# FCC CFR47 PART 24 SUBPART E

# CLASS II PERMISSIVE CHANGE TEST REPORT

# FOR

**MCBTS 1900 SINGLE CARRIER POWER AMPLIFIER**

**MODEL: ORIOLE 2**

**FCC ID: I2O-ORIOLE1**
(GRANTED ON 02/02/1999)

**REPORT NUMBER: 99U0485**

**ISSUE DATE: AUGUST 31, 1999**

*Prepared for*
**SPECTRIAN, INC.**
**350 WEST JAVA DRIVE**
**SUNNYVALE, CA 94089**

*Prepared by*
**COMPLIANCE CERTIFICATION SERVICES, INC.**
**d.B.a.**
**COMPLIANCE CERTIFICATION SERVICES**
**1366 BORDEAUX DRIVE**
**SUNNYVALE, CA 94089, USA**
**TEL: (408) 752-8166**
**FAX: (408) 752-8168**

**LAB CODE:200065-0**

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COMPLIANCE CONSULTING SERVICES DOCUMENT NO:CCSUP4031A
1366 BORDEAUX DRIVE SUNNYVALE, CA 94089 USA TEL:(408) 752-8166 FAX:(408) 752-8168

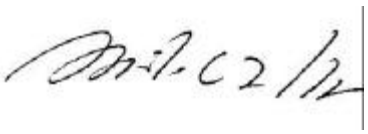
## 1. VERIFICATION OF COMPLIANCE

| | |
|---|---|
| COMPANY NAME: | SPECTRIAN, INC.<br>350 WEST JAVA DRIVE<br>SUNNYVALE CA 94089 |
| CONTACT PERSON: | BILL HENNING Jr. / MANAGER , AMPLIFIER ENGINEERING |
| TELEPHONE NO: | ( 408) 543-5977 |
| MODEL NO/NAME: | ORIOLE 2 |
| SERIAL NO: | N/A |
| DATE TESTED: | AUGUST 13, 1999 |

| | |
|---|---|
| TYPE OF EQUIPMENT: | MCBTS 1900 SINGLE CARRIER POWR AMPLIFIER |
| MEASUREMENT DISTANCE: | (X) 3 METER ( ) 10 METER |
| FCC RULES: | PART 2, PART 15, PART 24 SUBPART E |
| EQUIPMENT AUTHORIZATION PROCEDURE | CLASS II PERMISSIVE CHANGE |
| MODIFICATIONS MADE ON EUT | ☐ YES ☒ NO |
| DEVIATIONS FROM MEASUREMENT PROCEDURE | ☐ YES (refer to section 20 for comments)<br>☒ NO |

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC CFR 47, PART 2, PART 15 and PART 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.

Reviewed By



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

## 2. CLASS II PERMISSIVE CHANGE :

The differences to the previous ( I2O-ORIOLE1) filing include, a replacement device in the output stage, an additional MMIC device on the pre-amplifier located on the correction board, and use of a delay line filter to replace the coaxial delay line used in the correction topology.

## 3. 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: Spectrian, Inc.
350 West Java Drive
Sunnyvale CA 94089

**2.983(b)** FCC ID: I2O-ORIOLE1 GRANTED ON :02/02/1999

**2.983(c)** Quantity production is planned.

**2.983(d)** **Technical Description**

The MCBTS Single Carrier Power Amplifier ( SCPA) is a Personal Communications Systems ( PCS ) multi-stage linear power amplifier designed to be used as the final amplifier in PCS CDMA base stations. For detail technical information, please refer to Technical Description file. **Confidentiality is requested for this item.**

**(1) Types of Emissions**

CDMA : FXW

**(2) Frequency Range**

1931 – 1989 MHZ

**(3) Range of Operating Power**

40.4 - 44.4dB gain ( 42.4 dB nominal)

**(4) Maximum Power Rating**

The maximum output power is 17.8 Watts.

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

25.5 – 26.5 Vdc.

**(6) Function of Each Active Device**

Refer to Block Diagram . **Confidentiality is requested for this item.**

**(7) Complete Circuit Diagrams and Functional Diagram**

Refer to Schematics Diagram. **Confidentiality is requested for this item.**

**(8) Instructions/Installation Manual**

Not applicable for this product.

**(9) Tune-up/Optimization Procedure**

Not applicable for this product. This amplifier is Plug-n-Play.

**(10) Means for Frequency Stabilization**

Not applicable for this product.

**(11) Means for Limiting Modulation**

Not Applicable.

**(11) Means for Limiting Power**

The output power of this amplifier is 42.5dBm maximum. There are no power level controls within the amplifier. These are controlled by the system. The amplifier does contain a closed loop for correction.

**(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%



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DC Supply Voltage: 25.5 – 26.5 Vdc.

**Section 2.983(f) Equipment Identification**

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

**Section 2.983(g) Photographs**

Photographs of the equipment, internal and external views, are found in the External photos and internal photos files.

**Section 2.983 Description of Various Base Station Configurations**

Not Applicable

**Section 2.983 Use of Various Power Supplies**

Not Applicable.


