HEWLETT PACKARD

SERVICE MANUAL

MODEL 3585A SPECTRUM ANALYZER

Serial Numbers: 1750A00716 and greater

WARNING

To help minimize the possibility of electrical fire or shock hazards, do not expose this instrument to rain or excessive moisture.

VOLUME I

Manual Part No. 03585-90006

Microfiche Part No. 03585-90056

P.O. Box 301, Loveland, Colorado, 80537 U.S.A.

Printed: August 1981

HEWLETT PACKARD

CERTIFICATION

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility, and to the calibration facilities of other International Standards Organization members.

WARRANTY

This Hewlett-Packard product is warranted against defects in material and workmanship for a period of one year from date of shipment [,except that in the case of certain components listed in Section I of this manual, the warranty shall be for the specified period] . During the warranty period, Hewlett-Packard Company will, at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by -hp-. Buyer shall prepay shipping charges to -hp- and -hp- shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to -hp- from another country.

Hewlett-Packard warrants that its software and firmware designated by -hp- for use with an instrument will execute its programming instructions when properly installed on that instrument. Hewlett-Packard does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. HEWLETT-PACKARD SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCLUSIVE REMEDIES

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. HEWLETT-PACKARD SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

ASSISTANCE

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

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CATHODE-RAY TUBE WARRANTY AND INSTRUCTIONS

The cathode-ray tube (CRT) supplied in your Hewlett-Packard Instrument and replacement CRT's purchased from -hp- are warranted by the Hewlett-Packard Company against electrical failure for a period of one year from the date of shipment from Colorado Springs. Broken tubes and tubes with phosphor or mesh burns are not included under this warranty. No other warranty is expressed or implied.

INSTRUCTION TO CUSTOMERS

If the CRT is broken when received, a claim should be made with the responsible carrier. All warranty claims with Hewlett-Packard should be processed through your nearest Hewlett-Packard Sales/Service Office (listed at rear of instrument manual).

INSTRUCTIONS TO SALES/SERVICE OFFICE

Return defective CRT in the replacement CRT packaging material. If packaging material is not available, contact CRT Customer Service in Colorado Springs. The Colorado Springs Division must evaluate all CRT claims for customer warranty, Material Failure Report (MFR) credit, and Heart System credit. A CRT Failure Report form (see reverse side of this page) must be completely filled out and sent with the defective CRT to the following address:

HEWLETT-PACKARD COMPANY
1900 Garden of the Gods Road
Colorado Springs, Colorado 80907

Parcel Post Address:
P.O. Box 2197
Colorado Springs, Colorado 80901

Attention: CRT Customer Service

Defective CRT's not covered by warranty may be returned to Colorado Springs for disposition. These CRT's, in some instances, will be inspected and evaluated for reliability information by our engineering staff to facilitate product improvements. The Colorado Springs Division is equipped to safely dispose of CRT's without the risks involved in disposal by customers or field offices. If the CRT is returned to Colorado Springs for disposal and no warranty claim is involved, write "Returned for Disposal Only" in item No. 5 on the form.

Do not use this form to accomplish CRT repairs. In order to have a CRT repaired, it must be accompanied by a customer service order (repair order) and the shipping container must be marked "Repair" on the exterior.

X-RAY RADIATION NOTICE

Model 3585A

ACHTUNG

Während des Betriebs erzeugt dieses Gerät Röntgenstrahlung. Das Gerät ist so abgeschirmt, daß die Dosisleistung weniger als 36 pA/kg (0,5mR/h) in 5cm Abstand von der Oberfläche der Katodenstrahlröhre beträgt. Somit sind die Sicherheitsbestimmungen verschiedener Länder, u.A. der deutschen Röntgenverordnung eingehalten.

Die Stärke der Röntgenstrahlung hängt im Wesentlichen von der Bauart der Katodenstrahlröhre ab, sowie von den Spannungen, welche an dieser anliegen. Um einen sicheren Betrieb zu gewährleisten, dürfen die Einstellungen der Niederspannungsund des Hochspannungsnetzteils nur nach der Anleitung in Kapitel V des Handbuches vorgenommen werden.

Die Katodenstrahlröhre darf nur durch die gleiche Type ersetzt werden. (Siehe Kapitel Vi für HP-Ersatzteile).

Das Gerät ist in Deutschland zugelassen unter der

Nummer 6.62-S104

WARNING

When operating, this instrument emits x-rays; however, it is well shielded and meets safety and health requirements of various countries, such as the X-ray Radiation Act of Germany.

Radiation emitted by this instrument is less than 0.5 mR/hr at a distance of five (5) centimeters from the surface of the cathode-ray tube. The x-ray radiation primarily depends on the characteristics of the cathode-ray tube and its associated low-voltage and high voltage circuitry. To ensure safe operation of the instrument, adjust both the low-voltage and high-voltage power supplies as outlined in Section V of this manual (if applicable).

Replace the cathode-ray tube with an identical CRT only. Refer to Section VI for proper HP part number.

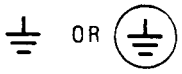
Number of German License: 6.62-S104

SAFETY SYMBOLS

General Definitions of Safety Symbols Used On Equipment or In Manuals.

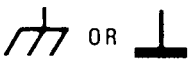
Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the instrument.

Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts must be so marked).



Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal which must be connected to ground before operating equipment.

Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault. A terminal marked with this symbol must be connected to ground in the manner described in the installation (operating) manual, and before operating the equipment.



Frame or chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.

Alternating current (power line).

Direct current (power line).

Alternating or direct current (power line).

WARNING

The WARNING 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 in injury or death to personnel.

CAUTION

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

NOTE:

The NOTE sign denotes important information. It calls attention to procedure, practice, condition or the like, which is essential to highlight.

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SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements. This is a Safety Class 1 instrument.

GROUND THE INSTRUMENT

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. The instrument is equipped with a three-conductor ac power cable. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

USE CAUTION WHEN EXPOSING OR HANDLING THE CRT

Breakage of the Cathode-ray Tube (CRT) causes a high-velocity scattering of glass fragments (implosion). To prevent CRT implosion, avoid rough handling or jarring of the instrument. Handling of the CRT shall be done only by qualified maintenance personnel using approved safety mask and gloves.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

DANGEROUS PROCEDURE WARNINGS

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting.

SECTION I
GENERAL INFORMATION

SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION

This manual volume contains information necessary to install, operate, test, and understand the operation of the Hewlett-Packard Model 3585A Spectrum Analyzer. Complete operating and programing information can be found in the 3585A Operating Manual.

This manual volume is divided into seven sections, each covering a specific topic or aspect of servicing the instrument:

Section	Topic
I	General Information
II	Installation and Interfacing
III	Operation Overview
IV	Performance Tests
V	Adjustments
VI	Circuit Functional Descriptions
VIII	Backdating

This section of the manual contains the performance specifications and general operating characteristics of the 3585A. Also listed are available options and accessories, and instrument and manual identification information.

1-2. SPECIFICATIONS

Operating specifications for the 3585A are listed in Table 1-1. These specifications are the performance standards or limits against which the instrument is tested. Any changes in specifications due to manufacturing, design or traceability to the U.S. National Bureau of Standards are included in Table 1-1 of this manual. Specifications listed in this manual supersede all previous specifications for the Model 3585A.

1-3. INSTRUMENT AND MANUAL IDENTIFICATION

The instrument identification serial number is located on the rear panel. Hewlett-Packard uses a two-section serial number consisting of a four-digit prefix and a five-digit suffix separated by a letter designating the country in which the instrument was manufactured. (A = U.S.A.; G = West Germany; J = Japan; U = United Kingdom.) The prefix is the same for all identical instruments and changes only when a major instrument change is made. The suffix, however, is assigned sequentially and is unique to each instrument.

This manual applies to instruments with serial numbers indicated on the title page. If changes have been made in the instrument since this manual was printed, a yellow "Manual Changes" supplement supplied with the manual will define these changes and explain how to adapt the manual to the newer instruments. In addition, backdating information contained in Section VII adapts the manual to instruments with serial numbers lower than those listed on the title page.

On the title page of this manual is a Microfiche part number. This number can be used to order 4 x 6 inch microfilm transparencies of these publications. The Microfiche package includes the latest Manual Changes supplement and all pertinent Service Notes.

1-4. DESCRIPTION

The 3585A is a 20 Hz to 40.1 MHz, microcomputer controlled spectrum analyzer. It may be utilized for spectrum analysis or network analysis (amplitude only) applications. As a spectrum analyzer, the 3585A provides a graphic display of the spectral components of the input signal. For network analysis measurements, the 3585A Tracking Generator can be used as a drive signal for the network under test. The network's output can then be applied to the 3585A input to obtain a graphic display of the network's amplitude versus frequency response.

The 3585A is structured as a conventional triple-conversion, swept super-heterodyne spectrum analyzer. The addition of microcomputer hardware control and data manipulation greatly enhances the analytical power of the 3585A. Flexible control of the displayed trace is obtained through dedicated key subroutines that produce optimum displayed results in a minimum amount of time.

Microcomputer control gives the 3585A several unique features. The most obvious feature is the keyboard entry of parameters which replaces more conventional knobs. The input attenuation and mixer levels are automatically set by the 3585A's Auto Range feature to maintain the specified dynamic range. Other microcomputer controlled features include: coupling of Frequency Span, Bandwidth and Sweep Time; centering of signals; moving signals to the Reference Level and storage and measurement of frequency and amplitude Offsets. Microcomputer control further allows the operator to override the automatic features of the 3585A.

The 3585A's Local Oscillator is fully synthesized using -hp-'s patented Fractional N technique. This provides frequency settability of 0.1 Hz over the 20 Hz to 40.1 MHz range. Beyond the advantage of high system resolution, the 3585A's Synthesized Local Oscillator allows stable, repeatable frequency measurements. The advanced design of the 3585A's Fractional N synthesized Local Oscillator also results in phase-continuous, linear sweeps with low spurious sidebands.

The amplitude accuracy of the 3585A is enhanced by an Automatic Calibration system, through which internal analog offsets and errors are removed using the internal 10 MHz reference as a level and frequency standard and the Tracking Generator with an internal calibrator as a flatness standard. The calibration system measures and corrects errors caused by IF frequency and gain shifts, and input gain and flatness deviations. It also corrects the Tracking Generator frequency.

The trace information displayed on the 3585A CRT is digitally stored in memory. As a result, flicker-free, non-blooming displays are maintained independent of sweep time. Marker information and Entry parameters are displayed above and below the CRT graticule to give the operator the present instrument status. Prefaced parameters are intensified for easy data entry.

The 3585A keyboard controls are completely HP-IB programmable. In addition, commands are available to output information such as: active or stored keyboard settings, instrument status, A or B trace in marker amplitudes or normalized binary data, marker amplitude and frequency and CRT alphanumerics. A 50-character line of annotation or six 50-character lines of instructional messages can be displayed on the 3585A using the HP-IB. Finally, the keyboard may be configured as a limited data input terminal, with each key having a unique, numeric code. When coupled with the instructional message capability, this can provide a calculator based system where operator decisions can be entered on the 3585A keyboard. When used in this manner, the operator is not required to understand the calculator language, only answer the questions on the 3585A display.

1-5. OPTIONS

The following options are available for use with the Model 3585A:

-hp- Part Number

Option 907: Front Handle Kit.....5061-0091
Option 908: Rack Mounting Kit.....5061-0079
Option 909: Front Handle and Rack Mounting Kit.....5061-0085
Option 910: Additional Set of Manuals
Service Manual.....03585-90006
Operating Manual.....03585-90003

1-6. Accessories Supplied

The following is a list of accessories included with the 3585A:

Item	Quantity	-hp- Part Number
Accessory Kit	1 each	03585-84401
Includes the following:		
Cable Assembly Extender	5 each	03585-61601
Cable Assembly Adapter	1 each	03585-61616
Jack to Jack Adapter	3 each	1250-0669
PC Extender Boards:		
43-pin	1 each	03585-66591
36-pin	1 each	03585-66590
18-pin	1 each	03585-66592
15-pin	1 each	03585-66595
15-pin	1 each	03585-66596
10-pin	1 each	03585-66593
6-pin	1 each	03585-66594

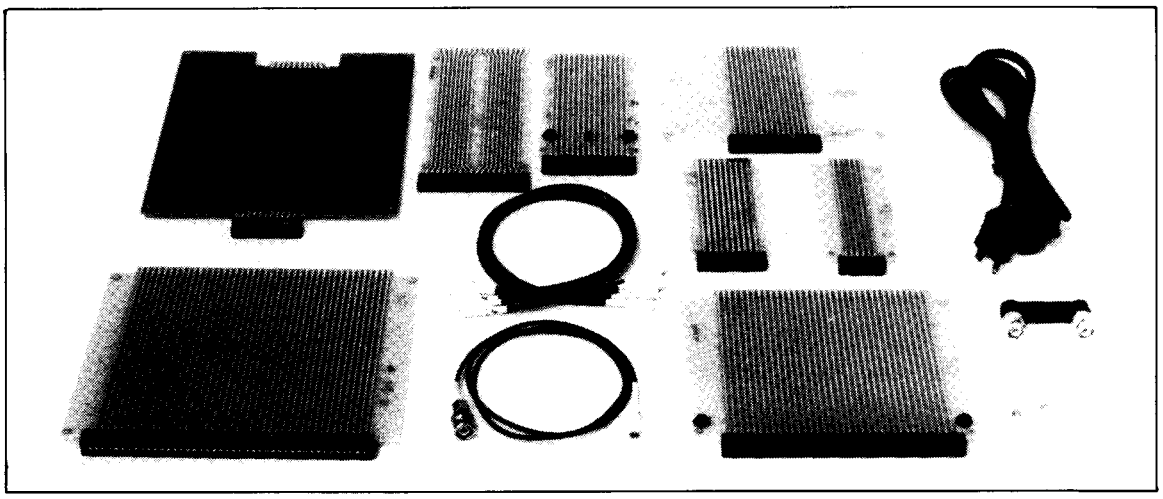


Figure 1-1. Accessories Supplied

1-7. ACCESSORIES AVAILABLE

The following is a list of accessories available for use with the Model 3585A.

a. Input Probes.

1. 1120A 1:1 active probe provides 100 kΩ shunted by 3 pf.
2. 10021A 1:1 passive probe for 50 Ω or 1 MΩ shunted by 70 pf.
3. 10040A 10:1 passive probe provides 1 MΩ shunted by 9 pf.

b. Balancing Transformers.

1. 11473A 75 Ω to 600 Ω WECO 310.
2. 11473B 75 Ω to 600 Ω Siemens 9 REL STP-6AC.
3. 11474A 75 Ω WECO 241.
4. 11475A 75 Ω to 150 Ω Siemens 9 REL STP-6AC.
5. 11476A 75 Ω to 124 Ω WECO 408A.

c. Preamplifiers.

1. 461A 20 dB or 40 dB gain 1 kHz to 150 MHz.
2. 465A 20 dB or 40 dB gain 5 Hz to 1 MHz.

d. VHF Switch.

1. 59307A provides one pair of single throw 4-pole switches.

e. Permanent Records.

1. CRT Camera.
   197A Option 006 provides 3 1/4" x 4 1/4" Polaroid photographs.
2. X-Y Recorder
   7044A provides permanent 11" x 17" plots.

1-8. Recommended Test Equipment

Equipment required to maintain the Model 3585A is listed in Table 1-2. Other equipment may be substituted if it meets the requirements listed in the table.

