

FCC Part 95 (H) Test Report
for
GE Medical Systems
on the
WMTS Transmitter
Model: 342MCCN-XXX
FCC ID: OU5340MT

Job No: J20046260
Date of Test: May 1 to 10, 2001

Report No.: 20462601
Date of Report: May 25, 2001



NVLAP Laboratory Code: 200201-0

Tested by:	Suresh Kondapalli	Review Date: 5/31/01
Reviewer:	David Chernomordik, Ph.D. EMC Site Manager	Review Date: 5/31/01

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1.0 Job Description**1.1 Client Information**

The EUT has been tested at the request of:

Company: GE Medical Systems
61 Barnes park North,
Wallingford, CT 06492 USA

Name of contact: Lenny Bienasz

Telephone: (203) 949-8225

Fax: (203) 949-2536

1.2 Equipment under test (EUT)

Equipment type: WMTS Transmitter

Model number(s): 342MCCN-XXX

Part or serial number: Not Labeled

Manufacturer: SAME as above.

Use of Product : Medical Telemetry

Production is planned: ☒ Yes, ☐ No

Technical Specifications:

Type of Emission	F3D
Max. modulation frequency (M)	0.5 kHz
Max. Allowed deviation (D)	5 kHz, typically 3 kHz
RF Output Power	4 mW
Means for variation of operating power	Fixed
Frequency Range	608 to 614MHz
Max. number of Channels	238
Channel separation	25 kHz
Antenna	Detachable rod antenna
External input	Ultrasound, ECG and UA



EUT receive date: April 30, 2001
EUT received condition: Good condition prototype
Test start date: May 1, 2001
Test end date: May 4, 2001

1.3 Test plan reference

FCC Part 2.1093, FCC Part 95 (H)

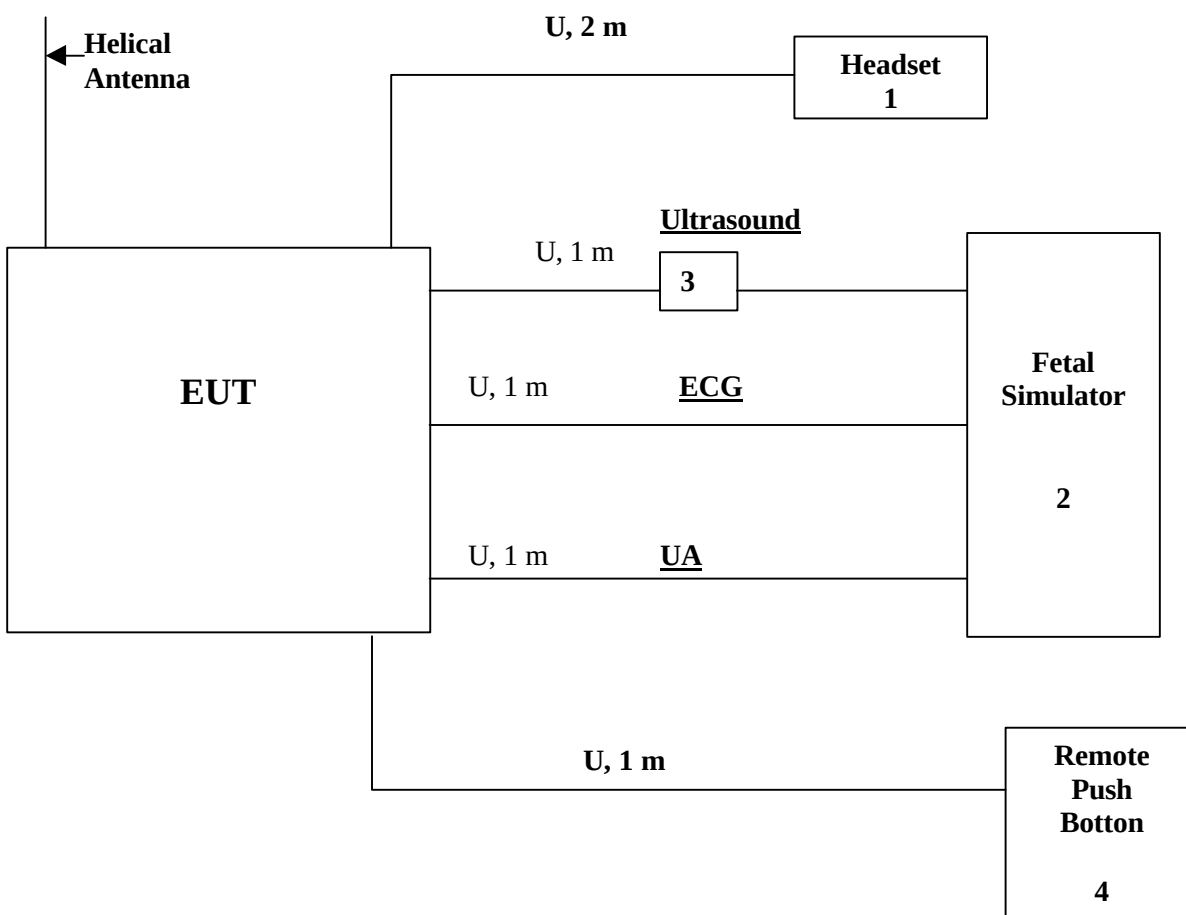
1.4 Description of the EUT

The 340M OB Telemetry System is comprised of a transmitter and receiver to provide an RF link between patient worn transducers and fetal monitor, allowing patient to freely move about while staff monitor fetal heart rate and uterine contractions remotely.

