ADDENDUM TO FC02-054

FOR THE

METER READER, VERSA PROBE

FCC PART 15 SUBPART C SECTIONS 15.207 & 15.209

COMPLIANCE

DATE OF ISSUE: JULY 25, 2002

PREPARED FOR:

Northrop Grumman Corporation
3910 Sorrento Valley Blvd., Suite A
San Diego, CA 92121

P.O. No.: 58890U
W.O. No.: 78304

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: June 24-28, 2002

Report No.: FC02-054A

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TABLE OF CONTENTS

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CKC Laboratories, Inc has received test site Registration Acceptance from the following agencies:
FCC (USA); VCCI (Japan); and Industry Canada.
CKC Laboratories, Inc. has received Letters of Acceptance through an MRA for the following agencies:
ACA/NATA (Australia); SABS (South Africa); SWEDAC (Sweden); Radio Communications Agency (RA); HOKLAS (Hong Kong); Bakom (Swiss); BIPT (Belgium); Denmark Telestyrelsen; RvA (Netherlands); SEE (Luxembourg) SITTEL (Bolivia); and UKAS (UK).

ADMINISTRATIVE INFORMATION

DATE OF TEST:	June 24-28, 2002
DATE OF RECEIPT:	June 24, 2002
PURPOSE OF TEST:	To demonstrate the compliance of the Meter Reader, Versa Probe with the requirements for FCC Part 15 Subpart C Sections 15.207 & 15.209 devices. The purpose of Addendum A is to revise the restricted band and add the operating channels on page 6.
TEST METHOD:	ANSI C63.4 (1992)
MANUFACTURER:	Northrop Grumman Corporation 3910 Sorrento Valley Blvd., Suite A San Diego, CA 92121
REPRESENTATIVE:	David Willms
TEST LOCATION:	CKC Laboratories, Inc. 110 Olinda Place Brea, CA 92621

SUMMARY OF RESULTS

As received, the Northrop Grumman Corporation Meter Reader, Versa Probe was found to be fully compliant with the following standards and specifications:

United States

- FCC Part 15 Subpart C Sections 15.207 & 15.209
- ANSI C63.4 (1992) method

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

APPROVALS

QUALITY ASSURANCE:

Steve Behm, Director of Engineering Services

Joyce Walker, Quality Assurance Administrative Manager

Septimiu Apahidean, EMC/Lab Manager

TEST PERSONNEL:

Eddie Wong, EMC Engineer

EQUIPMENT UNDER TEST (EUT) DESCRIPTION
The Meter Reader tested by CKC Laboratories was representative of a production unit. The EUT is a handheld automatic water meter reading transceiver.

15.31(m) Number Of Channels
This device was tested on a single channel.

15.33(a) Frequency Ranges Tested
15.207 Conducted Emissions: 450 kHz – 30 MHz
15.209 Radiated Emissions: 9 kHz – 1000 MHz

FCC SECTION 15.35: ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	450 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz

15.203 Antenna Requirements
The antenna is an integral part of the EUT and is non-removable; therefore the EUT complies with Section 15.203 of the FCC rules.

15.205 Restricted Bands
The factory preset transmit frequency was stepped through. The transmit frequencies are: 10.2 kHz, 14.3 kHz, 16.6KHz, 19.2 kHz, 25.6 kHz, 28.6 kHz and 153.6 kHz. The EUT was found to be compliant by not transmitting the restricted band of 90 kHz – 110 kHz.

Eut Operating Frequency
The EUT was operating from 10 kHz – 160 kHz.

EQUIPMENT UNDER TEST

Meter Reader

Manuf: Northrop Grumman Corporation
Model: Versa Probe
Serial: VP13A1342
FCC ID: (pending)

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Power Supply

Manuf: Friwa
Model: FW7207/12
Serial: NA
FCC ID: NA

Handheld Computer

Manuf: Logicon
Model: MC-V
Serial: 9406-062012722
FCC ID: DoC

REPORT OF MEASUREMENTS

The following tables report the worst case emissions levels recorded during the tests performed on the Meter Reader, Versa Probe. All readings taken were peak readings unless otherwise stated. The data sheets from which the emissions tables were compiled are contained in Appendix C.

Table 1: 15.209 - Fundamental Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Dist dB	Cable dB	15.31 dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
0.026	86.8	13.5	-19.0	0.1	-80.0	1.4	39.4	-38.0	N

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 1 Meter

NOTES: N = No Polarization
V = Vertical Polarization

COMMENTS: EUT is placed on the wooden table, set in TX freq of 25.6 kHz CW. Communication port is connected to hand held computer acting as a load. Range of measurement: Fundamental 9 kHz - 150 kHz: RBW=VBW=200 Hz. 7.2 VDC battery Power. 21°C, 51% relative humidity.

dBuV to Power conversion.

Measured field strength = 100.4 dBuV (corrected) @ 1 meter,

= 81.4 dBuV @ 3 meter (19 dB H field attenuation).

Field strength level of 81.4 dBuV into a 50 Ohm = **0.000003 watts.**

$$V = 10^{-6} \text{ x anti Log} \frac{dB\mu V}{20}$$

$$\text{Power} = \frac{V^2}{R}$$

Table 2: 15.31(e) - Voltage Variations				
FREQUENCY MHz	**CORRECTED READING dBµV/m 85%**	**CORRECTED READING dBµV/m 100%**	**CORRECTED READING dBµV/m 115%**	**SPEC LIMIT dBµV/m**
0.026	1.3	1.3	1.4	39.4

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Sections 15.31(e)
Test Distance: 1 Meter

NOTES: N = No Polarization

COMMENTS: EUT is placed on the wooden table, set in TX freq of 25.6 kHz CW. Communication port is connected to hand held computer acting as a load. Range of measurement: Fundamental 9 kHz - 150 kHz: RBW=VBW=200Hz. 7.2 VDC (100%), 6.12 VDC (85%) 8.28 VDC (115%). 21°C, 51% relative humidity.

Table 3: 15.207 - Six Highest Conducted Emission Levels									
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Lisn dB	dB	dB	dB	CORRECTED READING dBµV	SPEC LIMIT dBµV	MARGIN dB	NOTES
0.654726	32.0	0.0				32.0	48.0	-16.0	B
2.392548	32.1	0.0				32.1	48.0	-15.9	B
2.453862	33.6	0.0				33.6	48.0	-14.4	B
2.515176	34.0	0.0				34.0	48.0	-14.0	B
2.576490	32.8	0.0				32.8	48.0	-15.2	B
2.637804	31.4	0.0				31.4	48.0	-16.6	B

Test Method: ANSI C63.4 (1992) NOTES: B = Black Lead
Spec Limit: FCC Part 15 Subpart C Section 15.207

COMMENTS: EUT is placed on the wooden table. Communication port is connected to a DC power supply. Range of measurement: 450 kHz - 30 MHz. Mode: Charging 450 kHz - 30 kHz: RBW=VBW=9 kHz. 21°C, 51% relative humidity.

