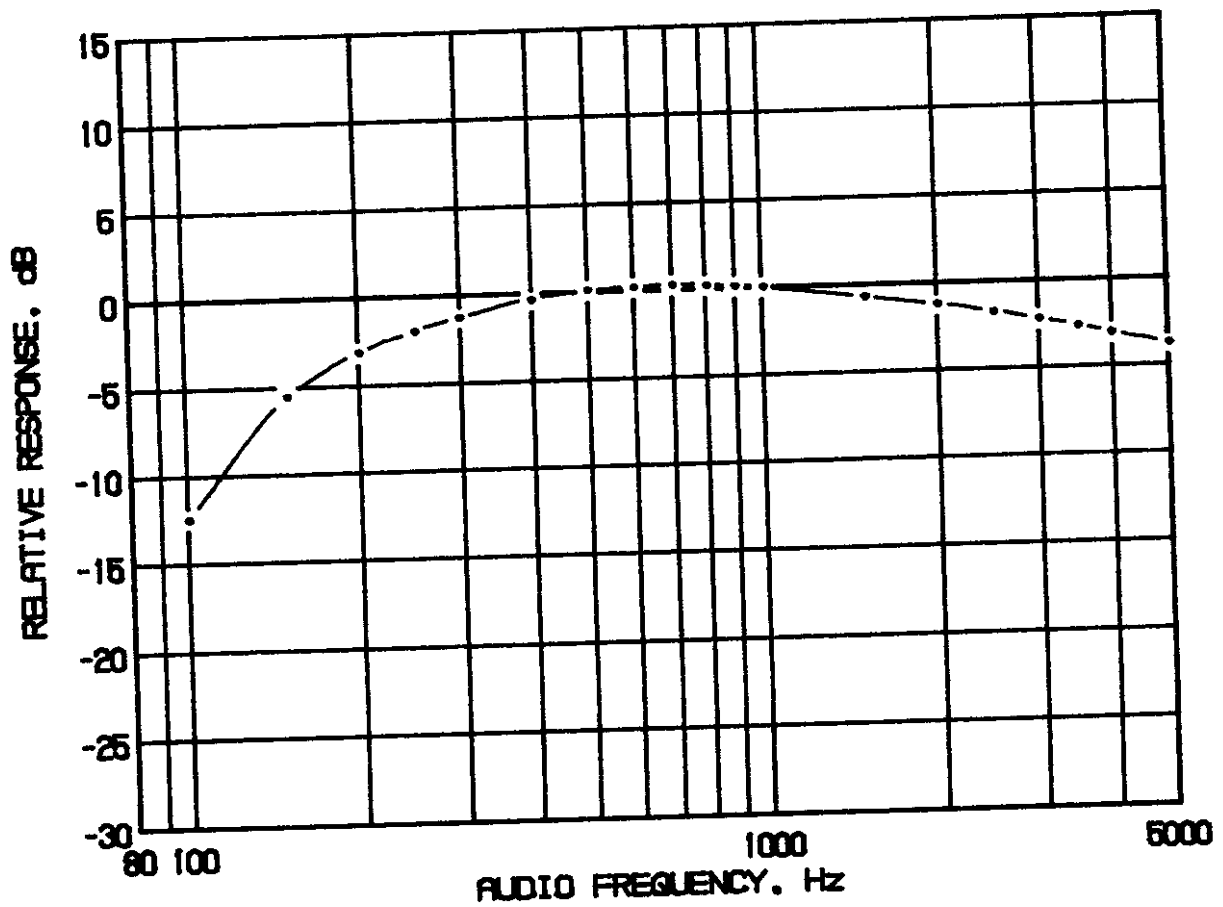


FIGURE 1
TRANSMITTER FREQUENCY RESPONSE

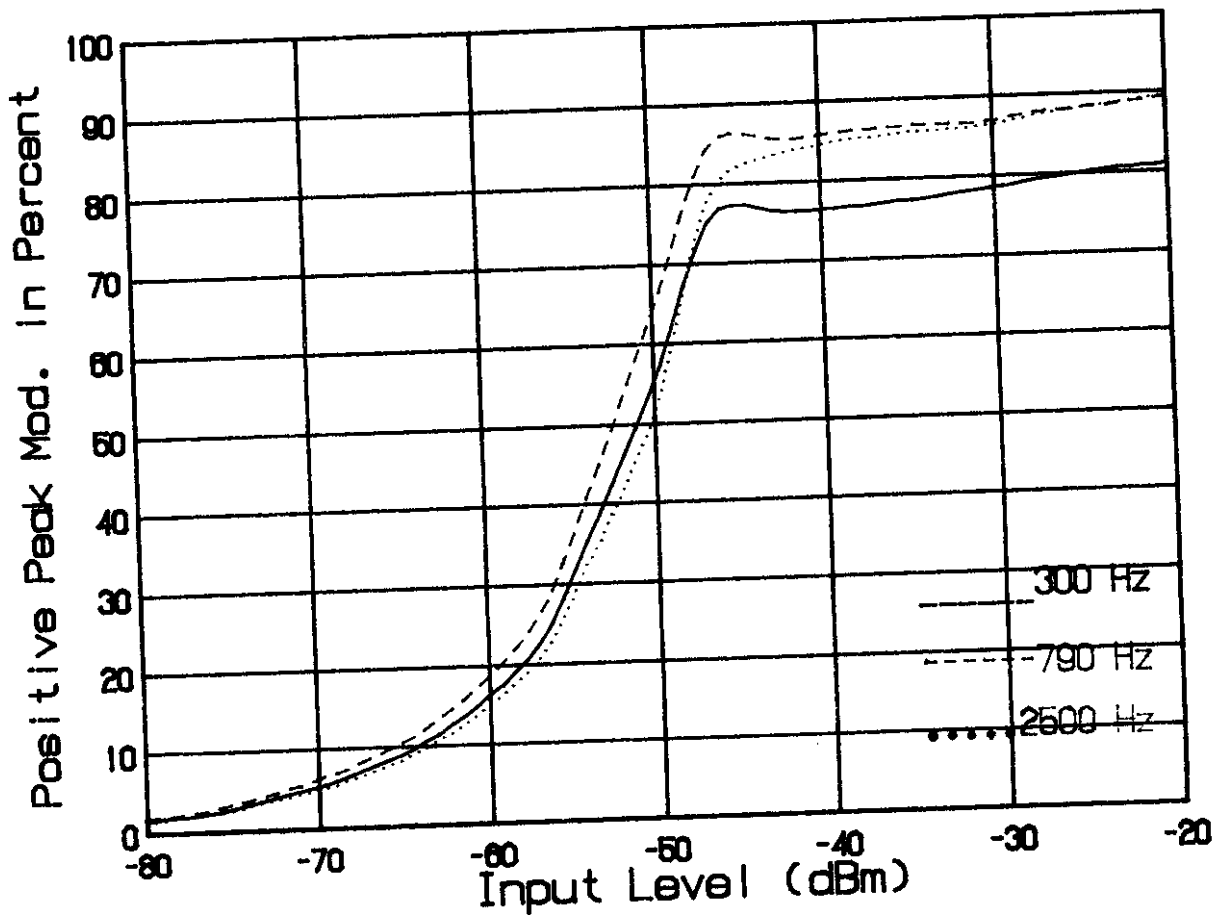


TRANSMITTER FREQUENCY RESPONSE
FCC ID: MGPCM-11

FIGURE 1

FIGURE 2a

AM MODULATION LIMITING - POSITIVE PEAKS



MODULATION LIMITING CHARACTERISTICS

Percent modulation as a function of input level at microphone jack in dBm for 300 Hz, 790 Hz, and 2500 Hz tones.

