

## T-2071-M (Derringer) Modulation Characteristics - Deviation Frequency Response:

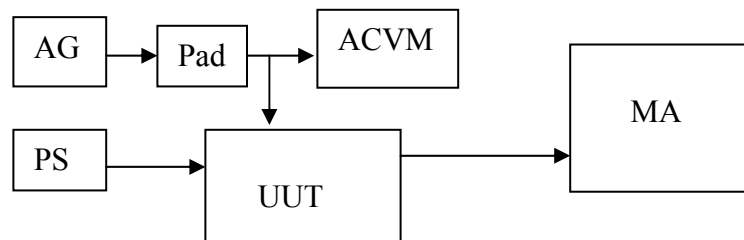
### Relevant FCC Chapter:

"§ 2.1047 Measurements required: Modulation characteristics.

- (a) *Voice modulated communication equipment.* A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted."

### Test Setup:

The setup for this test is shown below.



AG – Audio Generator – Leader LAG126S – SN 9050213

PS – Power Supply – Hewlett-Packard HP6207B – SN 1149A01889

Pad – 20 dB Pad – Mini Circuits CAT20

ACVM – AC Volt Meter – Leader LMV181A – SN 2010903

UUT – T-2071-M Derringer

MA – Modulation Analyzer – Marconi 2955R – SN 132260-001

### Test Method:

The unit under test was calibrated to 100% modulation with a 1 kHz tone at a level of 50 mV RMS. This resulted in FM deviation of 2.5 kHz at the Narrow Band setting and 5 kHz at the Wide Band setting. For the purposes of the test, the audio input of the unit was driven with a level adequate to modulate the carrier at 20% (for both the Narrow and Wide Band settings) from 100 Hz to 3100 Hz with measurements being taken at every 100 Hz. Measurements above 3100 Hz are not practical due to the frequency characteristics of the Scrambler circuit, described in detail in the Circuit Description document that is part of this filing.

### Test Results:

The results of the test are shown in Figures 3 and 4. Below 300 Hz with the AGC on, it was not possible to drive the input level high enough to elicit a 20% modulation level. This is due to the design of the AGC circuit, described in detail in the Circuit Description document that is part of this filing.

