Agilent E5100A/B Network Analyzer

HP Instrument BASIC Users Handbook Supplement

SERIAL NUMBERS

This manual applies directly to instruments with serial number prefix JP1KC, JP2KC, JP3KC, JP4KC, JP5KC, MY405. For additional important information about serial numbers, read "Serial Number" in Appendix A of this Manual.

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July 2001 ................................. Fourth Edition (part number: E5100-90025)
**Typeface Conventions**

**Bold**
Boldface type is used when a term is defined. For example: icons are symbols.

**Italics**
Italic type is used for emphasis and for titles of manuals and other publications.
Italic type is also used for keyboard entries when a name or a variable must be typed in place of the words in italics. For example: copy filename means to type the word copy, to type a space, and then to type the name of a file such as file1.

**Computer**
Computer font is used for on-screen prompts and messages.

**HARDKEYS**
Labeled keys on the instrument front panel are enclosed in [].

**SOFTKEYS**
Softkeys located to the right of the CRT are enclosed in ___.

**Safety Symbols**
General definitions of safety symbols used on equipment or in manuals.

**Warning**
Warning denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.

**Caution**
Caution sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result damage to or destruction of part or all of the product.

**Note**
Note denotes important information. It calls attention to a procedure, practice, condition or the like, which is essential to highlight.
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Introduction

This supplement provides a brief description of HP Instrument BASIC and an introduction to its use.

Brief Description of HP Instrument BASIC

HP Instrument BASIC is a complete system controller residing inside your analyzer. It communicates with your analyzer via GPIB commands through the “internal” interface. It can also communicate with other instruments, computers, and peripherals over the GPIB interface on the rear panel.

![Diagram of HP Instrument BASIC System]

Figure 1-1. HP Instrument BASIC System

The HP Instrument BASIC’s programming interface includes an editor and a set of programming utilities. The utilities allow you to perform disk I/O, renumber, secure, or delete all or part of your program.

The HP Instrument BASIC command set is similar to the command set of HP 9000 Series 200/300 BASIC. Therefore, HP Instrument BASIC programs can be run on any HP BASIC workstation with few if any changes. Porting information can be found in the HP Instrument BASIC Programming Techniques of the HP Instrument BASIC Users Handbook.
Using This Manual

This supplement is not intended to teach you the HP Instrument BASIC programming language nor to learn how to operate the E5100A/B. You should become familiar with the operation of the analyzer and the BASIC programming language before attempting to control the analyzer using HP Instrument BASIC. If you are not familiar with HP Instrument BASIC, see chapters 1 and 2 and appendix B before trying to use it.

The organization of this supplement is described below:

■ Chapter 1. Introduction
   This chapter provides a brief description of HP Instrument BASIC and how to use this manual.

■ Chapter 2. Quick Start
   This chapter provides information on how to edit, run, save, and load the program on HP Instrument BASIC. This chapter is useful if you are new user of HP Instrument BASIC.

■ Chapter 3. Analyzer Specific HP Instrument BASIC Features
   This chapter summarizes the unique features specified for the analyzer.

■ Chapter 4. Analyzer Specific HP Instrument BASIC Commands
   This chapter provides definitions for BASIC commands specific to the analyzer’s HP Instrument BASIC.

■ Appendix A. Manual Changes
   This appendix contains the information required to adapt this manual to earlier versions or configurations of the analyzer than the current printing date of this manual.

■ Appendix B. External Keyboard
   This appendix provides a reference guide to the analyzer’s HP Instrument BASIC's key definitions for the keyboard.
Quick Start

This chapter provides a quick start guide for using HP Instrument BASIC. A new user can become familiar with HP Instrument BASIC by performing these procedures.

Using HP Instrument BASIC

The following pages show how to use HP Instrument BASIC by writing, executing, listing, saving, and getting programs.

Connecting the Keyboard

Connect the furnished keyboard to the keyboard connector on the rear panel as shown in Figure 2-1.

![Figure 2-1. Connecting a Keyboard](image)

Allocating Screen Area for HP Instrument BASIC

Because all of the analyzer’s screen is allocated for analyzer operation after power ON, you must allocate screen area for HP Instrument BASIC when you want to use it.

