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APPLICANT: TEKK INC.

FCC ID: GOXSD4000

TEST REPORT:

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GENERAL INFORMATION REQUIRED
FOR TYPE ACCEPTANCE

2.983 (a,b,c) TEKK INC. will sell the
MODEL NO. GOXSD4000 UHF transceiver in quantity,
for use under FCC RULES PART 22 & 90.

2.983 (d) TECHNICAL DESCRIPTION

(1) Type of Emission: 20K0F2D For 25KHz
10K0F2E For 12.5KHz

For 25KHz

$$B_n = 2M + 2DK$$

$$M = 19,200 \text{ Bits per second}$$

$$D = 0.4\text{KHz (Peak Deviation)}$$

$$K = 1$$

$$B_n = 2(19,200/2) + 2(0.4K)(1) = 19.2K + 0.8K = 20.0K$$

ALLOWED AUTHORIZED BANDWIDTH = 20.00KHz.

For 12.5KHz

$$B_n = 2M + 2DK$$

$$M = 9600\text{Bits per second}$$

$$D = 0.825\text{kHz (Peak Deviation)}$$

$$K = 1$$

$$B_n = 2(9.6/2)k + 2(0.825)K(1) = 9.6K + 1.65K = 11.25K$$

ALLOWED AUTHORIZED BANDWIDTH = 11.25KHz.

90.209(b)(5)

(2) Frequency Range: 440-470 MHz

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

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

(5) DC Voltages and Current into Final Amplifier:

POWER INPUT

FINAL AMPLIFIER ONLY

$$V_{ce} = 13.6 \text{ Volts}$$

$$I_{ce} = 0.50 \text{ A.}$$

$$P_{in} = 6.8 \text{ Watts}$$

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- (6) Function of each electron tube or semiconductor device or other active circuit device: -SEE EXHIBIT 6.
- 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 #8.
- (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 L26, L25, C158, c156, C154, C152, L24, & C150..
- Limiting Modulation:
The transmitter audio limiting circuitry is contained in the loop filter IC6.
- Limiting Power: There is no provision for limiting power.
- (12) Digital modulation. This unit does NOT use digital modulation, it uses a FSK.
- 2.983(e) The data required by 2.985 through 2.997 is submitted below.

2.985(a) RF power output.

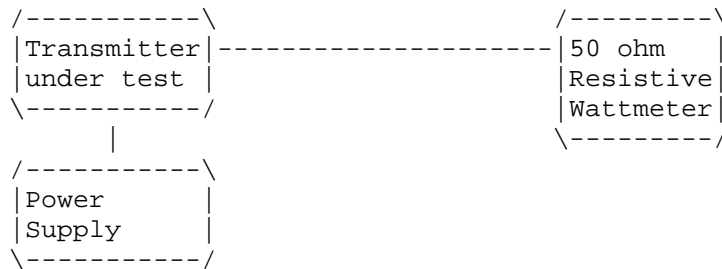
RF power is measured by connecting a 50 ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage of 7.2V, and the transmitter properly adjusted the RF output measures:

POWER OUTPUT

INPUT POWER: (13.5V)(0.52A) = 6.8 Watts

OUTPUT POWER: 2.1 Watts Efficiency: 30%

METHOD OF MEASURING RF POWER OUTPUT



2.987(a) Voice Modulation characteristics:

(a) AUDIO FREQUENCY RESPONSE NOT APPLICABLE

2.987(a) AUDIO LOW PASS FILTER
This UUT does not have a low pass filter.

2.987(b) Audio input versus modulation This is a data
transmitter that uses F2 type of emissions.

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2.989(c) Occupied bandwidth:

90.210(c,)

For transmitters that are not equipped with an audio low pass filter pursuant to S90.211(b), the power of any emission must be attenuated below the unmodulated carrier output power as follows; (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5kHz but not more than 10kHz: At least $83 \log(f_d/5)$ dB; (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10kHz, but not more than 250% of the authorized bandwidth: At least $29 \log(f_d/11)$ dB or 50dB, whichever is the lesser attenuation; (3) On any frequency removed from the center of the authorized bandwidth by more than 250% of the authorized bandwidth: At least $43 + 10 \log(P_o)$ dB.

