

## **Section (C)**

### **Index for Measurement Data**

<b>FCC Section:</b>	<b>Description</b>	<b>7554 Measurements</b>	<b>Page</b>
90.207	Type of Emission	12K0F3E	
90.209	Bandwidth Limitations	12.5 kHz	
90.210	Emission Mask (B) as per 90.211	11 kHz	
90.214	Transient Frequency Behavior	<8 mil Sec	
2.1046	RF Power into Final	500 mill Watts Max	
2.1047	Modulation Characteristics	1 VRMS for 3kHz Deviation	
90.209	Occupied Bandwidth	<11 kHz	
	Mean RF Power attenuation 10 kHz from center frequency	-43 dBc	
2.1051	Spurious Emissions Conducted	-43 dBc	
2.1053	Spurious Emissions Radiated	-43 dBc	
2.1055	Frequency Stability	>.005%	

## MEASUREMENT DATA REQUIRED FOR CERTIFICATION

(A) RADIO FREQUENCY POWER OUTPUT

RF power output at output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1046 (A).

POWER MEASUREMENTS

The DC power into the final RF stage and RF power output into the RF load were determined in the following manner. Refer to Schematic 7554. C15, C18, C22 and C14 were adjusted for the maximum RF output power into a Boonton Model 42A power meter. The maximum RF output power was obtained with the value of components called out in the part list. The maximum DC current into the RF final "Q1" was measured to be 118mA. across a .1 ohm resistor placed in series with L8 at 6.4VDC. The maximum current into IC1 which contains the driver transistor was 14 mA.

RF power delivered to the power meter for the units tested is as follows:

Unit #	Frequency	Power Measured
1	167.675 MHz	472 milwatts
2	155.425 MHz	481 milwatts

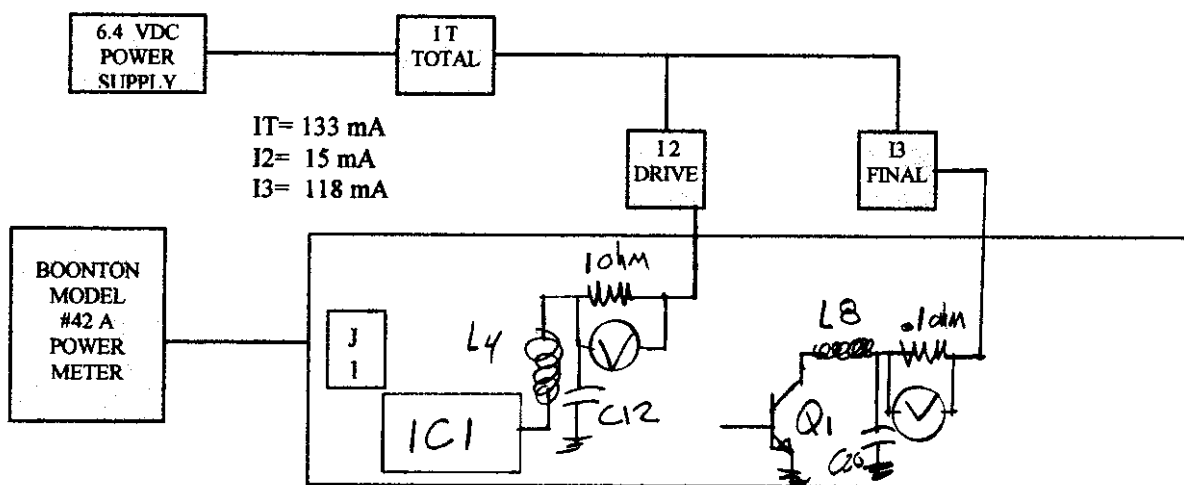


FIG (1)

(B) MODULATION CHARACTERISTICS 2.1047 A&B

Voice modulated communications equipment: A curve or equivalent data showing the frequency response of the audio modulating circuit over a frequency range of 100 to 5000 Hz shall be submitted as specified in 2.987 (A).

MODULATION CHARACTERISTICS MEASUREMENTS

The following equipment was used to measure the modulation characteristics of Model 7554 units #1 & #2: H/P 400 GL RMS Voltmeter, H/P 3310 Audio Generator. See Fig. (2) . Refer to Print ( TM7554) Note: A low impedance audio signal was injected at the Junction of C2 and R2. This signal is then amplified and hard limited by IC1. IC1 audio output is then passed through the low pass filter IC2 . Its output is applied to IC1 modulator at pin #3.

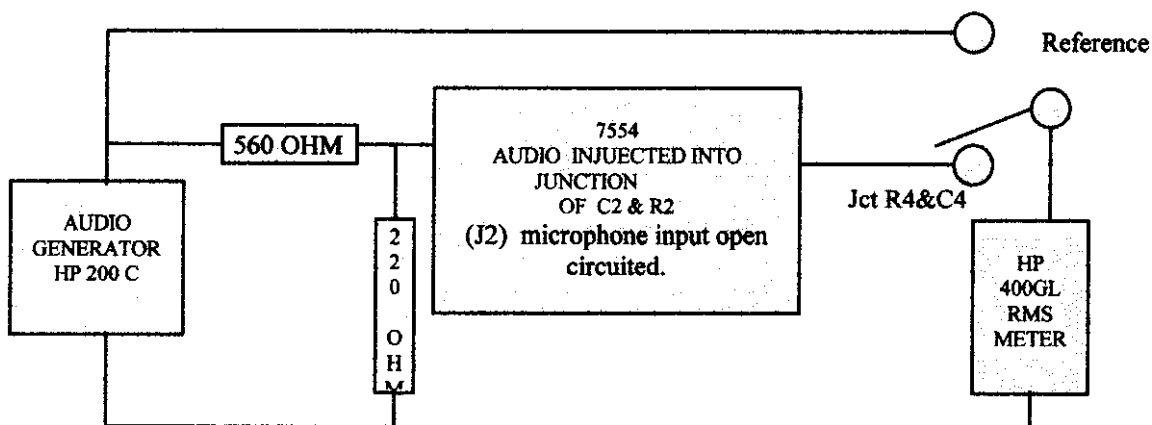


FIG (2)

The audio level was held constant across the audio spectrum while the following curves were being made. See Fig. (3), page 4.

Curve #1: The input level was adjusted to -40 dBV rms. This level is not sufficient to cause the limiter circuitry to be activated. This curve illustrates the audio response to the modulator before limiting after passing through the low pass filter

Curve #2: The input level was increased to -20dBV rms. This level is sufficient to cause the limiter to become active. This level will be the 0 dB reference on the three audio response curves.

