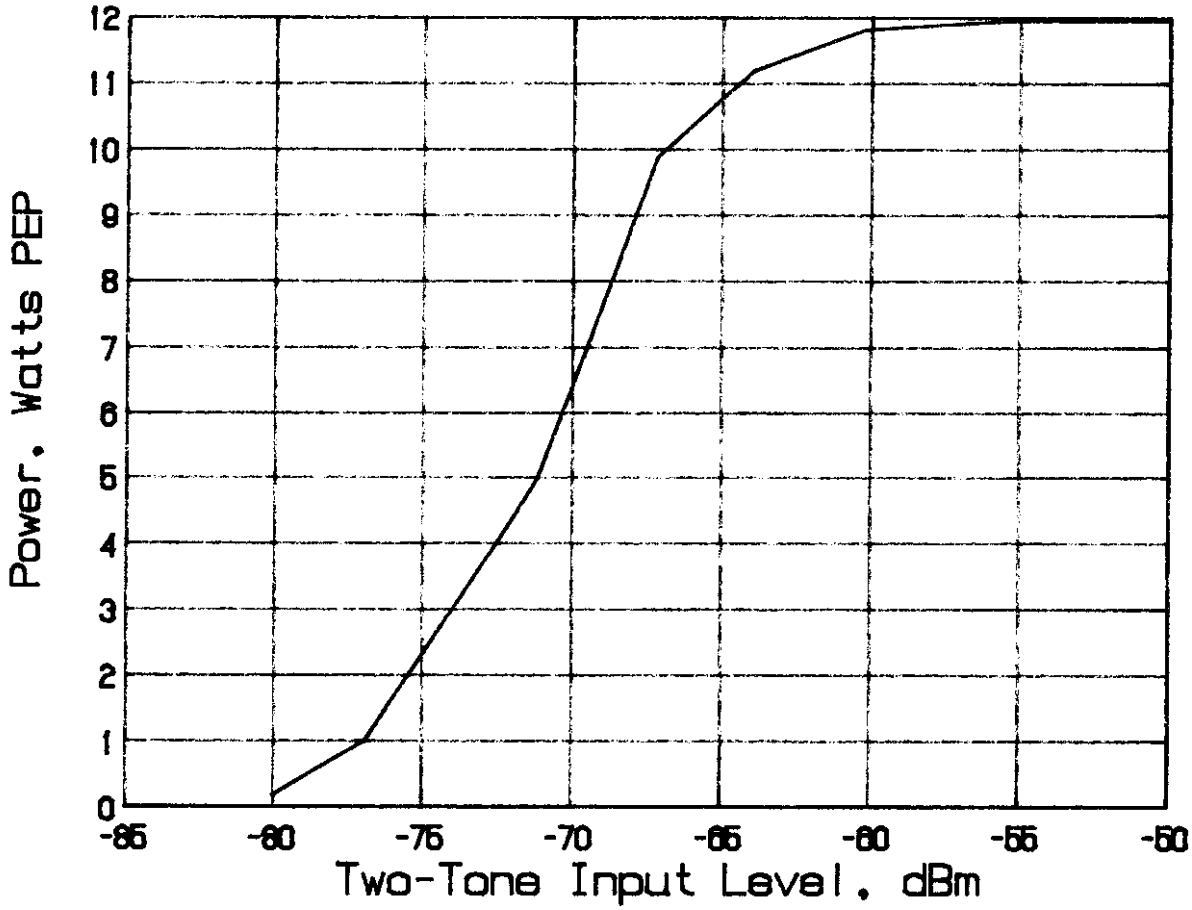
FIGURE 1

RF POWER OUTPUT VS AUDIO INPUT VOLTAGE
Two-Tone: 2400 + 500 Hz

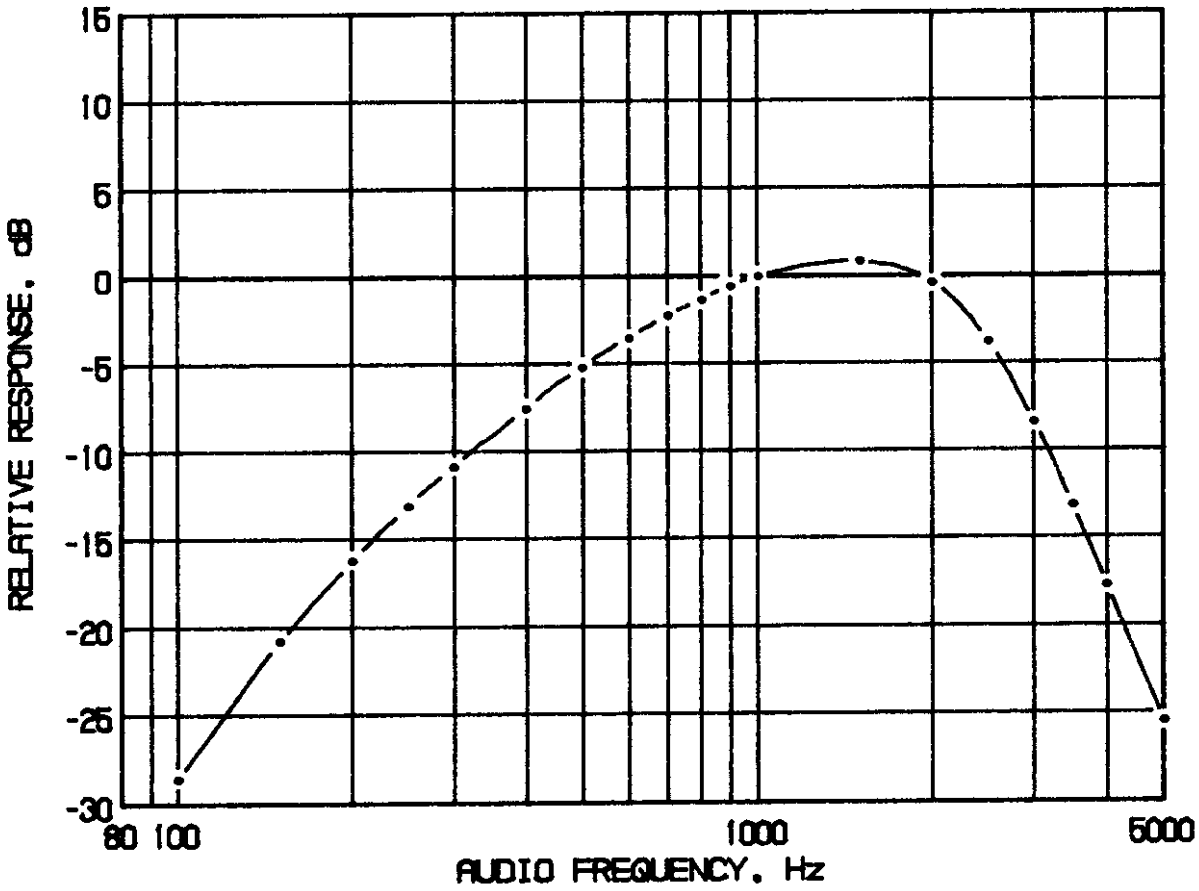


SIDEBAND MODE
RF POWER OUTPUT VS AUDIO INPUT