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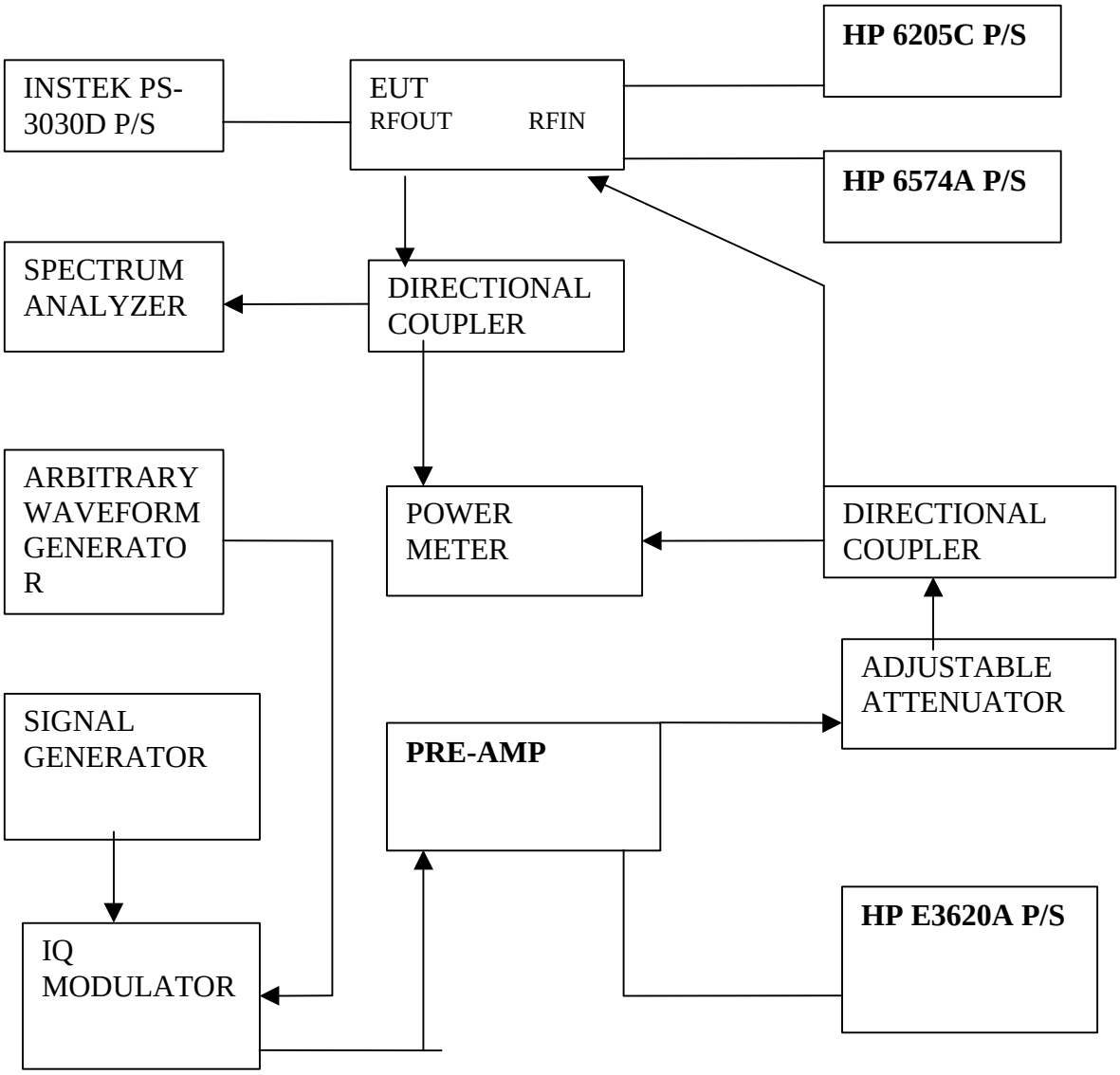
## 4. TEST SETUP AND TEST RESULT :

**Test Set-up**

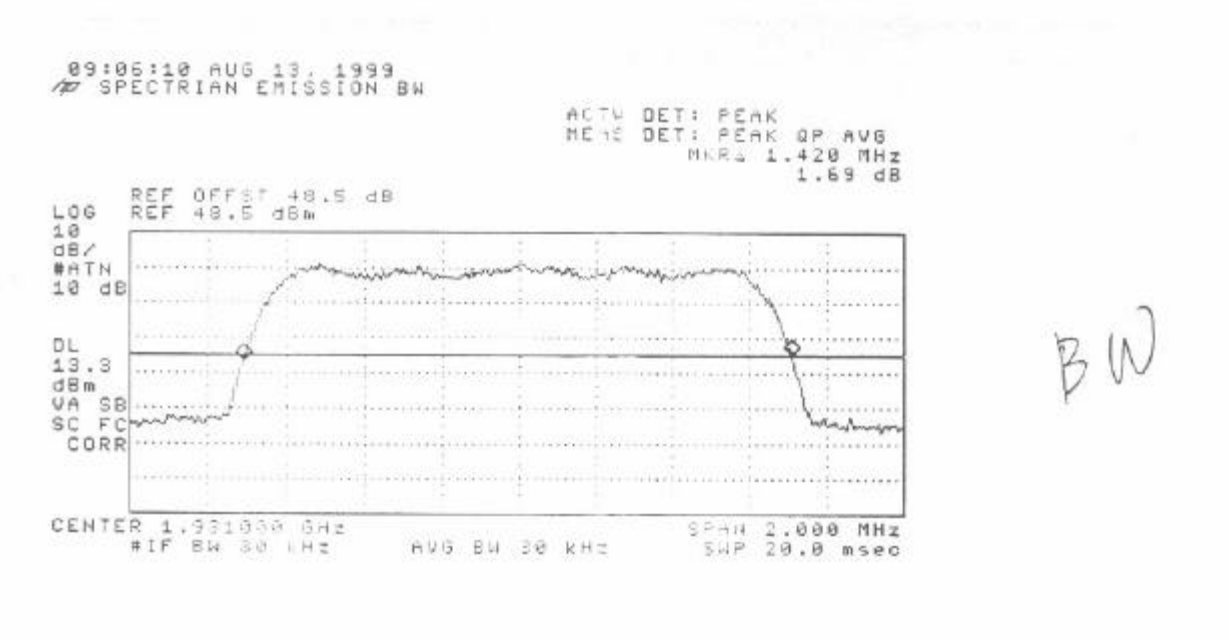



SECTION 2.1047 MEASUREMENT REQUIRED: MODULATION CHARACTERISTICS

Not Applicable

## SECTION 2.1049 MEASUREMENT REQUIRED: OCCUPIED BANDWIDTH

Data on the bandwidth occupied by this transmitter is presented in graphical form using spectrum analyzer plots. Emission bandwidth ( per 24.238b, the 26dB BW) was measured with RBW=30KHz, VBW=30KHz. Spectrum plot is supplied. Measured occupied bandwidth was 1.42MHz.



