

ENGINEERING STATEMENT

In Connection With

ARKON NETWORKS, INC.

Model No. PRF500 Cordless Telephone

FCC ID: PBWA9R8

Hyak Laboratories, Inc. has been retained to perform radiated and conducted spurious measurements on the PRF500 cordless telephone in accordance with Section 15.249 of FCC rules.

I am an Electronics Engineer, a principal in the firm of Hyak Laboratories, Inc., Springfield, Virginia. My education and experience are a matter of record with the Federal Communications Commission, having submitted numerous applications for equipment authorization.

All tests were made by me or under my supervision in accordance with the rules and regulations of the Federal Communications Commission.

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Rowland S. Johnson

Dated: October 10, 2000

INTRODUCTION

Procedures of ANSI 63.4 (1992) were used.

The PRF500 is a 20-channel analog, frequency modulation, 900 MHz band system operating between 902.30 - 904.20 and 925.800 - 927.700 MHz.

COMPLIANCE WITH SECTION 15.249 OF PART 15

15.249(a,b) The field strength of the radiation emission was measured and found to comply with the limits established by 15.249(a) and 15.209. (See data of Tables 1 and 2.)

15.249(c) Emissions radiated outside of the specified frequency bands, except for harmonics, were attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in 15.209, (whichever is the lesser attenuation). See Figures 1a, 1b, 2a and 2b for low and high channels.

Operating channels (total of 20, see Appendix 8) are limited within the 902 - 928 MHz band to:

Hand: Channel 1 925.800 MHz, Channel 20 927.700 MHz.

Base: Channel 1 902.300 MHz, Channel 20 904.200 MHz.

15.207(a) AC power line conducted radio frequency voltage did not exceed 250uV (+48 dBuV) from .45 to 30 MHz (see Figures 3 and 4).

DATA

Tables and Figures referenced above follow immediately after this page. Description of measurement procedures and test equipment used in the measurements follow the data pages.

TABLE 1a

RADIATED SPURIOUS EMISSIONS  
Measured at 3 meters  
PART 15(B) PARA. 15.249

Frequency Frequency

<u>To Which Tuned (MHz)</u>	<u>of Emission (MHz)</u>	<u>Meter Reading (dBm)</u>	<u>Antenna Factor (dB)</u>	<u>Field<sup>1</sup> Intensity uV/m @ 3m</u>	<u>FCC Limit uV/m @ 3m</u>	<u>dB to Limit</u>
925.800	925.820	-53.2	32.4	20417V	50000	- 7.8
925.800	1853.420	-83.2	27.5	367H	500	- 2.7
925.800	2780.160	-102.8	30.3	53H	500	-20
925.800	3706.880	-101.6*	32.9	82V	500	-16
925.800	4633.600	-102.0*	33.3	82V	500	-16
925.800	5560.320	-100.8*	35.0	115**	500	-13
925.800	6487.040	-101.6*	35.8	115**	500	-13
925.800	7413.760	-102.0*	37.4	132**	500	-12
925.800	8340.480	- 98.8*	38.1	207**	500	- 7.7
925.800	9258.200	- 98.8*	38.6	219**	500	- 7.2

Note 1:  $\text{uV/m} = \text{Log}_{20}^{-\text{dBu/m}}$

dBu = dBm + antenna factor + 107

\*Measured at 1 meter, extrapolated to 3 meters.

\*\*Measuring system noise floor.

RBW 100 kHz to 1 GHz; 1 MHz > 1 GHz. Reduced if CW signal.

H,V: Worst-case test antenna polarization.

HAND-HELD UNIT  
RADIATED SPURIOUS  
EMISSIONS  
FCC ID: PBWA9R8

TABLE 1a (CH 01)

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TABLE 1b

RADIATED SPURIOUS EMISSIONS  
Measured at 3 meters  
PART 15(B) PARA. 15.249

<u>Frequency To Which Tuned (MHz)</u>	<u>Frequency of Emission (MHz)</u>	<u>Meter Reading (dBm)</u>	<u>Antenna Factor (dB)</u>	<u>Field<sup>1</sup> Intensity uV/m @ 3m</u>	<u>FCC Limit uV/m @ 3m</u>	<u>dB to Limit</u>
927.700	927.740	-51.4	32.4	22387V	50000	- 7.0