1.5 System test configuration

1.5.1 System block diagram & Support equipment

The diagram shown below details the placement of the equipment under test during the testing



S: Shielded	U: Unshield	F: With Ferrite Core
--------------------	--------------------	-----------------------------

Item #	Description	Manufacturer	Model No.	Serial No.
1	Headset	Radio Shack	33.1160	Not Labeled
2	Maternal Fetal Simulator	GE	325	Not Labeled
3	5700 Transducer (Two numbers)	Corometrics		Not Labeled
4	Remote push button	Switch Craft	3919	Not Labeled



1.6 Justification

The system was configured for testing in a typical manner in accordance with ANSI C63.4 standard. During radiated emission testing, the peripheral locations were varied with respect to the EUT to maximize the emissions.

1.7 Mode(s) of operation

Transmitting data from patient worn transducer to fetal monitor.

1.8 Modifications required for compliance

No modifications were implemented by Intertek Testing Services.

2.0 Test Summary

FCC RULE	DESCRIPTION OF TEST	RESULT	PAGE
2.1046	RF Power Output	5 mW	7
2.1047	Modulation Characteristics	Not Applicable	-
2.1049	Occupied Bandwidth	Passed	9
2.1053	Spurious emissions at antenna terminal	Passed	12
95.1115(a)	Field Strength of fundamental	Passed	16
95.1115(b)	Field Strength of undesired emissions	Passed	16
15.107	AC Line Conducted Emissions	Not Applicable. The EUT is battery operated	-
2.1055	Frequency Stability Vs. Temperature Vs. Voltage	0.4 ppm 0.12 ppm	20
2.1093	RF Exposure	Passed	Separate SAR report

3.0 RF Power Output

3.1 Test Description

Requirement:	FCC § 2.1046
RF Output Power	

3.2 Test Procedure

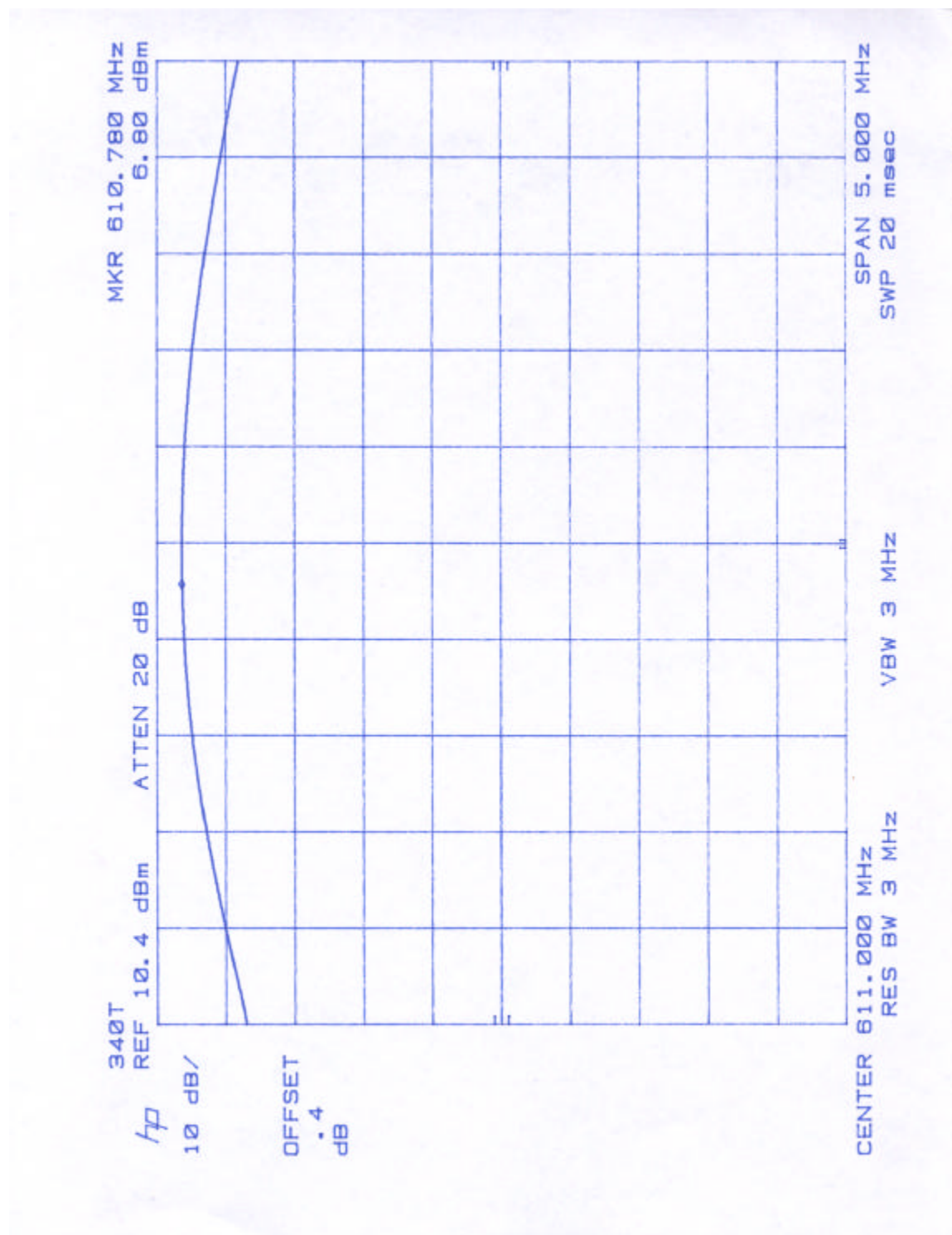
The antenna was disconnected from the transmitter and a spectrum analyzer was connected to the antenna terminal through a short cable. The output power was read out and the cable loss was setup as OFFSET.

