

Stratus Test Labs

55 Fairbanks Blvd., Marlboro, MA 0175

Code of Federal Regulations 47 (1998) FCC Part 15 Test Report

Applicant: Master Tech Engineering, Inc.
11 Pine Street
Lynnfield, MA 01940

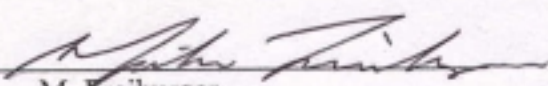
Equipment Under Test: Remote Control Receiver
Model: MDR

Test Location: Stratus Test Labs

Test Date: June 17, 1999 & July 9, 1999

This report contains the results of an investigation of the product tested and is representative of the properties of similar products. This report may only be used to document the CFR 47, FCC Part 15 testing herein and may only be reproduced in full. Any distribution of the information contained in this report requires prior approval from Master Tech Engineering, Inc..

Tested By:


M. Freiburger
Test Engineer

Reviewed By:

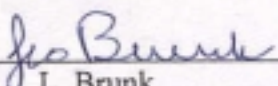

L. Brunk
Lab Manager

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1.0 OVERVIEW

This report has been compiled to document the test parameters, effects and results of the Master Tech Engineering Remote Control Receiver, Model:MDR to demonstrate compliance with CFR 47, FCC Part 15, Class A requirements for commercial data processing equipment. The test data identifies the recorded information as related to the FCC limit requirements. Successful completion to FCC, permits the use of the authorized FCC label for the product tested.

Note From The Manufacturer:

"The digital device within the Vehicular Data Recorder is an exempted device due to the fact that it is utilized exclusively in a transportation vehicle (15.103(a)) and due to the fact that it is used exclusively as industrial or commercial test equipment (15.103(c)). Therefore, the receiver will be tested as an independent device, to part 15 Subpart B-Unintentional Radiators.

Receiver Model No: MDR

Receiver Type: Superregenerative

Operating Frequency: 318MHz

Frequencies generated within the receiver: 65KHz (quench oscillator), 4.005MHz (micro controller clock), approx. 318MHz (superregenerative oscillator)

Conducted power line emissions limit (all except Class A digital devices): 250uV

Radiated emission limits are per 15.109(a)"

"per 15.111, (1) radiated emissions were tested with antenna terminal shielded and terminated with a 50 ohm resistive termination and (2) Antenna power conduction was measured at the antenna terminal with a 50 ohm analyzer-antenna power conduction limit is 2nW (-57dBm)."

2.0 PRODUCT IDENTIFICATION**Equipment Under Test:**

Type: Remote Control Receiver for use in Vehicle Data Recorder

Model: MDR

SN: 990500005

Power Supply: External

Internal Boards:

Description	Part Number	Rev	Freq. in Mhz
Receiver	MDR	N/A	4.005MHz, 65KHz, 318MHz

Application Firmware Assembly: 206378-39 A V1.0

Oscillator Frequencies: 4.005MHz, 65KHz, 318MHz

Support Equipment: None

Cables: None

Modifications made to Equipment: None

3.0 TEST DESCRIPTION

The EUT was operated in a normal configuration on a twelve foot diameter, rotatable turntable mounted flush to the ground plane. The power input cable was routed across the turntable to a central set of power outlets located just below the ground plane.

Radiated E-Field emission measurements were performed from 30Mhz to 2000Mhz with the receive antenna located 10 meters from the EUT while the EUT was operating normally. The maximum emission level was determined by rotating the equipment on the turntable and varying the antenna height from 1 to 4 meters and varying the antenna polarization between horizontal and vertical orientation.

Conducted emission measurements from 150Khz to 30 Mhz were performed for each power input line cord of the EUT, while the EUT was operating normally. Each line cord is connected to a Line Input Stabilization Network (LISN) during conducted emission measurements.

An antenna power conduction test was also performed at the antenna terminal. (450KHz to 2GHz) See pages 8 to 12 for test data. Test was performed by connecting a cable from the antenna part of the EUT to the ESMI test receiver. A maximum peak was performed from 450KHz to 2GHz. Sweeps of the frequency range were then plotted.

Test Equipment Mode of Operation:

The test software in the Rohde & Schwarz EZM test equipment allows the test engineer to look at specific frequencies of noise produced by the EUT. While watching the noise level, the test engineer maximizes them by rotating the EUT, raising and lowering the antenna and changing antenna polarization. When the signals are maximized, the test engineer performs a quasi-peak measurement and logs the result on an excel spread sheet along with cable loss and antenna factor.

Deviations: There were no deviations to the test procedure.