## SECTION 2.1051 MEASUREMENTS REQUIRED: SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINALS ( **SECTION 24.238 LIMITS** )

Minimum standard: 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

For CDMA
.01 * 1.42MHz = 14.2kHz. A RES BW of 30kHz was used for measurement.

**Test Results**

Please refer to the following table which indicates the chart number.

| PLOT DESCRIPTION | PLOT NUMBER |
|---|---|
| BOTTOM BLOCK A | 1 |
| TOP BLOCK A | 2 |
| BOTTOM BLOCK D | 3 |
| TOP BLOCK D | 4 |
| BOTTOM BLOCK B | 5 |
| TOP BLOCK B | 6 |
| BOTTOM BLOCK E | 7 |
| TOP BLOCK E | 8 |
| BOTTOM BLOCK F | 9 |
| TOP BLOCK F | 10 |
| BOTTOM BLOCK C | 11 |
| TOP BLOCK C | 12 |
| OUT OF BAND LOW | 13 |
| OUT OF BAND HI | 14 |
| $2^{ND}$ HARMONIC AVERAGE READING | 15 |
| INPUT PLOT | 16 |

**Plots at band edges use average.**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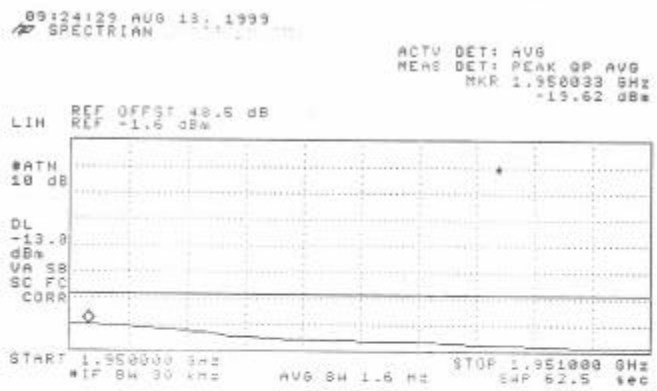


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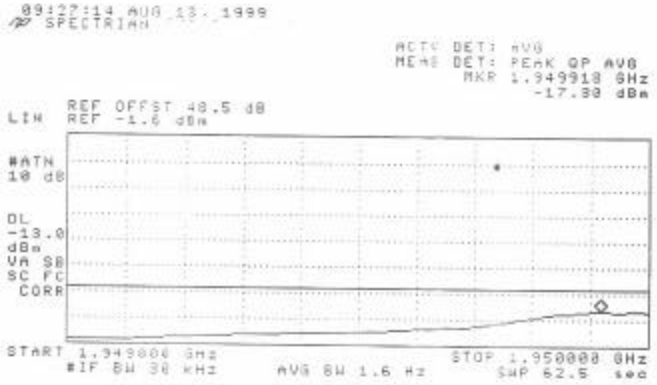


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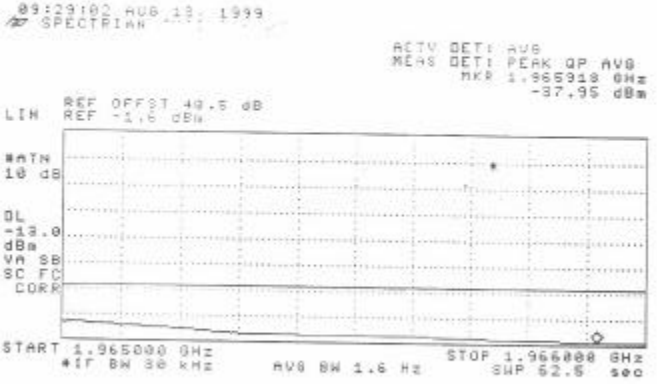


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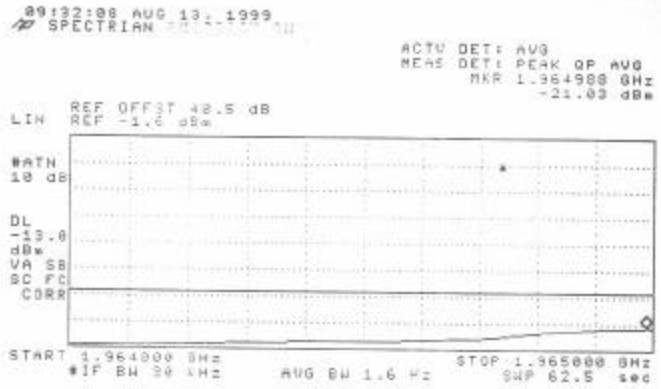


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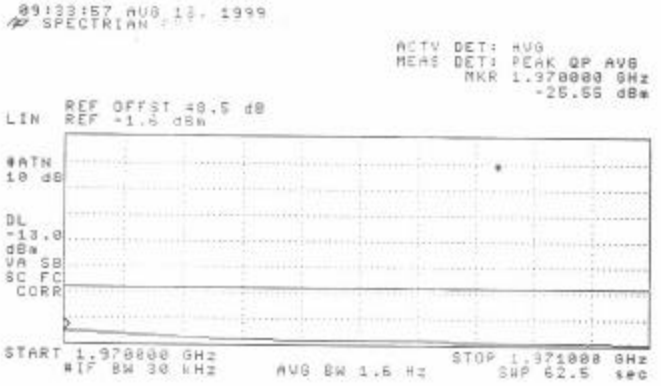


