FCC CFR47 PART 24 SUBPART E

CLASS II PERMISSIVE CHANGE TEST REPORT

FOR

PCS MULTICARRIER REPEATER

MODEL: R1910-1

FCC ID: NTTR1910-1
(GRANTED ON 07/17/1998)

REPORT NUMBER: 99U0133

ISSUE DATE: MARCH 22, 1999

Prepared for
WATKINS-JOHNSON COMPANY
3333 Hillview Ave.
Palo Alto, CA 94303, USA

Prepared by
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LAB CODE:200065-0

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1. EUT PHOTOGRAPHS
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COMPLIANCE CONSULTING SERVICES DOCUMENT NO:CCSUP4031A
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1. FCC CERTIFICATION INFORMATION

The following information is in accordance with FCC Rules, 47CFR Part 2, Subpart J, sections 2.983 - 2.999.

2.983(a) Applicant: Watkins-Johnson Company.
3333 Hillview Avenue
Palo Alto, CA 94303

2.983(b) FCC ID: NTTR1910-1 GRANTED ON :07/17/1998

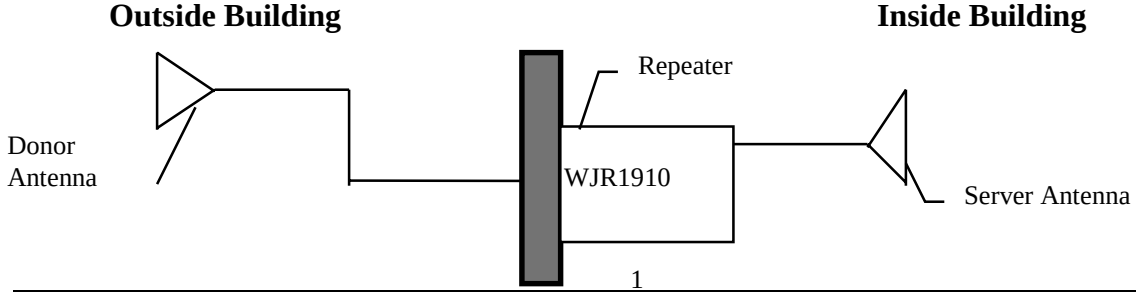
2.983(c) Quantity production is planned.

2.983(d) Technical Description

The following Class II changes were made to the repeater, only:
R101, 102, 103, 145, 146, 147, 166, 167, 168, 211, 212, 213, 229, 230, 231, 266, 339, 340, 341, 353, 354, 355, 356, and R359.
These resistors were changed on the R1910, a previous granted unit, to **increase** the output **gain from 70 to 95 dB**.

The R1910-1 are **Multicarrier PCS Repeaters** used to extend the coverage of a PCS base station that are located inside buildings that do allow sufficient signal strength. At the base station there exists a hole in the coverage for wireless service. The repeater receives the base station signal via an external antenna. This signal is amplified and filtered by the repeater and ultimately retransmitted via a second antenna. The entire process is duplicated for the reverse path where the handset signal is amplified and filtered and retransmitted to the base station. This technique provides PCS coverage inside buildings that previously did not have sufficient signal strength.

Model	Frequency Band
R1910 A/D	A&D(1930-1950 MHz Forward, 1850-1870 MHz Reverse)
R1910 B/E	B&E(1950-1970 MHz Forward, 1870-1890 MHz Reverse)
R1910 C/F	C&F(1970-1990 MHz Forward, 1890-1910 MHz Reverse)



(1) Types of Emissions

(a) CDMA: F9W
(b) TDMA: DXW (NADC)
(c) GSM : GXW

(2) Frequency Range

CDMA: Block A - F
Forward : 1930-1990 MHz
Reverse: 1850-1910MHz

TDMA : Block A-F
Forward: 1930 - 1990 MHz
Reverse: 1850 - 1910 MHz

GSM(PCS-1900) : Block A-F
Forward: 1930 - 1990 MHz
Reverse: 1850 - 1910 MHz

(3) Range of Operating Power

40 - 95dB gain (-40-/+27dBm)

CDMA :Maximum output power is 0.1 W
TDMA :Maximum output power is 0.5 W
GSM: Maximum output power is 0.5 W

(4) Maximum Power Rating

24.232(A); Maximum Peak output power for base station transmitters should not exceed 100 Watts.

24.232(B); Mobile/Portable stations are limited to 2 Watts EIRP peak power.

(5) Applied voltages and currents into the final transistor elements

4.8 VDC at 1.2 A on Q409 and Q415

(6) Function of Each Active Device

Refer to **Attachment**: Schematics and Parts list. Confidentiality is requested for these items.

(7) Complete Circuit Diagrams and Functional Diagram

Refer to **Attachment**: Schematics and Parts list. Confidentiality is requested for these

items.

(8) Instructions/Installation Manual

Refer to **Attachment**: Installation and Service manual

(9) Tune-up/Optimization Procedure

Refer to **Attachment**: Installation and Service manual

(10) Means for Frequency Stabilization

U502: 10 MHz reference for L.O. PLL U501

(11) Means for Limiting Modulation

Not Applicable.

(11) Means for Limiting Power

Software that limits the output power to the maximum output power specified. If the unit detects that the output power exceeds this power then attenuation is added to keep the power at maximum. When no more attenuation can be added the unit is turned off.

(11) Means for Attenuating Higher Audio Frequencies

Not Applicable.

(12) Description of Digital Modulation Techniques

Not Applicable

2.983(e) Standard Test Conditions

The transmitter was tested under the following conditions:

Room Temperature: 20 - 23 °C
Relative Humidity: 35 - 50%
DC Supply Voltage: 12V (option)
AC Supply Voltage: Autoranging 100-230 VAC, 50/60Hz. <1A

The transmitter was aligned and tuned up according to manufacturer's alignment procedure, prior to testing. All data presented represents the worst case parameter being measured.

Section 2.983(f) Equipment Identification

A drawing of the equipment identification nameplate appears under **Attachment**: PROPOSED FCC ID LABEL FORMAT.

Section 2.983(g) Photographs

Photographs of the equipment, internal and external views, are found in the **Attachment**: Eut Photographs.

Section 2.983 Description of Various Base Station Configurations

Not Applicable

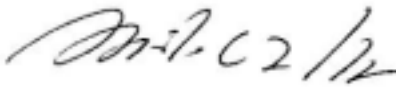
Section 2.983 Use of Various Power Supplies

Current version uses AC autoranging supply. Anticipated future option will be 12VDC input.

