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Cablescan

Series 90

90

SETUP MANUAL

May 4, 2015

Series 90

SETUP MANUAL

(Part Number 5900407-00)

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ABOUT THIS MANUAL

This manual provides setup and installation information on all Cablescan Series 90 Test Systems:

Low Voltage Models	High Voltage Models
Series 90	Series 90HV
Series 90L4	Series 90H8
Series 90L8	

Information that is not identified by model number(s) pertains to all models. Where information is identified by certain models, read the portions pertaining to your model.

Before attempting to operate your model of the Series 90, be sure to read this manual until you understand it. Then, when first using your Series 90, follow the manual as closely as necessary to achieve proper operation. When you eventually develop mastery of the system, you will continue to turn to the manual as a reference.

Information in this manual supports a second volume, "Series 90 Software Manual."

If you have a question or problem regarding this manual, please contact Cablescan.

SERIES 90 FAMILY OF TEST SYSTEMS

SERIES 90/SERIES 90HV

The Cablescan Series 90 (Figure 1) is a high-speed continuity tester that you also can use as an assembly aid and a final interconnect verifier. The Series 90HV (Figure 2) is a high-voltage model that typically is used for testing quality of insulation and quality of harness connections. All test and build features of the standard Series 90 are incorporated in the Series 90HV. You can apply either model to the test and assembly of:

- Cables and harness assemblies
- Back planes
- Bare printed circuit boards

. . . with up to 131,072 test points (standard Series 90), or 47,104 points (Series 90HV).

You normally operate the Series 90/90HV through a Windows-based system controller using the keyboard, mouse and monitor. You can create and store your test/build programs on the system controller's hard drive or network attached storage devices. You also can obtain and store test programs through the learn-known-good process, or you can import test programs from other sources.

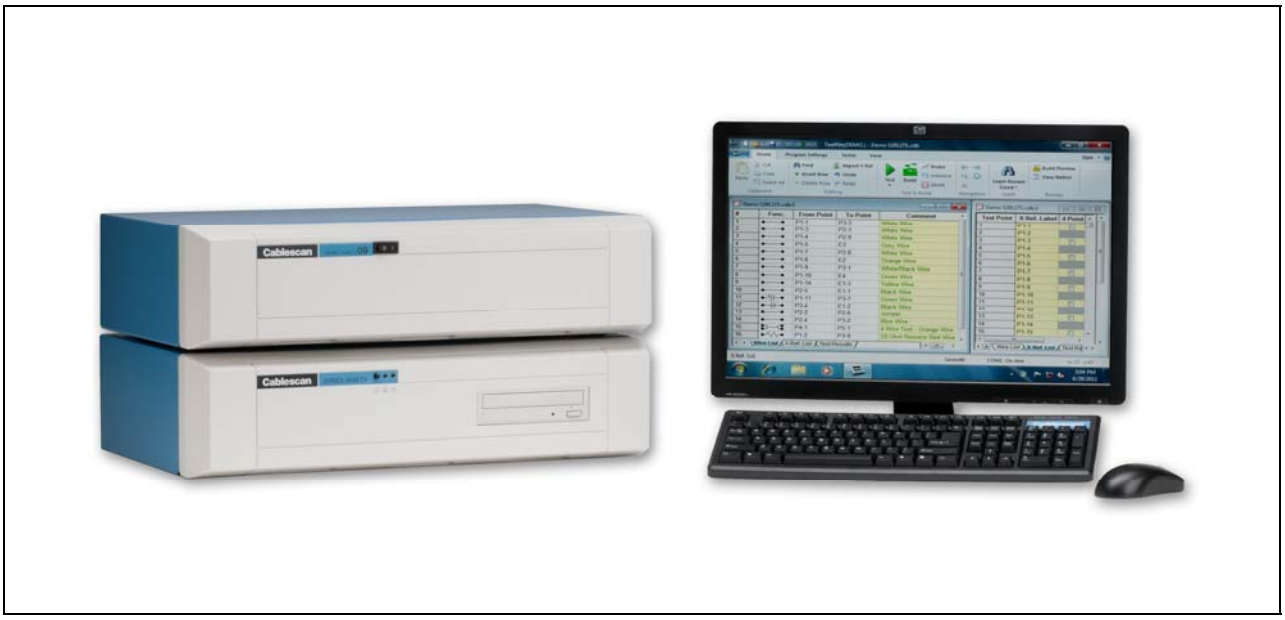
SERIES 90L4/SERIES 90L8/SERIES 90H8

The Cablescan Series 90L4 (not shown), Series 90L8 and Series 90H8 (Figure 3) are low and high-voltage models that are used on small assemblies and require use of your PC as the control device. All test and build features of the Series 90 and 90HV are incorporated in the Series 90L4, Series 90L8, and Series 90H8. You can apply them to the test and assembly of:

- Cables and harness assemblies
- Back planes
- Bare printed circuit boards

. . . with up to 512 test points.

You operate the Series 90L4/90L8/90H8 through your own PC, which serves as the controller, running on Cablescan-supplied software. You can create and store your test/build programs on the hard drive or network attached storage devices. You also can obtain and store test programs through the learn-known-good process, or you can import test programs from other sources.



SERIES 90-S9 (Nine-board Expansion Cabinet)



SERIES 90-S32 (Thirty-two-board Expansion Cabinet)

Figure 1. The Series 90 Test Systems



SERIES 90HV-S23 (Twenty-three-board Expansion Cabinet)

Figure 2. The Series 90HV Test System



(Controlled by your PC)

Series 90L4 (Four-board Cabinet)



(Controlled by your PC)

Series 90H8 (Eight-board Cabinet)

Figure 3. The Series 90 L4 and Series 90H8 Test Systems

SYSTEM COMPONENTS

SERIES 90

The Series 90 consists of a system control and one to thirty-two expansion cabinets to accommodate scanner boards. See Figure 4. There are two models: the Series 90-S9, with a nine-board Expansion Cabinet (which may be ordered with 1 to 9 boards); the Series 90-S32, with a thirty-two board Expansion Cabinet (which may be ordered with 1 to 32 boards). Additional 9 and 32-board Expansion Cabinets can be added, in any combination, to either model. They may be ordered with partial or full complements of scanner boards.

SERIES 90HV

The Series 90HV consists of the same system control and one to thirty-two expansion cabinets to accommodate high-voltage scanner boards. There is only one model, the Series 90HV-S23, with a 23-board expansion cabinet. It may be ordered with 1 to 23 high-voltage, 64-point scanner boards. Additional 23-board expansion cabinets may house partial or full complements of scanner boards.

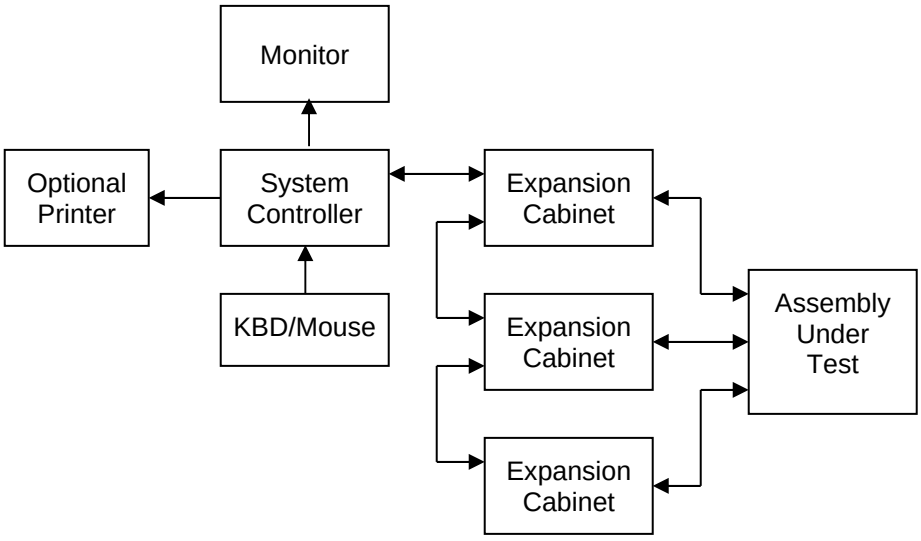


Figure 4. Series 90/90HV Simplified Diagram

SERIES 90 SYSTEM CONTROLLER

The Series 90/90HV system controller is based on an Intel processor. The controller contains a hard disk drive and a DVD drive. Human interface with the controller is provided by a 101-key keyboard, mouse, and a monitor. The controller communicates with the expansion cabinets through its high-speed serial port. USB ports are provided to accommodate an optional printer.

EXPANSION CABINETS

Each expansion cabinet holds and interconnects the scanner boards, a scanner control board that provides communication with the system controller (or PC), and a power supply that converts line power to voltage levels of DC power required within the system.

Multiple expansion cabinets can be added to the Series 90 and Series 90HV to obtain up to 32 cabinets. Maximum possible test points: 131,072 for the Series 90 and 47,104 for the Series 90HV. The Series 90L4, Series 90L8, and Series 90H8 are single cabinet systems and cannot be expanded using multiple cabinets. Maximum test points for each of these testers is 512 (1024 test points for the Series 90L8).

Series 90

Two expansion cabinet models are offered in the Series 90:

- Series 90-E9: Nine scanner boards with 128 test points each, yielding 1152 maximum possible test points per cabinet.
- Series 90-E32: Thirty-two scanner boards with 128 test points each, yielding 4096 maximum possible test points per cabinet.

Series 90HV

One expansion cabinet model is available for the Series 90HV:

- Series 90HV-E23: Twenty-three scanner boards with 64 test points each, yielding 1,472 maximum possible test points per cabinet

SERIES 90L4/L8/H8

The Series 90L4/L8/H8 has no system controller; you control it through your own PC using Cablescan-supplied software. See Figure 5. There are no provisions for additional expansion cabinets.

- Series 90L4: Four scanner boards with 128 test points each, yielding 512 maximum possible test points.
- Series 90L8: Eight scanner boards with 128 test points each, yielding 1024 maximum possible test points.
- Series 90H8: Eight scanner boards with 64 test points each, yielding 512 maximum possible test points.

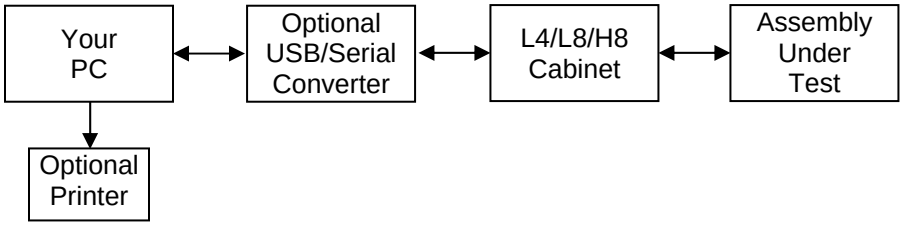


Figure 5. Series 90L4/H8 Simplified Diagram

SERIES 90 SYSTEM SETUP

UNPACKING

The major components of the Series 90 are packaged in foam-packed shipping cartons. Carefully unpack the components, and set the containers aside for future use. Visually inspect each component for damage or deficiency. Record any damage or deficiency and report it to Cablescan. In the event the equipment has been damaged because of shipping, notify both the carrier and Cablescan immediately.

POWER CONNECTION

Before applying power to the Series 90, make sure that the operating voltage is correct and the unit is properly grounded (see GROUNDING THE UNIT, below).

Grounding the Unit

Each component of the Series 90/90HV is shipped with a three-wire (grounded) power cable. When the cable is connected to a three-wire (grounded) power receptacle, it connects the chassis of the unit to ground.

WARNING

Continuity of the grounding circuit is vital for the safe operation of the units. Never operate the Series 90 system through an ungrounded power connector, or with the grounding conductors disconnected.

Power Cords

All power cords are supplied with North American-type plugs. The plug ends must be replaced for countries with other standards. To help make the change easier, the power cord wires are coded with the International color code standard. A translation table for the North American and International color code standards is provided below.

	INTERNATIONAL COLOR CODE	NORTH AMERICAN COLOR CODE
LINE	brown	White
NEUTRAL	blue	Black
GROUND	green/yellow	Green

SERIES 90/SERIES 90HV SYSTEM CONTROLLER INTERFACING

Rear Panel

The rear panel of the system controller has seven vertical slots. They are numbered 1 through 7 starting at your right side when facing the rear panel. See Figure 6. Exact placement of the interface ports and control boards may vary between systems. A typical system controller contains the following interface ports and control boards:

- Cablescan I/O Board (Typically slot 6)
- VGA Color Monitor Adapter (15-pin High Density D-type connector)
- Serial I/O ports (9-pin male D-type connector, COM 1)
- Keyboard connector (Bottom PS2 connector, KB)
- Mouse Connector (Top PS2 connector, MOUSE)
- USB Ports
- Ethernet Port

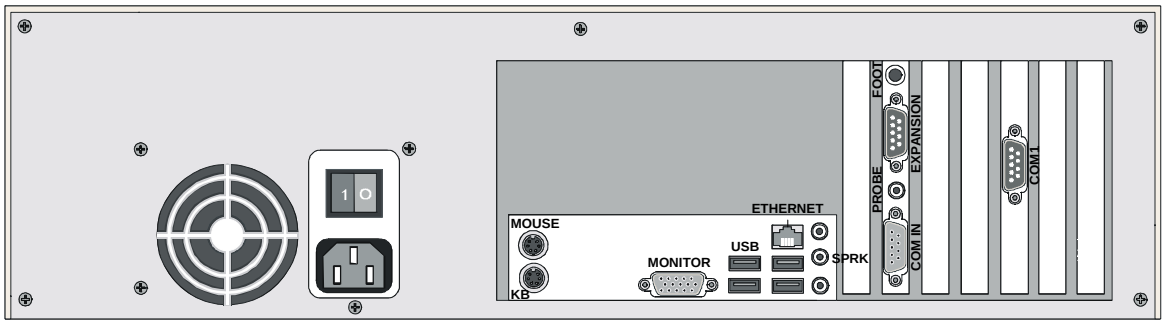


Figure 6. System Controller Rear Panel

I/O Board

The Cablescan I/O Board is a high-speed communication board used in sending and receiving test information to the Scanner Control Boards located in Series 90 expansion cabinets. (The Scanner Control Board controls the Scanner Boards, which contain the test points in its cabinet.) One of the main purposes of the Scanner Control Board is to allow up to 32 cabinets to be daisy chained together as one system. The I/O board inserts into a PCI slot on the CPU board. There are four external connections on the board: Expansion cabinet connector (male 9-pin D-type), PC/COM port input connector (female 9-pin D-type), footswitch connection (phone jack), and a wrist strap probe connection (banana jack).

SERIES 90/90HV CONNECTION PROCEDURE

Basic System Hookup

Arrange the Series 90/90HV with the system controller alongside the expansion cabinet. Connect the system as shown in Figure 7, and as described below:

1. Connect power cord (part number 9200016) from INPUT power connector (male) on rear panel of expansion cabinet to AC receptacle.
2. Connect power cord (part number 9200016) from INPUT power connector (male) on rear panel of system controller to AC receptacle.
3. Connect LCD monitor power cord from INPUT power connector (male) on color monitor to AC receptacle. (The color monitor may have an attached cord.)
4. Connect keyboard to bottom PS/2 connector (KB) on System Controller.
5. Connect mouse to top PS/2 connector (MOUSE) on System Controller.
6. Connect VGA monitor to High-density 15-pin D connector (Monitor) on System Controller.

