TEST REPORT

Report Number: 3131485MPK-001
Project Number: 3131485
August 25, 2007

Testing performed on the
Advanced Digital Hand Held Scanner
Model Number: 0705
FCC ID: ADV0705
to

FCC Part 15, Subpart B

Class: B

for
GRE America

ACCREDITED

A2LA Certificate Number: 1755-01

Test Performed by:	Test Authorized by:
Intertek	GRE America
1365 Adams Court	425 Harbor Blvd. Suit B
Menlo Park, CA 94025	Belmont, CA 94002

Prepared by: _____ **Date:** August 25, 2007
Krishna K Vemuri

Reviewed by: _____ **Date:** August 25, 2007
Suresh Kondapalli

VERIFICATION OF COMPLIANCE
Report No. 3131485MPK-001

Verification is hereby issued to the named APPLICANT and is VALID ONLY for the equipment identified hereon for use under the rules and regulations listed below.

Equipment Under Test:	Advanced Digital Hand Held Scanner
Trade Name:	GRECOM
Model No.:	0705
Serial No.	000010
Applicant:	GRE America
Contact:	Mr. Teru Takahashi
Address:	425 Harbor Blvd. Suite B Belmont, CA 94002
Country	USA
Tel. number:	650-591-1400
Fax number:	650-591-2001
Applicable Regulation:	FCC Part 15, Subpart B
Equipment Class:	Class B
Date of Test:	August 22 to 24, 2007

We attest to the accuracy of this report:

Krishna K Vemuri
Senior EMC Project Engineer

Suresh Kondapalli
EMC Team Leader

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1.0 General Description

1.1 Product Description

The Equipment under Test (EUT) is Advanced Digital Hand Held Scanning Receiver, model 0705.

Please refer to the attached specifications sheets in Appendix A for more details.

A pre-production version of the sample was received on August 21, 2007 in good condition. As declared by the Applicant, it is identical to production units.

1.2 Related Submittal(s) Grants

This is a single application for certification of a scanning receiver.

1.3 Test Methodology

Both conducted (if applicable) and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). All radiated measurements were performed in a semi-anechoic chamber. Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Data Section"** of this Application.

1.4 Test Facility

The test site and conducted measurement facility used to collect the radiated data is Site 1, a 10 meter semi-anechoic chamber. This test facility and site measurement data have been fully placed on file with the FCC and A2LA accredited.

1.5 Summary of Test Results

Model: 0705
FCC ID: ADV0705

TEST	REFERENCE	RESULTS
Radiated Emission	15.109	Complies
AC Line Conducted Emission	15.107	Complies
Antenna Conducted Emission	15.111	Complies
FCC Part 15.121 Requirement	15.121	Complies *

* Refer to file: GRE ADV0705 REPORT FOR FCC RULE PART 15.121

2.0 System Test Configuration

2.1 Justification

The tests were performed according to the test procedure as outlined in CFR47 Part 15.31 and in ANSI C63.4.

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst-case emissions.

For the measurements, the EUT is placed on top of a non-conductive table. If the EUT attaches to peripherals, they are connected and operational (as typical as possible).

For radiated emission measurements, the signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance if measured at a closer distance.

2.2 EUT Exercising Software

The unit was setup to receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

2.3 Mode of Operation

The EUT was tested in two modes:

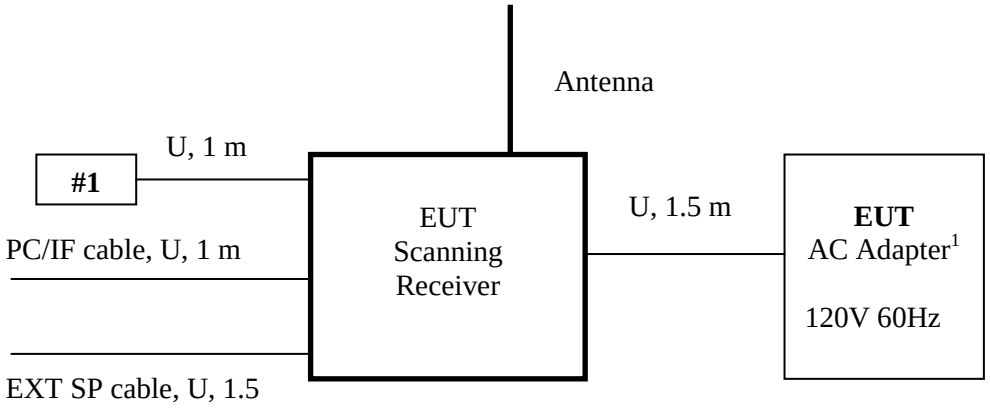
Test Mode 1: The EUT was set to constantly receive at the low, middle and high channels of each band.

Test Mode 2: The EUT was set to constantly scan all bands.

2.4 Support Equipment List and Description

Item #	Description	Model No.	Serial No.
1	External headphones	DS	Not Labeled

2.5 Equipment Setup Block Diagram



[1] GRE, AC Adapter, Model: RH48-1380600DU

U: Unshielded
m: meter

2.6 Equipment Modification

Any modifications installed previous to testing by GRE will be incorporated in each production model sold/leased in the United States.

Intertek Testing Services installed no modifications.

3.0 Emission Test Results

AC line conducted emission measurements were performed from 0.15 MHz to 30 MHz. Analyzer resolution is 10 kHz or greater.

Radiated emission measurements and antenna conducted emission measurements were performed from 30 MHz to 8000 MHz. Analyzer resolution is 100 kHz or greater for frequencies from 30 MHz to 1000 MHz, 1 MHz - for frequencies above 1000 MHz.

Preliminary tests were performed to determine the worst-case emission with the EUT tuned to the low, middle and high channels of each band. From these preliminary measurements the EUT was tuned to the frequency with the highest emission and the final scan was performed using the automated test software.

The same procedure was used to determine the worst-case emission level with the EUT setup in scanning mode for each band.

The final recorded data reflects the worst-case result.

A sample calculation and data tables of the emissions are included.

All measurements were performed with peak detection unless otherwise specified.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG + DF

Where FS = Field Strength in dB(µV/m)
RA = Receiver Amplitude (including preamplifier) in dB(µV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB(1/m)
AG = Amplifier Gain in dB
DF = Distance Factor in dB

Assume a receiver reading of 52.0 dB(µV) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(µV/m). This value in dB(µV/m) was converted to its corresponding level in µV/m.

RA = 52.0 dB(µV)
AF = 7.4 dB(1/m)
CF = 1.6 dB
AG = 29.0 dB
DF = 0 dB
FS = 52 +7.4 +1.6 –29.0 + 0 = 32 dB(µV/m)
Level in µV/m = Common Antilogarithm [(32 dB(µV/m)/20] = 39.8 µV/m

3.2 Radiated Emission Data

Tested By:	Krishna K Vemuri
Test Date:	August 22 & 23, 2007

Temperature	**(°C)**	20 ^{0}C
Relative Humidity	**(%)**	50%

The results on the following page(s) were obtained when the device was tested in the condition described in Section 2.

