TYPE OF EXHIBIT: TABLE OF CONTENTS
FCC PART: 2.1033(c)(14)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 23, 2015

TYPE OF EXHIBIT: LIST OF TEST EQUIPMENT USED
FCC PART: 2.947(d)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 23, 2015

ITEM	MAKE/MODEL	SERIAL NO.	CAL.	NEXT CAL.
Agilent	N5181A	MY47070348	31 Oct 2014	31 Oct 2017
RF Test Set	HP 8920A	3352A03633	12 Oct 2015	12 Oct 2017
Spectrum Analyzer	Advantest R3265A	75060189	12 Oct 2015	12 Oct 2016
Spectrum Analyzer	HP 8560E	3720A02980	12 Oct 2015	12 Oct 2016
Log periodic	Electro-Metrics LPA-25	8-101	30 Apr 2014	30 Apr 2017
Gain Horn	EMCO 3105	2034	22 Oct 2013	22 Oct 2015
Digital Oscilloscope	Link Instruments DSO-28	225100009800	N/A	N/A
Temp. Chamber	Delta Design 3900	0-52-R	N/A	N/A
DC Power Supply	HQ PS3010U		N/A	N/A
Multimeter	HP 3466A		N/A	N/A

TYPE OF EXHIBIT: MEASUREMENT METHODS
FCC PART: 2.947
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 23, 2015

Unless noted otherwise, all of the measurements made on this device and included in this report were made per ANSI/TIA-603-C-2004.

Dennis Zimmerman
Project Engineer
RITRON, Inc.

TYPE OF EXHIBIT: DESCRIPTION OF MEASUREMENT FACILITY
FCC PART: 2.948
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: April 21, 2015

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:

Dennis Zimmerman
Project Engineer
RITRON, Inc.

TYPE OF EXHIBIT: RADIO FREQUENCY OUTPUT POWER
FCC PART: 2.1046(a)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 13, 2015

PROCEDURE:

1. The RQX-117NX was aligned for transmitter operation at three frequencies across the operating band. RF power output using an external 12 VDC was measured. The unit is capable of being powered by 3 D cells or an external 8 to 12 volt battery. The controller senses the battery voltage and adjusts to either low power (nominal 800 mW) or high power (nominal 2.5 W). Battery voltage ranges are as follows:

   3 D cells: 4.5 to 3.3 v
   12 v external battery: 12 v to 8 v

2. Power was supplied to the RQX-117NX by a PS3010U Power Supply. The RQX-117NX was connected to a HP8920A Test Set through an SMB test port connector 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.

3. The voltage (V tx) and current (I tx) into the power supply lead of the RF Power Module was measured by an HP3466A Digital Multimeter for the various supply voltages.

4. As can be seen in the table the 3 D cells yields a nominal 800 mW output while the external 12 VDC can yield up to 2.5 Watts output power.

TYPE OF EXHIBIT: RADIO FREQUENCY OUTPUT POWER
FCC PART: 2.1046(a)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 13, 2015

RESULTS:

	3 D cell internal battery			12v external input			
Frequency (MHz)	**Vin int (VDC)**	**I tx (A)**	**Power (W)**	**Vin ext (VDC)**	**I tx (A)**	**Power (W)**	**Vtx (VDC)**
150.815	3.3	0.43	0.685				3.15
	4.5	0.47	1.1				4.35
				8	0.75	2.48	6.9
				12	0.75	2.48	7.14
161.565	3.3	0.43	0.75				3.15
	4.5	0.47	1.1				4.37
				8	0.75	2.48	6.9
				12	0.75	2.5	7.14
173.9	3.3	0.43	0.74				3.15
	4.5	0.47	1.15				4.35
				8	0.75	2.49	6.9
				12	0.75	2.5	7.14

TYPE OF EXHIBIT: MODULATOR RESPONSE-FM 12.5 kHz CHANNELS
FCC PART: 2.1047(a)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 13, 2015

PROCEDURE:

1. The RQX-117NX was aligned for transmitter operation at 161.565 MHz at 2.5 Watts.

2. The audio output of the HP8920 was swept in frequency from 200 Hz to 6 kHz and was injected in the AUX_IN input.

3. The modulated signal was demodulated by an HP8920A and the audio output signal was sent to an HP8560E spectrum analyzer to obtain a larger dynamic range of measurement.

4. The overall FM deviation is plotted relative to deviation at 1 kHz. The TIA-603-C limits are plotted above and below the response curve. The frequency response is independent of carrier frequency.

TYPE OF EXHIBIT: MODULATOR RESPONSE-FM 12.5 kHz CHANNELS

FCC PART: 2.1047(a)

MANUFACTURER: RITRON, Inc.

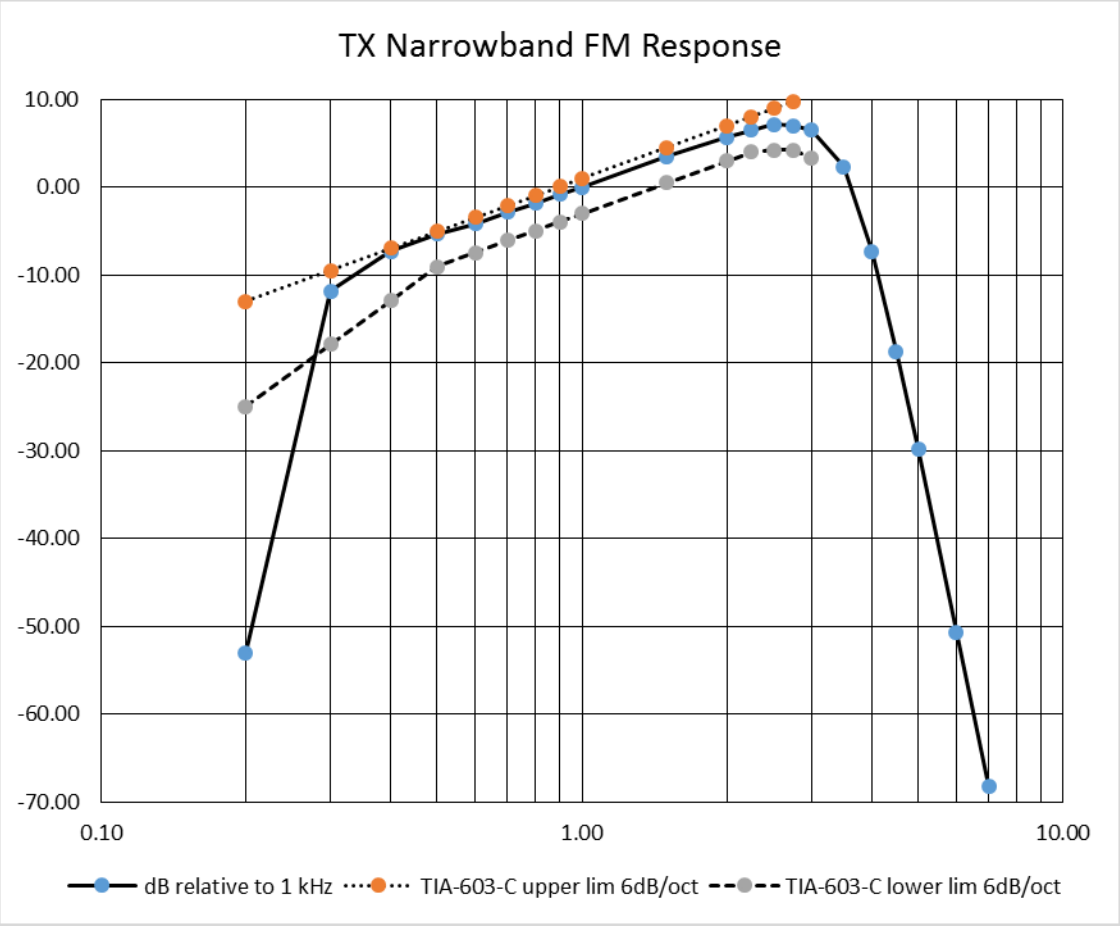
MODEL: RQX-117NX

TYPE OF UNIT: VHF FM/NXDN 2-way callbox

FCC ID: AIERIT41-117

DATE: October 13, 2015

RESULTS: Pre-emphasized Transmitter



TYPE OF EXHIBIT: MODULATION LIMITING CURVES
FCC PART: 2.1047(b)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 13, 2015

PROCEDURE:

1. The RQX-117NX was aligned for transmitter operation on 161.565 MHz.

2. The RF output was connected to the RF input of a radio Test Set configured to measure FM deviation. The audio output of the audio test set was routed to the audio input of the RQX-117NX.

3. The frequency of the audio generator was adjusted to find the frequency of maximum response. As outlined in the Maintenance manual the RQX-117NX transmit deviation was adjusted for 2.4 kHz maximum deviation for 12.5 kHz channel spacing. Other FM deviations were compared to this as a percentage of maximum deviation.

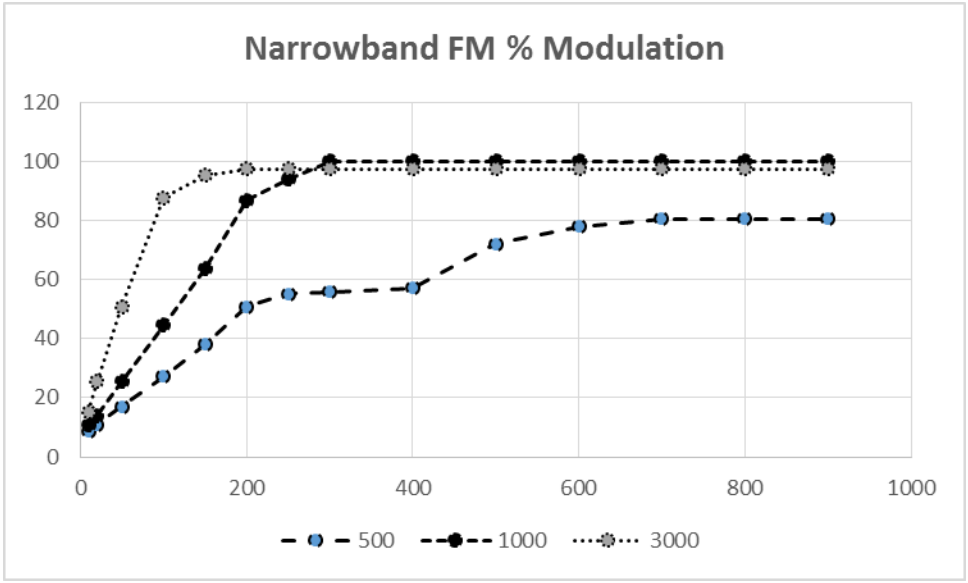
4. The audio frequency was set to 500 Hz and the output level was varied from zero to a level producing limiting.

5. Step 4 was repeated for audio frequencies of 500, 1000 and 3000 Hz for 12.5 kHz channel spacing.

TYPE OF EXHIBIT: MODULATION LIMITING CURVES-12.5 kHz CHANNELS
FCC PART: 2.1047(b)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 13, 2015

RESULTS: Pre-emphasized TX

input (mV rms)	Frequency (kHz) 500	1000	3000
10	0.2	0.26	0.36
20	0.26	0.33	0.6
50	0.4	0.6	1.2
100	0.64	1.05	2.07
150	0.9	1.5	2.25
200	1.2	2.05	2.3
250	1.3	2.22	2.3
300	1.32	2.36	2.3
400	1.35	2.36	2.3
500	1.7	2.36	2.3
600	1.84	2.36	2.3
700	1.9	2.36	2.3
800	1.9	2.36	2.3
900	1.9	2.36	2.3



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH
FCC PART: 2.1049(c)(1), 90.210(d), 90.210(e)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 22, 2015

PROCEDURE:

1. A 20 dB attenuator was inserted between the RQX-117NX and the HP 8560E spectrum analyzer. Output power was set at the maximum 2.5 Watts. All plots have power spectra within the superimposed FCC occupied bandwidth masks. The occupied bandwidth plots are independent of carrier frequency, therefore, only the plots for 160.41 MHz are shown. Plot specifics for each plot follow:

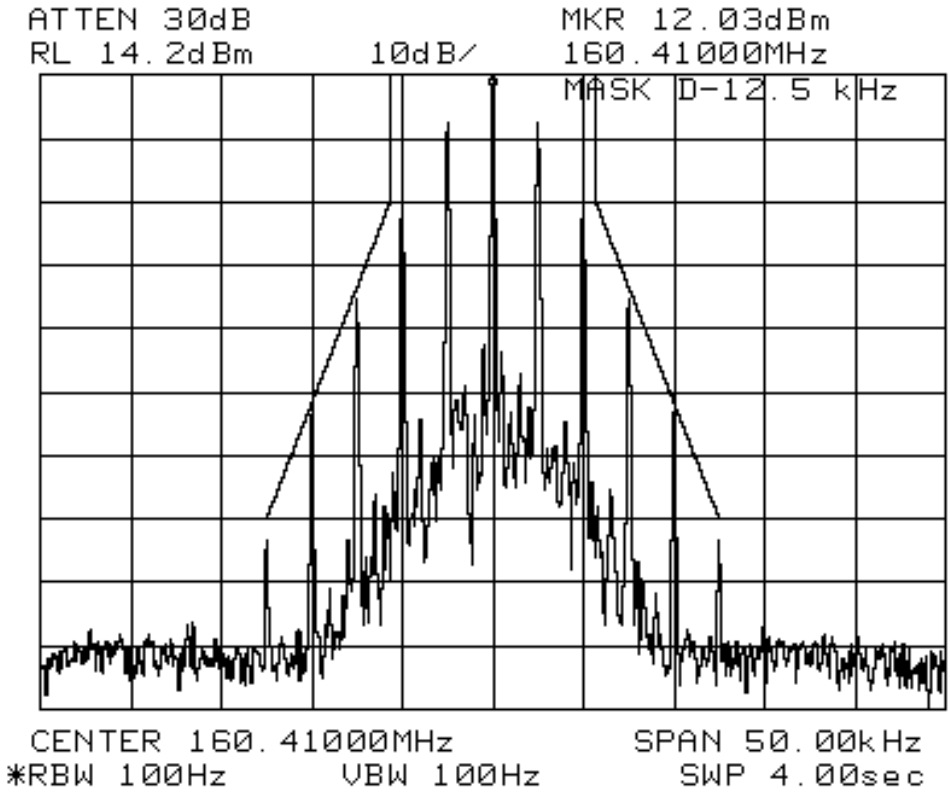
2. For 12.5 kHz analog channel voice operation, a 2.5 kHz audio signal was applied to the microphone input of the unit. Its level was adjusted to be 16 dB above that required to produce 50% of peak deviation at the frequency of maximum deviation. The deviation adjustment was set for 2.4 kHz maximum deviation for 12.5 kHz channel operation and a spectrum analyzer was connected to the RF output through an RF power attenuator. The analyzer was set to sweep +/-25 kHz of carrier with a reference level set to that of an unmodulated carrier.

3. For 12.5 kHz digital voice and data operation, the NXDN module transmits 4 FSK at about +/-3.1 kHz deviation. The analyzer was set to sweep +/-25 kHz of carrier with a reference level set to that of the unmodulated carrier. Digital voice and data are indistinguishable when viewed on a spectrum analyzer and therefore, will be shown as one plot.

4. For 6.25 kHz digital voice and data operation the NXDN module transmits 4 FSK at about +/-1.3 kHz deviation. The analyzer is set to sweep +/-25 kHz either side of the carrier. Digital voice and data are indistinguishable when viewed on a spectrum analyzer and therefore, will be shown as one plot. Also, digital and voice and data can also be combined as a common signal with the plot appearing the same as data or digitized voice.

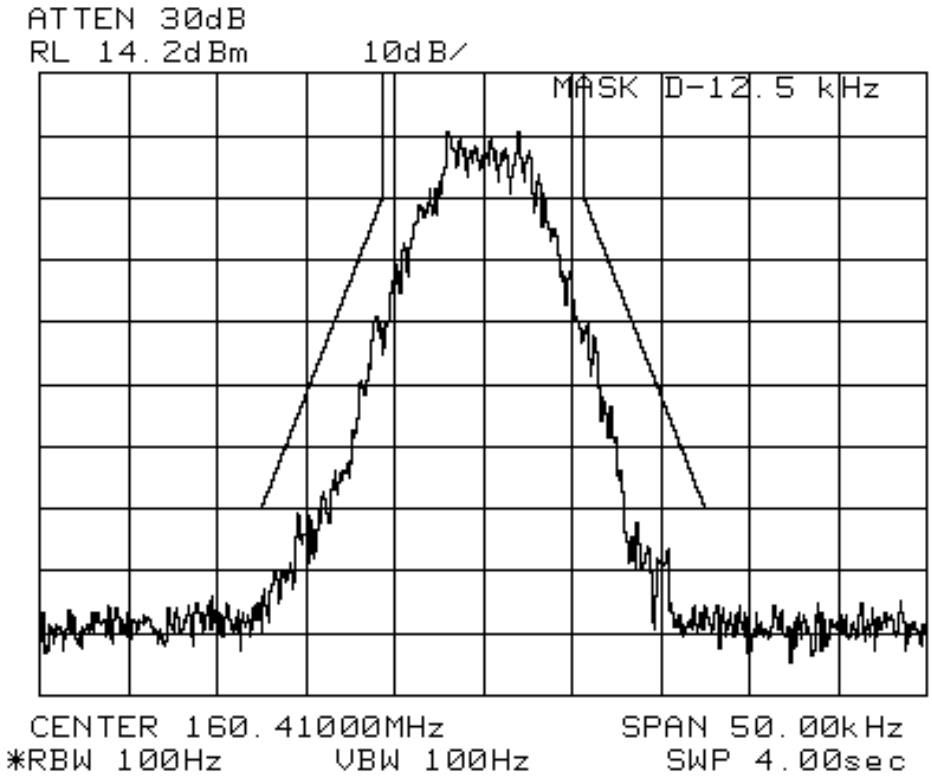
TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-Analog 12.5 kHz CHANNELS
FCC PART: 2.1049(c)(1), 90.210(d)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 22, 2015

RESULTS: Analog voice modulation



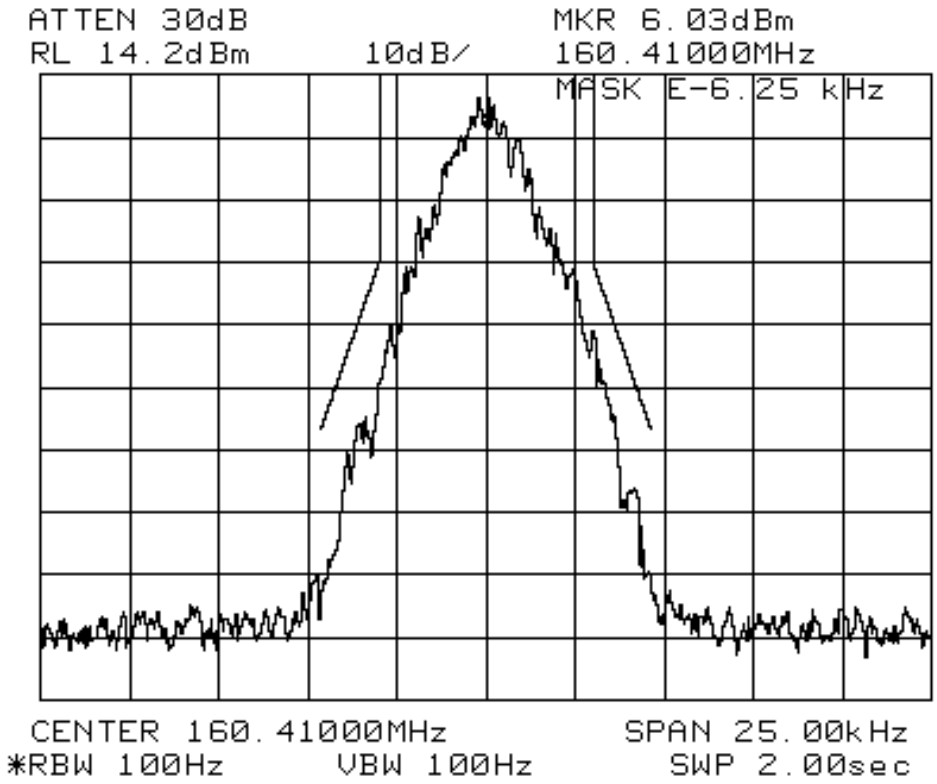
TYPE OF EXHIBIT: OCCUPIED BANDWIDTH- Digital 12.5 kHz CHANNELS
FCC PART: 2.1049(c) (1), 90.210(d)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 22, 2015

RESULTS: narrow band digital voice/data modulation



TYPE OF EXHIBIT: OCCUPIED BANDWIDTH-6.25 kHz CHANNELS
FCC PART: 2.1049(c)(1), 90.210(e)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 22, 2015

RESULTS: Super-narrow band digital voice/data modulation



TYPE OF EXHIBIT: BANDWIDTH CALCULATION/MODULATION TYPE
FCC PART: 2.1049(c)(1), 90.210(d), 90.210(e)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: August 10, 2015

RESULTS:

Modulation:

Analog Voice

Analog voice signals directly modulates the transmitter carrier with a maximum peak deviation which is dependant upon the channel spacing. Voice signals are pre-emphasized, limited, and filtered prior to being sent to the modulator.

Digital Voice & Data -4FSK

NXDN digital voice and data is the 4-level (4FSK) filtered output of a digital voice encoder and directly modulates the transmitter carrier. The maximum deviation is dependent upon the channel spacing. The 4FSK data stream is encoded into dibits (2 bit symbols) at half the original data rate and used to create a 4-level signal which passes through a root-raised cosine filter and is then used to directly modulate the transmitter carrier. The maximum deviation is dependent upon the channel spacing which in NXDN is either super-narrow band at 6.25 kHz or wideband at 12.5 kHz.

TYPE OF EXHIBIT: BANDWIDTH CALCULATION/MODULATION TYPE
FCC PART: 2.1049(c)(1), 90.210(d), 90.210(e)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: August 10, 2015

RESULTS:

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.

Modulation	f_Δ	f_m	BW	Emissions Designator
Analog Voice				
12.5 kHz	2.5	3	11.0	11K0F3E
Digital Voice				
6.25 kHz	1.05	0.95	4.0	4K00F1E
12.5 kHz	2.10	1.90	8.0	8K00F1E
4FSK Data				
6.25 kHz	1.05	0.95	4.0	4K00F1D
12.5 kHz	2.10	1.90	8.0	8K00F1D
Digital Voice/Data Combination				
6.25 kHz	1.05	0.95	4.0	4K00F7W
12.5 kHz	2.10	1.90	8.0	8K00F7W

TYPE OF EXHIBIT: CONDUCTED SPURIOUS EMISSIONS
FCC PART: 2.1051, 90.210(d)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 13, 2015

PROCEDURE:

1. The RQX-117NX was aligned for transmitter operation low, mid and high frequencies and at a 2.5 Watt power level. The transmitter was modulated in a manner consistent with the type of signal to be transmitted.

2. The RF output was connected to an HP 8560E spectrum analyzer through a 20 dB, 10 watt, 50-ohm RF attenuator. The frequency spectrum around each carrier was searched from 9 kHz to 270 MHz. No spurious above -25 dBm exists in this range.

3. In searching above 270 MHz, a 270 MHz high pass filter was added after the attenuator in order to see only the harmonic spurious and negate the overload effects of the transmitter.

4. The transmitter was keyed and the output spectrum was examined up to 1.8 GHz. The attenuation of the high pass filter at the transmitter harmonic frequencies was measured and factored into the absolute results. These results are tabulated below.

TYPE OF EXHIBIT: CONDUCTED SPURIOUS EMISSIONS
FCC PART: 2.1051, 90.210(d)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 13, 2015

RESULTS:

Carrier Freq (MHz)	Harmonic	Spur level (dBm)	Spur level (dBc)	margin < -25dBm (dB)
150.815				
	2	-41.67	-75.67	16.67
	3	-48.5	-82.5	23.5
	4	-41.67	-75.67	16.67
161.565				
	2	-43.67	-77.67	18.67
	3	-42.83	-76.83	17.83
	4	-42.67	-76.67	17.67
173.39				
	2	-41.5	-75.5	16.5
	3	-45.83	-79.83	20.83
	4	-46.83	-80.83	21.83

Passed: predominate spurs at the 2nd, 3rd and 4th harmonics are well below the -25 dBm limit.

TYPE OF EXHIBIT:	FIELD STRENGTH OF SPURIOUS EMISSIONS-TRANSMITTER
FCC PART:	2.1053(a), (b)
MANUFACTURER:	RITRON, Inc.
MODEL:	RQX-117NX
TYPE OF UNIT:	VHF FM/NXDN 2-way callbox
FCC ID:	AIERIT41-117
DATE:	October 16, 2015

PROCEDURE:

1. The measurements for field strength of spurious emissions were taken at the RITRON, Inc. 3-meter test site, details of which are on file with the FCC and Industry Canada.

2. The RQX-117NX was aligned and programmed for transmitter operation close to the band edges of 151.815 MHz and 173.975 MHz and the band center of 161.565 MHz at a 2.5 Watt power level. (173.975 MHz if for test purposes only, **"NOT FOR FCC CERTIFICATION")**

TYPE OF EXHIBIT: TABLE OF CONTENTS
FCC PART: 2.1033(c)(14)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 23, 2015

3. The transmitter was connected to its internal VHF antenna.

4. All field strength measurements were made with the Advantest R3265A spectrum analyzer, log periodic antenna and EMCO gain horn.

5. The transmitter was keyed and the spectrum searched from 9 kHz to the 10th harmonic of the transmitted carrier. When a spurious emission was found, the

height of the field strength measurement antenna and orientation of the RQX-117NX were varied to provide maximum field strength. This level is noted as Pspur.

6. A substitution antenna, a calibrated dipole, was substituted for the RQX-117NX at the RQX-117NX's location. An RF signal generator was set at the frequency of the RQX-117NX spurious at a level of Pgen (typically 0 dBm).

7. The height of the field strength measurement antenna was adjusted for maximum signal strength. The level at the field strength antenna was noted as Pref.

TYPE OF EXHIBIT: FIELD STRENGTH OF SPURIOUS EMISSIONS-TRANSMITTER
FCC PART: 2.1053(a), (b)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 16, 2015

EQUATIONS:

For an absolute level of the spur, the equation is:

Spur Level(dBm) = Pspur (dBm) - Pref (dBm) + Lcab (dB) - Pgen (dBm)

For radiated emissions testing, Pspur (dBm) is the spurious emissions level as measured at the range receiving antenna.

Where:

Pgen is the RF signal generator level at the substitution antenna input.

Lcab is the cable loss from the substitution signal generator to the substitution antenna.

Pref is the power level of the substitution antenna emission at the receiving antenna output.

TYPE OF EXHIBIT: FIELD STRENGTH OF SPURIOUS EMISSIONS-TRANSMITTER
FCC PART: 2.1053(a), (b)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 16, 2015

Three frequencies, 150.815, 161.565 and 173.975 MHz were tested for spurious emissions exceeding the FCC limit of -25 dBm (relative level of -59 dBc). The substitution method of measurement was used. All spurious levels passed. The ones that where within 20 dB of the FCC limits are harmonics and are recorded below:

Note: (173.975 MHz if for test purposes only, **"NOT FOR FCC CERTIFICATION")**

161.565 MHz harmonics:

Vertical

Harmonic	freq(Ghz)	Gen level (dBm)	coax loss(dB)	Sub Vert ref(dBm)	Max Vert (dBm)	Max Spur ERP(dBm)	FCC limit (dBm)	FCC limit(dBc)	Max Spur ERP(dBc)	FCC Margin (dB)
2	0.32313	0	-1.28	-27.6	-72	-45.7	-25	-59.0	-79.7	20.7
4	0.64626	0	-1.81	-34.3	-76	-43.2	-25	-59.0	-77.1	18.2

TYPE OF EXHIBIT: FREQUENCY STABILITY VS TEMPERATURE
FCC PART: 2.1055(a)(1), 90.213
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 18, 2015

PROCEDURE:

1. The RQX-117NX uses both a 26 MHz reference oscillator for the analog radio and a 36.4 MHz reference oscillator for the digital radio. Both are aligned for transmitter operation at 155.075 MHz at 2.5 Watts.

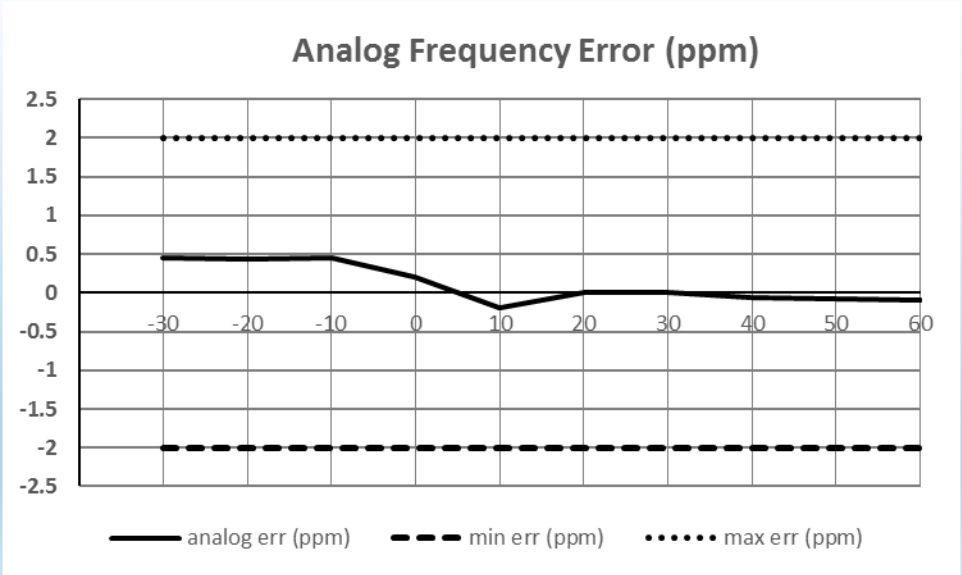
2. The RQX-117NX was placed in a Delta Design Model 3900 CL Temperature Chamber. The RF output of the RQX-117NX was connected to an HP 8920 Test Set to monitor the transmitter frequency. A PS3010U Power Supply was adjusted for a nominal voltage of 12 VDC and connected to the DC power supply input of the RQX-117NX. An AD592 precision temperature transducer was used to monitor the temperature inside the chamber.

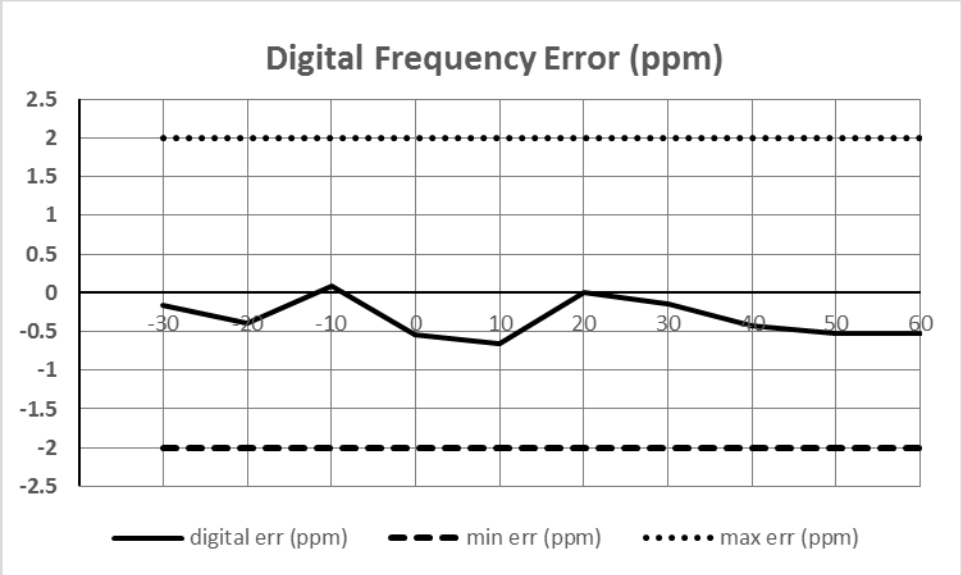
3. The chamber and the RQX-117NX were cooled to -30 degrees C and slowly raised in temperature. The temperature was allowed to stabilize for 15 minutes for each 10 degree increment in temperature until the unit reached a temperature of 60 degrees C.

4. The RF frequency at each temperature was recorded and compared with the frequency at 20 degrees C. All performance was well within the +/- 2 ppm FCC limits.

TYPE OF EXHIBIT: FREQUENCY STABILITY VS TEMPERATURE
FCC PART: 2.1055(a)(1), 90.213
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 18, 2015

RESULTS:





Temp (C)	analog err (ppm)	digital err (ppm)
-30	0.45	-0.17
-20	0.43	-0.39
-10	0.44	0.09
0	0.20	-0.54
10	-0.19	-0.66
20	0.00	0.00
30	0.01	-0.14
40	-0.06	-0.43
50	-0.07	-0.52
60	-0.09	-0.52

TYPE OF EXHIBIT: FREQUENCY STABILITY VS SUPPLY VOLTAGE
FCC PART: 2.1055(d)(1)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 18, 2015

PROCEDURE:

1. The RQX-117NX was aligned for transmitter operation at 161.565 MHz with 2.5 Watts output power. The unit is capable of operating on an external power supply or internal batteries. The unit was initially setup with the external power option with a nominal range of 8 to 12 VDC.

2. The RF output of the RQX-117NX was connected to an HP 8920B Test Set to monitor the transmitter frequency. A PS3010U Supply was adjusted over the potential range of the external power supply input of the RQX-117NX. The output frequency of the RQX-117NX was noted.

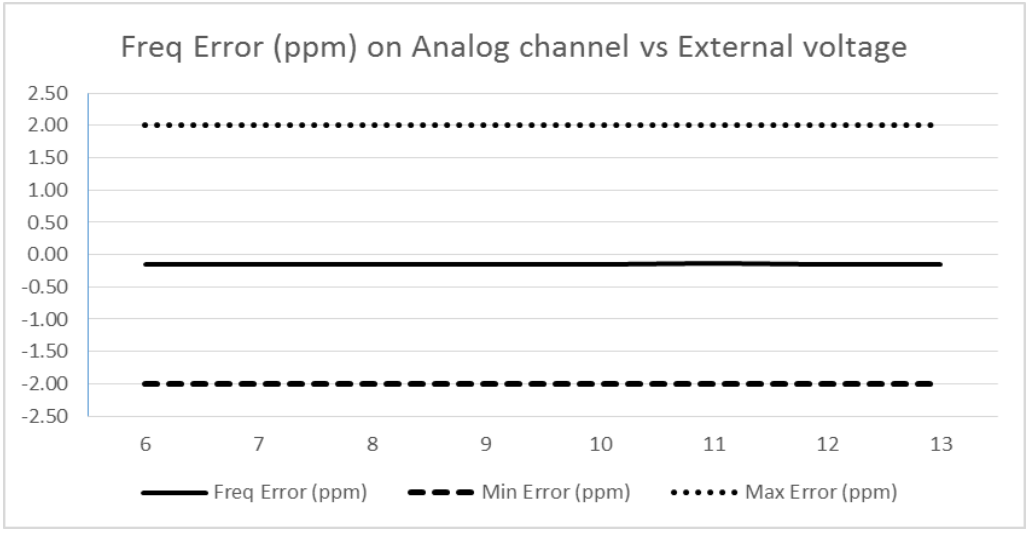
3. The above was repeated for the unit simulating the 3.3 to 4.5 VDC range of the internal 3 D cell batteries. In all cases frequency stability stays within the FCC limits of +/- 2 ppm.

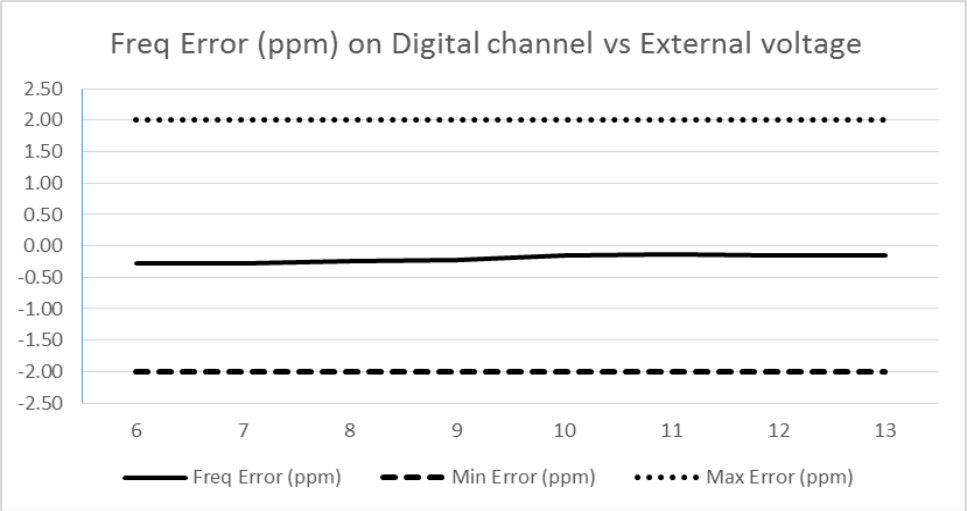
TYPE OF EXHIBIT: FREQUENCY STABILITY VS SUPPLY VOLTAGE
FCC PART: 2.1055(d)(1)
MANUFACTURER: RITRON, Inc.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 18, 2015

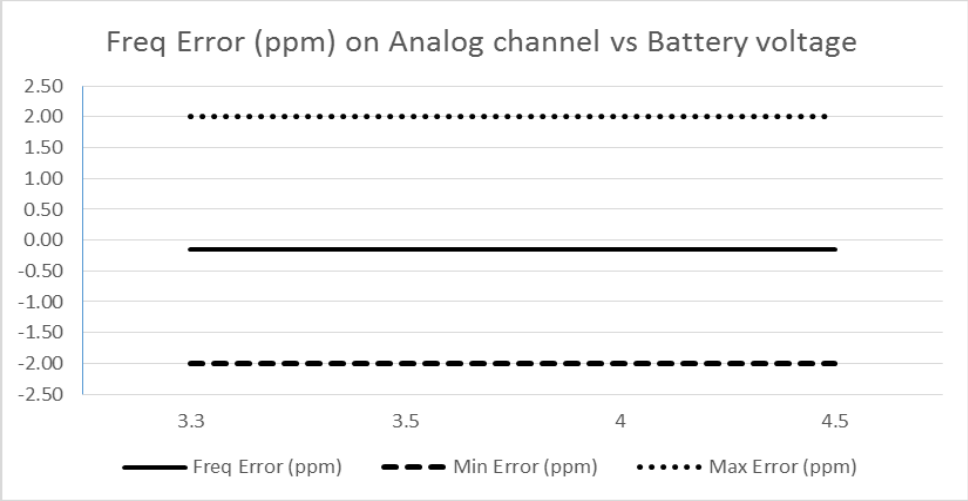
RESULTS:

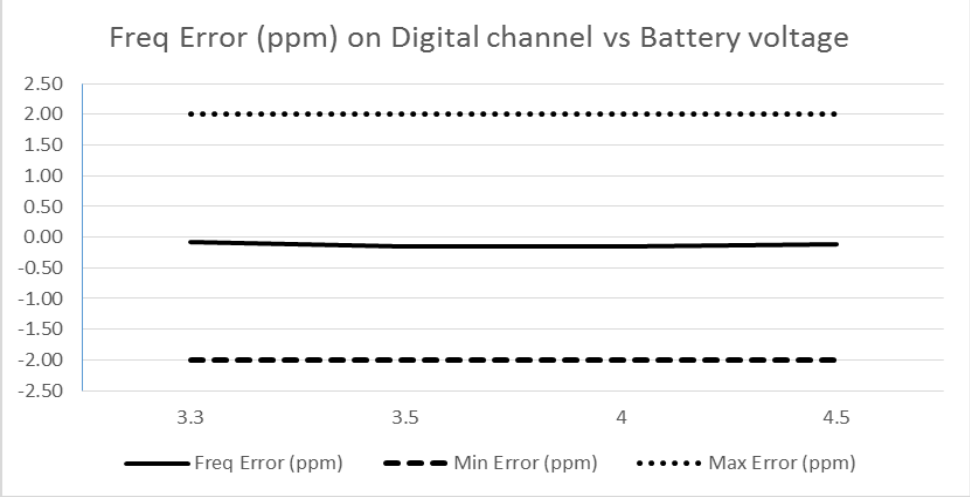
External VDC	Analog Freq (MHz)	Freq Error (ppm)	Digital Freq (MHz)	Freq Error (ppm)
6	161.564977	-0.14	161.564954	-0.28
7	161.564976	-0.15	161.564954	-0.28
8	161.564976	-0.15	161.564962	-0.24
9	161.564977	-0.14	161.564965	-0.22
10	161.564977	-0.14	161.564976	-0.15
11	161.564978	-0.14	161.564979	-0.13
12	161.564977	-0.14	161.564977	-0.14
13	161.564977	-0.14	161.564977	-0.14

Internal VDC	Analog Freq (MHz)	Freq Error (ppm)	Digital Freq (MHz)	Freq Error (ppm)
3.3	161.564977	-0.14	161.564986	-0.09
3.5	161.564979	-0.13	161.564975	-0.15
4	161.564978	-0.14	161.564975	-0.15
4.5	161.564978	-0.14	161.564981	-0.12




Freq Error (ppm) on Digital channel vs External voltage
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
6
7
8
9
10
11
12
13
Freq Error (ppm)
Min Error (ppm)
Max Error (ppm)


Freq Error (ppm) on Analog channel vs Battery voltage
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
3.3
3.5
4
4.5
Freq Error (ppm)
Min Error (ppm)
Max Error (ppm)

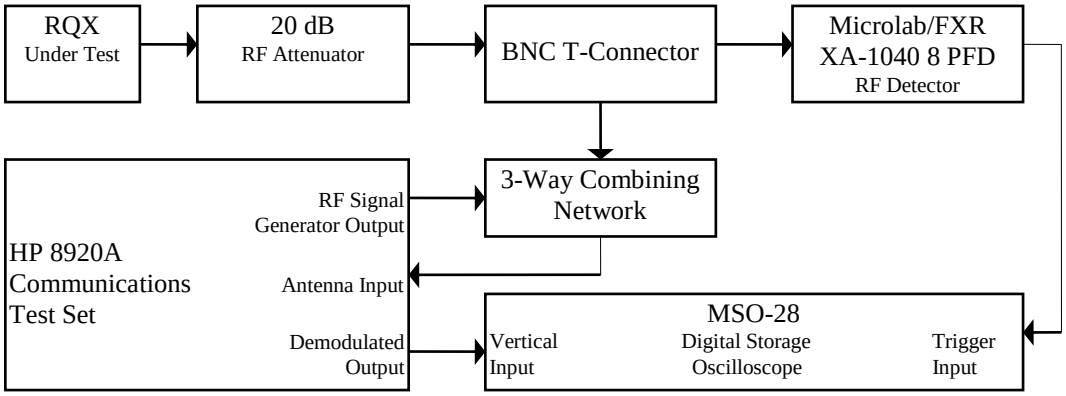

Freq Error (ppm) on Digital channel vs Battery voltage
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
3.3
3.5
4
4.5
Freq Error (ppm)
Min Error (ppm)
Max Error (ppm)

TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR
FCC PART: 90.214
MANUFACTURER: RITRON, INC.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 14, 2015

PROCEDURE:

1. The RQX-117NX was aligned for transmitter operation on 155 MHz at full rated power. The following procedure will be run first for the narrowband analog radio subsystem and then for the NXDN digital subsystem.

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



3. The HP 8920A Receiver was set to measure FM deviation with the audio bandwidth set at <20 Hz to greater than 230 kHz with the RF frequency set to 155 MHz.

4. The RQX-117NX transmitter under test was activated and the HP 8920A was used to measure the RF response through the test network.

TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR
FCC PART: 90.214
MANUFACTURER: RITRON, INC.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 14, 2015

PROCEDURE (continued):

5. The RQX-117NX transmitter was turned off. The HP 8920A RF Signal Generator was set to 155 MHz at an RF level at the HP 8920A which was 30 dB below that measured in step 3 and modulated with a 1 kHz tone at +/-12.5 kHz for analog and +/-6.25 kHz deviation for digital.

6. The MSO-28 Digital Oscilloscope Horizontal Sweep Rate was set to 10 msec/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 MSO-28 Digital Oscilloscope was set to trigger at 1 division from the left side of the display when the RF Detector sensed RF power from the RQX-117NX transmitter.

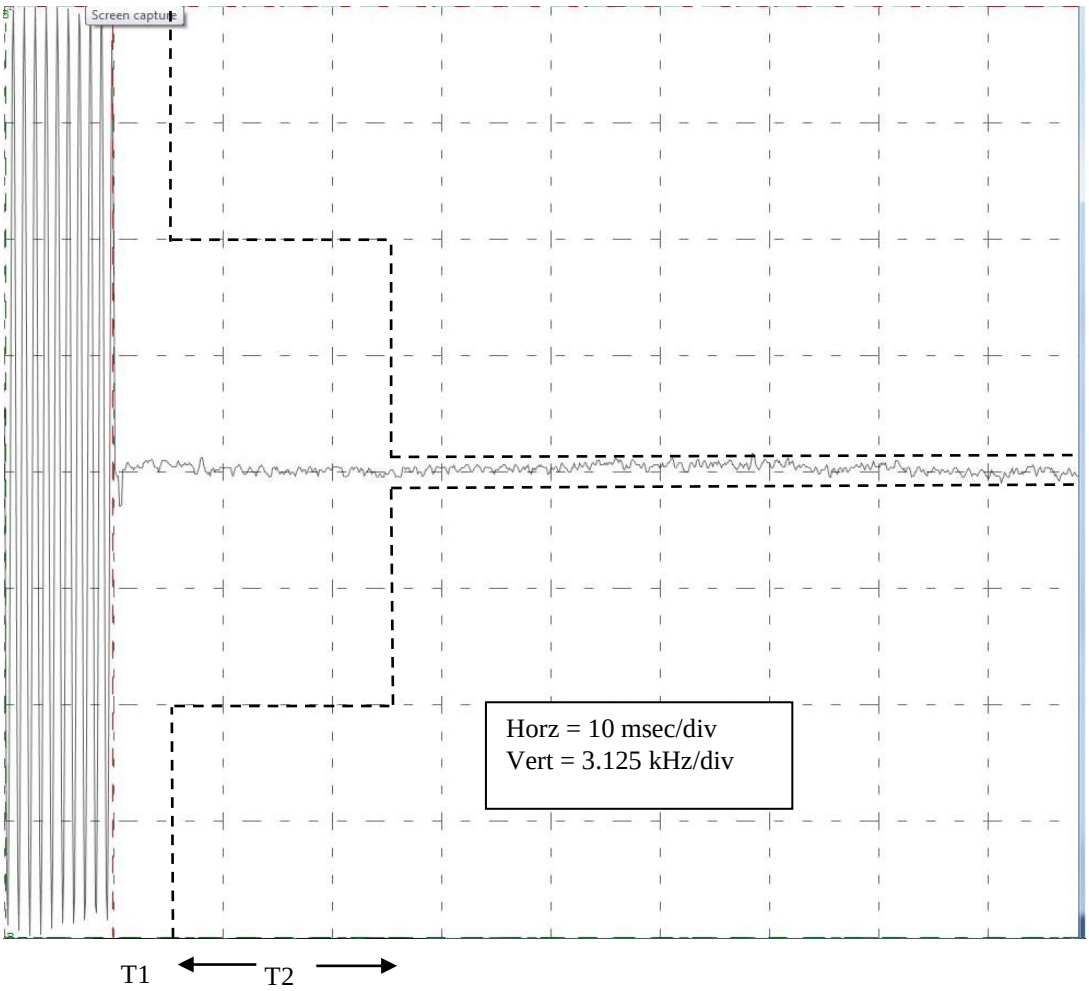
8. The RQX-117NX transmitter was activated and the resulting waveform on the oscilloscope display was stored and plotted. The FCC limits per Part 90.214 were added to the plot. The resulting plot is labeled “Switch On Condition” and shows compliance with FCC Part 90.214/IC RSS-119, section 6.5.

9. The MSO-28 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 RQX-117NX transmitter.

10. The RQX-117NX transmitter was turned off and the resulting waveform on the oscilloscope display was stored and plotted. The limits per FCC Part 90.214/RSS-119, section 6.5 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.

TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR
FCC PART: 90.214
MANUFACTURER: RITRON, INC.
MODEL: RQX-117NX
TYPE OF UNIT: VHF FM/NXDN 2-way callbox
FCC ID: AIERIT41-117
DATE: October 14, 2015

RESULTS: Analog Narrowband Switch-On Condition



TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR

FCC PART: 90.214

MANUFACTURER: RITRON, INC.

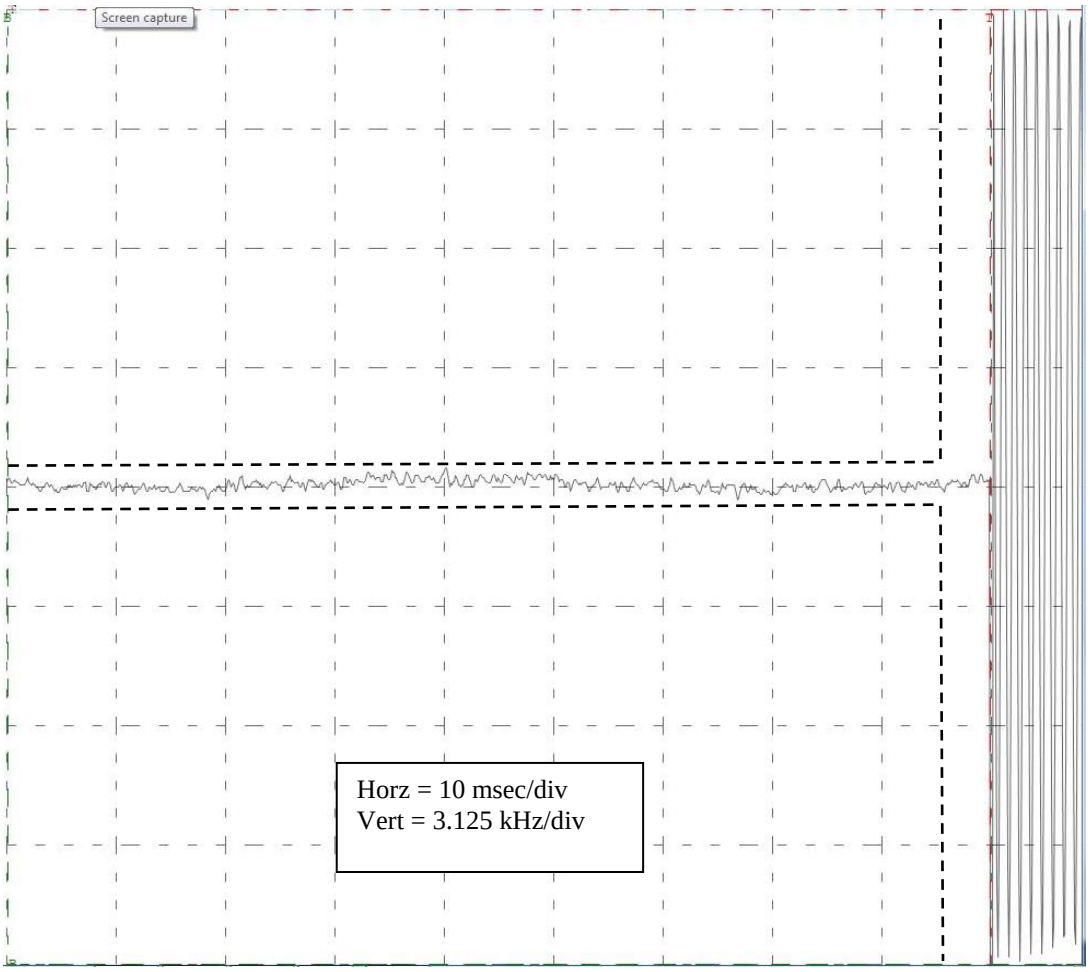
MODEL: RQX-117NX

TYPE OF UNIT: VHF FM/NXDN 2-way callbox

FCC ID: AIERIT41-117

DATE: October 14, 2015

RESULTS: Analog Narrowband Switch-Off Condition



TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR

FCC PART: 90.214

MANUFACTURER: RITRON, INC.

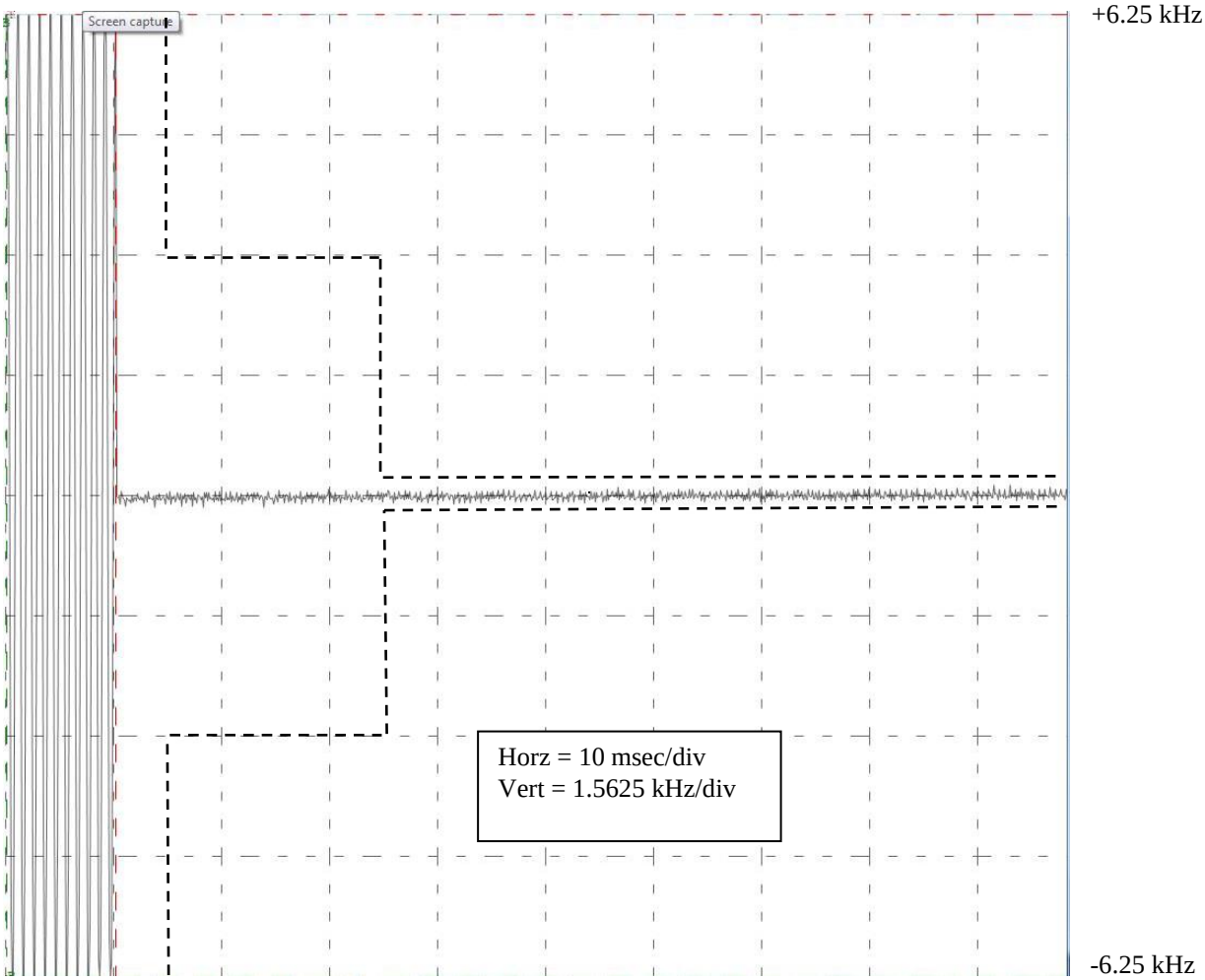
MODEL: RQX-117NX

TYPE OF UNIT: VHF FM/NXDN 2-way callbox

FCC ID: AIERIT41-117

DATE: October 14, 2015

RESULTS: Digital Super Narrowband Switch-On Condition



TYPE OF TEST: TRANSIENT FREQUENCY BEHAVIOR

FCC PART: 90.214

MANUFACTURER: RITRON, INC.

MODEL: RQX-117NX

TYPE OF UNIT: VHF FM/NXDN 2-way callbox

FCC ID: AIERIT41-117

DATE: October 14, 2015

RESULTS: Digital Super Narrowband Switch-Off Condition