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APPLICATION FOR TYPE ACCEPTANCE

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MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 30, 1998

The following is a list of attached exhibits required by the Federal Communications Commission for the application to and grant of F.C.C. Type Acceptance.

TYPE OF EXHIBIT:	MANUFACTURER'S STATEMENT
FCC PART:	2.983 (a) (b) (c)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 30, 1998

The AIERIT07-450 is a 450 - 480 MHz UHF-FM Handheld Transceiver to be manufactured and marketed in the United States of America by the applicant, RITRON, Inc. of Carmel, Indiana.

The AIERIT07-450 will be marketed by RITRON, Inc. as a Patriot model RTX-454.

The F.C.C. designator for this unit is ..... FCC ID: AIERIT07-450

RITRON, Inc. will be manufacturing and marketing the AIERIT07-450 handheld transceiver on a continuing basis.

Signed: Kevin G. Matson

Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF EXHIBIT: SEMICONDUCTOR FUNCTION

FCC PART: 2.983 (d) (6)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: December 14, 1998

DESCRIPTION:

The following list specifies the manufacturer, identification and function of each semiconductor device used in the RTX-454 handheld transceiver.

Schem ID	RITRON PN#	Manufacturer	Manufacturer ID	Function
CR101	02450016	Kingbright	L3WEGW	TX/RX Indicating LED
CR102	04810003	Faichild	1N4001	Reverse Voltage Protection
CR103	48A1005C	Motorola Semiconductors	MMBD7000LT1	Voltage Clamp
CR104	48A1005C	Motorola Semiconductors	MMBD7000LT1	Voltage Clamp
CR105	48A1005C	Motorola Semiconductors	MMBD7000LT1	PTT Switching
CR106	04810003	Fairchild	1N4001	Reverse voltage protection
CR107	48A1005C	Motorola Semiconductors	MMBD7000LT1	Voltage Clamp
CR108	48A1005C	Motorola Semiconductors	MMBD7000LT1	Turn On Detection
CR301	48C1004E	Motorola Semiconductors	MMBV-105GLT1	VCO Tuning
CR302	48C1004G	Motorola Semiconductors	MMBV-2101L	VCO Modulation
CR303	48A1004D	Motorola Semiconductors	MMBV3401T1	TX/RX VCO Switching
CR304	48A1005C	Motorola Semiconductors	MMBD7000LT1	Biasing
CR401	04820017	Motorola Semiconductors	MZP4744A	Overvoltage Protection
CR402	04810032	M/A Com, Inc.	1N0350	TX/RX RF Switching
CR501	04810032	M/A Com, Inc.	1N0350	TX/RX RF Switching
CR502	48A1005C	Motorola Semiconductors	MMBD7000LT!	Voltage Clamp
CR503	48A1005C	Motorola Semiconductors	MMBD7000LT1	Squelch Noise Compensation
IC101	314J0005	Motorola Semiconductors	MC68HC908AZ60CFU	Microcontroller
IC102	31030005	Motorola Semiconductors	MC33111D	Audio Signal Compander
IC103	31010004	National Semiconductors	LM386MX-1	Audio Amplifier
IC104	310E0002	National Semiconductors	LP2980-5.0	Voltage Regulator
IC105	311K0003	Philips Components	74LV4053PWDH	Audio Signal Processing
IC106	31020001	National Semiconductors	MF6CWM-50	Sub-Audible Low Pass Filter
IC107	31010016	Motorola Semiconductors	MC33202	Audio Processing
IC108	31010016	Motorola Semiconductors	MC33202	Audio Processing
IC109	310K0001	Dallas Semiconductor	DS1806E	Audio Signal Level Control
IC301	313K0002	Motorola Semiconductors	MC145190DT	Frequency Synthesizer
IC401	31520001	RF Micro Devices	RF2114	TX RF Amplifier
IC501	31510001	Motorola Semiconductors	MC13143D	Double-Balanced Mixer
IC502	31030003	Motorola Semiconductors	MC3371BD	RX FM-IF Subsytem
IC503	311E0001	Maxim	MAX4544	450 KHz Signal Switching
IC504	311E0001	Maxim	MAX4544	450 KHz Signal Switching

Schem ID	RITRON PN#	Manufacturer	Manufacturer ID	Function
IC505	311E0001	Maxim	MAX4544	450 KHz Signal Switching
IC506	31010006	Motorola Semiconductors	LM2931AD-5.0R2	Voltage Regulator
Q 101	48010R02	Motorola Semiconductors	MUN2211T1	LED Indicator Switching
Q 102	48010R02	Motorola Semiconductors	MUN2211T1	LED Indicator Switching
Q 103	4801002A	Motorola Semiconductors	MMBT3906LT1	PTT Detection
Q 104	48010R02	Motorola Semiconductors	MUN2211T1	PTT Detection
Q 105	48130001	Central Semiconductors	CBCX69	Voltage Switching
Q 106	4801001Q	Motorola Semiconductors	MMBT-5088LT1	Audio Amplifier Enable
Q 107	4801001Q	Motorola Semiconductors	MMBT-5088LT1	Oscillator Slewing
Q 108	480A0001	Rohm	UMZ1NTR	Voltage Switching
Q 110	480A0001	Rohm	UMZ1NTR	Voltage Switching
Q 301	4821007Y	Motorola Semiconductors	MMBR941LT1	VCO Buffer Amplifier
Q 302	4821007Y	Motorola Semiconductors	MMBR941LT1	VCO Oscillator
Q 303	48010R02	Motorola Semiconductors	MUN2211T1	TX/RX VCO Switching
Q 304	48010R02	Motorola Semiconductors	MUN2211T1	TX/RX VCO Switching
Q 305	4801001Q	Motorola Semiconductors	MMBT-5088LT1	VCO Voltage De-coupling
Q 306	4821007Y	Motorola Semiconductors	MMBR941LT1	VCO Buffer Amplifier
Q 401	48130001	Central Semiconductors	CBCX69	TX Voltage Switching
Q 402	4801001Q	Motorola Semiconductors	MMBT-5088LT1	TX Voltage Switching
Q 403	04801021	Motorola Semiconductors	MRF-652	TX RF Power Amplifier
Q 501	4821007Y	Motorola Semiconductors	MMBR941LT1	RX RF Amplifier
Q 502	4821003B	Motorola Semiconductors	MMBT918LT1	IF RF Amplifier
Q 503	480A0001	Rohm	UMZ1NTR	Squelch Noise Compensation
Q 504	480A0001	Rohm	UMZ1NTR	RX Voltage Switching
Q 505	480A0001	Rohm	UMZ1NTR	Battery Volage Switching
Q 506	4821003B	Motorola Semiconductors	MMBT918LT1	RX 1st LO Multiplier/Amplifier

TYPE OF EXHIBIT:	STATEMENT OF CERTIFYING ENGINEER
FCC PART:	2.947
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 30, 1998

I, Kevin G. Matson, have been employed by RITRON, Inc. since May 1980, working in the Engineering Department since November 1980 as a radio frequency Project Engineer.

I received an Associates Degree in Electrical Engineering Technology from Purdue University at Indianapolis in 1980.

I received a Bachelor of Science Degree in Electrical Engineering Technology from Purdue University at Indianapolis in 1982.

I hereby certify that all measurements and date herein were taken by me, that they were obtained using sound and accepted engineering principles, and that they accurately reflect the performance and characteristics of the units tested.

Signed: Kevin G. Matson

Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF EXHIBIT:	TEST EQUIPMENT LIST
FCC PART:	2.947 (d)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	December 7, 1998

The measured data in this report was obtained using one or more of the following pieces of equipment. The particular equipment used in any one test is detailed in the procedure for that test.

ITEM	MANUFACTURER	MODEL NO.	SERIAL NO.
Communications Test Set	IFR	AM/FM 1500	1645
Communications Test Set	Hewlett-Packard	8920-A	3141A00549
Spectrum Analyzer	Hewlett-Packard	8590-A	2618A00355
Spectrum Analyzer	Hewlett-Packard	8554B	1502A 09103
Spectrum Analyzer	Hewlett-Packard	8559A	2010A 06979
Audio Sweep Generator	B & K Precision	3025	22-06213
Power Supply	VIZ	WP706A	A238235
Digital Oscilloscope	Philips	PM-3335	DM648004
Digital VOM	Fluke	45	6723040
Digital VOM	B&K	2704A	234-008459
RF Wattmeter	Bird	6154	8652
Dipole Antenna	Electro-Metrics	BDA-25	8-101
Log Periodic Antenna	Electro-Metrics	LP-25	8-102
Microwave Test Antenna	Polarad	CA-B	11-3

TYPE OF EXHIBIT:	TEST EQUIPMENT LIST
FCC PART:	2.947 (d)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	December 7, 1998

The measured data in this report was obtained using one or more of the following pieces of equipment. The particular equipment used in any one test is detailed in the procedure for that test.

ITEM	MANUFACTURER	MODEL NO.	SERIAL NO.
Temperature Chamber	Delta Design III	3900 CL	0-52-4
Thermocouple	Triplett	320 G/P	1050201
30dB Power Attenuator	Bird	8306-300-N	N/A
10dB Attenuator	ELCOM	AT-51-10	N/A
20dB Attenuator	Tenuline	8340-200	1544

TYPE OF EXHIBIT:	DESCRIPTION OF MEASUREMENT FACILITY
FCC PART:	2.948
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 30, 1998

The Field Strength measurements filed with this application were made on a site certified by RITRON, Inc. Data pertaining to this site is on file with the FCC and is current.