Curve #3: The input level was increased to 0dbV rms. This level is sufficient to cause the limiter to be in hard-limiting across the entire audio spectrum being investigated Curve #3 illustrates that the audio level into the modulator does not exceed the reference level.

The modulator sensitivity is 1 VRMS per 3 kHz deviation at the junction of R4 and C4 and Pin # (3), IC1. The modulation can be decreased by adjusting the values of R5 & R6. The range of IC1 limiter is in excess of 30dB. Please Note: The modulation is factory adjusted for the proper deviation.

2.5 kHz  
# 5 kHz

MODULATING FREQUENCY

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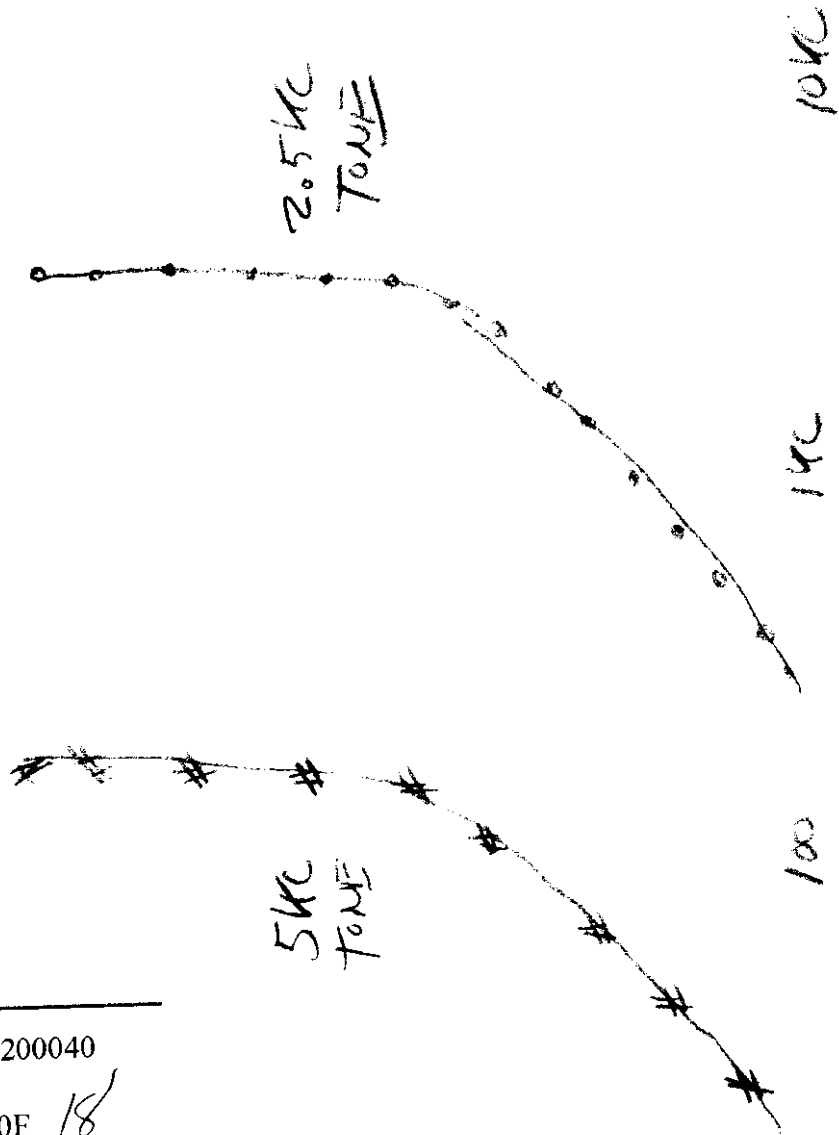
0 dBV

