

Agilent TS-5410
Compact Functional Test System
CEDGN Diagnostics User's Guide



Manual Part Number E2232-90010

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A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

Safety Summary

The following general safety precautions must be observed during all phases of operation of this system. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the system. Agilent Technologies, Inc. assumes no liability for the customer's failure to comply with these requirements.

General

This product is provided with a protective earth terminal. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

WARNING: DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE
Do not operate the system in the presence of flammable gases or flames.

If the equipment in this system is used in a manner not specified by Agilent Technologies, the protection provided by the equipment may be impaired.

Cleaning Instructions

Clean the system cabinet using a soft cloth dampened in water.

WARNING: DO NOT REMOVE ANY SYSTEM COVER

Operating personnel must not remove system covers. Component replacement and internal adjustments must be made only by qualified service personnel. Equipment that appears damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

Environmental Conditions

Unless otherwise noted in the specifications, this system is intended for indoor use in an installation category II, pollution degree 2 environment. It is designed to operate at a maximum relative humidity of 80% and at altitudes of up to 2000 meters. Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

Before applying power

Verify that all safety precautions are taken. Note the external markings described in "Safety Symbols and Regulatory Markings" on page 4.

Ground the System

To minimize shock hazard, the system chassis must have a hard-wired connection to an electrical protective earth ground. The system must also be connected to the ac power mains through a power cable that includes a protective earth conductor. The power cable ground wire must be connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective grounding will cause a potential shock hazard that could result in personal injury.

Fuses

Use only fuses with the required rated current, voltage, and specified type (normal blow, time delay). Do not use repaired fuses or short-circuited fuse holders. To do so could cause a shock or fire hazard.

Operator Safety Information

MODULE CONNECTORS AND TEST SIGNAL CABLES CONNECTED TO THEM CANNOT BE OPERATOR ACCESSIBLE:

Cables and connectors are considered inaccessible if a tool (e.g., screwdriver, wrench, socket, etc.) or a key (equipment in a locked cabinet) is required to gain access to them.














Additionally, the operator cannot have access to a conductive surface connected to any cable conductor (High, Low or Guard).

ASSURE THE EQUIPMENT UNDER TEST HAS ADEQUATE INSULATION BETWEEN THE CABLE CONNECTIONS AND ANY OPERATOR-ACCESSIBLE PARTS (DOORS, COVERS, PANELS, SHIELDS, CASES, CABINETS, ETC.): Verify there are multiple and sufficient protective means (rated for the voltages you are applying) to assure the operator will NOT come into contact with any energized conductor even if one of the protective means fails to work as intended. For example, the inner side of a case, cabinet, door, cover or panel can be covered with an insulating material as well as routing the test cables to the module's front panel connectors through non-conductive, flexible conduit such as that used in electrical power distribution.

Safety Symbols and Regulatory Markings

Symbols and markings on the system, in manuals and on instruments alert you to potential risks, provide information about conditions, and comply with international regulations. Table 1 defines the symbols and markings you may encounter.

Table 1 Safety Symbols and Markings

Safety symbols	
	Warning: risk of electric shock.
	Caution: refer to accompanying documents.
	Alternating current.
	Both direct and alternating current.
	Earth (ground) terminal
	Protective earth (ground) terminal
	Frame or chassis terminal
	Terminal is at earth potential. Used for measurement and control circuits designed to be operated with one terminal at earth potential.
	Switch setting indicator. ○ = Off, = On.
	Standby (supply); units with this symbol are not completely disconnected from ac mains when this switch is off. To completely disconnect the unit from ac mains, either disconnect the power cord, or have a qualified electrician install an external switch.
Regulatory Markings	
	The CE mark is a registered trademark of the European Community.
	The CSA mark is a registered trademark of the Canadian Standards Association.
	The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australian EMC Framework regulations under the terms of the Radio Communications Act of 1992.
ISM 1-A	This text indicates that the product is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).

Service and Support

Any adjustment, maintenance, or repair of this product must be performed by qualified personnel. Contact your customer engineer through your local Agilent Technologies Service Center.

Agilent on the Web

You can find information about technical and professional services, product support, and equipment repair and service on the Web:

<http://www.agilent.com>

Click the link to **Test & Measurement**. Select your country from the drop-down menus. The Web page that appears next has contact information specific for your country.

Agilent by Phone

If you do not have access to the Internet, call one of the numbers in Table 2.

Table 2 Agilent Call Centers and Regional Headquarters

United States and Canada:	Test and Measurement Call Center (800) 452 4844 (toll-free in US)
Europe:	(41 22) 780 8111
Japan:	Measurement Assistance Center (81) 0426 56 7832
Latin America:	305 269 7548
Asia-Pacific:	(85 22) 599 7777

Software Updates

TS-5400 Series IIB Software updates can be found at this web site:

http://we.home.agilent.com/cgi-bin/bvpub/agilent/expandedresults/cp_ExpandedResults.jsp?NAV_ID=-536888551.536882176.03&LANGUAGE_CODE=en&contentType=Editorial&entityType=ED39&COUNTRY_CODE=ZZ



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Chapter 1

Running Diagnostics

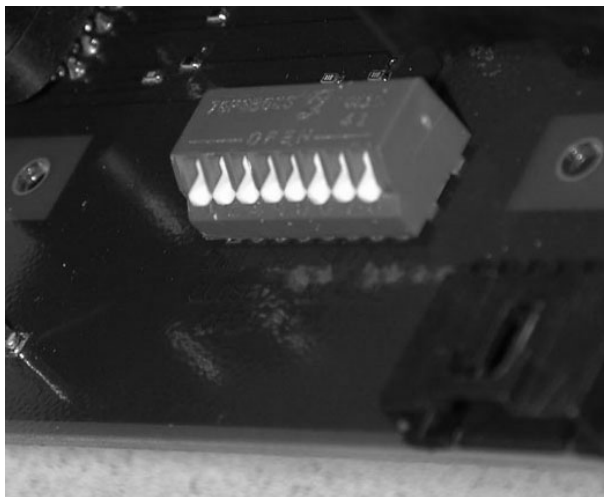
This chapter describes how to use the Diagnostics Test Fixture and the appropriate CEDGN testplan to verify the operation of system equipment. Contents of this chapter are:

- Configuring and Installing the Diagnostic Test Fixture page 9
- Configuring and Running the CEDGN Testplan page 10
- Resolving Test Failures page 12

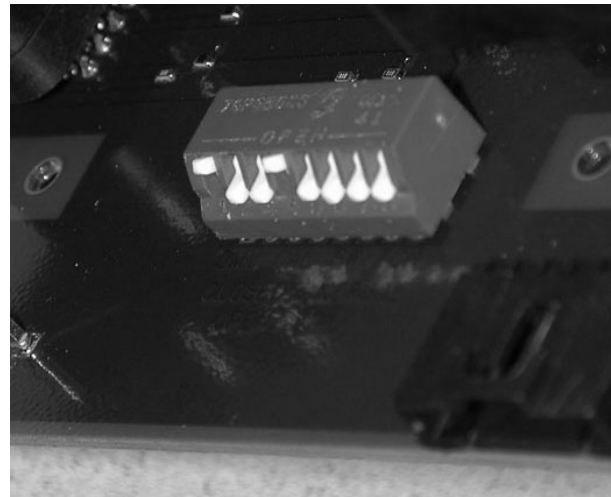
Note Diagnostic testing is intended to verify basic connectivity and instrument functionality. It does not provide a full functional test of instrumentation and specifications.

Configuring and Installing the Diagnostic Test Fixture

The switch settings on the test fixture depend on which DMM is used in your system (Agilent 34401A DMM or Sigametrics SM2040 DMM). Prior to installing the test fixture onto the Test System Interface, set the test fixture switches, according to your DMM, as shown in Figure 1-1.



Agilent 34401A DMM Switch Settings (all closed)



Sigametrics SM2040 DMM Switch Settings (switch 1 and 4 open)

Figure 1-1. Diagnostic Test Fixture Switch Settings

After configuring the switches on the test fixture, install the test fixture onto Test System Interface connectors TC1 and TC2 and rotate the two knobs clockwise as shown in Figure 1-2.

