# 9100 *Series*

## Automated
## Operations
## Manual

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# Contents

## Index

# Figures

# Where Am I?

| | | |
|---|---|---|
| ***Getting Started*** | | A description of the parts of the 91 00A/9105A, what they do, how to connect them, and how to power up. |
| ***Automated Operations Manual*** | You Are Here | How to run pre-programmed test or troubleshooting procedures. |
| ***Technical User's Manual*** | | How to use the 91 00A/9105A keypad to test and troubleshoot your Unit Under Test (UUT). |
| ***Applications Manual*** | | How to design test or troubleshooting procedures for your Unit Under Test (UUT). |
| ***Programmer's Manual*** | | How to use the programming station with the 91 OOA to create automated test or troubleshooting procedures. |
| ***TL/1 Reference Manual*** | | A description of all TL/1 commands arranged in alphabetical order for quick reference. |
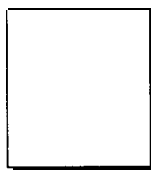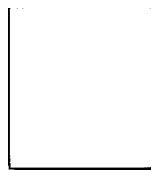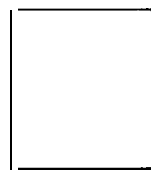
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**Section 1**

# Overview

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The 9100A/9105A system is designed to test and troubleshoot digital electronic boards that are controlled by microprocessors. Testing precedes troubleshooting. If a board proves to be defective in a test, you can troubleshoot it to locate the fault. The board or system under test is called a UUT (Unit Under Test).

Testing and troubleshooting can be done in two ways:

- **Automated:** Using test and troubleshooting programs that were previously written and stored on disk for your use. This manual explains automated operation, which can be done with little knowledge of the UUT or of the 9100A/9105A.
- **Keystroke:** The user typically employs a combination of automated procedures and manual keypad commands to troubleshoot a UUT. To do so, the user should be familiar with both the UUT and the 9100A/9105A. Detailed information about the 9100A/9105A is found in the *Technical User's Manual.*

You should already have read *Getting Started,* which describes the basic pieces of the 9100A and the 9105A.

Among the topics covered in this manual are:

- **Operator's Keypad and Display:** Section 2 describes the operator's keypad and shows you how to use it.
- **Avoiding Connection Problems:** Section 3 shows you how to avoid or correct some common setup-type errors.
- **Preparing to Test or Troubleshoot:** Section 4 shows how to:

    Perform system level self-tests, which check that the pod, probe, and **I/O** modules are connected to and communicating with the system.

    Configure the system by restoring saved system settings from the user disk.

    Calibrate the system by restoring saved calibration data from the user disk. If restored data is invalid, recalibration is necessary.

- **Automated Testing:** Section 5 shows how to use the EXEC command to run programs that test a UUT for defects.
- **Automated Troubleshooting:** Section 6 shows how to use the GFI command to troubleshoot a UUT.
- **Simulating UUT Operation:** Section 7 shows how to use the RUN UUT test. During the test, the pod replaces the UUT microprocessor and runs UUT programs, independently of the 9100A/9105A to verify correct operation of the UUT.

Figure A-l (Appendix A) is a flowchart of typical automated operations which are summarized in the following sections.

Appendix B describes common disk operations such as formatting and copying.

## POWER-UP PROCEDURE FOR THE 9105A          1.1.

To power-up the 9105A, you should:

1. Turn on the mainframe electrical power by setting the power switch on the back of the mainframe (near the power cord) to the 1 (on) position. The system then proceeds through its automatic power-up self-test.

2. After the self-tests are completed, you will be prompted to insert the disk labeled "System Disk 1" into Drive 1 (the upper micro-floppy disk drive). The following figure shows the disk drives on a 9 105A mainframe:
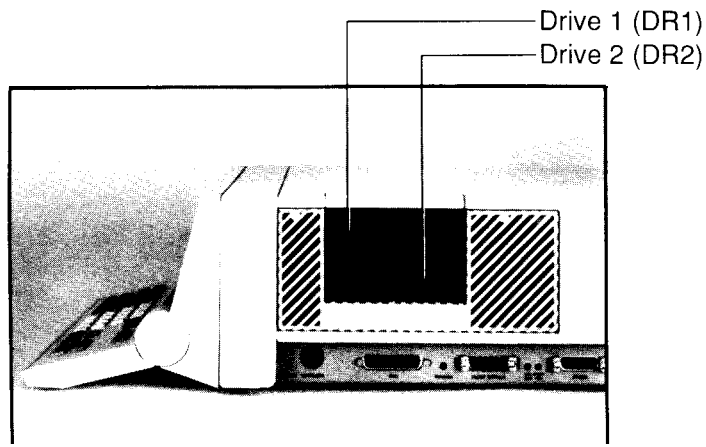


3. After the loading of System Disk 1 is completed, you are prompted to insert System Disk 2 into Drive 1.

4. When the loading of System Disk 2 is completed, a ready message will appear on the operator's display. (If no pod is connected, an additional message appears on the operator's display to tell you so.)

This completes the power-up procedure.

To use the 9105A for testing or troubleshooting, you will also need to do the following:

1. Connect the pod (for the microprocessor you are testing) to the 9105A mainframe.

2. Insert a User Disk appropriate for that microprocessor into Drive 2. This User Disk is either Master User Disk 1, Master User Disk 2, or a User Disk programmed at your organization for use with a particular UUT.

3. Press the RESET key to read the pod database from the User Disk you have inserted into Drive 2.

If the following message appears on the operator's display:

`Pod name does not match data base name`

there is no User Disk in Drive 2 (or the wrong one has been inserted).

The correct User Disk should be left in Drive 2, since pod information on the User Disk is needed for some test or troubleshooting operations (pressing the RESET key, for example).

## POWER-UP PROCEDURE FOR THE 9100A          1.2

To power-up the 9 100A, you should:

1. Turn on the mainframe electrical power by setting the power switch on the back of the mainframe (near the power cord) to the 1 (on) position. The system now proceeds through its automatic power-up self-tests.

2. If you are using the monitor, set the monitor's power switch to the 1 (on) position.

3. When the power-up procedure is completed, a ready message will appear on the operator's display.

A user disk can store information for different UUTs using a
named file directory for each. A WT file directory contains test
and troubleshooting programs, calibration data, and a system
configuration.

Once information for a particular type of UUT is stored on a
user disk, your system should use only that disk for all UUTs of
that type because the stored calibration data is unique to your
system.

The 9100A/9105A 3.5inch disk drives use industry standard
double-sided disks that can be obtained from Fluke or any
commercial computer store. Each disk stores over 650 kilobytes
of information.

To insert the disk into the drive, turn the disk so that the round,
metal hub is down and the arrow on the top-left comer of the
disk points toward the disk drive. Push the disk in until it
latches.

To remove the disk from the drive, press the black ejection
button on the drive.

Do not expose the recording surface under the spring-loaded
metal shield. Treat disks as you would treat audio cassettes. Do
not expose them to:

* Moisture.
* Extreme temperatures.
* Direct sunlight.
* Magnetic fields.

A plastic locking tab is provided on each disk for write-
protection. When a disk is write-protected, data can be read
from but not written to the disk. To write-protect a disk, slide
the tab over so that you can see through the window in the disk
case.

## PREPARING TO TEST OR TROUBLESHOOT 1.4.

When preparing to test or troubleshoot, you will probably go
through a routine such as the one summarized below. Section 4
of this manual contains more complete description of the self-
test, configuration and calibration processes.

1. Power-up the system.

2. Perform self-tests on the pod, the probe, and each
   I/O module used.

3. Check that the right disk drive has been selected.
   See Section 2.3 of this manual.

4. Configure the system by restoring a configuration
   from the user disk.

5. Calibrate the system or restore calibration data stored
   on the user disk.

## REPETITIVE TESTING AND
## TROUBLESHOOTING SUMMARY                     1.5.

After your 9100A/9105A system has been through power-up,
self-tests, configuration, and calibration, it is ready for testing
and troubleshooting. The processes are summarized below, and
are explained in detail in later sections of this manual.