-10 dBV

-20 dBV

-30 dBV

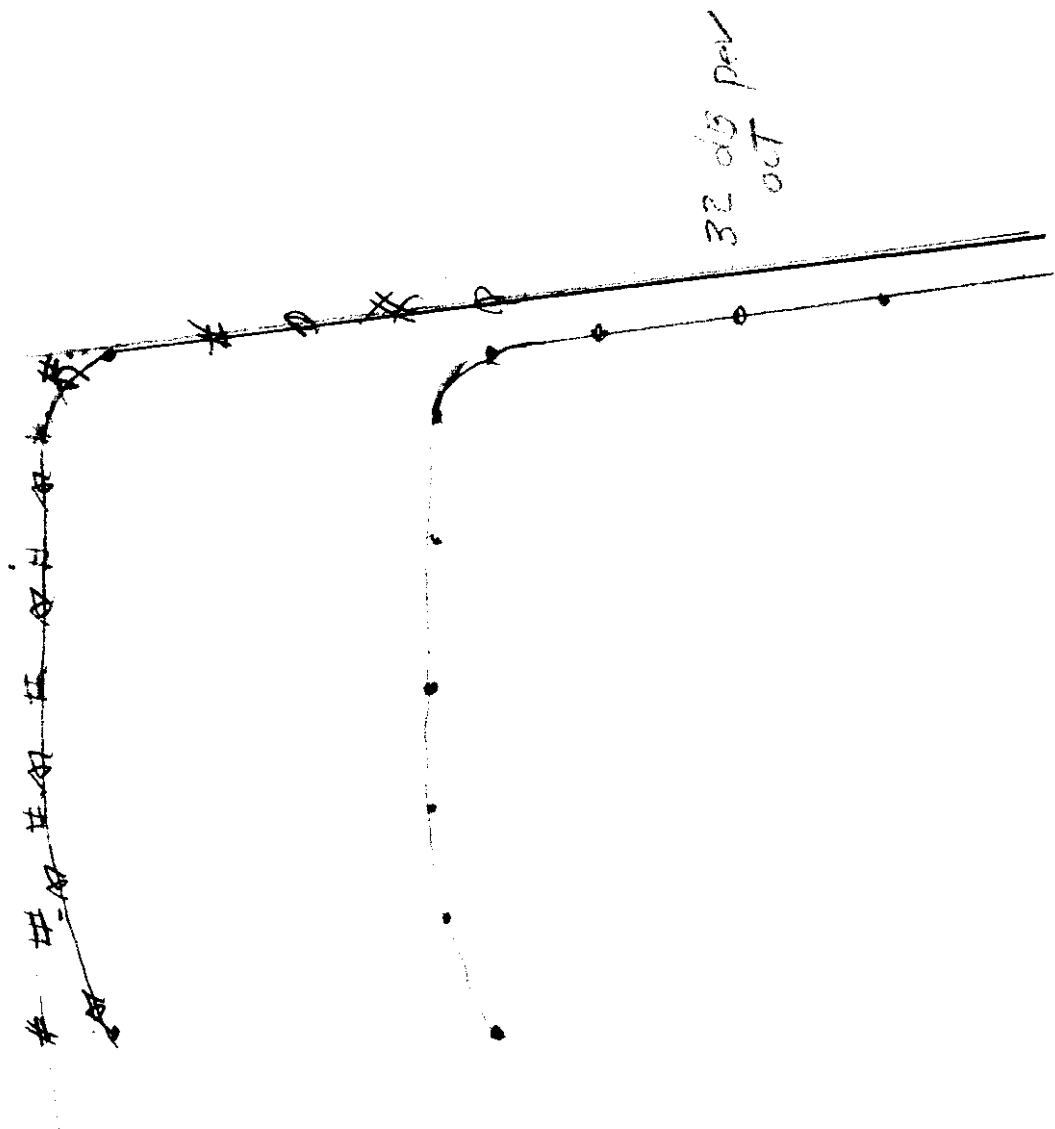
-40 dBV 10



MEASURED DEVIATION

JCT R46C4

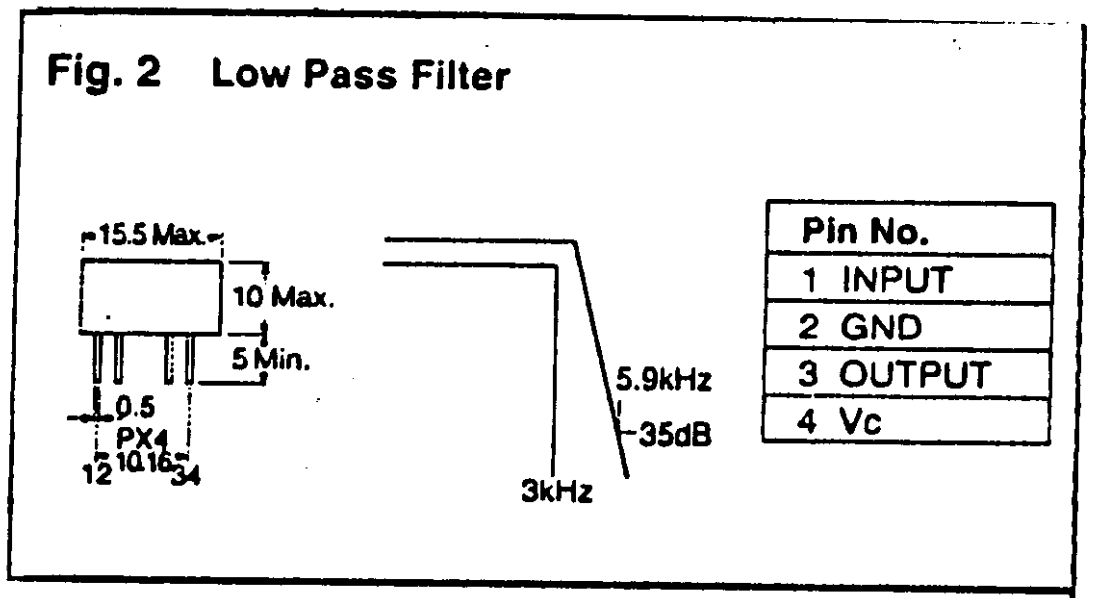
10 Hz 100 Hz 1000 Hz 10000 Hz



#1 (0)	-40
#2 (0)	-20
#3 (0)	0
INPUT LEVEL	

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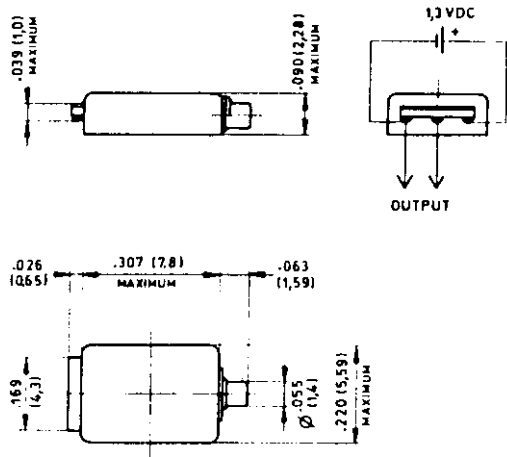
TK5426

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# LECTRET

## PERFORMANCE SPECIFICATION MODEL 1242



DIMENSIONS IN INCHES (MM)

New subminiature condenser microphone for professional applications. A special feature is the low frequency cut of 5dB per octave below 1 KHz which improves the quality of voice communications in noisy environments. Transducers represent the state of the art in resistance to shock and vibration and in acoustic performance. A novel electret element and integral preamplifier are included.

Noise level ("A"-weighted) (2 KHz equivalent SPL)	32 dB nom.
Supply voltage	3 V (.9-20 V)
Current drain at 3 V	30 $\mu$ A
Output impedance	1.5-4 Kohm
Distortion (3%THD at 3 V supply)	115 dB SPL

### Sensitivity (dBV)

Frequency	min	nom	max
300 Hz		-73	
1000 Hz	-69	-65	-61
2000 Hz		-62	
~ 3800 Hz		-60	

