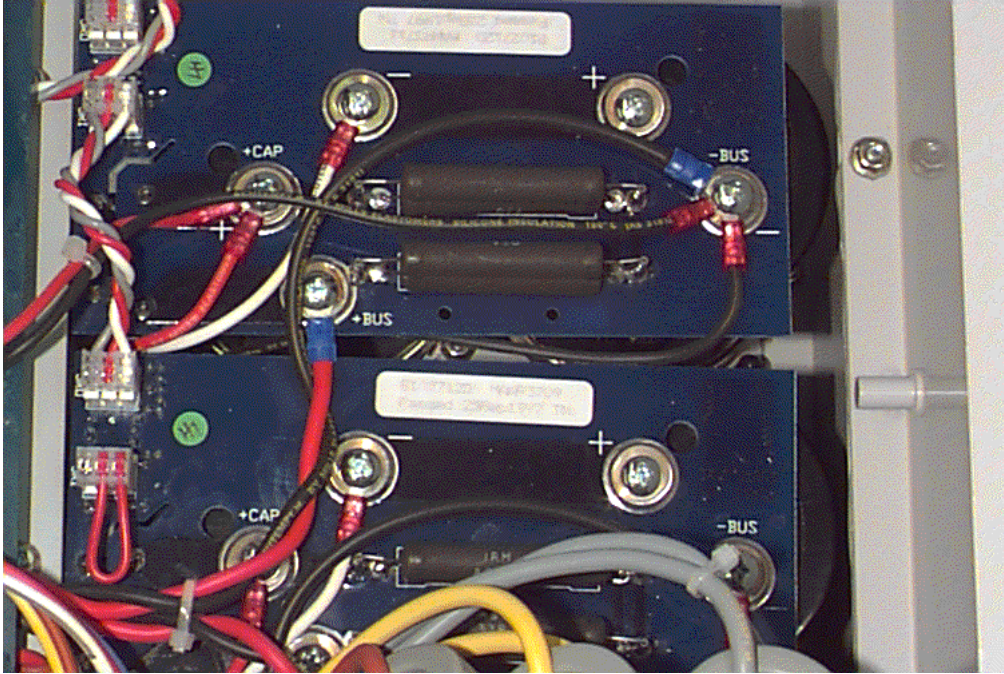


Photo 6: Chassis 3 slow charge card on bus capacitors.

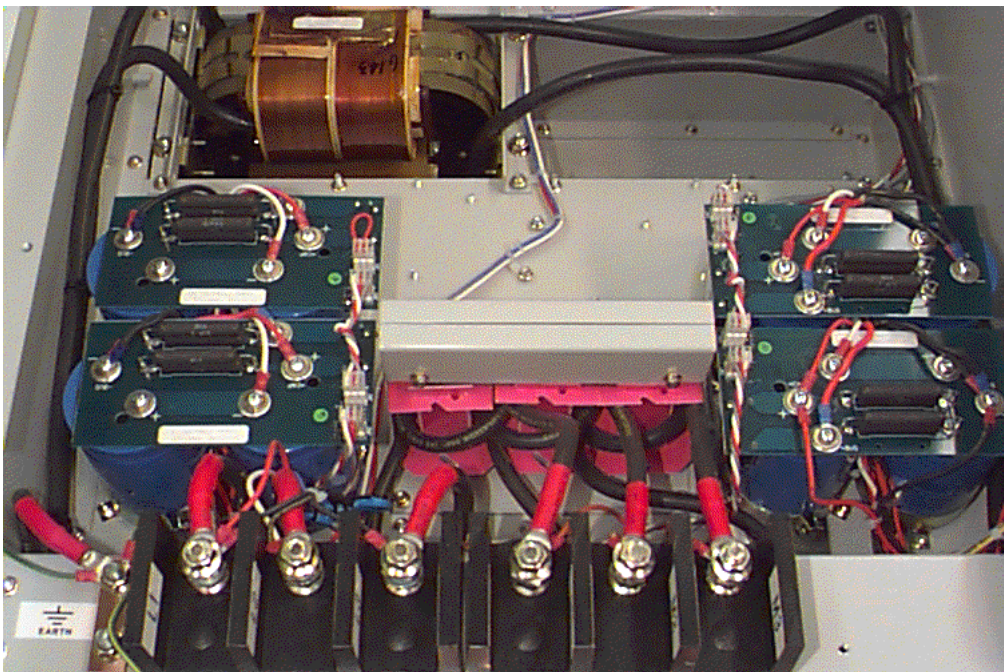


Photo 7: Chassis 4 slow charge cards and bus capacitors.

Power Supply Off VSC Stopped Speed = 0%

Checking the DC buss capacitors and their voltage sharing:

- Use diode test range on your meter to ensure there is not a short circuit across DC buss capacitors (+CAP to - and + to -BUS) and the reading steadily increases till an open circuit is indicated.
- Check DC bus capacitor voltage sharing:
- Measure the voltages across capacitor terminals (+CAP to - and + to -BUS) on the slow charge card and ensure readings are within +/- 10% of each other.

If sharing is not correct check voltage share resistors (20k ohm) and replace as required.

If voltage share resistors are OK replace DC bus capacitors following the procedure "Replacement of Capacitor Modules".

Checking the slow charge circuit:

- Make sure the small plug-in connector is secured in it's socket on each of the modules and that all wiring to each module is properly connected.
- Measure the resistance of the slow charge resistors on each of the modules between terminals Bus + and Cap +. They should be 33 ohms if not replace the slow charge card.

Approximately 2 seconds after power up the voltage measured across Bus + and CAP+ should be zero, if not replace the slow charge card.