- Functional Testing (EXEC key) - Section 5.
- Automated Troubleshooting (GFI key) - Section 6.
- RUN UUT Testing (RUN UUT key) - Section 7.

To use the 9100A/9105A to test or troubleshoot:

1. Connect the pod to the UUT, and then power-up the
   UUT.

2. Test the UUT using the RUN UUT key or the EXEC
   key or a combination of the two.

3. If the UUT fails a test, troubleshoot it using the GFI
   key.

## CHANGING TO A NEW TYPE OF UUT               1.6.

After you test or troubleshoot one type of UUT and are ready for another type, you will typically follow the procedure shown below. Section 4 describes self-tests, configuration, and calibration.

1.  Perform self-tests on any new pod, probe, or I/O module added to the system.

2.  Change user disks if the new UUT directory is on a different user disk.

3.  Recalibrate the system if the new UUT uses a new pod or extra I/O modules.

4.  Restore the configuration for the new UUT from the user disk.

## CHANGING 9100A/9105A SYSTEM DEVICES 1.7.

If parts of the system such as the pod, probe, or I/O modules are changed, you should follow the procedure below. Section 4 describes self-tests, configuration, and calibration.

1.  Perform self-tests for the new devices.

2.  Recalibrate the system.

# Section 2
# The Operator's Keypad and Display

Figure 2-l shows the operator's keypad and display. Functions of the status lights and some of the keys are summarized in the section following this figure.

You enter commands and information through the operator's keypad, and you get responses from the operator's display.

This section shows you how to use the keypad, using the SETUP MENU and EXEC keys as examples. Descriptions of all the keys are available in Section *3* of the ***Technical User's Manual.***

## DISPLAY SAVER                                                      2.1.

If there is no keyboard or display activity for approximately 20 minutes, the operator's display goes blank, but no data is lost. While the display is blanked, the top two status lights and bottom two status lights blink. Pressing any key on the operator's keypad will restore the contents of the display, but the keystroke is ignored.
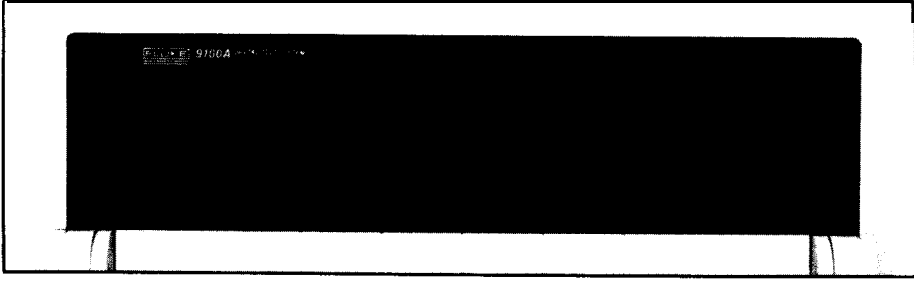
Operator's Display
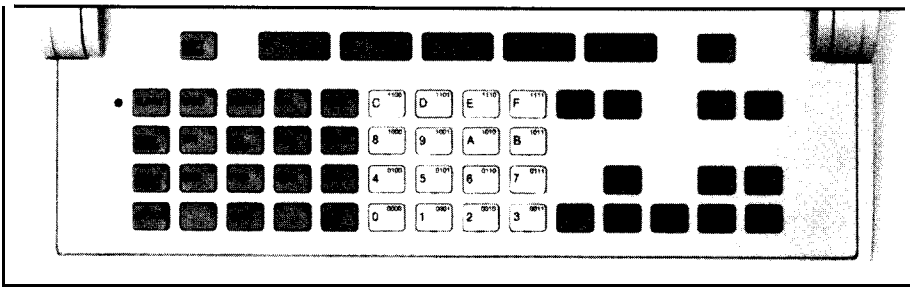
Operator's Keypad

Figure 2-I : The Operator's Keypad and Display

## SUMMARY OF STATUS LIGHTS AND KEYS        2.2.

Here is a brief summary of the keys and status lights referred to in this manual. A complete description of all keys is given in the *Technical User's Manual.*

## Status Lights                                    2.2.1.

**BUSY -** Commands are being executed. If flashing, the system is looping (executing a command repetitively).

**STOPPED -** Test execution has halted. Press the CONT key to continue testing.

**RUN UUT -** The pod microprocessor has control of the UUT and is executing instructions from UUT memory.

**STORING SEQUENCE -** The system is storing your current keystrokes.

**DISK ACCESS -** A disk is being accessed or parked.

**MORE SOFTKEYS -** There are too many softkey labels to display. Press SOFT KEYS to scroll hidden labels into view.

**MORE INFORMATION -** More information is available. Press an arrow key to see it.

**ALPHA -** The cursor is on a field which requires an alphanumeric entry. The alphanumeric character for each key is shown on the upper right comer of the function keys and the hex keypad keys.

## Function Keys                                    2.2.2.

**ARROW KEYS** - Move the flashing cursor. The keys bring hidden fields into view if the MORE INFORMATION light is on.

**ENTER/YES** - Performs the displayed command or responds YES to a displayed question.

**CLEAR/NO** - Deletes the character typed last or responds NO to a displayed question.

**SOFT KEYS** - Scrolls hidden softkey labels into view if the MORE SOFTKEYS light is on. Press it to recall prior labels.

**ALPHA** - Changes the grey keys from alphanumeric mode to normal functions. The ALPHA light is on in alphanumeric mode.

**SETUP MENU** - Specifies (among other things) the disk drive from which to execute programs.

**EXEC** - Executes a program.

**GFI** - Executes a built-in troubleshooting program that troubleshoots a particular UUT (Unit Under Test).

**RESET** - Resets hardware and all fields to power-up values but retains stored GFI information.

## Softkeys                                         2.2.3.

**F1 through F5 (softkeys)** - Selects the corresponding softkey label on the display directly above the softkey.

Here is an example of how to enter commands that select a disk drive and execute a program from the selected drive.

1. **If the 9100A/9105A is not already on, power-up the system** as described in Section 1.1 or 1.2.

2. **Insert your user disk** into the disk drive at the side of the system.

   If your system is a 9105A, insert the user disk into Drive 2, the lower drive.

   If your system is a 9100A, your files may be stored on the internal hard disk; if so, you may omit this step.

3.   **Press the SETUP MENU key.** The SETUP
     MENU command appears on the display.

┌──── Softkey Labels
│┌─── Cursor, highlighting the first field of the SETUP command

**SETUP** POD REPORT POWER SUPPLY FAILURE ON

SETUP  RESTORE  SAVE

F1    F2    F3    F4    F5

└──── Softkeys, F1 through F5
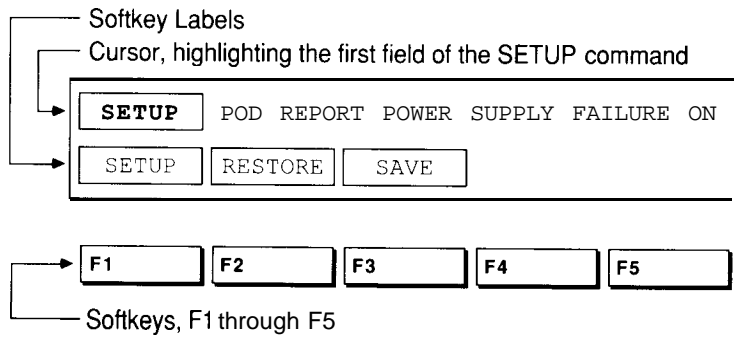
Notice the cursor, the flashing block over the word
SETUP. The cursor highlights a "field." A field is a
word or number in a command that can be changed.
Do not change any fields yet.

The words in boxes on the bottom line of the display
are called "softkey labels." The keys F1 through F5
on the keypad are called "softkeys." To select a
softkey function, press the softkey on the keypad
just below the corresponding label.