### Device conformity range of deviation from 1 KHz

300 Hz	-12 dB	to	-5 dB
1000 Hz		0	
2000 Hz	+1 dB	to	+5 dB
~ 3800 Hz	+2 dB	to	+10 dB

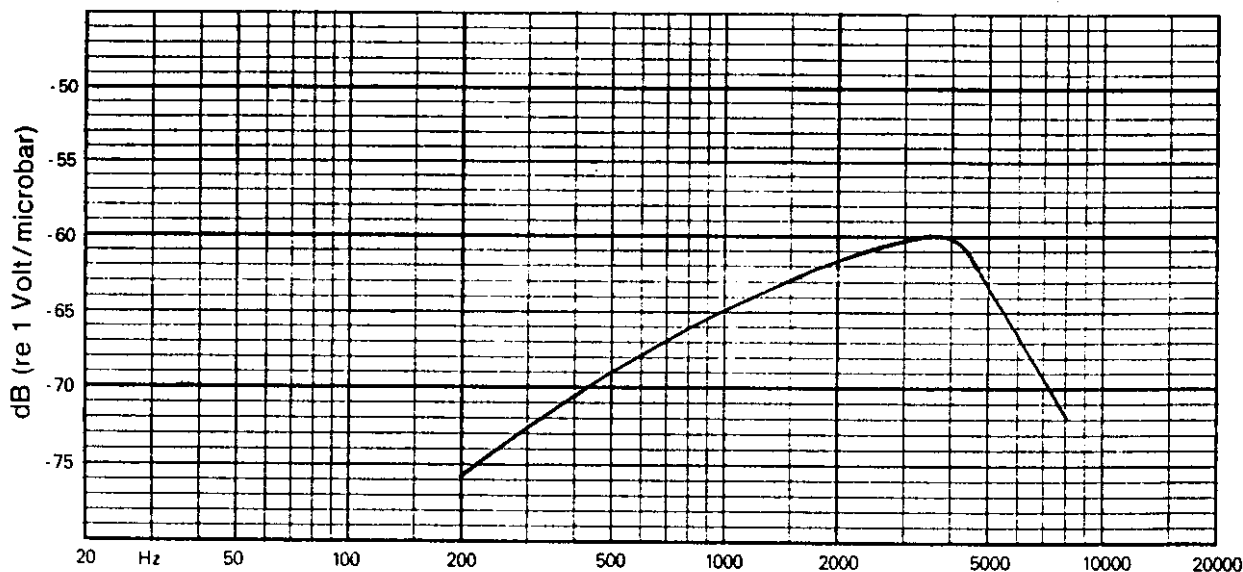
PATENTS PENDING

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## FREQUENCY RESPONSE

(Measured with 3 V supply and high impedance amplifier)





(C) OCCUPIED BANDWIDTH (90.209) (1)

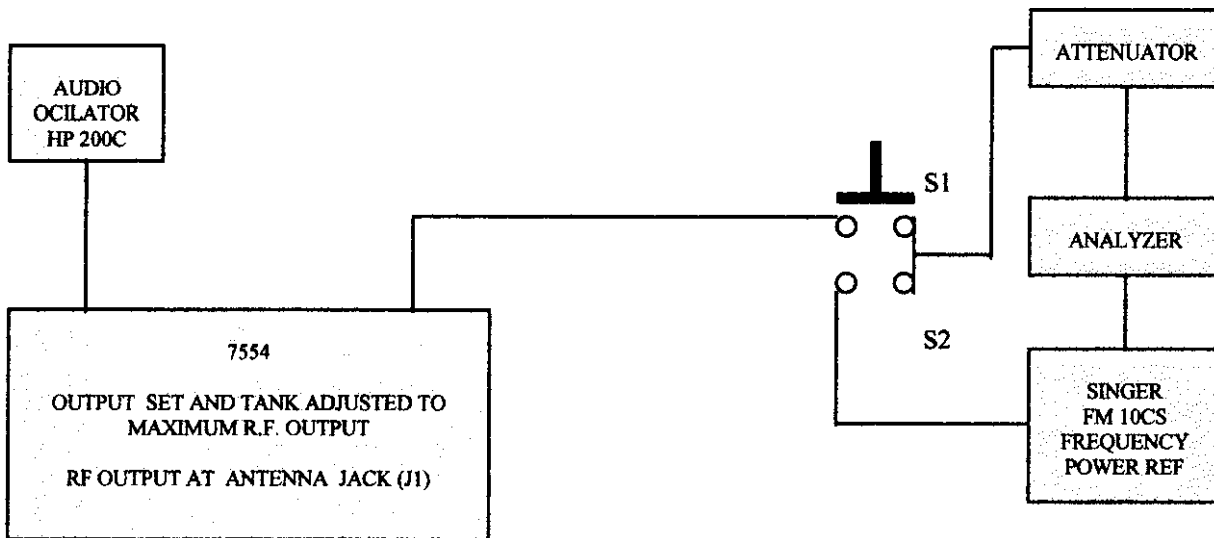
The frequency bandwidth such that below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission. When modulated by and input signal 16 dB greater than required to produce 50% modulation, test at 2500 Hz.

MEASURED OCCUPIED BANDWIDTH

Model 7554 Test Units #1 & #2 had less than 11 kHz occupied bandwidth at 2500 Hz modulation. Please note: Audio level was held constant for 1000 and 2,500 Hz test..

TEST EQUIPMENT SET-UP FOR CONDUCTIVE OCCUPIED BANDWIDTH

H/P Model 182C and 8558B spectrum analyzer; Singer FM10CS Kay Model 40-0 attenuator.



SPECTRUM ANALYZER SETTING

Bandwidth 500 Hz  
Horizontal (X plane)  
Vertical (Y plane)  
Video Filter: off

Scan time 20 msec per division  
10 KHz per division  
10 dBm per division  
Log Scale: on

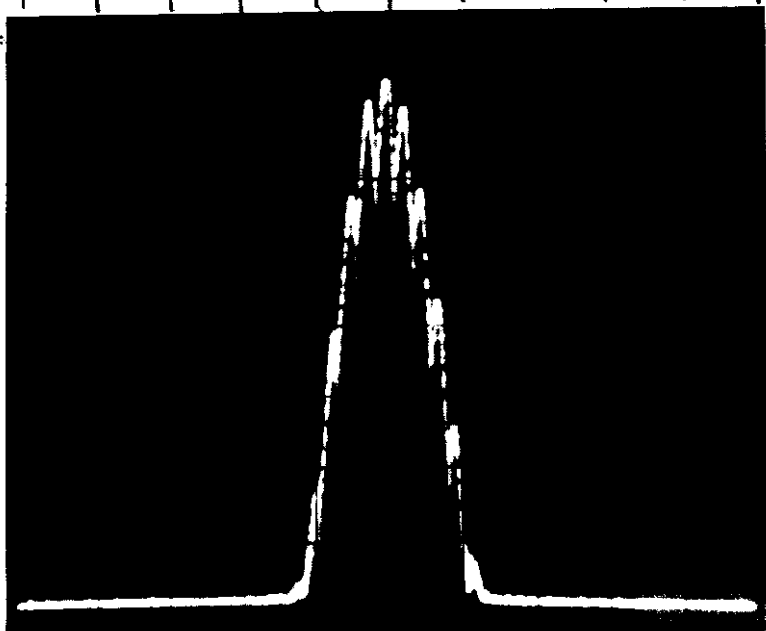
See page 9 for spectrum display.