1. Press [Display] DISPLAY ALLOCATION.

2. Verify the ALL INSTRUMENT is underlined.

3. Select your required softkey in the following keys.

   **HALF INSTR HALF BASIC**  Two half-screens with one graticule display above the HP Instrument BASIC display.
The full screen is allocated for the HP Instrument BASIC Display.

A full screen graticule with three status lines for HP Instrument BASIC under the graticule.

**Editing a Program**
When you edit a program, you must be in the EDIT mode.

1. Enter the EDIT mode.
   - From keyboard
     Type EDIT **(Enter)**
   - From front panel
     Press **System IBASIC Edit**

2. Verify that the cursor appears at line number 10.
3. Type the program. For example:

   ```plaintext
   10 ASSIGN @Hpe5100 TO 800
   20 CLEAR @Hpe5100
   30 OUTPUT @Hpe5100;"INST CH2"
   40 OUTPUT@Hpe5100;"INST:STAT ON"
   50 END
   ```

   This program makes the channel 2 activate.

4. Exit the EDIT mode.
   - From keyboard
     Press **Esc** or **Pause**
   - From front panel
     Press **System IBASIC END EDIT**

**Running the Program**
After writing the program, run the program as follows:

- From keyboard
  Type RUN **(Enter)** or **(F10)**
- From front panel
  Press **System IBASIC Run**

---

2.2 Quick Start
Listing the Program

You can list the program on the screen or to a printer.

- Listing on the screen
  1. Change the display allocation to either HALF INSTR, HALF BASIC, or ALL BASIC.
  2. Type LIST (Enter).
  3. The program is listed on the screen.

- Listing to the printer
  1. Type PRINTER IS 12 (Enter) to set the output device to be a printer.
  2. Type LIST (Enter).
  3. The program is listed to the printer.
  4. Type PRINTER IS screen (Enter) to get the output device back to screen.

Saving Programs

You can save the program to the storage device.

- Save to the Built-in flexible disk drive
  1. Insert an initialized 2DD or 2HD micro flexible disk into the disk drive.
  2. Type MSI ":INTERNAL,4" (Enter).
  3. Type SAVE "filename " (Enter).

- Save to RAM disk memory
  1. Type MSI ":MEMORY,0" (Enter).
  2. Type SAVE "filename " (Enter).

Refer to "Initialize" in Chapter 3 for initializing the RAM disk memory or the disk.

Listing File Names

You can list the file names that are stored on the storage device.

- Listing on the screen
  1. Change the display allocation to either HALF INSTR, HALF BASIC, or ALL BASIC.
  2. Type CAT (Enter).
  3. The file names stored on the storage device are listed on the screen.

- Listing to the printer
  1. Type PRINTER IS 12 (Enter) to set the output device to be a printer.
  2. Type CAT (Enter)
  3. The file names stored on the storage device are listed on the printer.
  4. Type PRINTER IS screen (Enter) to get the output device back to screen.
Getting Programs
You can load a program from the storage device.

- Load from the Built-in disk drive
  1. Insert an initialized 2DD or 2HD micro flexible disks into the disk drive.
  2. Type MSI ":INTERNAL,4" (Enter).
  3. Type GET "filename" (Enter).

- Load from RAM disk memory
  1. Type MSI ":MEMORY,0" (Enter).
  2. Type GET "filename" (Enter).

For More Information
This chapter provided an introduction to using HP Instrument BASIC. For more information, see the following chapters and documents:

<table>
<thead>
<tr>
<th>For more information on</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keyboard and softkeys</td>
<td>Appendix B</td>
</tr>
<tr>
<td>HP Instrument BASIC commands</td>
<td><em>HP Instrument BASIC Language Reference</em> of the <em>HP Instrument BASIC Users Handbook</em></td>
</tr>
<tr>
<td>GPIB commands</td>
<td><em>GPIB Command Reference</em></td>
</tr>
</tbody>
</table>
Analyzer Specific HP Instrument BASIC Features

This chapter summarizes the following HP Instrument BASIC features that are specific to the analyzer:

- Power On Auto-start Program
- Display Allocation
- Mass Storage
- Graphics
- External RUN/CONT Connector
- I/O Interface and Select Codes

Power On Auto-start Program

HP Instrument BASIC allows you to automatically load and execute a program file named AUTOST during power-up.

The disk on which you stored AUTOST must be inserted in the disk drive before the analyzer is turned ON.