Mode of EUT Operation: Running; RomDos 6.22 OS

4.0 TEST RESULTS

The Master Tech Engineering Remote Control Receiver, Model:MDR, meets the CFR 47, FCC Part 15, Class A requirements for radiated and conducted emissions with the modifications listed on page 4. This class A digital apparatus also meets all requirements of the Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

5.0 TEST DATA

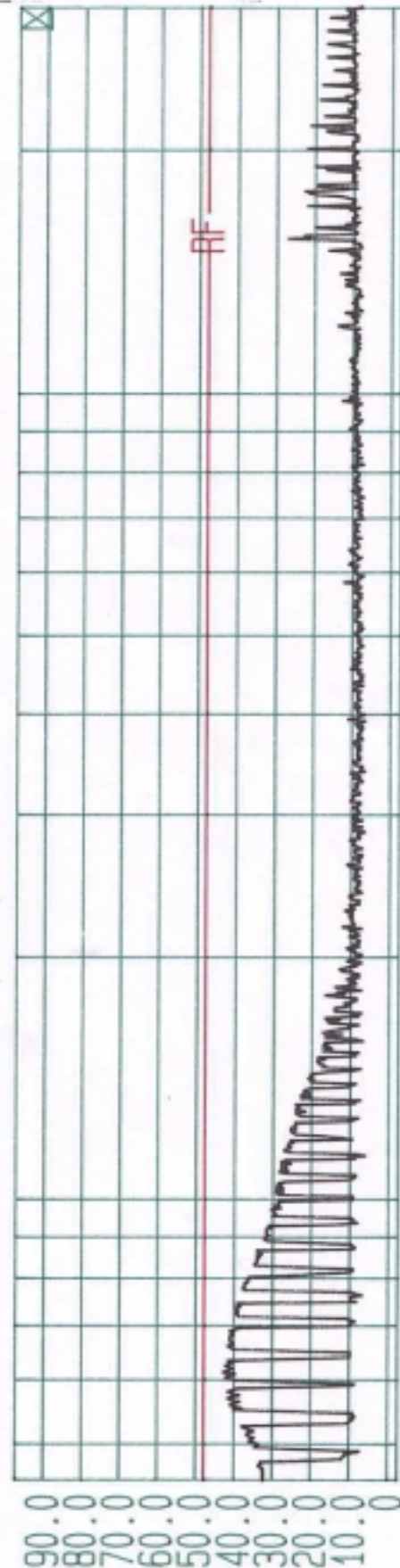
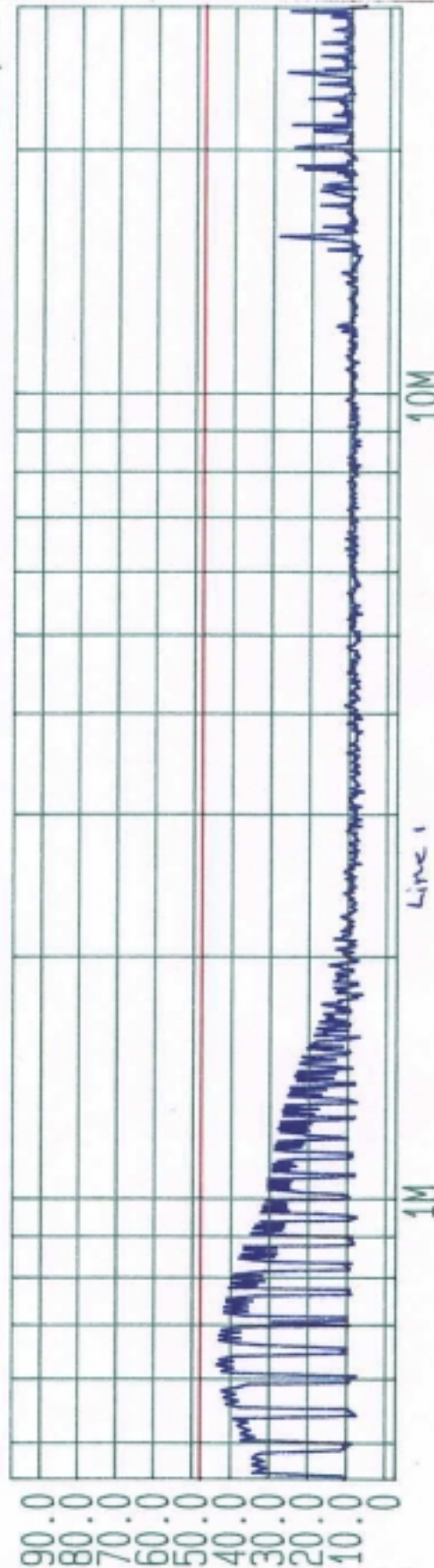