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KHZ

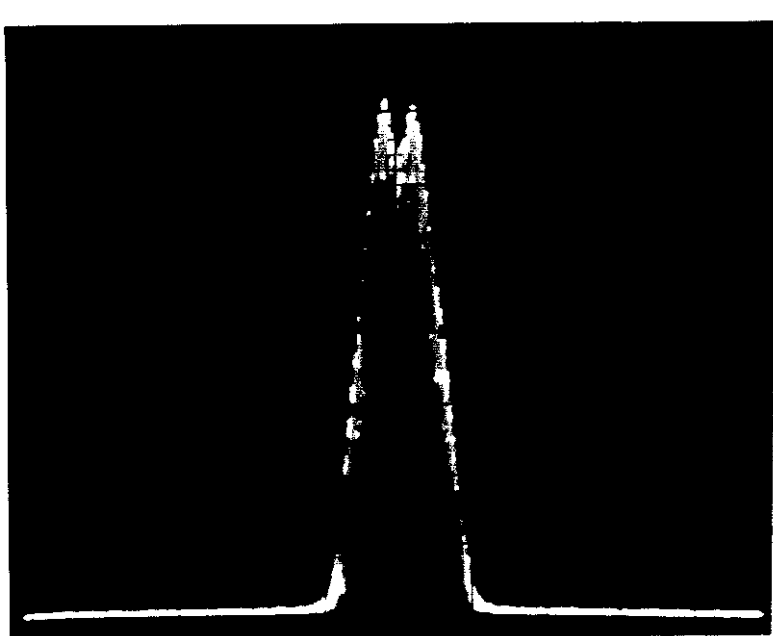
-50 -40 -30 -20 -10 0 10 20 30 40 50

DBM

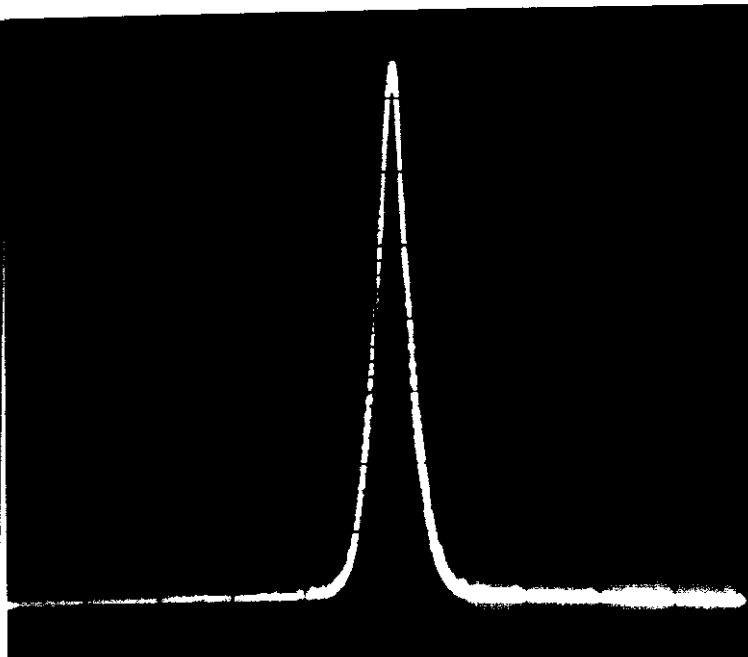


+30  
+20  
+10  
0  
-10  
-20  
-30  
-40  
-50

2500 CPS



1200 CPS



CARRIER

(D) SPURIOUS EMISSIONS FROM THE TRANSMITTING EQUIPMENT FOR THE FOLLOWING CONDITIONS:

(A) CONDUCTED SPURIOUS EMISSIONS (2.1051)

Test procedure as started in EIA standards RS-316-5.3 with the following exceptions. The antenna on the transmitter was removed. The antenna output, (J1) was then connected to a H/P 8558B Spectrum analyzer which presents a 50 ohm load to the transmitter output, and the spectrum was investigated for spurious emissions from the lowest crystal oscillator frequency to 1.8 GHz. The audio level was adjusted 16 db greater than required to produce 50% modulation at 2500 Hz and injected at the junction of C2 & R2, (J2) microphone input open circuited. Spurious 20 dB below the permissible value need not be reported

TEST EQUIPMENT SET-UP FOR CONDUCTIVE SPURIOUS EMISSIONS

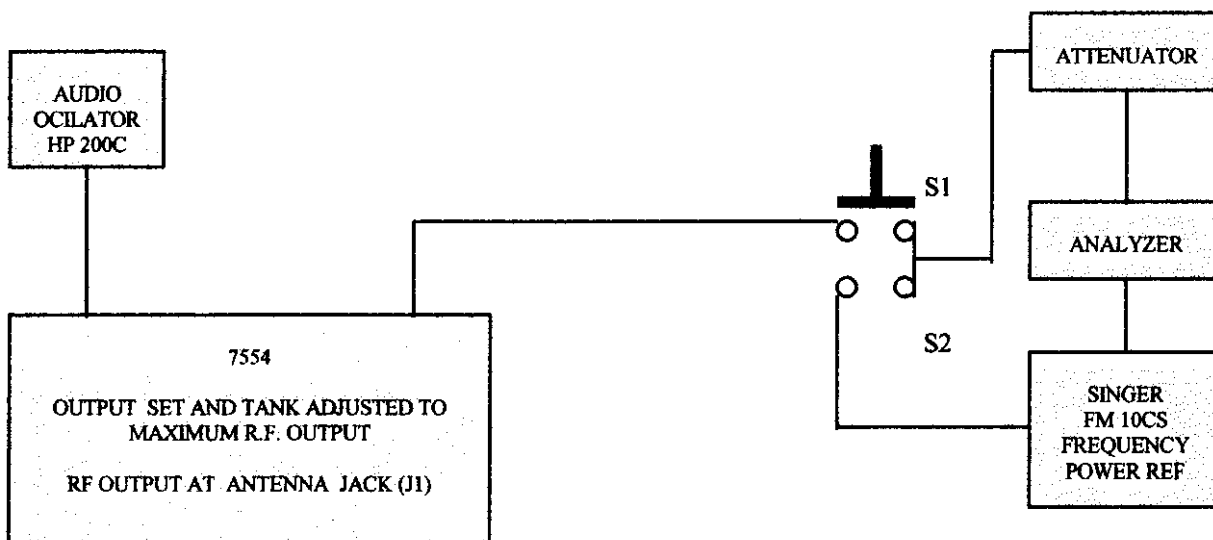
The following equipment was used to measure the conductive spurious emissions of Model 7554, Units #1 & #2: at the antenna output connector

H/P Model 182C and 8558B spectrum analyzer; Singer FM10CS; Kay Model 40-0 attenuator

TEST EQUIPMENT SET-UP FOR CONDUCTIVE SPURIOUS EMISSIONS

Bandwidth 1MHz  
Horizontal (X plane)  
Vertical (Y plane)  
Video Filter: off

Scan time 10 msec per division  
100 MHz per division  
10 dbM per division  
Log Scale:: on



The spectrum analyzer was set up whereby any spurious emissions conducted less than -60 dBm below the carrier would be recorded. The spectrum was scanned from the lowest oscillator frequency to 1.8 GHz.