TYPE OF EQUIPMENT:	PCS MULTICARRIER REPEATER
MEASUREMENT DISTANCE:	3 METER
TECHNICAL LIMIT:	FCC 24 BROADBAND
FCC RULES:	PART 2, PART 15, PART 24
EQUIPMENT AUTHORIZATION PROCEDURE	CLASS II PERMISSIVE CHANGE
MODIFICATIONS MADE ON EUT	☐ YES (REFER TO PAGE 7) ☒ NO

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC CFR 47, PART 15 AND 24. The results of testing in this report apply to the product/system, which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved By



MIKE C.I. KUO / VICE - PRESIDENT
COMPLIANCE CERTIFICATION SERVICES

2. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

3. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code:200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT(1300F2))

4. MEASUREMENT INSTRUMENTATION

Radiated emissions were measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, BI-log, ridged waveguide, and liner horn. EMI receivers were used for line conducted readings, spectrum analyzers with pre-selectors and quasi-peak detectors were used to perform radiated measurements. Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specification for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

5. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

6. UNITS OF MEASUREMENT

Measurements of radiated interference are reported in terms of dB(uV/m) at a specified distance. The indicated readings on the spectrum analyzer were converted to dB(uV/m) by

use of appropriate conversion factors. Measurements of conducted interference are reported in terms of dB(uV).

The field strength is calculated by adding the Antenna Factor and Cable Factors, then by subtracting the Amplifier Gain from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4dB/m and a Cable Factor of 1.1dB is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/m. The 32 dBuV/m value was mathematically converted to its corresponding level in uV/m.

FS = 52.5 + 7.4 + 1.1 - 29 = 32 dBuV/m

Level in uV/m = Common Antilogarithm [(32 dBuV/m)/20] = 39.8 uV/m

7. CLASSIFICATION OF DIGITAL DEVICE

Class A includes digital devices that are marketed for use in commercial, industrial or business environments, excluding devices which are marketed for use by the general public or are intended to be used in the home.

Class B includes digital devices that are marketed for use in residential environments, notwithstanding use in commercial, business and industrial environments.

Note: The responsible party may also qualify a device intended to be marketed in a commercial, business or industrial environment as Class B device, and in fact is encouraged to do so provided the device complies with the technical specifications for a Class B digital device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B digital device, regardless of its intended use.

8. RADIATED EMISSION LIMITS

FCC PART 15 CLASS A

MEASURING DISTANCE OF 10 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	90	39.1
88-216	150	43.5
216-960	210	46.4
Above 960	300	49.5

FCC PART 15 CLASS B

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

FCC RADIATED EMISSION ALTERNATIVE METHOD
(CISPR 22/EN55022)

Limits for radiated disturbance of Class A ITE at
measuring distance of 10 m

Frequency range MHz	Quasi-peak limits dB(uV/m)
30 to 230	**40**
230 to 1000	**47**

NOTES
1. The lower limit shall apply at the transition frequency.
2. Additional provisions may be required for cases where interference occurs.

Limits for radiated disturbance of Class B ITE at
Measuring distance of 10 m

Frequency range MHz	Quasi-peak limits dB(uV/m)
30 to 230	**30**
230 to 1000	**37**

NOTES
1. The lower limit shall apply at the transition frequency.
2. Additional provisions may be required for cases where interference occurs.

9. RADIATED EMISSION TEST PROCEDURE

The EUT and all other support equipment are placed on a wooden table 80-cm above the ground screen. Antenna to EUT distance is 3 meters . During the test, the table is rotated 360 degrees to maximize emissions and the antenna is positioned from 1 to 4 meters above the ground screen to further maximize emissions. The antenna is polarized in both vertical and horizontal positions.

EUT test configuration is according to Section 8 of ANSI C63.4/1992.

Monitor the frequency range of interest at a fixed antenna height and EUT azimuth. Frequency span should be small enough to easily differentiate between broadcast stations and intermittent ambients. Rotate EUT 360 degrees to maximize emissions received from EUT. If emission increases by more than 1 dB, or if another emission appears that is greater by 1 dB, return to azimuth where maximum occurred and perform additional cable manipulation to further maximize received emission.

Move antenna up and down to further maximize suspected highest amplitude signal. If emission increased by 1 dB or more, or if another emission appears that is greater by 1dB or more, return to antenna height where maximum signal was observed and manipulate cables to produce highest emissions, noting frequency and amplitude.

10. CONDUCTED EMISSION LIMITS

FCC CLASS A

FREQUENCY RANGE	FIELD STRENGTH (Microvolts)	FIELD STRENGTH (dBuV)/QP
450kHz-1.705MHz	1000	60
1.705MHz - 30MHz	3000	69.54

FCC CLASS B

FREQUENCY RANGE	FIELD STRENGTH (Microvolts)	FIELD STRENGTH (dBuV)/QP
450kHz-30MHz	250	48

FCC CONDUCTED EMISSION ALTERNATIVE METHOD
(CISPR 22/EN55022)

Limits for conducted disturbance at the mains ports of Class A ITE

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	**Average**
0.15 to 0.50	**79**	**66**
0.5 to 30	**73**	**60**
Note- The lower limit shall apply at the transition frequency.		

Limits of Conducted disturbance at the mains ports
of Class B ITE

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	**Average**
0.15 to 0.50	**66 to 56**	**56 to 46**
0.50 to 5	**56**	**46**
5 to 30	**60**	**50**

Note
1.The lower limit shall apply at the transition frequencies
2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

11. CONDUCTED EMISSION TEST PROCEDURE

The EUT is located so that the distance between the boundary of the EUT and the closest surface to the LISN is 0.8m.

EUT test configuration is according to Section 7 of ANSI C63.4/1992.

Conducted disturbance shall be measured between the phase lead and the ground, and between the neutral lead and the ground. The frequency 0.450 - 30 MHz (or 0.150 - 30 MHz in case of CISPR 22/EN55022 method) shall be investigated.

Set the EMI receiver to PEAK detector setting and sweep continuously over the frequency range to be investigated. Set resolution bandwidth to 9kHz minimum. Connect EMI receiver input cable to LINE 1 RF measurement connection on the LISN. Connect a 50ohm terminator to the unused RF connection on the LISN. For each mode of EUT operation, maximize emissions readings by manipulating cable and wire positions. Record the configuration for each EUT power cord, which produces emissions closest to the limit. Repeat the same procedure for LINE 2 of each EUT power cord.

