Exhibit M: Spurious Radiated Emissions

FCC ID: OXZSTDPREVIEW

Harmonics and Spurious Radiated Emissions

Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:
Single

Operating Modes Investigated:
Typical

Antennas Investigated:
Integral Antenna

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
12 Vdc

Frequency Range Investigated			
Start Frequency	30 MHz	Stop Frequency	40 GHz

Software\Firmware Applied During Test			
Exercise software	Standard Production Software	Version	Unknown
Description			
The system was tested using standard operating production software to exercise the functions of the device during the testing.			

Equipment Modifications

The following modifications were made to achieve compliance: A ferrite bead was added to the sensor cable.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT	Preco, Inc.	SPV 2020	none
Display Unit	Preco, Inc.	Preview	none
DC Supply	Hewlett Packard	6654A	TPC

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Sensor	PA	0.9	Yes	EUT	Display Cable
Display	PA	8.5m	No	Display Unit	Sensor Cable
DC Leads	No	1.2	No	DC supply	Sensor Cable

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	03/19/2002	12 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	03/19/2002	12 mo
Antenna, Biconilog	EMCO	3141	AXE	12/31/2001	36 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	12/03/2001	14 mo
Antenna, Horn	EMCO	3115	AHC	08/12/2002	12 mo
Pre-Amplifier	Miteq	AMF-4D-010120-30-10P	AOP	07/09/2002	12 mo
Spectrum Analyzer	Tektronix	2784	AAO	03/08/2001	24 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	07/09/2002	12 mo
High Pass Filter	K&L Microwave	1WP01-15000/E6000-O/	HFJ	08/09/2002	12 mo
Antenna, Horn	EMCO	3160-09	AHG	01/15/2000	36 mo
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	01/17/2000	36 mo
Antenna, Horn	EMCO	3160-10	AHI	01/15/2000	36 mo
Pre-Amplifier	Miteq	JS4-26004000-40-SP	APV	06/26/2000	36 mo
DC Power Supply	Topward	TPS-2000	TPD	NCR	N/A

Test Description

Requirement: The field strength of harmonics and spurious radiated emissions shall comply with the limits as defined in 47 CFR 15.249. Field strength limits are specified at a distance of 3 meters. Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Sec. 15.209, whichever is the lesser attenuation. As shown in Sec. 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified in Sec. 15.249 by more than 20 dB under any condition of modulation.

Configuration: The antenna to be used with the EUT was tested. The EUT was configured for continuous modulated operation at its single transmit frequency.

While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:1992). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Harmonic Emissions – Pulse Spectrum Mode

To determine the “true peak level” of harmonic emissions, the measurement procedure described by Andy Leimer of the FCC OET Laboratory (FCC Procedure for Pulsed Signals.txt, dated 11/16/99) was used. Per step (C), if the harmonic emissions are viewed in pulse spectrum mode, the level of the harmonic emissions are measured using analyzer settings as listed in the Hewlett Packard Application

Note 150-2 (*Spectrum Analysis…Pulsed RF*, Nov. 1971) such that a true pulse spectrum is obtained (RBW greater than PRF). The video bandwidth should be equal to, or greater than the RBW. The pulse repetition frequency (PRF) of the fundamental emission was measured to be 2.78 MHz; therefore a 3 MHz resolution bandwidth (RBW) and a 7 MHz video bandwidth (VBW) were used to measure the harmonic emissions. A pulse desensitization factor in dB (calculated from Equation 10 in HP Note 150-2) is added to the measured levels to obtain the "true peak levels". The pulse width was measured to be 14.1 nS; therefore a 24 dB pulse desensitization factor was used (k = 1.5, B = 3 MHz).

The average levels of the harmonic emissions are the "true peak levels" measured above minus the calculated duty cycle factor in dB. The duty cycle correction factor is calculated from Equation 4 in HP Note 150-2. The pulse width was measured to be 14.1 nS and the PRF = 2.78 MHz; therefore a 28 dB duty cycle correction factor was used.

Harmonic Emissions – Line Spectrum Mode

Unless otherwise noted on the data, all the measurements of harmonic emissions were made in Pulse Spectrum Mode. If a measurement was made in Line Spectrum Mode, it would have been made in the following manner:

To determine the "true peak level" of harmonic emissions, the measurement procedure described by Andy Leimer of the FCC OET Laboratory (FCC Procedure for Pulsed Signals.txt, dated 11/16/99) was used. Per step (b), if a harmonic emission is viewed in line spectrum mode (HP Note 150-2), the average level of the harmonic emission equals the level of the line spectra at the center frequency of the emission. No pulse desensitization factor is added to this level. The resolution bandwidth should be chosen such that the individual line spectra are clearly resolved (RBW less than or equal to 0.3 * PRF).

