

# SECTION I

## INTRODUCTION & GENERAL DESCRIPTION

### 1-1 INTRODUCTION.

**1-1.1 PURPOSE.** This manual provides Operation and Service instructions necessary to set up, service, test, troubleshoot, and operate the Weinschel Corporation Model 8850, Attenuation Measurement System. The manual also provides component location, reference designators, part numbers, and nomenclature to identify all the assemblies and sub-assemblies of the Model 8850 (Figure 1-1).

**1-1.2 SCOPE.** This manual is to be used in conjunction with the operation and maintenance of the Model 8850, Attenuation Measurement System. The manual also provides a description of each system instrument; testing of the system; maintenance procedures to maintain the instruments; and troubleshooting to a system instrument or component.

**1-1.3 ARRANGEMENT.** The information contained in this manual is tabulated in the Table of Contents, List of Illustrations, and List of Tables. The manual is divided into five sections, listed as follows:

SECTION I	Introduction & General Description
SECTION II	Installation & Shipment
SECTION III	Theory & Operating Instructions
SECTION IV	Maintenance & Replaceable Parts List
SECTION V	Performance Testing, Calibration, & Troubleshooting

**1-1.4 RELATED MANUALS.** The following manuals contain information that may be used in conjunction with this manual to operate, service, or calibrate the Model 8850.

<u>Manual</u>	<u>Title</u>
H4-1 and H4-2	Federal Supply Code for Manufacturers Cataloging Handbook
IM-180	Operation and Service Manual Model VM-7 Attenuator and Signal Calibrator
IM-211	Quality Assurance Manual, Weinschel Corporation
IM-212	Operation and Service Manual Model 8852, Frequency Converter
IM-220	Operation and Service Manual Model 8300 Attenuator
IM-226	Operation and Service Manual Model 4380 & 4381, Synthesized CW Signal Source

IM-230      Service & Maintenance Instructions for Model 4380 and 4381 Synthesized CW Signal Sources

IM-249      Operation Manual, SWR Measurement Kit (P/N 187-4003)

**1-1.5 SAFETY CONSIDERATIONS.** The Model 8850 system components and all related documentation must be reviewed for familiarization with safety markings and procedures before any operation and/or service. Refer to the **SAFETY SUMMARY** located at the beginning of this manual for a summary of safety information and procedures. Following these simple safety precautions will ensure safe operation and service of the Model 8850.

### 1-1.6 CONTACTING WEINSCHTEL CORPORATION.

In the event of an instrument malfunction, contact Weinschel Corporation. An apparent malfunction of an instrument or component may be corrected over the phone by contacting the Customer Service Department at Weinschel Corporation. **DO NOT** send the instrument or component back to the factory without a Return Material Authorization (RMA) number. When it is necessary to return an item, state the symptoms or problems, catalog and type number of the instrument or component, serial numbers of the instrument or component(s) to be returned and date of original purchase. Also write the company name, your name, RMA number and phone number on an index card. Then attach the card to the instrument or component to be returned. Paragraph 2-3.1 provides information regarding packing and reshipment. Or contact Weinschel Corporation using the following:

**Via mail;**      Weinschel Corporation  
5305 Spectrum Drive  
Frederick, MD 21703-7362  
U.S.A.

**Via Telefax;**      301-831-4570

**Via Phone;**      Call TOLL FREE 800-638-2048  
toll call # 301-831-4701


**1-1.7 ABBREVIATIONS AND ACRONYMS.** The following list contains abbreviations used throughout this manual. Abbreviations and acronyms that are not listed conform with MIL-STD-12D.

ASSY      Assembly  
CW      Continuous Wave  
DUT      Device Under Test  
ESDS      Electrostatic Discharge Sensitive




Figure 1-1: Attenuation Measurement System, Model 8850


### 1-1.8 ELECTROSTATIC DISCHARGE SENSITIVE.


The equipment documented in this manual contains certain Electrostatic Discharge Sensitive (ESDS) components or parts. Therefore, certain procedures/steps are identified by the use of the symbol . This symbol is used in two ways:



### CAUTION

All procedures and/or steps identified as  must be followed exactly as written and according to ESDS device handling procedures in IM-210 or other accepted ESDS procedures. Failure to comply **WILL RESULT** in ESDS damage

a. When the ESDS symbol  is placed between a paragraph number and title, all of that paragraph, including all subparagraphs, is considered an ESDS device handling procedure.

b. When the ESDS symbol  is placed between a procedure/step number and the text, all of that procedure is considered an ESDS device handling procedure.

## 1-2 GENERAL DESCRIPTION.

**1-2.1 DESCRIPTION OF EQUIPMENT.** The following paragraphs provide a general description of Model 8850, Attenuation Measurement System (shown in Figure 1-1) designed by Weinschel Corporation.