In addition, ERP was measured by the substitution method using half-wave dipole (Robert's antenna).

3.3 Test Results

See plot 3.1 on the next page. The measured power output is 6.8 dBm (4.8 mW).
The maximum ERP measured equals 7.2 dBm or 5.2 mW.

Plot 3.1



4.0 Occupied Bandwidth, Necessary Bandwidth

4.1 Test Description

Requirement:	FCC §2.1049
Emission Bandwidth:	<11 kHz

4.2 Test Procedure

The antenna was disconnected from the transmitter and the short cable was connected to the transmitter RF output. The RF output was connected to the input of the spectrum analyzer.

The resolution bandwidth of the spectrum analyzer was setup at least 10 times higher than the necessary bandwidth of the transmitter. The spectrum analyzer reading obtained is used as a reference for occupied bandwidth measurements.

The resolution bandwidth of the spectrum analyzer was setup to 100 Hz and the spectrum of the transmitting signal was recorded.

4.3 Test Results

See on the following pages the occupied bandwidth plots:

Plot Number	Description
4.1	Reference level
4.2	20-dB bandwidth

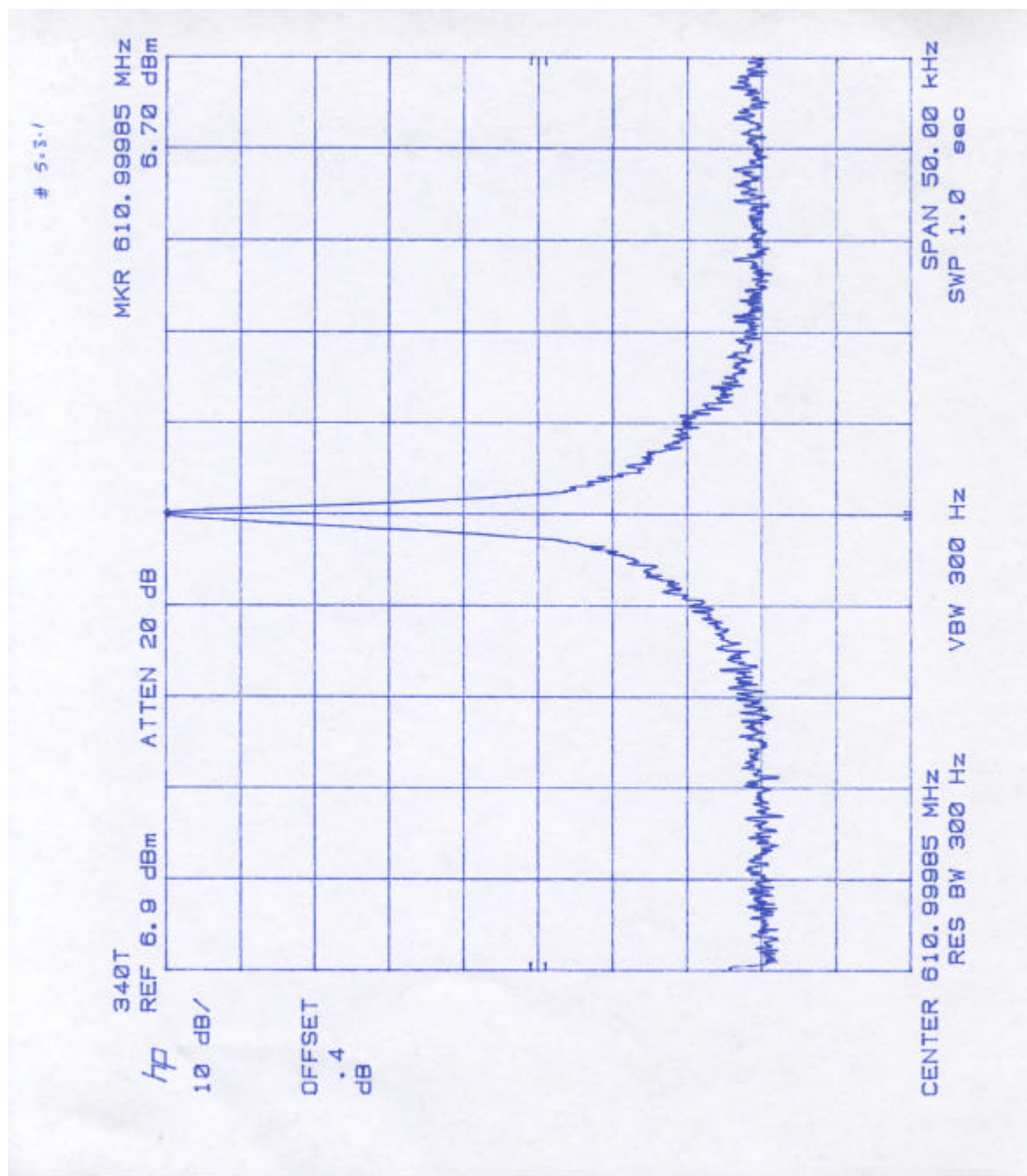
The Necessary Bandwidth was calculated using the formula:

$$B = 2 \times (M + D),$$

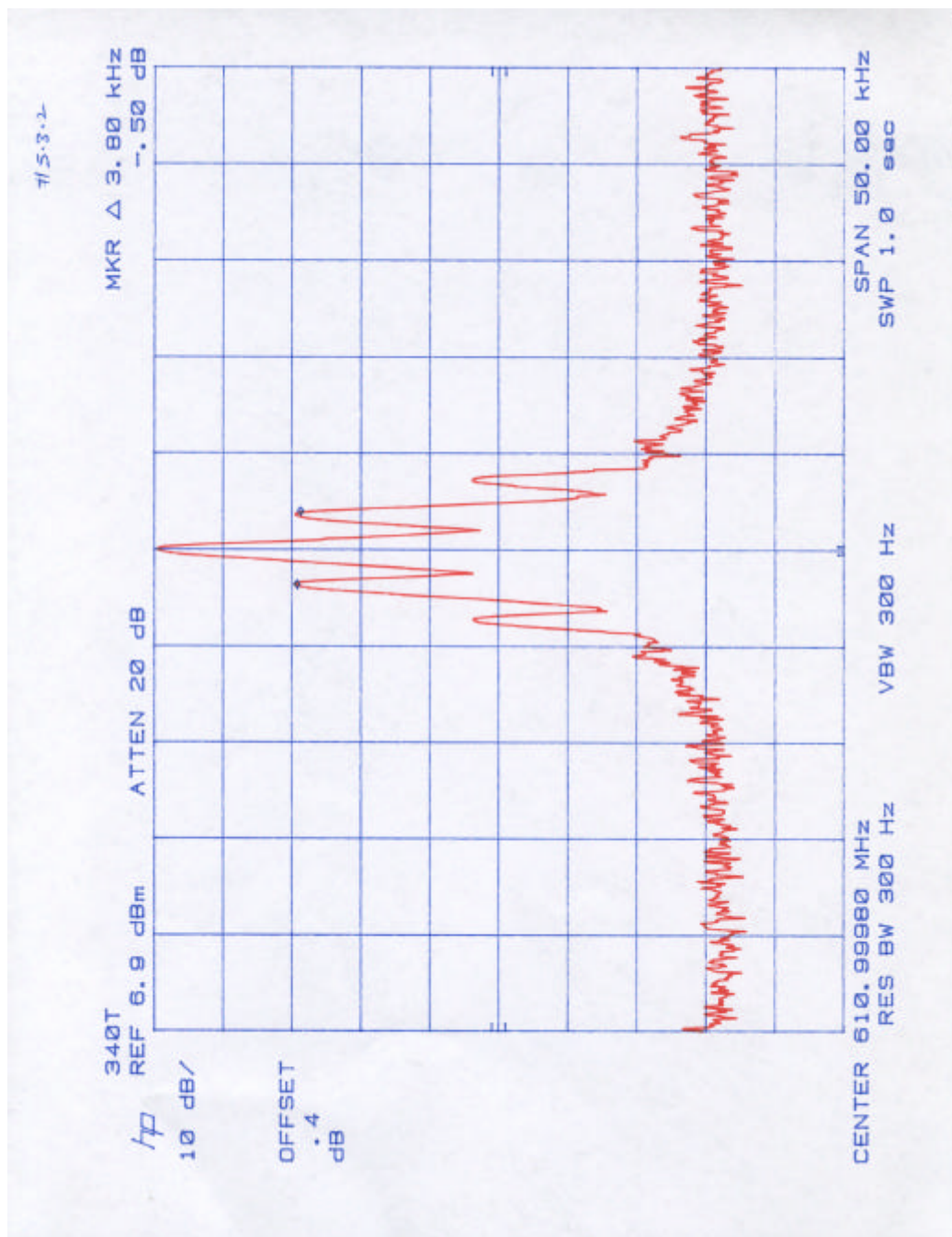
Where M is the highest modulation frequency, D is the deviation.