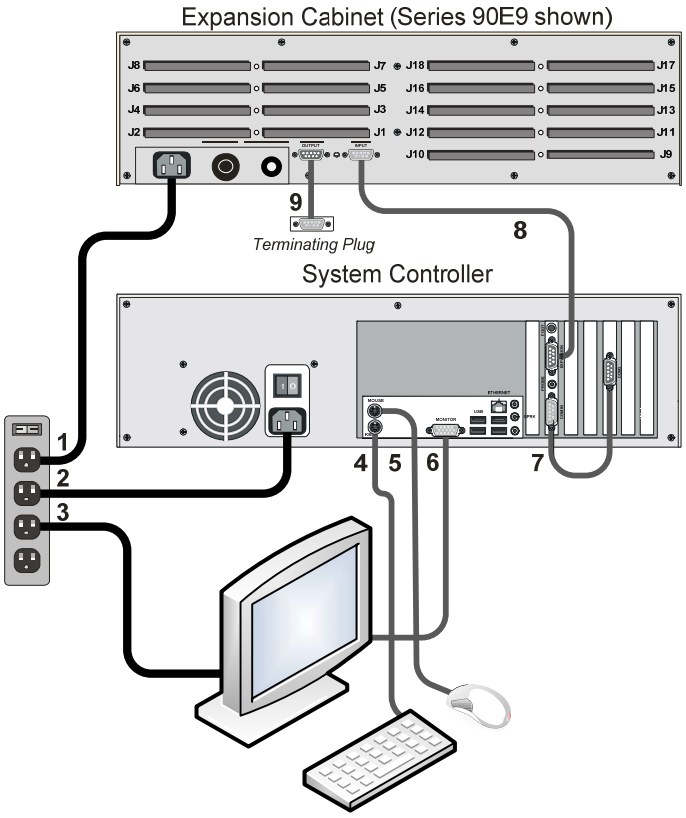


Figure 7. Series 90/90HV Cable Connections

7. Connect female end of the short (1 foot) 9-conductor cable (part number 9100086) to bottom connector of Expansion Input/Output Board (COM IN); connect male end to serial communication port (COM1).
8. Connect female end of 9-conductor cable (part number 9100069) to top connector of Expansion Input/Output Board (EXPANSION); connect male end to INPUT connector on the expansion cabinet.
9. Connect terminating plug (part no. 5211116) to OUTPUT connector on expansion cabinet.

NOTE

Make sure that all interface cables are secured with their mounting screws. The most common source of trouble is poor connections.

Adding Expansion Cabinets

1. To add a second expansion cabinet, remove terminating plug from OUTPUT connector on the first expansion cabinet.
2. Connect the female end of another 9-conductor cable (part number 9100069) to the OUTPUT connector of first expansion cabinet, and male end to INPUT connector on second cabinet.
3. If the second cabinet is the last in the chain, connect the terminating plug to its OUTPUT connector. (The terminating plug is attached only to the last expansion cabinet.)

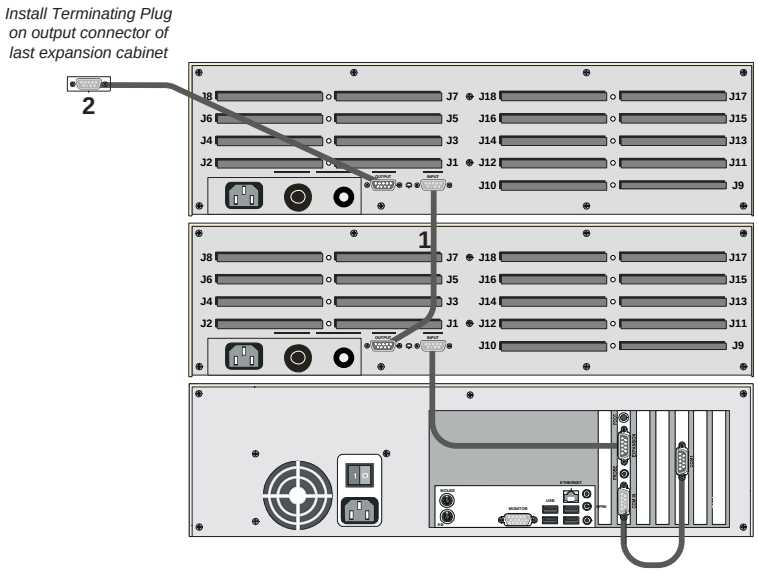


Figure 8. Multiple Expansion Cabinet Hookup

Series 90L4/Series 90L8/Series 90H8 Scanner Control

The Scanner Control Boards in the Series 90L4, Series 90L8 and Series 90H8 are designed to communicate through a serial port (COM) instead of a Cablescan I/O board. Since a PC serial port cannot be daisy chained, the Series 90L4, Series 90L8 and Series 90H8 are limited to one cabinet (512 test points or 1024 test points for the Series 90L8). For Series 90L4, Series 90L8 and Series 90H8, the other external signals, which include the footswitch and wrist strap connections, and the remote signals, are available on the PC's parallel (LPT) ports or secondary serial port(COM), controlled by Series 90 TestRite software. Refer to the section on Remote Signals for pin assignments.

Series 90L4/L8/H8 Connection Procedure

A Series 90L4/90L8/90H8 can be connected to a PC using either a serial port or USB port on the PC.

Connecting to Serial Port on PC

Arrange the Series 90L4/90L8/90H8 alongside your PC. Connect the power cords as shown in Figure 9, and as described below:

1. Verify power switch on rear panel is in OFF position.
2. Connect power cord (part number 9200016) from power connector (male) on rear panel to an AC power source (100 to 220V~).
3. Connect PC serial port to and tester serial port with 9-conductor cable (9100069).
4. Connect PC to appropriate power source in accordance with PC instruction manual.

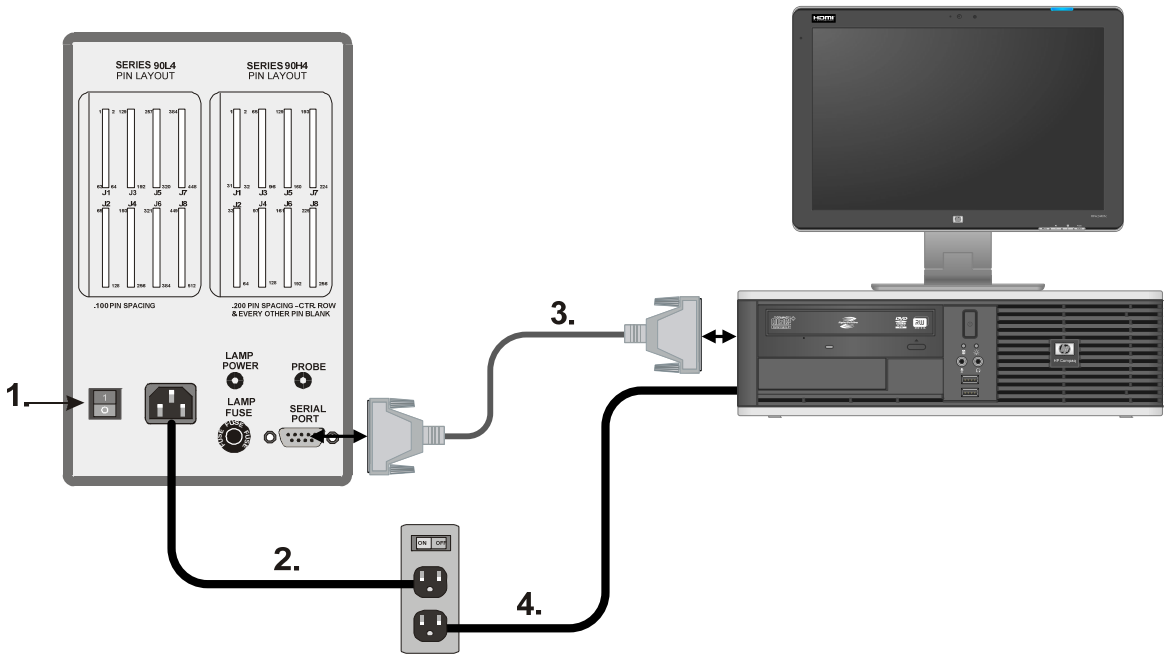


Figure 9. Series 90L4/L8/H8 Cable Connections

Connecting to USB Port on PC

Arrange the Series 90L4/90L8/90H8 alongside your PC. Connect the power cords as shown in Figure 10, and as described below:

1. Verify power switch on rear panel is in OFF position.
2. Connect power cord (part number 9200016) from power connector (male) on rear panel to an AC power source (100 to 220V~).
3. Connect USB to serial converter (2240048) to PC.
4. Connect tester serial port to USB to serial converter with 9-conductor cable (9100069).
5. Connect PC to appropriate power source in accordance with PC instruction manual.

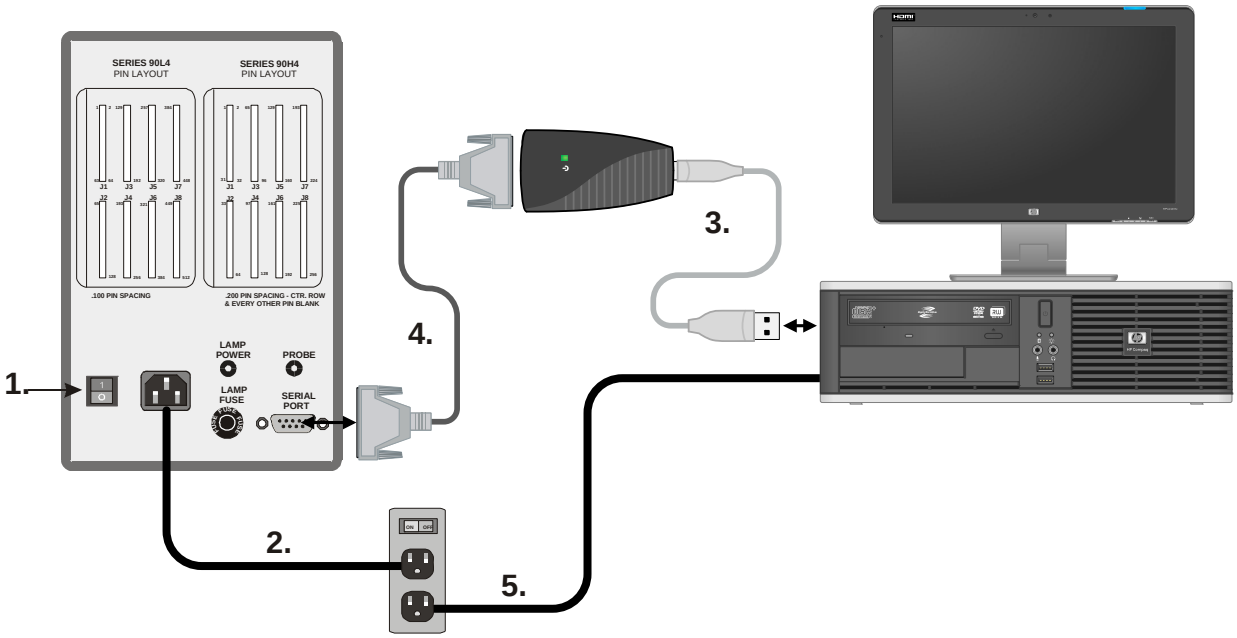


Figure 10. Series 90L4/L8/H8 Cable Connections

Grounding the Unit

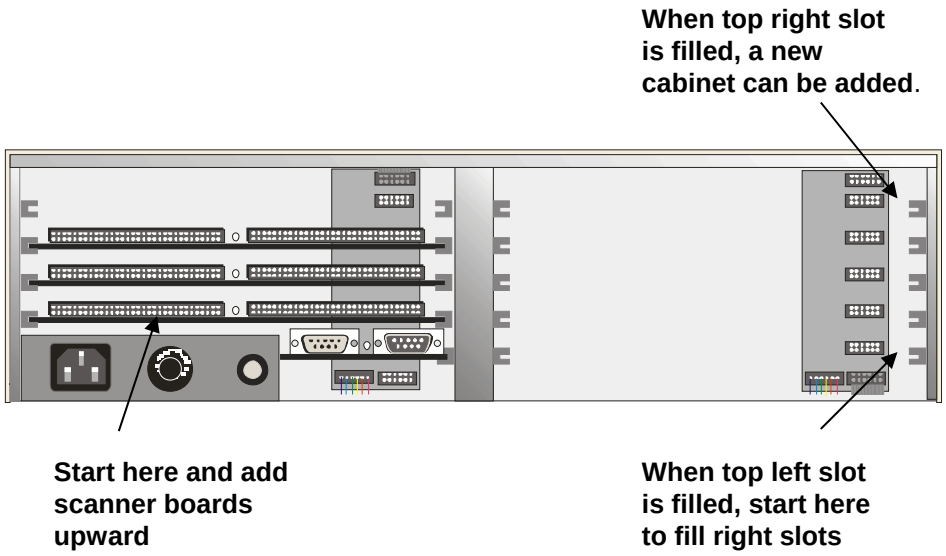
The Series 90L4/90L8/90H8 is shipped with a three-wire grounded cable. When the cable is connected to a three-wire (grounded) receptacle, it connects the chassis of the unit to ground.

ADDING SCANNER BOARDS

Scanner boards are added to the expansion cabinet to increase test point capacity. To add a scanner board to an expansion cabinet, turn off power and disconnect the power cord. (Power must be shut off on the entire system.)

Series 90E9/Series 90E32 Cabinets

On the 9-card Series 90E9 cabinet, remove the rear panel. On the 32-card Series 90E32 cabinet, the rear panel is split into two halves; remove the panel on the side where the scanner board will be installed. All scanner boards must be installed consecutively in the card cage without skipping one. As shown in Figure 11, scanner boards are installed from the bottom left and upward. When the top slot is filled, the next board is inserted into the right-hand column, at the bottom, with additional boards continuing toward the top. If more capacity is needed after the last slot has been filled, a new cabinet must be added. (Refer to Adding Expansion Cabinets, earlier in this section.)