927.700	1855.480	-84.8	27.5	305V	500	- 4.3
927.700	2783.220	-103.4	30.3	50V	500	-20
927.700	3710.960	-102.9*	32.9	71H	500	-17
927.700	4638.700	-101.9*	33.3	83V	500	-16
927.700	5566.440	-100.8*	35.0	115**	500	-13
927.700	6494.180	-101.6*	35.8	115**	500	-13
927.700	7421.920	-102.2*	37.4	129**	500	-12
927.700	8349.660	-98.8*	38.1	207**	500	- 7.7
927.700	9277.390	-98.8*	38.6	219**	500	- 7.2

Note 1:  $\text{uV/m} = \text{Log}_{20}^{-1\text{dBu/m}}$

dBu = dBm + antenna factor + 107

\*Measured at 1 meter, extrapolated to 3 meters.

\*\*Measuring system noise floor.

RBW 100 kHz to 1 GHz; 1 MHz > 1 GHz. Reduced if CW signal.

H,V: Worst-case test antenna polarization.

HAND-HELD UNIT  
RADIATED SPURIOUS  
EMISSIONS  
FCC ID: PBWA9R8

TABLE 1b (CH 20)

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TABLE 2a

RADIATED SPURIOUS EMISSIONS  
Measured at 3 meters  
PART 15(B) PARA. 15.249

Frequency To Which Tuned (MHz)	Frequency of Emission (MHz)	Meter Reading (dBm)	Antenna Factor (dB)	Field <sup>1</sup> Intensity uV/m @ 3m	FCC Limit uV/m @ 3m	dB to Limit
902.300	902.270	-56.9	32.4	13335V	50000	-11.5
902.300	1804.540	-84.8	27.5	305H	500	- 4.3
902.300	2706.810	-103.6	30.3	48V	500	-20

902.300	3609.080	-102.1*	32.9	78H	500	-16
902.300	4511.350	-102.3*	33.3	79H	500	-16
902.300	5413.620	-101.1*	35.0	111**	500	-13
902.300	6315.890	-101.7*	35.8	114**	500	-13
902.300	7218.160	-101.3*	37.4	143**	500	-11
902.300	8120.430	-98.8*	38.2	209**	500	- 7.6
902.300	9022.700	-98.6*	38.8	229**	500	- 6.8

Note 1:  $\text{uV/m} = \text{Log}_{20}^{-\text{dBu/m}}$

$\text{dBu} = \text{dBm} + \text{antenna factor} + 107$

\*Measured at 1 meter, extrapolated to 3 meters.  
 \*\* Measuring system noise floor.

RBW 100 kHz to 1 GHz; 1 MHz > 1 GHz. Reduced if CW signal.

H,V: Worst-case test antenna polarization.

BASE UNIT  
 RADIATED SPURIOUS  
 EMISSIONS  
 FCC ID: PBWA9R8

TABLE 2a (CH 01)

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TABLE 2b

RADIATED SPURIOUS EMISSIONS  
 Measured at 3 meters  
 PART 15(B) PARA. 15.249

Frequency To Which Tuned (MHz)	Frequency of Emission (MHz)	Meter Reading (dBm)	Antenna Factor (dB)	Field <sup>1</sup> Intensity uV/m @ 3m	FCC Limit uV/m @ 3m	dB to Limit
904.200	904.195	-55.3	32.4	16032V	50000	- 9.9
904.200	1808.390	-83.6	27.5	351H	500	- 3.1
904.200	2712.585	-102.8	30.3	53H	500	-19
904.200	3616.780	-101.9*	32.9	79V	500	-16
904.200	4520.975	-102.5*	33.3	78H	500	-16
904.200	5425.170	-101.4*	35.0	107**	500	-13
904.200	6329.365	-101.4*	35.8	117**	500	-13

904.200	7233.560	-101.5*	37.4	140**	500	-11
904.200	8137.755	-99.1*	38.2	202**	500	- 7.9
904.200	9041.950	-98.9*	38.8	221**	500	- 7.1

Note 1:  $\text{uV/m} = \text{Log}_{20}^{-1\text{dBu/m}}$

$\text{dBu} = \text{dBm} + \text{antenna factor} + 107$

\*Measured at 1 meter, extrapolated to 3 meters.  
 \*\* Measuring system noise floor.

RBW 100 kHz to 1 GHz; 1 MHz > 1 GHz. Reduced if CW signal.

