

# Marstech Limited

11 Kelfield Street, Etobicoke, Ontario, Canada, M9W 5A1  
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Authorized by:  
Professional Engineers  
Ontario

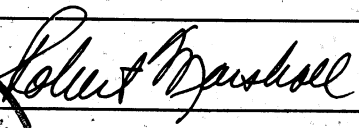
Engineering &  
Administrative



Testing For FCC  
Submissions/Verifications

Approved Test Facility



TEST REPORT			
REPORT DATE:		June 13, 2001	
		REPORT NO: 21163D	
CONTENTS:	See Table of Contents		
SUBMITTOR:	Mandolyn Electronic Technology Inc. 250 Shields Court, Unit 10B Markham, Ontario L3R 9W7		
SUBJECT:	Model No: RC270 and RC270D		
	FCC ID: PLJRC270		
TEST SPECIFICATION:	FCC CFR 47 Part 15 Subpart "C" Unintentional Radiators Sections: 15.101, 15.109 NOTE: Tests Conducted Are "Type" Tests.		
DATE SAMPLE RECEIVED:	April 9, 2001	DATE TESTED:	April 16, 2001
RESULTS:	Equipment tested complies with referenced specification.		
ALTERATIONS:	Alterations required in compliance with referenced specification: <u>Model RC270D:</u> 1. C13 changed from 0.68 $\mu$ F/250V to 0.1 $\mu$ F/250V 2. L4 changed from 0.015mH to 0.71mH		
Tested by:	Original signed by: Jim Sims and Ed Chang	Approved and Certified by:	
			Robert G. Marshall, P. Eng.
		Date: R. G. MARSHALL	June 28/01
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# MARSTECH LIMITED

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## TECHNICAL REPORT - FCC 2.1033(b)

### Applicant

Mandolyn Electronic Technology Inc.  
250 Shields Court, Unit 10B  
Markham, Ontario  
L3R 9W7

### FCC Identifier

PLJRC270

### Manufacturer

W. H. Mandolyn International Ltd.  
Yen Yang Industrial City  
Zhang Mu Tou Zhen  
Dongguan, China

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C	Block Diagram Schematic Diagram	2.1033(b)(5)	Exhibit C Exhibit C(1) Exhibit C(2)-1 to -2
D	Report of Measurements Device Measured Test Facility and Equipment Test Results and Methods Test Set-up Photos	2.1033(b)(6)	Exhibit D Exhibit D(1) Exhibit D(2)-1 to -2 Exhibit D(3)-1 to -16 Exhibit D(3)-17 to -18
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EXHIBIT D

(FCC Ref. 2.1033(b)(6))

"Report of Measurements"

*MARSTECH LIMITED*

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EXHIBIT D(1)

DEVICE MEASURED

(FCC Ref. 2.1033(b)(6))

APPLICANT:

Mandolyn Electronic Technology Inc.  
250 Shields Court, Unit 10B  
Markham, Ontario  
L3R 9W7

MANUFACTURER:

W. H. Mandolyn International Ltd.  
Yen Yang Industrial City  
Zhang Mu Tou Zhen  
Dongguan, China

FCC IDENTIFIER:

PLJRC270

MODEL NUMBERS:

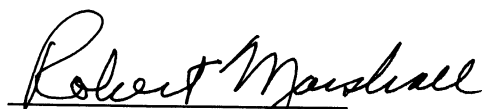
RC270 and RC270D

SERIAL NO.:

Not Marked

Marstech Limited  
11 Kelfield Street  
Etobicoke, Ontario  
M9W 5A1 CANADA

TECHNICIANS:  
Ed Chang  
Jim Sims

  
Robert G. Marshall, P. Eng.

