

TABLE OF CONTENTS LIST

APPLICANT: BOW ELECTRONICS CO., LTD.

FCC ID: IJNBR-100

TEST REPORT:

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

EXHIBITS CONTAINING:

EXHIBIT 1.....POWER OF ATTORNEY LETTER
EXHIBIT 2.....FCC ID LABEL SAMPLE AND SKETCH OF LOCATION
EXHIBIT 3A.....EXTERNAL REAR VIEW PHOTOGRAPH
EXHIBIT 3B.....EXTERNAL FRONT VIEW PHOTOGRAPH
EXHIBIT 3C-3D.....INTERNAL COMPONENT SIDE PHOTOGRAPH
EXHIBIT 3E-3F.....INTERNAL SOLDER SIDE PHOTOGRAPH
EXHIBIT 4.....BLOCK DIAGRAM
EXHIBIT 5A-5D.....PARTS LIST
EXHIBIT 6.....SCHEMATIC - RF PORTION
EXHIBIT 7.....SCHEMATIC - CPU
EXHIBIT 8A-8L.....USER'S MANUAL
EXHIBIT 9A-9D.....CIRCUIT DESCRIPTION
EXHIBIT 10.....AUDIO FREQUENCY RESPONSE GRAPH
EXHIBIT 11A.....MODULATION LIMITING PLOT - 300 Hz
EXHIBIT 11B.....MODULATION LIMITING PLOT - 1000 Hz
EXHIBIT 11C.....MODULATION LIMITING PLOT - 3000 Hz
EXHIBIT 12.....AUDIO LOW PASS FILTER GRAPH
EXHIBIT 13.....OCCUPIED BANDWIDTH CW PLOT
EXHIBIT 14.....OCCUPIED BANDWIDTH With DEVIATION PLOT

APPLICANT: BOW ELECTRONICS CO., LTD.

FCC ID: IJNBR-100

DATE: OCTOBER 4, 1999

REPORT #: T:\CUS\B\BOW\BOW425A9\BOW425A9.RPT

PAGE: TABLE OF CONTENTS

GENERAL INFORMATION REQUIRED
FOR TYPE ACCEPTANCE

2.983 (a,b,c) BOW ELECTRONICS CO., LTD. will manufacture the FCCID: IJNBR-100 FAMILY RADIO SERVICES 14 CHANNEL TRANSCEIVER in quantity, for use under FCC RULES PART 95.

2.983 (d) TECHNICAL DESCRIPTION

2.983 (d) (1) Type of Emission: 10K4F3E
95.629

$$\begin{aligned} B_n &= 2M + 2DK \\ M &= 3000 \\ D &= 2.2K \\ B_n &= 2(3.0) + 2(2.2) = 10.4K \end{aligned}$$

Authorized Bandwidth 12.5KHz

2.983 (d) (2) Frequency Range: 1. 462.5625 8. 467.5625
95.627 2. 462.5875 9. 467.5875
3. 462.6125 10. 467.6125
4. 462.6375 11. 467.6375
5. 462.6625 12. 467.6625
6. 462.6875 13. 467.6875
7. 462.7125 14. 467.7125 MHz

2.983 (d) (3) Power Output shall not exceed 0.500Watts effective
95.637 radiated power. There can be no provisions for
95.647 increasing the power.

2.983 (d) (4) Maximum Output Power Rating: 500 milliWatts
95.637 effective radiated power.

95.645 The antenna is an intergral part to the unit, it cannot be removed without rendering the unit inoperative. In order to remove the antenna the case must unscrewed, then the PCB assemblies must be removed then the antenna can be removed.

2.983 (d) (5) DC Voltages and Current into Final Amplifier:

FINAL AMPLIFIER ONLY
Vce = 4.5 Volts DC Ice = 0.31A.
Pin = 1.42 Watts

APPLICANT: BOW ELECTRONICS CO., LTD.
FCC ID: IJNBR-100
DATE: OCTOBER 4, 1999
REPORT #: T:\CUS\B\BOW\BOW425A9\BOW425A9.RPT
PAGE #: 1

2.983 (d) (6) Function of each electron tube or semiconductor device or other active circuit device: SEE EXHIBIT 5A-5D.

