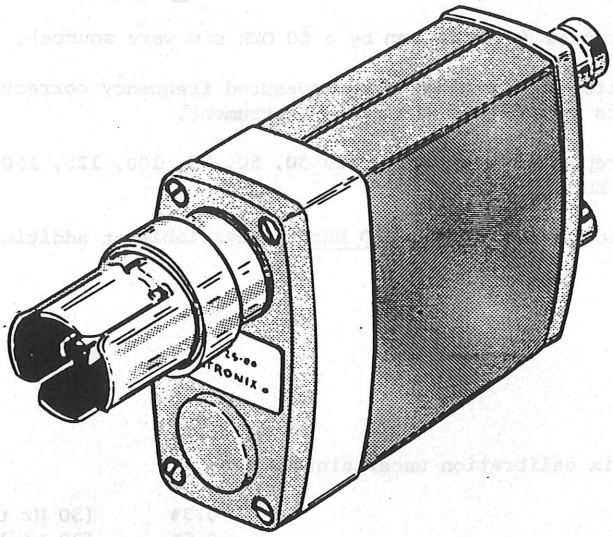
CALIBRATION FIXTURE

Peak-To-Peak Detector

Part No. 067-0625-00



The 067-0625-00 Peak-To-Peak Detector is designed to measure the output voltage flatness of 50 OHM, constant-amplitude signal generators. The Detector has a frequency range of 50 Hz to 500 MHz and requires a 1.2V p-p input. Higher input voltages can be measured by attaching the appropriate attenuator.

DATA SHEET

NO. 062-1306-00

DATE MAR 1986(R)

SECTION 1

SPECIFICATIONS

Detector Sensitivity:[1]	10 ±1 mVdc/ 1% V p-p input change at approximately 1.2V p-p input.
Voltage Levels:	See Operating Instructions. Basic level is approximately 1.2V p-p.
Temperature Range:	23 ±10 deg C

Frequency Response (when driven by a 50 OHM sinewave source):

Calibration data providing the measured frequency correction factors at 10 points is furnished with the instrument.

The 10 reported frequencies are 30, 50, 75, 100, 125, 150, 175, 200, 225, and 250 MHz.

Correction factors above 250 MHz are available at additional cost.

Tektronix calibration uncertainties are:

0.3%	(50 Hz to 30 MHz)
0.5%	(30 to 100 MHz)
1.0%	(100 to 250 MHz)
2.5%	(250 to 500 MHz)

All measurements are referenced to NBS Certified Primary Standards. NBS uncertainties are not included in above specifications.

[1] The DC voltmeter used to measure the detector output must provide a floating approximate 2 M OHM load. A differential oscilloscope with 1 M OHM inputs is also acceptable.

SECTION 2

OPERATING INSTRUCTIONS

2.1 Preliminary Considerations

2.1a The 067-0625-00 is a sinewave peak-to-peak detector that has been designed to provide an accurate "volts across 50 ohms" type calibration for leveled, sinewave voltage generators.[1] This is achieved by maintaining nearly constant impedance and constant voltage response over the entire frequency range.

By selecting an operating level of about 1.2 volts, a calibrated sensitivity of 10 mV/1% is achieved. Higher voltage levels can be measured by adding attenuators.

CAUTION

Voltage at the detector input should not exceed 10 V p-p.

2.1b SG503/SG504 Calibrations.

The 067-0625-00 is especially useful in the calibration of SG503 and SG504 Leveled Sine-wave Generators.

A calibration chart is provided for the 1.2V p-p basic voltage range. With the addition of one or two 6dB attenuators the input voltage range can be extended to 2.4 or 4.8 V p-p. When Tektronix attenuators (Part Number 011-0069-02) are used, the 2.4 and 4.8 V p-p frequency responses are typically within 0.2% of the 1.2V p-p response up to 100 MHz and within 0.3% up to 250 MHz. These attenuators are the preferred attenuators called out in the SG503/SG504 service manuals.

2.2 Procedure

1. Select the generator level and appropriate attenuator from the table below.

NOTE

The specifications above 10 MHz are only valid if the specified type of attenuator is used. The exact voltage level will depend upon the particular detector.

[1] The General Radio Experimenter (Sept. - Oct. 1969) Signal Generator Output Calibration.

