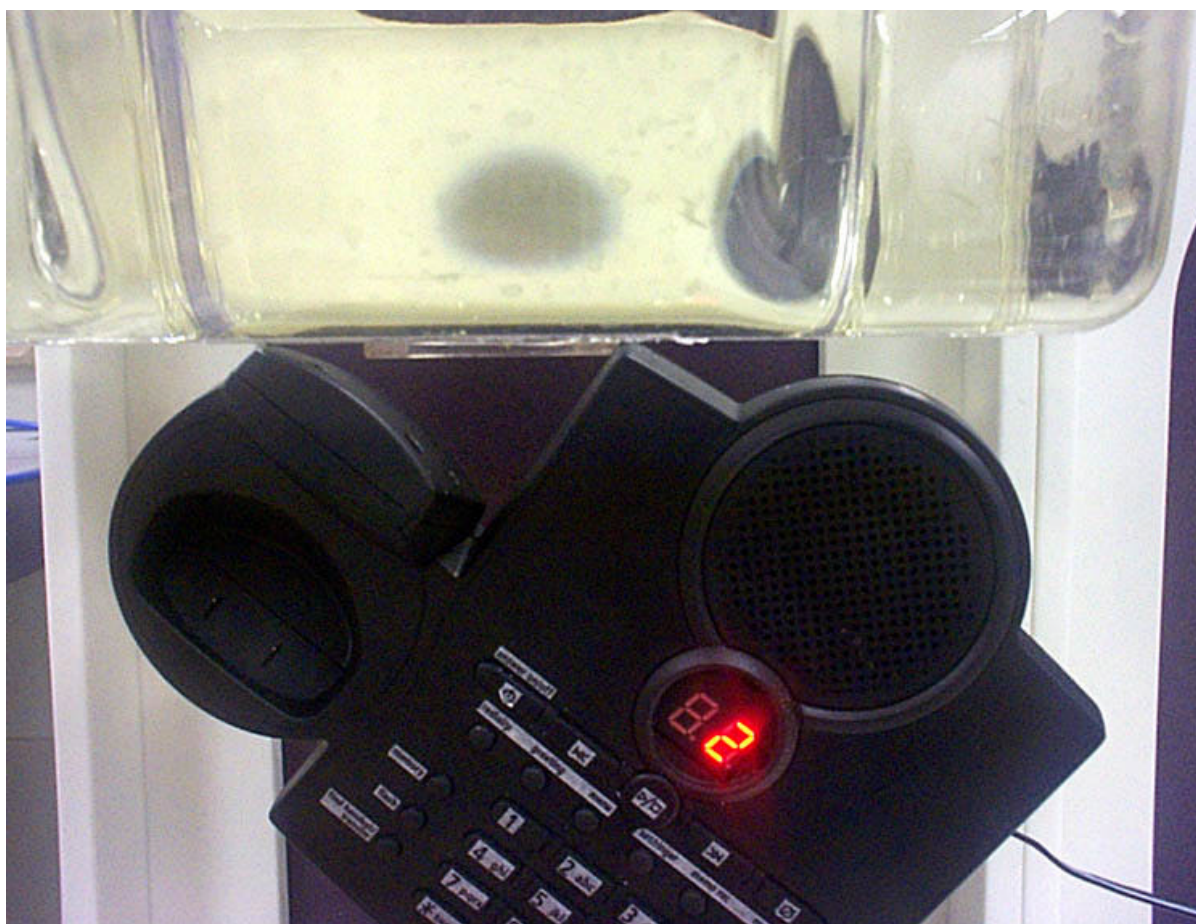


## Appendix B

### PICTURES OF THE EVALUATION SETUP

**PICTURE 1**

TOP SIDE UP, Distance 0 mm



**PICTURE 2**

TOP SIDE UP, Distance 10 mm





**PICTURE 3**

KEYBOARD SIDE UP, Distance 0 mm



**PICTURE 4**

KEYBOARD SIDE DOWN, Distance 0 mm



**PICTURE 5**

LEFT SIDE UP, Distance 0mm





## APPENDIX C: VALIDATION SCAN

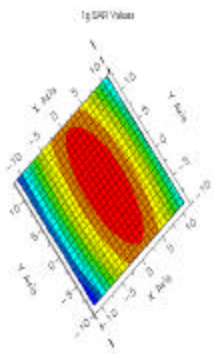


Figure 5. Contour Plot of 1 gram Validation Scan

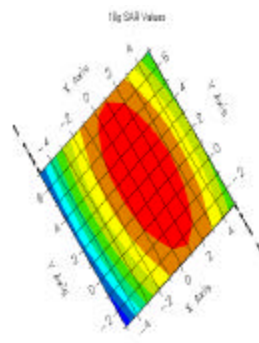


Figure 6. Contour Plot of 10 gram Validation Scan

Frequency: 5800 MHz

Tissue Type: Muscle

Conversion Factor: 2.5

Input Power to Dipole: 0.1 W (Normalized to 1W)

Distance from Dipole to Tissue: 10 mm

Tissue Depth: 15 cm

Measured 1 Gram SAR (W/Kg)	Target 1 Gram SAR (W/Kg)	Delta (%)
137.4	132.3	+3.9

Measured 10 Gram SAR (W/Kg)	Target 10 Gram SAR (W/Kg)	Delta (%)
40.1	38.4	+4.4

## Appendix D: UNCERTAINTY BUDGET

### Calculated Uncertainties

Type of Uncertainty	Specific to	Uncertainty
Power variation due to battery condition	DUI	0%
Extrapolation due to depth measurement	Setup	3.8%
Conductivity	Setup	1.0%
Permittivity	Setup	2.0%
Probe Calibration	Setup	7.0%
Probe Positioning	Setup	1.0%
Probe Isotropy	Setup	1.5%
Other Setup Uncertainty (Ambient)	Setup	3.0%
<b>18.0%</b>		<b>Expanded Uncertainty K=2</b>



## Appendix E: Probe Calibration

### NCL CALIBRATION LABORATORIES

Calibration File No.: C-P-0256

## CERTIFICATE OF CALIBRATION

It is certified that the equipment identified below has been calibrated in the  
**NCL CALIBRATION LABORATORIES** by qualified personnel following recognized  
procedures and using transfer standards traceable to NRC/NIST.

Equipment: Miniature Isotropic RF Probe 5.8 GHz

Manufacturer: APREL Laboratories

Model No.: E-010