90.210(d) Emission Mask D - 12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz 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 5.625 kHz removed from f_0 : Zero dB.

(2) On any frequency from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but not more than 12.5 kHz: At least $7.27 (f_d - 2.88 \text{ kHz})$ dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least $50 + 10 \log(P)$ dB or 70 dB, whichever is the lesser attenuation.

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.

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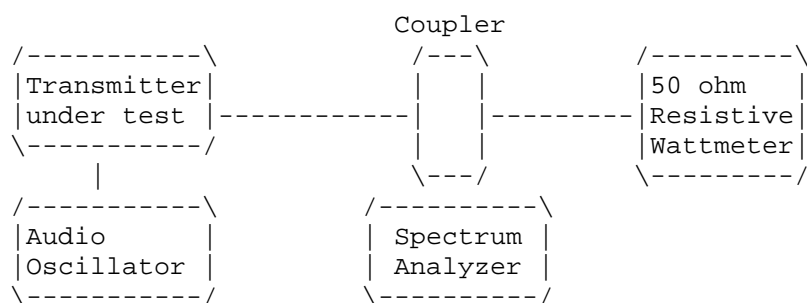
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Radiotelephone transmitter with modulation limiter.

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

Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT



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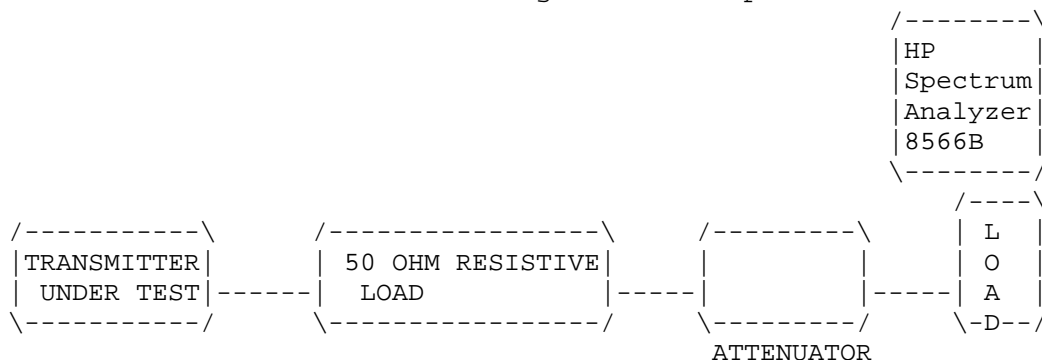
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2.991 Spurious emissions at antenna terminals(conducted):
Data on the following page shows the level of conducted spurious responses. The carrier was modulated 100% using a 2500Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603.

Method of Measuring Conducted Spurious Emissions



2.991 Continued Spurious Emissions at the Antenna Terminals:

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

For 25KHz $43 + 10\log(5.5) = 43 + 7.4 = 50.4\text{dB}$
 For 12.5KHz $50 + 10\log(P_o) = 50 + 6.63 = 56.63$

EMISSION FREQUENCY MHz	dB BELOW CARRIER
455.025	00.00
910.00	-77.00
1365.00	-78.00
1820.00	-80.20
2275.00	-105.90
2730.00	-96.70
3185.00	-95.90
3640.00	-106.10
4095.00	-116.60

METHOD OF MEASUREMENT: The procedure used was TIA/EIA-603 STANDARD without any exceptions. An audio generator was connected to the UUT through a dummy microphone circuit and the output of the transmitter connected to a standard load and from the standard load through a pre-selector filter of the spectrum analyzer. The spectrum was scanned from 400KHz to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer. The measurements were made using the shielded room located at TIMCO ENGINEERING INC. 25355 WEST NEWBERRY ROAD, NEWBERRY FLORIDA 32669.

