TYPE OF EXHIBIT:	TEST REPORT
FCC PART:	2.1033 (c)(14)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	April 22, 2014

The following is a list of attached exhibits required by the Federal Communications Commission for the application to and grant of FCC Type Acceptance. All tests are per TIA-603-D (2010) where applicable.

TABLE OF CONTENT:

TYPE OF EXHIBIT:	TEST EQUIPMENT LIST
FCC PART:	2.947(d)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	April 22, 2014

TEST EQUIPMENT:

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.	Last Cal	EXP Cal
Comms Test Set	Aeroflex	IFR COM-120B	485001757	6 DEC 2013	6 DEC 2014
Signal generator	Hewlett-Packard	8657B	3315V04378	18 APR 2014	18 APR 2015
Spectrum Analyzer	Advantest	R3265A	75060189	02 OCT 2013	02 OCT 2014
Log Periodic Antenna	Electro-Metrics	LPA-25	8-102	17 MAY 2011	17 MAY 2014
Dipole Antenna	Electro-Metrics	BDA-25	8-101	17 MAY 2011	17 MAY 2014
Dipole Antenna	Electro-Metrics	EM-6925	292	8 APR 2014	8 APR 2015
Dipole Antenna	Electro-Metrics	EM-6927	292	8 APR 2014	8 APR 2015
Gain horn	EMCO	3105	2034	22 OCT 2013	22 OCT 2015

SUPPORT EQUIPMENT:

ITEM	MANUFACTURER	MODEL NO.	SERIAL NO.		
Power Supply	BK Precision	1630	146-03508		
Digital Oscilloscope	Philips	PM-3335	DM648004		
Digital Multimeter	Fluke	179	82800086		
Temperature Chamber	Associated Laboratories	ELH-0.5-LC	N/A		
Thermocouple	Omega	7035-J-225	8504		
272 MHz high pass filter	Ritron				
30dB Power Attenuator	Bird	8306-300-N	N/A		
10dB Attenuator	ELCOM	AT-51-10	N/A		

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	DESCRIPTION OF MEASUREMENT FACILITY
FCC PART:	2.948
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	April 22, 2014

DESCRIPTION:

The emission 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 Industry Canada.

Firm Registration Number: 536261

Firm FRN: 0004-3348-76

FCC Reference: ANSI STD C63.4-2003

Industry Canada Radio Standard: Procedure 212

This site is used on a continuing basis exclusively by RITRON, Inc. and is utilized only for 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.

All other measurements are taken at RITRON's engineering laboratory in Carmel, IN.

PHOTO OF RITRON TEST SITE:

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	RADIO FREQUENCY POWER OUTPUT
FCC PART:	95.639(h)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 6, 2014

PROCEDURE:

1. The JBS-146M was aligned for transmitter operation at 2W per the tune-up procedure using frequencies at the lower and upper range of the desired operating band.
2. Power was supplied to the JBS-146M at J302 DC POWER input by a BK Precision 1630 power supply set to 12 volts, the specified input voltage.
3. The JBS-146M was connected to an IFR COM-120A Test Set used to measure the RF carrier power. The input to the Test Set provides a resistive 50-ohm termination at the frequencies and power levels used for this test.
4. A Fluke 179 multimeter was used to measure the I_{TX} transmitter current that supplies the final RF amplifier.
5. Measurements were taken at frequencies that span the desired operating band of 151.820 -154.600 MHz.

RESULTS:

			2W Operation	
Frequency (MHz)	**Input (VDC)**	**+V_{TX} (VDC)**	**I_{TX} (mA)**	**Power (W)**
151.820	12	8.2	617	2.0
154.600	12	8.2	604	2.0

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	TRANSMITTER AUDIO OVERALL RESPONSE
FCC PART:	2.1047(a)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 6, 2014

PROCEDURE:

1. The JBS-146M was set to transmit narrowband (12.5 kHz) at a frequency near the center of the desired operating band, with the radio set for pre-emphasis and voice audio lowpass filter.
2. The output of an IFR COM-120B audio function generator was applied to the input of the JBS-146M audio processing circuitry at J303 at a constant input level of 15 mVP to prevent limiting at any frequency.
3. The audio input frequency was varied from 100-5000 Hz, and the resulting FM deviation was measured using an IFR COM-120B Test Set.
4. The transmitter audio frequency response was calculated as:

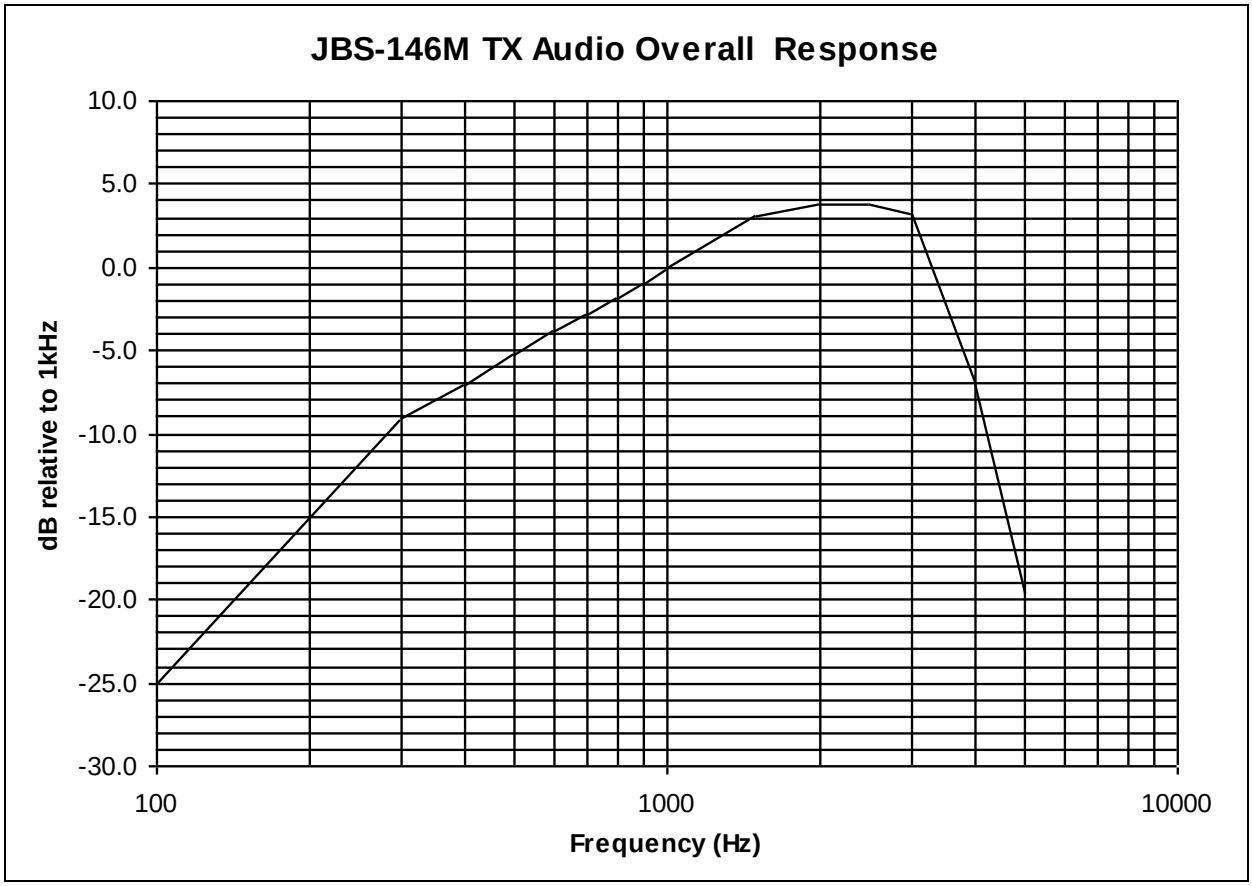
   20 log (Deviation of test frequency/deviation of 1 kHz reference frequency)
5. Results were plotted on the attached chart.