### MEASURED SPURIOUS EMISSIONS

Test Unit #1:

Center Frequency: 155.425 MHz reference level 25 dBm

#### Recorded Spurious Emissions

<u>Frequency MHz</u>	<u>Level</u>	<u>dbM</u>	<u>--</u>	<u>Frequency MHz</u>	<u>Level</u>	<u>dbM</u>	<u>Frequency</u>	<u>Level dBm</u>
77.71	-25	194.281	-28	-	-	-	-	-
116.56	-30	310.850	-28	-	-	-	-	-
CARRIER	25	621.700	-40	-	-	-	-	-

The maximum conducted spurious emission was 50 db below carrier. The emission was on 77.71 MHz which is the 2nd harmonic of the crystal oscillator.

Test Unit #2:

Center Frequency: 167.675 MHz, reference level 25 dBm

#### Recorded Spurious Emissions

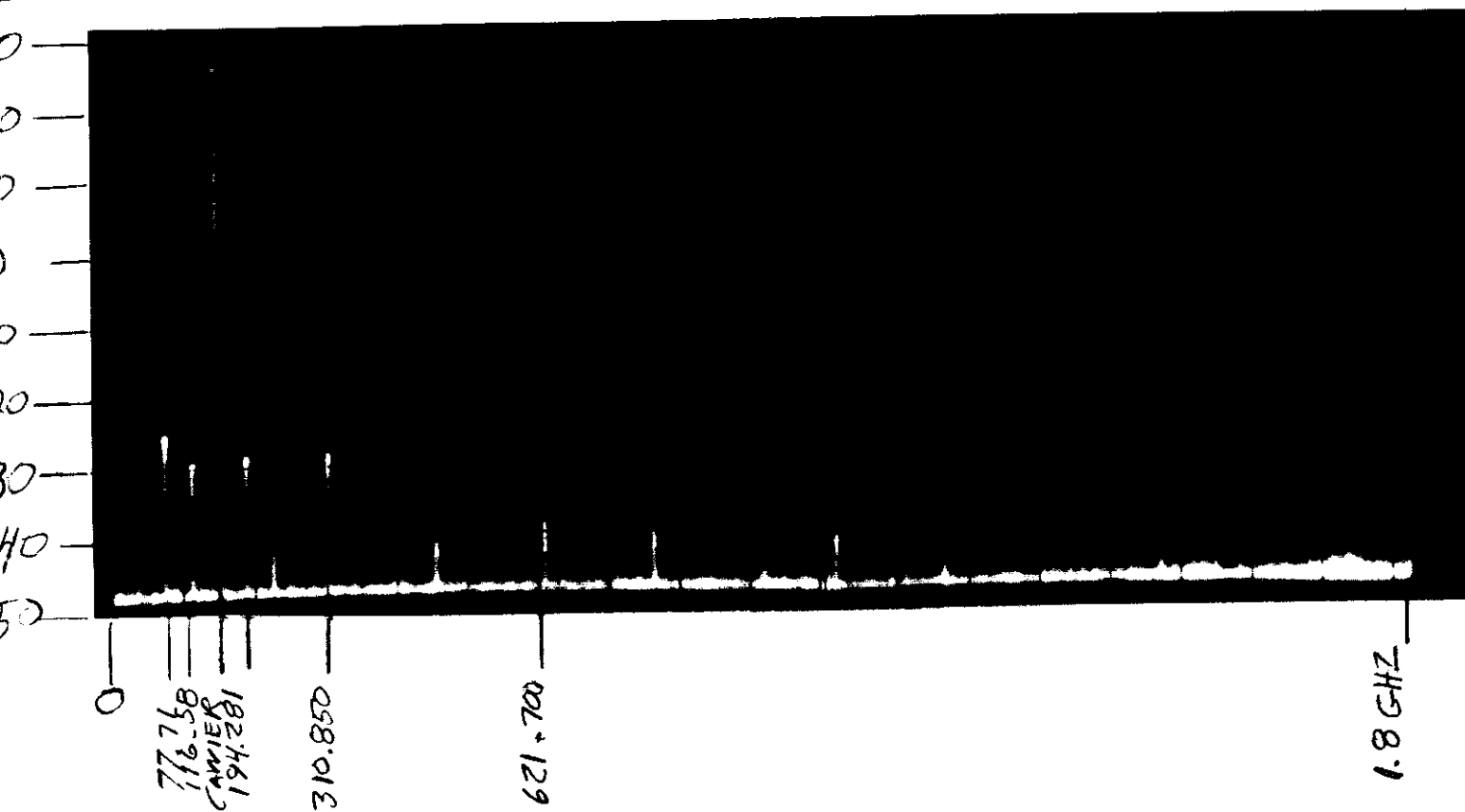
<u>Frequency MHz</u>	<u>Level in</u>	<u>dbM</u>	<u>--</u>	<u>Frequency MHz</u>	<u>Level in</u>	<u>dbM</u>
83.837	-23		335.350	-22		-
125.756	-26		503.025	-30		-
CARRIER	25		670.700	-33		
251.510	-34		838.375	-36		
1173.7225	-35		1509.075	-35		
1341.4100	-35		1676.750	-32		

The maximum conducted spurious emission was 47 db below carrier. The emission was on 335.350 MHz which is the 2<sup>nd</sup> harmonic of the carrier.