As per 342MCCN-XXX specification, M=0.5 kHz, D=5 kHz. Therefore B=11 kHz.

Plot 4.1



Plot 4.2





5.0 Spurious emissions at antenna terminal

5.1 Test description

Parameter:	FCC §2.1051
Requirement:	

5.2 Test Procedure

The test was performed according the procedure outlined in ANSI C63.4 Standard.

The antenna was disconnected from the transmitter and a spectrum analyzer was connected to the antenna terminal through a short cable. The cable loss was setup as OFFSET.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

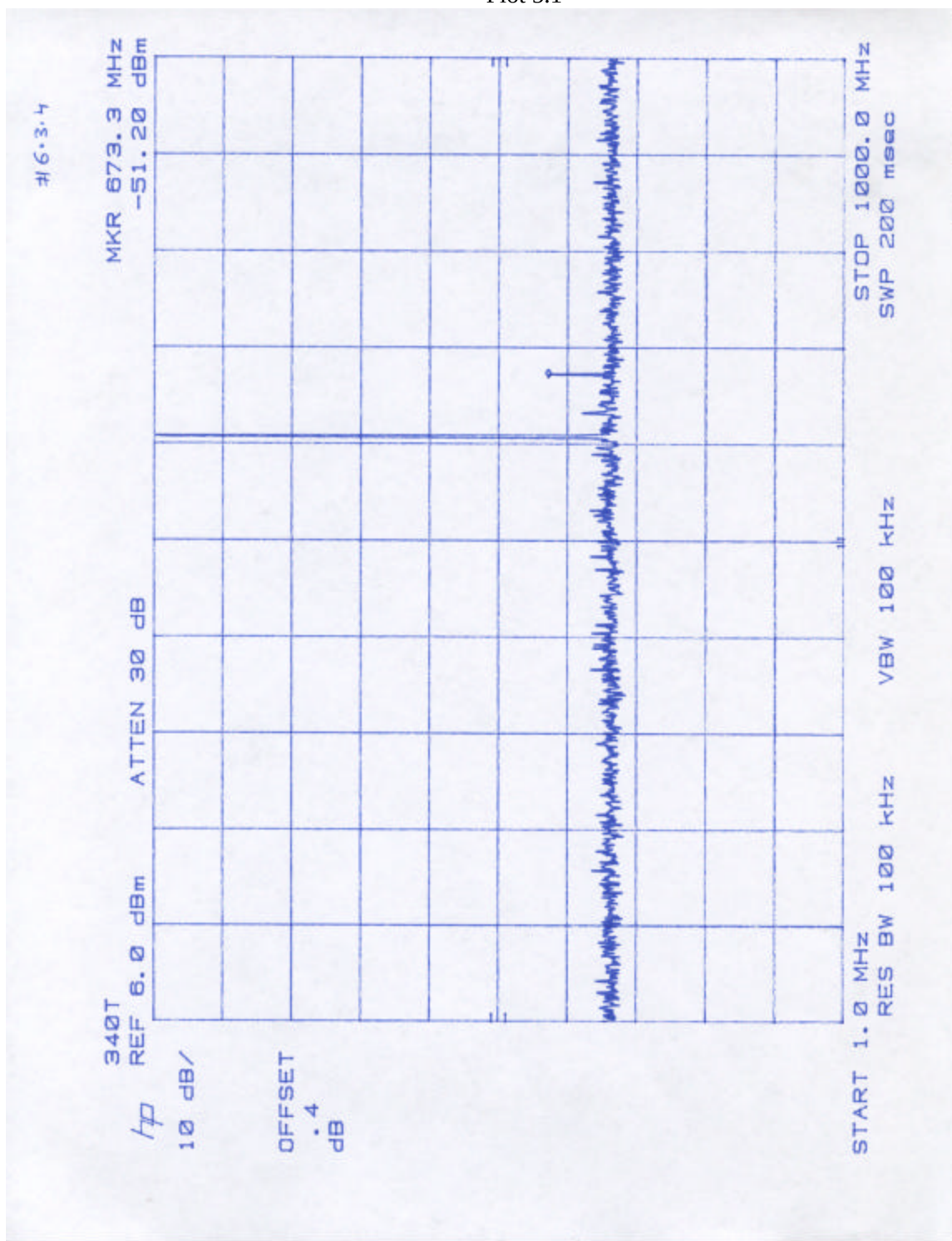
5.3 Test Result

See plots 5.1 – 5.3 for spurious emissions

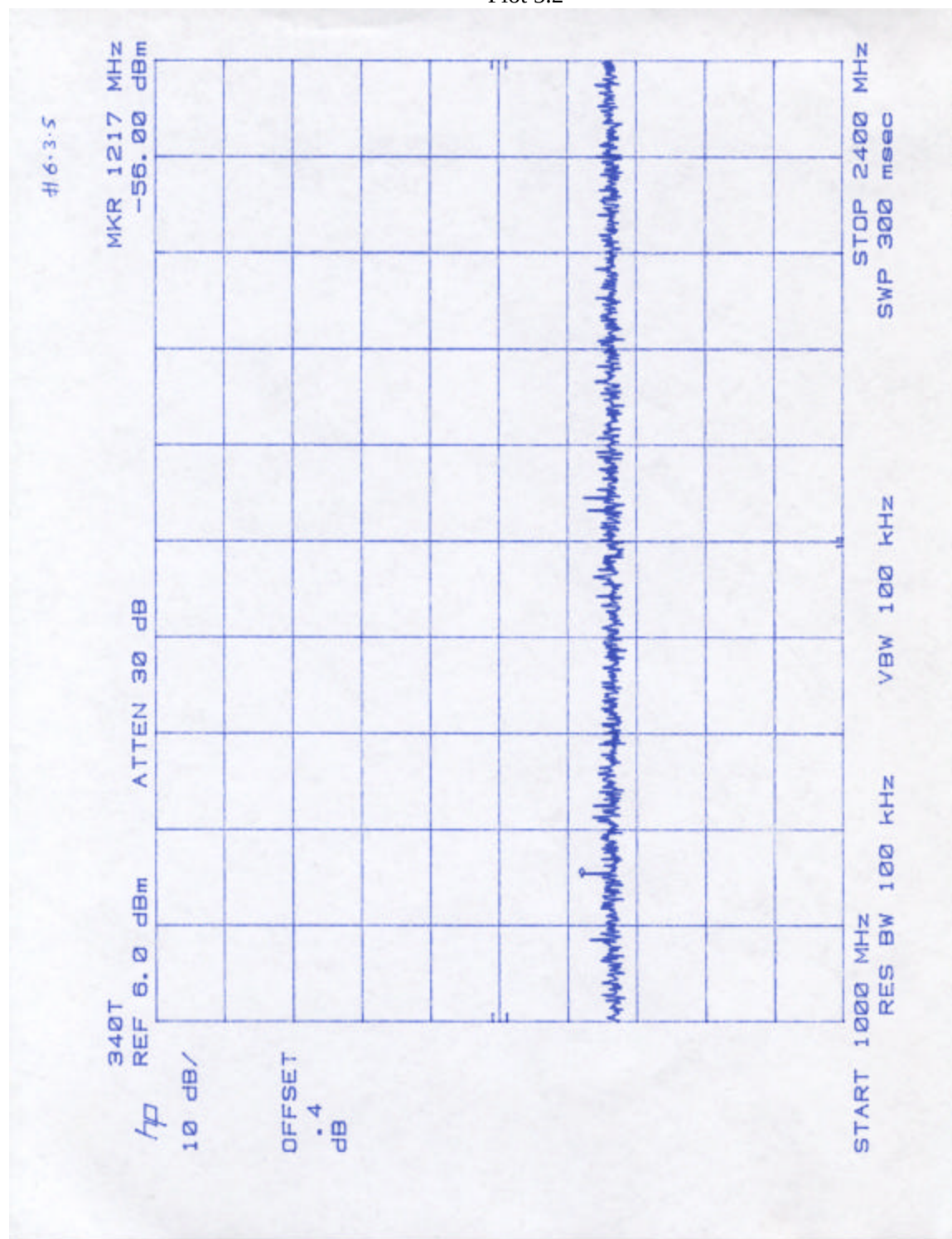
Data Sheet Number	Description
5.1	Conducted Spurious Emissions, 1.0 MHz to 1 GHz
5.2	Conducted Spurious Emissions, 1 GHz to 2.4 GHz
5.3	Conducted Spurious Emissions, 2.4 GHz to 10 GHz