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

NAME OF TEST: RADIATED SPURIOUS EMISSIONS

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

$$50 + 10\log(2.1) = 53.2 \text{ dB}$$

EMISSION FREQUENCY MHz	ATT. dBc	FCC LIMIT. dBc
470.02	0.00	
940.00	66.29	53.2
1410.10	80.87	53.2
1880.00	86.98	53.2
2350.10	80.75	53.2
2820.00	84.11	53.2
3290.20	91.66	53.2
3760.00	98.72	53.2
3760.00	98.12	53.2

METHOD OF MEASUREMENT: The tabulated Data shows the results of the radiated field strength emissions and attenuation calculated per TIA/EIA 603. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA 603. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 6051 N.W. 19th Lane Gainesville, FL 32605.

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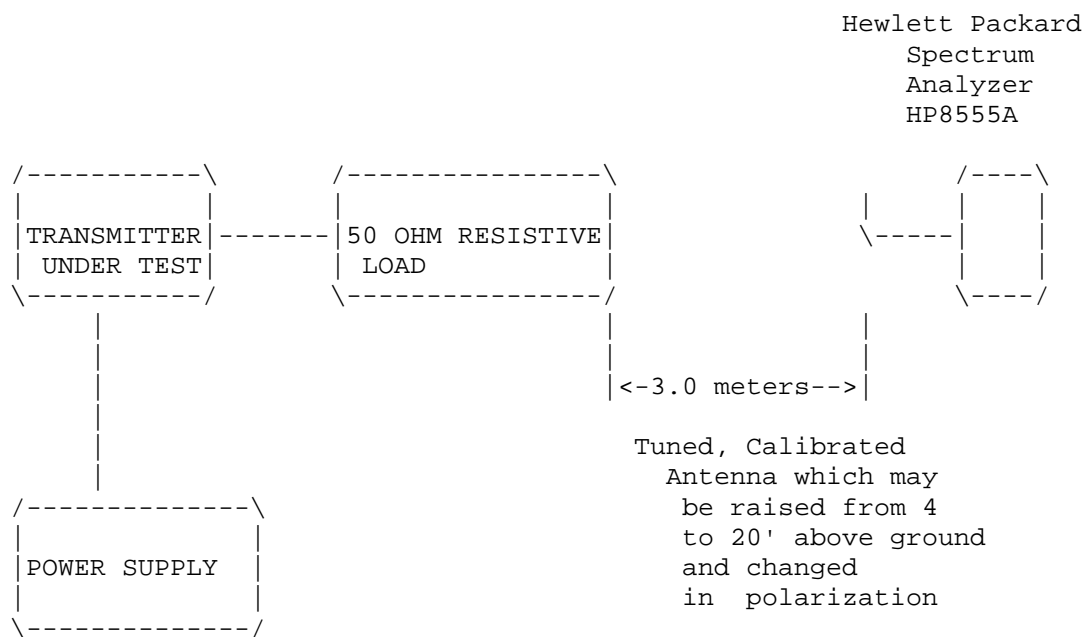
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2.993(a)(b) Continued Field strength of spurious emissions:

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)

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.

Readings were also taken at minus 25% of the battery voltage of 5.4VDC, which we estimate to be the battery endpoint.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 440.02523 MHz

TEMPERATURE C	FREQUENCY MHz	PPM
REFERENCE_____	440.025 230	00.0
-30_____	440.025 430	+00.04
-20_____	440.025 550	+00.07
-10_____	440.025 450	+00.05
0_____	440.025 380	+00.03
+10_____	440.025 310	+00.02
+20_____	440.025 170	-00.01
+30_____	440.025 100	-00.03
+40_____	440.025 010	-00.05
+50_____	440.025 030	-00.04

20oC Battery End-Point 5.4VDC 440.025 350 -00.03

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was -00.01 to +00.07 ppm. The maximum frequency variation over the voltage range was +00.03 ppm.

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

REQUIREMENTS: In the 421-512MHz frequency band, transient frequencies must be within the maximum frequency difference limits during the time interval indicated below for 12.5kHz Channels:

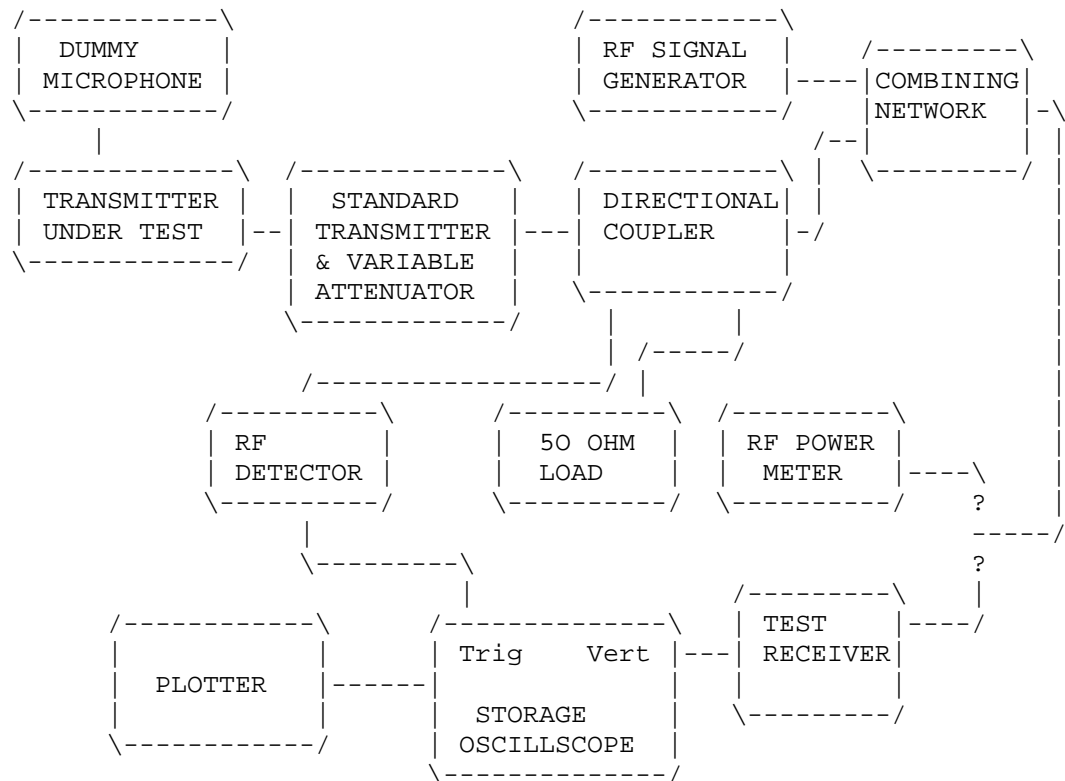
Time Interval	Maximum Frequency	Portable Radios 421-512Mhz
t1	+12.5kHz	10.0ms
t2	+6.25kHz	25.0ms
t3,t4	+12.5kHz	10.0ms

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.

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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-4H.
- 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: 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. Signal Generator: HP 8640B, S/N 2308A21464 Cal. 9/23/99
3. Signal Generator: HP 8614A, S/N 2015A07428 Cal. 5/29/99
4. Passive Loop Antenna: EMCO Model 6512, 9KHz to 30MHz, S/N 9706-1211 Cal. 6/23/97
5. Biconnical Antenna: Eaton Model 94455-1, S/N 1057
6. Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
7. Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153 Cal. 11/24/99
8. Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180, 1-18 GHz, S/N 2319 Cal. 4/27/99
9. Horn 40-60GHz: ATM Part #19-443-6R
10. Line Impedance Stabilization Network: Electro-Metrics Model FCC-25/2, S/N 2512 Cal. 11/18/99
11. Line Impedance Stabilization Network: Electro-Metrics Model ANS-25/2, S/N 2604 Cal. 11/30/99
12. Line Impedance Stabilization Network: Electro-Metrics Model EM-7820, S/N 2682 Cal. 12/1/99
13. Line Impedance Stabilization Network: Electro-Metrics Model EM-7821, S/N 101 Cal. 12/1/99
14. Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
15. AC Voltmeter: HP Model 400FL, S/N 2213A14499 Cal. 9/21/99
16. Digital Multimeter: Fluke Model 8012A, S/N 4810047 Cal 9/21/99
17. Digital Multimeter: Fluke Model 77, S/N 43850817 Cal 9/21/99
18. Oscilloscope: Tektronix Model 2230, S/N 300572 Cal 9/23/99
19. Frequency Counter: HP Model 5385A, S/N 3242A07460 Cal 10/6/99

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