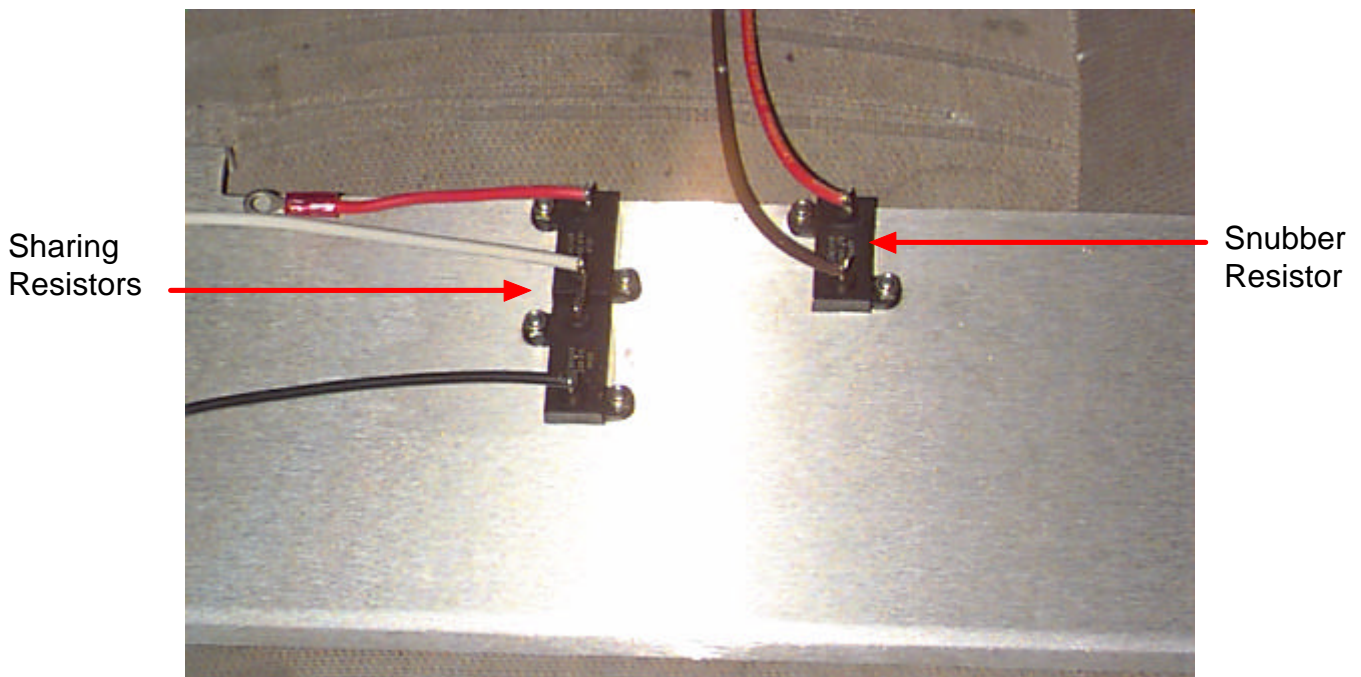
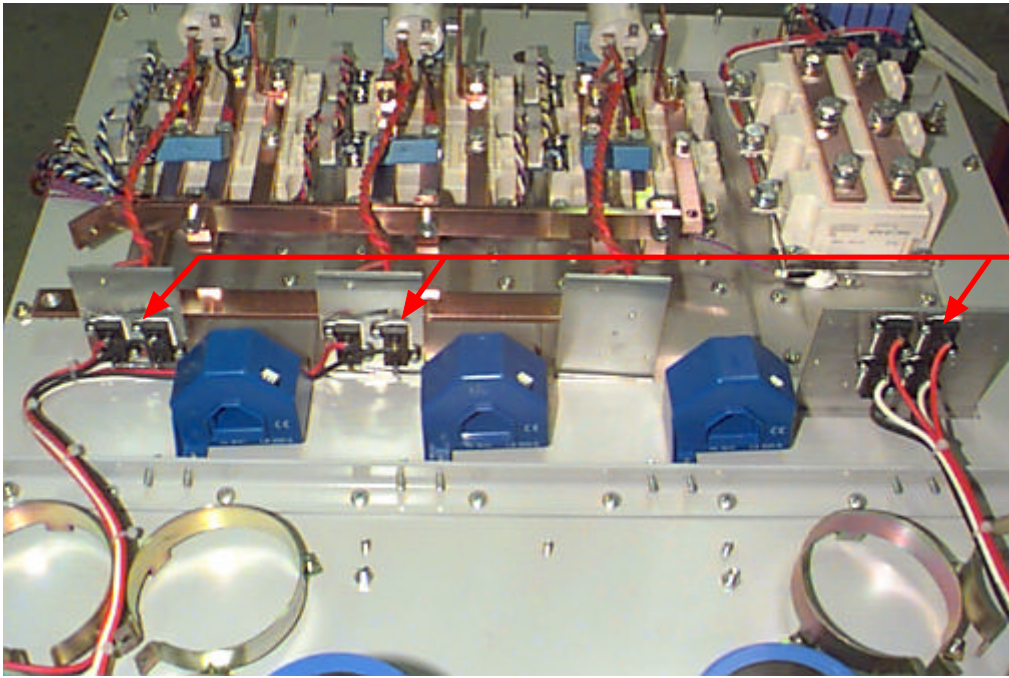


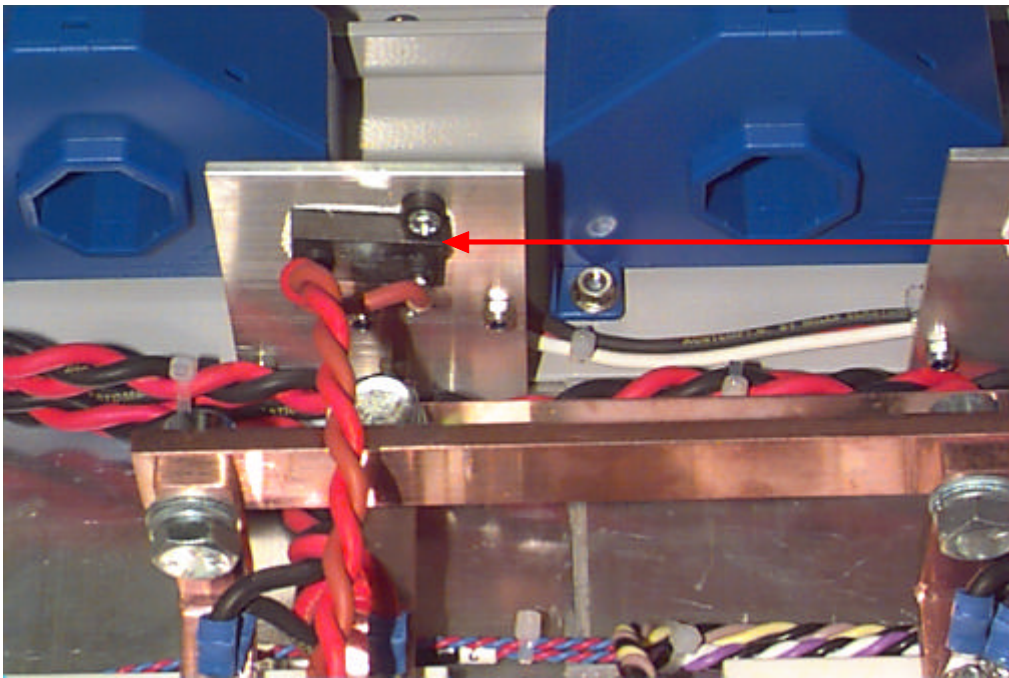
Photo 8: Chassis 2 Sharing and Snubber resistors.