(Three boards shown, leaving six empty slots)

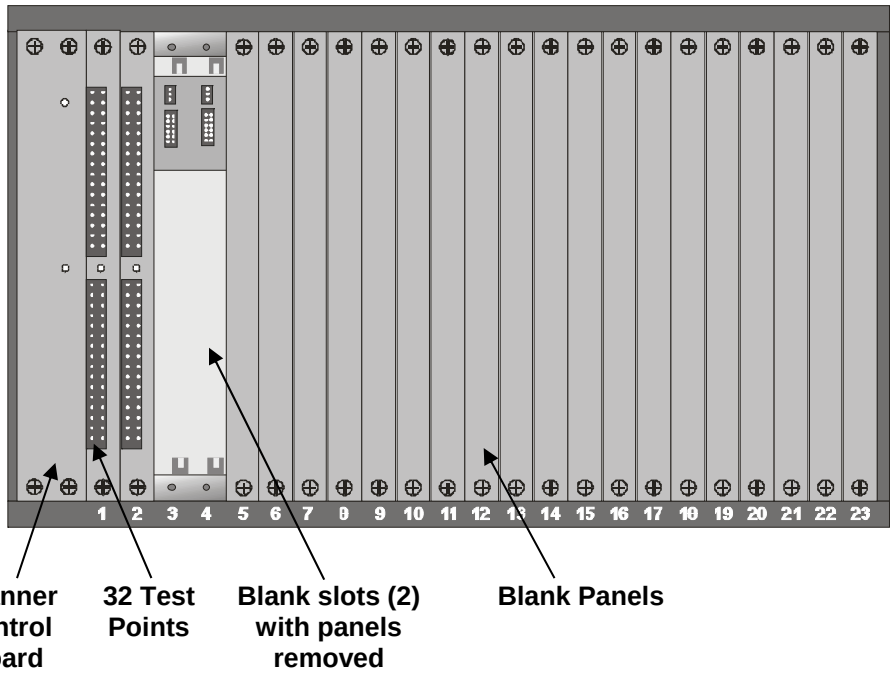
Figure *11. Series 90E9 Scanner Board Locations*

NOTE

Low-voltage Series 90 scanner boards 5210944-00 and 5210944-01 must have jumpers installed before they are inserted into the expansion cabinets. Scanner boards 5210944-02 have no jumper configuration. For jumper location and settings, refer to Scanner Board Jumpers, later in this section on page 15.

Series 90HV23 Cabinet

Starting at the left, remove blank panel for each high-voltage scanner board to be added. All scanner boards must be installed consecutively in the card cage without skipping one. As shown in Figure 12, scanner boards are installed from the left. If more capacity is needed after the last slot has been filled, a new cabinet must be added. (Refer to Adding Expansion Cabinets, earlier in this section.)



(Two boards shown, leaving twenty-one empty slots)

Figure 12. Series 90HV Scanner Board Locations

NOTE

Make sure that the terminating plug is installed on the 9-pin output connector on the rear panel. A time out error message will be displayed when the system initiates communication with the expansion cabinet if the termination plug is not installed. (Refer to Series 90/90HV Connection Procedure, earlier in this section.)

Series 90L4/L8/H8 Cabinet

Remove front panel from tester. Starting at the left side, install scanner boards consecutively in the card cage without skipping a slot, as shown in Figure 13. High-voltage scanner boards cannot be installed in a Series 90L4 or Series 90L8 and low-voltage scanner boards cannot be installed in a Series 90H8.

Each model (Series 90L4/Series 90L8 or Series 90H8) is contained in one cabinet configuration:

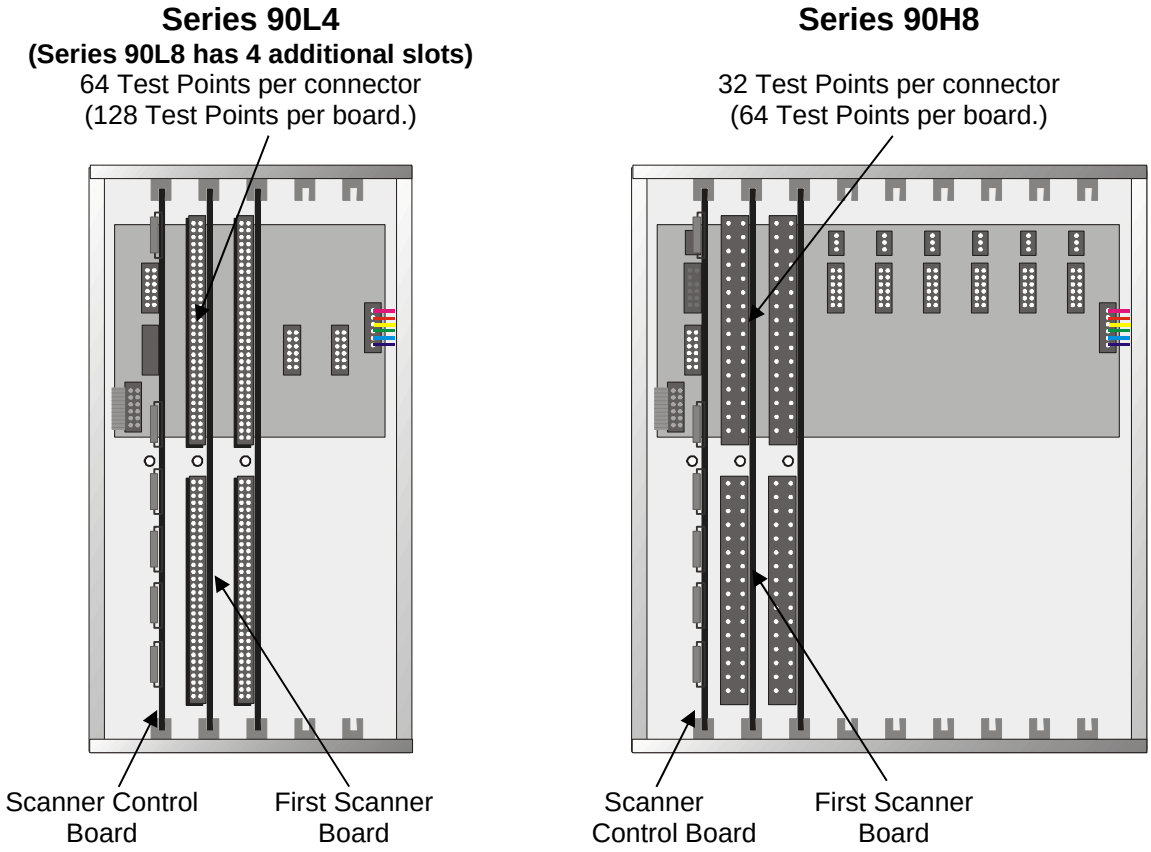


Figure *13. Series 90L4/H8 Scanner Board Locations*

NOTE

The Series 90L4/L8 low-voltage scanner boards 5210944-00 and 5210944-01 must have jumpers installed before they are inserted into the expansion cabinets. Scanner boards 5210944-02 have no jumper configuration. For jumper location and settings, refer to Scanner Board Jumpers, later in this section on page 15.

Low-voltage Scanner Board Jumpers

Each low-voltage scanner board 520944-00 and 520944-01 must have a jumper installed for configuration. (The 5210944-02 low voltage scanner boards and the high-voltage scanner boards do not have jumpers.) As illustrated, the jumper is installed across two pins of a three-pin connector located on the component side, opposite the test point connectors. This jumper can be installed in one of two locations on the three-pin connector. Each scanner board, except for the last board in the cabinet, must have a jumper install in the position for "all other boards". See Figure 14. Note that the position of the jumper varies depending upon the scanner board version. On the last board, move the jumper to the "last board" position. When multiple expansion cabinets are required, the last board of each cabinet must be jumpered as the last board.

Low-voltage scanner boards 5210944-02 have no jumpers and require no jumper configuration before installation but requires TestRite version 6.0.114 or later. Low-voltage scanner boards without jumpers can be mixed with low-voltage scanner boards with jumpers in the same expansion cabinet. Jumper requirement for low-voltage scanner boards with jumpers still applies when mixed with low-voltage scanner boards without jumpers.

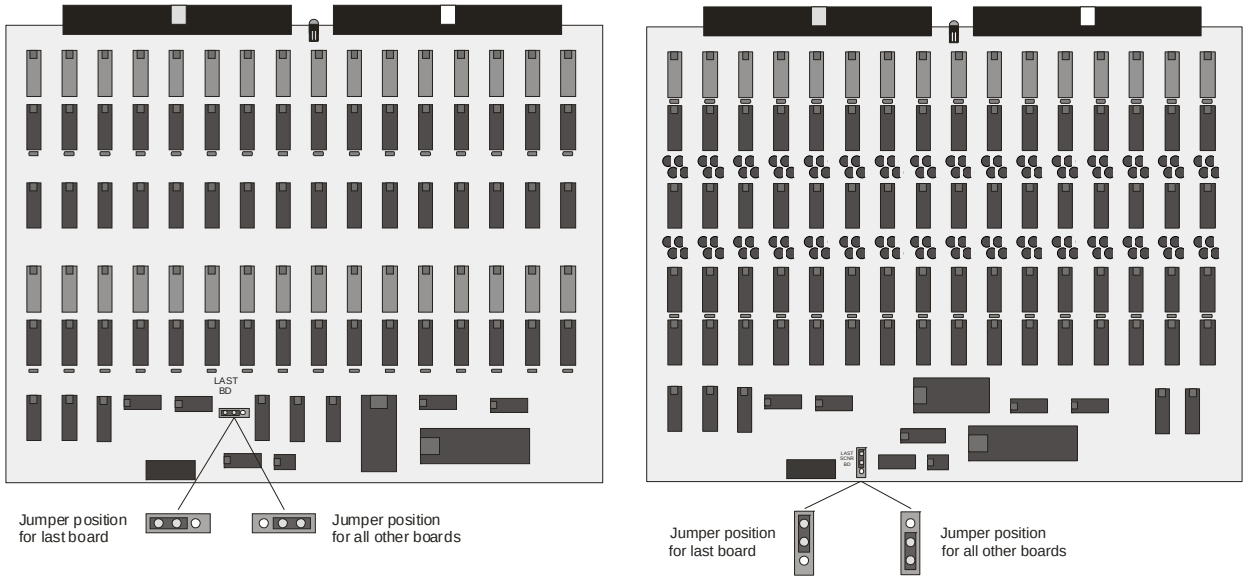
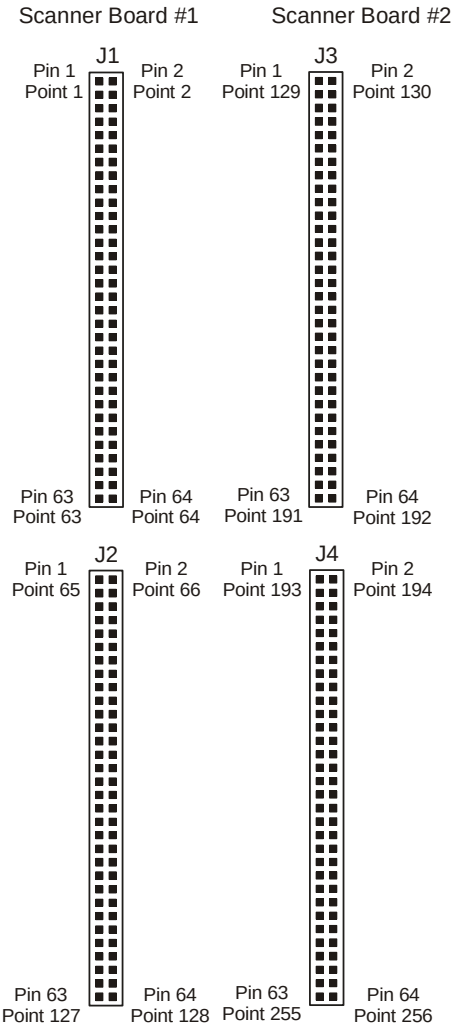


Figure 14. Scanner Board Jumpers

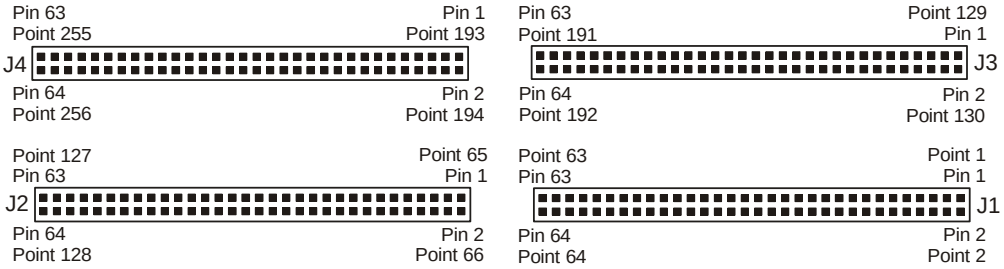
SCANNER BOARD PINS AND TEST POINT ASSIGNMENTS

SERIES 90 LOW-VOLTAGE SYSTEMS

The Series 90 low voltage test systems use scanner boards that have 128 test points each. These scanner boards use two 64-pin, .100-inch dual row pin headers to connect to the interface fixture. When making interface cables, see Figure 15 for the proper location and orientation of the connectors.



Series 90 L4/L8 *(Vertical Board Layout)*



Series 90 S9 & S32 *(Horizontal Board Layout)*

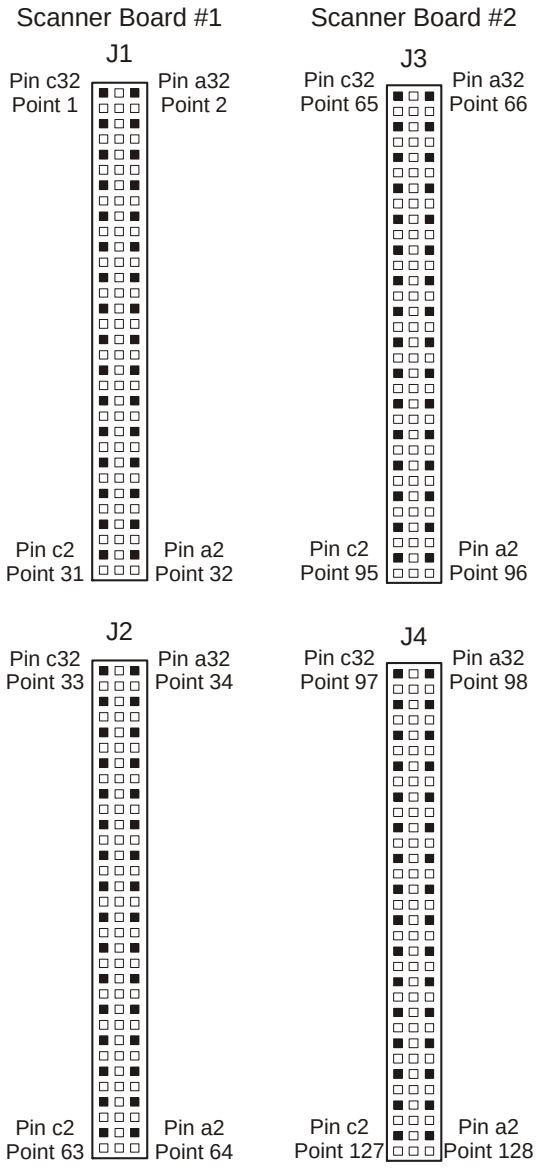
Figure 15. Low-voltage Scanner Board Layouts

SERIES 90 HIGH VOLTAGE SYSTEMS

The Series 90 high voltage test systems use scanner boards that have 64 test points each. These scanner boards use selectively loaded 96-pin DIN connectors. The connectors are loaded with pins in the even-numbered outer two rows, A and C. The center row B is not loaded. Therefore, rows 2, 4, 6, etc., are the only rows with pins. This configuration yields 32 pins per connector. The first pin of each connector is located in the upper left corner. The second pin is located in the upper right corner. See Figure 16 for the proper location and orientation of the connectors.

Note:

When making interface cables, be careful to use these locations and avoid using the pin numbers stamped on the DIN connectors.