Display Allocation

Display allocation softkeys allocate the screen area for HP Instrument BASIC (see Figure 3-1).

<table>
<thead>
<tr>
<th>Softkey</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL_INSTR</td>
<td>Selects a full screen single screen or two half-screen graticules.</td>
</tr>
<tr>
<td>HALF_INTR HALF_BASIC</td>
<td>Selects two half-screens, one graticule display above the HP Instrument BASIC display.</td>
</tr>
<tr>
<td>ALL_BASIC</td>
<td>Selects a full screen single HP Instrument BASIC display.</td>
</tr>
<tr>
<td>BASIC_STATUS</td>
<td>Selects a full screen graticule and three status lines for HP Instrument BASIC under the graticule.</td>
</tr>
</tbody>
</table>
The following table lists the number of lines and columns in the BASIC print area for each display allocation. It also shows the keyboard input line status for each allocation. When the keyboard input line is available, you can execute BASIC commands from the keyboard.

<table>
<thead>
<tr>
<th>Display Allocation</th>
<th>BASIC Print Area</th>
<th>Keyboard Input Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Instrument</td>
<td>0 columns 0 lines</td>
<td>not available</td>
</tr>
<tr>
<td>Half Instrument Half BASIC</td>
<td>68 columns 10 lines</td>
<td>available</td>
</tr>
<tr>
<td>ALL BASIC</td>
<td>68 columns 25 lines</td>
<td>available</td>
</tr>
<tr>
<td>BASIC Status</td>
<td>0 columns 0 lines</td>
<td>available</td>
</tr>
</tbody>
</table>

**Run Light Indications**

- (blank) Program stopped; can execute commands; CONTINUE not allowed.
- Program paused; can execute commands; CONTINUE is allowed.
- ? BASIC program waiting for input from keyboard; cannot execute commands.
- * This indication has two possible meanings:
  - Program running; CANNOT execute commands. CONTINUE not allowed.
  - System executing a command entered from the keyboard; cannot enter commands.
Mass Storage

Storage Unit

The analyzer has two types of storage units: the built-in flexible disk drive and the RAM disk memory. The RAM disk memory uses a part of the RAM in the analyzer as a virtual disk drive. The RAM disk memory can be operated in the same way as the built-in flexible disk drive.

- **Built-in flexible disk drive**
  - The 720 Kbyte (2DD) and 1.44 Mbyte (2HD) 3.5 inch micro-flexible disk are supported.
- **RAM disk memory**
  - The RAM disk memory capacity is a maximum of 512 Kbytes.

To switch the Instrument BASIC’s storage devices, type the following statement on the keyboard input line (Not in EDIT mode):

```
MSI " : :INTERNAL", " : :INTERNAL,4", or " : :4" the built-in flexible disk drive
MSI " : :MEMORY", " : :MEMORY,0", or " : :0" the RAM disk memory
```

Storage Format

Both the built-in flexible disk drive and the RAM disk memory support the LIF and DOS formats. The instrument automatically detects the disk format.

DOS formats supported are:

- 720 Kbyte, 80 tracks, double-sided, 9 sectors/track, 512 kbyte/sector
- 1.44 Mbyte, 80 tracks, double-sided, 18 sectors/track, 512 kbyte/sector

Initialize

You can initialize the mass storage as described below:

- **Built-in flexible disk drive**
  1. Insert your micro-flexible disk into the built-in flexible disk drive slot.
  2. Press [Save/Recall] FILE UTILITIES.
  3. Toggle the STORE DEV [ ] to STORE DEV [A:DISK].
  4. Press INITIALIZE.
  5. Press INITIALIZE A:DISK :YES.
- **RAM disk memory**
Graphics

HP Instrument BASIC adds graphics capability to the analyzer. You can draw pictures on the CRT display independent of the grids and traces.

The analyzer has two screens, the instrument screen and the graphics screen. These two screens are always displayed together on the CRT and are not separately selectable. The instrument screen consists of a trace display area and a softkey label area. The HP Instrument BASIC editor is also displayed on the trace display area. The graphics screen covers the trace display area as shown in Figure 3-2. The graphics screen is like an independent transparent overlay in front of the instrument screen. You cannot draw figures in the softkey label area.