RESULTS:

Frequency	**Audio Response**	
(Hz)	**(dB)**	**(Hz)**
100	-25.1	80
300	-9.0	510
400	-7.0	640
500	-5.2	790
600	-3.9	920
700	-2.8	1040
800	-1.8	1170
900	-1.0	1290
1000	0.0	1440
1500	3.1	2060
2000	3.8	2220
2500	3.8	2220
3000	3.2	2070
4000	-7.0	640
5000	-19.6	150

TYPE OF EXHIBIT:	TRANSMITTER AUDIO OVERALL RESPONSE
FCC PART:	2.1047(a)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 6, 2014

PLOT:



SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	TRANSMITTER AUDIO LOWPASS FILTER
FCC PART:	2.1047(a)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 10, 2014

PROCEDURE:

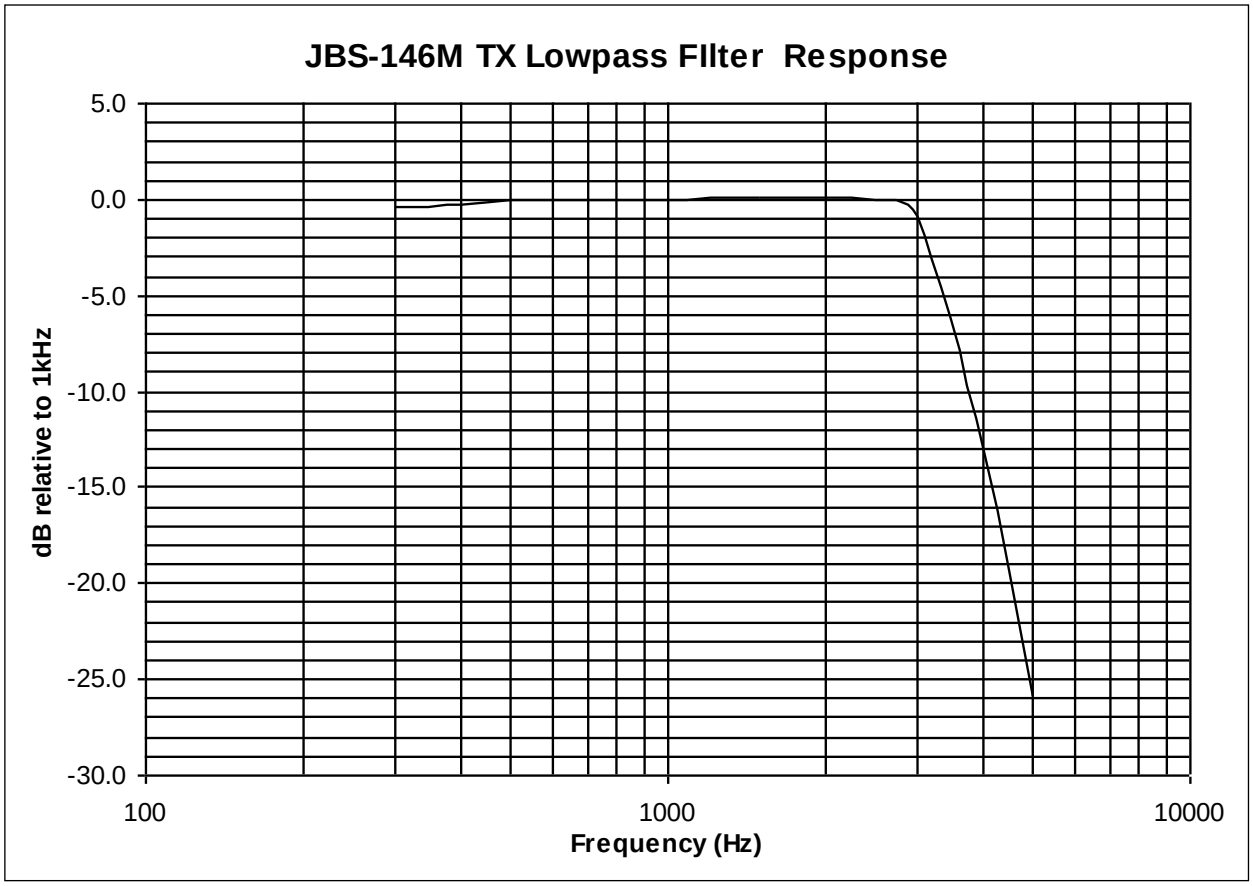
1. The JBS-146M was set to transmit narrowband (12.5 kHz) at a frequency near the center of the desired operating band, with the radio set for no pre-emphasis.
2. The output of an IFR COM-120B audio function generator was applied to the input of the JBS-146M audio processing circuitry at J303 at a constant input level of 15 mVP to prevent limiting at any frequency.
3. The audio input frequency was varied from 300-5000 Hz, and the resulting FM deviation was measured using an IFR COM-120B Test Set.
4. The transmitter audio frequency response was calculated as:

   20 log (Deviation of test frequency/deviation of 1 kHz reference frequency)
5. Results were plotted on the attached chart.