Serial No.: 163

Calibration Procedure: SSI/DRB-TP-D01-032

Project No: Probe Cal Internal

Calibrated: May 8<sup>th</sup> 2002  
Recalibration required: may 7<sup>th</sup> 2003  
Released on: May 8<sup>th</sup> 2002

Released By: \_\_\_\_\_

### **NCL** CALIBRATION LABORATORIES

51 SPECTRUM WAY  
NEPEAN, ONTARIO  
CANADA K2R 1E6

Division of APREL Lab.  
TEL: (613) 820-4988  
FAX: (613) 820-4161



## INTRODUCTION

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-032 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-010 163.

## REFERENCES

SSI/DRB-TP-D01-032 E-Field Probe Calibration Procedure

IEEE P-1528 *DRAFT* "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

SSI-TP-014 Tissue Calibration Procedure

### Conditions

Probe 163 was a new probe taken from stock prior to calibration.

**Ambient Temperature of the Laboratory:** 23 °C +/- 0.5 °C

**Temperature of the Tissue:** 22 °C +/- 0.5 °C



## CALIBRATION RESULTS SUMMARY

<b>Probe Type:</b>	E-Field Probe E-010
<b>Serial Number:</b>	163
<b>Frequency:</b>	5.8 GHz
<b>Sensor Offset:</b>	2.4 mm
<b>Sensor Length:</b>	2.5 mm
<b>Tip Enclosure:</b>	Glass*
<b>Tip Diameter:</b>	7 mm
<b>Tip Length:</b>	40 mm
<b>Total Length:</b>	290 mm

\*Resistive to recommended tissue recipes per IEEE-P1528

## SENSITIVITY IN AIR

**Channel X:**  $0.58 \text{ } \mu\text{V}/(\text{V/m})^2$   
**Channel Y:**  $0.58 \text{ } \mu\text{V}/(\text{V/m})^2$   
**Channel Z:**  $0.58 \text{ } \mu\text{V}/(\text{V/m})^2$

**Diode Compression Point:** 76 mV

## SENSITIVITY IN MUSCLE TISSUE

**Frequency:** 5.8 GHz

**Epsilon:** 48.2(+/-10%)      **Sigma:** 6.0 S/m (+/-10%)

### ConvF

**Channel X:** 2.5

**Channel Y:** 2.5

**Channel Z:** 2.5

Tissue sensitivity values were calculated using a load impedance of 5 MΩ.