Results:	**Complies** by 10.4 dB

3.2 Test Data (Continued)

FCC Part 15.109 Class B Radiated Emissions Data

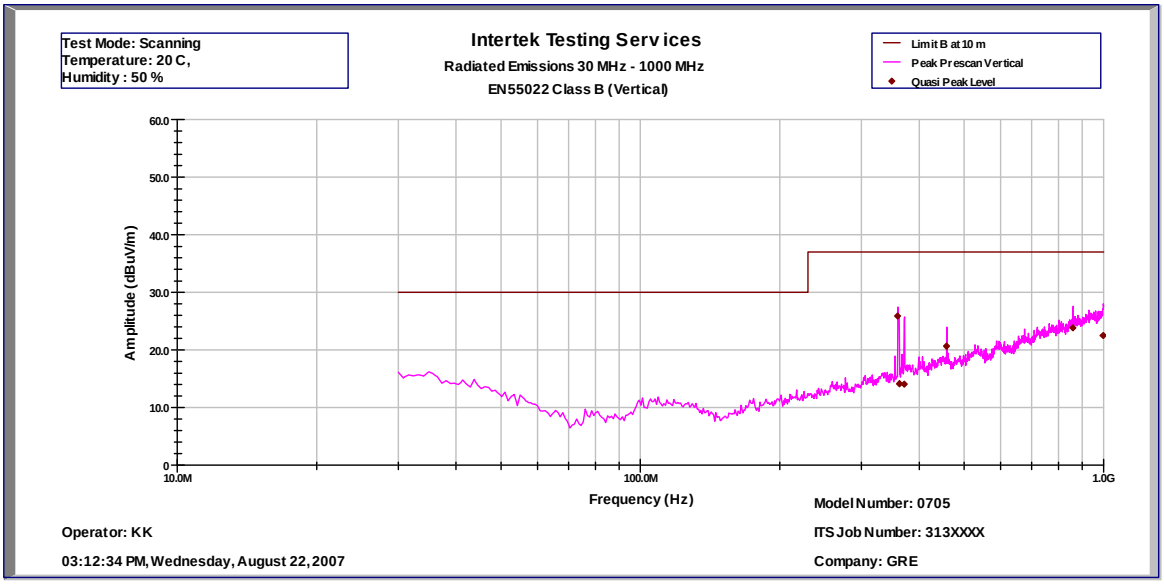
Model: 0705
Test Mode: Receiving at Tuned frequency
Test distance: 3 m

Tuned Frequency	L.O. Frequency	Antenna Polarization	FS at 3 m	FS Limit at 3 m	Margin	RA	AG	CF+3 dB ext. att.	AF
MHz	MHz	H/V	dB(µV/m)	dB(µV/m)	dB	dB(µV)	dB	dB	dB(1/m)
25	405.8	H	18.6	46.0	-27.4	26.0	27.7	4.3	16.0
39.5	420.3	H	19.2	46.0	-26.8	26.5	27.8	4.3	16.2
54	434.8	H	20.8	46.0	-25.2	27.9	27.9	4.3	16.5
108	488.8	H	20.7	46.0	-25.3	27.4	28.3	4.4	17.2
122.5	503.3	H	17.6	46.0	-28.4	23.8	28.4	4.5	17.7
136.99	517.79	H	18.2	46.0	-27.8	23.9	28.5	4.5	18.3
137	517.8	H	18.4	46.0	-27.6	24.1	28.5	4.5	18.3
155.5	536.3	H	14.8	46.0	-31.2	20.0	28.6	4.5	18.9
174	554.8	H	16.8	46.0	-29.2	21.9	28.5	4.5	18.9
216	596.8	H	20.8	46.0	-25.2	25.6	28.5	4.5	19.2
224.99	605.79	H	20.2	46.0	-25.8	24.9	28.4	4.5	19.2
225	605.8	H	20.1	46.0	-25.9	24.8	28.4	4.5	19.2
368.5	749.3	H	18.5	46.0	-27.5	21.0	28.2	4.8	20.9
512	892.8	H	18.9	46.0	-27.1	19.4	27.9	5.0	22.4
764	383.2	H	22.0	46.0	-24.0	29.3	27.5	4.3	15.9
767	386.2	H	21.1	46.0	-24.9	28.4	27.5	4.3	15.9
773	392.2	H	18.9	46.0	-27.1	26.3	27.6	4.3	15.9
776	395.2	H	18.5	46.0	-27.5	25.9	27.6	4.3	15.9
794	413.2	H	16.6	46.0	-29.4	24.0	27.8	4.3	16.1
797	416.2	H	17.3	46.0	-28.7	24.7	27.8	4.3	16.1
803	422.2	H	17.8	46.0	-28.2	25.1	27.8	4.3	16.2
813.5	432.7	H	17.6	46.0	-28.4	24.7	27.9	4.3	16.5
823.9875	443.187	H	18.3	46.0	-27.7	25.4	28.0	4.4	16.5
849	468.2	H	14.5	46.0	-31.5	20.9	28.2	4.4	17.4
859	478.2	H	19.3	46.0	-26.7	25.5	28.2	4.4	17.6
868.9875	488.187	H	21.0	46.0	-25.0	27.6	28.3	4.4	17.3
894	513.2	H	18.7	46.0	-27.3	24.5	28.5	4.5	18.2
917	536.2	H	16.8	46.0	-29.2	22.0	28.6	4.5	18.9
939.9875	559.188	H	20.4	46.0	-25.6	25.6	28.5	4.5	18.8
940	559.2	H	20.5	46.0	-25.5	25.7	28.5	4.5	18.8
950	569.2	H	20.5	46.0	-25.5	25.6	28.5	4.5	18.9
960	579.2	H	18.3	46.0	-27.7	23.0	28.5	4.5	19.3
1240	859.2	H	22.1	46.0	-23.9	23.3	28.0	4.9	21.9
1270	889.2	H	22.2	46.0	-23.8	22.7	27.9	5.0	22.4
1300	919.2	H	22.8	46.0	-23.2	22.9	27.9	5.0	22.8

Notes:
1. Negative signs (-) in the Margin column signify levels below the limit.
2. All readings below 1 GHz are quasi-peak, above 1 GHz – average.
3. All other readings not reported are at least 20 dB below the limit.
4. For L.O. frequency calculation, see Appendix A