FCC ID: MGPCBS 2100

FIGURE 1

FIGURE 2

TRANSMITTER FREQUENCY RESPONSE

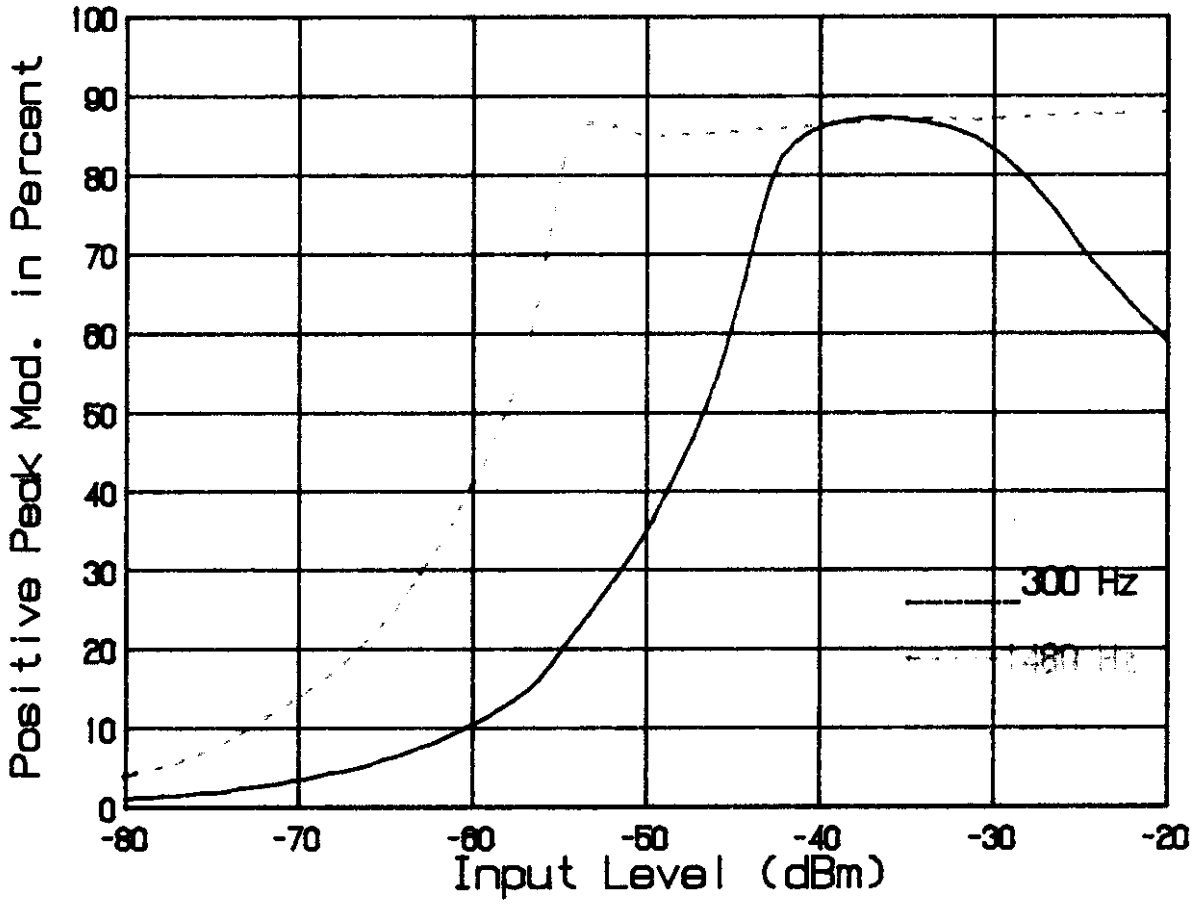


TRANSMITTER FREQUENCY RESPONSE
FCC ID: MGPCBS2100

FIGURE 2

FIGURE 3a

AM MODULATION LIMITING - POSITIVE PEAKS