12. AMBIENT CONDITIONS

The ambient conditions at the time of final tests were as follows:

	Radiated Emission	Conducted Emission
Temperature	**17**^{o}C	**21**^{o}C
Humidity	**81%**	**62%**

13. EQUIPMENT MODIFICATIONS

Not Applicable

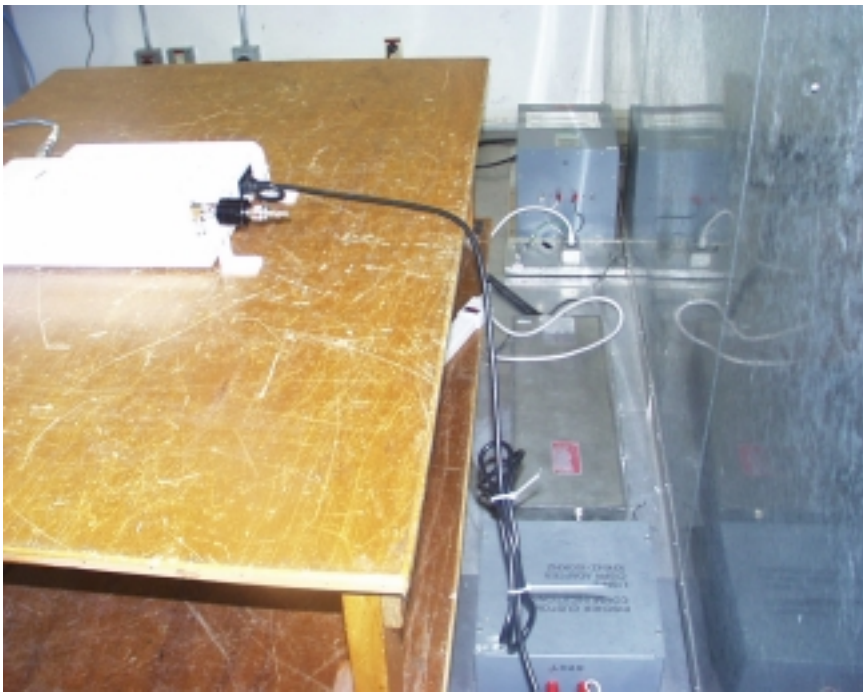
14. A) TEST EQUIPMENT LIST

Equipment	Manufacturer	Model No.	Serial No.	Site	Cal Date	Due Date
Spectrum Analyzer	**H.P.**	**8593EM**	**3710A00205**	**A**	**05/98**	**05/99**
Antenna	**Eaton**	**94455-1**	**1197**	**B**	**10/98**	**10/99**
Antenna	**Emco**	**3146**	**2120**	**B**	**10/98**	**10/99**
Horn Antenna	**EMCO**	**3115**	**9001-3245**	**N/A**	**12/97**	**12/00**
Pre-Amp	**H.P.(P2)**	**8447D**	**2944A06550**	**N/A**	**09/98**	**09/99**
Pre-Amp	**H.P. (1-26.5GHz)**	**8449B**	**3008A00369**	**N/A**	**04/98**	**04/99**

B) SUPPORT EQUIPMENT

Device Type	**Manufacturer**	**Model Number**	**Serial No.**	**FCC ID / DoC**
LAPTOP	NEC	PC-6100-41402	5Y001048	A3DP8
HIGH POWER ATTENUATOR	NARDA	766-10	4800	N/A

15. EUT SETUP PHOTOS



16. TEST RESULT SUMMARY FOR PART 15.

FCC PART 15 Radiated Emission Test was conducted by operating the configuration as indicated below.

OATS No: B-SITE	Data Report No. 990324B1	Date 3/24/99	Tested By: JUAN MARTINEZ

Six Highest Radiated Emission Readings

Frequency Range Investigated				30 MHz TO 1000 MHz			
Freq. (MHz)	Meter Reading (dBuV)	C.F. (dB/m)	Corrected Reading (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Reading Type (P/Q/A)	Polar (H/V)
63	**53.3**	**-19.57**	**33.73**	**40.0**	**-6.27**	**P**	**V**
42.1	**40.3**	**-14.13**	**26.17**	**40.0**	**-13.83**	**P**	**V**
83.6	**38.7**	**-16.08**	**22.62**	**40.0**	**-17.38**	**P**	**V**
112.7	**42.45**	**-14.47**	**27.98**	**43.5**	**-15.52**	**P**	**V**
256.45	**38.78**	**-11.56**	**27.22**	**46.0**	**-18.78**	**P**	**V**
289.75	**40.78**	**-9.72**	**31.06**	**46.0**	**-14.94**	**P**	**V**

C.F.(Correction Factor)=Antenna Factor + Cable Loss-Amplifier Gain
Corrected Reading = Metering Reading + C.F. Margin = Corrected Reading - Limits
P= Peak Reading H= Horizontal Polarization/Antenna
Q= Quasi-peak V= Vertical Polarization/Antenna
A= Average Reading
Comments: N/A

17. FCC PART 15 FINAL CONDUCTED EMISSION TEST was conducted by operating the configuration as indicated below.

Conducted Room	Plot No. 99u133		Date 3/24/99		Tested By: Juan Martinez		
Six Highest Conducted Emission Readings							
Frequency Range Investigated				450 kHz TO 30 MHz			
Freq. (MHz)	Meter Reading (dBuV)	C.F. (dB)	Corrected Reading (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Reading Type (P/Q/A)	Line (L1/L2)
12.11	**46.02**	**0**	**46.02**	**48**	**-1.98**	**P**	**L1**
13.28	**46.36**	**0**	**46.36**	**48**	**-1.64**	**P**	**L1**
14.33	**46.17**	**0**	**46.17**	**48**	**-1.83**	**P**	**L1**
12.11	**46.02**	**0**	**46.32**	**48**	**-1.68**	**P**	**L1**
13.28	**46.36**	**0**	**46.47**	**48**	**-1.53**	**P**	**L2**
14.33	**46.17**	**0**	**46.58**	**48**	**-1.42**	**P**	**L2**

C.F.(Correction Factor)=Insertion Loss + Cable Loss
Corrected Reading = Metering Reading + C.F.
Margin = Corrected Reading - Limits
P= Peak Reading L1=Hot
Q= Quasi-peak L2=Neutral
A= Average Reading