3.2 Test Data (Continued)

Model: 0705
Test Mode: Scanning all channels
Test distance: 10 m

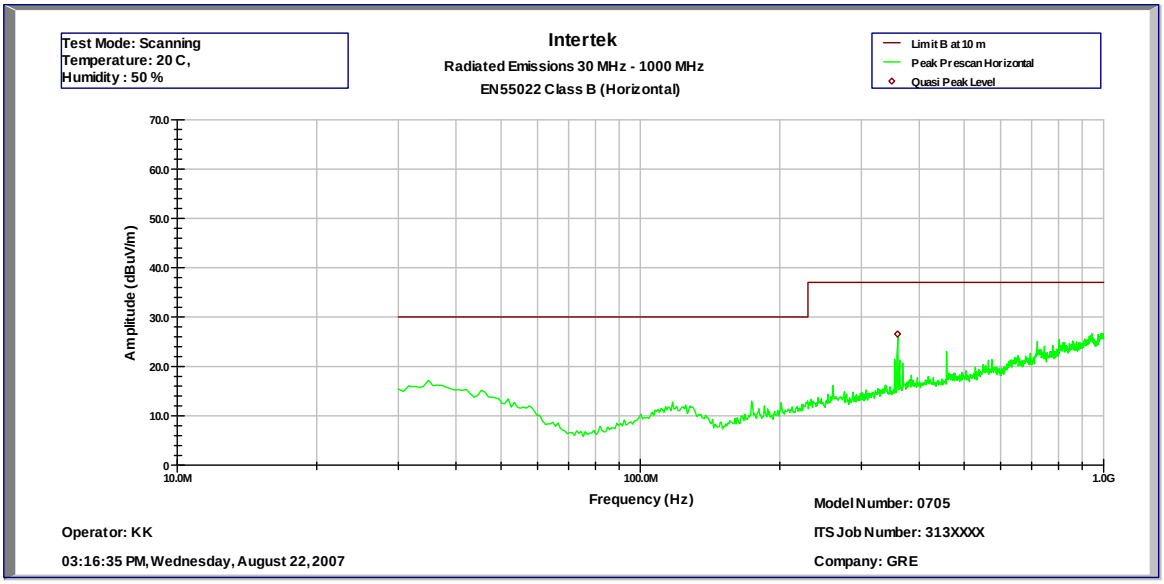


Intertek Testing Services							
Radiated Emissions 30 MHz - 1000 MHz							
EN55022 Class B (QP-Vertical)							
Operator: KK				Model Number: 0705			
				ITS Job Number: 3131485			
03:12:34 PM, Wednesday, August 22, 2007				Company: GRE			
Frequency	Quasi Pk FS	Limit@10m	Margin	RA	CF	AG	AF
MHz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB(1/m)
359.39	25.9	37.0	-11.1	33.0	5.7	27.3	14.6
362.69	14.1	37.0	-22.9	21.0	5.7	27.4	14.8
371.3	14.0	37.0	-23.0	20.2	5.7	27.4	15.6
458.18	20.7	37.0	-16.3	25.2	6.1	28.1	17.4
859.1	23.8	37.0	-13.2	22.0	7.7	28.0	22.2
998.64	22.5	37.0	-14.5	18.5	8.3	27.7	23.4

Test Mode: Scanning
Temperature: 20 C,
Humidity : 50 %

3.2 Test Data (Continued)

Model: 0705
Test Mode: Scanning all channels
Test distance: 10 m



Intertek Testing Services							
Radiated Emissions 30 MHz - 1000 MHz							
EN55022 Class B (QP-Horizontal)							
Operator: KK				Model Number: 0705			
				ITS Job Number: 3131485			
03:16:35 PM, Wednesday, August 22, 2007				Company: GRE			
Frequency	Quasi Pk FS	Limit@10m	Margin	RA	CF	AG	AF
MHz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB(1/m)
359.34	26.6	37.0	-10.4	34.0	5.7	27.3	14.3

Test Mode: Scanning
Temperature: 20 C,
Humidity : 50 %

3.3 AC Line Conducted Emission Data

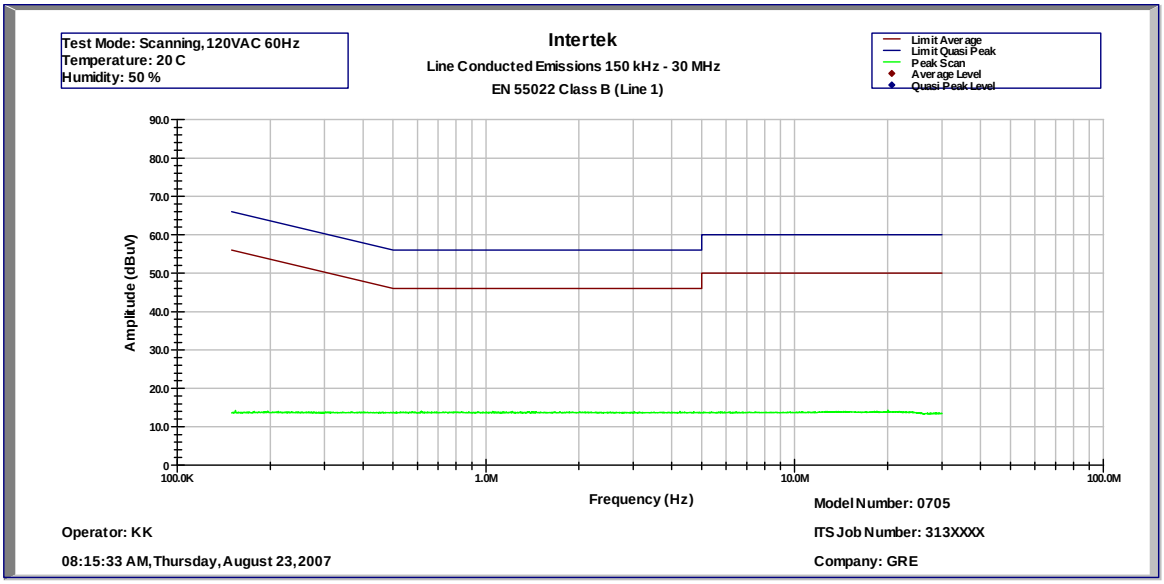
Tested By:	Krishna K Vemuri
Test Date:	August 23, 2007