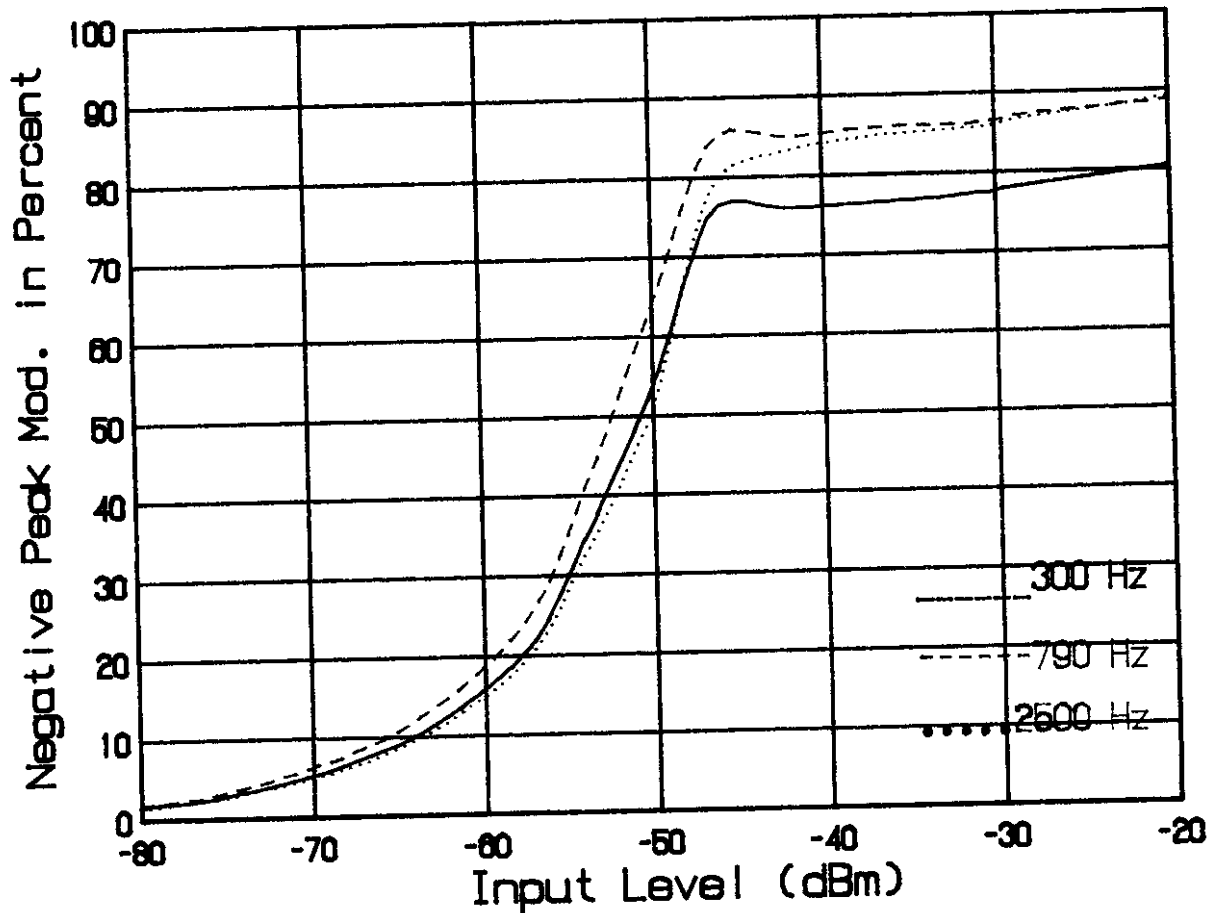
MODULATION LIMITING POSITIVE PEAKS

FCC ID: MGPCM-11

FIGURE 2a

FIGURE 2b

AM MODULATION LIMITING - NEGATIVE PEAKS



MODULATION LIMITING CHARACTERISTICS

Percent modulation as a function of input level at microphone jack in dBm for 300 Hz, 790 Hz, and 2500 Hz tones.