The peak levels of the harmonic emissions are the average levels measured above, plus the pulse desensitization factor in dB (20*log(duty cycle)).

Spurious Emissions above 1 GHz

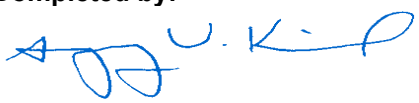
The peak level of spurious emissions were measured with a 1 MHz resolution bandwidth and a 3 MHz video bandwidth. No pulse desensitization factor was added to these levels.

The average level of spurious emissions were measured with a 1 MHz resolution bandwidth and a 10 Hz video bandwidth. No pulse desensitization factor was added to these levels

Spurious Emissions below 1 GHz

The quasi-peak level of spurious emissions were measured with a 120 kHz resolution bandwidth and a 300 kHz video bandwidth. No pulse desensitization factor was added to these levels.

Completed by:



NORTHWEST EMC

Field Strength of Spurious Emissions

REV df3.02 10/23/2002

EUT:	SPV 2020			Work Order:	PRCO0010
Serial Number:	none			Date:	12/26/02
Customer:	Preco, Inc.			Temperature:	68
Attendees:	none			Humidity:	34%
Cust. Ref. No.:				Barometric Pressure	29.97
Tested by:	Greg Kiemel	Power:	12 Vdc	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.249	Year:	2001
Method:	ANSI C63.4	Year:	2000

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

EUT power provided by 12 Vdc lab power supply. Ferrite bead on cable harness.

EUT OPERATING MODES

Transmitting

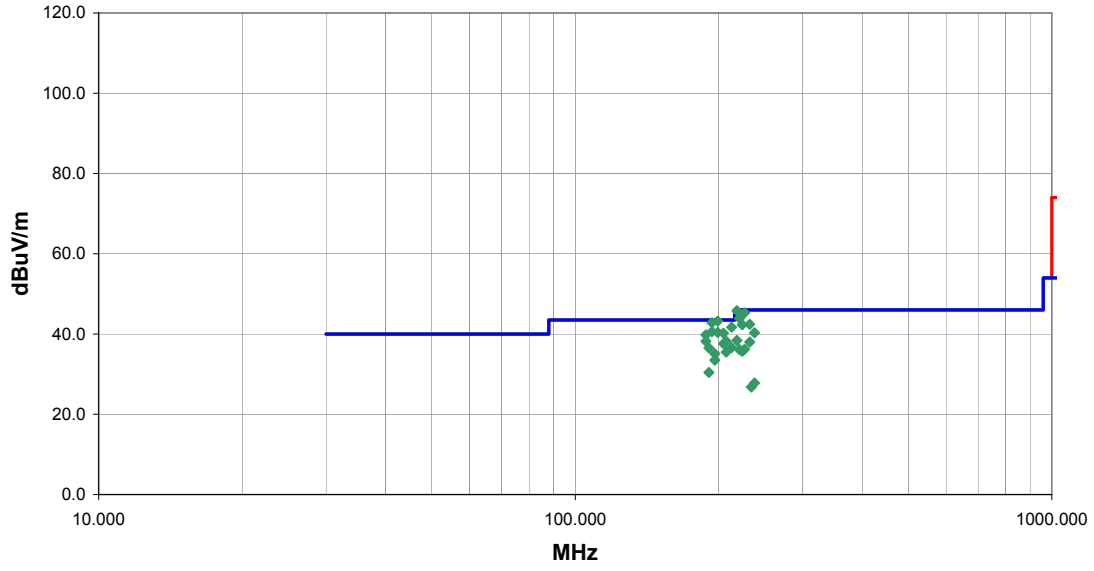
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Test Distance (m)	Run #
Pass	3	2