This site is used exclusively by RITRON, Inc. and is utilized only for the RF Field Strength Measurements of equipment designed and manufactured by RITRON, Inc. It is NOT used for measurements by or for any other party on a contract basis or otherwise.

Signed: Kevin G. Matson

Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF TEST: RADIO FREQUENCY POWER OUTPUT

FCC PART: 2.985

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 18, 1998

TEST RESULTS:

Frequency (MHz)	TX Mode	Collector Voltage (VDC)	Collector Current (Amps)	Input Power (Watts)	Output Power (Watts)	Efficiency
450.050	Low	9.6	0.50	4.80	1.45	30.2%
	High	9.6	1.05	10.08	5.10	50.6%
	High	11.2	1.09	12.21	5.50	45.0%
465.050	Low	9.6	0.50	4.80	1.50	31.3%
	High	9.6	1.00	9.60	4.90	51.0%
	High	11.2	1.06	11.87	5.25	44.2%
480.050	Low	9.6	0.43	4.13	1.30	31.5%
	High	9.6	0.90	8.64	4.50	52.1%
	High	11.2	0.97	10.86	4.90	45.1%

Certifying Engineer: Kevin G. Matson

Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF TEST:	RADIO FREQUENCY POWER OUTPUT
FCC PART:	2.985
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 18, 1998

PROCEDURE:

The RTX-454 was aligned for transmitter operation on 450.050, 465.050 and 480.050 MHz (Fo) at full rated power per the tune-up procedure outlined in the Preliminary Maintenance Manual. This represents frequencies at the low, middle and high end of the RTX-454 operating frequency band.

Power was supplied to the RTX-454 via P601 and P602 by a VIZ WP706A Power Supply. The RTX-454 was connected at the RF Test Jack J401 to the input of a Bird 6154 Thermaline Wattmeter, used to measure RF power of the carrier.

A B&K Digital Multimeter was connected in series with L407 to measure the Collector current of Q403, the final RF amplifier device. A Fluke 45 Digital Multimeter was used to measure Q403 Collector supply voltage at L407.

The RTX-454 is equipped with an 8-cell AA Nicad battery pack that has a nominal voltage of 9.6 VDC and a maximum voltage of 11.2 VDC.

Measurements were taken with the power supply set to 9.6 VDC. The RTX-454 transmitter was then set to operate in low and high power modes, with test measurements made as described above with the power supply set to 9.6 VDC. To achieve maximum power output rating, measurements were taken with the RTX-454 set for high power and the power supply set for 11.2 VDC.

TYPE OF TEST:	MODULATOR RESPONSE
FCC PART:	2.987 (a)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 18, 1998

PROCEDURE:

The RTX-454 was aligned for transmitter operation on 465.050 MHz (Fo) at full rated power per the tune-up procedure outlined in the Preliminary Maintenance Manual.

The RTX-454 speech amplifier was disconnected from the modulator at R170. The audio output of an IFR 1500 Communications Test Set was connected to R170 through a 100μF capacitor. The RTX-454 was connected at the Antenna Test Jack J401 to the 50Ω RF input of the IFR 1500, which was used to measure FM deviation.

The audio signal generator was set to a frequency of 1000 Hz and the output was adjusted to provide +/- 1.5 KHz deviation (60% rated system deviation) as indicated by the IFR 1500. This output level was 96.4 mVRMS.

With the audio generator output level fixed at 96.4 mVRMS, the frequency was varied from 100 - 5000 Hz. Deviation was measured at various frequencies within this range and recorded on the accompanying chart.

A separate measurement was made for sub-audible tones. The audio signal generator was set for various sub-audible tones between 67 - 250 Hz at an output level of 44 mVRMS, the level required to produce 500 Hz deviation at 67 Hz. There was no variation in resulting deviation across the sub-audible frequency range.

TYPE OF TEST: MODULATOR RESPONSE

FCC PART: 2.987 (a)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 18, 1998

TEST RESULTS:

Test Frequency: 465.050 MHz
Input Voltage required for 60% deviation at 1000 Hz: 96.4 mVRMS

Modulation Frequency (Hz)	Frequency Deviation (+/- Khz)	Percent System Deviation
100	1.31	52.4%
200	1.35	54.0%
400	1.54	61.6%
800	1.53	61.2%
1000	1.50	60.0%
2000	1.47	58.8%
3000	1.35	54.0%
4000	1.25	50.0%
5000	1.10	44.0%

Certifying Engineer: Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF TEST:	SPEECH AMPLIFIER LOW-PASS FILTER RESPONSE
FCC PART:	2.987 (a)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 20, 1998

PROCEDURE:

The stages of the RTX-454 speech amplifier prior to the low-pass filter were removed by disconnecting C158 from the output of limiting amplifier IC106B. The output of a BK Precision Model 3025 Sweep/Function Generator was applied to C158.

A Fluke Model 45 Dual Display Multimeter was used to measure the low-pass filter output at Pin 7 of IC107B.

The audio signal generator was set for a 1000 Hz sine wave at an output level of 2.01 VRMS to produce 0 dB at the output of the low-pass filter. This level was selected to prevent limiting or distortion at any frequency. The Fluke Model 45 Dual Display Multimeter was set to make all measurements relative to this reference level.

The frequency of the audio signal generator was varied from 100 Hz to 100 Khz with the output level constant. Measurements were recorded on the accompanying chart. All measurements were +/- relative to the 0 dB measured at 1000 Hz.

TYPE OF TEST: SPEECH AMPLIFER LOW-PASS FILTER RESPONSE

FCC PART: 2.987 (a)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 20, 1998

TEST RESULTS:

Input Voltage required for 0 dB output at 1000 Hz: 2.01 VRMS

Frequency (Hz)	Measured Amplitude (dB)	Relative Amplitude (dB)
100	-0.49	-0.49
200	-0.44	-0.44
300	-0.39	-0.39
400	-0.33	-0.33
500	-0.26	-0.26
600	-0.18	-0.18
800	-0.02	-0.02
1000	0.00	0.00
2000	-0.04	-0.04
3000	-4.17	-4.17
4000	-9.73	-9.73
5000	-14.59	-14.59
6000	-18.72	-18.72
8000	-25.44	-25.44
10000	-30.84	-30.84
12000	-35.40	-35.40
16000	-42.44	-42.44
20000	-48.15	-48.15
24000	-51.69	-51.69
40000	-69.70	-69.70
80000	-66.42	-66.42
100000	-69.14	-69.14

Certifying Engineer: Kevin G. Matson
Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF TEST: SPEECH AMPLIFIER LOW-PASS FILTER RESPONSE

FCC PART: 2.987 (a)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

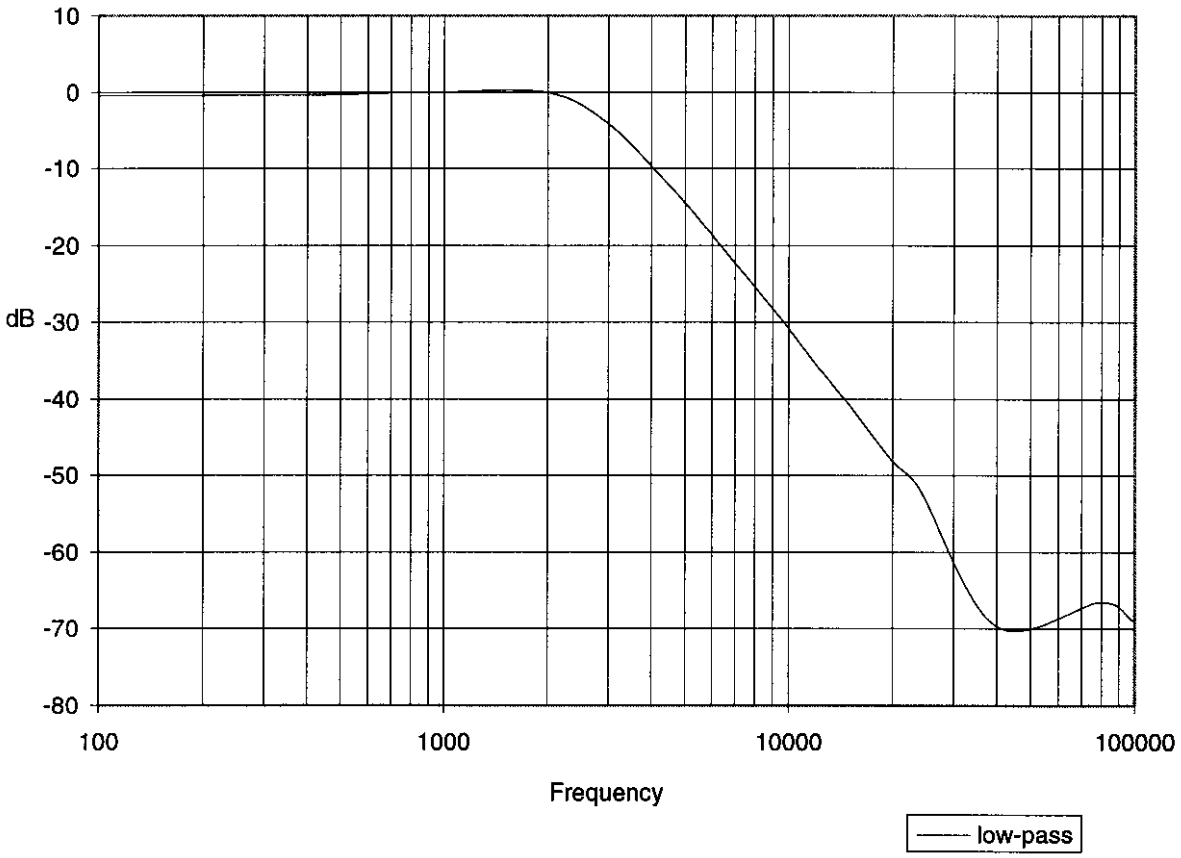
MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 20, 1998

CURVE:



TYPE OF TEST:	PERCENT MODULATION VS. MODULATION INPUT VOLTAGE
FCC PART:	2.987 (b)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 23, 1998

PROCEDURE:

1. The RTX-454 was aligned for transmitter operation on 465.050 MHz (Fo) per the tune-up procedure outlined in the Preliminary Maintenance Manual.