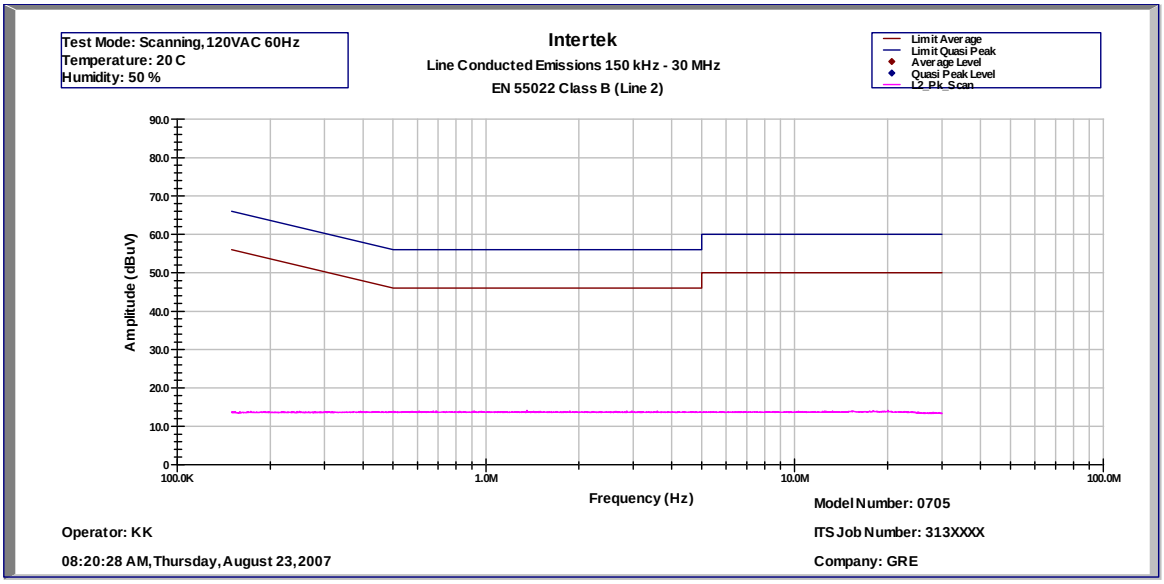
Temperature	**(°C)**	20 ^{0}C
Relative Humidity	**(%)**	50%

The results on the following page(s) were obtained when the device was tested in the condition described in Section 2.

Results:	**Complies** by 32.0 dB

3.3 Test Data (Continued)





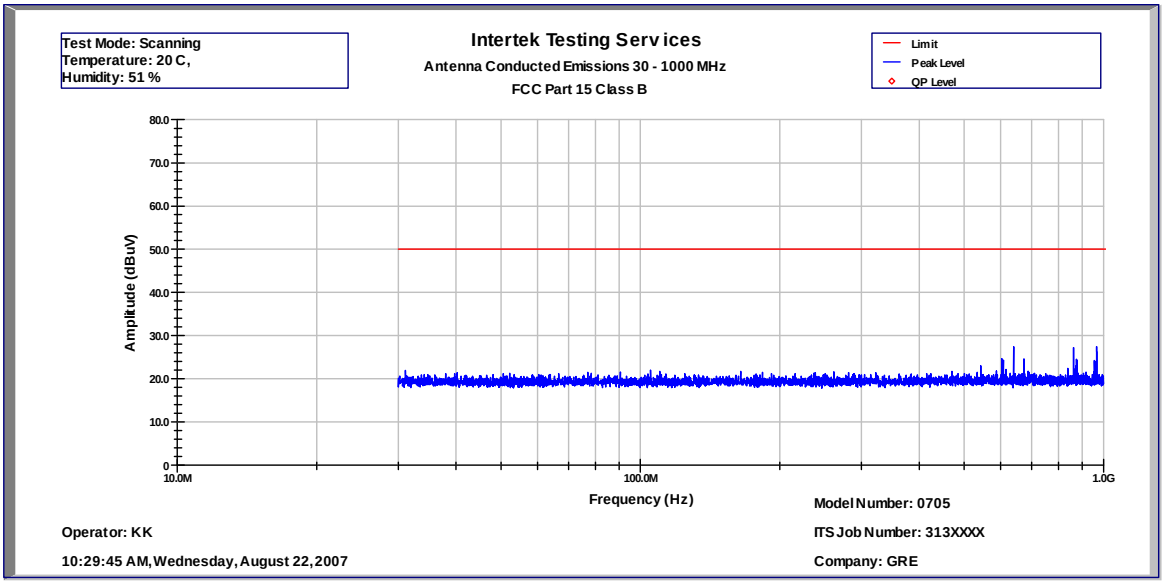
3.4 Antenna Conducted Emission Data

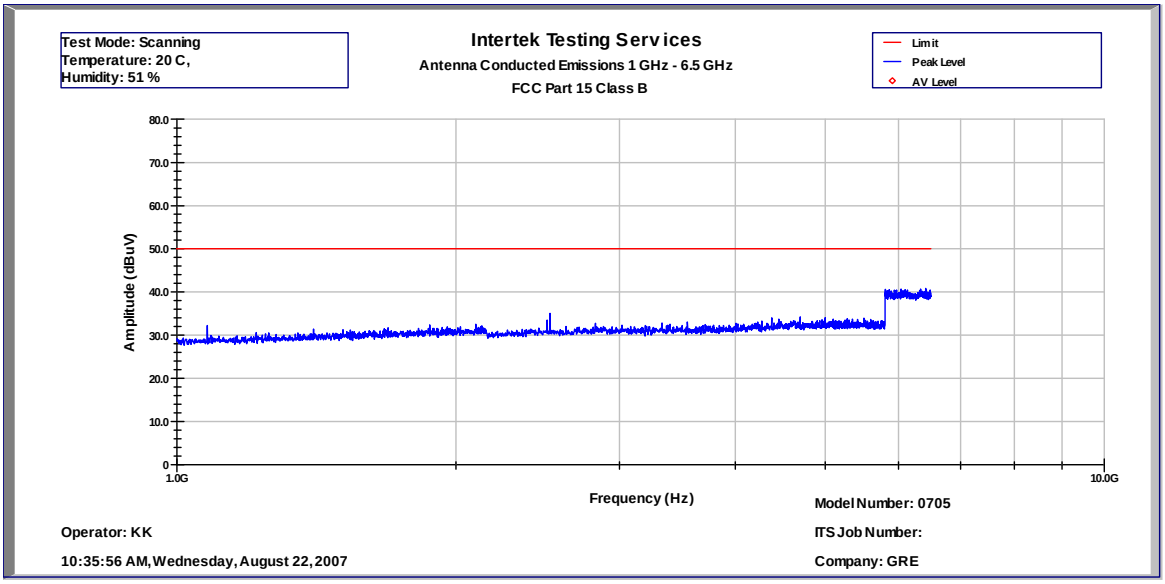
Tested By:	Krishna K Vemuri
Test Date:	August 22, 2007

Temperature	**(°C)**	20 ^{0}C
Relative Humidity	**(%)**	51%

The results on the following page(s) were obtained when the device was tested in the condition described in Section 2.

Results:	**Complies** by 9.2 dB


Test Mode: Scanning
Temperature: 20 C,
Humidity: 51 %
Intertek Testing Services
Antenna Conducted Emissions 30 - 1000 MHz
FCC Part 15 Class B
Limit
Peak Level
QP Level
Amplitude (dBuV)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
10.0M
100.0M
1.0G
Frequency (Hz)
Model Number: 0705
ITS Job Number: 313XXXX
Company: GRE
Operator: KK
10:29:45 AM, Wednesday, August 22, 2007


Test Mode: Scanning
Temperature: 20 C,
Humidity: 51 %
Intertek Testing Services
Antenna Conducted Emissions 1 GHz - 6.5 GHz
FCC Part 15 Class B
Limit
Peak Level
AV Level
Amplitude (dBuV)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
1.0G
10.0G
Frequency (Hz)
Model Number: 0705
ITS Job Number:
Company: GRE
Operator: KK
10:35:56 AM, Wednesday, August 22, 2007

4.0 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list.