Recommended Attenuators	Tektronix Part No.	Nominal Generator Level For Detector OV Outputs.
None	- - - - - -	1.2 V p-p
6dB (2X)	011-0069-02	2.4
(2) 6dB (2X)	011-0069-02	4.8

Other type attenuators may be used, but for the highest accuracy they should be calibrated with the detector as a unit.

2. Connect generator (and attenuator if required) to detector input.

3. Connect DC voltmeter or differential oscilloscope to detector output. DC voltmeter must provide a floating approximate 2 M OHM load. Oscilloscope must have 1 M OHM inputs and be in A minus B mode.

4. Verify that an increase in generator output causes a positive-going indication on the voltmeter or oscilloscope.

5. Wait approximately 5 minutes for detector and generator to stabilize. Then set the generator to reference frequency and adjust generator output for zero detector DC output.

6. Change generator frequency and note detector DC output. The change in generator output is determined by the following relationship:

$$\Delta \frac{\text{Generator Output}}{1\%} = \Delta \frac{\text{Detector Output}}{10\text{mV}}$$

NOTE

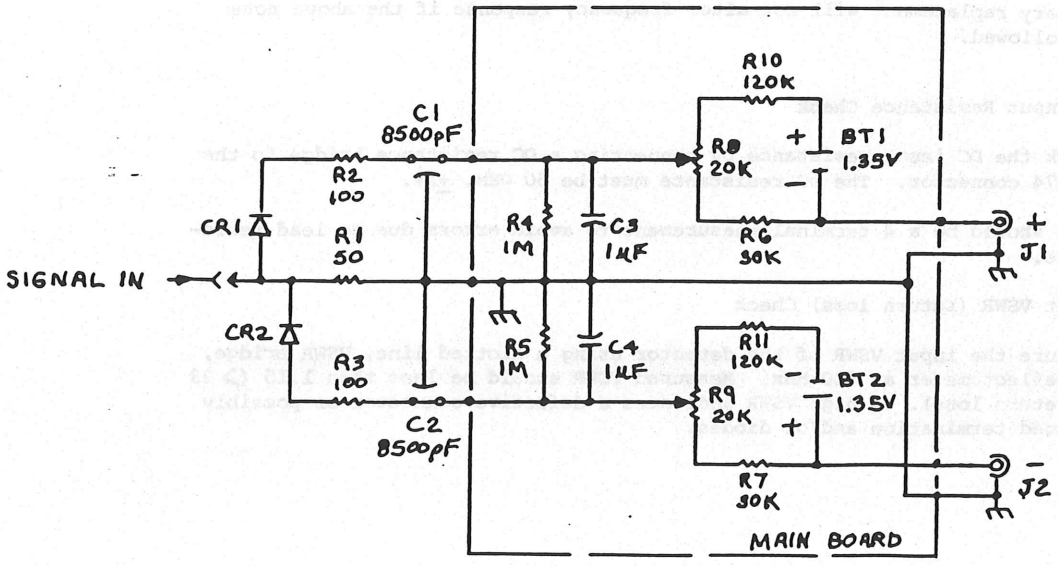
This relationship is valid for peak-to-peak voltage changes up to 10%. Because the diode rectification efficiency is a function of the applied voltage, large changes will deviate from the above relationship.

7. After measuring the generator's output at various frequencies, recheck output at the reference frequency to verify negligible drift.

SECTION 3

THEORY OF OPERATION

The detector employs a 50 OHM tapered termination and a pair of silicon Schottky barrier diodes. RF voltage is sampled at each positive peak by one diode and at each negative peak by the other diode. The conduction of each diode charges up its respective capacitor. For example, with 1.2 V p-p applied to a particular detector, the DC voltage developed across one capacitor will be + 0.3 V and -0.3V across the other. A 0.3 V bucking source is placed in a series with each output. Therefore, with 1.2 V p-p applied, the DC output voltage is reduced to zero. If this peak-to-peak voltage is increased or decreased by 1% from this reference level, the DC output will be a corresponding ±10 mV. To obtain this 10 mV/1% output relationship, it is necessary for the input to be a particular value for each individual detector. This input voltage varies from 1.15 to 1.25V peak-to-peak at 23 deg. C.