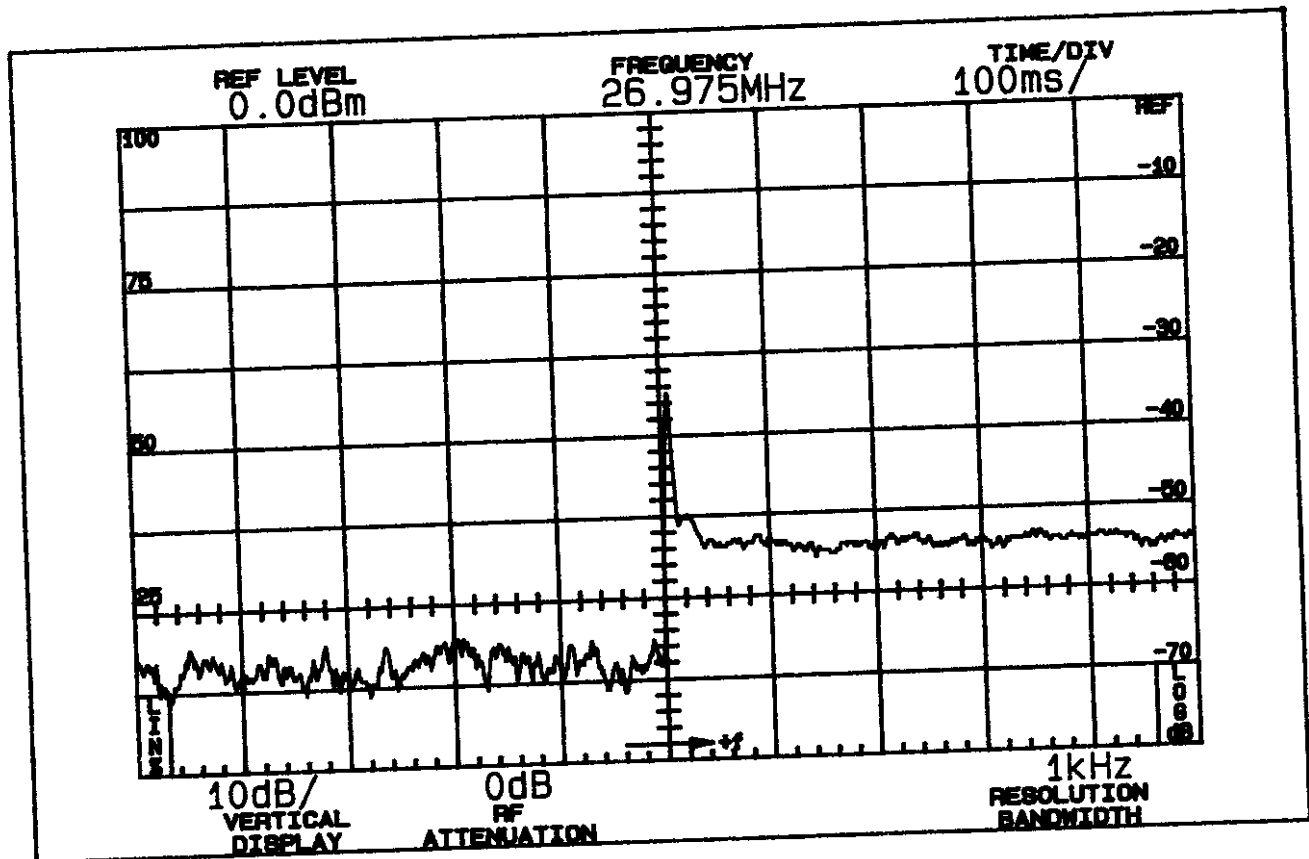
MODULATION LIMITING NEGATIVE PEAKS

FCC ID: MGPCM-11

FIGURE 2b

As 14040012.00W

FIGURE 3a
MODULATION LIMITER ATTACK TIME



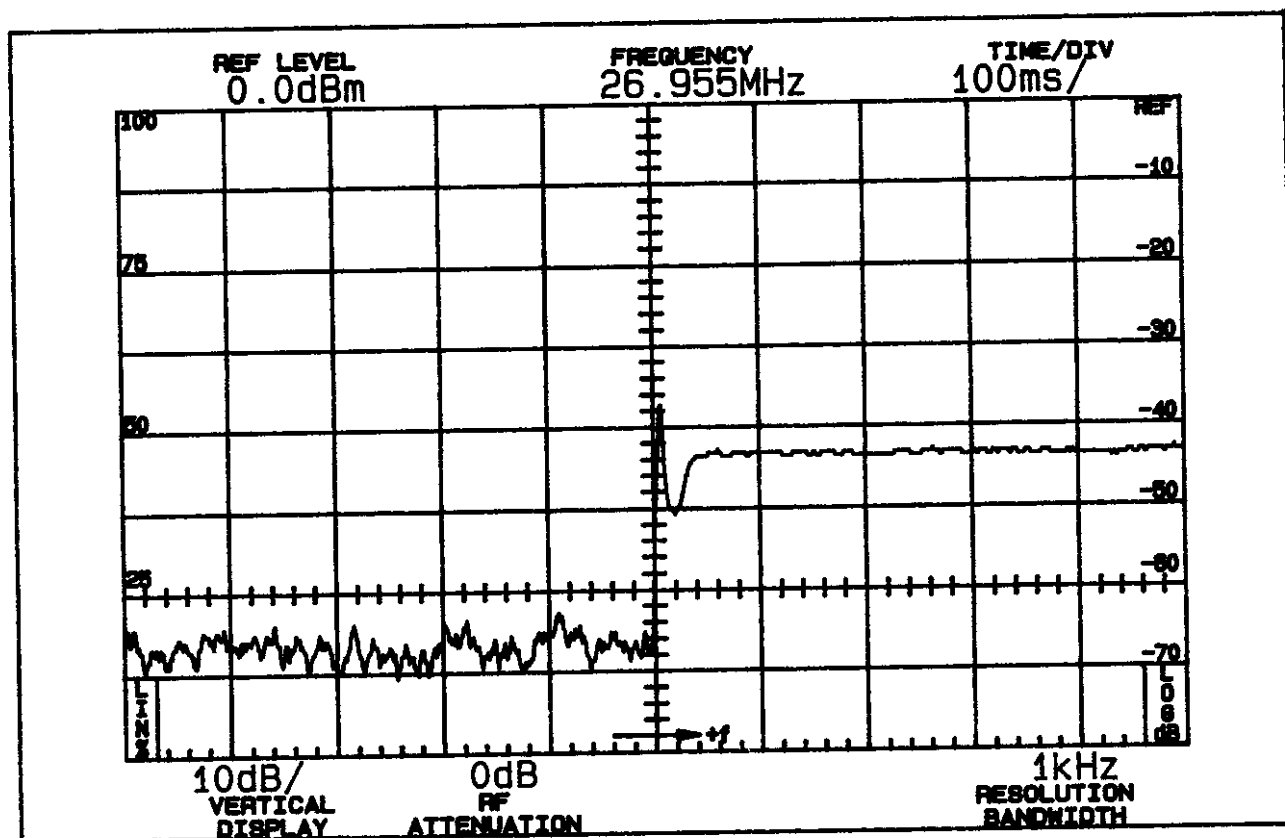
Measurement Conditions: 16 dB over 50% modulation level at 790 Hz with 2500 Hz tone, upper fourth order sideband; horizontal scale 100 ms/div.

UPPER FOURTH-ORDER SIDEBAND
LIMITER ATTACK TIME
FCC ID: MGPCM-11

FIGURE 3a

FIGURE 3b

MODULATION LIMITER ATTACK TIME



Measurement Conditions: 16 dB over 50% modulation level at 790 Hz with 2500 Hz tone, lower fourth order sideband; horizontal scale 100 ms/div.

LOWER FOURTH-ORDER SIDEBAND
LIMITER ATTACK TIME
FCC ID: MGPCM-11

FIGURE 3b

C. MODULATION CHARACTERISTICS (Continued)

4. Occupied Bandwidth - AM
(Paragraph 2.989(c) of the Rules)

Figure 4 is a plot of the sideband envelope of the transmitter taken from a Tektronix 494P spectrum analyzer. Modulation corresponded to conditions of 2.989(a) and consisted of 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50% modulation at 790 Hz, the frequency of maximum response. Measured modulation under these conditions was >85% for both positive and negative peaks.

The plot is within the limits imposed by Paragraph 95.631(b)(1,3) for double sideband AM modulation. The horizontal scale, frequency, is 10 kHz per division and the vertical scale, amplitude, is a logarithmic presentation equal to 10 dB per division.

D. SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS
(Paragraph 2.991 of the Rules)

The CM-10 Plus transmitter was tested for spurious emissions at the antenna terminals while the equipment was modulated with a 500 Hz signal, 16 dB above minimum input signal for 50% modulation at 790 Hz, the frequency of highest sensitivity.