Not:e: Chassis 3 has the same layout of resistors but a greater quantity.



Sharing Resistors

Photo 9: Chassis 4 Sharing resistors



Snubber Resistor

Photo 10: Chassis 4 Snubber resistor

CHECKING THE IGBT MODULES

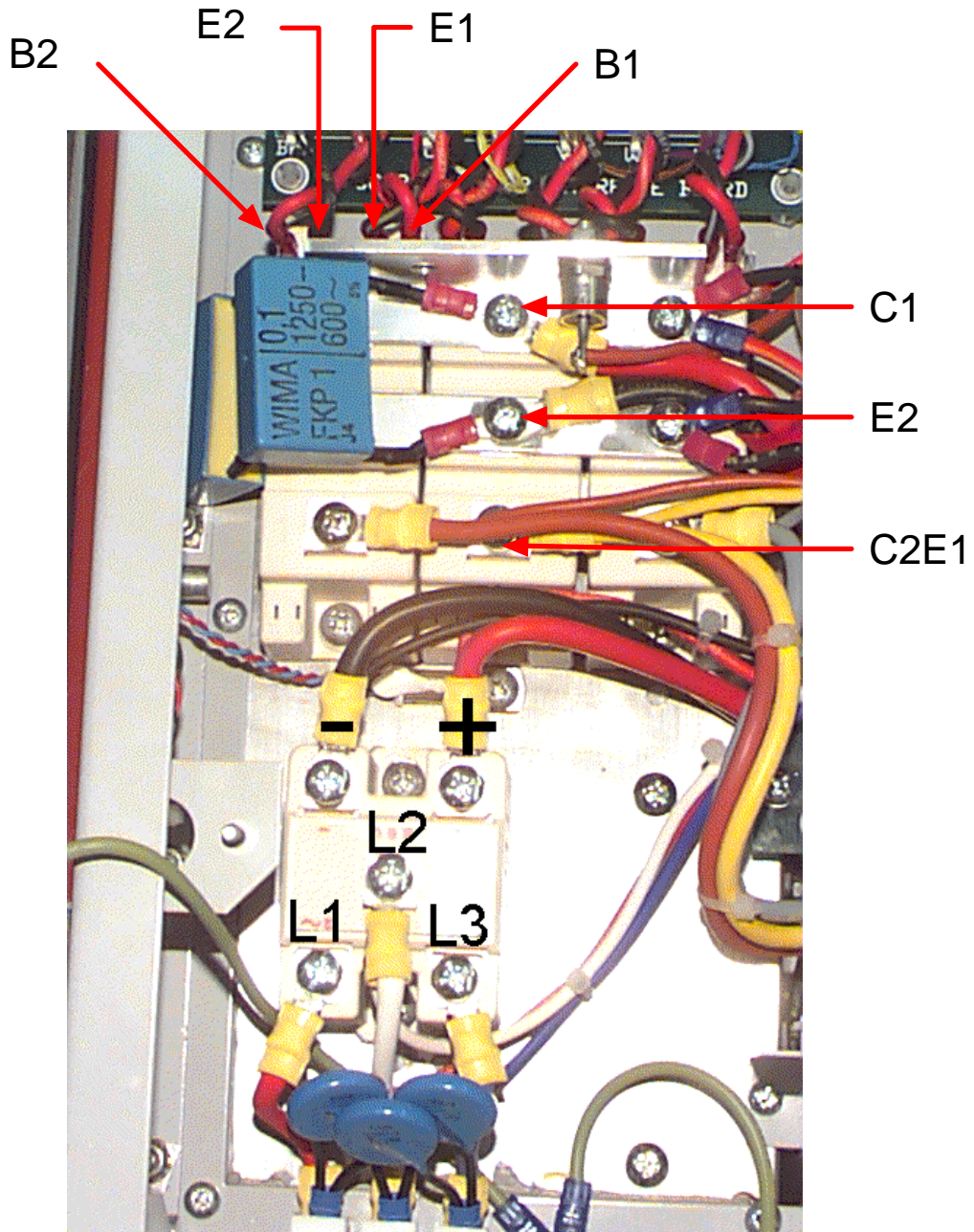


Photo 11: Chassis 2 IGBT and Rectifier terminals.

