

TABLE OF CONTENTS LIST

APPLICANT: IKARUS USA

FCC ID: QARNOVA6-72

TEST REPORT:

PAGE 1.....COVER SHEET - GENERAL INFORMATION & TECHNICAL DESCR.
PAGE 2.....TECHNICAL DESCRIP. CONTINUED. AND RF POWER OUTPUT
PAGE 3.....MODULATION CHARACTERISTICS AND OCCUPIED BANDWIDTH
PAGE 4.....OCCUPIED BANDWIDTH PLOT
PAGE 5.....FIELD STRENGTH OF SPURIOUS EMISSION
PAGE 6.....FREQUENCY STABILITY
PAGE 7-10...TEST EQUIPMENT LIST

EXHIBITS CONTAINING:

EXHIBIT 1.....FCC ID LABEL SAMPLE & SKETCH OF LOCATION
EXHIBIT 2.....EXTERNAL PHOTOGRAPHS
EXHIBIT 3.....INTERNAL PHOTOGRAPHS
EXHIBIT 4.....SCHEMATIC
EXHIBIT 5.....USER'S MANUAL
EXHIBIT 6.....OPERATIONAL DESCRIPTION
EXHIBIT 7.....TUNING PROCEDURE
EXHIBIT 8.....TEST SET UP PHOTO\

APPLICANT: IKARUS USA

FCC ID: QARNOVA6-72

REPORT #: T:\MkarusUSA_QAR\758UT2\Extra\758UT2TestReport.doc

TABLE OF CONTENTS LIST

GENERAL INFORMATION

2.1033(c)(1)(2) IKARUS USA will sell the
FCCID: QARNOVA6-72 Radio Control
transmitter in quantity, for use under FCC RULES
PART 95 SUBPART C.

IKARUS USA
5876 ENTERPRISE PARKWAY
BILLY CREEK COMMERCE CENTER
FORT MYERS, FL 33905

2.1033(c)(3) Instruction manual is included as exhibit #5.

2.1033 (4) Type of Emission: 8K0F1D

95.631(b)(1)

$B_n = 2M + 2DK$

$M = 4,000$ Bits per second

$D = 2.2\text{kHz}$ (Peak Deviation)

$K = 1$

$B_n = 2(4000/2) + 2(2.0K)(1) = 4.0K + 4.0K = 8.0k$

95.631(b) Authorized Bandwidth 8 kHz for F1D

2.1033(c)(5) Frequency Range: 72.01-72.99 MHz

95.623(a)

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

95.645 This unit has no user controls of any type other than
changing the channel element which is accomplished via
the lower front right of the unit.

(6) Function of each electron tube or semiconductor
device or other active circuit device:
See Exhibit #6.

(7) See next page

(8) DC Voltages and Current into Final Amplifier:

FINAL AMPLIFIER ONLY

$V_{ce} = 12.6\text{Volts}$ DC

$I_{ce} = 0.039\text{A}$.

$P_{in} = 0.5\text{Watts}$

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

95.647 The antenna is permanently attached and has less than unity
gain as the ground is less than perfect and there is no
provision for an other than the printed circuit board
ground.

