# CHAPTER 5
# HP-IB REMOTE OPERATION

This chapter discusses the requirements for remote operation of the spectrum analyzer using an HP-IB[5] controller.

## General Description

The HP 8569B digital storage display and sweep control can be accessed through HP-IB. The HP-IB connector is located on the rear panel (see Figure 54). An HP-IB interconnection cable (often supplied with the HP-IB Interface) is required to connect the analyzer to the controller HP-IB interface.

Programming codes are summarized on the pull-out information card and in Table 5 of this section. A more detailed syntax summary can be found in Appendix E. Programming information dealing with specific HP-IB controllers can be found in the *Introductory Operating Guide* addressing that specific controller.

## HP-IB Compatibility

The complete bus capability of the spectrum analyzer as defined in IEEE STD 488 (or the identical ANSI Standard MC 1.1), is presented following Table 6. The pro-

[5]Hewlett-Packard Interface Bus, the Hewlett-Packard implementation of IEEE STD 488-1975 and ANSI STD, MC 1.1, "Digital Interface for Programmable Instrumentation."

gramming capability of the instrument is further described by the three HP-IB messages in Table 6. Foremost among these messages is the data message, which is the primary method of communication between the analyzer and the controller. The responses of the analyzer to other messages are shown as well.

## Addressing the Spectrum Analyzer

Communication between instruments on the HP-IB requires that a unique address be assigned to each instrument. The address switch (Figure 55) on the rear panel of the analyzer is used to set the analyzer address.

The instrument address is the binary number represented by the on (1) or off (0) states of the five switch segments (A1 through A5). For example, the address 18 is set when A2 and A5 are on (1) and the other switch segments are off (0).

## Digital CRT Display Coordinates

References to the CRT display coordinates (specifically, commands AP/BP, BA/BB, IA/IB, and TA/TB as listed in Table 5) will follow the layout in Figure 56.

Within the range of the graticule, there are a total of 481 X-axis values (0 to 480, with 48 points per division) and 801 Y-axis values (0 to 800, with 100 points per division).

*Table 5. HP-IB Programming Codes*

| HP-IB Commands (Alphabetical Listing) | | | |
|---|---|---|---|
| AL | Display lower line control settings | LL | Input lower line message |
| AP | Output trace A peak signal coordinates | LU | Input upper line message |
| AT | Output RF Input Attenuation | MS | Output value of sweep flag |
| AU | Display upper line control settings | NS | Output INP–B→A state |
| BA | Output trace A byte values | RB | Output Resolution Bandwidth |
| BB | Output trace B byte values | RL | Output Reference Level |
| BP | Output trace B peak signal coordinates | SF | Start sweep and set sweep flag |
| CF | Output Center Frequency | SP | Output Frequency Span/Div |
| CS | Output annotation | ST | Output Sweep Time |
| DG | Output display mode | TA | Output trace A integer values |
| DM | Output detection mode | TB | Output trace B integer values |
| IA | Input trace A integer values | TS | Take sweep |
| IB | Input trace B integer values | VF | Output Video Filter |
| LG | Output Amplitude Scale | | |