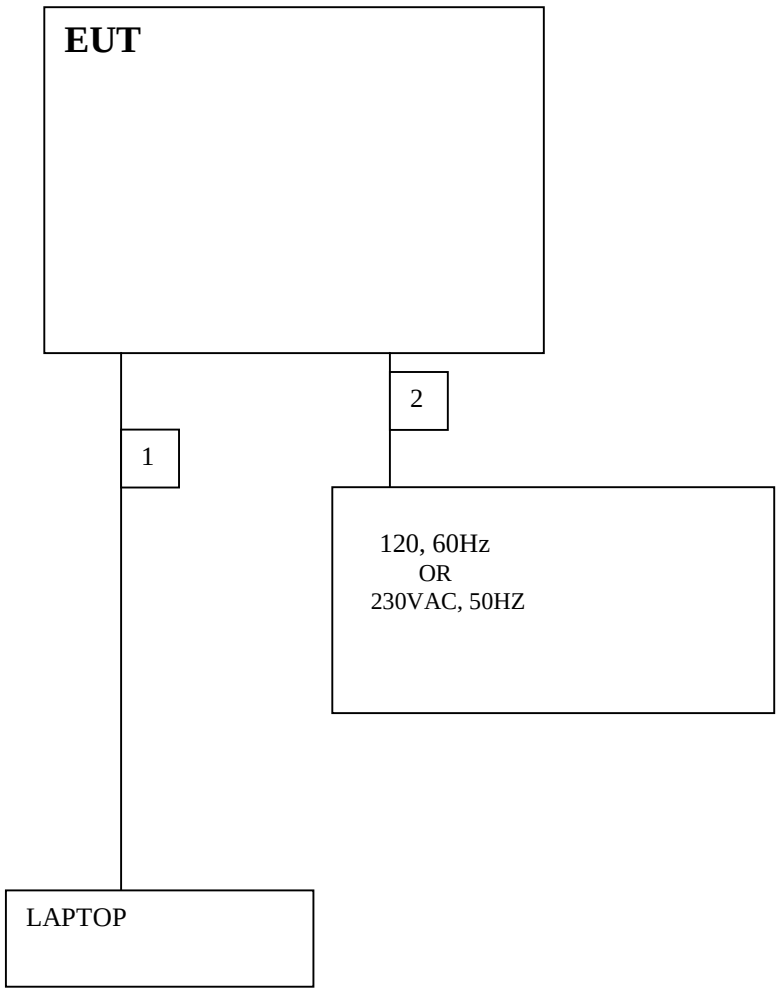
Comments: N/A

18. EXTERNAL I/O CABLE CONSTRUCTION DESCRIPTION

CABLE NO:1	
I/O Port: : RS-232	Number of I/O ports of this type:1
Number of Conductors: 9	**Connector Type: DB9**
Capture Type: SCREW-IN	**Type of Cable used: SHIELDED**
Cable Connector Type: MOLDED	**Cable Length: 4M**
Bundled During Tests: NO	**Data Traffic Generated: YES**
Remark: N/A	

CABLE NO:2	
I/O Port:: AC-INPUT	Number of I/O ports of this type:1 (AC CORD)
Number of Conductors: 3	**Connector Type: USA POWER PLUG**
Capture Type: PUSH-IN	**Type of Cable used: UNSHIELDED**
Cable Connector Type: PERMENATLY ATTACHED	**Cable Length: 2.3M**
Bundled During Tests: NO-RADIATED YES- LINE CONDUCTED	**Data Traffic Generated: NO**
Remark: N/A	

19. CONFIGURATION BLOCK DIAGRAM



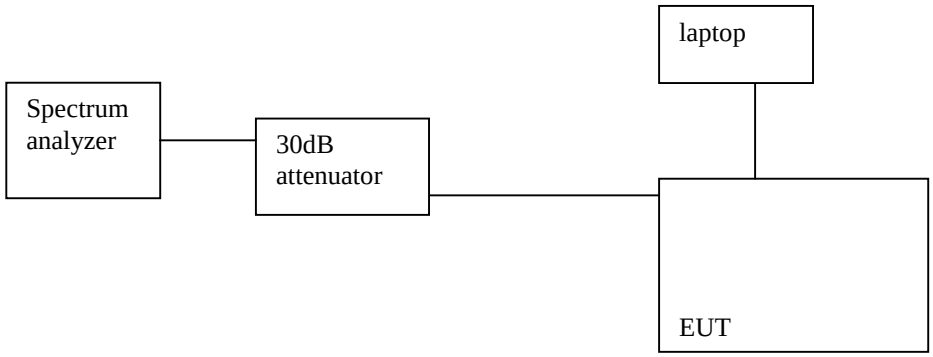
20. FCC PART 2 CERTIFICATION TEST RESULTS:

SECTION 2.1046 (was section 2.985): RF POWER OUTPUT

Equipment used.

HP Spectrum Analyzer/8593EM
Narda 30dB Attenuator
Flexco low loss cables, 9ft. (Loss: 0.85 dB/ft @ 26GHz)
H.P. Power Meter/436A

TEST SETUP:



Minimum Requirement:
24.232(A); Maximum Peak output power for base station transmitters should not exceed 100 Watts.

24.232(B); Mobile/Portable stations are limited to 2 Watts EIRP peak power.

Test Procedure:
The Repeater was set to maximum output power (maximum gain). RF output power was measured with Power Meter.

For CDMA:

Power In (F1): -66dBm
Power In (F2): -72dBm
Power Out: 23 dBm, for both FWD and REV channels.

For TDMA and GSM:

Power In (F1): -63dBm
Power In (F2): - 70dBm
Power Out: 28dBm, for both FWD and REV channels.

SECTION 2.1047(was Section2.987): MODULATION CHARACTERISTICS

(NOT APPLICABLE TO REPEATERS)

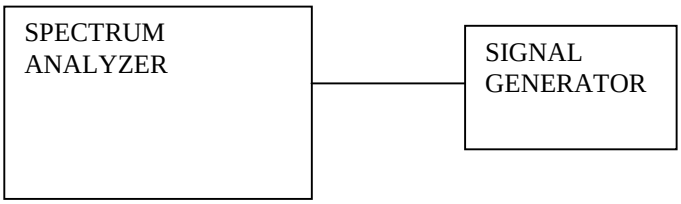
SECTION 2.1049 (Was Section 2.989): OCCUPIED BANDWIDTH

Test Equipment:

HP Spectrum Analyzer/8593EM
DC power supply
Low loss cable, 2ft(loss: 0.85dB/ft @ 26GHZ)
ATTENUATOR

Test Setup:

SETUP (A) FOR INPUT FROM SIGNAL GENERATOR



SETUP (B) FOR OUPUT FROM EUT

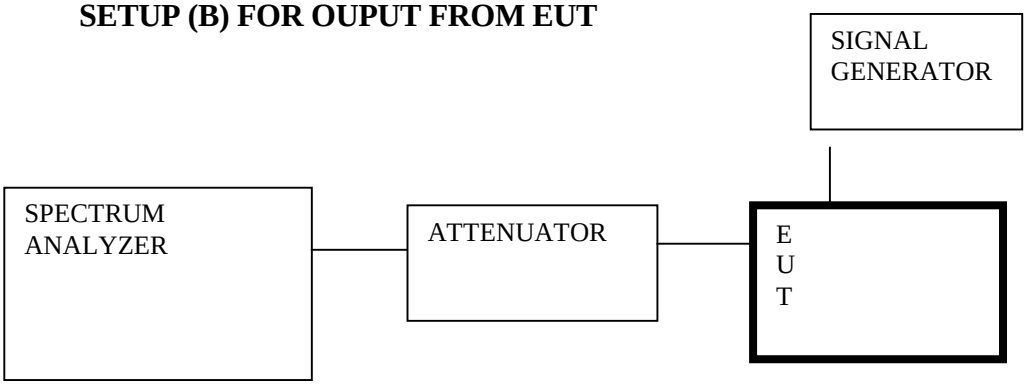


FIG. 2
Minimum:
Section 2.1049 (2.989) (i); transmitters designed for other types of modulation-when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used. A description of the input signal should be supplied.

Test Procedure:

The Eut's occupied bandwidth is compared to the input source plot (signal generator) and output plot (power amplifier) and check that no distortion is created when input signal is amplified by Eut.

Used setup **B** and connect output from Eut to spectrum analyzer, making sure that enough external attenuation is being used to protect input of spectrum analyzer. Use the **REF LVL OFF** function to correct for external attenuation and cable loss. Set the spectrum to the frequency that will be measured. Set the power amplifier to the maximum output gain. Recorded the signal generator level for future reference. Set spectrum **SWEEP TIME** to **AUTO** and set **RES BW.** to 30 kHz or 100 kHz. Use enough **SPAN** to display the whole signal on spectrum analyzer. Activate the **MAX HOLD** function and wait while the spectrum analyzer captures the envelope of the transmitted occupied bandwidth.