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
218.438	62.9	-17.1	358.0	1.2	3.0	0.0	H-Bilog	QP	0.0	45.8	46.0	-0.2
199.087	61.2	-18.0	155.0	1.6	3.0	0.0	H-Bilog	QP	0.0	43.2	43.5	-0.3
193.553	61.0	-18.2	141.0	2.2	3.0	0.0	H-Bilog	QP	0.0	42.8	43.5	-0.7
226.739	62.1	-16.8	272.0	1.2	3.0	0.0	H-Bilog	QP	0.0	45.3	46.0	-0.7
212.910	59.1	-17.4	6.0	1.8	3.0	0.0	H-Bilog	QP	0.0	41.7	43.5	-1.8
221.205	60.9	-17.0	360.0	1.2	3.0	0.0	H-Bilog	QP	0.0	43.9	46.0	-2.1
193.557	58.8	-18.2	36.0	1.0	3.0	0.0	V-Bilog	QP	0.0	40.6	43.5	-2.9
199.088	58.4	-18.0	36.0	1.0	3.0	0.0	V-Bilog	QP	0.0	40.4	43.5	-3.1
204.615	58.0	-17.8	201.0	2.2	3.0	0.0	H-Bilog	QP	0.0	40.2	43.5	-3.3
232.268	59.0	-16.6	79.0	1.4	3.0	0.0	H-Bilog	QP	0.0	42.4	46.0	-3.6
188.027	58.1	-18.3	130.0	2.2	3.0	0.0	H-Bilog	QP	0.0	39.8	43.5	-3.7
223.969	59.1	-16.8	299.0	2.2	3.0	0.0	H-Bilog	QP	0.0	42.3	46.0	-3.7
188.028	56.5	-18.3	183.0	1.0	3.0	0.0	V-Bilog	QP	0.0	38.2	43.5	-5.3
207.380	55.8	-17.6	183.0	2.2	3.0	0.0	H-Bilog	QP	0.0	38.2	43.5	-5.3
237.796	56.8	-16.5	225.0	1.2	3.0	0.0	H-Bilog	QP	0.0	40.3	46.0	-5.7
204.609	55.4	-17.8	141.0	1.0	3.0	0.0	V-Bilog	QP	0.0	37.6	43.5	-5.9
212.909	54.0	-17.4	41.0	1.0	3.0	0.0	V-Bilog	QP	0.0	36.6	43.5	-6.9
190.791	54.8	-18.3	131.0	1.6	3.0	0.0	H-Bilog	QP	0.0	36.5	43.5	-7.0
218.442	55.5	-17.1	42.0	1.4	3.0	0.0	V-Bilog	QP	0.0	38.4	46.0	-7.6
207.383	53.1	-17.6	124.0	1.0	3.0	0.0	V-Bilog	QP	0.0	35.5	43.5	-8.0
232.267	54.6	-16.6	290.0	1.6	3.0	0.0	V-Bilog	QP	0.0	38.0	46.0	-8.0
196.323	53.2	-18.1	143.0	1.7	3.0	0.0	H-Bilog	QP	0.0	35.1	43.5	-8.4
226.734	53.0	-16.8	37.0	1.4	3.0	0.0	V-Bilog	QP	0.0	36.2	46.0	-9.8
221.202	53.1	-17.0	34.0	1.0	3.0	0.0	V-Bilog	QP	0.0	36.1	46.0	-9.9
196.323	51.6	-18.1	28.0	1.0	3.0	0.0	V-Bilog	QP	0.0	33.5	43.5	-10.0
223.969	52.5	-16.8	53.0	1.0	3.0	0.0	V-Bilog	QP	0.0	35.7	46.0	-10.3
190.793	48.7	-18.3	358.0	1.0	3.0	0.0	V-Bilog	QP	0.0	30.4	43.5	-13.1
237.701	44.3	-16.5	261.0	1.6	3.0	0.0	V-Bilog	QP	0.0	27.8	46.0	-18.2
234.088	43.4	-16.6	58.0	1.2	3.0	0.0	H-Bilog	QP	0.0	26.8	46.0	-19.2

NORTHWEST EMC

Field Strength of Spurious Emissions

REV df3.03 12/16/2002

EUT:	SPV 2020			Work Order:	PRCO0010
Serial Number:	none			Date:	12/27/02
Customer:	Preco, Inc.			Temperature:	68
Attendees:	none			Humidity:	34%
Cust. Ref. No.:				Barometric Pressure	29.97
Tested by:	Greg Kiemel	Power:	12 Vdc	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.249	Year:	2001
Method:	ANSI C63.4	Year:	2000