MODULATION LIMITING CHARACTERISTICS

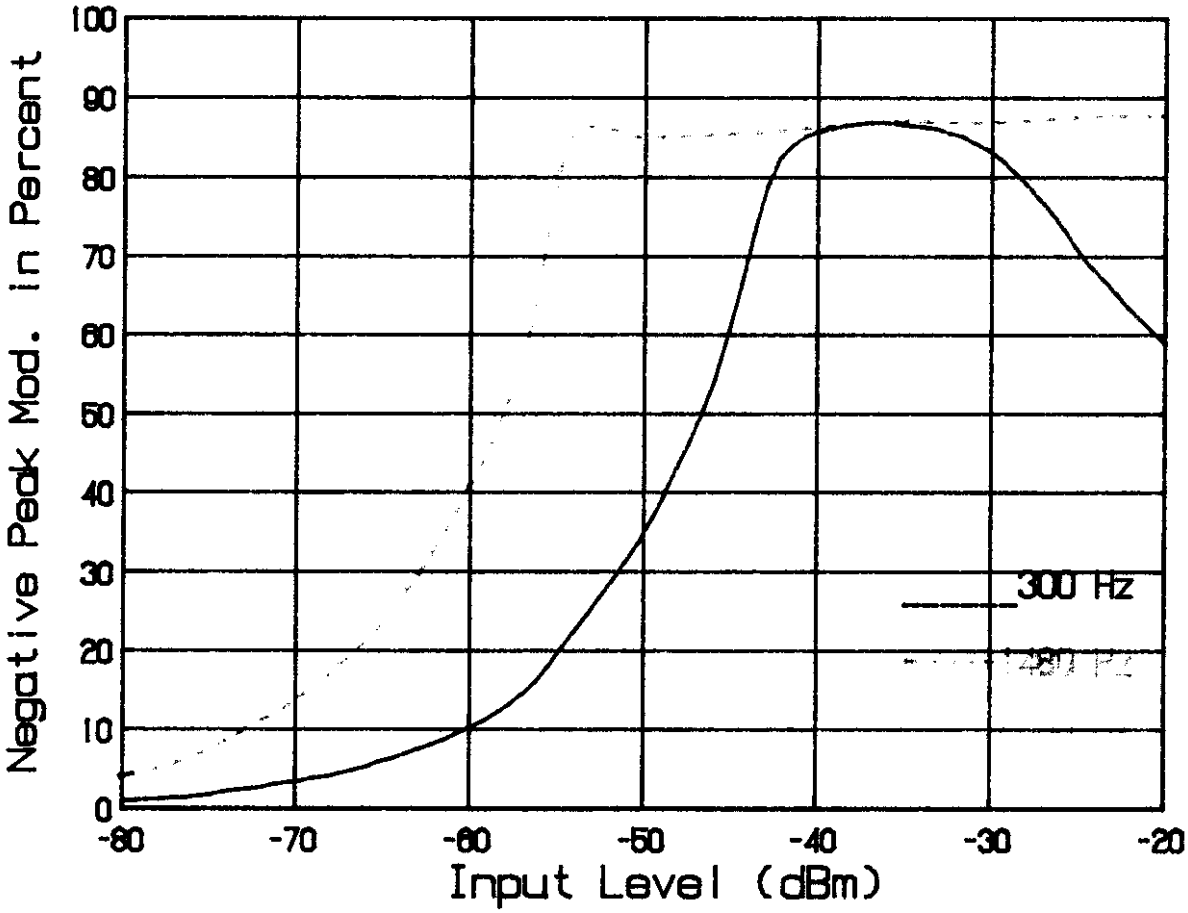
Percent modulation as a function of input level at microphone jack in dBm for 300 Hz, 1480 Hz, and 2500 Hz tones.