Series 90HV & H8 *(Vertical Board Layout)*

Figure 16. High-voltage Scanner Board Layout

INTERFACE CABLE ASSEMBLIES AND CONNECTORS

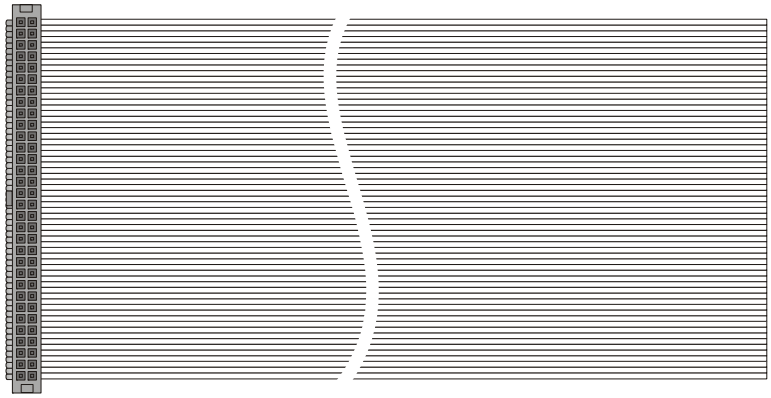
LOW-VOLTAGE INTERFACE CABLES

The Series 90 low-voltage test systems use 64-pin, AMP-Latch ribbon cable connectors to interface between the test points on the scanner boards and the assembly under test. The AMP connectors are latch-and-eject, 0.100-inch, dual-row pin headers. The latch height for the connector is .570 inches to allow a strain relief socket connector (7200481) to be used. The latch will not work with a substitute socket connector of a different height. Cablescan provides the following three 8-foot interface cable assemblies for interfacing the tester to the assembly under test:

5210914-03 Cable Assembly

The 5210914-03 cable assembly has a 64-pin socket connector (7200481) on one end, and an unterminated second end. This cable can be used by stripping back its unterminated end and soldering it to the mating connectors for the assembly under test. It can also be used to terminate a different type flat cable connector, which will then mate to a discrete version of the connector, such as a D-type, that is mounted either on the interface fixture or an adapter cable. This is the same cable assembly as 5210917-03 (shown in Figure 17), except without the second end connector 7200446.

7200481

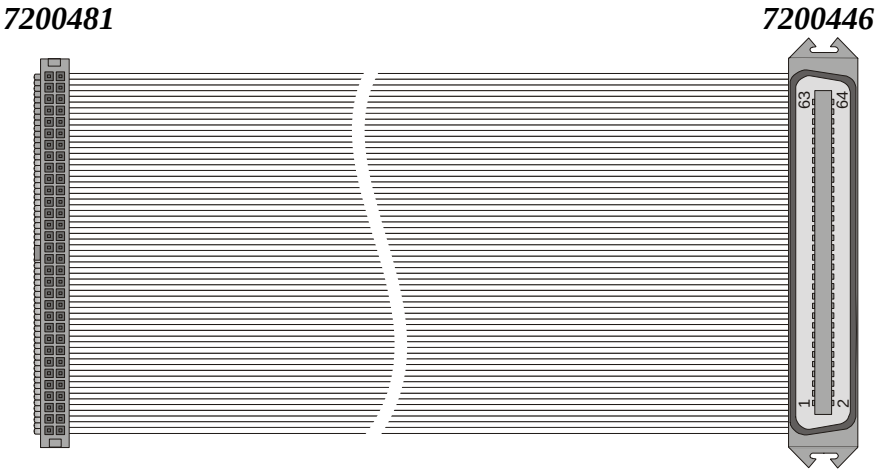


Low voltage Cable Assembly – 5210914-03

Figure 17. Low-voltage Cable Assembly – 5210914-03

5210917-03 Cable Assembly

The 5210917-03 cable assembly has a 64-pin socket connector (7200481) on one end and an AMP Champ flat cable connector (5210446) on the second end. This cable can be used to interface to a panel mountable discrete-wired type AMP Champ connector. The discrete-wired connector can then be mounted on the test fixture and used to wire the mating connectors and interfacing components on the fixture. See Figure 17, below.



Low voltage Cable Assembly – 5210917-03

Figure 17. Low-voltage Cable Assembly – 5210917-03

5210982 Cable Assembly

The 5210982 discrete-wired cable assembly (Figure 18) has a 64-pin AMP Champ IDC connector (7200449) on the first end and unterminated on the second end. This connector can be mounted on the interface fixture and used to wire the mating connectors.

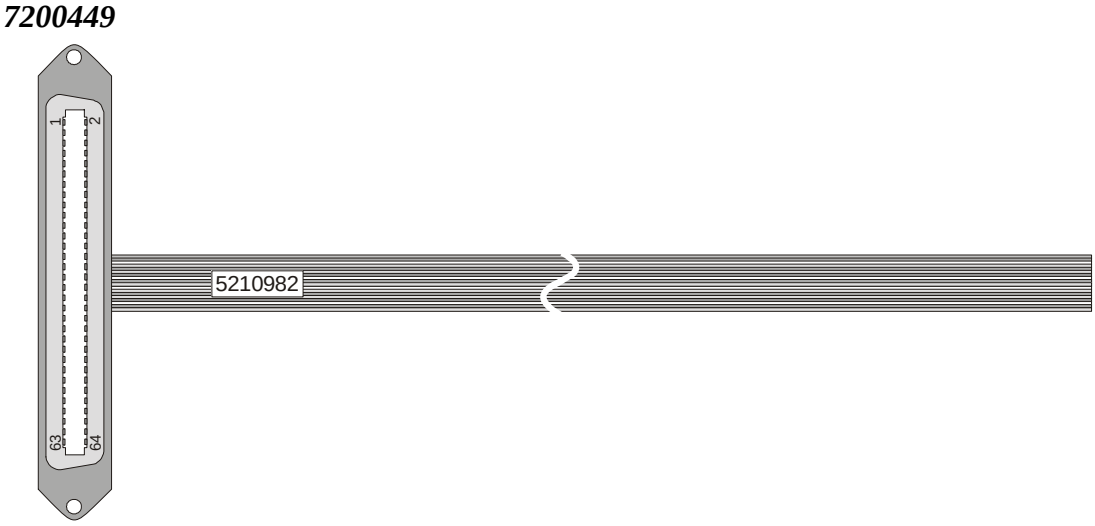


Figure 18. Low- voltage Cable Assembly – 5210982

Note:

The 7200449 is an IDC-type connector that uses special terminating tools when used without the cable. Refer to AMP literature for termination tools.

Low-voltage Interface Cable Assemblies			
CS P/N	***Description***	***First End Connector***	***Second End Connector***
5210914-3	64-conductor flat cable	7200481	*(no connector)*
5210917-3	64-conductor flat cable	7200481	7200446
5210982	64-conductor Harness Board *(discrete)*	7200449	*(no connector)*

Cablescan to AMP Conversion Table		
Cablescan Part No.	***Description***	***AMP Part No.***
7200426	64-pin latch and eject header, PCB connector	1-499141-2
7200446	64-pin male AMP Champ flat cable connector	552933-1
7200449	64-pin female AMP Champ IDC connector	2-552277-1
7200481	64-pin flat cable socket connector Strain relief part number	1-746288-2 1-499252-3

Low-voltage Cables and Components

HIGH-VOLTAGE INTERFACE CABLES AND CONNECTORS

The Series 90 high-voltage test systems use selectively loaded 96-pin DIN connectors to interface between the test points on the scanner boards and the assembly under test. For isolation purposes, the scanner board connectors have pins in only every-other position of the outer two rows. This configuration produces 32 pins per connector. Therefore, two 32-pin DIN connectors are used for each high voltage scanner board.

5211036 Connector Kit

The 5211036 connector kit is used to make high-voltage interface cables. The kit consists of the 32-pin scanner board interface DIN connector with solder tails and a connector hood. The 5211036 is used to make the 5211037 high-voltage cable assembly. See Figure 19.

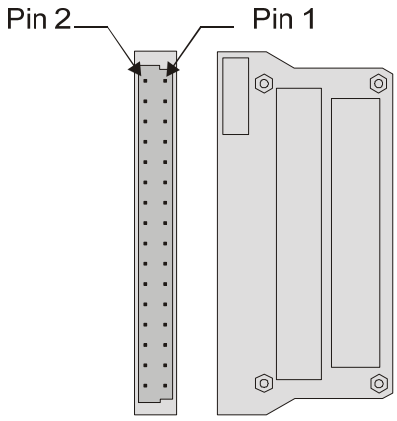


Figure 19. High-voltage Connector Kit – 5211036

5211037 Cable Assembly

The 5211037 is an eight-foot discrete wired high voltage cable assembly. It has a 32-pin male DIN connector (5211036) on one end, and the second end is unterminated. This cable can be used to terminate mating connectors for the assembly under test or a connector to interface to a test fixture. See Figure 19.

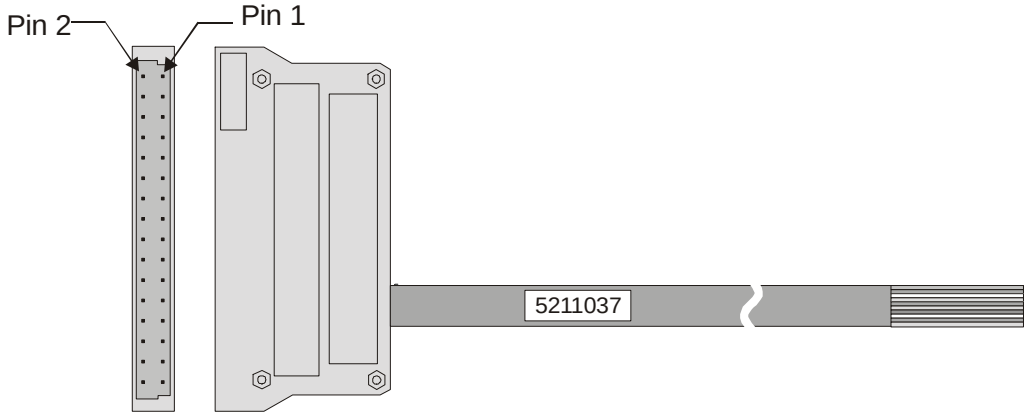


Figure 19. High-voltage Cable Assembly – 5211037

5211038 Cable Assembly

The 5211038 is a 96-conductor, eight-foot, discrete-wired, high-voltage cable assembly. It uses three, 32-conductor cable assemblies; 5211037 on one end and a 96-pin ZIF connector (plug) on the second end. The 96-pin ZIF plug is an ITT-600 series connector. This cable is used to interface to a test fixture.

5211088 Connector Kit

The 5211088 is a 96-pin, panel-mount ZIF receptacle that mates to the 5211038 cable assembly. This receptacle generally is mounted on a harness board or test fixture and used to wire the fixture. The connector kit contains a 96-pin receptacle and 100 crimp contacts.

High-voltage Cable Assemblies			
Cablescan Part No.	***Description***	***First End Connector***	***Second End Connector***
5211037	32-conductor High Voltage Cable	5211036	*(no connector)*
5211038	96-conductor High Voltage Cable	5211037 *(x3)*	*(see ITT table)*

Components for 5211036 Connector Kit		
Cablescan Part No.	***Description***	***ITW Part No.***
5211036	32-pin DIN male connector	100-932-124
-	Strain Relief	100-000-071
-	Housing	100-000-064

Cablescan-to-ITT Cannon Part Number Conversion		
Cablescan Part No.	***Description***	***ITT Cannon Part No.***
Cable End Connector Components		
5211061	96-pin ZIF connector, plug	DL2-96P
-	96-pin ZIF connector shell kit	DL2-J/S
-	96-pin ZIF connector handle	2040016-000
-	Contacts for ZIF connectors	030-2410-001
Panel-mount Connector Components Mount on Harness Board/Fixture		
5211060	96-pin ZIF connector kit	DL2-96R
	Kit contains 100 contacts	030-2410-001

High Voltage Cables and Components

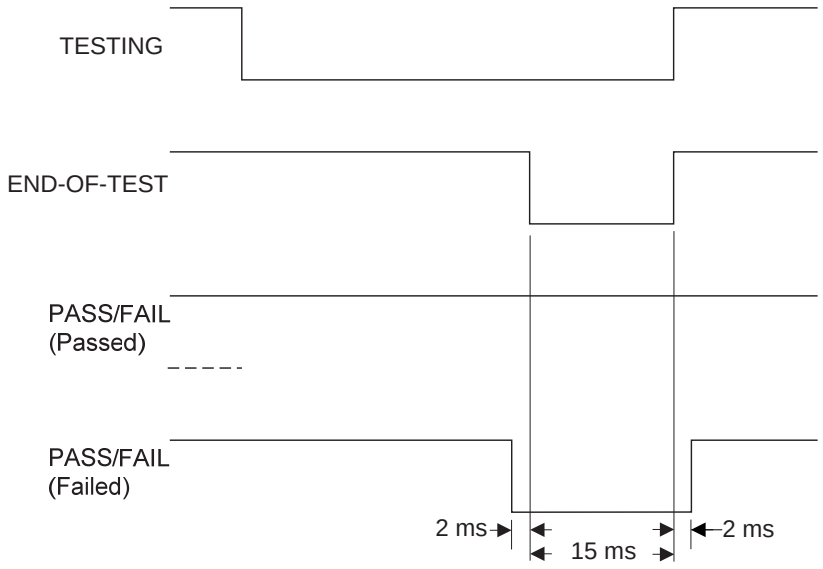
REMOTE SIGNALS

OUTPUT SIGNAL TIMING

The Series 90 provides external signals for use in controlling external devices and equipment. Refer to the following pages for locations of the signals. These signals are active during Test mode:

- TESTING - when test is in progress
- END-OF-TEST - when test is complete
- PASS/FAIL - whether test passed or failed

When a test is started, the TESTING signal changes from a logic high state to a logic low, and remains low until end of test. The END-OF-TEST signal transitions from a logic high state to a logic low state when the test is complete, and remains low for approximately 15 ms. After 15 ms, END-OF-TEST and TESTING signals return to a logic high state. A PASS/FAIL test status signal is output and occurs approximately 2 ms before END-OF-TEST transitions to low. If the test passed, the signal remains high. If the test failed, the signal transitions to a logic low. (External circuits can use END-OF-TEST to latch the PASS/FAIL test status signal.) The PASS/FAIL output is held for approximately 2 ms after END-OF-TEST and TESTING return to the high state. The time diagram is shown in See Figure 20 below:



Note: Timing is approximate and can vary between systems.

Figure 20. Signal Timing Diagram

INPUT SIGNALS

The Series 90 recognizes the following input signals:

- FOOT SWITCH - initiates a test if idle or advances from a pause condition
- EXECUTE TEST - initiates a test if idle
- ABORT – aborts the current operation

INPUT/OUTPUT CONNECTORS

The input and output signals can be directed to the follow ports:

- 9 Pin D Connector Serial Ports on PC. COM1, COM2, …
- 25 Pin D Connector Parallel Ports on PC. LPT1, LPT2, …
- 15 Pin D Connector I/O Port on Cablescan ISA Serial I/O Board.

Selections of I/O port are made in the Tester Settings dialog box in TestRite. See Series 90 Software Manual for more information.

9 Pin D Connector Serial Port

TestRite can utilize up to two serial ports for I/O signals. These are referred to as primary and secondary I/O ports.