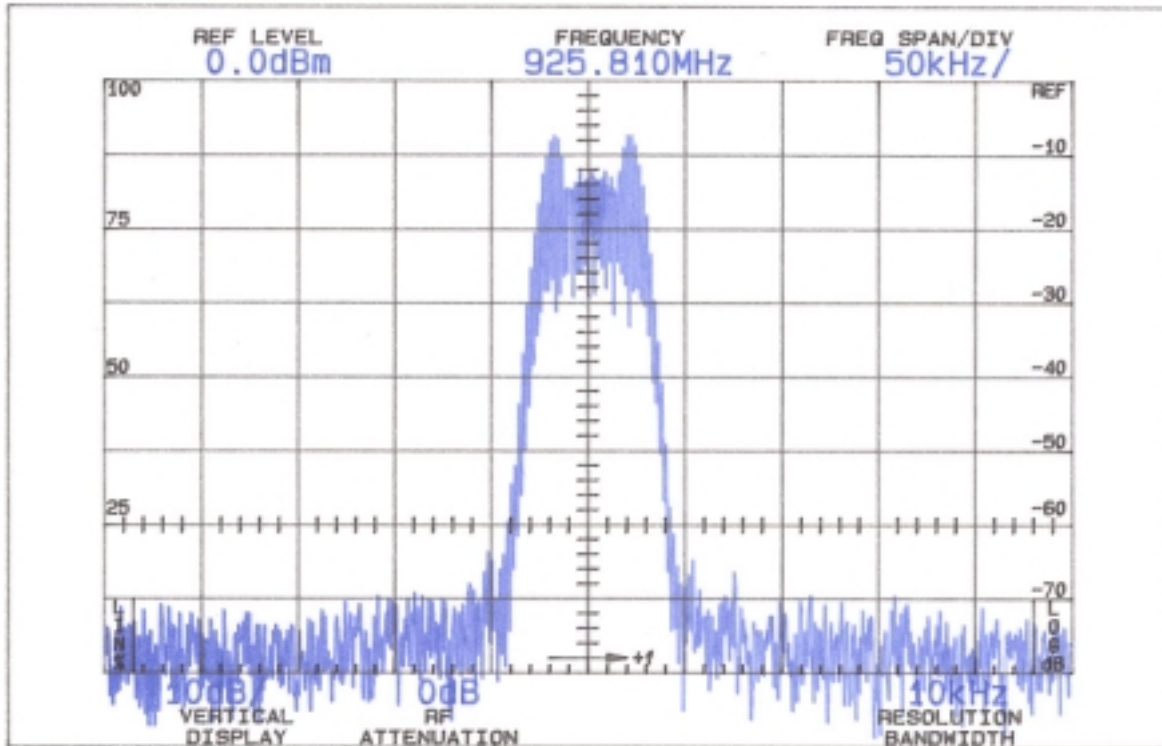
H,V: Worst-case test antenna polarization.

BASE UNIT  
 RADIATED SPURIOUS  
 EMISSIONS  
 FCC ID: PBWA9R8

TABLE 2b (CH 20)