Table 1-1. Specifications

NOTE

Specifications are guaranteed only when the Auto Calibration is on, the OVEN REF OUT is connected to the EXT REF IN and the instrument has warmed up at least 20 minutes at the ambient temperature.

FREQUENCY:

Measurement Range:

20 Hz to 40.1 MHz

Displayed Range:

Frequency Span:

0 Hz to 40.1 MHz Settable with 0.1 Hz resolution
10 Hz to 40 MHz in 1, 2, 5 steps

Accuracy:

-0% +0.2% of Frequency Span setting

Marker:

Readout Accuracy:

±0.2% of Frequency Span ± Resolution Bandwidth

Counter Accuracy:

±0.3 Hz ± 1 x 10^{-7}/month of counted frequency for a signal 20 dB greater than other signals and noise in the resolution bandwidth setting.

Manual Frequency Accuracy:

±0.1 Hz ± 1 x 10^{-7}/month using the internal reference.

Resolution:

Resolution Bandwidths

3 dB bandwidths of 3 Hz to 30 kHz in a 1, 3, 10 sequence

Accuracy

±20% at the 3 dB points

Selectivity (Shape Factor)

60 dB/3dB < 11:1

AMPLITUDE:

Measurement Range:

Terminated (50/75Ω) input

-137 dBm to +30 dBm or equivalent level in dBV or volts

High Impedance (1 MΩ) input

31 nV to 22V

Table 1-1. Specifications (Cont'd)

Displayed Range:

Vertical Scale:

10 division CRT settable to 10, 5, 2 and 1 dB/division relative to the Reference Level (which is represented by the top graticule line)

Input Range:

-25 dBm to +30 dBm in 5 dB steps

Reference Level (relative to Input Range):

Settability

-100 dB to +10 dB; 0.1 dB resolution

Accuracy (at Center Frequency, for Sweep Time ≥ 2 steps above auto setting at Manual Frequency, 1 or 2 dB/Div.)

Add 0.1 dB for auto sweep setting

Add 0.1 dB for 5 or 10 dB/Div.

Terminated (50/75Ω) input

+10 dB	-50 dB	-70 dB	-90 dB
±0.4 dB	±0.7 dB	±1.5 dB	

High Impedance(1 MΩ) input—add to above

20 Hz	10 MHz	40.1 MHz
±0.7 dB	±1.5 dB	

Amplitude Linearity (referred to Reference Level):

0 dB	-20 dB	-50 dB	-80 dB	-95 dB
±0.3 dB	±0.6 dB	±1.0 dB	±2.0 dB	

Frequency Response (referred to center of span):

Terminated (50/75Ω) input ±.5 dB

High Impedance (1 MΩ) input

20Hz	10 MHz	40.1 MHz
±0.7 dB	±1.5 dB	

Marker:

Amplitude Accuracy:

Center Frequency or Manual frequency at the Reference Level: Use Reference Level accuracy from +30 dBm to -115 dBm, add Amplitude Linearity below -115 dBm.

To Calculate Marker Accuracy:

Terminated (50/75Ω) input

At the Center or Manual Frequency and at the Reference Level - use Reference Level Accuracy.

At the Center or Manual Frequency and NOT at the Reference Level - add Reference Level Accuracy and Amplitude Linearity.

NOT at the Center or Manual Frequency and NOT at the Reference Level - add Reference Level Accuracy, Amplitude Linearity and Frequency Response.

High Impedance (1 MΩ) input

Calculate the Marker Accuracy according to the Terminated Input rules above, *then* add 1 MΩ Reference Level Accuracy.

Table 1-1. Specifications (Cont'd)

INPUT:

Signal Inputs:

Terminated (50/75Ω) input; >26 dB return loss, DC coupled, BNC connector. Applied dc voltage must be ≤ ten times the RANGE setting in volts for full specification compliance.

High Impedance (1 MΩ) Input; ±3% shunted by <30 pf, BNC connector

Maximum Input Level:

Terminated (50/75Ω) input; 13 V peak ac plus dc, relay protected against overloads to 42 V peak.

High Impedance (1 MΩ) input; 42 V peak ac plus dc (derate ac by a factor of two for each octave above 5 MHz).

External Reference Input:

10 MHz (or subharmonic to 1 MHz), 0 dBm to +15 dBm/50Ω

Required frequency accuracy, $\pm 5 \times 10^{-6}$. When an external reference is used the $\pm 1 \times 10^{-7}$/month specification on the Counter and Manual frequency accuracy is replaced by the accuracy of the external reference.

OUTPUT:

Tracking Generator:

Level
0 dBm to -11 dBm/50Ω with a single turn knob, continously variable

Frequency Accuracy
±1 Hz relative to analyzer tuning

Frequency Response
±0.7 dB

Impedance
50Ω; > 14 dB return loss

Probe Power:

+15 Vdc, -12.6 Vdc; 150 ma max.
Suitable for powering HP 1120A Active Probe

External Display

X, Y:1 volt full deflection;
Z: < OV to > 2.4 V.

Recorder:

X Axis: minimum of +10 Vdc full scale
Y Axis: +10 Vdc full scale
Z—penlift output (TTL levels)

IF:

350 kHz, -11 dBV to -15 dBV at the reference level

Video:

+10 Vdc at the reference level

Frequency Reference:

10.000 MHz $\pm 1 \times 10^{-7}$/mo., > +5 dBm into 50Ω

Table 1-1. Specifications (Cont'd)

DYNAMIC RANGE:

Spurious Responses: (which includes image, out of band and harmonic distortion) referred to a single signal whose amplitude is ≤ RANGE setting and whose frequency is ≥ ten times the Resolution Bandwidth.

Terminated (50/75Ω) input

< -80 dB

High Impedance (1 MΩ) input

< -80 dB; except second harmonic distortion, < -70 dB

Intermodulation Distortion: for two signals, each at least 6 dB below the RANGE setting and separated in frequency by at least 100 Hz, referred to the larger of the two signals.

Terminated (50/75Ω) input

< -80 dB; except 2nd order IM with one or both of the input signals within the range of 10 MHz to 40 MHz, < -70 dB

High Impedance (1 MΩ) input

< -70 dB

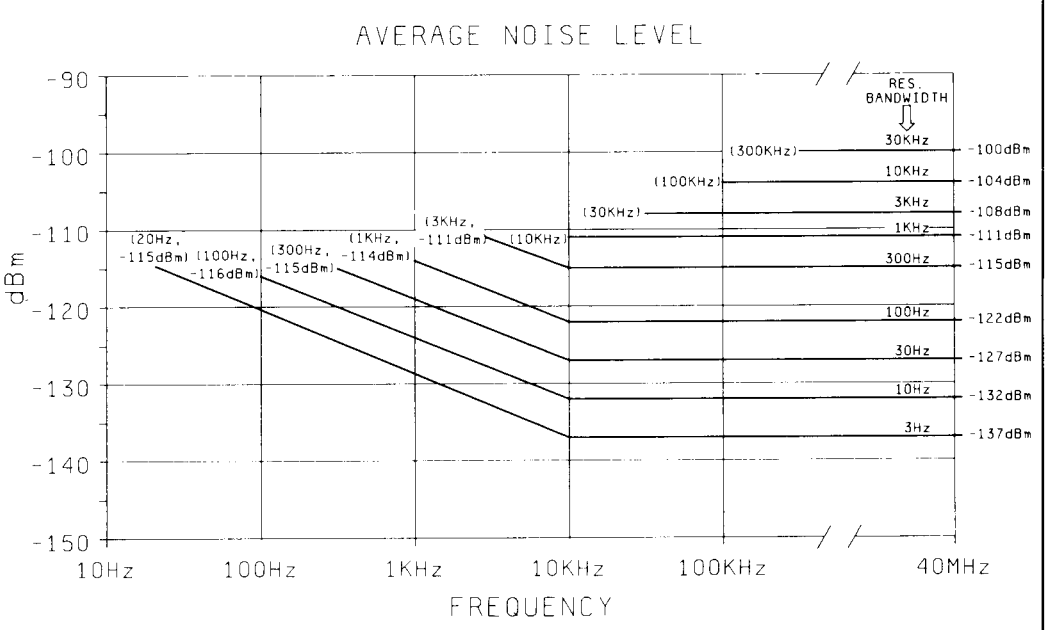
Residual Responses (no signal at input, -25 dBm Range)

< -120 dBm

Lo Feed Through:

< -15 dB with respect to Range

Average Noise Level (-25 dBm Range), 50/75Ω input)



1 MΩ input: Below 500 kHz add 12 dB to above.

Average Noise Level at 40 Hz (3 Hz Res. BW) using the Noise Level Key -123 dBm (1 Hz)

Table 1-1. Specifications (Cont'd)

DISPLAY:

Trace:

Two memories, A and B, each 1001 data points horizontally by 1024 data points vertically are displayed on the CRT at a flicker free rate.

Memory A - updated at the rate of the analyzer sweep time.

Memory B - updated by transfer from A (Store A→B).

Max Hold - retains in Memory A the largest signal level at each horizontal point over successive sweeps.

A-B - updates Memory A with sweep data minus Memory B data at each corresponding horizontal point.

Trace Detection:

A linear envelope detector is used to obtain video information from the IF signal. Peak signal excursions between horizontal sweep data points are retained and displayed at the left-hand data point. This assures that no signal responses are missed.

SWEEP:

Modes:

Continuous, Single or Manual

Trigger:

Free Run, Line, or External

Time:

Resolution: 0.2 sec
Minimum: 0.2 sec
Maximum: Frequency Span/minimum sweep rate limit

The minimum sweep rate limit is:

≥ 10 kHz Res BW - 10 sec/Hz of Frequency Span or 0.1 Hz/sec
≤ 3 kHz Res BW - 200 sec/Hz of Frequency Span or 0.005 Hz/sec

GENERAL:

Environmental:

Temperature:

Operating 0°C to 55°C

Humidity:

< 95% RH except 300 Hz Res. BW, < 40% RH

Warm-up Time:

20 minutes at ambient temperature

Power Requirements:

115 V (+11% - 25%), 48-440 Hz
230 V (+11% - 18%), 48-66Hz
< 180 watts, 3A max.

Weight:

39.9 kg (88 lb)

Dimensions:

22.9 cm (9 in) H x 42.6 cm (16.75 in) W x 63.5 cm (25 in) D

Remote Operation:

Compatible with IEEE Standard 488-1975 "Standard Digital Interface for Programmable Instrumentation"

Table 1-2. Recommended Test Equipment

Instrument	Required Characteristics	Usage: Semi-Automatic Performance Test	Usage: Operational Verification Tests	Recommended Model
Audio Oscillator	Frequency: 1kHz Distortion: ≤ -90dB Amplitude: 0.1Vrms	x	x	-hp- 339 or -hp- 239
Attenuator:				
Variable 10dB/Step	Range: 0 - 120dB	x	x	-hp- 355D
Variable 1dB/Step See Note 1	Range: 0 - 12dB	x	x	-hp- 355C
Bridge:				
Directional				
50Ω	Frequency: 0.1 - 40 MHz	x	x	-hp- 8721A
75Ω See Note 2, 3	Return Loss > 30dB Directivity >40dB	x	x	-hp- 8721A Option 008
Calculator	Compatible with -hp- 9825A Software and I/O	x		-hp- 9825
Calculator ROM's	HP-IB* and -hp- 9825A Compatible	x		-hp- 98210A and -hp- 98213A
Filter: 9MHz Low Pass	See Figure 4-14	x	x	
Frequency Counter	Range: 5 to 10 MHz Resolution: 0.1 Hz Accuracy: ±1 count, $\pm 5 \times 10^{-10}$/day	x	x	-hp- 5328A Option 010
Frequency Synthesizer	Freq. Range: 200 Hz to 40.1 MHz Amp. Range: +10 to -85 dBm Amplitude Accuracy: ±0.25 dBm	x	x	-hp- 3335A
Frequency Synthesizer	Freq. Range: 1 kHz to 33 MHz Amplitude Range: -25 dBm Amplitude Accuracy: ±0.4 dB	x	x	-hp- 3330B
Function Generator See Note 3	Frequency: 1.2kHz Square Wave: 100ns rise time dc Offset: ±1V	x		-hp- 3311A
HP-IB* Interconnection Cables		x		-hp- 10631
HP-IB* Interface Cable	-hp- 9825A Compatible	x		-hp- 98034A
Impedance Matching Network (50Ω to 75Ω Minimum Loss Pad)	Frequency: 0.1 to 40 MHz VSWR < 1.05	x	x	-hp- 8542B
Mixer: Double Balanced See Note 3	Frequency: 0.1 - 40MHz	x		-hp- 10534
Oscilloscope See Note 2	Vertical Scale: ≥ 5 mV/Div. Horizontal Scale: ≥ 50 nsec/Div.		x	-hp- 1740A
Power Supply: DC See Note 4	Voltage range: 0 - 10 V DC	x		-hp- 6213A
Printer: Impact	Plotter Capability	x		-hp- 9871A
Summer	See Figure 4-15	x	x	
Termination:				
Feedthrough				
50Ω	±0.1 ohm, 1 Watt	x	x	-hp- 11048C
75Ω		x	x	-hp- 11094C
Thermal Voltage Converter: 50Ω,0.5 V See Note 4	Frequency: 0.1 - 60MHz Calibration Data	x		-hp- 11051A Option 01
Voltage Divider: 10 to 1 Terminated in 50Ω See Note 4	See Figure 4-7	x		
Voltmeter: Digital See Note 4	Full Scale Range: 1Vdc Accuracy: ±0.004% Resolution: 6 Digits Input Resistance: >1 MΩ	x		-hp- 3455A

NOTES

1. *Attenuator must be calibrated by standards lab. Correction factors are required for the Operational Verification Tests.*
2. *Required for the Operation Verification Return Loss Test.*
3. *Required for the Semi-Automatic Performance Test Return Loss procedure.*
4. *Required to run the calibrator accuracy program.*

*Hewlett-Packard Interface Bus.

SECTION II
INSTALLATION AND INTERFACE

SECTION II
INSTALLATION AND INTERFACING

2-1. INTRODUCTION

This section contains instructions for installing and interfacing the Model 3585A Spectrum Analyzer. Included are initial inspection procedures, power and grounding requirements, environmental requirements, installation instructions, turn-on and interfacing procedures and instructions for repackaging for shipment.

2-2. INITIAL INSPECTION

This instrument was carefully inspected both mechanically and electrically before shipment. It should be free of mars or scratches and in perfect electrical order upon receipt. To confirm this, carefully inspect the instrument for signs of physical damage incurred in transit, check for supplied accessories (Paragraph 1-6) and test the electrical performance using the Performance Test procedures given in Section IV. If there is physical damage, if the contents are incomplete or if the instrument does not pass the Performance Tests, notify the nearest -hp- Sales and Service Office. If the shipping container is damaged or the cushioning material shows signs of stress, notify the carrier as well as the Hewlett-Packard Office. Keep the shipping materials for the carrier's inspection.

WARNING

To avoid the possibility of dangerous electrical shock, do not apply ac line power to the 3585A if there are signs of shipping damage to any portion of the outer enclosure.

2-3. POWER REQUIREMENTS

The Model 3585A requires a single-phase ac power source of:

86V to 127V, 48Hz to 440Hz (115V Voltage Selector Setting)
189V to 255V, 48Hz to 66Hz (230V Voltage Selector Setting)

Maximum power consumption is less than 180 watts; maximum line current is 3 amperes. Refer to Paragraph 2-15 for the Instrument Turn On procedure.

CAUTION

Before applying ac line power to the 3585A, be sure that the VOLTAGE SELECTOR switch is set for the proper line voltage and the correct line fuse is installed in the rear-panel line FUSE holder. (See Paragraph 2-15.)