MODULATION LIMITING POSITIVE PEAKS
FCC ID: MGPCBS2100

FIGURE 3a

FIGURE 3b

AM MODULATION LIMITING - NEGATIVE PEAKS



MODULATION LIMITING CHARACTERISTICS

Percent modulation as a function of input level at microphone jack in dBm for 300 Hz, 1480 Hz, and 2500 Hz tones.

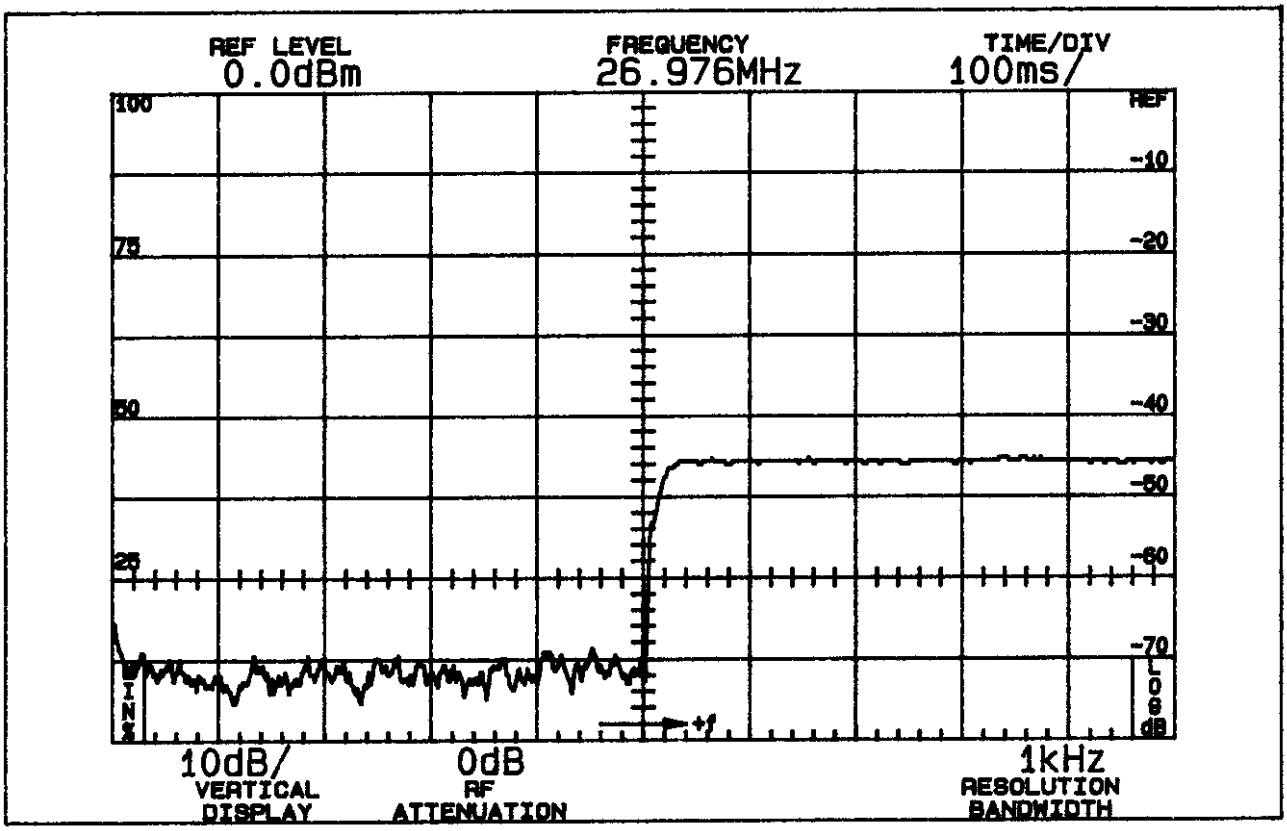
MODULATION LIMITING NEGATIVE PEAKS
FCC ID: MGPCBS2100

FIGURE 3b

A: \2100HZ.CSV

FIGURE 4a

MODULATION LIMITER ATTACK TIME



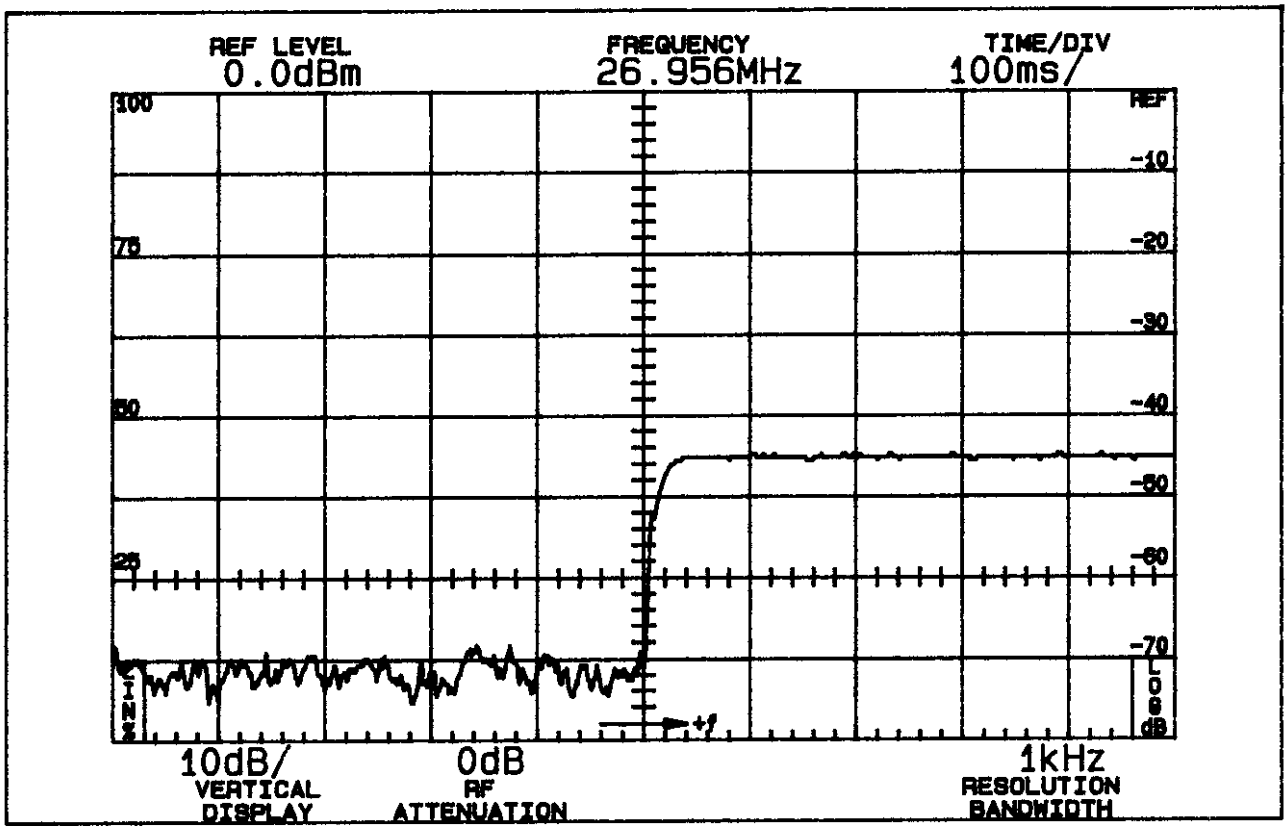
Measurement Conditions: 16 dB over 50% modulation level at 1480 Hz with 2500 Hz tone, upper fourth order sideband; horizontal scale 100 ms/div.

UPPER FOURTH-ORDER SIDEBAND
LIMITER ATTACK TIME
FCC ID: MGPCBS 2100

FIGURE 4a

FIGURE 4b

MODULATION LIMITER ATTACK TIME



Measurement Conditions: 16 dB over 50% modulation level at 1480 Hz with 2500 Hz tone, lower fourth order sideband; horizontal scale 100 ms/div.

LOWER FOURTH-ORDER SIDEBAND
LIMITER ATTACK TIME
FCC ID: MGPCBS 2100

FIGURE 4b

C. MODULATION CHARACTERISTICS (Continued)

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

Figure 5 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 1480 Hz, the frequency of maximum response. Measured modulation under these conditions was 88%.

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.