RESULTS:

Frequency	**Audio Response**	
(Hz)	**(dB)**	**(Hz)**
300	-0.3	1510
400	-0.2	1530
500	0.0	1570
600	0.0	1570
700	0.0	1570
800	0.0	1570
900	0.0	1570
1000	0.0	1570
1500	0.2	1600
2000	0.2	1600
2500	-0.1	1560
3000	-0.9	1420
4000	-13.0	350
5000	-25.9	80

TYPE OF EXHIBIT:	TRANSMITTER AUDIO LOWPASS FILTER
FCC PART:	2.1047(a)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 10, 2014



PLOT:

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	MODULATION LIMITING
FCC PART:	2.1047(b)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 7, 2014

PROCEDURE:

1. The JBS-146M was adjusted for a narrowband 100% deviation of +/- 2.5 kHz per the tune-up procedure. The radio was programmed for transmitter operation on a frequency representing the lower end of the desired operating band.
2. The output of an IFR COM-120B audio function generator was applied to the input of the JBS-146M audio processing circuitry at J303.
3. The output of the generator was adjusted from 1 mVP to 380 mVP at frequencies from 500 to 3000 Hz. This satisfies required deviation for 60% modulation +/- 20dB at all frequencies.
4. An IFR COM-120B was used to measure FM deviation. The resulting deviations were recorded as a percentage of the rated system deviation of +/- 2.5 kHz for narrowband operation.
5. An attached chart displays the narrowband (12.5 kHz) response.
6. The JBS-146M was set for wideband operation with a 100% deviation of +/- 5 kHz on a frequency representing the higher end of the desired operating band.
7. An IFR COM-120B was used to measure FM deviation. The resulting deviations were recorded as a percentage of the rated system deviation of +/- 5 kHz for narrowband operation.
8. An attached chart displays the wideband (25 kHz) response.

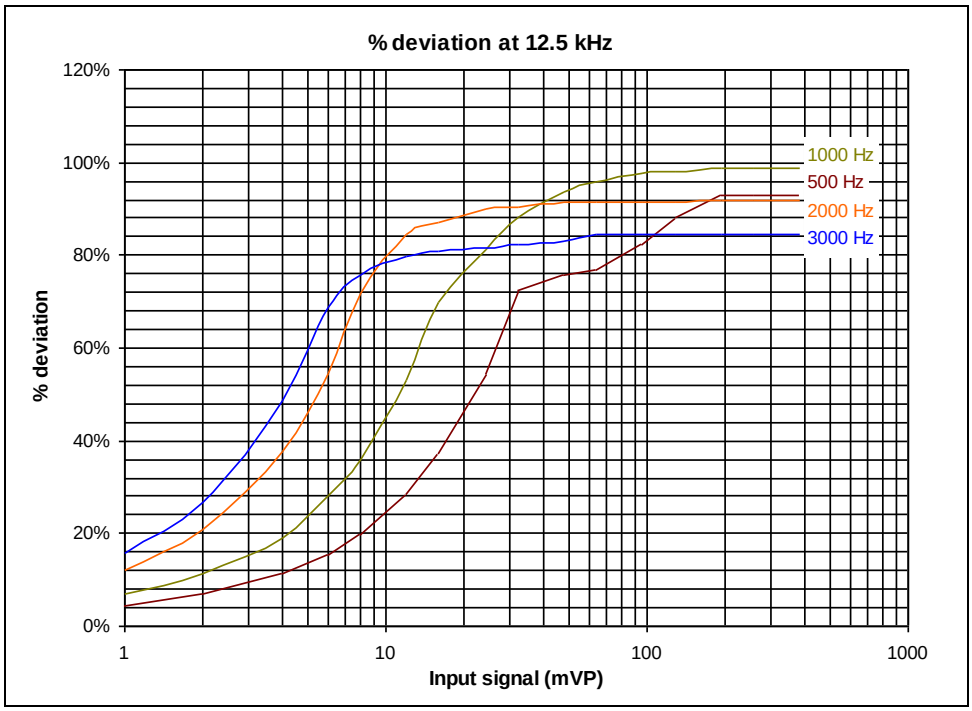
SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	MODULATION LIMITING
FCC PART:	2.1047(b)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 7, 2014

RESULTS FOR 12.5 kHz NARROWBAND

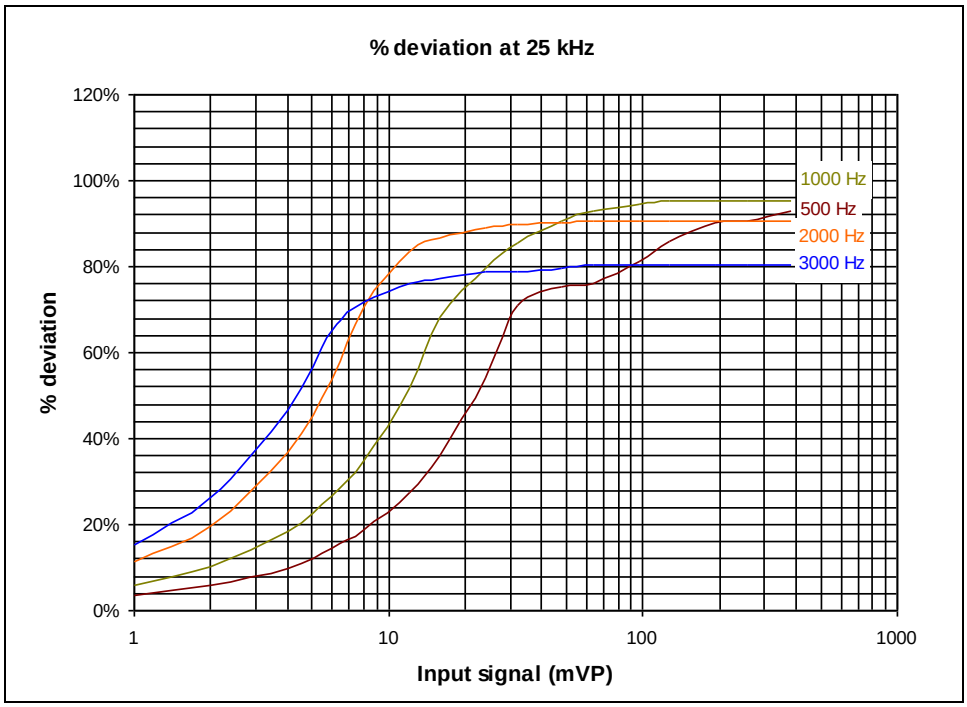
mVP	500 Hz	1000 Hz	2000 Hz	3000 Hz
1	4.4%	6.8%	12.0%	15.6%
2	6.8%	11.2%	20.8%	26.8%
4	11.2%	19.2%	37.6%	48.8%
6	15.2%	28.0%	54.4%	68.8%
8	19.6%	36.0%	71.6%	75.6%
12	28.4%	53.2%	84.4%	79.6%
16	37.2%	70.0%	87.2%	80.8%
24	54.4%	81.2%	90.0%	81.6%
32	72.4%	88.0%	90.4%	82.4%
48	75.6%	93.6%	91.6%	83.2%
64	76.8%	96.0%	91.6%	84.4%
96	82.4%	97.6%	91.6%	84.4%
128	88.0%	98.0%	91.6%	84.4%
192	92.8%	98.8%	92.0%	84.4%
256	92.8%	98.8%	92.0%	84.4%
380	92.8%	98.8%	92.0%	84.4%



