

TABLE OF CONTENTS LIST

APPLICANT: RADIOSHACK, A DIVISION OF TANDY CORP.

FCC ID: AAO01901210

TEST REPORT:

PAGE 1.....	COVER SHEET - GENERAL INFORMATION & TECHNICAL DESCR.
PAGE 2.....	TECHNICAL DESCRIPTION CONTINUED AND RF POWER OUTPUT
PAGE 3.....	MODULATION CHARACTERISTICS AND OCCUPIED BANDWIDTH
PAGE 4.....	SPURIOUS EMISSIONS AT ANTENNA TERMINALS
PAGE 5.....	FIELD STRENGTH OF SPURIOUS EMISSIONS
PAGE 6.....	METHOD OF MEASURING RADIATED SPURIOUS EMISSIONS
PAGE 7.....	FREQUENCY STABILITY
PAGE 8-9....	TRANSIENT FREQUENCY STABILITY
PAGE 10.....	CERTIFICATION OF TECHNICAL DATA
PAGE 11.....	LIST OF TEST EQUIPMENT

EXHIBITS CONTAINING:

EXHIBIT 1.....	POWER OF ATTORNEY LETTER
EXHIBIT 2.....	FCC ID LABEL SAMPLE
EXHIBIT 3.....	SKETCH OF LOCATION
EXHIBIT 4A.....	EXTERNAL FRONT VIEW PHOTOGRAPH
EXHIBIT 4B.....	EXTERNAL REAR VIEW PHOTOGRAPH
EXHIBIT 4C.....	INTERNAL COMPONENT SIDE PHOTOGRAPH
EXHIBIT 4D.....	INTERNAL SOLDER SIDE PHOTOGRAPH
EXHIBIT 5.....	BLOCK DIAGRAM
EXHIBIT 6A-6E....	PARTS LIST
EXHIBIT 7.....	SCHEMATIC
EXHIBIT 8A-8I....	USER'S MANUAL
EXHIBIT 9A-9C....	THEORY OF OPERATION
EXHIBIT 10A-10B...	TUNING PROCEDURE
EXHIBIT 11A-11E...	CRYTAL SPECIFICATION
EXHIBIT 12.....	AUDIO FREQUENCY RESPONSE GRAPH
EXHIBIT 13.....	AUDIO INPUT VS DEVIATION GRAPH
EXHIBIT 14.....	AUDIO LOW PASS FILTER GRAPH
EXHIBIT 15.....	OCCUPIED BANDWIDTH CW PLOT
EXHIBIT 16.....	OCCUPIED BANDWIDTH
EXHIBIT 17A-17B...	TRANSIENT FREQUENCY RESPONSE PLOTS

APPLICANT: RADIOSHACK, A DIVISION OF TANDY CORP.

FCC ID: AAO01901210

REPORT #: F:\CUS\R\RADSHACK\RAD200H9.RPT

PAGE: TABLE OF CONTENTS

GENERAL INFORMATION REQUIRED
FOR TYPE ACCEPTANCE

2.983 (a,b,c) RADIOSHACK, A DIVISION OF TANDY CORP. will sell the MODEL NO. AAO01901210 VHF transmitter in quantity, for use under FCC RULES PART 22 & 90.

2.983 (d) TECHNICAL DESCRIPTION

(1) Type of Emission: 16K0F3E For 25KHz
9K2F3E For 12.5KHz

For 25KHz

$$B_n = 2M + 2DK$$

$$M = 3000$$

$$D = 1.6\text{KHz (Peak Deviation)}$$

$$K = 1$$

$$B_n = 2(3.0\text{K}) + 2(1.6\text{K})(1) = 6.0\text{K} + 3.2\text{K} = 9.2\text{K}$$

ALLOWED AUTHORIZED BANDWIDTH = 20.00KHz.

For 12.5KHz

$$B_n = 2M + 2DK$$

$$M = 3000$$

$$D = 1.6\text{KHz (Peak Deviation)}$$

$$K = 1$$

$$B_n = 2(3.0\text{K}) + 2(1.6\text{K})(1) = 6.0\text{K} + 3.2\text{K} = 9.2\text{K}$$

ALLOWED AUTHORIZED BANDWIDTH = 11.25KHz.

90.209(b)(5)

(2) Frequency Range: 148-174 MHz

(3) Power Range and Controls: There are NO user Power controls.

(4) Maximum Output Power Rating:
5.0 & 0.85 Watts ,
into a 50 ohm resistive load.

(5) DC Voltages and Current into Final Amplifier:

POWER INPUT

FINAL AMPLIFIER ONLY

$$V_{ce} = 13.20 \text{ Volts}$$

$$I_{ce} = 1.26 \text{ A.}$$

$$P_{in} = 16.6 \text{ Watts}$$

(6) Function of each electron tube or semiconductor device or other active circuit device:

SEE EXHIBIT # 8A-8I

APPLICANT: RADIOSHACK, A DIVISION OF TANDY CORP.