Date 09.Jul.'99 Time 16:13:10

Ref.Lvl
97.00 dBμV

Res.Bw 9 kHz [imp]
T6.Lvl off
Scan.Stp 5.000 kHz

T1: PK+
T2: PK+
RF.Att 0 dB
Unit [dBμV]



Start 450 kHz
120V AC, 60Hz

Span 29.55 MHz

Center 3.67423 MHz

Meas.Time 5 ms

Stop 30 MHz

Master Tech Engineering, Inc.
Vehicular Data Recorder

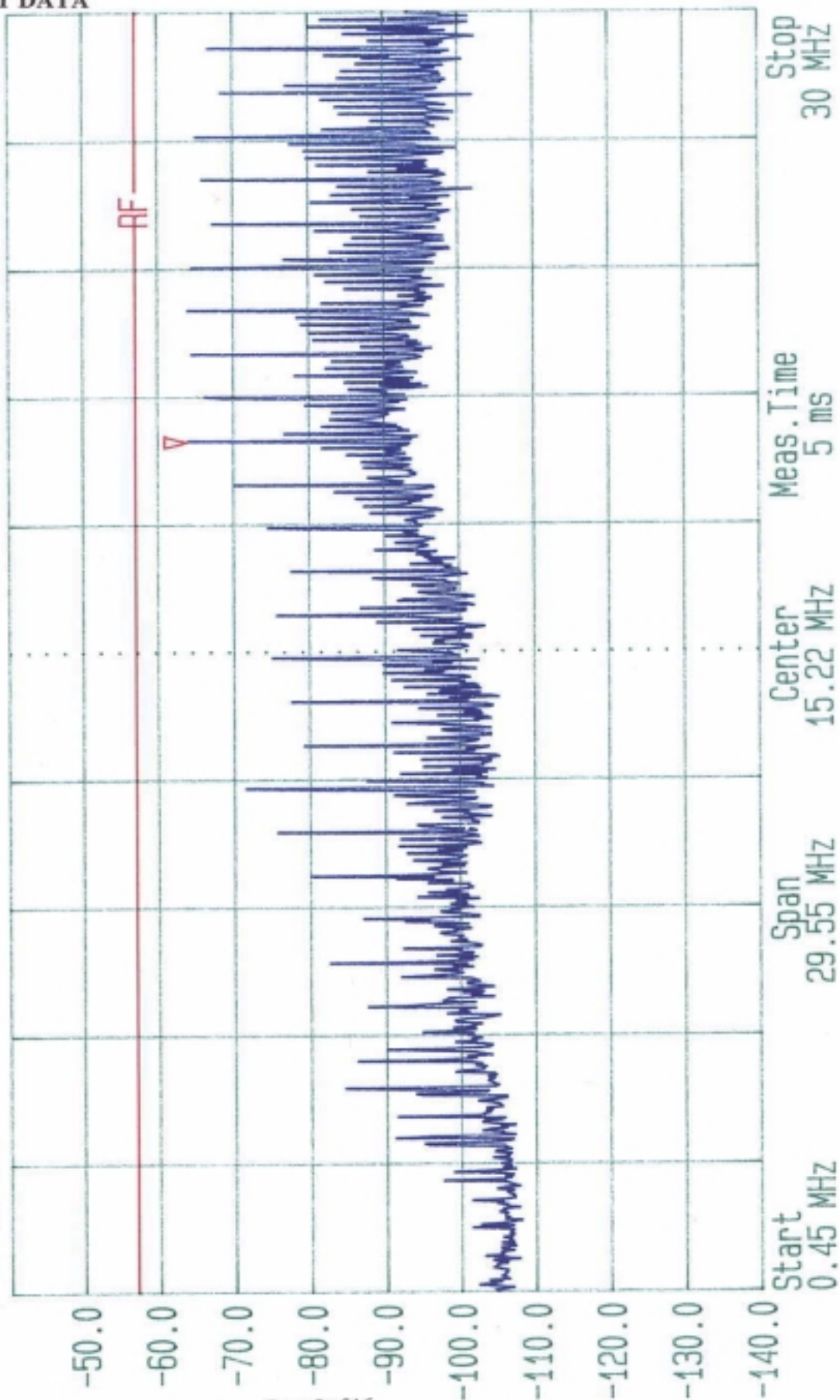


Date 17.Jun.'99 Time 10:26:19

Ref.Lvl -40.10 dBm
Marker -63.89 dBm
20.11 MHz

5.0 TEST DATA

Res.Bw 9 kHz [imp]
TG.Lvl off
Scan.Stp 5.000 kHz
T1: PK+ T3:
T2: RF:Att T4:
Unit 10 dB [dBm]

