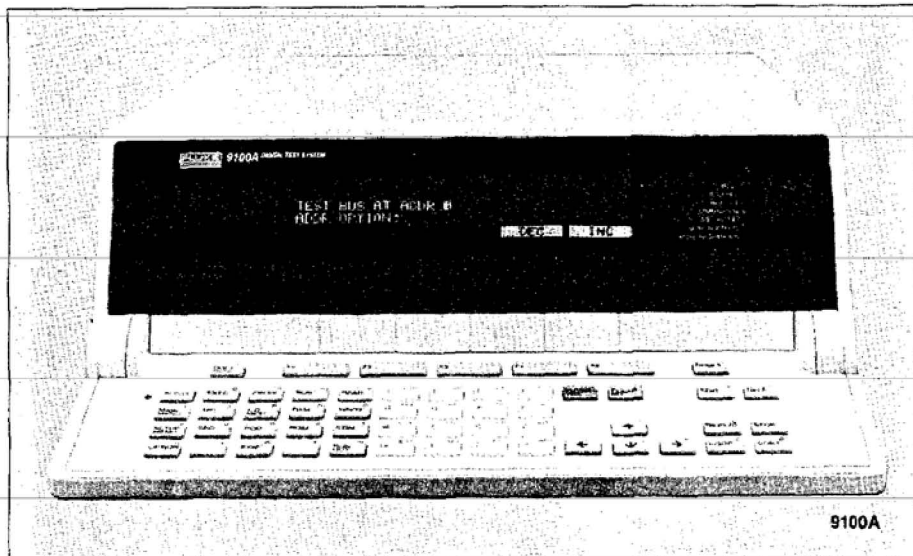


Digital Test Systems

9100 Series

RS-232



9100 Series Digital Test System

Emulative Board Test: Test microprocessor-based digital circuitry from the microprocessor outward

Automated Functional (GO/NO GO) Tests and Guided Fault Isolation (GFI) Test

Integrated program development environment

Automatic functional tests of μ P kernel

Automatic generation of GFI decision tree

Support for over 50 microprocessors

I/O module and single point probe to "close the loop" in measurement or stimulus

The 9100 Series is the newest member of Fluke's family of digital testers and troubleshooters. It is designed for fast, cost-effective automation of your test and troubleshooting procedures for microprocessor-based digital circuit boards.

Included in the 9100 Series are two testers: the 9100A Digital Test System, which can be used both for developing test software and as a stand-alone test station, and the 9105A Digital Test Station, an execute-only tester that can be used to execute programs developed on the 9100A.

The 9100A offers fast and easy development of functional test and troubleshooting programs which stay ahead of the increasing complexity of digital boards. Test program design is highly automated, guiding the test or service engineer through the development process. Combined with new state-of-the-art test hardware, complete digital board test and repair solutions can be created in record time.

The 9105A Digital Test Station turns a powerful test solution into an economical one. At very low cost, the 9105A delivers powerful automa-

ted tests, developed on the 9100A, to the factory floor or service center. An easy to use interface allows any operator to quickly test and troubleshoot. Guided Fault Isolation (GFI) programs isolate faults to the node level, so both functional testing and troubleshooting can truly be automated. The 9100A and 9105A combine to offer unmatched power, flexibility, and economy to factory board test and service center repair.

Both testers interface with the unit under test (UUT) through the following hardware components:

- A microprocessor interface pod; the pod emulates the microprocessor actions on the UUT.
- A single-point probe to measure UUT responses at any node within or beyond the microprocessor kernel; the probe can also provide stimulus at any node.
- I/O modules which allow testing of up to 160 nodes simultaneously.

Test Techniques For Every Part of the Board

The 9100 Series can detect and isolate faulty components on all types of microprocessor-based circuit boards. Types of tests include built-in functional testing of the microprocessor BUS, RAM, and ROM. The 9100 Series will also isolate faults in both synchronous and asynchronous circuitry and, through its microprocessor interface pods, can emulate a broad range of microprocessor chips. Together, these capabilities let you test your products more thoroughly and with a higher degree of confidence than ever before — at the design stage, during production, and in the field.

And, you can automate your troubleshooting procedures with minimal programming; the tester's built-in Guided Fault Isolation decision tree does most of the work.

Emulative Board Testing for the Kernel

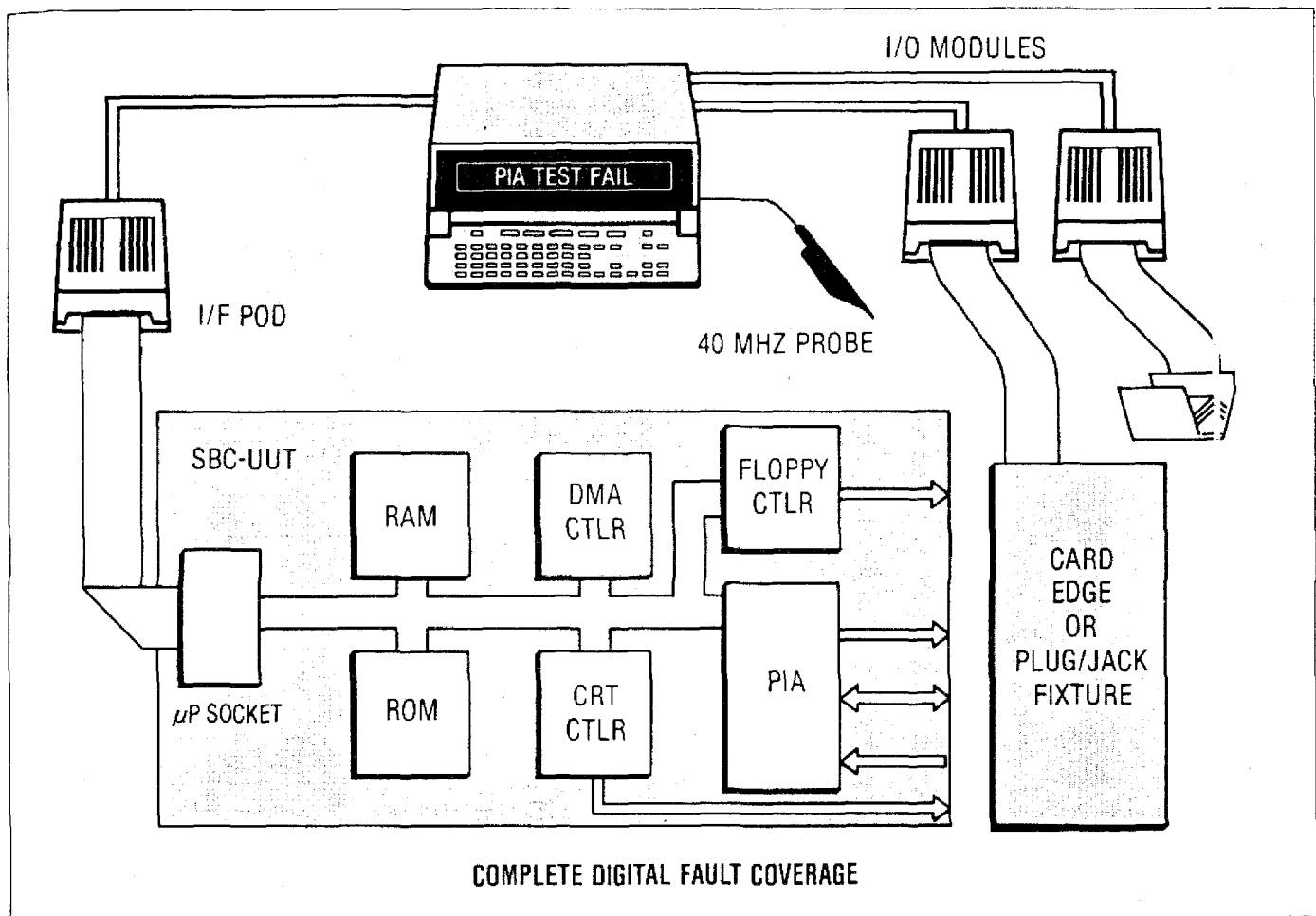
At the heart of Fluke's approach is a technique known as emulative board testing — so called because it involves emulation of the board's microprocessor. This technique is preferred by board manufacturers the world over for finding faults in kernel circuitry, because it is the only technique that tests a board from the "inside out." Consequently, it lets you locate more faults, more quickly, than any other approach.

Microprocessor interface pods. To emulate the board's microprocessor, you select the microprocessor interface pod that corresponds to the microprocessor on the board. Pods are available for over 50 microprocessor chips, including the new 80286. All existing Fluke microprocessor interface pods can be used with the 9100 Series.

The 80286 Pod with the 9100A/9105A main-frame allows a single instruction breakpoint and provides 8 K-bytes of overlay RAM, including the advanced pod features (see page 214 for pod information).

Total control of the bus. In addition to containing its own microprocessor, each pod has its own RAM, ROM, and I/O, making it a complete kernel. The pod replaces the board's microprocessor, allowing the pod to control all bus-related devices on the board. Plugging in the pod also causes the clock circuit of the board under test to be channeled to the pod's microprocessor, so that tests can be performed with the board running at its normal speed. A RUN UUT function allows you to execute programs residing in the UUT's memory. This allows execution of initialization programs and diagnostics, speeding troubleshooting.

Automatic bus-line monitoring. Bus-line monitoring takes place automatically when the pod accesses the unit under test. This means that no probing is necessary to find bus faults. It also means that the pod can detect dynamic faults —



those that come and go depending on the activity being performed — as well as static faults.