Date: June 28/01

EXHIBIT D(2)

TEST FACILITY AND EQUIPMENT LIST

FACILITIES

- Radiated      ANSI C63.4 (FCC OET/55) open field 3 meter test range. This test range is protected from the cold and moisture by a non-conductive enclosure.
- Conducted     2.5m Anechoic Chamber

EQUIPMENT

Hewlett-Packard spectrum analyzer # 8554 RF & 141T video.  
Anritsu 2601 A spectrum analyzer.  
Advantest R3261A Spectrum Analyzer  
Hewlett-Packard RF generator # 8640 B with an 002 doubler  
Hewlett-Packard RF voltmeter # 400 FL.  
Hewlett-Packard attenuator 30 dB # 11708A.  
Narda 20 watt (20 dB) attenuator  
A.H. Systems biconical antenna; ..... 20 MHZ - 330 MHZ  
A.H. Systems log periodic antenna; ..... 300 MHZ - 1.8 GHZ  
Eaton dipole antennas; T1, T2, T3 ..... 25 MHZ - 1.0 GHZ  
CDI Roberts dipole antennas; T1, T2, T3 & T4 25 MHZ - 1.0 GHZ

NOTE:

The Anritsu 2601 A spectrum analyzer, the Hewlett-Packard spectrum analyzer and the Advantest R3261A spectrum analyzer are calibrated annually, and that calibration is directly traceable to the National Research Council of Canada (NRC). This equipment is only used by qualified technicians and only for the purpose of EMI measurements. The three meter test range has been carefully evaluated to the ANSI document C63.4 and will be remeasured for reflections and losses every three years.

## FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division  
7435 Oakland Mills Road  
Columbia, MD. 21046

September 20, 2000

Electrohome Electronics Ltd.  
809 Wellington St. N.  
Kitchener, Ontario N2G 4J6  
Canada

Registration Number: 90578

Attention: Gerry Gallagher

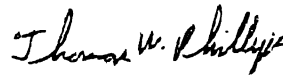
Re: Measurement facility located at Roseville  
3 meter-site  
Date of Listing: September 20, 2000

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that this filing must be updated for any changes made to the facility, and at least every three years from the date of listing the data on file must be certified as current.

If requested, the above mentioned facility has been added to our list of those who perform these measurement services for the public on a fee basis. An up-to-date list of such public test facilities is available on the Internet on the FCC Website at WWW.FCC.GOV, E-Filing, OET Equipment Authorization Electronic Filing.

Sincerely,



Thomas W Phillips  
Electronics Engineer

FCC ID: PLJRC270  
Marstech Report No. 21163D  
EXHIBIT D(2)-2

TOTAL P.01

SUMMARY OF RESULTS

COMPLIANCE

(yes) (no)

FIELD STRENGTH OF THE CARRIER FREQUENCY

Receiver: 15.231 b @ 3 Meters  
Transmitter

( x ) ( )  
N/A

BANDWIDTH

Receiver: 15.231 c  
Transmitter

N/A  
N/A

TRANSMITTER BAND RESTRICTIONS

Receiver: 15.205 a  
Transmitter

( x ) ( )  
N/A

SPURIOUS RADIATION LEVELS [EXHIBIT D(3)-17]

Receiver: 15.231 b 30.1dB $\mu$ V@ 3 Meters 450.18MHz  
Transmitter:

( x ) ( )  
N/A

LINE CONDUCTED RADIATION

Receiver:  
Transmitter:

( x ) ( )  
N/A

EQUIPMENT REQUIREMENTS AND IDENTIFICATION

- a) Manufacturers or applicants name:
- b) Model designation:
- c) Serial number:
- d) Antenna: 15.203
- e) Operator controls:
- f) FCC ID number: 15.201 b

( x ) ( )  
( x ) ( )  
(N/M) ( )  
( x ) ( )  
(N/A) ( )  
( x ) ( )

**15.107 (a) POWER LINE CONDUCTED INTERFERENCE**

**Requirements:**      0.45 - 30MHz      250 $\mu$ V or 47.96dB $\mu$ V

**Test Procedure:**      ANSI STANDARD C63.4-1992.  
The spectrum was scanned from 0.45 to 30MHz.

**Test Data:**

THE HIGHEST EMISSION READ FOR MODEL RC270D WAS 46.81 dB $\mu$ V@450.000 KHz.

THE HIGHEST EMISSION READ FOR MODEL RC270 WAS 22.92 dB $\mu$ V@4.8 MHz

The graphs on Exhibits D(3)-3 to D(3)-13 represent the emissions taken for this device.

Note: The sweep times indicated on the graphs are per division. The total sweep time is 10X the marked sweep/division. ie.  $8 \times 2 = 16$  seconds -- total sweep=160s.