5. Occupied Bandwidth - SSB

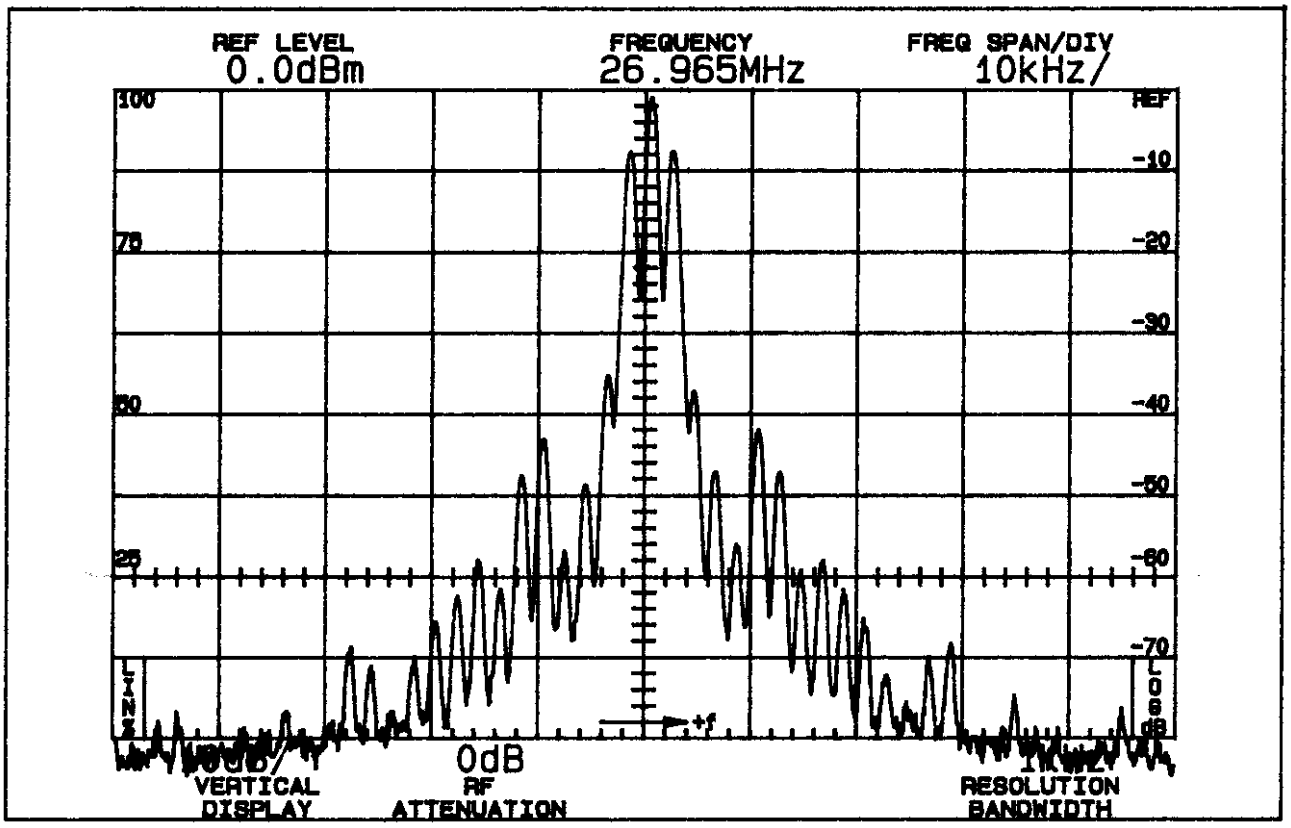
Figures 6a and 6b are plots of the sideband envelopes of the transmitter for USB/LSB taken from an Advantest P3361A spectrum analyzer. Modulation corresponded to an input level 10 dB above reference modulation per 2.989(c). The modulation is two tones at frequencies of 500 Hz and 2400 Hz applied simultaneously at levels to produce equal magnitude sidebands before the onset of limiting per 2.989(c)(2). The reference modulation level to produce reference peak envelope power was established per OCE 43.

Each sideband is 3 dB below 0 dB reference.

The plots are within the limits imposed by Paragraphs 95.631(b)(2,4) for single sideband modulation. The horizontal scale, frequency, is 5 kHz per division and the vertical scale, amplitude, is 10 dB per division.

FIGURE 5

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

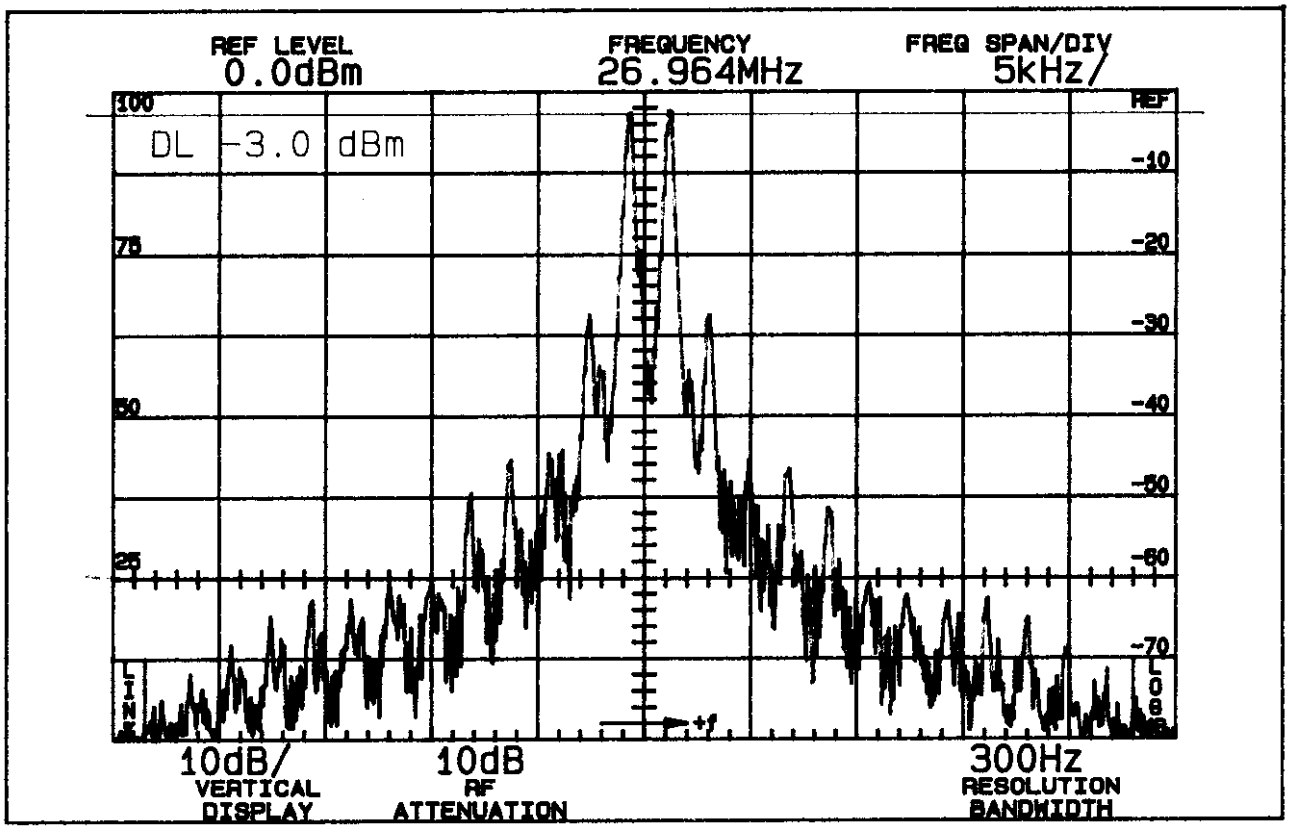
OCCUPIED BANDWIDTH - AM
FCC ID: MGPCBS 2100