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

COMMENTS

EUT power provided by 12 Vdc lab power supply. Ferrite bead on cable harness. Peak measurements: RBW = 1 MHz, VBW = 7 MHz. Average measurements: RBW = 1 MHz, VBW = 10 Hz

EUT OPERATING MODES

Transmitting with modulated carrier

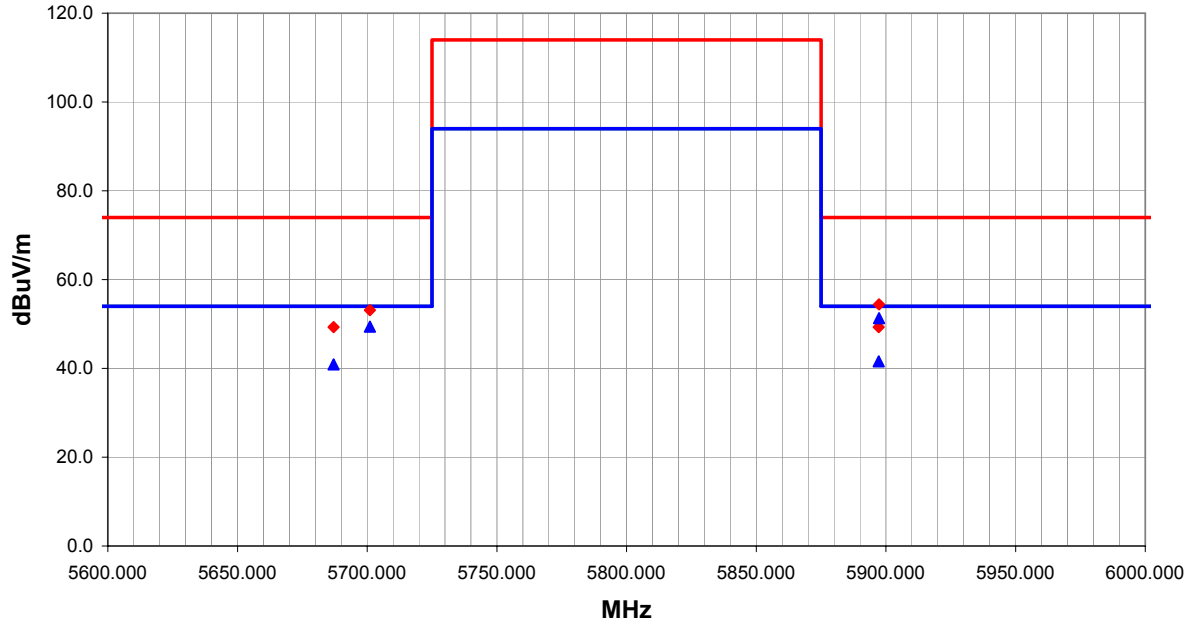
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Test Distance (m)	Run #
Pass	3	3

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
5897.350	41.8	9.5	0.0	1.4	3.0	0.0	H-Horn	AV	0.0	51.3	54.0	-2.7
5701.050	40.3	9.1	0.0	1.4	3.0	0.0	H-Horn	AV	0.0	49.4	54.0	-4.6
5897.250	32.1	9.5	340.0	1.2	3.0	0.0	V-Horn	AV	0.0	41.6	54.0	-12.4
5687.050	31.9	9.0	340.0	1.2	3.0	0.0	V-Horn	AV	0.0	40.9	54.0	-13.1
5897.350	44.9	9.5	0.0	1.4	3.0	0.0	H-Horn	PK	0.0	54.4	74.0	-19.6
5701.050	44.0	9.1	0.0	1.4	3.0	0.0	H-Horn	PK	0.0	53.1	74.0	-20.9
5687.050	40.3	9.0	340.0	1.2	3.0	0.0	V-Horn	PK	0.0	49.3	74.0	-24.7
5897.250	39.8	9.5	340.0	1.2	3.0	0.0	V-Horn	PK	0.0	49.3	74.0	-24.7

NORTHWEST EMC

Field Strength of Harmonic Emissions

REV df3.03 12/16/2002

EUT:	SPV 2020			Work Order:	PRCO0010
Serial Number:	none			Date:	12/27/02 & 01/06/03
Customer:	Preco, Inc.			Temperature:	68
Attendees:	none			Humidity:	34%
Cust. Ref. No.:				Barometric Pressure	29.97
Tested by:	Greg Kiemel	Power:	12 Vdc	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.249	Year:	2001
Method:	ANSI C63.4	Year:	2000