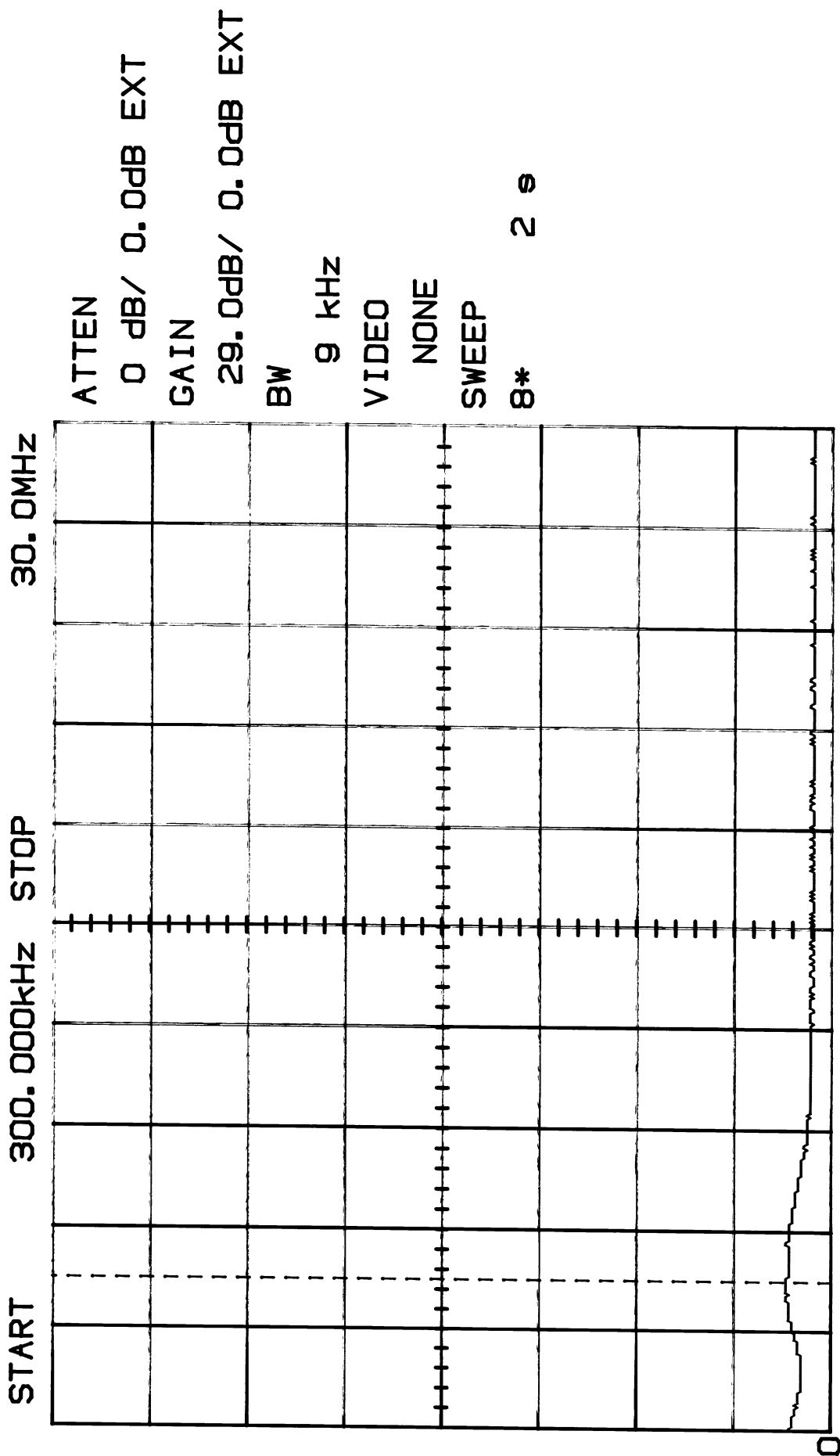
**Test Results:**

The measurements indicate that the units DO appear to meet the FCC requirements for this class of equipment.