2.983(d) (7) Complete Circuit Diagrams: The circuit diagram is included as EXHIBIT 6-7 of this report. The block diagrams are included as EXHIBIT 4 of this report.

2.983(d) (8) Instruction book. A draft copy of the instruction manual is included as EXHIBIT 8.

2.983 (d) (9) Tune-up procedure. The tune-up procedure is included INCLUDED IN USER'S MANUAL.

(10) Description of all circuitry and devices provided for determining and stabilizing frequency is given in EXHIBIT 8. The crystal specifications are included as PAGES NA.

2.983 (d)(11) Description of any circuits or devices employed for suppression of spurious radiation, for limiting modulation, and for limiting power will be 9A-9D.

(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.

95.637 RF power is measured by measuring the radiated power at 3 meters and then replacing the transmitter with a signal generator to determine the effective radiated power. The ERP shall not exceed 0.500 Watts.

MEASURED POWER OUTPUT = 500 milliWatts ERP

APPLICANT: BOW ELECTRONICS CO., LTD.

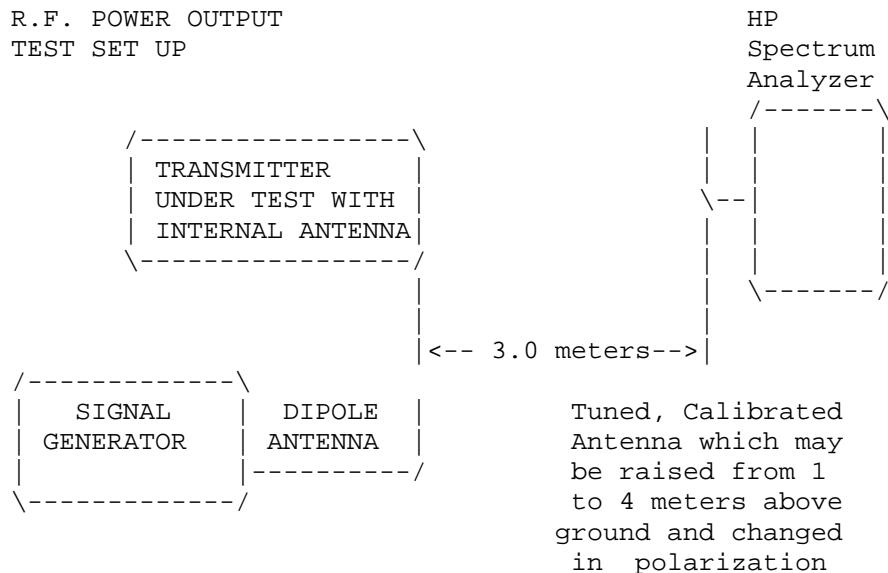
FCC ID: IJNBR-100

DATE: OCTOBER 4, 1999

REPORT #: T:\CUS\B\BOW\BOW425A9\BOW425A9.RPT

PAGE #: 2

R.F. POWER OUTPUT
TEST SET UP



Equipment placed 1 meter above ground
on a rotatable platform.

2.987(a)(b) Modulation characteristics:

AUDIO FREQUENCY RESPONSE

The audio frequency response was measured in accordance with TIA/EIA Specification 603. The audio frequency response curve is shown on the next page. The audio signal was fed into a dummy microphone circuit and into the microphone connector. The input required to produce 30 percent modulation level was measured. SEE EXHIBIT 10.

2.987(b) 1

Audio input versus modulation

The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are on the following pages. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz. SEE EXHIBITS 11A-11C.

95.635(b)

Post Limiter Filter The filter must be between the modulation limiter and the modulated stage. At any frequency between 3 & 20KHz the filter must have an attenuation of $60\log(f/3)$ greater than the attenuation at 1KHz. SEE EXHIBIT 12.

APPLICANT: BOW ELECTRONICS CO., LTD.