Built-in BUS, RAM, and ROM tests. Using the pods, you can quickly execute the 9100 Series' built-in BUS, RAM, and ROM test routines. Because these circuits operate the same way on all microprocessor-based boards, you can run these tests as soon as you plug in the pod, without writing any code at all. At the conclusion of each test, the system reports its findings to the operator via specific fault messages.

Functional Testing Beyond the Kernel

All of the devices interfacing with the UUT may be used to stimulate circuitry beyond the microprocessor kernel. Typically the majority of stimulus will be generated from the microprocessor socket via the interface pod.

Since the pod can emulate any activity which the microprocessor on the UUT can perform, functional testing may be performed in the following steps. Partition the UUT into functional areas, excite or stimulate a functional partition

from the pod, the single point probe or the I/O Module, measure the output response from the functional partition and compare the response to the expected response from a known good UUT.

I/O modules for rapid fault isolation. One of the innovations offered with the 9100 Series is the new type of circuit interface device for node-oriented troubleshooting: the I/O module. This module, which lets you test all pins on a chip at once, provides a quick means of detecting and isolating faults for signals up to 10 MHz. It works with both synchronous and asynchronous circuitry, on or off the bus. And, because you can use up to four I/O modules at a time, you can test as many as 160 pins simultaneously.

Modules may be clipped directly over the chip via a DIP clip, available in configurations ranging from 14 to 40 pins. Or you can use the 9100 Series 20-line flying lead module to develop your own custom connections, connecting the tester to the board edge, a bed-of-nails fixture, or a customized test fixture.

The I/O module lets you use a variety of test techniques. You can use it to drive a node high or low or to stimulate it with a string of data patterns. It can also gather a wide range of response data, including taking a node's signature, sensing its logic level, and measuring activity on a node through frequency measurements or event counting. Built-in clock connectors let you synchronize the module to an external clock when troubleshooting asynchronous circuitry.

The measurement may consist of signatures gathered concurrently at several nodes or it may be the circuit response measured by the pod. Functional testing may be automated by fixturing the nodes critical for functional testing. I/O Modules are adaptable, interfacing with test fixtures for functional testing.

The 9100 Series testers provide flexibility, several ways and alternatives to exercise circuitry on the UUT to perform reliable functional tests with a high degree of fault coverage and confidence.

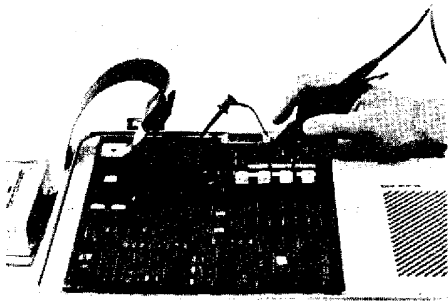
Digital Test Systems

9100 Series

Node-oriented Troubleshooting

If any of the built-in tests or functional tests indicate that faults exist, your next step is to perform node-oriented troubleshooting to isolate the fault to a particular component. One of the test techniques used in this process is signature analysis, in which the electrical "signature" of a node on the unit under test is compared with that of the same node on a known-good board. Other response factors may also be compared, including logic levels, event count, and frequencies.

Single-point probe for high-frequency signals. You can use the single-point probe instead of the I/O module for higher-frequency signals, up to 40 MHz. You can also use it for parts of the board that cannot be accessed with an I/O module. Like the I/O module, the single-point probe can be used to drive a node high or low, to stimulate a node, and to gather various types of response data. It can take signatures, sense logic levels, and count events or frequencies. An external clock module provides leads for testing asynchronous circuitry.



Get as much — or as little — automation as you want.

With the 9100 Series, you choose the degree of automation you want: Immediate Mode, for manual operation; Guided Fault Isolation, for automation of the troubleshooting process; or Unguided Fault Isolation, for semi-automated troubleshooting. If you do decide to automate, you'll find that many of the 9100 Series' special features — including the programming workstation, high-level programming language, and built-in Guided Fault Isolation decision tree — make the process easier and faster than you ever thought possible.

Manual operation lets you start testing immediately.

Immediate Mode lets you begin using your 9100 Series tester the first day you get it, without having to write any program code at all. With the pod connected, you can complete the built-in kernel tests. Then you can go on troubleshooting, using your knowledge of the unit under test to guide you. The mainframe keypad includes both hexadecimal and alphanumeric keys, so you can manually enter whatever data is needed.

To troubleshoot in Immediate Mode, select the first node you wish to test and attach the selected interface device (I/O module or probe). Then synchronize the interface device to the appropriate bus cycle. Next, key in the stimulus data and measure the response. The I/O Module and Probe measurement results are shown on the mainframe's three-line display. In the case of the single-point probe, color annunciators on the probe itself indicate logic levels: high, low or tri-state.

After completing the testing of the first node, you select another node and repeat the process. When you locate the circuit at which the input data is good but the output data is bad, you have successfully isolated the fault.

Obviously, to be able to work effectively in Immediate Mode, you need a high degree of familiarity with the board under test — both to determine the best probing sequence and to recognize whether the response is good or bad.

Automatic operation guides the operator from start to finish.

The 9100 Series' Guided Fault Isolation capability allows automation of the troubleshooting process. In this mode, the operator enters no data and makes no decisions. All necessary data — stimulus routines, reference lists, parts lists, known-good responses, and interconnectivity information — are contained in the program. The system tells the operator what to do at each step of the process and interprets all response data.

Once a Guided Fault Isolation program has been written, the only action required to initiate it, is to tell the system which nodes are suspected of being faulty, so it will know where to start the node-oriented troubleshooting. This information can either be entered by the operator or passed to the GFI program from a prior functional test.

At each step of the process, the system tells the operator which node to probe, using a graphic display to assist in locating the pin in question. As soon as the operator indicates that the interface device is attached, the system runs the appropriate stimulus program, reads the response, and compares it with the known-good response for that node. If the response is good, the system directs the operator to the next suspect node. If it is bad, the system uses its built-in back-tracing algorithm, together with the reference data in its files, to locate the chip driving the input to the bad node. This process continues until the system has traced the fault back to its source.

A key advantage of the system's Guided Fault Isolation capability is that all operators can benefit from the knowledge of your most experienced test engineers. Once your test engineers write the Guided Fault Isolation procedures, lower-level operators can execute them, saving you considerable labor costs.

Semi-automatic operation lets you choose the troubleshooting sequence. For semi-automatic troubleshooting, you can use the 9100 Series to perform Unguided Fault Isolation. This mode is like Guided Fault Isolation, except that the operator decides which node to probe. However, much of the manual activity is removed from the process, so you can troubleshoot more rapidly.

Once a node is selected, the appropriate stimulus routine is executed and the results of the stimulus are displayed. In this way, the operator guides the fault tracing procedure.

For experienced troubleshooters who prefer to follow their instincts rather than moving through a set troubleshooting sequence, Unguided Fault Isolation is the best technique.

The 9100A Programming Environment (With Option -004)

From its built-in back-tracing algorithm to its easy-to-use programming language, the 9100 Series lets you develop fully automated test and troubleshooting routines in a matter of days or weeks, as opposed to the months of development time required by many other systems.

Built-in GFI decision tree. The 9100A's specially designed back-tracing algorithm makes all the decisions about the troubleshooting sequence, allowing the programmer to enter the necessary information in simple data-base format. Information is stored in five kinds of files:

- **Stimulus programs to test each node.** The programs are designed to reveal all possible faults that could cause a particular node to fail. They don't need to be elaborate, however; in many cases, a series of reads or writes at the appropriate address is sufficient.
- **Known-good responses to compare with UUT responses.** After developing a stimulus program for a node, the programmer can use it on a known-good board to determine what a good response looks like. For each node, the programmer can select the most appropriate type of response: signature, logic level, frequency, or event count. An interactive program provides guidance in developing these files.
- **A reference list relating the device number to the type of device.** This is a simple matter of linking each device reference number on the UUT to the type of device used (e.g., U2 = 2114), so the system will know which part to look up in the parts library.
- **A parts library that explains the relationship of input pins to output pins.** GFI requires a parts library with a description of each part on the UUT. A part description specifies all input pins which are related to each output pin. A library of the most common parts is provided with the 9100 programming software. A field-oriented editor allows you to add custom parts or other parts not included in the standard library.

Time	Location	Altitude	Speed	Direction	Priority
Signal	Altitude	Speed	Direction	Priority	Pin
03-9	10 MILE	7854	10 10	100	95
03-10	10 MILE	8007	10 10	100	95
03-11	10 MILE	8438	10 10	100	95
03-16	10 MILE	8601	10 10	100	95
03-16	10 MILE	8602	10 10	100	95
03-14	10 MILE	8500	10 10	100	95
03-2	10 MILE	8080	10 10	100	95
03-11	PRGE				
03-12	PRGE				
03-13	PRGE				
03-14	PRGE				
03-15	PRGE				
03-16	PRGE				
03-17	PRGE				
03-18	PRGE				

Interconnectivity data, indicating which devices and pins make up each node. The back-tracing algorithm uses this information to isolate the fault to a single component. If this information already exists in a CAD/CAE file, you may be able to download it directly, saving data-entry time.