2-4. Power Cables

Figure 2-1 illustrates the standard power-plug configurations that are used for -hp-power cables. The -hp- part number directly below each drawing is the part number for a power cable equipped with a power plug of that configuration. The type of power cable that is shipped with each instrument is determined by the country of destination. If the appropriate power cable is not included with your instrument, contact the nearest -hp- Sales and Service Office and the proper cable will be provided.

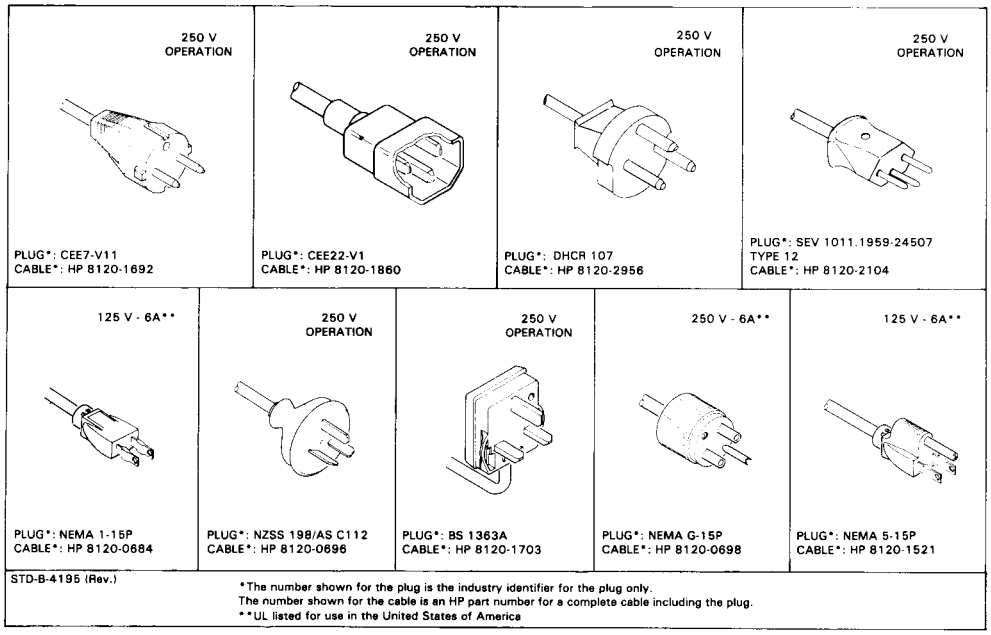


Figure 2-1. Power Cables

2-5. GROUNDING REQUIREMENTS

To protect operating personnel, the instrument's panel and cabinet must be grounded. The Model 3585A is equipped with a three-wire power cord which, when plugged into an appropriate receptacle, grounds the instrument. The offset pin on the power plug is the ground connection.

2-6. ENVIRONMENTAL REQUIREMENTS

WARNING

To prevent potential electrical or fire hazard, do not expose equipment to rain or moisture.

2-7. Operating Environment

In order for the 3585A to meet the specifications listed in Table 1-1, the operating environment must be within the following limits:

Temperature.....0°C to +55°C (+32°F to +131°F)
Relative Humidity.....≤ 95%*
Altitude.....≤ 15,000 feet
Magnetic Field Strength.....≤ 0.1 gauss

*Except 300 Hz Res. BW, 40%.

2-8. Storage and Shipping Environment

The 3585A should be stored in a clean, dry environment. The following environmental limitations apply to both storage and shipment:

Temperature..... −40°C to +75°C (−40°F to +158°F)
Relative Humidity..... ≤ 95%
Altitude..... ≤ 25,000 feet

In high-humidity environments, the instrument must be protected from temperature variations that could cause internal condensation.

2-9. Cooling System

The 3585A uses a forced-air cooling system to maintain the proper internal operating temperature. The cooling fan is located on the rear panel. Air, drawn through the rear-panel fan filter, is circulated through the instrument and exhausted through holes in the side panels. The instrument should be mounted to permit as much air circulation as possible, with at least one inch of clearance at the rear and on each side. The filter for the cooling fan should be removed and cleaned at least once every 30 days. To clean the fan filter, simply flush it with soapy water, rinse and then air dry.

2-10. Thermal Cutout

The 3585A is equipped with a thermal cutout switch which automatically disables the power supplies when the internal temperature exceeds +65°C (external termperature approximately +55°C). To reset the thermal cutout, set the LINE switch to OFF, allow time for the instrument to cool and then set the LINE switch to ON. (The thermal cutout will *not* reset automatically; the LINE switch must be turned off and then back on.) If a thermal cutout occurs, check for fan stoppage, clogged fan ports and other conditions that could obstruct air flow or cause excessive heating.

2-11. INSTALLATION

2-12. Bench Mounting

The 3585A is shipped with plastic feet attached to the bottom panel, ready for use as a bench instrument. The feet are shaped to make full-width modular instruments self align when they are staked. Because of its weight, the 3585A is not equipped with a tilt stand. It is recommend that a Front Handle Kit (Option 907, -hp- Part No. 5061-0091) be installed for ease of handling the instrument on the bench.

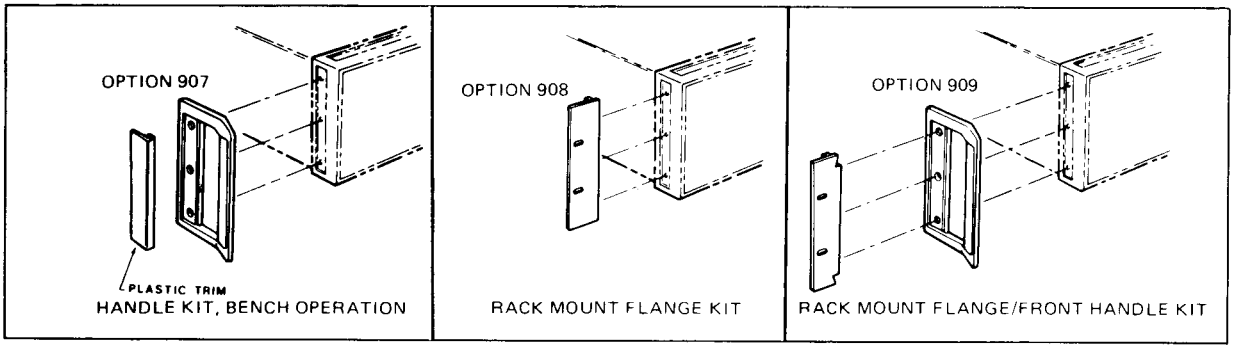


Figure 2-2. Rack Mount and Handle Kits

2-13. Rack Mounting Without Slides

a. Remove the plastic trim (Figure 2-2) and front handles from the 3585A if it is so equipped.

b. Remove the plastic feet from the bottom of the 3585A.

c. Install the Rack Flange Kit with or without handles according to the instructions included in the kit:

Rack Flange Kit (no handles).....Option 908, -hp- Part Number 5061-0079
Rack Flange & Front Handle Kit.....Option 909, -hp- Part Number 5061-0085

d. Install an Instrument Support Rail on each side of the instrument rack. (The Instrument Support Rails, used to support the weight of the instrument, are included with -hp- rack-mount cabinets.)

WARNING

1. The weight of the 3585A must be supported by Instrument support Rails inside the instrument rack. Do not under any circumstances attempt to rack mount the 3585A using only the front flanges.

2. The 3585A is heavy for its size (approximately 88 lbs, 40 kg.). Use extreme care when lifting it to avoid personal injury.

e. Using *two* people, lift the 3585A to its position in the rack on *top* of the Instrument Support Rails.

f. Using the appropriate screws, fasten the 3585A's Rack-Mount Flanges to the front of the instrument rack.

2-14. Rack Mounting With Slides

NOTE

To rack mount the 3585A with slides, the following items are required:

Quantity	*Description*
1	*Rack Flange Kit (Option 908, -hp- 5061-0079)* *OR* *Rack Flange & Handle Kit (Option 909, -hp- 5061-0085)*
1	*Heavy-Duty Slide Kit (-hp- Part No. 1494-0016)*
2	*Side Covers (-hp- Part No. 5060-9948)*

a. Perform Steps a through d of the previous procedure (Paragraph 2-13).

NOTE

Instrument Support Rails are not absolutely necessary when rack mounting with slides. However, they do relieve a considerable amount of strain from the slides and provide an extra measure of safety.

b. Remove the 3585A side covers and replace them with the side covers listed at the beginning of this procedure.

c. Attach a slide inner-member bracket to each side of the 3585A.

d. Attach the slide's outer members to the instrument rack according to the instructions included with the slides.

e. If your instrument rack has extension legs on the front, *be sure* that they are extended at this time.

WARNING

1. The weight of the 3585A can overturn your instrument rack when the mounting slides are fully extended. Physical injury can result.

2. The 3585A is heavy for its size (approximately 88 lbs., 40 kg.). Use extreme care when lifting it to avoid personal injury.

f. Using *two* people, lift the 3585A to its position in the rack and mate the two sections of the slides together. *Do not* rest the full weight of the 3585A on the extended slides until you are *sure* the instrument rack will not overturn.

g. Slide the 3585A into the rack. Using the appropriate screws, fasten the 3585A's Rack-Mount Flanges to the front of the rack.

2-15. Instrument Turn On

a. Before connecting ac power to the 3585A:

1. Set the rear-panel VOLTAGE SELECTOR switch to the position that corresponds to the power-line voltage to be used:

Voltage Selector	Line Voltage
115V	86V to 127V (48-440Hz)
230V	189V to 255V (48-66Hz)

WARNING

To avoid serious injury, be sure that the ac power cord is disconnected before removing or installing the ac line fuse.

2. Verify that the proper line fuse is installed in the rear-panel FUSE holder:

Voltage Selector	Fuse Type	-hp- Part No.
115V	3A, 250V Normal Blo	2110-0003
230V	1.5A, 250V Normal Blo	2110-0043

WARNING

To protect operating personnel, the 3585A chassis and cabinet must be grounded. The 3585A is equipped with a three-wire power cord which, when plugged into an appropriate receptacle, grounds the instrument. The offset pin on the power plug is the ground connection. To preserve this protection feature, the power plug shall only be inserted in a three-terminal receptacle having a protective earth ground contact. The protective action must not be negated by the use of an extension cord or adapter that does not have the required earth ground connection. Grounding one conductor of a two-conductor outlet is not sufficient protection.

Ensure that all devices connected to the 3585A are also connected to the protective earth ground.

b. Verify that the BNC-to-BNC jumper (supplied with the instrument) is connected between the rear-panel OVEN REF OUT and EXT REF IN connectors. (For information concerning the use of an external frequency reference, see the 3585A Operating Manual.)

c. Set the front-panel LINE switch to the OFF position.

d. Connect the ac power cord to the rear-panel LINE connector. Plug the other end of the power cord into a three-terminal *grounded* power outlet.

e. Set the front-panel INTENSITY control to the OFF (fully CCW) position.

f. Set the LINE switch to the ON position.

NOTE

The instrument's beeper will sometimes sound as a result of the local oscillator initially being unlocked during the turn-on sequence. This initial "beep" may be ignored.

g. Things to check:

1. Verify that the cooling fan (located on the rear panel) is operating.

2. Verify that the activated front-panel functions on your instrument correspond to those shown in Figure 2-3.

3. Verify that the front-panel SWEEPING light is flashing.

If any of the above conditions is not met, turn the instrument off immediately and contact the nearest -hp- Sales and Service Office or a qualified service technician.

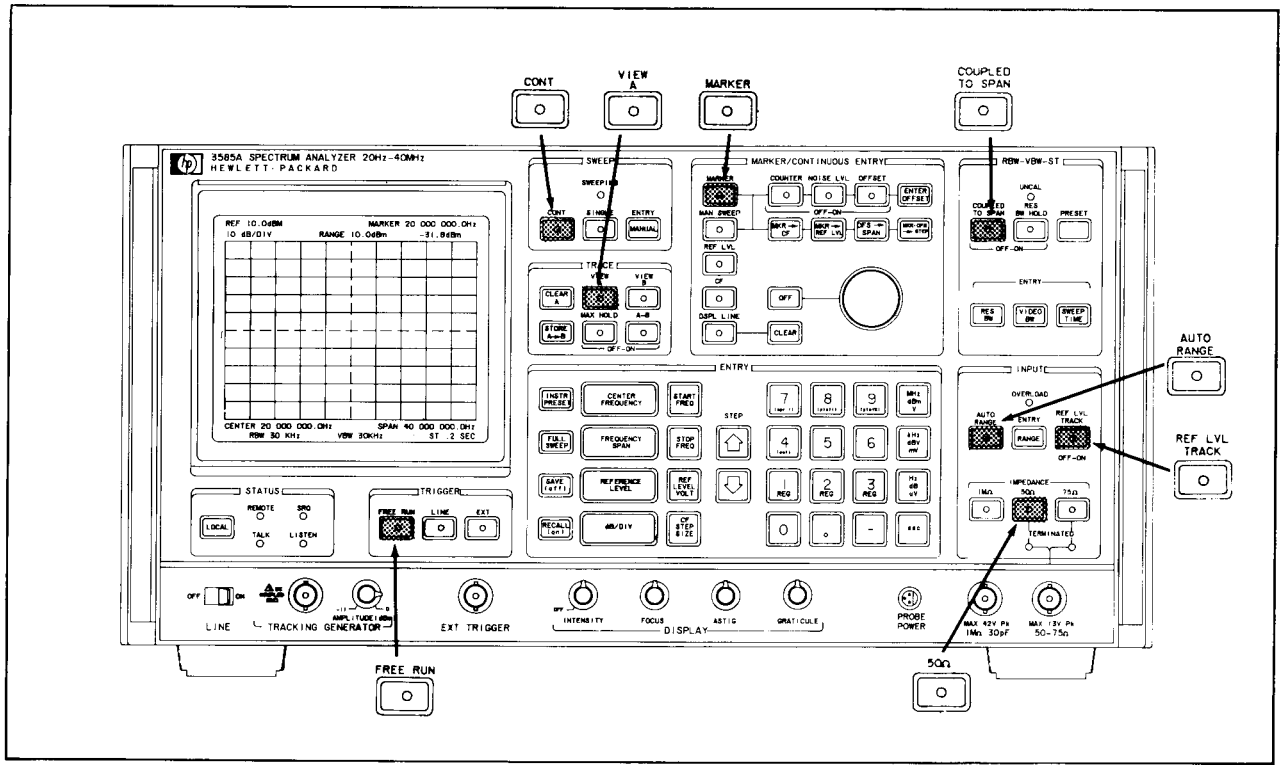


Figure 2-3. Front-Panel Functions Activated At Turn-On

h. Adjust the front-panel INTENSITY control to obtain the desired intensity on the CRT screen. Adjust the FOCUS and ASTIG controls as follows:

1. Set the FOCUS control to midrange.

2. Adjust the ASTIG (Astigmatism) control for the sharpest trace possible.

3. Adjust the FOCUS control for the sharpest and clearest trace possible.

4. Repeat Steps 2 and 3 until optimum adjustment is obtained. If, after several iterations a sharp, clear presentation cannot be obtained, internal adjustments are probably required. These adjustments must be performed by a qualified service technician.

i. The CRT display should now appear as shown in Figure 2-4.

Verify that the Zero Response is present and is aligned with the first vertical line on the left-hand side of the CRT graticule.