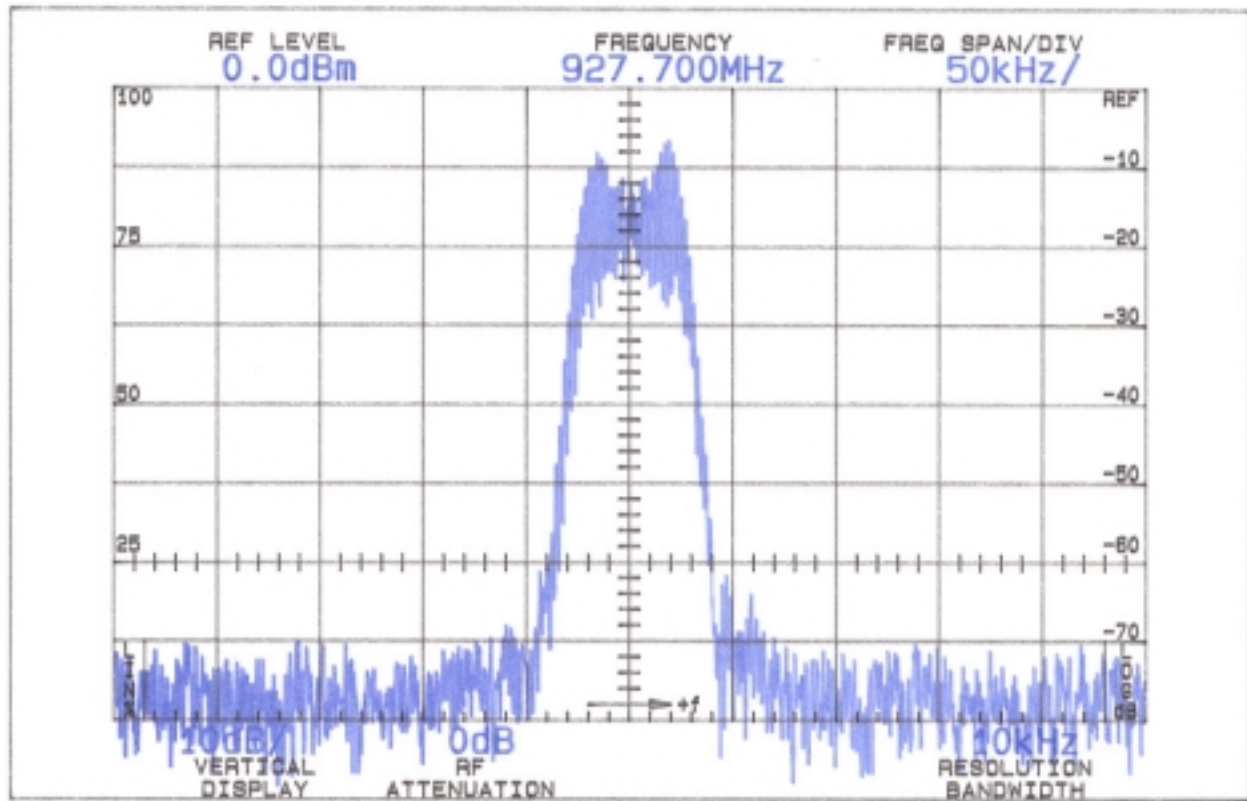
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FIGURE 1a



OCCUPIED BANDWIDTH  
MODEL PRF500 (Hand)  
Full Modulation (CH 01)

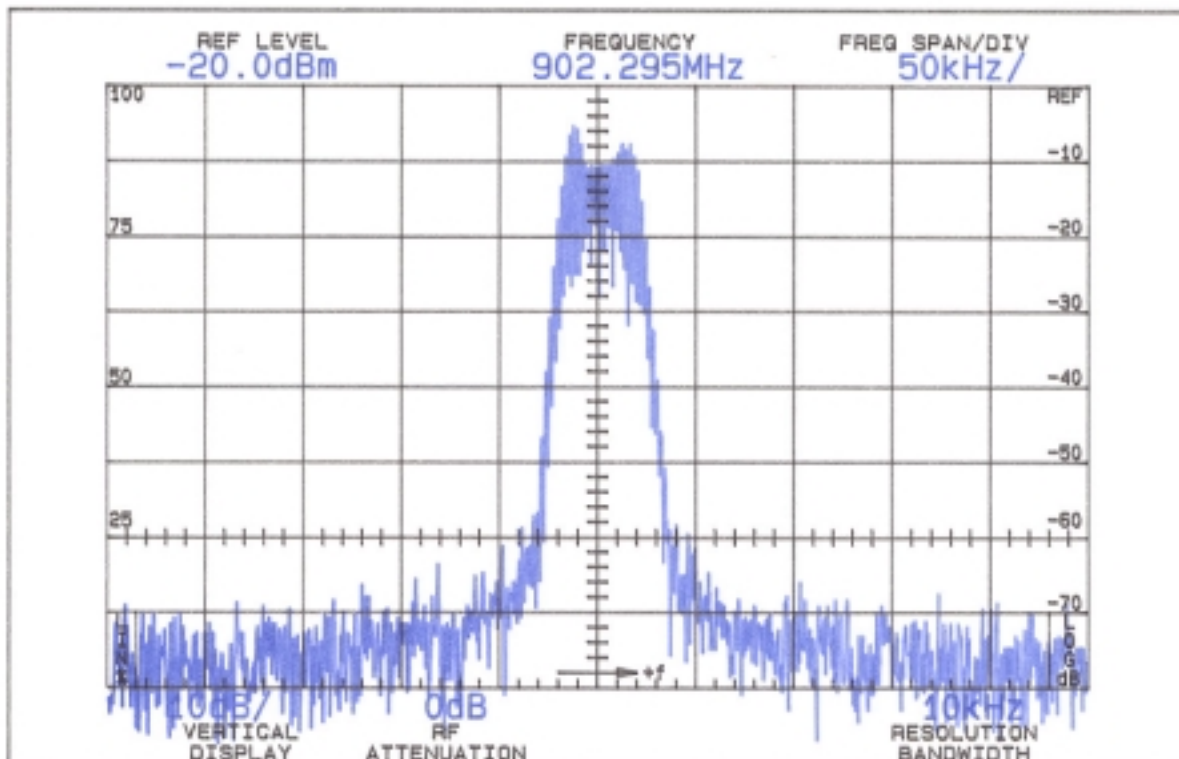
FIGURE 1a (925.800 MHz)