[illegible]

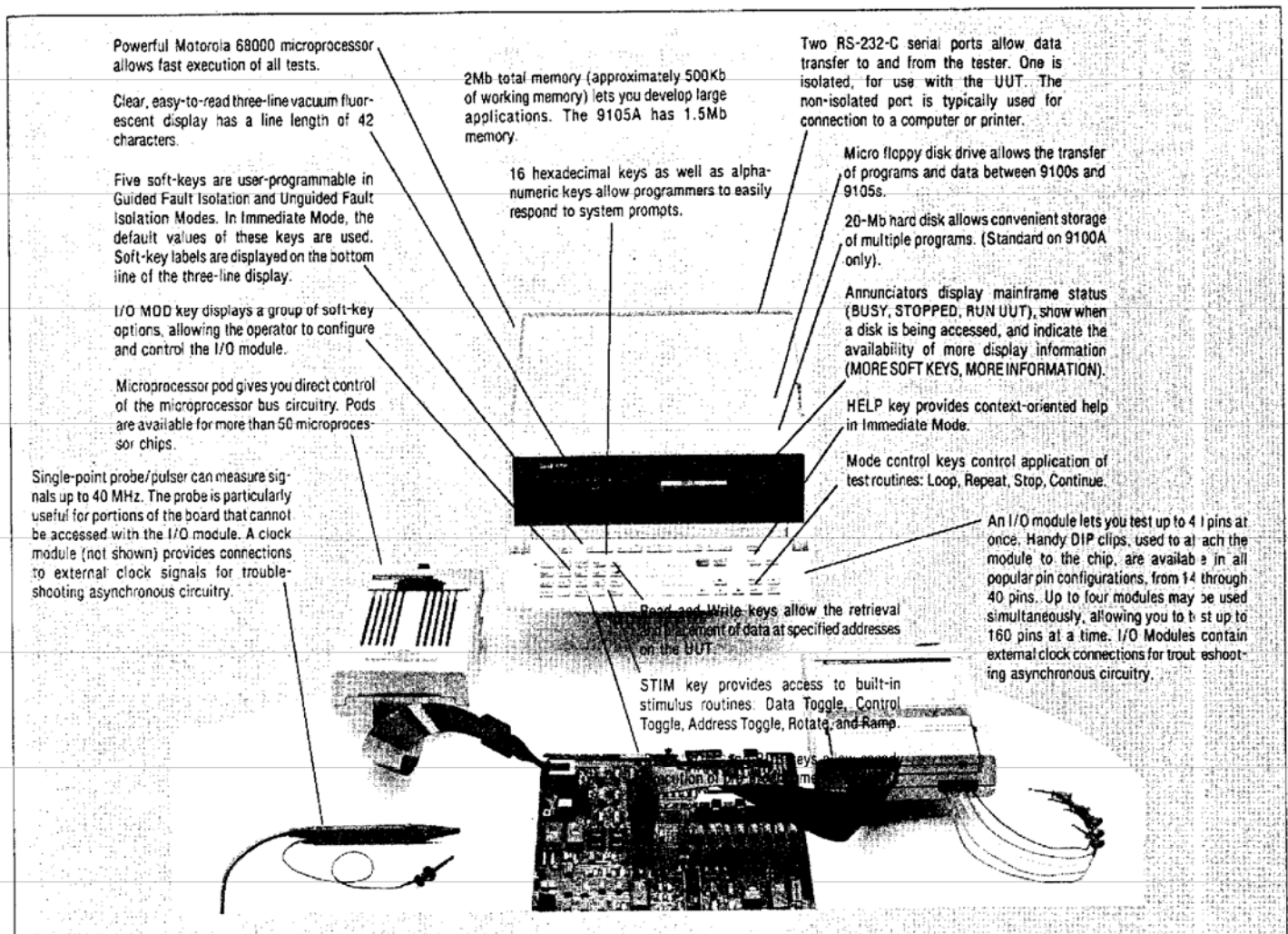
Special test language. The 9100A uses a programming language designed specifically for developing test and troubleshooting routines. Its command list incorporates all of the 9100 functions, program control constructs, and allowed variables, making it a well-rounded language for writing test programs.

Numerous features are designed into the program to make the programmer's job easier. Key among these are:

- Provision for default entries on most commands, simplifying the process of creating test routines.
- Built-in fault handlers that you can incorporate in your routines. (You can also choose to override these built-in fault handlers with custom-created ones).

You can write functional tests incorporating the microprocessor interface pod, I/O module, and probe. A debugger is provided with breakpoint and single step capabilities to help you quickly locate any problems. You can also write administrative programs — for example, to track board failures and the associated fault components for future analysis.

Programming for the 9100A is performed through an 80-column, 24-line Cf T and a standard computer-style keyboard. The keyboard also includes nine soft keys with built-in functions to speed program development.



Digital Test Systems

9100 Series

The 9105A Test Program Execution

The 9105A is an execute only version of the 9100A. It performs the same immediate mode operations as the 9100A and it will execute all programs written on the 9100A but you can not write programs with the 9105A. It has 1.5 Mbyte of RAM memory space and two floppy disk drives rather than a hard disk drive.

Applications and Programming Support

Fluke's application and programming support programs are designed to meet the needs of a wide variety of users.

Applications course. The 9100 Series offers you a choice of test techniques as well as a variety of circuit-interface devices. The best choice for a particular situation depends both on the type of circuitry involved and on your objective (functional test, fault isolation, etc.) Fluke's applications course shows you how to apply the 9100 Series to a wide range of circuits commonly found in microprocessor-based systems, so you can select the most appropriate test technique and interface device for each application.

Programming course. Programming the 9100 Series is easy, but you may still benefit from guidance in how to develop effective Guided Fault Isolation routines for different types of test and troubleshooting procedures. Fluke's programming course will help you get the most from the system's Guided Fault Isolation capabilities.

Contract consulting and programming.

Fluke's contract consulting and programming services offer still other options for applications and programming support. You can contract with us for consulting help as you work on your own applications and programs, or you can have us simply develop programmed routines for you, customizing them to your particular products and procedures. Contact your local Fluke representative for availability.

Maintenance Support.

Worldwide network of technical centers. Fluke's worldwide network of technical centers makes it easy for you to maintain and service your system, no matter where your operation is located.

Standard Warranty. Your 9100 Series tester comes with a 90-day warranty, including both time and materials. Warranty service is available at any Fluke technical center, worldwide.

Extended Warranty Agreement

All 9100A product line components come with a 90 day warranty. A one year, renewable, Extended Warranty, covering all repairs with performance testing, including parts, labor and return surface freight costs.

This warranty will be discounted 15% if purchased with the instrument or 7% if purchased prior to expiration of product warranty. See page 453.

Software Maintenance Agreement

A software maintenance agreement is a one year renewable agreement that provides for product upgrades during the covered period. Software upgrades include any hardware required for implementation.

Upgrades will include product improvements which increase the functionality of the product software and increase the throughput of testing and troubleshooting. Upgrades improve the operation of the operator control, programming station editor, programming language and functions, Guided Fault Isolation programming and the I/O devices such as the disks and communication ports. Some upgrades improve the operation of existing capabilities and some upgrades add new capabilities. Future major enhancements will be sold separately.

9100 Features

Mainframe: 20 Mbyte Hard Disk for program development and storage (9100A). Single (9100A) or Dual (9105A) 3.5 inch 140K-byte formatted MicroFloppy Drives for software loading, storage and copying. 16 bit μ P with 2.0 Mbytes (9100A) or 1.5 Mbytes (9105A) of internal RAM for program and data storage. Plug-in slots for 1 pod and 4 Parallel I/O Modules. Dual RS-232 Interfaces, one system referenced, one earth referenced.

Display: 3 line, 42 characters vacuum fluorescent dot matrix with graphics capability.

Keypad: User keyboard allows access to all functions. Seldom used functions are called with soft keys.

Built-In Tests

RAM: Allows selection of one of three possible tests for finding faults associated with RAM circuitry.

ROM: Reads ROM and computes CRCs and compares with stored CRC.

Bus: Checks the integrity of address, data and control bus.

Built-in Troubleshooting Functions

Read: Reads data from a specified location.

Write: Writes data to a specified location.

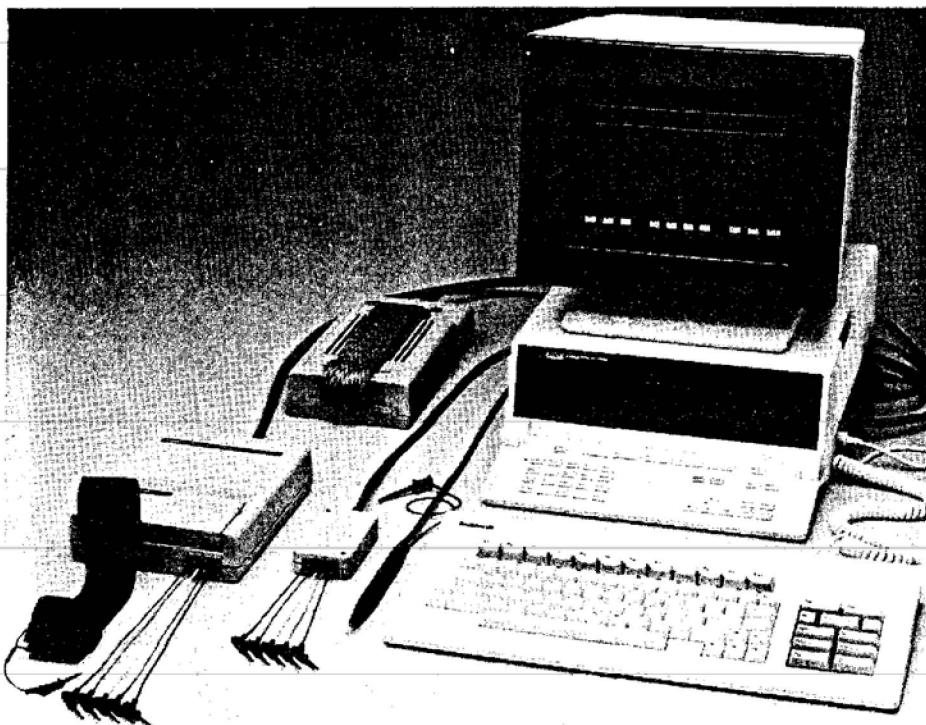
Toggle: Toggles a specified data, address or control bit.