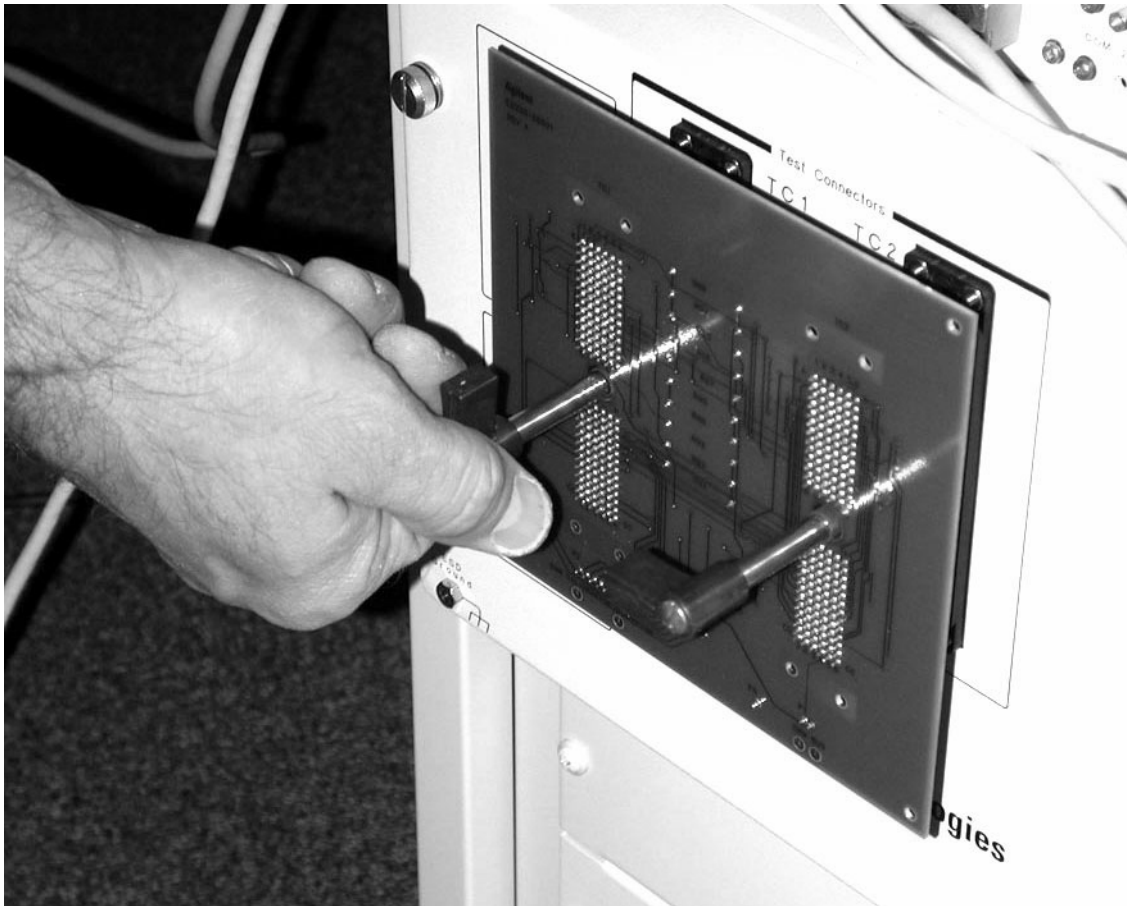
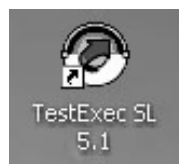


Figure 1-2. Installing the Test Fixture

Configuring and Running the CEDGN Testplan

1. Start Agilent Test Exec SL by clicking this icon on the desktop:



2. There are two testplans for E223x systems. The testplans are identical except for the Digital Multimeter (DMM) used:
 - **CEDGN E2230-Ag34401.tpa**--use this testplan if your system DMM is the Agilent 34401.
 - **CEDGN E2230-SM2040.tpa**--use this testplan if your system DMM is the Signametrics SM2040.

3. Load the appropriate testplan based on your DMM into TestExec SL. Testplans are located in this directory:

C:\Program Files\Agilent\ITS-5400 System Software\Service\E2230A\Testplans

4. Before running the testplan, identify the instrumentation you want to test in the first lines of the testplan as shown below. Place a 1 next to instruments you want to test, a 0 next to those instruments you do not want to test (or that are not in your system).

1. Click on instrument to add or remove from testing.

2. Type 0 to remove, 1 to add

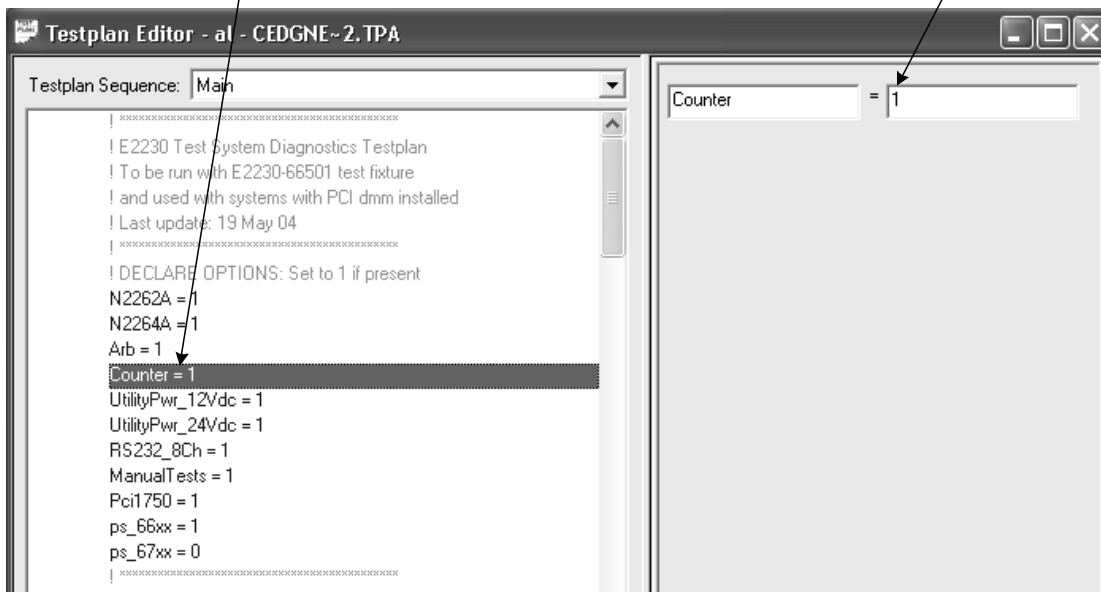



Figure 1-3. Specify the Instruments to be Tested

WARNING

The ManualTests are for the 664X Power Supply only. These tests require changing the remote sense switch on the 664x Power Supply and requires removing rack covers. Operating personnel MUST NOT remove system covers. Only qualified, service-trained personnel should remove system covers and gain access to the inside of the rack and the Power Supplies Remote/Local Sense Switch. Refer to Figure 2-9 on page 24 for the location of the power supply's Remote/Local Sense Switch).

5. Click  to run the testplan. The testplan will run tests on each system instrument specified in Step 4 and display the results of the testing.
6. Follow the instructions appearing on the display throughout the test.

Resolving Test Failures

Test failures can be caused by improper switch settings on the Diagnostic Test Fixture, improperly specifying system equipment (step 4) above, or by an actual test system instrument failure.

Before troubleshooting system equipment, verify the test fixture switches are properly set and the test system instrumentation was properly specified.

If the problem seems to be system equipment, swap the instrument and/or the cable between the instrument and the Test System Interface.

Chapter 2 contains detailed descriptions of each test that may help in isolating equipment problems to a particular component.

Chapter 2

Diagnostic Testing Details

Contents of this chapter are:

- Test Fixture Description page 13
- Diagnostic Testplan Description and Flow page 15
- Diagnostic Test Limitations page 26

Test Fixture Description

Figure 2-1 is a simplified schematic of the diagnostic test fixture. The test fixture reconfigures the N2261A module into a two-wire, 20-channel multiplexer. This 20-channel multiplexer connects the various system instruments to the DMM during testing. For switch module testing (N2261A, N2262A and N2264A modules), the DMM measures the various test fixture resistances based on the switch module and channel being tested. For power supply testing, the DMM measures the voltage output of the various supplies across resistive voltage-dividers on the test fixture.

Testing verifies the DMM, switch modules, the 664x power supply and the various other system instruments (such as the Arb, Counter and utility power supplies). The RS-232 serial COM ports are tested using a simple loopback. This loopback is also used to test the optional Advantech 1750 Digital I/O Module.

Refer to Appendix A for more details on the 20-channel multiplexer construction.

Notes The 20-channel multiplexer has resistors installed in the various switch paths. The resistors provide improved test coverage in the event that the relay common legs are mis-wired. See appendix A for details on resistor values.

The DMM Bus Extender Connector allows relay cards present on Test System Interface connectors TC3 and TC4 to be tested using another test fixture and a simple two-wire extender cable. This assumes the switch modules have the same pinouts as those defined on TC1 and TC2.

CUSTOM SYSTEMS MAY NOT HAVE IDENTICAL PIN MAPPING FROM TC1/TC2 TO TC3/TC4.