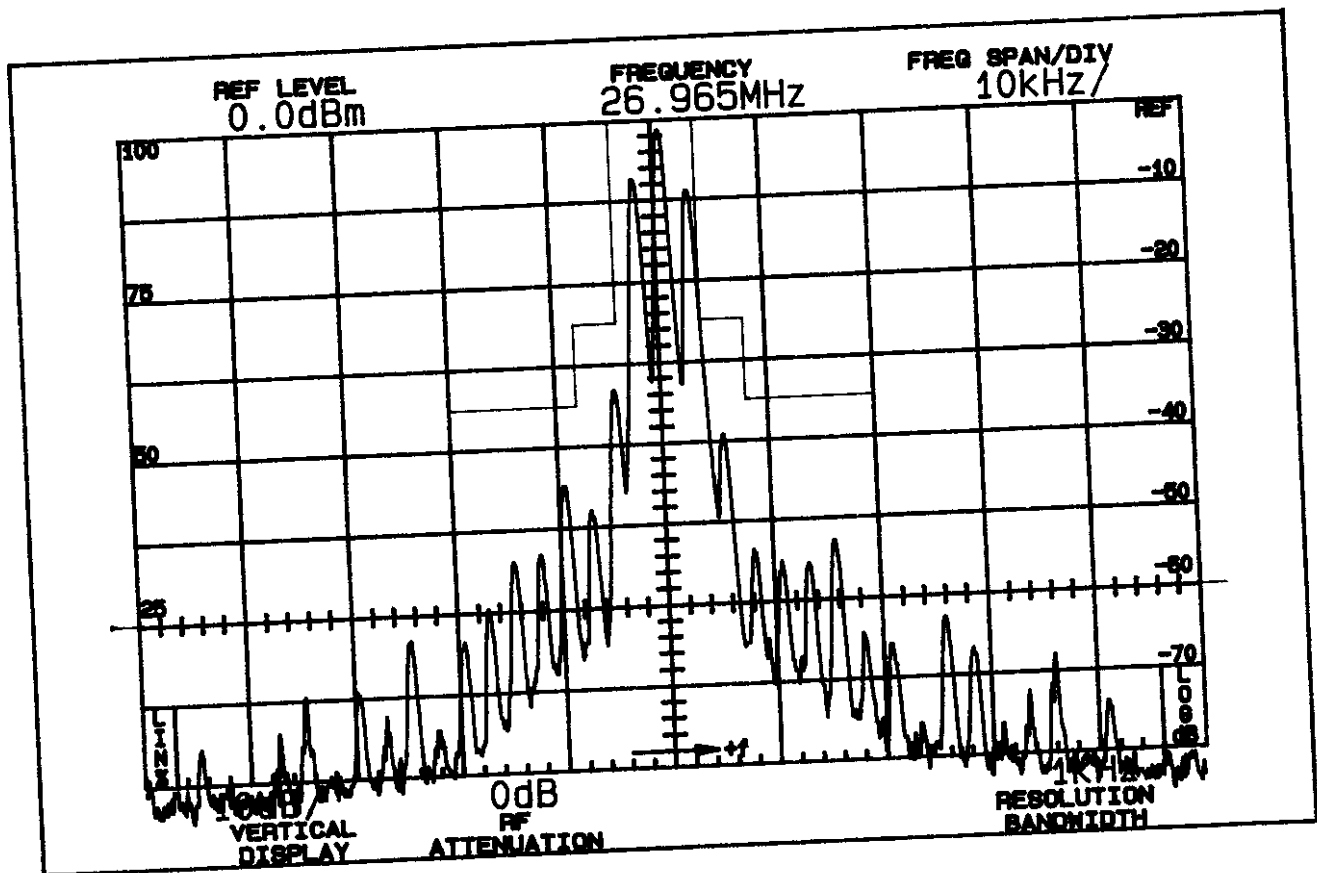
Measurements were made with Tektronix 494P spectrum analyzer coupled to the transmitter output terminal through Narda 765-20 50-ohm power attenuation.

In order to improve measurement system dynamic range, a series trap tuned to the carrier frequency was used on the Narda attenuator output. The trap, which had negligible shunt attenuation at the second harmonic and high frequencies, provided 26 dB attenuation of the fundamental. The trap was not used during close-in (within 10 MHz of the carrier) spurious measurements.

During the tests, the transmitter was terminated in the Narda 765-20 dummy load. Power was monitored on a Bird 43 Thru-Line wattmeter; dc supply was 13.8 volts throughout the tests.

Spurious emission was measured on Channels 1, 21, and 40 throughout the RF spectrum from 10 to 300 MHz. Any emissions that were between the 60 dB attenuation required and the noise floor of the spectrum analyzer were recorded. Data are shown in Table 1.

