

CLASSIC FREQUENCY CONTROL, Inc.

PO BOX 271915
 1000 CORDELL PARKWAY, SUITE 300
 OKLAHOMA CITY, OK 73177-1915
 TEL: (405) 942-3005 FAX: (405) 942-6830

**OUR EMPLOYEES ARE THE DIFFERENCE
 QUARTZ CRYSTAL SPECIFICATION WORKSHEET**

CLASSIC FREQUENCY CONTROL, INC., CATALOG NUMBER:	3600108
CUSTOMER/MANUFACTURER NAME:	MARTI ELECTRONICS
CUSTOMER/MANUFACTURER P/N, DWG. NO:	P/N: 011-2802ND. OSC. (12.800000 MHz)
EQUIPMENT MODEL NO. (SPECIFY TX OR RX):	RX
FREQUENCY (OPERATIONAL/CHANNEL) KHZ. OR MHZ:	N/A
FREQUENCY (CRYSTAL OSCILLATING) KHZ. OR MHZ:	12.800000 MHz.
CRYSTAL FREQUENCY FORMULA (IF APPLICABLE):	N/A
HOLDER TYPE (HC-6U, HC-11-U, HC-25-U, HC-45-U, HC-48U, etc.):	HC-50/U
MODE OF OSCILLATION (Fundamental, 3rd. Ovt., 5th. Ovt., 7th. Ovt.):	FUNDAMENTAL
CALIBRATION TEMPERATURE:	25°C.
CALIBRATION TOLERANCE AT Calibration Temperature:	± 30 PPM.
OSCILLATOR LOAD: (If Parallel, supply CL), Otherwise SERIES RESONANT:	32 PF
SHUNT CAPACITANCE (Co) (Holder Capacitance):	7.0 Pf.(MAXIMUM)
RESISTANCE (Maximum Resistance @ Series Resonance):	24 Ohms.
"Q" VALUE (Quality Factor):	N/A
MOTIONAL CAPACITANCE (C1) (TYPICAL):	0.020/0.024PF
MAXIMUM FREQ. CHANGE Over Temperature Range:	<±30.0 PPM
OPERATING TEMPERATURE RANGE:	-30.0°C TO 60°C.
SPURIOUS MODE OSCILLATIONS (Magnitude in db, relative to desired signal):	> 10db BELOW MAIN MODE

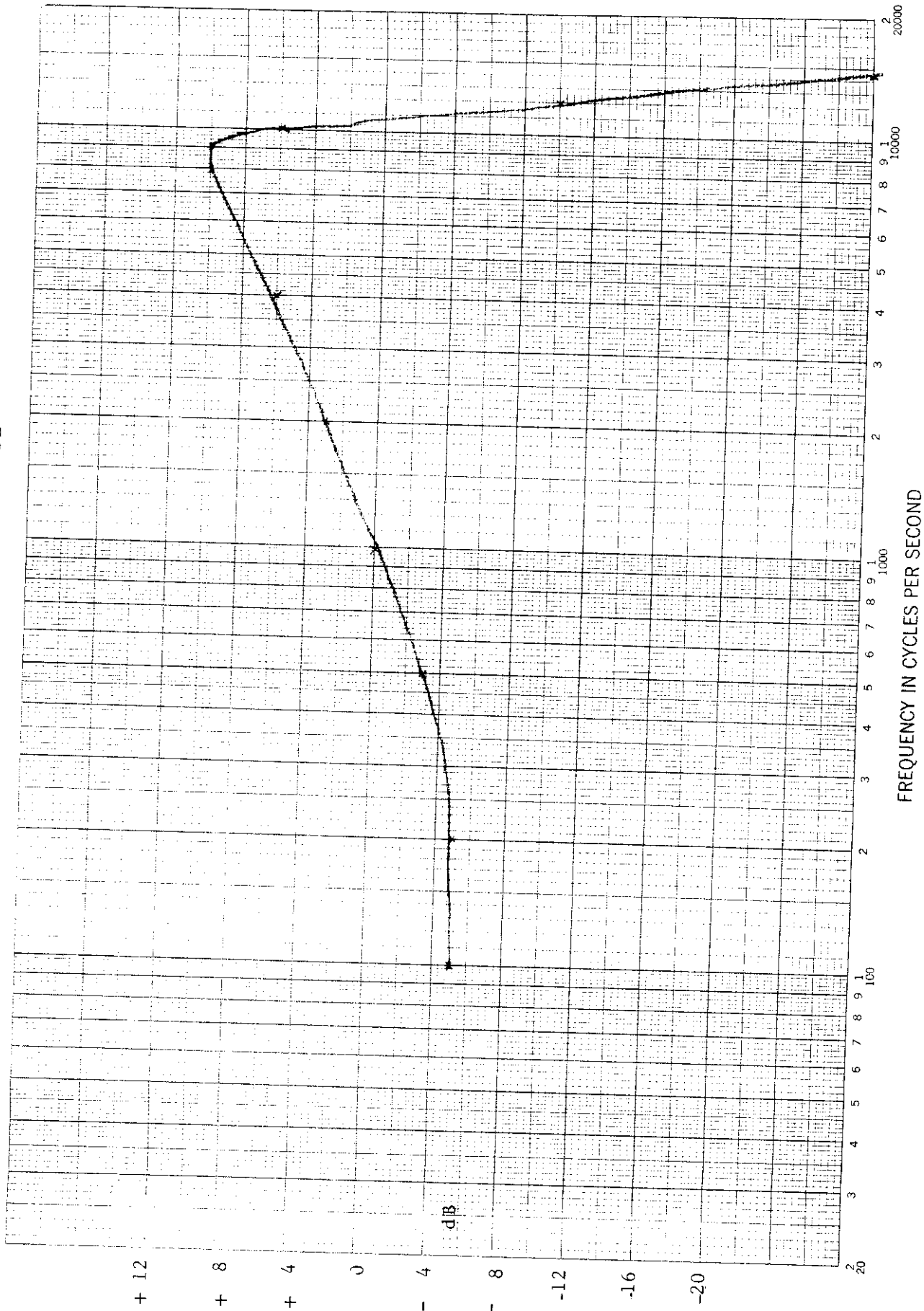
OTHER CONSIDERATIONS:

(AGEING RATE), FREQUENCY CHANGE FOR 15 YEARS: <± 5.0 PPM MAXIMUM.

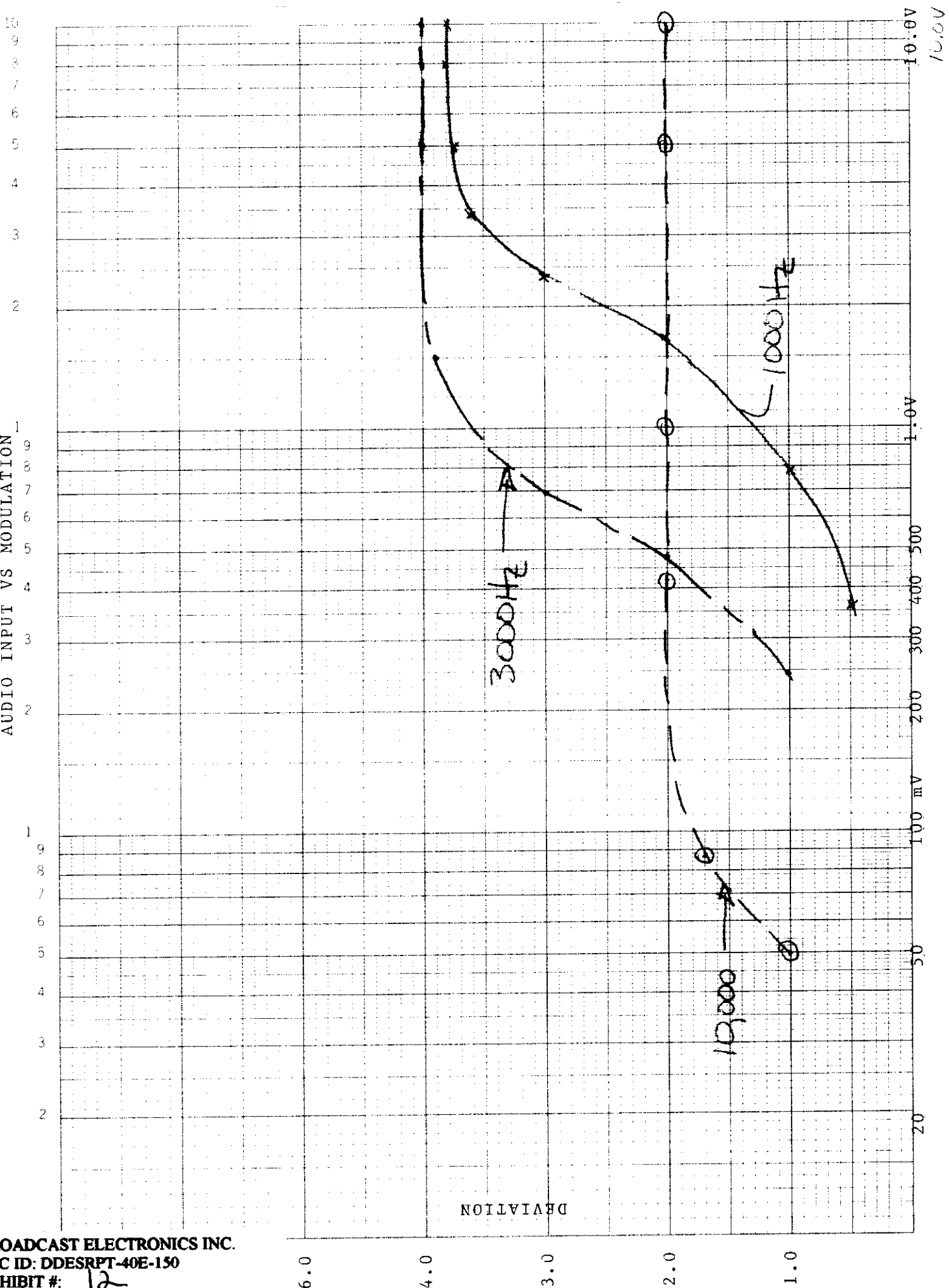
_____ BROADCAST ELECTRONICS INC.
 _____ FCC ID: DDESRT-40E-150
 _____ EXHIBIT #: 9

COMPLETED BY: Gene D. Stahl DATE: 4-16-99
 TITLE: PRESIDENT C:\maoffice\winword\xtalspec\3600108