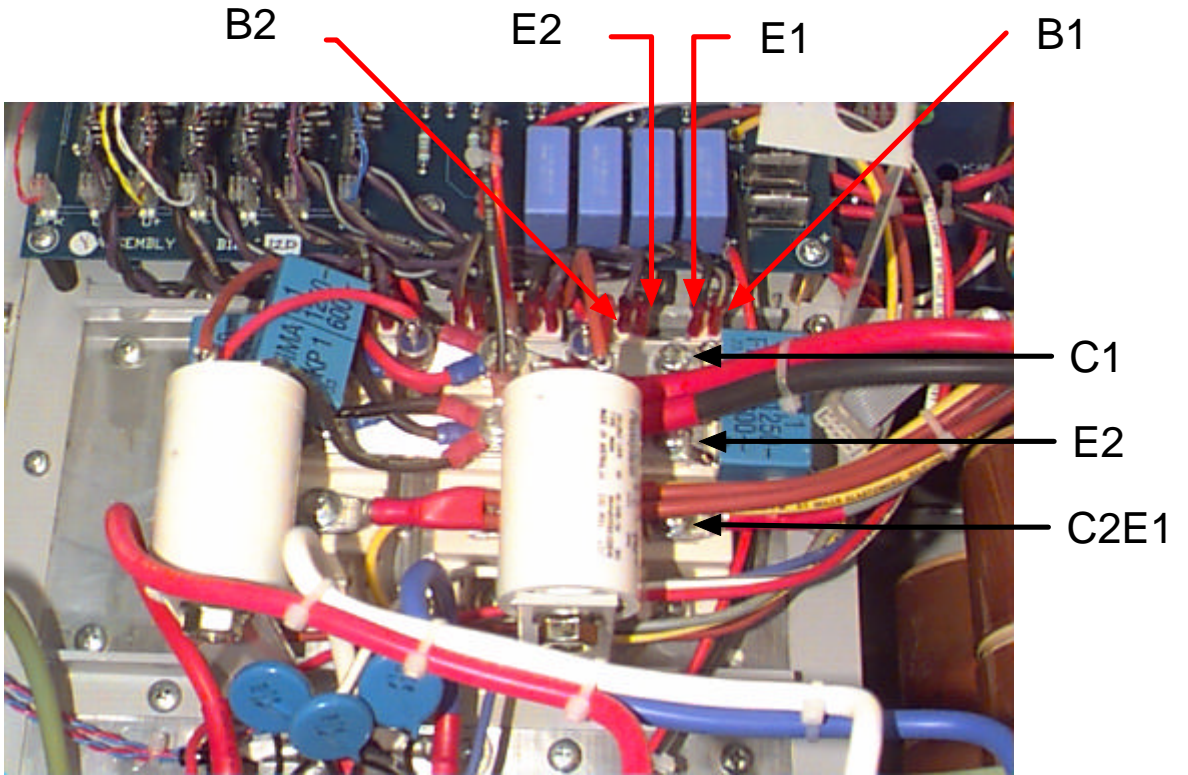


Photo 12: Chassis 3 IGBT terminals.

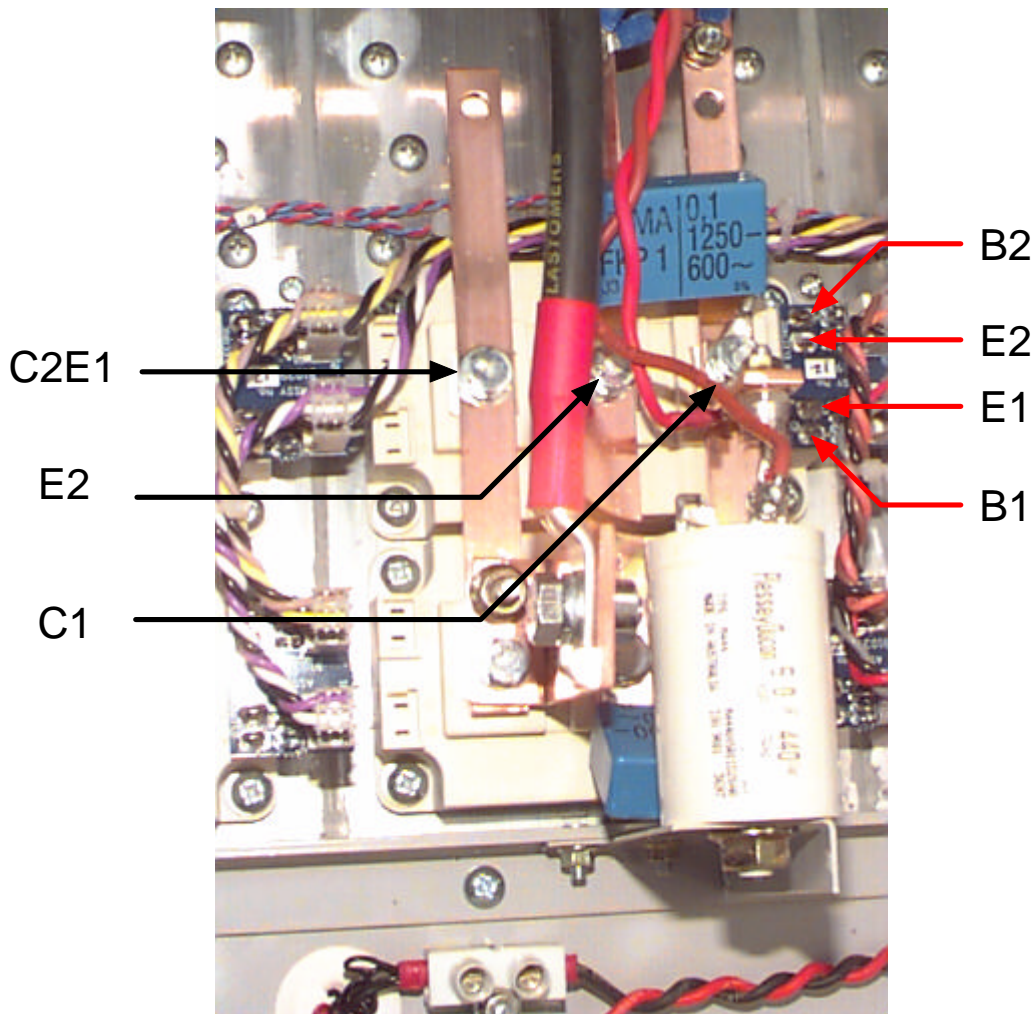


Photo 13: Chassis 4 IGBT terminals.

Note: Each IGBT has the same type of terminal.

CHECKING THE INPUT RECTIFIER MODULE

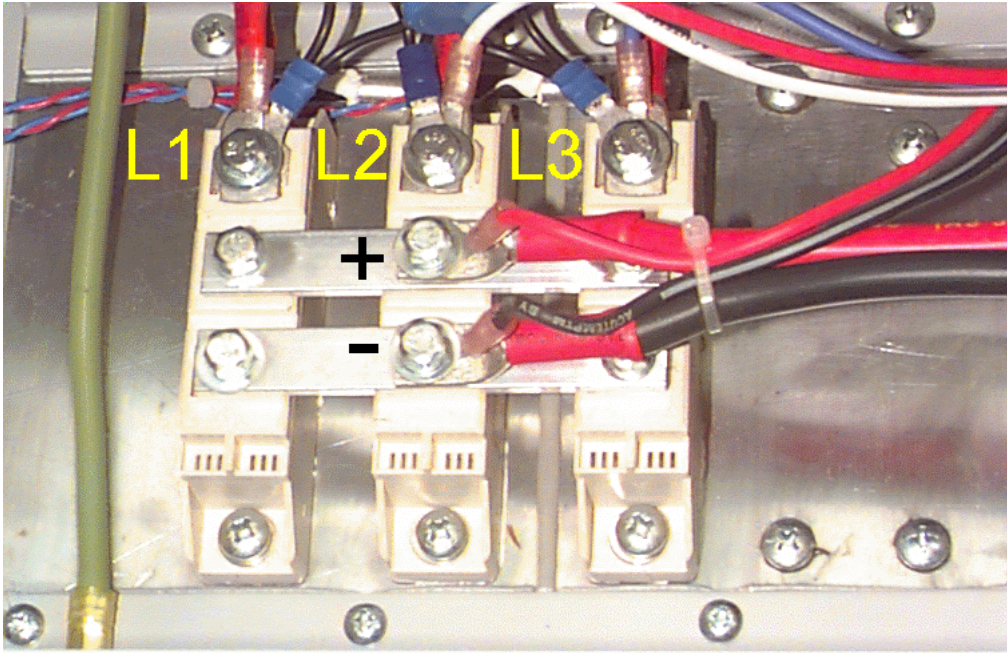


Photo 14: Chassis 3 rectifier module. First type.