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
Spectrum Analyzer Display w/85650 QP Adapter	Hewlett Packard	8566B/ 85650A	2416A00317 2521A01021	12	06/11/08
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	9/11/07
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	9/11/07
BI-Log Antenna	ARA Inc.	LPB-2513/A	1154	12	8/29/07
LISN	FCC	FCC-LISN-50-50-M-H	2012	12	8/02/08
Pre-Amplifier	HP	8447D	2944A09519	12	6/20/08

Appendix A – Local Oscillator Frequency calculation

FCC ID: ADV0705

1 LOCAL OSC FREQUENCY CALCULATION

-1 ADV0705 formula for 1st, 2nd and 3rd Local oscillation frequencies are as follow :

RECEIVING BAND (FR STEP)	FREQ. STEP (kHz)	RECEIVING FREQ. FR (MHz)	1st LOCAL PLL 1 /VCO 1 or VCO 2 (MHz)	2nd LOCAL PLL 2 /VCO 3 (MHz)	3rd LOCAL X' TAL (MHz)
VHF Low	10	25.0000 ~ 27.4050	A = (FR + 380.800) / 0.075	2nd Local = 1st IF - 21.4	20.9450
	5	27.4100 ~ 29.7000	= A.xxx (Cut away decimal)		
	10	29.7100 ~ 49.8300	1st Local = A x 0.075		
	5	49.8350 ~ 54.0000	1st IF = 1st Local - FR		
VHF High	8.33	108.0000 ~ 136.99166		2nd Local = 1st IF - 21.4	20.9450
	5	137.0000 ~ 137.9950			
	12.5	138.0000 ~ 143.9875			
	5	144.0000 ~ 147.9950	FR DENOTES Frequency Received.		
	12.5	148.0000 ~ 150.7875			
	5	150.8000 ~ 150.8450			
	7.5	150.8525 ~ 154.4975			
	5	154.5150 ~ 154.6400			
	7.5	154.6500 ~ 156.2550			
	25	156.2750 ~ 157.4500			
	7.5	157.4700 ~ 161.5725			
	5	161.6000 ~ 161.9750			
	12.5	162.0000 ~ 174.0000			
	5	216.0025 ~ 224.9950			
UHF Low	25	225.0000 ~ 316.4750		2nd Local = 1st IF - 21.4	20.9450
	〃	316.5000 ~ 316.7750	A = (FR + 380.700) / 0.075		
	〃	316.8000 ~ 337.8750	A = (FR + 380.800) / 0.075		
	〃	337.9000 ~ 338.0750	A = (FR + 380.700) / 0.075		
	〃	338.1000 ~ 339.2750	A = (FR + 380.800) / 0.075		
	〃	339.3000 ~ 359.4750	A = (FR + 380.700) / 0.075		
	〃	359.5000 ~ 379.9750	A = (FR + 380.800) / 0.075		
	12.5	380.0000 ~ 380.7125	〃		
	〃	380.7250 ~ 380.8000	A = (FR + 380.700) / 0.075		
	〃	380.8125 ~ 400.0000	A = (FR + 380.800) / 0.075		
	〃	400.0125 ~ 405.9750	A = (FR + 380.700) / 0.075		
	〃	405.9875 ~ 419.9875	A = (FR + 380.800) / 0.075		
	5	420.0000 ~ 450.0000	〃		
	6.25	450.00625 ~ 469.99375	〃		
	12.5	470.0000 ~ 512.0000	〃		
UHF High	3.125	764.0000 ~ 766.996875	A = (FR - 380.800) / 0.075	2nd Local = 1st IF - 21.4	20.9450
	〃	773.0000 ~ 775.996875	= A.xxx (Cut away decimal)		
	〃	794.0000 ~ 796.996875	1st Local = A x 0.075		
	〃	803.0000 ~ 805.996875	1st IF = FR - 1st Local		
	12.5	806.0000 ~ 823.9875			
	〃	849.0000 ~ 868.9875			
	〃	894.0000 ~ 939.9875			
	6.25	940.0000 ~ 960.0000			
	〃	1240.0000 ~ 1300.0000			

RECEIVING BAND (FR STEP)	FREQ. STEP (kHz)	RECEIVING FREQ. FR (MHz)	1st LOCAL PLL 1 /VCO 1 or VCO 2 (MHz)	2nd LOCAL PLL 2 /VCO 3 (MHz)	3rd LOCAL X' TAL (MHz)
UHF Low	25.0	310.0000	9210.666 = (310.0000 + 380.800) / 0.075 = 9210.666 (Cut away decimal) 690.750 =9210 x 0.075 380.750 = 690.750 - 310.0000	359.350 = 380.750 - 21.4	20.9450
	6.25	406.0000	10490.666 = (406.0000 + 380.800) / 0.075 = 10490.666 (Cut away decimal) 786.750 =10490 x 0.075 380.750 = 786.750 - 406.0000	359.350 = 380.750 - 21.4	20.9450
		446.0000	11024.000 = (446.0000 + 380.800) / 0.075 = 11024.000 (Cut away decimal) 826.800 =11024 x 0.075 380.800 = 826.800 - 446.0000	359.400 = 380.800 - 21.4	20.9450
		512.0000	11904.000 = (512.0000 + 380.800) / 0.075 = 11904.000 (Cut away decimal) 892.800 =11904 x 0.075 380.800 = 892.800 - 512.0000	359.400 = 380.800 - 21.4	20.9450
UHF High	3.125	764.0000	5109.333 = (764.0000 - 380.800) / 0.075 = 5109.333 (Cut away decimal) 383.175 =5109 x 0.075 380.825 = 764.000 - 383.175	359.425 = 380.825 - 21.4	20.9450
	6.25	806.0000	5669.333 = (806.0000 - 380.800) / 0.075 = 5669.333 (Cut away decimal) 425.175 =5669 x 0.075 380.825 = 806.000 - 425.175	359.425 = 380.825 - 21.4	20.9450
		860.0000	6389.333 = (860.0000 - 380.800) / 0.075 = 6389.333 (Cut away decimal) 479.175 =6389 x 0.075 380.825 = 860.000 - 479.175	359.425 = 380.825 - 21.4	20.9450
		960.0000	7722.666 = (960.0000 - 380.800) / 0.075 = 7722.666 (Cut away decimal) 579.150 =7722 x 0.075 380.850 = 806.000 - 579.150	359.450 = 380.850 - 21.4	20.9450
		12400.0000	11456.000 = (1240.0000 - 380.800) / 0.075 = 11456.000 (Cut away decimal) 859.200 =11456 x 0.075 380.800 = 1240.000 - 859.200	359.400 = 380.800 - 21.4	20.9450
		1300.0000	12256.000 = (1300.0000 - 380.800) / 0.075 = 12256.000 (Cut away decimal) 919.200 =12256 x 0.075 380.800 = 1300.000 - 919.200	359.400 = 380.800 - 21.4	20.9450