### Boundary Effect:

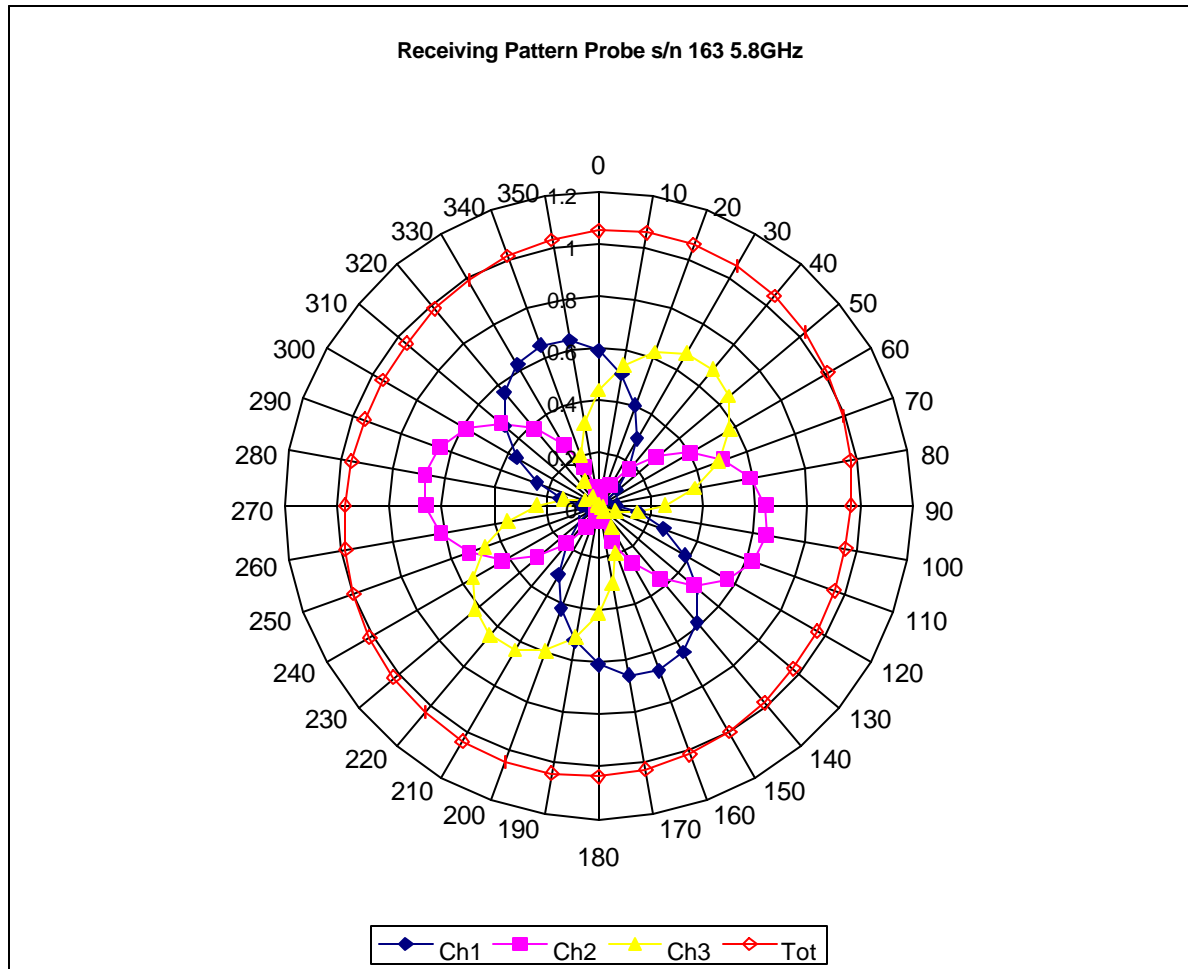
Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.6mm.