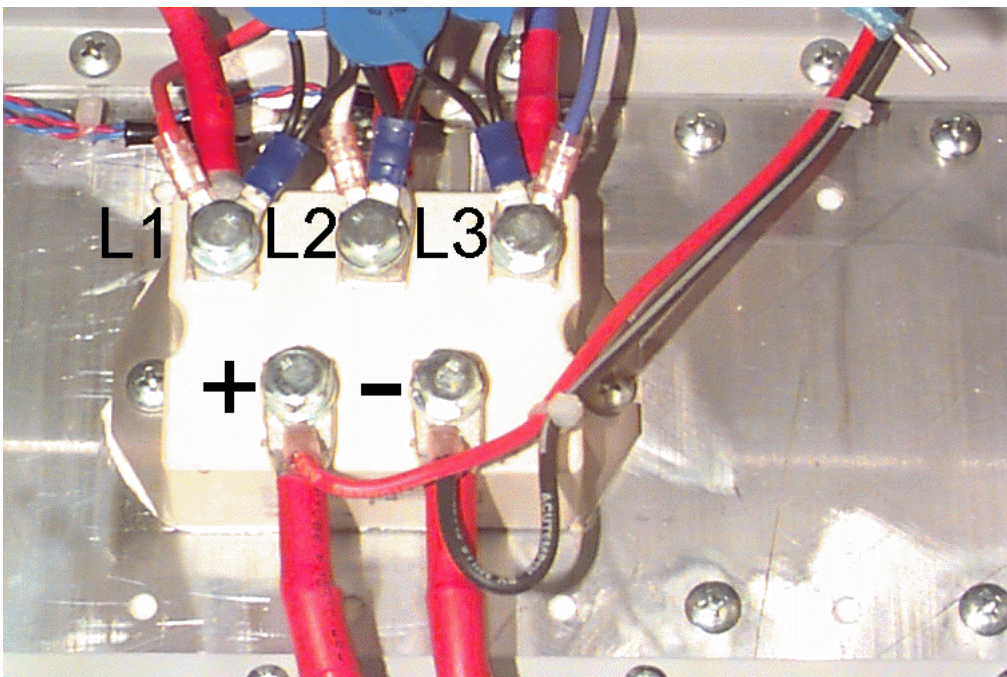


Photo 15: Chassis 3 rectifier module. Second type.

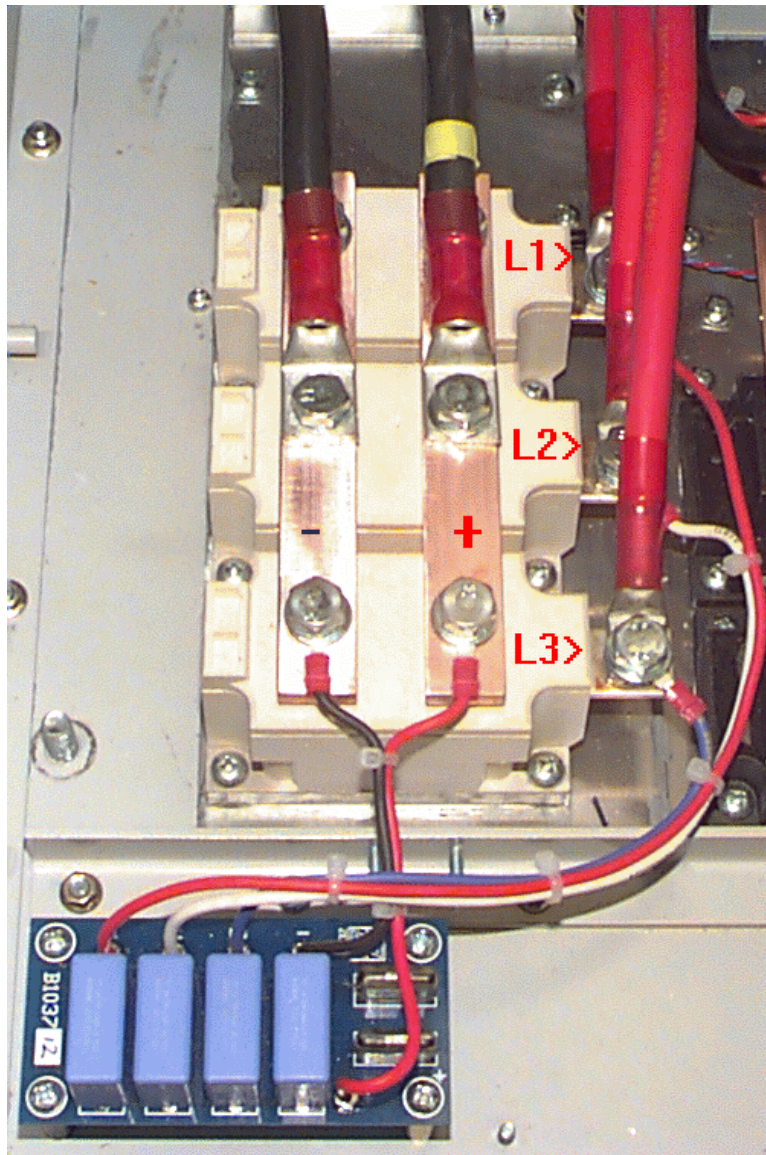


Photo 16 Chassis 4 rectifier module.

For the diode tests on the bridge rectifier modules, we have defined the "Red" and "Black" leads of the multi-meter as described below.

"Red Lead" Source of conventional current or positive lead
 "Black Lead" Sink of conventional current or negative lead

Power Supply Off VSC Stopped Speed = 0%

Note the connections to bridge rectifier module, then remove the +ve DC bus wiring from it. Set the multimeter to the diode test range and measure between each of the terminals shown in the table below. If the result of each test is not as shown, then the bridge rectifier module must be replaced.