*NOTE*

**If, in step 3 when you pressed the SETUP MENU key, the display did not look like the one shown in the figure, you could make it do so by** *performing* **the following sequence:**

- **Press the left arrow key enough times to move the cursor all the way to the left.**

- **Press the** *F1 softkey* **(SETUP).**

- **Press the right arrow key once and then press the** *F1 softkey* **(POD).**

- **Press the right arrow key once and then press the** *Fl softkey* **(REPORT).**

- **Press the right arrow key once and then press the** *F1 softkey* **(POWER).**

- **Press the right arrow key once and press the** *Fl softkey* **(ON); then press the left arrow key enough times to move the cursor all the way to the left.**

**What to do if you pressed the wrong function key:** Once a function key is pressed, you can modify the function fields using the keypad. If you pressed the wrong function key, you will want to immediately abandon the function. This can be done quite easily.

Examine the ALPHA light on the left corner of the keypad. The light turns on whenever the cursor enters a field requiring an alphanumeric entry. If the ALPHA light is off, you can simply press the function key you wanted originally. The present function display will be discarded and the new function selections will be displayed. If the ALPHA light is on, press the ALPHA key to turn the light off and press the function key you wanted originally. When the light is on, the keys are interpreted as alphanumeric entries for the field where the cursor presently resides.

**What to do if you pressed the wrong softkey:** Press the right softkey and the old (wrong) one will be discarded.

**4.** Press **the** RIGHT ARROW **key.** The cursor moves to the next field (POD) and you see a new set of softkeys for that field. The MORE SOFTKEYS light comes on, reminding you that there are more softkey labels than those displayed.

```
SETUP    POD     REPORT POWER SUPPLY FAILURE ON

  POD    USERDISK   PORT1      PORT2     TIME
```

```
F1         F2         F3         F4       F5
```

5. Press **the F2 softkey,** which is below the USERDISK label. The field now contains the word USERDISK.

If your system is a 9100A, the first line should read, "SETUP USERDISK HDR".

If your system is a 9105A, the first line should look like the display shown below:

```
 SETUP   USERDISK      2

   POD    USERDISK   PORT1      PORT2     TIME
```

```
F1         F2         F3         F4       F5
```

6. Press **the** RIGHT ARROW **key.** The display now shows which disk drives are available for use in the system

The example below is from a 9100A.

```
SETUP   USERDISK  [ HDR ]
[ HDR ]  [ DR1 ]
```

```
[ F1 ]  [ F2 ]  [ F3 ]  [ F4 ]  [ F5 ]
```
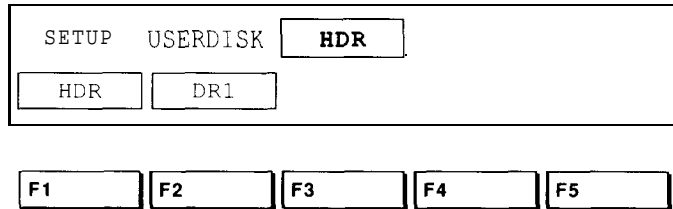
If you have a different system, your display will look different, as indicated below:

| *Your System* | *Labels* |
|---|---|
| 9100A | HDR  DR1 |
| 9 105A (two micro-floppy disk drives) | DR2  DR1 |

HDR is an internal hard disk drive.
DR1 (Drive 1) is the upper disk drive.
DR2 (Drive 2) is the lower disk drive.

4.     **Press the RIGHT ARROW key.** The cursor
       moves to the next field (POD) and you see a new set
       of softkeys for that field. The MORE SOFTKEYS
       light comes on, reminding you that there are more
       softkey labels than those displayed.

```
SETUP [    POD    ] REPORT  POWER  SUPPLY  FAILURE  ON
      [   POD   ][USERDISK][  PORT1  ][  PORT2  ][  TIME  ]
```

```
[F1       ][F2       ][F3       ][F4       ][F5       ]
```

5.     **Press the F2 softkey,** which is below the
       USERDISK label. The field now contains the word
       USERDISK.

       If your system is a 9100A, the first line should read,
       "SETUP USERDISK HDR".

       If your system is a 9105A, the first line should look
       like the display shown below:

```
  SETUP  [USERDISK]    DR2
      [   POD   ][USERDISK][  PORT1  ][  PORT2  ][  TIME  ]
```

```
[F1       ][F2       ][F3       ][F4       ][F5       ]
```

7.  **Press the softkey directly below the label of
    the disk drive you want to use.**

    The example below is from a 9105A, so it shows
    only the two micro-floppy disk drives.

    ```
    SETUP   USERDISK   [ DR2 ]

    [ DR2 ]   [ DR1 ]
    ```

    ```
    [ F1 ]   [ F2 ]   [ F3 ]   [ F4 ]   [ F5 ]
    ```

    If DR2 is selected, the system will always execute
    programs from user disks in Drive 2 until told to do
    otherwise.

    In normal use you rarely need steps 3 through 7
    because, when you configure the system as
    described in Section 4, disk drive selection should be
    automatic. This example took you through these
    steps to introduce softkeys.

Now, suppose you want to execute the program TEST1 which has been created and filed for a UUT called ABC.

8. Press **the EXEC key.** The EXEC command is displayed with the cursor at the first field.

```
EXECUTE UUT            PROGRAM
ADDR OPTION: c l
```

The ALPHA light on the left side of the ALPHA key comes on to indicate that the operator's keypad is now in alphanumeric mode. Instead of using the keys as function keys, they are now used to input letters, numbers, and other characters to the 9100A/9105A.

9. **Type the word ABC into the field** using the alphanumeric keys. Use white keys for the letters A, B, and C.

```
EXECUTE UUT ABC  ☐      PROGRAM
ADDR OPTION:
```

ABC identifies the Unit Under Test and also the directory where the program to be executed is located.

The characters you type appear at the cursor position, and the cursor moves one space to the right.

**What to do if you pressed the wrong alphanumeric key:** The alphanumeric keys are the 0 through 9, A through Z, space, period, and underscore keys. You can press the CLEAR key to delete the last key entry. Once you delete the very last entry, rather than leaving the field blank, the previous contents (from before you started to modify the field) are displayed once again since blank entries are not useful. This is very helpful if you change a field by accident and want to recall the original contents. Just press the CLEAR key until all the new entries are removed; the original entry will reappear.

10. **Press the RIGHT ARROW key.** The cursor moves to the next field. The ALPHA light remains on.

```
EXECUTE UUT ABC PROGRAM
ADDR OPTION:
```

11. **Type the word TEST1** into the new field. The display now looks like this with the cursor flashing at the end of the line:

```
EXECUTE UUT ABC PROGRAM TEST1
ADDR OPTION:
```

12. **Press the ENTER key.** The 9100A/9105A takes over from here. It will ask you to press some keys. The 9100A /9105A will inform you (on the display) when it has completed the program you requested. If for some reason you decide to stop the program prematurely, you can press the STOP key to do so.

## SUMMARY OF KEYPAD OPERATIONS 2.4.

The previous example showed you these useful features:

**Drive Selection:** In steps 3 through 7 you set up the system to execute programs from Drive 2.

**UUT Type:** In step 9 you typed ABC to specify the UUT being tested. A UUT is a Unit Under Test.

**Program Name:** In step 11 you typed TEST1 to specify which program to execute. TEST1 is one of many programs, all located in the ABC directory.

**ARROW Keys:** In steps 4, 6, and 10 you used arrow keys to move the cursor from field to field.

**ALPHA Key and Light:** In step 8 the ALPHA light came on to show that the keypad was in alphanumeric mode. When the ALPHA light is on, pressing the ALPHA key turns it off; when the light is off, you cannot use grey keys to type letters into fields.

**Softkey Fields:** Steps 4, 5, and 7 show how to use softkeys (F1 through F5) to change fields. When softkey labels are displayed, do not use anything but a softkey to change the field. The MORE SOFTKEYS light reminds you to press the SOFT KEYS key to scroll hidden softkey labels into view.

