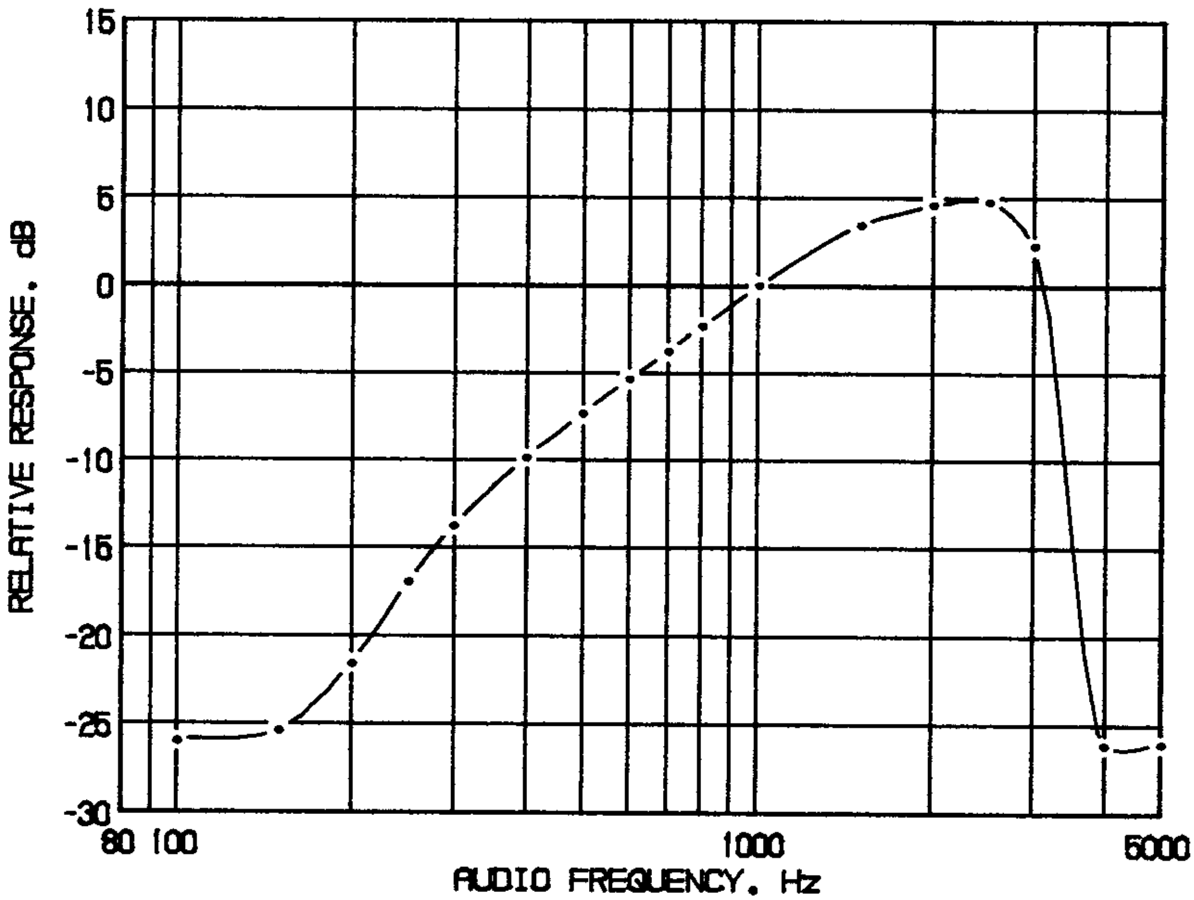
FIGURE 1

MODULATION FREQUENCY RESPONSE

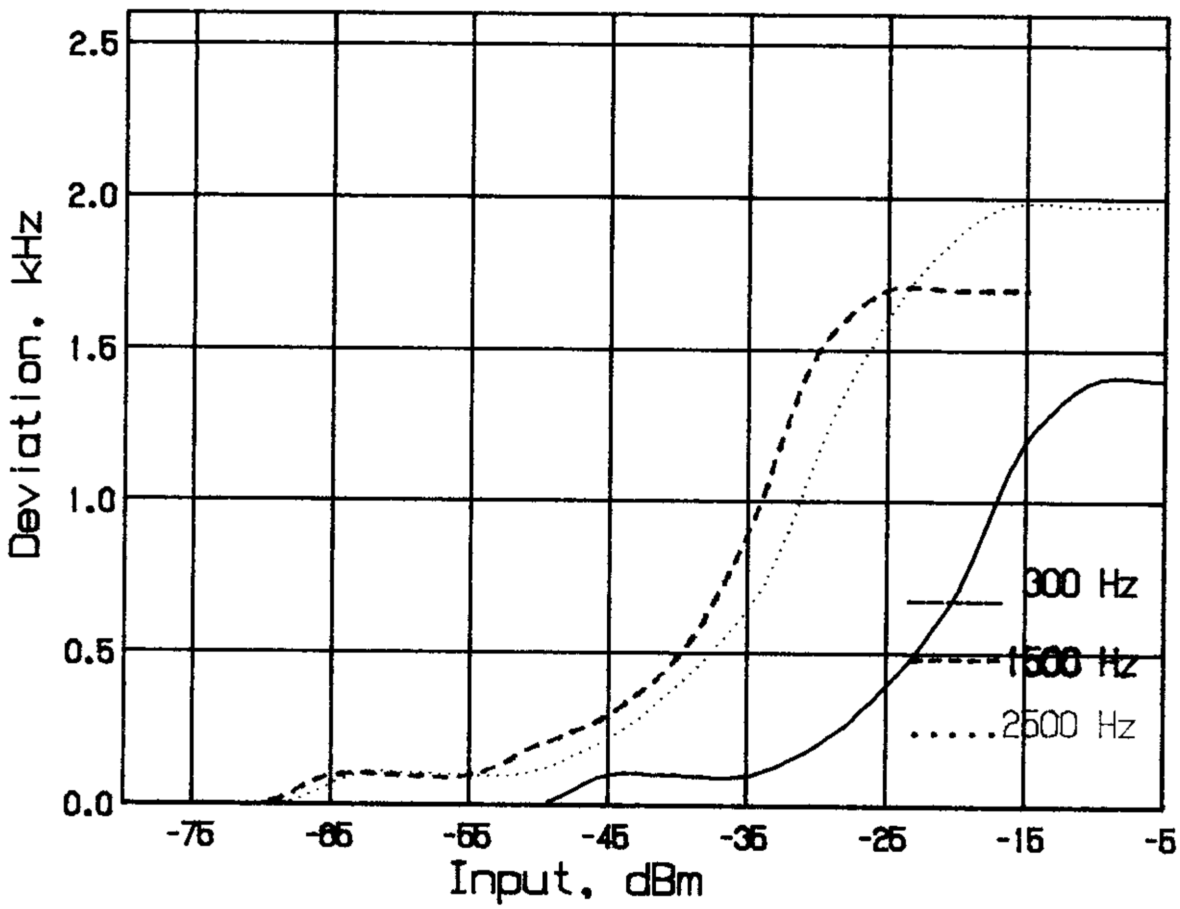


MODULATION FREQUENCY RESPONSE
FCC ID: BBOFRS310WX

FIGURE 1

FIGURE 2

AUDIO LIMITER CHARACTERISTICS

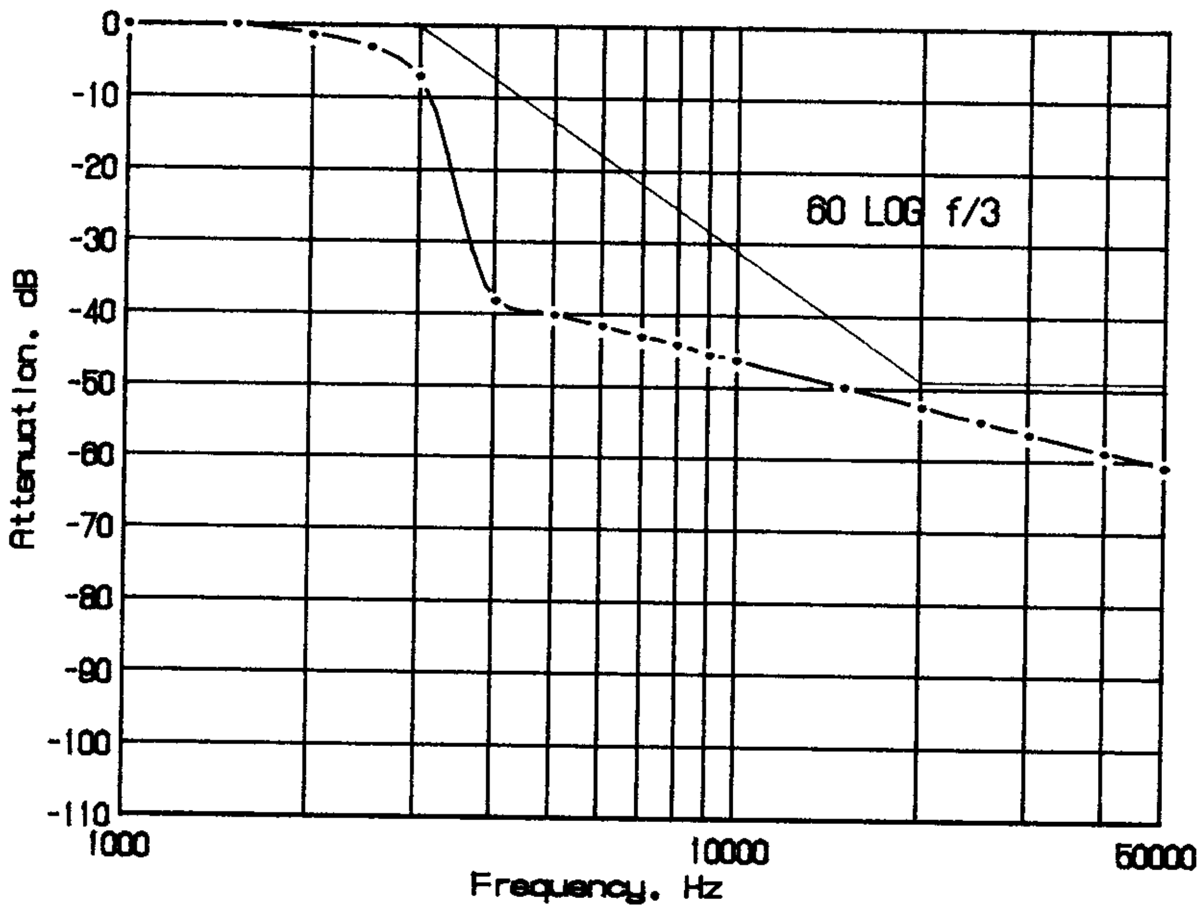


AUDIO LIMITER CHARACTERISTICS
FCC ID: BBOFRS310WX

FIGURE 2

FIGURE 3

AUDIO LOW PASS FILTER RESPONSE

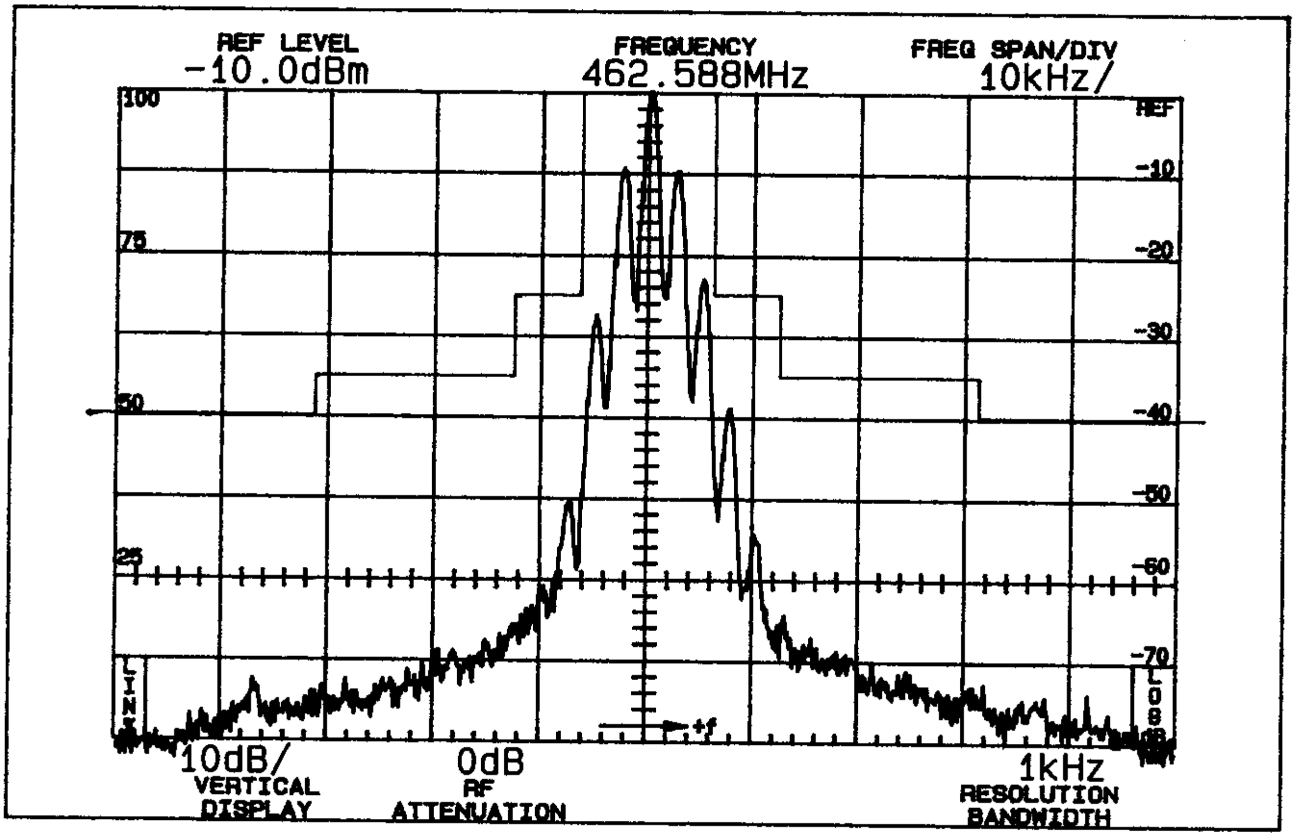


AUDIO LOW PASS FILTER RESPONSE
FCC ID: BBOFRS310WX

FIGURE 3

FIGURE 4

OCCUPIED BANDWIDTH



	ATTENUATION IN dB BELOW MEAN OUTPUT POWER Required
On any frequency more than 50% up to and including 100% of the authorized bandwidth, 12.5 kHz (6.25-12.5 kHz)	25
On any frequency more than 100%, up to and including 250% of the authorized bandwidth (12.5-31.25 kHz)	35