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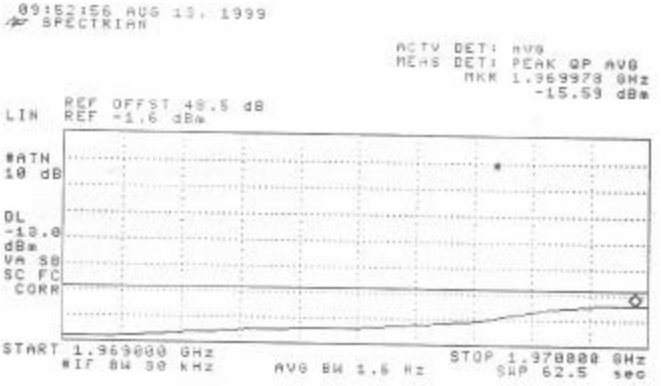


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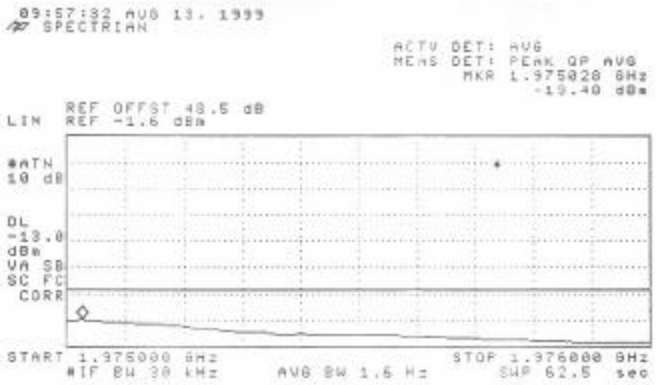


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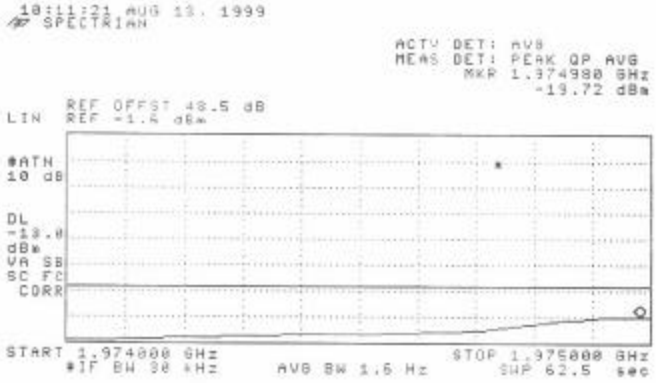


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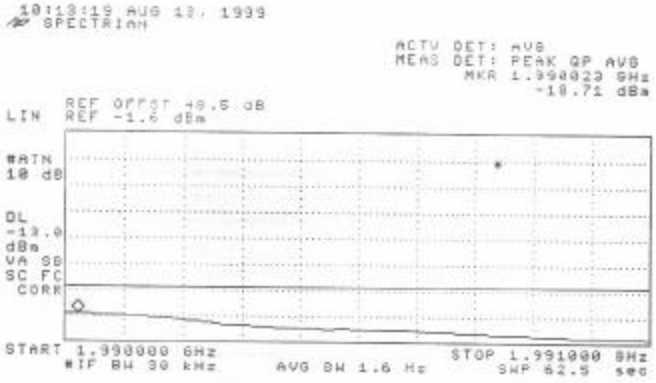


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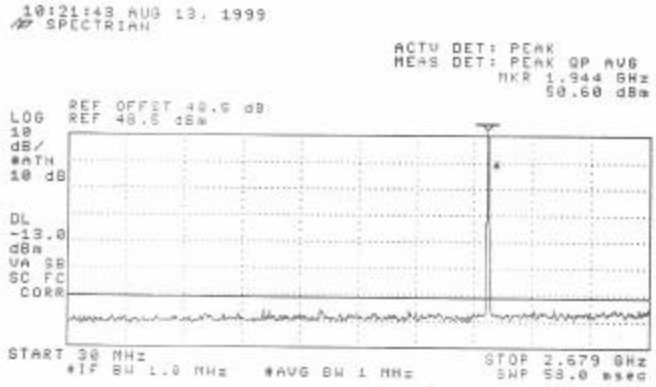


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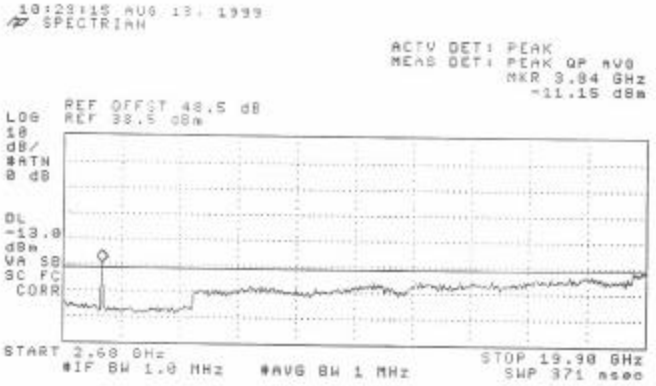


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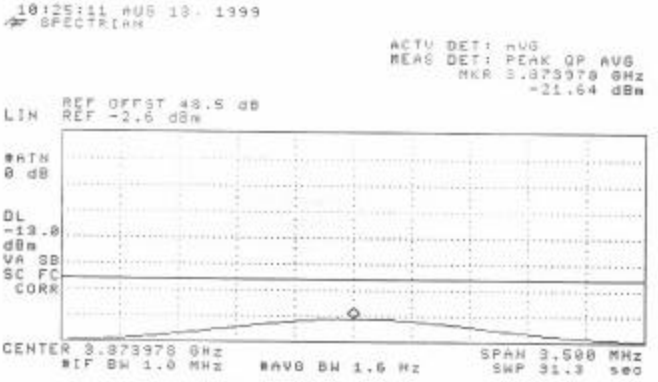