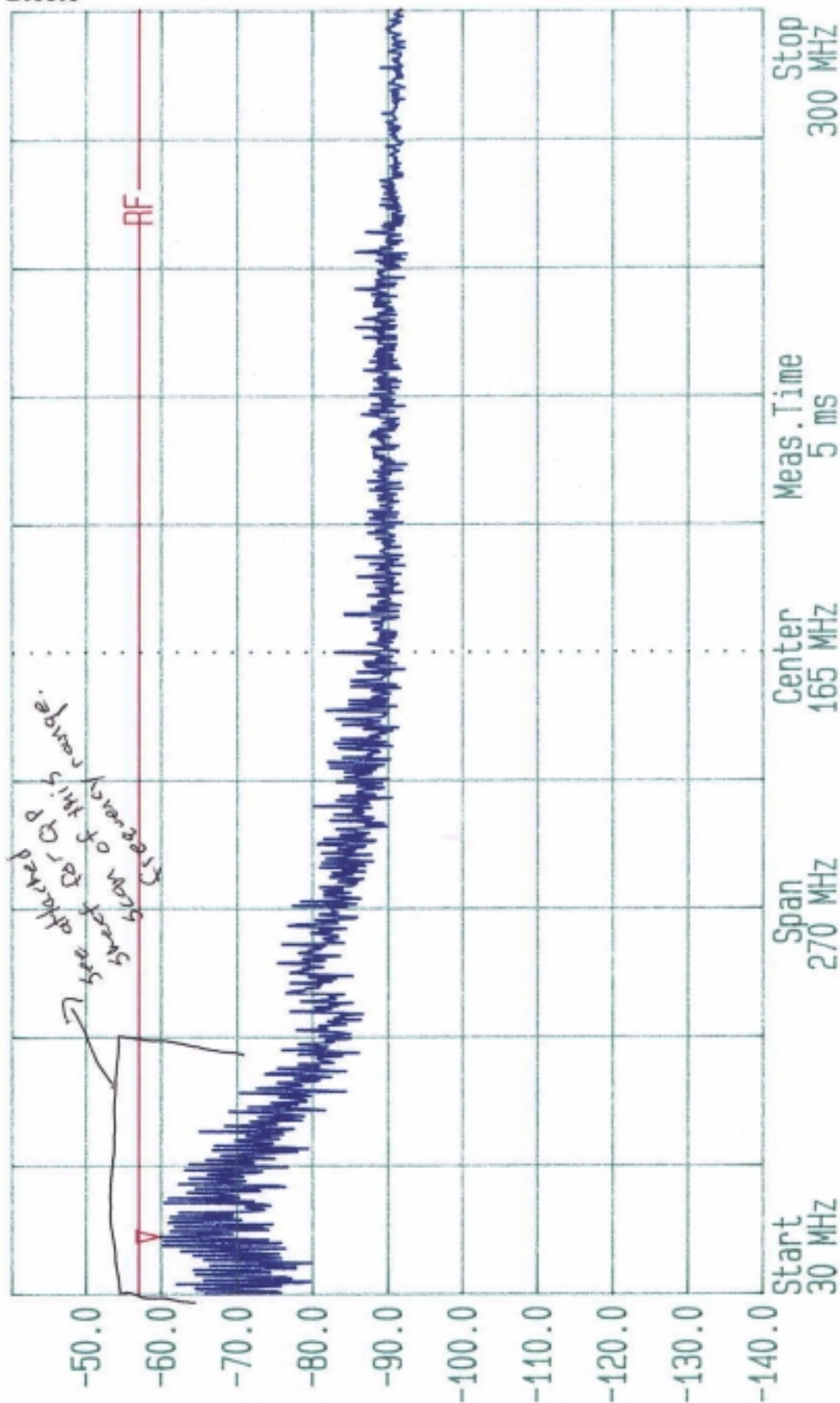


5.0 TEST DATA

Master Tech Engineering, Inc.