FCC ID: IJNBR-100

DATE: OCTOBER 4, 1999

REPORT #: T:\CUS\B\BOW\BOW425A9\BOW425A9.RPT

PAGE #: 3

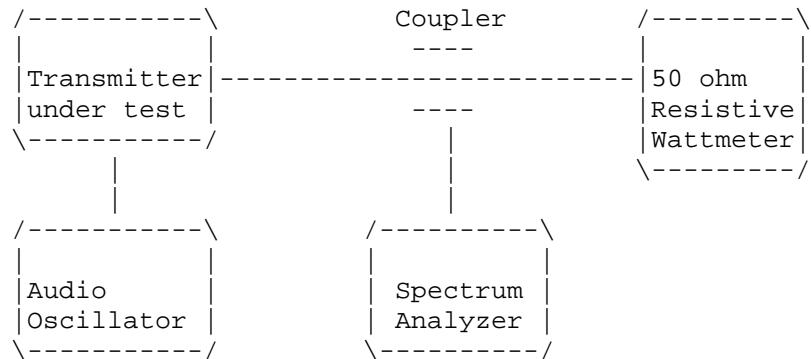
2.989(c) EMISSION BANDWIDTH:
95.633(b)(1)(3)(7)

Data in the plots shows that the sidebands from greater than 50% to 100% of the authorized bandwidth must be attenuated by at least 25dB and from 100 to 250% the sidebands must be attenuated by at least 35dB. Beyond 250% the sidebands must be attenuated by at least $43 + \log_{10}(TP)$. The transmitter was modulated with 2500 Hz, 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.

Radiotelephone transmitter with modulation limiter.

Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT



APPLICANT: BOW ELECTRONICS CO., LTD.
FCC ID: IJNBR-100
DATE: OCTOBER 4, 1999
REPORT #: T:\CUS\B\BOW\BOW425A9\BOW425A9.RPT
PAGE #: 4

2.991 Not Applicable, no antenna terminal allowed.

2.993(a)(b) UNWANTED RADIATION:
95.635(b)(7)

REQUIREMENTS: Emissions must be attenuated by at least the following below the output of the transmitter.

$$43 + 10\log(TP) = 43 + 10\log(0.5) = 40.00\text{dB}$$

TEST DATA:

EMISSION	METER	COAX	FIELD				
FREQ.	READING	LOSS	ACF	STRNGTH	ATT.	MARGIN	
MHz	@ 3m dBuV	dB	dB	dBuV/m	dBuV/m	dB	ANT.

467.73	104.1	1.60	18.56	124.26	0.00	0.00	V
935.50	31.80	2.90	24.18	58.88	65.37	25.38	H
1403.00	28.30	1.00	25.61	54.91	69.35	29.36	V
1870.80	30.20	1.01	27.48	58.69	65.56	25.57	V
2338.00	32.60	1.08	28.84	62.53	61.73	21.74	V
2806.00	33.20	1.15	30.01	64.37	59.89	19.90	H
3274.00	40.70	1.22	31.18	73.11	51.15	11.16	H
3741.00	23.00	1.29	32.35	56.64	67.61	27.62	V
4209.00	17.30	1.36	33.24	51.90	72.36	32.37	V
4677.00	9.40	1.43	33.76	44.59	79.66	39.67	V