**Alphanumeric Fill-in Fields:** Steps 9 and 11 show how to change fields by typing alphanumeric characters into them. These fields, indicated by the red ALPHA light, are typically names of components, files, or UUTs. They are blank at reset or power-up but retain characters later typed into them. The first character typed causes old ones to disappear, leaving room for new ones.

**Numeric Fill-in Fields:** These fields were not shown in the preceding example. When the cursor is at a numeric field, the ALPHA light will be off. These fields can only contain hex numbers, which can normally be entered or changed in the following two ways:

- Entered using the white keys on the keypad.

- Changed using the special INC and DEC softkeys. Press the INC softkey to increase the fields value by 1, or press the DEC softkey to decrease the fields value by 1.

Fields can be changed any number of times, in any order desired. Trying to move the cursor in a direction in which no field exists or entering an illegal value into a field normally causes the system to beep. Pressing ENTER executes the command using the fields displayed.

**Floating Point Fill-in Fields:** These fields were not shown in the preceding example either. When the cursor is at a floating point field, the ALPHA light will be off. These fields can only contain floating point numbers, which can normally be entered or changed in the following two ways:

- Entered using the white keys on the keypad.
- Changed using three softkeys ("-", ".", or "E"). Pressing the "-" softkey enters a negative value when necessary. Pressing the "." softkey enters the decimal point. Pressing the "E" softkey allows entering an exponent value.

Fields can be changed any number of times, in any order desired. Trying to move the cursor in a direction in which no field exists or entering an illegal value into a field normally causes the system to beep. Pressing ENTER executes the command using the fields displayed.

# Section 3
# Avoiding Connection Problems

---

Your 9100A/9105A is smart enough to discover many types of errors that might occur in setting up a UUT for testing or troubleshooting.

This section describes how to handle two common setup-type errors.

## NO POD CONNECTED 3.1.

The pod is not connected to the system. To clear the error:

1.  Switch off UUT power.

2.  Make sure the pod is connected to the system.

3.  Connect the pod to the UUT.

4.  Switch on UUT power and restart the test.

If the test fails again, the pod may be defective (see Section 4.2.2).

## BAD UUT POWER 3.2.

The system detects that the UUT power supply is producing an incorrect voltage. To clear the error:

1.  Switch off UUT power.

2.  Make sure the pod is correctly connected to the UUT test-access socket. For details, refer to the pod manual.

3.  Check power connections to the UUT.

4.  Switch on UUT power and restart the test.

If the test fails again, the UUT power supply is probably defective.

# Section 4
# Preparing to Test or Troubleshoot

## INTRODUCTION 4.1.

Every time you power-up, reset the system, or change parts of it, you should perform the following operations before using the system to test or troubleshoot a UUT.

- **Self-tests:** Ensure that the pod, probe, and I/O modules are connected and working correctly. The tests check that the devices are operating, but the tests do not check the accuracy of the devices' measurements.

- **Configuration:** Specifies the disk drive to be used, port configuration, error reporting, and other system settings. Settings can be saved on and restored from the user disk.

- **Calibration:** Adjusts the system to measure data as accurately as possible.

  An alternative to recalibration on power-up or system reconfiguration is saving calibration data (for that configuration) on a user disk and restoring it when necessary.

In addition to storing test programs and troubleshooting routines, a user disk can also store:

* Calibration data generated by calibrations.
* System configurations, including SETUP MENU command parameters and information used by the I/O MOD, PROBE, RAM, ROM, and SYNC commands.

If you reset the system or change any of its parts such as the pod, probe, or I/O modules:

* The self-tests should be repeated and the system must be recalibrated. New calibration data can be saved on the user disk, writing over the old data.
* Test and troubleshooting programs and the system configuration stored on user disks remain valid.

If you change to a different type of UUT:

* If the new UUT needs a new pod or I/O modules, the self-tests should be repeated and the system must be recalibrated. You can save new calibration data on the UUT user disk, writing over the old data.
* You may need another user disk for the new UUT. If so, the system can be configured for the new UUT by restoring the configuration data stored on the the new UUT user disk.

*CAUTION*

*Once information for a certain UUT is stored on a user disk, your system should use only that disk for all UUTs of that type because the calibration data stored is unique to each system.*

4-2

## SELF-TESTS (MAIN MENU KEY)                4.2.

Three self-tests should be performed after you power-up the
system or change the I/O module, pod, or probe. Before
running the tests, check that the devices are connected correctly.

### Probe   Self-Test                               **4.2.1.**

The probe self-test is a pass/fail check that the probe is
connected to and communicating with the system. To execute
this test:

1.   Press the MAIN MENU key, and use the left arrow
     key to move the cursor to the left-most field.

2.   Press the SELFTEST softkey.

3.   Move the cursor to the next field, and press the
     PROBE softkey. The display should read:

     **MAIN:** SELFTEST **PROBE**

**4.**  Press the ENTER key to perform the self-test. If the
     self-test fails, a failure message will appear on the
     operator's display. If this happens, check the probe
     connection and repeat the test, carefully following
     any instructions. If the test still fails, the probe
     requires service.

## Pod   Self-Test <span style="float:right">*4.2.2.*</span>

The pod self-test comprehensively tests the pod. If it fails, an error message is displayed to explain the cause of failure. If you do not understand the message, refer to the pod manual. To run this test:

1.   Make sure the pod is attached securely to the mainframe. Insert the pod UUT connector into the pod self-test socket, and lock it. Refer to the pod manual and *Getting Started* for details.

2.   Press the MAIN MENU key, and use the left arrow key to move the cursor to the left-most field.

3.   Press the SELFTEST softkey.

4.   Move the cursor to the next field, and press the POD softkey. The display should read:

     **MAIN:**   SELFTEST **POD**

5.   Press the ENTER key to perform the self-test. If the self-test fails, a failure message will appear on the operator's display. If this happens, check the pod connections and repeat the test carefully following any instructions. If the test still fails, the pod requires service.

6.   Remove the pod's UUT connector from the self-test socket and connect it to the UUT, which should be powered down. If necessary, refer to the pod manual for connection details.

## I/O Module Self-Test 4.2.3.

The I/O module self-test is a pass/fail check that the module concerned is connected to and communicating with the system. To execute the test:

1. Press the MAIN MENU key, and use the left arrow key to move the cursor to the left-most field.

2. Press the SELFTEST softkey.

3. Move the cursor to the next field, and press the I/O MOD softkey.

4. Move the cursor to the next field and identify the module to be tested by a number (1 through 4).

   For example, if module 2 is to be tested, press the "2" key (a white key on the operator's keypad). The display should read:

   **MAIN:** SELFTEST I/O MOD 2

5. Press the ENTER key. If the self-test fails, a failure message will appear on the operator's display. If this happens, check the I/O module connections and repeat the test carefully following any instructions. If the test still fails, the I/O module requires service.

## CONFIGURATION (SETUP MENU KEY) 4.3.

Configure the system each time you power-up or reset it or change parts of it. After doing so for one type of UUT, if you change to another, you should reconfigure the system. Configuration sets system parameters such as the disk drive to be used, error reporting, and port configurations.

## Disk Drive Selection 4.3.1.

Steps 3 through 7 in Section 2, "Operator's Keypad and Display," showed how to select a disk drive. Selecting a disk drive is only necessary if your user disk is not in the default drive. The default drives are:

* HDR (hard disk) in the 9100A.
* DR2 (drive 2) in the 9105A.

After configuring the system as described in the following sections, you should verify that the UUT directory is, in fact, on the user disk in the drive specified by the configuration. To verify the drive:

1. Press the SETUP MENU key and use the left arrow key to move the cursor to the left-most field.

2. Press the SETUP softkey.

3. Move the cursor to the next field and press the USERDISK softkey.

4. Verify that the drive specified in the right-most field contains the user disk with the UUT directory you need. Possible drives are:

    HDR (internal hard disk): 9100A only.
    DR1 (Drive 1): Upper disk drive.
    DR2 (Drive 2): 9105A lower disk drive.