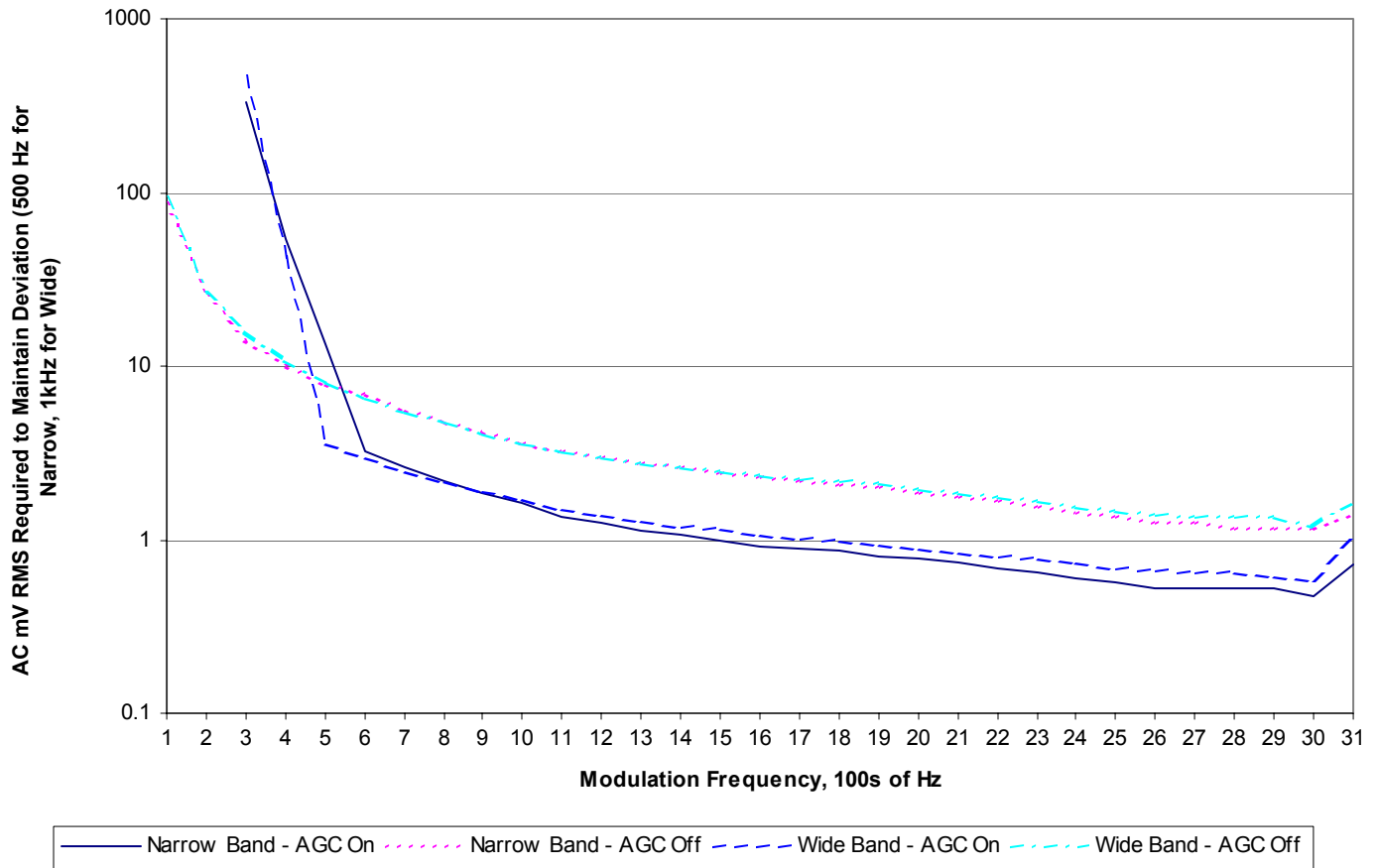
**Figure 3 - Deviation Frequency Response (Pursuant to FCC Requirement 2.1047a) – Raw Data**

AC mV RMS Required to Maintain Deviation (500 Hz for Narrow, 1kHz for Wide)

Hz x 100	Narrow Band Modulation		Wide Band Modulation	
	AGC On	AGC Off	AGC On	AGC Off
1	*	85.50	*	94.25
2	*	25.75	*	26.25
3	330.00	14.25	470.00	15.45
4	54.00	10.00	42.50	10.95
5	13.40	7.81	3.61	8.10
6	3.20	6.83	3.00	6.60
7	2.64	5.65	2.50	5.45
8	2.20	4.80	2.15	4.75
9	1.84	4.15	1.90	4.09
10	1.63	3.60	1.71	3.61
11	1.35	3.25	1.51	3.25
12	1.26	2.95	1.40	3.00
13	1.13	2.75	1.29	2.79
14	1.08	2.58	1.20	2.62
15	1.00	2.40	1.15	2.50
16	.92	2.31	1.08	2.37
17	.89	2.20	1.01	2.26
18	.86	2.07	.99	2.17
19	.81	2.00	.93	2.10
20	.77	1.88	.90	1.97
21	.74	1.77	.85	1.88
22	.69	1.67	.80	1.78
23	.64	1.55	.77	1.67
24	.60	1.43	.73	1.56
25	.57	1.35	.68	1.48
26	.53	1.25	.66	1.40
27	.52	1.25	.65	1.37
28	.52	1.15	.65	1.35
29	.52	1.15	.62	1.35
30	.47	1.15	.59	1.20
31	.72	1.40	1.05	1.67

