900 PC SOFTWARE

CONTROL AND DEVELOPMENT
PACKAGE FOR THE FLUKE 900

OPERATING INSTRUCTIONS

Revision 1.180

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HOW TO USE THIS DOCUMENTATION

1 900 PC SOFTWARE PACKAGE

1.1 HOW TO USE THIS DOCUMENTATION

This manual assumes some familiarity on the part of the user with the testing concepts and approach of the Fluke 900. Section 2 of the Fluke 900 Operator Manual on technical principles and Appendix I on applications are recommended as minimum reading for a user of 900 PC Software.

This package controls almost all of the functions of a standalone Fluke 900 as well as offering some expanded capabilities. It operates with a hierarchy of screens and windows that are summarized by the menu tree shown in Section 3.1 on Package Operation. Each screen listed corresponds to a subsection in Section 3. Much of the information presented is available through an on-line Help utility by pressing (F1)

The first time user will find a quick introduction to the basic functions of 900 PC Software in Section 2, Getting Started. Refer to the READ.ME file on the package diskettes for any documentation that has been created since the printing of these Operating Instructions.

> Wherever more information is available in the Fluke 900 Operator Manual to explain a subject, this reference appears enclosed in a border as shown with this paragraph. This document describes how to use the features of 900 PC Software and the reader is referred to the Fluke 900 Operator Manual for advice on when to use a feature.

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1.2 GENERAL DESCRIPTION

The 900 PC Software software package is intended to bring the power and ease of use of a Personal Computer to the operation of the FLUKE 900 Dynamic Troubleshooter. Most functions that can be executed from the keyboard of the Fluke 900 can be done from the a PC in a way that takes advantage of the PC's full screen and keyboard. The main features of this package are:

1.   Tactile keyboard control of Fluke 900 including use of function keys, menus and context-sensitive Help.

2.   Full screen color display of test parameters and results using windows and popup boxes.

3.   Unlimited Test Sequence storage to disk and ability to transfer to tester system RAM or cartridge.

4.   Structured database-type environment for Sequence programming that is more flexible and powerful and easy to use than the Fluke 900 standalone unit. Some aspects of this are:

            - Copying, moving and editing during Sequence creation are easier.
            - Subsequences within Sequences are allowed for structured testing.
            - Most test parameters are immediately visible or accessible through one window.
            - Documenting a Sequence is easier using fields for author, title, revision and

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description plus programmers comments for each line.
- Configurable options include color palette, PC port and coordination with other software instrument packages.

The basic concepts of 900 PC Software are as follows: The opening screen contains setup and file utility functions. These may be considered "housekeeping" tasks that permit the user to maintain and transfer files and configure hardware ports, paths, and colors. All testing and development of Sequences is done from the RUN pulldown menu. Within RUN are found all the capabilities present in the Fluke 900's Manual, Sequence and Develop modes. One effect of this is that to perform an immediate test on a single IC, you must run a newly created Sequence that consists of one device, since there is no Manual mode. The equivalent of Sequence and Develop modes on the Fluke 900 is achieved on the PC by setting the mode parameter found under the Header menu of the Seq Flow window.

All device library information is assumed to be resident in the Fluke 900. Even if LIBRARY files are resident on the PC disk, they must first be downloaded, using the Copy menu option, to the Fluke 900 (System RAM or a Cartridge) before they are usable in a Sequence. The process of creating a LIBRARY file of desired devices for download to the Fluke 900 is performed using the 900 Library Utility. This is a standalone package that may be used on its own or accessed from within 900 PC Software after specifying the path.

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GENERAL DESCRIPTION

The test parameters found in the local menu of the Fluke 900 are regrouped on a single TEST screen in <u>900 PC Software</u> into three categories: IC Definition, Initialization and Performance Envelope. They reflect the three basic steps that occur when testing a device with Dynamic Reference Comparison. Another window, Stimulus, contains the Reset parameter. Two minor changes to the present Fluke 900 parameters are that Reset and Pin Definition are each split into separate parts to reflect their use in two different functions. Reset pulse attributes such as polarity and duration are found in the Stimulus window and its Offset is found in the Initialization window. PinDef condition checks are found in the Definition window and pin ignore is found in the Performance Envelope window.

A Sequence that is run from a PC is in a database format that permits flexible manipulation and editing. In this configuration, the Fluke 900 is operating in Manual mode under remote control of the PC and its LCD display is inactive. For standalone operation of a Sequence on the Fluke 900, the Sequence database must be compiled into the two file types ".seq" and ".loc" that normally run on the Fluke 900 in its Sequence mode. This utility is available under the files menu.

1.3 SYSTEM REQUIREMENTS

1.3.1 HARDWARE REQUIREMENTS

The basic hardware must include a minimum of:

- IBM XT or AT computer or compatible machine
- Hard disk drive
- 640 K of RAM memory
- RS232 serial communications port
- Screen Monitor with any of the following adapters:
  Monochrome MDA
  Hercules Graphics
  Color CGA
  Color EGA
  Color VGA

- Fluke 900 Dynamic Troubleshooter with any board revision level, but with system firmware 5.00 or higher.

1.3.2 SOFTWARE REQUIREMENTS

This package will run under DOS version 3.2 or higher and is intended to run from a subdirectory on hard disk. It is recommended that all background TSR (Terminate and Stay Resident) programs be removed from memory before running this software to avoid interference.

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1.4 INSTALLATION

STEP 1

INSTALL FLOPPY DISKETTES ONTO HARD DISK

Bring up the DOS prompt at A: by typing:
cd a:

Insert floppy Disk 1 into drive A and type:
install

A prompt window appears for you to specify the directory and drive letter that the package will be installed in. Default is C:\900PCS but you may change the specification and press (F10) to accept. Note that, if a directory does not exist, it will be created for you automatically.

A prompt window also appears for you to confirm whether a demonstration Sequence will be copied into a subdirectory. The default subdirectory is FILES but you may specify it differently. If it does not yet exist, it will be created automatically.

If you followed the procedure outlined above and installed this package on disk in the root directory, you should have the following contents of the directory \900PCS :

900PCS.EXE
FITE.HLP
FITE.INI
FILES   <DIR>

STEP 2
OPTIONAL LIBRARY UTILITY, PATH, RAM DRIVE

At this time, you may also wish to install the Library Utility as a subdirectory (ie. \900PCS\LIBLOAD\). It may, however, reside anywhere on your disk and its path can be defined when it is accessed from the FILES menu of 900 PC Software. See Appendix IV of the tester Operator Manual for instructions on installing the Library Utility.

It is advisable to include the 900 PC Software executable file (900PCS) in your computer's path so you can run the program even when it is not in your current working directory (ie. PATH= C:\900PCS;...).

The package operational response may be speeded up by defining RAM in the PC as a virtual disk drive (designator E:). For example, with 1 Megabyte of PC RAM, 640 K is used for the program and 384 K is available for a virtual drive. To enable this, add the following command to the config.sys file of your PC:

DEVICE=C:\DOS\RAMDRIVE.SYS 384 512/E

Note that this assumes DOS is resident in a directory called DOS on C drive.

INSTALLATION

STEP 3
CONNECT AND CONFIGURE PC AND TESTER

Connect a "straight through" RS232 interface cable from the back of the tester to the serial com port of your PC. The cable should have data wires 2,3,7 connected as well as status wires 4,5,6,8,20.

Type 900PCS at the DOS prompt on your computer and the main screen will appear as described in the Section 3.2 .

Factory default settings for 900 PC Software and the tester are the same. You may verify that baud rate, parity, data bits and stop bits are set to the same for the tester and the PC by actions described in Section 1.6.2 of the Fluke 900 Operators Manual and Section 2.3 of these instructions.

You may want to change the baud rate to 19200 for maximum data transfer speed between PC and tester. In this case, the SYSTEM, RS232 screen on the tester appears as follows:

```
BAUD RATE:  19200    PARITY:   EVEN
STOP BITS:    1      MODE:     DCE CL
BITS/CHAR:    7      TIMEOUT:  None

Changing rs232c setup                11:31

              roll     advance          end
```

The RS232 screen from the Setup menu of 900 PC Software appears as follows:

```
                    900 PC Software  Rev. 0.1.0001522
                    ─── RS-232 Port Configuration ─────────


            Port Number 1
              Baud Rate 19200  ┌19200  9600  4800  2400  1200  600  300  110┐
                 Parity EUEN   └──────────────────────────────────────────┘
              Data Bits 7
              Stop Bits 1




┌────┬────┬────┬────┬────┬────┬────┬────┬────┬────┐
│ F1 │ F2 │ F3 │ F4 │ F5 │ F6 │ F7 │ F8 │ F9 │ F10│
│Help│    │    │    │  Revert    │    │    │  Accept│
└────┴────┴────┴────┴────┴────┴────┴────┴────┴────┘
```

1.4.1 TROUBLE GUIDE

Symptom: When first running a Sequence or doing anything that requires communication to the tester, an error message appears: "Timeout Occured".

Possible Cause and Solution:

- Tester and PC do not have the same baud rate, parity setting.
- Tester RS232 port is not set to DCE CL.
- Tester is not showing its main power-up screen.
- PC port setting is incorrect (ie. Port 1 or Port 2).
- RS232 cable is not connected.

Symptom: When first communicating to the tester, an error message appears such as "Cannot set 8250 " or any message other than "Timeout Occured".

Possible Cause and Solution:

- Garbled initialization file. The user should erase the file named FITE.INI and restart the 900 PC Software package.

Symptom: When first running 900 PC Software, the message "Not enough memory to run program" appears.

- The PC requires 640 K of RAM memory configured.
- Background programs and TSRs must be removed so that there is at least 564 K of free RAM space to use for this package.

2 GETTING STARTED

2.1 GETTING STARTED

This section outlines the typical process of creating a Test Sequence, compiling it into a form that runs on the standalone tester and copying it to the tester. Refer to Section 3 on Package Operation for details on how to perform any specific function involved in this process. In particular, Section 3.1 provides a diagram of the complete menu structure of 900 PC Software.

2.1.1 PREPARATION/CONFIGURATION

Follow the installation procedure described previously to connect up the tester to the PC and install 900 PC Software.The tester should be sitting in its main power up screen and be connected to the UUT in the same way required for Sequence development with the standalone tester.

From the DOS prompt, after power up of your PC, type:
cd 900pcs (Enter)
cd files (Enter)

This makes 900PCS\FILES the working directory.

Type 900PCS (Enter) to start the 900 PC Software package. If the message "Bad Command" appears, this means the program is not defined in your Path command. You must

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either add it to the Path command or run the program from the directory \900PCS (ie. now type cd.. (Enter) 900PCS(Enter))

The opening screen is refered to as the "Main Screen". When developing or running a Sequence, the "Test Screen" will be operating.