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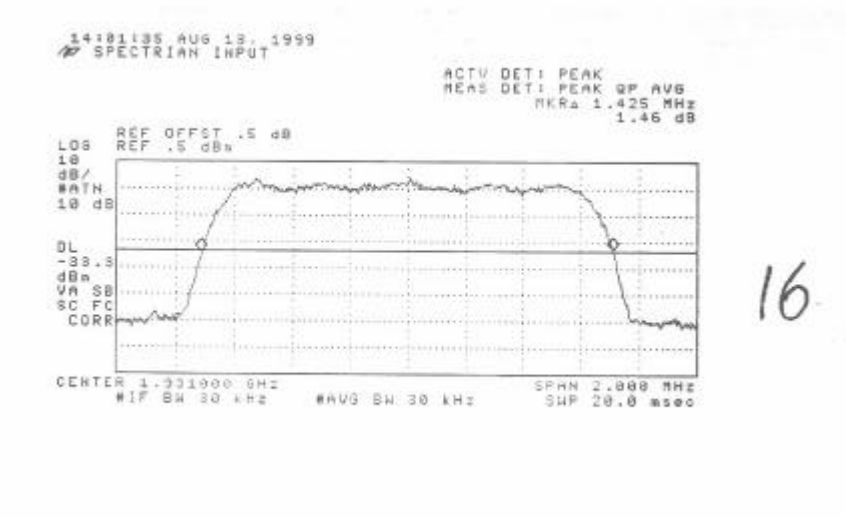
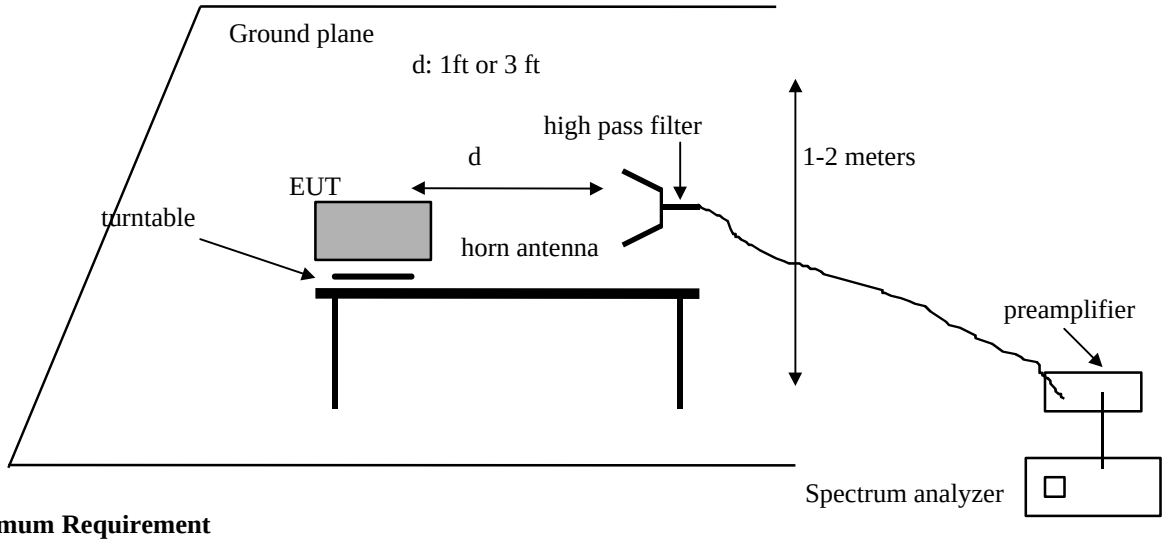



## SECTION 2.1053 MEASUREMENT REQUIRED: FIELD STRENGTH OF SPURIOUS AND HARMONIC RADIATION

**Measurement Equipment Used:**
HP 8593E Spectrum Analyzer
HP 8449 B Preamplifier, 1-26 GHz
ARA DRG-118/A Double Ridged Horn antenna, 1 - 18 GHz
QIM "The Workhorse" low loss cable, 9 ft (loss: 0.85 dB/ft@ 26 GHz)

**Test Set-Up**




**Minimum Requirement**

The magnitude of each spurious and harmonic emission detected as being radiated from the EUT must be at a level more than 43 + 10 log(mean output power, watts) dB below the mean power output ( = -13 dBm).

Resultant radiated field at 3 m from -13 dBm source feeding isotropic antenna: 82.4 dBuV/m

**Test Method**
The antenna output port of the EUT was terminated with a 50 ohm shielded termination. With the transmitter operating at full power, the EUT was rotated 360° and the search antenna was raised and lowered in both polarities, all in an attempt to maximize the levels of the received emission for each harmonic and spurious emission up to 10 fo.

**Test Results**
Corrected field strength readings extrapolated to 3m.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8/13/99