Red Lead	Black Lead	Result	
+	-	Open Circuit	Charging Caps.
-	+	approx. 0.80 Vdc	(2 diode drops)
+	L1, L2, L3	Open Circuit	
L1, L2, L3	+	approx. 0.40 Vdc	(1 diode drop)
-	L1, L2, L3	approx. 0.40 Vdc	(1 diode drop)
L1, L2, L3	-	Open Circuit	

REPLACEMENT OF CAPACITOR MODULES

Power Supply Off VSC Stopped Speed = 0%

Disconnect the power supply from the VSC 2000 input terminals.

A cap module is made up of: 2 x high voltage DC bus capacitors;

1 x capacitor slow charge card

2 x capacitor voltage share resistors (20k ohms).

Note: For Chassis 2, a Capacitor Charge board is not used as the slow charge circuit is located on the Power Interface board.

- Make a note of where each wire connects to the module so that you can replace it properly.
- Disconnect the Cap + and Cap - wires and remove the Cap Charge board.

CHECK ALL WIRING CAREFULLY BEFORE APPLYING INPUT POWER OR IGBT MODULE DAMAGE MAY RESULT.

DCCT BOARD REPLACEMENT PROCEDURE

Power Supply Off VSC Stopped Speed = 0%

VSC 2000 controllers fitted with B1007xx DCCT cards:

- These cards and wiring are a calibrated sub assembly which MUST be replaced in its entirety. Make a note of the wiring connections before removing the existing wiring and DCCT board.

Remove wiring and DCCT subassembly and replace with the new one, reconnecting as before. This completes the installation of the new DCCT.

VSC 2000 controllers fitted with L.E.M. DC current sensing devices (chassis 4 and up):

- DCCT card B1040xx is a plug in replacement.

SENSOR WIRING REPLACEMENT PROCEDURE

Power Supply Off VSC Stopped Speed = 0%

The Sensor Wiring consists of the temperature sensors - connector JT.

Carefully observe the location, mounting and connection of the sensing wires.

- Remove the Temperature Sensor by withdrawing it out from lug holding it to the heatsink and unplug the connector JT from the Power Interface board.
- Remove the bus sensing wires, noting carefully where they connect.

Now the old Sensor Wiring may be removed.

Fit the new Sensor in reverse to the removal procedure. Ensure segregation from High Voltage circuits is maintained. This completes the replacement of the Sensor Wiring.

CONTROL BOARD REPLACEMENT PROCEDURE

Power Supply Off VSC Stopped Speed = 0%

- Remove all the plugs, earth wire and terminal strips from the control board with all the field wiring still in place in the terminal strip.
- Remove the two EPROMS and the data card.
- Remove all ten mounting screws from the control board.

Fit new control card in reverse procedure.

CHECK THAT ALL THE TERMINALS AND EPROMS HAVE BEEN RE-INSERTED PROPERLY. MAKE SURE NONE OF THEM ARE DISPLACED BY ONE PIN.

POWER INTERFACE BOARD REPLACEMENT PROCEDURE

Power Supply Off VSC Stopped Speed = 0%

Ensure the power interface board is replaced with a board of identical assembly number to the original.

- Note carefully the wiring colour codes and their points of connection as there is quite a number of connections to be handled in replacing the board.
- When board replacement is completed, check all the new connections against the notes you made to ensure they are all correct.

INPUT RECTIFIER REPLACEMENT PROCEDURE

Power Supply Off VSC Stopped Speed = 0%

Note carefully the orientation of the rectifier module(s) on the heatsink. Also note the connections to the module.

- Remove the mounting screw(s) from the module and lift it from the heatsink.
- Apply a light smear of heatsink grease to the base of the new module and place it on the heatsink in the same position as the old module.
- Replace the mounting screw(s) and re-connect the wires carefully.

IGBT MODULE REPLACEMENT PROCEDURE

Power Supply Off VSC Stopped Speed = 0%

Before removing the old IGBT module, make a note of all the connections to it. Pay careful attention to the connection of the Gate Drive wires.

Chassis 2 : IGBT's have a zener diode soldered across Gate/Emitter.

Chassis 3 : IGBT's have a zener diode soldered across Gate/Emitter.

Chassis 4 : the gate drives are connected via small printed circuit boards mounted on top of the IGBT.

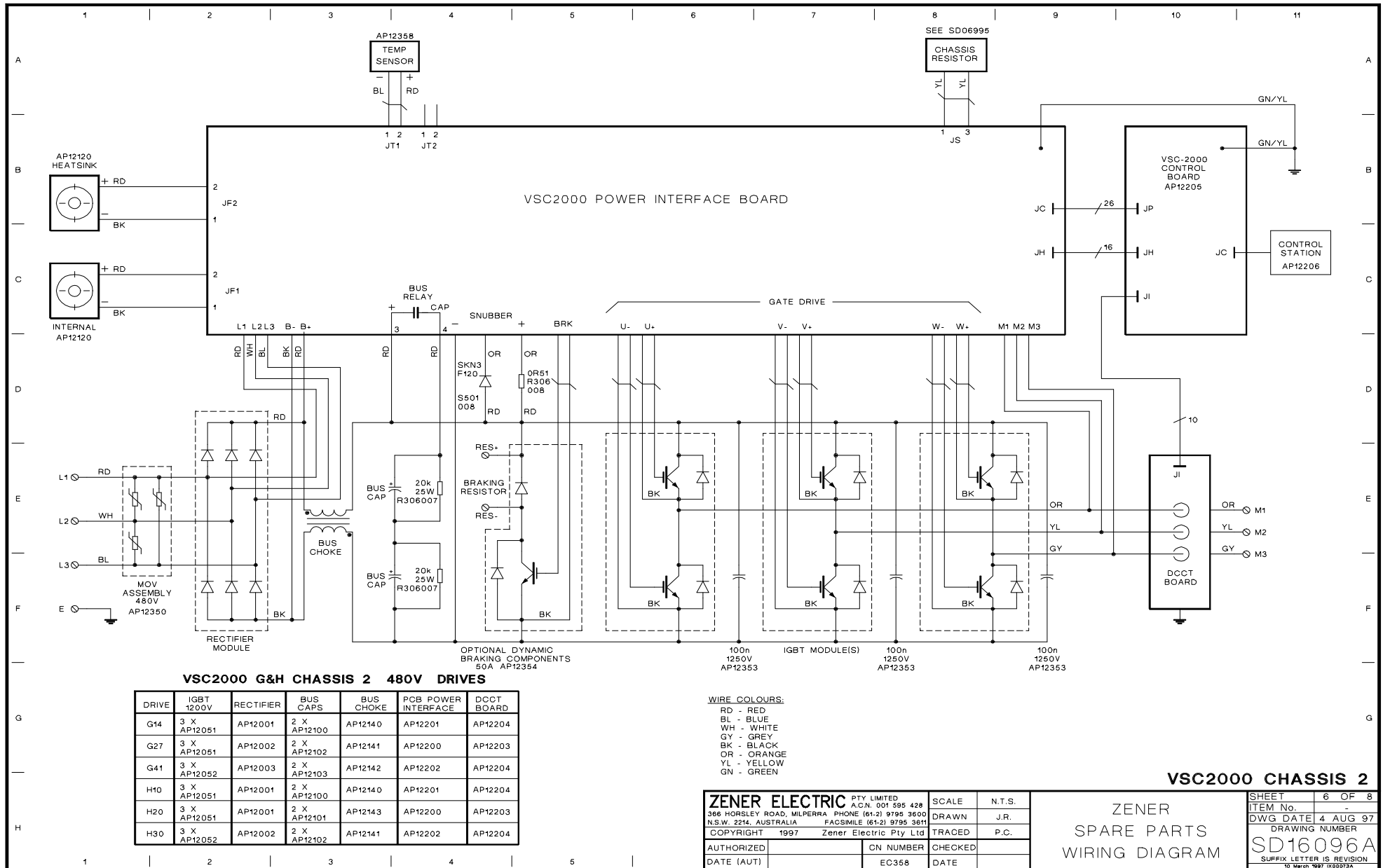
- Remove the wires and bus bars from the IGBT module.
- Remove the mounting screws from the modules.

