

TABLE OF CONTENTS LIST

APPLICANT: KESTON CO., LTD.

FCC ID: PFLFEEL-1400

TEST REPORT:

PAGE 1.....COVER SHEET - GENERAL INFORMATION & TECHNICAL DESCRIPTIVE
PAGE 2.....TECHNICAL DESCRIPTION CONTINUED & RF POWER OUTPUT
PAGE 3.....MODULATION CHARACTERISTICS AND OCCUPIED BANDWIDTH
PAGE 4.....METHOD OF MEASURING OCCUPIED BANDWIDTH
PAGE 5.....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.....LIST OF TEST EQUIPMENT

EXHIBITS CONTAINING:

EXHIBIT 1.....FCC ID LABEL SAMPLE
EXHIBIT 2.....SKETCH OF FCC ID LABEL LOCATION
EXHIBIT 3A.....EXTERNAL PHOTO - FRONT VIEW
EXHIBIT 3B.....EXTERNAL PHOTO - REAR VIEW
EXHIBIT 3C.....INTERNAL PHOTO - COMPONENT SIDE
EXHIBIT 3D.....INTERNAL PHOTO - SOLDER SIDE
EXHIBIT 3E.....INTERNAL PHOTO - RF BOARD - COMPONENT SIDE
EXHIBIT 3F.....INTERNAL PHOTO - RF BOARD - SOLDER SIDE
EXHIBIT 3G.....INTERNAL PHOTO - RF BOARD W/O SHIELDING PLATE
EXHIBIT 4.....BLOCK DIAGRAM
EXHIBIT 5A.....SCHEMATIC - MAIN
EXHIBIT 5B.....SCHEMATIC - RF
EXHIBIT 6.....CIRCUIT DESCRIPTION
EXHIBIT 7.....TUNING PROCEDURE
EXHIBIT 8.....GENERAL DESCRIPTION
EXHIBIT 9A-9C.....USER'S MANUAL
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 13A.....OCCUPIED BANDWIDTH CW PLOT
EXHIBIT 13B.....OCCUPIED BANDWIDTH PLOT - 2500 Hz TONE
EXHIBIT 14.....TEST SET UP PHOTO

APPLICANT: KESTON CO., LTD.

FCC ID: PFLFEEL-1400

REPORT #: T:\CUS\K\KESTON\622BU0\622B0.RPT

PAGE: TABLE OF CONTENTS

GENERAL INFORMATION REQUIRED
FOR TYPE ACCEPTANCE

2.1033(c)(1)(2) KESTON CO., LTD. will manufacture the
FCCID: PFLFEEL-1400 FAMILY RADIO SERVICES 14 CHANNEL
TRANSCEIVER in quantity, for use under FCC RULES
PART 95. The UUT is a PTT Radio with a maximum duty
cycle of 50%.

KESTON CO., LTD.
SUITE 210, DYBL, Dongyang Technical Collage
#62-160, Kochuk-Dong, Kuro-Gu
Seoul, 152-174, Korea

2.1033 (c) TECHNICAL DESCRIPTION

2.1033(c)(3) Instruction book. A draft copy of the instruction
manual is included as EXHIBIT 9A-9C.

2.1033(c) (4) Type of Emission: 10K0F3E
95.629

Bn = 2M + 2DK
M = 3000
D = 2.0K
Bn = 2(3.0)+2(2.0) = 10.0K

Authorized Bandwidth 12.5KHz

2.1033(c)(5) 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

2.1033(c)(6)(7) Power Output shall not exceed 0.500Watts effective
95.637 radiated power. There can be no provisions for
95.647 increasing the power or varing the power. The Maximum
Output Power Rating: 250 milliWatts
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.

2.1033(c)(8) DC Voltages and Current into Final Amplifier:

FINAL AMPLIFIER ONLY
Vce = 6V DC Ice = 0.10A.
Pin = 0.60 Watts

APPLICANT: KESTON CO., LTD.

FCC ID: PFLFEEL-1400

REPORT #: T:\CUS\K\KESTON\622BU0\622B0.RPT

PAGE #: 1

2.1033(c)(9) Tune-up procedure. The tune-up procedure is included 7.

2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram is included as EXHIBIT 5A-5B of this report. The block diagrams are included as EXHIBIT 4 of this report.

2.1033(c)(11) A photograph or a drawing of the equipment identification label is included as exhibit No.1

2.1033(c)(12) Photographs(8"X10") of the equipment of sufficient clarity to reveal equipment construction and layout, including meters, labels for controls, including any view under shields - See EXHIBIT 3A-3G.