PEAK TO PEAK DETECTOR TYPE 067-0625-00

SECTION 4

MAINTENANCE

4.1 General

Insure that the input GR-874 connector has not loosened. A loose connector may cause one or more of the following checks to fail.

4.2 Battery Replacement

Batteries should be replaced when voltage drops below 1.33 V or after one year. With the GR-874 connector facing you and oriented at the top, remove two screws on left side of front casting and two screws on same side of rear casting. Slightly loosen the two remaining screws on back of rear casting. Remove left cover side.

IMPORTANT

Always keep two remaining screws tight on the GR-874 connector end of detector when removing the side cover. This is necessary to avoid disturbing the detector RF section.

Battery replacement will not alter frequency response if the above note is followed.

4.3 DC Input Resistance Check

Check the DC input resistance by connecting a DC resistance bridge to the GR-874 connector. The DC resistance must be 50 OHM, ±1%.

This should be a 4 terminal measurement to avoid errors due to lead resistance.

4.4 Input VSWR (return loss) Check

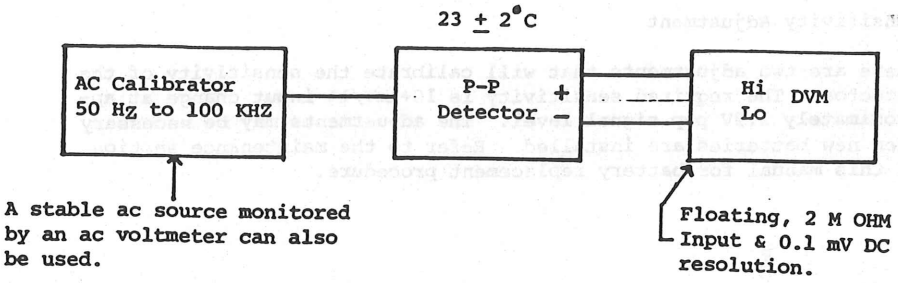
Measure the input VSWR of the detector using a slotted line, VSWR bridge, or reflectometer at 500 MHz. Measured VSWR should be less than 1.15 (> 23 dB return loss). A high VSWR indicates a defective connector or possibly damaged termination and/or diodes.

NOTE

If the Input Resistance Check (step 4.3) or the input VSWR Check (step 4.4) does not meet the requirements stated, return the 067-0625-00 Peak-to-Peak Detector to the factory for repairs.

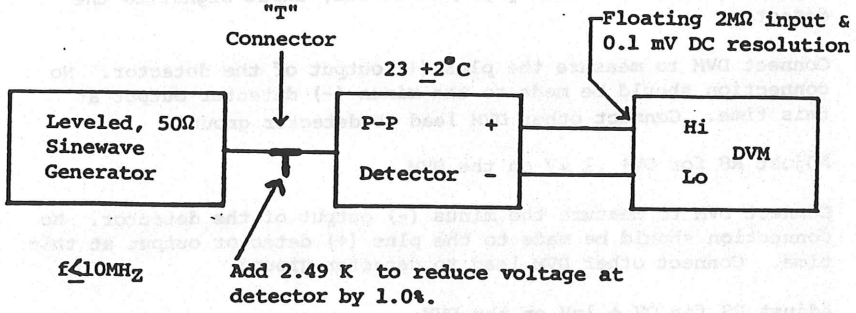
4.5 ΔDC/ΔV p-p Check

1a. To check the detector sensitivity, connect equipment as follows:



1b. Adjust source output to about 1.2V p-p (424 m Vrms) for zero detector output. Change input voltage to detector by 1%. DVM should read 10 ± 1 mVdc.

1c. If an ac voltmeter or ac calibrator is not available connect equipment as follows:



Repeat step 1b. Place 2.49 kΩ across "T"; DVM should read -10.0 ±1 mV.

Refer to adjustment procedure in case of sensistivity check failure.

SECTION 5

ADJUSTMENTS

5.1 Sensitivity Adjustment

There are two adjustments that will calibrate the sensitivity of the detector. The required sensitivity is 10+1mV/1% input change at approximately 1.2V p-p signal level. The adjustments may be necessary when new batteries are installed. Refer to the maintenance section of this manual for battery replacement procedure.