APPLICANT: IKARUS USA

FCC ID: QARNOVA6-72

REPORT #: T:\IkarusUSA_QAR\758UT2\Extra\758UT2TestReport.doc

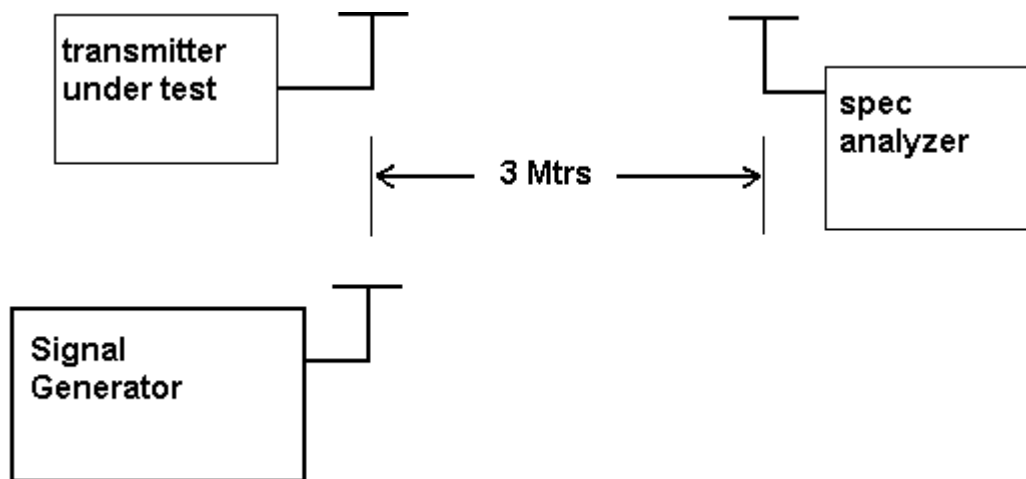
- 2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram is included as part of Exhibit #6.
- (10) Description of all circuitry and devices provided for determining and stabilizing frequency is given in EXHIBIT # 6.
- 2.1033(c)(11) The Equipment identification is shown as Exhibit #1.
- 2.1033(c)(12) Photographs of the equipment are shown as Exhibits No. 2-3.
- 2.1033(c)(13) Equipment employing Digital modulation. N/A.
- 2.1033(c)(14) The data required by 2.1046-2.1057 follows;
- 2.1046 RF power is measured per TIA/EIA STANDARD 603 using the substitution method. Measurements were made at the open field test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.

There is no provisions to change the power.

With a nominal battery voltage of 12.6 VDC, and the transmitter properly adjusted the RF output measures:

$$P_o = .2 \text{ Watts ERP}$$

2.1046 RF power output.



APPLICANT: IKARUS USA

FCC ID: QARNOVA6-72

REPORT #: T:\IkarusUSA_QAR\758UT2\Extra\758UT2TestReport.doc

Page 2 of 10

2.1047 Modulation characteristics:

AUDIO FREQUENCY RESPONSE

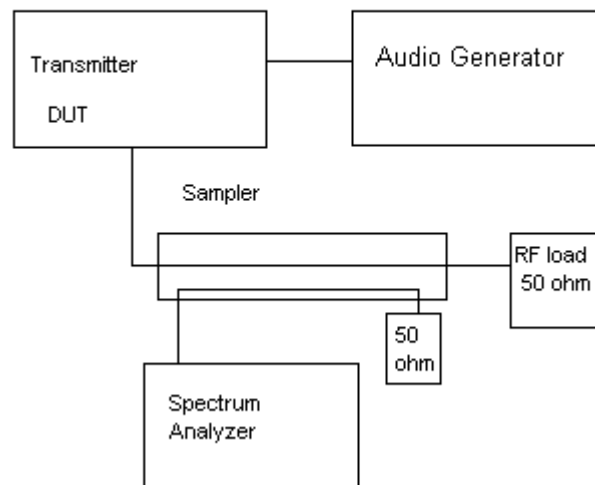
The Voice is NOT allowed in this band.