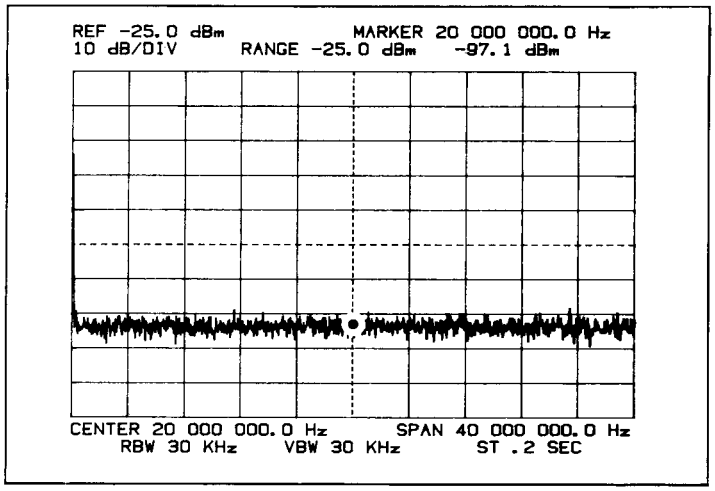


Figure 2-4. Turn-On Display

j. Press the front-panel INSTR PRESET key. (This will force an internal verification test and Automatic Calibration. The "CALIBRATING" message will appear on the CRT screen.)

If the beeper sounds and/or a Calibration Error Code (e.g., "CALIBRATION ERROR 03") appears on the CRT screen, the instrument is either defective or in need of adjustment. Turn the instrument off and see the Fault Isolation information in Volume Two or the Preliminary Troubleshooting procedures in Volume Three.

k. The 3585A's specifications are met after a 20-minute warmup at the ambient operating temperature.

NOTE

When the internal Oven Reference is enabled (about ten minutes after turn on), the beeper will sound and the "LOCAL OSC. UNLOCKED" message will momentarily appear on the CRT screen.

2-16. HP-IB CONNECTIONS AND INTERFACING*

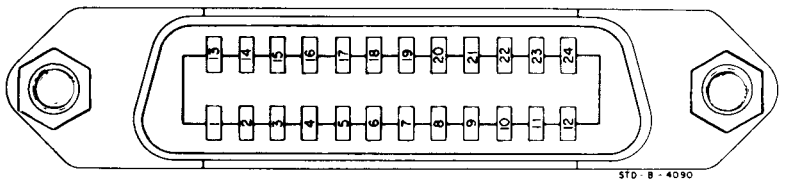
The 3585A HP-IB connector (Figure 2-5) is compatible with the -hp- 10631 (A, B, C or D) HP-IB Cables. The 3585A uses all of the HP-IB lines. The HP-IB system allows you to interconnect up to fourteen HP-IB compatible instruments (including the controller). The HP-IB Cables have identical "piggyback" connectors on both ends so that several cables can be connected to a single source without special adapters or switch boxes. You can interconnect system components and devices in virtually any configuration you desire. There must, of course, be a path from the calculator (or other controller) to every device operating on the bus. As a practical matter, avoid stacking more than three or four cables on any one connector. If the stack gets too long, the force on the stack can produce sufficient leverage to damage the connector mounting. Be sure that each connector is firmly screwed in place to keep it from working loose (see CAUTION in Figure 2-5).

2-17. Cable Length Restrictions

To achieve design performance with the HP-IB, proper voltage levels and timing relationships must be maintained. If the system cables are too long, the lines cannot be driven properly and consequently, the system will fail to perform. When interconnecting an HP-IB system, observe the following rules:

a. The total cable length for the system must be less than or equal to 20 meters (65 feet).

b. The total cable length for the system must be less than or equal to 2 meters (6 feet) times the total number of devices connected to the bus.



PIN	LINE	
1	DI01	
2	DI02	
3	DI03	
4	DI04	
13	DI05	
14	DI06	
15	DI07	
16	DI08	
5	EOI	
17	REN	
6	DAV	
7	NRFD	
8	NDAC	
9	IFC	
10	SRQ	
11	ATN	
12	SHIELD–CHASSIS GROUND	
18	P/O TWISTED PAIR WITH PIN 6	THESE PINS ARE INTERNALLY GROUNDED
19	P/O TWISTED PAIR WITH PIN 7	
20	P/O TWISTED PAIR WITH PIN 8	
21	P/O TWISTED PAIR WITH PIN 9	
22	P/O TWISTED PAIR WITH PIN 10	
23	P/O TWISTED PAIR WITH PIN 11	
24	ISOLATED DIGITAL GROUND	

CAUTION

The 3585A contains metric threaded HP-IB cable mounting studs as opposed to English threads. Metric threaded -hp-10631A, B, or C HP-IB cable lockscrews must be used to secure the cable to the instrument. Identification of the two types of mounting studs and lockscrews is made by their color. English threaded fasteners are colored silver and metric threaded fasteners are colored black. DO NOT mate silver and black fasteners to each other or the threads of either or both will be destroyed. Metric threaded HP-IB cable hardware illustrations and part numbers follow.

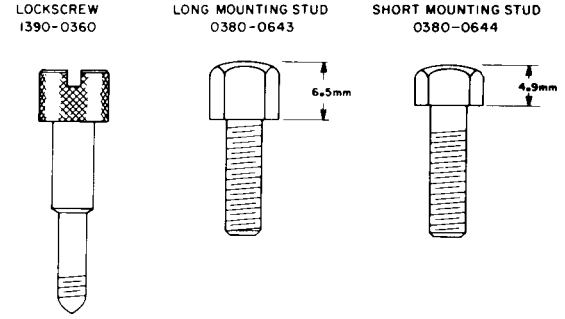


Figure 2-5. HP-IB Connector

*Hewlett-Packard Interface Bus (HP-IB) is -hp-'s implementation of IEEE Standard 488-1975, "Digital Interface for Programmable Instrumentation".

2-18. Calculator Interfacing

Instructions for interfacing the 3585A to -hp- calculators are included in the following HP-IB Users Guides:

a. For -hp- Model 9820A/9821A Calculators:

HP-IB Users Guide, -hp- Stock Number 59300-90001

b. For -hp- Model 9825A Calculators:

-hp- 9825A Calculator General I/O Programming, -hp- Stock Number 09825-90024.

c. For -hp- Model 9830A Calculators:

HP-IB Users Guide, -hp- Stock Number 59300-90002

These users guides can be ordered from the nearest -hp- Sales and Service Office.

2-19. HP-IB Address Selection

The 3585A is shipped from the factory with an ASCII listen address of "+" and a talk address of "K". This corresponds to a Select Code of eleven. You will probably want to leave the addresses as they are; but they can be changed if the need arises. The procedure is as follows:

WARNING

Address changes require access to the interior of the instrument where hazardous voltages are present and must, therefore, be performed by a qualified service technician. Do not remove the instrument's outer covers unless you are qualified to do so.

a. Disconnect ac line power from the 3585A.

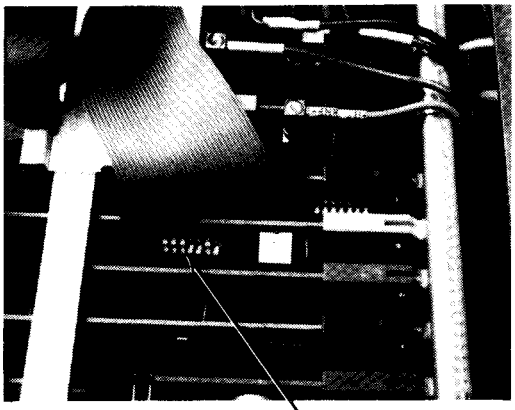
b. Remove the top cover.

c. Locate the A44 board (Figure 2-6).

d. Using a pen or pencil, change the Address Switch setting according to the table in Figure 2-6 to select the desired address.

e. Replace the top cover and restore power.

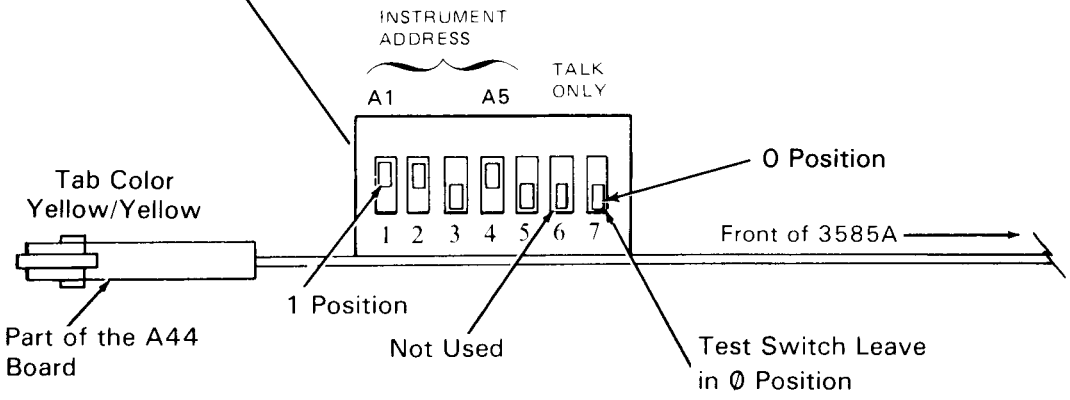
Top View of 3585A Showing Location of A44 Board.



Front of 3585

NOTE

When changing the HP-IB address **do not** *change the switches on the A45 board (tab color yellow/green.) The HP-IB Address Switch is under the gray ribbon cable.*



ASCII Code Character		Address Switches					5-bit Decimal Code	
Listen	Talk	A5	A4	A3	A2	A1		
SP	@	0	0	0	0	0	00	
!	A	0	0	0	0	1	01	
"	B	0	0	0	1	0	02	
#	C	0	0	0	1	1	03	
$	D	0	0	1	0	0	04	
%	E	0	0	1	0	1	05	
&	F	0	0	1	1	0	06	
'	G	0	0	1	1	1	07	
(	H	0	1	0	0	0	08	
)	I	0	1	0	0	1	09	
*	J	0	1	0	1	0	10	
+	K	0	1	0	1	1	11	FACTORY SETTING
,	L	0	1	1	0	0	12	
-	M	0	1	1	0	1	13	
.	N	0	1	1	1	0	14	
/	O	0	1	1	1	1	15	
Ø	P	1	0	0	0	0	16	
1	Q	1	0	0	0	1	17	
2	R	1	0	0	1	0	18	
3	S	1	0	0	1	1	19	
4	T	1	0	1	0	0	20	
5	U	1	0	1	0	1	21	
6	V	1	0	1	1	0	22	
7	W	1	0	1	1	1	23	
8	X	1	1	0	0	0	24	
9	Y	1	1	0	0	1	25	
:	Z	1	1	0	1	0	26	
;	[	1	1	0	1	1	27	
<	\	1	1	1	0	0	28	
=	]	1	1	1	0	1	29	
>	^	1	1	1	1	0	30	

Figure 2-6. Address Selection.

2-20. REPACKAGING FOR SHIPMENT

2-21. Original Packaging

If at all possible, repackage the instrument in the original container, which is specially designed to accommodate the weight of the 3585A. Containers and materials equivalent to those used in factory packaging are available through -hp- Sales and Service Offices. Place the instrument in the container with appropriate (3 to 4 inches) packing material and seal well with strong tape or metal bands. Also mark the container "FRAGILE" to insure careful handling.

NOTE

If the instrument is to be returned to -hp- for service, attach a tag indicating the type of service required. Include any symptoms or details that may be of help to the service technician. Also include your return address, the instrument's model number and full serial number. In any correspondence, identify the instrument by model number and full serial number.

2-22. Other Packaging

The following general instructions should be used for repackaging with commerically-available materials:

a. Wrap the instrument in heavy paper or plastic. (If shipping to a Hewlett-Packard office or service center, attached a tag indicating the type of service required, return address, model number, and full serial number.)

b. Use a strong shipping container. A doublewall carton made of 250-pound test material is adequate.

c. Use enough shock-absorbing material (3-to-4 inch layer) around all sides of the instrument to provide firm cushion and prevent movement inside the container. Protect the control panel with cardboard.

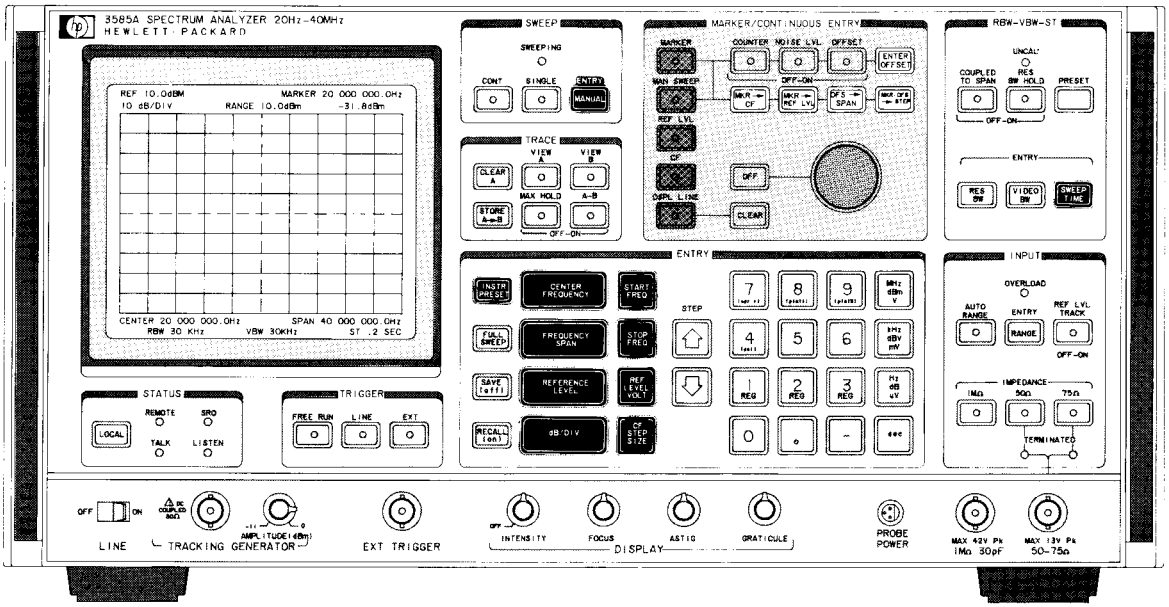
d. Seal the shipping container securely.

e. Mark the shipping container FRAGILE to assure careful handling.

SECTION III
OPERATION OVERVIEW

SECTION III
OPERATION OVERVIEW

This section provides an overview of the 3585A and general information concerning its major performance capabilities and operating features. Full details concerning -hp- 3585A operation can be found in the Operating Manual. Contents of the overview are as follows:



The 3585A Front Panel

3-1. PERFORMANCE SUMMARY AND DESCRIPTION

The Model 3585A is a high-performance, easy-to-use spectrum analyzer, covering the 20 Hz to 40.1 MHz frequency range. It can be used as a stand-alone bench instrument for signal-analysis and network-analysis applications; or, through its HP-IB interface, it can be linked to a computing controller and up to thirteen other HP-IB instruments to form a powerful automatic measurement system.*

3585A PERFORMANCE SUMMARY

FREQUENCY:

Measurement Range:

20 Hz to 40.1 MHz

Displayed Range:

0 Hz to 40.1 MHz full span

Resolution:

3 dB bandwidths of 3 Hz to 30 kHz in a 1, 3, 10 sequence

Manual Frequency Accuracy:

± 0.1 Hz $\pm$ 1 x 10^{-7}/mo.