### Spatial Resolution:

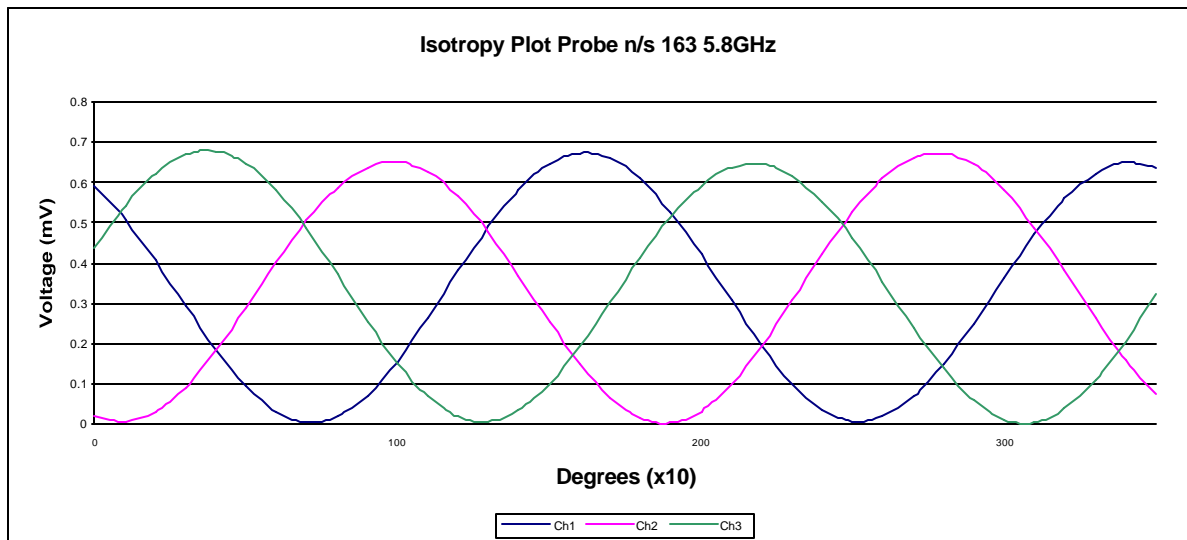
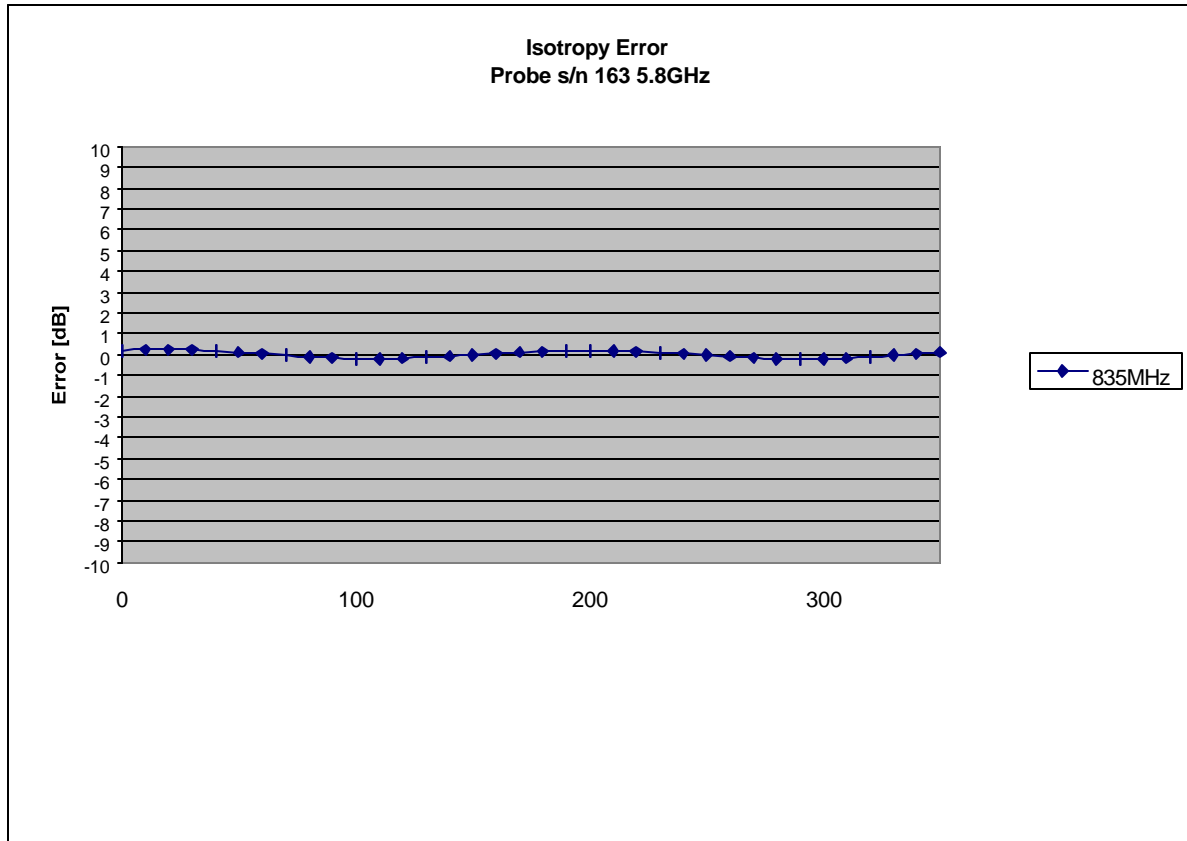
The measured probe tip diameter is 7 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.