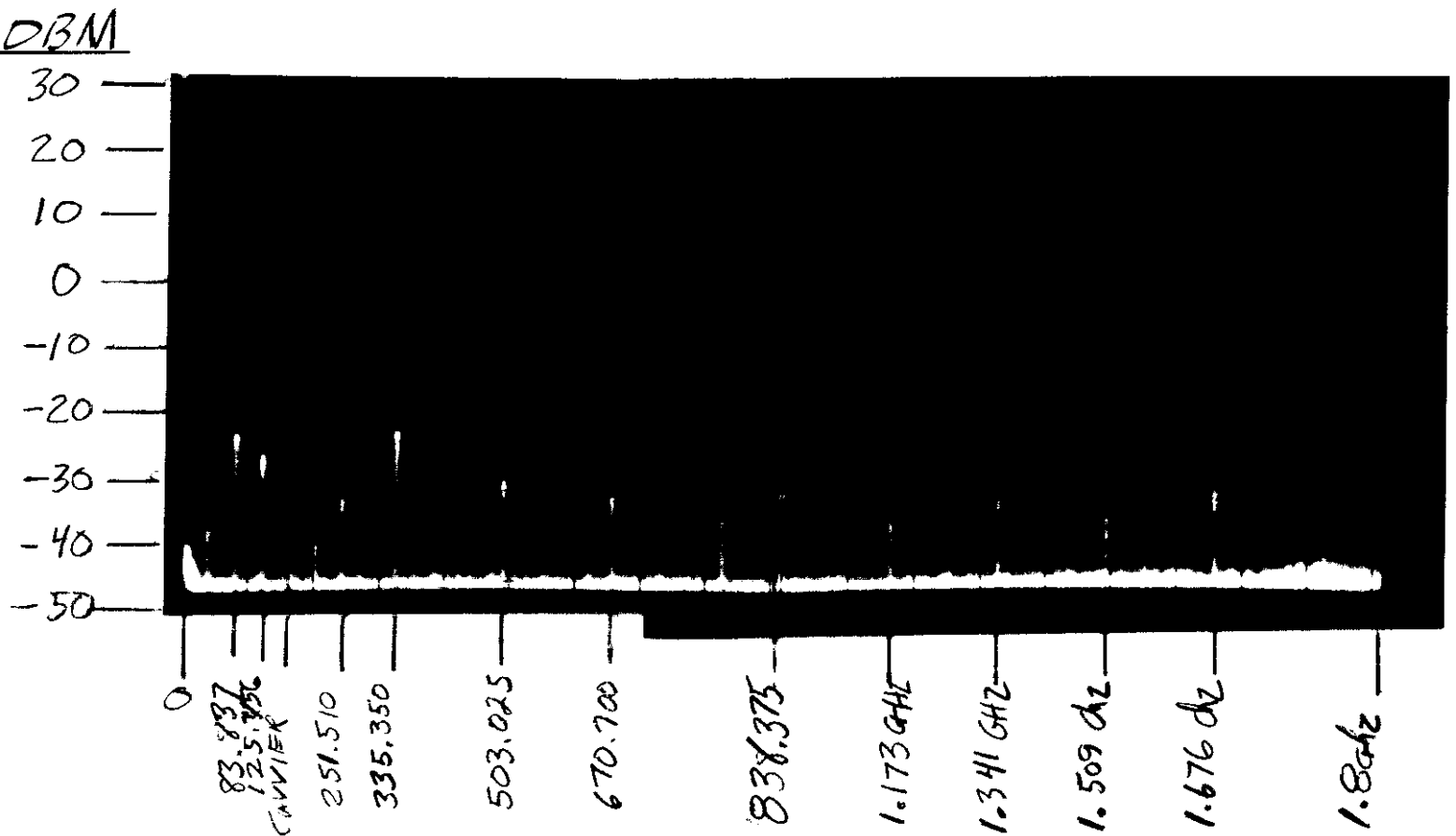
The noise floor was -45dbM on all above measurements. See pages 12 and 13 for spectrum display.

frequency 155.425

dBm



FREQUENCY  
167.675



(E) FIELD STRENGTH MEASUREMENTS OF SPURIOUS RADIATION (2.1053)

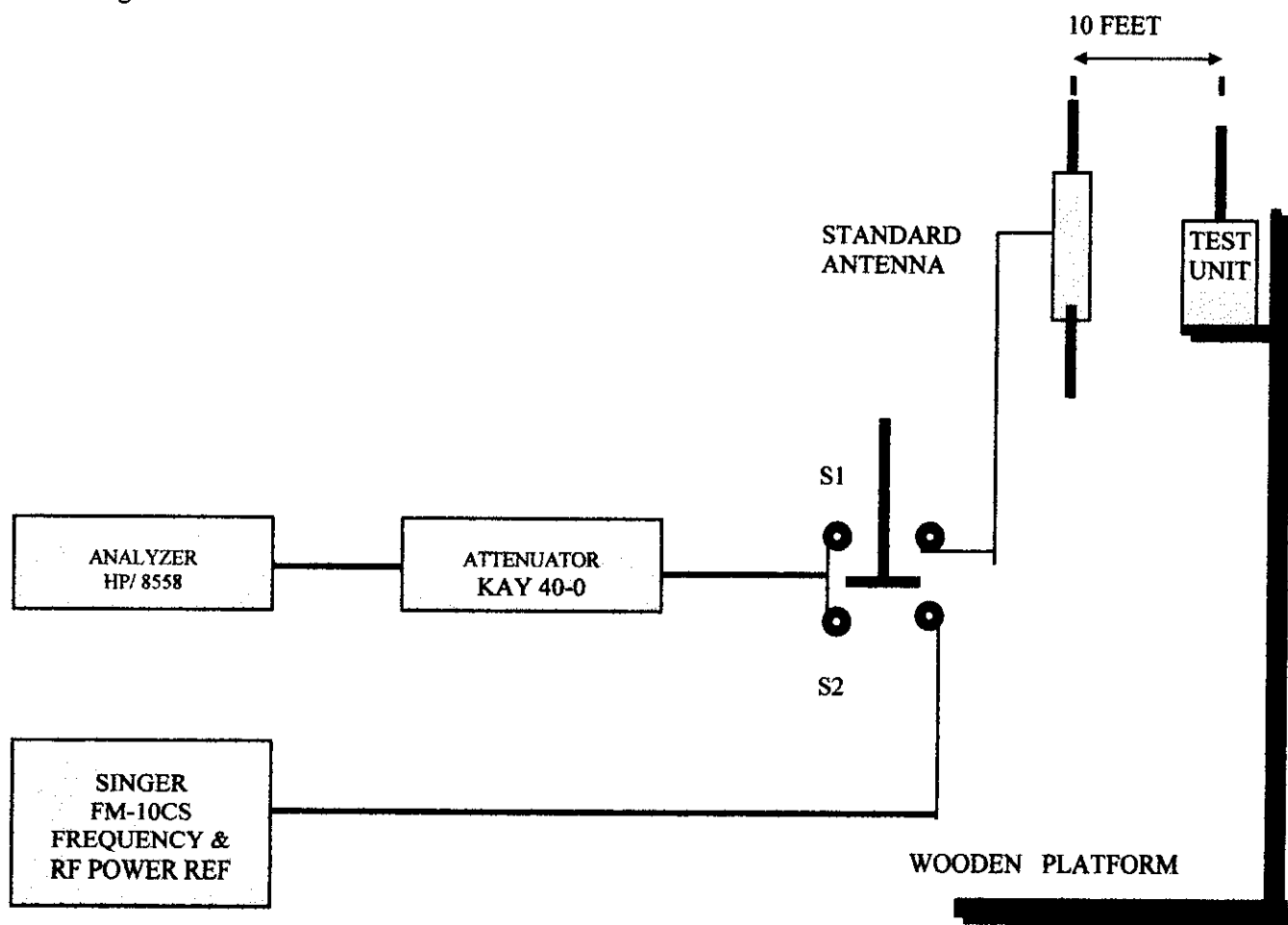
Measurements made in accordance with procedures outlined in FCC bulletin OCE 19 February 1968. Test units were tuned to the following frequency:

Unit #1	167,675 MHz
Unit #2	155.425 MHz.