The relay connections to the N2261A module are swapped (H&L). This pattern provides possible future test support for the N2266A module. See Appendix A for details.

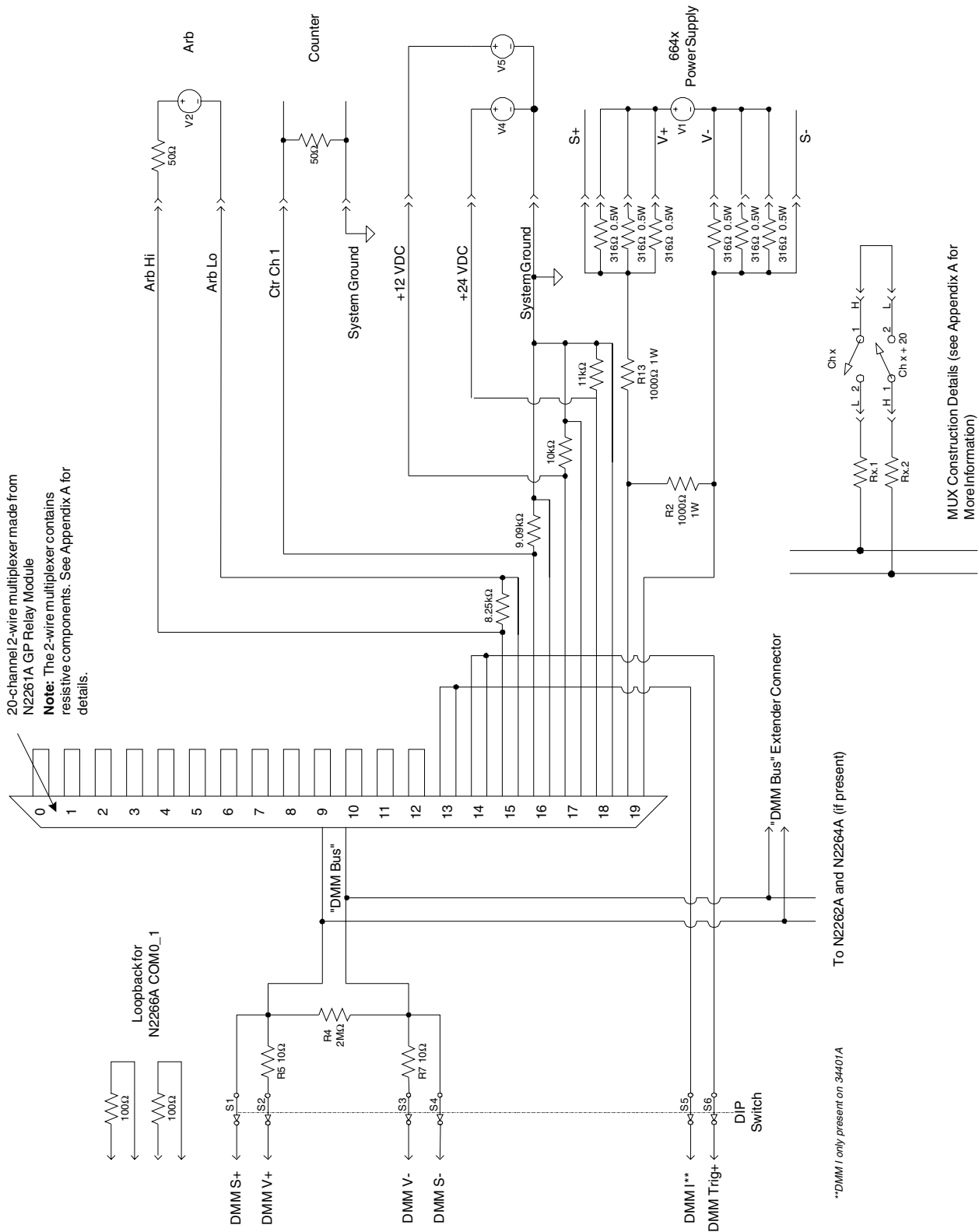


Figure 2-1. Diagnostic Test Fixture Simplified Schematic

Diagnostic Testplan Description and Flow

There are two diagnostic testplans for E223x systems. The testplans are identical except for the Digital Multimeter (DMM) used:

- **CEDGN E2230-Ag34401.tpa**--use this testplan if your system DMM is the Agilent 34401.
- **CEDGN E2230-SM2040.tpa**--use this testplan if your system DMM is the Signametrics SM2040.

The following paragraphs describe all possible tests from both testplans.

Test: Setups

Displays a user message instructing the operator to set the switches on the Diagnostic Test Fixture (see Figure 1-1 on page 9) and install in on the TC1 and TC2 connectors

Test: Global Reset

Initializes and resets all instruments in the hardware configuration table.

Test: Measure DMM Bus Float

Measurement setup consists of opening all relays/relay channels for all relay modules in the 3499A Mainframe (this is done in the previous test, test Global Reset). The Measure DMM Bus Float Test verifies that no loads other than fixed 2 M Ω resistance are present on the "DMM Bus". A DMM resistance measurement is made with all relays open and compared against limits. Figure 2-2 shows the test signal path.

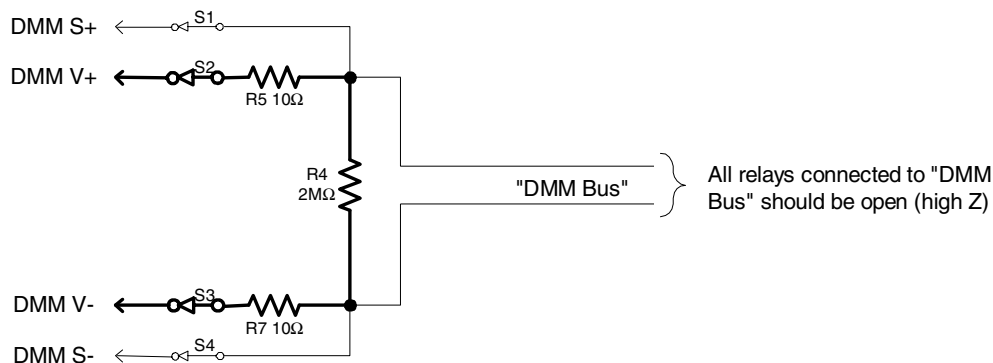


Figure 2-2. Test: Measure DMM Bus Float

Test: 6643A Pwr Supply

This test is performed only if a 6643A Power Supply is in the system. Measurement setup consists of connecting the DMM V+ and V- inputs to the power supply outputs via series resistors in the source legs of the power supply. The power supply outputs are connected to a load consisting of two 1k Ω resistors wired as a resistive voltage divider. The power supply's remote sensing is also connected to the resistive load. The three 316 Ω resistors wired in parallel in each supply line represent 105 Ω of "cable resistance". This means the power supply's remote sensing must operate properly to supply the correct voltage. The power supply is programmed to output 20Vdc and the voltage across the divider is measured by the DMM. The measured voltage should be one half the supply voltage or 10Vdc

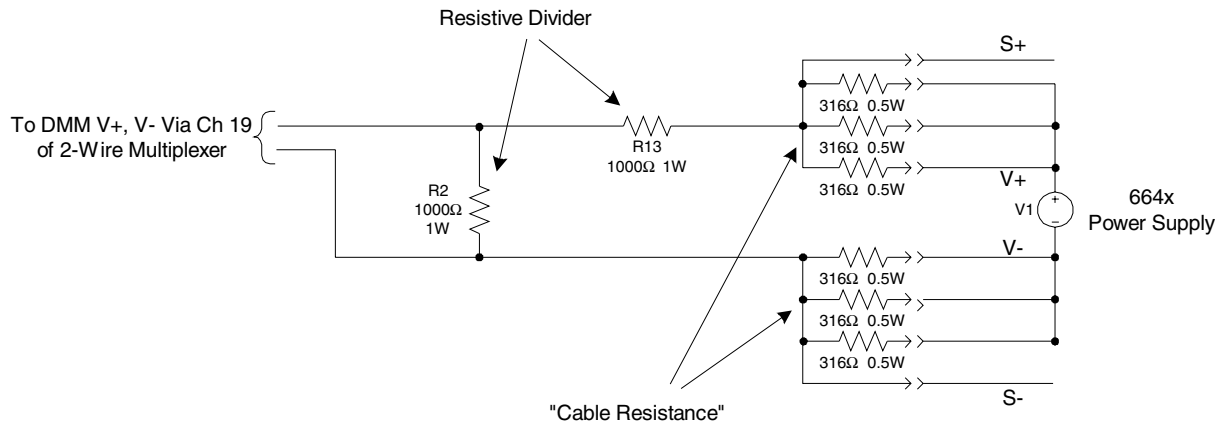


Figure 2-3. Test: 6643A Pwr Supply

Test: DMM Trig Test

This test is performed only if a 6643A Power Supply is in the system. This test configures the DMM for an external trigger and uses the 6643A Power Supply to create a trigger signal. A time-out is set with the UsecsStart and UsecsElapsed actions. The test will error if the triggered reading has not been made within the time-out interval.