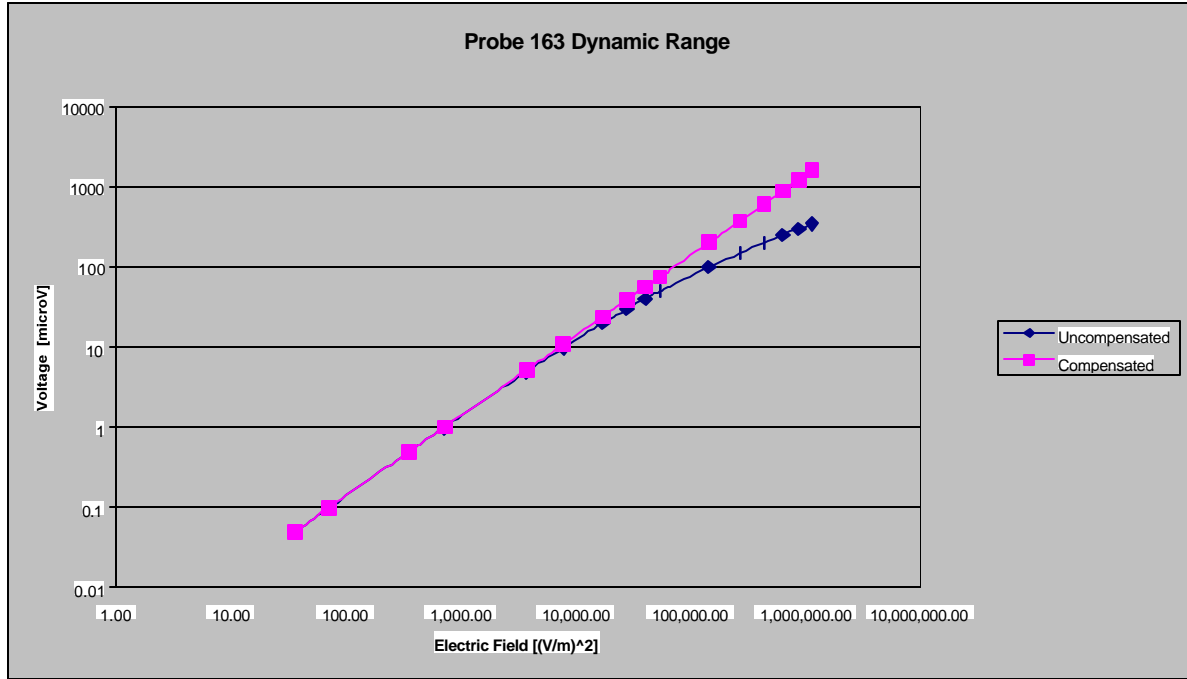
## RECEIVING PATTERN 5.8 GHZ (AIR)