If you wish to use simulated devices when developing your Sequence, you must first create a LIBRARY file containing the devices on the board and download it to the tester. Refer to the tester Operator Manual Appendix IV, Library Utility, to create and download a LIBRARY file. This utility may be accessed from the Library option of the Files menu in 900 PC Software.

```
┌─────────────────────────────────────────────────────────────┐
│               900 PC Software  Rev. 0.1.0001522               │
│ ▌Files▌                    Run                        Setup   │
│ ┌──────────┐                          ˅                       │
│ │Directory │                                                  │
│ │Edit      │                                                  │
│ │Copy      │                                                  │
│ │Delete    │                                                  │
│ │Rename    │                                                  │
│ │Compile   │                                                  │
│ │▐Library▌ │                                                  │
│ │Print     │                                                  │
│ │DOS Shell │                                                  │
│ └──────────┘                                                  │
│                                                               │
│                                                               │
│                                                               │
│                                                               │
│  F1    F2    F3    F4    F5    F6    F7    F8    F9    F10     │
│  Help                                                         │
└─────────────────────────────────────────────────────────────┘
```
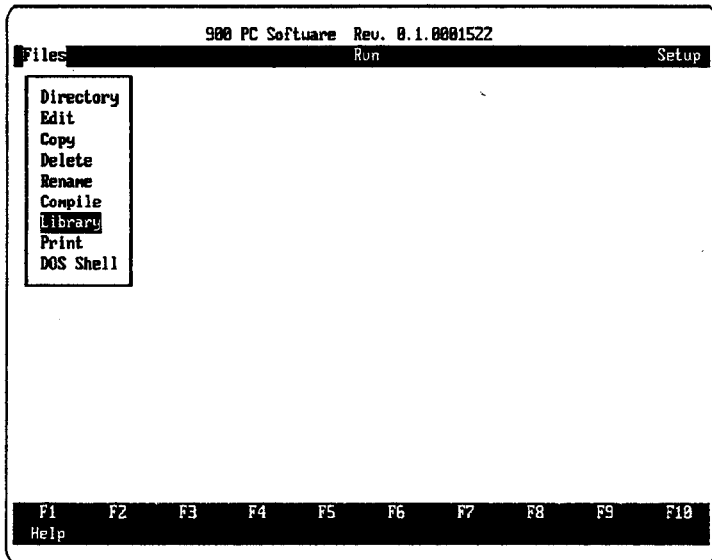
2.1.2 NAMING THE SEQUENCE

Select "Create Sequence" from the Run menu of the main
screen. Enter a Sequence name (TRIAL1 in this example)
and the location of the first device (U1 in this example) into
the Dialog Box that pops up.

```
                    900 PC Software  Rev. 0.1.000152Z
 Files                                     Run                        Setup
                                     Select Sequence From Working Directory
                                     Select Sequence From Another Directory
                                     Create Sequence

                          New Sequence
             Sequence Name TRIAL1
        First Location Name U1


 F1      F2     F3     F4     F5     F6     F7     F8     F9     F10
 Help    Clear               Revert                             Accept
```

Press (F10) to accept these entries.

The main Test screen appears with U1 highlighted in the
Sequence Flow window and default parameters in the other
windows.

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```
┌─────────────────────────────────────────────────────────────┐
│ TRIAL1.zsq                                          develop   │
│ ▐Measure▌              Untested                       Save     │
│ ┌── Definition ──────────┐  ┌── Sequence Flow ──────────┐    │
│ │             RD Drive = high│ │                          │    │
│ │ 20 pins     RD Test  = on  │ │ ▐U1▌         FLUKE 900   │    │
│ │ Simulation = N/A  Clipcheck = on│                       │    │
│ │ Activity = no     C_Sum = 0│ │                          │    │
│ └────────────────────────┘  └──────────────────────────┘    │
│ ┌── Initialization ──────┐  ┌──── Message ─────────────┐     │
│ │ Synchronization = off   │ │                          │     │
│ │ Trigger = off           │ │                          │     │
│ │ Reset Offset = 0 ns     │ │                          │     │
│ │ Ram Shadow = N/A        │ │                          │     │
│ └────────────────────────┘  └──────────────────────────┘    │
│ ┌── Performance Envelope ─┐  ┌──── Results ──────────────┐   │
│ │ FaultMask = 30ns  TestTime = 1000ms│    NONE            │   │
│ │ Pins Ignored = 0  Gate = off│  └────────────────────────┘  │
│ │ Threshold = 1800 mV     │  ┌──── Stimulus ─────────────┐   │
│ └────────────────────────┘  │  F900 generated reset      │   │
│                             └──────────────────────────┘     │
│ ┌────┬────┬────┬────┬────┬────┬────┬────┬────┬────┐          │
│ │ F1 │ F2 │ F3 │ F4 │ F5 │ F6 │ F7 │ F8 │ F9 │F10 │          │
│ │Help│ Def│Init│PEnv│SeqF│ Msg│Rslt│Stim│NEXT│TEST│          │
│ └────┴────┴────┴────┴────┴────┴────┴────┴────┴────┘          │
└─────────────────────────────────────────────────────────────┘
```

2.1.3 CREATING THE LOCATION LIST

Select the full Sequence Flow window by pressing F5. The previously defined locations (U1 in our example) appear as a list down the left side of the screen. Additional locations may be added below the highlight bar by pressing F6 (New Test). For example, enter U2 into the Dialog Box that appears after pressing F6. Repeat for U5, U10 and U8.

```
┌──────────────────────────────────────────────────────────────┐
│ TRIAL1.zsq                                            develop  │
│ ▐Cut▌      Copy       Paste       Rename      NewGroup  Header │
│ ┌begin MAIN ┐──────── Sequence Flow ────────────────          │
│ <begin MAIN >                                                  │
│ U1              FLUKE 900                                      │
│ U2              FLUKE 900                                      │
│ U5              FLUKE 900                                      │
│ U10             FLUKE 900                                      │
│ ▐U8             FLUKE 900▌                                     │
│ <end group>                                                    │
│                                                                │
│                                                                │
│                                                                │
│                                                                │
│                                                                │
│                                                                │
│ ┌────┬────┬────┬────┬────┬────┬────┬────┬────┬────┐          │
│ │ F1 │ F2 │ F3 │ F4 │ F5 │ F6 │ F7 │ F8 │ F9 │F10 │          │
│ │Help│UpLevel│DnLevel│Prev│Find│NewTest│Comment│  │  │Accept│  │
│ └────┴────┴────┴────┴────┴────┴────┴────┴────┴────┘          │
└──────────────────────────────────────────────────────────────┘
```

The highlight bar may be moved up and down this device list using the cursor control arrow keys. Move the bar to U1 at the top of the list and press F10 to return to the Test screen. You must also press Ⓨ to confirm the changes made.

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GETTING STARTED

```
┌─────────────────────────────────────────────────────────────────┐
│ TRIAL1.zsq                                              develop   │
│ █Cut█    Copy      Paste       Rename      NewGroup     Header    │
│ ───────────────────── Sequence Flow ─────────────────────        │
│ <begin MAIN >                                                     │
│ █U1              FLUKE 900                                        │
│ U2               FLUKE 900                                        │
│ U5               FLUKE 900                                        │
│ U10              FLUKE 900                                        │
│ U8               FLUKE 900                                        │
│ <end group>                                                       │
│              ┌────────────────────────────────────┐              │
│              │                                     │              │
│              │  Save Sequence Flow Changes? (Y/N)  │              │
│              │                                     │              │
│              │  ───── 'Y' Or 'N', Please ─────     │              │
│              └────────────────────────────────────┘              │
│                                                                   │
│                                                                   │
│                                                                   │
│                                                                   │
│  F1    F2    F3    F4    F5    F6    F7    F8    F9    F10        │
└─────────────────────────────────────────────────────────────────┘
```
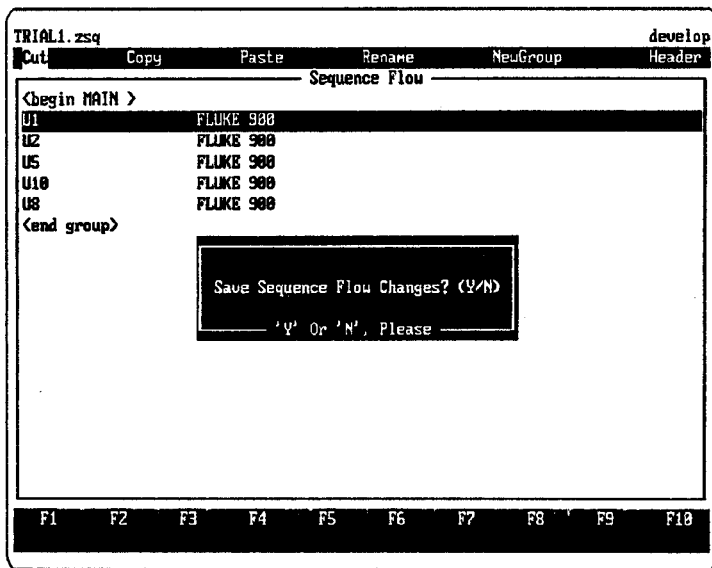
Note that the highlight bar in the small Sequence Flow window is pointing to the same location highlighted in the full Seq Flow window.

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2.1.4 DEFINING DEVICE PARAMETERS

With the highlight bar positioned at U1 in the Test screen, press ⒡⒉ to bring up the Device Definition window. Enter 7400 in the field and press ⒡⒑ to accept the entire window.

```
TRIAL1.zsq                                                      develop
┌───────────── Device Definition Parameters ─────────────┐
│                                                          │
│                    IC Name  7400                         │
│                    IC Size  14                           │
│                    Ucc Pins 14                           │
│                    Gnd Pins 7                            │
│           Reference Device Drive high                    │
│                    Pin Activity no                       │
│                    Simulation on                         │
│           Reference Device Test on                       │
│                    Check Sum 0                           │
│                    Clip Check on                         │
│                                                          │
└──────────────────────────────────────────────────────────┘
  F1     F2     F3     F4     F5     F6     F7     F8     F9    F10
 Help   Clear                Revert                          Accept
```

The next step would normally be to verify that our test for U1 passes on a good board. If not, you would change the parameters until it does. This is the normal procedure for setting up a Sequence, even on a standalone tester. Assume that U1 passes and proceed to the next test by pressing ⒡⒐ (NEXT). Note that the highlight bar moves to U2.

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GETTING STARTED

Repeat the procedure described above to define the next device, U2, as a 74244. Let us assume, for this example, that a Fault Mask parameter change is needed to obtain a passing test result. Press ⒡④ to enter the Performance Envelope window. The cursor will be positioned in the first field. Enter 60 as the value and accept the entire window with ⒡①⓪.

