CHAPTER 6
Troubleshooting the Drive

This chapter describes how to troubleshoot the drive and the equipment that is needed to do so.

6.1 Test Equipment Needed To Troubleshoot

An isolated multimeter will be needed to measure DC bus voltage and to make resistance checks. Note that dedicated troubleshooting test points are not provided.

6.2 Verifying That DC Bus Capacitors Are Discharged

ATTENTION: DC bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait five (5) minutes for the DC bus capacitors to discharge and then check the voltage with a voltmeter to ensure the DC bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.

The drive's DC bus capacitors retain hazardous voltages after input power has been disconnected. Perform the following steps before touching any internal components:

Step 1. Turn off and lock out input power. Wait five minutes.

Step 2. Verify that there is no voltage at the drive's input power terminals.

Step 3. Measure the DC bus potential with a voltmeter while standing on a non-conductive surface and wearing insulated gloves (1000 V).

Measure the DC bus potential at the test points on the Power Module Interface board. See figure 6.1 for 414 amp drives; see figure 6.2 for 500 amp and 643 amp drives.

Step 4. Once the drive has been serviced, reapply input power.

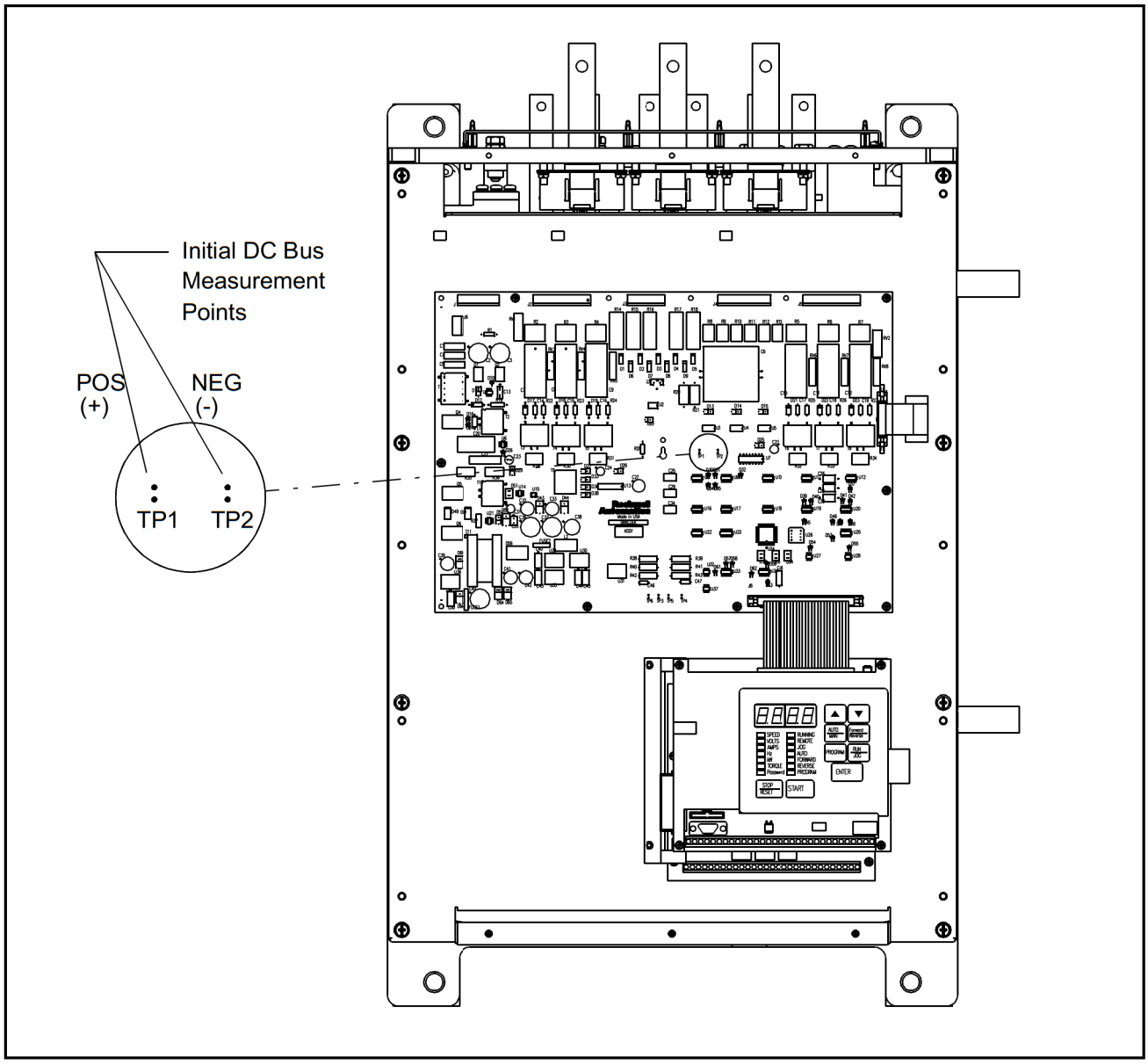

Figure 6.1 – DC Bus Voltage Terminals (414 Amp Drives)