-2 IF FREQUENCY

1st IF : 380.6500 ~ 380.86875Hz

2nd IF : 21.4000MHz

3rd IF : 455kHZ

-3 Example

RECEIVING BAND (FR STEP)	FREQ. STEP (kHz)	RECEIVING FREQ. FR (MHz)	1st LOCAL PLL 1 /VCO 1 or VCO 2 (MHz)	2nd LOCAL PLL 2 /VCO 3 (MHz)	3rd LOCAL X' TAL (MHz)
VHF Low	5.0	25.0000	A : 5410.666 = (25.0000 + 380.800) / 0.075 = 5410.666 (Cut away decimal) 1st Local : 405.750 =5410 x 0.075 1st IF : 380.750 = 405.750 – 25.0000	359.350 = 380.750 – 21.4	20.9450
		40.0000	5610.666 = (40.0000 + 380.800) / 0.075 = 5610.666 (Cut away decimal) 420.750 =5610 x 0.075 380.750 = 420.750 – 40.0000	359.350 = 380.750 – 21.4	20.9450
		54.0000	5797.333 = (54.0000 + 380.800) / 0.075 = 5797.333 (Cut away decimal) 434.775 =5797 x 0.075 380.775 = 434.775 – 54.0000	359.375 = 380.775 – 21.4	20.9450
VHF High	8.33	108.0000	6517.333 = (108.0000 + 380.800) / 0.075 = 6517.333 (Cut away decimal) 488.775 =6517 x 0.075 380.775 = 488.775 – 108.0000	359.375 = 380.775 – 21.4	20.9450
	7.5	154.1000	7132 = (154.1000 + 380.800) / 0.075 = 7132 (Cut away decimal) 534.9 =7137 x 0.075 380.800 = 534.9 – 154.1000	359.400 = 380.800 – 21.4	20.9450
	12.5	174.0000	7397.333 = (174.0000 + 380.800) / 0.075 = 7397.333 (Cut away decimal) 554.775 = 7397 x 0.075 380.775 = 554.775 – 174.0000	359.375 = 380.775 – 21.4	20.9450
	5.0	216.0025	7957.366 = (216.0025 + 380.800) / 0.075 = 7957.366 (Cut away decimal) 596.775 = 7957 x 0.075 380.7725 = 596.775 – 216.0025	359.370 = 380.7725 – 21.4	20.9450
	5.0	225.0000	8077.333 = (225.0000 + 380.800) / 0.075 = 8077.333 (Cut away decimal) 605.775 =8077 x 0.075 380.775 = 605.775 – 225.0000	359.375 = 380.775 – 21.4	20.9450

Appendix B – ADV0705 Specification

GENERAL RESEARCH OF ELECTRONICS, INC.
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JULY 10 2007
Reference No. 07003F

SPECIFICATIONS

SUBJECT: 1000 CHANNEL FREQUENCY MEMORIES WITH 1500 ID MEMORIES TRUNKING SYSTEM, VHF/UHF PROGRAMMABLE WITH SPECTRUM SWEEPER AND SKYWARN AM/FM SCANNING RECEIVER Model 0705

1. GENERAL

1.1.1 Programmable channel : 1000 channels (100 channels x 10 banks)
1500 ID memories (30 location x 5 sub-banks x 10 banks)
7 service search
1 Limit search bank
1 Priority channel
7 WX frequencies
WX alert and SAME receiving with 10 FIPS (Federal Information Processing Standard) area code memories
155 preprogrammed frequencies

1.2 Receiving mode : AM, FM, FM, Motorola Type I/II/IIi (Hybrid)Analog, LTR (EF Johnson), EDACS wide(GE/Ericsson/MA-COM), CTCSS and DCS

1.3 Receiving system : Triple conversion PLL super heterodyne

1st IF 380.8 MHz: The 1st Local OSC frequency for VHF and UHF Low/T band employs upper side of receiving frequency range.

: The 1st Local OSC frequency for UHF High band employs lower side of receiving frequency range

2nd IF 21.4 MHz : The 2nd Local OSC frequency employs lower side of 1st IF

– Continued –

1.4	Frequency range	: VHF Low	25.00000 – 54.00000 MHz
		VHF Aircraft	108.00000 – 136.99166 MHz
		VHF High	137.00000 – 174.00000 MHz
			216.00250 – 299.97500 MHz
		UHF Low/T	300.00000 – 512.00000 MHz
		UHF High	764.00000 – 960.00000 MHz
			1240 .00000 – 1300.0000 MHz

Except cellular band: 824 – 848.9875 MHz and 869 – 893.9875 MHz

1.5 Pre-Programmed band search:
- Marine
- CB
- FRS/GRMS/MURS
- Public safety
- Aircraft
- Amateur (Ham)
- Railroad

1.6 WX frequencies : 162.400, 162.425, 162.450, 162.475, 162.500, 162.525, 162.550 MHz

1.7 Scanning rate : 60 channels/sec.

1.8 Search rate : 78 steps/sec.

1.9 Display : LED back-light LCD with 16 characters X 4 lines with icons

1.10 Zeromatic : Activates during search mode

1.11 Audio output : 1.8 Watts

1.12 Signal Stalker band : Public safety band

All frequencies range divided to 10 groups

- Group 0 (25 – 54 MHz)
- Group 1 (108 – 136.99166 MHz)
- Group 2 (137 – 174 MHz)
- Group 3 (216.0025 – 299.9750 MHz)
- Group 4 (300 – 405.9875 MHz)
- Group 5 (406 – 470 MHz)
- Group 6 (470.0125 – 512 MHz)
- Group 7 (764 – 805.996875 MHz)
- Group 8 (806 – 868.9875 MHz)
- Group 9 (894 – 960, 1240 – 1300 MHz)

1.13 Speaker : Built-in 77 mm 8 Ohms dynamic speaker

1.14 Operating voltage : DC 13.8 Volts

1.15 Dimension : Approx. 185 (W) x 135 (D) x 55 (H) mm

1.16 Weight : Approx. 790 g without antenna

1.17 Accessory : Telescopic antenna, Owner's manual, Sleeve, Handle bracket, AC adapter and Other cabinet

1.18 Memory backup : No battery back-up required, EEPROM used

1.19 Drop test : In Gift-Box, Height 76 cm

2. ELECTRICAL

Standard Test Condition

(1) Power source voltage : 13.8 Volts DC
(2) Antenna impedance : 50 Ohms
(3) Test temperature : 25 degrees C
(4) Standard signal level : 100 μV
(5) Modulation frequency : 1 kHz
(6) Reference FM deviation : 3.0 kHz
(7) Reference AM modulation : 60%
(8) Reference audio output : 75 mWatts
(9) Audio output load : 8 Ohm resistive load