**1-2.1.1 Functional Description.** Combining the Model 8852 together with the accuracy, high sensitivity performance and reliability of our Model VM-7 (30 MHz receiver) has yielded a state-of-the-art 0.01 to 18 GHz Attenuation Measurement System. The Model 8852 performs the necessary RF to IF conversion to 30 MHz IF, which then can be measured by the VM-7.

This measurement system provides the user with greater flexibility for performing RF and microwave measurements in a cost effective manner. Some other features of this system include remote programmability over the IEEE-488 bus using an external controller, a linearity of 0.005 dB/10 dB is easily achievable over a greater than 80 dB dynamic range. Input sensitivity is -117 dB minimum. An auxiliary output of 2 to 18 GHz synthesized in 2 KHz steps at +7 dBm for driving an external mixer is provided.

**1-2.1.2 Physical Description.** For physical descriptions and electrical specifications of each system component as a stand alone instrument, reference the applicable Operation and Service Manual. The Model 8850 can be easily stacked with other Weinschel Corporation instruments or mounted in any cabinet or rack designed according to EIA RS-310 and MIL-STD-189. The Basic Model 8850 Attenuation Measurement System consist of:

MODEL #	NOMENCLATURE
VM-7	Attenuator and Signal Calibrator
8852	Frequency Converter
187-4001	Measurement Accessory Kit

**1-2.2 APPLICATIONS.** Figure 1-2 depicts a system setup for performing component measurements across the 0.01 - 18 GHz frequency band without changing any connections on the Model 8850 front panel. This setup gives the user the widest measuring frequency range possible (Refer to Section III for details).

Figure 1-3 depicts a one band measurement system that provides 90 dB of dynamic range with the lowest possible SWR and highest accuracy possible with the Model 8850. This setup can perform measurements in either the 0.01 - 2 GHz band or 2 - 18 GHz band depending on the Model 8850 front panel connection (Refer to Section III for details).

Figure 1-4 depicts a one band measurement system that provides the widest dynamic measurement range (100 dB) for the Model 8850. This setup can perform measurements in either the 0.01 - 2 GHz band or 2 - 18 GHz band depending on the Model 8850 front panel connection (Refer to Section III for details).

Figure 1-5 depicts a system where using the Model 8852 as a CW signal Source and the addition of the Weinschel Corporation Model 8853 will allow the Model 8850 to process frequencies up to 40 GHz in coax.

Figure 1-6 shows a Return Loss (SWR) measurement setup using SWR Measurement Kit (P/N 187-4003) that can be used with the Model 8850 and the CAMLab Windows™ Program (P/N 189-22) to perform return loss measurements. Once the measurements have been taken the program will display/graph or printout both return loss and the VSWR conversion. The values of the masking attenuators are recommended and the use of the power splitter is optional.

For further information configuring these or other similar RF microwave or millimeter wave systems, feel free to contact the factory concerning the Model 8850 or any other Weinschel Corporation instrument listed in this manual.

**1-2.3 SPECIFICATIONS.** Table 1-1 lists specifications to be considered, when using the Attenuation Measurement System, Model 8850. Table 1-2 lists the system specifications for the Model 8850-01 and 8850-02. Other specifications for the individual instruments can be located in the specific O & S manual (IM-180 for VM-7, IM-212 for Model 8852, and IM-226 for Model 4380).

**1-2.4 RECOMMENDED MATERIALS.** Table 1-3 provides a list of recommended consumables to be used when cleaning or servicing Model 8850.

**1-2.5 SPECIAL TOOLS AND TEST EQUIPMENT.** All recommended special tools and test equipment to be used with the 8850 is listed in Table 1-4.

**1-2.6 REPLACEABLE PARTS LIST.** The Replaceable Parts List (RPL) is located in Section IV of this manual. The RPL is intended for use in identification, requisition, and issue of parts for Model 8852. All assemblies, sub-assemblies, cables, and component parts are included in the RPL.

**1-2.7 AVAILABLE ACCESSORIES.** The following list contains all of the available accessories for Model 8850:

<u>Part/Model NO.</u>	<u>Description</u>
Figure 1-6	PLANAR CROWN® Connector System
MB-4	Measurement Bench
138-486	Rack Adapters (additional supporting hardware required) for the Model 8852 Frequency Converter
187-1006	VM-7 Rack Adapter/Chassis Slide Kit (for Racks up to 18-24 inches deep)
187-1007	VM-7 Rack Adapter Ears and attaching hardware.
8300	Level Set Attenuator
8853	Frequency Converter, 18 to 40 GHz
189-22	Calibration, Attenuation Measurement Lab (CAMLab) for Windows

**1-2.8 OPTIONS.** The Model 8850 at this time offers two options as follows:

**Option 01** - The 01 option adds a Synthesized CW Signal Source and a accessory kit of Weinschel Corporation low SWR masking attenuators and power divider to provide a measurement system as shown in Figure 1-2. The result is a measurement system that leads the field in performance, at a price compatible with production test as well as calibration laboratory budgets.