Vehicular Data Recorder

Date 17.Jun.'99 Time 09:56:37

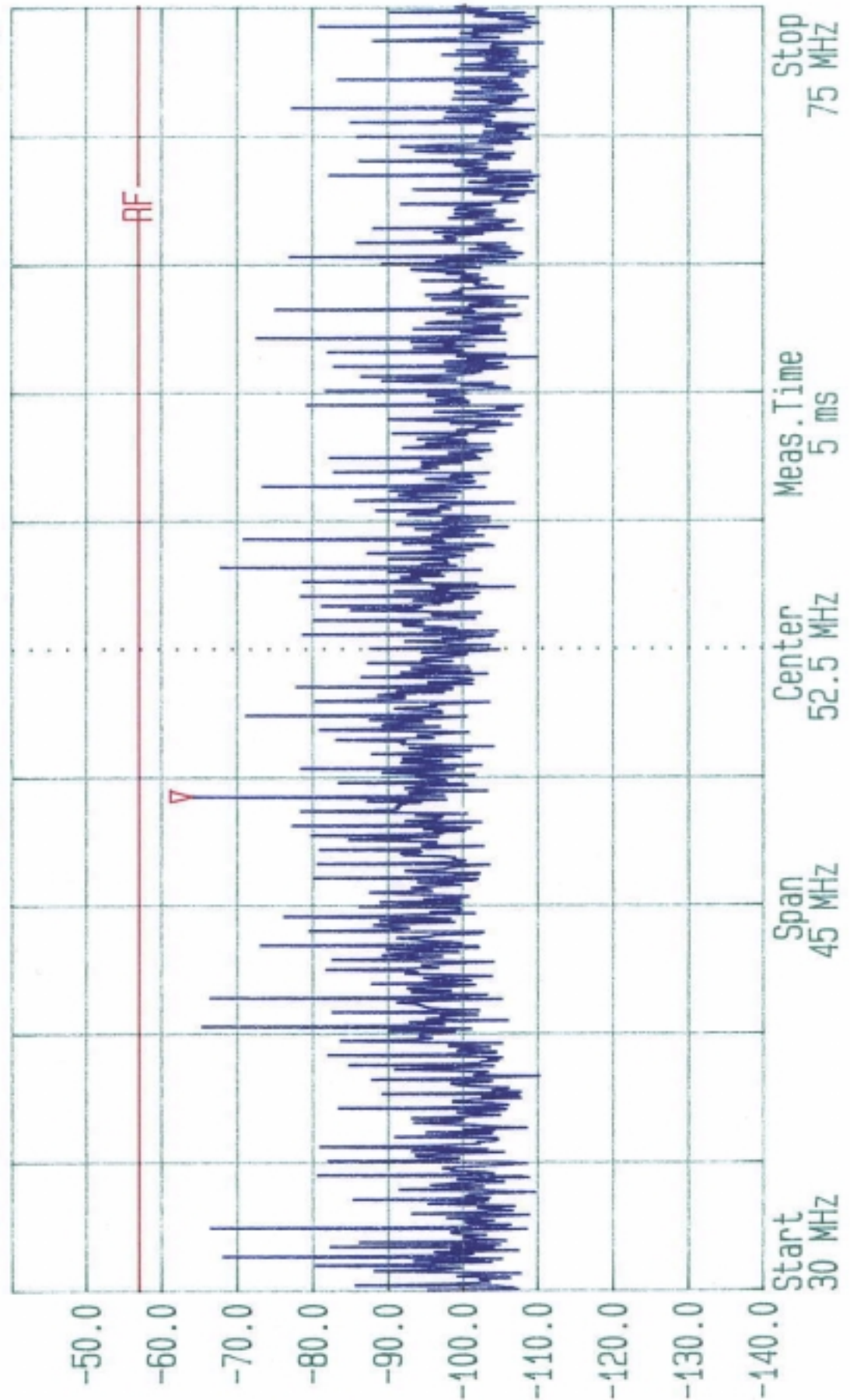
Ref.Lvl -40.10 dBm
Marker -59.75 dBm
42.0 MHzRes.Bw 120 kHz [imp]
T6.Lvl off
Scan.Stp 50.000 kHz
Unit 10 dB [dBm]T1: PK+
T2: RF.Att
T3:
T4:

5.0 TEST DATA

Master Tech Engineering, Inc.