Used setup **A** and connect signal generator to spectrum analyzer, make sure that the input signal from signal generator is low enough, before connecting to spectrum analyzer. Keep all settings on spectrum analyzer the same and only remove the **REF LVL OFF** function, which was used to correct the external attenuation. Set the spectrum to the frequency that will be measured. Set spectrum **SWEEP TIME** to **AUTO** and set **RES BW.** to 30 kHz or 100 kHz. Use enough **SPAN** to display the whole signal on spectrum analyzer. Activate the **MAX HOLD** function and wait while the spectrum analyzer captures the envelope of the transmitted occupied bandwidth

Repeated this procedure for CDMA, TDMA, and GSM

Test Result:

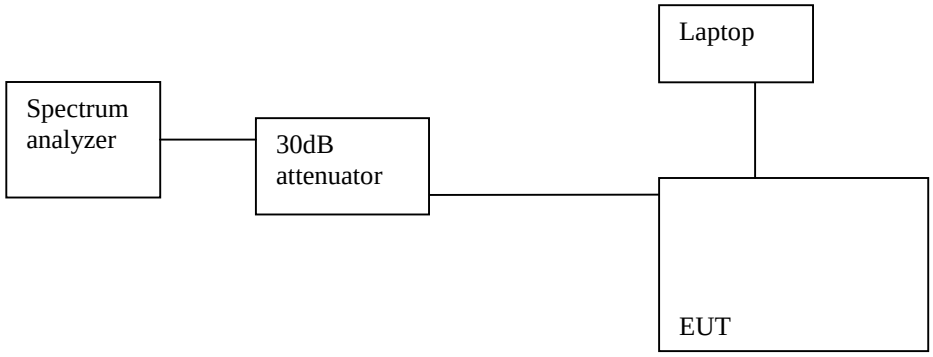
Plot included one for the input and another for the output. Please refer to spectrum plots under SECTION 2.1051 (2.991): SPURIOUS EMISSION AT ANTENNA TERMINAL table shows low, high, and input sections.

SECTION 2.1051 (2.991): SPURIOUS EMISSION AT ANTENNA TERMINAL.

Equipment used.

HP Spectrum Analyzer/8593EM
Narda 30dB Attenuator
Flexco low loss cables, 9ft. (Loss: 0.85 dB/ft @ 26GHz)
NEC Laptop Computer.

TEST SETUP:



Minimum standard:

24.238(a); The magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under conditions specified in the instruction manual and/or alignment procedure, shall not be less than 43+10 log(mean output power in watts) dBc below the mean power output outside a licensee's frequency block.

24.238 (b) & (c); Compliance with out of band emissions requirement is based on test being performed with 1MHz analyzer RES BW. At block edges, RES BW may be adjusted to a level at least as large as 1% of emission bandwidth. For the EUT this is at least

CDMA:
.01 * 1.438 MHz = 14.38kHz. A RES BW of 30 kHz was used for measurement.

TDMA:
.01 * 33.5 kHz = .335 kHz. A RES BW of 1 kHz was used for measurement.

GSM:
.01 * 313 kHz = 3.13 kHz. A RES BW of 3 kHz was used for measurement.

Test Procedure:

For all tests performed the output power or gain was set to maximum.

1) For the low and high block emission measurements used the above RES BW settings to show compliance and place display line at –13 dBm. Used average mode to show

compliance if peak mode emissions are over the –13 dBm limit. All modulation and block A-F were measured.

2) For the Out-of-Band measurements used 1 MHz RES BW and scan from 15 MHz to 10***fo*** of the fundamental carrier for all modulations and frequency blocks. Place display line at –13 dBm.

3) For the 26dB bandwidth: The emissions bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Test Results

Please refer to the following table which indicates the chart number associates with Low , High , 26dB Bandwidth, and out-of- band emissions. Included input signal sources plots from the signal generator.

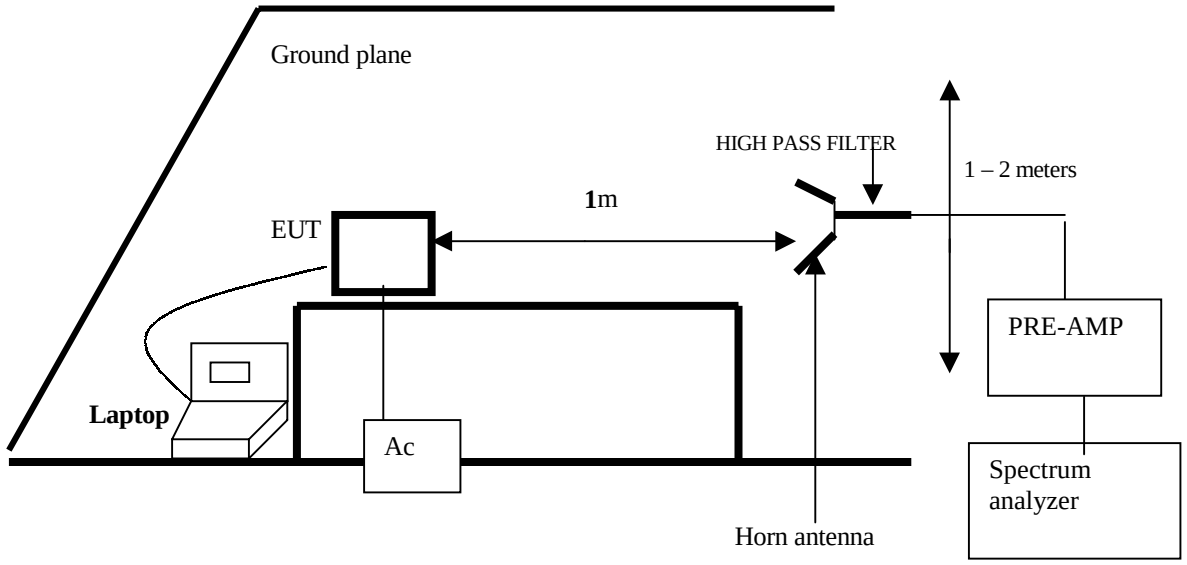
CDMA								
BLOCK A	LOW	26dB BW	Out-of-band	Inputs	BLOCK D	HIGH	Out-of-band	Inputs
Forward	**1**	**2**	**3+4**	**5**	**Forward**	**6**	**7+8**	**9**
Reverse	**10**	**11**	**12+13**	**14**	**Reverse**	**15**	**16+17**	**18**
BLOCK B	LOW	26dB BW	Out-of-band	Inputs	BLOCK E	HIGH	Out-of-band	Inputs
Forward	**19**	**20**	**21+22**	**23**	**Forward**	**24**	**25+26**	**27**
Reverse	**28**	**29**	**30+31**	**32**	**Reverse**	**33**	**34+35**	**36**
BLOCK F	LOW	26dB BW	Out-of-band	Inputs	BLOCK C	HIGH	Out-of-band	Inputs
Forward	**37**	**38**	**39+40**	**41**	**Forward**	**42**	**43+44**	**45**
Reverse	**46**	**47**	**48+49**	**50**	**Reverse**	**51**	**52+53**	**54**
TDMA								
BLOCK A	LOW	26dB BW	Out-of-band	Inputs	BLOCK D	HIGH	Out-of-band	Inputs
Forward	**55**	**56**	**57+58**	**59**	**Forward**	**60**	**61+62**	**63**
Reverse	**64**	**65**	**66+67**	**68**	**Reverse**	**69**	**70+71**	**72**
BLOCK B	LOW	26dB BW	Out-of-band	Inputs	BLOCK E	HIGH	Out-of-band	Inputs
Forward	**73**	**74**	**75+76**	**77**	**Forward**	**78**	**79+80**	**81**
Reverse	**82**	**83**	**84+85**	**86**	**Reverse**	**87**	**88+89**	**90**
BLOCK F	LOW	26dB BW	Out-of-band	Inputs	BLOCK C	HIGH	Out-of-band	Inputs
Forward	**91**	**92**	**93+94**	**95**	**Forward**	**96**	**97+98**	**99**
Reverse	**100**	**101**	**102+103**	**104**	**Reverse**	**105**	**106+107**	**108**
GSM								
BLOCK A	LOW	26dB BW	Out-of-band	Inputs	BLOCK D	HIGH	Out-of-band	Inputs
Forward	**109**	**110**	**111+112**	**113**	**Forward**	**114**	**115+116**	**117**
Reverse	**118**	**119**	**120+121**	**122**	**Reverse**	**123**	**124+125**	**126**
BLOCK B	LOW	26dB BW	Out-of-band	Inputs	BLOCK E	HIGH	Out-of-band	Inputs
Forward	**127**	**128**	**129+130**	**131**	**Forward**	**132**	**133+134**	**135**
Reverse	**136**	**137**	**138+139**	**140**	**Reverse**	**141**	**142+143**	**144**
BLOCK F	LOW	26dB BW	Out-of-band	Inputs	BLOCK C	HIGH	Out-of-band	Inputs
Forward	**145**	**146**	**147+148**	**149**	**Forward**	**150**	**151+152**	**153**
Reverse	**154**	**155**	**156+157**	**158**	**Reverse**	**159**	**160+161**	**162**