**Option 02** - The 02 option includes all items in the 01 option and the addition of a PC compatible system controller and CAMLab Windows™ software package.

NOTE: Windows™ is a registered trademark of Microsoft Corporation.

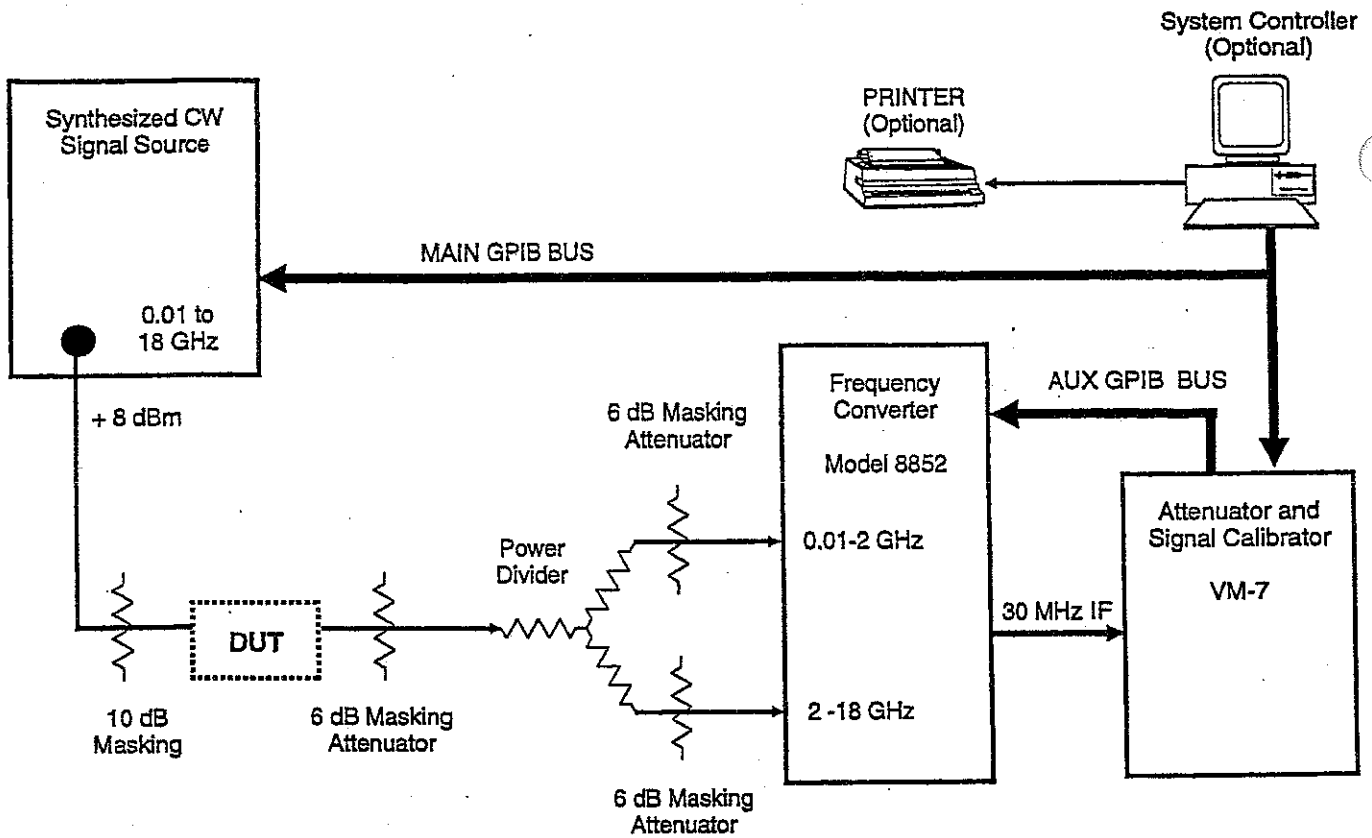


Figure 1-2. 0.01 - 18 GHz System Configuration

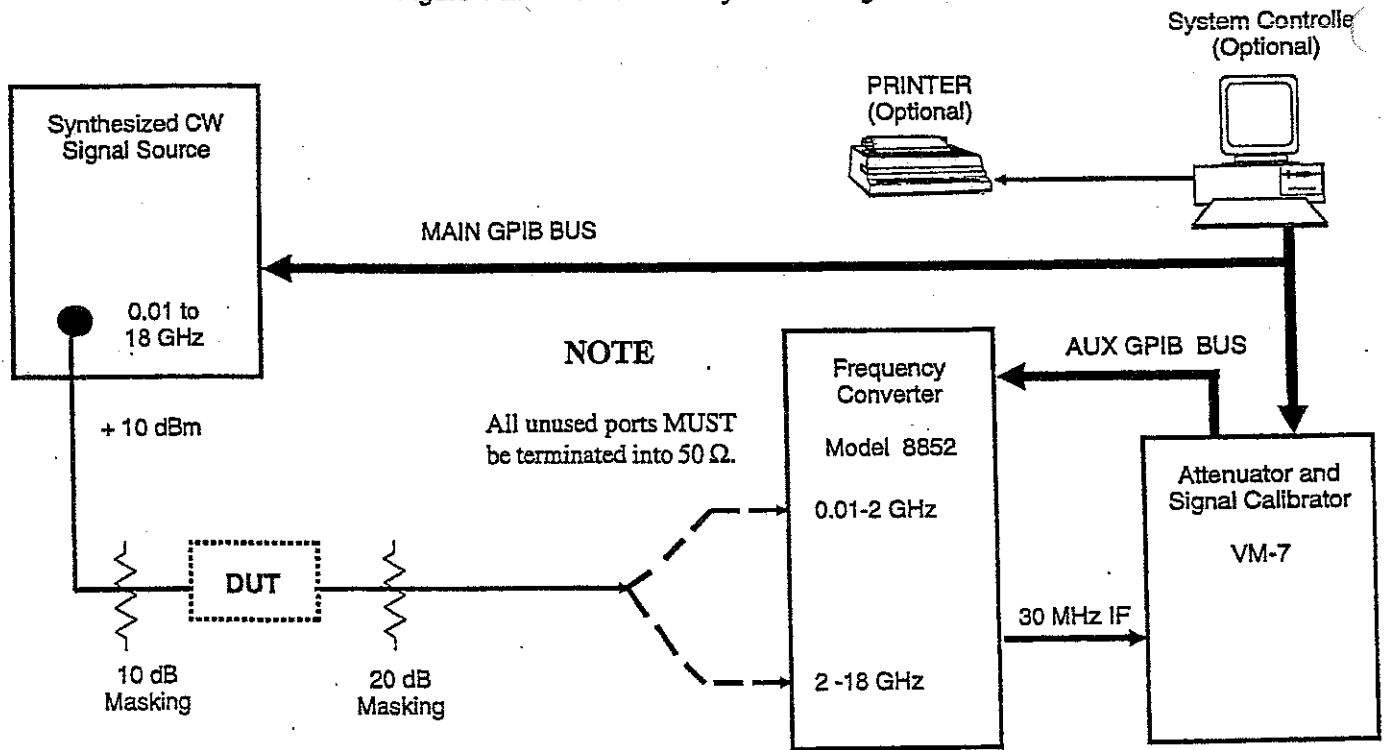


Figure 1-3. Highest Accuracy System Configuration

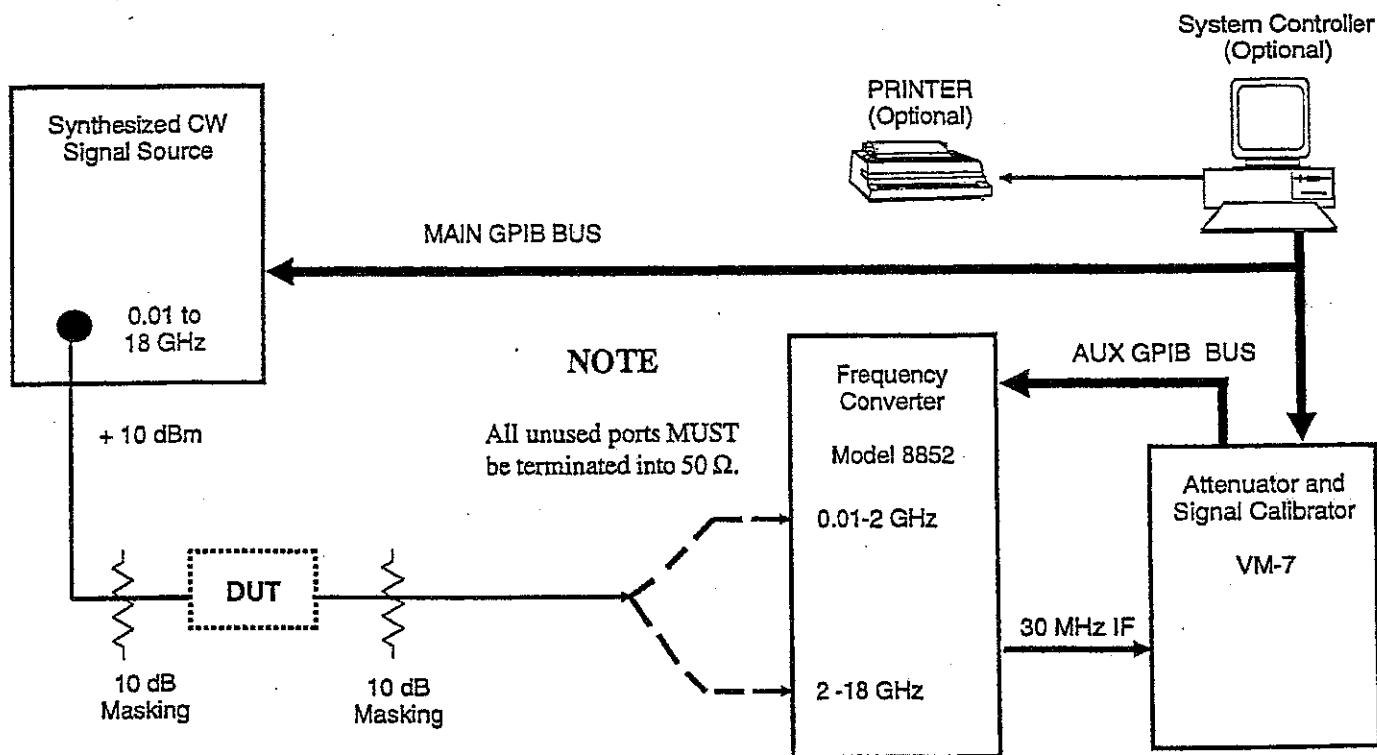


Figure 1-4. Widest Dynamic Range System Configuration

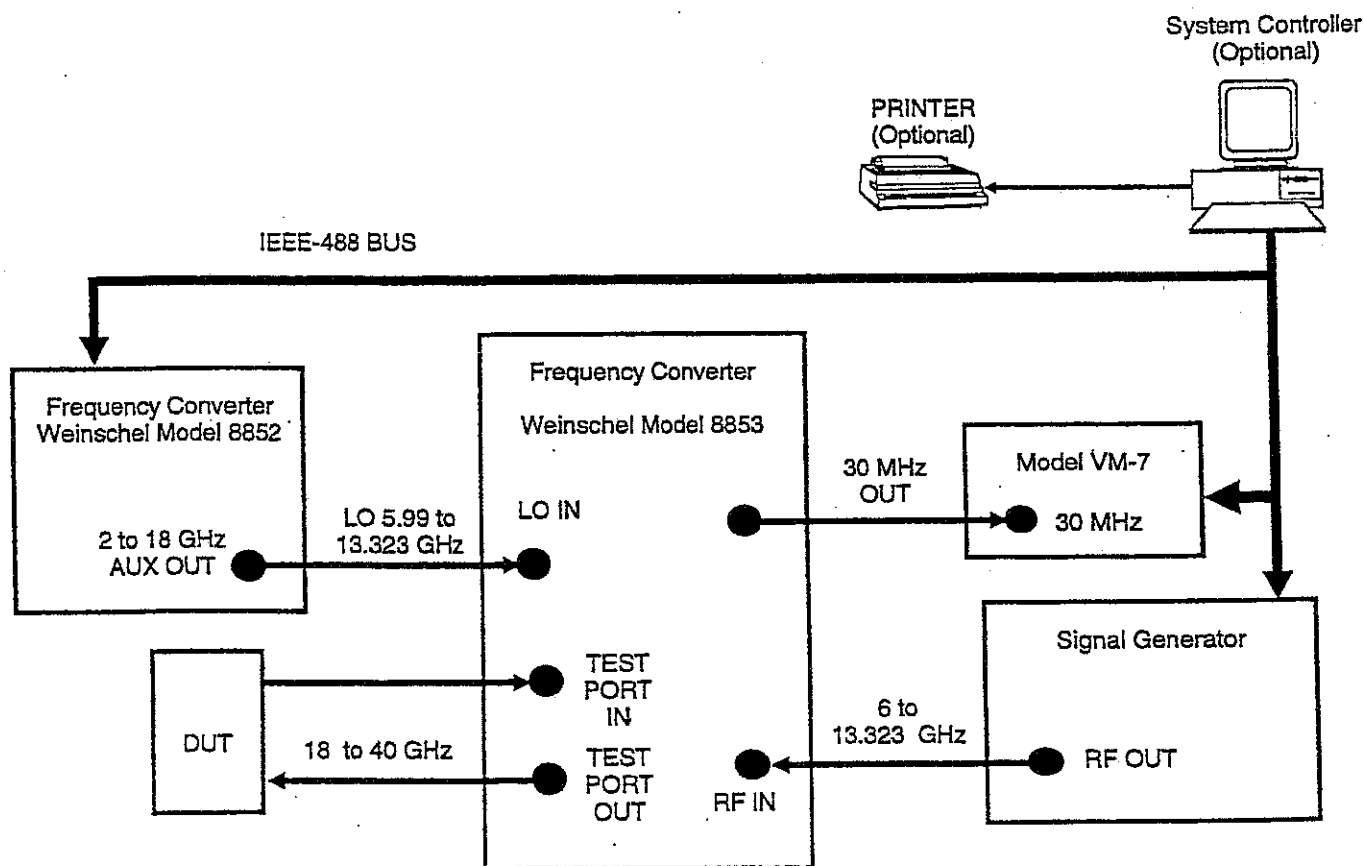


Figure 1-5. 18-40 GHz Measurement System

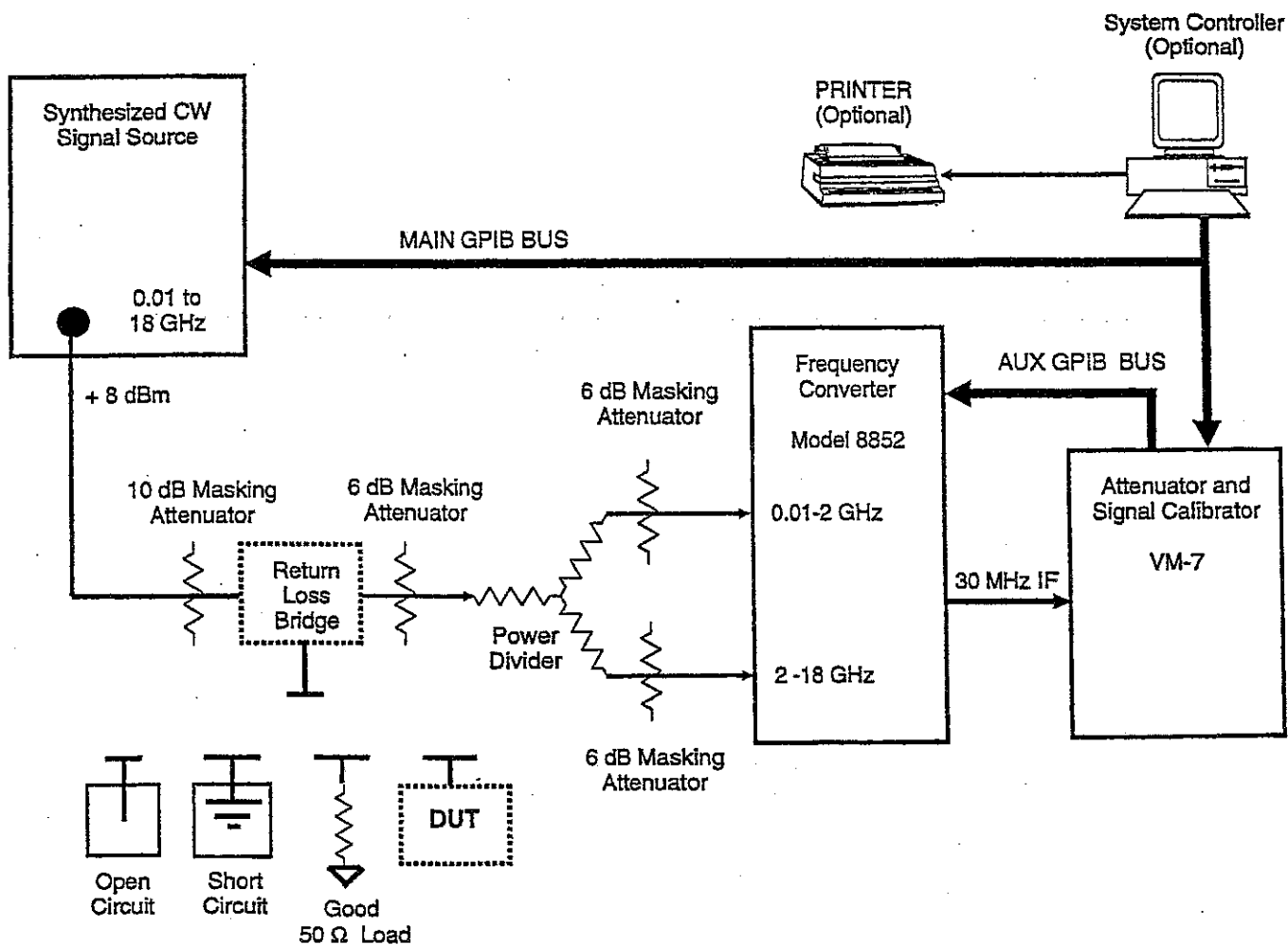


Figure 1-6. Return Loss Measurement Configuration

Table 1-1. Model 8850 Specifications

Specification	Description		