PETE KREBILL

SPECTRIAN
1900MHZ AMP

| F(MHz) | Level (dBuV) | AF (dB) | CL (dB) | AMP (dB) | FILTER (dB) | DIST (dB) | Total (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| Vertical | | | | | | | | | |
| 3862P | 69.6 | 32.3 | 4.86 | -35.5 | 1 | -10.5 | 61.76 | 102 | -40.24 |
| 3862A | 58.1 | 32.3 | 4.86 | -35.5 | 1 | -10.5 | 50.26 | 82 | -31.74 |
| 5793P | 54.8 | 35.1 | 5.94 | -35.5 | 1 | -10.5 | 50.84 | 102 | -51.16 |
| 5793A | 34.2 | 35.1 | 5.94 | -35.5 | 1 | -10.5 | 30.24 | 82 | -51.76 |
| 7724P | 52.9 | 36.9 | 6.48 | -35.5 | 1 | -10.5 | 51.28 | 102 | -50.72 |
| 7724A | 36.5 | 36.9 | 6.48 | -35.5 | 1 | -10.5 | 34.88 | 82 | -47.12 |
| 9655P | 46.6 | 38.2 | 8.1 | -35.5 | 1 | -10.5 | 47.9 | 102 | -54.1 |
| 9655A | 34.1 | 38.2 | 8.1 | -35.5 | 1 | -10.5 | 35.4 | 82 | -46.6 |
| 11586P | 49.5 | 38.9 | 8.64 | -35.5 | 1 | -10.5 | 52.04 | 102 | -49.96 |
| 11586A | 36.4 | 38.9 | 8.64 | -35.5 | 1 | -10.5 | 38.94 | 82 | -43.06 |
| 13517P | 50.6 | 41.3 | 9.54 | -35.5 | 1 | -10.5 | 56.44 | 102 | -45.56 |
| 13517A | 38.2 | 41.3 | 9.54 | -35.5 | 1 | -10.5 | 44.04 | 82 | -37.96 |
| 15448P | 50.9 | 39.5 | 10.8 | -35.5 | 1 | -10.5 | 56.2 | 102 | -45.8 |
| 15448A | 38.2 | 39.5 | 10.8 | -35.5 | 1 | -10.5 | 43.5 | 82 | -38.5 |
| 17379P | 53 | 45.9 | 12.24 | -35.5 | 1 | -10.5 | 66.14 | 102 | -35.86 |
| 17379A | 39.9 | 45.9 | 12.24 | -35.5 | 1 | -10.5 | 53.04 | 82 | -28.96 |
| 19310P | 60 | 23.7 | 13.14 | -35.5 | 1 | -10.5 | 51.84 | 102 | -50.16 |
| 19310A | 42.1 | 23.7 | 13.14 | -35.5 | 1 | -10.5 | 69.44 | 82 | -12.56 |
| Horizontal | | | | | | | | | |
| 3862P | 71.8 | 32.3 | 4.86 | -35.5 | 1 | -10.5 | 63.96 | 102 | -38.04 |
| 3862A | 58.9 | 32.3 | 4.86 | -35.5 | 1 | -10.5 | 51.06 | 82 | -30.94 |
| 5793P | 52 | 35.1 | 5.94 | -35.5 | 1 | -10.5 | 48.04 | 102 | -53.96 |
| 5793A | 31.3 | 35.1 | 5.94 | -35.5 | 1 | -10.5 | 27.34 | 82 | -54.66 |
| 7724P | 51.1 | 36.9 | 6.48 | -35.5 | 1 | -10.5 | 49.48 | 102 | -52.52 |
| 7724A | 35.2 | 36.9 | 6.48 | -35.5 | 1 | -10.5 | 33.58 | 82 | -48.42 |
| 9655P | 46.3 | 38.2 | 8.1 | -35.5 | 1 | -10.5 | 47.6 | 102 | -54.4 |
| 9655A | 34.1 | 38.2 | 8.1 | -35.5 | 1 | -10.5 | 35.4 | 82 | -46.6 |
| 11586P | 48.9 | 38.9 | 8.64 | -35.5 | 1 | -10.5 | 51.44 | 102 | -50.56 |
| 11586A | 36.3 | 38.9 | 8.64 | -35.5 | 1 | -10.5 | 38.84 | 82 | -43.16 |
| 13517P | 51.2 | 41.3 | 9.54 | -35.5 | 1 | -10.5 | 57.04 | 102 | -44.96 |
| 13517A | 38.2 | 41.3 | 9.54 | -35.5 | 1 | -10.5 | 44.04 | 82 | -37.96 |
| 15448P | 50.7 | 39.5 | 10.8 | -35.5 | 1 | -10.5 | 56 | 102 | -46 |
| 15448A | 37.9 | 39.5 | 10.8 | -35.5 | 1 | -10.5 | 43.2 | 82 | -38.8 |
| 17379P | 52.9 | 45.9 | 12.24 | -35.5 | 1 | -10.5 | 66.04 | 102 | -35.96 |
| 17379A | 39.8 | 45.9 | 12.24 | -35.5 | 1 | -10.5 | 52.94 | 82 | -29.06 |
| 19310P | 61.1 | 23.7 | 13.14 | -35.5 | 1 | -10.5 | 52.94 | 102 | -49.06 |
| 19310A | 46.1 | 23.7 | 13.14 | -35.5 | 1 | -10.5 | 73.44 | 82 | -8.56 |

AF=ANTENNA FACTOR
AMP=AMPLIFIER GAIN
CL=CABLE LOSS
FILTER= HPF FILTER LOSS
DIST=DISTANCE CORRECTION TO 3 meters

RES B/W=1MHZ
VIDEO B/W=1MHZ PEAK 10HZ AVERAGE

## SECTION 2.1055 MEASUREMENT REQUIRED: FREQUENCY STABILITY

Not applicable

## SECTION 2.1046: RF POWER OUTPUT

Measured with power meter. All outputs were adjusted between 42.4 and 42.8dBm, during testing.