HP-IB INTERCONNECTION CABLE
(SUPPLIED WITH THE HP CONTROLLER
HP-IB INTERFACE OPTION)
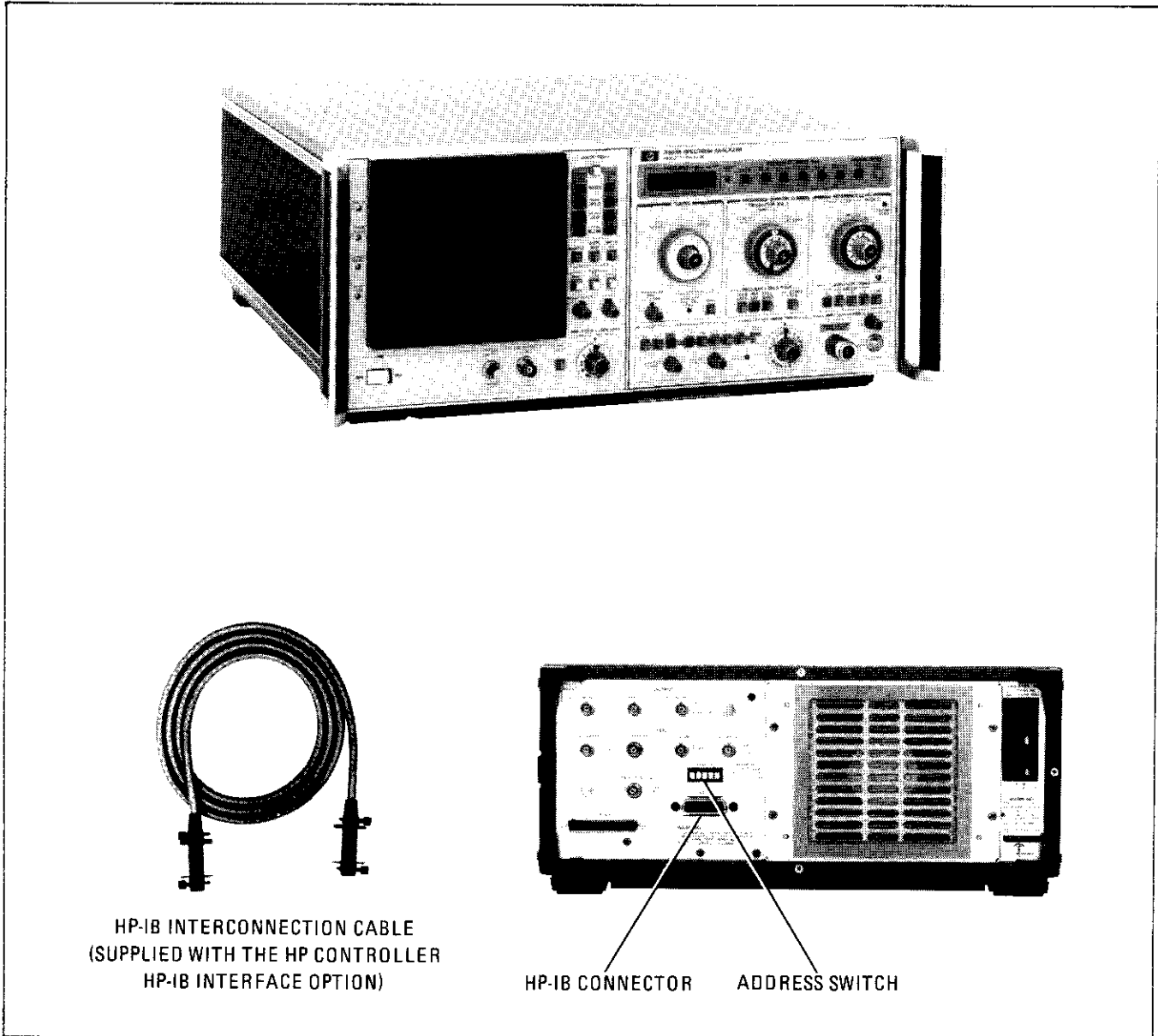
HP-IB CONNECTOR    ADDRESS SWITCH

*Figure 54. HP 8569B with HP-IB Interconnect Cable*

The Y-axis overrange values displayed above the top of the graticule are 801 to 820 for the trace output commands AP/BP, BA/BB, and TA/TB and 801 to 975 for the trace input commands IA/IB. (Values above 950 may be deflected off the top of the screen.)

Two lines of annotation near the top of the CRT display are controlled by the labeling commands CS, LL/LU, and AL/AU.

Table 5 is a summary of the HP 8569B HP-IB Programming Codes. For more detailed information concerning the front-panel controls of the analyzer, refer to Chapter 2. For information on syntax requirements, refer to Appendix E.
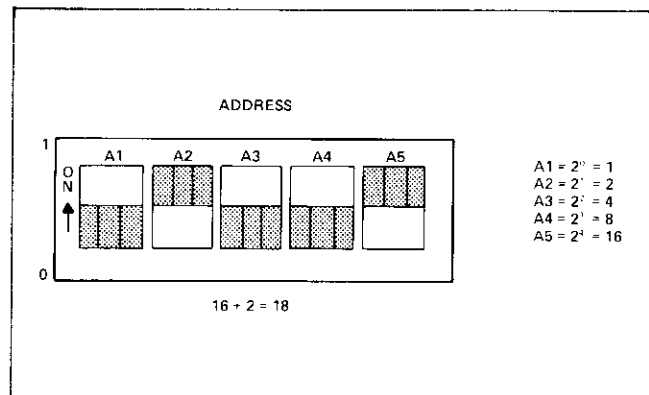


*Figure 55. HP-IB Address Switch*

36

Table 6. HP-IB Message Reference Table

| HP-IB Message | Response | Related Commands and Controls* | Interface Functions* |
|---|---|---|---|
| Data | Information pertaining to the digital storage display is available to the bus. Trace data and display messages can be sent to the analyzer via HP-IB. Program instructions can initiate sweeps. | | T7, L4 AH1, SH1 |
| Clear | Device clear; clear active traces and reset sweep. | DCL SDC | DC1 |
| Abort | Interface clear; unaddress instrument. | IFC | T7, L4 |

*Commands, Control lines and Interface Functions are defined in IEEE STD 488 (and the identical ANSI Standard MC1.1). Complete HP-IB capability is: SH1, AH1, T7, TE0, L4, LE0, SR0, RL0, PP0, DC1, DT0, C0, E2.