Input Power Requirements:	100, 120, 220, 240 Vac $\pm 10\%$ : 40 to 400 Hz (all instruments)		
Environmental:	Operating Temperature	0 to +50° C (+32 to 122° F)	
	Storage Temperature	-40° to +75° C (-40° to +167° F)	
	Humidity	less than 95%	
Input Frequency Range:	Low Band	10 MHz to 2 GHz	
	High Band	2 GHz to 18 GHz	
Frequency Resolution:	2 KHz above 2 GHz 1 KHz from 0.01 to 2 GHz		
Maximum Input level:	To prevent damage:	+20 dBm	
Impedance:	50 $\Omega$ nominal at RF Ports		
SWR at RF Inputs:			
Low Band	0.01 to 2 GHz	3:1 Max	
High Band	2 to 18 GHz	< 3:1 Max	
Dynamic Range:	0 to -103 dB	10 to 300 MHz	
	0 to -112 dB	300 to 1000 MHz	
	0 to -117 dB	1000 MHz to 18 GHz	
Linearity Accuracy*:	<u>FREQUENCY RANGE</u>	<u>ACCURACY</u>	<u>RANGE (dBm)</u>
	10 to 300 MHz	$\pm 0.100/10 \text{ dB} \pm 0.01$	-10 to -20