Table 4: 15.209 - Six Highest Radiated Emission Levels

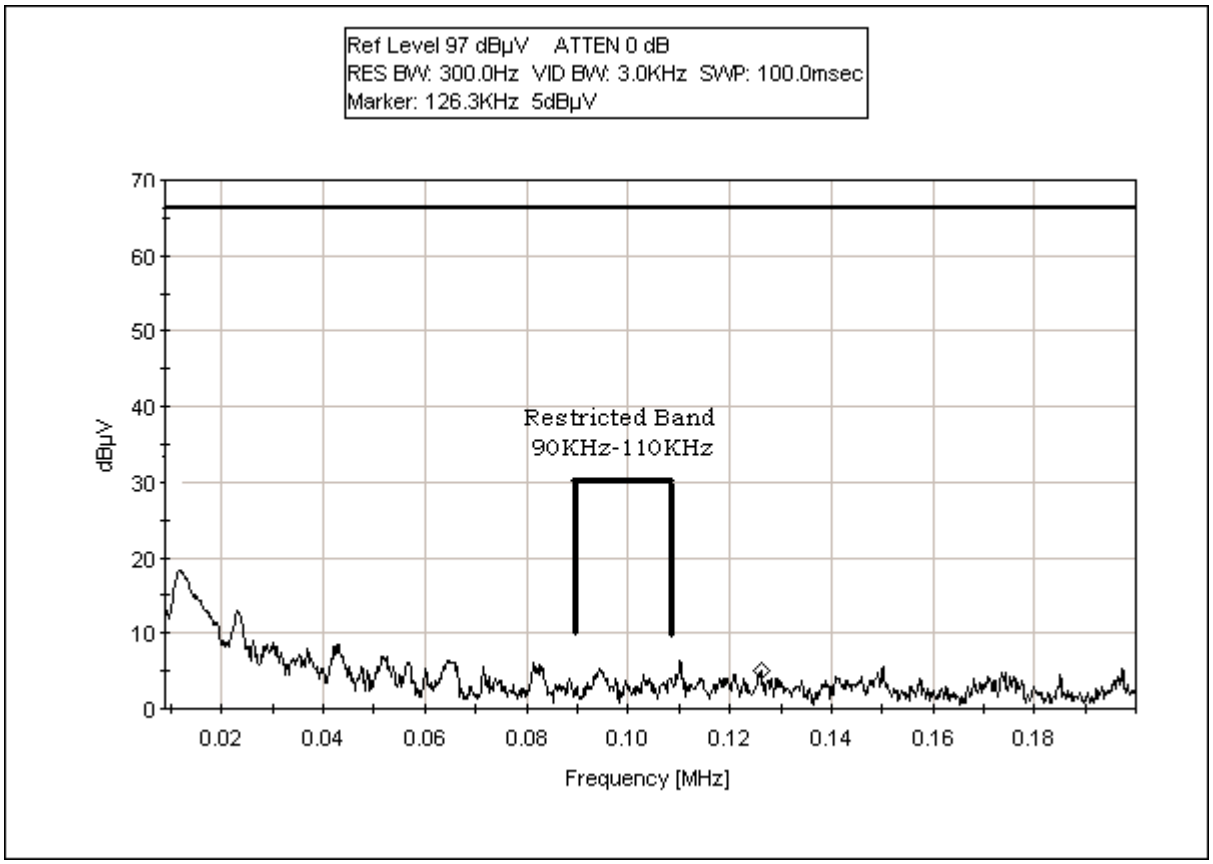
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
324.481	42.8	20.6	-28.2	3.7		38.9	46.0	-7.1	H-RS
324.483	44.2	20.6	-28.2	3.7		40.3	46.0	-5.7	H-TX
339.227	44.2	19.5	-28.2	3.8		39.3	46.0	-6.7	H-TX
648.888	39.8	20.8	-27.8	5.5		38.3	46.0	-7.7	V-RS
648.925	40.3	20.8	-27.8	5.5		38.8	46.0	-7.2	V-TX
663.657	39.2	21.4	-27.9	5.5		38.2	46.0	-7.8	V-RS

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 3 Meters

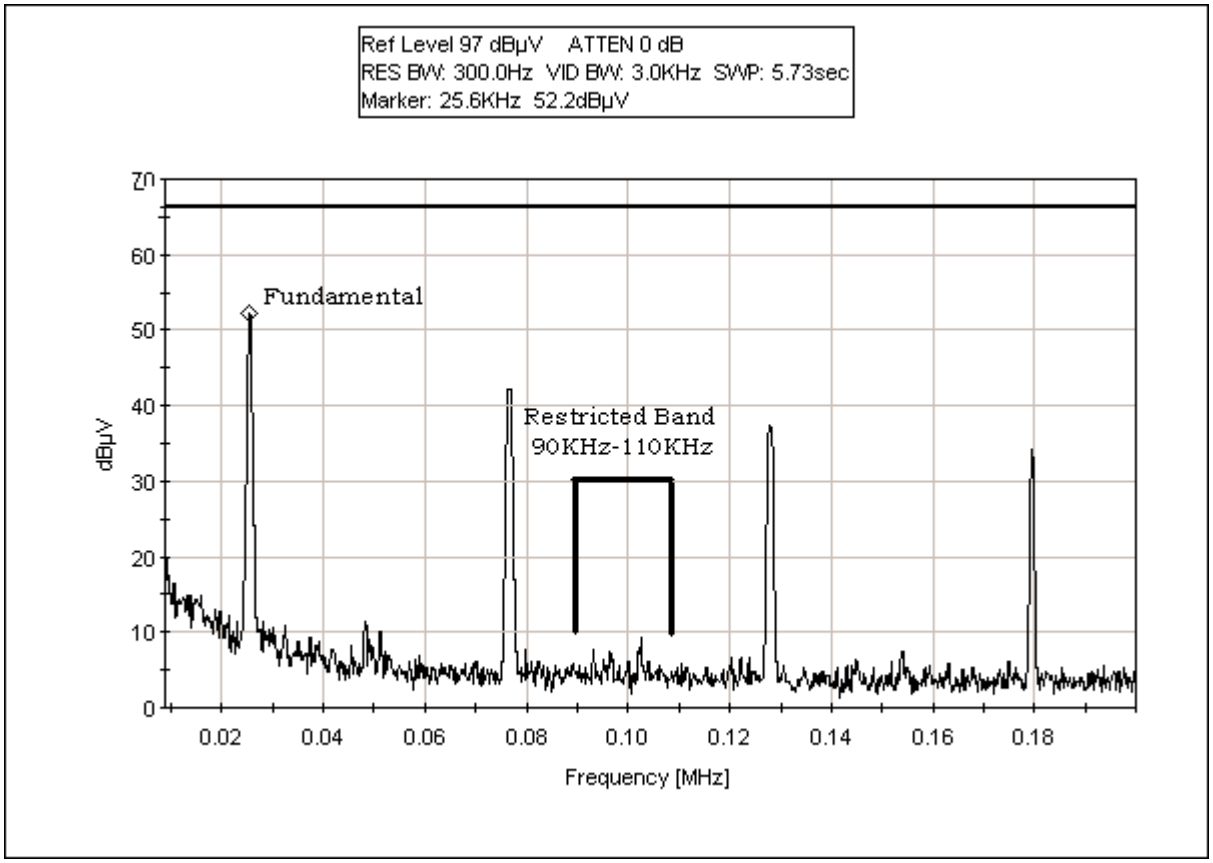
NOTES: H = Horizontal Polarization
V = Vertical Polarization
TX = Transmit
RS = RS232

COMMENTS: EUT is placed on the wooden table. Communication port is connected to hand held computer acting as a load. Range of measurement: 9 kHz - 1000 MHz. Mode: RS232 Data Transfer. 9 kHz - 150 kHz: RBW=VBW=200 Hz. 150 kHz - 30 kHz: RBW=VBW=9 kHz. 30 MHz – 1000 MHz: RBW=VBW=120 kHz. 7.2 VDC battery Power. 21°C, 51% relative humidity.

15.205 BAND EDGE AMBIENT



15.205 BAND EDGE FUNDAMENTAL



MEASUREMENT UNCERTAINTY

Measurement uncertainty associated with data in this report is a ± 2.94dB for radiated emissions and ± 1.56dB for conducted emissions.

EUT SETUP

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the photographs in Appendix A. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables. The corrected data was then compared to the applicable emission limits to determine compliance.

The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available I/O ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. I/O cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The radiated and conducted emissions data of the Meter Reader, Versa Probe, was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in Table A.

Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula in Table A. This reading was then compared to the applicable specification limit to determine compliance.

TABLE A: SAMPLE CALCULATIONS

	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Appendix B were used to collect both the radiated and conducted emissions data. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. For radiated measurements below 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. Conducted emissions tests required the use of the FCC type LISNs.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. For conducted emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used. A 10 dB external attenuator was also used during conducted tests, with internal offset correction in the analyzer. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dBµV, and a vertical scale of 10 dB per division.