Ramp: Ramps the data or address bits over all possible values with a specified starting value and a mask of bits to be ramped.

Rotate: Rotates right a specified starting data word through all possible bit positions.

Probe

Features: CRC signatures with external clock, start, stop, and enable; CRC signatures with external clock, start, and stop generated from a programmable number of clock pulses after start; CRC signatures with the clock from the pod sync; 24 bit transition counting using external start, stop, and enable; Frequency measurement to 40 MHz; Clocked 3-state logic level history using external clock, qualified with start, stop, and enable; Clocked 3-state logic level history using microprocessor pod sync clock;



Asynchronous 3-state level history in all modes; Selectable thresholds for TTL, CMOS, and RS-232 levels; Three logic level indicators on the handheld probe body; Probe output drive for high, low or toggle synchronized to pod sync, external clock or free run; Probe response button to signal the mainframe to gather response data; Common lead fused for both the probe and clock module to provide ground fault protection, with blown fuse indication.

Software

Programming: The user creates and debugs test or troubleshooting procedures with the programmer's station option. This gives the user full access to a screen oriented editor and integrated procedure debugger. Test procedures generated on the 9100A can be transported and executed on other 9100A/9105A systems via the 3.5 inch micro-floppy media.

Language: The test language, called TL/1, is used by a test engineer to specify automatic test and troubleshooting procedures. TL/1 is an easily read high level language designed for complete control of the functional test and GFI test environment. The language includes the 9010A language testing concepts. Enhancements are provided in the area of fault handling, UUT initialization and interface to GFI procedures.

Edit/Debug: Procedure editing and debugging are integrated to present a unified means of testing and modifying procedures. The editor is screen oriented, and always provides the user with a current picture of the procedure being edited. The debugger provides many features such as break-point, tracing and access to variables by name.

Guided Probe/Clip Troubleshooting: A menu-driven software package makes it easy for a technician to specify node list information and accumulate signatures from a good UUT. During troubleshooting, this information is used to guide the operator. The operator is told where to place the probe or IC clip to track down the fault.

Executing: The procedure execution environment on the 9100A and the 9105A are identical. Procedures generated on the 9100A will also run on the 9105A. Procedures are transported from the 9100A to the 9105A on a 3.5 inch micro-floppy disk.

Manuals

Getting Started: A description of the parts of the 9100A/9105A, what they do, how to connect them, and how to power up.

Automated Operations Manual: How to run pre-programmed test or troubleshooting procedures.

Technical User's Manual: How to run built-in tests and manual or pre-programmed troubleshooting procedures.

Applications Manual: How to write test or troubleshooting programs using the 9100A's TL/1 programming language.

— TL/1 Reference Manual

— Programmers Manual

— Pod Supplemental Manual

Specifications

9100A/9105A Electrical

Specifications

Single Point Probe Input Thresholds

TTL	CMOS	RS-232	
5.0V	5.0V	30V	GUARANTEED HIGH
2.6V	3.7V	3.2V	high or invalid
2.2V	3.3V	2.8V	GUARANTEED INVALID
1.0V	1.2V	-2.8V	low or invalid
0.6V	0.8V	-3.2V	GUARANTEED LOW
0.0V	0.0V	-30V	

Input Impedance: 70 k Ω shunted by less than 33 pF

Data Timing for Synchronous Measurements

Maximum Frequency: 40 MHz

Minimum Pulse Width (H or L): 12.5 nsec

Minimum Pulse Width (tri-state): 20 nsec

Setup Times

Data to Clk: 5 nsec

Start, Stop or Enable to Clk: 10 nsec

Hold Time

Clk to Enable: 10 nsec

Clk to Start or Stop: 0 nsec

Data Timing for Asynchronous Measurements

Maximum Frequency: 40 MHz

Minimum Pulse Width (H or L): 12.5 nsec

Minimum Pulse Width Invalid (X)

TTL or CMOS: 100 nsec $\pm$ 20 nsec

RS-232: 2000 nsec $\pm$ 400 nsec

Transition Counting

Maximum Frequency: 40 MHz minimum

Maximum Count: 16777215 + overflow

Maximum Stop Count: 65535 clocks

Frequency Measurement

Maximum Frequency: 40 MHz minimum

Resolution: 20 Hz

Accuracy: $\pm$ 250 ppm $\pm$ 20 Hz

Output Pulser

High: >3.5V @ 200 mA for less than 10 μ s; @

1% duty cycle >4.5 @ 5 mA continuously

Low: <.8V @ 200 mA for less than 10 μ s; @ 1%

duty cycle <4V @ 5 mA continuously

Clock Module Specifications

Input Threshold: 1.6V $\pm$ 0.2V

Input Impedance: 50K shunted by less than 10 pF

Clock, Start, Stop, and Enable Input Speed

Maximum Repetition Rate: 40 MHz

Minimum Pulse Width: 12.5 nsec

RS-232 Interfaces

One isolated (system referenced)

One non-isolated (earth referenced)

Baud Rates: 110, 134, 300, 600, 1200, 1800,

2400, 4800, 9600, 19200

Parity: Odd, even or none

Data Bits: 5, 6, 7, or 8

Stop Bits: 1, 1.5, 2

XON/XOFF (Ctrl-S/Ctrl-Q): Disable/enable

Clear to Send: Disable/enable

New Line: Carriage Return/Line Feed or Carriage Return

General Specifications

Operating Temperature: 5°C to 27°C 95% RH maximum (non-condensing); 27°C to 40°C; RH decreasing linearly from 95% to 5% (non-condensing)

Storage/Shipping Temperature: -20°C to 60°C; 8% to 80% RH, non-condensing; micro-floppy media limited to 5°C to 60°C, 8 to 80% RH non-condensing

Line Voltage: 90 to 132V ac 47 to 440 Hz; 180 to 264V ac 47 to 63 Hz

Power Consumption: Mainframe, 1.0W max; monitor, 50W max

Size:

Mainframe: 14.0 cm H x 34.3 cm W x 50.8 cm D (5.5 in x 13.5 in x 20.0 in) Monitor: 30.53 cm H x 33.53 cm W x 33.00 cm D (12.02 in x 13.2 in x 13 in) ASCII Keyboard: 5.02 cm H x 21.5 cm W x 47.2 cm D (2.0 in x 8.33 in x 18.51 in)

Weight:

Mainframe 8.26 kg (18.2 lb)

Monitor 8.44 kg (18.6 lb)

ASCII Keyboard 1.59 kg (3.5 lb)

Safety: Designed to meet the following safety standards: ANSI/UL 478, IEC 348, IEC 3435, and CSA 5568

Options

9100A-003 Parallel I/O Module

Features:

CRC signatures with Start, Stop, Enable clocked to pod or external clock.

CRC signatures with stop derived from a programmable number of clock pulses after Start.

Enable can be derived from the external enable line, or from Pod Sync, or can be forced true.

Programmable slopes on clock, start, stop, and enable.

CRC signatures can be taken during over-drive.

Transition counter gated by external Start, Stop, and Enable.

Frequency measurements to 10 MHz.

Clocked level history using external clock; qualified with Start, Stop, and Enable.

Asynchronous level history.

Drive of any arbitrary pattern of 0, 1, or 3-state.

Comparison of any arbitrary 40 bit pattern with a programmable 40 bit pattern of 0s and 1s.

True comparison available as a fault within TL/1 programs or as a message during immediate mode operation.

The hardware signal (DCE), is also available on the outside of the I/O module.

Logic thresholds switchable between CMOS and TTL.

Family of DIP and SMT logic clip modules with response button to start response gathering.

Common lead fuse protection, for ground fault protection with blown fuse indication.