		$\pm 0.005/10 \text{ dB} \pm 0.01$	-20 to -86
		$\pm 0.100/10 \text{ dB} \pm 0.01$	-100 to -103
	300 MHz to 1 GHz	$\pm 0.100/10 \text{ dB} \pm 0.01$	-10 to -20
		$\pm 0.005/10 \text{ dB} \pm 0.01$	-20 to -95
		$\pm 0.100/10 \text{ dB} \pm 0.01$	-100 to -112
	2 to 18 GHz	$\pm 0.100/10 \text{ dB} \pm 0.01$	-10 to -20
		$\pm 0.005/10 \text{ dB} \pm 0.01$	-20 to -100
		$\pm 0.100/10 \text{ dB} \pm 0.01$	-100 to -117
	* Exclusive of signal source, SWR effects and connector repeatability (1-18 GHz).		
Input Sensitivity**:	Wideband:	$\geq -100 \text{ dBm}$ @ .01-18 GHz	
	Narrowband:	$\geq -103 \text{ dBm}$ @ 10-300 MHz	
		$\geq -112 \text{ dBm}$ @ 301-1000 MHz	
		$\geq -117 \text{ dBm}$ @ 1.001-18 GHz	
	** Specification based on the ability of VM-7 to phase lock to signal.		
Operation:	Manual and Remote (Compatible with IEEE-488 STD-1987)		
AUX Output:	2 to 18 GHz, +7 dBm $\pm 2.5 \text{ dB}$ SMA connector, terminate into 50 $\Omega$ when not used.		

NOTE: For specifications on the individual instruments refer to the applicable O & S manual (IM-180 for VM-7, IM-212 for Model 8852, and IM-226 for Model 4380).

Table 1-2. Model 8850-01/02 Specifications

Specification	Description	
Input Power Requirements:	100, 120, 220, 240 Vac $\pm 10\%$ : 40 to 400 Hz (all instruments)	
Environmental:	Operating Temperature	0 to +50° C (+32 to 122° F)
	Storage Temperature	-40° to +75° C (-40° to +167° F)
	Humidity	less than 95%
Input Frequency Range:	Low Band	10 MHz to 2 GHz
	High Band	2 GHz to 18 GHz
Frequency Resolution:	2 KHz above 2 GHz 1 KHz from 0.01 to 2 GHz	
Impedance:	50 $\Omega$ nominal	
SWR at DUT Point:	0.01 to 4.0 GHz	1.15:1 Maximum
	4.0 to 12.4 GHz	1.20:1 Maximum
	12.4 to 18.0 GHz	1.25:1 Maximum
Dynamic Range:	0 to -103 dB	10 to 300 MHz
	0 to -112 dB	300 to 1000 MHz
	0 to -117 dB	1000 MHz to 18 GHz
Attenuation Accuracy*:	<u>ACCURACY</u>	<u>RANGE (dB)</u>
	$\pm 0.015$ dB	(System Repeatability)
	$\pm 0.005/10$ dB	0 to 80
	$\pm 0.100/10$ dB	80 to 105
	* Exclusive of SWR effects and connector repeatability (1-18 GHz).	
Operation:	Manual and Remote (Compatible with IEEE-488 STD-1987)	
AUX Output:	2 to 18 GHz, +7 dBm $\pm 2.5$ dB SMA connector, terminate into 50 ohms when not used.	

NOTE: For specifications on the individual instruments refer to the applicable O & S manual (IM-180 for VM-7, IM-212 for Model 8852, and IM-226 for Model 4380).