2. The RTX-454 was connected at the RF Test Jack J401 to the RF input of an IFR AM/FM 1500 Communications Test Set used to measure FM deviation.

3. The output of a BK Precision Model 3025 Sweep/Function Generator was applied to the microphone input of the RTX-454 through J101. The output of the audio generator was set to an output level of 1.0 VRMS, a level sufficient to drive the audio circuit into limiting at any frequency.

4. A Fluke Model 45 Dual Display Multimeter was used to measure the amplitude of the signal applied to the microphone input.

5. The frequency of the audio generator was adjusted to find the frequency of maximum response. The RTX-454 was set for 12.5 KHz bandwidth operation and the deviation was adjusted for +/- 2.5 KHz as outlined in the Preliminary Maintenance Manual.

6. The frequency of the audio signal generator was set to 300 Hz and the output level was adjusted to produce 250 Hz deviation, which is 10% of the rated modulation. The voltage level was then adjusted for 20% of the rated modulation, and repeated for every 10% increment.

7. The input voltage was adjusted to a level 16 dB greater than that required to produce 50% modulation. The maximum deviation was noted, along with the level required to achieve it, if 100% modulation was not realized.

8. Steps 6 and 7 were repeated for frequencies of 500, 750, 1000, 2000 and 3000 Hz.

9. The RTX-454 was set for 25 KHz bandwidth operation and the deviation was adjusted for +/- 5 KHz as outlined in the Preliminary Maintenance Manual.

10. Steps 6, 7 and 8 were repeated for 25 KHz bandwidth operation.

11. Results were plotted on separate graphs for 12.5 KHz and 25 KHz bandwidth operation.

TYPE OF TEST: PERCENT MODULATION VS. MODULATION INPUT VOLTAGE

FCC PART: 2.987 (b)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 23, 1998

TEST RESULTS:

Percent Modulation	Deviation (KHz)	Input level (mVRMS) - **12.5 KHz Bandwidth**					
		300 Hz	500 Hz	750 Hz	1000 Hz	2000 Hz	3000 Hz
10%	0.25	23.3	6.3	3.4	2.4	1.4.	1.7
20%	0.50	42.2	12.1	5.9	4.2	2.3	2.6
30%	0.75	62.5	17.3	8.2	5.7	3.0	3.7
40%	1.00	82.6	22.2	10.9	7.4	3.9	4.9
50%	1.25	100.4	26.9	13.6	9.2	4.8	6.0
60%	1.50	118.8	32.1	16.2	11.1	5.5	15.0*
70%	1.75	138.4	37.1	18.9	12.9	6.5	
80%	2.00	186.9	50.5	24.7	15.9	7.4	
90%	2.25	271.6*	76.4	32.8	20.9	8.8	
100%	2.50		98.0*	55.4*	40.1*	14.7*	
Level at 50%	+16 dB	634.5	170.0	85.9	58.1	30.3	35.7
Max Deviation	(KHz)	2.20*	2.30*	2.30*	2.30*	2.35*	1.45*

Percent Modulation	Deviation (KHz)	Input level (mVRMS) - **25 KHz Bandwidth**					
		300 Hz	500 Hz	750 Hz	1000 Hz	2000 Hz	3000 Hz
10%	0.50	23.6	7.1	3.7	2.4	1.4	1.5
20%	1.00	43.6	11.0	6.4	4.2	2.2	2.7
30%	1.50	64.2	16.0	8.3	5.6	3.0	3.6
40%	2.00	80.6	21.4	10.9	7.3	3.9	4.8
50%	2.50	97.7	26.0	13.1	9.2	4.6	5.8
60%	3.00	117.3	31.0	16.2	10.9	5.6	11.0*
70%	3.50	135.6	36.2	18.2	12.4	6.3	
80%	4.00	168.2	45.2	23.0	14.6	7.4	
90%	4.50	216.7	66.7	30.9	19.6	9.3	
100%	5.00	267.0*	85.7*	52.1*	41.7*	15.2*	
Level at 50%	+ 16 dB	617.8	164.3	82.8	58.1	29.1	36.1
Max Deviation	(KHz)	4.70*	4.80*	4.80*	4.80*	4.80*	2.90*

Certifying Engineer: Kevin G. Matson
Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF TEST: PERCENT MODULATION VS. MODULATION INPUT VOLTAGE

FCC PART: 2.987 (b)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

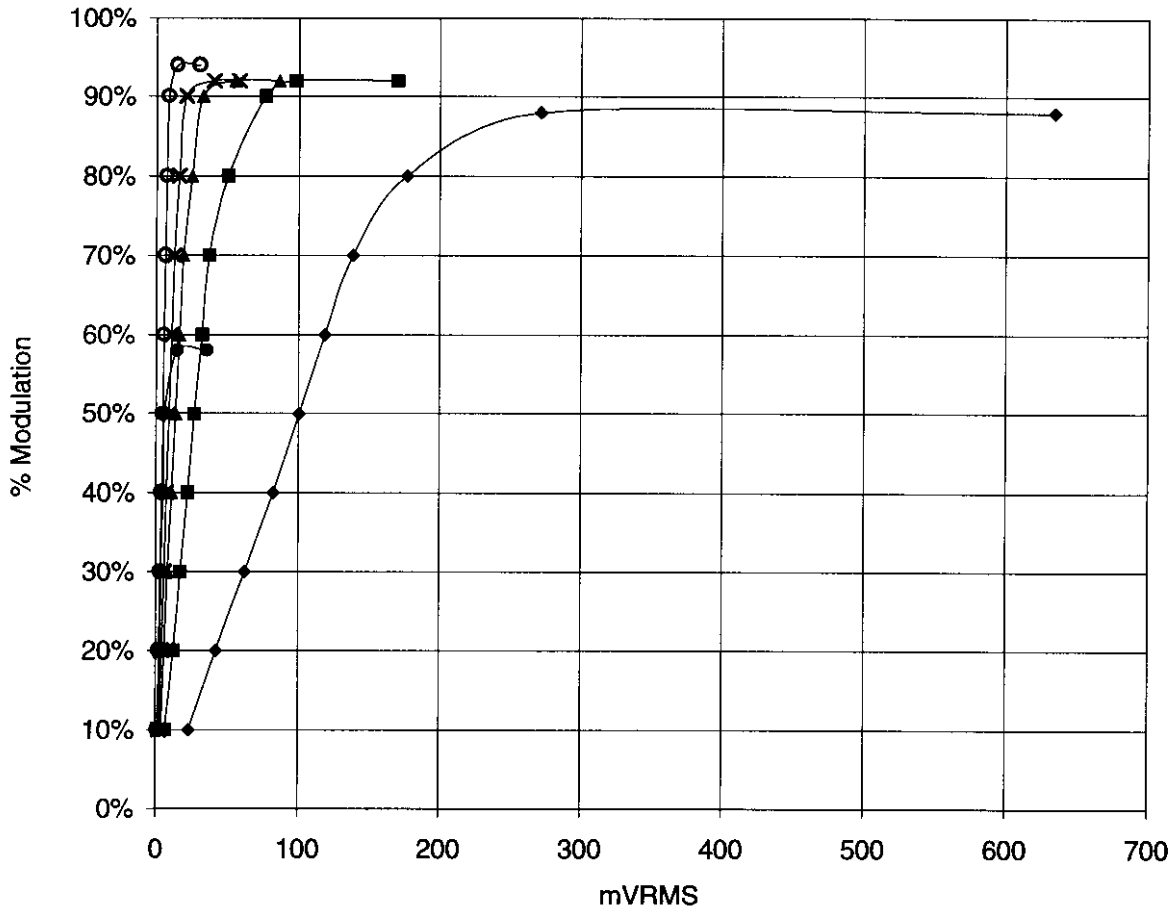
MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 23, 1998

CURVE:



Channel Bandwidth: 12.5 KHz
100% Modulation: 2.5 KHz

TYPE OF TEST: PERCENT MODULATION VS. MODULATION INPUT VOLTAGE

FCC PART: 2.987 (b)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

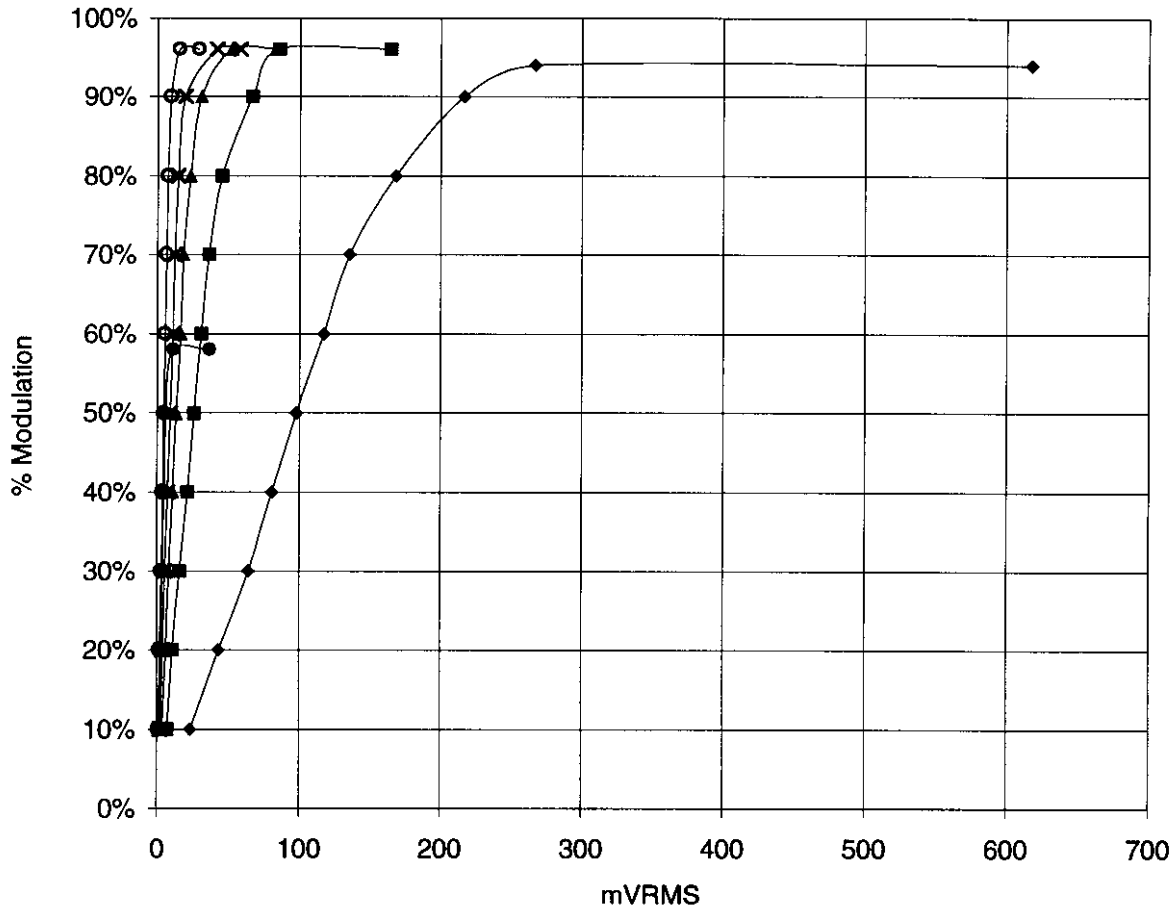
MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 23, 1998

CURVE:



Channel Bandwidth: 25.0 KHz
100% Modulation: 5.0 KHz

TYPE OF TEST:	OCCUPIED BANDWIDTH
FCC PART:	2.989 (c) (1) per 90.210 (b) (d)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 30, 1998

PROCEDURE:

1. The RTX-454 was aligned for transmitter operation on 465.050 MHz (Fo) at full rated power, was set for 12.5 KHz bandwidth operation, and the deviation was adjusted for +/- 2.5 KHz as outlined in the Preliminary Maintenance Manual.

2. The RF output of the RTX-454 was measured with a Bird Model 6154 Thermaline Wattmeter. This value was recorded as POWER OUTPUT. Power was supplied to the RTX-454 via P601 and P602 by a VIZ WP706A Power Supply set at +9.6 VDC to produce the maximum rated transmitter power output.

3. The RF Test Jack J401 was connected to the input of a Bird Model 8306-300-N 30 DB power attenuator. The output of the attenuator was connected to the input of a Hewlett Packard Model 8554B Spectrum Analyzer. The spectrum analyzer was set to:

   - 100 Hz Resolution
   - 5 Khz per Horizontal Division
   - 0 dBm Reference
   - 10 dB per Vertical Division

4. The center frequency of the spectrum analyzer was set to the RTX-454 carrier frequency and the full scale reference line was set to the level of the unmodulated carrier.

5. The output of a BK Precision Model 3025 Sweep/Function Generator was applied to the microphone input of the RTX-454 through J101. The frequency of the audio signal generator was set to 2500 Hz and the output adjusted to a level 16 dB greater than that necessary to produce 50% of the rated system deviation.

6. The spectrum analyzer readings of the sideband levels in dBm were recorded and a graph of the spectrum analyzer output was plotted. All readings were rounded up to the nearest dB.

7. Steps 3 - 6 were repeated with the radio set for low power operation.

8. The RTX-454 was set for 25 KHz bandwidth operation, and the deviation was adjusted for +/- 5 KHz as outlined in the Preliminary Maintenance Manual. Steps 3 - 7 were repeated for 25 Khz bandwidth operation.

TYPE OF TEST:	OCCUPIED BANDWIDTH
FCC PART:	2.989 (c) (1) per 90.210 (b) (d)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 30, 1998

EQUATIONS:

The analyzer readings in dBm were converted to power uing the following formula:

Power = .001 (antilog F(dBm, 10))

The power readings were summed to provide a reference power level. The total was converted back to dBm with the following formula and recorded as MEAN REFERENCE POWER OUTPUT:

dBm = 10 (log Fc (Power,.001))

The sideband powers on each side of the carrier were reduced to a percentage of the MEAN REFERENCE POWER OUTPUT. The percentages were added together starting with the carrier and expanding out equally in +/-2.5 Khz increments until greater than 99.0% of the total MEAN REFERENCE POWER was reached.

The occupied bandwidth is defined as having 99.0% of the total MEAN REFERENCE POWER existing within its limits.

Certifying Engineer: Kevin G. Matson

Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF TEST: OCCUPIED BANDWIDTH

FCC PART: 2.989 (c) (1) per 90.210 (d)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 30, 1998

DATA:

Carrier Frequency:	465.05	MHz
Power Output:	1.50	Watts
Power Output:	31.76	dBm
Mean Reference Power:	31.77	dBm
Channel Bandwidth:	12.5	KHz
Occupied Bandwidth:	10.0	KHz

Emission Frequency Offset (KHz)	Measured Relative Amplitude (dBm)	Actual Amplitude (dBm)	FCC Limit (dBm)	Power (Watts)	Percent MRP (%)	Occupied Bandwidth (%)
-25.0			-20.00			
-22.5			-20.00			
-20.0			-20.00			
-17.5			-20.00			
-15.0	-73.00	-41.24	-20.00	75.2E-9	0.00%	
-12.5	-71.00	-39.24	-38.18	119.1E-9	0.00%	
-10.0	-55.00	-23.24	-20.00	4.7E-6	0.00%	
-7.5	-42.00	-10.24	-1.83	94.6E-6	0.01%	
-5.0	-24.00	7.76	31.76	6.0E-3	0.40%	
-2.5	-10.00	21.76	31.76	150.0E-3	9.98%	
0.0	-1.00	30.76	31.76	1.2E+0	79.24%	99.99%
2.5	-10.00	21.76	31.76	150.0E-3	9.98%	
5.0	-24.00	7.76	31.76	6.0E-3	0.40%	
7.5	-41.00	-9.24	-1.83	119.1E-6	0.01%	
10.0	-60.00	-28.24	-20.00	1.5E-6	0.00%	
12.5	-71.00	-39.24	-38.18	119.1E-9	0.00%	
15.0	-73.00	-41.24	-20.00	75.2E-9	0.00%	
17.5			-20.00			
20.0			-20.00			
22.5			-20.00			
25.0			-20.00			

Cerifying Engineer: Kevin G. Matson

TYPE OF TEST: OCCUPIED BANDWIDTH

FCC PART: 2.989 (c) (1) per 90.210 (d)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

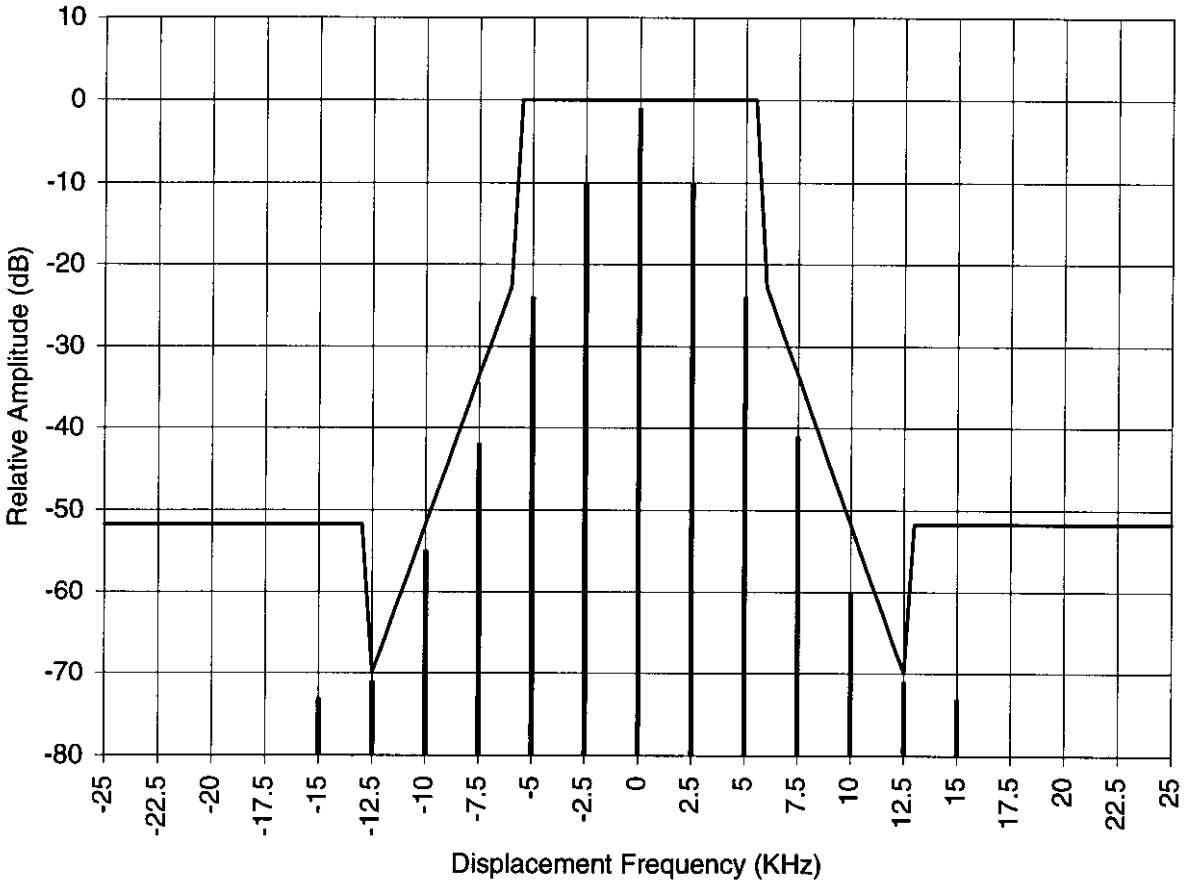
MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 30, 1998