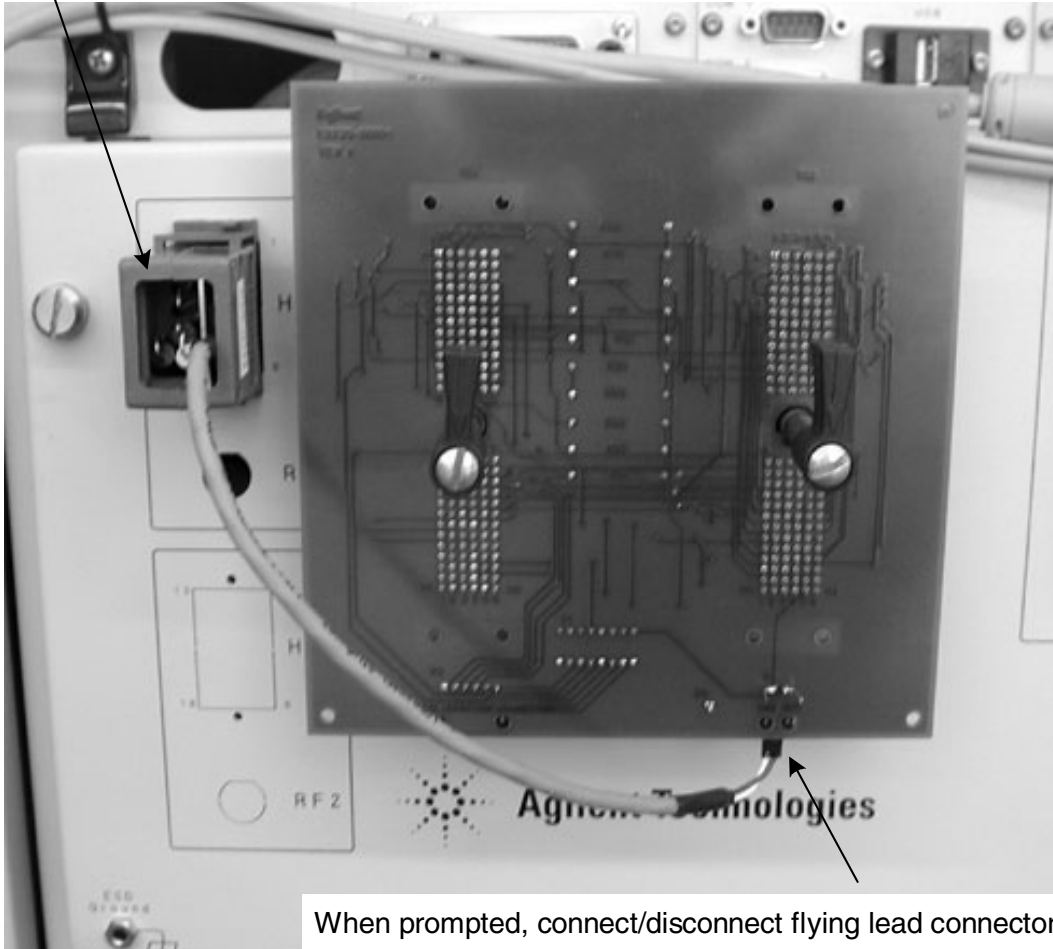
Test: N6700A Ch1 - Ch4

This test is performed only if an N6700 MPS is in the system. Before the first test, the operator is prompted to install the blue test connector to the N6700 power connector on the Express Connect (see Figure 2-4). An independent test is run for each of the power modules in the MPS (channels 1 through 4). For each power module, a specific voltage is programmed to be output across a load resistor in the test connector. The current is measured by the power module and compared against limits.

Test: DMM Trig Test(2)

This test is performed only if an N6700 MPS is in the system. The operator is prompted to connect the lead from the blue connector to the connector on the test fixture (see Figure 2-4). The test configures the DMM for an external trigger and programs power module #1 (Ch1) to create a trigger signal. A time-out is set with the UsecsStart and UsecsElapsed actions. The test will error if the triggered reading has not been made within the time-out interval. In the SM2040 testplan only, the operator is prompted to disconnect the flying lead from the Test Fixture (Figure 2-4). In the 34401 testplan, the lead remains connected for the DMM Current Input Test (2).

When prompted, connect blue connector to N6700A Power Connector



When prompted, connect/disconnect flying lead connector

Figure 2-4. N6700 MPS Test Connections

**Test: DMM Current
Input Test
(34401 DMM Only)**

This test is performed only if a 6643A Power Supply is in the system. The 34401 DMM's current input (I) is connected to channel 13 of the 20-channel multiplexer which connects to the 6643 Power Supply through approximately $1\text{k}\Omega$ of resistance. Turning on the power supply forces current through the I input and DMM V-. This current is measured and compared against limits.

**Test: DMM Current
Input Test (2)
(34401 DMM Only)**

This test is performed only if an N6700 MPS is in the system. The 34401 DMM's current input (I) is connected to channel 13 of the 20-channel multiplexer which connects to power module #1 in the N6700 through approximately $1\text{k}\Omega$ of resistance. (This connection is made using the flying lead connection shown in Figure 2-4.) Turning on the power supply forces current through the I input and DMM V-. This current is measured and compared against limits. Following this test, the operator is prompted to disconnect the flying lead from the Test Fixture (Figure 2-4).

**Tests: Arb 50 ohm,
Arb Hi Z**

The 33220 ARB is connected to the DMM through channel 15 of the 20-channel multiplexer (Figure 2-5). The output of the 33220A is enabled and the expected 50ohms + resistance present in multiplexer path is measured using the DMM and compared to limits. Next, the 33220A ARB's output is disabled and a High Z resistance measurement is made and compared against limits.

**Tests: Cntr 50 ohm,
Cntr Hi Z**

The 53131A Counter is connected to the DMM through channel 16 of the 20-channel multiplexer. The output of the counter is enabled and the expected 50Ω + resistance present in multiplexer path is measured using the DMM and compared to limits. Next, the counter's output is disabled and a High Z resistance measurement is made and compared against limits.

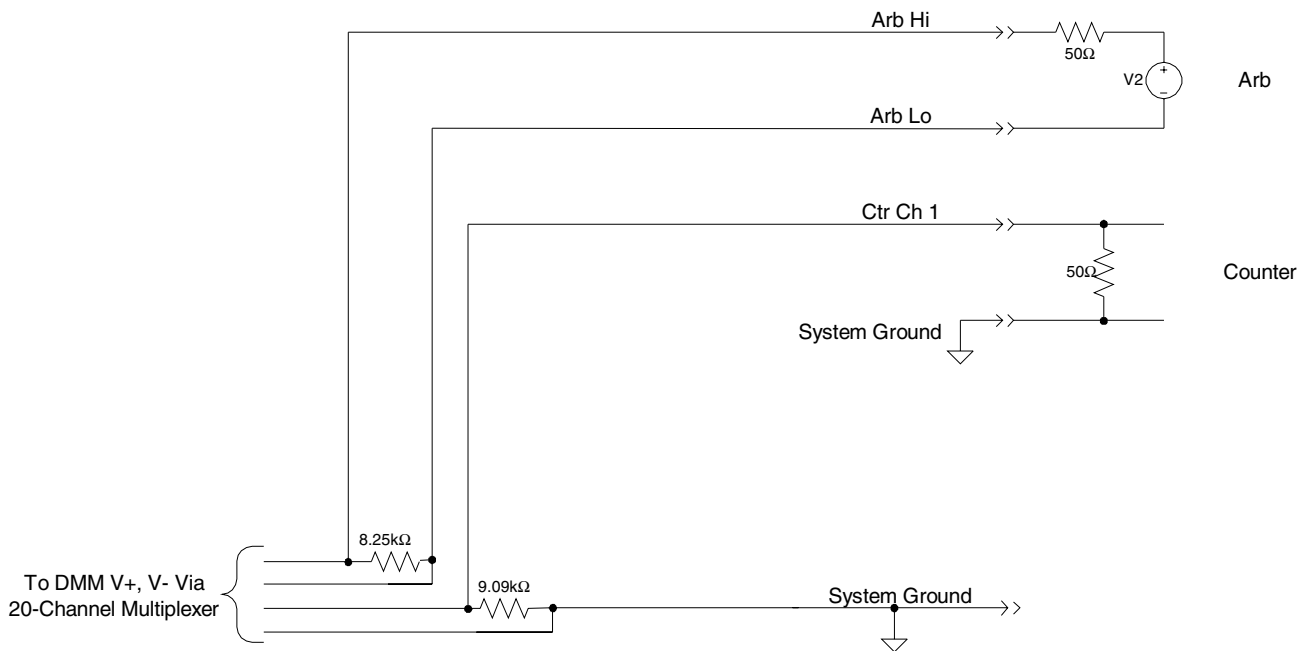


Figure 2-5. Tests: Arb 50 ohm, Arb Hi Z, Cntr 50 ohm, Cntr Hi Z

Testgroup: N2261A

The tests in this testgroup verify the N2261A General Purpose Relay Module. The test fixture configures the N2261A as a two-wire, 20-channel multiplexer. To create each multiplexer channel, two N2261A channels are connected together as shown in Table 2-1.