\* - See Test Results section for details

**Figure 4 - T-2071-M Deviation Frequency Response ( Pursuant to FCC Requirement 2.1047a )**



## T-2071-M (Derringer) Modulation Characteristics – Modulation Sensitivity:

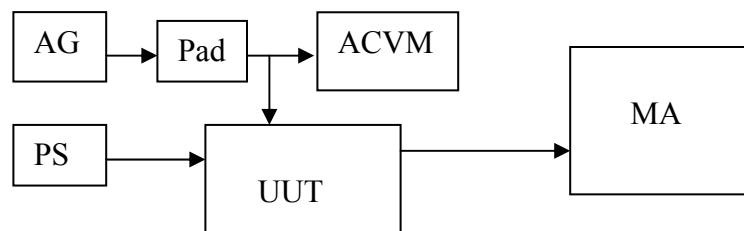
### Relevant FCC Chapter:

“§ 2.1047 Measurements required: Modulation characteristics.

(b) *Equipment which employs modulation limiting.* A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed. “

### Test Setup:

The setup for this test is shown below.



AG – Audio Generator – Leader LAG126S – SN 9050213  
 PS – Power Supply – Hewlett-Packard HP6207B – SN 1149A01889  
 Pad – 20 dB Pad – Mini Circuits CAT20  
 ACVM – AC Volt Meter – Leader LMV181A – SN 2010903  
 UUT – T-2071-M Derringer  
 MA – Modulation Analyzer – Marconi 2955R – SN 132260-001

### Test Method:

The unit under test was calibrated to 100% modulation with a 1 kHz tone at a level of 50 mV RMS. This resulted in FM deviation of 2.5 kHz at the Narrow Band setting and 5 kHz at the Wide Band setting. For the purposes of the test, the audio input of the unit was driven at 10 mv intervals from 10 to 100 AC mvRMS, as well as 1 AC mV RMS and 5 AC mV RMS, for each of the audio tones of 500, 1000, and 3000 Hz. At each voltage interval and frequency, the deviation was recorded with the unit in Narrow Band mode, AGC on and off, and Wide Band mode, AGC on and off. Measurements above 100% modulation at each frequency with the AGC off were not recorded.

### Test Results:

The results of the test are shown in Figures 5, 6 and 7. At 3000 Hz with the AGC off, it was not possible to drive the input level high enough to elicit a 100% modulation level. This is due to the design of the limiter circuit, described in detail in the Circuit Description document that is part of this filing.

**Figure 5 - Modulation Sensitivity (Pursuant to FCC Requirement 2.1047b) – Raw Data**

Kilohertz of deviation as a function of audio input level at various frequencies

Audio Input ACmvRMS	500 Hz				1000 Hz				3000 Hz			
	Narrow		Wide		Narrow		Wide		Narrow		Wide	
	AGC On	AGC Off	AGC On	AGC Off	AGC On	AGC Off	AGC On	AGC Off	AGC On	AGC Off	AGC On	AGC Off
1	.56	.12	1.05	.18	1.04	.20	2.00	.32	1.99	.52	3.40	.87
5	.64	.36	1.22	.65	1.21	.72	2.32	1.34	2.05	1.69	3.51	2.19
10	.68	.64	1.30	1.22	1.27	1.23	2.42	2.31	2.11	2.08	3.60	3.55
20	.74	1.13	1.42	2.22	1.38	1.79	2.64	3.40	2.11	2.32	3.64	3.91
30	.80	1.51	1.54	3.00	1.42	2.03	2.69	3.83	2.15	2.48*	3.69	4.02
40	.81	1.77	1.58	3.53	1.52	2.32	2.90	4.41			3.71	4.10
50	.84	1.98	1.63	3.94	1.55	2.50*	2.96	4.66			3.68	4.11
60	.86	2.13	1.67	4.26			3.02	4.84			3.74	4.12^

70	.88	2.26	1.71	4.52			3.11	5.04*				
80	.90	2.37	1.74	4.73								
90	.91	2.46	1.78	4.88								
100	.94	2.56*	1.82	5.01*								

\* - 100% modulation reached  
 ^ - See Test Results section for details

Figure 6 - Narrow Band Modulation Sensitivity (Pursuant to FCC Requirement 2.1047b)