TYPE OF EXHIBIT:	MODULATION LIMITING
FCC PART:	2.1047(b)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 7, 2014

RESULTS FOR 25 kHz WIDEBAND

mVP	500 Hz	1000 Hz	2000 Hz	3000 Hz
1	3.4%	6.0%	11.4%	15.2%
2	5.8%	10.2%	19.8%	26.2%
4	10.0%	18.6%	36.8%	46.8%
6	14.4%	26.8%	53.6%	65.0%
8	18.8%	34.8%	70.6%	71.6%
12	27.6%	51.6%	83.4%	76.0%
16	36.2%	68.2%	86.6%	77.4%
24	54.0%	79.8%	89.0%	79.0%
32	71.0%	85.6%	89.8%	79.0%
48	75.4%	90.6%	90.2%	79.6%
64	76.0%	92.8%	90.6%	80.2%
96	81.0%	94.6%	90.6%	80.2%
128	86.0%	95.2%	90.6%	80.2%
192	90.2%	95.2%	90.6%	80.2%
256	90.6%	95.2%	90.6%	80.2%
384	93.0%	95.2%	90.6%	80.2%



TYPE OF EXHIBIT:	EMISSIONS DESIGNATOR
FCC PART:	95.631(j)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 6, 2014

CALCULATIONS:

By Carson's rule, the occupied bandwidth for an FM signal may be calculated by:

$BW = 2(f_\Delta + f_m)$ where f_Δ is the frequency deviation and f_m is the modulating frequency.

The necessary bandwidth for the narrowband voice channel is:

Maximum modulation frequency (f_m) in kHz = 3

Maximum deviation (f_Δ) in kHz = 2.5

Necessary bandwidth for **narrowband** in kHz = 2(2.5 + 3) = 11

Narrowband emissions designator applied for is 11K0F3E.

The necessary bandwidth for the wide band voice channel is:

Maximum modulation frequency (f_m) in kHz = 3

Maximum deviation (f_Δ) in kHz = 5

Necessary bandwidth for **wide band** in kHz = 2(5 + 3) = 16

Wide band emissions designator applied for is 16K0F3E.

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	OCCUPIED BANDWIDTH
FCC PART:	95.635(e)(1)(2)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 20, 2014

PROCEDURE:

1. The JBS-146M was programmed for transmitter operation on a frequency at the upper range of the desired operating band. The transmitter was adjusted for a deviation of +/- 2.5 kHz at 1900 Hz for narrowband operation. The photo shows voice occupied bandwidth for 12.5 kHz bandwidth operation with a 2500 Hz audio tone.
2. The RF output of the JBS-146M was measured with an IFR COM-120B wattmeter at 2W. Power was supplied to the JBS-146M at J302 DC POWER input by a BK Precision 1630 power supply set to 12 volts.
3. The unit's antenna port was connected to the Advantest R3265A spectrum analyzer through a Bird 8306-300-N 30dB attenuator. The spectrum analyzer reference level was set to the measured level of the unmodulated carrier after attenuation.
4. The output of an IFR COM-120B audio function generator was applied to the input of the JBS-146M audio processing circuitry at J303. 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 at the frequency of maximum response.
5. The spectrum analyzer was centered on the transmit frequency and the sidebands were captured in max hold mode on the spectrum analyzer. The appropriate narrow band emission mask was also displayed.

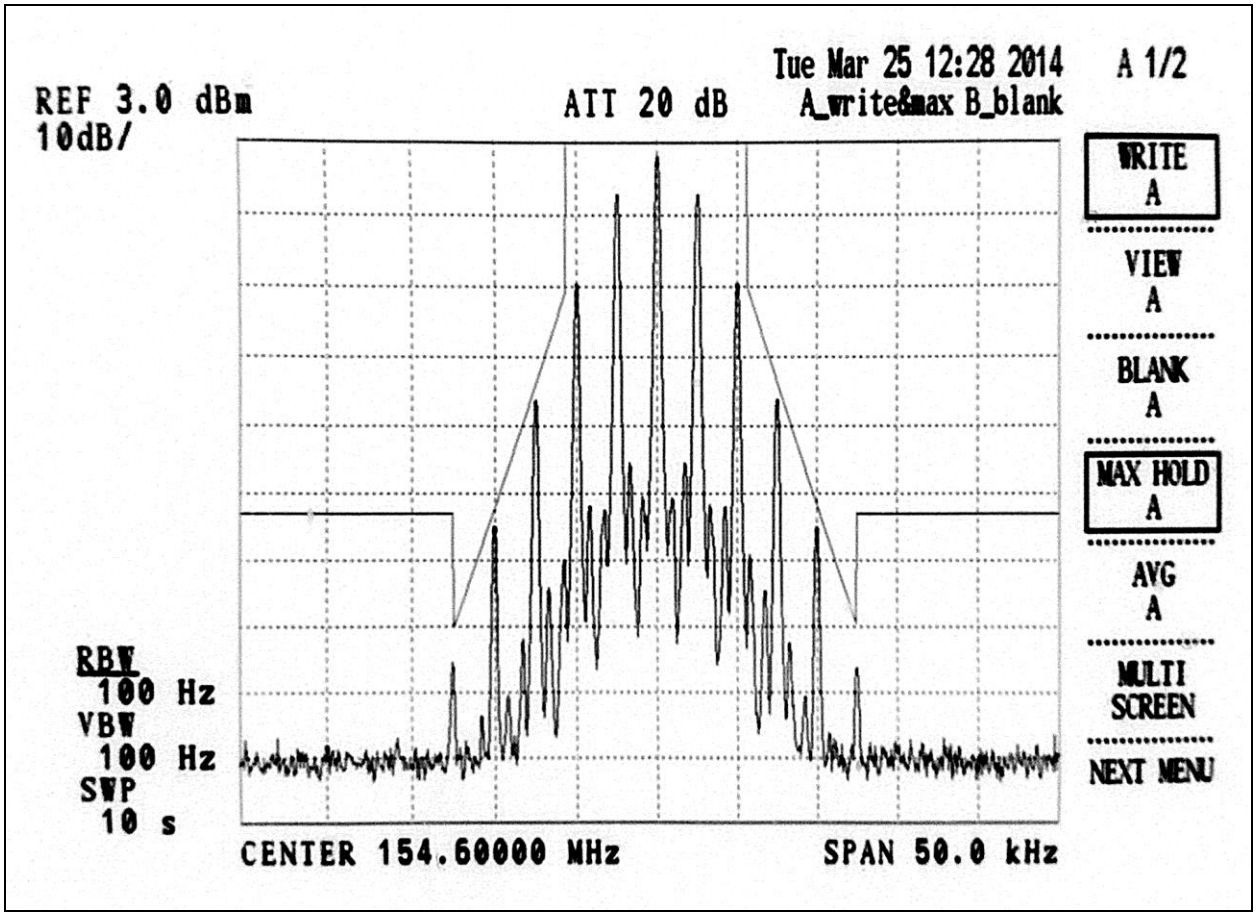
Frequency of maximum response:	1900	Hz
Level for 50% system deviation:	13	mVP
Level for 50% system deviation + 16DB:	82	mVP

6. Steps 2 - 5 were repeated at a frequency representing the lower range of the desired operating band.
7. The captured spectrum analyzer display represents the response with the highest sidebands.
8. The JBS-146M was set for wideband operation with a deviation of +/- 5 kHz at 1900 Hz.
9. The unit's antenna port was connected to the Advantest R3265A spectrum analyzer through a Bird 8306-300-N 30dB attenuator. The spectrum analyzer was centered on the transmit frequency and the sidebands were captured in max hold mode. The appropriate wide band emission mask was also displayed. The attached photo show occupied bandwidth for 25 kHz bandwidth operation with a 2500 Hz audio tone.

TYPE OF EXHIBIT:	OCCUPIED BANDWIDTH
FCC PART:	95.635(e)(1)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 20, 2014

ANALYZER DISPLAY:

12.5 kHz channel with 2500 Hz tone



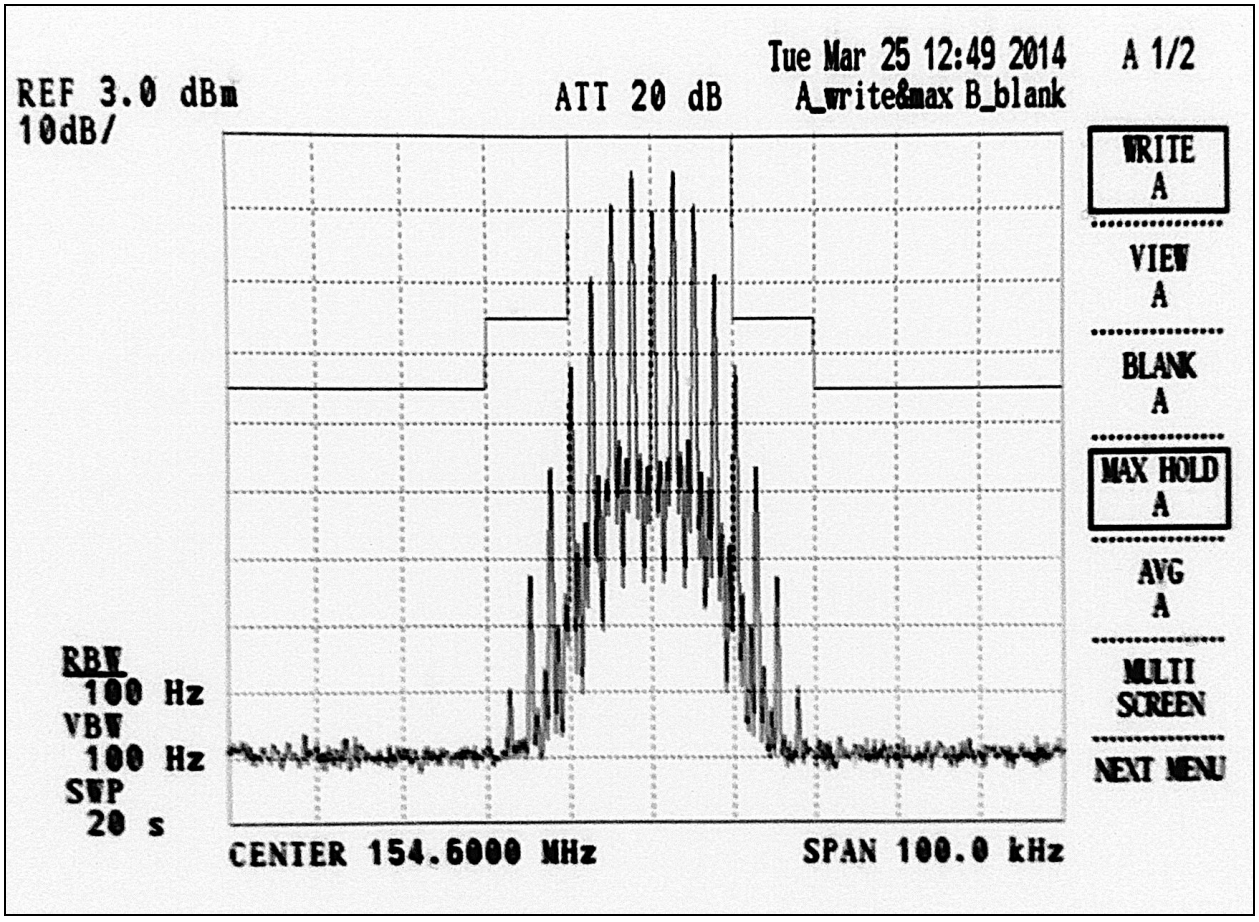
SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	OCCUPIED BANDWIDTH
FCC PART:	95.635 (e)(2)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 20, 2014

ANALYZER DISPLAY:

25 kHz channel with 2500 Hz tone



SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	SPURIOUS EMISSIONS AT ANTENNA TERMINALS
FCC PART:	2.1051
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 10, 2014

PROCEDURE:

1. The JBS-146M was programmed for transmitter operation on frequencies at the lower and upper range of the desired operating band.
2. Power was supplied to the JBS-146M at J302 DC POWER input by a BK Precision 1630 power supply set to 12 volts.
3. The transmitter was modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation as specified in FCC Part 2.1049 (c)(1).
4. The JBS-146M antenna port was connected to the Advantest R3265A spectrum analyzer through a Bird 8306-300-N 30dB attenuator.
5. The spectrum was searched from 8 MHz to the 10th harmonic of the operating frequency. All unreported emissions are more than 20 dB below the FCC limit.

RESULTS:

Maximum Output Power: 2W

FCC Attenuation per Part 90.210(d)(3): 53.0 dBc

Multiple of Carrier	Emission Frequency (MHz)	Analyzer Reading (dBm)	Attenuation Correction Factor (dB)	Spurious Power (dBm)	Spurious Power (dBc)	FCC Limit (dBc)	FCC Margin (dB)
Carrier	151.820						
2	303.640	-66.13	30	-36.13	-69.04	-52.91	16.13
3	455.460	-66.28	30	-36.28	-69.19	-52.91	16.28
Carrier	154.600						
2	309.200	-64.81	30	-34.81	-67.75	-52.94	14.81
3	463.800	-59.66	30	-29.66	-62.60	-52.94	9.66

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer (dB)

TYPE OF EXHIBIT:	FIELD STRENGTH OF SPURIOUS EMISSIONS
FCC PART:	2.1053
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	April 21, 2014

PROCEDURE:

1. Field strength of spurious radiation of the JBS-146M was taken at the RITRON, Inc. 3-meter test site, details of which are on file with the FCC. The measurements were via the substitution method.
2. The JBS-146M was aligned for transmitter operation on frequencies at the lower and upper range of the desired operating band. The radio was powered by a Ritron model RPS-1B, the 12 VDC power cube included with each radio.
3. The JBS-146M was terminated at the antenna port with the Ritron AFB-1545 antenna include with the product.
4. All field strength measurements were made with the Advantest R3265A Spectrum Analyzer connected to the Electro-Metrics BDA-25 dipole, Electro-Metrics LPA-25 log periodic or EMCO horn receiving antenna. All harmonic measurements were made through a 272 MHz high pass filter.
5. A calibrated ½-wave dipole antenna was substituted at the radio side of the range driven by a known power level from an HP 8657B RF signal generator to produce a known ERP at each harmonic. The receiving antenna was oriented both vertically and horizontally and reference measurements were taken at each harmonic. All harmonic measurements were made through a 272 MHz high pass filter. Cable loss from generator to the dipole was taken into account.
6. For each emission, the height and polarization of the field strength measuring antenna and orientation of the JBS-146M was varied to find maximum field strength.
7. The spectrum was searched up to the 10th harmonic of the transmit frequency. All non-harmonics were less than 20 dB below the FCC limits specified in Part 90.210(d)(3). All harmonics with greater than 20 dB margin were not reported.

TYPE OF EXHIBIT:	FIELD STRENGTH OF SPURIOUS EMISSIONS
FCC PART:	2.1053
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	April 21, 2014

RESULTS:

Power Output: 2 W **FCC Attenuation per Part 90.210(d)(3):** 53.0 dBc

JBS-146M				**Horizontal**			
Multiple of Carrier	**Emission Frequency MHz**	**1/2 Wave Dipole (cm)**	**Measured Reading @ 0 dBm**	**Substitution Reading @ 0 dBm**	**Spurious Reading dBm**	**Spurious level dBc**	**db below FCC Limit**
	151.820	98.8	-1.24	-17.25	2.12		
	154.600	97.0	-0.72	-18.00	1.84		
2	309.200	48.5	-1.66	-21.41	-55.72	-68.97	-15.97
3	463.800	32.3	-1.38	-24.00	-57.53	-67.91	-14.91

JBS-146M				**Vertical**			
Multiple of Carrier	**Emission Frequency MHz**	**1/2 Wave Dipole (cm)**	**Measured Reading @ 0 dBm**	**Substitution Reading @ 0 dBm**	**Spurious Reading dBm**	**Spurious level dBc**	**db below FCC Limit**
	151.825	98.8	-1.24	-23.21	4.29		
	154.600	97.0	-0.72	-22.63	5.78		
3	463.800	32.3	-1.38	-26.19	-54.13	-62.32	-9.32

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	FREQUENCY STABILITY VS. TEMPERATURE
FCC PART:	2.1055(a)(1), 95.632(c)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 14, 2014

PROCEDURE:

1. The JBS-146M uses a 26.0 MHz reference oscillator.
2. The JBS-146M was programmed for operation at a frequency near the low end of the desired operating band.
3. The unit was placed inside a Delta Design Model 3900 CL temperature chamber and power was supplied to the JBS-146M at J302 DC POWER input by a BK Precision 1630 power supply set to 12 volts. The antenna terminal was connected to the input of an IFR COM-120B RF communications test set used to measure frequency of the carrier. A Triplett model 320-G/P thermocouple was placed inside the chamber to measure temperature.
4. Frequency was measured at +25°C and recorded as a reference frequency.
5. The temperature was raise to +30°C for 30 minutes, at which time the transmitter frequency was measured and recorded.
6. Step 4 was repeated in +10°C increments up to +60°C.
7. The unit was allowed to return naturally back to the ambient room temperature of +25°C.
8. The temperature was lowered to +20°C for 30 minutes, at which time the transmitter frequency was measured and recorded.
9. Step 8 was repeated in -10°C increments down to -30°C.
10. The frequency remained within the 5 ppm specified across the full -30°C to +60°C temperature range.

TYPE OF EXHIBIT:	FREQUENCY STABILITY VS. TEMPERATURE
FCC PART:	2.1055(a)(1), 95.632(c)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 14, 2014

RESULTS:

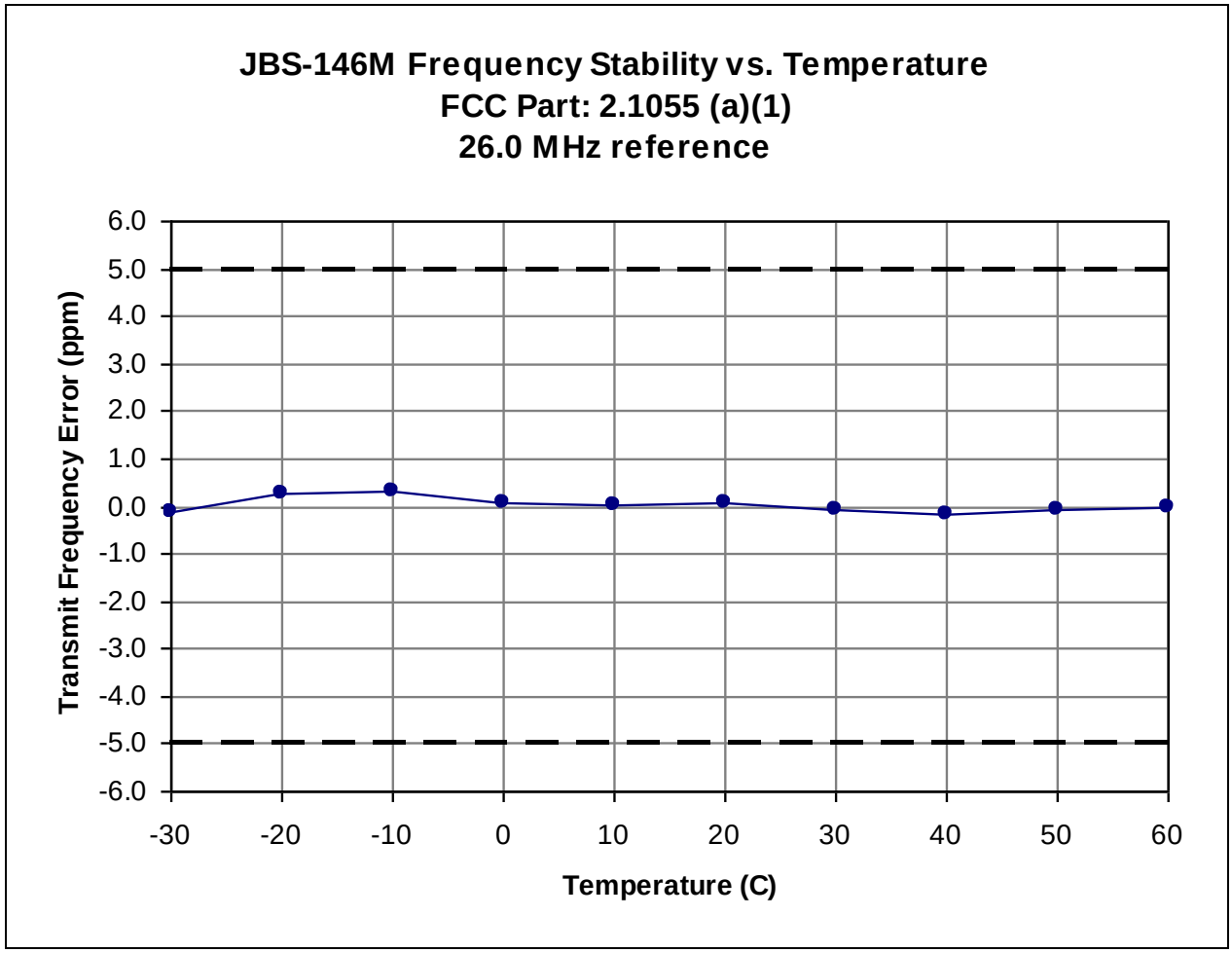
26 MHz reference oscillator		
Temp C	**Frequency (MHz)**	**Error (ppm)**
-30	151.819983	-0.11
-20	151.820044	0.29
-10	151.820047	0.31
0	151.820014	0.09
10	151.820006	0.04
20	151.820008	0.05
30	151.819989	-0.07
40	151.819974	-0.17
50	151.819989	-0.07
60	151.819998	-0.01
25	151.820000	0.00

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	FREQUENCY STABILITY VS. TEMPERATURE
FCC PART:	2.1055(a)(1), 95.632(c)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 14, 2014

PLOT:



TYPE OF EXHIBIT:	FREQUENCY STABILITY VS. VOLTAGE
FCC PART:	2.1055(d)(1), 95.632(c)
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 17, 2014

PROCEDURE:

1. The JBS-146M uses a 26.0 MHz reference oscillator.
2. The JBS-146M was programmed for operation at a frequency near the low end of the desired operating band.
3. The JBS-146M antenna terminal was connected to the input of an IFR COM-120B communications test set, used to measure frequency of the carrier.
4. A BK Precision Model 1630 power supply was used to apply supply voltage at the battery input.
5. The radio was put into transmit mode and the measured frequency at 12 VDC was used as a reference.
6. Frequency was checked from 85% to 115% of specified operating voltage.

   Minimum of 12 x 0.85 = 10.2 V

   Maximum of 12 x 1.15 = 13.8 V

RESULTS:

		26 MHz oscillator	
VDC	**Condition**	**Frequency (MHz)**	**Error (ppm)**
10.2	External Power @ 85%	151.820000	0.00
12.0	External Power Nominal	151.820000	0.00
13.8	External Power @ 115%	151.820000	0.00

SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

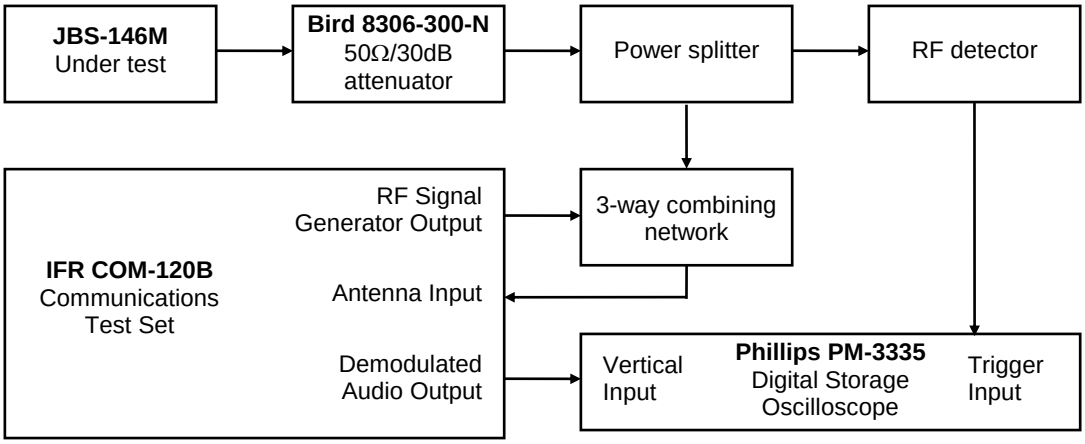
TYPE OF EXHIBIT:	TRANSIENT FREQUENCY BEHAVIOR
FCC PART:	90.214
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 17, 2014

PROCEDURE:

1. The JBS-146M was aligned for transmitter operation at 2W power level per the tune-up procedure for frequencies representing the low, middle, and upper range of the desired operating band.
2. Power was supplied to the JBS-146M at the BATTERY input by a BK Precision 1630 power supply set to 12 VDC.
3. The test equipment was connected per the TEST SETUP diagram.
4. The IFR COM-120B receiver was set to measure FM deviation with the audio bandwidth set at $\leq$ 20 Hz to 15 kHz and the RF frequency set to 154.600 MHz, a frequency at the high end of the specified operating band.
5. The JBS-146M transmitter under test was turned on and the IFR COM-120B Spectrum Analyzer was used to measure the RF power level through the test network.
6. The JBS-146M transmitter was turned off.
7. The IFR COM-120B RF signal generator was set to the transmit frequency at an RF level 30 dB below that measured in step 5, modulated with a 1 kHz tone at $\pm$ 12.5 kHz deviation.
8. The Phillips PM-3335 digital oscilloscope horizontal sweep rate was set to 10 mS per division. The vertical amplitude control was adjusted to display the 1000 Hz demodulated audio from the signal generator at $\pm$ 4 divisions (3.125 kHz/div), vertically centered on the screen.
9. The Phillips 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 JBS-146M transmitter.
10. The JBS-146M transmitter is turned on 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-B Part 2.2.19.3. The resulting plot is labeled “Switch ON” and shows compliance with FCC Part 90.214.
11. The Phillips 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 JBS-146M transmitter.
12. The JBS-146M transmitter is turned off 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-B Part 2.2.19.3. The resulting plot is labeled “Switch OFF” and shows compliance with FCC Part 90.214.
13. The test procedure was repeated for a frequency at the low end of the desired operating band. The worst case response occurred at the upper edge of the specified operating band, with the resulting display included in this exhibit.