5.2 Sensitivity Calibration

1. Perform these steps only if maintenance check in step 4.5 of this manual fails. If new batteries are installed, refer to maintenance checks before attemping adjustments.
2. Remove the right side cover while ensuring that the RF head is not disturbed (see note, paragraph 4.2, page 4-1).
3. Connect equipment as shown on page 4-2. If the 2nd set-up is used, omit step 11 of this procedure.
4. Adjust source for a 1.2V p-p (424 mV rms) input signal to the detector.
5. Connect DVM to measure the plus (+) output of the detector. No connection should be made to the minus (-) detector output at this time. Connect other DVM lead to detector ground.
6. Adjust R8 for 0V$\pm$ .1 mV on the DVM.
7. Connect DVM to measure the minus (-) output of the detector. No connection should be made to the plus (+) detector output at this time. Connect other DVM lead to detector ground.
8. Adjust R9 for 0V $\pm$.1mV on the DVM.
9. Connect DVM to measure the full output of the detector; i.e. Hi to plus (+) output, and Lo to minus (-) output. Do not ground either the Hi or Lo inputs. This must be a floating voltage measurement.
10. Fine adjust source amplitude for a 0.0 mV indication on the DVM.
11. Change input voltage to detector by +1%; DVM should indicate +10 $\pm$0.5mV.

12. Repeat step 11 except change input voltage to detector by -1%. DVM should indicate -10 ±0.5 mV.

If readings from steps 11 and/or 12 are high,reduce source voltage to no less than 1.15V p-p (407 mV rms) and repeat entire procedure beginning at step 5.

Conversely, if readings are too low increase source voltage to no greater than 1.25V p-p (442 mV rms) and repeat procedure beginning at step 5.

The detector should show the required sensitivity at some voltage between 1.15 and 1.25V p-p.

Additional points can be checked also by this procedure. Table 1 lists the tolerances for up to 10% input change.

TABLE 1

% Change	DC OUTPUT (mV)	Tolerance (mV)
0	0	reference set
0.5	5.0	±0.5
1	10.0	±1
3	30.0	±3
5	50.0	±5
10	100	±10

NOTE

It is not recommended that any part of the RF head be altered unless suitable standards exist to recalibrate the frequency and impedance response of the detector. If repairs or calibration data are required return the detector to the factory.