FIGURE 5

A:\2100LSB.GRH

FIGURE 6a

OCCUPIED BANDWIDTH - LSB



	ATTENUATION IN dB BELOW MEAN OUTPUT POWER Required
On any frequency more than 50% up to and including 150% from the center of the authorized bandwidth, 4 kHz (2-6 kHz)	25
On any frequency more than 150%, up to and including 250% from the center of the authorized bandwidth, 4 kHz (6-10 kHz)	35
On any frequency more than 250% from the center of the authorized bandwidth 4 kHz (>10 kHz)	60

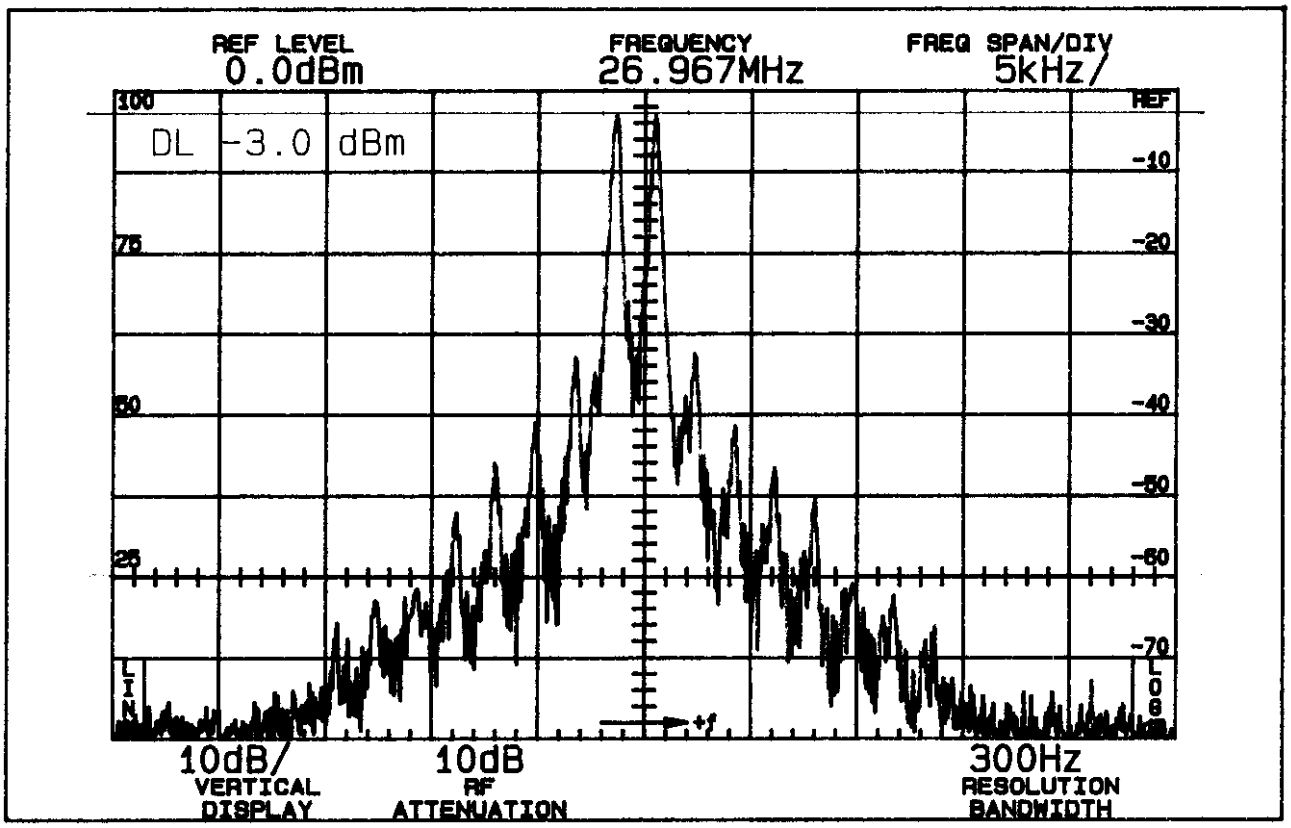
OCCUPIED BANDWIDTH - LSB
FCC ID: MGPCBS 2100