FCC ID: AAO01901210

REPORT #: F:\CUS\R\RADSHACK\RAD200H9.RPT

PAGE: 1

- 2.983(d) (7) Complete Circuit Diagrams: The circuit diagram is included as EXHIBIT #7. The block diagram is included as EXHIBIT #5.
- (8) Instruction book. The instruction manual is included as EXHIBIT #8.
- (9) Tune-up procedure. The tune-up procedure is given in EXHIBIT #10.
- (10) Description of all circuitry and devices provided for determining and stabilizing frequency is included in the circuit description in the instruction manual.

2.983 (11) Description of any circuits or devices employed for suppression of spurious radiation, for limiting modulation, and for limiting power. In addition to the interstage filtering the multi-section low pass filter made up of L12, L11, C40, C47, C95, C46, C94, C45, & C26.

Limiting Modulator:
The transmitter audio limiting circuitry is contained in the loop filter IC01.

Limiting Power: There is no provision for limiting power.

(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 wattmeter to the RF output connector. With a nominal battery voltage of 13.6V, and the transmitter properly adjusted the RF output measures:

POWER
INPUT POWER: (13.2V)(1.26A) = 16.6 Watts
OUTPUT POWER: 5.0 Watts Efficiency: 30%



- 2.987(a) Voice Modulation characteristics:
- (a) AUDIO FREQUENCY RESPONSE See the EXHIBIT #12.
- 2.987(a) AUDIO LOW PASS FILTER
The audio low pass filter is included and the plot is shown as EXHIBIT #14. Rules 90.210(b,d, & e) for mobile stations with a low pass filter.
- 2.987(b) Audio input versus modulation A plot of the audio input versus deviation is shown in in EXHIBIT #13.

2.989(c) Occupied bandwidth:
90.210(b,)
Data in the plots shows that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least $43 + \log(P)$ dB.

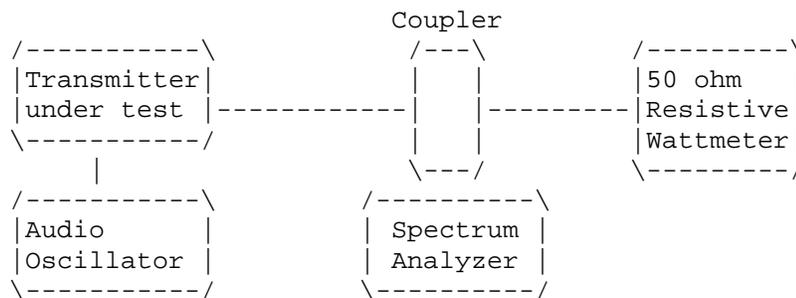
90.210(d) 12.5KHz channel bandwidth equipment. For transmitters designed to operate with a 12.5KHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows; (1) On any frequency from the center of the authorized bandwidth f_0 to 5.625kHz removed from f_0 : Zero dB.
(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency($f_d - 2.88$ kHz)dB.
(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency(f_d in kHz $\log(P)$ or 70dB, whichever is the lesser attenuation.

Radiotelephone transmitter with modulation limiter.

Test procedure: TIA/EIA-603 para 2.2.11 , with the exception that various tones were used.

Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT



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

NAME OF TEST: RADIATED SPURIOUS EMISSIONS

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

$$50 + 10\log(5.0) = 57.0 \text{ dB}$$

TEST DATA:

EMISSION FREQUENCY MHz	METER READING AT 3 METERS dBuV	COAX LOSS dB	ANTENNA CORRECTION FACTOR dB	FIELD STRENGTH dBuV/m@3m	ATT. dB	ANT. POL.
HIGH POWER						
154.60	116.64	0.90	16.76	134.30	0.00	H
309.20	50.50	1.40	15.37	67.27	67.03	H
463.80	34.05	1.60	18.47	54.12	80.18	H
618.40	47.70	1.60	20.50	69.80	64.50	H
773.00	50.00	2.00	22.08	74.08	60.22	H
927.60	37.30	2.90	24.12	64.32	69.98	H
1082.00	32.50	1.00	24.33	57.83	76.47	H
LOW POWER						
154.60	108.54	0.90	16.76	126.20	0.00	H
309.20	45.50	1.40	15.37	62.27	63.93	H
463.80	32.05	1.60	18.47	52.12	74.08	H
618.40	43.70	1.60	20.50	65.80	60.40	H
773.00	44.00	2.00	22.08	68.08	58.12	H
927.60	33.30	2.90	24.12	60.32	65.88	H
1082.00	30.50	1.00	24.33	55.83	70.37	H