Section 6

REPLACEABLE PARTS

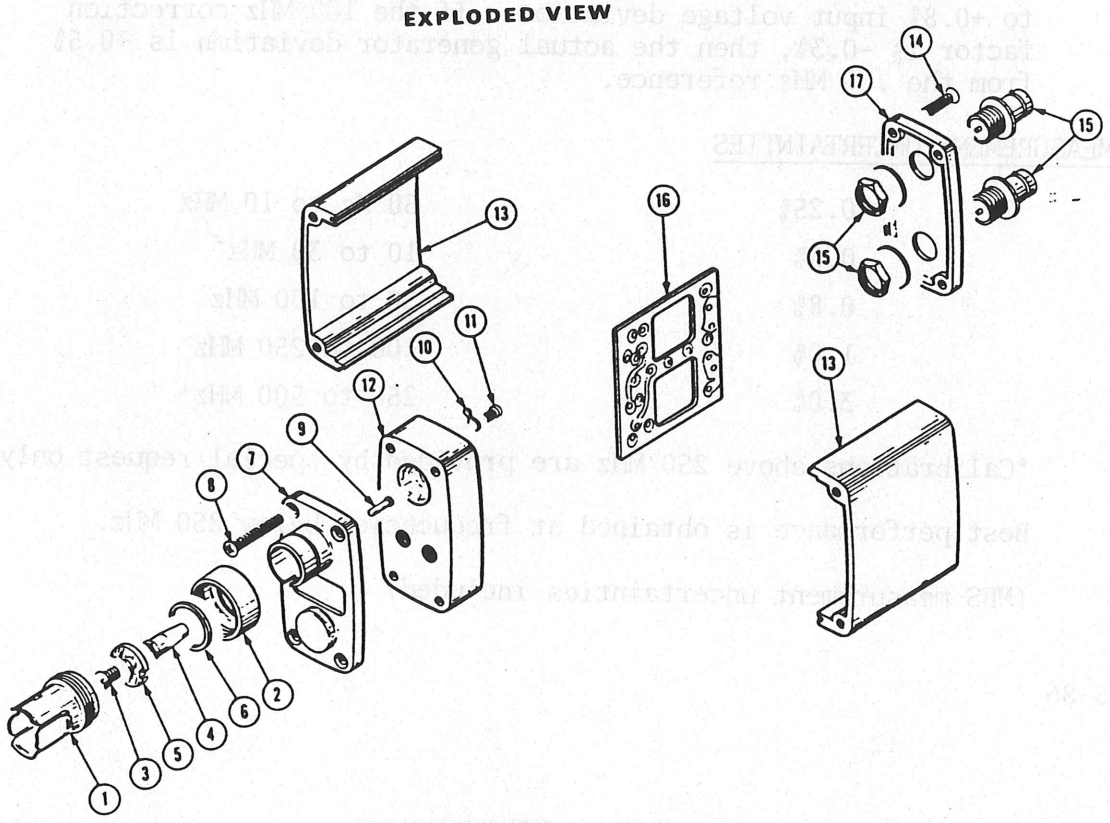
CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
01121	ALLEN-BRADLEY CO	1201 SOUTH 2ND ST	MILWAUKEE WI 53204
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
18488	CONNOR SPRING AND MFG CO DIV OF SLOSS AND BRITTAIN	831 MONTEREY PASS RD	MONTEREY PARK, CA 91754
19701	MEPCO/ELECTRA INC A NORTH AMERICAN PHILIPS CO	P O BOX 760	MINERAL WELLS TX 76067
24655	GENRAD INC	300 BAKER AVE	CONCORD MA 01742
24931	SPECIALTY CONNECTOR CO INC	2620 ENDRESS PLACE P O BOX D	GREENWOOD IN 46142
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507
50434	HEWLETT-PACKARD CO OPTOELECTRONICS DIV	640 PAGE MILL RD	PALO ALTO CA 94304
59660	TUSONIX INC	2155 N FORBES BLVD	TUCSON, ARIZONA 85705
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
83385	MICRODOT MANUFACTURING INC GREER-CENTRAL DIV	3221 W BIG BEAVER RD	TROY MI 48098
91637	DALE ELECTRONICS INC	P O BOX 609	COLUMBUS NE 68601
TK0435	LEMIS SCREW CO	4114 S PEORIA	CHICAGO IL 60609

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
BT1	146-0015-00			BATTERY,DRY:1.35V,1.1AH,MERCURY	80009	146-0015-00
BT2	146-0015-00			BATTERY,DRY:1.35V,1.1AH,MERCURY	80009	146-0015-00
C1	281-0728-00			CAP,FXD,CER DI:8500PF,+100-0%,500V	59660	327-010-X5M0852P
C2	281-0728-00			CAP,FXD,CER DI:8500PF,+100-0%,500V	59660	327-010-X5M0852P
C3	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAATR
C4	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAATR
CR1	152-0322-00			SEMICOND DVC,DI:SCHOTTKY BARRIER,SI,15V	50434	5082-2672
CR2	152-0322-00			SEMICOND DVC,DI:SCHOTTKY BARRIER,SI,15V	50434	5082-2672
J1	131-0106-02			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR178-1
J2	131-0106-02			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR178-1
R1	322-0618-00			RES,FXD,FILM:50 OHM,1%,0.25M,TC=T0	91637	CMF6042G50R00F
R2	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125M	01121	BB1015
R3	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125M	01121	BB1015
R4	315-0105-00			RES,FXD,FILM:1M OHM,5%,0.25M	19701	5043CX1M000J
R5	315-0105-00			RES,FXD,FILM:1M OHM,5%,0.25M	19701	5043CX1M000J
R6	315-0303-00			RES,FXD,FILM:30K OHM,5%,0.25M	19701	5043CX30K00J
R7	315-0303-00			RES,FXD,FILM:30K OHM,5%,0.25M	19701	5043CX30K00J
R8	311-0644-00			RES,VAR,NONWM:TRMR,20K OHM,0.5M	32997	3329H-G48-203
R9	311-0644-00			RES,VAR,NONWM:TRMR,20K OHM,0.5M	32997	3329H-G48-203
R10	315-0124-00			RES,FXD,FILM:120K OHM,5%,0.25M	19701	5043CX120K0J
R11	315-0124-00			RES,FXD,FILM:120K OHM,5%,0.25M	19701	5043CX120K0J