2.1049 Occupied bandwidth:
95.635(b)

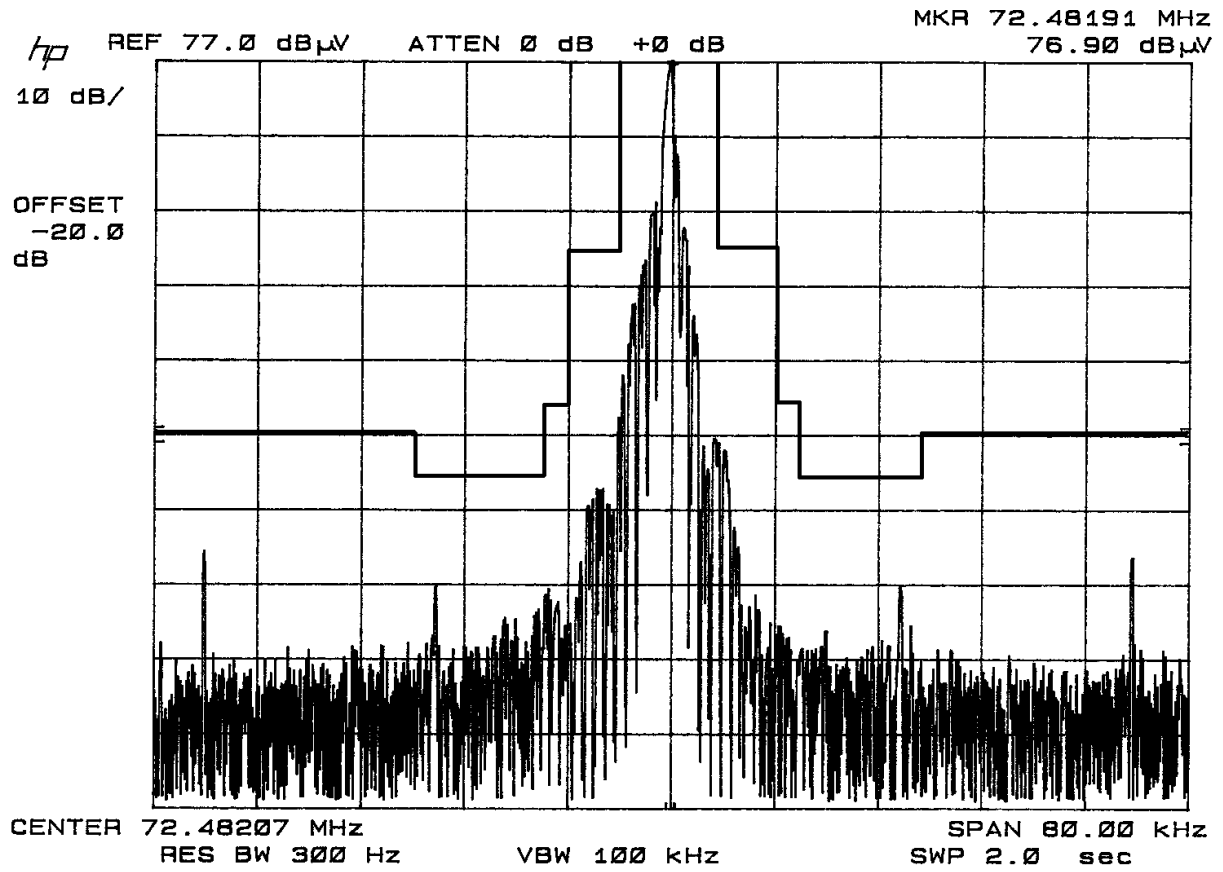
At least 25 dB on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth. At least 45 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 125% of the authorized bandwidth. At least 55dB on any frequency removed from the center of the authorized bandwidth by more than 125% up to and including 250% of the authorized bandwidth. At least $56+10\log(T)$ on any frequency removed from the center of the authorized bandwidth by more than 250%.

Radiotelephone transmitter with modulation limiter.
Test procedure diagram

Occupied BW Test Equipment Setup



OCCUPIED BANDWIDTH MEASUREMENT



APPLICANT: IKARUS USA

FCC ID: QARNOVA6-72

REPORT #: T:\IkarusUSA_QAR\758UT2\Extra\758UT2TestReport.doc

2.1051 SPURIOUS EMISSIONS AT ANTENNA TERMINALS.
NOT APPLICABLE, NO antenna port. This UUT has a permanently attached antenna.

2.1053 UNWANTED RADIATION:
95.635(1)(3)(7)(10)(11)(12)

REQUIREMENTS:

At least $56 + 10\log(T)$ on any frequency removed from the center of the authorized bandwidth by more than 250%.

$$56 + 10\log(0.2) = 49.01 \text{ dB}$$

TEST DATA:

Tuned Frequency MHz	Emission Frequency MHz	ATTN dBc	dBm Signal Generator
72.4	72.40	0.00	13
72.4	144.90	56	-43
72.4	217.40	73	-60
72.4	289.90	65	-52
72.4	362.40	61	-48
72.4	434.80	59	-46
72.4	507.30	59	-46
72.4	579.80	65	-52
72.4	652.30	62	-49
72.4	724.80	63	-50

METHOD OF MEASUREMENT: The procedure used was TIA/EIA STANDARD 603 using the substitution method. The unit was operating into its permanently attached antenna at a height of 80 cm. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental using a Agilent model 8566B spectrum receiver, and an appropriate antenna. Measurements were made at the open area test site of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45 Newberry, FL 32669.