FIGURE 4
OCCUPIED BANDWIDTH - AM



ATTENUATION IN dB BELOW
MEAN OUTPUT POWER
Required

On any frequency more than 50%
up to and including 100% of the
authorized bandwidth, 8kHz (4-8kHz)

25

On any frequency more than 100%,
up to and including 250% of the
authorized bandwidth (8-20kHz)

35

On any frequency removed from the
assigned frequency by more than
250% of the authorized bandwidth

60

OCCUPIED BANDWIDTH - AM
FCC ID: MGPCM-11

FIGURE 4

TABLE 1
TRANSMITTER CONDUCTED SPURIOUS

<u>Channel</u>	<u>Spurious Frequency MHz</u>	<u>-AM- dB Below Unmod Carrier Ref.</u>
1	53.930	90
1	80.895	86
1	107.860	102
1	134.825	105
1	161.790	104
1	188.755	106
1	215.720	106
1	242.685	106
1	269.650	104
21	54.430	90
21	81.645	86
21	108.860	100
21	136.075	104
21	163.290	105
21	190.505	105
21	217.720	104
21	244.935	106
21	272.150	104
40	54.810	88
40	82.215	87
40	109.620	101
40	137.025	105
40	164.430	106
40	191.835	106
40	219.240	105
40	246.645	104
40	274.050	105

Required: 60

All other spurious were over 20 dB below required 60 dB suppression.

E. FIELD STRENGTH MEASUREMENTS OF SPURIOUS RADIATION
(Paragraph 2.993(a)(b,2) of the Rules)

Field intensity measurements of radiated spurious emissions from the CM-10 Plus transmitter were made with a Tektronix 494P spectrum analyzer and dummy load located in an open field 3 meters from the test antenna. Output power was 3.9 watts. The supply voltage was 13.8 volts. The transmitter and test antennae were arranged according to OCE 42 to maximize pickup. The unit has no accessory jacks. Both vertical and horizontal test antenna polarization were employed.

Measurements were made from 10 MHz to 10 times the maximum operating frequency of 26.965 or 270 MHz.

Reference level for the spurious radiations was taken as an ideal dipole excited by 3.9 watts, the output power of the transmitter according to the following relationship:*

$$E = \frac{(49.2 \times P_t)^{1/2}}{R}$$

where E = electric-field intensity in volts/meter
 P_t = transmitter power in watts
 R = distance in meters

$$\text{for this case } E = \frac{(49.2 \times 3.9)^{1/2}}{3} = 4.6 \text{ V/m}$$

Since the spectrum analyzer is calibrated in decibels above one milliwatt (dBm):

$$\begin{aligned} 4.6 \text{ volts/meter} &= 4.6 \times 10^6 \text{ uV/m} \\ \text{dBu/m} &= 20 \text{ Log}_{10}(4.6 \times 10^6) \\ &= 133 \text{ dBu/m} \end{aligned}$$

Since 1 uV/m = -107 dBm, the reference becomes

$$133 - 107 = 26 \text{ dBm}$$

Representing a conversion for convenience, from dBu to dBm. The measurement system was capable of detecting signals 100 dB or more below the carrier reference level. Data, including antenna factor and line loss corrections, are shown in Table 2.

*Reference Data for Radio Engineers, International Telephone and Telegraph Corporation, Sixth Edition.

F. FIELD STRENGTH MEASUREMENTS (Continued)

TABLE 2

TRANSMITTER CABINET RADIATED SPURIOUS
Channel 1, 26.965 MHz; 3.9 watts; 13.8 Vdc

<u>Frequency, MHz</u>	<u>dB Below Carrier Reference</u>			
	<u>With Accessories</u>		<u>Without Accessories</u>	
	<u>Vertical</u>	<u>Horizontal</u>	<u>Vertical</u>	<u>Horizontal</u>
53.930	81	91	90	93
80.895	89	90	85	93
107.860	89	93	93	93
134.825	85	90	75	85
161.790	89	82	89	82
188.755	92	91	89	93
215.720	84	90	93	97
242.685	96	82	95	83
269.650	79	72	80	71
FCC Limit:	60	60	60	60

Unlisted spurious were more than 80 below carrier reference from 10 to 270 MHz.