```
TRIAL1.zsq                                                       develop
              ┌── Performance Envelope Parameters ─────────────┐
              │             Gate I/C          I/C Gate         │
              │                                                │
      FaultMask 60 ns          X  C ─┤1    ██ 20├─ C  X        │
      Threshold 1800mV         X  C ─┤2       19├─ C  X        │
 Test Time (CONT or ####) 1000ns X  C ─┤3       18├─ C  X      │
      Pins Ignored  0          X  C ─┤4       17├─ C  X        │
                               X  C ─┤5       16├─ C  X        │
          Gate off             X  C ─┤6       15├─ C  X        │
          Delay 0.000ns        X  C ─┤7       14├─ C  X        │
          Duration CONT        X  C ─┤8       13├─ C  X        │
          Polarity T           X  C ─┤9       12├─ C  X        │
                               X  C ─┤10      11├─ C  X        │
 Gating                                          E X          │
 Cond'n  = gate not defined                                   │
                                                             │
 Compare                                                      │
 When HI  = always high                                       │
              └────────────────────────────────────────────────┘
 F1    F2    F3    F4    F5    F6    F7    F8    F9    F10
Help  Clear             Revert                       Accept
```

The development of an actual board Sequence involves repeating the preceding steps for every location in the Sequence Flow list.

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2.1.5 REORDERING THE TESTS

Changing the order of tests is done from the Sequence Flow window. F5 enters this window from the Test screen and the up/down arrow keys move the highlight bar. Note that the left/right arrows move the Top Menu Cursor between various editing functions. We will use the Cut and Paste functions to make U10 the last location on the list.

Position the highlight bar on U10. Position the Top Menu Cursor on Cut and press (Enter) to start the cut, then (F10) to accept the cut. U10 has now been removed from the list and placed in the Paste Buffer. Move the highlight bar to U8, the last location on the list. Move the Top Menu Cursor to Paste and press (Enter). The revised list should now appear as:

> U1
> U2
> U5
> U8
> U10

Accept this list and return to the Test screen by pressing (F10).

2.1.6 ADDING OPERATOR PROMPTS

Scrolling through the Sequence Flow list may be done from the Test screen using the up/down arrow keys and the Page Up/Page Down keys. Once the highlight bar in the small Sequence Flow window is positioned on a desired device, pressing (F10) will accept it and update the test parameters. Note that moving to another location using arrow keys requires accepting the final position, while moving with (F9) (NEXT) does not. The location selected in the Test screen is the "current location".

Operator prompts may be added for each location by pressing (F6) (Msg) to enter text into the Message window. (F10) must be pressed to accept the text message.

2.1.7 DOCUMENTING THE SEQUENCE

Sequence documenting is done from the Sequence Flow window accessed by (F5). Programmer's comments may be added beside each location. For our example, move the highlight bar to U1, press (F7) (Comment) and press (Enter) twice to bring up a Dialog Box for a location comment. Enter "7400 GATE" and this will appear beside U1. Location comments appear beside the U#s; Sequence comments appear between U#s.

The Header option on the Top Menu Cursor has menu options for Title, Description, Author, and a Start Message operator prompt. Position the cursor and press (Enter) to permit entry of information for these purposes.

The Mode option of the Header menu is used at the completion of Sequence development to lock out further changes. After selecting this option, position cursor to "run only" and press (Enter).
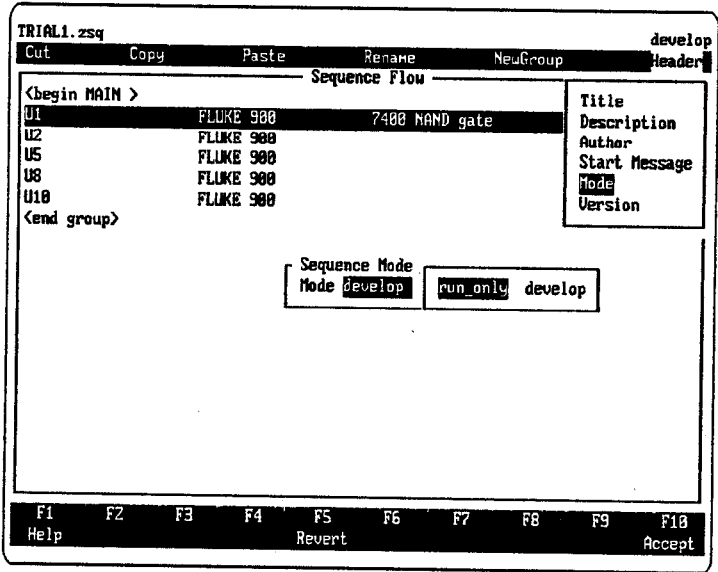
You are prompted to enter a password and confirm the setting. Further revisions can not be made to this Sequence unless you change the Mode back to "develop". This requires you to re-enter the original password.

Press (Esc) several times to exit the Header menu, the Sequence Flow window and the TRIAL1 Sequence. Press (Y) in response to the confirming save message.

2.1.8 RUNNING THE SEQUENCE

The sample Sequence created above may be run from the Main screen by choosing "working directory" from the menu and selecting the name TRIAL1.

The Sequence may also be run from a cartridge (or volatile tester System RAM) on a standalone tester after the following procedure:

1. Select Compile in the Files menu. Choose "Working Directory File" and the filename "TRIAL1.ZSQ". The new files TRIAL1.SEQ and TRIAL1.LOC and their tester-executable versions TRIAL1.SE@ and TRIAL1.LO@ will be created in the same directory as TRIAL1.ZSQ

2.

    Copy the SE@ and LO@ files from the working directory to the tester (typically the cartridge). Note that they are downloaded to the tester as
3. TRIAL1.seq and TRIAL1.loc .

    The tester may now be disconnected from the PC and the Sequence run from cartridge.

3 PACKAGE OPERATION

Operation of this package is through pulldown menus and function keys that produce popup windows and boxes. The (Esc) key is used to exit windows and modes as well as the package itself. A popup box appears when trying to exit the package and it requires the user to confirm. Similar reminders to save changes also appear before exiting certain modes.

3.1 SCREEN MENU HIERARCHY

```
                          ┌─────────────┐
                          │ Main Screen │
                          └─────────────┘
        ┌──────────────────────┬──────────────────────────────────┐
    ┌───────┐              ┌───────┐   ┌── Current Sequence  ┌───────┐
    │ Files │              │  Run  │───┤── From Working Dir   │ Setup │
    └───────┘              └───────┘   ├── From Another Dir   └───────┘
                                       └── Create Sequence
    ┌───────────┐
    ├─│ Directory │       ┌─────────────┐                      ┌────────┐
    └───────────┘       ┌─│ Test Screen │                    ├─│ RS232  │
    ┌───────┐           │ └─────────────┘   ┌── Size          └────────┘
    ├─│ Edit  │         │ ┌────────────┐    ├── RD Drive      ┌─────────┐
    └───────┘           ├─│ Definition │────┤── Activity      ├─│ Printer │
    ┌───────┐           │ └────────────┘    ├── Simulation    └─────────┘
    ├─│ Copy  │         │                   ├── RD Test       ┌────────┐
    └───────┘           │                   └── Clip Check    ├─│ Colors │
    ┌────────┐          │                                     └────────┘
    ├─│ Delete │        │ ┌───────────┐    ┌── Synchronization ┌────────┐
    └────────┘          ├─│ Initializ.│────┤── Trigger        ├─│ Editor │
    ┌────────┐          │ └───────────┘    ├── Reset Offset   └────────┘
    ├─│ Rename │        │                  └── Shadow         ┌──────────┐
    └────────┘          │                                     ├─│ MeasTool │
    ┌─────────┐         │ ┌──────────┐                        └──────────┘
    ├─│ Compile │       └─│ Perf.Env.│──┬── Fault Mask       ┌────────┐
    └─────────┘           └──────────┘  ├── Threshold        ├─│ Backup │
    ┌─────────┐                         ├── Pins Ignored     └────────┘
    ├─│ Library │                       └── Gate            ┌─────────┐
    └─────────┘                                            ├─│ Restore │
    ┌───────────┐                                          └─────────┘
    ├─│ Change Dir│                                        ┌──────────┐
    └───────────┘                                          ├─│ RAM Drive│
    ┌───────┐                                              └──────────┘
    ├─│ Print │                                            ┌─────────┐
    └───────┘                                              └─│ Config. │
    ┌───────────┐                                            └─────────┘
    └─│ DOS Shell │
      └───────────┘
```

STARTING THE PACKAGE

3.2 STARTING THE PACKAGE

<u>900 PC Software</u> installs itself in the directory 900PCS. Point to this directory by entering "cd 900pcs".

Enter "900pcs" at the DOS prompt and the main screen appears.

3.3 MAIN SCREEN

```
              900 PC Software  Rev. 0.1.0001522
 Files                                Run                        Setup

              ┌──────────── Help Window ────────────┐
              │Operation of this package is done through pulldown menus and│
              │function keys that produce popup windows and boxes. The Esc │
              │key is used to exit windows and modes.                       │
              │                                                             │
              │The Top Menu across the top of the screen produces Pulldown │
              │Menus below the highlighted cursor. These menus generally   │
              │change the operating mode by popping up a window or a       │
              │complete screen over the existing screen.                   │
              │                                                             │
              │Function key labels are found across the bottom of the      │
              │screen. They generally expand a screen window and enter into│
              │a submode, or they perform a simple specific function.      │
              │                                                             │
              │The Files pulldown menu contains utilities for displaying   │
              └──────── ↑, ↓, ←, →, Home, End, PgUp, PgDn, ESC ────────┘

   F1     F2     F3     F4     F5     F6     F7     F8     F9     F10
  Help
```
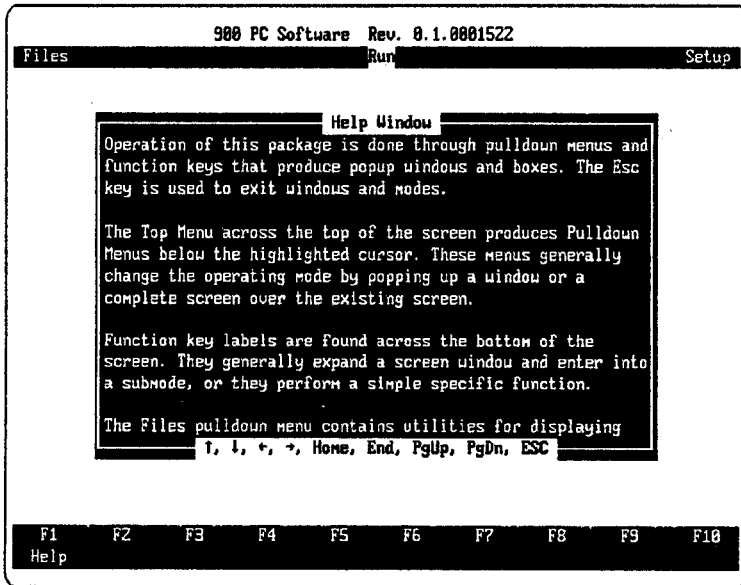
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The Top Menu across the top of the screen produces Pulldown Menus below the highlighted cursor. These menus generally change the operating mode by popping up a window or a complete screen over the existing screen.

Function key labels are found across the bottom of the screen. They generally expand a screen window and enter into a submode, or they perform a simple specific function.

The Files pulldown menu contains utilities for managing files on disk such as Directory, Delete, Rename, Print. The Edit option invokes your own editor as specified in the Setup menu to make changes to text files. The Compile option produces versions of PC-generated Sequences that will may be downloaded to a standalone tester. It also utilizes the compiler resident in the tester to convert tester compatible source files (.LOC, .SEQ, .LIB extensions) to executable versions for a standalone tester (.loc, .seq, .lib extensions). The Copy option is used for copying files within the PC and to/from the tester. The Library option invokes the Library Utility described in Appendix IV of the tester Operator Manual. The Change DIR option changes the working directory for the purposes of the Run menu.

The Run pulldown menu permits the loading of an existing board test Sequence from disk or the creation of a new Sequence.
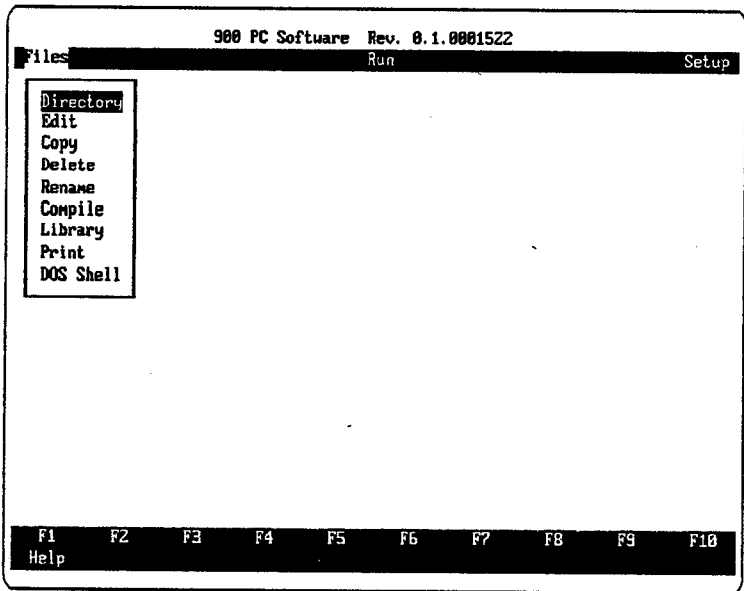
The Setup pulldown menu permits option setting for the PC serial port, printer page format, screen color template, path

definition for editors and other software packages, and specifying backup copies of Sequences and restoring them during their creation.

3.4 FILES MENU

To execute the following file utilities, move the cursor with the up/down arrows, press ⌊Enter⌋ and specify the desired disk and path in the Dialog Box.