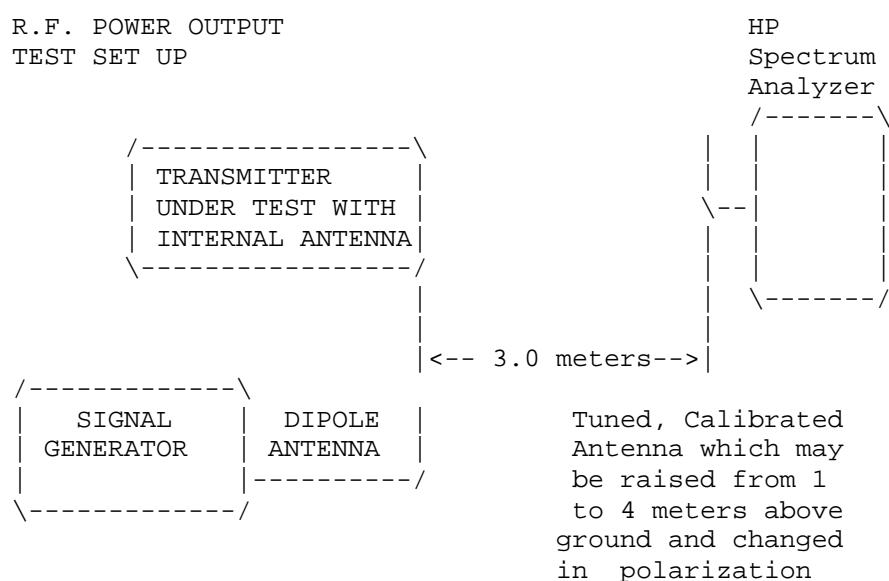
2.1033(c)(13) Digital modulation is not allowed.

2.1033(c)(14) The data required by 2.1046 through 2.1057 is submitted below.

2.1046(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 = 250 milliWatts ERP



Equipment placed 1 meter above ground on a rotatable platform.

APPLICANT: KESTON CO., LTD.

REPORT #: T:\CUS\K\KESTON\622BU0\622B0.RPT

PAGE #: 2

2.1047(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.

2.1047(b)

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 Exhibit 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.

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.

APPLICANT: KESTON CO., LTD.

FCC ID: PFLFEEL-1400

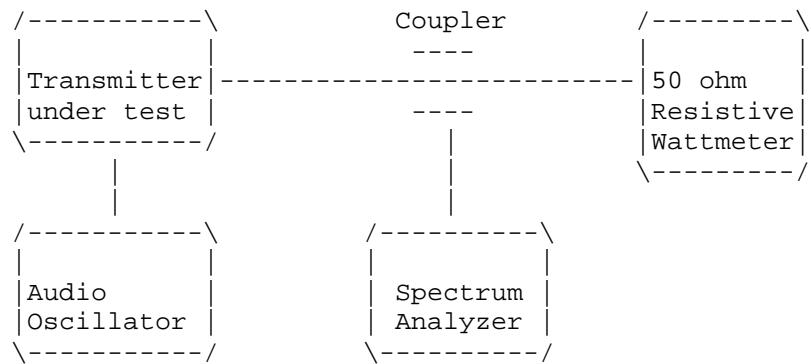
REPORT #: T:\CUS\K\KESTON\622BU0\622B0.RPT

PAGE #: 3

Radiotelephone transmitter with modulation limiter.

Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT



APPLICANT: KESTON CO., LTD.
FCC ID: PFLFEEL-1400
REPORT #: T:\CUS\K\KESTON\622BU0\622B0.RPT
PAGE #: 4

2.1051

Not Applicable, no antenna terminal allowed.

2.1053

UNWANTED RADIATION:

95.635(b)(7)

REQUIREMENTS:

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

$$43 + 10\log(TP) = 43 + 10\log(0.1) = 33.00\text{dB}$$

TEST DATA:

EMISSION FREQ. MHz	METER READING @ 3m dBuV	COAX LOSS dB	FIELD STRNGTH dBuV/m	ATT. dBuV/m	MARGIN dB	ANT.
462.60	101.40	1.60	18.44	121.44	0.00	H
925.20	51.40	2.90	24.10	78.40	43.04	V
1387.80	45.50	1.00	25.55	72.05	49.39	V
1850.40	41.50	1.01	27.40	69.91	51.53	V
2313.00	34.10	1.08	28.78	63.96	57.48	V
2775.60	27.70	1.15	29.94	58.79	62.65	V
3238.20	34.70	1.22	31.10	67.01	54.43	V
3700.80	32.90	1.29	32.25	66.44	55.00	H
4163.40	37.10	1.35	33.18	71.64	49.80	H
4626.00	33.10	1.42	33.70	68.23	53.21	H
467.70	101.40	1.60	18.56	121.56	0.00	V
935.40	52.10	2.90	24.18	79.18	42.38	V
1403.10	47.70	1.00	25.61	74.31	47.25	V
1870.80	40.10	1.01	27.48	68.59	52.97	V
2338.50	38.60	1.08	28.85	68.53	53.03	V
2806.20	28.30	1.15	30.02	59.47	62.09	V
3273.90	35.80	1.22	31.18	68.21	53.35	V
3741.60	33.90	1.29	32.35	67.55	54.01	H
4209.30	33.10	1.36	33.24	67.70	53.86	H
4677.00	34.10	1.43	33.76	69.29	52.27	H

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

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 849 N.W. State Road 45, Newberry, FL 32669.

APPLICANT: KESTON CO., LTD.