SECTION 2.1053 (2.993): FIELD STRENGTH OF SPURIOUS RADIATION.

Equipment used.

Emco Horn Antenna/3146
HP Pre-Amp (1 – 26.5 GHz)/8449B
HP Spectrum Analyzer/8593EM
FSY High Pass Filter (1.802GHz)/001
FLEXCO cable/20761; 19ft. coaxial cable (loss: .9dB/ft @ 26GHz)

Test setup



Minimum Requirement:

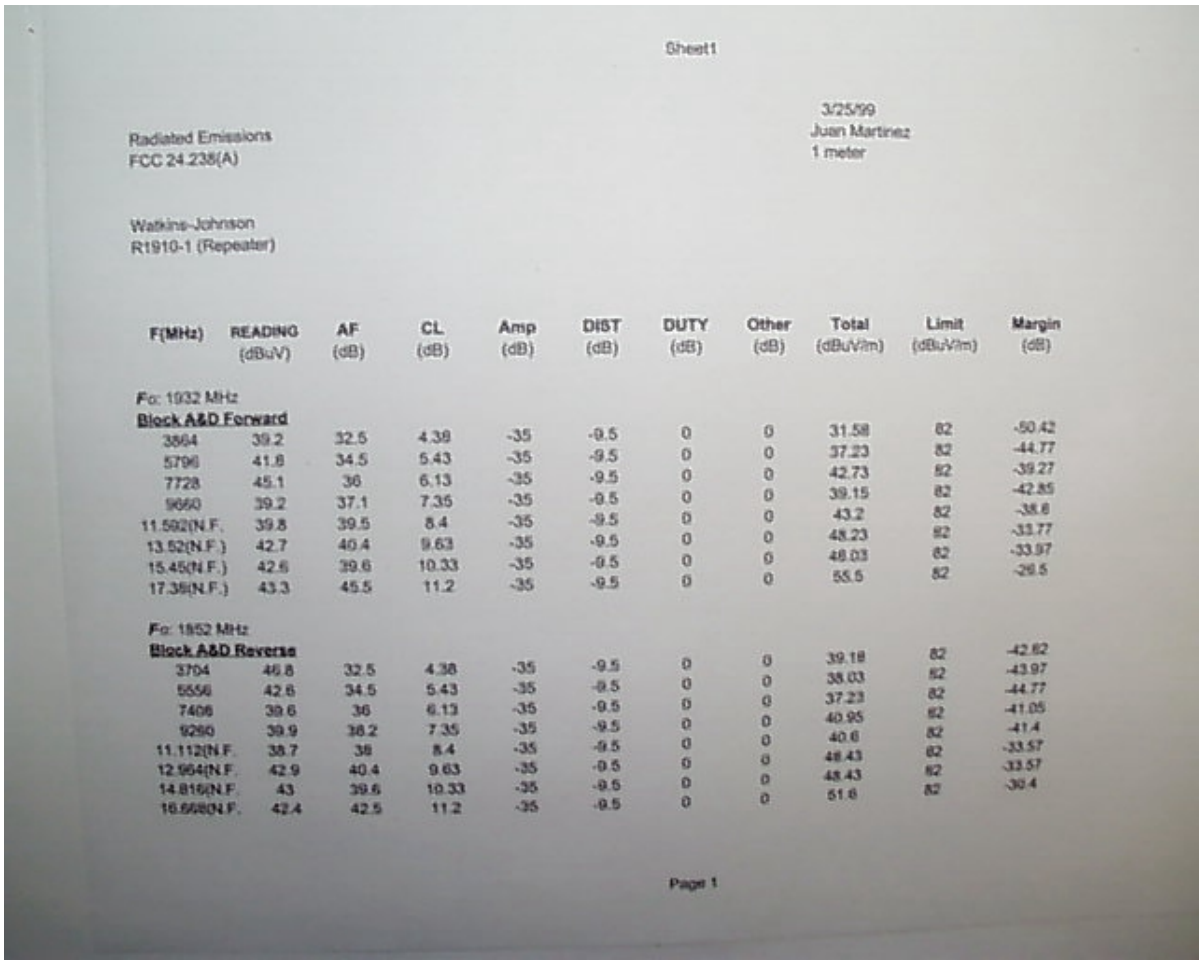
The magnitude of each spurious and harmonic emissions detected as being radiated from the EUT must be at a level no more than 43 + 10 log (mean output power, watts) dB below the mean power output (-13dBm).
Resultant radiated field at 3 meters from –13dBm source feeding isotropic antenna: 82 dBuV/m.