Table 2-1. 20-Channel Multiplexer Channels

Multiplexer Channel	N2261A Channel Pairs Used	Multiplexer Channel	N2261A Channel Pairs Used
0	CH00, CH20	10	CH10, CH30
1	CH01, CH21	11	CH11, CH31
2	CH02, CH22	12	CH12, CH32
3	CH03, CH23	13	CH13, CH33
4	CH04, CH24	14	CH14, CH34
5	CH05, CH25	15	CH15, CH35
6	CH06, CH26	16	CH16, CH36
7	CH07, CH27	17	CH17, CH37
8	CH08, CH28	18	CH18, CH38
9	CH09, CH29	19	CH19, CH39

Each multiplexer channel is terminated with a loop-back or unique resistance. For channels 0 through 16 (see Figure 2-6) each channel is closed (one test per channel) and the resistance is measured. The test fixture adds a small amount of resistance in each leg to allow for swapped pins to be measured (see Appendix A for details).

For channels 17 and 18, if a utility power supply is present, the power supply voltage is measured. If a utility power supply is not present, the resistance of each channel is measured as was done for channels 0 through 16.

For channel 19, if a 66xx power supply is present, the power supply voltage is measured. If a utility power supply is not present, the resistance of channel 19 is measured as was done for channels 0 through 16.

Note Since each test is using two N2261 channels, a test failure can be caused by either or both of those channels.

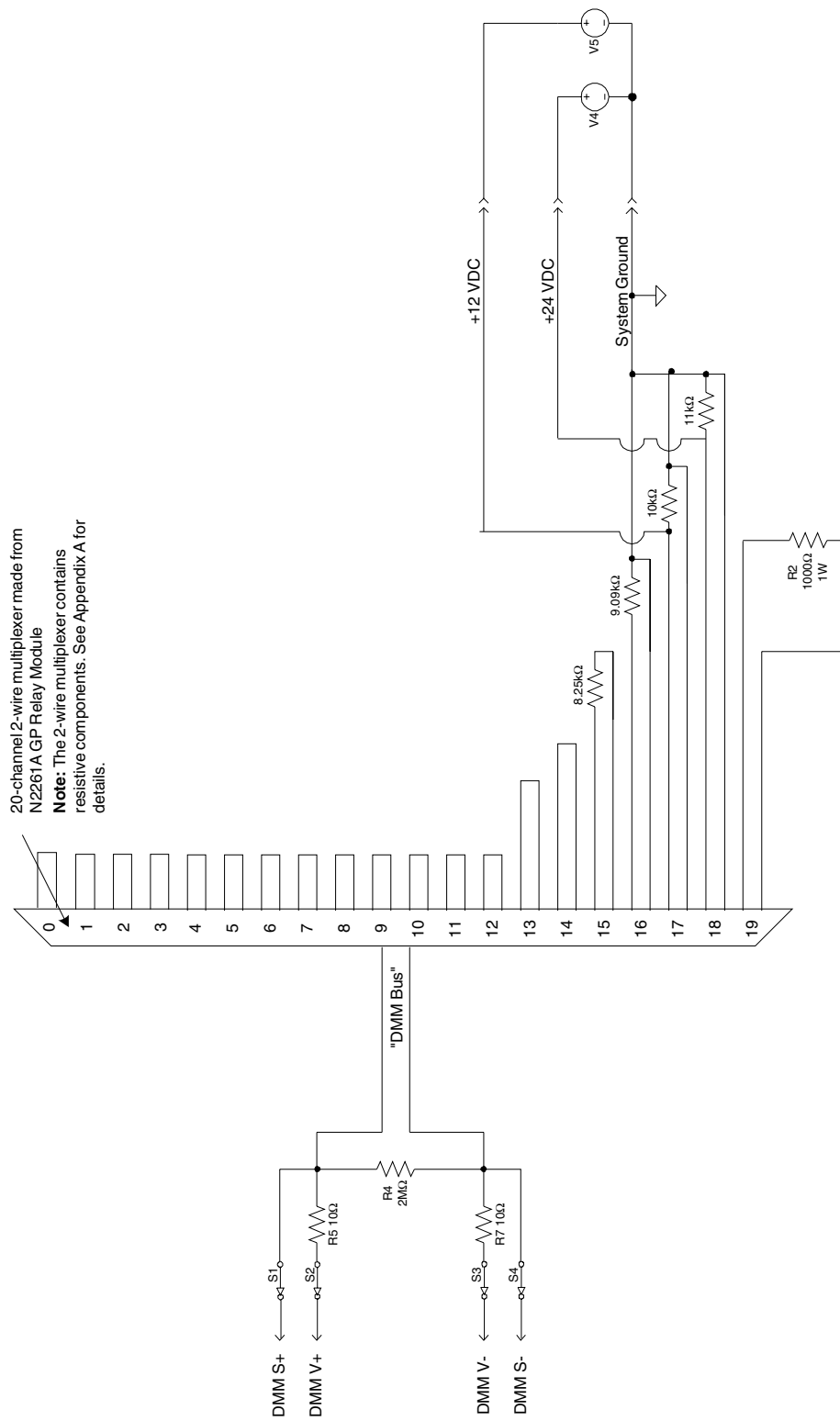


Figure 2-6. Tests: N2261A

Testgroup: N2262A

Measurement setup consists of connecting the N2262A 4x8, 2-wire matrix as shown in Figure 2-7. Note the "DMM Bus" shown in Figure 2-7 connects to the "DMM Bus" shown in Figure 2-2.

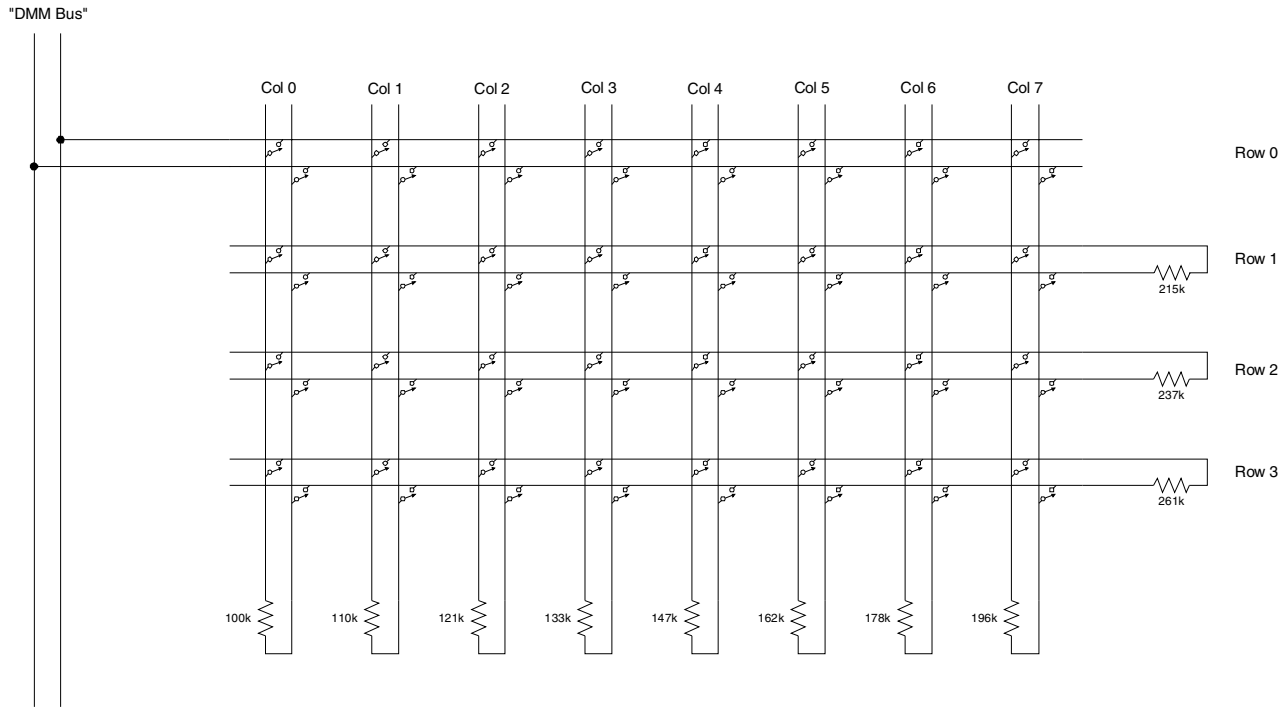


Figure 2-7. Tests: N2262A

The first eight tests in this testgroup connect Row 0 to Column 0 through 7, one column at a time. The resistance is measured for each Row 0/Column connection and compared to known limits. This sequence of tests is then repeated for Row 1, Row 2 and Row 3.