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the Tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

EUT TESTING

Mains Conducted Emissions

During conducted emissions testing, the EUT was located on a wooden table measuring approximately 80 cm high, 1 meter deep, and 1.5 meters in length. One wall of the room where the EUT was located has a minimum 2 meter by 2 meter conductive plane. The EUT was mounted on the wooden table 40 cm away from the conductive plane, and 80 cm from any other conductive surface.

The vertical metal plane used for conducted emissions was grounded to the earth. Power to the EUT was provided through a LISN. The LISN was grounded to the ground plane. All other objects were kept a minimum of 80 cm away from the EUT during the conducted test.

For conducted emissions testing, a 30 to 50 second sweep time was used for automated measurements in the frequency bands of 450 kHz to 1.705 MHz, 1.705 MHz to 3 MHz, and 3 MHz to 30 MHz. All readings within 20 dB of the limit were recorded. At frequencies where the recorded emissions were close to the limit, further investigation was performed manually at a slower sweep rate.

Radiated Emissions

The EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters.

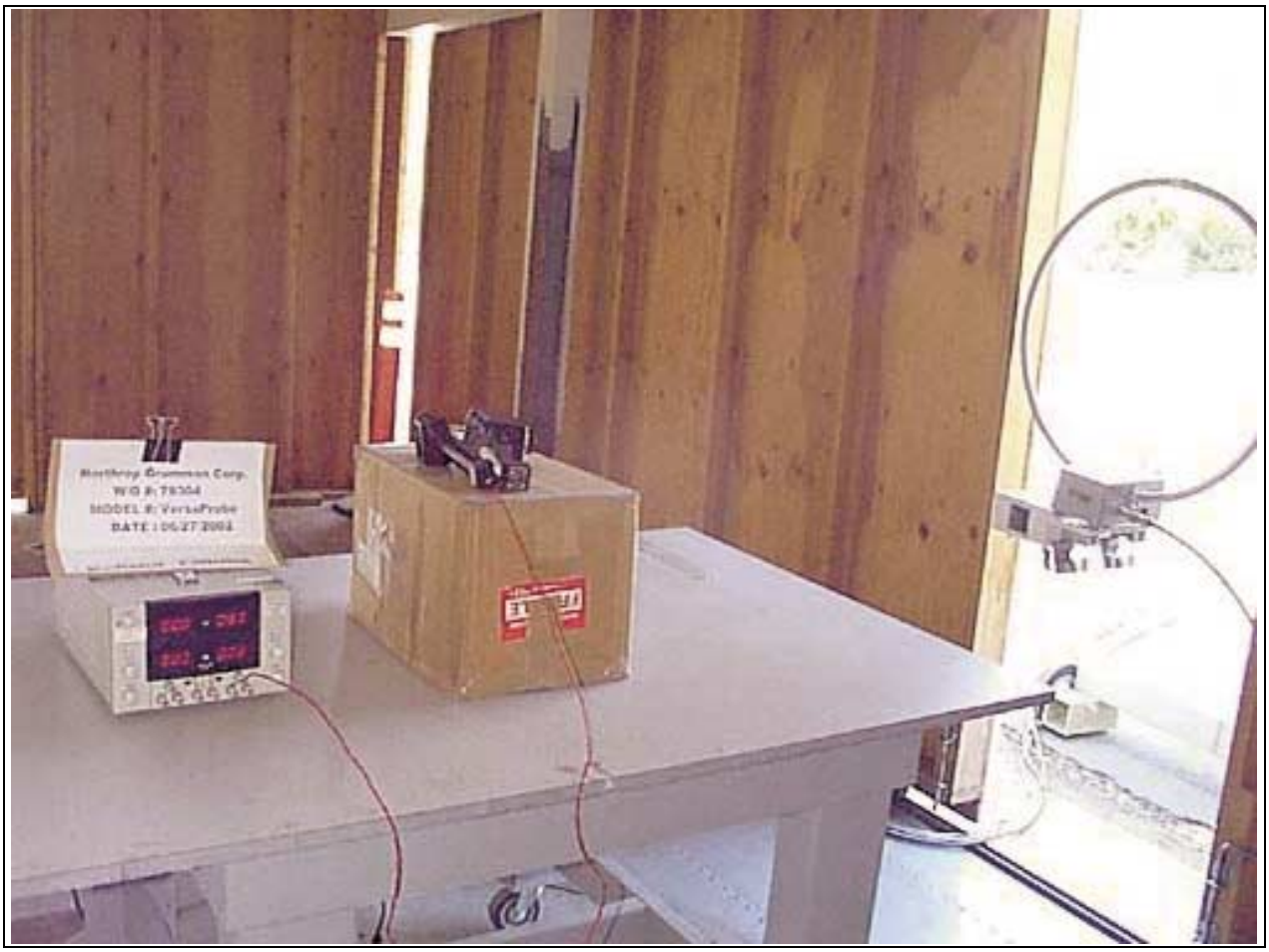
During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. The frequency range of 30 MHz to 88 MHz was scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks at or near the limit were recorded. The frequency range of 100 to 300 MHz was then scanned in the same manner using the biconical antenna and the peaks recorded. Lastly, a scan of the FM band from 88 to 110 MHz was made, using a reduced resolution bandwidth and frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 to 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 to 1000 MHz was again scanned Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

A thorough scan of all frequencies was made manually using a small frequency span, rotating the turntable as needed. The test engineer maximized the readings with respect to the table rotation, antenna height, and configuration of EUT. Maximizing of the EUT was achieved by monitoring the spectrum analyzer on a closed circuit television monitor.

APPENDIX A

TEST SETUP PHOTOGRAPHS

PHOTOGRAPH SHOWING VOLTAGE VARIATIONS



Voltage Variations

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS

Mains Conducted Emissions - Front View

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS

Mains Conducted Emissions - Back View

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Front View - Loop Antenna

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Back View - Loop Antenna

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Front View - Bicon and Log Periodic Antennas

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Back View – Bicon and Log Periodic Antennas

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Front View - H-Probe Antenna

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Back View - H-Probe Antenna

APPENDIX B

TEST EQUIPMENT LIST

FCC 15.205, Radiated Band Edge Plots

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092801	092802
QP Adapter	01437	HP	85650A	3303A01884	092801	092802
H-Field Probe	NA	Mark Chase	NA	NA	NA	NA

FCC 15.209, Radiated Emissions, Spur, RF Power.

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092801	092802
QP Adapter	01437	HP	85650A	3303A01884	092801	092802
Pre-amp	00309	HP	8447D	1937A02548	090501	090502
Antenna cable	NA	NA	RG214	Cable#15	122001	122002
Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	071601	071602
9KHz- 30 MHz						
Loop Antenna	00314	EMCO	6502	2014	073101	073102
30 MHz-100MHz						
Bicon Antenna	306	AH	SAS200/540	220	092401	092402
Log Periodic Antenna	331	AH	SAS 00/516	330	092401	092402

FCC 15.207, Conducted Emissions

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092801	092802
QP Adapter	01437	HP	85650A	3303A01884	092801	092802
LISN	02128	EMCO	3816/2NM	9809-1090	032002	032003

APPENDIX C: MEASUREMENT DATA SHEETS

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, Ca 92823 • (714) 993-6130

Customer: **Northrup Grunnmen Technology**
Specification: **FCC 15.209**
Work Order #: **78304** Date: 06/27/2002
Test Type: **Radiated Scan** Time: 08:49:12
Equipment: **Meter Reader** Sequence#: 1
Manufacturer: Northrop Grumman Corp. Tested By: Eddie Wong
Model: Versa Probe
S/N: VP13A1342

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Meter Reader*	Northrop Grumman Corp.	Versa Probe	VP13A1342

Support Devices:

Function	Manufacturer	Model #	S/N
Hand Held Computer	Logicon	MC-V	9406-062012722

Test Conditions / Notes:

EUT is placed on the wooden table, set in TX freq of 25.6 kHz CW . Communication port is connected to hand held computer acting as a load. Range of measurement: Fundamental 9 kHz - 150 kHz: RBW=VBW=200 Hz. 7.2 VDC battery Power. 21°C, 51% relative humidity.