Digital Test Systems

9100 Series

Electrical Specifications

Data Output Specifications:

Current, time >10 mS: ± 200 mA

Current, <10 mS: ± 2 A

Pattern Rate, 1 module driven: 35 kHz

Pattern Depth, (1 module driven during 10 mS
high current pattern drive mode): 256 patterns

Max current, per pin (driving high): 250 mA

Max current, per pin (driving low): 150 mA

Data Inputs: Input Impedance: 50 k Ω min

Input Thresholds

TTL	CMOS	
5.0V	5.0V	GUARANTEED HIGH high or invalid
2.6V	3.8V	
2.2V	3.3V	GUARANTEED INVALID low or invalid
1.0V	1.2V	
0.6V	0.8V	GUARANTEED LOW
0.0V	0.0V	

Clock, Start, Stop, and Enable Inputs:

Thresholds: Logic low 0.8V max; Logic high
2.0V min

Input Current: ± 1 μ A

Input/Output Overvoltage Protection: ± 15 V for
one minute maximum, any pin, one at a time

Transition Counter

Max Frequency: 10 MHz minimum

Max Count (Transition Mode): 8388607 counts
(+overflow)

Freq Accuracy (Freq Mode): ± 250 ppm ± 2 Hz

Stop Counter

Max Frequency: 10 MHz

Max Count: 65535 clocks

Clock:

Max Frequency: 10 MHz

Min Pulse Width: 50 nsec

Timing for Synchronous Measurements

Max Frequency of Clock: 10 MHz

Data Setup Time: 30 nsec

Data Hold Time: 30 nsec

Minimum Pulse Width (Start/Stop/Enable/
Clock): 50 nsec

Start Edge Setup Time (before clock edge, for
clock edge to be recognized): 0 nsec

Stop Edge Hold Time (after clock edge, for
clock edge to be recognized): 10 nsec

Enable Setup Time (before clock edge, for
clock edge to be recognized): 0 nsec

Enable Hold Time (after clock edge, for clock
edge to be recognized): 10 nsec

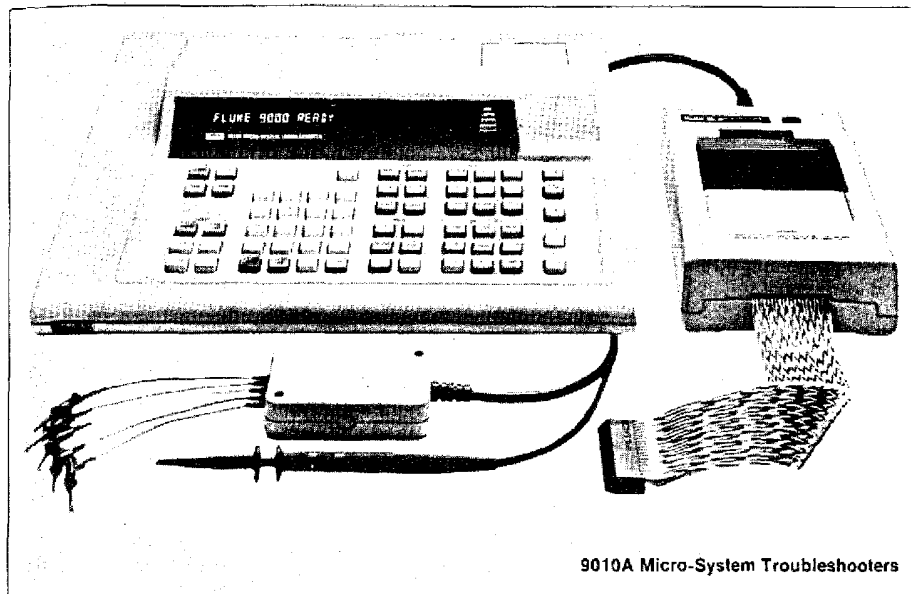
Data Timing for Asynchronous Measurements

Max Frequency: 10 MHz

Minimum Pulse Width (high or low): 50 nsec

Min pulse width (tri-state): 150 nsec

Data Compare Equal (DCE): Min pulse width of
Data and Enable: 75 nsec



9010A Micro-System Troubleshooters

9000 Series Micro-System Troubleshooters

Preprogrammed kernel test routines

Simple peripheral troubleshooting

Keyboard data entry

32-digit display

Power-up self-test

Keystroke programming (9010A only)

Language compiler optional (9005A and 9010A)

Communications interface (RS-232C is optional for 9005A and 9010A; either RS-232

or IEEE 488 is standard for 9020A)

Special Functions

- (a) Preprogrammed functional tests, offer structured testing and troubleshooting of the μ P's BUS, RAM, ROM and I/O Registers.
- (b) TROUBLESHOOTING functions: simple READ and WRITE commands allow you to stimulate and observe responses from peripheral interphase adapters (PIAs, CTCs, and UARTs) and circuitry beyond the μ P bus. Several special functions are available (RAMP, WALK) with preprogrammed stimulus sequences.
- (c) Optional RS-232: easy downloading of programs and test results to storage mediums, printers and other testers at remote locations. Optional IEEE-488 for computer controller operation (9020).
- (d) TAPE deck controls for storing and reading programs and UUT memory maps on the mini-cassette.
- (e) LEARN function which is used on a "known good" system, finds and maps RAM, ROM and read/writable I/O addresses.
- (f) Hexadecimal entry of address descriptors.
- (g) MODE control of tests and programs.
- (h) TEST SEQUENCING and ARITHMETIC keys for creating unique user-generated test routines.
- (i) PROBE controls used for synchronizing the troubleshooting probe to μ P cycles and to drive nodes high and/or low.
- (j) Pod design provides for easy servicing. Extensive input protection prevents damage to the pod from common accidental abuses such as plugging the pod into the socket backwards. Plug is inserted into socket on pod for self-test. Pins can be protected there when not in use.

Partial List of Processors Supported

Z80A	68010	8042	8314
Z80B	6802	8044	8711
Z8001	6802NS	8048	8711A
Z8002	6808	8049	8712
Z8003	6809	8050	8714
Z8004	6809E	8051	8718
1802	8031	8052	8719
1804	8032	8080	8751
1805	8035	8085A	9530
1806	8039	8085-2	8C186
6502	8040	8086	8C188
6800	8041	8088	8C286
68000	8041A		

The 9000 Series Micro-System Troubleshooters — 9005A, 9010A, and 9020A — are among the most comprehensive troubleshooting instruments ever developed for locating faults on microprocessor-based systems. They include built-in preprogrammed test routines for checking the entire microprocessor kernel: bus, RAM, ROM, and I/O. Included is a troubleshooting probe that you can use either to monitor logic action on a node-by-node basis or to inject stimulus pulses.

The three troubleshooters differ primarily in their programming and system capabilities.

The **9010A** is a self-contained, programmable model that lets you develop your own customized test programs. Using the 9010A, you can perform specialized guided fault-isolation routines on any portion of a board's digital circuitry.

The **nonprogrammable 9005A** includes the same built-in tests as the 9010A but cannot generate new test routines. It can, however, run test sequences developed on the 9010A and downloaded from a minicassette tape. With the optional RS-232C interface, you can also download test sequences directly from the 9010A or a host computer. Typically, you would develop guided fault-isolation programs at a central location, using a 9010A, and then run the programs at remote sites on 9005As.

The **9020A**, designed for systems use, runs test programs written and stored in a system controller or other computer. You can also combine the 9020A with other test instruments to troubleshoot complex microprocessor-based products with special measurement and control problems. The 9020A has no programming keys or cassette tape capability, so test sequences must be executed through the RS-232C or IEEE 488 port.

Read/Write Emulation

The 9000 Series Micro-System Troubleshooters eliminate tedious, manual probing techniques. Instead, they take control of the unit under test by plugging into its microprocessor socket. They then emulate the actions of the microprocessor, both reading data from and writing data to the unit's RAM, ROM, and I/O addresses.

Micro-System Troubleshooters

9000 Series

Built-in Tests

Fluke has taken the trouble out of verifying that the kernel — the heart of the microprocessor system — is operating properly, by including built-in kernel tests in all the 9000 Series Troubleshooters. These tests, initiated by a single keystroke, check the electrical integrity of the microprocessor bus, the read/write capability of the I/O registers, the data in ROM, and RAM operation. A fifth built-in test provides more extensive RAM tests when necessary, checking for pattern-sensitive failures.

The five tests, which cover more than 50% of the components on most boards, check for the problems that are often the most difficult to identify and isolate — including failures that lock up the microprocessor bus. Even if the troubleshooters had no other capabilities, the time saved by these built-in tests alone would more than justify their cost.

Of the five built-in tests, you should run the bus test first, since it verifies the integrity of the microprocessor's basic communication network. To test the remainder of the kernel, you need to enter the location of RAM, ROM, and I/O for the unit under test, so the troubleshooter will know what addresses to read from and write to. You can enter this information manually through the front-panel keyboard or download it from a minicassette — or, if you have the RS-232C interface, you can download it from a host computer or system controller. If address information is not readily available from the unit's documentation, there is a LEARN algorithm to let you generate a memory map from a known-good board. Once entered, memory-map information can be stored on a minicassette for later use (9005A/9010A).

Beyond the Bus

The 9000 Series Troubleshooters aren't limited to finding kernel-related problems; they can also isolate failures in synchronous circuitry outside the bus. The troubleshooting probe that comes with the 9000 Series will help you track such off-the-bus failures to their source. This probe is a powerful fault-finding tool, useful both for monitoring logic action and for injecting stimulus pulses.

In monitoring, or response mode, the troubleshooting probe takes signatures, counts events, and shows high/low logic states in each node probed. In stimulus mode, it can inject high or low pulses to stimulate readouts, print heads, interfaces, or other devices. Driven by a sync pulse from the interface pod, the probe can be synchronized to various microprocessor events, such as valid address or data periods on the microprocessor bus. You can also choose to use it in "free run" mode, injecting 1 kHz pulses at the contacted nodes.

To further extend the capabilities of the troubleshooting probe, add the asynchronous signature option. This option lets you test asynchronous circuits located outside the microprocessor bus structure (such as DMA controllers, video controllers, and video-generation circuits) with-

out using a logic analyzer or oscilloscope. Tests performed include signature gathering, waveform capture, and event counting. For more information, see the description of the Asynchronous Signature Probe Option.