Marker Accuracy:

Normal $\pm$ 0.2% of Frequency Span $\pm$ Resolution Bandwidth

Counter $\pm$ 0.3 Hz $\pm$ 1 x 10^{-7}/mo.

AMPLITUDE:

Measurement Range:

-137 dBm to $+$ 30 dBm (50Ω or 75Ω)

Displayed Range:

10, 5, 2, 1 dB/DIV over a 10 division scale

Dynamic Range:

Harmonic distortion and third order intermodulation distortion > 80 dB below signal ≤ to the Range Setting.

Average Noise Level:

< -137 dBm in the 3 Hz Resolution Bandwidth

Accuracy:

Best achievable accuracy over the measurement range is $\pm$ 0.4 dB to $\pm$ 1.3 dB depending on the level.

SWEEP:

Time:

0.2 sec. to 59,652 hrs.

INPUT:

Signal Inputs:

Terminated 50/75Ω; return loss > 26 dB

High-Impedance 1 MΩ; $\pm$ 3% shunted by < 30 pf

Max. Input Level:

50/75Ω; + 30 dBm (1 watt)

1 MΩ; 42 V Peak

OUTPUTS:

Tracking Generator:

0 dBm to $-$ 11 dBm (50 ohms)

Display:

X, Y, and Z outputs for auxiliary CRT display

Plotter:

Horizontal sweep output (x), video output (y), and penlift/blanking output to drive an X-Y recorder.

INSTRUMENT STATE STORAGE:

Up to three sets of user-defined control settings may be saved and recalled.

REMOTE OPERATION:

All analyzer control settings (with the exception of line, tracking generator amplitude and display) can be programmed via the Hewlett-Packard Interface Bus (HP-IB).*

*Hewlett-Packard Interface Bus (HP-IB) is -hp-'s implementation of IEEE Standard 488-1975 and identical ANSI Standard MC1.1, "Digital Interface for Programmable Instrumentation".

3-2. TURN ON AND WARMUP

Before applying ac line power to the 3585A, make certain that the rear-panel VOLTAGE SELECTOR switch is in the position that corresponds to the voltage and frequency of the ac power source. Also verify that the proper line fuse is installed in the rear-panel fuse holder (see Section II).

The 3585A specifications are met after a 20-minute warmup at the ambient operating temperature.

3-3. Frequency Reference

The 3585A can be operated using its own internal Oven Reference or an external frequency reference. The internal or external frequency reference must be connected to the rear-panel EXT REF IN connector.

3-4. Internal Oven Reference

The 3585A is equipped with a temperature-stabilized, crystal-controlled 10 MHz reference oscillator, whose output is available at the rear-panel OVEN REF OUT connector. The frequency accuracy of this internal Oven Reference is expressed as a time coefficient of 10 MHz $\pm$ 1 x 10^{-7} per month, relative to the time the instrument is shipped from the factory or the reference frequency is adjusted using the procedure outlined in Volume One of the Service Manual. The Oven Reference time coefficient is included in the Counter and Manual frequency accuracy specifications.

To use the internal Oven Reference, connect the BNC to BNC jumper (supplied with the instrument) between the rear-panel OVEN REF OUT and EXTERNAL REF IN connectors.

NOTES

1. Power is applied to the internal reference oven only when the LINE switch is in the ON position. The 3585A does not have a "standby" mode.

2. The output of the internal Oven Reference is **disabled** *until the oven reaches the proper operating temperature. During the oven warmup cycle, there is no signal applied to the EXT REF IN connector; so the 3585A's master oscillator runs in the open-loop mode in which the frequency accuracy is unspecified. When the oven reaches the proper operating temperature (about ten minutes after turn on), the Oven Reference is automatically enabled. At that time, the beeper sounds and the message, "L.O. UNLOCKED" momentarily appears on the CRT screen. The message disappears as soon as the master oscillator is phase-locked to the Oven Reference.*

3-5. External Reference

For applications requiring optimum frequency accuracy, the 3585A can be phase locked to an external frequency standard. The external reference frequency must be 10 MHz or any subharmonic down to 1MHz (±5 ppm); and the amplitude must be within the range of 0 dBm to + 15 dBm (50 ohms). The frequency accuracy of the external reference may be substituted for the Oven Reference time coefficient in the Counter and Manual frequency-accuracy specifications. To avoid performance degradation, the phase noise and spurious content of the external reference signal must be at least −110 dBc (1 Hz) relative to 10 MHz) at a 20 Hz to 1 kHz offset.

To use an external reference:

1. Remove the jumper from between the rear-panel OVEN REF OUT and EXTERNAL REF IN connectors.

   (To keep from losing the jumper, you may connect one end of it to any unused rear-panel connector.)

2. Using a shielded cable equipped with BNC connectors, connect your external reference to the EXTERNAL REF IN connector.

   (When the reference is initially connected, the beeper will sound and the "L.O. UNLOCKED" message will appear on the screen. The message will continue to be displayed until the master oscillator is properly phase-locked to the external reference.)

3-6. Operational Verification

The 3585A automatically performs an internal operational verification test and calibration during its turn-on sequence and also when the [INSTR PRESET] key is pressed. This internal test verifies that most of the analog and digital circuitry is operating properly; but it does not verify that the 3585A meets its published specifications. In the event of a test failure, the instrument's beeper will sound and, in most cases, a Calibration Error Code or failure message will appear on the CRT screen.

NOTE

The beeper will sometimes sound as a result of the local oscillator being unlocked during the instrument's turn-on sequence; but this initial "beep" does not constitute a test failure. To perform the verification test, allow the instrument to warmup for about two minutes and then press [INSTR PRESET] *. If this causes the beeper to sound, the instrument is either defective or in need of adjustment. Contact a qualified service technician or return the 3585A to -hp- for service.*

3-7. FRONT PANEL FEATURES

Even a casual glance at the front panel reveals that the 3585A is more than just an ordinary spectrum analyzer. One of the first things you will observe is that the front panel is almost completely devoid of the normal "analog" controls and dials found on traditional instruments. In place of these controls are pushbutton keys which are used to activate the various instrument functions and change the values of the operating parameters. The keys are conveniently arranged in functional groups called "control blocks". Each control block is labeled to assist the operator in locating the keys that are related to a specific parameter or function.

With its vast array of front-panel functions, the 3585A may at first appear to be quite complicated and difficult to operate. It is, of course, a very compact and sophisticated piece of equipment, having 70 keys, one knob and a large CRT screen in about 124 square inches of front panel. Despite its appearance, you will quickly discover that the 3585A is very easy to operate. It is actually easier to use than most oscilloscopes and almost as straightforward as an auto-ranging digital voltmeter.

You will have no trouble learning to operate the 3585A regardless of your range of experience with spectrum analyzers. By taking full advantage of the 3585A's automatic features, the inexperienced user can confidently make almost any type of signal-analysis measurement using a simple six-step procedure outlined in Chapter 2 of the Operating Manual.

If you are experienced in the use of traditional spectrum analyzers, you will immediately recognize most of the 3585A's operating parameters. While you may have some initial reservations about automatic features and the keyboard control over what is actually an "analog" instrument, your reservations will soon diminish as you discover the ease with which you can make sophisticated measurements and, at the same time, have complete flexibility and finger-tip control over every operating parameter and function. You will also appreciate the "human engineering" aspects that have carefully been incorporated in the design of the 3585A.

THE GREEN BUTTON [INSTR PRESET]

If there is any one key that stands out among all the rest, it is the green INSTR PRESET (Instrument Preset) key, located in the ENTRY control block. This key represents one of the most important aspects of operation and is probably the key that is most frequently used. It is neither a "panic button" nor a device to reset the processors, although it could perform these functions if they were required. Its primary purpose is simply to provide a convenient starting point for almost any type of measurement that you wish to perform. Even the most experienced operators (including the instrument's designers) normally begin their measurements with [INSTR PRESET] .

The [INSTR PRESET] key performs the following functions:*

a. Forces all parameters and functions to their turn-on states.

b. Restores a full 0 Hz to 40 MHz Frequency Span, with Resolution and Video Bandwidths of 30 kHz and a 0.2-second continuous sweep.

c. Activates all automatic and coupled functions.

d. Optimizes the Reference Level coupling and the Bandwidth/Sweep-Time coupling.

e. Activates the Terminated input and selects the 50-ohm IMPEDANCE setting.

f. Initiates an internal test sequence and an Automatic Calibration.

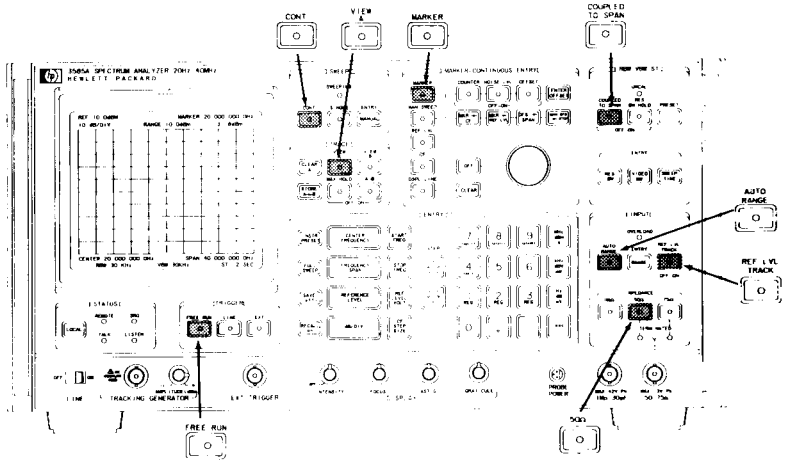
Presetting does not destroy the trace that is stored in Trace Memory "B"; and it does not erase the instrument-state storage registers in which control settings may have previously been stored.

Parameters

Range	+30 dBm*
Reference Level (REF)	+30 dBm
Vertical Scale (dB/DIV)	10 dB/DIV
Frequency Span (SPAN)	40 MHz
Center Frequency (CENTER or CF)	20 MHz
Start Frequency (START)	0.0 Hz
Stop Frequency (STOP)	40 MHz
Resolution Bandwidth (RBW)	30 kHz
Video Bandwidth (VBW)	30 kHz
Sweep Time (ST)	0.2 SEC.
Marker Frequency	20 MHz
Offset Register	0 Hz; 0 dBV

*With no input signal, the instrument automatically downranges to -25 dBm. With REF LVL TRACK activated, the Reference Level changes along with the Range setting.

Functions



Parameters and Functions Selected By [INSTR PRESET]

*The [INSTR PRESET] function is also used to activate instrument Test Modes and "pop" the instrument's Central Processor for certain types of diagnostic tests. These functions are fully described in Volume Two of the Service Manual.

FULL SWEEP PRESET [FULL SWEEP]

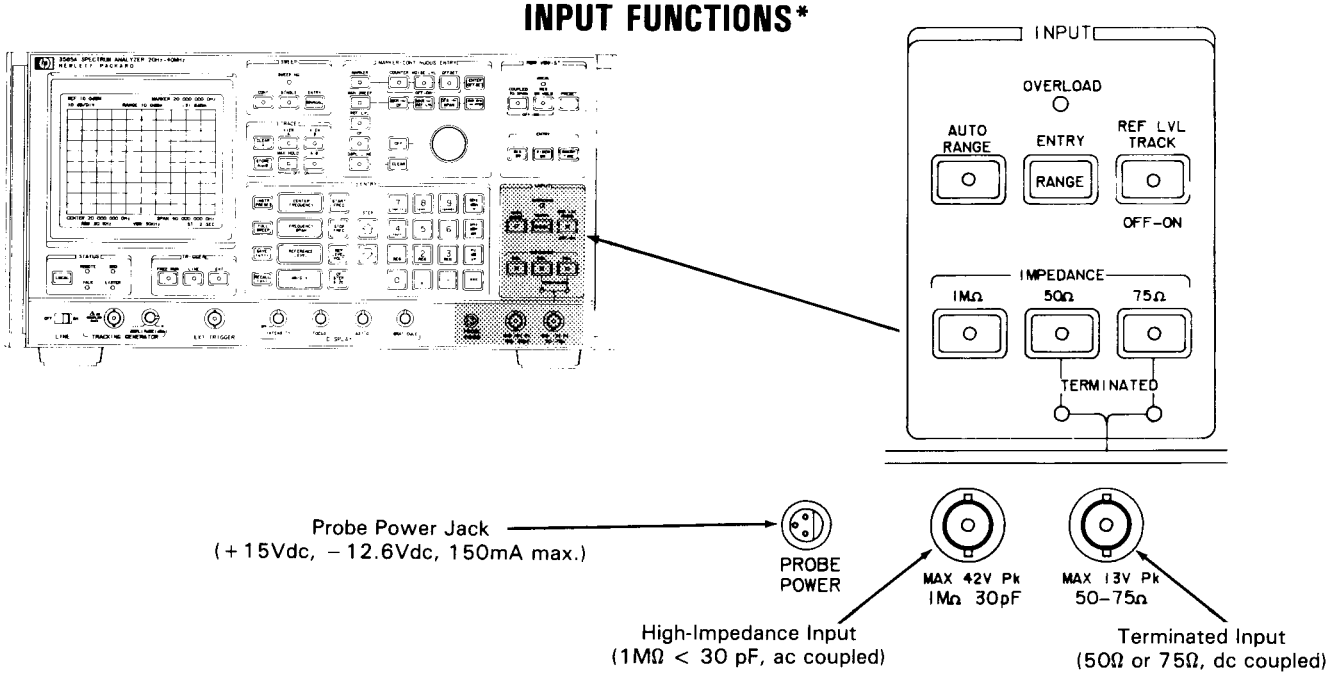
After completing a measurement with a narrow Frequency Span, it is sometimes desirable to return to a full 0 Hz to 40 MHz Span to locate the next signal to be measured without presetting the entire instrument. This can be done by pressing [FULL SWEEP] . The FULL SWEEP function does nothing but set the Center Frequency to 20 MHz and the Frequency Span to 40 MHz. It does not change the Marker position, erase Offsets, activate or deactivate any front-panel functions or change the values of the operating parameters.(With [COUPLED TO SPAN 0] activated, the RBW, VBW and Sweep Time parameters are coupled to Frequency Span and may, therefore, change when [FULL SWEEP] is pressed. The change in Center Frequency and/or Resolution Bandwidth caused by pressing [FULL SWEEP] initiates an Automatic Calibration.)

THE BEEPER

The 3585A communicates with the operator via alphanumeric messages that appear on the CRT screen. To call the operator's attention to these messages, it is equipped with an audible alerting device, called the "beeper", which produces a gentle (yet penetrating) high-pitched "beep" tone. The beeper sounds a single "beep" whenever a message of importance initially appears on the screen; and "beeps" again whenever the condition that produces the message is repeated. The beeper also sounds whenever an error is detected in the internal test routine that is performed during the turn-on sequence and each time the instrument is preset.

The beeper is automatically enabled by [INSTR PRESET] . It can be disabled by entering [SAVE (off)] [5] ; and reenabled by entering [RECALL (on)] [5] .

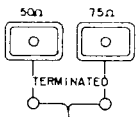
INPUT FUNCTIONS*



CAUTION

1. The Terminated input is dc coupled. Peak (combined ac/dc input) levels exceeding ±13 volts will "trip" the internal protection circuit causing the input to open, but such levels may also damage the input circuitry.

2. RF input levels exceeding ±5.25 volts peak may damage the High-Impedance input circuitry. The combined ac/dc input level applied to the High-Impedance input must not exceed ±42 volts peak.



Activate Terminated input and select 50Ω or 75Ω dc-coupled termination. Also used to select 50Ω or 75Ω calibration impedance for dBm measurements at the High-Impedance input.