Primary I/O Port		
Pin Number	***Function***	***Direction***
1	FOOT SWITCH	In
2		
3		
4	TESTING	Out
5	GND	
6		
7		
8		
9	ABORT	In

Secondary I/O Port		
Pin Number	***Function***	***Direction***
1	EXECUTE TEST	In
2		
3		
4	PASS/FAIL	Out
5	GND	
6		
7	END-OF-TEST	Out
8		
9		

A footswitch connection is provided on the I/O board for systems using a Cablescan System Controller. This connection becomes active when device selected for the Primary I/O Port is the same as the Communication Port.

All input signals are triggered when going from a positive to a negative state. For example, an Abort can be initiated at any time during a test cycle by having the Abort line drop from the

positive state to the negative state. Pull up resistors (10kΩ) are required on all input signals after the remote signals are enabled. .

25 Pin D Connector Parallel Port

TestRite can utilize a parallel port for I/O signals. Use of parallel port for I/O signals is not supported under Windows 7 and later versions of Windows.

Primary I/O Port		
Pin Number	***Function***	***Direction***
1	PASS/FAIL	Out
2		
3		
4		
5		
6		
7		
8		
9		
10	FOOT SWITCH	In
11	EXECUTE TEST	In
12		
13		
14	END-OF-TEST	Out
15		
16	TESTING	Out
17	+5VDC	
18		
19		
20		
21		
22		
23		
24		
25		

A 10kΩ pull up resistor is required from 5VDC (pin-17) and Footswitch (pin-10). Another 10kΩ pull up resistor is required between 5VDC (pin-17) and Execute Test (pin-11).

15 Pin D Connector I/O Port

Older Series 90 system, using the ISA version of the I/O Board, has a 15 pin D connector that provides the I/O signals.

Primary I/O Port		
Pin Number	***Function***	***Direction***
1	GND	
2	GND	
3	GND	
4	N/C	
5	EXECUTE TEST	In
6		
7	+5VDC	
8	+5VDC	
9	Inverted PASS/FAIL	Out
10	PASS/FAIL	Out
11	Inverted END-OF-TEST	Out
12	END-OF-TEST	Out
13	Inverted TESTING	Out
14	TESTING	Out
15		

The Foot Switch input is located on a separate connector on the same I/O board.

VACUUM FIXTURE OPERATION

Vacuum solenoids for test fixtures can be controlled using the TESTING signal. A programmed time delay can be added from the time the TESTING signal transitions to the actual start of test. This allows fixture settling time. The delay is controlled by the Startup Delay from the Series 90 Software.

TESTDIAG

THE TESTDIAG PROGRAM

TestDiag is one of three programs provided in Cablescan's TestRite software. It is primarily a test and diagnostic software for Series 90 and Series 90HV test systems. However, it can also run the built-in self-test of the standalone testers including TestMate, Model 64, Model 64x2, Model 256/PC, and Model 512. Running Self-Test from TestDiag is the same test that is run from tester front panel controls.

This chapter familiarizes you with the main components of the TestDiag screen and their use. Topics covered include:

- Starting TestDiag
- TestDiag Opening Screen
- TestDiag Menus

STARTING TESTDIAG

To run TestDiag follow the instructions below:

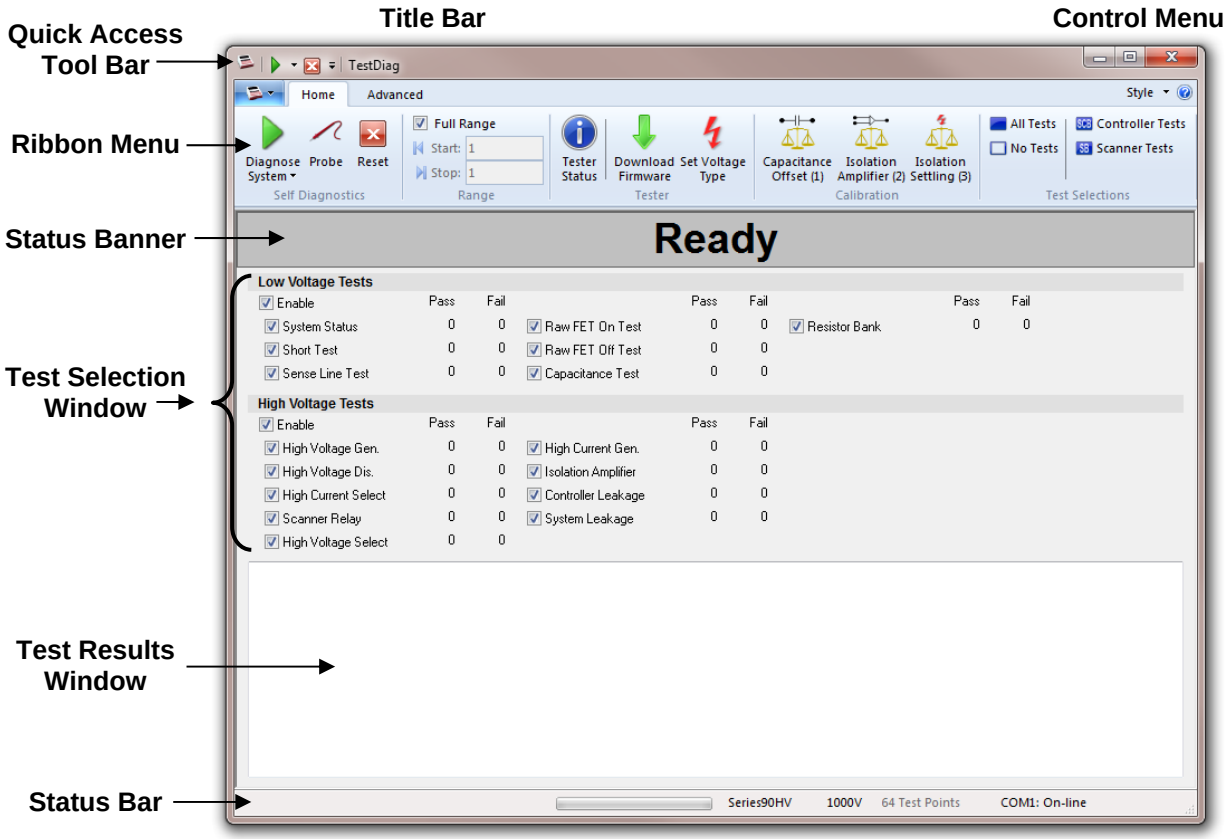
1. Click the Start button, and then point to Programs. A pop-up menu with various files and folders will open.
2. Move the pointer up or down this menu, to TestRite folder.
   A TestRite pop-up menu with various files will open.
3. Move the pointer up or down the menu, and click TestDiag. The TestDiag screen will appear, as shown below (next page). The screen elements are described in the paragraphs that follow.

Note:

TestRite and TestPanel must be closed before opening TestDiag. Since TestRite, TestPanel, and TestDiag use the same communications port, only one application can be running at one time.

TESTDIAG OPENING SCREEN

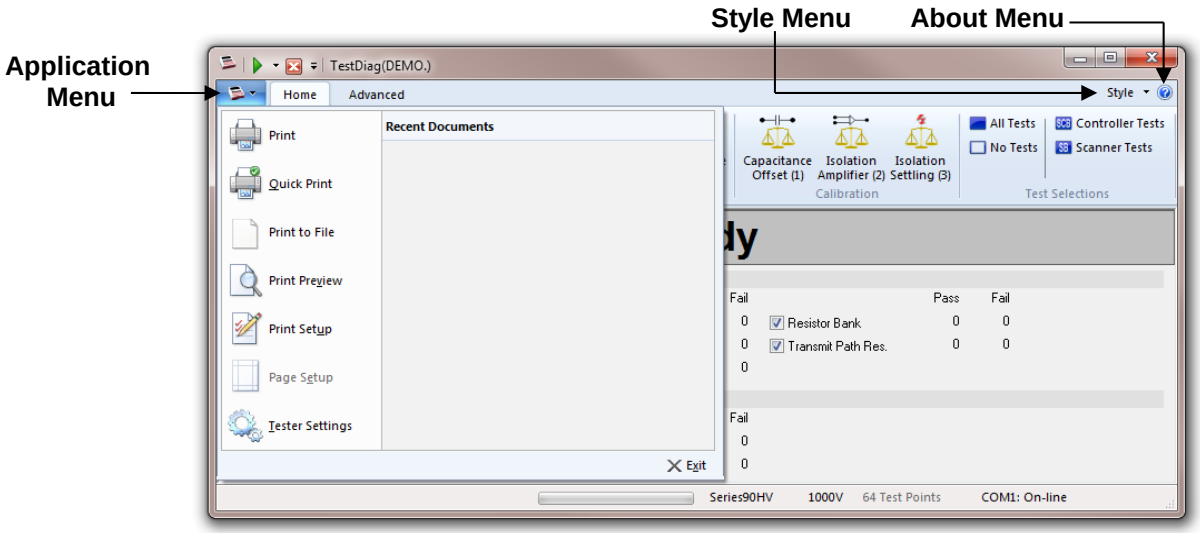
TestDiag is fast and easy to learn, and has an intuitive design: title bar, menus, message and dialog boxes, and comparable commands. TestDiag uses similar keyboard and mouse operations as most Windows applications to select objects and choose commands. Shown below is the TestDiag screen.



(TestDiag Screen)

The TestDiag screen is made up of the following main items: Quick Access Tool Bar, Title Bar, Control Menu, Ribbon Menu with two tabs, Test Results Window, and Status Bar. These items are described below.

In addition to these items the window contains menu access for Style, About, and Application Menus by clicking a appropriate button. Clicking the Application Menu opens the menu as shown below.



Title Bar

The Title bar contains the Application name (TestDiag) and the Control Menu.

Control Menu

The Control menu has three buttons: Minimize, Maximize/Restore, and Close. The minimize button reduces the application or window to an icon on the Windows task bar. The Maximize/Restore button restores the application or window to the previous size and location. The Close button closes TestDiag.

Quick Access Tool Bar

The Quick Access Toolbar is a small, customizable toolbar that provides access to frequently used commands independent of which ribbon tab is selected. By default, the Quick Access Toolbar is located in the title bar of the application window, but it can be configured to display below the ribbon through the drop down menu to the right of the commands.

Ribbon Menu

The Ribbon Menu contains tabs with buttons and check boxes for controlling the self-diagnostic operation. The ribbon is a user interface element interface which combines the menu bar and toolbar into a single floating pane. The purpose of the ribbon is to provide quick access to commonly used tasks within the program. At the top of the ribbon includes several tabs that are used to reveal different groups of commands. For example, the TestDiag ribbon includes Home, and Advance tabs that each display a different set of commands when selected. Since the ribbon contains both TestDiag menu options and toolbar commands, it cannot be removed from the screen. However, it can be minimized to free up more screen real estate for the primary document window. To minimize the ribbon, you can either click the upside down eject icon at

the top of the ribbon or use the keyboard shortcut Control+F1. Once the ribbon has been minimized, it can be restored by clicking the same icon or using the same keyboard shortcut.

Status Banner

The Status Banner on the TestDiag screen displays the operating status of the tester and the status of the test. The display provides the following messages in color-coded backgrounds:

- Tester Off (dark gray)
- Ready (light gray)
- Testing (light gray)
- Probe Identify (light gray)
- Aborted (red)
- Pass (green)
- Fail (red)
- Waiting (light gray)

Tester Off (dark gray background) is displayed when TestDiag cannot communicate with the tester. There are four items to check when this message is displayed; power to the tester, interface cable between tester components, and the tester type and communication port settings in the Settings Command window.

Ready (light gray background) is displayed when the tester is ready to run a test.

Testing (light gray background) is displayed while the tester is performing a test and results are being sent to the Test Results window.

Probe Identify (light gray background) is displayed while the tester is in probe search mode. Any test points identified with the probe are displayed in the Test Results Window.

Aborted (red background) is displayed when a test in progress has been cancelled. A test is cancelled by selecting the Reset command

Pass (green background) is displayed after all circuits have been tested and no errors, opens, or shorts have been found.

Fail (red background) is displayed after a complete test has been performed and errors have been encountered.

Waiting (light gray background) is displayed while the tester is waiting for user input.

Test Selection Window

The Test Selection Window comprises check boxes and radio buttons to select the tests to be performed on the type of tester selected.

Test Results Window

All test results are displayed in the Test Results Window.

Status Bar

The Status Bar displays information relating to the selected tester and its online status. Leftmost field displays information about the current test performed. To the right of this field is a progress bar for the current operation. To the right of the progress bar area is the current Tester Type setting. (The Tester Type is set using the Tester Settings command in the Application menu) and tester test point count.

Application Menu

The Application Menu is the first tab in the ribbon. Clicking the Application Menu opens a drop down menu for selecting commands for tester settings and printing. These commands include Print, Print Preview, Print Setup, Print to File, and Tester Settings.

Style Menu

The Style Menu provides settings for customizing the look of the ribbon menu.

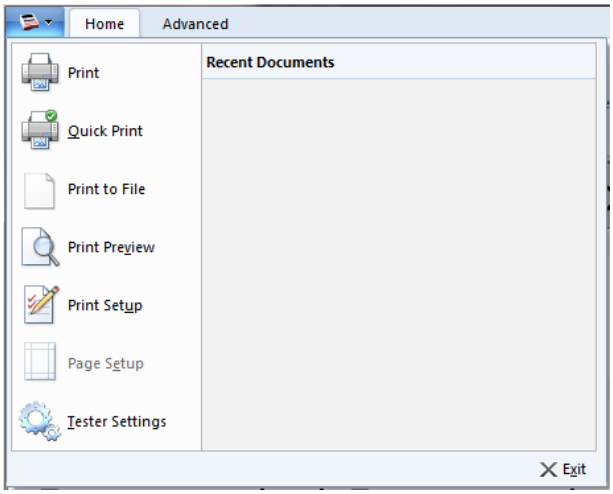
About Menu

Clicking the About Menu will bring up a dialog box containing information about the TestDiag application. Items found in the about dialog box are copyright notice, supported tester models and link to information about the registered user.

APPLICATION MENU

The Application Menu is opened by clicking the tester icon on the left of the ribbon menu. The Application Menu provides buttons for printing test results, printing to text files, previewing before printing, and printer setup.

The Application Menu also provides a button for accessing Tester Settings which are described below.



Print

Print command opens a print dialog box displaying the current printer selected and how the printout will be printed. After making any necessary changes to the printer, press OK to print the contents of the test results.

Quick Print

Quick Print command sends the test results directly to the default printer.

Print to File

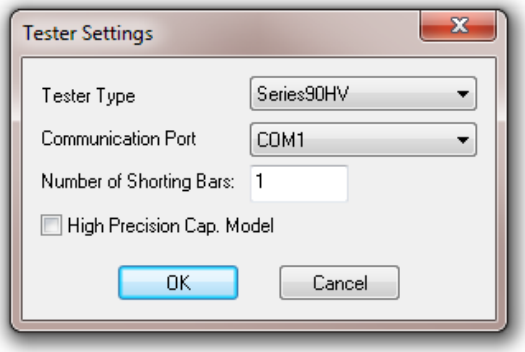
Print to File command saves the content of the Test Result Window in a text file. This can be useful when archiving or sharing the self-diagnostic test results.

Print Preview

Print Preview command opens a window displaying the test results on a simulated printout so that it can be viewed before printing. Press either the printer icon to print the results or press the close button to cancel the and close the window.