AUDIO FREQUENCY RESPONSE



BROADCAST ELECTRONICS INC.
FCC ID: DDES RPT-40E-150
EXHIBIT #: 11



10 KHz

MKR 153.5004 MHz
-42.00 dBm

ATTEN 10 dB +0 dB

REF -41.7 dBm

hp

10 dB/

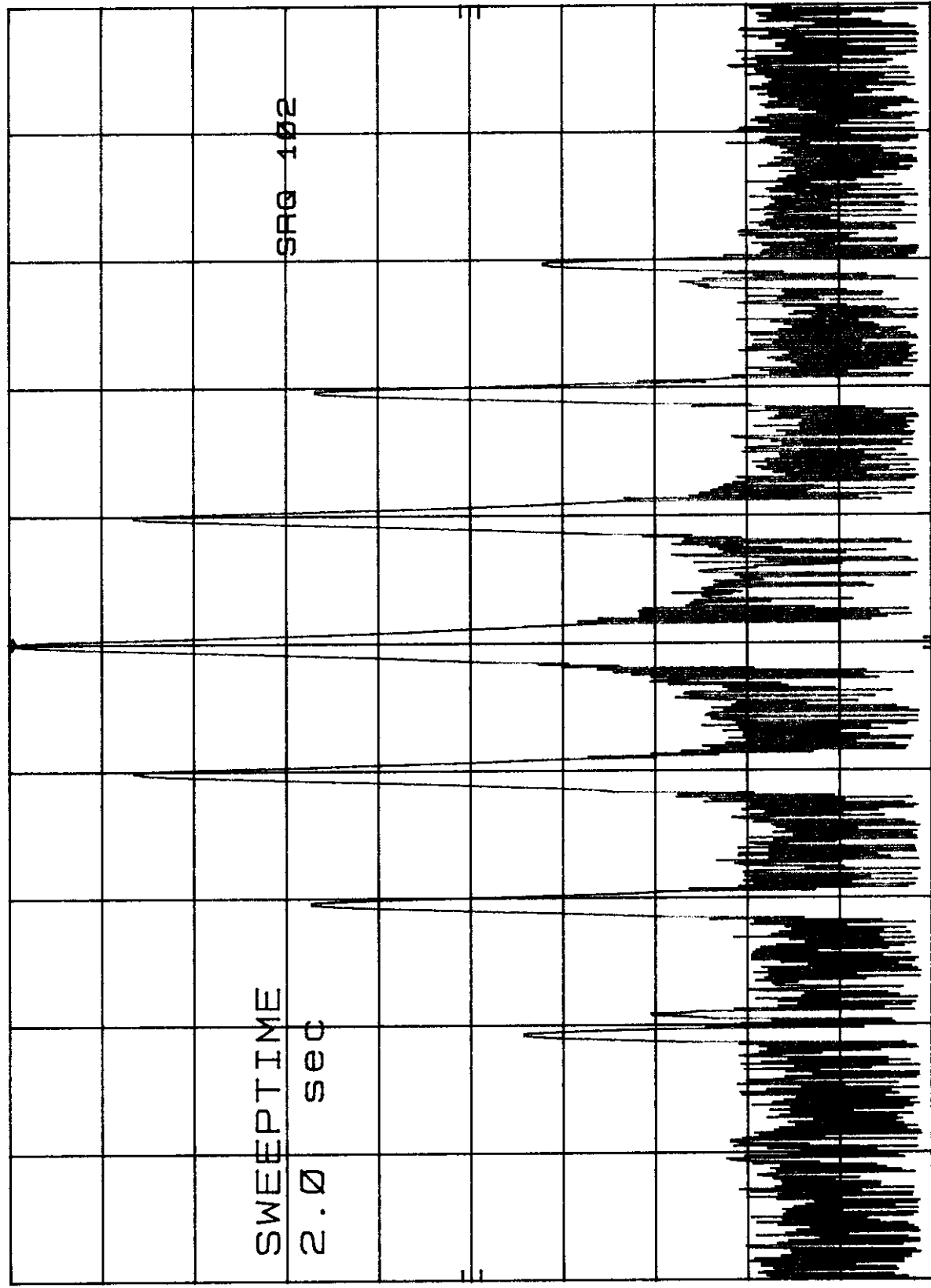
OFFSET
-20.0
dB

SWEPTIME
2.0 sec

SFO 102

BROADCAST ELECTRONICS INC.
FCC ID: DDESRPT-40E-150
EXHIBIT #: 15

CENTER 153.5004 MHz
RES BW 300 Hz
SPAN 100.0 KHz
SWP 2.0 sec
VBW 100 KHz



CW

MKR 153.50040 MHz
-41.60 dBm

ATTEN 10 dB +0 dB

REF -41.7 dBm

hp

10 dB/

OFFSET
-20.0
dB

CENTER
153.50040 MHz
STEP 10.00000 MHz

SRQ 140

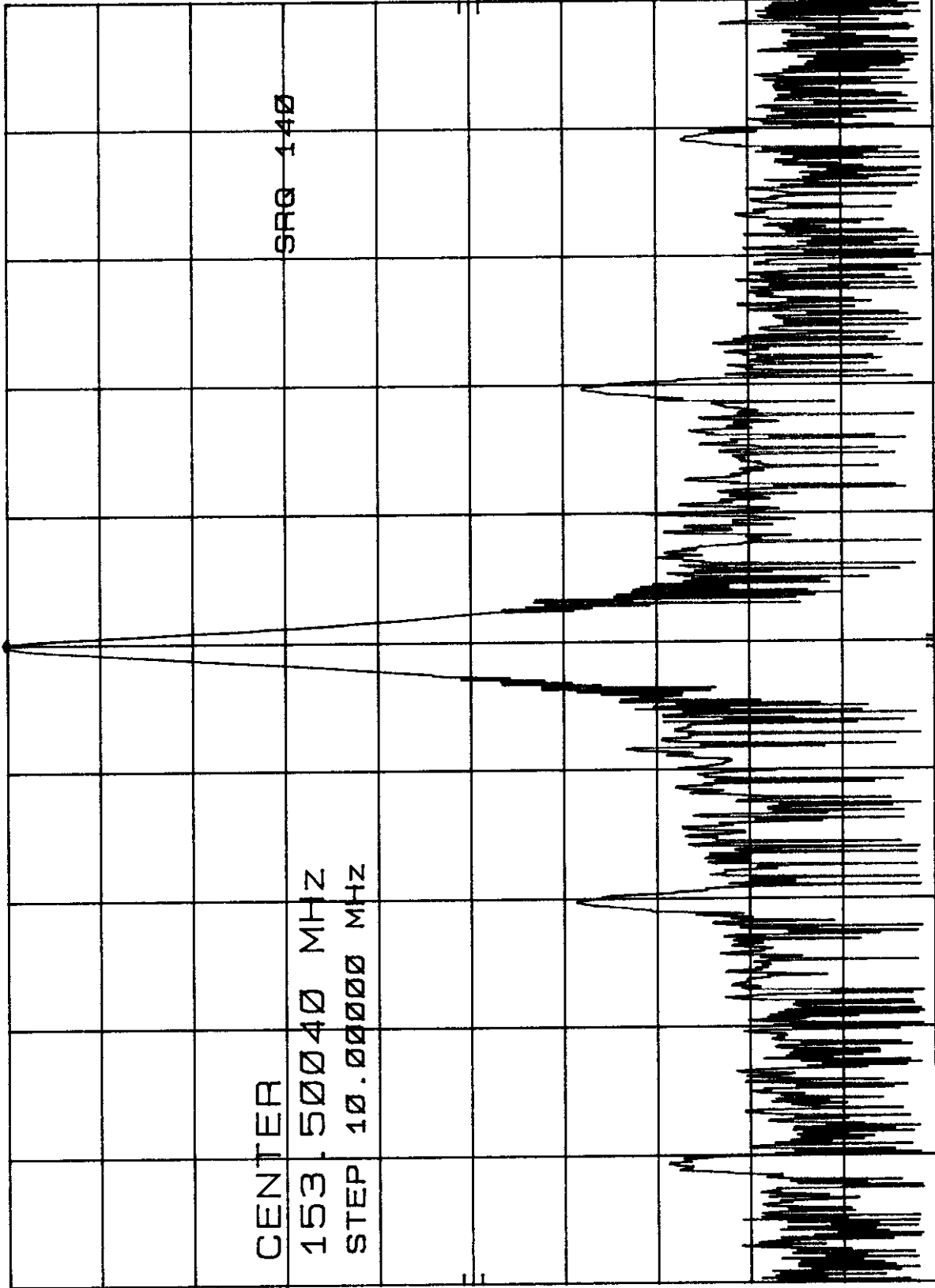
SPAN 50.00 KHZ
SWP 1.0 sec

VBW 100 KHZ

CENTER 153.50040 MHz
RES BW 300 Hz

BROADCAST ELECTRONICS INC.
FCC ID: DDESPT-40E-150
EXHIBIT #: 13

CENTER



10 dB/

h7p

REF -41.7 dBm

ATTEEN 10 dB +0 dB

MKR 153.5004 MHz

-43.80 dBm

TONER - 2.5 KHz

10 dB/

OFFSET -20.0 dB

BROADCAST ELECTRONICS INC.

FCC ID: DDESRT-40E-150

EXHIBIT #: 14

CENTER 153.5004 MHz

RES BW 300 Hz

VBW 100 KHz

SPAN 100.0 KHz

SWP 2.0 sec

SWEPTIME 2.0 sec

SRO 102



The image shows a spectrum analyzer display with a grid. The signal is centered at 153.5004 MHz. The display shows a complex waveform with multiple peaks and troughs. The parameters are: REF -41.7 dBm, ATTEEN 10 dB +0 dB, MKR 153.5004 MHz, -43.80 dBm, TONER - 2.5 KHz, 10 dB/ (twice), OFFSET -20.0 dB, BROADCAST ELECTRONICS INC., FCC ID: DDESRT-40E-150, EXHIBIT #: 14, CENTER 153.5004 MHz, RES BW 300 Hz, VBW 100 KHz, SPAN 100.0 KHz, SWP 2.0 sec, SWEPTIME 2.0 sec, and SRO 102.