![Figure 3-2. Screen Structure](image)

Each point on the graphics screen is addressable using a coordinate address as shown in Figure 3-2. The bottom left corner is the origin (0,0) and the top right corner is the maximum horizontal and vertical end points (547,479). The MOVE and DRAW statement parameters are specified using these coordinate values. Because the aspect ratio of a graphics screen is 1, you need not adjust the aspect ratio when drawing figures.

HP Instrument BASIC Graphics Commands

The analyzer’s HP Instrument BASIC has four graphics commands; MOVE, DRAW, PEN, and GCLEAR.

- **MOVE**
  Moves the pen from its current position to the specified coordinates.

- **DRAW**
  Draws a line from the current pen position to the specified coordinates.

- **PEN**
  Selects the pen used for plotting

- **GCLEAR**
  Clears the graphics screen, moves the pen from its current position to the origin (0,0), and selects pen 1.

**Note**

The total times of executing the **MOVE** and **DRAW** commands is up to 1933, even if the pen position is not changed.
**Initial settings**

When power is turned ON, the default settings are as follows:

- MOVE 0,0
- PEN 1

**External RUN/CONT Connector**

You can use the RUN or CONT commands in a program by inputting a TTL-compatible signal to the External RUN/CONT connector on the rear panel. The negative-going edge of a pulse more than 20 µs wide (\(T_p\)) in the LOW state will trigger RUN or CONT.

![RUN/CONT Trigger Signal](image)

**Figure 3-3. RUN/CONT Trigger Signal**

**I/O Interfaces and Select Codes**

Available interfaces and their select codes are listed in the following table:

<table>
<thead>
<tr>
<th>Select Codes</th>
<th>Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CRT</td>
</tr>
<tr>
<td>2</td>
<td>Keyboard</td>
</tr>
<tr>
<td>7</td>
<td>External GPIB interface</td>
</tr>
<tr>
<td>8</td>
<td>Internal GPIB interface</td>
</tr>
</tbody>
</table>
Analyzer Specific HP Instrument BASIC Commands

BASIC Commands Not Implemented

The following commands are listed in the *HP Instrument BASIC Language Reference* of the *HP Instrument Users Handbook*, but not implemented in the analyzer's HP Instrument BASIC.

- OFF CYCLE
- ON CYCLE

**Note**

GCLEAR and ON TIMEOUT commands are available, but the following supplementary items are added.

- GCLEAR
  
  Move the pen to (0,0) and select pen 1.

- OFF TIMEOUT and ON TIMEOUT
  
  The interface select code is 7 only.

BASIC Commands Specific to E5100A/B

The following commands are *not* listed in the *HP Instrument BASIC Language Reference* of the *HP Instrument BASIC Users Handbook*, but are available in the analyzer's HP Instrument BASIC.

- DATE
- DATE$
- READIO
- SET TIME
- SET TIMEDATE
- TIME
- TIME$
- WRITEIO
DATE

Keyboard Executable: Yes
Programmable: Yes
In an IF...THEN...: Yes

This command converts data formatted as (DD MMM YYY) into the numeric value used to set the clock.

```
DATE { formatted date }
```

literal form of formatted date

```
"day delimiter month delimiter year *
```

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>formatted date</td>
<td>string expression</td>
<td>(see drawing and text)</td>
</tr>
<tr>
<td>day</td>
<td>integer constant</td>
<td>1 to end-of-month</td>
</tr>
<tr>
<td>month</td>
<td>Literal (letter case ignored)</td>
<td>JAN, FEB, MAR, APR, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC</td>
</tr>
<tr>
<td>year</td>
<td>integer constant</td>
<td>1900 to 2079</td>
</tr>
</tbody>
</table>

Example Commands

```
DISP DATE("21 MAY 1991")

SET TIMEDATE DATE("1 JAN 1991")

DISP (DATE("1 JAN 1991") - DATE("11 NOV 1990")) DIV 86400
```

Display the Julian time for midnight on 21 MAY 1991.
Set the real time clock for midnight on 1 Jan 1991.
Display the number of days between 11 Nov 1990 and 1 JAN 1991.

Example:

```
DISP (DATE("1 JAN 1991") - DATE("11 NOV 1990")) DIV 86400
```

Semantics

The real time clock values represent Julian time, expressed in seconds. Julian time is seconds from midnight on 24 November, B.C. 4713.

Using a value from the DATE command as the argument for SET TIMEDATE will set the clock to midnight on the date specified. The results from the DATE and TIME commands must be combined to set the date and time of day.