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-1	132-0002-00			1	SHELL,ELEC CONN:	24655	0874-0603
					ATTACHING PARTS		
-2	132-0001-00			1	NUT,COUPLING:0.75-27 X 0.814 OD X 0.31, BRS	80009	132-0001-00
					END ATTACHING PARTS		
-3	132-0029-00			1	CONTACT,ELEC:	24655	0874-0612
					ATTACHING PARTS		
-4	132-0122-00			1	CONTACT,ELEC:0.25 HEX X 0.6,BRS SIL PL	80009	132-0122-00
					END ATTACHING PARTS		
-5	132-0028-00			1	INSULATOR,DISK:0.165 ID X 0.625 OD X 0.125	24655	0874-0700
-6	132-0007-00			1	RING,RETAINING:0.575 ID X 0.031 THK,PH BRZ	18488	ORDER BY DESCR
-7	204-0227-24			1	BODY,P-P DETECT:INPUT	80009	204-0227-24
					ATTACHING PARTS		
-8	211-0091-00			4	SCREW,MACHINE:2-56 X 0.875,OVH,SST	TK0435	ORDER BY DESCR
					END ATTACHING PARTS		
-9	214-0270-01			1	PIN,STR,HDLS:0.062 DIA X 0.4 L,BRASS	80009	214-0270-01
-10	210-0259-00			2	TERMINAL,LUG:0.099 ID,LOCKING,BRS CD PL	80009	210-0259-00
					ATTACHING PARTS FOR EACH		
-11	211-0079-00			1	SCREW,MACHINE:2-56 X 0.188,PNH,STL	TK0435	5549-418
					END ATTACHING PARTS		
-12	204-0461-00			1	BODY,P-P DETECT:	80009	204-0461-00
-13	200-0684-00			2	COV HALF,P ADAP:	80009	200-0684-00
					ATTACHING PARTS FOR EACH		
-14	211-0122-00			2	SCREW,MACHINE:2-56 X 0.312,OVH,STL	83385	ORDER BY DESCR
					END ATTACHING PARTS		
-15	131-0106-02			2	CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR178-1
-16				1	CKT BD ASSY:(AVAILABLE UNDER 067-0625-00)	80009	204-0227-25
-17	204-0227-25			1	BODY,P-P DETECT:TERMINATION		
					ACCESSORIES		
	062-1306-00			1	DATA SHEET:	80009	062-1306-00

EXPLODED VIEW



Tektronix, Inc.
Tektronix Industrial Park
P.O. Box 500
Beaverton, Oregon 97077

Phone: (503) 627-7111
TWX: 910-467-8708
Telex: 151754

TEKTRONIX 067-0625-00
PEAK TO PEAK DETECTOR

CORRECTION FACTORS

NOTE: Tests are performed with a floating 2 MΩ load across the detector outputs.

Application of correction factors when making measurements:

$$\Delta V(\%) = \frac{\text{Detector Output (mv)}}{10\ \text{mv}} + \text{Correction Factor (\%)}$$

ΔV: Voltage deviation (%) the generator would deliver to a 50.0 + j0 Ω load.

Correction factors from .05 MHz to 10 MHz, relative to .05 MHz, are negligible (<0.15%).

EXAMPLE

After the generator has been adjusted at .05 MHz for 0 mVdc detector output (0.0%), the frequency is changed to 100 MHz. The detector output voltage is now +8 mV, which is equivalent to +0.8% input voltage deviation. If the 100 MHz correction factor is -0.3%, then the actual generator deviation is +0.5% from the .05 MHz reference.

MEASUREMENT UNCERTAINTIES

0.25%	50 Hz to 10 MHz
0.5%	10 to 30 MHz
0.8%	30 to 100 MHz
1.0%	100 to 250 MHz
3.0%	250 to 500 MHz*

*Calibrations above 250 MHz are provided by special request only.

Best performance is obtained at frequencies below 250 MHz.

(NBS measurement uncertainties included)