```
┌──────────────────────────────────────────────────────────────┐
│              900 PC Software  Rev. 0.1.0001522                 │
│▐Files▌                        Run                       Setup▌│
│  ┌───────────┐                                                 │
│  │▐Directory▌│                                                 │
│  │ Edit      │                                                 │
│  │ Copy      │                                                 │
│  │ Delete    │                                                 │
│  │ Rename    │                                                 │
│  │ Compile   │                                                 │
│  │ Library   │                                                 │
│  │ Print   ⌐ │                                                 │
│  │ DOS Shell │                                                 │
│  └───────────┘                                                 │
│                                                                │
│                                                                │
│                                                                │
│                                                                │
│                          ⌐                                     │
│                                                                │
│                                                                │
│                                                                │
│ ┌──────────────────────────────────────────────────────────┐ │
│ │ F1    F2    F3    F4    F5    F6    F7    F8    F9    F10  │ │
│ │Help                                                       │ │
│ └──────────────────────────────────────────────────────────┘ │
└──────────────────────────────────────────────────────────────┘
```

Directory -
Lists the files resident on PC disk, cartridge inserted into the tester or present in the tester's volatile system RAM.

Edit -
Prompts for a file resident on PC disk, tester cartridge or tester system RAM and invokes the editor defined in the Setup menu. Edlin is the default editor.

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FILES MENU

Copy -
Transfers files between tester cartridge, tester system RAM and PC. Specify the source and destination with the cursor.

Delete -
Removes files from PC, or tester system RAM and cartridge. Highlight the filename with the cursor and press [Enter].

Rename -
Permits changing the name of PC-resident and tester-resident files.

Compile -
This utility will convert a Sequence file that is compatible with the 900 PC Software database (file with extension .SQN) into files that are compatible with the standalone tester (files with extensions .SEQ and .LOC). When the utility is performed on tester-compatible files (extensions .SEQ, .LOC and .LIB), executable versions with extensions .SE@, .LO@, .LI@ are produced. Note that these files are put into the same PC directory or tester medium as their source file versions.

Library -
This is the Library Utility described in Appendix IV of the tester Operator Manual. It is used to create downloadable LIBRARY files of standard and simulated devices. When you first invoke this utility from 900 PC Software, you will be prompted to enter the path where it was installed. Thereafter, the utility automatically starts when selected from the Files menu.

Change DIR -
This changes the working directory to any one that you specify.
When running a Sequence, it is backed up in the working
directory. Therefore, to restore a Sequence (using Restore
under the Setup menu), you must be running it from the
working directory, not "another directory".

Print -
Directs a specified file to the PC printer port. Specify the type
of file with the Highlight Bar and its name in the Dialog Box.
Note that Sequence means a listing of the database file on the
PC, not the tester version .SEQ file.

DOS Shell -
Brings up the DOS prompt and permits DOS commands. The
900 PC Software package frees up all memory except 10K.
Type EXIT to return to 900 PC Software.

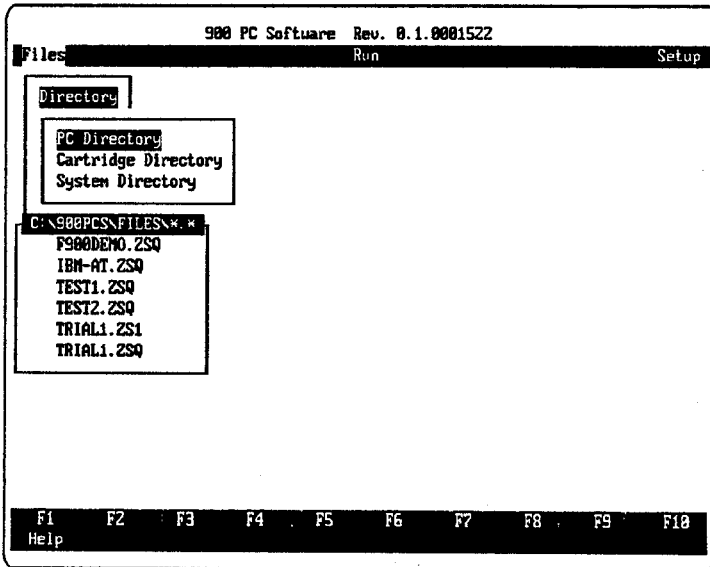| Operator Manual References |
| --- |
| Directory of tester files: 4-3 |
| File types: 5-5 |
| Compiling tester source files: 5-22 |

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FILES MENU

3.4.1 DIRECTORY

The following screen shows the popup boxes present when checking the directory of files on disk. A highlighted cursor serves to scroll the list of files through the Menu Box using up/down arrows.

```
                    900 PC Software  Rev. 0.1.0001522
 Files                                  Run                              Setup

   Directory

     PC Directory
     Cartridge Directory
     System Directory

   C:\900PCS\FILES\*.*
      F900DEMO.ZSQ
      IBM-AT.ZSQ
      TEST1.ZSQ
      TEST2.ZSQ
      TRIAL1.ZS1
      TRIAL1.ZSQ




   F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
   Help
```
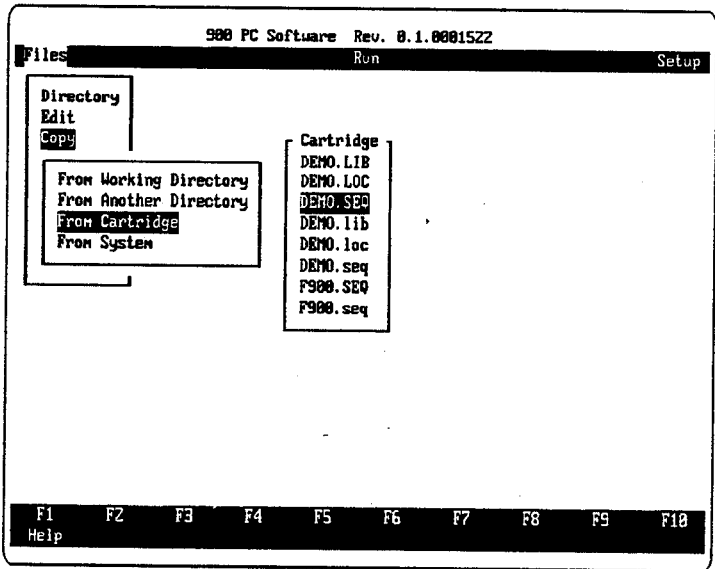
3.4.2 COPY

The Copy utility is used to duplicate files on disk and also to transfer them between PC and tester. Note that you will not be prompted if a file already exists and it will be copied over if so specified. The source file is specified by first

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selecting where it is located (working PC directory, other PC directory or tester). A list of files is presented as shown on the following page.

```
                    900 PC Software  Rev. 0.1.0001522
  ▐Files▌                              Run                              Setup
   ┌──────────┐
   │Directory │
   │Edit      │
   │Copy      │        ┌ Cartridge ┐
   │  └───────┴───┐    │ DEMO.LIB  │
   │  From Working Directory │ DEMO.LOC  │
   │  From Another Directory │ ▐DEMO.SEQ▌ │
   │  From Cartridge         │ DEMO.lib  │  ‣
   │  From System            │ DEMO.loc  │
   │  └────────────┘         │ DEMO.seq  │
                             │ F900.SEQ  │
                             │ F900.seq  │
                             └───────────┘




     F1     F2     F3     F4     F5     F6     F7     F8     F9     F10
    Help
```

Highlight the choice and press (Enter). The destination for copying is specified in a Dialog Box as shown on the next page.

FILES MENU

```
                    900 PC Software  Rev. 0.1.000152Z
 Files                               Run                              Setup

 Directory
 Edit
 Copy

  From Working Directory
  From ┌──────────────────────── File Copy ──────────────────────┐
  From │                                                          │
  From │        Copying Cartridge File: DEMO.SEQ                  │
 ──────│                                                          │
       │  To PC File DEMO.SEQ                                     │
       │                                                          │
       └──────────────────────────────────────────────────────────┘