APPLICANT: IKARUS USA

FCC ID: QARNOVA6-72

REPORT #: T:\IkarusUSA_QAR\758UT2\Extra\758UT2TestReport.doc

2.1055(a)(1) Frequency stability:
95.623(b)

Temperature and voltage tests were performed to verify that the frequency remains within the .002%, 20 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 the battery end point as per manufacturers specification +8 VDC.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 72.469 986

TEMPERATURE_	CFREQUENCY_MHz	PPM
REFERENCE	72.469 986	00.00
-30C	72.470 4023	5.75
-20C	72.470 846	11.87
-10C	72.470 7765	10.91
0C	72.470 745	10.48
10C	72.470 500	7.10
20C	72.470 226	3.31
30C	72.469 8377	-2.04
40C	72.469 4064	-8.00
50C	72.469 0462	-12.97

Frequency	END POINT VOLTS	BATT. PPM
72.469 9915	8 V	0.08

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was -12.97 to +11.87 ppm. The maximum frequency variation with voltage was 0.08 ppm.

APPLICANT: IKARUS USA

FCC ID: QARNOVA6-72

REPORT #: T:\IkarusUSA_QAR\758UT2\Extra\758UT2TestReport.doc

EMC Equipment List

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
X	3-Meter OATS	TEI	N/A	N/A	Listed 12/22/99	12/22/02
	3/10-Meter OATS	TEI	N/A	N/A	Listed 3/26/01	3/26/04
	Receiver, Beige Tower Spectrum Analyzer (Tan)	HP	8566B Opt 462	3138A07786 3144A20661	CAL 8/31/01	8/31/03
	RF Preselector (Tan)	HP	85685A	3221A01400	CAL 8/31/01	8/31/03
	Quasi-Peak Adapter (Tan)	HP	85650A	3303A01690	CAL 8/31/01	8/31/03
X	Receiver, Blue Tower Spectrum Analyzer (Blue)	HP	8568B	2928A04729	CHAR 10/22/01	10/22/03
X	RF Preselector (Blue)	HP	85685A	2848A18049 2926A00983	CHAR 10/22/01	10/22/03
X	Quasi-Peak Adapter (Blue)	HP	85650A	2811A01279	CHAR 10/22/01	10/22/03
X	Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
	Biconnical Antenna	Eaton	94455-1	1096	CAL 10/1/01	10/1/03
	Biconnical Antenna	Eaton	94455-1	1057	CHAR 3/15/00	3/15/02
	BiconiLog Antenna	EMCO	3143	9409-1043		
X	Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 10/2/01	10/2/03
	Log-Periodic Antenna	Electro-Metrics	EM-6950	632	CHAR 10/15/01	10/15/03
	Log-Periodic Antenna	Electro-Metrics	LPA-30	409	CHAR 10/16/01	10/16/03
	Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	152	CAL 3/21/01	3/21/04
	Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	153	CHAR 11/24/00	11/24/03