FIGURE 6a

A:\BS100USB.CRW

FIGURE 6b

OCCUPIED BANDWIDTH - USB



	ATTENUATION IN dB BELOW MEAN OUTPUT POWER Required
On any frequency more than 50% up to and including 150% from the center of the authorized bandwidth, 4 kHz (2-6 kHz)	25
On any frequency more than 150%, up to and including 250% from the center of the authorized bandwidth, 4 kHz (6-10 kHz)	35
On any frequency more than 250% from the center of the authorized bandwidth 4 kHz (>10 kHz)	60

OCCUPIED BANDWIDTH - USB
FCC ID: MGPCBS 2100

FIGURE 6b

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

The CBS-2100 transmitter was tested for spurious emissions at the antenna terminals while the equipment was modulated with a 2500 Hz signal, 16 dB above minimum input signal for 50% modulation at 1480 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 117 vac 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.

TABLE 1

TRANSMITTER CONDUCTED SPURIOUS

Channel	Spurious Frequency MHz	-AM- dB Below Unmod Carrier Ref.	dB Below Ref. PEP -SSB- LSB	USB
1	53.930	63	65	64
1	80.895	76	76	77
1	107.860	70	69	71
1	134.825	64	63	64
1	161.790	81	80	80
1	188.755	70	71	69
1	215.720	74	73	73
1	242.685	74	75	76
1	269.650	84	85	85
21	54.430	63	65	66
21	81.645	76	78	77
21	108.860	69	67	68
21	136.075	63	66	68
21	163.290	79	76	77
21	190.505	68	69	70
21	217.720	71	72	72
21	244.935	74	76	76
21	272.150	86	85	86
40	54.810	63	64	65
40	82.215	76	76	74
40	109.620	68	67	66
40	137.025	62	63	62
40	164.430	80	80	82
40	191.835	68	65	65
40	219.240	70	71	70
40	246.645	74	73	74
40	274.050	89	89	88
	Required:	60	60	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 CBS-2100 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 3.6 watts. The supply voltage was 117 vac. 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 3.6 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

for this case $E = \frac{(49.2 \times 3.6)^{1/2}}{3} = 4.4$ V/m

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

4.4 volts/meter = 4.4×10^6 uV/m

dBu/m = 20 Log $_{10}(4.4 \times 10^6)$

= 133 dBu/m

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

133 - 107 = 26 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; 3.6 watts; 117 vac

	dB Below Carrier Reference			
	With Accessories		Without Accessories	
Frequency, MHz	Vertical	Horizontal	Vertical	Horizontal
53.930	83	98	85	90
80.895	78	87	92	90
107.860	82	87	87	88
134.825	76	69	81	71
161.790	89	84	86	87
188.755	79	75	83	79
215.720	88	90	99	98
242.685	93	97	99	99
269.650	96	95	101	100
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°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 ±2° 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 117 vac. 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

Temperature	Output Frequency, MHz
-29.9	27.064989
-20.4	27.065065
-10.7	27.065095
0.2	27.065075
10.5	27.065043
20.9	27.064998
30.1	27.064958
39.7	27.064935
50.0	27.064943
Maximum frequency error:	27.065095
	27.065000
	+ .000095 MHz

FCC Rule 95.625(b) specifies .005% or a maximum of ± .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 a HP 5385A digital frequency counter as supply voltage was varied from ±15% above the nominal 117 vac rating. 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

Supply Voltage	Output Frequency, MHz
134.55	27.064999
128.70	27.064998
122.85	27.064998
117.00	27.064998
111.15	27.064997
105.30	27.064997
99.45	27.064997
Maximum frequency error:	27.064997
	27.065000
	- .000003 MHz

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

H. ADDITIONAL REQUIREMENTS FOR TYPE ACCEPTANCE
(Paragraph 95.665 of the Rules)

The CBS-2100 meets the applicable provision of 95.665(a).

External controls are limited to the following per 95.665(a):

1. Primary power connection
2. Microphone jack
3. RF output power connection
4. External earphone/mike jacks
5. On-off switch (combined with receiver volume control)
6. Upper/lower sideband selector
7. Not applicable, no R3E emission
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 95.667.

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 95.669.

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

The CBS-2100 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 are 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.