F. FREQUENCY STABILITY
(Paragraph 2.995(a)(1) of the Rules)

Measurement of frequency stability versus temperature was made at temperatures from -30°C to $+50^{\circ}\text{C}$ in 10° increments. At each temperature, the unit was exposed to the test chamber ambient a minimum of 60 minutes after indicated chamber temperature ambient had stabilized to within $\pm 2^{\circ}$ of the desired test temperature. Following a 30 minute soak at each temperature, the unit was turned on, keyed and frequency measured within 2 minutes. Test temperature was sequenced in the order shown in Table 3, starting with -30°C .

A Thermotron S1.2 temperature chamber was used. The transmitter output stage was terminated in a dummy load. Primary supply was 13.8 volts. Frequency was measured with a HP 5385A digital frequency counter connected to the transmitter through a power attenuator. Measurements were made on Channel 9, 27.065 MHz. No transient keying effects were observed. Data are shown in Table 3.

G. FREQUENCY STABILITY (Continued)

TABLE 3

<u>Temperature</u>	<u>Output Frequency, MHz</u>
-29.4	27.065040
-19.4	27.065069
- 9.6	27.065088
0	27.065113
10.4	27.065106
19.8	27.065073
30.4	27.065022
40.2	27.064977
50.1	27.064949
Maximum frequency error:	27.065113
	<u>27.060000</u>
	+ .000113 MHz

FCC Rule 95.625(b) specifies .005% or a maximum of $\pm .001353$ MHz.

G. FREQUENCY STABILITY AS A FUNCTION OF SUPPLY VOLTAGE
(Paragraph 2.995(d)(2) of the Rules)

Oscillator frequency as a function of power supply voltage was measured with an HP 6264B variable power supply was varied from $\pm 15\%$ above the nominal 13.8 volt rating for operating from automobile electrical systems. A Keithley 177 digital voltmeter was used to measure supply voltage at transmitter primary input terminals. Measurements were made at 20°C ambient. (See Table 4).

TABLE 4

<u>Supply Voltage</u>	<u>Output Frequency, MHz</u>
15.87	27.065080
15.18	27.065078
14.49	27.065076
13.80	27.065073
13.11	27.065071
12.42	27.065069
11.73	27.065066
Maximum frequency error:	27.065080
	<u>27.065000</u>
	+ .000080 MHz

FCC Rule 95.625(b) specifies .005% or a maximum of $\pm .0001353$ MHz. No effects on frequency related to keying the unit were observed.

H. ADDITIONAL REQUIREMENTS FOR TYPE ACCEPTANCE
(Paragraph 95.669 of the Rules)

The CM-10 Plus meets the applicable provision of 95.669(a).

External controls are limited to the following:

1. Primary power connection
2. Microphone jack
3. RF output power connection
4. External speaker jack
5. On-off switch (combined with receiver volume control)
6. Not applicable
7. Not applicable
8. Transmitting frequency selector
9. Transmit-receive switch
10. Meter for monitoring transmitter performance
11. Meter/pilot lamp for RF output indication

The serial number of each unit will be implemented in accordance with 95.671.

A copy of Part 5, Subpart D, of the FCC rules for the Citizens Band Radio Service, current at the time of packing of the transmitter, must be furnished with each CB transmitter marketed per 95.673.

I. PLL RESTRICTIONS
(Per Public Notice of April 27, 1978)

The CM-10 Plus meets the following conditions specified in the April 27, 1978 notice:

1. All frequency-determining elements, including crystals, PLL integrated circuits and channel selector switches are permanently wired and soldered in place.
2. The PLL integrated circuit division ratio selection is BCD coded. All the 40 channels are mask programmed into the CPU and can not be changed.
3. Channel selection is controlled by the masked program of the CPU and has only 40 positions for use in the United States.
4. All the undedicated leads in the CPU and PLL integrated circuits are disabled and molded in epoxy, and is not serviceable by the user.
5. A copy of the PLL data sheet is shown in Appendix 9.

J. FINAL AMPLIFIER DATA

1. A copy of the final RF amplifier data sheet is included in Appendix 10.

APPENDIX 1

EQUIPMENT IDENTIFICATION LABEL

EQUIPMENT IDENTIFICATION LABEL FOLLOWS THIS SHEET
(LABEL PLACEMENT SHOWN IN PHOTOGRAPHS)

EQUIPMENT IDENTIFICATION LABEL
FCC ID: MGPCM-11

APPENDIX 1