Transducer Legend:

T1=Active Loop Antenna T2=Cable #15 120602
T3=15.31 40dB/Dec Correction

Measurement Data: Reading listed by margin. Test Distance: 1 Meter

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	25.684k	86.8	+13.5	+0.1	-80.0		-19.0	1.4	39.4 Fundamental	-38.0	None

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, Ca 92823 • (714) 993-6130

Customer: **Northrop Grumman Corp.**
Specification: **FCC 15.209**
Work Order #: **78304** Date: 06/27/2002
Test Type: **Radiated Scan** Time: 09:48:47
Equipment: **Meter Reader** Sequence#: 1
Manufacturer: Northrop Grumman Corp. Tested By: Eddie Wong
Model: Versa Probe
S/N: VP13A1342

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Meter Reader*	Northrop Grumman Corp.	Versa Probe	VP13A1342

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

EUT is placed on the wooden table, set in TX freq of 25.6 kHz CW. Communication port is connected to hand held computer acting as a load. Range of measurement: Fundamental 9 kHz - 150 kHz: RBW=VBW=200 Hz. 7.2 VDC (100%), 6.12VDC (85%) 8.28VDC (115%). 21°C, 51% relative humidity.

Transducer Legend:

T1=Active Loop Antenna T2=Cable #15 120602
T3=15.31 40dB/Dec Correction

Measurement Data: Reading listed by margin. Test Distance: 1 Meter

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	25.680k	86.8	+13.5	+0.1	-80.0		-19.0	1.4	39.4 8.28 Vdc	-38.0	None
2	25.672k	86.7	+13.5	+0.1	-80.0		-19.0	1.3	39.4 6.12 Vdc	-38.1	None
3	25.674k	86.7	+13.5	+0.1	-80.0		-19.0	1.3	39.4 7.2 Vdc	-38.1	None

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, Ca 92823 • (714) 993-6130

Customer: **Northrop Grumman Corp.**
Specification: **FCC 15.207**
Work Order #: **78304** Date: 06/28/2002
Test Type: **Conducted Emissions** Time: 4:14:42 PM
Equipment: **Meter Reader** Sequence#: 3
Manufacturer: Northrop Grumman Corp. Tested By: Eddie Wong
Model: Versa Probe 110V 60Hz
S/N: VP13A1342

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Meter Reader*	Northrop Grumman Corp.	Versa Probe	VP13A1342

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Friwa	FW7207/12	NA

Test Conditions / Notes:

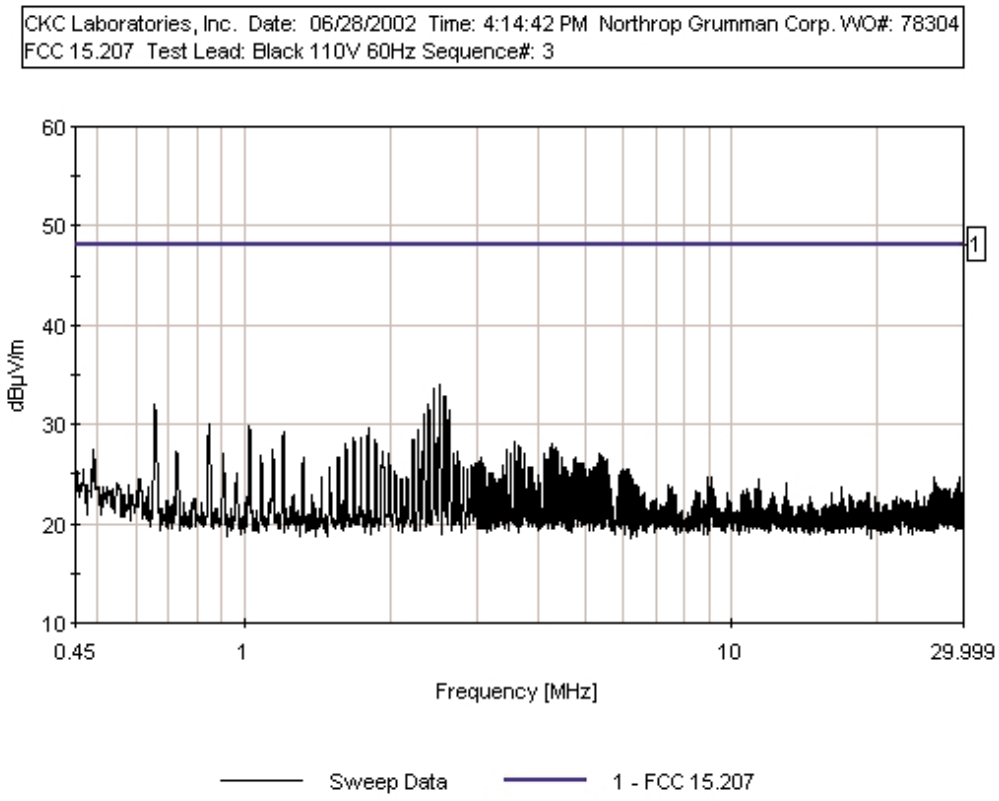
EUT is placed on the wooden table. Communication port is connected to a DC power supply. Range of measurement: 450 kHz - 30 MHz. Mode: Charging 450 Hz - 30 kHz: RBW=VBW=9 kHz. 21°C, 51% relative humidity.

Transducer Legend:

Measurement Data: Reading listed by margin. Test Lead: Black

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	2.515M	34.0					+0.0	34.0	48.0	-14.0	Black
2	2.454M	33.6					+0.0	33.6	48.0	-14.4	Black
3	2.576M	32.8					+0.0	32.8	48.0	-15.2	Black
4	2.393M	32.1					+0.0	32.1	48.0	-15.9	Black
5	654.726k	32.0					+0.0	32.0	48.0	-16.0	Black
6	2.638M	31.4					+0.0	31.4	48.0	-16.6	Black
7	2.337M	31.1					+0.0	31.1	48.0	-16.9	Black
8	848.460k	30.0					+0.0	30.0	48.0	-18.0	Black
9	1.024M	29.8					+0.0	29.8	48.0	-18.2	Black
10	1.797M	29.7					+0.0	29.7	48.0	-18.3	Black
11	2.275M	29.4					+0.0	29.4	48.0	-18.6	Black

12	1.203M	29.2	+0.0	29.2	48.0	-18.8	Black
13	1.678M	28.7	+0.0	28.7	48.0	-19.3	Black
14	1.733M	28.6	+0.0	28.6	48.0	-19.4	Black
15	1.857M	28.5	+0.0	28.5	48.0	-19.5	Black



Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, Ca 92823 • (714) 993-6130

Customer: **Northrop Grumman Corp.**
Specification: **FCC 15.207**
Work Order #: **78304** Date: 06/28/2002
Test Type: **Conducted Emissions** Time: 4:19:00 PM
Equipment: **Meter Reader** Sequence#: 4
Manufacturer: Northrop Grumman Corp. Tested By: Eddie Wong
Model: Versa Probe 110V 60Hz
S/N: VP13A1342

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Meter Reader*	Northrop Grumman Corp.	Versa Probe	VP13A1342

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Friwa	FW7207/12	NA

Test Conditions / Notes:

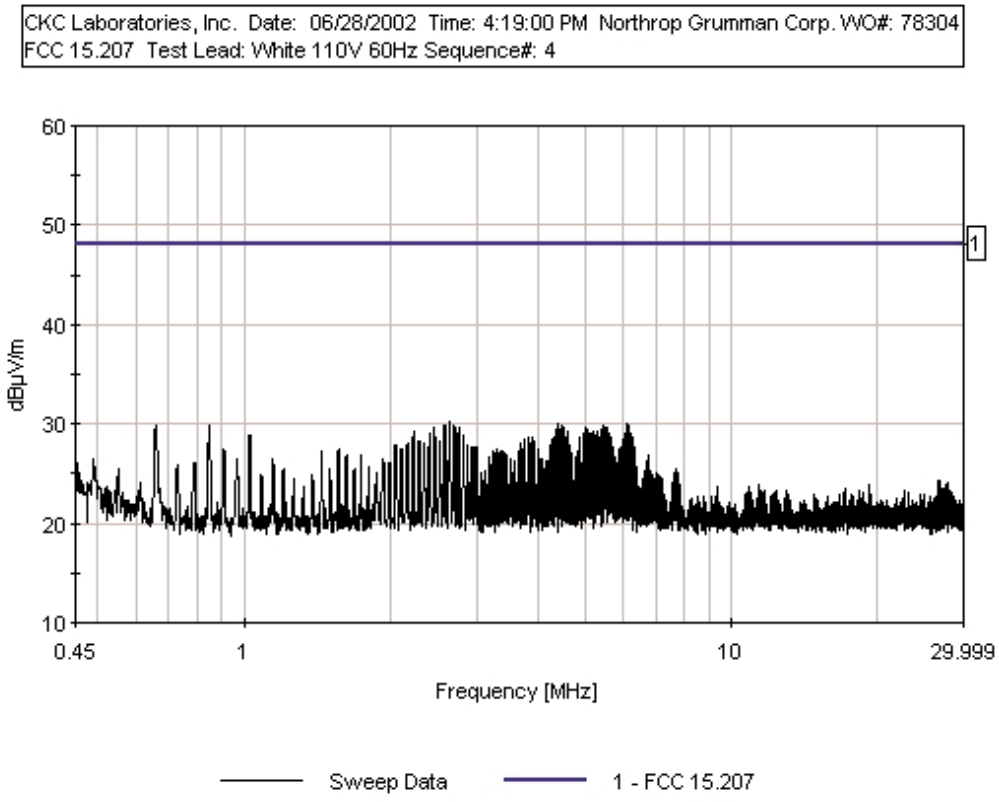
EUT is placed on the wooden table. Communication port is connected to a DC power supply. Range of measurement: 450 kHz - 30 MHz. Mode: Charging 450 kHz - 30 kHz: RBW=VBW=9 kHz. 21°C, 51% relative humidity.

Transducer Legend:

Measurement Data: Reading listed by margin. Test Lead: White

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	2.638M	30.2					+0.0	30.2	48.0	-17.8	White
2	4.416M	30.0					+0.0	30.0	48.0	-18.0	White
3	6.088M	30.0					+0.0	30.0	48.0	-18.0	White
4	2.576M	29.9					+0.0	29.9	48.0	-18.1	White
5	4.483M	29.9					+0.0	29.9	48.0	-18.1	White
6	658.848k	29.8					+0.0	29.8	48.0	-18.2	White
7	848.460k	29.8					+0.0	29.8	48.0	-18.2	White
8	2.694M	29.8					+0.0	29.8	48.0	-18.2	White
9	5.436M	29.8					+0.0	29.8	48.0	-18.2	White
10	6.149M	29.8					+0.0	29.8	48.0	-18.2	White
11	2.755M	29.7					+0.0	29.7	48.0	-18.3	White

12	4.544M	29.7	+0.0	29.7	48.0	-18.3	White
13	5.012M	29.7	+0.0	29.7	48.0	-18.3	White
14	5.486M	29.7	+0.0	29.7	48.0	-18.3	White
15	5.553M	29.6	+0.0	29.6	48.0	-18.4	White



Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, Ca 92823 • (714) 993-6130

Customer: **Northrop Grumman Corp.**
Specification: **FCC 15.209**
Work Order #: **78304** Date: 06/28/2002
Test Type: **Maximized emission** Time: 15:39:39
Equipment: **Meter Reader** Sequence#: 3
Manufacturer: Northrop Grumman Corp. Tested By: Eddie Wong
Model: Versa Probe
S/N: VP13A1342

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Meter Reader*	Northrop Grumman Corp.	Versa Probe	VP13A1342

Support Devices:

Function	Manufacturer	Model #	S/N
Hand Held Computer	Logicon	MC-V	9406-062012722

Test Conditions / Notes:

EUT is placed on the wooden table. Communication port is connected to hand held computer acting as a load. Range of measurement: 9 kHz – 1000 MHz. Mode: RS232 Data Transfer. 9 kHz - 150 kHz: RBW=VBW=200 Hz. 150 kHz - 30 kHz: RBW=VBW=9 kHz. 30 MHz – 1000 MHz: RBW=VBW=120 kHz. 7.2 VDC battery Power. 21°C, 51% relative humidity.

Transducer Legend:

T1=Active Loop Antenna	T2=Cable #15 120602
T3=15.31 40dB/Dec Correction	T4=Bicon 092401
T5=Log 331 092401	T6=Cable #10 071601
T7=Cable #15 120602	T8=Preamp 8447D 090501

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	324.481M	42.8	+0.0	+0.0	+0.0	+0.0	+0.0	38.9	46.0	-7.1	Horiz
			+20.6	+0.3	+3.4	-28.2					
2	648.925M	40.3	+0.0	+0.0	+0.0	+0.0	+0.0	38.8	46.0	-7.2	Vert
			+20.8	+0.4	+5.1	-27.8					
3	663.657M	39.2	+0.0	+0.0	+0.0	+0.0	+0.0	38.2	46.0	-7.8	Vert
			+21.4	+0.4	+5.1	-27.9					
4	368.737M	43.5	+0.0	+0.0	+0.0	+0.0	+0.0	36.7	46.0	-9.3	Horiz
			+17.5	+0.3	+3.6	-28.2					
5	295.013M	39.4	+0.0	+0.0	+0.0	+21.8	+0.0	36.5	46.0	-9.5	Horiz
			+0.0	+0.3	+3.3	-28.3					
6	324.486M	39.7	+0.0	+0.0	+0.0	+0.0	+0.0	35.8	46.0	-10.2	Vert
			+20.6	+0.3	+3.4	-28.2					
7	471.930M	42.0	+0.0	+0.0	+0.0	+0.0	+0.0	34.5	46.0	-11.5	Vert
			+16.5	+0.4	+4.2	-28.6					
8	353.969M	40.4	+0.0	+0.0	+0.0	+0.0	+0.0	34.5	46.0	-11.5	Vert
			+18.5	+0.3	+3.5	-28.2					
9	619.395M	37.3	+0.0	+0.0	+0.0	+0.0	+0.0	34.4	46.0	-11.6	Horiz
			+19.7	+0.4	+5.0	-28.0					