APPLICANT: IKARUS USA

FCC ID: QARNOVA6-72

REPORT #: T:\IkarusUSA_QAR\758UT2\Extra\758UT2TestReport.doc

Page 7 of 10

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	Double-Ridged Horn Antenna	Electro-Metrics	RGA-180	2319	CAL 12/19/01	12/19/03
	Horn Antenna	Electro-Metrics	EM-6961	6246	CAL 3/21/01	3/21/03
	Horn Antenna	ATM	19-443-6R	None	No Cal Required	
	Passive Loop Antenna	EMC Test Systems	EMCO 6512	9706-1211	CHAR 7/10/01	7/10/03
	Line Impedance Stabilization . . .	Electro-Metrics	ANS-25/2	2604	CAL 10/9/01	10/9/03
	Line Impedance Stabilization . . .	Electro-Metrics	EM-7820	2682	CAL 3/16/01	3/16/03
	Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 5/25/99	5/25/01
	Termaline Wattmeter	Bird Electronic Corporation	6104	1926	CAL 12/12/01	12/12/03
	Oscilloscope	Tektronix	2230	300572	CHAR 2/1/01	2/1/03
	Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 1/22/02	1/22/04
	AC Voltmeter	HP	400FL	2213A14499	CAL 10/9/01	10/9/03
	AC Voltmeter	HP	400FL	2213A14261	CHAR 10/15/01	10/15/03
	AC Voltmeter	HP	400FL	2213A14728	CHAR 10/15/01	10/15/03
X	Digital Multimeter	Fluke	77	35053830	CHAR 1/8/02	1/8/04
	Digital Multimeter	Fluke	77	43850817	CHAR 1/8/02	1/8/04
	Digital Multimeter	HP	E2377A	2927J05849	CHAR 1/8/02	1/8/04
	Multimeter	Fluke	FLUKE-77-3	79510405	CAL 9/26/01	9/26/03
	Peak Power Meter	HP	8900C	2131A00545	CHAR 1/26/01	1/26/03
	Digital Thermometer	Fluke	2166A	42032	CAL 1/16/02	1/16/04

APPLICANT: IKARUS USA

FCC ID: QARNOVA6-72

REPORT #: T:\IkarusUSA_QAR\758UT2\Extra\758UT2TestReport.doc

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	Thermometer	Traulsen	SK-128		CHAR 1/22/02	1/22/04
X	Temp/Humidity gauge	EXTech	44577F	E000901	CHAR 1/22/02	1/22/04
	Frequency Counter	HP	5352B	2632A00165	CAL 11/28/01	11/28/03
	Power Sensor	Agilent Technologies	84811A	2551A02705	CAL 1/26/01	1/26/03
	Service Monitor	IFR	FM/AM 500A	5182	CAL 11/22/00	11/22/02
	Comm. Serv. Monitor	IFR	FM/AM 1200S	6593	CAL 5/12/02	5/12/04
	Signal Generator	HP	8640B	2308A21464	CAL 11/15/01	11/15/03
	Modulation Analyzer	HP	8901A	3435A06868	CAL 9/5/01	9/5/03
	Near Field Probe	HP	HP11940A	2650A02748	CHAR 2/1/01	2/1/03
	BandReject Filter	Lorch Microwave	5BR4-2400/ 60-N	Z1	CHAR 3/2/01	3/2/03
	BandReject Filter	Lorch Microwave	6BR6-2442/ 300-N	Z1	CHAR 3/2/01	3/2/03
	BandReject Filter	Lorch Microwave	5BR4-10525/ 900-S	Z1	CHAR 3/2/01	3/2/03
	High Pas Filter	Microlab	HA-10N		CHAR 10/4/01	10/4/03
	Audio Oscillator	HP	653A	832-00260	CHAR 3/1/01	3/1/03
	Frequency Counter	HP	5382A	1620A03535	CHAR 3/2/01	3/2/03
	Frequency Counter	HP	5385A	3242A07460	CHAR 12/11/01	12/11/03
	Preamplifier	HP	8449B-H02	3008A00372	CHAR 3/4/01	3/4/03
	Amplifier	HP	11975A	2738A01969	CHAR 3/1/01	3/1/03
	Egg Timer	Unk			CHAR 8/31/01	8/31/03

APPLICANT: IKARUS USA

FCC ID: QARNOVA6-72

REPORT #: T:\NkarusUSA_QAR\758UT2\Extra\758UT2TestReport.doc

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	Measuring Tape, 20M	Kraftixx	0631-20		CHAR 2/1/02	2/1/04
	Measuring Tape, 7.5M	Kraftixx	7.5M PROFI		2/1/02	2/1/04
	Coaxial Cable #51	Insulated Wire Inc.	NPS 2251- 2880	Timco #51	CHAR 1/23/02	1/23/04
	Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 1/24/02	1/24/04
	Coaxial Cable #65	General Cable Co.	E9917 RG233/U	Timco #65	CHAR 1/23/02	1/23/04
	Coaxial Cable #106	Unknown	Unknown	Timco #106	CHAR 1/23/02	1/23/04

APPLICANT: IKARUS USA

FCC ID: QARNOVA6-72

REPORT #: T:\IkarusUSA_QAR\758UT2\Extra\758UT2TestReport.doc

Page 10 of 10