## Restoring a System Configuration      4.3.2.

To restore a system configuration (all system settings) from a user disk:

1.  Press the SETUP MENU key and use the left arrow key to move the cursor to the left-most field.

2.  Press the RESTORE softkey.

3.  Move the cursor to the next field and press the SYSTEM softkey.

4.  Move the cursor to the next field and press one of the following   softkeys:

    USERDISK: If the system configuration was saved in the USERDISK directory. The resulting display should read:

    **RESTORE SYSTEM SETTINGS FROM** USERDISK

    UUT FILE: If the system configuration was saved in a UUT directory.

5.  If you pressed the UUT FILE softkey in step 4, type the UUT directory name; for example, type "DEMO". The resulting display should read:

    **RESTORE SYSTEM SETTINGS FROM UUT FILE DEMO**

6.  Press the ENTER key to configure the system.

## CALIBRATION (MAIN MENU KEY)  4.4.

Calibration is the process of adjusting the 9100A/9105A system so that individual variations in the time delays associated with the probe and pod are known and compensated.

Five calibrations should be routinely performed on the system, as described in the *Technical User's Manual.* The calibrations are:

- Probe compensation calibration.
- Probe to external clock module calibration.
- Probe to pod calibration.
- I/O module external calibration.
- I/O module to pod calibration.

Calibration should be done when the system is first set up and at regular intervals (at least monthly) after that. Calibration is also necessary whenever devices attached to the system are changed or repaired. Probe compensation remains stable and is only necessary when a probe is first connected to the mainframe.

The section on "An Alternative to Calibration," describes how to calibrate the system by restoring data generated by previous calibrations. This should be done after each power-up or reset before testing or troubleshooting a UUT.

## AN ALTERNATIVE TO CALIBRATION                4.5.

You do not have to calibrate the system at every power-up. A
more convenient procedure is to restore calibration data from the
user disk after the self-tests have been performed and the system
configured. If you do not calibrate the system at power-up, you
should at least restore saved calibration data.

Each calibration generates data, which can be saved on the user
disk using the SETUP MENU key. Once the system is
calibrated for a given pod, probe, clock module, and I/O
module, the data is good until one or more of those devices is
changed.

If you test or troubleshoot one type of UUT and then change to
another, the calibration data stored on user disk for the new
UUT will be invalid if a new pod is connected. In this case, the
system should be recalibrated, after which the new data can be
stored on the user disk.

### Invalid   Calibration   Data                      4.5.1.

The calibration data you restore from user disk may be invalid if:

* After the data was saved, your system's pod, probe, I/O
  modules, or clock module was changed. This includes
  swapping I/O modules: for example, removing an I/O
  module from connector 1 and attaching it to connector 2.
* Your system has never been calibrated.
* Your system was last calibrated more than one month ago.
* When testing or troubleshooting, you changed pods or I/O
  modules when changing from one type of UUT to another.

## Restoring Calibration Data 4.5.2.

To restore calibration data from a user disk:

1. Press the SETUP MENU key and use the left arrow key to move the cursor to the left-most field.

2. Press the RESTORE softkey.

3. Move the cursor to the next field and press the CALDATA softkey.

4. Move the cursor to the next field and press one of the following softkeys:

   USERDISK: If the calibration data was saved in the USERDISK directory. The resulting display should read:

   **RESTORE** CALDATA **FROM** USERDISK

   UUT FILE: If the calibration data was saved in a UUT directory.

5. If you pressed the UUT FILE softkey in step 4, type the UUT directory name; for example, type "DEMO". The resulting display should read:

   **RESTORE** CALDATA **FROM UUT FILE DEMO**

6. Press ENTER to restore the previously saved calibration data.

## SUMMARY

**Self-tests:** Should be performed for each device (pod, probe, or I/O module) when the device is attached to the mainframe.

**Configurations:** Can be saved on and restored from a user disk for each UUT. They specify SETUP MENU command settings and provide information for other commands.

**Calibration:** Generates data which can be stored on a user disk and restored at power-up or reset. This data is sometimes invalid. Calibration must be performed when:

- The system is first installed and every 30 days thereafter.
- The pod, probe, I/O module, or clock module is changed.
- The system is powered up or reset.

Before you test or troubleshoot a UUT, you should ensure that self-tests, calibration, configuration, and disk drive verification have all been performed appropriately. Some guidelines are shown on the next page:

**After each power-up** or **reset** before you test or trouble-shoot a UUT:

- Calibrate and configure the system for the type of UUT you are about to test or troubleshoot.
- Ensure that self-tests have been performed on the pod, probe, and I/O modules.
- Verify that the system mode is appropriate and that your user disk is in the correct drive.

**If you reset or change any part of the system:**

- The self-tests will have to be repeated and the system recalibrated. You can save new calibration data on the user disk, writing over the old data.
- Test and troubleshooting programs and the system config-uration remain valid.

**If you change UUTs from one type to another:**

- You may have to change pods or I/O modules. If so, repeat the self-tests and calibrations with the new pod.
- System settings are probably different for the new UUT. Restore settings from the new UUT directory to recon-figure the system.

# Section 5
# Automated Testing
# (The EXEC Key)

The EXEC key executes test programs which are stored on a user disk. Its use involves pressing the EXEC key, entering a UUT directory name, entering a program name, and pressing the ENTER key. After you do this, the program takes control of the test.

EXEC test programs may ask you to follow some simple instructions such as probing or clipping UUT components. You should need very little knowledge about the UUT to test it under program control in this way.

## A TYPICAL AUTOMATED TEST                    5.1.

This procedure is a typical automated functional test of a UUT called ABC.

1.    If you are using a 9105A, check to be sure that the user disk for testing your UUT is in Drive 2.

2.    Connect the pod to the UUT.

3.    Make other connections to the UUT if instructed to do so.

4.    Press the EXEC key and, if necessary, move the cursor to the left-most field. The display will now look like that below:

**EXEC  UUT      PROGRAM** _____

### *NOTE*

*The fields may not always be blank, but they will change when you enter the names you want.*

5.    Enter a UUT directory name into the first field using the operator's keypad. For this example, we will use a UUT called ABC. Now the display looks like this:

**EXEC UUT ABC PROGRAM** _____

### *NOTE*

*The field for the program name may not be blank, but it will change when you enter the name you want.*

6. Move the cursor to the next field to the right and enter the program name using the operator's keypad. We will use TEST2 as the program name for this example. The display should now look like that below:

```
EXEC UUT ABC PROGRAM TEST2
```

7. Press the ENTER key to execute the program TEST2.

If the UUT name and program name you enter are not found on the currently selected disk drive, the error message "PROGRAM DOESN'T EXIST ON DISK" appears on the display.

If the UUT name and program name are found, the selected test is executed.

8. Suppose this UUT has no faults. It would then pass the functional test. Your programmer might have designed a display message such as the following to tell you what to do next:

```
TEST2  PASSES.
PLEASE  SET  UP  A  NEW  UUT  FOR  TESTING.
```

If instead, the UUT is defective and the fault is detected by this test, a message such as the one below might appear on the operator's display:

```
TEST  2  FAILS.
USE  GFI  TO  TROUBLESHOOT.
```

## SUMMARY OF EXEC KEY USE       5.2.

The EXEC key is used to execute previously written test programs. To use the EXEC key:

- Remove the UUT microprocessor or disable it.
- Connect the pod to the UUT.
- Press the EXEC key and use the left arrow key to move the cursor to the left-most field.
- Type the UUT directory name into the left-most field.
- Move the cursor to the next field and type the program name.
- Press the ENTER key.
- Follow any displayed instructions, and note any information from failed tests. The information will be helpful when troubleshooting a faulty UUT.

# Section 6
# Automated Troubleshooting (The GFI Key)

## INTRODUCTION 6.1.

The GFI (Guided Fault Isolation) key lets you use a powerful program-built into the 9 100A/9 105A system-to troubleshoot a defective UUT. You need no special knowledge of either GFI or the UUT.