 ┌────────────────────────────────────────────────────────────────┐
 │  F1     F2     F3     F4     F5     F6     F7     F8     F9    F10│
 │ Help   Clear                Revert                          Accept│
 └────────────────────────────────────────────────────────────────┘
```
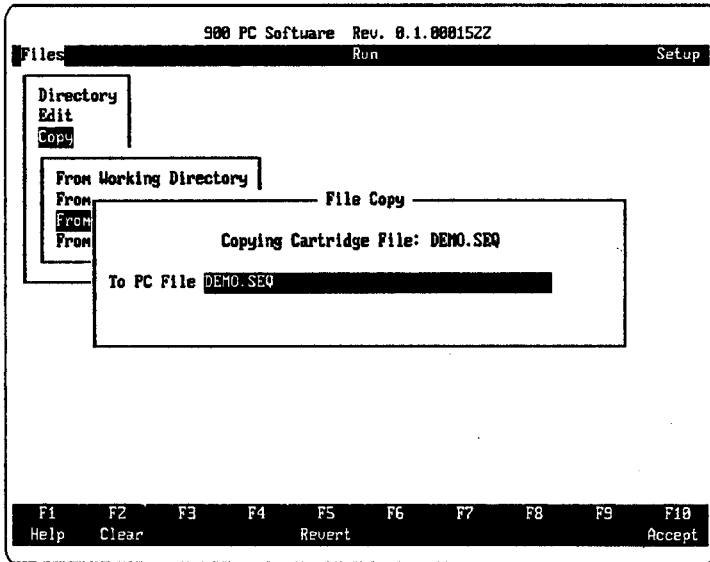
Note about filename conventions:

Sequence source files that are resident on the tester have the filename extensions SEQ, LOC, LIB. The executable versions of these source files have the extensions seq, loc, lib. When copying an executable file from the tester to PC, its extension is modified to be SE@, LO@ or LI@ since the PC does not recognize lowercase filenames. When one of these files is copied back down to the tester, its name extension is automatically converted back into the tester executable form (ie. FILE.SE@ becomes FILE.seq).

3.4.3 COMPILE

The Compile utility is used to convert files from one format to another according to the following table (note filename extensions shown in parantheses):

File Type	Converts to
Sequence on PC database (ZSQ)	Tester source file(SEQ,LOC) and tester executable files (SE@,LO@) on PC
Tester source files resident in PC (SEQ,LOC,LIB)	Tester executable files resident in PC (SE@, LO@, LI@)
Tester source files resident in tester (SEQ,LOC,LIB)	Tester executable files resident in tester (seq,loc,lib)

Note that, when creating a Sequence in the 900PC Software database that is to be compiled and downloaded for standalone tester operation, you must conform to certain syntax conventions that apply to the tester. These restrictions do not apply to Sequences intended for operation within 900 PC Software. For example:

- Filenames must begin with alpha characters
- No spaces are allowed in file or location names
- Location names may not have shifted characters (from the tester keyboard) or a dash, but may have an underline. eg.: U37_A is allowed, U37(A) and U37-A are not).
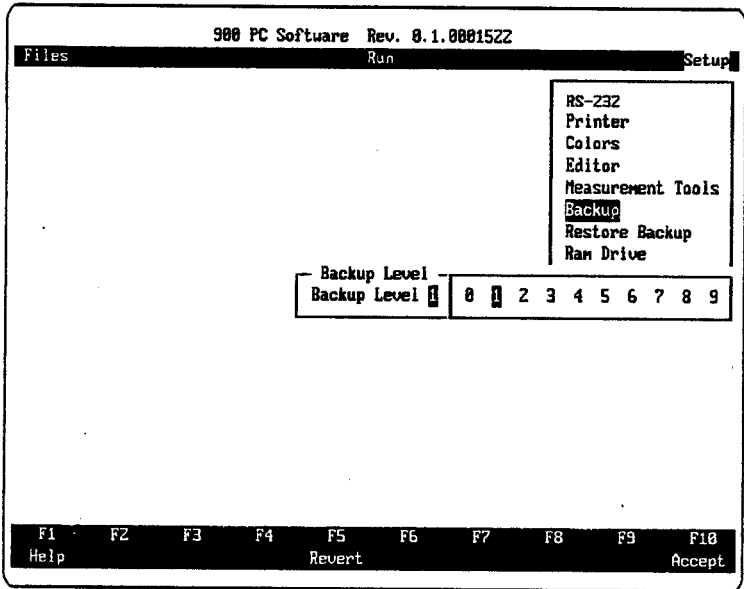
FILES MENU

- Operator messages that are longer than 2 lines are truncated
- Quotation marks cannot be used in operator messages
- Start Message information from 900 PC Software appears as nonexecutable comments in the SEQ file and does not appear on the tester display.

In general, if you cannot successfully compile a ZSQ file into SE@ and LO@ versions but it does produce SEQ and LOC file versions, investigate the syntax restrictions of the tester compiler. The line numbers of the compile errors appear and the files may be viewed with an editor. Another way to do this is to copy the SEQ file to the tester system RAM and then do a manual compile from the tester keyboard to locate the exact line with a problem.

SETUP MENU

3.5 SETUP MENU

Setup defines various option and configuration settings. Shown below is the popup Menu Box that appears when the Backup option is selected.

```
                    900 PC Software  Rev. 0.1.000152Z
 Files                              Run                              Setup
                                              RS-232
                                              Printer
                                              Colors
                                              Editor
                                              Measurement Tools
                                              Backup
   .                                          Restore Backup
                              ┌ Backup Level ┐ Ram Drive
                              │ Backup Level 1│ 0 1 2 3 4 5 6 7 8 9
                              └──────────────┘

                              .

 ┌─────────────────────────────────────────────────────────────────┐
 │ F1     F2     F3     F4     F5     F6     F7     F8     F9    F10  │
 │ Help                     Revert                            Accept │
 └─────────────────────────────────────────────────────────────────┘
```

Each option is described below:

RS232 -

Permits setting of communications port. Up and down arrows select an active parameter and left/right arrows position the Highlight Bar on the desired setting. Press (Enter) to confirm each setting and (F10) to accept the entire configuration.

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SETUP MENU

Printer -
Permits page formatting for file printouts. Up/down arrows select an edit field for numeric entry. `Enter` confirms each setting, `F10` accepts the entire configuration and `F9` restores the configuration to the settings that were present before changes.

Colors -
Permits the user to choose different colors for various windows and parts of the screen. See section 2.3.1 for more explanation.

Editor -
Permits the user to define the path and name of the editor to be used in the Files menu.

Measurement Tools -
Permits the user to define the path and menu name of instrument programs found in the measure pulldown menu. Up to three such definitions may be specified.

Backup -
Permits 0 to 9 backup copies of a Sequence to be retained during development. A maximum of 3 is recommended to conserve disk space.

Restore Backup -
Permits one of the backup copies of a Sequence to replace the current version. Therefore, any changes made since the last Save procedure are discarded.

RAM Drive -

Permits the user to specify a portion of extended RAM in the PC to be used in the execution of the 900 PC Software. This will speed up the operational response of the package. To enable RAM Drive, enter the virtual drive letter (eg. E) in the field of the Dialog Box. A blank field will diable this feature. See the installation procedure in Section 1.4 on how to define the RAM space as a drive letter in the PC config.sys file.

Configuration -

Tester hardware and firmware revision levels are listed.
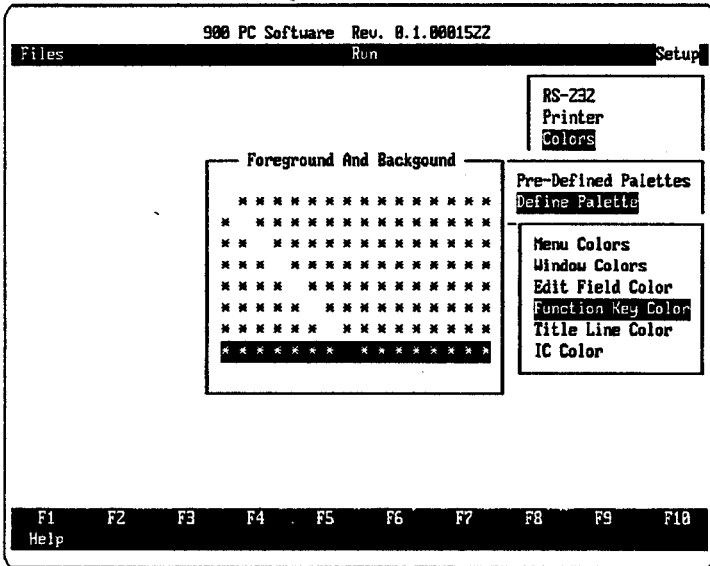
Operator Manual References
Setting RS232 port: 1-29
Tester hardware configuration: 1-18

3.5.1 COLORS

The Menu Boxes permit the user to choose colors for various parts of the screen by moving the cursor to the desired color (foreground and background) and pressing (Enter).

```
┌──────────────────────────────────────────────────────────┐
│              900 PC Software  Rev. 8.1.8881522              │
│ ▐Files                       Run                    ▐Setup▌│
│                                          ┌──────────────┐  │
│                                          │ RS-232       │  │
│                                          │ Printer      │  │
│                                          │ ▐Colors▌     │  │
│              ┌─ Foreground And Backgound ─┤             │  │
│              │   x x x x x x x x x x x x x │Pre-Defined Palettes│
│           ╲  │  x  x x x x x x x x x x x x │▐Define Palette▌│
│              │  x x  x x x x x x x x x x x │               │  │
│              │  x x x  x x x x x x x x x x │Menu Colors    │  │
│              │  x x x x  x x x x x x x x x │Window Colors  │  │
│              │  x x x x x  x x x x x x x x │Edit Field Color│ │
│              │  x x x x x x  x x x x x x x │▐Function Key Color▌│
│              │  x x x x x x x  x x x x x x │Title Line Color│ │
│              │  x x x x x x x x x x x x x x│IC Color        │ │
│              └────────────────────────────┘└──────────────┘  │
│                                                              │
│ ▐F1     F2     F3     F4  .  F5    F6     F7     F8     F9     F10▌│
│  Help                                                        │
└──────────────────────────────────────────────────────────┘
```

Two palettes are predefined. The terminology used is as follows:

Menu -
A horizontal (eg. Top menu) or vertical (eg. pulldown) list of selections with a highlight cursor. Choices menu is the horizontal menu of choices for some parameters.

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Window -

The entire screen has a background and may have areas within it called windows (eg. Definition, Results, Stimulus, etc.). A window may fill the entire screen when selected.

Box -

Machine status messages and error messages will appear in boxes in the center of the screen to provide operator information.

Field -

The current values for each parameter in a window. The active field is highlighted, the passive ones are not.

Function Key Line -
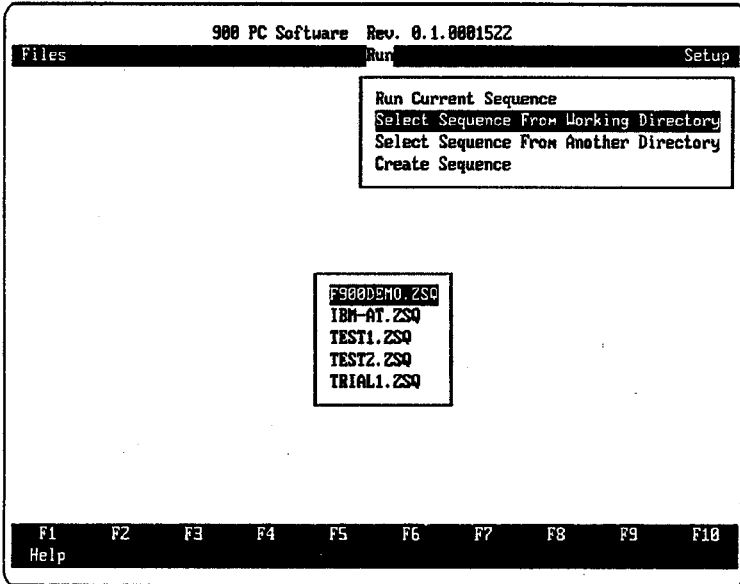
The labels across the bottom of the screen.

Title Line -

The top line of the screen.

RUN MENU

3.6 RUN MENU

To load and run a Sequence file from the PC disk, pulldown the Run menu, move the cursor and press (Enter) on one of the selections in the pulldown menu.

