Chapter 1. General Information

INTRODUCTION

The HP 85070A dielectric probe kit allows measurements of the complex permittivity for a wide range of solid and liquid materials. It performs all of the necessary network analyzer control, calculation, and data presentation functions. The software controls the network analyzer to measure the complex reflection coefficient of the probe in the MUT (material under test). Then it converts the reflection coefficient into the complex permittivity of the MUT.

Finally it displays the measurement results in a variety of graphical and tabular formats. The software also facilitates printing or plotting the results, saving the results to disk, and saving test setups to disk.

The dielectric probe provides a convenient, repeatable method for measuring various dielectric materials. The convenience is a result of needing only to press the probe against (or immerse it in) the MUT to make a measurement. The probe is used with a vector network analyzer to take advantage of the analyzer's measurement flexibility, speed, and accuracy. Use of the vector network analyzer allows the software to calibrate out (as detailed later) a variety of measurement errors and thus enhance accuracy.

ITEMS SUPPLIED WITH THE KIT

As illustrated in Figure 1-1, these items constitute the HP 85070A dielectric probe kit:

- HP 85070A software disk (one 5.25 in high-density disk)*
- Microsoft® Windows version 3.0 **
- Dielectric probe
- Dielectric probe cable
- Remote switch assembly
- This manual
- 3.5 mm fixed load
- Shorting block and spring clip
- Test port cable clamp
- Small glass vial
- Large glass vial
- Type-N to SMA adapter
- Type-N to 7 mm adapter
- Rubber adapter for small vial
- Rubber adapter for large vial
- Rubber stopper, 2 mm vial

*With option 300, replaced with one 3.5 in double-sided, double-density disk.
** Not included with option 300.
Note: Microsoft® Windows and MS-DOS® are US registered trademarks of Microsoft Corporation

Before using the HP 85070A software, be sure that all of these items have been received and appear to be in good condition. Contact your Hewlett-Packard representative if any item is missing or appears to be damaged.

DESCRIPTION OF THE DIELECTRIC PROBE KIT

Two versions of the software allow use of either IBM-AT compatible or HP 9000 series 300 computers.

The MS-DOS version of the software (standard) features the clean look of the Windows environment. This version is for IBM-AT compatible machines such as the HP Vectra. It uses a mouse for most commands and entries. It is not user-modifiable.

The HP BASIC version of the software (option 300) features a Windows-like presentation. This is the HP 9000 series 300 (or IBM-AT with Viper Card) version. The user interface portion of the source code may be customized for your individual application. It uses softkey menus for most commands and entries.

Software Features

- Completely controls the network analyzer.
- Guides you through calibration and measurement.
- Automatically computes permittivity (e').
- Offers a variety of data formats and displays.

EQUIPMENT REQUIRED

The equipment required to operate a dielectric measurement system is detailed in chapter 2, "Getting Started."

Recommended Test Equipment

Neither the probe nor the software have any adjustments or repairable parts, so test equipment is required for the other system instruments only. Refer to the appropriate manuals for recommended test equipment.

INSTRUMENT SPECIFICATIONS

Construction materials: stainless steel and polystyrene
Flatness: 100 microinches, typical, over-lapped surface
Temperature, operating and storage: 0°C to 55°C
Pressure: 200 psi, maximum
Shock: 1000 g's
Chemical resistance: The probe is compatible with most materials and liquids and is resistant to strong acids. However, these materials will cause degradation and should be avoided: aromatic hydrocarbons, chlorinated hydrocarbons, and ketones. In particular, avoid materials that might distort or damage polystyrene.