4.2 Analyzer Specific HP Instrument BASIC Commands
If the DATE command is used as an argument for SET TIMEDATE to set the clock, the date must be in the range: 1 Mar 1900 to 4 Aug 2079.

Specifying invalid date, such as the thirty-first of February, will cause an error.

Leading blanks or non-numeric characters are ignored. ASCII spaces are recommended as delimiters between the day, month and year. However, any non-alphanumeric character, except the negative sign (−), may be used as the delimiter.
**DATES**

Keyboard Executable  Yes
Programmable        Yes
In an IF . . . THEN . . .  Yes

This command formats the number of seconds into a date (DD MMM YYY).

```
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>seconds</td>
<td>numeric expression</td>
<td>-4.623683256E+12 to 4.653426350399E+13</td>
</tr>
</tbody>
</table>
```

- **Example Commands**
  
  DISP DATE$(TIMEDATE)
  DISP DATE$(2.111510608E+11)

- **Display the date of the real time clock**
- **Display the date for 2.111510608E+11 seconds in Julian time.**

- **Semantics**

  The real time clock values represent Julian time, expressed in seconds. Julian time is seconds from midnight on 24 November, B.C. 4713.

  The date returned is in the form: DD MMM YYY, where DD is the day of the month, MMM is the month mnemonic, and YYY is the year.

  The day is blank filled to two character positions. Single ASCII spaces delimit the day, month, and year.

  The first letter of the month is capitalized and the rest are lowercase chacters.

  Years less than the year 0 are expressed as negative years.
READIO

Keyword Executable    Yes
Programmable          Yes
In an IF ... THEN ...  Yes

This command reads the contents of the register used for an I/O port.

```
READIO (Interface select code, register number)
```

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>select code</td>
<td>numeric expression</td>
<td>15</td>
</tr>
<tr>
<td>register number</td>
<td>numeric expression</td>
<td>0</td>
</tr>
</tbody>
</table>

- Example Commands

  `Ioprt=READIO(15,0)`
SET TIME

Keyboard Executable   Yes
Programmable         Yes
In an IF ... THEN ... Yes

This command sets the time of the real time clock.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>seconds</td>
<td>numeric expression, rounded to the nearest hundredth</td>
<td>0 to 86399.99</td>
</tr>
</tbody>
</table>

- Example Commands

  SET TIME ("22:00:30")  
  Set the real time clock to 22:00:30 in the same day.

  SET TIME Hours*3600+Minutes*60  
  Set the real time clock to Hours:Minutes hours.

- Semantics

  The real time clock values represent Julian time, expressed in seconds. Julian time is seconds from midnight on 24 November, B.C. 4713.

  This command changes only the time within the current day, not the date. The new clock setting is equivalent to (TIMEDATE DIV 86400)×86400 plus the specified setting.
SET TIMEDATE

Keyboard Executable   Yes
Programmable        Yes
In an IF ... THEN ... Yes

This command resets the absolute seconds (time and day) given by the real time clock.

---

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>seconds</td>
<td>numeric expression, rounded to the nearest</td>
<td>2.08662912E+12 to</td>
</tr>
<tr>
<td></td>
<td>hundredth</td>
<td>2.143252224E+11</td>
</tr>
</tbody>
</table>

- Example Commands

    SET TIMEDATE DATE("1 JAN 1993")+TIME("10:00:00")
    Set the real time clock for 10:00:00 on 1 Jan 1993.

    SET TIMEDATE TIMEDATE+86400
    Put the real time clock forward one day.

The real time clock values represent Julian time, expressed in seconds. Julian time is seconds from midnight on 24 November, B.C. 4713.
TIME

Keyboard Executable  Yes
Programmable      Yes
In an IF ... THEN ... Yes

This command converts data formatted as time of day (HH:MM:SS), into the number of seconds past midnight.

---

 literal form of time of day

---

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>time of day</td>
<td>string expression representing the time in 24</td>
<td>(set drawing)</td>
</tr>
<tr>
<td></td>
<td>hour format</td>
<td></td>
</tr>
<tr>
<td>hours</td>
<td>literal</td>
<td>0 to 23</td>
</tr>
<tr>
<td>minutes</td>
<td>literal</td>
<td>0 to 59</td>
</tr>
<tr>
<td>seconds</td>
<td>literal; default = 0</td>
<td>0 to 59.99</td>
</tr>
<tr>
<td>delimiter</td>
<td>literal; single character</td>
<td>(see text)</td>
</tr>
</tbody>
</table>

Example Commands

- DISP TIME(“8:40:00”)  Display the seconds from midnight to 8:40:00.
- SET TIME TIME(“8:40:00”)  Set the real time clock for 8:40:00.