Custom Test Programming on the Fluke 9010A

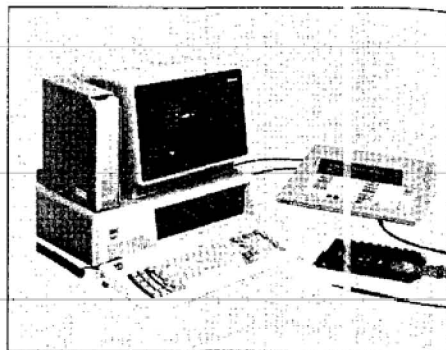
The 9010A lets you write your own comprehensive test routines tailored to the unique characteristics of the equipment you service. These programs can include prompting messages to help guide your technicians through the test procedures. Once written, your test programs can be stored on minicassettes for later use — or for loading in a 9005A.

You can generate your own test software in two ways. First, you can develop short programs right on the 9010A's keyboard, in much the same way as with a scientific calculator. Second, for more extensive test routines, you can use the 9010A's Language Compiler, developing programs off-line on a personal computer and then downloading them to either a 9010A or 9005A. The Compiler runs on a number of popular personal computers, including the IBM® PC and Kay Pro II® as well as on the Fluke 1720A and 1722A Instrument Controllers. For more information, see the description of the Language Compiler on page 163.

A Powerful Test System Using the Fluke 9020A

The combination of a Fluke 9020A Micro-System Troubleshooter with an IBM or IBM-compatible personal computer and Fluke's TestWriter™ software (see page 164 for more information) gives you a powerful system for performing large-scale guided fault-isolation. In this system, the 9020A is used to stimulate and gather response information from the unit under test; the personal computer acts as both the system controller and the storage medium; and the TestWriter software minimizes programmer time through simplified data-entry procedures.

This test configuration makes developing test programs so easy that it opens the door to new types of tests — tests that previously would have required too much programming time to be cost-effective. And it makes performing the tests so simple that virtually any technician can immediately begin troubleshooting, without going through the extensive training required to use more traditional test techniques.



Options and Accessories

9000A-910 Utility Tape

The 9000A-910 Utility Tape contains many programs designed to enhance the operation of the 9010A. These include:

- Merge Tape — Lets you read specific programs from a minicassette tape, renumbering them as desired and merging them with programs already in the 9010A. With this utility, you can combine programs from two or more tapes onto a single tape.
- Frequency Counter — Lets you use the troubleshooting probe to measure frequencies of up to 6 MHz.
- Setup — Lets the 9010A operator make changes in the setup menu while the system is under program control.
- Probe Pulser — Lets the 9010A operator change pulser status while the system is under program control.
- Register Addition and Subtraction — Allows for the addition or subtraction of the contents of two registers while the system is under program control.

The Utility Tape comes with a manual and one minicassette that describes how to use each of these programs.



9010A Language Compiler

If your test routines are short, you can develop them right at the keyboard of the 9010A. For more extensive test routines, you'll find it easier to work off-line on a personal computer, using the 9010A Language Compiler and downloading the results to the 9010A.

The Language Compiler lets you write extensive test and troubleshooting routines more quickly and conveniently. The Compiler is available in several versions, offering compatibility with the following computer systems:

- IBM™ Personal Computer
- Kay Pro™ II
- Fluke 1720A and 1722A Instrument Controllers

Sophisticated development tools come with the Compiler to speed the program-development process. Using these features, you can:

- Share common test routines among multiple programs through a File Inclusion feature, linking them together automatically at compile time.
- Save time when entering code by using keyword abbreviations, optional command keywords, and shorthand notations.
- Assign symbolic names to your programs, labels, and registers, making it easier to understand and remember the purpose of the different program sections.
- Document programs with comments imbedded within the program listing, making them easier to follow should you later wish to revise them.

9000A-006 Asynchronous Signature Probe Option

The 9000A-006 Asynchronous Signature Probe Option gives you high-powered fault isolation capabilities for asynchronous circuits located outside the microprocessor bus structure. With this option, you no longer need to augment your 9000 Series Troubleshooter with a logic analyzer.

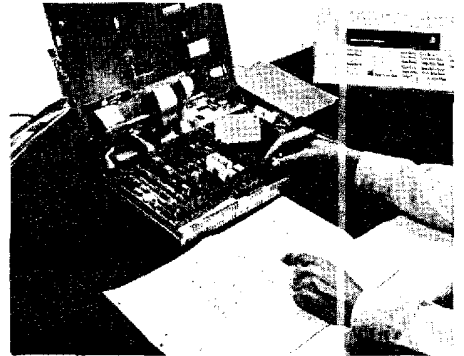
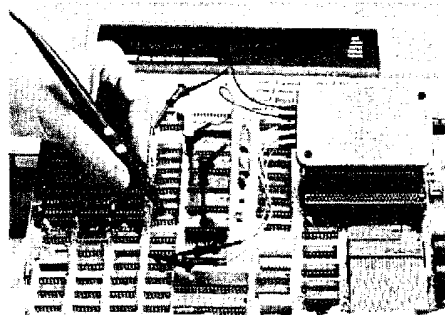
By adding the Asynchronous Signature Probe to the 9000 Series, you gain the ability to perform real-time measurement of such asynchronous circuits as:

- DMA controllers
- Video controllers
- Video-generation circuits
- Communication circuits
- Peripheral controllers

The Asynchronous Signature Probe provides three distinct troubleshooting measurements:

- Signature gathering, using the cyclic redundancy check technique.
- Waveform capture, in which the probe-tip data stream is sampled every 20 nanoseconds for a total of up to 32 data samples. The results of this sampling are both displayed and stored.
- Event counting, a powerful tool for node characterization. Using this feature, you can count events from the probe tip either continuously or through a measurement window. A 24 bit register allows you to record over 16 million events.

The Asynchronous Signature Probe consists of a circuit board, installed in the 9000 Series mainframe; a clock module, which picks up timing and control signals from the unit under test; and a special set of operating programs contained on a minicassette tape.



Micro-System Troubleshooters

9000 Series

9020A-925 TestWriter

Fluke's TestWriter software, combined with the 9020A Micro-System Troubleshooter, an interface pod, and an IBM (or IBM-compatible) personal computer, makes it easy to develop guided fault-isolation or automated diagnostic programs for digital circuit testing. In this configuration, the personal computer, communicating with the 9020A-001 through its RS-232-C interface, acts as both a system controller and a storage medium.

TestWriter offers the best of both worlds in regards to program generation and execution. Programmers will welcome TestWriter's time-savings and simplified data entry procedures. Operators will appreciate the use of menus in directing the testing process, as well as the easy-to-read graphic feedback of the testing process.

TestWriter's ability to automatically generate a fault tree eliminates the tedious time-consuming process of entering individual decision statements when structuring a program. The programmer simply enters UUT descriptive information: the component types and their interconnectivity. This time-saving feature, together with the increased memory capacity in the PC is what makes TestWriter extremely effective when generating large GFI programs.

The test engineer proceeds by developing a set of stimulus routines; one and, sometimes, several for each node on the UUT.

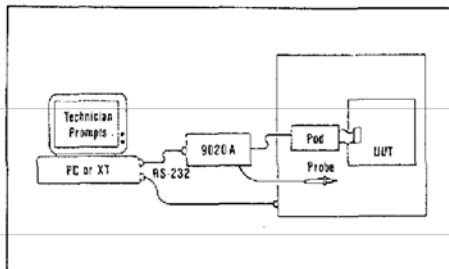
The last step in completing the GFI program is to gather responses on each node of a "known good" UUT while stimulated by the corresponding stimulus routine(s). These responses are stored in a separate file which will be used for comparison with responses from a defective board during the fault isolation process.

TestWriter also simplifies the process of troubleshooting defective units. The operator makes selections from menus, aided by prompts and graphic displays. The personal computer automatically sends the appropriate commands to the 9020A and records the responses. It also provides a graphic display of the node that the operator is probing, along with the other points that drive that node.

As each nodal measurement is taken, the display will show whether the response was GOOD or BAD. The software will continue to ask for probe points until it can make a decision on the cause of the problem. Once made, this decision is displayed on the CRT.

For cases where the operator is experienced in troubleshooting a particular board, TestWriter also allows unguided fault isolation, in which the operator decides the order in which nodes are to be tested.

Test Station Configuration

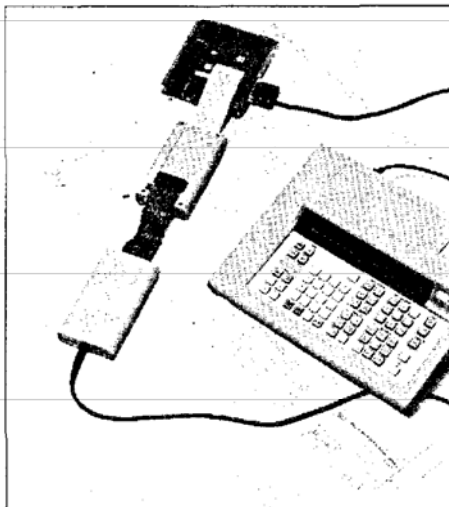


9010A/GF Upgrade Kit

This kit, in conjunction with the 9010A-001 (RS-232C interface port), transforms a 9010A into a dual purpose unit: it will continue to function as a standard 9010A and, in addition, can function as a 9020A-001. As a 9020A, this unit can operate with the above described TestWriter software, which executes on an MS-DOS compatible personal computer.