OCCUPIED BANDWIDTH  
 MODEL PRF500 (Hand)  
 Full Modulation (CH 20)

FIGURE 1b (927.700 MHz)

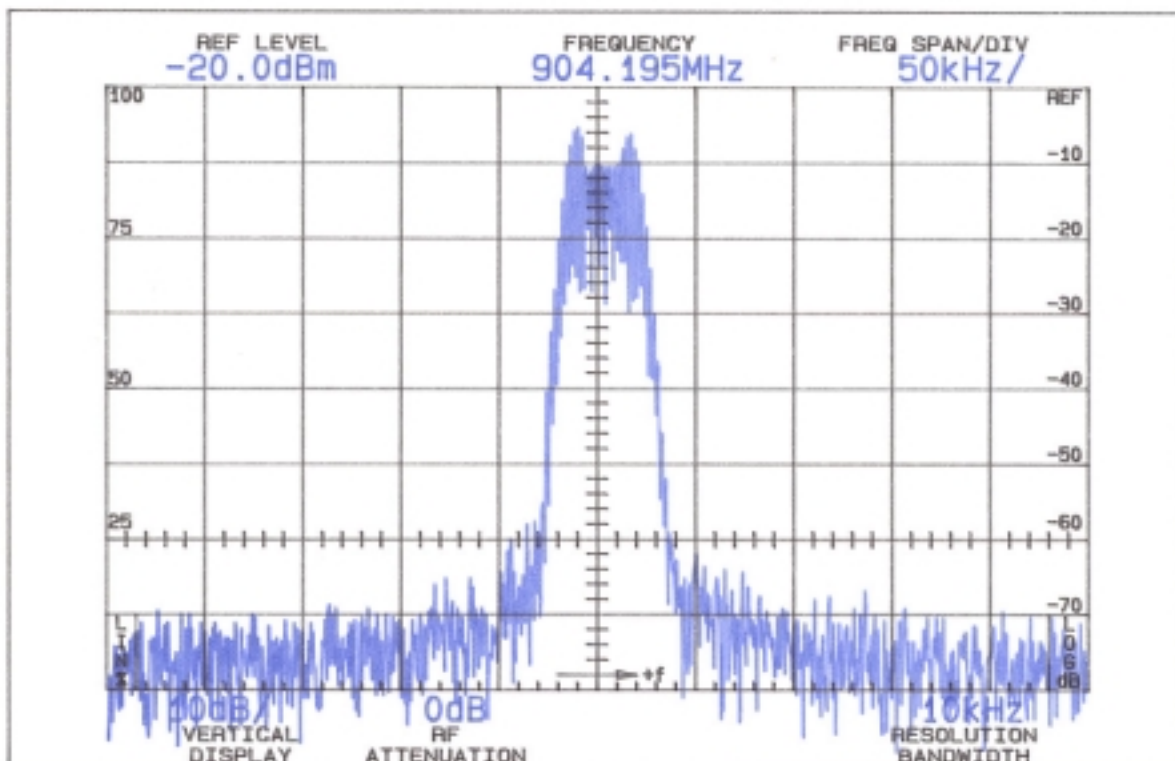




OCCUPIED BANDWIDTH  
MODEL PRF500 (Base)  
Full Modulation (CH 01)