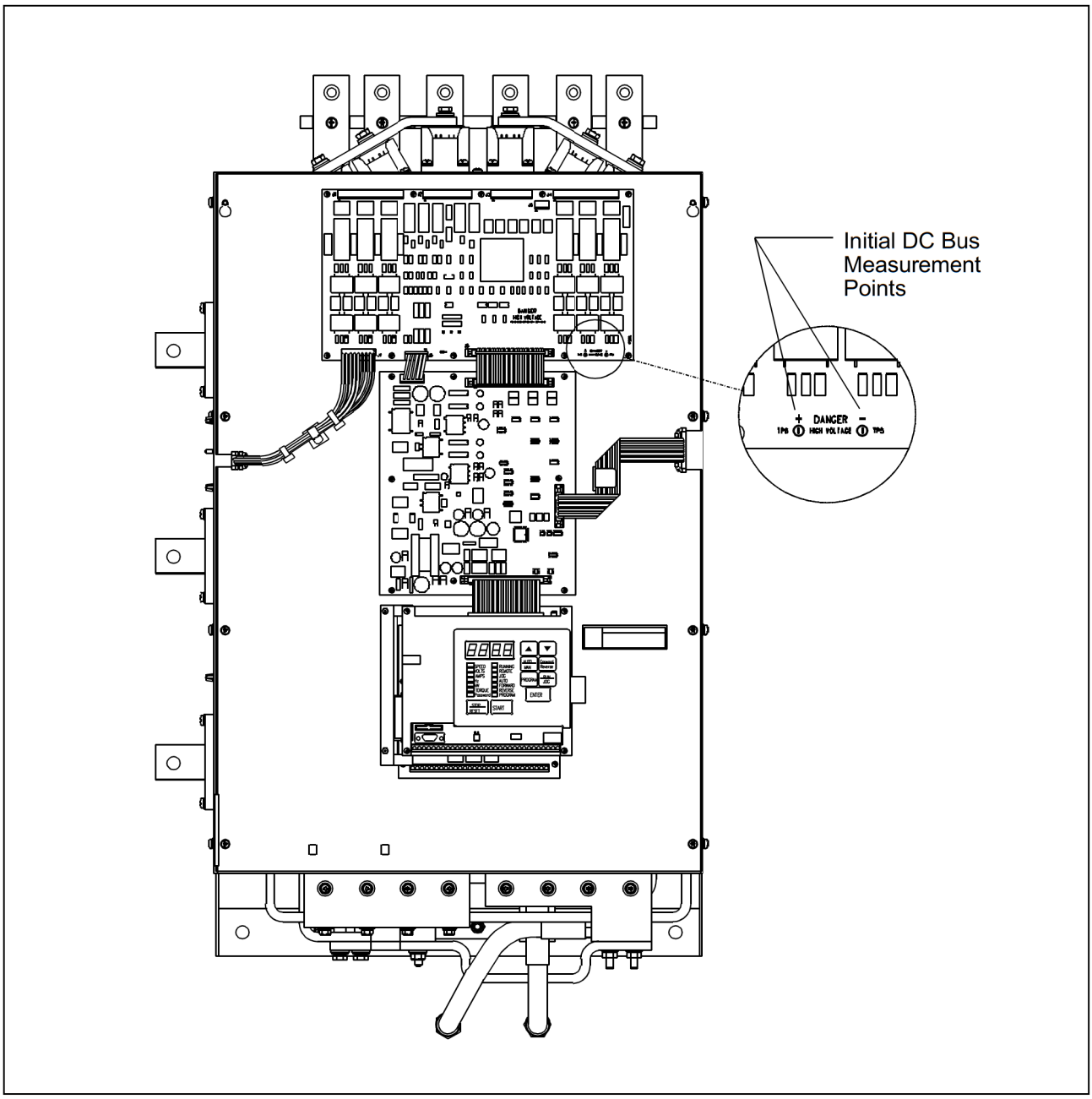

Figure 6.2 – DC Bus Voltage Terminals (500 Amp and 643 Amp Drives)

6.3 Checking the Power Modules and Motor with Input Power Off

Use the following procedure to check the drive's Power Module circuitry with power off:

ATTENTION: DC bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait five (5) minutes for the DC bus capacitors to discharge and then check the voltage with a voltmeter to ensure the DC bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.

Step 1. Turn off and lock out input power. Wait five minutes.

Step 2. Verify that there is no voltage at the drive's input power terminals.

Step 3. Check the DC bus potential with a voltmeter as described in section 6.2 to ensure that the DC bus capacitors are discharged.

Step 4. Disconnect the motor from the drive.

Step 5. Check all AC line and DC bus fuses.

Step 6. If a fuse is open, use a multimeter to check the input diodes and output IGBTs. See table 6.1.

Step 7. Check motor impedance.

Step 8. Reconnect the motor to the drive.

Step 9. Reapply input power.

Table 6.1 – Resistance Checks

Input Diode No.	Meter Connection (+) (-)	Component is OK if resistance (R) is:	Component is defective if:
1	* SCR1	10 < R < 1 megohm	Continuity (short circuit) or open when the meter is connected with reversed polarity.
2	* SCR2		
3	* SCR3		
4	* SCR4		
5	* SCR5		
6	* SCR6		
7	SCR1 **		
8	SCR2 **		
9	SCR3 **		
10	SCR4 **		
11	SCR5 **		
12	SCR6 **		
* (+) DC Bus Volts power terminal ** (-) DC Bus Volts power terminal			

Table 6.1 - Resistance Checks (Continued)

IGBT No.	Meter Connection (+) (-)	Component is OK if resistance (R) is:	Component is defective if:
1	* W/T3	10 < R < 1 megohm	Continuity (short circuit) or open when the meter is connected with reversed polarity.
2	* V/T2		
3	* U/T1		
4	W/T3 **		
5	V/T2 **		
6	U/T1 **		
* (+) DC Bus Volts power terminal ** (-) DC Bus Volts power terminal			