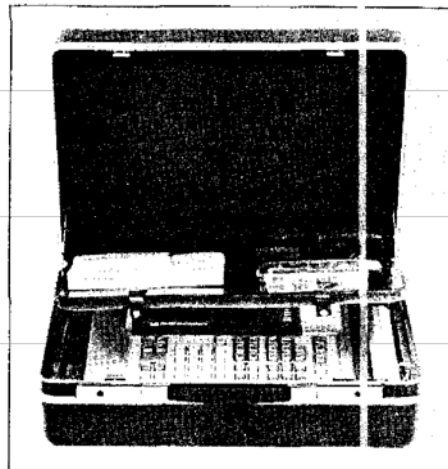
This upgrade kit allows you to execute all existing test procedures on the 9010A and expands its utility by offering you the ability to interface it with a pc and utilizing the power of the TestWriter software system.

The upgrade may be ordered as a kit for Fluke field service center installation in your unit or can be ordered factory installed for new units. The installation adds an internal module and a switch labeled GFI (Guided Fault Isolation) on the rear panel. In the GFI-ON mode the 9010A with 9010A/GF option behaves as a 9020A.



Transit Cases

Lockable hard case holds 9000 Series pod, probe, accessories, four mini-cassette tapes, and user's manual. Foam-lined, sturdy construction.



Specifications

Technical Specifications

Display: Vacuum fluorescent; displays up to thirty-two 14-segment alphanumeric characters at once.

Self Test: All 9000 Series units perform self-tests at each power-up, verifying proper operation of internal RAM, ROM, clock, power supply, display, and communications with interface pod. Pod has own self-test socket to verify proper operation at microprocessor plug.

Test Speed: Tests run at full system speed, based on clock in unit under test.

Keyboard Data Entry: Hexadecimal—0 through 9 and A through F.

Mag Tape: (9005A and 9010A only). Mini-cassette tapes store all "learned" data plus test programs generated on-line for off-the-line testing. One tape holds up to 12K bytes—the same as internal memory on the 9005A and 9010A. Both units come with a built-in tape drive.

Interface Pod: Plugs into 9000 Series mainframe; must match type of microprocessor used in circuits being tested. Pods available for 8-bit and 16-bit microprocessors. Special circuitry protects pods from damage even if plugged in backwards.

Troubleshooting Probe: Plugs into 9000 Series mainframe. In response mode, takes signatures, counts events, shows logic states; in stimulus mode, injects either clock-synchronized or 1 kHz pulses. Measurement thresholds are 0.8V (low), 2.4V (high). Stimulus pulses are <0.2V at 100 mA (low), >4V at 100 mA (high). Probe is protected to $\pm 30V$.

Automatic Functions Summary

Learn Mode: (9010A and 9020A only). Uses a known-good system of same type as unit under test to locate and determine size of RAM, ROM, and read/writeable I/O registers, and to compute signatures. Stores results in memory for immediate comparison to circuits being tested; data can also be saved on minicassette — or (with RS-232-C option) downloaded to another system or device.

Built-In Kernel Tests: Using data entered either automatically through Learn mode or manually through the keyboard, the 9000 Series Troubleshooters can perform the following tests of kernel circuitry (each initiated by a single keystroke):

- **BUS** — Checks electrical integrity of address, data, and control lines; isolates stuck nodes and adjacent-trace shorts.
- **RAM SHORT** — Checks each RAM location for ability to read and write; verifies address decoding; detects data-line shorts beyond bus buffers.
- **ROM** — Computes ROM signatures and compares them with those in the known-good unit.
- **I/O** — Checks each I/O register identified in the known-good system to make sure it is read/writeable.
- **AUTO** — Runs all the above tests; initiated by a single keystroke. (Typically requires several minutes, depending on size of memory being checked.)
- **RAM LONG** — A more complex RAM test, used to isolate "soft" or pattern-sensitive RAM faults.

In addition, 9000 Series Troubleshooters continually monitor the power supply of the unit under test for out-of-tolerance conditions as well as the UUT clock signal. An error message is displayed if they detect a defect.

Troubleshooting Functions Summary

The following function keys are available on the 9000 Series Micro-System Troubleshooters:

- **READ** — Displays data contents of specified address.
- **WRITE** — Writes specified data to any address location.
- **WALK** — Writes automatic walking pattern to specified address.
- **RAMP** — Writes automatic binary incrementing ramp to specified location.
- **TOGGL DATA** — Pulses specified data bit between high and low state.
- **TOGGL ADDR** — Pulses specified address bit between high and low state.
- **TOGGL DATA, then STS/CTL** — Pulses specified control bit between high and low state.
- **READ PROBE** — Displays probe measurements, including signatures, logic states and event counts.
- **SYNC** — Allows probe measurements or stimulus to be either asynchronous or synched to valid address or data periods on the microprocessor bus.

- **HIGH (Pulse)** — Activates high-going pulses. The frequency and width of the pulses depend on the sync mode selected.
- **LOW (Pulse)** — Activates low-going pulses. The frequency and width of the pulses depend on the sync mode selected.
- **HIGH and LOW toggle** — Pulses alternate between high-going and low-going. Also, a scope trigger-signal of about 100 mV amplitude can be synchronized with address or data sync pulses from the mainframe.

Test-programming Functions Summary (9010A)

(Not applicable to 9020A; available in execute-only mode on 9005A.)

Users wishing to troubleshoot beyond the system kernel into peripheral devices can write and edit test programs tailored to the unique architecture of the systems they work with. The following keys are available for on-line programming:

- **PROGM** — Opens and closes test programs (both for development and for editing).
- **EXEC** — Runs selected test program.
- **DISPL** — Allows programs to include operator prompts (e.g., PROBE U6 PIN 7).
- **Sequencing keys (IF, >, =, GOTO, LABEL)** — Available for comparison, branching, looping, and labeling steps in the test program.
- **Arithmetic keys** — Eight logical operations available for arithmetic control of mainframe registers that store user-specified address and data information during program writing.
- **Editing keys** — Allow the operator to scroll backwards or forwards through the programming steps.

Mode Control Summary

Mode control keys give operator control over all functions: automatic tests, programmed tests, and troubleshooting operations. The following mode control keys are available:

- **STOP** — Halts current test or operation.
- **REPEAT** — Causes test or operation to repeat once.
- **CONT** — Advances to next test step or continues last operation.
- **LOOP** — Continuously repeats a functional test, programmed test step, or troubleshooting command — or loops on any fault.

- **RUN UUT** — Allows full exercise of both the self-diagnostics and normal run operation of the unit under test, with the pod microprocessor acting as the processor of the unit being tested.

General Specifications

Temperature: 0°C to +50°C operating temperature (+10°C to +40°C for minicassette) -40°C to +70°C non-operating temperature +4°C to +50°C for minicassette)

Power: 100, 120, 220, 240V ac $\pm 10\%$; 50 Hz, 60 Hz $\pm 5\%$; 40W maximum

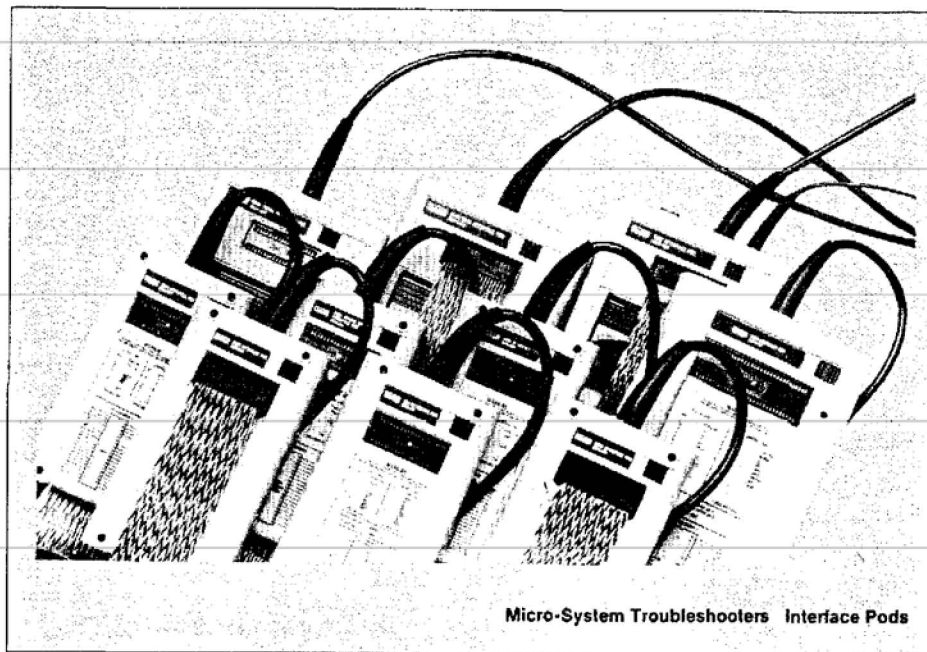
Size: 11.5 cm H x 35.5 cm W x 30.5 cm D (4.5 in H x 14 in W x 12 in D)

Weight: 6 kg (13 lb) mainframe; 0.7 kg (.5 lb) per interface pod

Included: Probe, probe accessories, two minicassettes (none with 9020A), manuals, power cord

Micro-System Troubleshooters

9000 Series Interface Pods



Micro-System Troubleshooters Interface Pods

Interface Pods

- 50 microprocessors supported
- Adapter kits available for other microprocessors
- Easy connection to unit under test
- Intelligent pods with built-in software*
- Quick memory tests*
- Quick looping Reads and Writes*
- Built-in self-diagnostics

* Available on some pod models only. See Table 1 for a listing of pods offering these features.