Note

Notice that Row 0 is used to connect to the "DMM Bus" for all tests. Relay failures in Row 0 can appear as failures in the other rows.

Testgroup: N2264A

The N2264A contains twelve channels of general purpose relays, three channels of high current general purpose relays and 16 I/O bits which can be as two independent 8 bit ports. Relay verification and DI/DO operation occurs at the same time using the setup shown in Figure 2-8. By placing resistance in each leg of the high current relays connections (3 wires total), each wire can be verified.

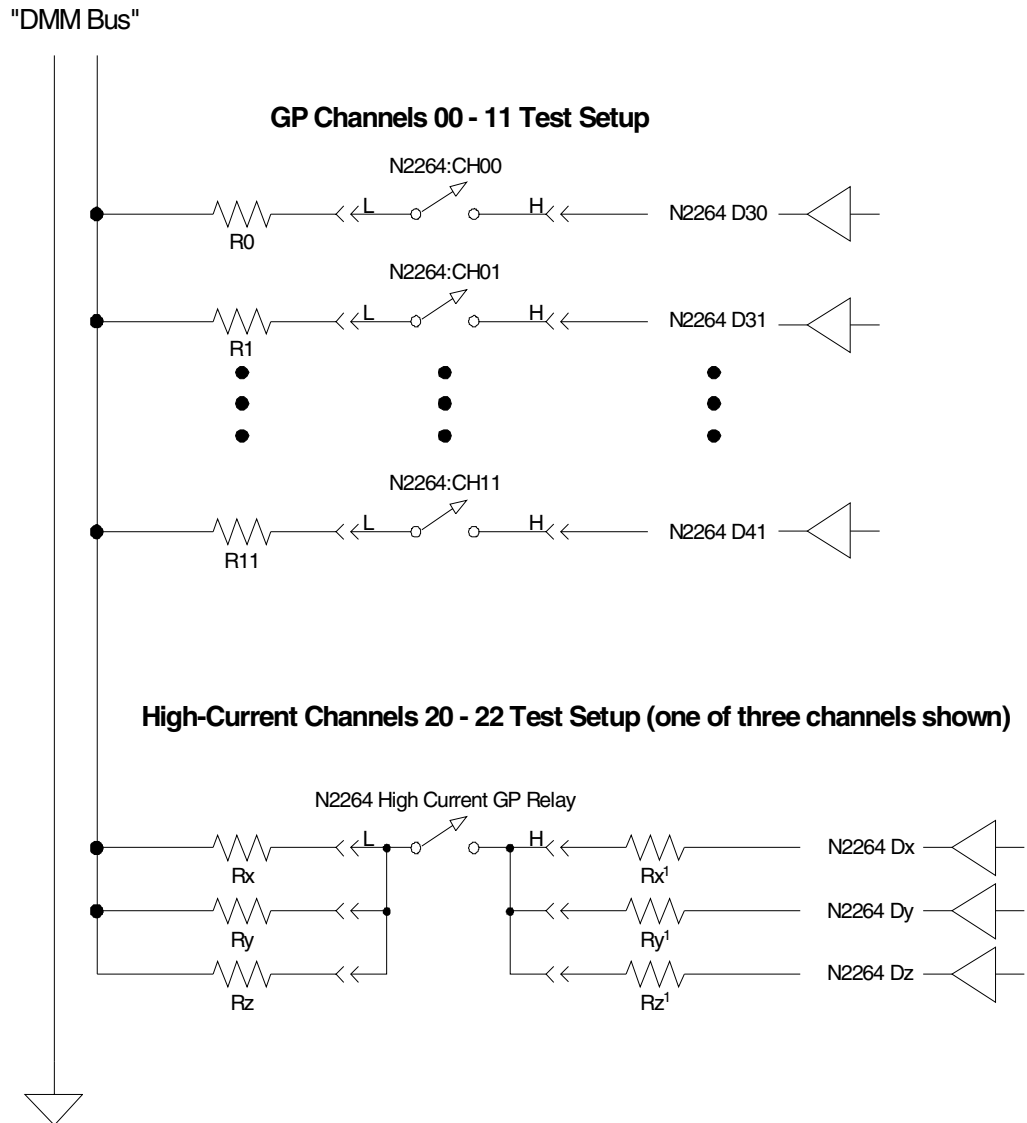


Figure 2-8. Tests: N2264

GP Channels and Digital I/O Bits D30 - D41 Tests

The first 24 tests in this testgroup (*test N2264A Ch00 D30(0)* through *test N2264A Ch11 D41 (1)*) verify operation of the twelve general purpose relay channels 00 through 11 and Digital I/O bits D30 through D41. Each bit has a high test and a low test. For example, in the first test GP CH00 is closed and a 0 (low) is written to bit D30. The voltage is measured on the DMM and checked against limits. In the second test, bit D30 is tested by again closing GP CH00 but this time writing a 1 (high) and measuring the voltage. For all of these tests, N2261A channel 36 is closed to tie one side of the "DMM Bus" to System Ground. All digital I/O voltage measurements are referenced to System Ground.

High-Current Channels and Digital I/O Bits D42 - D45 Tests

The remaining N2264A tests verify the high-current channels CH20 through CH22 and Digital I/O Bits D42 - D45. The test setup is shown in Figure 2-8. For current sharing purposes, each high-current channel has three connections to the TC1 Test System Interface connector. A Digital I/O bit is connected to each of these three connections.

For each high-current channel, four tests are performed. The first test, (for example, *test N2264A CH20, D42 - D44 (0)*) sets all bits low. The voltage is measured across the voltage dividing resistors and checked against limits. The second test, (for example, *test N2264A CH20, D42(1) D43-44(0)*) sets one bit high and the other two bits low. The voltage is measured across the voltage dividing resistors and checked against limits. The third test, (for example, *test N2264A CH20, D42 - 43(1), D44(0)*) sets two bits high and the other bit low. The voltage is measured across the voltage dividing resistors and checked against limits. Finally, the fourth test, (for example, *test N2264A CH20, D42-44(1)*) sets all bits high. The voltage is measured across the voltage dividing resistors and checked against limits. So, in the above listed example tests, bits D42-D44 are tested high and low as well as all three connections to high-current channel 20.

Test: Scm2 All of the RS-232 COM lines are tested using a simple loopback method:

Table 2-2. Test: Scm2 Loopbacks

Side 1	Side 2
COM2	COM2
COM3	COM7
COM4	COM8
COM5	COM9
COM6	COM10

Note Notice that COM2 is looped back onto itself. This is because COM2 comes from the computer and should always be present. COM3-COM10 are from the 8-channel PCI card and may or may not be present.

Test: Pwr Supply Multiple Cable Connections

If manual tests were specified, this test checks the power supply in *local sense* mode. In this test, the user is instructed to set the power supply remote sense switch to “local”. The remote sense switch is on the rear of the power supply and is shown in Figure 2-9.

WARNING The ManualTests require changing the remote sense switch on the 664x Power Supply and requires removing rack covers. Operating personnel **MUST NOT** remove system covers. Only qualified, service-trained personnel should remove system covers and gain access to the inside of the rack and the Power Supplies Remote/Local Sense Switch.