10 dB/

h7p

REF -41.7 dBm

ATTEEN 10 dB +0 dB

MKR 153.5004 MHz

-43.80 dBm

OFFSET -20.0 dB

BROADCAST ELECTRONICS INC.
FCC ID: DDESRT-40E-150
EXHIBIT #: 14

CENTER 153.5004 MHz

RES BW 300 Hz

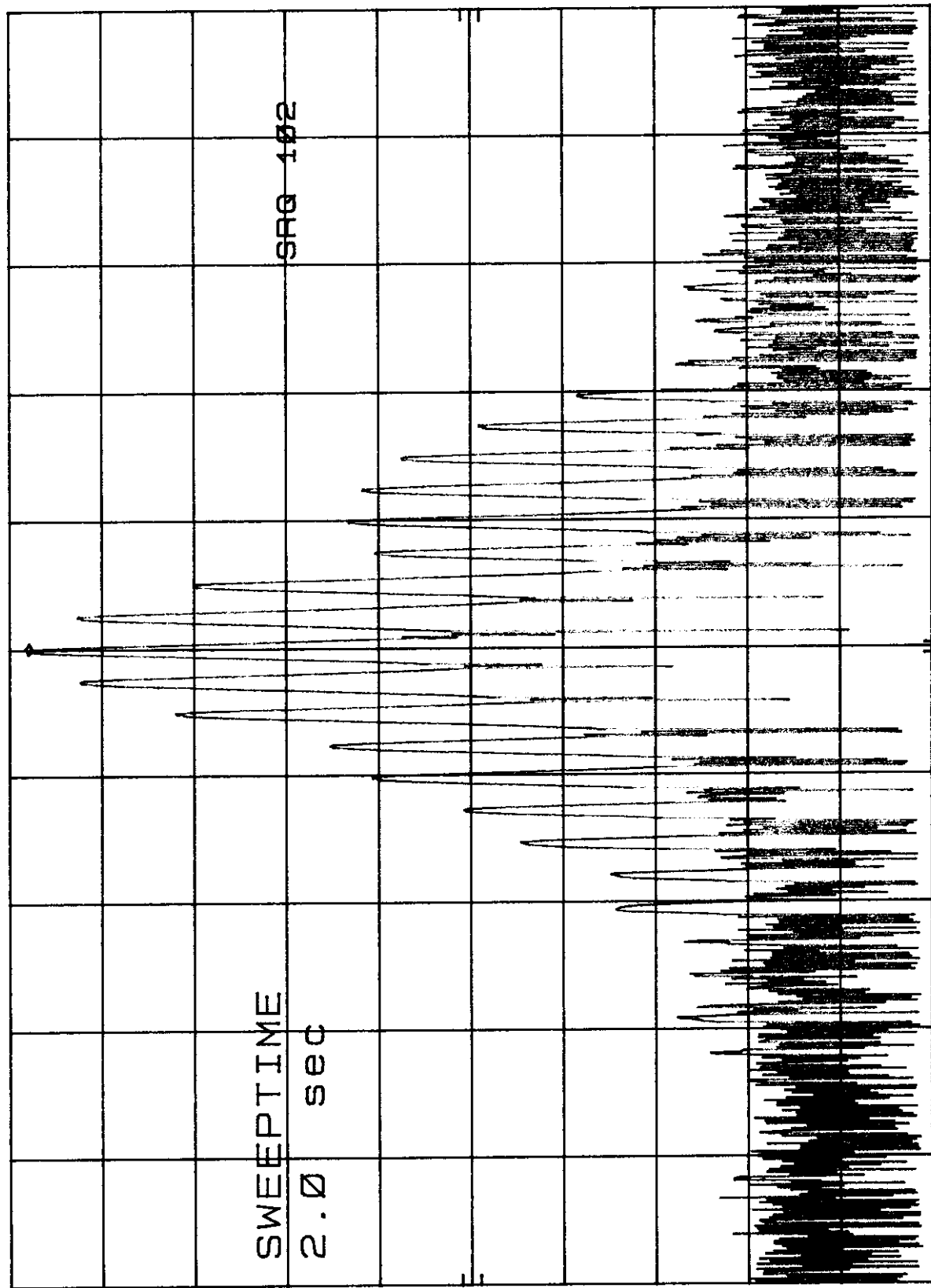
VBW 100 KHz

SPAN 100.0 KHz

SWP 2.0 sec

SWEPTIME 2.0 sec

SRO 102



GENERAL INFORMATION REQUIRED
FOR TYPE ACCEPTANCE

2.983 (a,b,c) MARTI ELECTRONICS, INC. will manufacture the SRPT-20 quantity, for use under FCC RULES PART 74.401, REMOTE PICKUP BROADCAST STATIONS.

2.983 (d) TECHNICAL DESCRIPTION

(2) Type of Emission: 28K0F3E (5.0KHz DEV)

$$B_n = 2M + 2DK$$

$$M = 10,000$$

$$D = 4.0KHz$$

$$K = 1$$

$$B_n = 20K + 2(4.0K)(1) = 20K + 8.0k = 28.0$$

ALLOWED AUTHORIZED BANDWIDTH = 30KHz. (5.0KHz Dev)

2.983(d)

(7) Frequency Range: Part 74: 150-174MHz, TEST FREQ = 153.3525MHz.

(3) Power Range and Controls: The output of this UNIT is NOT adjustable.

(4) Maximum Output Power Rating: 40 Watts into 50 ohms resistive load.