2.1 Frequency range :

Freq.	Step	Mode (Default)
25.0000 – 26.9600 MHz	10 kHz	AM
26.9650 – 27.4050 MHz	10 kHz	AM
27.4100 – 29.5050 MHz	5 kHz	AM
29.5100 – 29.7000 MHz	5 kHz	FM
29.7100 – 49.8300 MHz	10 kHz	FM
49.8350 – 54.0000 MHz	5 kHz	FM
108.000 – 136.9916 MHz	8.33 kHz	AM
137.000 – 137.995 MHz	5 kHz	FM
138.000 – 143.9875 MHz	12.5 kHz	FM
144.000 – 147.9950 MHz	5 kHz	FM
148.000 – 150.7875 MHz	12.5 kHz	FM
150.800 – 150.8450 MHz	5 kHz	FM
150.8525 – 154.4975 MHz	7.5 kHz	FM
154.5150 – 154.6400 MHz	5 kHz	FM
154.6500 – 156.2550 MHz	7.5 kHz	FM
156.2750 – 157.4500 MHz	25 kHz	FM
157.4700 – 161.5725 MHz	7.5 kHz	FM
161.6000 – 161.9750 MHz	5 kHz	FM
162.0000 – 174.0000 MHz	12.5 kHz	FM
216.0025 – 219.9975 MHz	5 kHz	FM

220.0000 – 224.9950 MHz	5 kHz	FM
225.0000 – 379.9750 MHz	25 kHz	AM
380.0000 – 419.987500 MHz	12.5 kHz	FM
420.0000 – 450.000000 MHz	5 kHz	FM
450.00625 – 469.99375 MHz	6.25 kHz	FM
470.00000 – 512.00000 MHz	12.5 kHz	FM
764.00000 – 766.996875 MHz	3.125 kHz	FM
773.00000 – 775.996875 MHz	3.125 kHz	FM
794.00000 – 796.996875 MHz	3.125 kHz	FM
803.00000 – 805.996875 MHz	3.125 kHz	FM
806.00000 – 823.987500 MHz	12.5 kHz	FM
849.00000 – 868.987500 MHz	12.5 kHz	FM
894.00000 – 939.987500 MHz	12.5 kHz	FM
940.00000 – 960.000000 MHz	6.25 kHz	FM
1240.0000 – 1300.00000 MHz	6.25 kHz	FM

				Nominal	Limit
2.2	Sensitivity	:	VHF Low	0.3 μV	1 μV
	FM: (S+N)/N = 20 dB		VHF Aircraft	0.3 μV	1 μV
	Dev.: 3 kHz at 1 kHz		VHF High 137 -174 MHz	0.5 μV	2 μV
			216.0025 – 224.995 MHz	0.5 μV	2 μV
			225 – 299.975 MHz	0.5 μV	2μV
			UHF Low/T 300 - 405.9875 MHz	0.8 μV	3μV
			406 - 512 MHz	0.5 μV	2 μV
			UHF High 764 - 960 MHz	0.7 μV	3 μV
			1240 - 1300 MHz	0.7 μV	4 μV
	AM: (S+N)/N = 20 dB	:	VHF Low	1 μV	3 μV
	Mod.: 60% at 1 kHz		VHF Aircraft	1 μV	3 μV
			VHF High 137 -174 MHz	1.5 μV	5 μV
			216.0025 – 299.995 MHz	1.5 μV	5 μV
			225 – 299.975 MHz	2 μV	6 μV
			UHF Low/T 300 - 405.9875 MHz	3 μV	10 μV
			406 - 512 MHz	2 μV	6 μV
			UHF High 764 – 960 MHz	2 μV	6 μV
			1240 – 1300 MHz	3 μV	12 μV
2.3	Spectrum sweeper sensitivity	:	450 MHz	-60 dBm	-50 dBm

			Nominal	Limit
2.4	Data decode sensitivity			
	ED wide : 4 kHz Dev. at 450, 860 MHz	ED (GE/Ericsson/MA-COM)	1 μV	4 μV
	MO (Voice channel) : 350 Hz Dev. at 174, 450, 860 MHz	MO (Motorola)	0.5 μV	2 μV
	MO (Control channel) : 4 kHz Dev. at 174, 450, 860 MHz	MO (Motorola)	0.8 μV	4 μV
	LTR : 800 Hz Dev. at 450, 860 MHz	LTR (EF Johnson)	0.5 μV	3 μV
	WX Alert 1050 Hz tone : 3 kHz Dev. at 162.4 MHz		0.3 μV	1 μV
	WX SAME detect sensitivity : 4 kHz Dev. at 162.4 MHz		0.5 μV	2 μV
2.5	CTCSS decode sensitivity : 350 Hz Dev. at 450, 860 MHz		0.5 μV	3 μV
2.6	DCS decode sensitivity : 350 Hz Dev. at 450, 860 MHz		0.5 μV	3 μV
2.7	WX alert tone decode range : 4 kHz Dev. 2 μV at 162.400 MHz		1050 ±25 Hz	±40 Hz
2.8	WX alert tone checking time : 4 kHz Dev. 2 μV at 162.400 MHz		2.8 sec.	2 – 5 sec.
	Note: When receiving WX alert in priority operation, the priority sampling time up to 2 sec. is added to this depending on Alert tone transmission timing.			
2.9	WX alert sound level at 1 ft. :		80 dB SPL	70 dB SPL
2.10	Image ratio 1st IF image :	VHF Low at 41 MHz	50 dB	40 dB
		VHF Aircraft at 124 MHz	50 dB	40 dB
		VHF High at 154.1 MHz	50 dB	40 dB
		UHF Low/T at 310 MHz	40 dB	25 dB
		at 450 MHz	50 dB	40 dB
		UHF High at 860 MHz	80 dB	60 dB
		1270 MHz	55 dB	40 dB
	2nd IF image :	VHF High at 154.1 MHz	45 dB	35 dB