Tester Settings

The tester settings command opens a Tester Settings dialog box for specifying the type of tester connected, the communication (COM) port used on the PC, the number of available shorting bars, and a selection that specifies if the connected tester is a high precision capacitance model.



Tester Type

Specifies the type of tester that is connected. Tester Type is selected by clicking the drop-down list. The Status bar on the TestDiag screen will display the selected tester model.

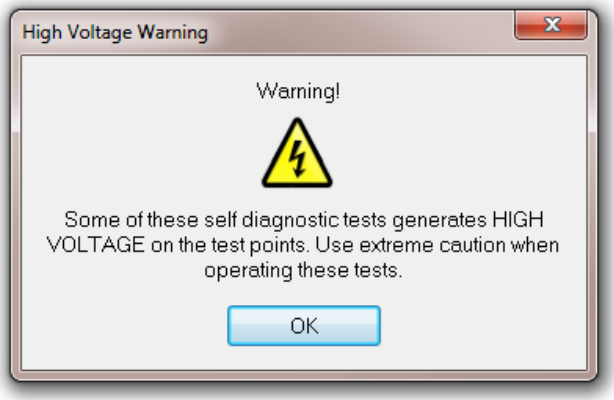
Communication Port

Specifies PC port connected to the tester. The Communication port is selected by clicking the drop-down list. The Status bar will display the port specified and will display "On-line" if PC and tester are communicating.

High Precision Cap. Model

Selects if the connected tester is a high precision capacitance model, 5210973-03.

After selecting the Tester Type and the Communication Port, click the OK button and the Tester Settings window will close. A warning window will open if the Tester Type was set to Series 90HV.



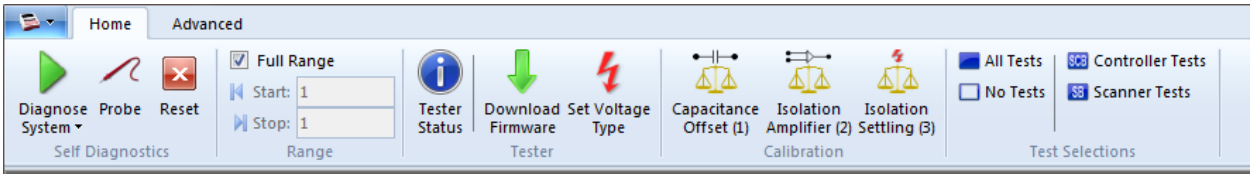
High Voltage Warning

Caution must be taken when performing diagnostic tests on high voltage systems. The Series 90 high voltage system generates up to 1500 vdc, and during testing, applies 1500 vdc to the scanner board connectors. Keep hands clear of tester while tests are running. Click on the Reset button to stop the test before making a setup change.

RIBBON MENU

The TestRite ribbon menu contains two tabs for setting up how the test is run, what tests to run, and running the test. As in other Windows applications, controls for commands that do not apply to the situation or to the type of tester at the time are grayed out and cannot be selected. TestRite ribbon menu commands are as follows:

Home Tab



After starting TestDiag, the Home tab is selected by default. This tab contains the most commonly used commands for performing self-diagnostics and calibration. These commands are described below.

Self Diagnostics Group

Self Diagnostics group contains controls for starting and stopping self-diagnostic tests and entering the Probe Search mode.

Diagnose System

Diagnose System command initiates the test according to the selections checked. If a high-voltage tester is connected, make sure all hands are clear of tester before clicking this button. A Diagnose System button is also provided in the Quick Access Tool Bar.

Loop Diagnostic Tests

Loop Diagnostic Tests button is accessible by pressing the down arrow, located below the Diagnose System button. This button is used to place the system in a continuous diagnostic test mode. The diagnostic test is stopped (aborted) by clicking the Reset button in this group.

Probe

Probe command is used to locate points on the tester. Probe can be used as a troubleshooting aid to identify points during trouble shooting.

Reset

Reset command is used to terminate the operation currently in progress. It also is used to re-establish communication between the PC and the tester. This command typically is used after power has been turned off and then back on, thereby interrupting communication between TestDiag and the tester. A Reset button is also provided in the Quick Access Tool Bar.

Range Group

Range group contains options for specifying the range of test points the self-diagnostic tests will be performed on.

Full Range

The Full Range check box is selected when all test points in the tester are to be tested. For special test setup situations, the range can be limited by unchecking the Full Range box and entering the Start, beginning test point, and the Stop, ending test point, of the range to be tested.

Start

Selects the first point in the range of test points to be tested when the Full Range box is unchecked.

Stop

Selects the last point in the range of test points to be tested when the Full Range box is unchecked.

Tester Group

Tester group contains selections for configuring and examining the tester.

Tester Status

Tester Status command opens a window to display the tester configuration; tester model, com port number, number of test points, and whether the tester is active.

Download Firmware

Download Firmware command is used to download firmware to the Scanner Control Board (SCB) from the PC to the EEPROM on the board. TestRite automatically checks the firmware in the SCB during initialization, and if the firmware requires updating, a message box opens and provides a button to download the new firmware. The Download Firmware function is used to force the firmware to be downloaded

Warning

Interrupting the tester or PC during download can corrupt the EEPROM. If corrupted, a new EEPROM must be installed on the Scanner Control Board. Contact the factory for a new EEPROM.

Set Voltage Type

Set Voltage Type is for high-voltage systems. Early Series 90HV had a maximum isolation test voltage of 1000 vdc. This was later increased to 1500 vdc. This value should be set according to the tester connected. After the tester has the latest firmware downloaded, this value will automatically be set by the software.

Calibration Group

Calibration group is used during the calibration of the tester.

Capacitance Offset (1)

Capacitance Offset Function measures the amount of capacitance in the system. This value is used as an offset to the measurements made during test to improve capacitance measurement accuracies. This function needs to be run only when the values being measured are below 1000 pf. It also needs to be run when hardware changes are made to the tester such as when adding or replacing Scanner Boards or when replacing the Scanner Control Board.

Isolation Amplifier (2)

This function is only used by the factory for special tester evaluations and troubleshooting.

Isolation Settling Amplifier (3)

Isolation Settling Amplifier function measures the high voltage measurement characteristics of the tester and configures the tester to operate at optimal performance.

Test Selections Group

Test Selections group provide buttons for quickly selecting different patterns of self-diagnostic tests.

All Tests

All Tests function selects all self-diagnostic tests.

No Tests

No Tests function deselects, unchecks, all self-diagnostic tests. This is a quick way to uncheck all the test boxes and is used when only one or two tests are to be tested. Proceed by checking the tests that are to be run.

Controller Tests

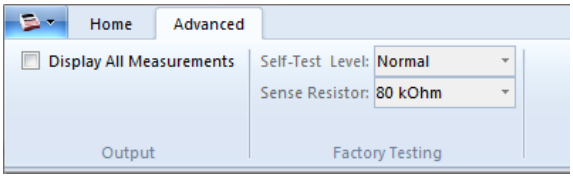
Controller Tests function selects all self-diagnostic tests related to the Scanner Controller Board in the tester. All other self-diagnostic tests will be deselected.

Scanner Tests

Scanner Tests function selects all self-diagnostic tests related to the Scanner Boards in the tester. All other self-diagnostic tests will be deselected.

Advanced Tab

Advanced Tab is the second ribbon menu tab and contains controls for displaying measurements and special factory settings.



Output Group

Output group contains a control for displaying all measurements performed by the self-diagnostic tests.

Display All Measurements

Display All Measurements, when checked, displays all measurements run during the self-diagnostic tests. All measurements regardless of Pass or Fail result will be displayed in the Test Results Window. When unchecked only failed tests and results are displayed.

Factory Testing

This function is only used by the factory for special tester evaluations and troubleshooting.

Style Menu

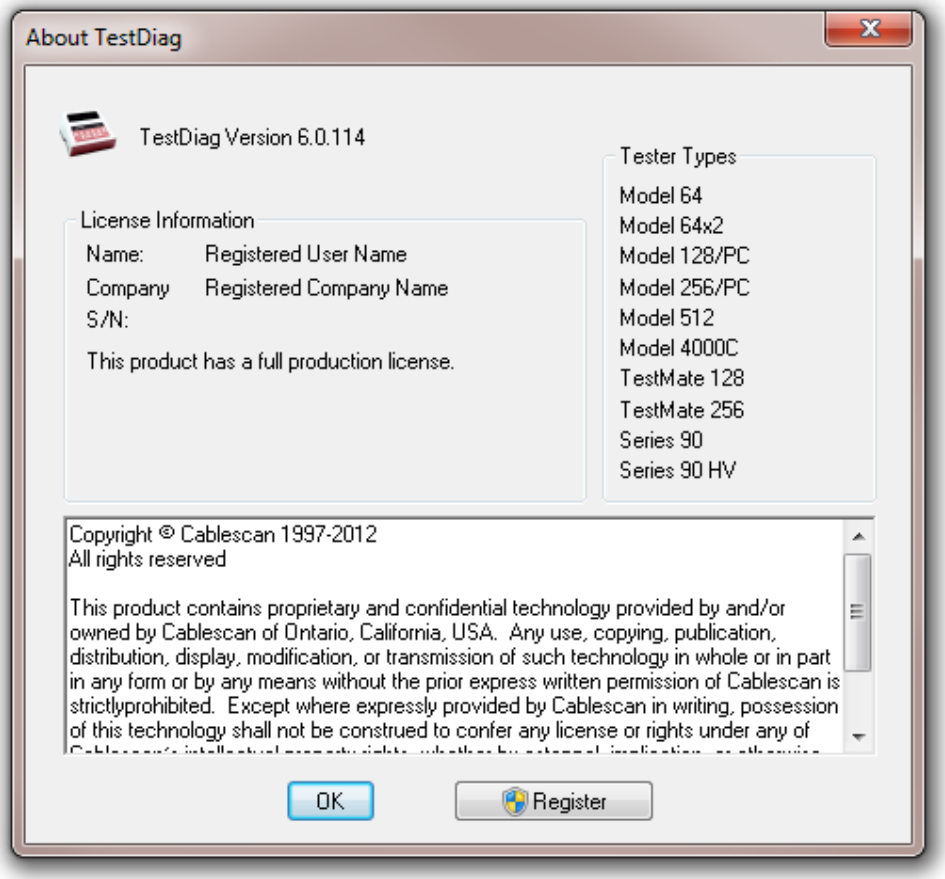
The style menu is used to change the look of the TestDiag window. Clicking the Style menu opens a selection list with the following choices:

- Office 2007 (Blue Style)
- Office 2007 (Black Style)
- Office 2007 (Silver Style)
- Office 2007 (Aqua Style)
- Windows 7

The Windows 7 style is selected by default.

About Menu

Clicking the About Menu opens a dialog box with information about the registered user and supported tester types.



Register

Clicking the Register button opens a dialog box for changing the registered user name, the company name, and the serial number.

DIAGNOSTIC TESTS

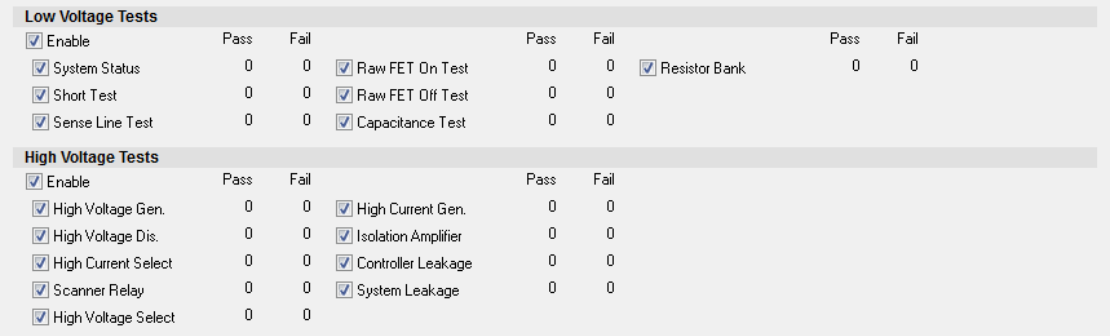
Diagnostic tests can be performed on all Cablescan testers that are capable of interfacing to TestRite software. TestDiag automatically configures the Test Selection Window for, and provides tests based on, the type of tester selected from the Tester/Settings window. Functions that do not apply to the situation or tester type at the time are grayed out and cannot be selected.

Note:

Interface cables between the tester and the test fixture must be disconnected while running diagnostics.

TEST SELECTION WINDOW

The Test Selection Window comprises check boxes and radio buttons to select the tests to be performed on the type of tester selected. (See previous section for selecting the type of tester.) Since TestMate, Model 64, Model 64x2, Model 128/PC, Model 256/PC, and Model 512 have built-in self-test routines, all of their check boxes on the TestDiag screen are grayed out. The check boxes on the TestDiag screen pertain only to the Series 90 systems. The screen is divided into two types of tests: low voltage and high voltage. Low-voltage Tests are performed on both low-voltage and high-voltage Series 90 testers. High-voltage Tests are special tests that are performed on only the high-voltage Series 90 testers. When the tester type is set to Series 90, the High-voltage Tests are grayed out. When the tester type is set to Series 90HV, none of the Test check boxes are grayed out. However, a group of tests, Low Voltage or High Voltage, can be disabled (grayed out) by unchecking the Enable check box in the specific group.



(Test Selection Window)

LOW-VOLTAGE TESTS

Application

Low Voltage Tests are basic Series 90 test functions and are run on both low voltage and high voltage Series 90 systems. Low-voltage Tests are available when the tester type is set to Series 90 or Series 90HV. The Low-voltage Tests are described below:

Test Descriptions

Enable

Enable is used to turn on or off the low-voltage tests without requiring the check boxes for each test to be unchecked. Enable can be unchecked while testing a high-voltage system and only high-voltage tests are to be run.

System Status

System Status tests the following voltages and circuits and reports errors accordingly:

- VCC Voltage
- Ground Voltage
- +6.0V Voltage
- AD Reference Voltage
- +2.0V Voltage
- -5.0V Voltage
- RAM on the controller card
- Scanner Assign Errors

Short Test

Short Test performs shorts tests between all test points on the scanner boards. (Interface cables must be disconnected during diagnostics.)

Sense Line Test

Sense Line Test verifies isolation and noise levels for each test point.

Raw FET On Test

Raw FET On Test verifies FET On condition for each test point by activating its 5-volt driver and verifying that the FET pulls the signal to ground.

Raw FET Off Test

Raw FET Off Test verifies FET Off condition for each test point by activating its 5-volt driver and verifying that the signal is not pulled to ground.

Capacitance Test

Capacitance Test verifies the capacitance for each test point. The result of this test is only important in case the tester will be used to measure capacitors.

Resistor Bank

TestDiag uses a set of thirteen fixed resistors to verify the accuracy of the tester. These values were selected to test the full range of the tester and each current source. A schematic of the resistor bank is provided in Appendix A.

HIGH-VOLTAGE TESTS

Application

High-voltage tests are available when the tester type is set to Series 90HV. The high-voltage tests are performed on the high-voltage circuits after the low voltage tests are run. Some of the high voltage tests require a shorting bar to be installed and other tests require a resistor bank to be installed. Message windows open to indicate when the shorting bar or resistor bank is to be installed or removed. It is safe to make these changes to the system while it is paused with the message window opened; however, when the system is running, there will be times that 1500 vdc will be applied to the test points.