Test procedure:

EUT antenna output was terminated with a 50-ohm terminator. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3 ft from the EUT. With the transmitter operating at full power the turntable was slowly rotated to locate the direction of maximum emission once maximum direction was determined; the search antenna was raised and lowered in both vertical and horizontal polarization.

Test Result:

The maximum readings so obtained are recorded in a spreadsheet attached.



Sheet1

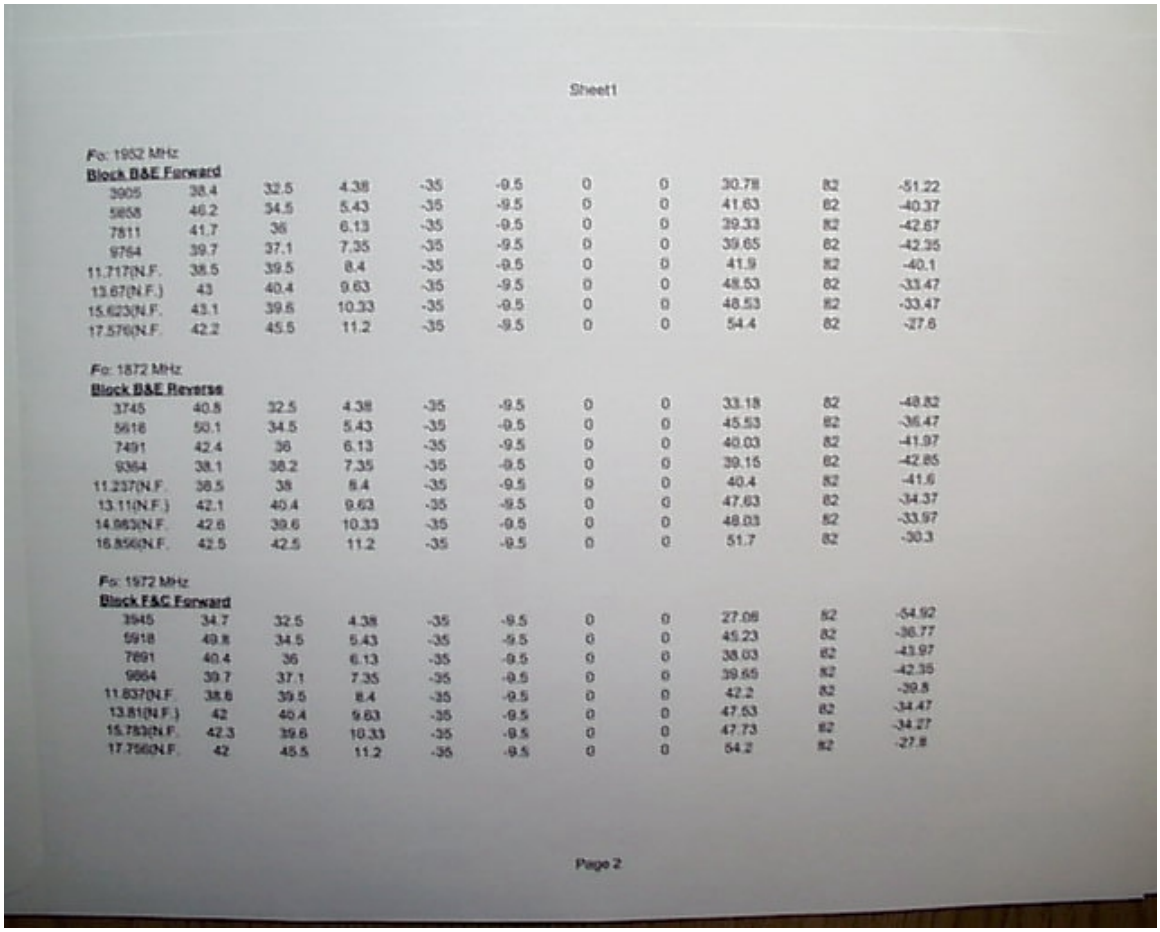
3/25/99
Juan Martinez
1 meter

Radiated Emissions
FCC 24.238(A)

Watkins-Johnson
R1910-1 (Repeater)

F(MHz)	READING (dBuV)	AF (dB)	CL (dB)	Amp (dB)	DIST (dB)	DUTY (dB)	Other (dB)	Total (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Fo: 1932 MHz										
Block A&D Forward										
3864	39.2	32.5	4.38	-35	-9.5	0	0	31.58	82	-50.42
5796	41.8	34.5	5.43	-35	-9.5	0	0	37.23	82	-44.77
7728	45.1	36	6.13	-35	-9.5	0	0	42.73	82	-39.27
9660	39.2	37.1	7.35	-35	-9.5	0	0	39.15	82	-42.85
11.592(N.F.	39.8	39.5	8.4	-35	-9.5	0	0	43.2	82	-38.8
13.52(N.F.)	42.7	40.4	9.63	-35	-9.5	0	0	48.23	82	-33.77
15.45(N.F.)	42.6	39.6	10.33	-35	-9.5	0	0	48.03	82	-33.97
17.36(N.F.)	43.3	45.5	11.2	-35	-9.5	0	0	55.5	82	-26.5
Fo: 1852 MHz										
Block A&D Reverse										
3704	46.8	32.5	4.38	-35	-9.5	0	0	39.18	82	-42.82
5556	42.6	34.5	5.43	-35	-9.5	0	0	38.03	82	-43.97
7408	39.6	36	6.13	-35	-9.5	0	0	37.23	82	-44.77
9260	39.9	38.2	7.35	-35	-9.5	0	0	40.95	82	-41.05
11.112(N.F.	38.7	38	8.4	-35	-9.5	0	0	40.6	82	-41.4
12.964(N.F.	42.9	40.4	9.63	-35	-9.5	0	0	48.43	82	-33.57
14.816(N.F.	43	39.6	10.33	-35	-9.5	0	0	48.43	82	-33.57
16.668(N.F.	42.4	42.5	11.2	-35	-9.5	0	0	51.6	82	-30.4

Page 1



Sheet1

Fo: 1952 MHz

Block B&E Forward

3905	38.4	32.5	4.38	-35	-9.5	0	0	30.78	82	-51.22
5858	46.2	34.5	5.43	-35	-9.5	0	0	41.63	82	-40.37
7811	41.7	36	6.13	-35	-9.5	0	0	39.33	82	-42.67
9764	39.7	37.1	7.35	-35	-9.5	0	0	39.65	82	-42.35
11.717(N.F.	38.5	39.5	8.4	-35	-9.5	0	0	41.9	82	-40.1
13.67(N.F.)	43	40.4	9.63	-35	-9.5	0	0	48.53	82	-33.47
15.623(N.F.	43.1	39.6	10.33	-35	-9.5	0	0	48.53	82	-33.47
17.576(N.F.	42.2	45.5	11.2	-35	-9.5	0	0	54.4	82	-27.6