Plot 5.1

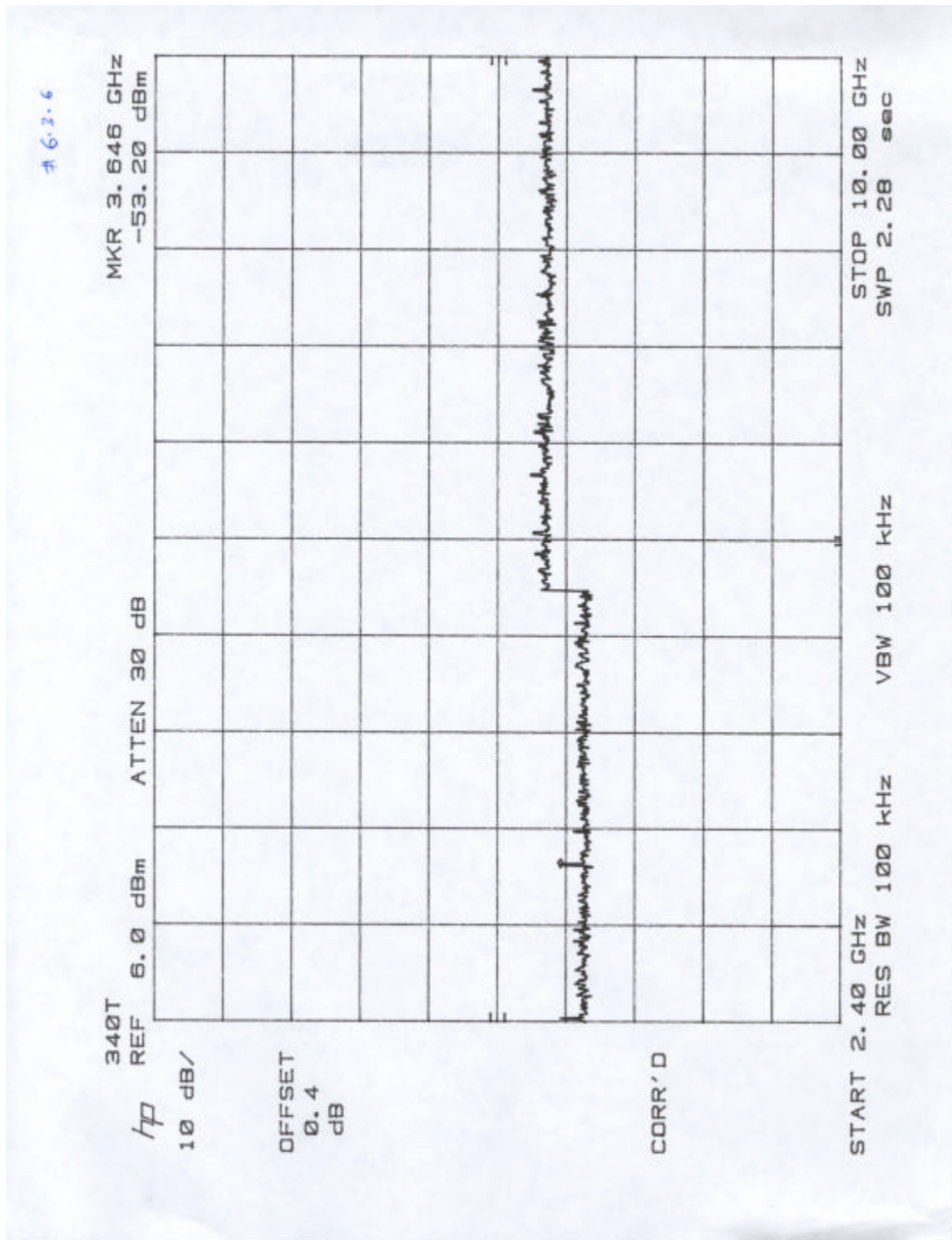


Plot 5.2





Plot 5.3



6.0 Field Strength of Radiated Emissions

6.1 Test description

Parameter:	FCC § 95.1115
Requirement:	< 200 mV/m at fundamental frequency, < 500 µV/m undesired radiation

6.2 Test Procedure

The test was performed according the procedure outlined in ANSI C63.4 Standard.

The transmitter was placed on a wooden turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

6.3 Test Results

Please see the following pages for the test result.

Data Sheet Number	Description
6.1	Radiated Emissions at Low Channel 608 MHz
6.2	Radiated Emissions at High Channel 614 MHz

Data Sheet 6.1

**Radiated Emissions
Test Data**

Company:	GE Medical Inc	Model #:	340T	Standard	FCC § 95.1115
EUT:	WMTS Transmitter	FCC ID #	OU340MT	Limit	
Project #:	J20042625	Test Date:	May 04,20 01	Test Distance	3 meters
Test Mode:	Transmitter@608.02MHz	Engineer:	Suresh	Duty Relaxation	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	8	7	2	2	8	0	21	0	0	0
Model:	EMCO 3115	EM LPA-25	EMCO 3143	CDI P950	CDI_P1000	None	Grn_M+L	None	None	None

Frequency	Reading	Detector	Ant .	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(μV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(μV/m)	dB(μV/m)	dB
608.02	81.9	Peak	7	0	V	19.1	0.0	1.7	0.0	102.7	106.0	-3.3
1216.04	23.4	Ave.	8	0	V	25.0	0.0	2.5	0.0	50.9	54.0	-3.1
1824.06	51.5	Ave.	8	8	V	26.7	29.3	3.1	0.0	52.0	54.0	-2.0
2432.08	49.3	Ave.	8	8	V	29.1	28.5	2.3	0.0	52.2	54.0	-1.8
3041.00	44.1	Ave.	8	8	V	31.3	28.0	2.5	0.0	49.9	54.0	-4.1
3648.12	40.2	Ave.	8	8	V	33.0	27.8	2.7	0.0	48.1	54.0	-5.9
4256.14	36.5	Ave.	8	8	V	34.5	27.9	2.9	0.0	46.0	54.0	-8.0
4864.16	28.4	Ave.	8	8	V	34.0	28.1	3.2	0.0	37.5	54.0	-16.5
5472.18	28.1	Ave.	8	8	V	35.4	28.3	3.5	0.0	38.7	54.0	-15.3
6080.20	29.0	Ave.	8	8	V	37.1	28.3	3.9	0.0	41.7	54.0	-12.3

Notes:	a) D.C.F.:Distance Correction Factor
	b) Insert. Loss (dB) = Cable A + Cable B + Cable C .
	c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
	d) Negative signs (-) in Margin column signify levels below the limits.
	e) All other emissions not reported are below the equipment noise floor which is at least 10 dB below the limits.