How the Interface Pod Works

The interface pod functions as the test interface between the suspect circuit board and the troubleshooter mainframe, adapting the general architecture of the mainframe to that of the specific microprocessor system under test. When you plug the pod into the unit under test, you are effectively replacing the microprocessor in that unit with the micro-processor in the pod.

This unique test connection gives the Fluke troubleshooter mainframe the ability to access board and system components *directly*, through the central control element of the entire system — the microprocessor. As a result, you get exceptionally high-confidence test results.

Unlike emulators and development systems intended for software debugging, these interface pods are designed specifically for hardware troubleshooting. Each pod is a self-contained system with its own microprocessor, RAM, ROM, and I/O memory space. This means

that the unit being tested does not need to be operating for the Fluke troubleshooter to begin testing. It also means that you can test for multiple faults by simply disabling each faulty line as it is identified and continuing to run the tests.

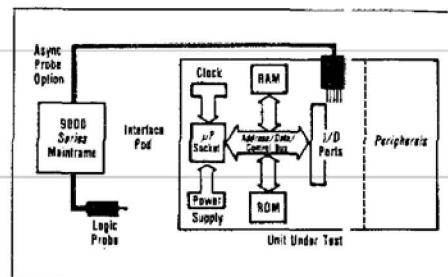
Each pod includes a RUN UUT function to let you test the unit's operation as though it were operating under its own microprocessor. When this function is activated, it electrically disconnects the unit being tested from the pod, letting it perform as if its microprocessor were still in the socket.

Microprocessors Supported

Fluke interface pods currently support an extensive range of microprocessors, as shown in Table 1. New pods are added regularly to support additional microprocessors as they are introduced.

IBM is a registered trademark of International Business Machines Corporation.
Kay Pro II is a registered trademark of Non-Linear Systems, Inc.

The interface pod obtains its clock signal from the unit under test and runs at the same speed as the unit. Since manufacturers often build a particular microprocessor in different versions, each running at a different clock speed, Fluke selects the fastest clock speed available when designing its pods. This ensures the pod's ability to test any processor in that family, regardless of clock speed.



Advanced Pod Features

As microprocessor technology advances, Fluke has made its pods correspondingly larger and more powerful. Accordingly, the newer pods (indicated by an * in Table 1) offer advanced features not available in some of the earlier models. These include more intelligence, interrupt features, quick memory tests, and quick looping read and write tests.

Table 1. Microprocessors Supported by Fluke Interface Pods

System μP	Pod Model #	System μP	Pod Model #
Z80A	9000A-Z80	8041A	900A-8048*
Z80B	9000A-Z80/AA	8042	900A-8048*
Z8001	9000A-Z8000*	8044	900A-8051*
Z8002	9000A-Z8000*	8048	900A-8048*
Z8003	9000A-Z8000*	8049	900A-8048*
Z8004	9000A-Z8000*	8050	900A-8048*
1802	9000A-1802*	8051	900A-8051*
1804	9000A-1802*	8052	900A-8051*
1805	9000A-1802*	8080	900A-8080
1806	9000A-1802*	8085A	900A-8085
6502	9000A-6502	8085A-2	900A-8085
6800	9000A-6800	8086	900A-8086*
68000	9000A-68000*	8088	900A-8088*
68010	9000A-68000*	8344	900A-8051*
6802	9000A-6802	8741	900A-8048*
6802NS	9000A-6802	8741A	900A-8048*
6808	9000A-6802	8742	900A-8048*
6809	9000A-6809	8744	900A-8051*
6809E	9000A-6809	8748	900A-8048*
8031	9000A-8051*	8749	900A-8048*
8032	9000A-8051*	8751	900A-8051*
8035	9000A-8048*	80186	900A-80186*
8039	9000A-8048*	80188	900A-80188*
8040	9000A-8048*	80286	900A-80286*
8041	9000A-8048*	9900	900A-9900

* Incorporates one or more advanced features (see discussion under "Advanced Pod Features" in this section.)

Note: For microprocessors not found in this table, contact your local area Fluke Sales Office or Representative for a copy of Technical Data B 1156, "User-Designed Interface Pod Adapters."

More Intelligence. Many of the newer pods feature additional built-in software, enhancing the troubleshooting and test capabilities of the mainframe. With this software, the user need only send the test parameters to the pod from the troubleshooter mainframe. The pod will independently execute the specified function, providing much faster test results than is possible with mainframe execution.

Interrupt Features. Some of the newer pods also have interrupt testing capabilities, allowing them to read information from received interrupts. The user can control the configuration of the pod's interrupt lines, enabling and disabling interrupts and forcing interrupt-acknowledge cycles.

Quick Memory Tests. Fluke has increased the speed of memory testing in many of its newer pods, including the 8051, 8086, 8088, Z8000, 68000, 80186, 80188, and 80286 building Quick RAM and Quick ROM tests into the pod software. In addition to greatly reducing the test time, these tests provide:

- A choice of byte or word test for the 16-bit microprocessors
- A choice of address increment size
- More flexibility under program control

The Quick RAM test consists of two parts. The first rapidly tests the read/write capabilities of either small segments of memory or the entire block of RAM. The second, a pattern verification test, verifies that memory addresses are being

properly decoded and checks dynamic RAM memory for refresh problems, verifying its ability to retain accurate information.

The Quick ROM test uses a checksum procedure to test the ROM for faults. It also finds any inactive data bits (bits that always read high or low regardless of the ROM address selected).

Quick Looping Read or Write. The Quick Looping Read or Write function rapidly performs continuous Reads or Writes at a specified address. This feature lets you easily view bus signals on an oscilloscope synchronized to the TRIGGER OUTPUT pulse (located on the rear panel of the Troubleshooter). By increasing the repetition rate of the oscilloscope trace, this function makes the trace signal brighter and therefore easier to see.

Special Circuitry

Because the pod is intended to be used with defective micro-systems, Fluke designed it with special input protection circuitry. This circuitry provides overvoltage protection on each line to the unit under test — even if the pod is plugged in backwards. Other pod circuitry monitors and checks each read/write operation as it is performed. A self-test socket is included for verifying proper pod function.

Pod Adapter Packaging Kit

Allows testing of many microprocessor systems not directly supported by a Fluke interface

pod. Consists of all the parts necessary to house the adapter circuitry, to connect the pod to the adapter, and to connect the adapter to the UUT.

Micro-System Troubleshooters

9000 Series Interface Pods

9005A, 9010A, 9020A Option Compatibility

Option	Description	9005A	9010A	9020A-001	9020A-002
9000A-*	Interface Pods (all)	•	•	•	•
9010A-001	RS-232 Interface	1	1	#	—
9000A-006	Asynchronous Signature Probe	1	1	1	1
9000A-010	Demonstration and Training Package	2	2	2	2
9000A-200	Kit for customizing Interface Pods	3	3	3	3
9000A-201	Clip-on Adapter for -8051 Pod	•	•	•	•
9000A-900	Transit Case	•	•	•	•
9000A-901/AC	PCB for Troubleshooting Classes	•	•	•	•
9000A-910	Utility Tape	—	•	—	—
9010A-920	Language Compiler for 1722A or 1720A	—	4	—	—
9010A-922	Language Compiler for Kay Pro	—	5	—	—
9010A-923	Language Compiler for IBM PC	—	5	—	—
9020A-925	Testwriter, PC Software	6	6	7	—
9000A-9711	Tape for Troubleshooting 8520As	•	•	—	—
9010A/GF	For Guided Fault Testing w/ Option -925	1	1	—	—
Other Items					
Y8007	Package of Ten Minicassette Tapes	•	•	—	—

Notes: All options are customer-installable except where noted.

• Compatible option

* Option suffix identifies Interface Pod type

RS-232 capability included

1 Installed at Factory or, at extra charge later, order through Service Center

2 Requires 9000A-80286 Pod

3 Use only on 40-pin microprocessor adaptations

4 Option 9010A-001 is required. E Disk Option 1720A-001 is required for 1720A

5 Option 9010A-001 is required

6 Requires IBM PC with RS-232 Interface, 9010A, and 9010A/GF

7 Requires IBM PC with RS-232 Interface

9100 Series Option Compatibility

Option	Description	9100A/SYS	9100A	9105A
9000A-*	Interface Pods (all)	•	•	•
9100A-003	Parallel I/O Module (four can be used)	#	•	•
9100A-004	Programmers' Station w/ Monochrome Monitor	#	1	—
9100A-005	Programmers' Station w/o Monitor (for Color)	—	1	—
9105A-007	512K Memory Expansion	—	—	1
9105A-008	Real-Time Clock	—	—	1
9100A-009	Monochrome Monitor	2	1	1
9000A-010	Demonstration and Training Package	4	4	4
9100A-011	Color Video Card	—	1	1
9100A-012	2 M-Byte Memory Expansion	1	1	—
9100A-013	Keyboard	#	•	•
Other Items				
Y8091	Package of Ten 3.5-inch Floppy Disks	#	#	#
Y9100A-DCS	DIP CLIP Set (-14D through -40D)	#	•	•

Notes: All options are customer-installable except where noted.

• Compatible option

* Option suffix identifies Interface Pod type

One included

1 Installed at Factory or, at extra charge later, order through Service Center

2 Included as part of 9100A-004