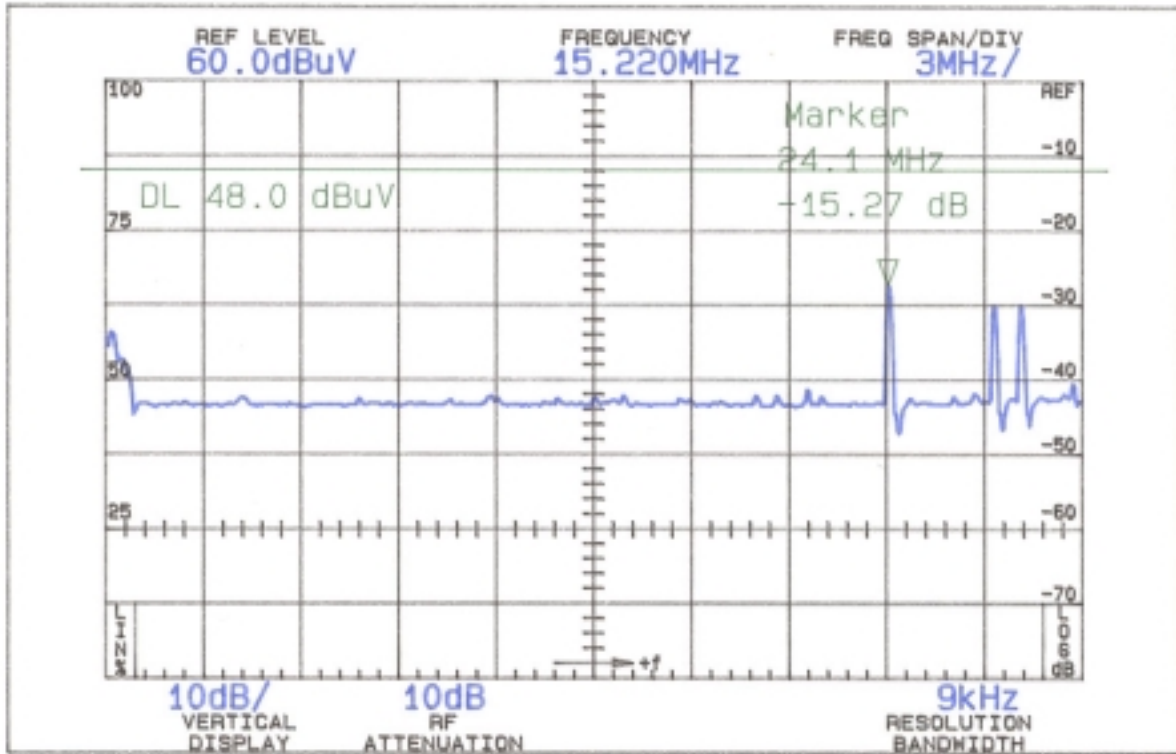
FIGURE 2a (902.300 MHz)

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FIGURE 2b



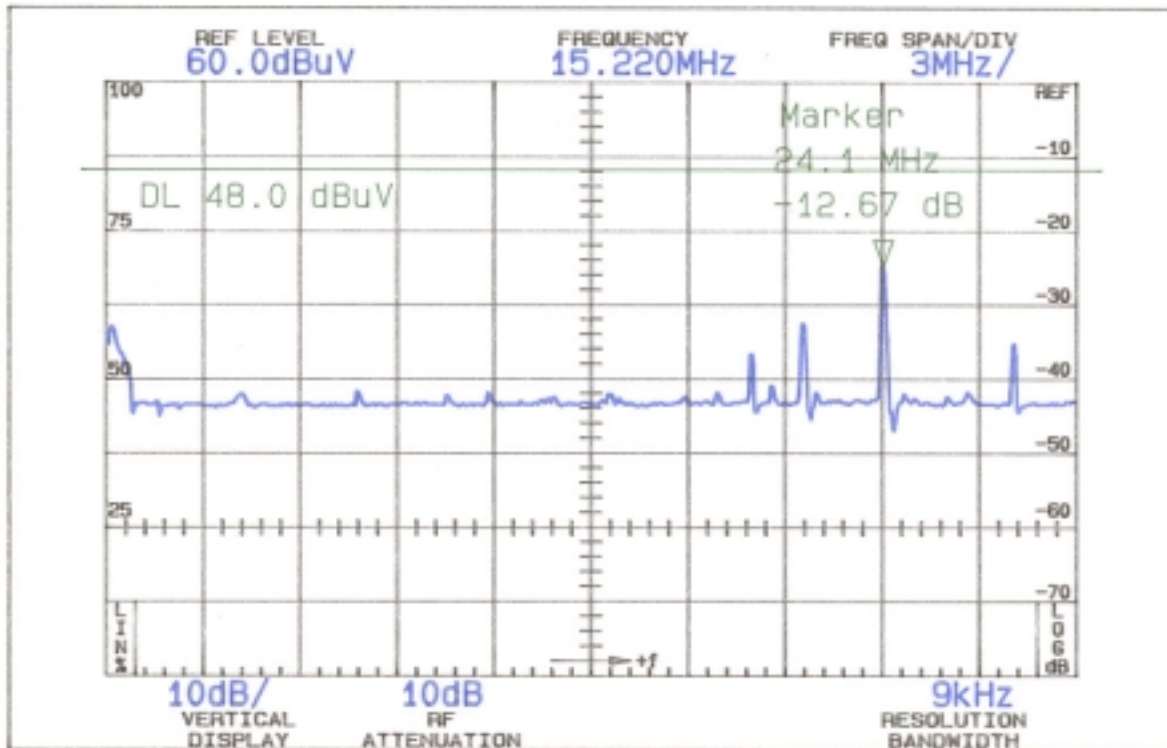
OCCUPIED BANDWIDTH  
MODEL PRF500 (Base)  
Full Modulation (CH 20)