## SECTION 1.1307 ROUTINE ENVIRONMENTAL EVALUATION

Not applicable

## SECTION 15.109 RADIATED EMISSION LIMITS:

```
                                                Project No. : 99U0485
        Compliance Engineering Services Inc.     Report No. : 990816A1
                                                      Date : 08/16/1999
                                                      Time : 10:07
            >> 3 M RADIATED EMISSION DATA <<      Test Engr : PETE K


                     Company : SPECTRIAN
         Equipment Under Test : 1900MHZ AMP
           Test Configuration : EUT/4-POWER SUPPLIES/WAVEFORM GENERATOR/SIGNAL
                                GENERATOR/IQ MODULATOR/PRE-AMP
                Type of Test : FCC CLASS B
            Mode of Operation : IDLE

    Freq.   dBuV   PreAmp   Ant   Cable  dBuV/m  Limit  Margin  Pol  Hgt(m)  Az
  Bilog 2049 ; Pre-amp = 8447D-P1 2944A06833:
NO EMISSIONS DETECTED WITHIN 20dB OF LIMITS.

  Total # of data 0
  V. a2.2
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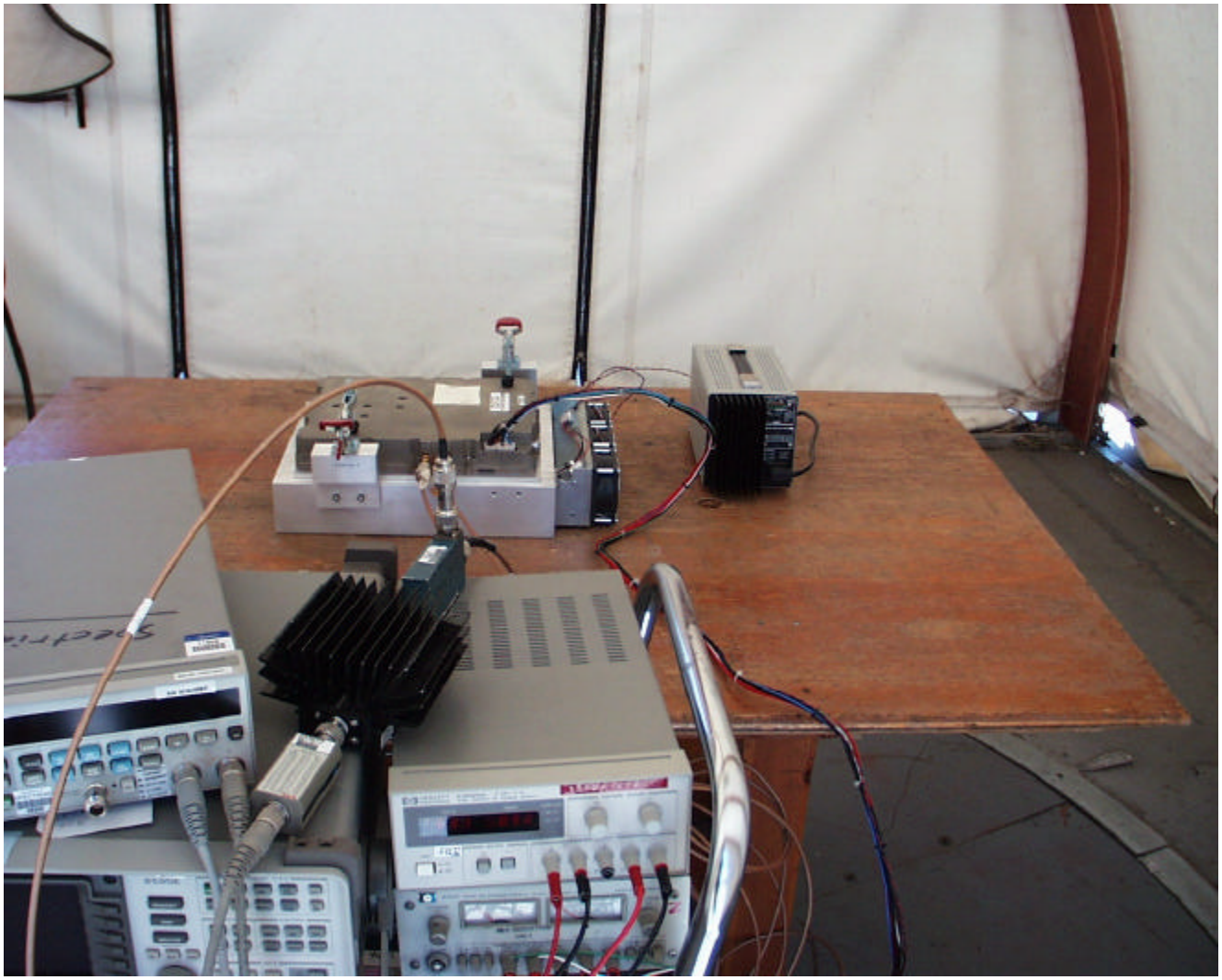
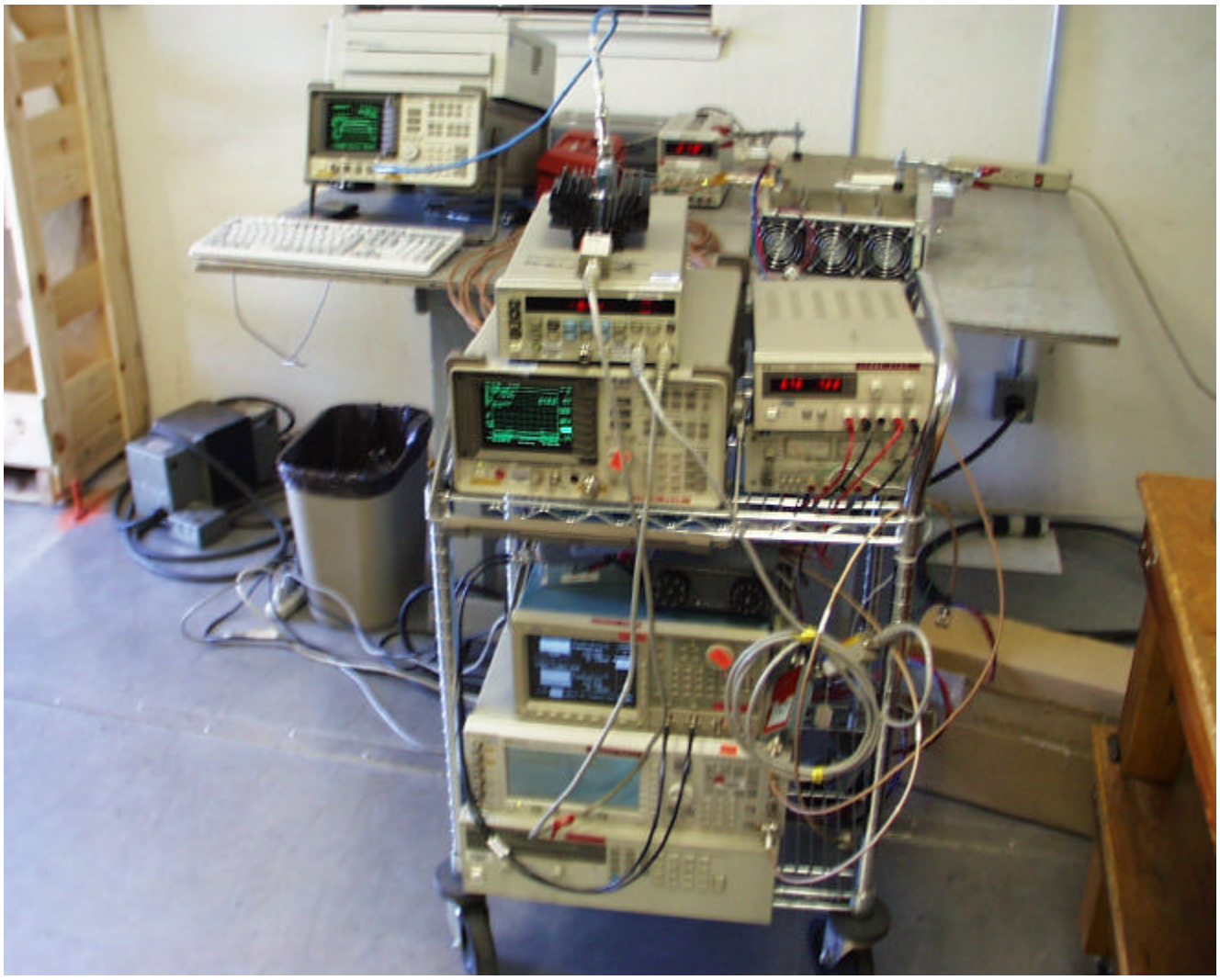
## 5. TEST SETUP PHOTOS







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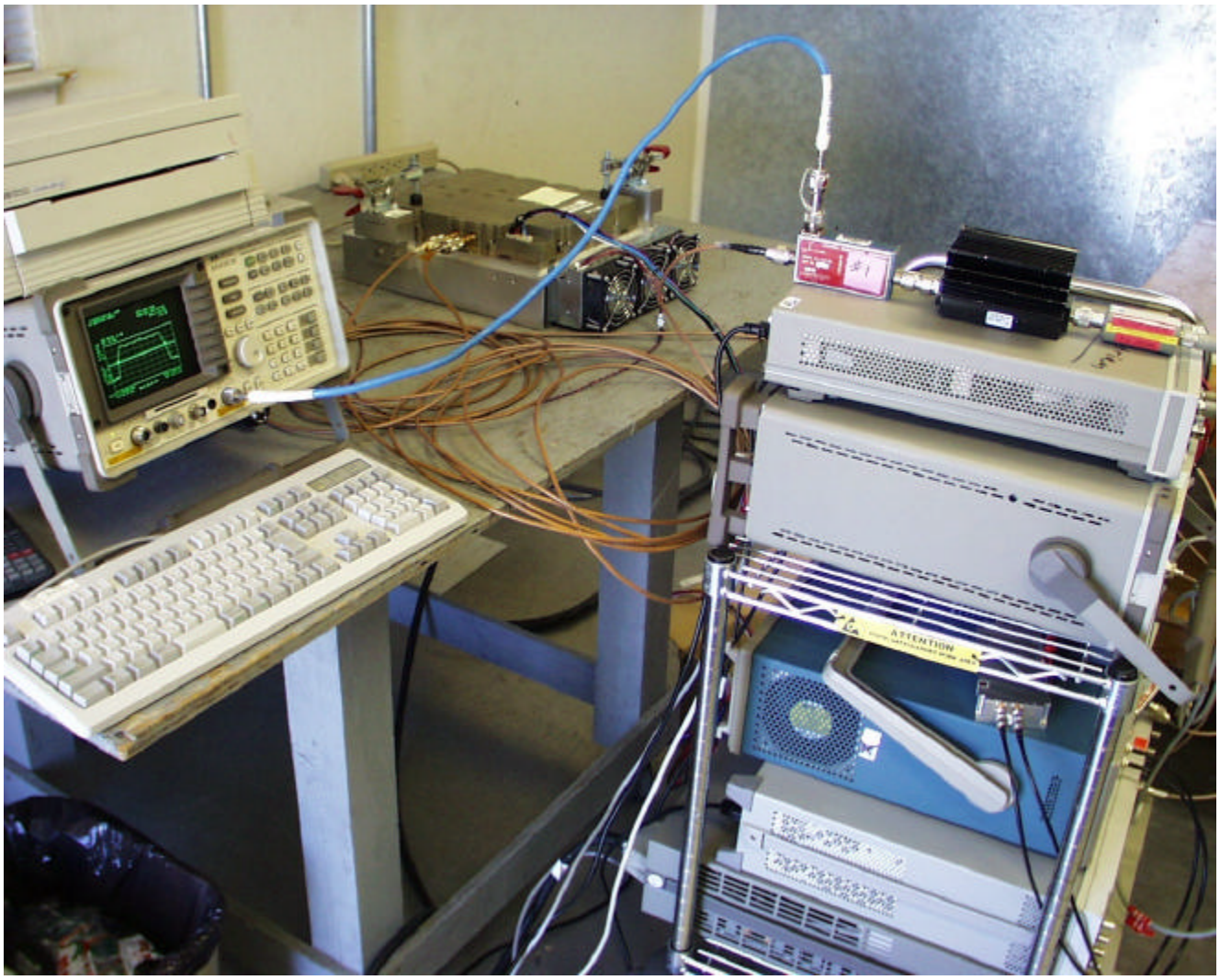



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