Vehicular Data Recorder

Date 17.Jun.'99 Time 10:45:00

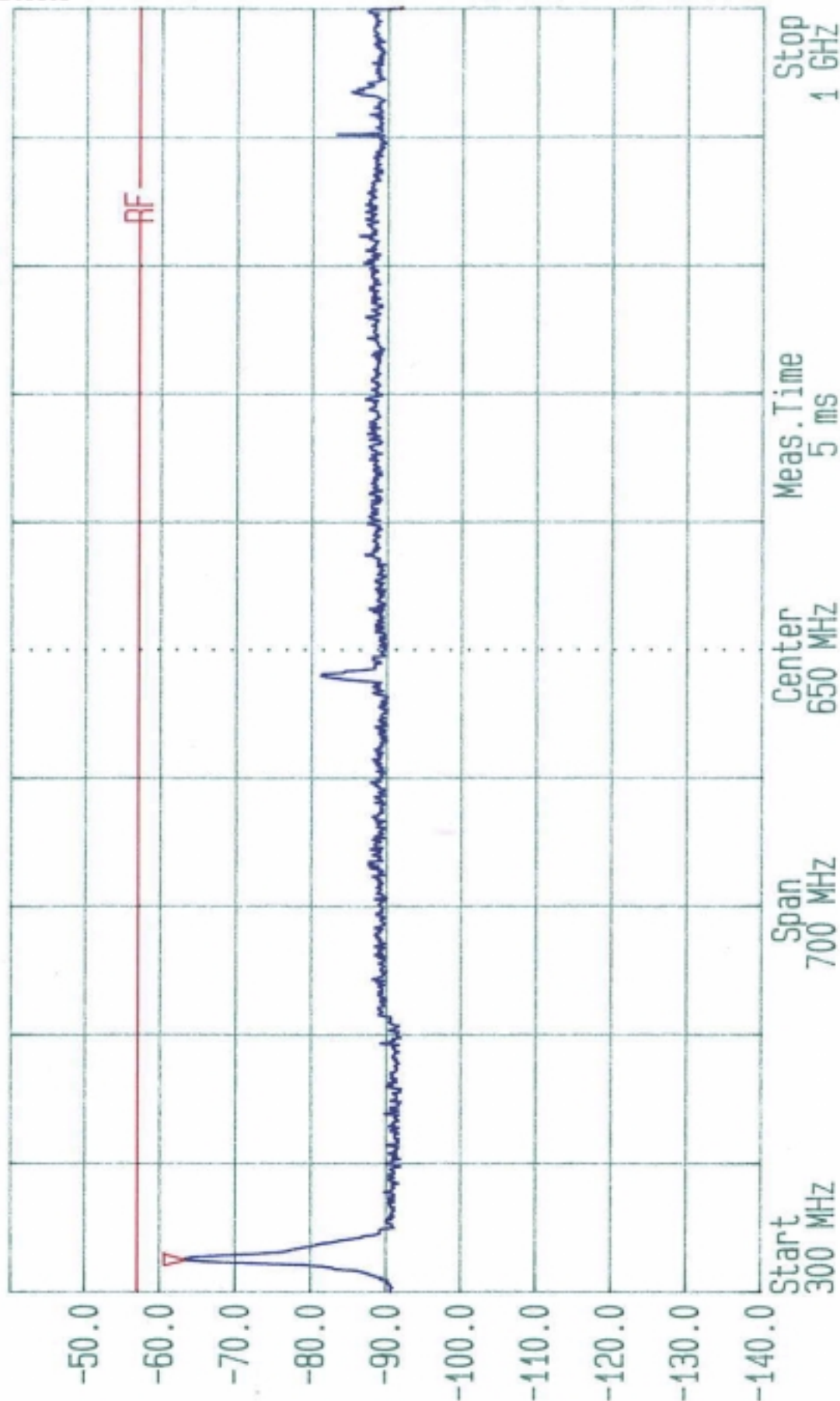
Ref.Lvl -40.10 dBm
Marker -64.12 dBm
47.30 MHzRes.Bw 9 kHz [imp]
TG.Lvl off
Scan.Stp 50.000 kHzT1: QPK T3:
T2: RF:Att T4:
Unit 10 dB
[dBm]

5.0 TEST DATA

Master Tech Engineering, Inc.

Vehicular Data Recorder

Date 17.Jun.'99 Time 10:04:55

Ref.Lvl -40.10 dBm
Marker -63.43 dBm
317.8 MHzRes.Bw 120 kHz [imp]
TG.Lvl off
Scan.Stp 50.000 kHzT1: PK+ T3:
T2: RF: Att T4:
Unit 10 dB [dBm]