(5) DC Voltages and Current into Final Amplifier:

FINAL AMPLIFIER ONLY

$$14.85DC$$

$$V_{ce} = 14.80Volts$$

$$I_{ce} = 6.5 A.$$

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- 2.983(d) (6) Function of each electron tube or semiconductor device or other active circuit device:
See EXHIBIT 5.
- 2.983(d) (7) Complete Circuit Diagrams: The circuit diagram is included as part of the EXHIBIT 5a-5n. The block diagram is also included as EXHIBIT #3.
- (8) Operators Manual is included as EXHIBIT #11a-111.
- (9) Tune-up procedure. The tune-up procedure is given as part of EXHIBIT 11.
- (10) Description of all circuitry and devices provided for determining and stabilizing frequency is included as part of EXHIBIT 11.
- 2.983(d) (11) Description of any circuits or devices employed for suppression of spurious radiation, for limiting modulation, and for limiting power.

The inter stage coupling helps to suppress the spurious and the harmonics are suppressed by the low pass filter. The low pass filter is made up of L1, C1, L2, C2, L3, C3, and L4.

- 2.983(d) (11) Description of any circuits or devices employed for suppression of spurious radiation, for limiting modulation, and for limiting power.

Limiting Modulation:

The transmitter audio circuitry is contained in the audio processing board and is controlled by that assembly dependent upon which combination of modulation and sub carrier is to be used, see Instruction Manual.

- 2.983(d) Limiting Power:
There is no provision for limiting power, the design limits the power to 22Watts. There is a provision for reducing the power in the instruction book.

2.983(d) (12) Digital modulation. This unit does not use digital modulation.

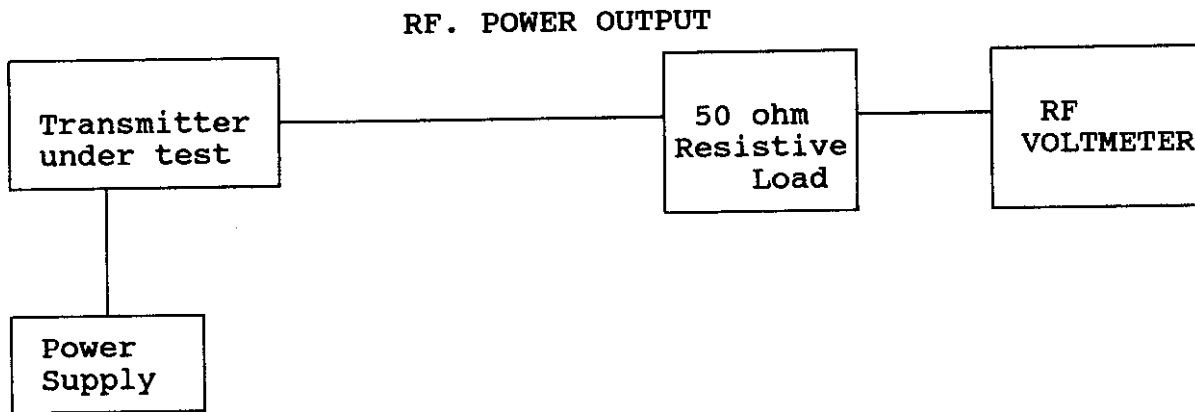
2.983(e) The data required by 2.985 through 2.997 is submitted below.

2.985(a) RF power output.

RF power is measured by connecting a 50 ohm, resistive watt meter to the RF output connector. With a nominal voltage of 120VAC and the transmitter properly adjusted the RF output measures:

INPUT POWER: FOR 15.0 V OPERATION
 $(14.8V)(6.5A) = 96.2\text{Watts}$

OUTPUT POWER: FOR 15.0 V OPERATION
40.1WATTS



2.987(a)(b) Modulation characteristics:

AUDIO FREQUENCY RESPONSE

The audio frequency response was measured in accordance with TIA/EIA Specification 603-PARA 2.2.11. The audio frequency response curves are shown for 5.0KHz deviation.

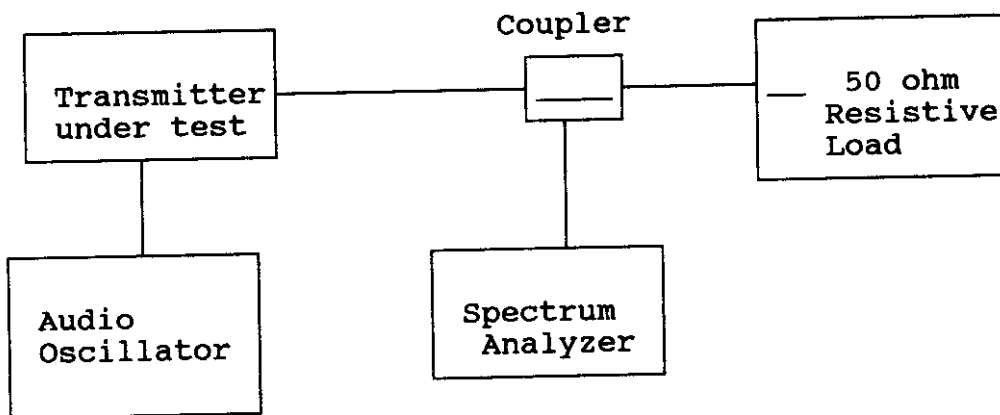
AUDIO LOW PASS FILTER

The audio low pass filter is not required in this unit.