Test Descriptions

There are 9 separate tests for the high-voltage circuits. During diagnostic testing, the results of each test are displayed in the Test Results window.

Enable

Enable is used to turn on or off the high voltage tests without requiring each test to be unchecked. Enable can be unchecked while running only the low-voltage tests on a high voltage system.

High-Voltage Gen

High-Voltage Generator verifies the output voltage and the speed of the high-voltage generator. It measures the read back voltage and the ramp-up time.

High Voltage Dis

High Voltage Discharge verifies that the high-voltage discharge circuit is functional. It measures the time required to reach the discharge level from the charge level.

High Current Select

High Current Select verifies the operation of the high-current-select relay and makes a pretest of the high-current generator.

Scanner Relay

Scanner Relay verifies the operation and resistance of the scanner board relays using both low-current and high current sources. This test requires all points within the test range to be shorted together.

High Voltage Select

High Voltage Select verifies the operation of the high-voltage-select relay. This test requires a shorting bar to be installed.

High Current Gen

High Current Generator verifies the operation of the high-current generator. This test requires a shorting bar to be installed.

Isolation Amplifier

Isolation Amplifier tests the performance of the isolation amplifier and the high-voltage-generator when loaded. This test uses a 100Mohm load resistor between test point 1 and test point 57.

Controller Leakage

Controller Leakage tests for high-voltage leakages on the scanner control board. During this test the high-voltage-select relay is deactivated to isolate the control board from the scanner boards.

System Leakage

System Leakage tests the high-voltage leakage in the complete system. The high-voltage-select relay is activated to connect the scanner boards.

SERIES 90 CALIBRATION

PURPOSE

The Series 90 is manufactured with precision components to eliminate manual adjustments to maintain system accuracy. Calibration of the Series 90 consists of running diagnostic tests to verify the tester meets specifications. Measurement accuracy is a function of fixed precision components on the Scanner Control board. Measurement inaccuracies of the Series 90 are caused by either a component failure or a component out of specifications.

Each time the Series 90 is powered On, it performs a self-test and verifies the test reference voltage against an internal precision fixed voltage reference. If the test reference voltage is out of specifications, a warning message is displayed.

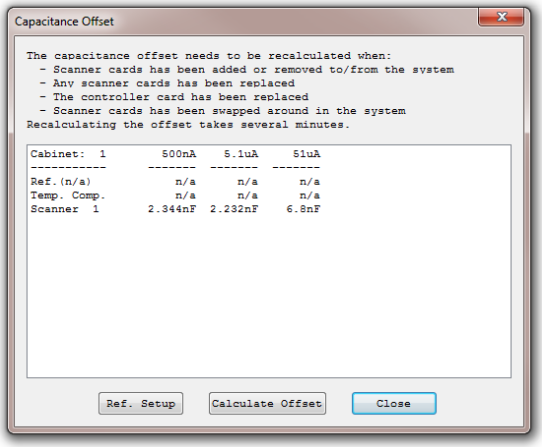
Cablescan recommends periodic testing of the Series 90 test points using the diagnostic tests in TestDiag. Running the Low Voltage components test selection verifies the operation of all test points in the system. This test verifies that an open or short displayed during regular operation is not caused by a faulty test point. The Series 90 must be returned to Cablescan for repair if the tester fails to pass diagnostics.

Measurement accuracy is verified using several resistance values connected across specific test points. The resistor values and the test point assignments are provided in the schematic in Appendix A. These resistors are referenced in the software as the Resistor Bank. A Resistor Bank can easily be made by soldering the resistors to a spare scanner board mating connector. The resistors should be one percent and should be tested before each calibration using a calibrated meter. A calibration board is also available from Cablescan and is shown in Appendix B. To perform a verification (calibration) test, follow the test procedures below. For the high-voltage Series 90 testers, run both the low-voltage and high-voltage test procedures.

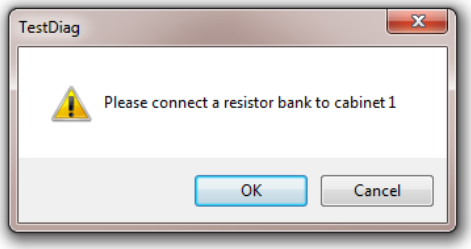
Low-voltage Test Procedure

The following steps are performed while running the diagnostic tests. The check box for each of the low-voltage tests below is assumed checked.

1. Remove all interface cables from scanner board connectors.
2. From the Calibration Group in the Home Tab, click Capacitance Offset (1) button. The Capacitance Offset dialog box, shown to the right, will open

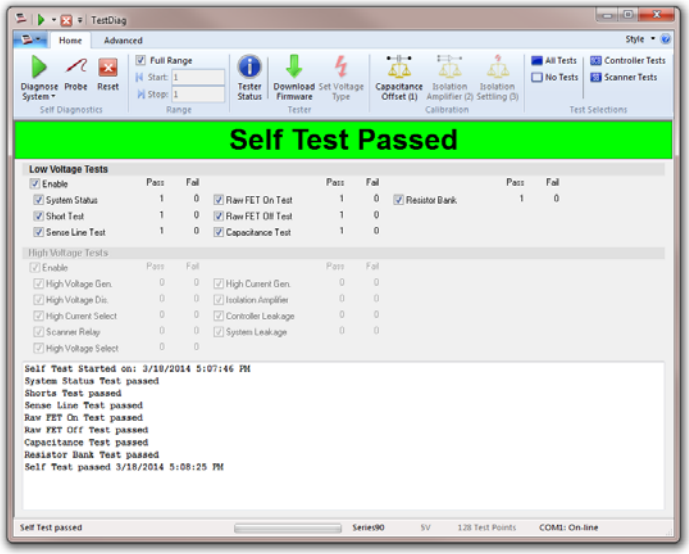


3. From the bottom of the Capacitance Offset dialog box, click Calculate Offset button.
4. After capacitance offset is complete and measurements are displayed, click Close button.
5. From the Self Diagnostic Group in the Home Tab, click the Diagnose System button.
6. A message box opens prompting to remove shorting bars and resistor banks. Remove all connections to the scanner boards.
7. **Warning**: Keep hands clear while this test is being run and click OK.
8. TestDiag performs several tests on various circuit components. Verify Passed is displayed after each of the following tests:
   - System Status Test
   - Shorts Test
   - Sense Line Test
   - Raw FET On Test
   - Raw FET Off Test
   - Capacitance Test
9. TestDiag pauses and displays a message box



prompting to install resistor bank on first scanner board connector (J1). Install Calibration board using connectors opposite of side marked "Shorting Bar."

10. Click OK, and verify Resistor Bank test passes.
11. Verify Self-Test passed. If all tests pass, Test Results window will display as shown.



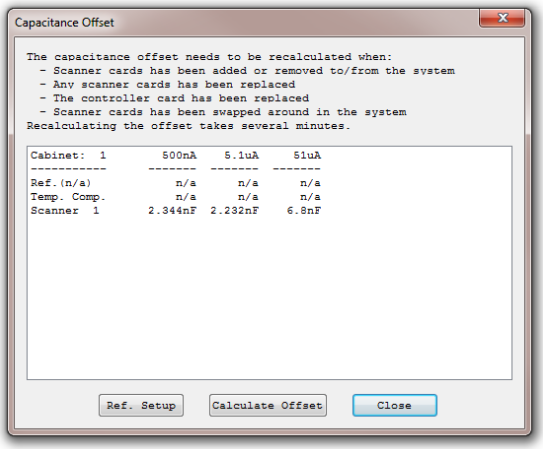
High-voltage Test Procedure

The following steps are performed while running the diagnostic tests. The check box for each of the high-voltage tests below is assumed checked.

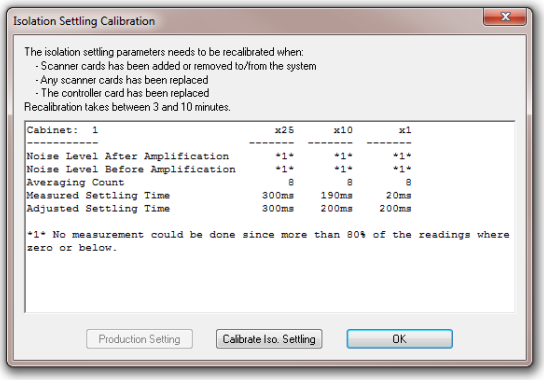
High Voltage Warning

Caution must be taken when performing diagnostic tests on high-voltage systems. The Series 90 high-voltage system generates up to 1500 vdc, and during testing applies 1500 vdc to the scanner board connectors. Keep hands clear of tester while tests are running. Make setup changes only when a message window indicates to install or remove shorting blocks or resistor banks.

1. Remove all interface cables from scanner board connectors.
2. From the Calibration Group in the Home Tab, click Capacitance Offset (1) button. The Capacitance Offset dialog box, shown to the right, will open



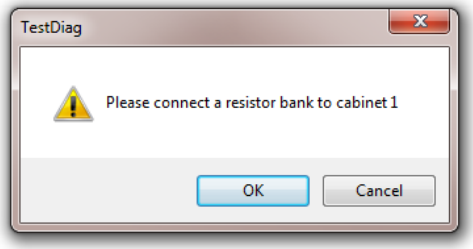
3. From the bottom of the Capacitance Offset dialog box, click Calculate Offset button.
4. After capacitance offset is complete and measurements are displayed, click Close button.
5. From the Calibration Group in the Home Tab, click Isolation Settling (3) button. A Isolation Settling Calibration message box will open as shown to the right.



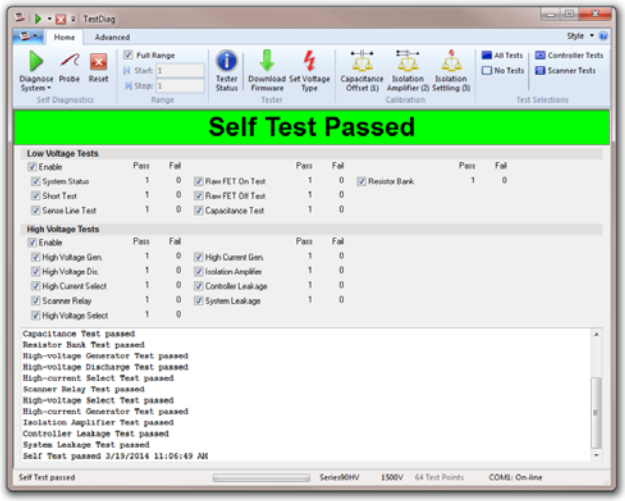
6. Click the Calibrate Iso. Settling button.
7. After isolation settling is complete and measurements are displayed, click OK button. The isolation settling can take up to 10 minutes to complete.
8. From the Self Diagnostic Group in the Home Tab, click the Diagnose System button.
9. . A message box opens prompting to remove shorting bars and resistor banks. Remove all connections to the scanner boards.
10. **Warning**: Keep hands clear while this test is being run and click OK.
11. TestDiag performs several tests on various circuit components. Verify that Passed is displayed after each of the following tests:

- System Status Test
- Shorts Test
- Sense Line Test
- Capacitance Test
- Raw FET On Test
- Raw FET Off Test

12. TestDiag pauses and displays a message box prompting to install resistor bank on first scanner board connector (J1). Install Calibration board using connectors opposite of side marked "Shorting Bar."



13. Click OK, and verify Resistor Bank test passes.
14. TestDiag pauses and displays a message box prompting to remove shorting bars and resistor banks. Remove all connections to the scanner boards and click OK.
15. Verify High Voltage Generator test passes
16. Verify High Voltage Discharge test passes.
17. TestDiag pauses and displays a message box prompting to install a shorting bar (connector) on the first scanner board connector (J1). Install Calibration board using connectors marked "Shorting Bar." To make a shorting bar, use a scanner board mating connector (5211036) and solder a shorting wire across all pins.
18. TestDiag performs several tests on various high-voltage circuit components. Verify that Passed is displayed after each of the following tests:
    - Scanner Relay Test
    - High Voltage Select Test
    - High Current Generator Test
19. TestDiag pauses and displays a message box prompting to install a 100 MΩ resistor between test point 1 and test point 57. Install Calibration board using connectors opposite side marked "Shorting Bar."
20. Click OK, and verify Isolation Amplifier test passes.
21. TestDiag pauses and displays a message box prompting to remove shorting bars and resistor banks. Remove all connections to the scanner boards and click OK.
22. Verify Controller Leakage test passes.
23. Verify System Leakage test passes.
24. Verify Self-Test passed. If all tests pass, Test Results window will display as shown.



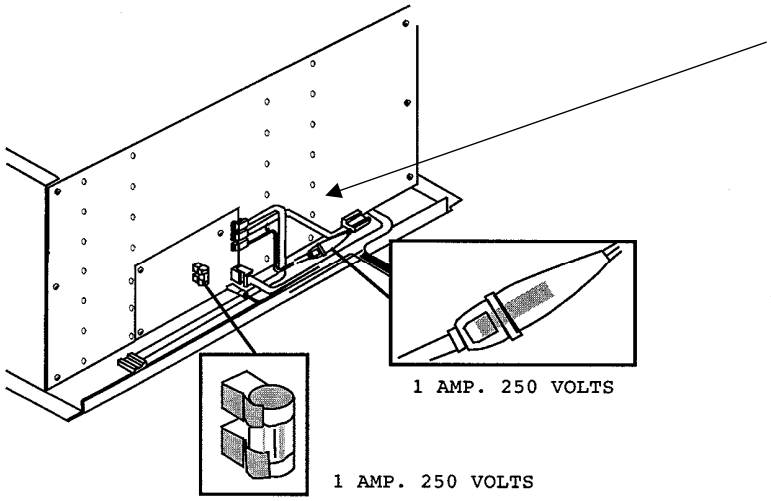
FUSE REPLACEMENT

SERIES 90S9 AND SERIES 90S32 FUSE REPLACEMENT

There are two 0.5-amp fuses in the Series 90, both in the expansion cabinet. One fuse is internal and is mounted on the power supply board. On early low-voltage Series 90 systems, the second fuse is an in-line fuse located between the lamp power connector on the rear panel and the power supply. On later Series 90 and Series 90HV, the second fuse is on the rear panel and is marked Lamp Fuse.

Early Series 90 expansion cabinets without rear panel mounted fuse holders (Figure 21)

1. Be sure power is totally disconnected from cabinet.
2. To gain access to the power supply, remove the back panel of the expansion cabinet and remove the four screws on the bottom of the cabinet nearest the sides.
3. Slide the top cover forward until it just clears the front of the unit. Do not over-extend the cover, since the front panel switch is wired to the main chassis.
4. Reach up and disconnect the switch harness, then fully remove the cover.
5. Locate the power supply and fuses on the front of the card cage assembly. Use replacement fuses with the same rating as those installed. (Replacing the fuse with a higher-rated fuse can cause permanent damage to the power supply, scanner control board, and scanner boards.)
6. Reconnect switch harness and reassemble cover and back panel.



Front of Expansion Cabinet with cover removed.

NOTE:
Early Series 90 as shown. Later Series 90 and Series 90HV fuse located on rear panel and marked Lamp Fuse.

Figure 21. Fuse Locations – Early Model Expansion Cabinet

SERIES 90L4/H8 FUSE REPLACEMENT

There are two fuses in the Series 90L4/90H8. One fuse is internal and is mounted on the power supply board. The second fuse is on the rear panel and is marked Lamp Fuse.