FCC ID: PFLFEEL-1400

REPORT #: T:\CUS\K\KESTON\622BU0\622B0.RPT

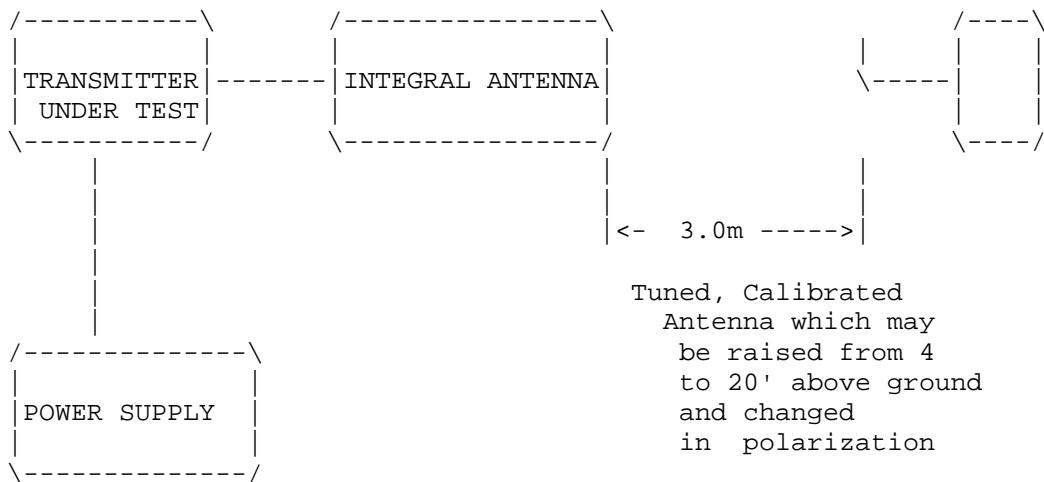
PAGE #: 5

2.1053
95.631(b)(8)(9)

UNWANTED RADIATION:

Method of Measuring Radiated Spurious Emissions

Hewlett Packard
Spectrum
Analyzer
HP8566B



Equipment placed 4' above ground
on a rotatable platform.

APPLICANT: KESTON CO., LTD.
FCC ID: PFLFEEL-1400
REPORT #: T:\CUS\K\KESTON\622BU0\622B0.RPT
PAGE #: 6

2.1055

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 6.0V.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 462.687 500

TEMPERATURE_C	FREQUENCY_MHz	PPM
REFERENCE_____	462.687 500	00.00
-20_____	462.686 305	-2.59
-10_____	462.687 754	+0.55
0_____	462.688 148	+1.40
+10_____	462.688 335	+1.81
+20_____	462.688 305	+1.74
+30_____	462.687 486	-0.03
+40_____	462.687 109	-0.85
+50_____	462.687 297	-0.44
BATT. End-Point 5.1V/dc	462.687 680	+0.39
BATT. End-Point 6.9V/dc	462.687 659	+0.34

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was -2.59 to +1.81 ppm. The maximum frequency variation with voltage was +0.39 ppm.

APPLICANT: KESTON CO., LTD.

FCC ID: PFLFEEL-1400

TEST EQUIPMENT LIST

1. Spectrum Analyzer: HP 8566B-Opt 462, S/N 3138A07786, w/
preselector HP 85685A, S/N 3221A01400, Quasi-Peak Adapter
HP 85650A, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02,
S/N 3008A00372 Cal. 10/17/99
2. Biconnical Antenna: Eaton Model 94455-1, S/N 1057
3. Biconnical Antenna: Electro-Metrics Model BIA-25, S/N 1171
4. Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
5. Log-Periodic Antenna: Electro-Metrics Model LPA-30, S/N 409
6. Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180,
1-18 GHz, S/N 2319
7. 18-26.3GHz Systron Donner Standard Gain Horn #DBE-520-20
8. Horn 40-60GHz: ATM Part #19-443-6R
9. Line Impedance Stabilization Network: Electro-Metrics Model
ANS-25/2, S/N 2604 Cal. 2/9/00
10. Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
11. Frequency Counter: HP Model 5385A, S/N 3242A07460 Cal 10/6/99
12. Peak Power Meter: HP Model 8900C, S/N 2131A00545
13. Open Area Test Site #1-3meters Cal. 12/22/99
14. Signal Generator: HP 8640B, S/N 2308A21464 Cal. 9/23/99
15. Signal Generator: HP 8614A, S/N 2015A07428
16. Passive Loop Antenna: EMCO Model 6512, 9KHz to 30MHz, S/N
9706-1211 Cal. 6/10/00
17. Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153
Cal. 11/24/99
18. AC Voltmeter: HP Model 400FL, S/N 2213A14499 Cal. 9/21/99
19. Digital Multimeter: Fluke Model 8012A, S/N 4810047 Cal 9/21/99
20. Digital Multimeter: Fluke Model 77, S/N 43850817 Cal 9/21/99
21. Oscilloscope: Tektronix Model 2230, S/N 300572 Cal 9/23/99

APPLICANT: KESTON CO., LTD.

FCC ID: PFLFEEL-1400

REPORT #: T:\CUS\K\KESTON\622BU0\622B0.RPT

PAGE #: 8