			Nominal	Limit
2.11 Attenuator	:	VHF Low at 41 MHz	20 dB	17 – 24 dB
		VHF Aircraft at 124 MHz	20 dB	17 – 24 dB
		VHF High at 154.1 MHz	20 dB	17 – 24 dB
		UHF Low/T at 450 MHz	17 dB	10 – 20 dB
		UHF High at 860 MHz	13 dB	8 – 20 dB
		at 1270 MHz	13 dB	8 – 18 dB
2.12 Squelch sensitivity (Band center)				
Threshold	:	AM/FM	0.5 μV	2 μV
Tight: (S+N)/N	:	AM	20 dB	10 dB
		FM	25 dB	15 dB
2.13 Selectivity				
AM 25 – 27.995 MHz	:	–6 dB	±4 kHz	>±2.5 kHz
		–50 dB	±6 kHz	<±12 kHz
Other frequency	:	–6 dB	±7 kHz	>±4.5 kHz
		–50 dB	±13 kHz	<±25 kHz
2.14 Spurious rejection (Except Primary image)	:	VHF High at 154.1 MHz	40 dB	30 dB
2.15 IF rejection ratio	:	380.8 MHz at 154.1 MHz	60 dB	40 dB
		21.4 MHz at 154.1 MHz	100 dB	80 dB
		Fr 225 – 300 MHz	30 dB	not specified
		300 – 405.975 MHz	10 dB	not specified
2.16 Acceptable radio frequency displacement at EIA RS-204D	:		±6 kHz	±3 kHz
2.17 Signal meter indicating		Full Level (▪▮▮▮▮) at 154.1 MHz	-96 dBm	-94dBm - -98dBm
2.18 Signal to noise ratio	:	VHF Low	40 dB	30 dB
AM/FM		VHF Aircraft	40 dB	30 dB
RF: 100 μV		VHF High 137 -174 MHz	40 dB	30 dB
Dev.: 3 kHz at 1 kHz		216.0025 – 299.975 MHz	40 dB	30 dB
Mod. 60% at 1 kHz		UHF Low/T 300 - 512 MHz	35 dB	25 dB
		UHF High 764 – 960 MHz	35 dB	25 dB
		1240 – 1300 MHz	35 dB	25 dB
2.19 Residual noise Vol. min. and Squelched	:		2 mV	5 mV

				Nominal	Limit
2.20	Scanning rate without trunking:		138 – 147.9 MHz (in 100 kHz: Intervals)	60 ch/sec.	33 – 66 ch/sec.
2.21	Search rate	:	at 162.25 – 167.25 MHz	78 steps/sec.	60 – 95 steps/sec.
2.22	Spectrum Sweeper Time	:	Public safety band	1.1 sec.	1.35 sec.
	One active signal the Other no signal		All band	4.8 sec.	6.38 sec.
2.23	Scan and Search delay time	:		2 sec.	1 – 3 sec.
2.24	Audio output (T.H.D. 10 %) 8 Ohms R Load, 1 kHz	:	RF input: 100 μV at 154.1 MHz	1.5 Watts	1.0 Watts
2.25	T.H.D. at 50 mWatt	:	RF input: 100 μV at 154.1 MHz	1 %	5 %
2.26	Audio max. power	:	RF input: 100 μV at 154.1 MHz		
	8 Ohm internal speaker			1.8 Watts	1.3 Watts
	32 Ohm at headphone mono/stereo (each phone)			19/14 mWatts	<28 mWatts
2.27	Audio frequency response at –6 dB	:	RF input: 100 μV at 154.1 MHz	300 Hz	200 – 400 Hz
				2.0 kHz	1.5 – 3.0 kHz
2.28	Intermediate frequency	:	1st 380.8 MHz 2nd 21.4 MHz 3rd 455 kHz		
2.29	Current drain at 13.8 Volts	:	Vol. Max.	400 mA	550 mA
	8 Ohm internal speaker at 154.1 MHz		Squelched	200 mA	250 mA
2.30	Current drain	:	Vol. Max.	80 mA AC	120 mA AC
	AC adapter GA-04D-1100A		Squelched	40 mA AC	60 mA AC
	8 Ohm internal speaker at 154.1 MHz				
2.31	Birdies and step frequency when search	:	Under discussion		
2.32	Filter	:	Saw filter for 380.8 MHz, Monolithic crystal filter for 21.4 MHz and ceramic filter for 455 kHz		
2.33	Antenna impedance	:	50 Ohms		

2.34 Temperature range : Test to specification between: +18°C – +35°C
Operate (Need not meet spec.): -20°C – +60°C

3. OPERATING CONTROLS AND CONNECTIONS

3.1 Volume control with power switch

3.2 Squelch control

3.3 Keyboard (30 keys): FUNCtion, PROG, WX/Skywarn, TRUNK, MANual, PRIority, TUNE, TEXT, ATT, PAUSE, MODE, ▲, ▼, DIM, SCAN/Spectrum sweeper, SeaRCH, L/OUT, ENTer, CLEAR, 1, ABC/2, DEF/3, GHI/4, JKL/5, MNO/6, PQRS/7, TUV/8, WXYZ/9, 0, • and DELAY

3.4 LCD display: 16 characters x 4 lines and 8 icons
Frequency, Mode, ch, Bank, ... etc.
F, T, G, A, S ,▲ ,▼, ... icons

3.5 BNC type antenna connector

3.6 Earphone jack (D = 3.5 mm stereo)

3.7 External power jack

3.8 PC/IF jack (D = 3.5 mm stereo)

4. FEATURES

4.1 10 bank and 1000 channel memories for trunking bank and channel combined with conventional mode memory

4.2 Triple trunking of Motorola (type Ⅰ, Ⅱ and hybrid analog system), EDACS wide and LTR

4.3 CTCSS and DCS Sub-audible encoded squelch mode

4.4 Scan both trunking channels and conventional channels at same time

4.5 1500 ID memories in 10 ID banks, 5 sub-ID memories in each bank and each sub-ID memory has 30 ID locations.

4.6 Alphanumeric data entry

4.7 Clone the memory to other unit

4.8 Spectrum sweeper function (Total 200 lock out frequencies in signal stalker, All Band 150, Public safety Band 50)

4.9 Pre-programmed Marine, CB, FRS/GRMS/MURS, Public safety, Aircraft, Amateur(Ham), Railroad, and Weather frequencies

4.10 WX alert and SAME receiving with 10 FIPS (Federal Information Processing Standard) area code memories

4.11 Skywarn function

4.12 Attenuator control (Normal attenuator and Global attenuator)

4.13 Frequency tune mode (Frequency ▲ or ▼)

4.14 "Zeromatic" tuning system

4.15 Change the direction at the searching by ▲(up) or ▼(down)

4.16 60 channels/sec. scanning rate and 78 steps/sec. searching rate

4.17 2 second scan and search delay

4.18 Manual selection for channel

4.19 Scan mode [Cleared channels (000.000 freq.) are not scan.]

4.20 Deleting a frequency from a channel

4.21 1 limit search bank

4.22 Key tone and alert tone

4.23 16 characters x 4 lines dot matrix and 8 icons LCD (Indicate channel numbers, Frequency, ID number and the data on the LCD)

4.24 LCD and keyboard backlighting with dimmer switch

4.25 LCD contrast control

4.26 Crystal filter for 2nd IF and Ceramic filter for 3rd IF section

4.27 50 lock out frequencies per search bank, Public safety, Aircraft, Ham, Railroad, Limit search (Totaling 250 frequencies)

4.28 Frequency lock-out review and Channel lock-out review

4.29 155 preprogrammed frequencies

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