The external 18" wire antenna was connected to the test units. The standard antenna was located 10 feet from the test unit when the measurements were made. Test results are listed below. In all cases, results indicate the maximum intensity observed. The spectrum was investigated for spurious emissions from the lowest crystal oscillator frequency to 1.8 GHz.

TEST EQUIPMENT SET-UP FOR RADIATED SPURIOUS EMISSIONS (2.993) (A)

The following equipment was used to measure the radiated spurious emissions of Model 7554, Units #1 & #2:  
 Singer FM10CS H/P Model 182C and 8558B Spectrum Analyzer Kay Model 40-0 Attenuator  
 Singer Metric KT105D



EQUIPMENT SET-UP (Fig. 5)  
 FCC ID: FLC200040

# SPECTRUM ANALYZER SETTINGS

Bandwidth 100 MHz	Scan time 10 msec per division
Horizontal (X plane)	10 MHz per division
Vertical (Y plane)	10 dbM per division
Video filter: off	log scale: on

Please Note: When using the standard antenna (KT-105D), dipole antenna DM-105-T1 was used up to 140 MHz, DM-105-T2 was used from 040-400 MHz, DM-105 -T3 was used from 400 and up.

## MEASURED RADIATED SPURIOUS EMISSIONS

Test Unit #1 :

Center Frequency: 167.675 MHz Field Intensity on Analyzer

Carrier Level ..... -11 dbM

2<sup>nd</sup> harmonic of carrier (335.350). .... -58 dbM

3<sup>rd</sup> harmonic of carrier (503.025) ..... -56 dbM

Test Unit #2 :

Center Frequency: 155.425 MHz Field Intensity on Analyzer

Carrier Level ..... -12 dbM

2<sup>nd</sup> harmonic of carrier (310.85)... .... -56 dbM

3<sup>rd</sup> harmonic of carrier (466.275) ..... -61 dbM

Ambient noise level with transmitter off ..... -75 dbM



FREQUENCY STABILITY (2.1055) (A)(A) TEMPERATURE FROM -30 TO 50 DEGREES CENTIGRADE

The transmitter was placed in a chamber along with a centigrade thermometer and exposed to the following temperature extremes. Note: Each frequency measurement was made at the specified temperature after a five hour thermal stabilization period.

<u>TEMPERATURE C.</u>	<u>-- UNIT #1 (Hz)</u>	<u>-- UNIT #2 (Hz)</u>	
-30	167,677,028	155,426,834	
-20	167,676,542	155,426,492	
-10	167,676,173	155,425,994	
0	167,675,821	155,425,699	
10	167,675,385	155,425,373	
20	167,675,000	155,425,000	NORMALIZED
30	167,674,530	155,424,676	
40	167,674,161	155,424,410	
50	167,673,708	155,423,997	
Delta (f)	2.53 KHz	2.61 KHz	
Delta (c)	80 degrees	80 degrees	

Frequency stability better than .002% over temperature range.

Note: The 7554 uses one 9 VDC transistor battery to power the transmitter. The battery is a throwaway. The operating range of the transmitter is strictly dependent on the battery characteristics.

TEST EQUIPMENT SET-UP FOR TEMPERATURE STABILITY TEST

H/P Model 5383A Frequency Meter; PMC Model BPA 20D Power Supply; Delta 575OCSD Temperature Chamber; Fluke thermocouple

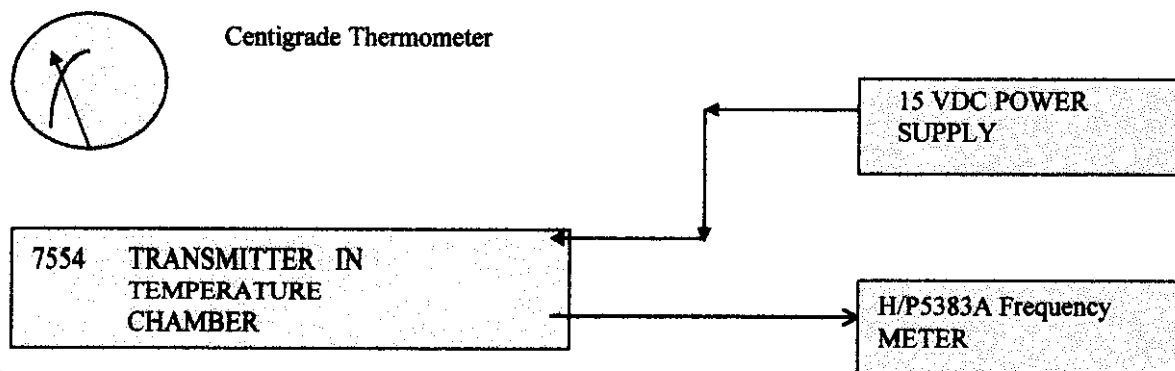


Fig (6)  
FCC ID: FLC200040

PRIMARY SUPPLY VOLTAGE

- (B) The primary battery supply voltage was varied from 85% To 115% of the normal supply voltage at the input to the external battery connection SW1.

UNIT	DELTA (V)	VOLTAGE DC	FREQUENCY HZ	DELTA (F)
1	2.7 VDC	10.3	155,425,171 hZ	NORMALIZED 369 CPS
		9	155,425,650	
		7.6	155,424,802	
2	2.7 VDC	10.3	167,673,842	NORMALIZED 389 CPS
		9	167,675,000	
		7.6	167,675,231	

Frequency stability better than .001% over power supply voltage change.

TEST EQUIPMENT SET-UP FOR POWER SUPPLY STABILITY TEST

Same as under FREQUENCY STABILITY with the following exceptions: The temperature was held constant at 25 degrees C and the power supply voltage was varied.

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