5.0 TEST DATA

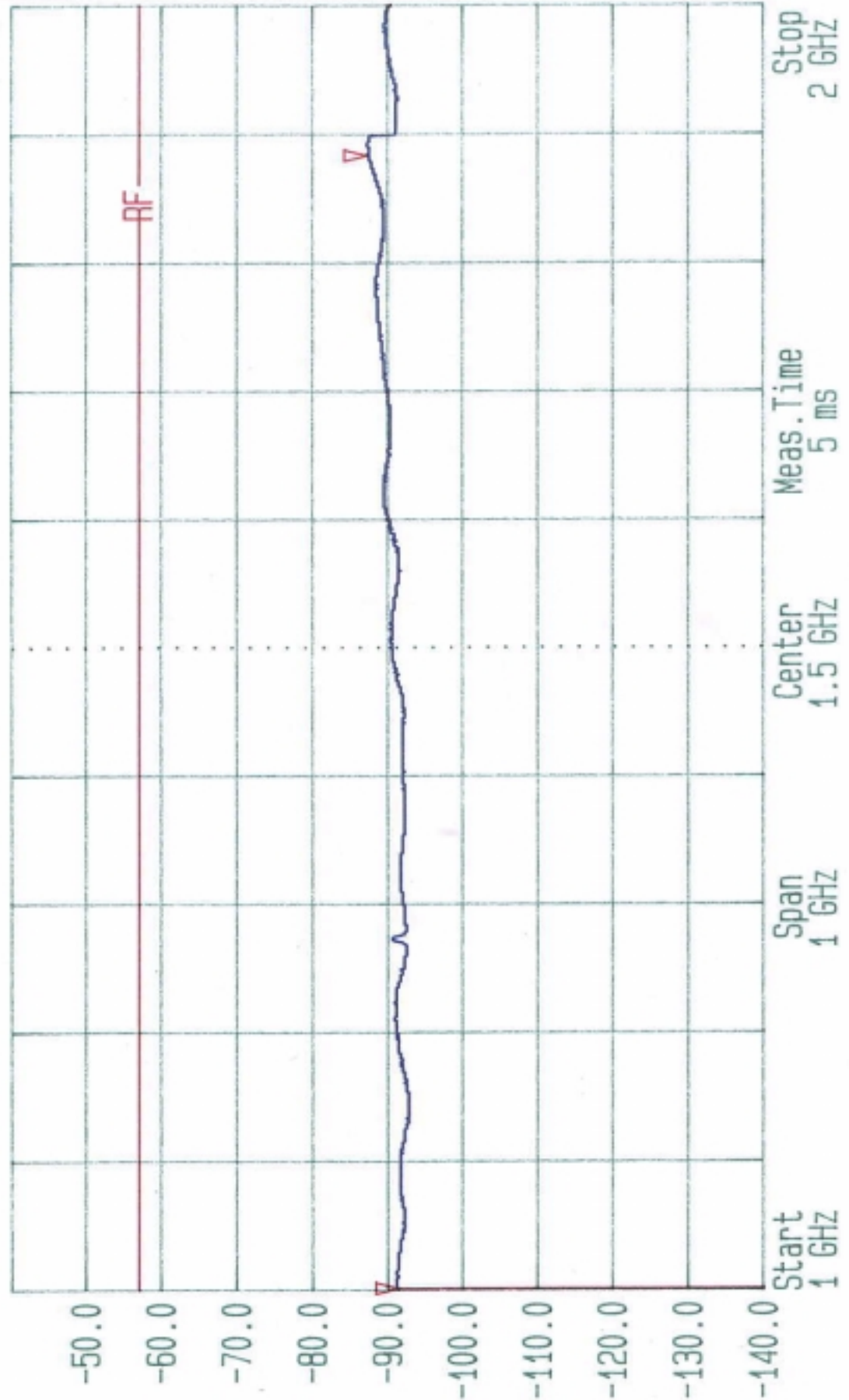
Master Tech Engineering, Inc.
Vehicular Data Recorder

Date 17.Jun.'99 Time 10:20:39
Ref.Lvl -40.10 dBm Manual
AVG -91.29 dBm
1.0022 GHz

Res.Bw 1 MHz [imp]
TG.Lvl Off
Scan.Stp 50.000 kHz
Unit RF.Att

T1: AVG
T2: RF.Att
T3:
T4:

10 dB
[dBm]