Apply a thin smear of heatsink grease to the base of the modules and place the IGBT back on the heatsink.

- Insert and tighten the mounting screws.
- Replace the wiring and check carefully.

IF YOU REPLACE A FAULTY IGBT YOU MUST ALSO REPLACE THE POWER INTERFACE BOARD OR FURTHER DAMAGE MAY OCCUR.

VSC 2000 Chassis 2 Internal Wiring Diagram



VSC2000 G&H CHASSIS 2 480V DRIVES

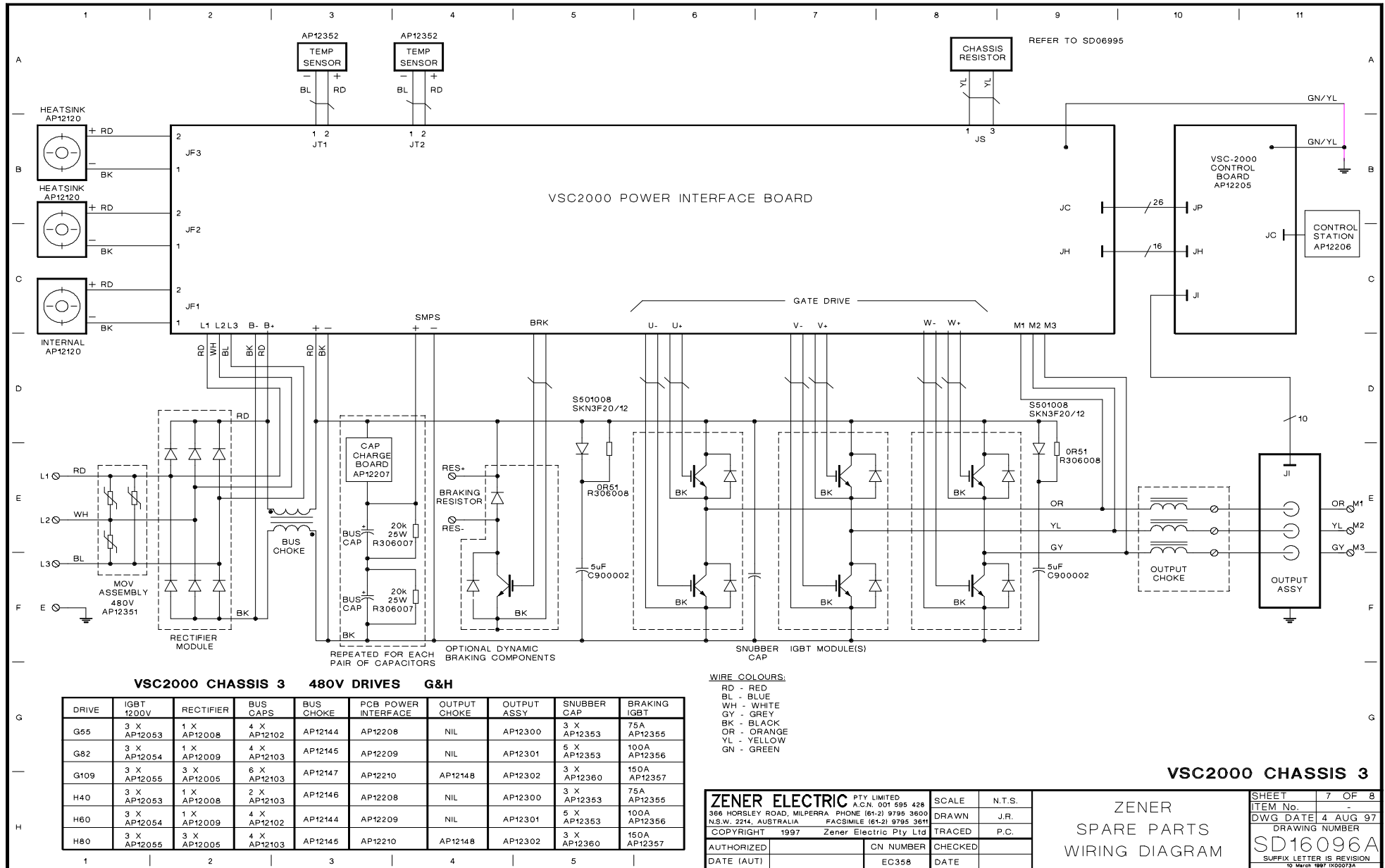
DRIVE	IGBT 1200V	RECTIFIER	BUS CAPS	BUS CHOKE	PCB POWER INTERFACE	DCCT BOARD
G14	3 X AP12051	AP12001	2 X AP12100	AP12140	AP12201	AP12204
G27	3 X AP12051	AP12002	2 X AP12102	AP12141	AP12200	AP12203
G41	3 X AP12052	AP12003	2 X AP12103	AP12142	AP12202	AP12204
H10	3 X AP12051	AP12001	2 X AP12100	AP12140	AP12201	AP12204
H20	3 X AP12051	AP12001	2 X AP12101	AP12143	AP12200	AP12203
H30	3 X AP12052	AP12002	2 X AP12102	AP12141	AP12202	AP12204