Lights indicate that Terminated input is terminated in 50Ω or 75Ω, and also indicate the calibration impedance.

Activates High-Impedance input; deactivates Terminated input.

Sets RANGE automatically as a function of the composite ac input-signal level.

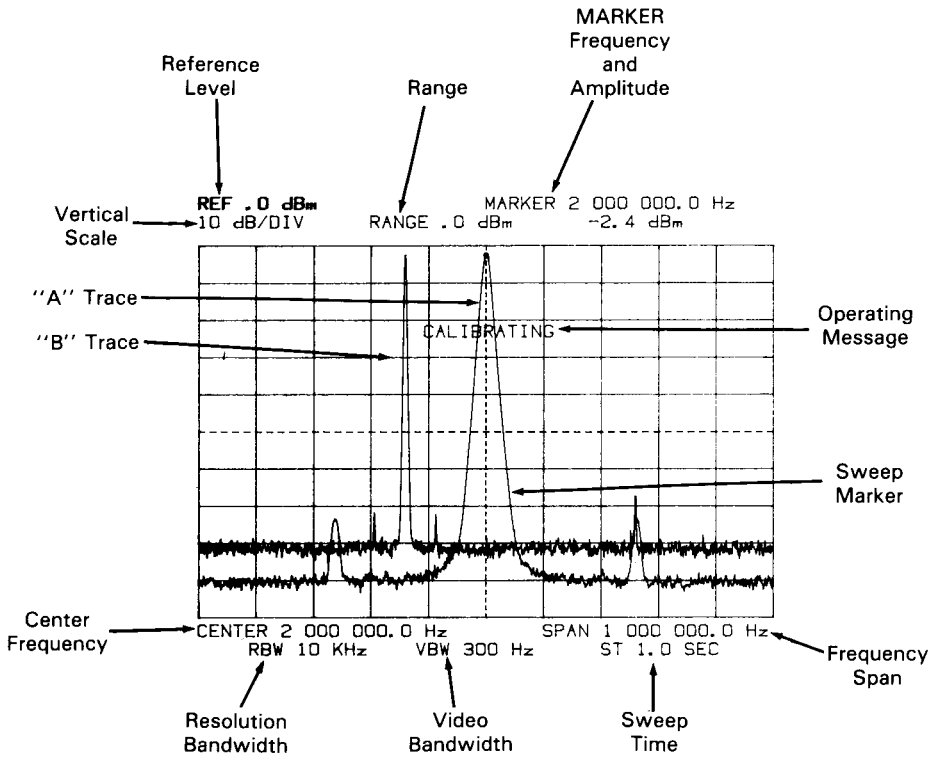
Deactivates AUTO RANGE ; prefaces RANGE, enabling it to be changed with STEP keys.

Lights when ac input-signal level exceeds RANGE setting.

Couples Reference Level (amplitude of top graticule line) to RANGE. Initially sets Reference Level equal to RANGE to maintain on-screen display. The Reference Level can be set equal to RANGE at any time by turning REF LVL TRACK off and then back on.

*See Operating Manual (Chapter 4) for additional information.

CRT DISPLAY OVERVIEW*



The CRT (Cathode Ray Tube) displays:

a. Graphic traces of amplitude-versus-frequency:

Two digitally-stored graphic traces, read out of Trace Memories "A" and/or "B", are written onto the CRT screen at a rapid, flicker-free rate. Each trace is a point-by-point plot, consisting of 1,001 equally-spaced points, connected by straight lines. Trace Memory "A", containing the Current ("A" or "A-B") Trace, is updated by the frequency sweep or at the Manual measurement point by real-time video samples taken at the Manual frequency. Trace Memory "B" is updated only by transfer from Trace Memory "A" with [STORE A→B] .

*See Operating Manual (Chapter 6) for additional information.

b. Markers:

1. Tunable Marker:

Positioned with MARKER ◯, MAN SWEEP ◯, or by otherwise changing the Manual frequency. Used for direct measurement of on-screen responses or for real-time measurements in the Manual mode.

2. Stationary (Offset) Marker

With OFFSET activated, the stationary marker appears at the point on the CRT trace that represents the Offset reference frequency.

3. Sweep Marker:

Displayed, when Sweep Time is ≥ 1 second, to indicate the position of the frequency sweep.

c. Display Line:

When the DSPL LINE function if activated, a horizontal Display Line appears on the CRT screen. The Display-Line amplitude can be adjusted with DSPL LINE ◯ to measure the trace amplitude in "dB" relative to the Reference Level (top graticule line).

d. Measurement Data:

The Frequency/Amplitude readout, in the top-right corner of the CRT screen, displays the Marker, Counter, Manual or Offset frequency and amplitude or the Display-Line amplitude, depending on which MARKER/CONTINUOUS ENTRY functions are activated.

e. Current values of all pertinent operating parameters.

f. Operating Messages:

1. Status Messages; e.g., "CALIBRATING"

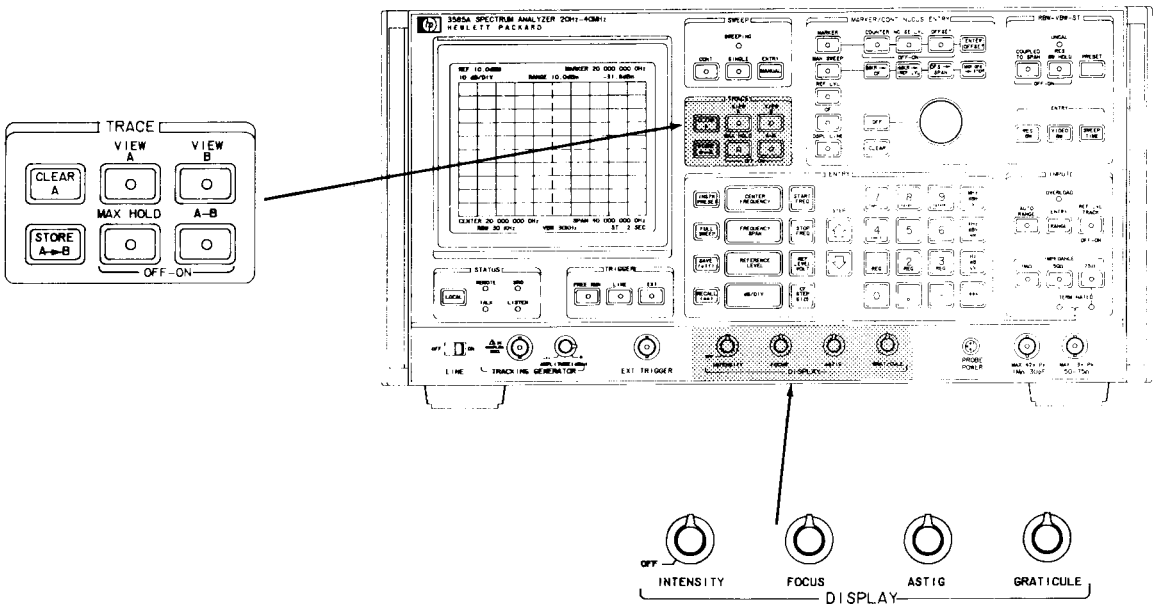
2. Entry Requests; e.g., "ENTER REG. NUMBER"

3. Operator Error Messages; e.g., "OUT OF RANGE"

4. Calibration Error Codes; e.g., "CALIBRATION ERROR 01"

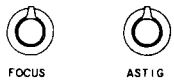
g. Externally-generated graphics and alphanumerics, remotely entered via the HP-IB.

DISPLAY ADJUSTMENTS AND TRACE FUNCTIONS*



Display Adjustments:

Controls the intensity of all CRT writing. Minimum intensity (OFF) blanks the CRT.



Adjust for optimum sharpness and clarity of CRT image.

Controls background illumination.

Trace Functions:

Displays Current ("A" or "A-B") Trace stored in Trace Memory "A".

Nondestructively transfers the Current Trace to Trace Memory "B" where it is safely kept until a different trace is stored or the instrument is turned off.

Displays trace that is stored in Trace Memory "B".

Erases Trace Memory "A". Resets and automatically rearms Continuous sweep; terminates Single sweep.

Subtracts "B" Trace from current "A" Trace and writes the difference into Trace Memory "A" to produce the "A-B" Trace.

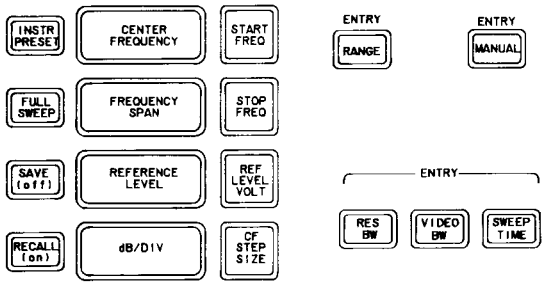
Causes the Current Trace to retain the maximum positive video amplitude that occurs over succesive frequency sweeps or at the Manual measurement point.

*See Operating Manual (Chapter 6) for additional information.

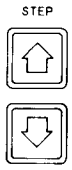
KEYBOARD ENTRY FUNCTIONS*

Entry Keys

Each of the 3585A's major operating parameters has a dark brown ENTRY key which, when pressed, prefaces that parameter. The prefaced parameter is highlighted on the CRT screen to indicate that its value can be changed using the STEP keys or the Number/Units keyboard.



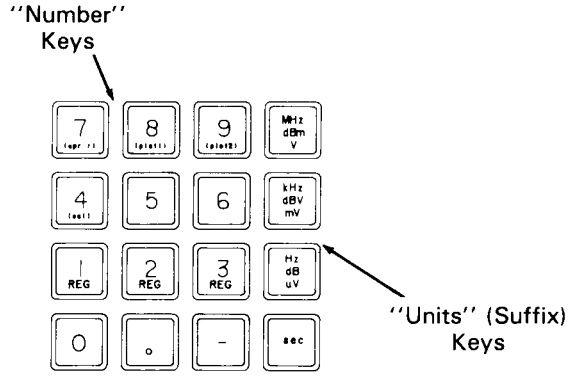
Step Keys



The STEP keys increment ⇧ or decrement ⇩ the value of the prefaced parameter. Each press of a STEP key produces a single step; multiple step changes can be made without reprefacing. Step sizes for all parameters except Center Frequency and Manual frequency are internally defined to either produce an appropriate amount of change or select the next available setting. Center and Manual frequency steps are equal to the Center-Frequency Step Size which can be set to any value within the range of 0 Hz to 40.1 MHz with 0.1 Hz resolution. Steps that would exceed the upper or lower limit of a parameter are not accepted.

Number/Units Keyboard

The value of any prefaced parameter (except RANGE) can be set exactly using the Number/Units keyboard. To numerically change the value of a prefaced parameter, simply enter the desired number using the "Number" keys and then terminate the entry by pressing the appropriate suffix (Units) key. The 3585A's free-entry format allows you to make your entries in the units that are the most convenient. Entries that exceed the limits of a parameter or attempt to select unavailable settings are not accepted.



*See Operating Manual (Chapter 5) for additional information.

SAVE (off)/RECALL (on) FUNCTIONS [SAVE (off)] [RECALL (on)]

[SAVE (off)] or [RECALL (on)] followed by [1 REG], [2 REG] or [3 REG], saves or recalls instrument state in Register 1, 2 or 3.

[SAVE (off)] [4 (cal)] disables Auto. Cal.*

[RECALL (on)] [4 (cal)] enables Auto. Cal. and forces Auto. Cal. cycle.

[SAVE (off)] [5] disables beeper.*

[RECALL (on)] [5] enables beeper and causes beeper to sound.

[RECALL (on)] [6] initiates Instrument Test Mode entry sequence. (See Volume Two of the Service Manual.)

[SAVE (off)] [6] does nothing.

[SAVE (off)] [RECALL (on)] [7], [8] and [9] are plotter functions (see Operating Manual).

*Auto. Cal. and beeper are automatically enabled by [INSTR PRESET].

Instrument-State Storage

To save time when making a series of measurements requiring different control settings, the SAVE key can be used to store the current operating parameters and states of the front-panel functions in Register 1, 2 or 3. The stored parameters and functions can then be recalled at any time using the RECALL key. The contents of the Instrument-State Storage Registers are retained until different settings are stored or the instrument is turned off.

Example:

Save the current instrument state in Register 1 by pressing [SAVE (off)] [1 REG].

Press [INSTR PRESET] or otherwise change the instrument state.

Recall the stored settings by pressing [RECALL (on)] [1 REG].

Things That Are Saved:

a. Operating Parameters:

Range (if AUTO RANGE deactivated)
Reference Level (and amplitude display units)
Vertical Scale (dB/DIV)

Frequency Span
Center Frequency
Manual frequency (if in Manual mode)
Center-Frequency Step Size

Resolution Bandwidth
Video Bandwidth
Sweep Time

b. States of all front-panel functions having LED indicators.

c. Marker position

d. Display-Line amplitude

e. Offset reference frequency and amplitude (whether or not OFFSET on)

Things That Are Not Saved:

a. CRT traces

b. "On" states of momentary-contact functions; e.g., MKR→CF .

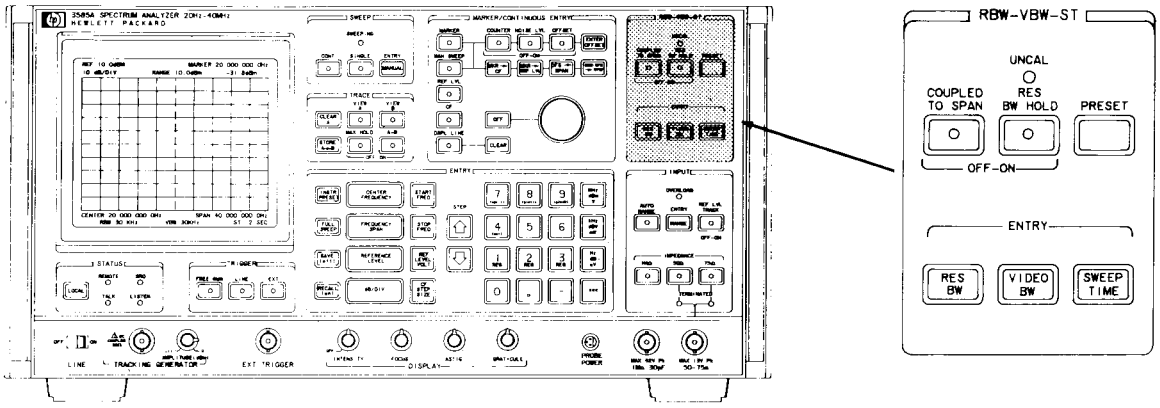
d. Other SAVE (off) / RECALL (on) functions:

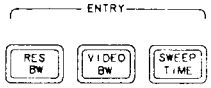
Calibration disabled
Beeper disabled
Test modes
Plotter functions

e. Prefaced parameter

f. HP-IB Status (as indicated by STATUS lights)

BANDWIDTH AND SWEEP TIME FUNCTIONS*





The ENTRY keys preface the Resolution Bandwidth (RBW), Video Bandwidth (VBW) or Sweep Time (ST) parameter. The prefaced parameter can be changed by Step Entry or Numeric Entry.

Couples RBW to Frequency Span; couples VBW to RBW; automatically adjusts Sweep Time according to RBW, VBW and Frequency Span. (The INSTR PRESET function activates COUPLED TO SPAN, deactivates RES BW HOLD and optimizes the RBW, VBW ST coupling.)