Running GFI involves pressing the GFI key and the RUN softkey. You then specify a UUT component name and pin and press the ENTER key. GFI starts running from the specified UUT location.

As GFI runs, you may be asked to probe a specific pin on a UUT component or to clip over an entire UUT component. This section describes how to probe or clip over components.

GFI is normally used for automated troubleshooting of a UUT after it fails a test. GFI uses stored information about the UUT which a programmer stores in files in the 9100A/9105A system.

GFI troubleshoots by backtracing: it starts with a bad output and then works backwards to find the defective component. A defective component is one that has good inputs but produces the wrong output.

When you run GFI, you have to specify a starting point on the UUT in the form of a component name and pin. You can get this information from:

- Any person who knows enough about the UUT to suggest a starting point based on the results of previous tests.

- A GFI suggestion list containing hints generated by an automated test; the list suggests one or more locations at which GFI could begin backtracing. Viewing the hint list involves pressing the GFI key, the SUGGEST softkey,       ~ and the ENTER key.

   The most promising suggestions are at the top of the suggestion list. As GFI runs, it updates the list.

As GFI backtraces through a UUT, it generates a summary which classifies each component in the backtracing path as good, bad, or untested.  Viewing the summary involves pressing the GFI key, the SUMMARY softkey, and the ENTER key.

## USING SYSTEM DEVICES TO TEST UUT COMPONENTS
6.3.

When GFI runs, you may be asked to follow one or more simple instructions using system devices to test UUT components. The following sections show how to follow some common instructions.

## UUT DIP Components
6.3.1.

Most UUT components are integrated circuits (ICs). ICs are often dual in-line packages (DIPs) that have a number of pins: 14, 16, 20, or more. On component U13, pin 6 would be U13-6.

The figure below shows how pins are numbered on a 28-pin DIP. The top surface is marked by a notch or dimple. Looking down at it, pins are numbered counter-clockwise starting to the left of the mark with pin 1.
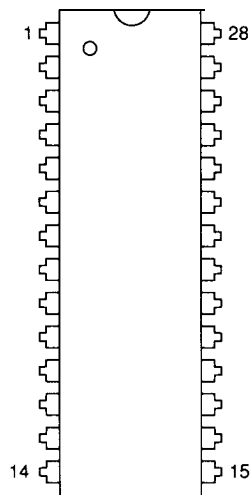
You may be asked to probe a UUT component at a specified point. For example, the display may read:

```
PROBE U10-3
PRESS BUTTON ON PROBE WHEN READY
```

Figure 6-l shows how to use the probe. The sequence is described below:

1.  Refer to a UUT schematic or layout drawing to locate the point: in this case, U10 pin 3.

2.  Connect the probe common clip to a UUT common ground point.

3.  Place the tip of the probe firmly against the specified pin.

    It is sometimes convenient to unscrew the probe tip and replace it with the provided flying lead, which then clips to the specified location.

4.  Press the probe's ready button. The 9100A/9105A will beep once when the measurement begins and a second time when the measurement is complete. Do not move the probe until after the second beep.

Pod Connection

Probe's Common
Clip, connected
to the UUT common

Probe Ready Button
Probe Logic-Level
Lights



Optional Flying-Lead Tip
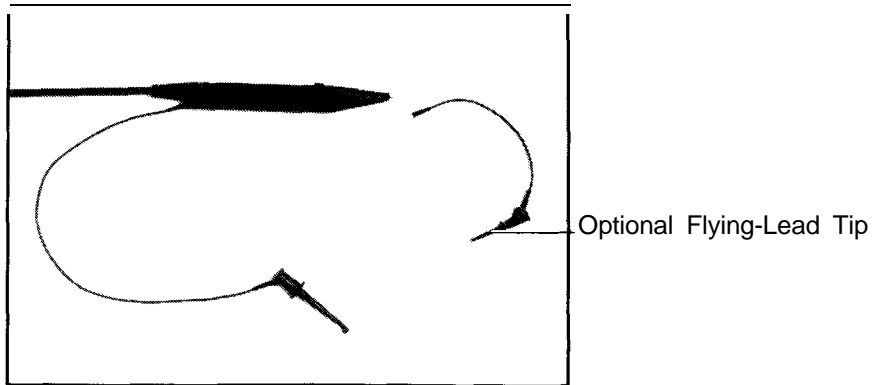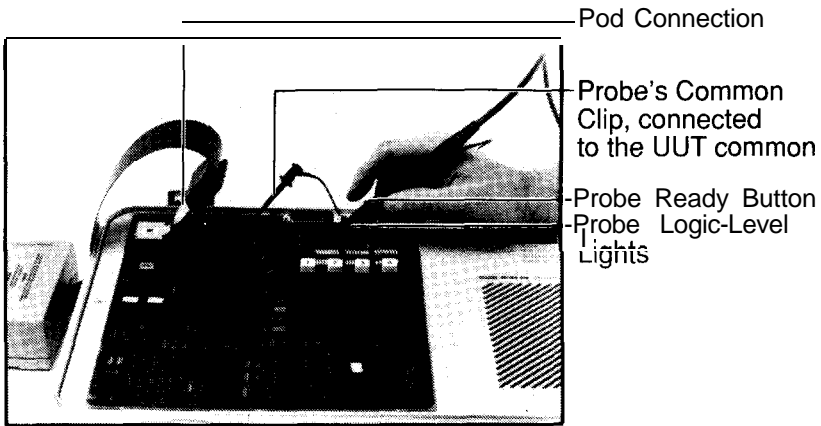
Figure 6-l : Using the Probe

You may be asked to connect an I/O module to a UUT component by clipping over it. For example, the display may read:

```
CLIP u3
PRESS BUTTON ON I/O MOD WHEN READY
```

I/O modules are connected to DIP components by clip modules. The part number of a clip module tells you the size of the DIP it clips over. For example, a 28-pin clip module is labelled "Y9100A-28D."

Clip modules for 28- and 40-pin DIPs fit over both I/O module connectors "A" and "B." Other clip modules can fit over either I/O module connector "A" or "B" as desired.

If asked, for example, to "CLIP U3" and "PRESS BUTTON ON I/O MOD WHEN READY" do so as follows:

1. Identify U3 on the UUT layout diagram, which locates U3 on the UUT and tells you that U3 is, for example, a 20-pin DIP IC.

2. Pick out the necessary clip module-in this case, a Y9 100A-20D.

3. Plug the clip module into either the "A" or the "B" connector on the I/O module.

4. The clip at the end of the cable fits over U3, as shown in Figure 6-2. Use the grey wire on the cable to locate pin 1 on the clip; line it up with pin 1 on the DIP IC.

5. Connect the clip module's common clip to the UUT's common point.

6. Press the ready button on the clip module.

Control-Line Leads, may be connected to the UUT.