CURVE:



Channel Bandwidth: 12.5 KHz
Power Output: 1.5 Watts

TYPE OF TEST: OCCUPIED BANDWIDTH

FCC PART: 2.989 (c) (1) per 90.210 (b)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

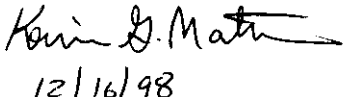
DATE: November 30, 1998

DATA:

Carrier Frequency:	465.05	MHz
Power Output:	1.50	Watts
Power Output:	31.76	dBm
Mean Reference Power:	31.73	dBm
Channel Bandwidth:	25.0	KHz
Occupied Bandwidth:	20.0	KHz

Emission Frequency Offset (KHz)	Measured Relative Amplitude (dBm)	Actual Amplitude (dBm)	FCC Limit (dBm)	Power (Watts)	Percent MRP (%)	Occupied Bandwidth (%)
-25.0			-3.24			
-22.5			-3.24			
-20.0			6.76			
-17.5	-71.00	-39.24	6.76	119.1E-9	0.00%	
-15.0	-68.00	-36.24	6.76	237.7E-9	0.00%	
-12.5	-52.00	-20.24	6.76	9.5E-6	0.00%	
-10.0	-38.00	-6.24	31.76	237.7E-6	0.02%	
-7.5	-24.00	7.76	31.76	6.0E-3	0.40%	
-5.0	-13.00	18.76	31.76	75.2E-3	5.05%	
-2.5	-5.00	26.76	31.76	474.3E-3	31.87%	
0.0	-6.00	25.76	31.76	376.8E-3	25.32%	100.00%
2.5	-5.00	26.76	31.76	474.3E-3	31.87%	
5.0	-13.00	18.76	31.76	75.2E-3	5.05%	
7.5	-24.00	7.76	31.76	6.0E-3	0.40%	
10.0	-37.00	-5.24	31.76	299.3E-6	0.02%	
12.5	-52.00	-20.24	6.76	9.5E-6	0.00%	
15.0	-70.00	-38.24	6.76	150.0E-9	0.00%	
17.5	-73.00	-41.24	6.76	75.2E-9	0.00%	
20.0			6.76			
22.5			-3.24			
25.0			-3.24			

Cerifying Engineer: Kevin G. Matson



12/16/98

TYPE OF TEST: OCCUPIED BANDWIDTH

FCC PART: 2.989 (c) (1) per 90.210 (b)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

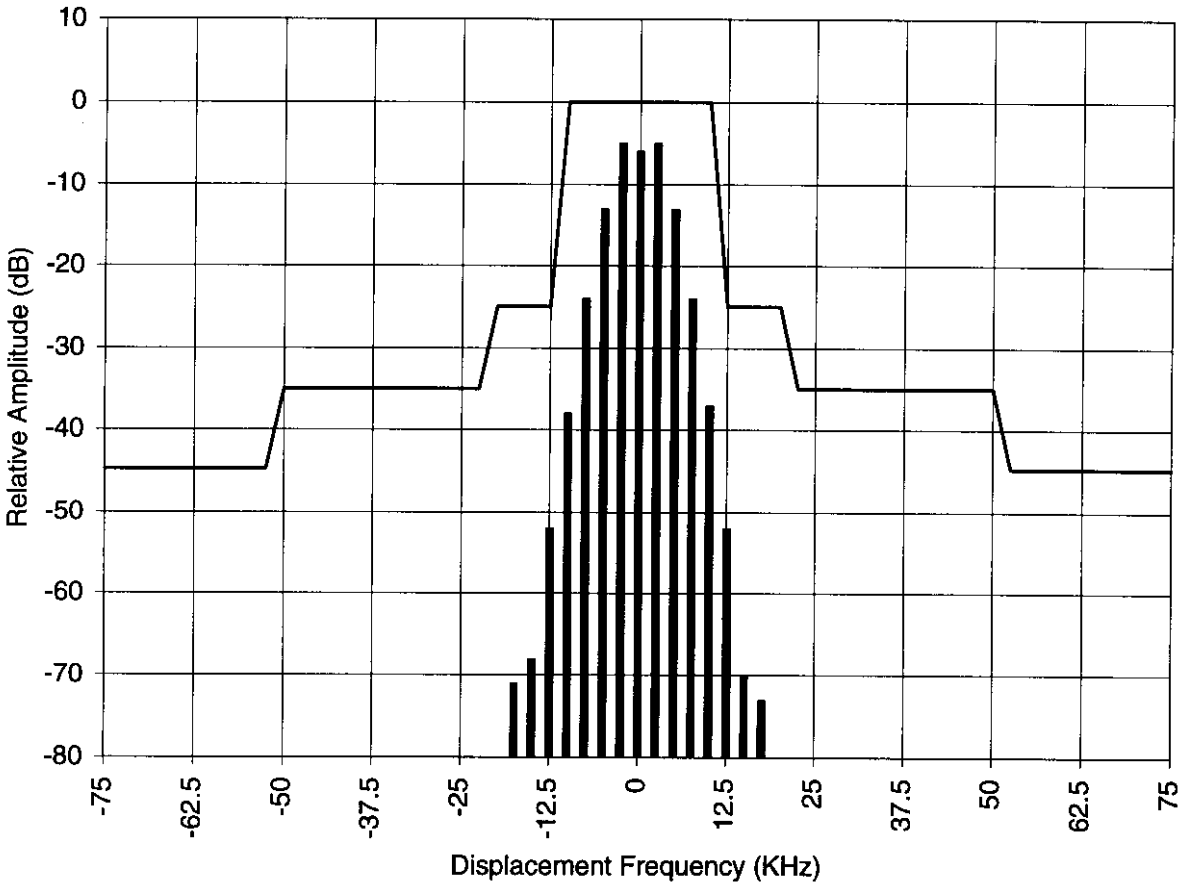
MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 30, 1998

CURVE:



Channel Bandwidth: 25 KHz
Power Output: 1.5 Watts

TYPE OF TEST: OCCUPIED BANDWIDTH

FCC PART: 2.989 (c) (1) per 90.210 (d)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 30, 1998

DATA:

Carrier Frequency:	465.05	MHz
Power Output:	5.50	Watts
Power Output:	37.40	dBm
Mean Reference Power:	37.40	dBm
Channel Bandwidth:	12.5	KHz
Occupied Bandwidth:	10.0	KHz

Emission Frequency Offset (KHz)	Measured Relative Amplitude (dBm)	Actual Amplitude (dBm)	FCC Limit (dBm)	Power (Watts)	Percent MRP (%)	Occupied Bandwidth (%)
-25.0			-20.00			
-22.5			-20.00			
-20.0			-20.00			
-17.5			-20.00			
-15.0	-72.00	-34.60	-20.00	347.0E-9	0.00%	
-12.5	-71.00	-33.60	-32.53	436.9E-9	0.00%	
-10.0	-57.00	-19.60	-14.36	11.0E-6	0.00%	
-7.5	-44.00	-6.60	3.82	219.0E-6	0.00%	
-5.0	-26.00	11.40	37.40	13.8E-3	0.25%	
-2.5	-10.00	27.40	37.40	550.0E-3	10.00%	
0.0	-1.00	36.40	37.40	4.4E+0	79.42%	99.99%
2.5	-10.00	27.40	37.40	550.0E-3	10.00%	
5.0	-25.00	12.40	37.40	17.4E-3	0.32%	
7.5	-42.00	-4.60	3.82	347.0E-6	0.01%	
10.0	-60.00	-22.60	-14.36	5.5E-6	0.00%	
12.5	-71.00	-33.60	-32.53	436.9E-9	0.00%	
15.0	-72.00	-34.60	-20.00	347.0E-9	0.00%	
17.5			-20.00			
20.0			-20.00			
22.5			-20.00			
25.0			-20.00			

Cerifying Engineer: Kevin G. Matson

Kevin G. Matson
12/16/98

TYPE OF TEST: OCCUPIED BANDWIDTH

FCC PART: 2.989 (c) (1) per 90.210 (d)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