MARGIN = (Field strength of Fund - FS OF EMISSION) - 40dB

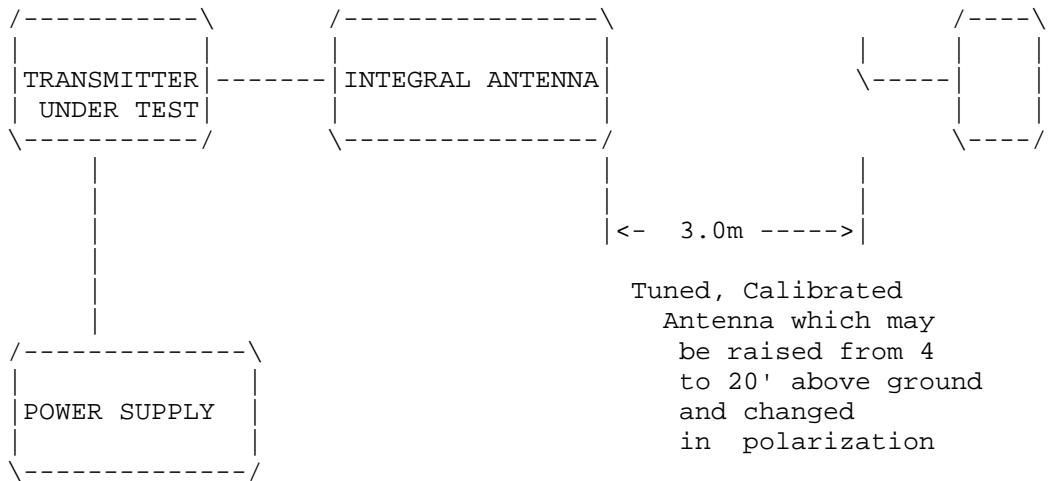
METHOD OF MEASUREMENT: The procedure used was C63.4-1992 for intentional radiators. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer, an Eaton model 94455-1 Biconical Antenna, ElectroMetrics antennas models TDA, TDS-25-1, TDS-25-2 and 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.

APPLICANT: BOW ELECTRONICS CO., LTD.
FCC ID: IJNBR-100
DATE: OCTOBER 4, 1999
REPORT #: T:\CUS\B\BOW\BOW425A9\BOW425A9.RPT
PAGE #: 5

2.993(a)(b) UNWANTED RADIATION:
95.631(b)(8)(9)

Method of Measuring Radiated Spurious Emissions

Hewlett Packard
Spectrum
Analyzer
HP8566B



Equipment placed 4' above ground
on a rotatable platform.

APPLICANT: BOW ELECTRONICS CO., LTD.
FCC ID: IJNBR-100
DATE: OCTOBER 4, 1999
REPORT #: T:\CUS\B\BOW\BOW425A9\BOW425A9.RPT
PAGE #: 6

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

Temperature and voltage tests were performed to verify that the frequency remains within the 0.00025%, 2.5 ppm 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.

Readings were also taken at plus and minus 15% of the battery voltage of 4.5 VDC.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 467.712 500

TEMPERATURE OC	FREQUENCY MHz	PPM
REFERENCE_____	467.712 500	00.00
-20_____	467.712 550	0.11
-10_____	467.713 130	+1.35
0_____	467.713 200	+1.50
+10_____	467.713 410	+1.95
+20_____	467.713 000	1.07
+30_____	467.712 600	0.21
+40_____	467.712 280	-0.47
+50_____	467.712 100	-0.85
20c BATT. End-Point 3.4V/dc	467.712 860	0.77

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was -0.85 to +1.95 ppm. The maximum frequency variation with voltage was +0.77ppm.

APPLICANT: BOW ELECTRONICS CO., LTD.

FCC ID: IJNBR-100

DATE: OCTOBER 4, 1999

REPORT #: T:\CUS\B\BOW\BOW425A9\BOW425A9.RPT

PAGE #: 7

2.983(f) Photo or Drawing of Label:
See EXHIBIT 2.

2.983(g) Photos of Equipment:
See EXHIBIT 3A-3F.

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. 7/6/99
2. Signal Generator, Hewlett Packard 8640B, cal. 9/23/99
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. 4/27/99
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
11. AC Voltmeter, HP 400FL, Serial No 2213A14499. Cal. 9/21/99
12. Digital Multimeter, Fluke 8010A/12A, Serial No. 4810047. Cal 9/21/99
13. Digital Multimeter, Fluke 77, Serial No. 43850817. Cal 9/21/99
14. Oscilloscope, Tektronix 2230, Serial No. 300572. Cal 9/23/99

APPLICANT: BOW ELECTRONICS CO., LTD.
FCC ID: IJNBR-100
DATE: OCTOBER 4, 1999
REPORT #: T:\CUS\B\BOW\BOW425A9\BOW425A9.RPT
PAGE #: 8