On any frequency removed from the assigned frequency by more than 250% of the authorized bandwidth (over 31.25 kHz)	43+10LogP = 39 (P = 0.4)

OCCUPIED BANDWIDTH
FCC ID: BBOFRS310WX

FIGURE 4

D. MODULATION CHARACTERISTICS (Continued)

The plots are within FCC limits. The horizontal scale (frequency) is 10 kHz per division and the vertical scale (amplitude) is a logarithmic presentation equal to 10 dB per division.

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

The FRS 310WX has a permanently attached antenna. There is no connector for an external antenna. Therefore, no antenna terminal conducted measurements were made.

F. DESCRIPTION OF RADIATED SPURIOUS MEASUREMENT FACILITIES

A description of the Hyak Laboratories' radiation test facility is a matter of record with the FCC. The facility was accepted for radiation measurements from 25 to 1000 MHz on October 1, 1976 and is currently listed as an accepted site.

G. FIELD STRENGTH MEASUREMENTS OF SPURIOUS RADIATION

Field intensity measurements of radiated spurious emissions from the Maxon FRS-214 were made with a Tektronix 494P spectrum analyzer using Singer DM-105 for the measurements to 1 GHz, and EMCO 3115 horn to 4.8 GHz.

The transmitter was located in an open field 3 meters from the test antenna. Supply voltage was a power supply with a terminal voltage under load of 6.0 Vdc.

The transmitter and test antennae were arranged to maximize pickup. Both vertical and horizontal test antenna polarization were employed.

The measurement system was capable of detecting signals 100 dB or more below the reference level. Measurements were made from the lowest frequency generated within the unit (12 MHz), to 10 times operating frequency. Data after application of antenna factors and line loss corrections are shown in Table 3.

TABLE 3

TRANSMITTER CABINET RADIATED SPURIOUS

462.5875 MHz, 6.0 Vdc, 0.295 watts

Spurious Frequency MHz	Radiated Field uV/m @ 3M	dB Below Carrier Reference[1]
462.588	1269492.1	0.0V
925.176	1170.5	60.7V*
1387.764	510.8	67.9H*
1850.352	4488.1	49.0H
2312.940	3644.2	50.8V*
2775.526	955.4	62.5V*
3238.114	3526.8	51.1H*
3700.702	2608.5	53.7H*
4163.288	876.8	63.2V*
4625.878	933.7	62.7H*
	Required: 43+10 Log(P) =	38

[1]Worst-case polarization, H-Horizontal, V-Vertical.