2.989(e) Occupied bandwidth:

Data in the plots shows that all sidebands beyond the authorized bandwidth are less than 0.5% of the unmodulated carrier. The plots show the transmitter modulated with 10,000 Hz (the highest modulation frequency), adjusted for 50% modulation plus 16 dB. The spectrum analyzer was set with the unmodulated carrier at the top of the screen. The test procedure diagram and occupied bandwidth plots follow.

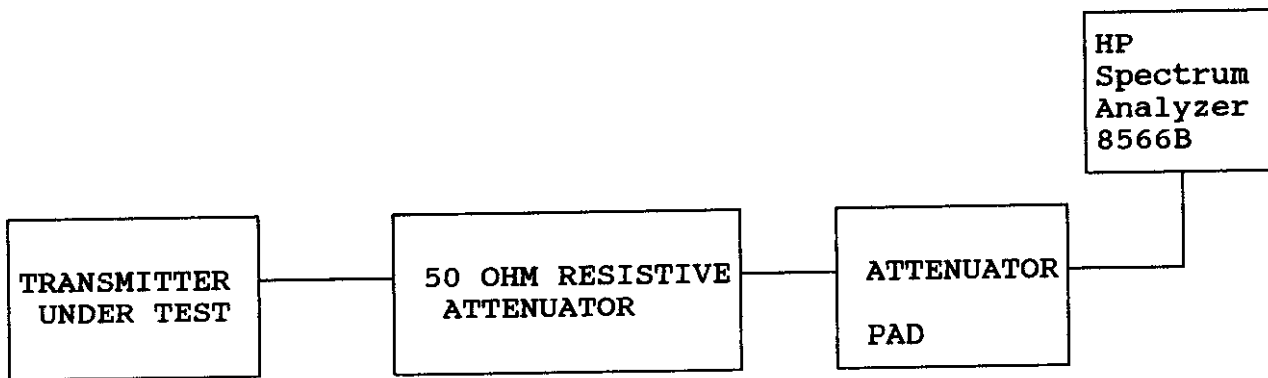
Test procedure diagram
OCCUPIED BANDWIDTH MEASUREMENT



2.991

Spurious emissions at antenna terminals(conducted):
Data on the following page shows the level of conducted spurious responses. The carrier was modulated 100% using a 2500Hz tone. The spectrum was scanned from 30MHz to 5.0GHz. The measurements were made in accordance with TIA/EIA-603.

Method of Measuring Conducted Spurious Emissions



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2.991 Continued

NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

REQUIREMENTS: Emissions must be $43 + 10\log(P_o)$ dB below the mean power output of the transmitter.

$$43 + 10 \log(40) = 59.0 \text{ dB}$$

<u>EMISSION FREQUENCY MHz</u>	<u>dB BELOW CARRIER</u>
153.35	00.0
306.7	-71.2
460.1	-88.4
613.4	-88.8
766.8	-89.4
920.1	-84.4
1073.5	-83.8
1226.8	-88.2
1380.2	-90.6
1533.5	-87.5

METHOD OF MEASUREMENT:

Measurements were made in accordance with TIA/EIA603. The spectrum was scanned from 10KHz to at least the tenth(10th) harmonic using a HP MODEL 8566B spectrum analyzer. Measurements were conducted The measurements were made at TIMCO ENGINEERING INC. 6051 N.W. 19th Lane, Gainesville, Florida 32605.

2.993(a)(b) Field strength of spurious emissions:

The tabulated Data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 to 1.6GHz. This test was conducted per ANSI C63-1992 with the exception of briefly connecting the transmitter to its own antenna for the purpose of establishing a reference.

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NAME OF TEST: RADIATED SPURIOUS EMISSIONS

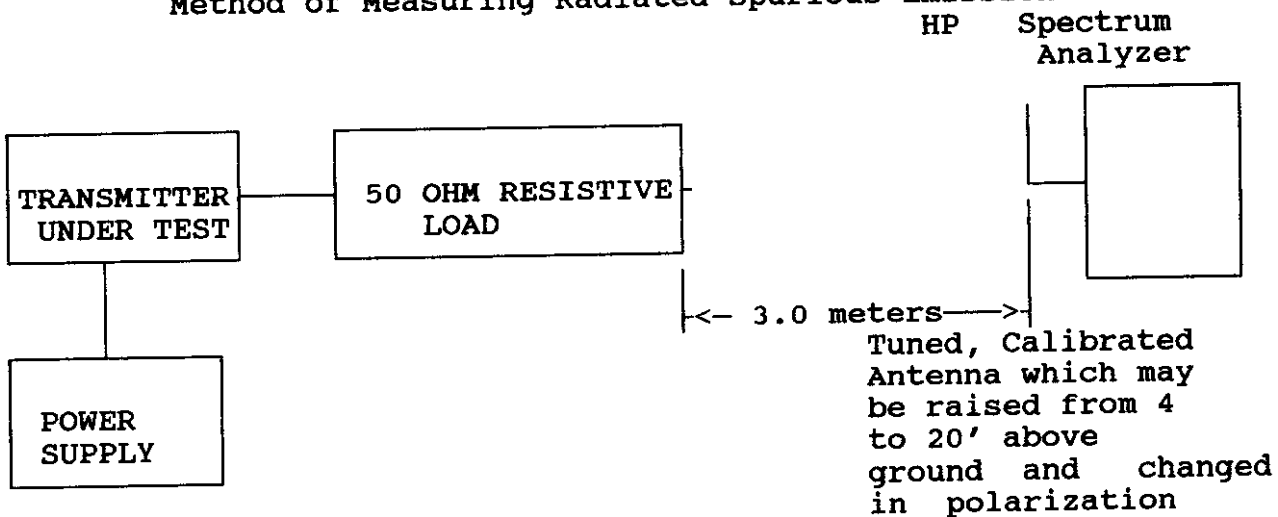
REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