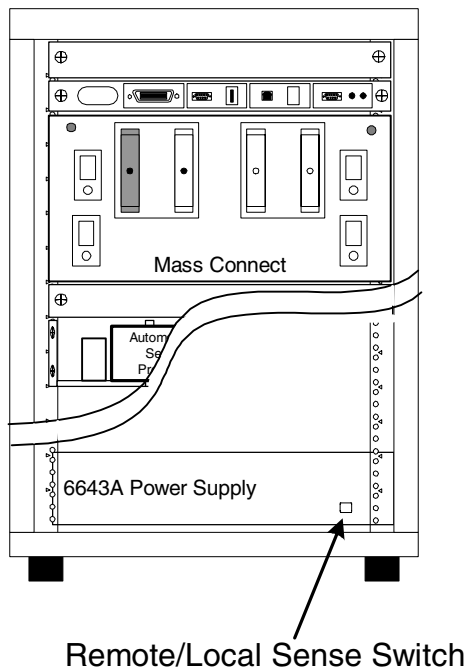


Figure 2-9. Power Supply Remote Sense Switch

Measurement setup consists of connecting the DMM V+ and V- inputs to the power supply outputs via series resistors in the source legs of the power supply. The power supply outputs are connected to load consisting of two 1k resistors wired as a resistive voltage divider. The power supply's remote sensing is not connected so the three 300 Ω resistors wired in parallel in each supply line represent 100 Ω of additional resistance. The power supply is programmed to output 20Vdc and the voltage across one half of the divider is measured by the DMM and checked against limits. Accounting for the voltage drop across the 100 Ω resistors, the measured voltage should be approximately 9.03 Vdc.

Following the measurement, the user is instructed to set the power supply remote sense switch back to the “remote” position.

Test: Pwr Verify Remote Sense Switch

This test (a manual test), simply checks that the remote sense switch has been returned to the “remote” position and remote sensing is working. It is an exact duplication of the *6643A Pwr Supply test*, refer to “Test: 6643A Pwr Supply” on page 15.

Test: N2261A Row00 and 20 (4W Ohm Meas) (SM2040 DMM only)

This test (a manual test), checks the 4-wire resistance measurement capability of the SM2040 DMM. The test instructs the operator to remove the test fixture, close switches 1 and 4 (the SM2040 4-wire sense lines) and replace the test fixture onto TC1 and TC2. The test then closes 20-wire multiplexer channel 0, makes a 4-wire resistance measurement and compares the results against limits.

Since all previous measurements made using the SM2040 DMM were done in the two-wire mode (see “Test Fixture Switch Settings” on page 29 for details), a failure of this test indicates a problem in the SM2040 DMM 4-wire resistance mode.

Testgroup: N67xxA mfg test

These tests are for use by Agilent when manufacturing the system only. These tests should be set to Ignore.

Test: pci-1750...

These tests check the Advantech 1750 PCI Digital I/O Module. The same loopback connections that were used to test the serial card (“Test: Scm2” on page 23) are used to loopback the digital inputs to the digital outputs.

The *pci-1750* tests check the operation of bits by writing a hex value to the digital I/O outputs, reading the values looped back to the digital I/O inputs, and comparing the results to the expected hex value (equivalence testing).

Notice, the connections required to test the serial card do not result in a direct one-to-one mapping of the digital I/O channels. For example, to test the serial card, the COM3, TxD line is connected to the COM7 RxD line (not the COM7 TxD line). This mapping, when applied to the Digital I/O Card, connects bit 0 in to bit 1 out. The *result* values for equivalence testing are adjusted to compensate for the bit-swapping.

Diagnostic Test Limitations

The diagnostic fixture and testplans do a good job of verifying overall system functionality. There are some minor gaps in test coverage though, as described below.

- **N2261A cable**--cannot detect wire swapping or a short in the wires with 0 ohms in the lead. Open wires are detected.
- **N2264A Digital I/O pairs D42/D43, D44/D45**--since these lines connect to the same node, the tests cannot detect a wire swapping or short between these (although an open wire can be detected).
- **N2262A H/L lines.** Cannot detect if high and low are swapped on any one channel. It can detect an open wire and swapped with another channel.
- **Serial COM ports.** Cannot detect if COMx is swapped with COMy (for the COMx-COMy pairs as shown in Table 2-2 on page 23).

Appendix A

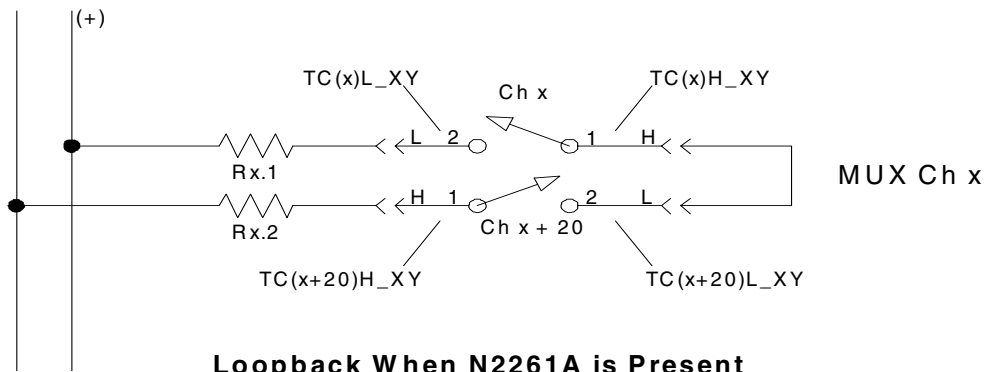
Diagnostic Test Fixture Details

Contents of this chapter are:

- N2261A and N2266A Interconnect Mapping page 27
- Test Fixture Switch Settings page 29
- Test Fixture Schematics page 30

N2261A and N2266A Interconnect Mapping

The interconnect mapping is designed so that either an N2261A module or the currently unsupported* N2266A module may be tested. Figure 2-10 shows the test fixture loopback configuration when an N2261A module is present. Table 2-3 shows the N2261A channels used and the corresponding TC connections



Loopback When N2261A is Present

Figure 2-10. N2261A Loopback Configuration

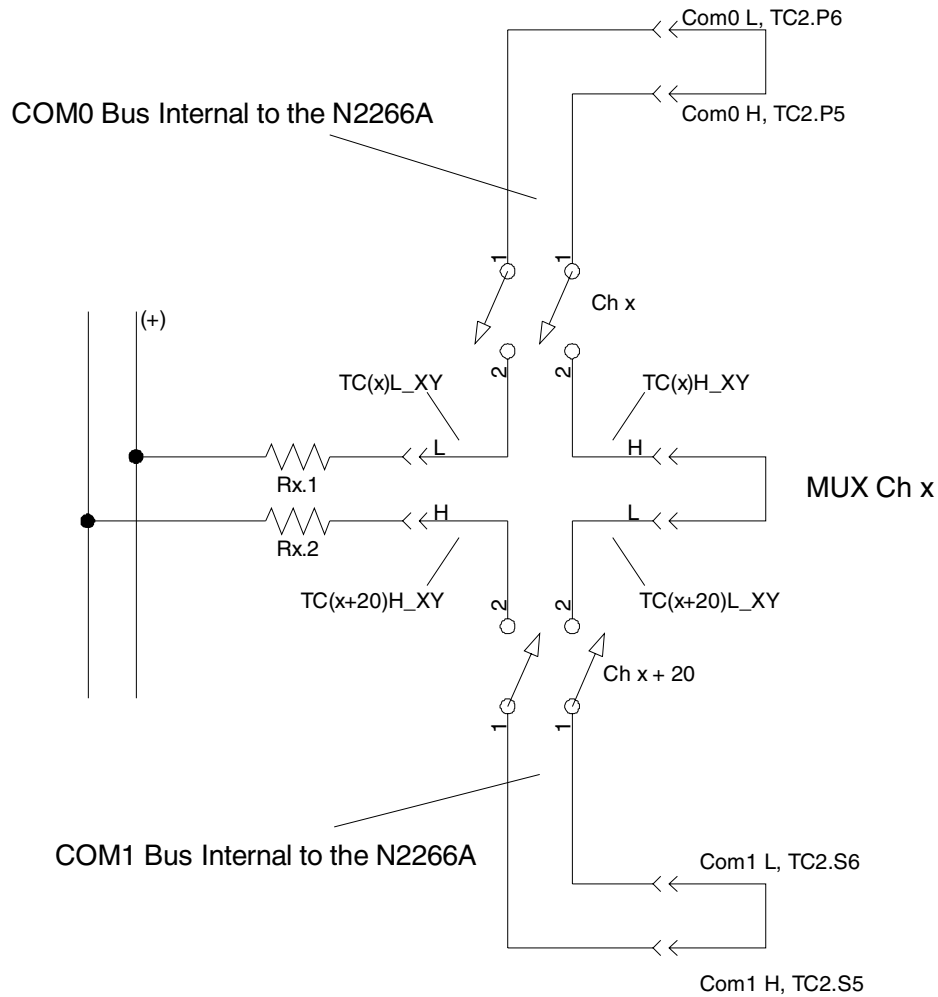
**N2266A mapping is intended as a possible future enhancement to testing and the diagnostic testplans. No testing is currently available for the N2266A.*