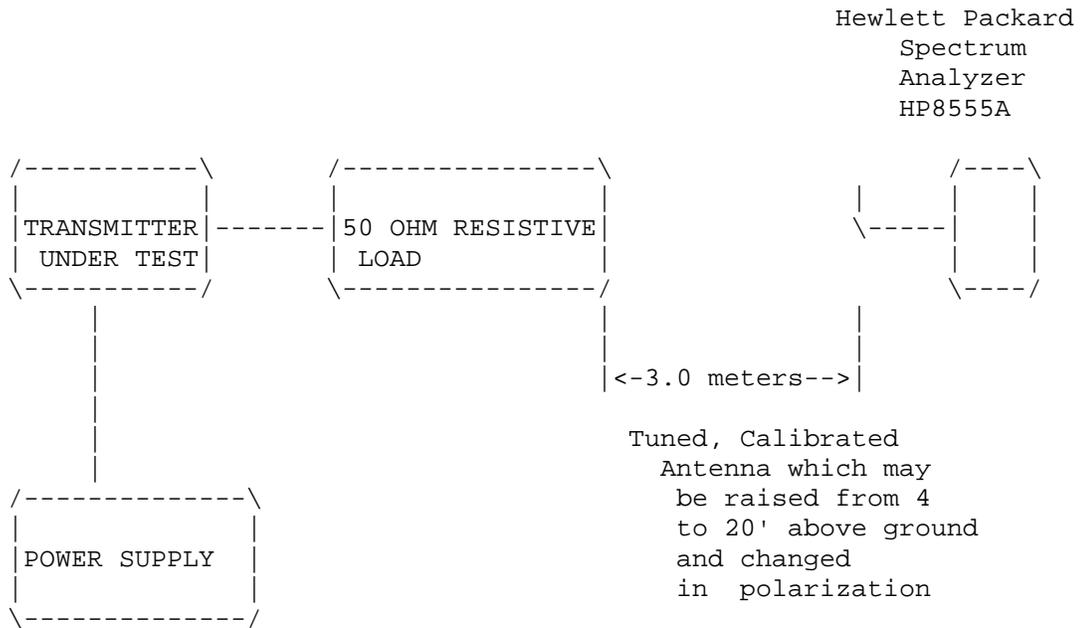
METHOD OF MEASUREMENT: The tabulated Data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental. This test was conducted per ANSI STANDARD C63.4-1992 with the exception of briefly connecting the transmitter to a half wave dipole for the purpose of establishing a reference. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 6051 N.W. 19th Lane Gainesville, FL 32605.

APPLICANT: RADIOSHACK, A DIVISION OF TANDY CORP.
 FCC ID: AAO01901210
 REPORT #: F:\CUS\R\RADSHACK\RAD200H9.RPT
 PAGE #: 5

2.993(a)(b)

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

Method of Measuring Radiated Spurious Emissions



Equipment placed 4' above ground on a rotatable platform.

2.995(a)(b)(d) Frequency stability:
90.213(a)(5)

Temperature and voltage tests were performed to verify that the frequency remains within the .00025%, 2.5 ppm specification limit, for 25KHz spacing & 0.00025% for 12.5KHz spacing and 0.0001% for 6.25KHz spacing. 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): 154.600 000MHz

<u>TEMPERATURE_C</u>	<u>FREQUENCY_MHz</u>	<u>PPM</u>
REFERENCE_____	154.600 000	00.0
-30_____	154.599 700	-1.94
-20_____	154.599 670	-2.13
-10_____	154.599 870	-0.84
0_____	154.600 140	+0.90
+10_____	154.600 080	0.51
+20_____	154.599 160	-1.03
+30_____	154.599 740	-1.68
+40_____	154.599 810	-1.22
+50_____	154.599 890	-0.71
20c 85% BATT.11.53V/dc	154.599 910	0.58
20c 115% BATT.15.64V/dc	154.599 840	1.03

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was -2.13 to 0.90 ppm. The maximum frequency variation over the voltage range was +1.03 ppm.

2.995(a)(b)(d) Frequency stability:
90.214 Transient Frequency Behavior

REQUIREMENTS: In the 150-174MHz frequency band, transient frequencies must be within the maximum frequency difference limits during the time interval indicated below for 12.5kHz Channels:

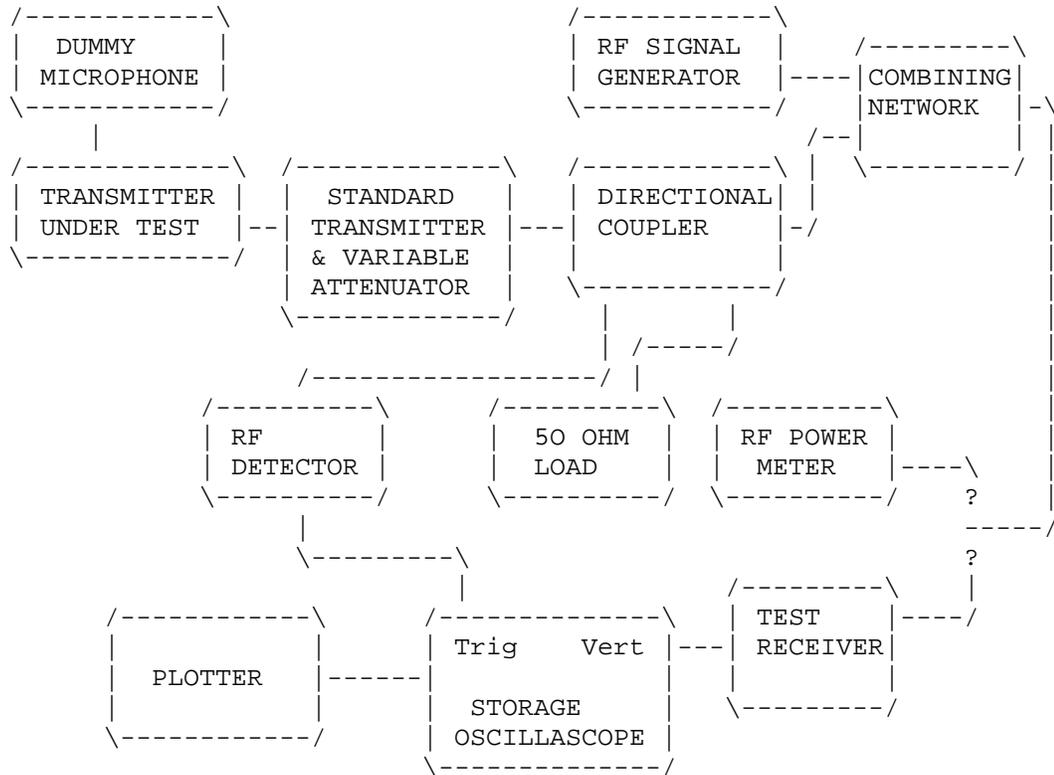
Time Interval	Maximum Frequency	Portable Radios 150-174Mhz
t1	+12.5kHz	5.0ms
t2	+6.25kHz	20.0ms
t3,t4	+12.5kHz	5.0ms

TEST PROCEEDURE: TIA/EIA TS603 PARA 2.2.19, the levels were set as follows;

1. Using the variable attenuator the transmitter level was set to 40dB below the test receivers maximum input level, then the transmitter was turned off.
2. With the Transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
3. Reduce the attenuation between the transmitter and the RF detector by 30dB.
4. With the levels set as above the transient frequency behavior was observed & recorded.

APPLICANT: RADIOSHACK, A DIVISION OF TANDY CORP.
FCC ID: AAO01901210
REPORT #: F:\CUS\R\RADSHACK\RAD200H9.RPT
PAGE: 8

2.995(a)(b)(d) Frequency stability:
 90.214 Transient Frequency Behavior
 (Continued)



2.983(f) Photo_or_Drawing_of_Label: See Exhibit 2.

2.983(g) Photos_of_Equipment:
See Exhibits 4A-4D.

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, the undersigned, certify that the enclosed measurements and enclosed data are true and correct.

S.S. Sanders
Engineer

LIST OF TEST EQUIPMENT

1. Spectrum Analyzer: Hewlett Packard 8566B - Opt 462, w/
preselector 85685A, & Quasi-Peak Adapter HP 85650A, & HP
8449B - OPT H02 Cal. 6/26/98
2. Signal Generator, Hewlett Packard 8640B, cal. 10/1/98
3. Signal Generator, HP 8614A Serial No.2015A07428 cal. 5/27/99
3. Eaton Biconnical Antenna Model 94455-1
20-200 MHz Serial No. 0997 Cal. 10/30/98
4. Electro-Metric Dipole Kit, 20-1000 MHz, Model TDA-30 10/31/98
5. Electro-Metric Horn 1-18 GHz, Model RGA-180, Cal. 10/30/98
6. Electro-Metric Antennas Model TDA-30/1-4, Cal. 10/15/98
7. Electro-Metric Line Impedance Stabilization Network Model
No. EM-7821, Serial No. 101; 100KHz-30MHz 50uH. Cal.11/19/98
8. Electro-Metric Line Impedance Stabilization Network Model
No. EM-7820, Serial No. 2682; 10KHz-30MHz 50uH. Cal. 11/19/98
9. Special low loss cable was used above 1 GHz
10. Tenney Temperature Chamber

APPLICANT: RADIOSHACK, A DIVISION OF TANDY CORP.
FCC ID: AA001901210
REPORT #: F:\CUS\R\RADSHACK\RAD200H9.RPT
PAGE: 11