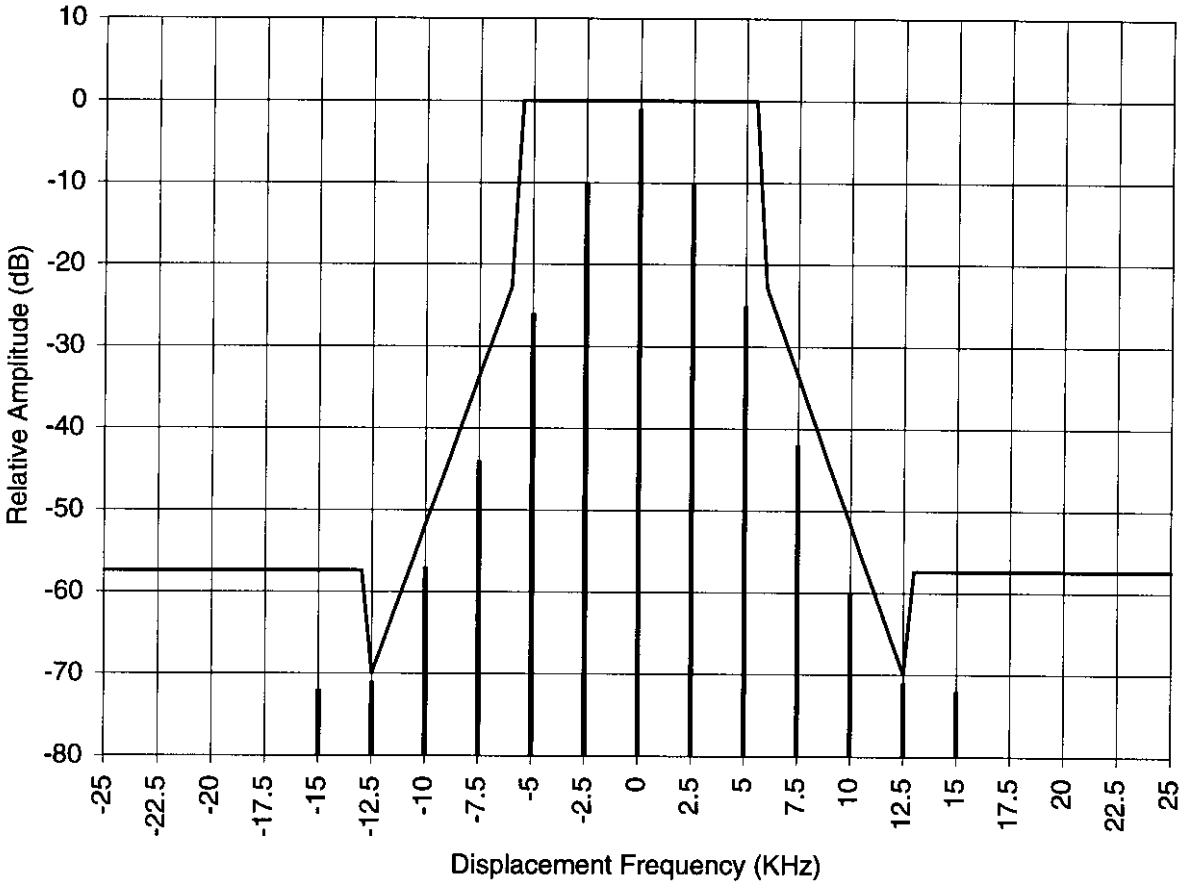
MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 30, 1998

CURVE:



Channel Bandwidth: 12.5 KHz
Power Output: 5.5 Watts

TYPE OF TEST: OCCUPIED BANDWIDTH

FCC PART: 2.989 (c) (1) per 90.210 (b)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 30, 1998

DATA:

Carrier Frequency:	465.05	MHz
Power Output:	5.50	Watts
Power Output:	37.40	dBm
Mean Reference Power:	37.56	dBm
Channel Bandwidth:	25.0	KHz
Occupied Bandwidth:	20.0	KHz

Emission Frequency Offset (KHz)	Measured Relative Amplitude (dBm)	Actual Amplitude (dBm)	FCC Limit (dBm)	Power (Watts)	Percent MRP (%)	Occupied Bandwidth (%)
-25.0			2.40			
-22.5			2.40			
-20.0			12.40			
-17.5	-71.00	-33.60	12.40	436.9E-9	0.00%	
-15.0	-66.00	-28.60	12.40	1.4E-6	0.00%	
-12.5	-50.00	-12.60	12.40	55.0E-6	0.00%	
-10.0	-37.00	0.40	37.40	1.1E-3	0.02%	
-7.5	-24.00	13.40	37.40	21.9E-3	0.38%	
-5.0	-12.00	25.40	37.40	347.0E-3	6.09%	
-2.5	-4.00	33.40	37.40	2.2E+0	38.45%	
0.0	-7.00	30.40	37.40	1.1E+0	19.27%	100.00%
2.5	-5.00	32.40	37.40	1.7E+0	30.54%	
5.0	-13.00	24.40	37.40	275.7E-3	4.84%	
7.5	-24.00	13.40	37.40	21.9E-3	0.38%	
10.0	-36.00	1.40	37.40	1.4E-3	0.02%	
12.5	-51.00	-13.60	12.40	43.7E-6	0.00%	
15.0	-68.00	-30.60	12.40	871.7E-9	0.00%	
17.5	-72.00	-34.60	12.40	347.0E-9	0.00%	
20.0			12.40			
22.5			2.40			
25.0			2.40			

Cerifying Engineer: Kevin G. Matson Kevin G. Matson
12/16/98

TYPE OF TEST: OCCUPIED BANDWIDTH

FCC PART: 2.989 (c) (1) per 90.210 (b)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

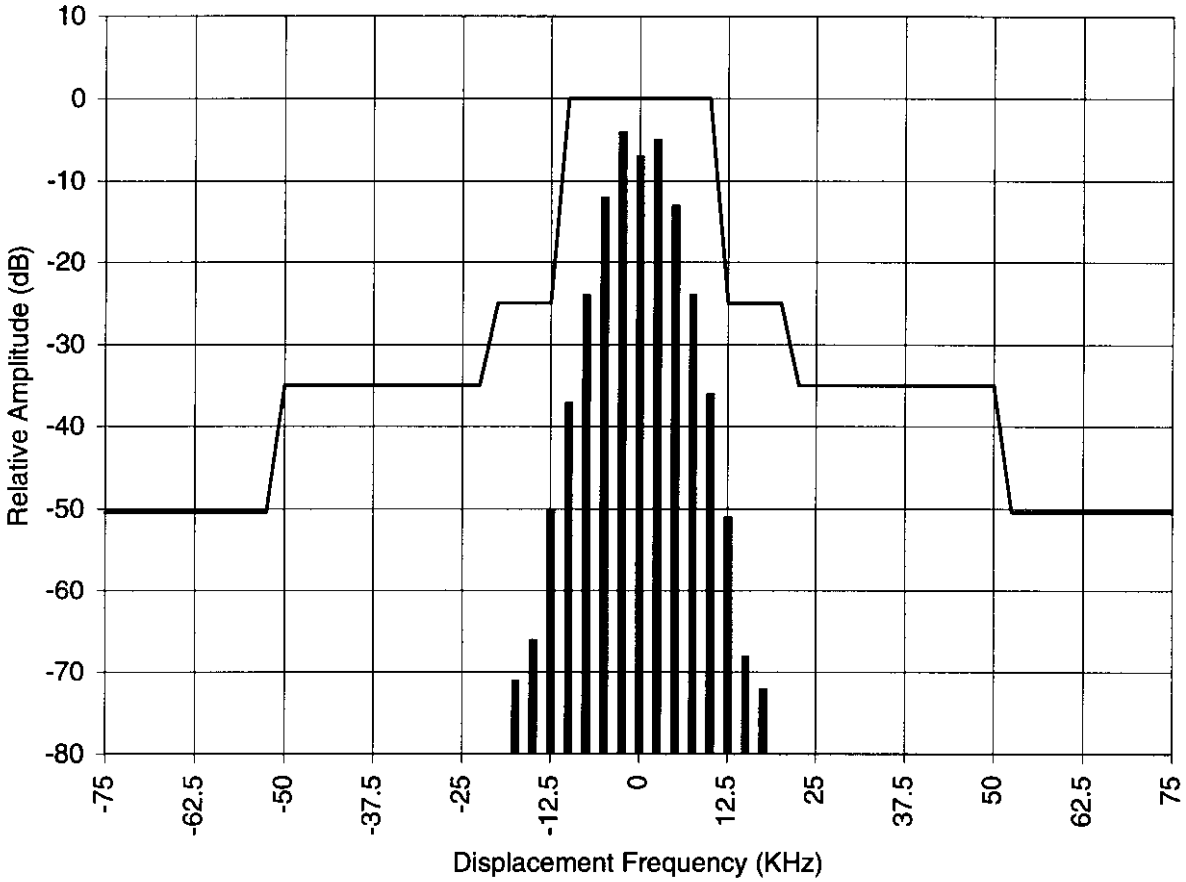
MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 30, 1998

CURVE:



Channel Bandwidth: 25 KHz
Power Output: 5.5 Watts

TYPE OF TEST:	SPURIOUS EMISSIONS AT ANTENNA TERMINALS
FCC PART:	2.991
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 20, 1998

PROCEDURE:

The RTX-454 was aligned for transmitter operation on 465.050 MHz (Fo) at full rated power per the tune-up procedure outlined in the Preliminary Maintenance Manual.

This test was conducted as specified in 2.991 "under the conditions specified in 2.989 as appropriate", i.e. "when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation" "... at the frequency of maximum response of the audio modulating circuit."