$$43 + 10 \log(40.0) = 59.0 \text{ dB}$$

EMISSION FREQUENCY MHz	METER READING @ 3m dBuV	COAX LOSS dB	ACF dB	FIELD STRENGTH dBuV/m	ATT dB	MARGIN dB	POLARITY ANT.
153.35	118.20	0.90	16.80	135.90	0.00	0.00	H
306.70	38.20	1.40	15.46	55.06	80.84	21.81	H
460.05	22.10	1.60	18.38	42.08	93.82	34.79	H
613.40	23.10	1.60	20.39	45.09	90.80	31.77	H
766.75	20.10	2.00	22.03	44.13	91.77	32.74	V
920.10	20.10	2.90	24.12	47.12	88.78	29.75	H
1073.45	18.50	1.00	24.29	43.79	92.11	33.08	H
1226.95	18.40	1.00	24.91	44.31	91.59	32.56	H
1380.30	18.20	1.00	25.52	44.72	91.18	32.15	H
1533.65	17.20	1.00	26.13	44.33	91.56	32.53	H

METHOD OF MEASUREMENT: The procedure used was C63.4-1992 with the exception that the unit was temporarily operating into a dipole antenna to establish a reference, then connected to a dummy load. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer, an Eaton model 94455-1 Biconical Antenna, ElectroMetrics antennas models TDA, TDS-25-1, TDS-25-2 & RGA 180. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 6051 N.W. 19th LANE Gainesville, FL 32605.

Method of Measuring Radiated Spurious Emissions



Equipment placed 4' above ground on a rotatable platform.

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2.995(a)(b)(d) Frequency stability:

74.464

Temperature and voltage tests were performed to verify that the frequency remains within the .0005%,(5.0 ppm)(§74.464) specification limit.

The test was conducted as follows: The transmitter was placed in the temperature chamber at 25 degrees C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15 second intervals. The worse case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -30 degrees C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute, and again frequency readings were noted at 15 second intervals. The worst case number was recorded for temperature plotting. This procedure was repeated in 10 degree increments up to 50 degrees C.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 153.352 500

<u>TEMPERATURE C</u>	<u>FREQUENCY MHz</u>	<u>PPM</u>
-30	153.352 760	+01.70
-20	153.352 640	+00.91
-10	153.352 620	+00.78
0	153.352 610	+00.71
10	153.352 590	+ 0.59
20	153.352 630	+ 0.85
30	153.352 580	+ 0.52
40	153.352 510	+ 0.07
50	153.325 550	+ 0.32

25c 15% Volt(120)= 102.0VAC 153.325 520 + 0.06
25c 15% Volt(120)= 138VAC 153.325 530 + 0.07

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was +01.70 ppm. There was only +0.07PPM variation over voltage range.

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2.983(f) Photo or Drawing of Label:

See EXHIBIT #7.

2.983(g) Photos of Equipment:

See EXHIBITS 6a-6z.

2.997 Frequency Spectrum Investigated The Spectrum was investigated from 0.010 to At least the tenth harmonic of the fundamental.

2.999 Measurement Procedures for Type Acceptance:

Measurement techniques have been in accordance with EIA specifications and the FCC requirements.

2.909 Certification of Technical Data by Engineers

We certify that the enclosed measurements and enclosed data are true and correct.

S.S. Sanders
Engineer

LIST OF TEST EQUIPMENT

1. Frequency Counter - Hewlett Packard Model 5383A
S/N 2338A06071
2. SPECTRUM ANALYZER - HP Model 8566B
3. RF PRE-SELECTOR - HP Model 85685A
4. QUASI-PEAK ADAPTER - HP 85650A
5. RF Power Meter - Bird Model 43 Serial 81398
6. RF Attenuators - Narda MOD 766-20
7. Audio Oscillator - Hewlett Packard Model 201C
Serial 351-06107
8. Modulation meter - IFR MODEL AM/FM 500A.
9. Voltmeter - Hewlett Packard Model 427A
Serial Number 731-0751
10. HP Distortion Analyzer Model No. 334A
Serial Number 822-01817
11. Tenney Jr. Temperature Chamber
11. Eaton Biconical antenna Model 94455-1 antenna kit 20-200 MHz
12. Electro-Metric Dipole Kit 20-1000MHz, Model TDA 25
13. Electro-Metrics RGA-180 antenna kit 1- 18 GHz
14. HP broadband preamplifier model 8447D, serial no.
1644A00978, 30 - 1000 MHz.
15. Avaatek AFT-2032 broadband preamplifier, serial no.
8606SN01, 1 - 2 GHz.

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