10	678.397M	34.7	+0.0 +21.9	+0.0 +0.5	+0.0 +5.2	+0.0 -27.9	+0.0	34.4	46.0	-11.6	Vert
11	530.939M	40.5	+0.0 +17.6	+0.0 +0.4	+0.0 +4.5	+0.0 -28.6	+0.0	34.4	46.0	-11.6	Vert
12	648.919M	35.7	+0.0 +20.8	+0.0 +0.4	+0.0 +5.1	+0.0 -27.8	+0.0	34.2	46.0	-11.8	Horiz
13	589.928M	38.5	+0.0 +18.7	+0.0 +0.4	+0.0 +4.8	+0.0 -28.2	+0.0	34.2	46.0	-11.8	Vert
14	486.692M	41.1	+0.0 +16.7	+0.0 +0.4	+0.0 +4.3	+0.0 -28.6	+0.0	33.9	46.0	-12.1	Vert
15	530.950M	39.8	+0.0 +17.6	+0.0 +0.4	+0.0 +4.5	+0.0 -28.6	+0.0	33.7	46.0	-12.3	Horiz
16	663.652M	34.6	+0.0 +21.4	+0.0 +0.4	+0.0 +5.1	+0.0 -27.9	+0.0	33.6	46.0	-12.4	Horiz
17	693.125M	33.4	+0.0 +22.5	+0.0 +0.5	+0.0 +5.2	+0.0 -28.0	+0.0	33.6	46.0	-12.4	Vert
18	398.209M	42.0	+0.0 +15.6	+0.0 +0.4	+0.0 +3.8	+0.0 -28.3	+0.0	33.5	46.0	-12.5	Horiz
19	634.155M	35.6	+0.0 +20.3	+0.0 +0.4	+0.0 +5.0	+0.0 -27.9	+0.0	33.4	46.0	-12.6	Vert
20	486.681M	40.5	+0.0 +16.7	+0.0 +0.4	+0.0 +4.3	+0.0 -28.6	+0.0	33.3	46.0	-12.7	Horiz
21	339.225M	38.2	+0.0 +19.5	+0.0 +0.3	+0.0 +3.5	+0.0 -28.2	+0.0	33.3	46.0	-12.7	Horiz
22	280.248M	37.3	+0.0 +0.0	+0.0 +0.3	+0.0 +3.1	+20.6 -28.3	+0.0	33.0	46.0	-13.0	Horiz
23	560.414M	37.9	+0.0 +18.2	+0.0 +0.4	+0.0 +4.7	+0.0 -28.5	+0.0	32.7	46.0	-13.3	Vert
24	870.093M	31.1	+0.0 +22.6	+0.0 +0.6	+0.0 +5.9	+0.0 -27.7	+0.0	32.5	46.0	-13.5	Horiz
25	678.383M	32.8	+0.0 +21.9	+0.0 +0.5	+0.0 +5.2	+0.0 -27.9	+0.0	32.5	46.0	-13.5	Horiz
26	958.570M	29.3	+0.0 +23.8	+0.0 +0.6	+0.0 +6.4	+0.0 -27.7	+0.0	32.4	46.0	-13.6	Horiz
27	457.206M	40.1	+0.0 +16.3	+0.0 +0.4	+0.0 +4.1	+0.0 -28.7	+0.0	32.2	46.0	-13.8	Horiz
28	457.206M	40.0	+0.0 +16.3	+0.0 +0.4	+0.0 +4.1	+0.0 -28.7	+0.0	32.1	46.0	-13.9	Vert
29	501.429M	38.7	+0.0 +16.9	+0.0 +0.4	+0.0 +4.4	+0.0 -28.5	+0.0	31.9	46.0	-14.1	Horiz
30	634.148M	34.0	+0.0 +20.3	+0.0 +0.4	+0.0 +5.0	+0.0 -27.9	+0.0	31.8	46.0	-14.2	Horiz
31	294.961M	34.7	+0.0 +0.0	+0.0 +0.3	+0.0 +3.3	+21.8 -28.3	+0.0	31.8	46.0	-14.2	Vert
32	442.435M	39.8	+0.0 +16.1	+0.0 +0.4	+0.0 +4.0	+0.0 -28.6	+0.0	31.7	46.0	-14.3	Horiz
33	309.718M QP	34.6	+0.0 +21.7	+0.0 +0.3	+0.0 +3.3	+0.0 -28.3	+0.0	31.6	46.0	-14.4	Horiz
^	309.742M	38.4	+0.0 +21.7	+0.0 +0.3	+0.0 +3.3	+0.0 -28.3	+0.0	35.4	46.0	-10.6	Horiz

35	752.125M	31.4	+0.0 +22.1	+0.0 +0.5	+0.0 +5.5	+0.0 -27.9	+0.0	31.6	46.0	-14.4	Vert
36	811.093M	31.1	+0.0 +21.7	+0.0 +0.6	+0.0 +5.7	+0.0 -27.6	+0.0	31.5	46.0	-14.5	Horiz
37	501.468M	38.3	+0.0 +16.9	+0.0 +0.4	+0.0 +4.4	+0.0 -28.5	+0.0	31.5	46.0	-14.5	Vert
38	162.267M	37.1	+0.0 +0.0	+0.0 +0.3	+0.0 +2.3	+17.6 -28.3	+0.0	29.0	43.5	-14.5	Horiz
39	722.631M	31.2	+0.0 +22.4	+0.0 +0.5	+0.0 +5.3	+0.0 -28.0	+0.0	31.4	46.0	-14.6	Horiz
40	471.941M	38.9	+0.0 +16.5	+0.0 +0.4	+0.0 +4.2	+0.0 -28.6	+0.0	31.4	46.0	-14.6	Horiz
41	693.126M	31.1	+0.0 +22.5	+0.0 +0.5	+0.0 +5.2	+0.0 -28.0	+0.0	31.3	46.0	-14.7	Horiz
42	177.016M	37.0	+0.0 +0.0	+0.0 +0.3	+0.0 +2.4	+17.3 -28.2	+0.0	28.8	43.5	-14.7	Horiz
43	899.589M	29.1	+0.0 +23.0	+0.0 +0.6	+0.0 +6.0	+0.0 -27.6	+0.0	31.1	46.0	-14.9	Vert
44	737.365M	30.7	+0.0 +22.2	+0.0 +0.5	+0.0 +5.4	+0.0 -27.9	+0.0	30.9	46.0	-15.1	Horiz
45	427.714M	39.2	+0.0 +15.9	+0.0 +0.4	+0.0 +3.9	+0.0 -28.5	+0.0	30.9	46.0	-15.1	Vert
46	368.743M	37.6	+0.0 +17.5	+0.0 +0.3	+0.0 +3.6	+0.0 -28.2	+0.0	30.8	46.0	-15.2	Vert
47	442.443M	38.8	+0.0 +16.1	+0.0 +0.4	+0.0 +4.0	+0.0 -28.6	+0.0	30.7	46.0	-15.3	Vert
48	132.794M	37.7	+0.0 +0.0	+0.0 +0.2	+0.0 +2.1	+16.5 -28.4	+0.0	28.1	43.5	-15.4	Horiz
49	427.712M	38.8	+0.0 +15.9	+0.0 +0.4	+0.0 +3.9	+0.0 -28.5	+0.0	30.5	46.0	-15.5	Horiz
50	398.236M	39.0	+0.0 +15.6	+0.0 +0.4	+0.0 +3.8	+0.0 -28.3	+0.0	30.5	46.0	-15.5	Vert
51	353.975M	36.3	+0.0 +18.5	+0.0 +0.3	+0.0 +3.5	+0.0 -28.2	+0.0	30.4	46.0	-15.6	Horiz
52	589.824M	34.2	+0.0 +18.7	+0.0 +0.4	+0.0 +4.8	+0.0 -28.2	+0.0	29.9	46.0	-16.1	Horiz
53	811.120M	29.5	+0.0 +21.7	+0.0 +0.6	+0.0 +5.7	+0.0 -27.6	+0.0	29.9	46.0	-16.1	Vert
54	737.402M	29.7	+0.0 +22.2	+0.0 +0.5	+0.0 +5.4	+0.0 -27.9	+0.0	29.9	46.0	-16.1	Vert
55	899.576M	27.8	+0.0 +23.0	+0.0 +0.6	+0.0 +6.0	+0.0 -27.6	+0.0	29.8	46.0	-16.2	Horiz
56	280.260M	34.0	+0.0 +0.0	+0.0 +0.3	+0.0 +3.1	+20.6 -28.3	+0.0	29.7	46.0	-16.3	Vert
57	383.460M	37.1	+0.0 +16.5	+0.0 +0.4	+0.0 +3.7	+0.0 -28.3	+0.0	29.4	46.0	-16.6	Horiz
58	250.764M	36.5	+0.0 +0.0	+0.0 +0.3	+0.0 +2.9	+17.9 -28.2	+0.0	29.4	46.0	-16.6	Horiz
59	545.659M	35.0	+0.0 +17.9	+0.0 +0.4	+0.0 +4.6	+0.0 -28.6	+0.0	29.3	46.0	-16.7	Vert