Semantics

This command returns a positive integer, in the range 0 to 86399, equivalent to the number of seconds past midnight.

While any number of non-numeric characters may be used as a delimiter, a single colon is recommended. Leading blanks and non-numeric characters are ignored.
**TIMES**

Keyboard Executable  Yes
Programmable  Yes
In an IF ... THEN ...  Yes

This command converts the number of seconds past midnight into a string representing the
time of day (HH:MM:SS).

```
TIMES (seconds) ( )
```

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>seconds</td>
<td>numeric expression, truncated to the nearest second; seconds past midnight</td>
<td>0 to 86399</td>
</tr>
</tbody>
</table>

- **Example Commands**

  DISP "The time is: "; TIMES(TIMEDATE)  *Display the time of the real time clock.*
  DISP TIMES(45296)  *Display the time for 45296 seconds past midnight*

- **Semantics**

  TIMES takes the time in seconds and returns the time of day in the form HH:MM:SS, where
HH represents hours, MM represents minutes, and SS represents seconds. A module 86400 is
performed on the parameter before it is formatted as a time of day.
WRITEIO

Keyboard Executable  Yes
Programmable        Yes
In an IF... THEN... Yes

This command writes register data in decimal notation to a specified I/O port.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>select code</td>
<td>numeric expression</td>
<td>15</td>
</tr>
<tr>
<td>register number</td>
<td>numeric expression</td>
<td>0</td>
</tr>
<tr>
<td>register data</td>
<td>numeric expression</td>
<td>-2147483648 to +2147483647</td>
</tr>
</tbody>
</table>

Example Commands

WRITEIO 15,0;12
Manual Changes

Introduction
This appendix contains the information required to adapt this manual to earlier versions or configurations of the analyzer than the current printing date of this manual. The information in this manual applies directly to the E5100A/B Network Analyzer serial number prefix listed on the title page of this manual.

Manual Changes
To adapt this manual to your E5100A/B, see Table A-1 and Table A-2, and make all the manual changes listed opposite your instrument’s serial number and firmware version.

Instruments manufactured after the printing of this manual may be different from those documented in this manual. Later instrument versions will be documented in a manual changes supplement that will accompany the manual shipped with that instrument. If your instrument’s serial number is not listed on the title page of this manual or in Table A-1, it may be documented in a yellow MANUAL CHANGES supplement.

In additions to change information, the supplement may contain information for correcting errors (Errata) in the manual. To keep this manual as current and accurate as possible, Agilent Technologies recommends that you periodically request the latest MANUAL CHANGES supplement.

For information concerning serial number prefixes not listed on the title page or in the MANUAL CHANGES supplement, contact the nearest Agilent Technologies office.

Turn on the line switch or execute the *IDN? command by GPIB to confirm the firmware version. See the GPIB Command Reference manual for information on the *IDN? command.

Table A-1. Manual Changes by Serial Number

<table>
<thead>
<tr>
<th>Serial Prefix or Number</th>
<th>Make Manual Changes</th>
</tr>
</thead>
</table>

Table A-2. Manual Changes by Firmware Version

<table>
<thead>
<tr>
<th>Version</th>
<th>Make Manual Changes</th>
</tr>
</thead>
</table>
Instruments Covered by This Manual

Agilent Technologies uses a two-part, ten-character serial number that is stamped on the serial number plate (see Figure A-1) attached to the rear panel. The first five digits and the letter are the serial prefix and the last five digits are the suffix.

![Figure A-1. Serial Number Plate (Sample)]
Keyboard

The keyboard keys are arranged into the following functional groups:

Character Entry Keys

The character entry keys are arranged in the familiar QWERTY typewriter layout, but with additional features.

- **Caps Lock**
  Sets the unshifted keyboard to either upper-case (which is the default after power ON) or lower-case (normal typewriter operation).

- **Shift**
  You can enter standard upper-case and lower-case letters, using the Shift key to access the alternate case.