Fo: 1872 MHz

Block B&E Reverse

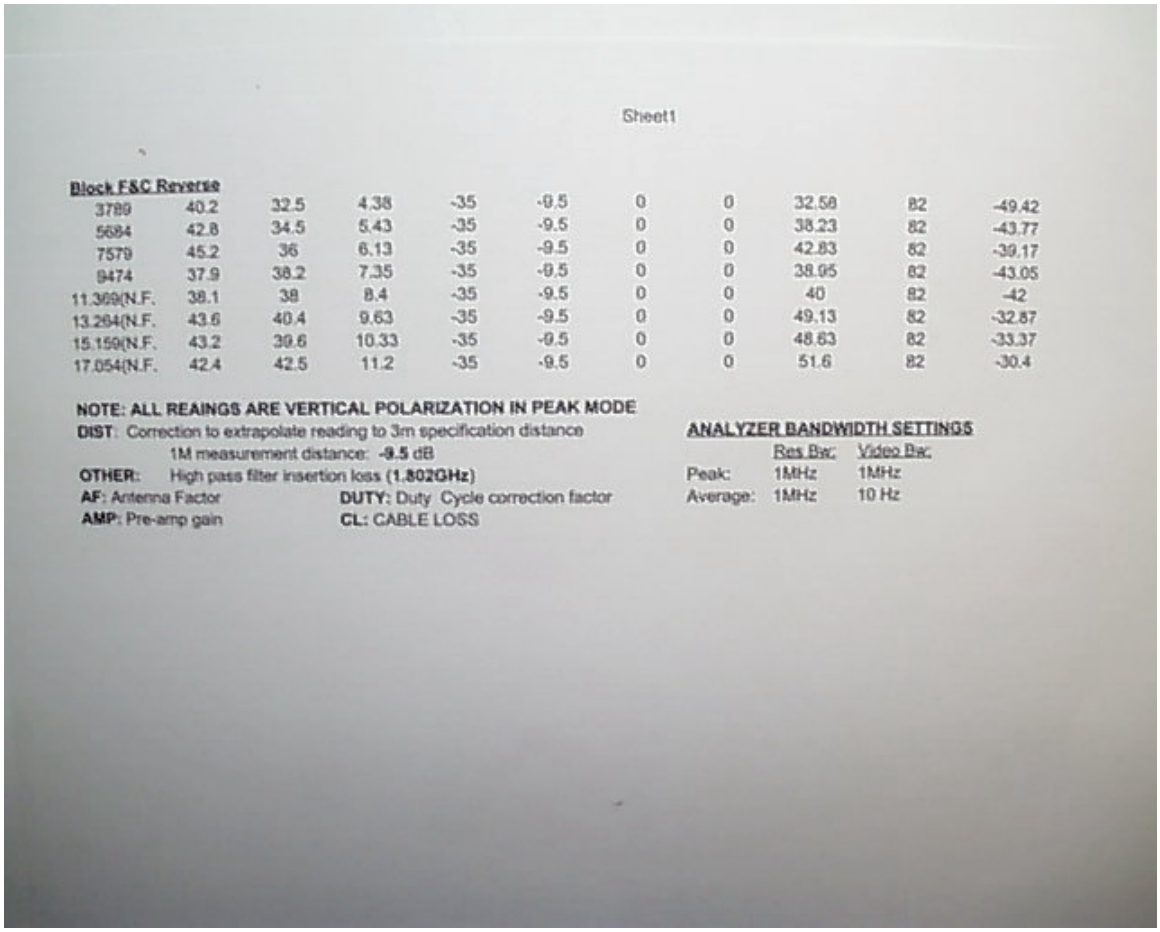
3745	40.8	32.5	4.38	-35	-9.5	0	0	33.18	82	-48.82
5618	50.1	34.5	5.43	-35	-9.5	0	0	45.53	82	-36.47
7491	42.4	36	6.13	-35	-9.5	0	0	40.03	82	-41.97
9364	38.1	38.2	7.35	-35	-9.5	0	0	39.15	82	-42.85
11.237(N.F.	38.5	38	8.4	-35	-9.5	0	0	40.4	82	-41.6
13.11(N.F.)	42.1	40.4	9.63	-35	-9.5	0	0	47.63	82	-34.37
14.983(N.F.	42.6	39.6	10.33	-35	-9.5	0	0	48.03	82	-33.97
16.856(N.F.	42.5	42.5	11.2	-35	-9.5	0	0	51.7	82	-30.3

Fo: 1972 MHz

Block F&C Forward

3945	34.7	32.5	4.38	-35	-9.5	0	0	27.08	82	-54.92
5918	49.8	34.5	5.43	-35	-9.5	0	0	45.23	82	-36.77
7891	40.4	36	6.13	-35	-9.5	0	0	38.03	82	-43.97
9864	39.7	37.1	7.35	-35	-9.5	0	0	39.65	82	-42.35
11.837(N.F.	38.6	39.5	8.4	-35	-9.5	0	0	42.2	82	-39.8
13.81(N.F.)	42	40.4	9.63	-35	-9.5	0	0	47.53	82	-34.47
15.783(N.F.	42.3	39.6	10.33	-35	-9.5	0	0	47.73	82	-34.27
17.756(N.F.	42	45.5	11.2	-35	-9.5	0	0	54.2	82	-27.8

Page 2



Sheet1

Block F&C Reverse										
3789	40.2	32.5	4.38	-35	-9.5	0	0	32.58	82	-49.42
5684	42.8	34.5	5.43	-35	-9.5	0	0	38.23	82	-43.77
7579	45.2	36	6.13	-35	-9.5	0	0	42.83	82	-39.17
9474	37.9	38.2	7.35	-35	-9.5	0	0	38.95	82	-43.05
11.369(N.F.	38.1	38	8.4	-35	-9.5	0	0	40	82	-42
13.264(N.F.	43.6	40.4	9.63	-35	-9.5	0	0	49.13	82	-32.87
15.159(N.F.	43.2	39.6	10.33	-35	-9.5	0	0	48.63	82	-33.37
17.054(N.F.	42.4	42.5	11.2	-35	-9.5	0	0	51.6	82	-30.4

NOTE: ALL REAINGS ARE VERTICAL POLARIZATION IN PEAK MODE
DIST: Correction to extrapolate reading to 3m specification distance
1M measurement distance: **-9.5** dB
OTHER: High pass filter insertion loss **(1.802GHz)**
AF: Antenna Factor **DUTY:** Duty Cycle correction factor
AMP: Pre-amp gain **CL:** CABLE LOSS

ANALYZER BANDWIDTH SETTINGS

	Res Bw:	Video Bw:
Peak:	1MHz	1MHz
Average:	1MHz	10 Hz

SECTION 2.1055 (Was Section 2.995): FREQUENCY STABILITY

For Class II permissive change, frequency and voltage stability was not performed, since the changes to the repeater, which was previously granted, was to increase the output gain of the repeater. No changes in the stability circuitry were made.