60	339.236M	33.4	+0.0 +19.5	+0.0 +0.3	+0.0 +3.5	+0.0 -28.2	+0.0	28.5	46.0	-17.5	Vert
61	766.858M	28.1	+0.0 +21.9	+0.0 +0.5	+0.0 +5.6	+0.0 -27.8	+0.0	28.3	46.0	-17.7	Horiz
62	206.536M	34.3	+0.0 +0.0	+0.0 +0.3	+0.0 +2.6	+16.9 -28.4	+0.0	25.7	43.5	-17.8	Horiz
63	840.614M	27.2	+0.0 +22.1	+0.0 +0.6	+0.0 +5.8	+0.0 -27.7	+0.0	28.0	46.0	-18.0	Horiz
64	412.956M	35.9	+0.0 +15.7	+0.0 +0.4	+0.0 +3.9	+0.0 -28.4	+0.0	27.5	46.0	-18.5	Vert
65	383.496M	34.8	+0.0 +16.5	+0.0 +0.4	+0.0 +3.7	+0.0 -28.3	+0.0	27.1	46.0	-18.9	Vert
66	265.452M	32.9	+0.0 +0.0	+0.0 +0.3	+0.0 +3.0	+19.2 -28.3	+0.0	27.1	46.0	-18.9	Vert
67	235.982M	34.6	+0.0 +0.0	+0.0 +0.3	+0.0 +2.8	+17.5 -28.3	+0.0	26.9	46.0	-19.1	Horiz
68	516.152M	33.1	+0.0 +17.2	+0.0 +0.4	+0.0 +4.5	+0.0 -28.5	+0.0	26.7	46.0	-19.3	Horiz
69	619.317M	29.6	+0.0 +19.7	+0.0 +0.4	+0.0 +5.0	+0.0 -28.0	+0.0	26.7	46.0	-19.3	Vert
70	221.271M	34.7	+0.0 +0.0	+0.0 +0.3	+0.0 +2.7	+17.3 -28.3	+0.0	26.7	46.0	-19.3	Horiz
71	560.439M	31.8	+0.0 +18.2	+0.0 +0.4	+0.0 +4.7	+0.0 -28.5	+0.0	26.6	46.0	-19.4	Horiz
72	412.972M	34.7	+0.0 +15.7	+0.0 +0.4	+0.0 +3.9	+0.0 -28.4	+0.0	26.3	46.0	-19.7	Horiz
73	545.658M	31.9	+0.0 +17.9	+0.0 +0.4	+0.0 +4.6	+0.0 -28.6	+0.0	26.2	46.0	-19.8	Horiz
74	118.024M	34.9	+0.0 +0.0	+0.0 +0.2	+0.0 +1.9	+15.0 -28.4	+0.0	23.6	43.5	-19.9	Horiz
75	236.041M	33.3	+0.0 +0.0	+0.0 +0.3	+0.0 +2.8	+17.5 -28.3	+0.0	25.6	46.0	-20.4	Vert
76	308.867M	28.3	+0.0 +21.8	+0.0 +0.3	+0.0 +3.3	+0.0 -28.3	+0.0	25.4	46.0	-20.6	Vert
77	206.502M	31.4	+0.0 +0.0	+0.0 +0.3	+0.0 +2.6	+16.9 -28.4	+0.0	22.8	43.5	-20.7	Vert
78	516.175M	31.6	+0.0 +17.2	+0.0 +0.4	+0.0 +4.5	+0.0 -28.5	+0.0	25.2	46.0	-20.8	Vert
79	253.678M	31.0	+0.0 +0.0	+0.0 +0.3	+0.0 +2.9	+18.2 -28.2	+0.0	24.2	46.0	-21.8	Vert
80	221.258M	29.5	+0.0 +0.0	+0.0 +0.3	+0.0 +2.7	+17.3 -28.3	+0.0	21.5	46.0	-24.5	Vert
81	18.960M	18.1	+10.4 +0.0	+0.8 +0.0	-40.0 +0.0	+0.0 +0.0	-19.0	-29.7	29.5	-59.2	None

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, Ca 92823 • (714) 993-6130

Customer: **Northrop Grumman Corp.**
Specification: **FCC 15.209**
Work Order #: **78304** Date: 06/27/2002
Test Type: **Maximized emission** Time: 17:12:26
Equipment: **Meter Reader** Sequence#: 2
Manufacturer: Northrop Grumman Corp. Tested By: Eddie Wong
Model: Versa Probe
S/N: VP13A1342

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Meter Reader*	Northrop Grumman Corp.	Versa Probe	VP13A1342

Support Devices:

Function	Manufacturer	Model #	S/N
Hand Held Computer	Logicon	MC-V	9406-062012722

Test Conditions / Notes:

EUT is placed on the wooden table. Communication port is connected to hand held computer acting as a load. Range of measurement: 9 kHz - 1000 MHz Mode: Transmit 26.5 kHz CW. 9 kHz - 150 kHz: RBW=VBW=200 Hz. 150 kHz - 30 kHz: RBW=VBW=9 kHz 30 MHz-1000 MHz: RBW=VBW=120 kHz. 7.2 VDC battery Power. 21°C, 51% relative humidity.

Transducer Legend:

T1=Active Loop Antenna	T2=Cable #15 120602
T3=15.31 40dB/Dec Correction	T4=----------
T5=Bicon 092401	T6=Log 331 092401
T7=Cable #10 071601	T8=Cable #15 120602
T9=Preamp 8447D 090501	T10=Dipole#4 110902

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	324.483M	44.2	+0.0 +0.0 -28.2	+0.0 +20.6 +0.0	+0.0 +0.3	+0.0 +3.4	+0.0	40.3	46.0	-5.7	Horiz
2	339.227M	44.2	+0.0 +0.0 -28.2	+0.0 +19.5 +0.0	+0.0 +0.3	+0.0 +3.5	+0.0	39.3	46.0	-6.7	Horiz
3	648.888M	39.8	+0.0 +0.0 -27.8	+0.0 +20.8 +0.0	+0.0 +0.4	+0.0 +5.1	+0.0	38.3	46.0	-7.7	Vert
4	309.714M	40.8	+0.0 +0.0 -28.3	+0.0 +21.7 +0.0	+0.0 +0.3	+0.0 +3.3	+0.0	37.8	46.0	-8.2	Horiz
5	324.491M	41.6	+0.0 +0.0 -28.2	+0.0 +20.6 +0.0	+0.0 +0.3	+0.0 +3.4	+0.0	37.7	46.0	-8.3	Vert

6	353.962M	42.9	+0.0 +0.0 -28.2	+0.0 +18.5 +0.0	+0.0 +0.3	+0.0 +3.5	+0.0	37.0	46.0	-9.0	Horiz
7	280.253M	41.0	+0.0 +20.6 -28.3	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +3.1	+0.0	36.7	46.0	-9.3	Horiz
8	619.425M	39.5	+0.0 +0.0 -28.0	+0.0 +19.7 +0.0	+0.0 +0.4	+0.0 +5.0	+0.0	36.6	46.0	-9.4	Vert
9	339.208M	41.5	+0.0 +0.0 -28.2	+0.0 +19.5 +0.0	+0.0 +0.3	+0.0 +3.5	+0.0	36.6	46.0	-9.4	Vert
10	678.373M	36.1	+0.0 +0.0 -27.9	+0.0 +21.9 +0.0	+0.0 +0.5	+0.0 +5.2	+0.0	35.8	46.0	-10.2	Vert
11	353.966M	41.0	+0.0 +0.0 -28.2	+0.0 +18.5 +0.0	+0.0 +0.3	+0.0 +3.5	+0.0	35.1	46.0	-10.9	Vert
12	530.914M	41.1	+0.0 +0.0 -28.6	+0.0 +17.6 +0.0	+0.0 +0.4	+0.0 +4.5	+0.0	35.0	46.0	-11.0	Vert
13	368.727M	41.7	+0.0 +0.0 -28.2	+0.0 +17.5 +0.0	+0.0 +0.3	+0.0 +3.6	+0.0	34.9	46.0	-11.1	Horiz
14	368.727M	41.6	+0.0 +0.0 -28.2	+0.0 +17.5 +0.0	+0.0 +0.3	+0.0 +3.6	+0.0	34.8	46.0	-11.2	Horiz
15	294.967M	37.5	+0.0 +21.8 -28.3	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +3.3	+0.0	34.6	46.0	-11.4	Horiz
16	589.931M	38.1	+0.0 +0.0 -28.2	+0.0 +18.7 +0.0	+0.0 +0.4	+0.0 +4.8	+0.0	33.8	46.0	-12.2	Vert
17	309.715M	36.7	+0.0 +0.0 -28.3	+0.0 +21.7 +0.0	+0.0 +0.3	+0.0 +3.3	+0.0	33.7	46.0	-12.3	Vert
18	560.400M	38.1	+0.0 +0.0 -28.5	+0.0 +18.2 +0.0	+0.0 +0.4	+0.0 +4.7	+0.0	32.9	46.0	-13.1	Vert
19	958.569M	29.2	+0.0 +0.0 -27.7	+0.0 +23.8 +0.0	+0.0 +0.6	+0.0 +6.4	+0.0	32.3	46.0	-13.7	Vert
20	250.751M	39.3	+0.0 +17.9 -28.2	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +2.9	+0.0	32.2	46.0	-13.8	Horiz
21	294.976M	34.6	+0.0 +21.8 -28.3	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +3.3	+0.0	31.7	46.0	-14.3	Vert
22	368.729M	38.1	+0.0 +0.0 -28.2	+0.0 +17.5 +0.0	+0.0 +0.3	+0.0 +3.6	+0.0	31.3	46.0	-14.7	Vert

