



MODEL 93

W1 CABLE ASSEMBLY
TEST UNIT

STUDIO
TECHNOLOGIES
INC.

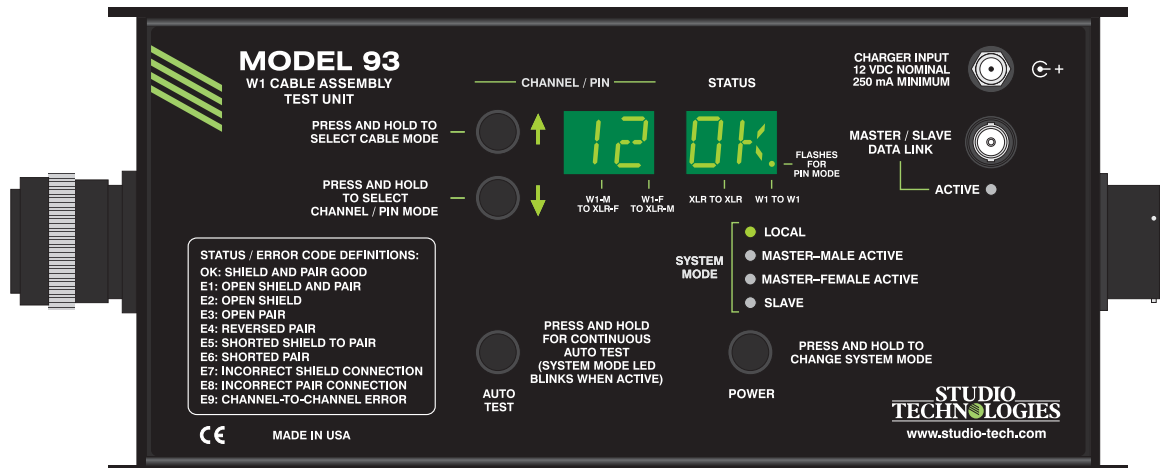
Highlights:

- Tests W1 cables and fanouts
- Channel or pin mode testing
- Complete test in less than six seconds
- End-to-end testing supported
- Simple error codes display fault conditions
- Circuitry protected from outside voltages
- Rugged LED-based displays
- Internal rechargeable battery

The Model 93 is designed to test the integrity of W1-type cable assemblies. Widely used by the audio industry, “W1s” provide twelve balanced signal pairs, each with an individual shield. For live production and broadcast applications it’s critical that all signal paths are fully functional. But without specialized test equipment it’s impossible to confirm W1 performance. The Model 93 accomplishes this task in a simple-to-use but technically sophisticated manner—it’s far from just a continuity checker. Under software control, the internal microcontroller-based circuitry independently tests each signal pin for connectivity, opens, and shorts. The Model 93 can ensure that the value of a production company’s significant investment in W1 cable assemblies is maximized. When two Model 93 units are used together they can prove invaluable for facilities that include permanently installed W1 cabling.

For operator convenience, testing can be selected from among two formats: channel mode or pin mode. Channel mode is provided specifically for field applications where testing is most effective when oriented toward how a W1 is actually used. Pin mode is oriented toward supporting technical personnel who are responsible for fabricating or repairing cable assemblies. In both modes solid-state displays indicate which channel or pin is being tested, along with the test result. For ease of use the Model 93 supports both automatic and manual testing. The unit is housed in a rugged aluminum enclosure and is constructed for reliable “field” performance where abuse is often a way of life. An internal rechargeable battery provides the operating power.

When the Model 93’s channel mode is selected, testing is organized as twelve signal channels. Two of the display digits indicate which channel is currently being tested. The display digits, depending on which mode is selected, can also display the test results. The results can include ALL OK and FAIL, as well as a number of error codes. The codes allow conditions such as open shields or pins, crossed signal pairs, or short circuits to be displayed. In the pin test mode, all 39 pins associated with the W1 connectors can be tested. Two of the display digits indicate which specific pin, or pin group, is being tested. The other two digits can display which pin (or pins) are connected to the pin under test.



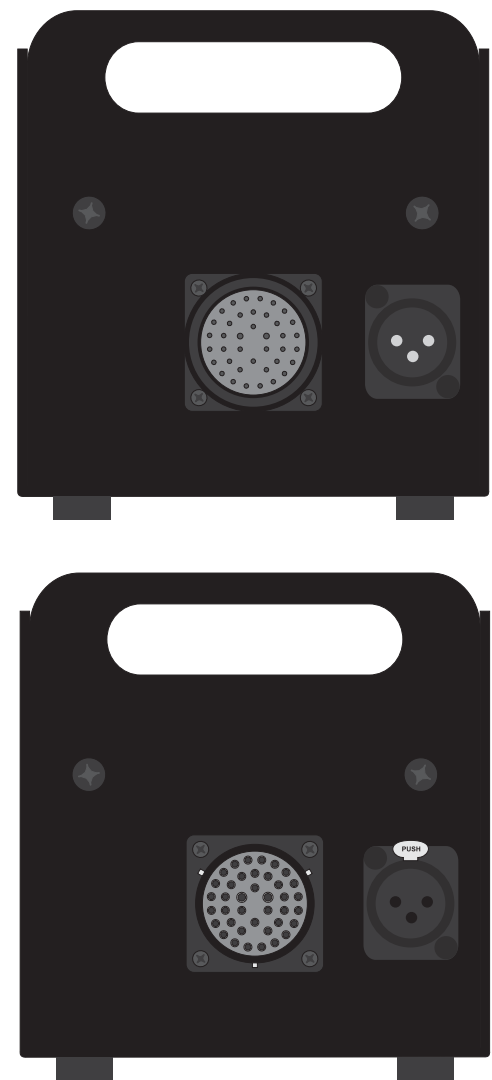
The Model 93 is capable of testing individual cable assemblies where both the male and female W1 connector associated with a specific cable assembly are accessible. Referred to as the Model 93's local system mode, both connectors of the designated cable assembly are terminated on the Model 93. This mode is appropriate for testing flexible cable assemblies that are newly assembled or are being prepared for temporary deployment. With rapid and complete testing, W1s will either be confirmed as ready for use or "flagged" for repair or replacement.

The Model 93 also allows testing of W1 "fanouts." These cable assemblies typically have a female or male W1 connector on one end and twelve male or female 3-pin XLR-type connectors on the other. Connecting this type of fanout to the Model 93 is simple. In addition to one male and one female W1 connector, the Model 93 also provides two 3-pin XLR-type connectors, one male and one female. Under software control, a technician can "walk through" the twelve channels, connecting one fanout channel at a time. In addition to testing fanouts, this feature can find use in testing W1 cabling that terminates on patch bays or breakout panels. As a "bonus" the Model 93 also supports testing of standard 3-conductor audio cables that terminate on XLR-type connectors.

A unique testing challenge is encountered when W1 cable assemblies have already been "run" in preparation for a broadcast event or have been permanently installed as part of a facility's infrastructure. Using the master/slave system modes, two Model 93 units can work together to perform end-to-end testing of in-place cabling. This unique capability can be valuable for new installations as well as during routine maintenance and repair. Using a separate cable path, a bidirectional data link is established to allow the two Model 93 units to coordinate their resources. One unit is designated as the master while the other is designated as the slave. Two master modes ensure that W1 cable assemblies with either male or female connectors on the master end can be tested. While the buttons on the master unit control the testing functions to be performed, both units simultaneously display the test status. BNC connectors are used to establish the data link between the two Model 93 units. This connector type was selected because of its common use in video applications. However, cable other than 75 ohm coax can also be used for the data link, including microphone, "CAT5" data, and multi-pair "telco."

Four pushbutton switches, five LED indicators, and a 4-digit LED display provide the Model 93's operator interface. The power button is used to power up and power down the unit. The power button is also used to select which of the four system modes is selected. Four LED indicators, one associated with each system mode, display which mode is active. The up and down buttons allow manual selection of the channel or pins designated for testing. The up button is also used to select which cable mode is active. The down button is also used to select between channel and pin mode. The auto test button is used to enable the two automatic test sequences. The LED display indicates which of the twelve W1 channels or 39 connector pins is currently being tested. And, depending on which test is selected, will also display the test results in a variety of ways. These green-colored LED displays were selected for their visibility and long-term reliability. An LED indicator is also provided to confirm when data associated with the master/slave mode data link is present.

The Model 93 provides two automatic test sequences: auto test and continuous auto test. The auto test sequence is the unit's fastest test method, specifically included to support busy field broadcast applications. It takes less than six seconds from the time the auto test pushbutton is pressed until the test results are displayed. In the channel mode, auto testing begins with channel 1 and continues on through to channel 12. When selected for pin mode auto testing will begin with pin q and continue on through pin g. (While available for manual testing as a group, pins r, m, and k are not part of the auto test sequences.) During the auto test sequence the LED display will indicate which channel or pin is being tested.



Model 93 Left-Side End Panel (above)
and Right-Side End Panel

At the end of the entire test sequence one of three result messages will then display: ALL OK, FAIL, or OPEN. As expected, when the result is ALL OK the W1 is ready for use. A FAIL message will display if one or more errors are detected. And OPEN will display should no pins be detected as being connected. This typically indicates that the cable designated for testing has not been correctly connected to the Model 93.

The continuous auto test sequence is enabled whenever the auto test button is pressed and held. Using this test sequence, the Model 93 will test all channels or pins followed by a summary results message. However, the difference with this test sequence is that the results for each individual channel or pin will be displayed as testing progresses. Whenever a defective channel or pin is detected the sequence will pause momentarily while the right two digits display the applicable error information. The test sequence will then continue on to the next channel or pin. After a slight pause for the summary results to be displayed, testing will continue, again starting with channel 1 or pin q. The continuous auto test mode was specifically included for situations where a more detailed view of the test results is desired.

To ensure a thorough analysis of the connection status of a W1 cable assembly the Model 93 is capable of testing all 39 pins of the male and female mating connectors, organized as 36 individual pins and one group of three pins. This allows confirmation of correct channel wiring, as well as detecting opens, shorts, and reverses (pair crosses). All Model 93 input and output circuits are extensively protected from damage due to static discharge (ESD) and DC voltages commonly found in field-production and broadcast environments. These voltage sources can include tally, intercom, IFB, and microphone phantom power among others that might be present on a W1 cable assembly that has been designated for testing.

Contained within the Model 93's enclosure is a rechargeable 12 volt sealed lead-acid battery. This will provide continuous operation in excess of eight hours before recharging is required. An external 12 volt DC power adapter, provided with each Model 93, allows simultaneous charging of the battery and powering of the unit. Circuitry contained within the Model 93 implements the actual battery charging function, minimizing recharge time while maximizing battery life. While the power button can be used to manually turn off the Model 93, to conserve the battery's energy automatic shutdown will occur after ten minutes of inactivity. Under software control, automatic shutdown will also occur whenever the battery voltage reaches its minimal acceptable value. This prevents the battery from reaching a deep-discharge condition. For reliability under the less-than-gentle field environments the battery is securely clamped within the Model 93's enclosure. It's expected that the battery will provide correct operation for a period of three to five years before replacement will become necessary. A competent technician should be able to perform the task in well under 30 minutes.

Model 93 Specifications

Application: electrical testing of standard W1 cable assemblies

Connectors:

W1 Cable Assemblies: one male and one female 39-pin circular W1-type

Fanout and XLR: one male and one female 3-pin XLR-type

Data Link: BNC

12 Volt DC Power In: coaxial power jack, 2.1 x 5.5 mm, locking bushing, compatible with Switchcraft S760K plug

Power Source:

Internal: 12 volt 1.3 amp-hour sealed lead-acid battery. Operating time 8 hours minimum with fully charged battery. Recharge time 8 hours maximum.

External: 12 volts DC nominal, acceptable range 10-15 volts DC; 250 mA minimum recommended for operation and battery charging. Units shipped to North America and Japan include a 120 V input/12 Vdc output power supply.

Master/Slave Operation:

Data Link: modified LIN bus, 1200 bit/s

Maximum Distance between Units: tested to 2400 feet using Belden 1694A coaxial cable and 4000 feet using standard CAT5E UTP

Dimensions:

Height: 5.0 inches (12.7 cm)

Width: 5.0 inches (12.7 cm)

Length: 11.0 inches (27.9 cm)

Overall Length: 12.5 inches (31.8 cm)

Weight: 5.5 pounds (2.5 kg)

Features and specifications subject to change without notice.

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