```
                    900 PC Software  Rev. 0.1.0001522
 Files                              Run                              Setup

                             Run Current Sequence
                             Select Sequence From Working Directory
                             Select Sequence From Another Directory
                             Create Sequence




                        F900DEMO.ZSQ
                        IBM-AT.ZSQ
                        TEST1.ZSQ
                        TEST2.ZSQ
                        TRIAL1.ZSQ




   F1     F2     F3     F4     F5     F6     F7     F8     F9     F10
   Help
```

The Run Current Sequence option is only shown if a Sequence has already been run. It is considered to be currently loaded and may be re-run by positioning the cursor and pressing (Enter). The popup Menu Box shows the available Sequences for the other options:

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Working Directory -
The directory that was current when 900PC Software was started or that has since been changed through the Change DIR option of the files menu.

Another Directory -
A disk and directory path that you must specify in a Dialog Box.
(eg. A:\FILES)

The Create Sequence option prompts the user to enter a new Sequence name and the first IC location into a Dialog Box. The initial Test screen then appears.

Note that, unlike the standalone tester, there is no Manual Mode to test devices outside of a Sequence. It is a simple matter, however, to create a dummy Sequence consisting of a single device. The Test screen then operates like Manual Mode and you may change the device and any parameters over and over.

3.6.1 TEST SCREEN

This is the main testing screen and is used both for running and developing Test Sequences. Each window has an associated Function Key which permits changing of the parameters in that window. The Highlight Bar in the Sequence Flow window indicates the location of the current IC to be tested.

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RUN MENU

```
┌─────────────────────────────────────────────────────────────────────┐
│ F900DEMO.ZSQ         FLUKE 900 DEMO UUT BOARD              develop     │
│ ▐Measure▌                    Untested                         Save     │
│ ┌──── Definition ─────┐      ┌──── Sequence Flow ────────┐            │
│ │ 74244      RD Drive = high │  ▐U37_PASS         FLUKE 900▌          │
│ │ 20 pins    RD Test  = on   │  U37_FAIL          FLUKE 900          │
│ │ Simulation = on  Clipcheck = on │  U2_PASS      FLUKE 900          │
│ │ Activity = no    C_Sum = 0 │                              │        │
│ └────────────────────────────┘  └───────────────────────────┘        │
│ ┌──── Initialization ────┐     ┌──────── Message ──────────┐         │
│ │ Synchronization = off  │     │ Place a 74244 Reference Device in the│
│ │ Trigger = off          │     │ ZIF Socket                │         │
│ │ Reset Offset = 0 ns    │     │                           │         │
│ │ Ram Shadow = N/A       │     └───────────────────────────┘         │
│ └────────────────────────┘                                            │
│ ┌──── Performance Envelope ────┐  ┌──────── Results ────────┐         │
│ │ FaultMask = 40ns  TestTime = 3000ns │        NONE          │         │
│ │ Pins Ignored = 0  Gate = off │  └───────────────────────────┘       │
│ │ Threshold = 1800 mV │          ┌──────── Stimulus ────────┐         │
│ └──────────────────────────────┘  │   F900 generated reset  │         │
│                                    └───────────────────────────┘      │
│ ┌────┬────┬────┬────┬────┬────┬────┬────┬────┬────┐                   │
│ │ F1 │ F2 │ F3 │ F4 │ F5 │ F6 │ F7 │ F8 │ F9 │F10 │                   │
│ │Help│ Def│Init│PEnv│SeqF│ Msg│Rslt│Stim│NEXT│TEST│                   │
│ └────┴────┴────┴────┴────┴────┴────┴────┴────┴────┘                   │
└─────────────────────────────────────────────────────────────────────┘
```

Each location has a set of parameter windows that define its test. The initial parameter values are retrieved from a device library as default values and they may be changed individually. The default values of certain parameters, however, are not taken from the library, but are taken from the preceding location. These parameters are: Test Time, Stimulus and External Trigger. In this way, they behave like global parameters on the standalone tester. They usually have a setting for the entire board, not an individual device.

(F10) (TEST) initiates the test cycle on the tester. Test results are provided to the PC when a failure occurs or the Test Time expires. Note that if Test Time is set to continuous or the tester is actively waiting for a Trigger that

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RUN MENU

is not occuring, the user can terminate the test in two ways. (Esc) aborts the test; pressing the TEST key on the tester itself provides the full Trigger and test results to the PC.

(F9) (NEXT) moves the bar to the IC below the current one and updates all the screen parameters. Page Up, Page Down and Up/down arrow keys will also scroll the bar within the Seqence Flow window to point to another location. Press (F10) (Accept) to update the screen parameters associated with the location in the highlight bar.

Selecting a location may also be done in the full Seq Flow window accessed by pressing (F5). Here there is an expanded location list and a Find key to search for a location.

The very top line of the Test screen identifies the name of the Sequence, a user-definable descriptive title in the center, and the mode (develop or run-only). The descriptive title and mode are set through Seq Flow.

The Top Menu has:
Measure, to perform a measurement function (eg. frequency) or to shell out to another instrument package.

Untested, which lists the IC locations not yet tested. It is initialized each time the Sequence is restarted from the main screen.

Save, which saves the Sequence test parameters and device locations to disk. The previous version(s) are also retained as backup copies according to the setting in the Setup menu.

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RUN MENU

3.6.2 RESULTS SCREEN

This screen appears automatically after a FAIL test result or may be brought up with a Function Key after a PASS result.

```
┌─────────────────────────────────────────────────────────────────┐
│ F900DEMO.ZSQ        FLUKE 900 DEMO UUT BOARD            develop   │
│                    ──── Test Results ────                         │
│ FAIL:                     Time to Fault = 5.411 ms               │
│ Failed DUT                                                        │
│                                                                   │
│  Programmed    State    ┌───────┐    State    Programmed         │
│       high     ┤ 1   █ 20 ├      high                            │
│     active     ┤ 2     19 ├      active                          │
│     active     ┤ 3   ? 18 ├      active                          │
│     active     ┤ 4   4 17 ├      active                          │
│     active     ┤ 5   2 16 ├      active                          │
│     active     ┤ 6   4 15 ├      active                          │
│     active     ┤ 7   4 14 ├      active                          │
│     active     ┤ 8     13 ├      active                          │
│     active   X─┤ 9     12 ├      active                          │
│        low     ┤ 10    11 ├      active                          │
│                └───────┘                                          │
│                                                                   │
├───────────────────────────────────────────────────────────────┤
│  F1    F2    F3    F4    F5    F6    F7    F8    F9    F10        │
│  Help        Prog  State                                   TEST  │
└─────────────────────────────────────────────────────────────────┘
```

The pins that had signals which exceeded the Fault Mask setting are marked with X. F4 (State) produces a listing of the observed activity beside each pin. The time that the fault was captured after the start of test (eg. edge of the Reset pulse) appears at the top of the screen. The state of the DUT pins at the end of test can only be viewed using the tester's keyboard operating in nonremote mode.

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Mismatches in programmed pin activity appear as the following screen:

```
F900DEMO.2SQ            FLUKE 900 DEMO UUT BOARD          develop
                        ─── Test Results ───
FAIL:
Failed Conditions

  Programmed   State                    State   Programmed
        low       ┌1  █    20┐   high
  4.773MHz1%  10.00MHz  C ─│2       19│   active
              active     ─│3       18│   active
              active     ─│4    8  17│   active
              active     ─│5    2  16│   active
              active     ─│6    8  15│   active
              active     ─│7    8  14│   high
              active     ─│8       13│   active
              active     ─│9       12│   active
        low       ─│10      11│   active

┌────┬────┬────┬────┬────┬────┬────┬────┬────┬────┐
│ F1 │ F2 │ F3 │ F4 │ F5 │ F6 │ F7 │ F8 │ F9 │ F10│
│Help│    │Prog│State│   │    │    │    │    │TEST│
└────┴────┴────┴────┴────┴────┴────┴────┴────┴────┘
```

Pins which fail the specified condition activity checks are marked with C. The actual observed condition and the preprogrammed condition will appear beside the pin(s).

Press F5 to observe the actual activity on all pins. Press F4 to see the programmed activity conditions on all pins.

┌───┐
│ Operator Manual References   │
│ Interpreting test results: 3-6   │
└───┘

3.6.3 MEASURE - FREQUENCY

Selecting frequency from the measure window is similar to using immediate frequency on a number of pins with the standalone tester. The pulldown menu permits selection of Frequency and a window appears for the user to specify what to measure.

```
F900DEMO.ZSQ          FLUKE 900 DEMO UUT BOARD          develop
                    ── Frequency Selection ──

              Pin 2   Time Out  on
          Thru Pin 8

              Pin     Time Out  on
          Thru Pin

              Pin     Time Out  on
          Thru Pin

              Pin     Time Out  on
          Thru Pin

              Pin     Time Out  on
          Thru Pin

          External no  Time Out  on


   F1     F2     F3     F4     F5     F6     F7     F8     F9     F10
  Help   Clear                Revert                             Accept
```

Frequency can be measured on up to 5 groups of pins (eg. 1-2, 5, 7-10, 14, 20). Time out should be set to "off" for any signal less than 100 Hz. Note that the Cntrl right/left arrows move the cursor between the pin column and the Time Out column. When in the Time Out column, the cursor resides in a small Choices Menu Box.

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External is the EXT patch lead on the Interface Buffer.
Gate and Delayed Gate are the pin conditions defined from
the Performance Envelope window.
[F10] (Accept) confirms the setting of the entire Frequency
Dialog Box.

```
F900DEMO.2SQ          FLUKE 900 DEMO UUT BOARD              develop
                    ── Frequency Definition ──
 Pin #   Frequency   Period    Time High   Time Low   Duty Cycle
  2      10.00 MHz  100.00 ns   46.80 ns   53.20 ns    46.80 %
  3      H          H           H          H            0.00 %
  4      H          H           H          H            0.00 %
  5      L          L           L          L            0.00 %
  6      66.30 kHz  15.08 us    0.95 us    14.13 us     6.30 %
  7      66.30 kHz  15.08 us   14.69 us    0.39 us     97.40 %
  8      H          H           H          H            0.00 %




                    ── ↑, ↓, Home, End, ESC ──
  F1    F2    F3    F4    F5    F6    F7    F8    F9    F10
                   Change
```

Operator Manual References
Frequency measurement: 3-33

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RUN MENU

3.6.4 DEFINITION WINDOW

The Device Definition screen is used to specify the device under test. This is also where activity condition checks are programmed for any desired pins.