23	265.506M	37.0	+0.0 +19.3 -28.3	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +3.0	+0.0	31.3	46.0	-14.7	Horiz
24	840.593M	30.4	+0.0 +0.0 -27.7	+0.0 +22.1 +0.0	+0.0 +0.6	+0.0 +5.8	+0.0	31.2	46.0	-14.8	Vert
25	634.129M	33.4	+0.0 +0.0 -27.9	+0.0 +20.3 +0.0	+0.0 +0.4	+0.0 +5.0	+0.0	31.2	46.0	-14.8	Vert
26	899.623M	29.1	+0.0 +0.0 -27.6	+0.0 +23.0 +0.0	+0.0 +0.6	+0.0 +6.0	+0.0	31.1	46.0	-14.9	Vert
27	811.120M	30.7	+0.0 +0.0 -27.6	+0.0 +21.7 +0.0	+0.0 +0.6	+0.0 +5.7	+0.0	31.1	46.0	-14.9	Vert
28	737.367M	30.7	+0.0 +0.0 -27.9	+0.0 +22.2 +0.0	+0.0 +0.5	+0.0 +5.4	+0.0	30.9	46.0	-15.1	Vert
29	177.023M	36.1	+0.0 +17.3 -28.2	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +2.4	+0.0	27.9	43.5	-15.6	Horiz
30	280.260M	34.5	+0.0 +20.6 -28.3	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +3.1	+0.0	30.2	46.0	-15.8	Vert
31	501.412M	36.9	+0.0 +0.0 -28.5	+0.0 +16.9 +0.0	+0.0 +0.4	+0.0 +4.4	+0.0	30.1	46.0	-15.9	Vert
32	722.629M	29.6	+0.0 +0.0 -28.0	+0.0 +22.4 +0.0	+0.0 +0.5	+0.0 +5.3	+0.0	29.8	46.0	-16.2	Vert
33	383.465M	37.4	+0.0 +0.0 -28.3	+0.0 +16.5 +0.0	+0.0 +0.4	+0.0 +3.7	+0.0	29.7	46.0	-16.3	Vert
34	442.460M	37.7	+0.0 +0.0 -28.6	+0.0 +16.1 +0.0	+0.0 +0.4	+0.0 +4.0	+0.0	29.6	46.0	-16.4	Vert
35	766.992M	29.0	+0.0 +0.0 -27.8	+0.0 +21.9 +0.0	+0.0 +0.5	+0.0 +5.6	+0.0	29.2	46.0	-16.8	Vert
36	235.994M	36.8	+0.0 +17.5 -28.3	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +2.8	+0.0	29.1	46.0	-16.9	Horiz
37	398.210M	37.5	+0.0 +0.0 -28.3	+0.0 +15.6 +0.0	+0.0 +0.4	+0.0 +3.8	+0.0	29.0	46.0	-17.0	Vert
38	796.332M	28.6	+0.0 +0.0 -27.6	+0.0 +21.5 +0.0	+0.0 +0.6	+0.0 +5.7	+0.0	28.8	46.0	-17.2	Vert
39	693.142M	28.6	+0.0 +0.0 -28.0	+0.0 +22.5 +0.0	+0.0 +0.5	+0.0 +5.2	+0.0	28.8	46.0	-17.2	Vert

40	486.925M	35.7	+0.0 +0.0 -28.6	+0.0 +16.7 +0.0	+0.0 +0.4	+0.0 +4.3	+0.0	28.5	46.0	-17.5	Vert
41	457.200M	36.4	+0.0 +0.0 -28.7	+0.0 +16.3 +0.0	+0.0 +0.4	+0.0 +4.1	+0.0	28.5	46.0	-17.5	Vert
42	177.021M	33.7	+0.0 +17.3 -28.2	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +2.4	+0.0	25.5	43.5	-18.0	Vert
43	427.730M	36.1	+0.0 +0.0 -28.5	+0.0 +15.9 +0.0	+0.0 +0.4	+0.0 +3.9	+0.0	27.8	46.0	-18.2	Vert
44	265.474M	33.4	+0.0 +19.2 -28.3	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +3.0	+0.0	27.6	46.0	-18.4	Vert
45	265.516M	33.2	+0.0 +19.3 -28.3	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +3.0	+0.0	27.5	46.0	-18.5	Vert
46	132.791M	34.2	+0.0 +16.5 -28.4	+0.0 +0.0 +0.0	+0.0 +0.2	+0.0 +2.1	+0.0	24.6	43.5	-18.9	Horiz
47	250.730M	33.7	+0.0 +17.9 -28.2	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +2.9	+0.0	26.6	46.0	-19.4	Vert
48	412.960M	34.9	+0.0 +0.0 -28.4	+0.0 +15.7 +0.0	+0.0 +0.4	+0.0 +3.9	+0.0	26.5	46.0	-19.5	Vert
49	516.190M	32.8	+0.0 +0.0 -28.5	+0.0 +17.2 +0.0	+0.0 +0.4	+0.0 +4.5	+0.0	26.4	46.0	-19.6	Vert
50	206.505M	32.0	+0.0 +16.9 -28.4	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +2.6	+0.0	23.4	43.5	-20.1	Horiz
51	545.678M	31.3	+0.0 +0.0 -28.6	+0.0 +17.9 +0.0	+0.0 +0.4	+0.0 +4.6	+0.0	25.6	46.0	-20.4	Vert
52	206.498M	31.3	+0.0 +16.9 -28.4	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +2.6	+0.0	22.7	43.5	-20.8	Vert
53	988.082M	28.9	+0.0 +0.0 -27.9	+0.0 +24.2 +0.0	+0.0 +0.6	+0.0 +6.9	+0.0	32.7	54.0	-21.3	Vert
54	988.111M	28.4	+0.0 +0.0 -27.9	+0.0 +24.2 +0.0	+0.0 +0.6	+0.0 +6.9	+0.0	32.2	54.0	-21.8	Vert
55	118.024M	32.9	+0.0 +15.0 -28.4	+0.0 +0.0 +0.0	+0.0 +0.2	+0.0 +1.9	+0.0	21.6	43.5	-21.9	Horiz
56	236.003M	31.4	+0.0 +17.5 -28.3	+0.0 +0.0 +0.0	+0.0 +0.3	+0.0 +2.8	+0.0	23.7	46.0	-22.3	Vert

57	199.700k	56.6	+11.2	+0.1	-80.0	-19.0	-31.1	21.6	-52.7	None
58	250.800k	52.8	+11.3	+0.1	-80.0	-19.0	-34.8	19.6	-54.4	None
59	354.100k	48.6	+11.2	+0.1	-80.0	-19.0	-39.1	16.6	-55.7	None
60	301.200k	49.9	+11.3	+0.1	-80.0	-19.0	-37.7	18.0	-55.7	None
61	404.500k	45.9	+11.2	+0.1	-80.0	-19.0	-41.8	15.5	-57.3	None
62	81.900k	54.9	+11.5	+0.1	-80.0	-19.0	-32.5	29.3	-61.8	None
63	133.000k	47.1	+11.3	+0.1	-80.0	-19.0	-40.5	25.1	-65.6	None