Prevents the RBW *and* VBW from changing as a function of Frequency Span. It also prevents RBW (but not VBW) from changing when the PRESET key is pressed. (Does not prevent Step or Numeric RBW/VBW changes.)

Restores optimum RBW, VBW and Sweep Time settings. (If RES BW HOLD is activated, the PRESET key restores the optimum VBW and Sweep time; but does not affect the RBW).

Lights when manually-selected sweep rate too fast to maintain calibration. (Accuracy specifications are met *only* when this light is out.)

*See Operating Manual (Chapter 7) for additional information.

OPERATION WITH BANDWIDTH/SWEEP TIME COUPLING:

To begin a measurement, the operator normally presses [INSTR PRESET]. This activates [COUPLED TO SPAN], deactivates [RES BW HOLD] and sets the Frequency Span to 40 MHz. It also sets the RBW and VBW to 30 kHz and the Sweep Time to 0.2 seconds. These are the preferred or "optimum" settings for the full 40 MHz Span.

After connecting the signal source, the operator adjusts the Center Frequency and Frequency Span (or Start and Stop Frequencies) to display the signals of interest. During this process, the Resolution Bandwidth is automatically narrowed as a function of Frequency Span to maintain a good aspect ratio and provide an appropriate amount of frequency resolution. Since the Video Bandwidth is coupled to Resolution Bandwidth, it changes along with the RBW to maintain proportional display smoothing. The Sweep Time is mathematically calculated according to the RBW, VBW and Frequency Span, and is automatically adjusted to maintain the maximum-calibrated sweep rate or the analyzer's minimum Sweep Time of 0.2 seconds.

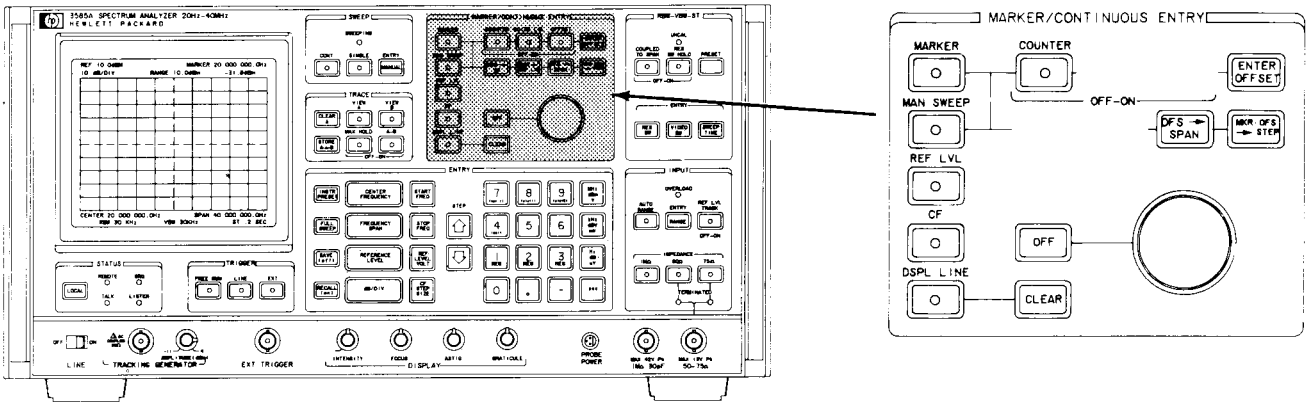
Once the frequency parameters have been set, the operator can freely adjust the RBW and/or VBW settings to obtain the required resolution, sensitivity and display smoothing. With optimized Sweep Time coupling, the Sweep Time is automatically adjusted to maintain the optimum sweep rate. If desired, the Sweep Time can be increased from the optimum setting to minimize the effects of sweep dynamics; or it can be decreased (at the cost of calibration) to quickly survey the spectrum of interest.

The coupling system is very flexible and will allow the operator to select any available RBW, VBW, Sweep Time combination. It will then remember and, where possible, maintain the relationships established by the operator. The optimum settings can be restored by pressing the [PRESET] key.

For applications such as horizontal expansion, it is desirable to maintain a specific RBW setting and adjust the Frequency Span, while allowing the coupling system to automatically adjust the Sweep Time. This can be done by activating the [RES BW HOLD] function.

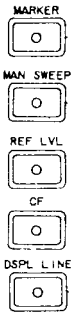
If the operator does not wish to use the coupling system, it can be completely disabled by deactivating the [COUPLED TO SPAN] function. (The UNCAL indicator and PRESET key are operative whether or not the [COUPLED TO SPAN] function is activated.)

MARKER/CONTINUOUS ENTRY FUNCTIONS*



Continuous Entry Functions

The Continuous Entry control is a multi-purpose "digital potentiometer" whose function is selected using the Continuous Entry keys. (Only one Continuous Entry Function can be activated at a time.) It can be used with:



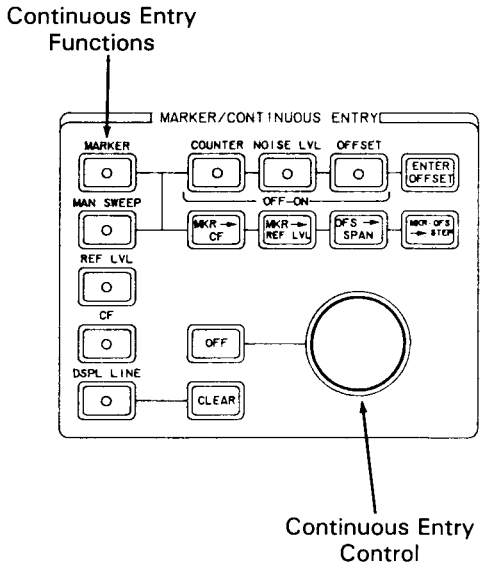
to position the tunable Marker for measurement of on-screen responses.

to tune the Manual frequency.

to adjust the Reference Level.

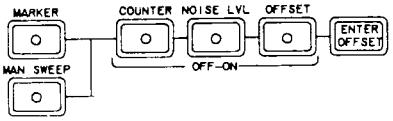
to adjust the Center Frequency.

to adjust the Display-Line amplitude.



*See Operating Manual (Chapter 8) for additional information.

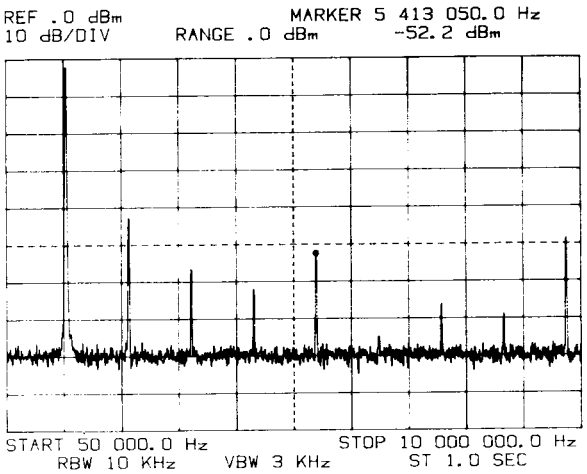
Marker/Manual Measurement Functions



Marker

Measure absolute frequency and amplitude of on-screen responses with MARKER

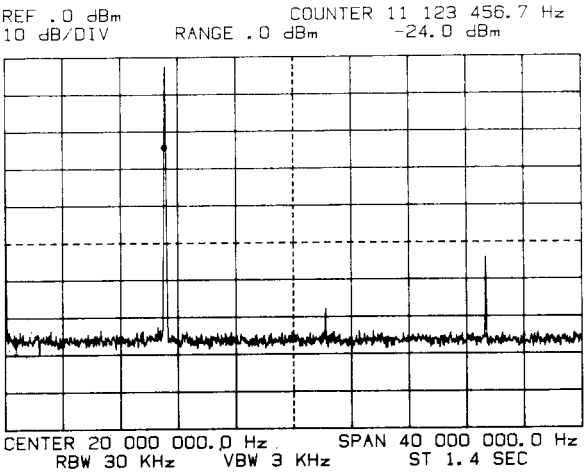
(The Marker amplitude can be displayed in dBm (50Ω or 75Ω), dBV or rms volts. The Marker's frequency resolution and accuracy is limited by the point-by-point display and sweep dynamics.)



Counter

Use the COUNTER function to precisely measure the frequency of the signal that is producing the response on which the Marker is positioned.

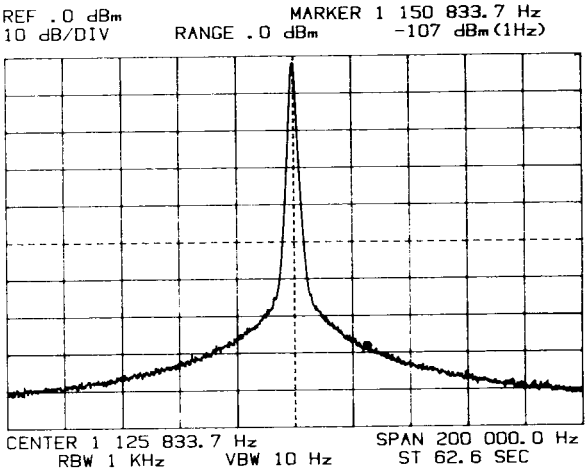
(The Counter, unaffected by display resolution and sweep dynamics, displays the true frequency at the peak of the response. The Marker does not need to be at the peak of the response, but it must be at least 20 dB above the noise and 20 dB above any unresolved signal.)



Noise Level

The NOISE LVL function provides a direct real-time reading of the rms random noise spectral density at the Marker or Manual frequency, normalized to a 1 Hz noise power bandwidth. All correction factors are included in the internal noise-measurement routine.

(Absolute noise level readings are displayed in "dBm (1 Hz)", "dBV (1 Hz)" or "V Hz". Relative (Offset) noise readings are displayed in "dB (1 Hz)". Noise measurement times range from 0.3 seconds to 33 seconds, depending on the Resolution Bandwidth setting.)

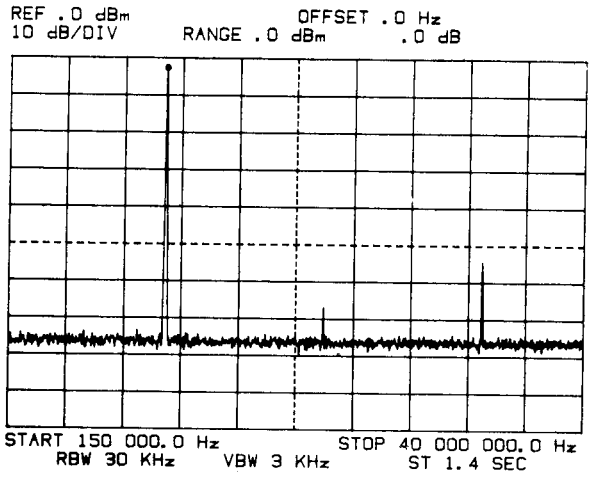


Offset Function

The OFFSET function allows you to quickly and easily measure the relative frequency and amplitude between two signals of interest or between any two points within the measurement range of the instrument. It can be used in conjunction with the MARKER or MAN SWEEP function to make relative measurements at the Marker or Manual frequency; it will operate with the COUNTER function to count the frequency difference between two signals; and it will also operate in conjunction with the NOISE LVL function to measure signal-to-noise ratio.

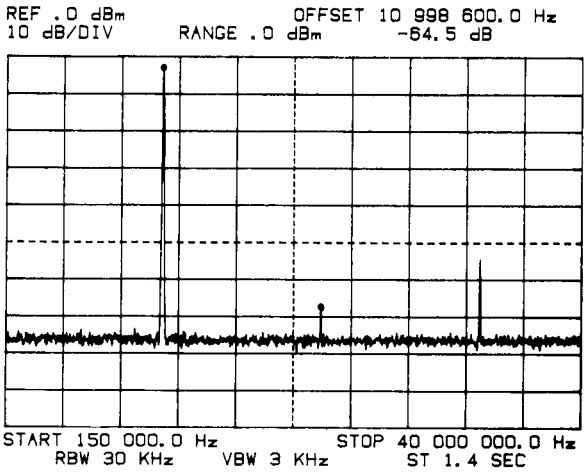
For example, to measure the frequency and amplitude of a harmonic relative to the fundamental:

a. Set the Marker to the peak of the fundamental response with MARKER, activate OFFSET and then press ENTER OFFSET.

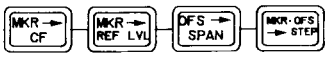


b. Set the Marker to the peak of the harmonic response with ◯; observe the "OFFSET" reading.

(Offset amplitude readings are displayed only in "dB". A stationary marker remains at the point on the CRT trace that represents the Offset reference frequency.)



Marker/Offset Entry Functions



The Marker/Offset entry functions are time saving, single-key operating aids which allow the operator to quickly perform frequently used manipulations such as centering a signal and moving it to the top of the screen. They also make it easy to enter an arbitrary Frequency Span, "zoom-in" on a signal of interest or enter the Center-Frequency Step size:

Sets the Center-Frequency equal to the current Marker, Counter or Manual frequency, and moves Marker to the Center-Frequency point on the CRT trace.

(To quickly move a response to the center of the screen, set the Marker to the peak of the response with 

and then press 

.)

Sets Reference Level equal to Marker amplitude.

(To move a response to the top of the screen, simply set the Marker to the peak of the response and press 

.)

Sets Frequency Span equal to displayed "Offset" frequency. Operates only when OFFSET function is activated.

(Set the Marker to the desired Start Frequency, activate 

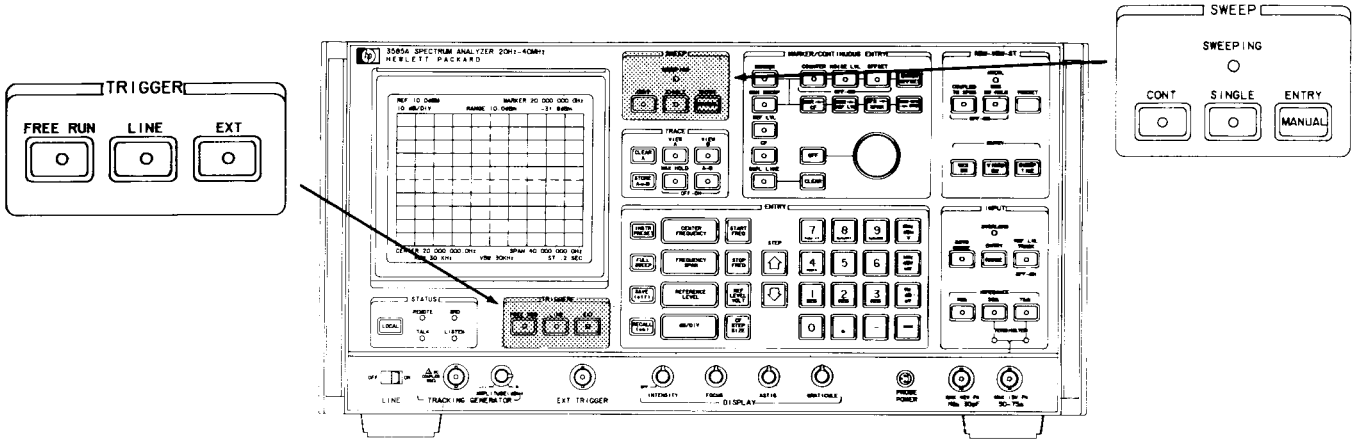
, press 

; move the Marker to the desired Stop Frequency and press 

.)

Sets the Center-Frequency Step Size (also Manual frequency step size) equal to the Marker, Counter, Manual or Offset frequency, whichever is being displayed.