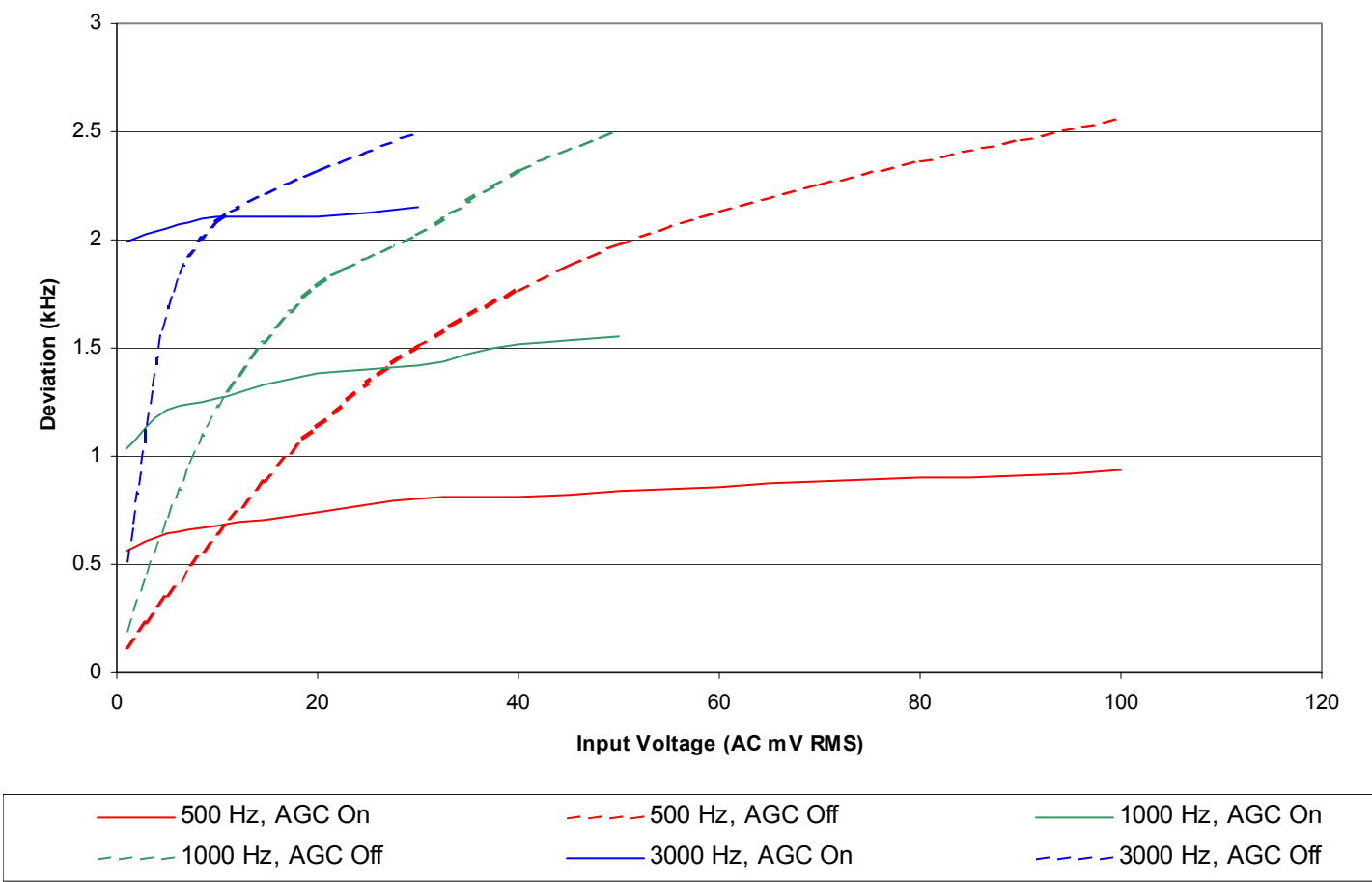


Figure 7 - Wide Band Modulation Sensitivity (Pursuant to FCC Requirement 2.1047b)