I/O Module

Clip Module, plugged into I/O module

Grey Wire, indicates position of pin 1 on UUT component

Clip Module, clipped over UUT component

Clip Module's Common Clip, connected to UUT common
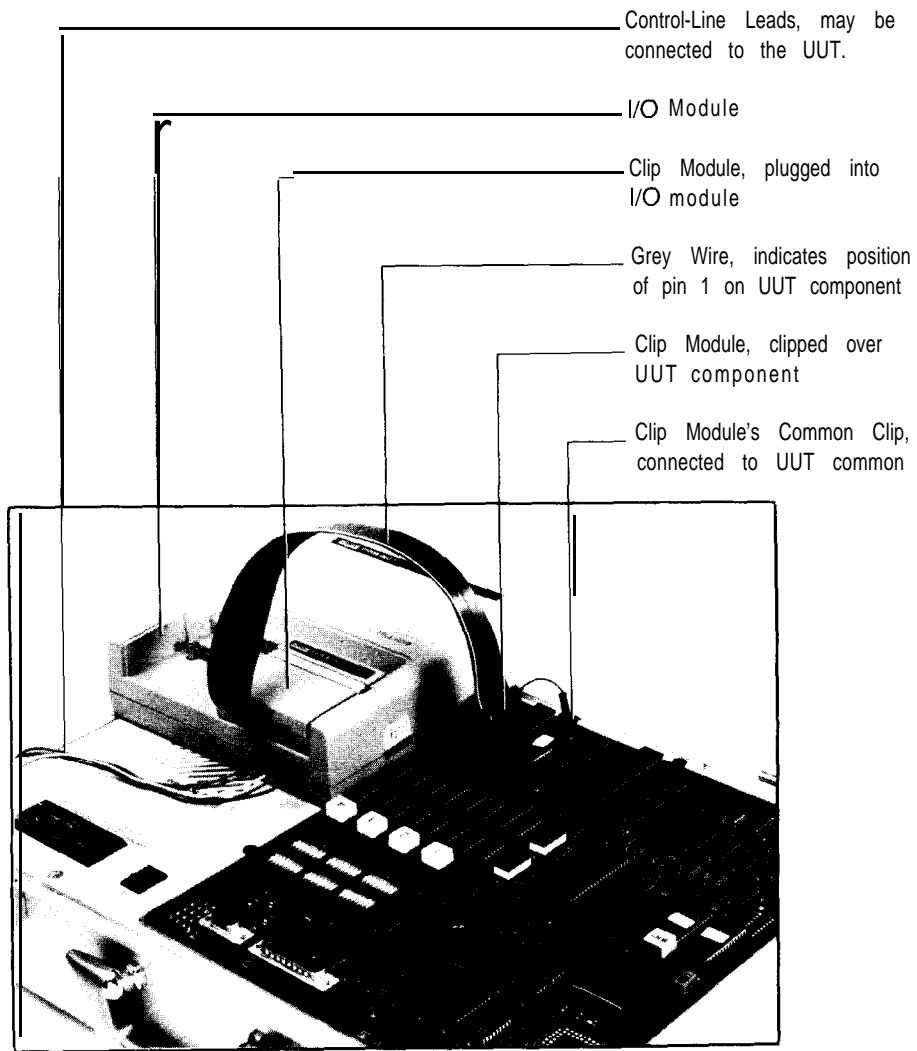
Figure 6-2: Using Clip Modules

The procedure below shows a typical sequence of operations
you might use with the 9100A/9105A to isolate a fault on a
defective UUT. This procedure was taken from a real UUT, but
of course, you will have a different UUT and will probably even
have a different fault, so the results you see will almost certainly
be different. However, this example will be helpful in
understanding what to expect when you run GFI to isolate faults
on your UUTs.

Suppose you have a defective UUT and you wish to isolate the
fault. To do so, a known-bad point on the defective UUT must
be identified. The 9100A/9105A will use this as a starting point
to begin backtracing. For your convenience, the 9100A/9105A
can be programmed for automatic selection of a known-bad
starting point if you have run an automated test first. Then when
you press the GFI key to begin fault isolation, the name of an
appropriate known-bad point on the defective UUT is already
entered into the command for you.

A typical GFI procedure is shown below:

1.  Check to be sure that the pod is connected to the
    UUT.

2.  Check to be sure that any other connections required
    for your UUT have been made.

3.  Test the UUT with an automated functional test that
    fails.

4.  Press the GFI key and use the left arrow key to move
    the cursor to the left-most field.

**5.**  Press the RUN softkey. At this point the operator's
    display will look something like that below:

    `RUN GFI WT DEMO REF U3 PIN l`

If for some reason you do not like this starting point, you can press the SUGGEST softkey and then the ENTER key to look at other recommended starting points for GFI. Then you can press the GFI key followed by the RUN softkey and enter another GFI starting point using the cursor control keys and the operator's display.

6.    When you are ready to begin fault isolation at the point in the RUN GFI command, press the ENTER key. If the GFI database exists for the selected UUT, GFI takes over and starts backtracing from the selected starting point on the UUT.   For this example, the display now becomes:

```
RUN GFI UUT DEMO REF U3 PIN 1
CLIP u3
PRESS BUTTON ON I/O MOD WHEN READY
```

7.    Attach a clip over the component specified (U3 in this case) and press the ready button on the clip module used.

8.    GFI tests and displays the condition of all pins of U3 and recommends the next component to test. A typical display is shown below:



The arrow on the displayed IC pins indicates bad input, output, or bidirectional pins. The words in the lower left comer display the status of each pin as the cursor is moved from pin to pin with the right arrow and left arrow keys.

The words in the upper left corner show the GFI recommendation for the next component to check. In this example, GFI decided U27 should be tested next.

9. It is usually appropriate to use the GFI recommendation for the next component to test, rather than to check the status of all the pins on the displayed IC. So, you would clip over U27 and press the clip module ready button.

In this example, suppose that GFI decides that it has already isolated the problem and the display shows:

```
OPEN CIRCUIT BETWEEN
U27-30 AND U3-17
```

GFI has identified the probable defect and will therefore stop execution.

10. In some cases you might decide to view the GFI summary or the suggestion list, but it is usually appropriate at this point to clear the GFI summary and the suggestion list. This is done by the following steps:

Press the GFI key.

Use the cursor control keys to move the cursor to the left-most field.

Press the CLEAR softkey and then the ENTER key.

During GFI, TL/1 stimulus programs are loaded continuously from the UUT directory on the hard disk or floppy disk. Floppy disk accesses comprise a large portion of the GFI execution time. An E-disk can be created in the RAM of the 9100A where UUT information can be temporarily stored. The 9100A accesses the UUT information from the E-disk quickly, and GFI operates faster.

To create an E-disk and load the UUT information into it, perform the following steps:

1.    Press the MAIN MENU key.

2.    Locate and press the softkey under E-DISK (you may need to press the SOFT KEYS button to have E-DISK appear on the display).

3.    Press the RIGHT ARROW key. The highlighted word on the first line of the display should be LOAD. If it is DELETE, press the softkey under LOAD.

4.    Press the RIGHT ARROW key. If the UUT information is stored on the 9105A floppy disk in disk drive DR1, press the softkey under DR1 (if information is on DR2, press softkey DR2). If the UUT information is stored on the 9100A hard disk (HDR), press the softkey under HDR (if on DR1, press the softkey DR1).

5.    Press the RIGHT ARROW key. Type the name of the UUT.

6.    Press the RIGHT ARROW key. A default amount of RAM is shown on the display. This amount should be enough to store your UUT information.

*NOTE*

*It is recommended that your 9IOOA has at
least 3 megabytes of memory when using
the E-disk.*

7.    Press the ENTER/YES key. This creates the E-disk
      and loads the UUT information into it.

An error message may appear on the display;"E-Disk is too
small to hold UUT -- make E-Disk larger". Use the following
steps to increase the amount of RAM for the E-disk:

1.    Press the UP-ARROW key to clear the message off
      the screen and enter a higher amount of RAM into the
      right-most  field.

2.    Press the ENTER/YES key to attempt loading again,
      and repeat this procedure until you are able to load
      the E-disk successfully.

During GFI execution and after E-disk has been loaded; if you
receive "Out of Memory" errors, there is not enough RAM to
run your programs and use the E-disk. You can delete E-disk
using the following steps:

1.    Press the MAIN MENU key.

2.    Locate and press the softkey under E-DISK (you
      may need to press the SOFT KEYS button to have
      E-DISK appear on the display).

3.    Press the RIGHT ARROW key. The highlighted
      word on the first line of the display should be
      DELETE. If it is LOAD, press the softkey under
      DELETE.

4.    Press the ENTER/YES key.

The E-disk is now deleted, and the RAM used to store the
E-disk is returned for use by GFI.

**To run GFI from a specified location:**

- Disable the UUT microprocessor.
- Connect the pod to the UUT.
- Press the GFI key and use the left arrow key to move the cursor to the left-most field.
- Press the RUN softkey.
- Type the UUT directory name at the second field.
- Type the component name at the third field.
- Type the component pin name at the last field.
- Press the ENTER key.

**To display the GFI summary:**

- Press the GFI key and use the left arrow key to move the cursor to the left-most field.
- Press the SUMMARY softkey.
- Press the ENTER key.