1. Be sure power is totally disconnected.
2. To gain access to the power supply remove the six screws on the rear panel.
3. Remove the panel and set it down with the power supply board facing up.

NOTE

When removing the rear panel, be careful not to over-extend the internal cabling.

3. Locate the fuse on the power supply board as shown in Figure 22, below. Use replacement fuse with the same rating as the one installed. (Replacing the fuse with a higher rated fuse can cause permanent damage to the power supply, scanner control board, and scanner boards.)
4. Reinstall rear panel.

Rear Panel **Inside View of Rear Panel**

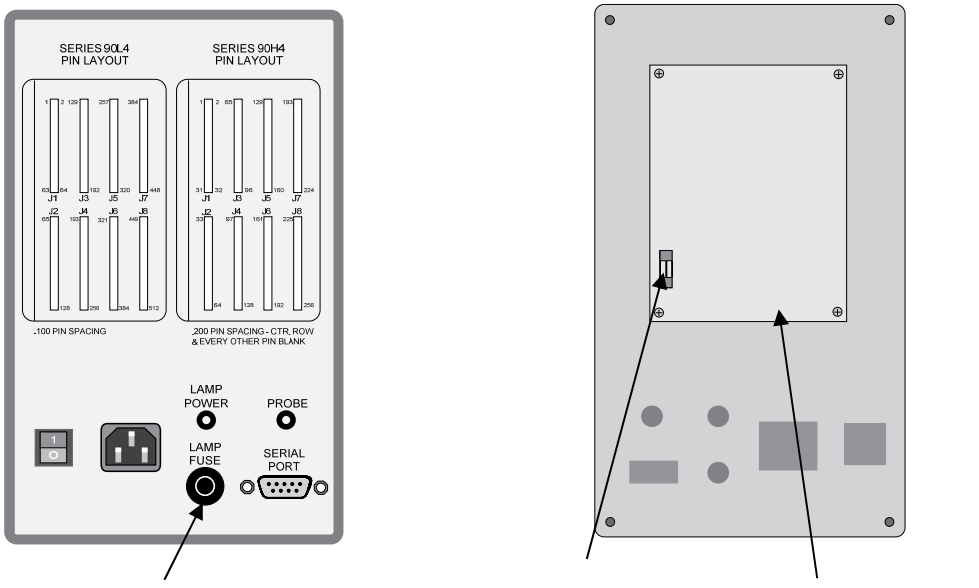


Figure 22. Series 90L4/90H8 Fuse Locations

CARE OF SERIES 90

MAINTENANCE

The most common source of trouble with the Series 90 is poor connection with the harness or circuit being tested. This problem can be prevented or reduced by routine inspection for damage, wear, or foreign matter. Be especially aware that poor connections during the learn-known-good process will prevent a complete wire list program.

Cleaning of the controls, front panels, and other surfaces may be done with any mild soap and water. All "wetted" areas must be thoroughly dried after cleaning.

WARNING

Be sure power is completely disconnected from Series 90 before cleaning and thoroughly drying unit. Damage to circuitry and/or injury to personnel could result.

REPAIR

If Series 90 requires repair due to any defect of manufacture, and if it is within the warranty period, contact Cablescan for instructions on returning it to the factory. Even if Series 90 is beyond the warranty period, and repair is necessary, it is advisable to return the unit to the factory for repair.

If it is necessary for the user to replace parts, the replacement parts must be Cablescan, Inc., parts, or parts of equivalent rating and quality.

NOTE

Please read "Warranty" in the front of this manual.

HANDLING CIRCUIT BOARDS

If a circuit board is to be handled outside the cabinet, anti-static measures must be employed. Any person handling the board must wear an anti-static 1-megohm wrist strap connected to ground. (The wrist strap supplied with the Series 90 for operator use does not have a 1-megohm resistor.) When circuit boards are removed from the cabinets, they should be placed immediately in anti-static bags. Whenever circuit boards are to be shipped, they should first be placed in anti-static bags.

SHIPPING AND STORAGE

If any of the major components (system controller, or an expansion cabinet) is to be removed from use and placed in storage or shipped, it should be packed and properly cushioned in the original shipping container and properly marked.

If the repackaged component is to be shipped to Cablescan for repair, it should be accompanied by information pertaining to the malfunction. The information should adequately describe the problem and symptoms, and should include the name and telephone number of the person to be contacted, as well as the address to which the unit is to be returned.

REPLACEMENT PARTS

The following part numbers are provided for use in ordering replacements from Cablescan:

Cable Assembly – Expansion cabinet interface 9100069
Connector – High-voltage scanner board (32 pins) 7200557
Connector – Low-voltage scanner board (64 pins) 7200426
Power Supply – Expansion cabinets 2020009
Power Cord 9100016
Scanner Board for all low-voltage models (128 test points) 5210944-01
Scanner Board for H4 & H8 – High voltage (64 test points) 5211018
Scanner Board for HV23 – High voltage (64 test points) 5211018-01
Scanner Control Board for all low-voltage models 5210948
Scanner Control Board for H4 & H8 – High voltage 5211023-01
Scanner Control Board for HV23 – High voltage 5211023-02
Series 90 Installation Manual 5900407
TestRite Software Manual for Series 90.....5900408
TestRite Software Series 90.....5211107
Series 90-E32 – Thirty-two-board expansion cabinet 5210972
Series 90-E9 – Nine-board expansion cabinet 5210963
Series 90-H23 – High-voltage twenty-three-board expansion cabinet 5211031
Series 90-H4 Front Panel Hole Cover 5501055
Series 90 Front Panel Hole Cover (all low-voltage testers) 5500902
Terminating Plug 5211116
Footswitch.....2100086
Wrist Strap and Probe Assembly Kit.....5210061
Mouse.....2240035
Monitor 5211000
Keyboard.....5210983
High Voltage Calibration Board.....5211117
Low Voltage Calibration Board.....5211118

SPECIFICATIONS

PARAMETER	LOW-VOLTAGE SERIES 90	HIGH VOLTAGE SERIES 90HV
MODELS	Series 90 S9 Series 90 S32 Series 90 L4 Series 90 L8	Series 90HV S23 Series 90 H8
TEST POINT CAPACITY	Up to 131,072 test points (in increments of 128) **Series 90 L4**: up to 512 test points **Series 90 L8**: up to 1024 test points	Up to 47,104 test points (in increments of 64) **Series 90 H8**: up to 512 test points
CONTINUITY RANGE	**2 wire test:** 1.0 Ω to 50 kΩ **4 wire test:** 1.0 Ω to 50 kΩ	**2 wire test:** 100 mΩ to 50 kΩ **4 wire test:** 10m Ω to 50 kΩ
CURRENT RANGE	512 nA to 5.12 mA (Auto ranging)	512 nA to 1.0 A
ISOLATION (Shorts Threshold)	10 Ω to 9.5 MΩ	10 Ω to 9.5MΩ @ 5 VDC 500 kΩ to 1.0 GΩ * *(* depends on test voltage)*
CONTINUITY TEST VOLTAGE	5 VDC or 200 mVDC	
ISOLATION TEST VOLTAGE	5 VDC or 200 mVDC	5 VDC to 1500 VDC or 200 mVDC
RAMP TIME	N/A	40 V/second to 10 kV/second
RESISTANCE TEST	1.11 Ω to 8.64 MΩ (± 10%± 1Ω)	
CAPACITANCE TEST	**Standard Version:** 1.11 nF to 9.09 mF (± 20%) **Precision Cap. Version:** 5.56 pF to 9.09 mF (± 20% ±9 pF)	
DIODE TEST	Voltage drop 55.6 mV to 4.36 V (±10%)	
DWELL TIME	Auto or Programmable: from 1µs to 1 minute	

SPECIFICATIONS – CONTINUED

PARAMETER	LOW-VOLTAGE SERIES 90	HIGH VOLTAGE SERIES 90HV
TEST SPEED	**Continuity:** 500 points/sec **Component:** 50 points/sec	**High Current:** 20 points/sec **Isolation:** 20 points/second* (* plus dwell & ramp-up time)
BODY CONDUCTANCE	Less than 10 µA	
LAMP/RELAY DRIVERS	Scanner boards can be assigned to drive lamps and relays. Up to 100 mA @ 5 VDC per point	Up to 1 A @ 5 VDC per point
INPUT POWER	**Series 90/90HV System Controller**: 100 to 252 V~, 5 A, 50/60 Hz. **All Series 90 Expansion Cabinets:** 100 to 252 V~, 1 A, 50/60 Hz.	

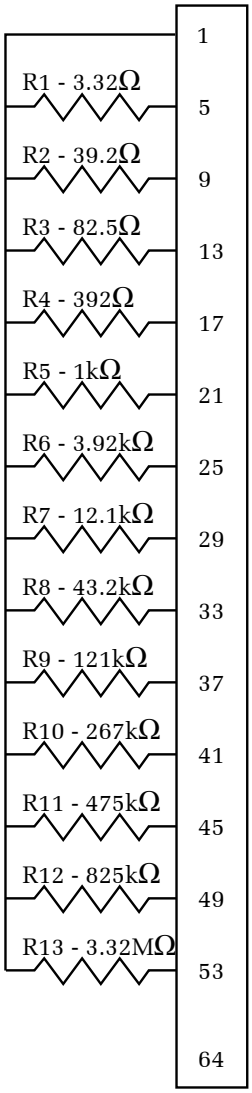
SPECIFICATIONS – CONTINUED

PARAMETER	LOW-VOLTAGE SERIES 90	HIGH VOLTAGE SERIES 90HV
DIMENSIONS/ WEIGHT (Height x Width x Depth)	**Series 90/90HV System Controller:** 6.0 x 23.5 x 15.0 inches (15.2 x 59.7 x 38.1 cm) 26 Ibs (11.8 kg)	
	Series 90-S9 Expansion: 6.0 x 23.5 x 15.0 inches (15.2 x 59.7 x 38.1 cm) 21 lbs (9.5 kg) plus 1 lb (0.5kg) per 128 points	**Series 90HV-S23 Expansion:** 14.5 x 24.1 x 12.0 inches (36.8 x 61.2 x 30.5 cm) 32 lbs (14.6 kg) plus 1.5 lbs (0.68kg) per 64 points
	Series 90-S32 Expansion: 15.0 x 23.5 x 15.0 inches (38.1 x 59.7 x 38.1 cm) 31 lbs. (14.1 kg) plus 1 lb (0.5kg) per 128 points	**Series 90H8** 12.75 x 9.75 x 12.25 inches (32.4 x 24.8 x 31.1 cm) 18 lbs. (8.2 kg) plus 1.5 lb. (0.68g) per 64 points
	Series 90L4: 12.75 x 7.0 x 12.25 inches (32.4 x 17.8 x 31.1 cm) 18 lbs. (8.2 kg) plus 1 lb. (0.5kg) per 128 points	
	Series 90L8: 12.75 x 9.75 x 12.25 inches (32.4 x 24.8 x 31.1 cm) 18 lbs. (8.2 kg) plus 1 lb. (0.5kg) per 128 points	

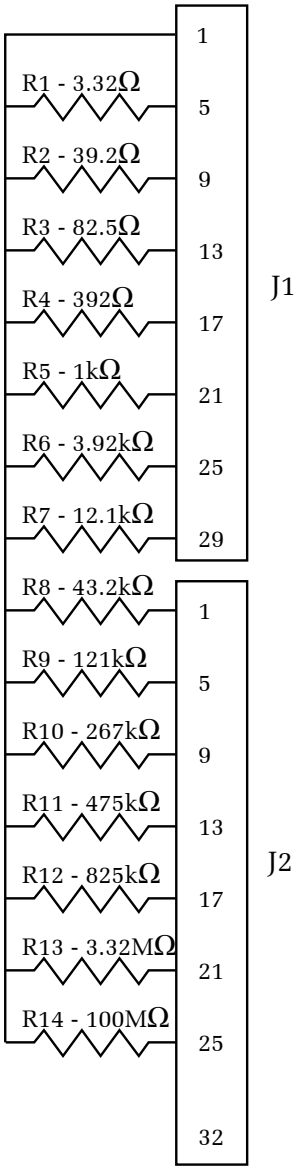
Cablescan makes product improvements as required and therefore all specifications and system configurations are subject to change without notice.

APPENDIX A - SCANNER RESISTOR BANK

A bank of resistors is used to test the scanner board and scanner control board. The resistors can be soldered directly to a mating connector, or optional calibration boards may be used. The low-voltage testers use thirteen resistors and the high-voltage testers use fourteen. The values and corresponding connector locations are shown below.



Low-voltage Resistor Bank



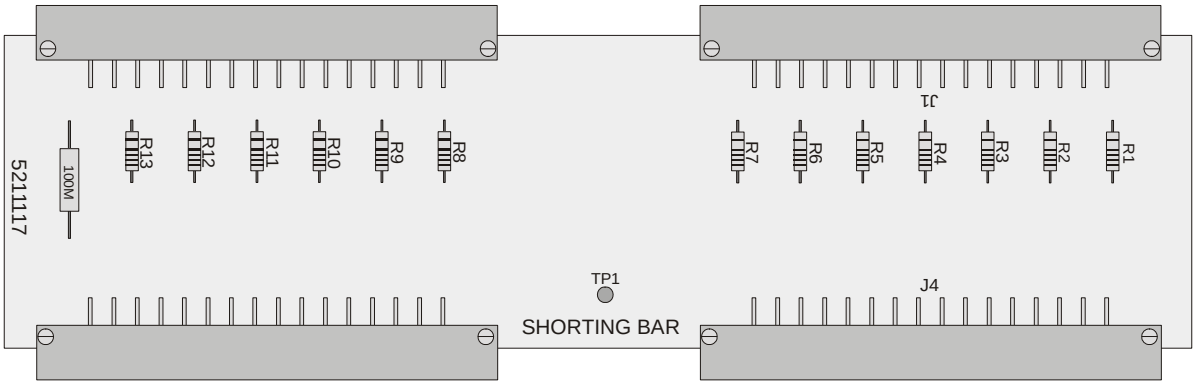
High -voltage Resistor Bank

Note:

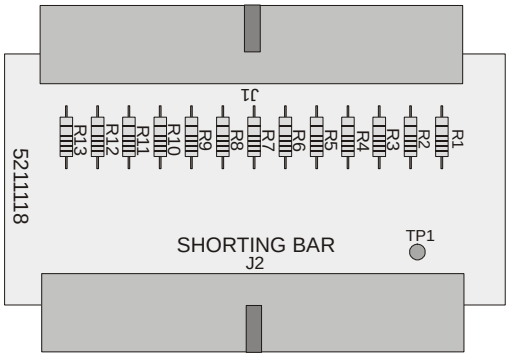
The 100 MΩ resistor, R14, must be rated at 1500 vdc or higher.

APPENDIX B – CALIBRATION BOARDS

The low-voltage and high-voltage resistor banks, shown in Appendix A, are available from Cablescan. The boards are constructed with two sets of connectors, one set on each side of the board. The resistor bank is connected to one set, while the second set of connectors is used as a shorting bar. During high-voltage testing, one of the tests requires all test points of each connector to be shorted or connected together.



High Voltage Calibration Board – Part Number 5211117



Low Voltage Calibration Board– Part Number 5211118

NOTES

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