## ISOTROPY ERROR 5.8 GHZ (AIR)

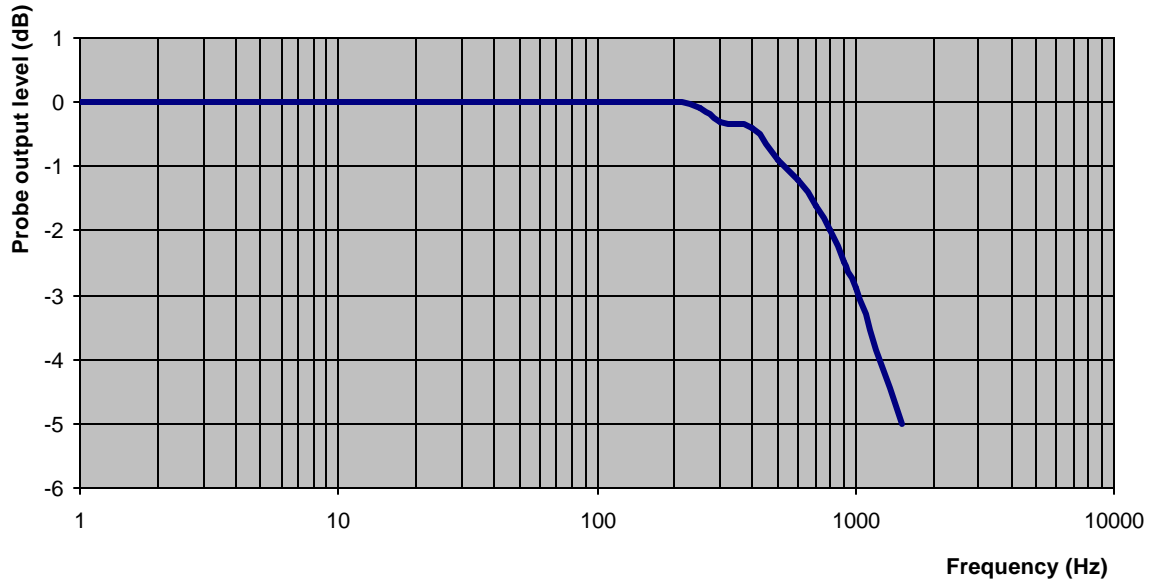


## DYNAMIC RANGE



## Video Bandwidth

Probe Frequency Characteristics



Video Bandwidth at 500 Hz                      1 dB  
Video Bandwidth at 1.02 KHz:                3 dB



## CONVERSION FACTOR UNCERTAINTY ASSESSMENT

<b>Frequency:</b>	5.8 GHz
<b>Epsilon:</b> 48.2 (+/-10%)	<b>Sigma:</b> 6.0 S/m (+/-10%)
<b>ConvF</b>	
<b>Channel X:</b> 2.5	<b>7%(K=2)</b>
<b>Channel Y:</b> 2.5	<b>7%(K=2)</b>
<b>Channel Z:</b> 2.5	<b>7%(K=2)</b>

To minimize the uncertainty calculation all tissue sensitivity values were calculated using a load impedance of 5 M $\Omega$ .

### Boundary Effect:

For a distance of 2.6mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.

## TEST EQUIPMENT

The test equipment used during Probe Calibration, manufacturer, model number and, current calibration status are listed in the following table:

Instrument	Manufacturer	Model Number	Asset Number Serial Number	Calibration Due
UniPhantom	APREL		APL-085	N/A
Universal Frame	APREL		APL-114	N/A
<1GHz TEM Cell			APL-1GHZ-TEM	Jan 2003
>1GHz-2GHz Tem Cell			APL-2GHZ-TEM	Jan 2003
ALIDX-500	APREL/IDX		-	March 2003
RF Amplifier	APREL		301467	October 2003
Signal Generator	HP		301463	November 2002
Power Meter	R&S		301451	September 2002
Power Sensor	R&S		301461	September 2002
Directional Coupler	HP		100251	October 2002
VNA	Anritsu		Z0107643 TEMP	August 2002
Slotted Line	HP		100195	N/A
Slotted Line Probe	APREL		APL-SLP-001	December 2002
APREL D-835-S1			301463	March 2003
D-900-S1	APREL		301472	March 2003
D-1900-S1	APREL		301459	March 2003
Measuring Amplifier	B&K		100675	Feb 2003
Signal Generator	B&K		100677	Feb 2003