**To see the GFI suggestion list:**

- Press the GFI key and use the left arrow key to move the cursor to the left-most field.
- Press the SUGGEST softkey.
- Press the ENTER key.

**To erase the GFI summary and suggestion list:**

- Press the GFI key and use the left arrow key to move the cursor to the left-most field.
- Press the CLEAR softkey.
- Press the ENTER key.

**To make GFI start automatically:**

- Press the GFI key and use the left arrow key to move the cursor to the left-most field.
- Press the SETUP softkey and use the right arrow key to move the cursor to the right-most field.
- Press the ENABLE softkey. GFI starts automatically after a TL/1 program that generates GFI hints is executed.
- Press the ENTER key.

# Section 7
# Simulating UUT Operation
# (RUN UUT Key)

Use the RUN UUT test to simulate normal UUT operation. The pod's microprocessor executes instructions found in UUT memory, starting at a specified address. Beyond lending the pod microprocessor to the UUT, the 9100A/9105A system does not interfere in the operation.

Starting this test involves pressing the RUN UUT key, the SPECIAL softkey, checking the default starting address, and pressing the ENTER key. If your pod allows breakpoints, you can use the BREAK softkey, before using the ENTER key, to specify a breakpoint.

The pod does not return control of the UUT to the 9 100A/9105A system unless a specified breakpoint address (exit) is encountered or the RUN UUT HALT command is entered while RUN UUT is in progress.

To start a typical RUN UUT test:

1. Connect the pod to the UUT.

2. Press the RUN UUT key and use the left arrow key to move the cursor to the left-most field.

3. Press the SPECIAL softkey.

4. Move the cursor to the right-most field. If your pod allows breakpoint addresses, you will see the following softkey choices, one of which you should use:

*NOTE*

*If your pod does not allow breakpoints, you will not see the following softkey labels.*

NO BREAK: This will cause the pod to start executing stored instructions at the address specified. The display should read something like:

`RUN UUT SPECIAL ADDR FFFFO NO BREAK`

BREAK: Pressing this softkey allows you to specify a UUT memory address at which the RUN UUT test is to stop.

The MORE INFORMATION light may come on if
the command is so long that you have to use the right
arrow key to view the next field.

5. Press the ENTER key to enter the command.

## STOPPING RUN UUT                                   7.2.

After you execute a RUN UUT command, the pod takes control
of the UUT and does not return control to the 9100A/9105A
unless you execute RUN UUT HALT.

To stop a typical RUN UUT test:

1. Press the RUN UUT key and use the left arrow key
to move the cursor to the left-most field.

2. Press the HALT softkey. The display should now
read:

    RUN  UUT  HALT

3. Press the ENTER key to enter the command.

# Appendix A
# Typical Automated
# Operations Flowchart

Figure A- 1 is a flowchart of typical automated operations of the type described in Section 1, "Overview."
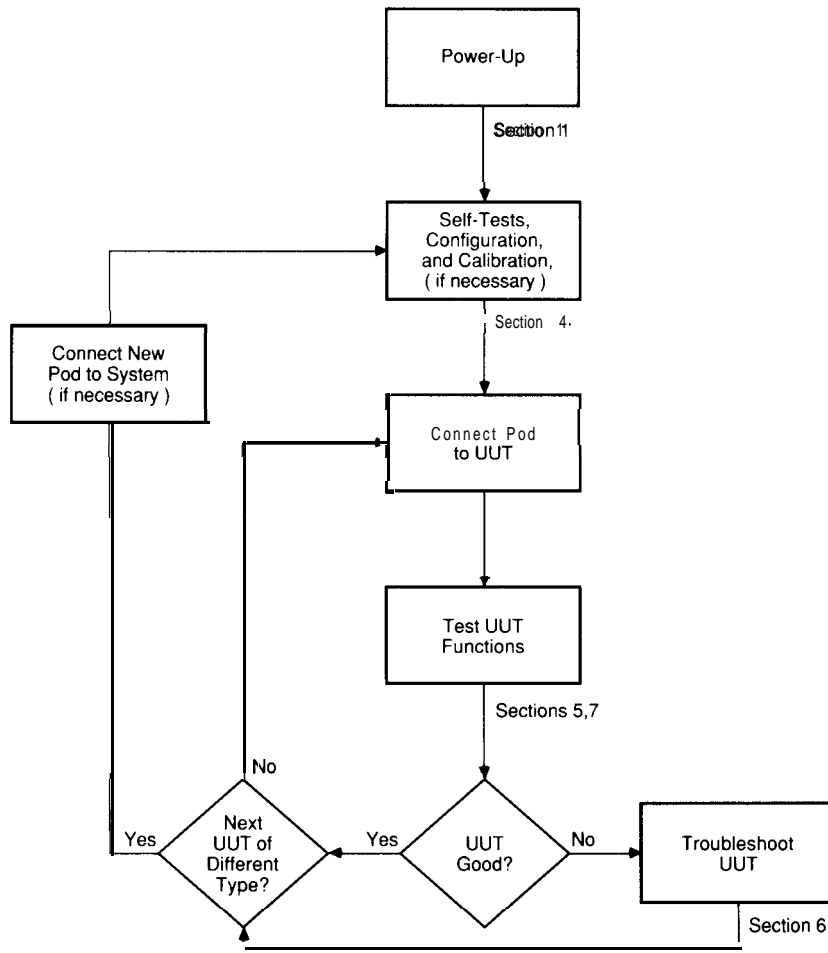
Figure A-I : Typical Automated Operations

# Appendix B
# Disk Formatting
# and Duplicating

---

## FORMATTING A DISK

Before disks are used for the first time, they have to be formatted. Formatting configures a disk for data storage.

### CA UTION

**Formatting a disk that has been used before will erase any data previously stored on it.**

To format a disk:

1. Power-up the system and insert the disk to be formatted in the upper drive, Drive 1.

2. Press the MAIN MENU key twice, to display the command with the cursor at the first field. The red MORE SOFTKEYS light comes on because there are more softkey labels than those displayed.

3. Press the SOFT KEYS key to see additional labels.

4. Press the FORMAT softkey.

5. Move the cursor to the next field and press the DR1 softkey to specify Drive 1.

6. Press the ENTER key to format the disk in Drive 1.

## DUPLICATING A USER DISK B.2.

### Duplicating a User Disk
### Using a 91 00A/9105A B.2.1.

If the disk to receive the copy has not been formatted, follow the instructions in Appendix B, Section B.l, "Formatting a Disk" prior to the following procedure.

The following procedure uses a sector to sector copy method. This method of copying deletes all files which are on the destination disk.

1. Place the user disk (the one you wish to copy) in Drive 1.

2. Press the MAIN MEND key and use the left arrow key to move the cursor to the left-most field.

3. Press the SOFT KEYS key to display additional softkey labels and then press the COPY softkey.

4. Press the right arrow key once and then press the DR 1 softkey.

5. Press the right arrow key once and then press the DR1 softkey again. The display should now read:

   **MAIN: COPY DISK FROM DR1 TO DR1**

6. Press the ENTER key.

7. When prompted by the display, insert the source user disk into Drive 1; and press ENTER. The BUSY status light will turn off when ready for the next step of the procedure.

8. When prompted by the display, insert the destination disk (the new user disk) in Drive 1 and press ENTER. The BUSY status light will turn off when ready for the next step of the procedure.

Depending on the amount of available memory in the 9100A or 9105A, steps 7 and 8 will be repeated until the source disk is completely copied to the destination disk.

When the copy is complete, the BUSY status light will turn off and the display will now read:

```
MAIN: COPY DISK FROM DR1 TO DR1 COMPLETE
```

## Backing Up Disks                                      B.2.2.

You should create backups (duplicate copies) of your disks on a regular daily basis to avoid losing too much data in cases of:

* Defective or damaged disks.

* Lost disks.

* Power failures during system operation.

* Accidental erasure of data.

To avoid substantial data loss, backup files on a regular basis.

# Index