The RF Output of the RTX-454, RF Test Jack J401, was connected to a 25 Watt, 50 Ohm, 20 dB attenuator, a UHF Notch Filter tuned to 465.050 Mhz, and two 1 Watt, 50 Ohm, 10 dB attenuators before being connected to the input of an HP 8559A Spectrum Analyzer. The VIZ WP706A power supply was connected to the battery contacts P601 and P602. The voltage was set to 9.6 VDC.

The measured insertion loss of the attenuators, notch filter, and cables are listed as the "Correction Factor" on the Data Sheet. For each emission frequency, the insertion loss was measured using a HP 8444A-OPT 059 Tracking Generator and HP 8590A Spectrum Analyzer.

The spectrum was searched from 8 Mhz to the 10th harmonic of the operating frequency. All unreported emissions were more than 20 dB below the FCC limit of 50 + 10 log P, or -20 dBm.

A second test was conducted with the RTX-454 set to operate at low power. All other conditions remained the same.

TYPE OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

FCC PART: 2.991

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 20, 1998

TEST RESULTS:

Test Frequency: 465.050 MHz
Power Output: 5.0 Watts

Emission Frequency (Mhz)	Measured Amplitude (dBm)	Correction Factor (dB)	Resultant Amplitude (dBm)
450.650	-75	+46	-29
465.050	-43	+80	+37
479.450	-70	+41	-29
930.100	-73	+46	-27

Test Frequency: 465.050 Mhz
Power Output: 1.5 Watts

Emission Frequency (Mhz)	Measured Amplitude (dBm)	Correction Factor (dB)	Resultant Amplitude (dBm)
450.650	-77	+46	-31
465.050	-48	+80	+32
479.450	-76	+41	-35

Certifying Engineer: Kevin G. Matson
Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF TEST:	FIELD STRENGTH OF SPURIOUS RADIATION
FCC PART:	2.993 (b)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 18, 1998

PROCEDURE:

The following measurements were taken at the RITRON, Inc. 3 meter test site. Measurements were made in accordance with FCC Rules & Regulations Part 2.947, using the procedures of IEC Publication 106.

The RTX-454 was aligned for transmitter operation on 465.050 MHz (Fo) at full rated power per the tune-up procedure outlined in the Preliminary Maintenance Manual. The unit was then terminated at the antenna port with a non-radiating 50Ω terminating load.

All field strength measurements were made with the Hewlett-Packard Model 8559A Spectrum Analyzer and the appropriate antenna for the frequency being measured. The antennas used were:

- Electro-Metrics BDA-25 Dipole Antenna at 0 to 200 MHz
- Electro-Metrics LP-25 Log Periodic Antenna at 200 to 1000 MHz
- Polarad CA-BB Microwave Antenna at 1000 to 10,000 MHz

For each emission, the height and polarization of the field strength measuring antenna and orientation of the RTX-454 were varied to provide maximum field strength. The spectrum was searched from 4 MHz to the 10th harmonic of the transmit frequency. All unreported emissions were more than 20 dB below the FCC limits specified in Part 90.210(d)(3).

The RTX-454 was then set for low power transmitter operation and test measurements were repeated as described above.

TYPE OF TEST:	FIELD STRENGTH OF SPURIOUS RADIATION
FCC PART:	2.993 (b)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 18, 1998

EQUATIONS:

Analyzer readings in dBm and the calibrated antenna factor were converted to field strength as follows:

$$P_{3m} = R + 107 + K$$
$$E_{3m} = \text{Log}^{-1} (P_{3m} / 20)$$

where:
P_{3m} = Power output at 3 meters in dBm.
R = Direct reading from spectrum analyzer in dBm.
K = Antenna factor in dB at 3 meters.
E_{3m} = Field strength at 3 meters in μV/m.

The reference level for a half wave dipole was computed as follows:

$$E_{ref} = 1000000 * \sqrt{(49.2 * P)} / D$$

where:
P = Transmitter power in Watts.
D = Distance in meters.

The amount, in dB, that the measured field strength is below the reference field strength was computed as follows:

$$E = 20 \text{ Log } (E_{3m} / E_{ref})$$

where:
E = The amount below reference level in dB.
E_{3m} = Field strength at 3 meters in μV/m.
E_{ref} = Reference field strength at 3 meters in μV/m.

TYPE OF TEST: FIELD STRENGTH OF SPURIOUS RADIATION

FCC PART: 2.993 (b)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 18, 1998

TEST RESULTS:

Carrier Frequency: 465.050 MHz
Power Output: 5.50 Watts
Dipole Reference Level: 5483308.00 µV / m
FCC Limit: 57.40 dB

Emission Frequency	Multiple of	Antenna	Analyzer Reading	Antenna Factor	Field Strength	dB Below Reference	dB Below FCC
(MHz)	Carrier		(dBm)	(dB)	(µV/m)	Level	Limit
930.100	2	Log Periodic	-60	28.53	5979.43	-59.25	-1.84

Carrier Frequency: 465.050 MHz
Power Output: 2.00 Watts
Dipole Reference Level: 3306559.14 µV / m
FCC Limit: 53.01 dB

Emission Frequency	Multiple of	Antenna	Analyzer Reading	Antenna Factor	Field Strength	dB Below Reference	dB Below FCC
(MHz)	Carrier		(dBm)	(dB)	(µV/m)	Level	Limit
930.100	2	Log Periodic	-63	28.53	4223.11	-57.85	-4.84

Certifying Engineer: Kevin G. Matson

Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF TEST:	FREQUENCY STABILITY VS. TEMPERATURE
FCC PART:	2.995 (a)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	December 2, 1998

PROCEDURE:

The RTX-454 was aligned for transmitter operation on 465.050 MHz (Fo) at full rated power per the tune-up procedure outlined in the Preliminary Maintenance Manual.

The RTX-454 was placed in a Delta Design Model 3900 CL Temperature Chamber. The RF Output, RF Test Jack J401, of the RTX-454 was connected to the input of an IFR 1500 Communications Test Set to monitor the transmitter frequency. A VIZ WP706A Power Supply was adjusted for a nominal voltage of 9.6 VDC and connected to battery contacts P601 and P602 of the RTX-454. A Triplett Model 320-G/P Thermocouple was used to monitor the temperature inside the chamber.

The RTX-454 was heated to +50 degrees C and allowed to stabilize for 30 minutes for the 1st measurement and 15 minutes for each 5 degree decrement until the RTX-454 reached a temperature of -30 degrees C.

TYPE OF TEST: FREQUENCY STABILITY VS. TEMPERATURE

FCC PART: FCC Part: 2.995 (a)

MANUFACTURER: RITRON, Inc.
505 West Carmel Drive
Carmel, IN 46033

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: December 2, 1998

Frequency (MHz): 465.050
Nominal Temp (C): +25
FCC Limit (ppm): +/- 2.5

Temperature (C)	Frequency (MHz)	Deviation (ppm)
50	465.050200	-0.19
45	465.050055	-0.51
40	465.049970	-0.69
35	465.050120	-0.37
30	465.050215	-0.16
25	465.050290	0.00
20	465.050560	0.58
15	465.050685	0.85
10	465.050775	1.04
5	465.050760	1.01
0	465.050735	0.96
-5	465.050725	0.94
-10	465.050620	0.71
-15	465.050305	0.03
-20	465.050230	-0.13
-25	465.050175	-0.25
-30	465.050105	-0.40

Certifying Engineer: Kevin G. Matson
Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF TEST: FREQUENCY STABILITY VS. TEMPERATURE

FCC PART: 2.995 (a)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

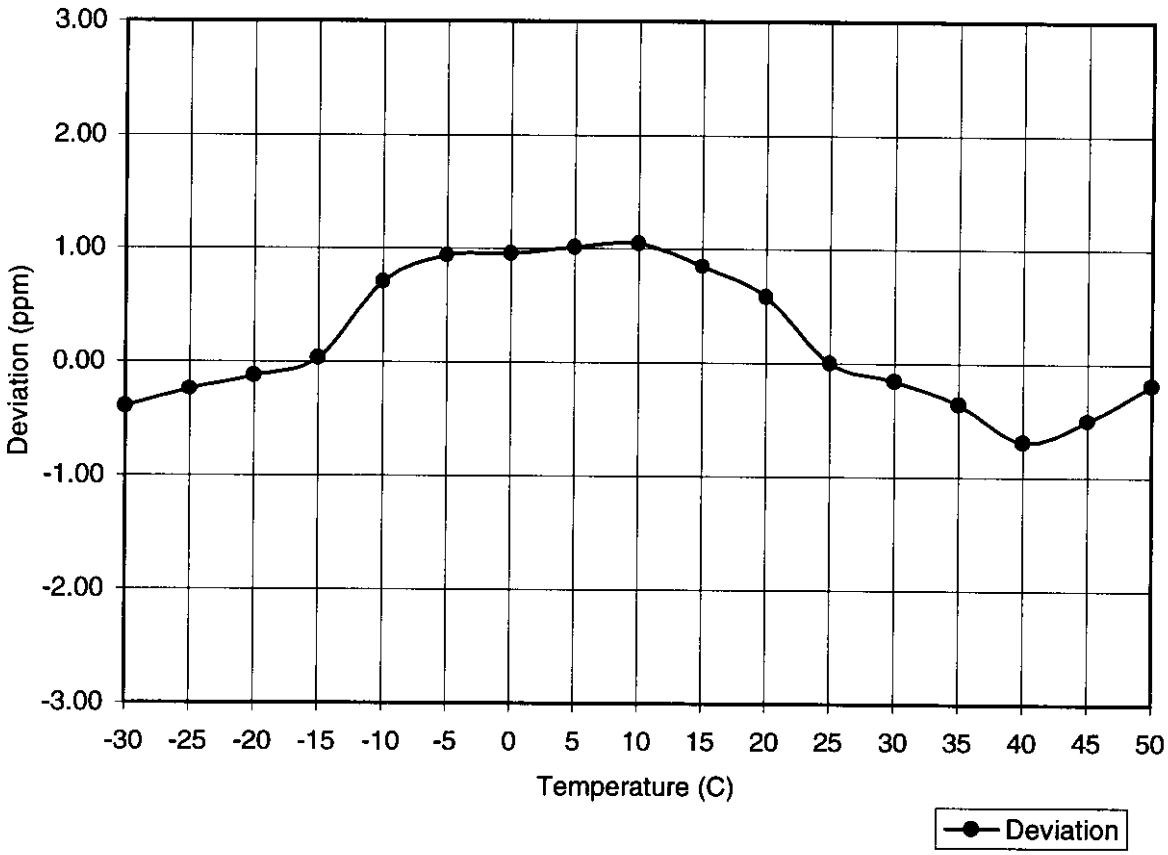
MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: December 2, 1998