- **Enter**
  Has three functions:
  - When a running program prompts you for data, respond by typing in the requested data and then press Enter. This signals the program that you have provided the data and that it can resume execution.
  - When typing in program source code, the Enter key is used to store each line of program code.
  - After typing in a command, the Enter key causes the command to be executed.

- **Print Screen**
  performs no function.

- **Ctrl**
  In the EDIT mode, CTRL allows you to control the editor in the same as using the cursor-control, display-control, and editing keys.

- **Back space**
  Erases the character to the left of the cursor and moves the cursor to the erased character's position on the line.

- **Tab**
  Performs no function.
Cursor-Control and Display-Control Keys

- ** cursors**  Allow you to scroll lines up and down in the print display area. Shifted, these keys cause the display to scroll toward the top or bottom of the display.
- ** Page Up, Page Down**  Allow you to move horizontally along a line. Shifted, these keys allow you to “jump” to the left and right limits of the current line. Cause the display to scroll up or down in one-half page increments.

Numeric Keypad

The numerical keypad provides a convenient way to enter numbers and perform arithmetic operations. Just type in the arithmetic expression you want to evaluate, then press **Enter**. The result is displayed in the lower-left corner of the screen.

- **Enter**  Performs the same function as the **Enter** key. The numerical keypad serves the same function as the numerical keypad on the front panel of the analyzer.
- **Tab**  Performs no function.

Editing Keys

- **Insert**  Performs no function. The HP Instrument BASIC is always in the insert mode. The characters you type are always inserted to the left of the cursor.
- **Delete**  Deletes the character at the cursor’s position.
- **Shift** **Insert**  Inserts a new line above the cursor’s current position (edit mode only).
- **Shift** **Delete**  Deletes the line containing the cursor (edit mode only).

Softkeys

There are eight softkeys (labeled **1** through **8**). The softkey labels are indicated on the right of the analyzer’s screen.

- **F9** (Edit)  Enters into the EDIT mode.
- **F10** (Run)  Starts a program running from the beginning.
- **F11** (Continue)  Resumes program execution from the point where it paused.
- **F12**  changes Display Allocation.

Figure B-1 shows the softkey menus accessed from **System** key on the front panel. Pressing a softkey performs the command labeled or produces a sequence of characters on the keyboard input line (or on the “current line” in the EDIT mode).

Pressing the softkeys on the front panel of the analyzer performs the same functions as pressing the **1** through **8** function keys.
Figure B-1. Softkey Menus for HP Instrument BASIC

- **Step**
  Allows you to execute one program line at a time. This is particularly useful for debugging.

- **Continue**
  Resumes program execution from the point where it paused.

- **Run**
  Immediately executes a program.

- **Pause**
  Pauses program execution after the current program line is executed.

- **Stop**
  Stops program execution after the current line. To restart the program, press RUN.

- **Edit**
  Enters into the EDIT mode.

- **FILE UTILITY**
  Leads to the File Utility softkey menu to access the disk.

- **ON KEY LABEL**
  Leads to a softkey menu defined during program execution, if the softkey menu has been defined.

- **ASSIGN @E5100**
  Produces the command “ASSIGN @Hpe5100” at the cursor's current position.

- **OUTPUT @E5100**
  Produces the command “OUTPUT @Hpe5100” at the cursor's current position.

- **ENTER @E5100**
  Produces the command “ENTER @Hpe5100” at the cursor's current position.

- **EXECUTE**
  Produces the command “EXECUTE” at the cursor's current position.

- **END**
  Produces the command “END” at the cursor's current position.

- **GOTO LINE**
  Allows you to move the cursor to any line number or to a label. After pressing GOTO LINE, type a line number or a label and then press Enter. The cursor moves to the specified line or label. Move the program line specified.

- **RECALL LINE**
  Recalls the last deleted line.

- **END EDIT**
  Exit the EDIT mode.
CAT

Produces the command “CAT”. CAT lists the contents of a mass storage directory.

RE-SAVE

Produces the command “RE-SAVE"". RE-SAVE creates a specified ASCII file if it does not exist; otherwise, it rewrites a specified ASCII file by copying program lines as strings into that file.

GET

Produces the command “GET"". GET reads the specified ASCII file and attempts to store the strings into memory as program lines.

MSI []

Change the mass storage devise.
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