SWEEP AND TRIGGER FUNCTIONS



Sweep Functions:

SWEEPING ○ — Lights to indicate that a frequency sweep is in progress. Goes out between sweeps and during mid-sweep interruptions.

CONT ○ — Repetitive frequency sweeps synchronized by sweep trigger. Upon completion of each sweep, the sweep is automatically rearmed and a new sweep is initiated on receipt of a sweep trigger. Pressing CONT ○ resets the sweep that is currently in progress (except when switching from Single).

SINGLE ○ — Single frequency sweep initiated by sweep trigger. Once a Single sweep has terminated, it resets to the Start Frequency to await rearming. Pressing SINGLE ○ (except when switching from Cont.) resets and/or rearms the sweep, enabling a new sweep to be initiated by a sweep trigger.*

ENTRY MANUAL — Selects Manual mode; automatically activates MAN SWEEP ○ ; sets Manual frequency equal to current Marker frequency; prefaces Manual frequency, enabling it to be changed by Step or Numeric Entry.

Trigger Functions:

FREE RUN ○ — Sweep automatically triggered after rearming.

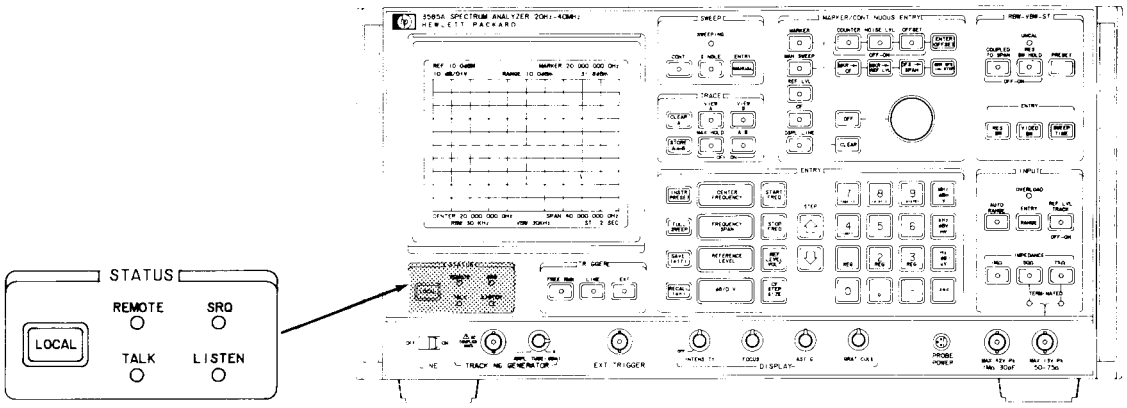
LINE ○ — Sweep internally triggered at power-line frequency (48 Hz to 440 Hz).

EXT ○ — Sweep triggered by High-to-Low transition or contact closure at EXT TRIG input.*

EXT TRIGGER — High = open or +2.0V to +35V; Low = short to ground (outer shell) or +1.3V to −35V. Sweep triggered by High-to-Low transition; triggers are accepted only after the sweep has been rearmed. (Rearming time ranges from about 25 milliseconds to 2.4 seconds, depending on RBW/VBW settings.) Triggers applied during a sweep or during rearming are ignored.

*Sweep rearming and triggering operations are inhibited during Automatic Calibrations and also while operating parameters are being changed.

HP-IB STATUS FUNCTIONS*



REMOTE ○ Lights to indicate that the 3585A is in the Remote control mode. This mode can be entered only via the HP-IB.

(When the 3585A is in Remote, all front-panel functions except the LINE switch, the DISPLAY controls, the Tracking Generator AMPLITUDE control and the LOCAL key are disabled. Pressing any key (except [LOCAL] or [INSTR PRESET]) or rotating the Continuous Entry control will cause the beeper to sound and the message, "HP-IB REMOTE SET" to appear on the CRT screen.).

[LOCAL] Returns the 3585A to Local and reenables all front-panel functions. An HP-IB Local Lockout will disable [LOCAL] until a remote Return To Local command is given, or the LINE switch is turned off and then back on.

(Pressing [LOCAL] during an HP-IB Local Lockout causes the beeper to sound and the message, "HP-IB LOCAL LOCKOUT" to appear on the CRT screen.)

LISTEN ○ Lights to indicate that the 3585A is addressed to listen.**

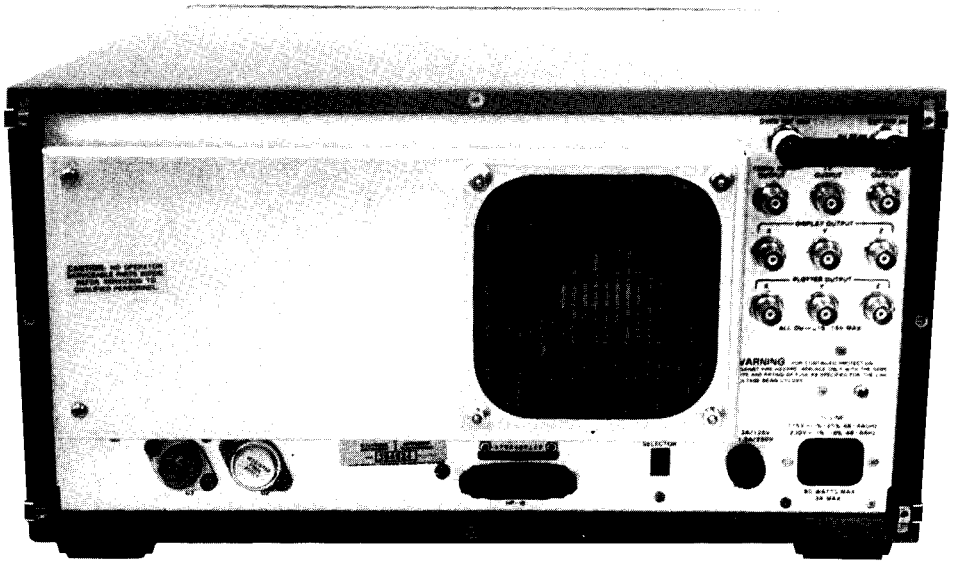
TALK ○ Lights to indicate that 3585A is addressed to talk.

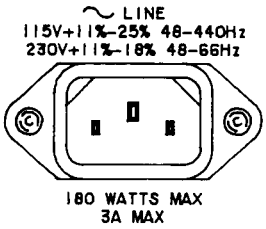
Lights to indicate that the 3585A is generating an HP-IB Service Request.

*HP-IB operation is fully described in the Operating Manual.

**The LISTEN or TALK light will remain on (even in Local) until the 3585A is unaddressed via the HP-IB or is turned off and then back on.

3-8. REAR-PANEL FEATURES

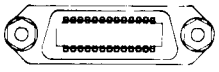




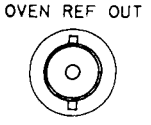
AC Line Input Connector: Accepts power cord supplied with instrument.

AC Line Fuseholder.

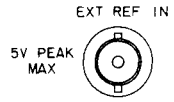
Line Voltage Selector Switch.



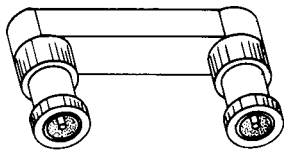
HP-IB Connector: Used to interface the instrument with the Hewlett-Packard Interface Bus (HP-IB) for remote operation. Remote operation is described in the Operating Manual.



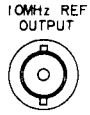
The OVEN REF OUT supplies a 10 MHz ± 1 x 10^{-7} per month sinusoidal frequency reference from an internal crystal oscillator, located in a temperature-controlled oven. The output is ac coupled and the output impedance is 50 ohms. The nominal output level is +10 dBm/50 ohms. The output is disabled during the oven's warmup cycle. To use the internal Oven Reference, this output must be connected to the EXT REF IN jack.



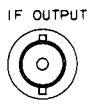
The EXT REF IN input allows the 3585A's master oscillator to be phase locked to the internal Oven Reference or an external frequency standard. The input is ac coupled and the input impedance is 50 ohms. The frequency of the reference signal applied to this input must be 10 MHz or any subharmonic down to 1 MHz (± 5 ppm), and the amplitude must be within the range of 0 dBm to $+15$ dBm (50 ohms). Dynamic range performance will be degraded unless the phase noise and spurious content of the reference signal is ≤ -110dBc (1 Hz) referred to 10 MHz at a 20 Hz to 1 kHz offset.



To use the internal Oven Reference, connect this BNC-to-BNC jumper between the OVEN REF OUT connector and the EXTERNAL REF IN connector.



The 10 MHz REF OUTPUT supplies a 10 MHz square wave that is phase locked to the reference frequency applied to the EXTERNAL REF IN connector. When the internal Oven Reference is used, the frequency accuracy is 10 MHz $\pm$ 1 x 10^{-7} per month. The output is transformer coupled, the output impedance is 50 ohms and the nominal output level is $+20$ dBm/50 ohms. This reference output can be used to phase lock an external signal source or another analyzer to the 3585A's frequency reference.



The IF OUTPUT is taken from a voltage divider which connects directly to the output of the 3585A's final IF filter. The output signal is a 350 kHz (nominal) sine wave, whose amplitude is linearily proportional to the amplitude of the input-signal component to which the 3585A is tuned. The output is ac coupled and the output impedance is approximately 450 ohms. When the signal amplitude is equal to the Reference Level and the Reference Level is $+10$ dB to -56 dB relative to the Range setting, the full-scale IF output level ranges from approximately 247 mV rms (-12.0 dBV) to 157 mV rms(-16.0 dBV), depending on the internal IF gain setting. The IF gain settability is limited to 4 dB steps and, because of the variable offsets that are introduced by the Automatic Calibration system, the IF gain and full-scale IF output level is not always the same for a given Reference Level setting. The full-scale IF output level will vary (over a 4 dB range) as a function of Reference Level, Range, Impedance and Resolution Bandwidth. Before using the IF Output in a critical measurement application, select the required operating parameters, force an Automatic Calibration and then *measure* the full-scale IF output level.

The IF Output can be used to drive an external detector (e.g., a voltmeter or wave analyzer) to obtain a linear video output which, in turn, can be used for audio monitoring in radio surveillance applications, or applied to the vertical input of a storage 'scope or X-Y Recorder for applications requiring a linear amplitude scale. The IF Output can also be connected to a true rms voltmeter, such as the -hp- Model 3403C, for making rms noise-level measurements.

(The 3585A's equivalent noise bandwidth is approximately 1.2 times the 3 dB bandwidth established by the Resolution Bandwidth setting. The 3 dB bandwidth has a specified tolerance of ±20% and must, therefore, be measured to obtain accurate results.)

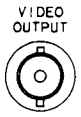
NOTES

1. The IF Output goes to its full-scale level (270 mV to 190 mV) during Automatic Calibration cycles.

2. The Video Output level is + 10 Vdc during Automatic calibrations.

3. If the video amplitude is more than ten divisions below the Reference Level, the Video Output will go negative. Maximum negative output levels are typically as follows:

dB/DIV	*Maximum Negative Output*
10	*– 0.5 Vdc*
5	*– 10.5 Vdc*
2 or 1	*– 13.5 Vdc*

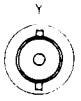
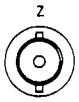


The VIDEO OUTPUT supplies a dc output voltage (prior to peak detection and digitizing) that is proportional to the "A" Trace video amplitude on the CRT screen. The Video Output is scaled to one volt per division, and the nominal output level ranges from + 10.0 Vdc at the Reference Level to 0.0 Vdc at ten divisions below the Reference Level. The output resistance is 1 kilohm, nominal. The output is diode clamped to ±15 Vdc and is internally fused at 62 mA, N.B.

The Video Output can be applied to an external analog-to-digital converter or digital voltmeter to obtain higher amplitude resolution than is provided by the CRT readouts; it can be used in conjunction with the "X" and "Z" PLOTTER outputs to make oscilloscope plots or X-Y recordings of the non peak-detected video signal; and, when connected to a high-impedance headset or amplifier through a coupling capacitor, it can be used to monitor the audio on an amplitude-modulated carrier. (Since the video amplitude is logarithmic, the audio obtained from the Video Output is quite distorted although intelligible enough for monitoring purposes.)

DISPLAY OUTPUTS

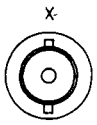
The DISPLAY outputs allow all of the CRT information to be displayed on an auxiliary CRT monitor, such as the -hp- Model 1310A Large Screen Display:

	Output Level (nominal)	Output Resistance (nominal)	Protection
			
	OV to +1 Vdc	1 kilohm	diode clamped to ±15 Vdc; internally fused at 62 mA, N.B.
	Beam Off: −0.5 Vdc* Beam On: +4.3 Vdc	47 ohms	diode clamped to ground and +5 Vdc; internally fused at 62 mA, N.B.

*The "Z" output is strictly a beam off/on function; there is no intensity modulation.

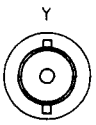
PLOTTER OUTPUTS

The PLOTTER outputs operate in conjunction with the 3585A's Plotter functions (described in the Operating Manual) to allow the CRT traces to be plotted with an external X-Y recorder or storage scope:



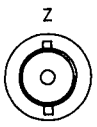
PLOTTER OUTPUT 'X' supplies a dc voltage that corresponds to the position of the 3585A's special Plotter sweep or the frequency sweep, depending on which Plotter function is being used. The output voltage ranges from 0 Vdc for the left edge to approximately +10 Vdc for the right edge. The maximum slew rate is about 0.6 volts per second, corresponding to a minimum Sweep Time of 17 seconds.

The output resistance is 1 kilohm, nominal. The output is diode clamped to ±15 Vdc and is internally fused at 62 mA, N.B.



PLOTTER OUTPUT 'Y' supplies a dc voltage that is proportional to the peak-detected CRT trace data read out of Trace Memory "A" or "B". The output voltage ranges from 0 Vdc at the bottom of the screen, to approximately +10.4 Vdc at the Reference Level, or about +10.64 Vdc at the upper limit of the vertical scale.

The output resistance is 1 kilohm, nominal. The output is diode clamped to ±15 Vdc and is internally fused at 62 mA, N.B.



PLOTTER OUTPUT 'Z' or pen down drive output supplies a polarized closure to ground (outer shell) through a silicon NPN transistor. The output is TTL compatible and is also capable of directly driving penlift coils that require a closure to ground for pen down.

Pen Down Output: +0.2 Vdc; 225 mA into +42 Vdc, maximum.
Pen Up Output: +4.4 Vdc, nominal.

(The output is internally pulled up to +5 Vdc through an isolation diode and a 4.7 kilohm resistor. Positive input voltages greater than +4.4 Vdc will reverse bias the isolation diode, causing the output to appear as an open circuit.)

The "Z" Output is protected by a 54-volt Zener diode to ground and is internally fused at 225 mA, N.B. Input voltages exceeding -0.6 Vdc or +54 Vdc will blow the fuse.

The X-Y recorder pen, connected to the "Z" Output, will go down approximately two seconds after the Plot 1 or Plot 2 function is activated, and will remain down until the end of the plot. If both traces are to be plotted (Plot 1 function) the pen goes up during retrace.

NOTE

The pen is not lifted during Automatic Calibration cycles. If you are plotting with the VIDEO OUTPUT or IF OUTPUT (externally detected) where the output goes to full-scale during Automatic Calibrations, it will be necessary to deactivate the Auto. Cal. to prevent your plot from being defaced when an Auto. Cal. occurs. The PLOTTER outputs are not affected by the Auto. Cal.