

# Measurement Automation with HP Instrument BASIC

## Product Note 3588A-1

### What is HP Instrument BASIC ?

Often, when you want to customize a measurement result or automate a measurement procedure, you write a program for a small computer that controls your test equipment. HP Instrument BASIC in the HP 3588A simplifies this task. It is a 100% syntax compatible version of HP BASIC that runs inside the instrument; it's like having a small HP BASIC controller inside your analyzer. With HP Instrument BASIC you can set up an instrument state, make a measurement, manipulate the data and present the results on the analyzer display. It even lets the analyzer act as a controller; you can control other instruments, like a switch or signal generator, over the HP-IB.

### Example programs for the HP 3588A

The following displays show the results of HP Instrument BASIC programs that run in the HP 3588A. These programs automate measurement tasks and present results in customized displays. They are easy to modify for other applications and are provided at no charge with the HP Instrument BASIC option.

#### Total Harmonic Distortion Calculation

This program automatically selects the highest peak on the display as the fundamental. By

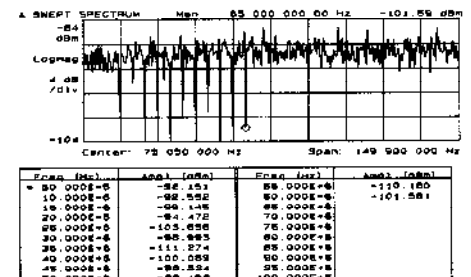
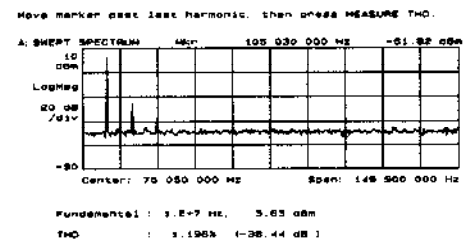
pressing the customized softkey labeled *measure THD*, the program moves the marker to the harmonics, measures the values and computes total harmonic distortion. This program illustrates how to read in a marker value, write results to the display and create a custom softkey on the analyzer.

#### Discrete Sweep

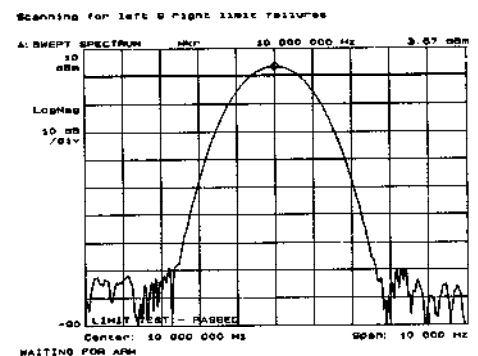
After making one swept measurement, the program switches the analyzer to manual tune mode and steps through each of the 20 frequencies in the table. The key feature in this program is the data table which is updated as each measurement is completed. Also, interactive softkeys allow you to increment the measurement frequency manually or automatically.

#### 3 dB Bandwidth

This program determines the 3 dB bandwidth of the response displayed on the analyzer. This is especially useful when the analyzer, with its tracking generator, is used to measure the frequency response of a filter. The program measures the bandwidth by moving the marker to the peak of the response and then to the -3 dB points on both sides of the peak. The result is then displayed, or a limit line is drawn 3 dB down from the peak. This program shows how to implement marker searches and generate limit lines automatically.



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## How HP Instrument BASIC works

### Keystroke Recording

This is the simplest form of programming. While the analyzer is in "record" mode, HP Instrument BASIC runs in the background and generates code as you press keys to make a measurement. This process is much simpler than writing a program on an external computer because you do not need to read a manual to find analyzer commands. The command strings are generated automatically as you press keys on the analyzer front panel. After the recording session, you can repeat the keystroke sequence by running the HP Instrument BASIC program.

**Table 1:**  
**Partial listing of**  
**the THD program**

```
10 ! HP Instrument BASIC example program
20 ! -----
30 ! Total Harmonic Distortion (THD) test
40 ! -----
50 !
60 COM /Dut/ @Hp3588a
70 DIM Prompt${60}
80 !
90 Fund_image: IMAGE "      Fundamental : ",K," Hz, ", 3D.2D, " dBm"
100 Thd_image:IMAGE "      THD          : ", 2D.3D,"% (", 3D.2D, " dB )"
110 !
120 ASSIGN @Hp3588a TO 800
130 !
140 Prompt$="Move marker past last harmonic, then press MEASURE THD."
150 !
160 Start: !
170 !
180 !OUTPUT @Hp3588a;"SYST:PRES"
190 !
200 CLEAR SCREEN
210 GCLEAR
220 DISP Prompt$
230 OUTPUT @Hp3588a;"DISP:PART LOWER"
240 OUTPUT @Hp3588a;"SYST:RPGLOCK OFF"
250 !
260 ON KEY 1 LABEL "MEASURE THD" GOSUB Measure
270 !
280 Hang_out: GOTO Hang_out
```

### The Editor

After capturing a series of key-strokes, you can embellish the program. In the edit mode, the program is displayed on the CRT of the analyzer and softkeys help you edit the program. In this mode, all keys on the front panel of the analyzer take on alpha functions, allowing you to type in commands. In addition, a typing utility lets you select basic keywords from a softkey menu.

Large programs can be developed on an HP Series 300 computer running HP BASIC. Since HP Instrument BASIC is a 100% syntax compatible subset of HP BASIC, you can develop a program on a computer, transfer it to a 3.5-inch disk and insert the disk into the HP 3588A. HP Instrument BASIC provides the standard de-bugging tools of HP BASIC, so run time errors can be analyzed and fixed while running your program in the analyzer.

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