6.0 TEST EQUIPMENT

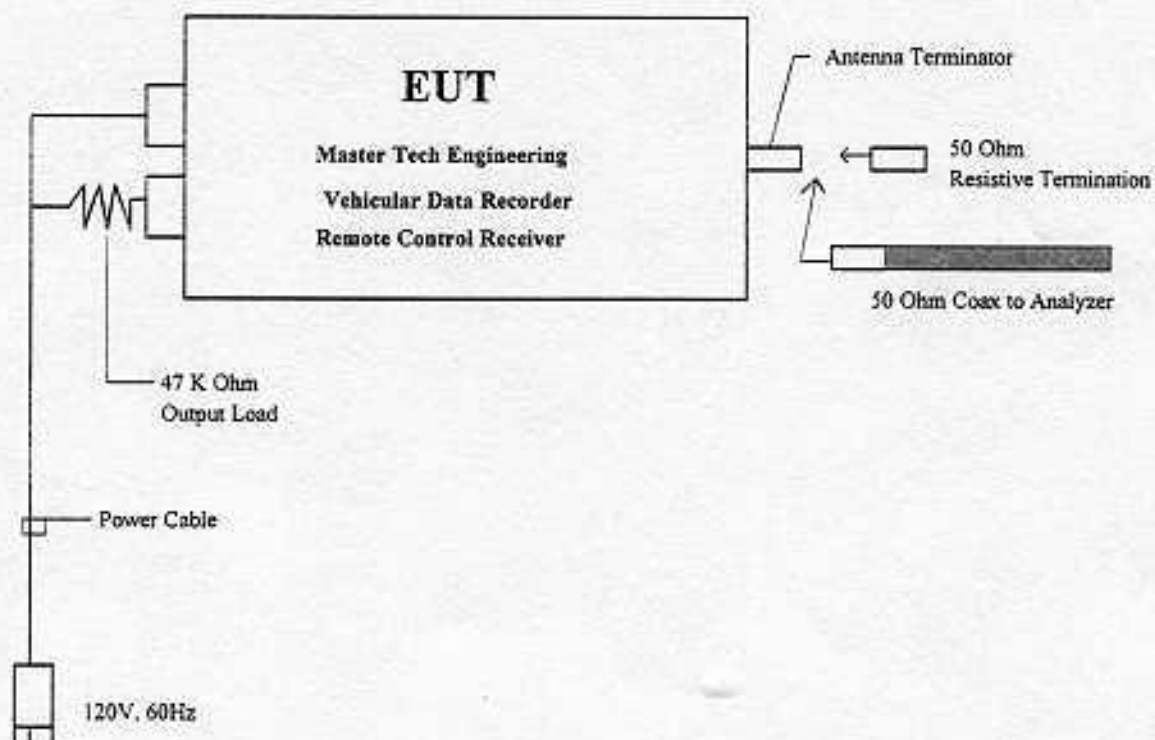
Equipment	Serial #	Last Cal	Cal Due
* Test Site #1		08/03/98	08/03/99
* Rohde & Schwarz EZMI Receiver	Dis. 825035/002 RF. 849937/001	04/04/99	04/04/00
Conducted Testing			
* Rohde & Schwarz ESH2-Z5 LISN	890484/018	02/27/99	08/27/99
* R&S ESH3-Z2 Pulse Limit	890173/035	02/27/99	08/27/99
Solar 8602-50-TS-50-N LISN	A08297	02/27/99	08/27/99
Solar 8602-50-TS-50-N LISN	A08299	02/27/99	08/27/99
Solar 8602-50-TS-50-N LISN	A08298	02/27/99	08/27/99
Solar 8602-50-TS-50-N LISN	A08296	02/27/99	08/27/99
* .5M Type N/BNC Cable	05	10/01/98	10/01/99
* Conducted Helix Cable	06	10/01/98	10/01/99
EMCO 3825/2 LISN	9501-2293	02/22/99	08/22/99
EMCO 4825/2 LISN	1058	02/27/99	08/27/99
* BNC Cable	07	10/01/98	10/01/99
Radiated Testing			
* EMCO Biconilog Antenna	9804-1268	05/01/98	11/01/99
EMCO 3301B Active Monopole Antenna	4005	05/28/98	12/28/99
EMCO 6502 Active Loop Antenna	2304	09/24/98	09/24/99
EMCO 3121C Dipole Antenna	345	10/01/98	10/01/99
EMCO 3121C Dipole Antenna	346	10/01/98	10/01/99
* EMCO Double Ridge Guide Antenna	4556	10/07/98	10/07/99
* .5 Type N Cable	01	10/01/98	10/01/99
* 10M Antenna Helix Cable	02	10/01/98	10/01/99
30M Antenna Helix Cable	03	10/01/98	10/01/99
* 6M Type N Cable	04	10/28/98	10/28/99
* 6M Type N Cable	008	10/28/98	10/28/99
Miscellaneous			
HP8656B Signal Generator	2819U04494	02/26/99	08/26/99
* HP8591A Spectrum Analyzer	3212A02870	02/26/99	08/26/99
* HP8447D Amplifier	2727A05454	02/26/99	08/26/99
Beckman Ammeter	00601295	02/26/99	08/26/99
Fluke Multimeter	52470093	02/27/99	08/27/99

* Indicates equipment used for this testing.

All equipment used for testing has been calibrated according to methods and procedures defined by the National Institute of Standards and Technology (NIST).

Standard Uncertainty per NIST Technical Note 1297 1994 is estimated to be 3.2db for Radiated Emissions and 2.4db for Conducted Emissions.

7.0 BLOCK DIAGRAM



8.0 PHOTOGRAPHS



8.0 PHOTOGRAPHS