0,975          480,975

0,820          480,820

CTR  2.4001 GHz     SPAN 50 kHz/      RES BW 3 kHz      VF OFF
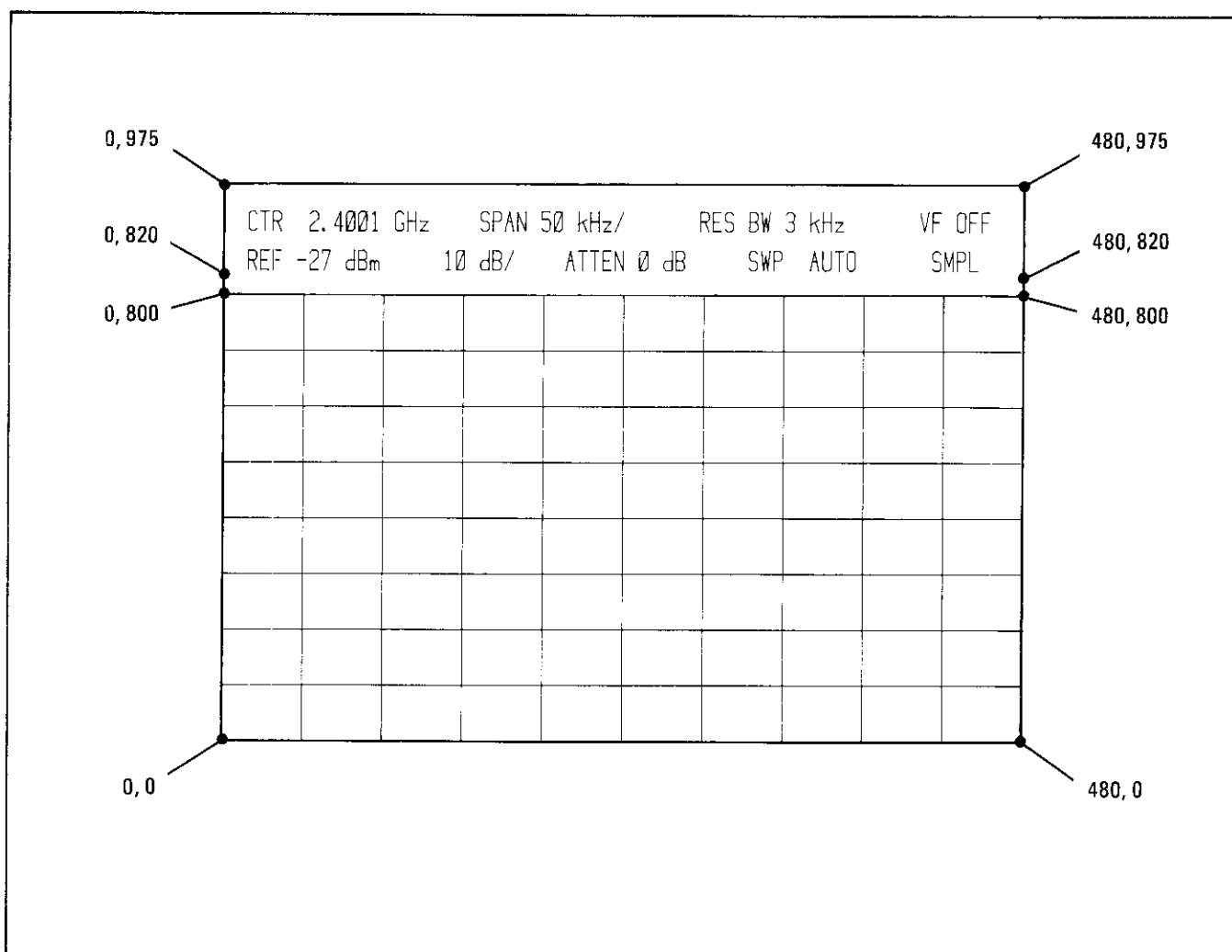REF -27 dBm      10 dB/     ATTEN 0 dB      SWP  AUTO      SMPL

0,800          480,800

0,0          480,0

Figure 56. Display Coordinates