

Vector Network Analyzer (Cont.)

Model 360

MEASUREMENT ENHANCEMENT (Cont.)

Calibration Standards: User selects SMA, GPC-3.5, GPC-7, Type N, TNC, K Connector, and V Connector from calibration menu. Use of fixed or sliding load can be selected for each connector type. Open circuit capacitance coefficients can be modified manually or through the GPIB interface.

Data Averaging: Averaging of 1 to 4095 averages can be selected. Averaging can be toggled on/off with front-panel button. Front-panel LED indicates when averaging is active.

Video IF Bandwidth: Front-panel switch selects three levels of video IF bandwidth. NORMAL, REDUCED, and MIN selections correspond to approximately 10 kHz, 1 kHz, and 100 Hz, respectively.

Trace Smoothing: Functions similarly to Frequency Averaging. The percentage of trace to be smoothed can be selected from 0 to 20% of trace. Front-panel button turns smoothing on/off, and front-panel LED indicates when smoothing is active.

LRL CALIBRATION

Option 3 for the Wiltron 360 VNA enables calibration of the 360 using the Line-Reflect-Line (LRL) calibration technique. The LRL calibration technique uses the characteristic impedance of a length of transmission line as the calibration standard. A full LRL calibration consists merely of two transmission line measurements, a high reflection measurement, and an isolation measurement. Using this technique full 12 term error correction can be performed on the 360 VNA.

Because very high quality air lines are readily available, excellent directivity and source match are possible with LRL calibration. Wiltron 360, LRL calibration is excellent for measurements in transmission media, such as microstrip or waveguide, in which opens or precision terminations are difficult to realize. The impedance standard

is the transmission line, meaning calibration standards are more readily achievable in these media.

The Wiltron 360, LRL calibration is well suited to "non-insertable devices", such as devices with the same sex connector on each end. With the proper airline standards, and LRL calibration can be performed on the 360 with virtually any desired connector configuration.

Performance:

Calibration Performed: LRL + Isolation

Dispersion Compensation: Selectable as Coaxial (non-dispersive), Waveguide, or Microstrip

Reference Plane: Selectable as Middle of line 1 or Ends of line 1

Corrected Impedance: Determined by Calibration Standards

Accuracy: Determined by calibration components. For a GPC-7 calibration, when properly calibrated with an appropriate Maury Microwave LRL calibration kit, the specifications in Table 2 (page 20) apply.

MEASUREMENT ACCURACY

The following graphs give measurement accuracy after 12-term vector error correction. The errors are worst case contributions of residual directivity, load and source match, frequency response, isolation, network analyzer dynamic accuracy, and connector repeatability. In preparing the following graphs, minimum video/IF bandwidth and averaging of 1024 points were used. Changes in the video IF bandwidth or averaging can result in variations at low levels. The waveguide specifications describe the system performance for the waveguide millimeter tests systems. The millimeter waveguide systems are configured using the 3635A test set, the 3640 and 3641 Series modules, the 360SS, System Source and 6729A Microwave Synthesizer. All measurements require the use of the appropriate waveguide calibration kits.

Table 1. Test Set Dynamic Range Summary

Test Set	Frequency (GHz)	Maximum Signal Into Port 2	Noise Floor (dBm)	Dynamic Range (dB)	Port 1 Power (dBm, typical)	Noise Floor Relative to a Thru Calibration (dB, typical)
3610A	0.04	+20	-95	115	-4	91
	1	0	-113	113	-5	108
	20	0	-108	108	-7	101
3611A	0.04	+20	-92	112	-6	86
	1	+3	-109	112	-7	102
	20	+3	-105	108	-9	96
	40	+3	-101	104	-15	86
3612A	0.04	+20	-95	115	-10	85
	1	+3	-112	115	-11	101
	20	+3	-108	111	-17	91
	40	+3	-105	108	-22	83
	60	+3	-86	95	-23	63
3620A	0.04	+30	-98	128	-4	94
	1	+30	-115	145	-5	110
	20	+30	-110	140	-8	102
3621A	0.04	+30	-95	125	-6	89
	1	+30	-112	142	-7	105
	20	+30	-107	137	-10	97
	40	+30	-103	133	-18	85
3622A	0.04	+30	-95	125	-10	85
	1	+30	-112	142	-11	101
	20	+30	-107	137	-18	89
	40	+30	-103	133	-24	79
	60	+30	-83	113	-26	57
3630A	0.01	-10	-117	107	-	-
	1	-10	-117	107	-	-
	20	-10	-115	105	-	-
	40	-10	-107	97	-	-
3631A	0.01	-10	-117	107	-	-
	1	-10	-117	107	-	-
	20	-10	-115	105	-	-
	40	-10	-107	97	-	-
	60	-10	-90	77	-	-
WR-22 33-50 GHz	40	-1	-102	101	-4	98
WR-19 40-60 GHz	50	+1	-101	102	-4	97
WR-15 50-75 GHz	60	-7	-100	93	-10	90
WR-10 75-110 GHz	94	-4	-100	96	-10	90