Data Sheet 6.2

**Radiated Emissions
Test Data**

Company:	GE Medical Inc	Model #:	340T	Standard	FCC 95.1115
EUT:	WMTS Transmitter	S/N #:	OU340MT	Limits	
Project #:	J20042625	Test Date:	May 04,20 01	Test Distance_	3 meters
Test Mode:	Transmitter@613.97MHz	Engineer:	Suresh K	Duty Relaxation	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	8	7	11	2	8	0	21	0	0	0
Model:	EMCO 3115	EM LPA-25	LPB-2520A	CDI P950	CDI P1000	None	Grn_M+L	None	None	None

Frequency	Reading	Detector	Ant	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(μV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(μV/m)	dB(μV/m)	dB
613.97	84.5	Peak	11	0	V	18.9	0.0	1.7	0.0	105.1	106	-0.9
1227.95	23.3	Ave.	8	0	V	25.0	0.0	2.5	0.0	50.8	54.0	-3.2
1841.92	46.5	Ave.	8	8	V	26.7	29.3	3.1	0.0	47.0	54.0	-7.0
2455.9	41.8	Ave.	8	8	V	29.1	28.5	2.3	0.0	44.7	54.0	-9.3
3069.9	40.2	Ave.	8	8	V	31.3	28.0	2.5	0.0	46.0	54.0	-8.0
3683.8	38.8	Ave.	8	8	V	33.0	27.8	2.7	0.0	46.7	54.0	-7.3
4297.8	36.6	Ave.	8	8	V	34.5	27.9	2.9	0.0	46.1	54.0	-7.9
4911.8	28.8	Ave.	8	8	V	34.0	28.1	3.2	0.0	37.9	54.0	-16.1
5525.7	33.8	Ave.	8	8	V	36.6	28.3	3.7	0.0	45.8	54.0	-8.2
6139.7	30.7	Ave.	8	8	V	37.1	28.3	3.9	0.0	43.4	54.0	-10.6

Notes:

- D.C.F.:Distance Correction Factor
- Insert. Loss (dB) = Cable A + Cable B + Cable C .
- Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).
- Negative signs (-) in Margin column signify levels below the limits.
- All other emissions not reported are below the equipment noise floor which is at least 10 dB below the limits.

7.0 Frequency Stability

7.1 Test description

Requirement:	FCC § 2.1055
Frequency Tolerance:	

7.2 Test Procedure

The ppm frequency error of the transmitter was calculated by:

$$ppm\ error = \left(\frac{MCF}{ACF} - 1 \right) \cdot 10^6$$

Where MCF is the Measured Carrier Frequency in MHz
ACF is the Assigned Carrier Frequency in MHz

7.2.1 Frequency Stability vs. Temperature

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feedthrough attenuator. The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.

7.2.2 Frequency Stability vs. Voltage

At room temperature (25 ± 5 °C), an external variable DC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.

7.3 Test Results

Frequency Stability vs Temperature		
ACF (MHz): 610.999790		Limit: N/A
Temperature, C	MCF (MHz)	PPM Error
50	610.999600	0.19
40	610.999740	0.05
30	610.999710	0.04
20	611.000015	.022
10	611.000190	0.40
0	611.000505	0.40
-10	Unit turned off by thermal sensor	-
-20	-	-

AFC (MHz) 611.11			Limit: 2 ppm
%	Voltage	MCF (MHz)	PPM Error
115	6.9	610.999823	0.003
100	6.0V	610.999913	0.12
85	5.1	610.999798	0.001
Battery Endpoint	4.0	610.999798	0.001

Maximum frequency deviation equals 0.4 ppm

8.0 List of test equipment

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. INTERVAL	CAL. DUE
Spectrum Analyzer w/85650 QP Adapter	Hewlett Packard	8566B	2416A00317 2043A00251	12	4/6/02
Spectrum Analyzer w/8650 QP Adaptor	Hewlett Packard	8568B	1912A0053 2521A01021	12	2/23/02
Spectrum Analyzer	Tektronix	2784	B3020108	12	8/4/01
Bi-Log Antenna	EMCO	3143	9509-1160	12	6/8/01
Log Periodic Antenna	EMCO	LPA-25	1079	12	7/05/02
Double-ridged Horn Antenna	EMCO	3115	9107-3712	12	3/17/02
Pre-Amplifier	CDI	P950	ITS009	12	10/6/01
Pre-Amplifier	CDI	P1000	N/A	12	10/6/01
Power Meter	Hewlett Packard	8900D	3607U00673	12	7/31/01