Table 2-3. N2261A Channel/TC2 Mapping

MUX ch	C(x)	C(x+20)	TC(x)L_XY	TC(x)H_XY	TC(x+20)L_XY	TC(x+20)H_XY	Rx1	Rx2	Rx1+Rx2
0	CH00	CH20	TC2.B1	TC2.A1	TC2.F6	TC2.E6	261	274	535
1	CH01	CH21	TC2.B2	TC2.A2	TC2.H4	TC2.G4	287	301	588
2	CH02	CH22	TC2.B3	TC2.A3	TC2.H5	TC2.G5	316	332	648
3	CH03	CH23	TC2.D1	TC2.C1	TC2.H6	TC2.G6	348	383	731
4	CH04	CH24	TC2.D2	TC2.C2	TC2.V6	TC2.V5	422	464	886
5	CH05	CH25	TC2.D3	TC2.C3	TC2.W2	TC2.W1	511	562	1073
6	CH06	CH26	TC2.F1	TC2.E1	TC2.W4	TC2.W3	590	619	1209
7	CH07	CH27	TC2.F2	TC2.E2	TC2.W6	TC2.W5	649	681	1330
8	CH08	CH28	TC2.F3	TC2.E3	TC2.X2	TC2.X1	715	750	1465
9	CH09	CH29	TC2.H1	TC2.G1	TC2.X4	TC2.X3	825	909	1734
10	CH10	CH30	TC2.H2	TC2.G2	TC2.X6	TC2.X5	1000	1100	2100
11	CH11	CH31	TC2.H3	TC2.G3	TC2.Z2	TC2.Z1	1210	1330	2540
12	CH12	CH32	TC2.B4	TC2.A4	TC2.Z4	TC2.Z3	1470	1620	3090
13	CH13	CH33	TC2.B5	TC2.A5	TC2.Z6	TC2.Z5	1780	1960	3740
14	CH14	CH34	TC2.B6	TC2.A6	TC2.AA2	TC2.AA1	2150	2370	4520
15	CH15	CH35	TC2.D4	TC2.C4	TC2.AA4	TC2.AA3	2610	2870	5480
16	CH16	CH36	TC2.D5	TC2.C5	TC2.AA6	TC2.AA5	3160	0	3160
17	CH17	CH37	TC2.D6	TC2.C6	TC2.CC2	TC2.CC1	3480	3830	7310
18	CH18	CH38	TC2.F4	TC2.E4	TC2.CC4	TC2.CC3	4220	4640	8860
19	CH19	CH39	TC2.F5	TC2.E5	TC2.CC6	TC2.CC5	0	0	0

Resistor R2 in multiplexer channels 16 and 19 is set to 0 ohms to allow the low side of the DMM bus and the low side of the power supply to be taken to system ground. This is required on occasion for subsequent DMM measurements. The side effect of having 0 ohms for these two relays is that a test "hole" exists where a wire "swapping" in the cable for these (and only these) two corresponding relay channels are not detected.

Figure 2-11 shows the loopback configuration when an N2266A is present. The TC2 pins used for the COM loopbacks for the N2266A are unused pins for the N2261A.



Loopback When N2266A is Present

Figure 2-11. N2266A Loopback Configuration (N2266A Testing not Currently Supported)

Test Fixture Switch Settings

The 34401A is capable of making 2-wire voltage measurements with the test fixture circuitry connected to its High and Low Sense lines. The SM2040 cannot do this. The switch on the test fixture allows you to disconnect the SM2040's Sense lines for 2-wire measurement. When using the SM2040 DMM, the last test directs you to connect the sense lines at which point the SM2040's 4-wire measurement capability is tested.

N6700 Test Fixture Schematic

Figure 2-12 shows the schematic for the N6700 power test fixture.

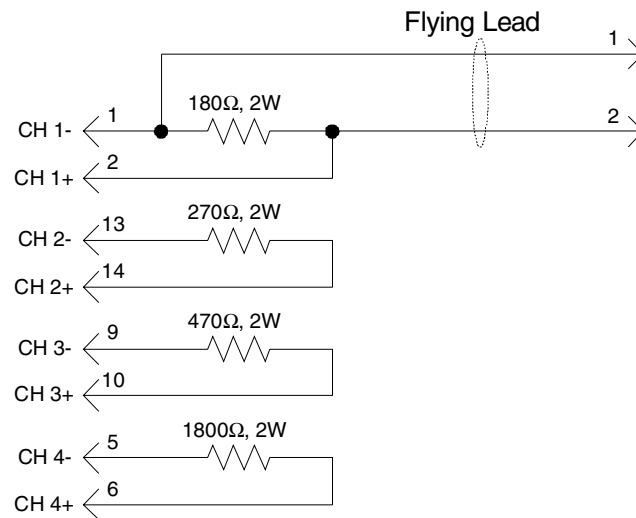
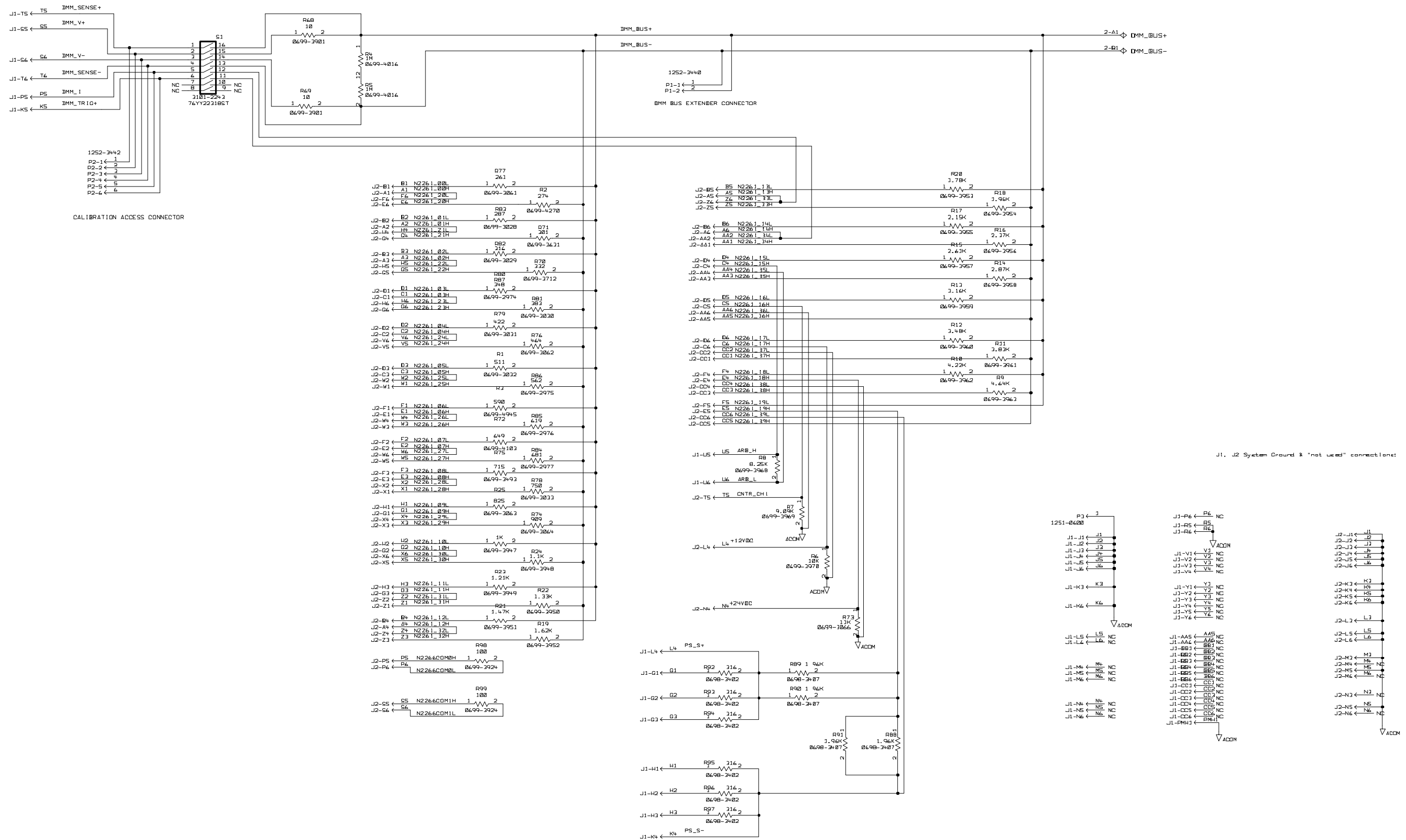


Figure 2-12. N6700 Test Fixture Schematic

Test Fixture Schematics

Schematics for the E2230-66501 Test Fixture PC Assembly are shown on the following two pages.

E2230-66501 Schematic #1



E2230-66501 Schematic #2