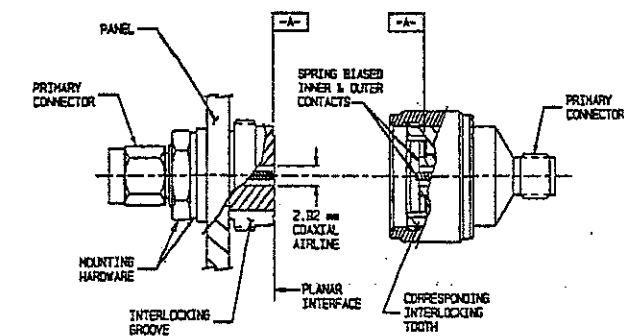
Table 1-3. Recommended Consumable Materials

Item Number	Nomenclature	Material	Specification Number	MGR Part Number
1	Acid Brush (Fiber-Bristle)	Isopropyl Alcohol	H-B-643 Type II CLASS 1	411 (Pump Spray) or 418 (Aerosol) Research Products Corp.  021-22-5 Weinschel
2	Aluminum Wool		MIL-A-4864A	
3	Brush, Soft-Bristle		H-B-420 Type II	
4	Cleaner/Solvent		TT-1-735A (3)	
5	Cloth, Lint Free		MIL-C-85043 Type IIA	
6	Filter Coat Adhesive			
7	Filter Media			

Table 1-4. Special Tools and Test Equipment

Tool/Equipment/ Model Number	Nomenclature	Use and Application
Fluke 8502 or 8505 or equivalent	Digital Voltmeter	Linearity Test Setup
PC System Controller	IBM PC or Compatibles with GPIB Interface	IEEE-488 Bus Control
Weinschel 189-22	CAMLab Windows™ Software	Remote System Operation
Weinschel 1110 and 1111	Thermister Mounts (Power Standard)	Linearity Test Setup
Weinschel 1806	Precision Power Meter	Linearity Test Setup
Weinschel 8200	Controller with Models 150-110 & 150-15 Attenuators installed.	Linearity Test Setup
Gigatronics GT9000 Wiltron 68000 or equivalent	Synthesized CW Signal Source	Signal Source for Model 8850 and all testing setups
Weinschel 2-30	30 dB Fixed Attenuator, dc-18 GHz	Linearity Test Setup
Weinschel 187-14	Linearity Test Software for Models 8850 & VM-7	Linearity Test Setup
Weinschel AS-18 or equivalent	Calibrated Attenuator Set	Measurement Accuracy Setup

-A- INDICATES MECHANICAL MATING PLANES



FLAT WASHER ONLY REQUIRED WHEN MOUNTING THE BULKHEAD ON PANELS 2.4 (3/32) THICK OR LESS

LUCAS WEINSCHTEL 2.92 mm CONNECTORS ARE COMPATIBLE WITH SMA, 3.5 mm, K AND OTHER 2.92 mm CONNECTORS

MODEL 7004A-1  
PLANAR BULKHEAD  
2.92 mm FEMALE

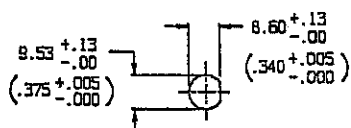
12.4 (.487)  
REF PLANE

MODEL 7004A-2  
PLANAR BULKHEAD  
2.92 mm MALE

14 (.553)  
REF PLANE

5 (3/16) MAX  
PANEL THICKNESS

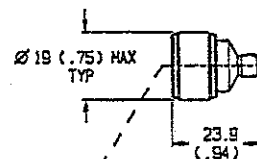
PLANAR  
INTERFACE



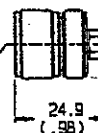
MOUNTING HOLE  
FOR BULKHEAD

#### NOTES:

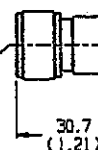
1. 2.4mm Crowns also available.
2. Electronic Specifications are based on a mated pair.
3. For more information about the Planar Crown Connectors contact Weinschel Corporation.



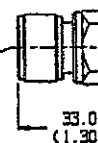
MODEL 7005A-1  
SMA FEMALE



MODEL 7005A-2  
SMA MALE



MODEL 7005A-3  
TYPE N FEMALE



MODEL 7005A-4  
TYPE N MALE



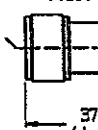
MODEL 7005A-5  
BPC-7



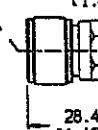
MODEL 7005A-6  
3.5 mm FEMALE



MODEL 7005A-7  
3.5 mm MALE



MODEL 7005A-8  
TNC FEMALE



MODEL 7005A-9  
TNC MALE



MODEL 7005A-10  
2.92 mm FEMALE



MODEL 7005A-11  
2.92 mm MALE

Figure 1-7. Planar Crown® Connector System