SAMPLE CALCULATIONS

Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Pulse Desensitization Factor - Duty Cycle Correction Factor

Duty Cycle Correction Factor = 20 * log (pulse width * pulse repetition frequency)

Pulse Desensitization Factor = 20 * log (pulse width * k * resolution bandwidth), where k = 1.5

COMMENTS

EUT power provided by 12 Vdc lab power supply. Ferrite bead on cable harness. Resolution Bandwidth = 3 MHz, Video Bandwidth = 7 MHz. Unless otherwise noted on the data, the measurements were made in Pulse Spectrum Mode (HP Note 150-2)

EUT OPERATING MODES

Transmitting with pulse modulated carrier: pulse width = 14 nS, pulse repetition frequency = 2.78 MHz,

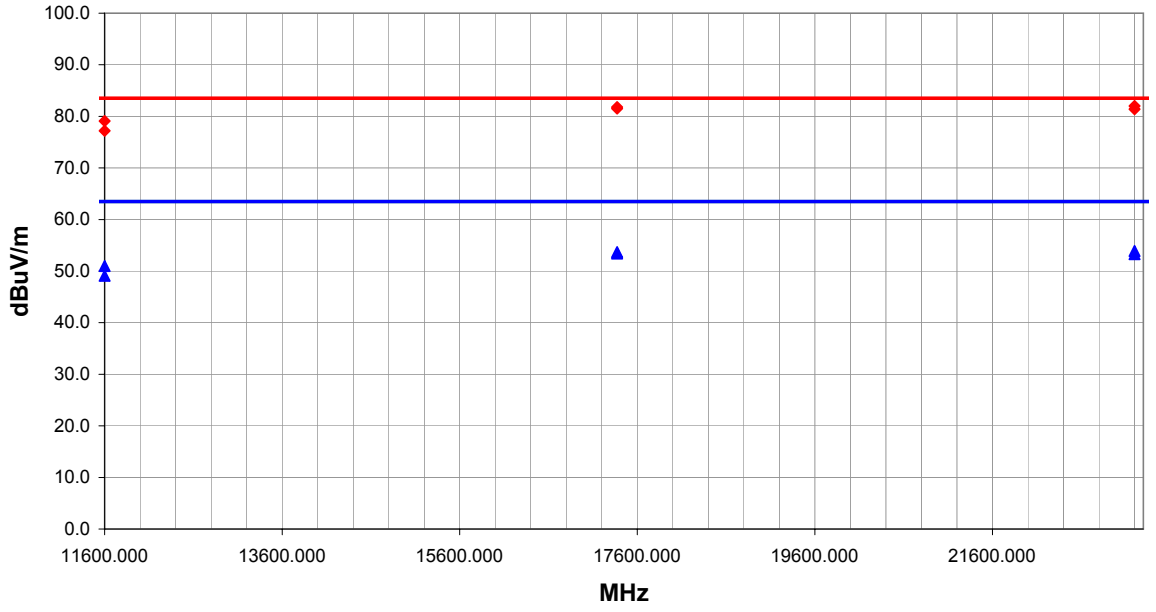
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Test Distance (m)	Run #
Fail	1	4

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Pulse Desensitization Factor	Duty Cycle Correction Factor (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
23200.000	47.3	10.7	45.0	1.0	24.0	0.0	H-Horn	PK	0.0	82.0	83.5	-1.5
17373.000	38.5	15.2	10.0	1.0	28.1	0.0	H-Horn	PK	0.0	81.8	83.5	-1.7
17373.000	38.2	15.2	345.0	1.0	28.1	0.0	V-Horn	PK	0.0	81.5	83.5	-2.0
23200.000	46.7	10.7	45.0	1.1	24.0	0.0	V-Horn	PK	0.0	81.4	83.5	-2.1
11600.000	47.2	7.9	0.0	1.0	24.0	0.0	H-Horn	PK	0.0	79.1	83.5	-4.4
11600.000	45.3	7.9	0.0	1.0	24.0	0.0	V-Horn	PK	0.0	77.2	83.5	-6.3
23200.000	47.3	10.7	45.0	1.0	24.0	28.1	H-Horn	AV	0.0	53.9	63.5	-9.6
17373.000	38.5	15.2	10.0	1.0	0.0	0.0	H-Horn	AV	0.0	53.7	63.5	-9.8
17373.000	38.2	15.2	345.0	1.0	0.0	0.0	V-Horn	AV	0.0	53.4	63.5	-10.1
23200.000	46.7	10.7	45.0	1.1	24.0	28.1	V-Horn	AV	0.0	53.3	63.5	-10.2
11600.000	47.2	7.9	0.0	1.0	24.0	28.1	H-Horn	AV	0.0	51.0	63.5	-12.5
11600.000	45.3	7.9	0.0	1.0	24.0	28.1	V-Horn	AV	0.0	49.1	63.5	-14.4