WIRE COLOURS:
 RD - RED
 BL - BLUE
 WH - WHITE
 GY - GREY
 BK - BLACK
 OR - ORANGE
 YL - YELLOW
 GN - GREEN

VSC2000 CHASSIS 2

ZENER ELECTRIC PTY LIMITED 366 HORSLEY ROAD, MILPERRA PHONE (61-2) 9795 3600 N.S.W. 2214, AUSTRALIA FACSIMILE (61-2) 9795 3611		SCALE	N.T.S.	ZENER SPARE PARTS WIRING DIAGRAM	SHEET	6 OF 8
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AUTHORIZED	CN NUMBER	TRACED	P.C.	DWG DATE	4 AUG 97	DRAWING NUMBER
DATE (AUT)	EC358	CHECKED	DATE	SD16096A		SUFFIX LETTER IS REVISION

VSC 2000 Chassis 3 Internal Wiring Diagram



VSC2000 CHASSIS 3

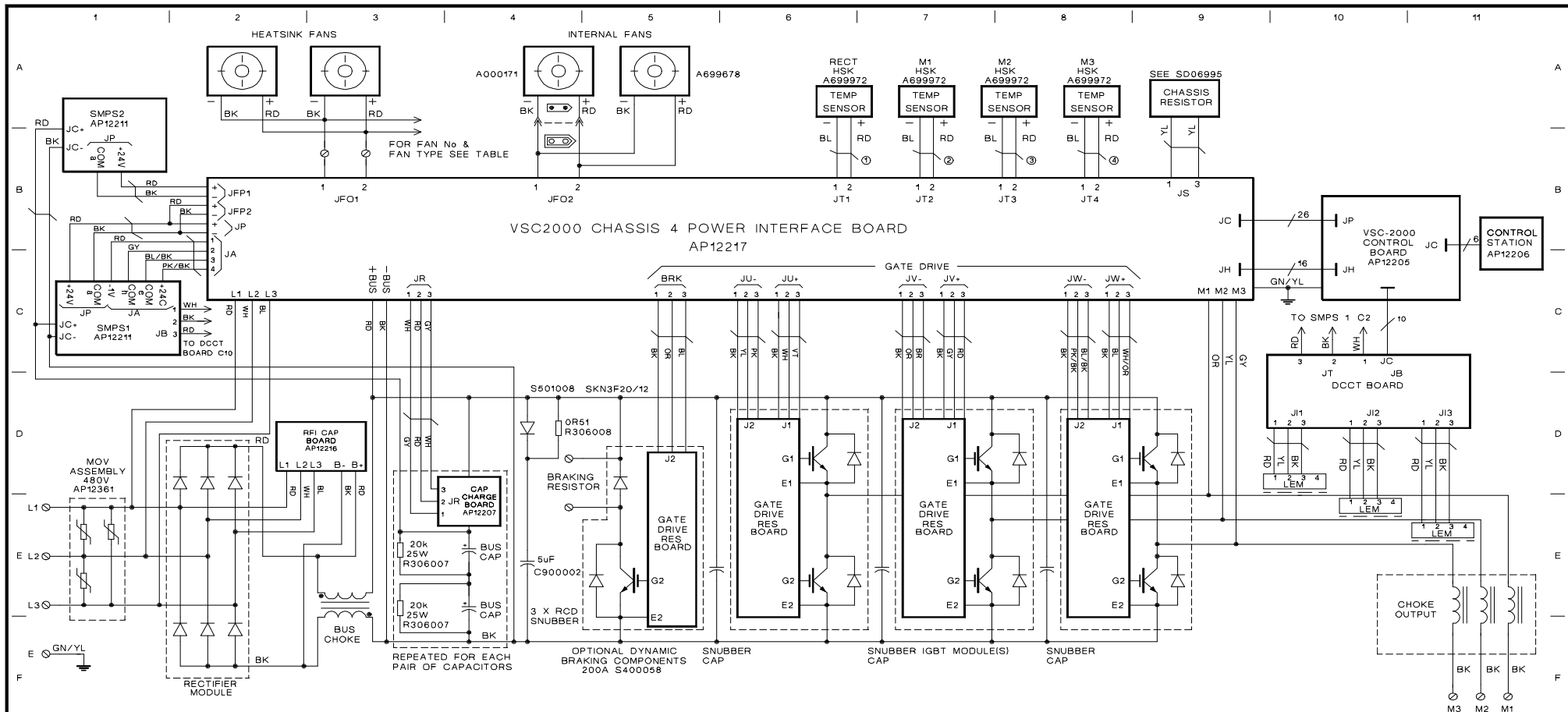
ZENER ELECTRIC PTY LIMITED
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AUTHORIZED	CN NUMBER
DATE (AUT)	EC358

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 SPARE PARTS
 WIRING DIAGRAM

SHEET	7 OF 8
ITEM No.	-
DWG DATE	4 AUG 97
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VSC 2000 Chassis 4 Internal Wiring Diagram



VSC2000 CHASSIS 4 480V DRIVES

DRIVE	RECTIFIER MODULE	IGBT 1200V	BUS CAPS	DCCT BOARD	OUTPUT CHOKE	GATE DRIVE RES BOARD	LEM	SNUBBER CAP	HEATSINK FANS
G143	3 X 201A AP12007	6 X 150A AP12054	8 X 4700uF AP12103	AP12212	6.3uH AP12149	AP12218 6 OFF	AP12303	6 X 100n AP12353	4 X 120mm G008009
G190	3 X 201A AP12007	6 X 200A AP12055	10 X 4700uF AP12103	AP12213	4.7uH AP12150	AP12219 6 OFF	AP12303	6 X 100n AP12350	4 X 120mm G008009
G203	3 X 201A AP12007	9 X 150A AP12054	10 X 4700uF AP12103	AP12214	4.2uH AP12151	AP12218 9 OFF	AP12303	9 X 100n AP12353	4 X 120mm G008009
G271	3 X 260A AP12006	9 X 200A AP12055	14 X 4700uF AP12103	AP12215	3.2uH AP12152	AP12219 9 OFF	AP12304	9 X 100n AP12350	3 X 150mm G008016

- WIRE COLOURS:**
 RD - RED
 BL - BLUE
 WH - WHITE
 GY - GREY
 BK - BLACK
 OR - ORANGE
 YL - YELLOW
 GN - GREEN
 PK - PINK
 VT - VIOLET
 BR - BROWN

VSC2000 CHASSIS 4

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