CURVE:



TYPE OF TEST:	FREQUENCY STABILITY VS. SUPPLY VOLTAGE
FCC PART:	2.995 (d)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	November 19, 1998

PROCEDURE:

The RTX-454 was aligned for transmitter operation on 465.050 MHz (Fo) at full rated power per the tune-up procedure outlined in the Preliminary Maintenance Manual.

The RF Output, RF Test Jack J401, of the RTX-454 was connected to the input of an IFR 1500 Communications Test Set to monitor the transmitter frequency.

A VIZ WP706A Power Supply was connected to battery contacts P601 and P602 of the RTX-454. The output of the power supply was adjusted between 8.0 VDC and 11.2VDC, which represents a minimum of 1.0 VDC/cell and a maximum of 1.4 VDC/cell of the 8-cell battery pack used in the RTX-454.

TYPE OF TEST: FREQUENCY STABILITY VS. SUPPLY VOLTAGE

FCC PART: 2.995 (d)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

DATE: November 19, 1998

TEST RESULTS:

Test Frequency: 465.050 Mhz
Nominal Supply Voltage: 9.6 Vdc

Supply Voltage (Vdc)	Transmitter Frequency (Mhz)	Frequency Deviation (Hz)	Frequency Deviation (ppm)
8.0	465.050000	0.0	0.0
8.5	465.050000	0.0	0.0
9.0	465.050000	0.0	0.0
9.6	465.050000	0.0	0.0
10.0	465.050000	0.0	0.0
10.5	465.050000	0.0	0.0
11.2	465.050000	0.0	0.0

Certifying Engineer: Kevin G. Matson

Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR

FCC PART: 90.214

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: RTX-454

TYPE OF UNIT: UHF-FM Handheld Transceiver

FCC ID: AIERIT07-450

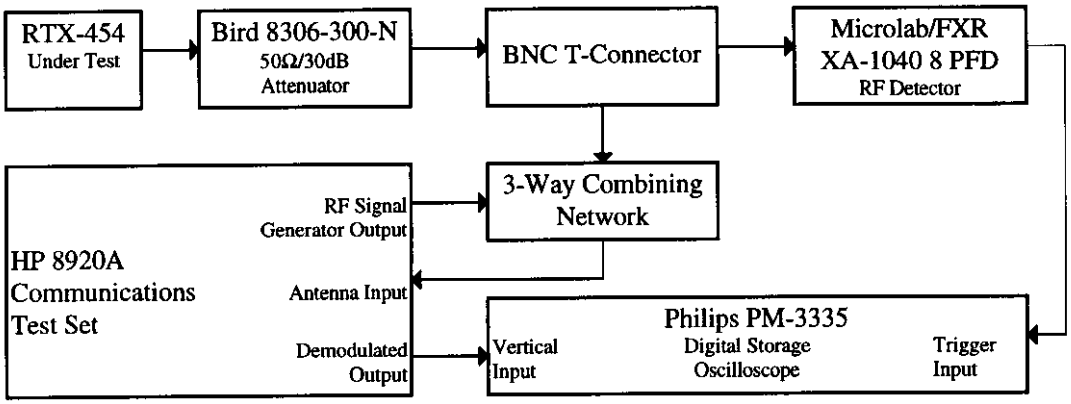
DATE: December 3, 1998

PROCEDURE:

The RTX-454 was aligned for transmitter operation on 465.050 MHz (Fo) at full rated power per the tune-up procedure outlined in the Preliminary Maintenance Manual.

The following tests were conducted per EIA-603 Part 2.2.19 as follows:

1. The test equipment was connected per the following diagram:



2. The HP 8920A Receiver was set to measure FM deviation with the audio bandwidth set at <20 Hz to 15 KHz and the RF frequency set to 465.050 MHz.

3. The RTX-454 transmitter under test was activated and the HP 8920A Spectrum Analyzer was used to measure the RF power level through the test network.

4. The RTX-454 transmitter was turned off.

5. The HP 8920A RF Signal Generator was set to 465.050 MHz at a RF level 20 dB below that measured in step 3, modulated with a 1 KHz tone at +/-25 KHz deviation.

TYPE OF TEST:	TRANSIENT FREQUENCY BEHAVIOR
FCC PART:	90.214
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	December 3, 1998

PROCEDURE (continued):

6. The Philips PM-3335 Digital Oscilloscope Horizontal Sweep Rate was set to 10msec/div. The Vertical Amplitude Control was adjusted to display the 1000 Hz demodulated audio from the Signal Generator at +/-4 divisions, vertically centered on the screen.

7. The Philips PM-3335 Digital Oscilloscope was set to trigger at 1 division from the left side of the display when the RF Detector senses RF power from the RTX-454 transmitter.

8. The RTX-454 transmitter was activated and the resulting waveform on the oscilloscope display was stored and plotted. The FCC limits per Part 90.214 were added to the plot in the same manner illustrated in EIA-603 Part 3.2.19.2. The resulting plot is labeled "Switch On Condition" and shows compliance with FCC Part 90.214.

9. The Philips PM-3335 Digital Oscilloscope was set to trigger at 1 division from the right side of the display when the RF Detector senses loss of RF power from the RTX-454 transmitter.

10. The RTX-454 transmitter was turned off and the resulting waveform on the oscilloscope displey was stored and plotted. The FCC limits per Part 90.214 were added to the plot in the same manner illustrated in EIA-603 Part 3.2.19.2. The resulting plot is labeled "Switch Off Condition" and shows compliance with FCC Part 90.214.

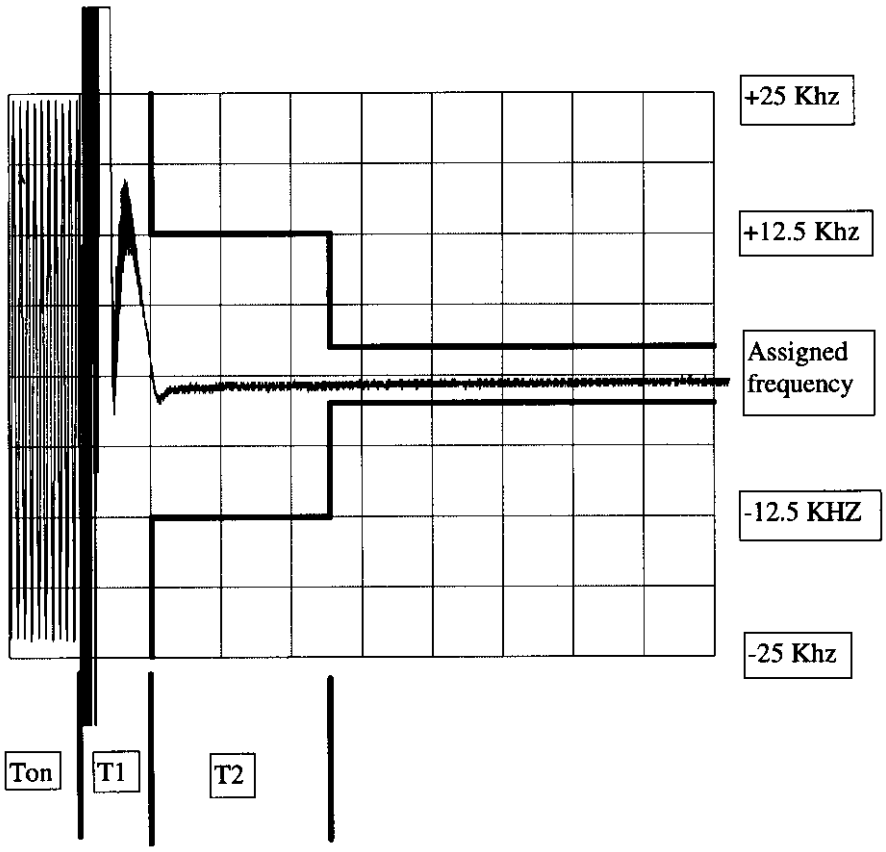
Certifying Engineer: Kevin G. Matson

Kevin G. Matson - Project Engineer

Date: 12/16/98

TYPE OF TEST:	TRANSIENT FREQUENCY BEHAVIOR
FCC PART:	90.214
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	December 3, 1998

Switch On Condition:



TYPE OF TEST:	TRANSIENT FREQUENCY BEHAVIOR
FCC PART:	90.214
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	RTX-454
TYPE OF UNIT:	UHF-FM Handheld Transceiver
FCC ID:	AIERIT07-450
DATE:	December 3, 1998

Switch Off Condition: