Wireless Messaging Group
One Glenayre Way
Quincy, IL 62301 USA
217-221-6773

November 12, 1998

Federal Communications Commission
Authorized and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

Gentlemen:

Please find enclosed the application and technical exhibits for Type Acceptance of Glenayre Electronics' transmitter, FCC ID: BFLGL-T8500-CN. This transmitter is an FM land-mobile base unit for use in the 924 to 960 MHertz frequency range with an RF power output of 250 Watts.

Digital signal processing (DSP) and direct digital synthesis (DDS) techniques are used at low signal levels for processing, modulation, and RF generation.

This application demonstrates FCC compliance for digital modulation to 9600 bps.

Glenayre requests that this transmitter be authorized to operate with the optional device.

1. The Motorola C-Net™ Platinum Series controller. This controller houses the 10 MHertz oscillator, which is the RF reference for the transmitter. Glenayre has characterized the performance of this oscillator over the temperature range of –30 to +50 degrees Centigrade. The Model Number for this controller: C-Net™ Platinum Series.

The use of the optional external 10 MHertz reference oscillators in no way degrades the spectral character of the BFLGL-T8500-CN as presented in this Type Acceptance submission.

Sincerely,

Chaman L. Bhardwaj
Lead Compliance Engineer
Tel: 217-221-6416 or chaman.bhardwaj@glenayre.com

TYPE APPROVAL APPLICATION
FOR
MODEL:GL-T8500-CN
FCC ID:BFLGL-T8500-CN
TEST DATES: OCTOBER 21 THROUGH NOVEMBER 10, 1998

TEST REPORT PREPRED BY:

……
Chaman L. Bhardwaj
LEAD COMPLIANCE ENGINEER

APPROVED BY:

……
Joseph E. Jones, Jr., P.E., NCE
SR. MANAGER COMPLIANCE GROUP

GLENAYRE™

CERTIFICATION OF TEST DATA

I hereby certify that the test data identified below were taken by myself, or under my direct supervision; that the tests were conduced according to accepted good engineering practice; and that the data are true and correct, according to my knowledge and belief.

Standards used for measurements for the transmitter is TIA/EIA-603

Signed __Chaman L. Bhardwaj_____ Date: November 12, 1998

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Exhibit 5	Motorola CNET
Exhibit 6	Schematics
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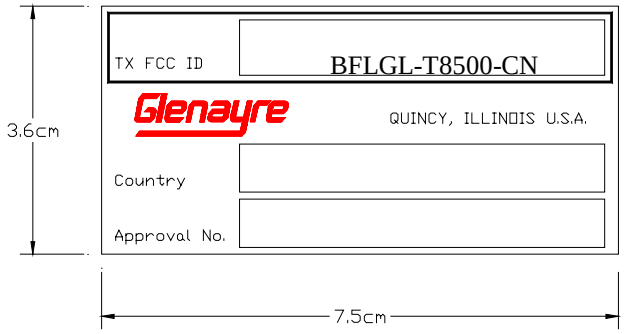
EXHIBIT 1: EQUIPMENT IDENTIFICATION LABEL (FCC 2.1003)



NOTES:

1. Color - Background Black. Blocks (3 Plcs) & lettering to be natural aluminum color.
2. Pressure sensitive adhesive backing to be 3m 467 or equivalent.
3. Positioned vertically on std. strip.
4. Block Sizes - (A) 0.6 cm X 5.4 cm (B) 0.6 cm X 4.0 cm
5. Label must have manufacturer's Identifier Mark.
6. Affixed to Rear of EXCITER Chassis

TECHNICAL SPECIFICATION:

1	Type of emission	16K0F3E, 14K4F1D, 9K6F1D
2	Frequency Range	924 to 960 MHz
3	Operating Power Range	250 Watts
4	Maximum occupied bandwidth	16 kHz [22.359 (b)(2), 90.210(g)]
5	Maximum Deviation	+/- 4.8 kHz
6	Maximum Digital Information Rate (Bits per second)	2 level modulation - 4800 bps 4 level modulation - 9600 bps
7	Final amplifier voltage and current	Powered by 18-30 volt power supply and draws ? ampere
8	Function of each active circuit	See Technical Manual / Instruction Book
9	Complete circuit diagram	See EXHIBIT 7
10	Technical manual	See EXHIBIT 6
11	Tune up procedure	See Technical Manual - EXHIBIT 6
12	Frequency stabilizing device	The carrier frequency is controlled by an oven controlled crystal oscillator (OXCO) in all modulation modes
13a	Spurious suppression device	In all modes of operation the transmitter uses two local oscillators to convert a 100 kHz signal to the output frequency. Frequency stability is derived directly from the OCXO. The first intermediate frequency and the second intermediate frequency (carrier frequency) are filtered to remove mixing products. The final power amplifier is followed by a low-pass filter to attenuate harmonics that may be produced.
13b	Modulation limiting circuits	Analog and digital modulation are accomplished by digital processing. For any audio signal within the specified audio range, deviation is monitored by the DSP circuits and not allowed to exceed the set limit. Digital modulation is determined by the data state of the TTL compatible input. The input only recognizes two data states (1 and 0) and cannot be overdriven to cause over-modulation.
13c	Power limiting circuits	Power generated by the final amplifier is controlled by an automatic gain control circuit. This circuit maintains a constant power output under all conditions.
14	Identification label	EXHIBIT 1

Exhibit 2

TEST PROCEDURES AND RESULTS

CONTENTS DESCRIPTION	REF. FCC #	PAGE Start at
Brief Technical Description of Device Under Test (DUT)	BFLGL-T8500-CN	8
Test Equipment List		7
RF Power Output	2.985	10
Modulation Characteristics	2.987	11
Occupied Bandwidth	2.989	15
Spurious Emissions	2.991	30
Field Strength	2.993	31
Frequency Stability (Temperature)	2.995 (a)(1)	Exhibit 5
Frequency Stability (warm-up)	2.995 (c)	Exhibit 5
Frequency Stability (line voltage)	2.995 (d)	Exhibit 5
Test Configurations		A1-A4

BRIEF TECHNICAL DESCRIPTION:

The device under test (DUT) Model: GL-T8500-CN is a 250 Watts non-broadcast transmitter. The description can be found in section 6.0 of the users manaul. The block diagram for this device is shown in figure 3-9 of the user's manual p/n 9110.00163. rev. f.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	S/N	Cal. due date
Bird	Power Meter	4421	1014	Sept. 30/1999
Hewlett Packard	Spectrum Analyzer	8562E	3728A00454	Sept. 30/1999
Hewlett Packard	Modulation Analyzer	8901A	2134A01494	Aug. 31/1999
Bird	Power attenuator	8327-300	2079	May 31/1999
Hewlett Packard	Spectrum Analyzer	8563E	3745A08025	Nov.30/1999
Hewlett Packard	Frequency Counter	5316 A	2120A01229	June 30/1999
Fluke	Multimeter	12	56210002	Aug. 31/1999
Wavetek	Audio & Data generator	20	C92010051	Jun 30/1999
Hewlett Packard	Distortion analyzer	339A	2025A05312	May 31/1999
EMCO	Biconilog antenna	3141	1081	June 30/2000
EMCO	Horn antenna	3115	5394	Jan 31/2000
Associated Environmental Systems	Environmental Chamber	SK-3108	5258	Oct. 30/1999
Tektronix	Oscilloscope	2465	050-1778-03	July 31/1999
Band Pass Filter	Microlab/FXR 840-960 MHz	LB-C08	1052	NA

RF POWER OUTPUT DATA [FCC 2.985(a)]

Tune equipment according to procedure in user's manual. Terminate RF output of Transmitter equipment into antenna terminal into a 50-ohm, resistive load. Monitor equipment RF power output using a calibrated RF wattmeter. The test configuration is shown in Appendix A1.

Measure dc voltage and current applied to final RF amplifying device(s).

Record RF power output and dc current and voltage input at the RF power levels for which the equipment is rated.

Frequency Range: 924-960 MHz

Power Rating: 100-250 watts

At 250 watts

Measured RF Output: 250 watts
Measued RF out put: 54.9 dBm
Total Measured dc voltage:26.7 volts
Total Measured dc current: 23.7 amperes
Total dc power input: 632.79 watts

Rated Power Supply for	Measured Volts (V)	Measured Current (A)	Measured Power V x A watts
PA1-A-25 V	26.7	6.1	162.87
PA2-A-25 V	26.7	5.8	154.86
PA1-B-25 V	26.7	5.9	157.53
PA1-B-25V	26.7	5.9	157.53
Total	26.7	23.7	632.79

MODULATION CHARACTERISTICS – DIGITAL (FCC 2.987)

Digital modulation is generated and shaped by digital signal processing techniques (DSP). The filter does not exist in a conventional analog sense. The frequency response plots for the digital filter is shown in EXHIBIT 3-1,3-2, and 3-3 for the data rise times which are selectable for 88/150 microsecond filter. All data complies with applicable limits as specified in 47 CFR, Parts 22.359, 24.133, 90.209, and 90.210 for occupied bandwidth.

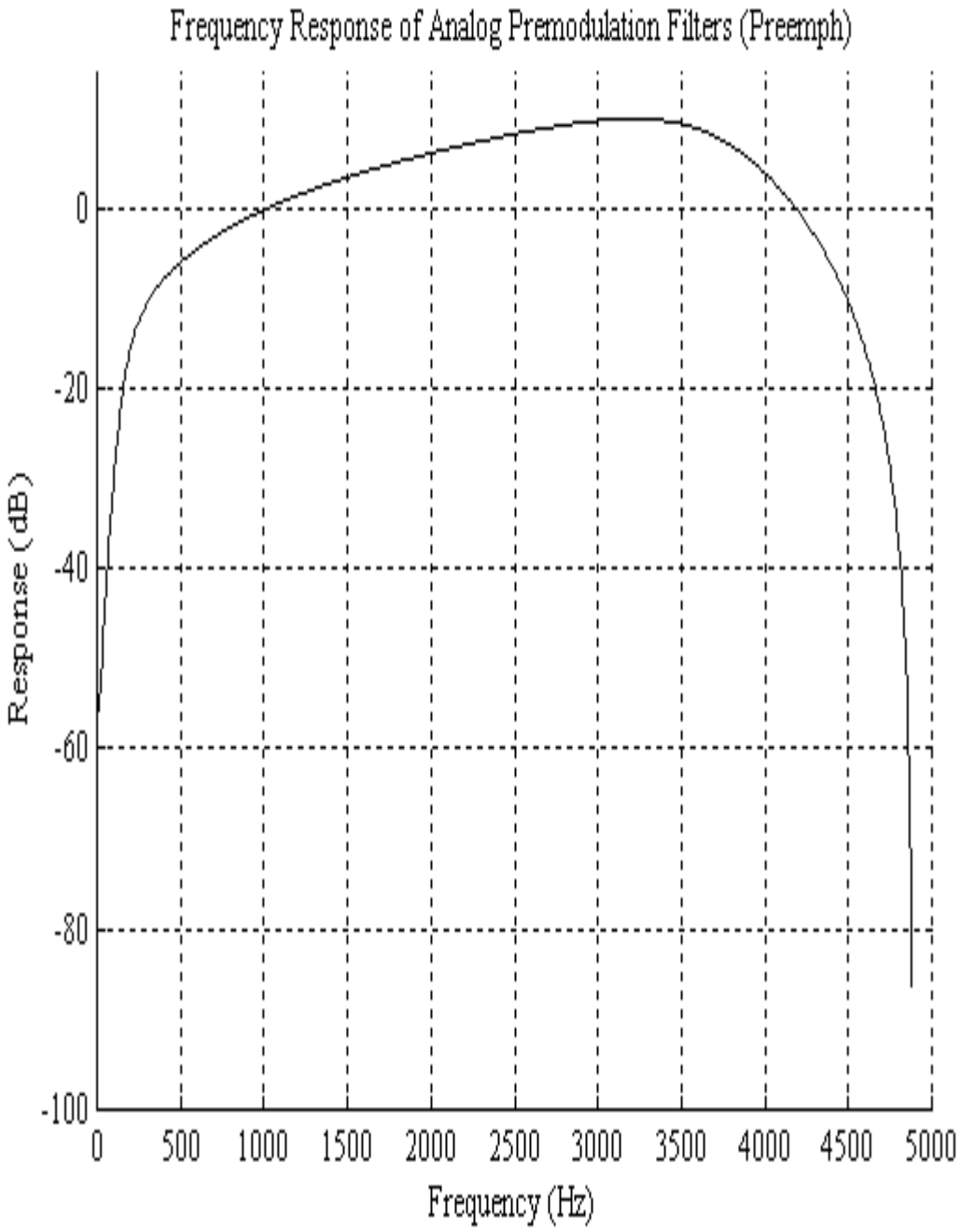

Frequency Response of Analog Premodulation Filters (Preemph)
Response (dB)
0
-20
-40
-60
-80
-100
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
Frequency (Hz)

EXHIBIT 3-1

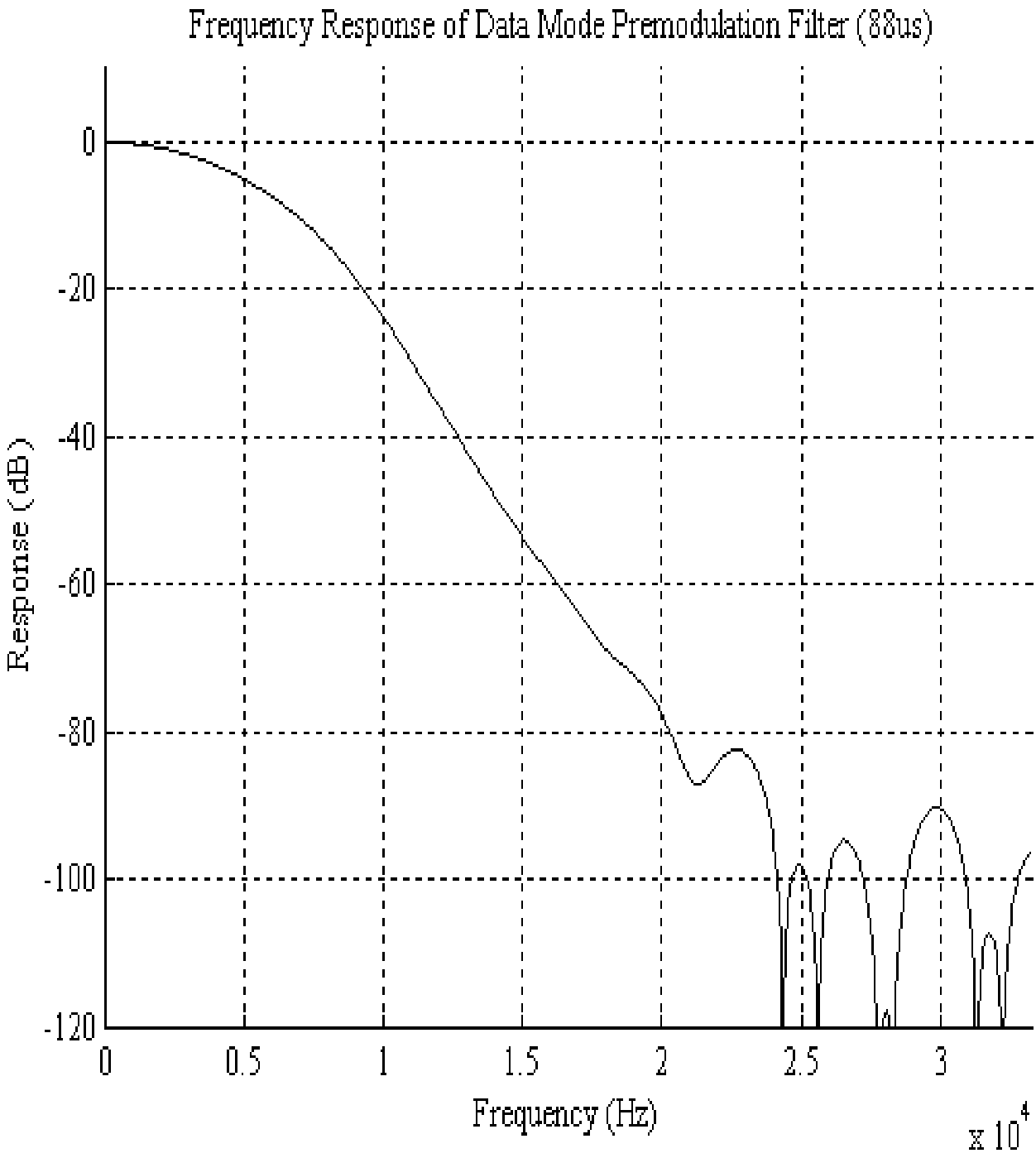

Frequency Response of Data Mode Premodulation Filter (88us)
Response (dB)
0
-20
-40
-60
-80
-100
-120
0
0.5
1
1.5
2
2.5
3
Frequency (Hz)
x 10^4

EXHIBIT 3-2

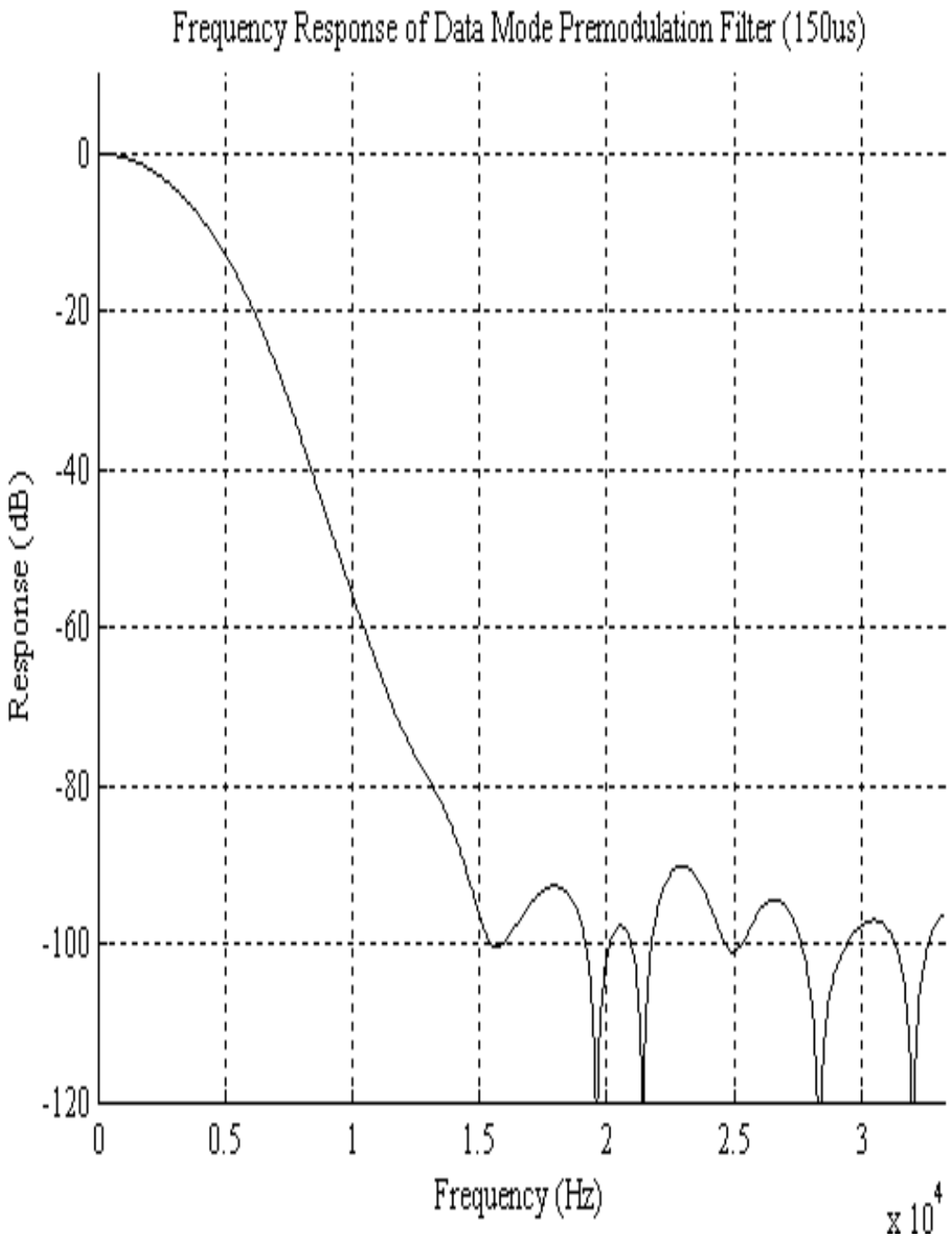

Frequency Response of Data Mode Premodulation Filter (150us)
Response (dB)
0
-20
-40
-60
-80
-100
-120
0
0.5
1
1.5
2
2.5
3
Frequency (Hz)
x 10^4

Exhibit 3-3

PER FCC RULE 22.359 (B), OCCUPIED BANDWIDTH - Digital Mode

Test procedure: A digital signal is fed into the data input of the transmitter to simulate data. The transmitter is placed in the digital modulation mode and its RF output observed on a spectrum analyzer. The transmitter is set for a maximum deviation of +/- 4.8 kHz. The spectrum is observed at maximum output power level.

Step #1 Establish a power reference using an unmodulated carrier with Transmitter operating at a maximum rated RF output power.

Step #2 Operate equipment with a specified input signal to produce a modulated RF signal at the antenna terminal.

Step #3 Plot spectral graph with the emission mask specified in 47CFR, Part 22.359(b)

The test results showing compliance to 47 CFR Part 22.359 (b) are presented in this section of this test report.

The test results shows compliance to FCC Rules 22.359 (b)

Results: Spectrum bandwidth limitations meet or exceed FCC requirements as defined by Part 22.359(b)(2)

The bandwidth calculations for 14 K4F1D, the direct frequency modulation of the carrier in the digital mode is:

Carson's bandwidth rule…

Bn = 2(M + D) (Where M = the highest modulation frequency)

M = [4800 symbols / (2 symbols /cycle)]

M = 2400 Hz

or

M = (9600 bits / second) / FSK level

M = 9600 / 4

M = 2400 Hz

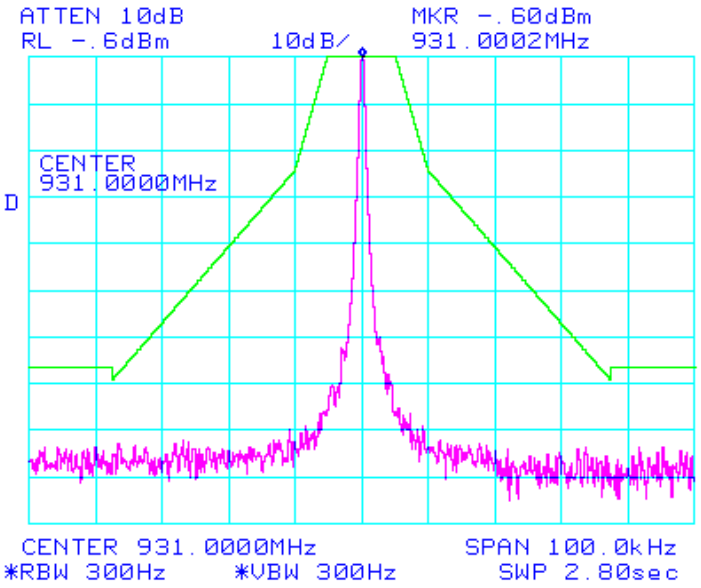
D = Highest Deviation rate. +/- 4.8 kHz

Bn = 2 (2400 + 4800)

Bn = 14.4 kHz

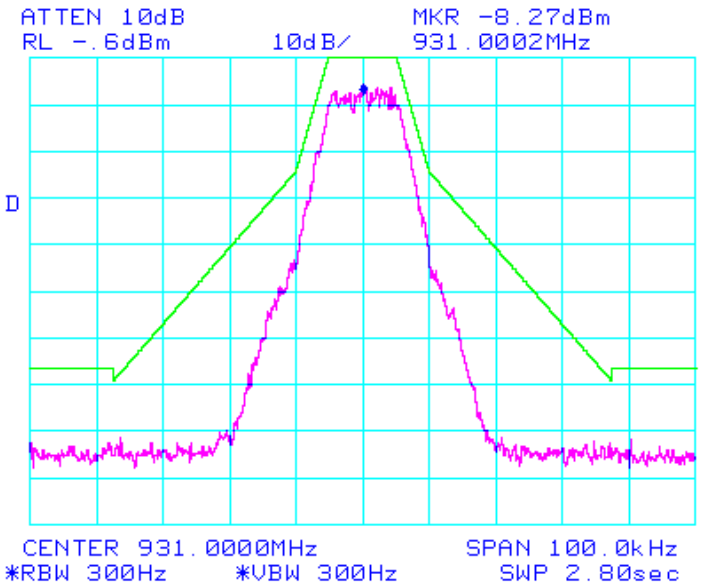
Occupied Bandwidth (digital)*

Analyzer Settings:	Ref. Level	0 dBm
	SW Width	100 kHz
	Res. Bandwidth	300 Hz
	Video Filter	300 Hz
	Detector:	Peak



Un-Modulated Carrier, Mask per FCC-22.359(b)(2)
Model: GL-T8500

Exhibit 3-4



Modulated Carrier, +/- 4800 Hz, 9600 bps, FCC-22.359 (b)(2) Mask

* 9600 bits/second,
4 Level modulation with
88 microseconds rise time filter (highest rise time)

EXHIBIT 3-5

PER FCC RULE 24-133 (1) OCCUPIED BANDWIDTH - Digital Mode

Test procedure: A digital signal is fed into the data input of the transmitter to simulate data. The transmitter is placed in the digital modulation mode and its RF output observed on a spectrum analyzer. The transmitter is set for a maximum deviation of +/- 4.8 kHz. The spectrum is observed at 250 watts power output level.

Step #1 Establish a power reference using an unmodulated carrier with Transmitter operating at a maximum rated RF output power.

Step #2 Operate equipment with a specified input signal to produce a modulated RF signal at the antenna terminal.

Step #3 Plot spectral graph with the emission mask specified in 47CFR, Part 24.133(1)

The test results showing compliance to 47 CFR, Part 24.133 (1)

Results: Spectrum bandwidth limitations meet or exceed FCC requirements as defined by Part 24.133 (1)

The bandwidth calculations for 14 K4F1D, the direct frequency modulation of the carrier in the digital mode is:

Carson's bandwidth rule…

Bn = 2(M + D) (Where M = the highest modulation frequency)

M = [4800 symbols / (2 symbols /cycle)]

M = 2400 Hz

or

M = (9600 bits / second) / FSK level

M = 9600 / 4

M = 2400 Hz

D = Highest Deviation rate. +/- 4.8 kHz

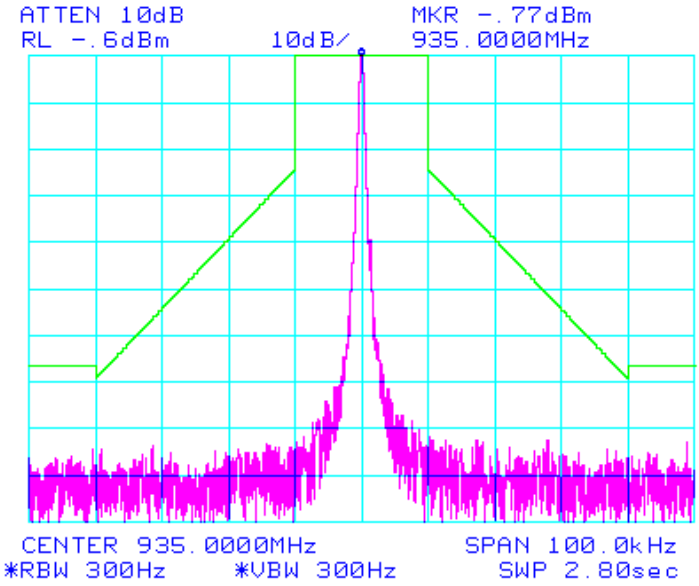
Bn = 2 (2400 + 4800)

Bn = 14.4 kHz

PER FCC RULE 24.133(1) OCCUPIED BANDWIDTH (digital)*

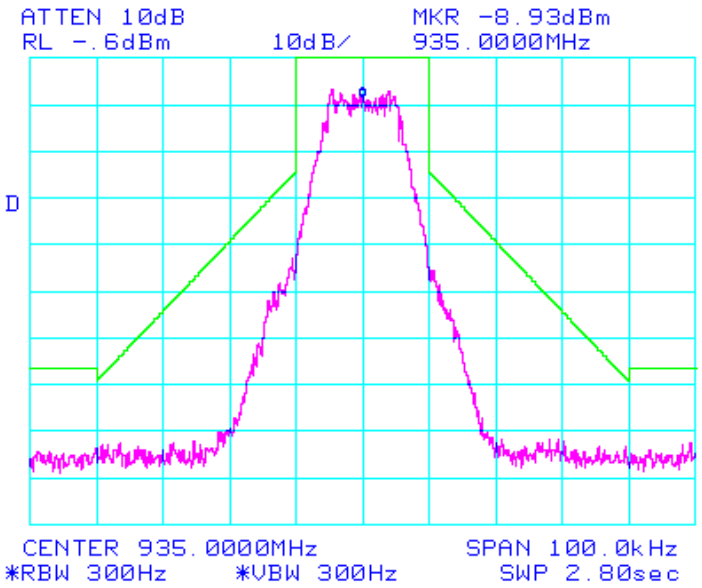
For transmitters authorized a bandwidth greater than 10 kHz.

Analyzer Settings:	Ref. Level	0 dBm
	SW Width	10 kHz/Div
	Res. Bandwidth	300 Hz
	Video Filter	300 Hz
	Detector:	Peak



Unmodulated carrier, 24.133 (1) Mask

Exhibit 3-6



Modulated carrier, +/- 4800 Hz, 9600 bps, 24.133(1) Mask

Exhibit 3-7

PER FCC RULE 90-210 (J)OCCUPIED BANDWIDTH - Digital Mode

Test procedure: A digital signal is fed into the data input of the transmitter to simulate data. The transmitter is placed in the digital modulation mode and its RF output observed on a spectrum analyzer. The transmitter is set for a maximum deviation of +/-2.4 kHz. The spectrum is observed at maximum output power level.

Step #1 Establish a power reference using an unmodulated carrier with Transmitter operating at a maximum rated RF output power.

Step #2 Operate equipment with a specified input signal to produce a modulated RF signal at the antenna terminal.

Step #3 Plot spectral graph with the emission mask specified in 47CFR, Part 90-210(j)

The test results showing compliance to 47 CFR, Part 90.210(j)

The bandwidth calculations for 9K6F1D, the direct frequency modulation of the carrier in the digital mode is:

Carson's bandwidth rule…

Bn = 2(M + D) (Where M = the highest modulation frequency)

M = [4800 symbols / (2 symbols /cycle)]

M = 2400 Hz

or

M = (9600 bits / second) / FSK level

M = 9600 / 4

M = 2400 Hz

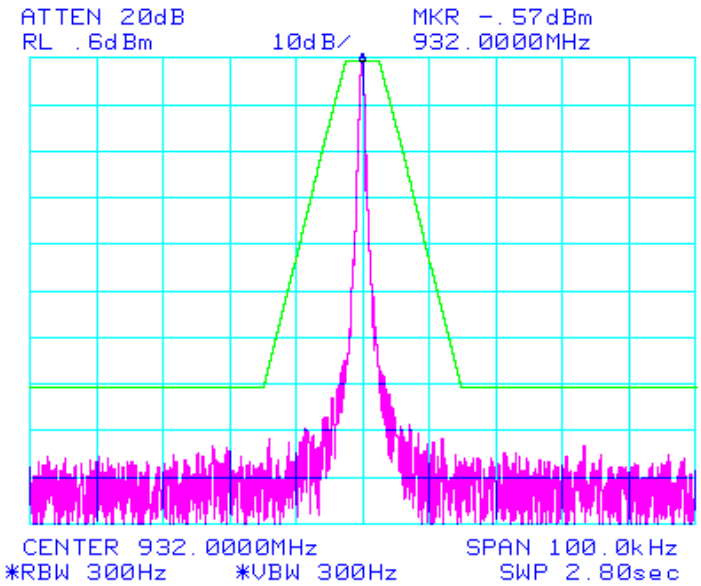
D = +/- 2.4 kHz

Bn = 2 (2400+ 2400)

Bn = 9.6 kHz

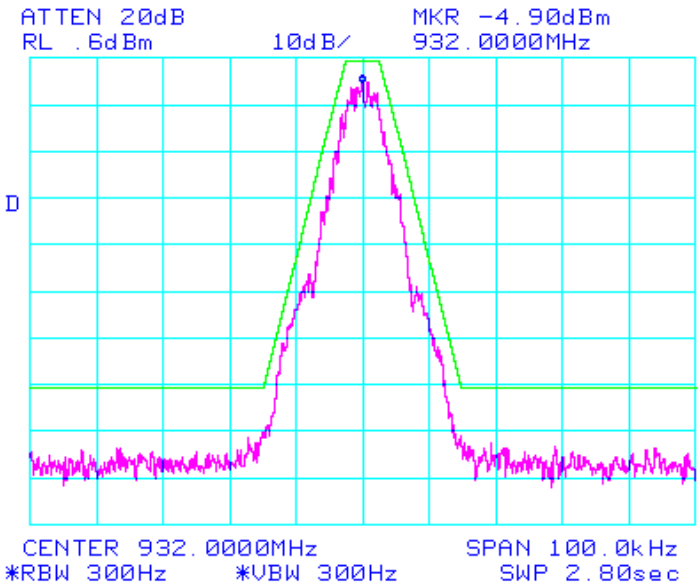
PER FCC RULE 90.210(J) OCCUPIED BANDWIDTH (digital)*

Analyzer Settings:	Ref. Level	0 dBm
	SW Width	10 kHz/Div
	Res. Bandwidth	300 Hz
	Video Filter	300 Hz
	Detector:	Peak



Unmodulated carrier, mask per 90.210(j)

Exhibit 3-8



Modulated carrier, mask per 90.210(j)
+/- 2400 Hz, 9600 bps

Modulated Carrier per mask 90.210(j)

* 9600 bits/second,
4 Level modulation with
88 microseconds rise time filter (highest rise time)

EXHIBIT 3-9

PER FCC RULE 101.111 (A) (2) OCCUPIED BANDWIDTH - Digital Mode

Test procedure: A digital signal is fed into the data input of the transmitter to simulate data. The transmitter is placed in the digital modulation mode and its RF output observed on a spectrum analyzer. The transmitter is set for a maximum deviation of +/-4.8 kHz. The spectrum is observed at maximum output power level.

Step #1 Establish a power reference using an unmodulated carrier with Transmitter operating at a maximum rated RF output power.

Step #2 Operate equipment with a specified input signal to produce a modulated RF signal at the antenna terminal.

Step #3 Plot spectral graph with the emission masks specified in 47CFR, Part 101.111 (a)(2) for ABW of 25 & 200 kHz.

The test results showing compliance to 47 CFR , Part 101.111(a) (2)

The bandwidth calculations for 14K4F1D, the direct frequency modulation of the carrier in the digital mode is:

Carson's bandwidth rule…

Bn = 2(M + D) (Where M = the highest modulation frequency)

M = [4800 symbols / (2 symbols /cycle)]

M = 2400 Hz

or

M = (9600 bits / second) / FSK level

M = 9600 / 4

M = 2400 Hz

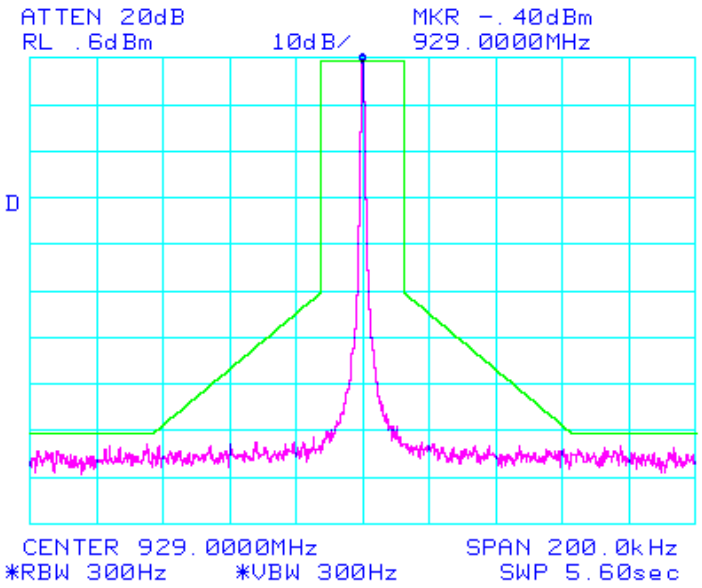
D = +/- 4.8 kHz

Bn = 2 (2400 + 4800)

Bn = 14.4 kHz

Occupied Bandwidth (digital)

Analyzer Settings:	Ref. Level	0 dBm
	SW Width	10 kHz/Div
	Res. Bandwidth	300 Hz
	Video Filter	300 Hz
	Detector:	Peak

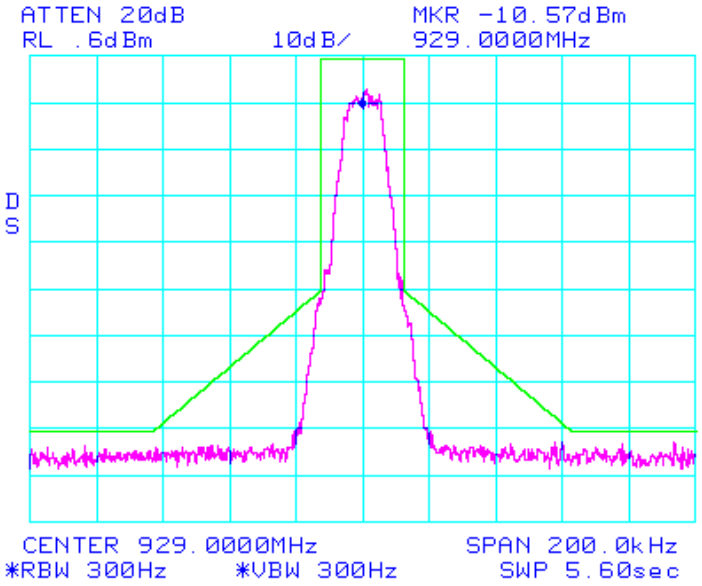


Unmodulated carrier, 101.111(a)(2) Mask, ABW of 25 kHz

EXHIBIT 3-10

Occupied Bandwidth (digital)*

Analyzer Settings:	Ref. Level	0 dBm
	SW Width	10 kHz/Div
	Res. Bandwidth	300 Hz
	Video Filter	300 Hz
	Detector:	Peak



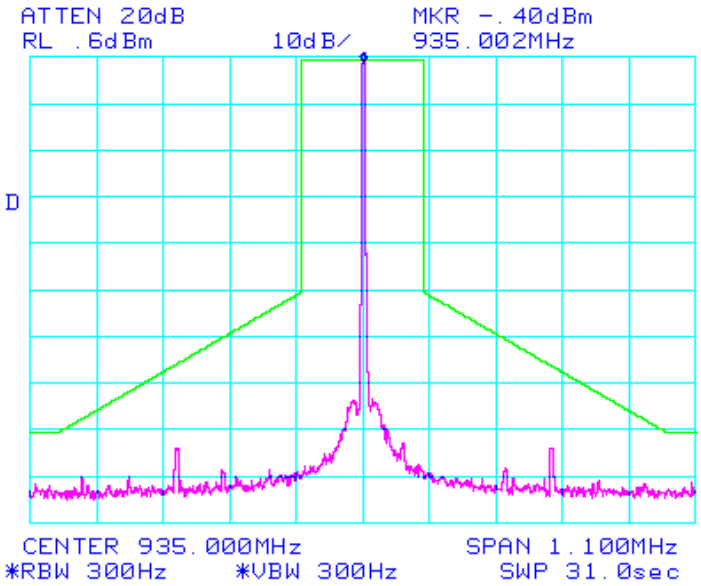
Modulated carrier, 101.111(a)(2) Mask, ABW of 25kHz +/-4800 Hz, 9600bps

* 9600 bits/second,
4 Level modulation with
88 microseconds rise time filter (highest rise time)

EXHIBIT 3-11

Occupied Bandwidth (digital)*

Analyzer Settings:	Ref. Level	0 dBm
	SW Width	10 kHz/Div
	Res. Bandwidth	300 Hz
	Video Filter	300 Hz
	Detector:	Peak

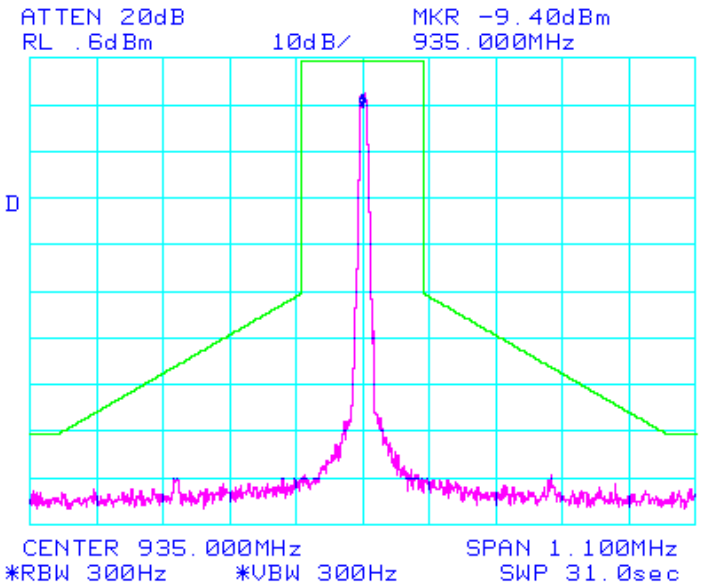


Unmodulated carrier, 101.111 (a)(2) Mask, For ABW of 200kHz

Exhibit 3-12

Occupied Bandwidth (digital)*

Analyzer Settings:	Ref. Level	0 dBm
	SW Width	10 kHz/Div
	Res. Bandwidth	300 Hz
	Video Filter	300 Hz
	Detector:	Peak



Modulated carrier, +/-4800 Hz, 9600 bps, 101.11(a)(2) Mask

For Authorized Bandwidth of 200kHz

Exhibit 3-13

SPURIOUS EMISSIONS (FCC 2.991)

Digital Test Procedure

Modulate the transmitter in digital mode at a maximum 9600 bit rate with a test signal (square wave) for + 4.8 kHz deviation to simulate data transmission. Operate at maximum output power rating

Terminate transmitter antenna terminal with a 50-ohm resistive load. Provide a sample of RF output that is frequency independent.

Apply RF sample to spectrum analyzer input through a notch filter tuned to transmitter carrier frequency.

Record the frequency and relative amplitude of each spurious response. The worst case emissions are recorded in this exhibit. The spurious emissions were scanned in all tests as indicated in Occupied Bandwidth measurement tests.

Results are recorded in exhibit 3-14

Fc = 935.000 MHz

Analyzer Settings:	Ref. Level	0dBm
	Res. Bandwidth	3 kHz
	Video Filter	3 kHz

Device Under Test:

Model:GL-T8500-CN
Test Freq.: 935.000 MHz
Tested by: Chaman Bhardwaj

Method of calculation:
Measured level dBc = Spectrum analyzer reading + cable and attenuator losses (dB)

Frequency (MHz)	Measured reading (dBm)	Limit dBm	Remarks/ Margin
1,870.000	-41.7	-26	Passed
2,805.000	<-55.5	-26	Passed
3,740.000	< -55.0	-26	Passed
4,675.500	< -55.0	-26	Passed
10,000.000	< -55.00	-26	Passed

Note: There were no other detectable signals in the frequency range of 30-10,000 MHz

Exhibit 3-14

Field Strength (FCC 2.993)

Description of test site: 3-Meter Anechoic test Chamber, on file with Commission November 15, 1996. The receiver antenna is located 1 meter from the transmitter.

If transmitter is to operate in digital mode, use the same modulation test setup as in spurious emissions (digital) tests. Perform field strength test at both maximum and minimum rated power output, the worst case results are recorded below in exhibit 3-15.

Calibrated Broad Band antennas are used as the receive antenna.

Final stage Power amplifier out put **Pt** = 250 Watts
Theoretical Numerical gain of a dipole antenna = 1.64

The following formula can be used to compute a field strength at a known distance **d** (meters) :

For d= 1.0 meter

$$E\ (v/m) = \frac{\sqrt{(30\ Pt.\ 1.64)}}{d}$$

E = 110.91 v/m

E dBμV/m = 20 log (110.91x 1E 6)= 161 dBμV/m

FCC limit for harmonics:
FCC Minimum = 43 + 10 Log (Ptx watts)

= 43 + 10 Log (250)

= 67.0 dBc

FCC limit (*) 161 -67.0 = 93.9 dBμV/m …..Limit at 1 m test distance
FCC limit (**) 161-67.0-9.5= 84.4 dBμV/m …..Limit at 3 m test distance
Note: All data taken is worst case as transmitter is rotated 360 degrees and Receive antenna height varied from 1-4 meter.
Calculation :

Total Measured Value E (dB**μV** /m) = Receiver/ analyzer reading dB**μV** -Pre Amp. Gain + Cable Loss (dB) + AF (dB)

Note: there was no external pre amplifier used, so Pre- amp gain = 0 dB

Test distance = 1 meter for frequency range 1-10 GHz and 3.0 meters for 30-1000 MHz

Results: Device under test meets FCC requirements of Field Strength (FCC 2.993)

Fundamental Freq. = 935.000 MHz.

Analyzer Settings:

Resolution BW =120KHz
Video BW = 1MHz
Span/ div = auto/50 MHz
Sweep rate = 914 msec.
Detector: Peak
Mode of Operation: Digital Modulation

S/N	Frequency GHz	Total Measured Value dBµV/m		Angle	Height	FCC Limit (*) dBµV/m
		Vert. Pol	Horz. Pol	Deg. V/H	Meters V/H	
1	1.87	77.0	72.0	38/258	1.00/1.08	93.9
2	2.805	86.6	81.0	297/163	1.00/1.27	93.9
3	3.74	77.4	61.2	349/239	1.70/1.50	93.9
4	4.675	73.4	70.5	274/34	1.50/1.00	93.9
5	5.61	73.8	<73.8	34/30	1.00/1.00	93.9
6	6.54	<76	<76.7	30/30	1.00/1.00	93.9
7	7.48	<77.7	<77.7	30/30	1.00/1.00	93.9
8	8.415	<80.5	<80.5	30/30	1.00/1.00	93.9
9	9.35	<83.2	<83.2	30/30	1.00/1.00	93.9

Note: All data taken is worst case as transmitter is rotated 360 degrees and receiving antenna polarization is changed (H and V) and height was varied from 1-4 m . Frequency spectrum was checked for radiated spurious and harmonic emissions out to tenth harmonic. The range of spectrum scanned 30MHz to 10 GHz. The S/N 5 through 10 levels are the analyzer base line levels.

Exhibit 3-15

ANTENNA FACTOR CHART

Manufacturer: EMCO
Antenna: Biconilog
Model: 3141 – 3.0 Meter Calibration
S/N: 1081

FREQUENCY MHZ	ANTENNA FACTOR dB
26	13.8
28	13.1
30	12.4
40	9.0
50	7.3
60	7.7
70	8.8
80	9.8
90	10.2
100	10.1
110	9.8
120	9.4
130	9.3
140	9.9
150	10.4
160	10.7
170	11.0
180	10.9
190	10.9
200	11.1
225	12.3
250	13.1
275	14.0
300	15.4
325	15.4
350	15.8
375	16.4
400	16.7
425	16.9
450	17.4
475	17.9
500	18.4
525	19.1
550	19.6

575	20.3
600	20.9
625	21.0
650	21.0
675	21.5
700	21.9
725	21.9
750	22.0
775	22.3
800	22.4
825	22.7
850	23.1
875	23.8
900	24.1
925	24.1
950	24.1
975	24.3
1000	24.6
1050	24.8
1100	25.2
1150	26.2
1200	26.8
1250	26.2
1300	26.5
1350	27.5
1400	27.4
1450	27.2
1500	27.8
1550	29.0
1600	28.7
1650	28.4
1700	28.7
1750	29.8
1800	29.8
1850	30.2
1900	30.0
1950	30.3
2000	30.6

Exhibit 3-16

Manufacturer: EMCO

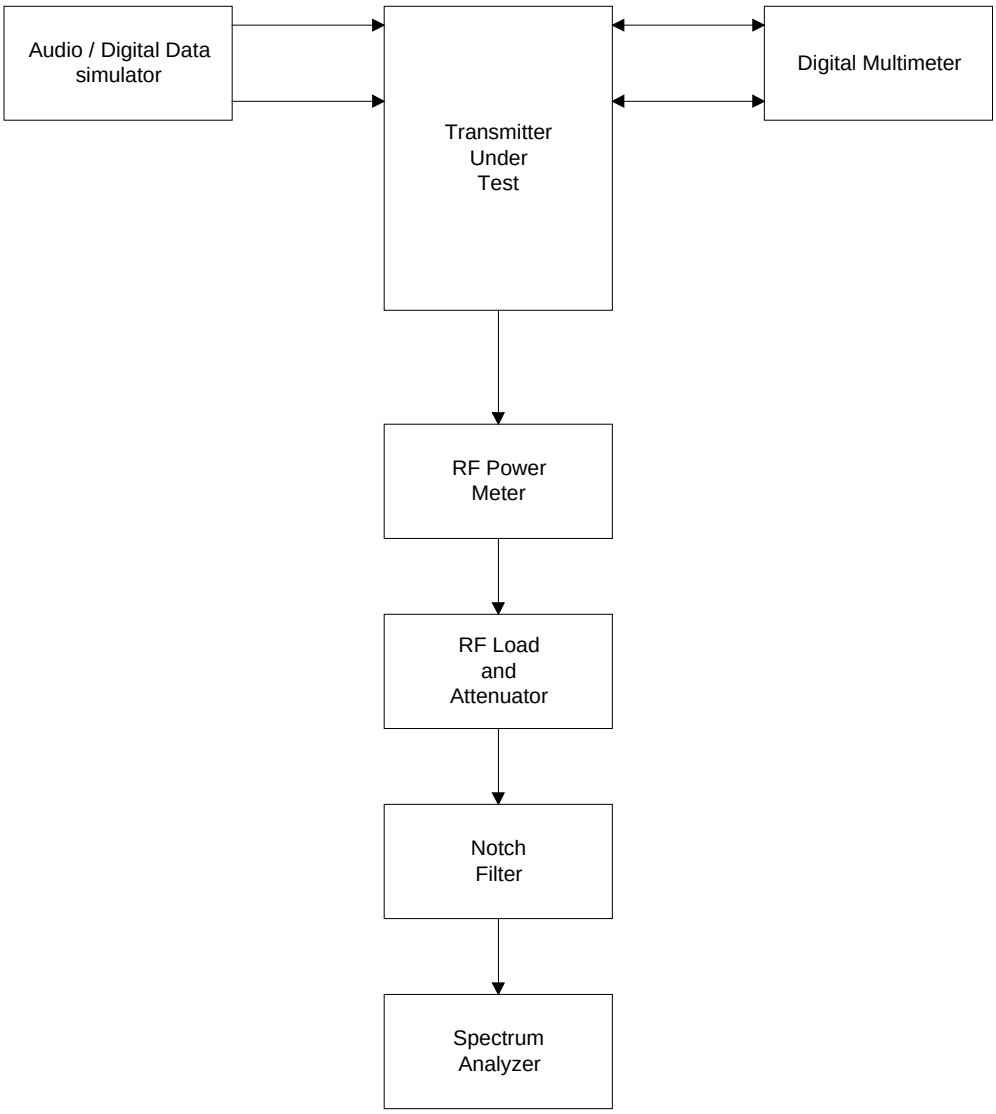
Antenna: Double Ridged Guide
Model: 3115 – 1.0 Meter Calibration
S/N: 1081

FREQUENCY MHZ	ANTENNA FACTOR dB
1000	25.1
1500	25.2
2000	27.5
2500	28.7
3000	30.6
3500	32.7
4000	32.1
4500	32.2
5000	33.9
5500	34.6
6000	35.0
6500	35.3
7000	36.1
7500	36.7
8000	37.1
8500	37.9
9000	38.4
9500	38.1
10000	38.2
10500	38.2
11000	38.4
11500	39.0
12000	39.2
12500	39.3
13000	40.8
13500	41.8
14000	41.5
14500	41.5
15000	39.9
15500	38.4
16000	38.3
16500	39.9
17000	41.9
17500	43.7
18000	48.3

Exhibit 3-17

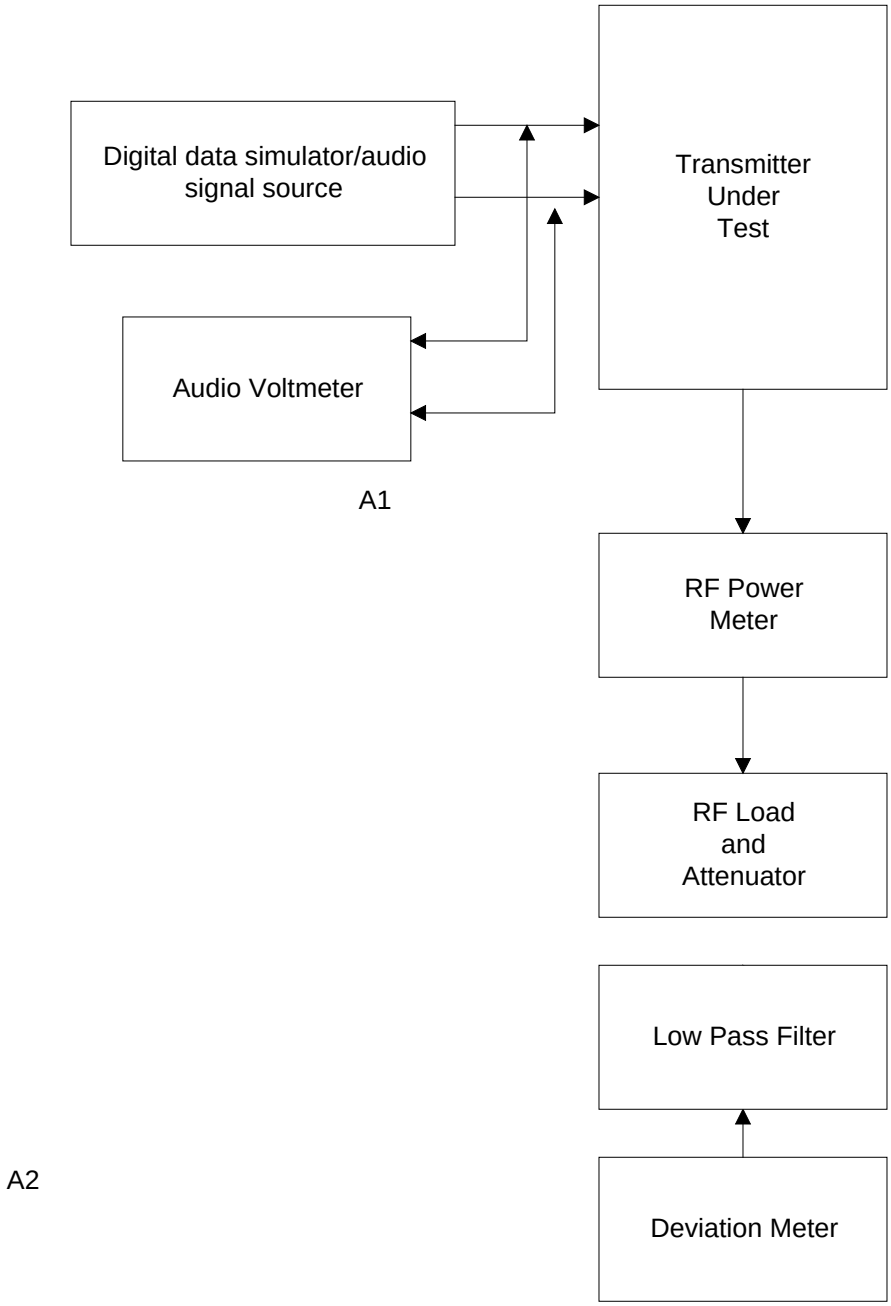
GLENAYRE ELECTRONICS

RF Power Output, Occupied Bandwith, and Spurious Emissions
Test Setup



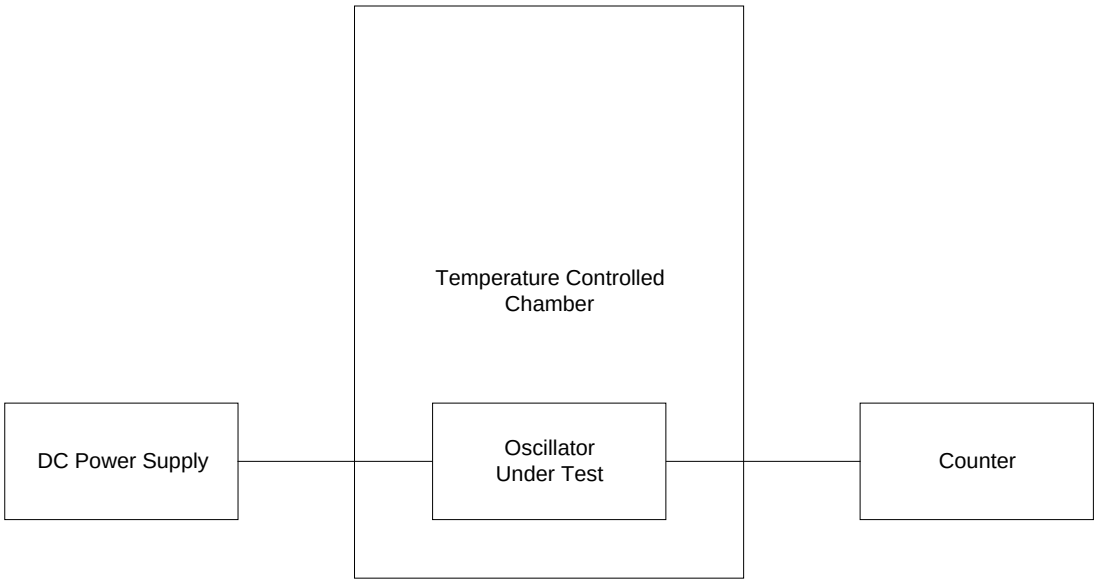
A1

Frequency Response and Deviation Limiter Operation
Test Setup



GLENAYRE ELECTRONICS

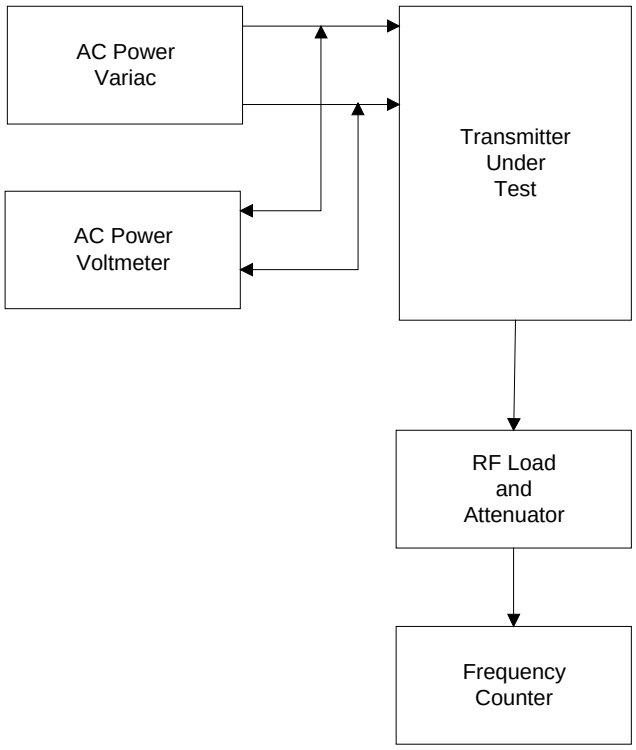
Oscillator Teperature Stability and Warm-Up Time
Test Setup



A3

GLENAYRE ELECTRONICS

Oscillator Line Voltage Sability
Test Setup



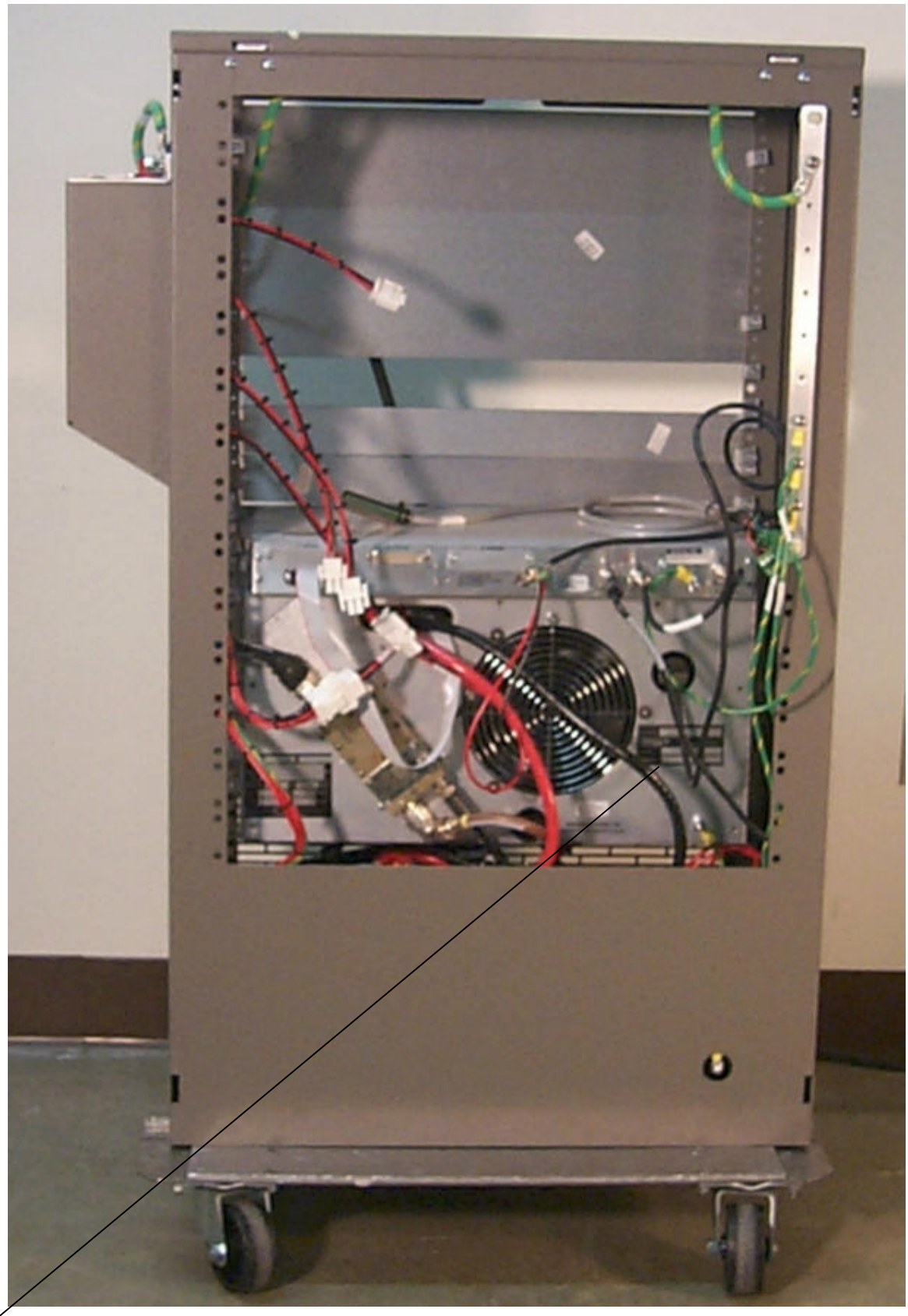
A4

Exhibit 4

Photographs on transmitter, Model: GL-T8500-CN

Front view of Transmitter, Model: GL-T8500-CN

Backside view of Transmitter, Model: GL-T8500-CN



Location of FCC ID label

Backside view without cover, Transmitter Mode:GL-T8500-CN

Leftside view of transmitter, Model:GL-T8500-CN

Right side view of transmitter, Model: GL-T8500-CN

Exhibit 5
Frequency Stability Test Data
(FCC 2.995)

FREQUENCY STABILITY
C-Net™ Platinum Series controller

Oscillator Temperature Stability

Operate oscillator and other frequency determining circuits in a temperature chamber. Measure the oscillator frequency with a frequency counter capable of at least 1 Hz resolution. Record the oscillator frequency after the temperature within the chamber has stabilized for one hour at each test temperature of –30, -20, -10, 0, +10, +20, +30, +40, and +50°C.

Refer to Exhibit 5A for test results.

Oscillator Warm-up Time

Operate oscillator and other frequency determining circuits in a temperature chamber. Measure the oscillator frequency with a frequency counter capable of at least 1 Hz resolution. Record the oscillator frequency at regular intervals until the frequency is within the published tolerance. Start each series of readings from a cold start at the beginning ambient temperature. Repeat for beginning ambient temperatures of –30, 0 and +50°C.

Refer to Exhibit 5B for test results.

Oscillator Line (Supply) Voltage Stability

Operate transmitter into a 50-ohm load. Provide a sample of RF output to a frequency counter. Power the transmitter from a variable voltage, primary power source. Record transmitter frequency at each value of primary power source voltage. Repeat at voltages equal to 85%, 100%, and 115% of rated primary power source voltage.

Refer to Exhibit 5C for test results

OSCILLATOR TEMPERATURE STABILITY

Oscillator Model: **C-Net™ Platinum Series controller**

Temperature (Degrees C)	Time (Hours)	Frequency (Hertz)	Delta F (Hertz)
+25C (room)	0 hrs	10,000,000.004	Ref
-30C	1 hrs	9,999,999.983	-0.021
-20C	2 hrs	10,000,000.043	+.039
-10C	3 hrs	10,000,000.102	+.098
0C	4 hrs	10,000,000.125	+.121
+10C	5 hrs	10,000,000.090	+0.086
+20C	6 hrs	10,000,000.048	+0.044
+30C	7 hrs	9,999,999.922	-0.082
+40C	8 hrs	9,999,999.816	-0.188
+50C	9 hrs	9,999,999.899	-0.105

Exhibit 5A

Time from Turn On	10,000,000.48 Hz – REF Frequency (25ºC)		
	-30ºC Start	0ºC Start	+50ºCStart
1 minute	10,000,591.87	10,000,355.62	10,000,005.73
2 minutes	10,000,322.90	10,000,112.19	9,999,999.53
3 minutes	10,000,144.32	10,000,010.17	10,000,000.25
4 minutes	10,000,050.90	9,999,999.66	10,000,,000.106
5 minutes	10,000,010.13	10,000,000.276	10,000,000.146
6 minutes	9,999,997.10	10,000,000.307	10,000,000.176
7 minutes	9,999,999.88	10,000,000.320	10,000,000.190
8 minutes	9,999,999.94	10,000,000.345	10,000,000.175
9 minutes	9,999,999.99	10,000,000.358	10,000,000.175
10 minutes	10,000,000.03	10,000,000.368	10,000,000.216
11 minutes	10,000,000.057	10,000,000.370	10,000,000.213
12 minutes	10,000,000.073	10,000,000.379	10,000,000.198
13 minutes	10,000,000.095	10,000,000.377	10,000,000.221
14 minutes	10,000,000.102	10,000,000.381	10,000,000.214
15 minutes	10,000,000.126	10,000,000.382	10,000,000.217
16 minutes	10,000,000.136	10,000,000.384	10,000,000.226
18 minutes	10,000,000.157	10,000,000.386	10,000,000.230
20 minutes	10,000,000.176	10,000,000.389	10,000,000.222
22 minutes	10,000,000.194	10,000,000.391	10,000,000.207
24 minutes	10,000,000.203	10,000,000.391	10,000,000.204
26 minutes	10,000,000.216	10,000,000.395	10,000,000.209
28 minutes	10,000,000.227	10,000,000.398	10,000,000.206
32 minutes	10,000,000.246	10,000,000.399	10,000,000.206
36 minutes	10,000,000.259	10,000,000.403	10,000,000.219
40 minutes	10,000,000.028	10,000,000.408	10,000,000.224
44 minutes	10,000,000.028	10,000,000.409	10,000,000.224
48 minutes	10,000,000.299	10,000,000.413	10,000,000.222
52 minutes	10,000,000.301	10,000,000.418	10,000,000.227
56 minutes	10,000,000.309	10,000,000.422	10,000,000.222

Exhibit 5B

OSCILLATOR LINE VOLTAGE STABILITY

Supply Voltage (%)	Volts (dc)	Frequency (Hz)	Delta F (Hz)
77	+20	10,000,000.409	0
100	+26	10,000,000.410	0
115	+30	10,000,000.410	0

Maximum frequency variation, at – Volts = + - Hz.

*The unit is designed for operation from a dc power source; range of 20 to 30 volts, nominal 26 Vdc.

Exhibit 5C