```
F900DEMO.ZSQ          FLUKE 900 DEMO UUT BOARD          develop
┌──────────────── Device Definition Parameters ────────────────┐
│                                                               │
│                                                               │
│              IC Name 74244                                    │
│              IC Size 20                                       │
│              Vcc Pins 20                                      │
│              Gnd Pins 10                                      │
│    Reference Device Drive high                                │
│           Pin Activity no                                     │
│             Simulation ┌on┐ ┌──────────┐                      │
│    Reference Device Test on  │ on  off  │                     │
│              Check Sum    0  └──────────┘                     │
│             Clip Check on                                     │
│                                                               │
│                                                               │
│                                                               │
│                                                               │
├───────────────────────────────────────────────────────────── │
│  F1    F2    F3    F4    F5    F6    F7    F8    F9    F10     │
│ Help                    Revert                        Accept   │
└───────────────────────────────────────────────────────────────┘
```

Up/down arrows select the desired parameter and left/right arrows choose a value from a Menu Box. Press (Enter) to update the value. (F10) (Accept) confirms the entire window and (F5) reverts to the setting when the window was entered.

The user will normally select a device number and all further parameters in this window are filled in from the library (eg.

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Vcc pins, IC size...). A device not in the library may be specified by choosing the size of the IC followed by its Vcc and GND pins. This will clear the IC name field.

Other parameters that may be set are:

Reference Device Drive -
High for TTL, Low for weak devices.

Pin Activity -
[Enter] alters the condition tests on the DUT and EXT.

Simulation -
N/I means Simulation Option hardware is not installed in tester. N/A means simulation library is not resident in the tester cartridge or system RAM. Off means that a reference device must be in the socket.

RD Test -
The automatic test of the Reference Device before DUT comparison test may be set to ON or OFF. Out of circuit device testing using RD Test can only be done from the tester keyboard in nonremote operation.

Check Sum -
The numerical value to be entered must first be obtained from the tester key board in nonremote operation.

Clip Check -
Off disables the check for clip orientation.

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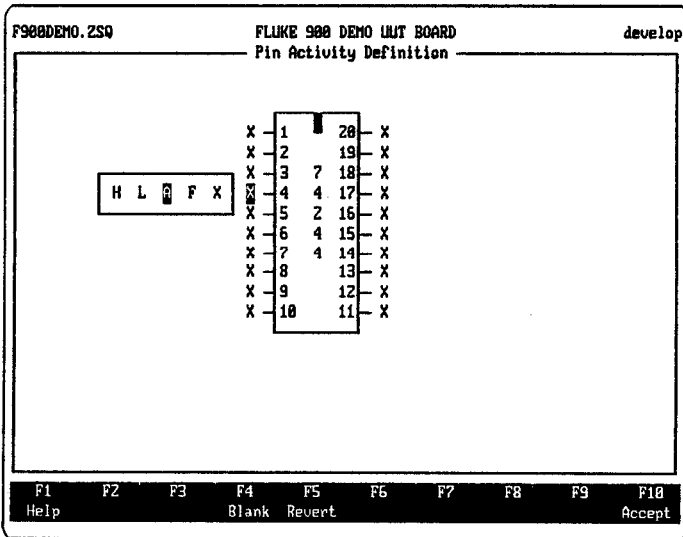Operator Manual References
RD Drive: 3-27
Activity: 3-17
Simulation: 3-2   RD Test: 3-28
Check Sum: 3-29   Clip Check: 3-32

3.6.4.1 ACTIVITY WINDOW

Condition checks may be performed on specified pins by choosing "alter" in the activity field of the Definition window.

```
F900DEMO.ZSO          FLUKE 900 DEMO UUT BOARD              develop
                      ─ Pin Activity Definition ─

                              X ─┤1    ▮  20├─ X
                              X ─┤2       19├─ X
                              X ─┤3    7  18├─ X
                              X ─┤4    4  17├─ X
              ┌─────────────┐ ▓ ─┤     .        
              │ H  L  ▓  F  X│ X ─┤5    2  16├─ X
              └─────────────┘ X ─┤6    4  15├─ X
                              X ─┤7    4  14├─ X
                              X ─┤8       13├─ X
                              X ─┤9       12├─ X
                              X ─┤10      11├─ X


   F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
  Help                   Blank  Revert                                  Accept
```

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Pin Activity check can be set on any pins as follows:

H - high during the entire test time
L - low during the entire test time
A - at least 1 transition during the test time
F - frequency measurement within a tolerance
X - don't care

Up/down arrows move the Choices Menu Box from pin to pin. Ctrl right/left arrow moves it to the other side of IC. Right/left arrows highlight a choice and (Enter) confirms it.

When F is chosen, a Dialog Box appears for entering the values. Enter the value, M, K or H for units and a tolerance value before pressing (F10) to accept them. (F10) (Accept) confirms the entire Pin Activity window. (F5) reverts to the setting when the window was entered and (F4) clears all settings.

Operator Manual References
Condition Activity: 2-28, 3-17

3.6.5 INITIALIZATION WINDOW

The parameters in this window ensure that RD and DUT are in the same state before comparison testing.

```
┌─────────────────────────────────────────────────────────────┐
│ F900DEMO.ZSQ          FLUKE 900 DEMO UUT BOARD       develop  │
│                   ─ Initialization Parameters ─              │
│ ┌───────────────────────────────────────────────────────┐   │
│ │                        Word1 Word2       Word1 Word2   │   │
│ │                                                        │   │
│ │ Synchronization off ┌ on off ┐  X   X ─1  █ 20─ X   X │   │
│ │       Trigger off    └─────────┘ X   X ─2    19─ X   X │   │
│ │    Reset Offset   0ms            X   X ─3  7 18─ X   X │   │
│ │      Ram Shadow N/A              X   X ─4  4 17─ X   X │   │
│ │                                  X   X ─5  2 16─ X   X │   │
│ │                                  X   X ─6  4 15─ X   X │   │
│ │                                  X   X ─7  4 14─ X   X │   │
│ │                                  X   X ─8    13─ X   X │   │
│ │                                  X   X ─9    12─ X   X │   │
│ │                                  X   X ─10   11─ X   X │   │
│ │                                        E1 X  E2 X     │   │
│ │ RESET PULSE                                            │   │
│ │           start of test                                │   │
│ │              ┆                                          │   │
│ │  ─┐       ┌──────────────>time                         │   │
│ │   └───────┘                                            │   │
│ └───────────────────────────────────────────────────────┘   │
│ ┌────┬────┬────┬────┬────┬────┬────┬────┬────┬────┐          │
│ │ F1 │ F2 │ F3 │ F4 │ F5 │ F6 │ F7 │ F8 │ F9 │F10 │          │
│ │Help│    │    │    │  Revert   │    │    │    │Accept│        │
│ └────┴────┴────┴────┴────┴────┴────┴────┴────┴────┘          │
└─────────────────────────────────────────────────────────────┘
```

Synchronization -
If "on" is selected, a Sync Time value must be entered in milliseconds (3000 ms is typical). This is how long the tester will try to initialize a synchronous RD and DUT before returning a FAIL or Unable-to-Synchronize test result.

Trigger -
Choose "alter" to define two events (W1, W2) on the device pins and EXT which cause the start of comparison.

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```
┌──────────────────────────────────────────────────────────────────────┐
│ F900DEMO.ZSQ          FLUKE 900 DEMO UUT BOARD              develop     │
│ ┌───────────────── Initialization Parameters ─────────────────┐        │
│ │                                                              │        │
│ │                      Word1 Word2          Word1 Word2         │        │
│ │  Synchronization off      X   X ─┐1   ■  20├─ X    X          │        │
│ │        Trigger off        X   X ─┤2      19├─ X    X          │        │
│ │     Reset Offset    0ms   X   X ─┤3   ?  18├─ X    X          │        │
│ │     Ram Shadow N/A        X   X ─┤4   4  17├─ X    X          │        │
│ │                           X   X ─┤5   2  16├─ X    X          │        │
│ │                           X   X ─┤6   4  15├─ X    X          │        │
│ │                           0   X ─┤7   4  14├─ X    X          │        │
│ │                    ┌──────┐  0   X ─┤8      13├─ X    X       │        │
│ │                    │ 1  0 X│  0   X ─┤9      12├─ X    X       │        │
│ │                    └──────┘  X   X ─┤10     11├─ X    X       │        │
│ │                                          E1 X  E2 X          │        │
│ │  RESET PULSE                                                 │        │
│ │        start of test                                        │        │
│ │             ┌─────┐                                         │        │
│ │             │     │      ──────>time                        │        │
│ │  ───────────┘     └──────────────                           │        │
│ └──────────────────────────────────────────────────────────────┘      │
│ ┌────────────────────────────────────────────────────────────────┐    │
│ │  F1    F2    F3    F4    F5    F6    F7    F8    F9    F10        │    │
│ │  Help            Blank Revert                        Accept      │    │
│ └────────────────────────────────────────────────────────────────┘    │
└──────────────────────────────────────────────────────────────────────┘
```

Up/down arrows move a Choices Menu Box through consecutive pins and words. Ctrl left/right arrows move the Menu Box sideways between words and pins. E1 and E2 mean words 1 and 2 of the EXT lead. Left/right arrows move the choice cursor from X (don't care) to 1 or 0 and (Enter) confirms each pin change.

(F4) sets the entire Trigger definition to "don't care", (F5) reverts to the setting present when you first entered the initialization window. (F10) (Accept) must be pressed to confirm any new Trigger setting.

When testing with a Trigger setting, the occurence of the Trigger words starts the actual testing and produces a Pass or Fail test result. If, however, the Trigger words do not occur, the tester remains waiting for Trigger with the activity LEDs showing the DUT states. The user may press ⌈Esc⌉ , which returns the result: "Test Aborted". Alternatively, pressing the TEST key on the tester will terminate the test cycle and return the result: "Trigger did not occur".

Reset Offset -

A negative value (eg.-100 ms) shifts the comparison Test Time into the Reset pulse duration. This is used for testing devices in the UUT reset circuit. A positive value (eg.100 ms) delays comparison testing until some time after the trailing edge of the Reset pulse. This can be used to wait for a device to be initialized by the UUT before testing.

RAM Shadow -

"on" and "off" enable and disable the use of this feature which ignores comparison testing of RAM locations that have not been first written. N/I means the Simulation Option hardware is not installed. N/A means the Shadow Pattern for the selected RAM device is not available and must first be downloaded to the tester as a library file.

Operator Manual References
Sync Time: 3-23, 7-4
Trigger: 3-24
Reset Offset: 3-19
RAM Shadow: 2-30

3.6.6 PERFORMANCE ENVELOPE

Performance Envelope parameters affect the comparison testing of RD and DUT.

```
F900DEMO.ZSQ           FLUKE 900 DEMO UUT BOARD              develop
┌──────────── Performance Envelope Parameters ─────────────┐
│                                                            │
│                          Gate.I/C          I/C Gate        │
│                                                            │
│          FaultMask ▮40▮ns      X  C ─┤1    ▮  20├─ C  X    │
│          Threshold 1800mV      X  C ─┤2       19├─ C  X    │
│ Test Time (CONT or ####) 3000ms X C ─┤3   7  18├─ C  X    │
│          Pins Ignored  0       X  C ─┤4   4  17├─ C  X    │
│                                X  C ─┤5   2  16├─ C  X    │
│              Gate off          X  C ─┤6   4  15├─ C  X    │
│              Delay 0.000ns     X  C ─┤7   4  14├─ C  X    │
│              Duration CONT     X  C ─┤8      13├─ C  X    │
│              Polarity T        X  C ─┤9      12├─ C  X    │
│                                X  C ─┤10     11├─ C  X    │
│ Gating                        └──────────┘                │
│ Cond'n  = gate not defined                    E  X        │
│                                                            │
│                                                            │
│ Compare                                                    │
│ When HI  = always high                                     │
│                                                            │
├────────────────────────────────────────────────────────┤
│  F1     F2     F3     F4     F5     F6    F7    F8    F9   F10 │
│ Help   Clear              Revert                        Accept │
└────────────────────────────────────────────────────────┘
```

Up/down arrows move between parameters. Value changes must be confirmed by pressing (Enter). (F2) clears out a numeric field, (F5) reverts the Performance Envelope setting to what it was when the window was entered. (F10) confirms any changes made to the entire screen. The parameters are:

Fault Mask -

The tolerance of comparison (1 to 9999 ms in 1 ms steps).