*Reference data only, more than 20 dB below FCC limit.

All other spurious from 12 MHz to the tenth harmonic were 20 dB or more below FCC limit.

Power:

$$P = (F.1.x3)^2/49.2$$

$$= (1.2695x3)^2/49.2$$

$$= 0.295\ W$$

H. FREQUENCY STABILITY
(Paragraph 2.995(a)(2))

Measurement of frequency stability versus temperature was made at temperatures from -20°C to +50°C. At each temperature, the unit was exposed to test chamber ambient a minimum of 60 minutes after indicated chamber temperature ambient had stabilized to within ±2° of the desired test temperature. Following the 1 hour 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 4, starting with -20°C.

A Thermotron S1.2 temperature chamber was used. Temperature was monitored with a Keithley 871 digital thermometer. The transmitter output stage was terminated in a dummy load. Primary supply was 6.0 volts. Frequency was measured with a HP 5385A frequency counter connected to the transmitter through a power attenuator. Measurements were made at 462.5875 MHz. No transient keying effects were observed.

TABLE 4

FREQUENCY STABILITY AS A FUNCTION OF TEMPERATURE

462.5875 MHz, 6.0 Vdc, 0.295 W

Temperature, °C	Output Frequency, MHz	p.p.m.
-19.7	462.587755	0.6
- 9.8	462.587797	0.6
0.4	462.587804	0.7
10.3	462.587763	0.6
20.4	462.587706	0.4
30.1	462.587656	0.3
40.4	462.587639	0.3
50.2	462.567641	0.3

Maximum frequency error: 462.587804
462.587500

\+ .000304 MHz

FCC Rule 95.627(b) specifies .00025% (2.5 p.p.m.) or a maximum of ± 0.001156 MHz, which corresponds to:

High Limit	462.588656 MHz
Low Limit	462.586344 MHz

I. 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 frequency counter as supply voltage provided by an HP 6264B variable dc power supply was varied from ±15% above the nominal 6.0 volt rating to below the battery end point. A Fluke 197 digital voltmeter was used to measure supply voltage at transmitter primary input terminals. Measurements were made at 20°C ambient.

TABLE 5

FREQUENCY STABILITY AS A FUNCTION OF SUPPLY VOLTAGE

462.5875 MHz, 6.0 Vdc Nominal; 0.295W

Supply Voltage		Output Frequency, MHz	p.p.m.
6.9	115%	462.587700	0.4
6.6	110%	462.587701	0.4
6.3	105%	462.587705	0.4
6.0	100%	462.587706	0.4
5.7	95%	462.587704	0.4
5.4	90%	462.587708	0.4
5.1	85%	462.587710	0.5
4.9*	80%	462.587708	0.4

Maximum frequency error: 462.587710
462.587500

\+ .000210 MHz

FCC Rule 95.627(b) specifies .00025% (2.5 p.p.m) or a maximum of ± 0.001156 MHz, corresponding to:

High Limit	462.588656 MHz
Low Limit	462.586344 MHz

*Battery end point.

APPENDIX 6

TRANSMITTER ALIGNMENT

ONE (1) PAGE ALIGNMENT PROCEDURE FOLLOWS THIS SHEET

APPENDIX 7

CIRCUITS AND DEVICES TO STABILIZE FREQUENCY

SYNTHESIZER

A phase locked loop (PLL) circuit establishes and stabilizes operating frequency.

The data for producing necessary frequencies is established by the CPU on the digital board.

The frequency stability of the Tx/Rx is maintained by the TCXO, which generates a stable frequency of 12.8 MHz.

APPENDIX 8

CIRCUITS TO SUPPRESS SPURIOUS RADIATION AND LIMIT MODULATION

Circuitry to Suppress Spurious Emissions

Output from the final RF power amplifier, Q501, and presented to a low-pass filter configured in a "pi" network consisting of C273, L217, C75, L219, C277, C279, L221, C280 and C281.

Circuitry to Limit Modulation and Audio Low Pass Filter

Microphone signal is amplified limited to prevent deviation over 2.5 kHz, and applied to a 3 kHz low-pass filter configured around IC308C.