FIGURE 2b (904.200 MHz)



AC LINE CONDUCTED  
FCC ID: PBWA9R8

FIGURE 3 (LEFT LISN)



AC LINE CONDUCTED  
FCC ID: PBWA9R8

FIGURE 4 (RIGHT LISN)

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#### PROCEDURES, EMISSION BANDWIDTH

Measurement of emission bandwidth was made with a 2500 Hz tone producing full modulation.

The input signal was coupled directly to the audio input

stage of the hand-held unit, and through the telephone interface of the base-unit.

A Tektronix 494P spectrum analyzer was used; input audio signal was from a IEC F-47 function generator.

#### PROCEDURES, RADIATED SPURIOUS EMISSIONS

The field strength of the radiated emissions from the PRF500 was measured following ANSI 63.4 (1992) at a distance of 3 meters to the third harmonic at which time the horn antennas were moved to 1 meter. The spectrum was scanned from 30 MHz to the tenth harmonic using a Tektronix 494P spectrum analyzer.

Measurement procedure included recording the worst-case field strength for receiving test antenna polarization, test antenna height variation from 1 meter to 3 meters and test sample rotation, and test sample antenna in both vertical and horizontal plane.

The test sample was placed on a rotatable 80 cm high wooden stand. The receiving antenna, placed 3 meters from the test sample, was a Singer DM-105A dipole, or Polarad CA-L, CA-S, or EMCO 3115 Horns. RBW used on the TEK 494P was 100 kHz to 1 GHz; 1 MHz > 1 GHz. Measurements above the 2nd harmonic were made at 1 meter extrapolated to 3 m; peak responding detector, VBW = > than RBW.

The base unit was operated from a 120 Vac power line. The associated 1 meter long telephone line was extended vertically upward through the axis of rotation of the test table. To produce an output signal without use of the hand-held unit, a temporary external switch was added to the transmitter keying circuit. The permanently attached vertical antenna was extended to the limit of its length.

For tests of the hand-held unit, the equipment was placed on the test stand with its permanently attached vertical antenna extended to its limit.

Since the hand-held unit was not equipped to accommodate other than a "cradle" type charger, no measurements with an external battery charger were made.

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#### PROCEDURES, RADIATED SPURIOUS EMISSIONS (Continued)

The spectrum was checked from 30 to the tenth harmonic. All emissions not reported were less than 50 uV/m @ 3m or in system noise. Tabulation of the measurements are shown in Tables 1 and 2 for and hand-held and base unit respectively.

#### PROCEDURES, AC POWER LINE CONDUCTED

Using a 50uH LISN, AC power line conducted radio frequency voltage was measured using an Advantest R3361A spectrum analyzer. Measurements were made from .45 to 30 MHz using CISPR quasi-peak detector with 9 kHz resolution bandwidth. Data in dBuV, are shown in Figures 3 and 4 for right and left LISN port respectively.

A 120 second scan time was used.