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Threshold -
The DUT transition level between logic 0 and 1 set on the Interface Buffer. Values are 0 to 5000 in 100 mvolt steps.

Test Time -
The duration of comparison. Values range from 1 to 9999 milliseconds in ms steps. The letter C specifies continuous test.

Pins Ignored -
This is used to disable or re-enable comparison on selected pins. Choose alter to change the setting. Move the Nenu Box to the desired pin(s) with up/down arrows. Ctrl left/right arrows move the box to the opposite side of the IC. Left/right arrows highlight I(ignore) or C(compare) and (Enter) confirms the choice.

(F4) changes all pins to compare, (F5) reverts to the setting when the window was first entered and (F10) (Accept) confirms the setting for the entire IC. If a setting was changed and Esc is pressed, you are asked to confirm the update.

Gate -
Choose "alter" to define a time segment of comparison within Test Time.

Operator Manual References
Fault Mask: 1-6, 2-5, 2-22
Threshold: 3-17
Test Time: 3-6
Ignoring pins: 3-18
Gate: 2-24,3-25

3.6.6.1 GATE

Gate defines a time of comparison within Test Time based on the state of the pins and the EXT lead along with its parameters Delay, Duration and Polarity (if the tester has the Simulation Option installed).

```
F900DEMO.ZSO              FLUKE 900 DEMO UUT BOARD           develop
                     — Performance Envelope Parameters —

                              Gate I/C          I/C Gate

           FaultMask  40ns       X  C —1    ▮  20— C  X
           Threshold 1800mV      X  C —2       19— C  X
Test Time (CONT or ####) 3000ms  X  C —3   7 18— C  0    1   0 X
      Pins Ignored  0            X  C —4   4 17— C  X
                                 X  C —5   2 16— C  X
              Gate off           X  C —6   4  15— C  X
             Delay 0.000ns       X  C —7   4  14— C  X
           Duration  CONT        X  C —8      13— C  X
           Polarity  T           X  C —9      12— C  X
                                 X  C —10     11— C  X
Gating                                                E X
Cond'n  _|‾‾‾‾‾‾‾‾‾‾‾‾|_

Compare
When HI _|‾‾‾‾‾‾‾‾‾‾‾‾|_

  F1    F2    F3    F4    F5    F6    F7    F8    F9    F10
 Help              Blank Revert                        Accept
```

RUN MENU

Enter a value for Delay and Duration or press ⌐Enter¬ a few times to make a Choices Menu Box appear beside the IC pins. Up/down and Ctrl left/right arrows position the Menu Box at each pin. Left/right arrows select logic 0, 1 or don't care for each pin. Press ⌐Enter¬ to confirm changes in each setting. Ctrl left/right arrows also move the highlight box to the Delay, Duration and Polarity fields when the Menu Box is on an adjacent pin.

Testers which have the Simulation Option hardware installed permit values to be set for Delay, Duration and Polarity. After the gate condition occurs, comparison is delayed for a time, then enabled for a duration. Polarity may be set (T)True or (I)Inverted to define a condition of comparison or a condition of ignoring.

Values and units of the two settings can span the following ranges:

40 ns	10 us
80 ns	20 us
120 ns	30 us
.	.
600 ns	150 us

⌐F4¬ changes the Gate setting to "don't care", ⌐F5¬ reverts to the setting when the window was first entered and ⌐F10¬ confirms the entire Gate setting.

Operator Manual References
Gate: 2-24,2-27,3-25

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3.6.7 STIMULUS WINDOW

The options that may be selected using the cursor are:

User Generated -
The tester reset lead is always tristated and has no effect on the UUT. This is for test setups where the UUT cannot be rest or looping diagnostics are being used.

Tester Generated Reset -
This will pulse the tester's Reset lead before comparison testing. Use arrows to move the Choices Menu Box, highlight a choice and confirm with (Enter).

Polarity -
For a negative pulse, the lead is driven high for 10 ms, low for the pulse duration and back high for 10 ms. The reverse occurs for a positive pulse.

Reset Vcc -
Internal drive will sink/source 50 mA at 0.8/4.2 V. External drive will operate from a voltage supplied on the VCC patch lead up to 15 V.

Duration -
The width of the pulse, 10 to 32760 ms in 1 ms steps.

Operator Manual References
Reset Pulse: 3-19

3.6.8 MESSAGE WINDOW

An operator prompt may be added that is 4 lines of 37 characters. The message will wrap to the next line when entered but may split words in the middle. Press (F10) (Accept) to confirm the entry.

3.6.9 SEQUENCE FLOW WINDOW

The Sequence Flow window is a programming window used to define the order and structure of testing.

```
F900DEMO.ZSQ              FLUKE 900 DEMO UUT BOARD              develop
 Cut        Copy        Paste       Rename      NewGroup       Header
                        —— Sequence Flow ——
<begin MAIN >
U37_PASS            FLUKE 900          74244
U37_FAIL            FLUKE 900          74244
U2_PASS             FLUKE 900          8288
U2_FREQFAIL         FLUKE 900          8288
FREQUENCY           FLUKE 900          Measure clock speed
FU3                 FLUKE 900          PAL22V10
RAM                 <group>
U62_PASS            FLUKE 900          8259
U62_FAILSYNC        FLUKE 900          8259
U43_EXTGATE         FLUKE 900          74244
U43_DELAYGATE       FLUKE 900          74244
U90                 FLUKE 900          41256
<end group>




   F1     F2     F3     F4     F5     F6     F7     F8     F9     F10
  Help  UpLevel DnLevel Prev   Find  NewTest Comment              Accept
```

A list may be created down the left side of the screen showing individual tests in the order they are to be executed. A highlight pointer indicates the current one with test parameters loaded in the TEST Screen. Each line shows the test instrument (F900) and space for a programmer's comment.

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Terminology used:

Location -
device topological position (U#), also known as an individual test.
Group -
a series of locations given a group name, also known as a level in the program structure.

Each location is uniquely defined by its name. If there are multiple U2 locations listed in the Sequence, for example, they all will have the same set of parameters and a change to one will change the others. If you want to duplicate a location and make a parameter change to the duplicate without affecting the original, do the following:

> Make the original location (eg. U2) the current one using the pointer bar in the Sequence Flow window.
> Go into the full Seq Flow window using ⑤ and add a new location with a unique name (eg. U2A). It will have the original's parameters.
> Return to the Test screen and make any desired parameter modifications.

Eighteen location and group names may appear on a single screen and the arrow keys scroll the list to accomodate Sequences of any length. The Sequence structure permits a grouping of locations by function to assist in fault isolation. The board can be divided into groups and subgroups by function, each of which can have its own

location list. Note that the list of locations that appears in the Sequence Flow Window of the Test Screen is a single "run list" of all locations.

As an example, the following is a typical structured Sequence and run list:

Main		Run List
Sequence		U1
U1		U4
<RESET>	RESET	U5
.	. Group	U7
.	U4	U37
.	U5	U38
.	U7	U39
.		U80
<BUS>---	BUS	U81
U57	Group	U57
U58	U37	U58
U59	U38	U59
	U39	
	<DMA>-- DMA Group	
	U80	
	U81	

To change the currently selected location in the TEST screen, move the Highlight Bar in the Seq Flow Window with the up/down arrows to the desired location and press ⌐F10⌐ (Accept).

The function keys within the Seq Flow Window are:

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RUN MENU

F2/F3 (Up/Down Level) -
The main Sequence may have groups which are accessed by highlighting a group name and pressing F3 (Down Level). F2 (Up Level) returns back. The structure will allow levels within levels.

F4 (Previous) -
This is used to select a location that was previously tested. A Dialog Box appears with an ordered list of locations that have been selected previously in the TEST screen. You may move the cursor to a desired location and press (Enter). The TEST screen will then appear to retest this location.

F5 (Find) -
This is used to position the highlight pointer on a specified location. Enter the location into the Dialog Box. If it exists, The Highlight Bar moves and you are asked to Accept, Cancel (restore the pointer to its previous location), or choose the Next occurence of the specified location. The main Sequence and all groups are searched in consecutive order.

F6 (New Test) -
This is used to add a new location below the Highlight Bar. Press F6 and enter the location name into the Dialog Box.

F7 (Comment) -
This key is used to enter a programmer's comment beside the location with the Highlight Bar. A location comment appears beside the highlighted location. A Sequence comment is inserted below the highlighted location.

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3.6.9.1 SEQUENCE EDITING

The top line menu has a number of editing functions that may be executed by moving the Top Menu Cursor with arrows and pressing (Enter).

Cut -
Move menu cursor to Cut, press (Enter), then move the Highlight Bar to mark text for removal and press (Enter) again. The cut locations now fill the Paste Buffer.

Copy -
Move Menu Cursor to Copy, press (Enter), then mark text with highlight. Press (Enter) to put a copy in the Pasting Buffer.

Paste -
Position the highlight pointer to the location immediately before the desired copy pasting location. Move menu cursor to Paste and press (Enter).

Rename -
A pulldown menu appears for you to select location or group name. Press (Enter). Now enter the old and new names in the Dialog Box that appears. The old name will be changed wherever it appears in the Sequence.

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New Group -
Position Highlight Bar to the location immediately before the desired group location. Move Top Menu Bar to NewGroup, press (Enter) and type a name into the Dialog Box.

Header -
The Header menu options are used to document a Sequence and to change from "development mode" to "run only mode" and back.

3.6.9.2 SEQUENCE DOCUMENTATION

The Header option pulls down the menu shown below.

```
F900DEMO.ZSQ         FLUKE 900 DEMO UUT BOARD              develop
┌──────┬──────┬────────┬────────┬────────────┬──────────┐
│ Cut     Copy       Paste       Rename      NewGroup    │Header│
├──────────────────── Sequence Flow ─────────────────────┤
│ <begin MAIN >                              ┌──────────┐ │
│ U37_PASS         FLUKE 900       74244     │Title     │ │
│ U37_FAIL         FLUKE 900       74244     │Description│ │
│ U2_PASS          FLUKE 900       8288      │Author    │ │
│ U2_FREQFAIL      FLUKE 900       8288      │Start Message│
│ FREQUENCY        FLUKE 900       Measure clock speed │Mode│
│ FU3              FLUKE 900       PAL22V10  │Version   │ │
│ RAM              <group>                   └──────────┘ │
│ U62_PASS         FLUKE 900       8259                   │
│ U62_FAILSYNC     FLUKE 900       8259                   │
│ U43_EXTGATE      FLUKE 900       74244                  │
│ U43_DELAYGATE    FLUKE 900       74244                  │
│ U90              FLUKE 900       41256                  │
│ <end group>                                            │
│                                                        │
├────┬────┬────┬────┬────┬────┬────┬────┬────┬───────────┤
│ F1    F2    F3    F4    F5    F6    F7    F8    F9    F10│
│ Help  UpLevel DnLevel Prev  Find  NewTest Comment    Accept│
└────────────────────────────────────────────────────────┘
```

Version -

A Dialog Box appears with an edit field showing the Sequence version and the date and time it was saved. The version is in the form: X.YYY. The user typically enters a number for X and YYY is automatically incremented each time the Sequence is saved.