NORTHWEST EMC

Main Lobe Bandwidth of the Fundamental

Rev BETA 01/30/01

EUT:	SPV 2020			Work Order:	PRCO0010
Serial Number:	none			Date:	12/27/02
Customer:	Preco, Inc.			Temperature:	68 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	38% RH
Customer Ref. No.:	N/A	Power:	12 Vdc%	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	47 CFR 15.249	Year:	Most Current	Method:	ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Transmitting with pulse modulation

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

The main lobe of the fundamental emission is contained within the specified band of 5.725 to 5.875 GHz

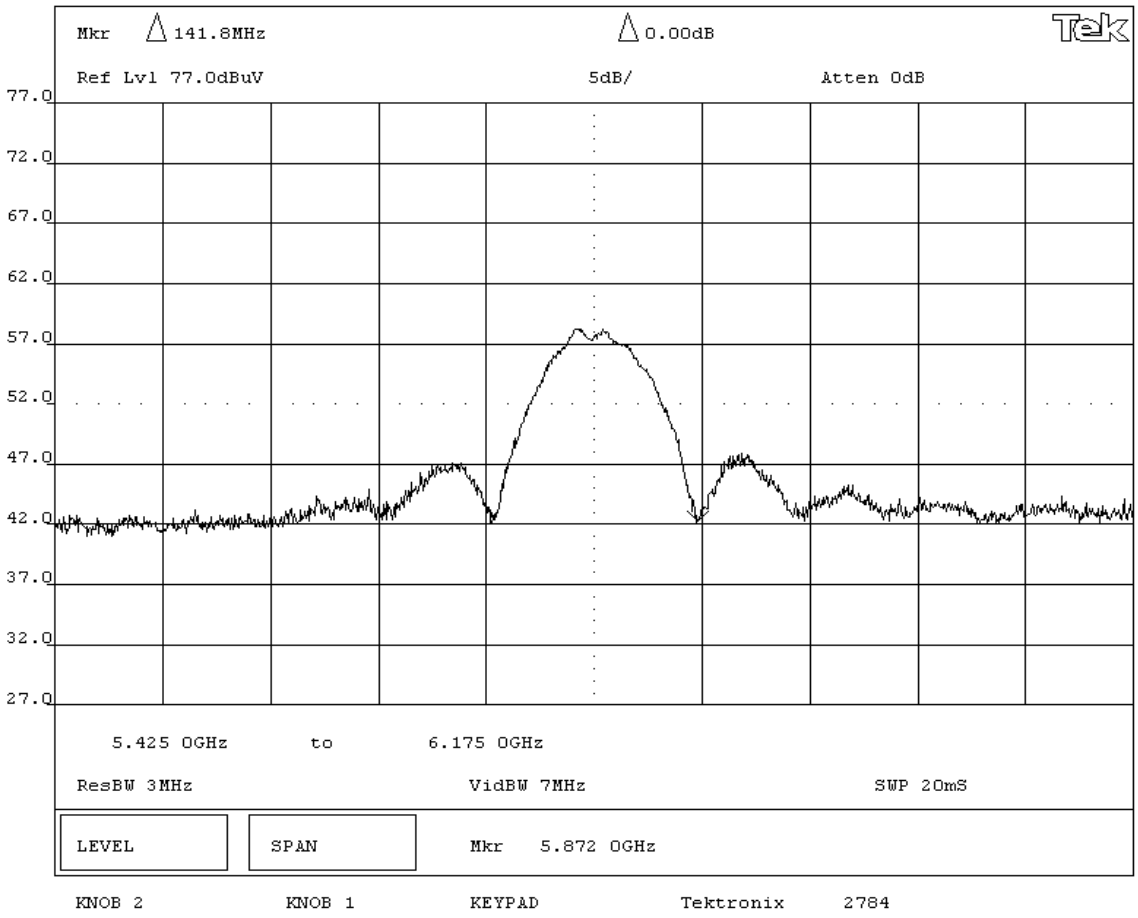
RESULTS	Bandwidth
Pass	141.8 MHz

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Channel Bandwidth