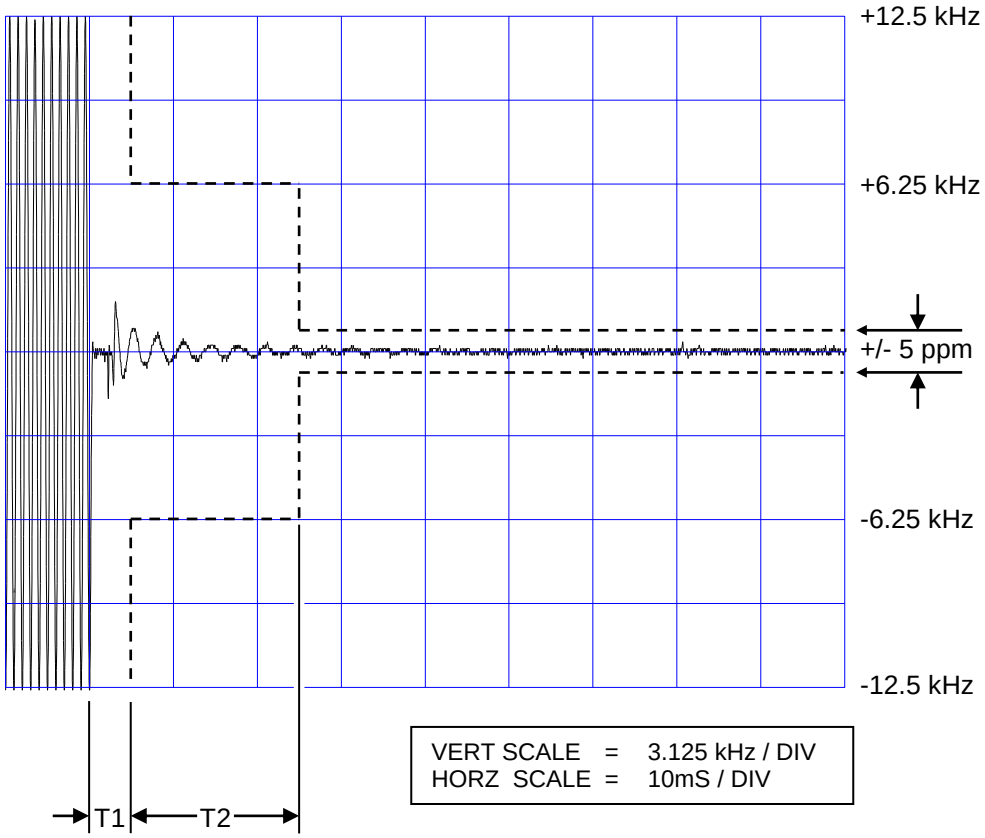
TYPE OF EXHIBIT:	TRANSIENT FREQUENCY BEHAVIOR
FCC PART:	90.214
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 17, 2014

TEST SETUP:



TYPE OF EXHIBIT:	TRANSIENT FREQUENCY BEHAVIOR
FCC PART:	90.214
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 17, 2014

SWITCH ON CONDITION

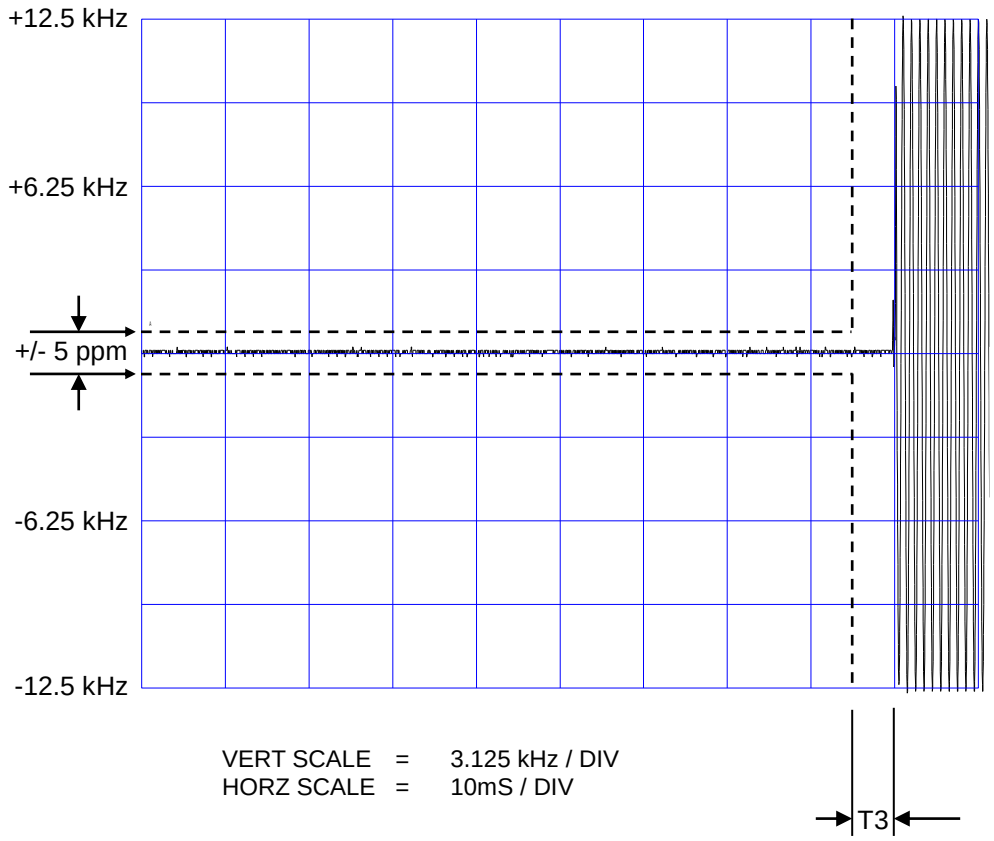


SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer

TYPE OF EXHIBIT:	TRANSIENT FREQUENCY BEHAVIOR
FCC PART:	90.214
MANUFACTURER:	RITRON, INC.
MODELS:	JBS-146M
TYPE OF UNIT:	VHF-FM 2-Way Desk Top Radio
FCC ID:	AIERIT37-146M
DATE:	March 17, 2014

SWITCH OFF CONDITION



SIGNED: Michael A. Pickard

Michael A. Pickard - Project Engineer