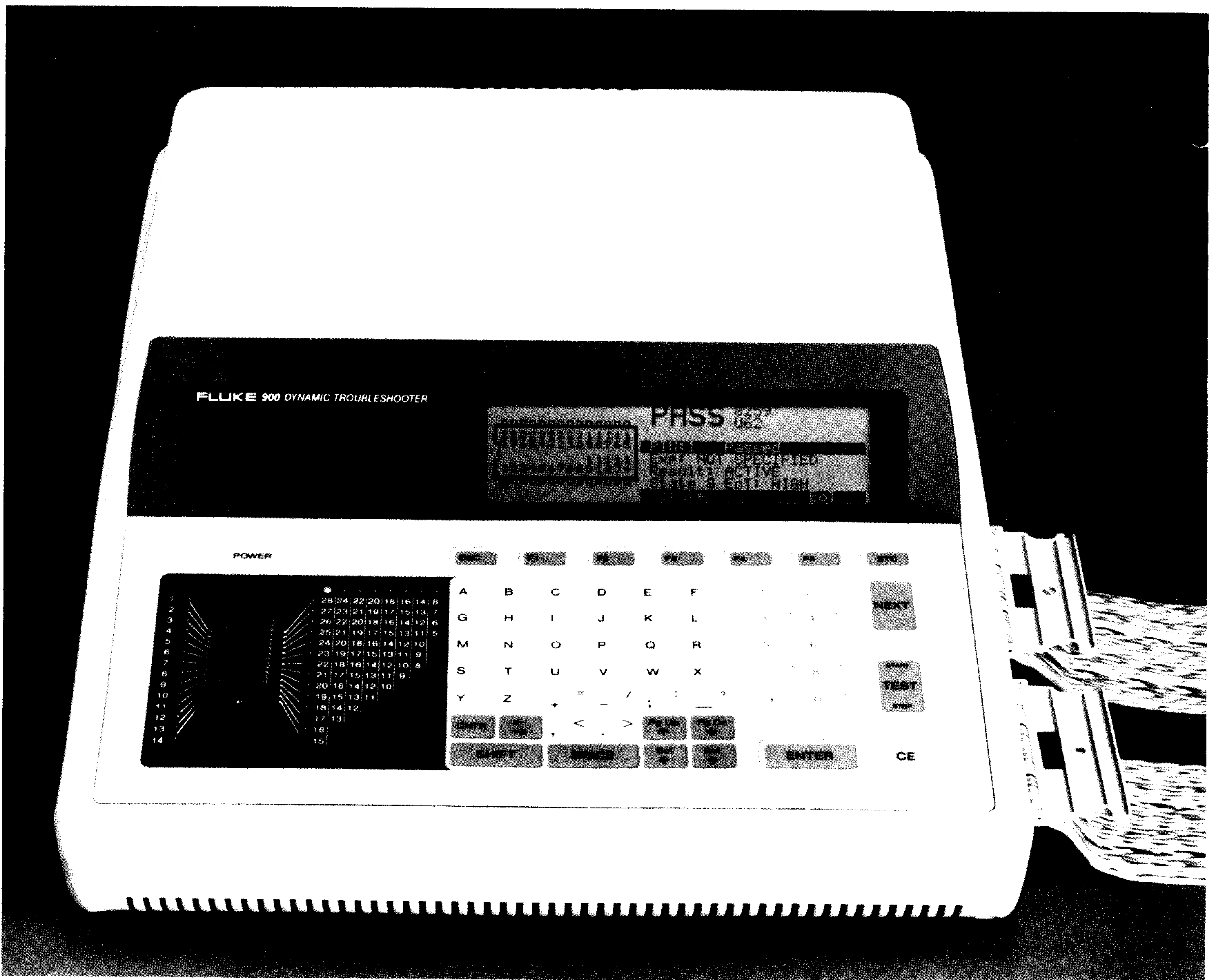
Technical Data

Fluke 900

900-001 Simulation Option



FLUKE

Introduction

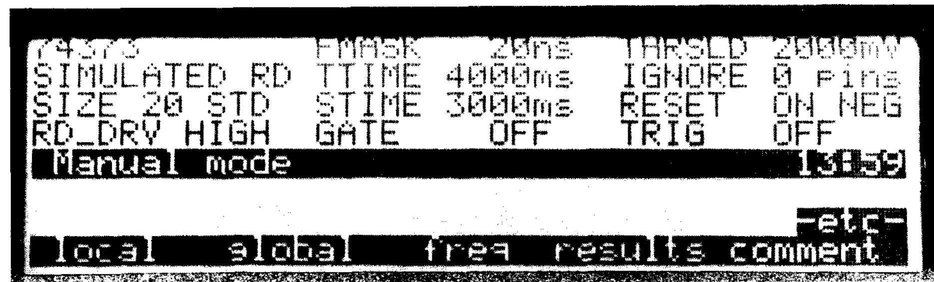
The Simulation Option package improves both the speed of trouble-shooting and the ease of Test Sequence development with the Fluke 900. This option brings three new features to the Dynamic Troubleshooting capabilities of the Fluke 900:

- Reference Device (RD) Simulation
- Delayed Gate
- Shadow RAM.

Reference Device Simulation removes the need to maintain, handle, and insert a Reference Device for a large number of common components. This will save time in troubleshooting and further automate this task to gain a higher throughput. The new features called Delayed Gate and Shadow RAM simplify the troubleshooting task, but more important, they simplify and reduce the Test Sequence development effort. They provide an easy way to handle two common troubleshooting difficulties: bus contention and RAM initialization.

Bus contention appears in bus structured units-under-test (UUTs) when one bus driver is momentarily enabled at the same time as another driver. The Delayed Gate feature provides a simple mechanism for the test technician to define a test window to mask out the conflicting signals. The comparison test window may be enabled some time after the device under test has been enabled. The duration of the comparison window may be specified as well.

Dynamic Reference Comparison is an effective and straightforward method to test programmable devices such as RAM. The prerequisite is that the reference device has been initialized to contain the same information as the device under test. Apparent failures can occur when a read-before-write is performed by the memory self test or other diagnostic stimulus. Shadow RAM automatically inhibits the output comparison test for RAM locations (addresses) that have not been written (or initialized) first by the diagnostic stimulus.



Reference Device Simulation

All of the Advantages of Dynamic Reference Comparison.

Reference Comparison achieves its superior test and troubleshooting performance by comparing the real time performance of the device under test to that of a known-good replacement device. The real time comparison is made against a one hundred percent functional model. No adjustments need to be made to this model, even if the device under test is used in a “special” circuit configuration such as inputs tied together, or input or control lines tied to ground or Vcc. The reference device is subjected to the exact same input conditions that are driving the device under test in the circuit.

Reference Device Simulation retains all of the benefits of the Dynamic Reference Comparison test technique, while adding the convenience typical of software modelling with none of the disadvaantages of this method. The RD Simulation Option is implemented using a reconfigurable high speed logic array which is programmed from a “Simulation Library” to behave like the device under test. This hardware can simulate virtually any SSI and MSI device.

You specify the device under test by its generic component name (i.e. 74245), clip over this device and press the test button. There is no need to search a tray with reference devices, pick the desired device and insert it in the tester’s ZIF socket. The number of reference devices to be maintained is reduced to only VLSI components, custom devices or customized devices.

When testing a device on the UUT, the Fluke 900 with the Simulation Option will default to the simulation mode if the device under test is described in the Simulation Library. The user may elect to override this mode anytime and utilize the real replacement component as the model.

Simulated devices can be slightly faster, the same or slightly slower than the equivalent reference device, depending on the complexity and technology of the real device. Differences may range from 0 to 40 nanoseconds. During Test Sequence development, the effect of this difference is compensated for by an adjustment in the FMASK test parameter.

The standard Fluke 900 can compare the performance of components for data rates up to 20 MHz. Depending upon the complexity of the component under test, the comparison with the simulated component supports data rates up to **12** to **16** MHz. Complex devices operating at data rates higher than the bandwidth supported by the simulation hardware, can be tested using the real reference model.

Increased Device Coverage.

The standard Fluke 900 is limited to testing 5 Volt logic devices because the power supplied to the reference device in the socket is limited to the standard TTL supply of 5 volts. With the addition of the RD Simulation Option, the Fluke 900 can simulate the logic states and test CMOS devices which are operating with supply voltages up to 15 volts.

Mixed logic level devices such as RS-232 drivers are also supported in the Simulation Library.

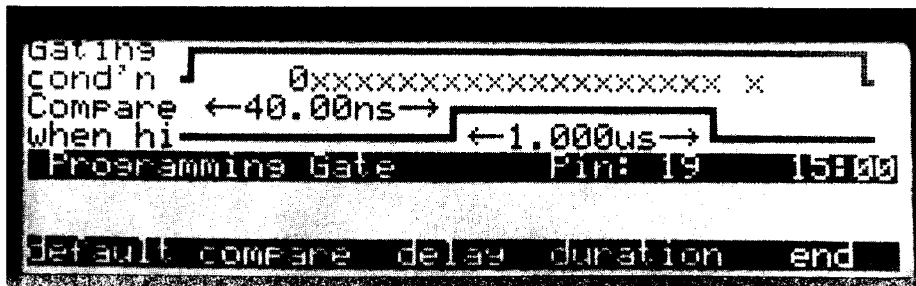
The Simulation library.

The Simulation Library is distributed on floppy disks compatible with the MS-DOS operating system. The library distribution disk contains the utility programs and routines to allow the user to select and configure a simulation library for a specific UUT. The library to support a specific UUT may be downloaded from a personal computer to the Fluke 900. The library may then be kept in system RAM for execution of the test procedure. Or, for

stand-alone operation of the Fluke 900, it may be stored in a non-volatile RAM cartridge which can be distributed with the Test Sequence for the given UUT.

The Simulation Library does not replace the device library available with the basic Fluke 900. The Simulation Library is employed in addition to the standard device library which performs the basic functional verification of the simulation hardware and manages the synchronization of the simulated device with the device under test.

The Simulation Library covers many common TTL and CMOS devices at market introduction time. The library will be augmented, using floppy disks as the distribution medium. A Simulation Library Maintenance Agreement is included with the Simulation Option for the Fluke 900. This agreement is in force for one year from the date of purchase. It will be renewable thereafter. A new Simulation Library package will be released approximately once per calendar quarter until all of the more common devices that can be simulated are included. A list of the devices covered in the Simulation Library is available from your account representative.



Delayed Gate

The Delayed Gate feature simplifies the test of devices like bus drivers. Typically, these devices can only be tested while they are actively driving the bus. Many times, you will see one complicating factor: the data is not stable or valid for the total duration of the device enable signals.

With the standard Fluke 900 this problem can be solved using the GATE function. Care must be taken, however, to select a valid gate signal on a device other than the device under test. The choice is typically a control signal on the UUT that tells the receiving circuit (like RAM) that the data is valid. Selecting a good GATE signal on the UUT requires knowledge of the operation of the UUT, or, alternatively, requires time to experiment and verify that the test results are valid.

The Delayed Gate feature greatly simplifies the test of components in this situation. It allows the test technician to specify a testing window in relation to the control lines on the device under test. The user can specify the comparison window to start a fixed amount of time after the device has been enabled or selected. The duration of the comparison window may be specified as well.

Bus drivers which are subject to bus contention problems can now be tested with little experimentation and without detailed knowledge of the operation of the UUT. The quality of the test will not be compromised. If the gate window is properly selected, the values for the performance envelope test parameters (FMASK and THRESHOLD) can be small to perform a tight real-time test.

Shadow RAM

The Dynamic Reference Comparison method is the most effective way to test the performance of a programmable device like a RAM chip, operating in the circuit. The DRC method verifies both the data storage and retention, as well as the timing of the output data.

The prerequisite for success is that the RAM chip under test and the reference chip must contain the same information in every location which is read during the comparison test. This may be accomplished by waiting until every location in both devices has been initialized to the same data patterns. The TRIGGER function or a time delay (OFFSET) may be used to ensure proper initialization.

Sometimes, however, the diagnostic program that provides the stimulus for the memory chip test accesses memory in an unpredictable or unknown pattern. If a read-before-write is executed to a number of memory locations, it will most likely cause a false failure in the device comparison test.

The Shadow RAM feature will automate the memory test independent of the read and write sequencing of the diagnostic program providing the test stimulus. When the Shadow RAM feature is active, the data output(s) of the RAM under test are only compared with the output(s) of the reference device for addresses (locations) that have been written into since the start of the comparison test. This greatly simplifies the RAM test making it as easy as testing a combinatorial device like a 7400 NAND gate.

When a RAM device is selected, the Shadow RAM records addresses within a 64K byte block size. A RAM chip is tested in 64K byte increments. For larger RAM devices, a reset is automatically issued and the device is retested with the shadow covering the next block size. This shadow pattern and a maximum speed parameter form part of the RAM chip description in the Simulation Library.

When testing a RAM chip using the Shadow RAM feature -whether the test resulted in a "pass" diagnostic or not – the Fluke 900 can display the number of locations in the device under test that were accessed during the comparison test period. This number is a figure of merit that indicates to what extent the RAM test stimulus exercised the RAM chip under test.

Ordering Information:

The 900 Simulation Option (900-001) includes the following:

- Hardware components to be installed in your 900 Dynamic Troubleshooter
- An update of the system firmware of your 900, if necessary.
- A floppy disk (5.25 inch, MS-DOS format for 360K bytes) containing the most recent release of the Simulation Library, as well as the software to manage this library information in your personal computer. This software allows you to: 1) create sub-libraries for specific UUTs, and 2) download sub-libraries to your 900.
- A Simulation Library Maintenance Agreement. Periodically, Fluke will add components to the Simulation Library. The contract included with the purchase of your 900-001 is in force for one year from the date of product shipment. This contract may be extended at the end of this period by ordering a Simulation Library Maintenance Agreement Renewal (900-901).
- A reply form to inform us of the person (name and mailing address) who is to receive the Simulation Library updates during the period that the maintenance agreement is in force.

John Fluke Mfg. Co., Inc.
P.O. Box 9090, Everett, WA 98206
Tel. (206) 346-6100
For more information call:
(800) 443-5853 (toll free) in the U.S.A.
(416) 890-7600 from Canada
(206) 356-5500 from other countries

Philips International B.V.
T&M Dept., Building TQIII-1
5600 MD Eindhoven, The Netherlands
Telex: 35000 PHTC NUNLFEVSI

© Copyright 1990, John Fluke Mfg. Co., Inc. All rights reserved.
Printed in U.S.A. A0401A-02U900Z/SE EN 9498752 14311

FLUKE