NORTHWEST EMC

Pulse Repetition Frequency

Rev BETA 01/30/01

EUT:	SPV 2020			Work Order:	PRCO0010
Serial Number:	none			Date:	12/27/02
Customer:	Preco, Inc.			Temperature:	68 F
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	38% RH
Customer Ref. No.:	N/A	Power:	12 Vdc%	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	47 CFR 15.249	Year:	Most Current	Method:	ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Transmitting with pulse modulation

DEVIATIONS FROM TEST STANDARD

None

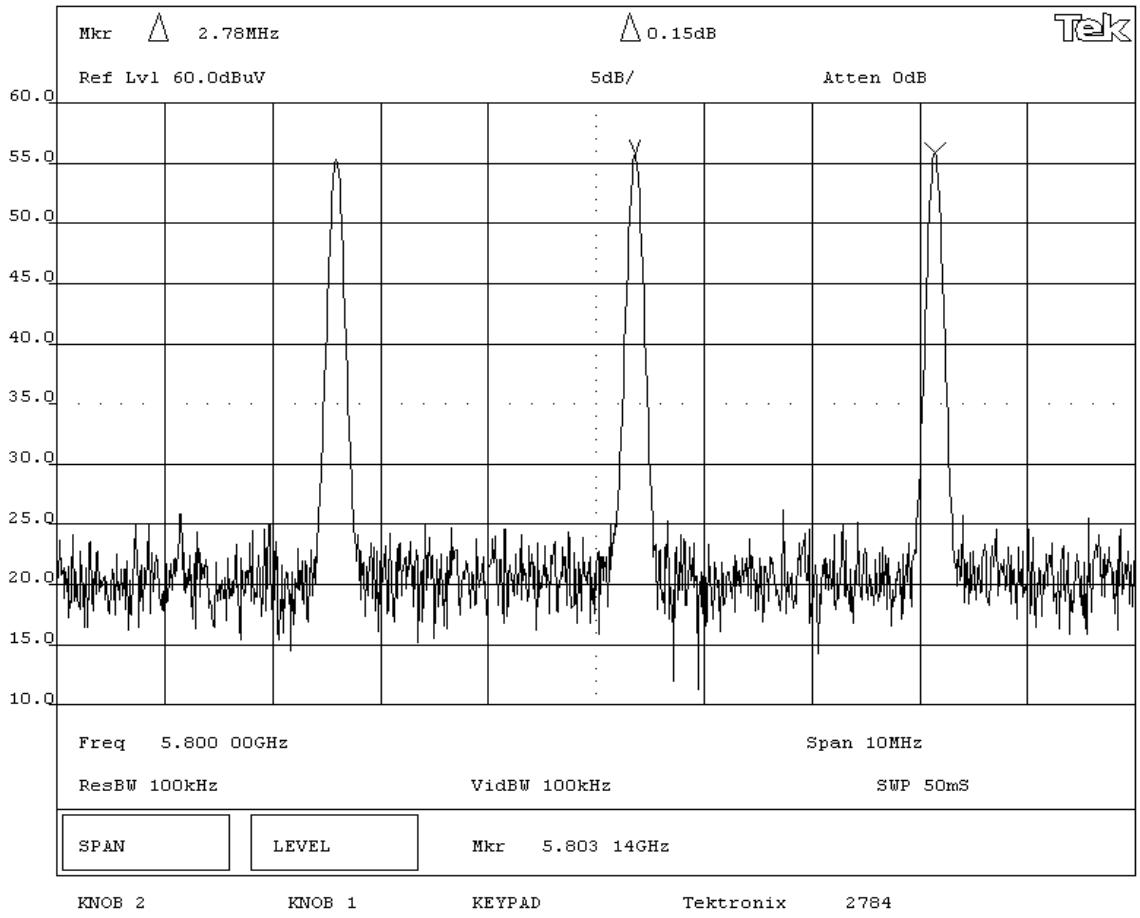
REQUIREMENTS

The field strength of the fundamental is measured using a RBW greater than the pulse repetition frequency

RESULTS	PRF
Pass	2.78 MHz

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Pulse Repetition Frequency