DIMMER AT MAX. LOAD / QP MODE  
MODEL RC270  
SIDE: A

250.9  
uV

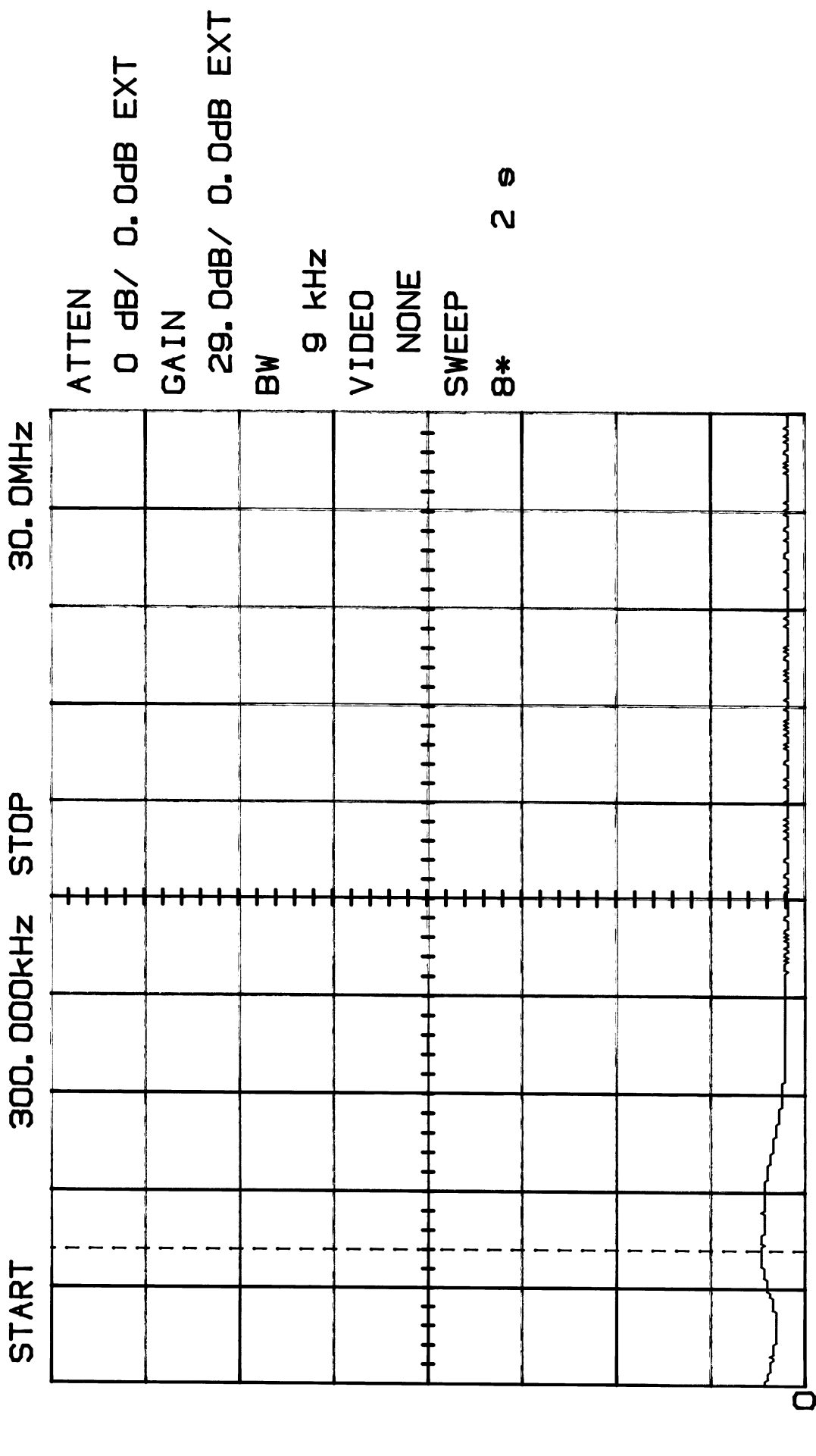


M1 14uV/ 4.8MHz

10:40:53 06-06-2001

DIMMER AT MAX. LOAD / QP MODE  
 MODEL RC270  
 SIDE: B

250.9  
 $\mu$ V



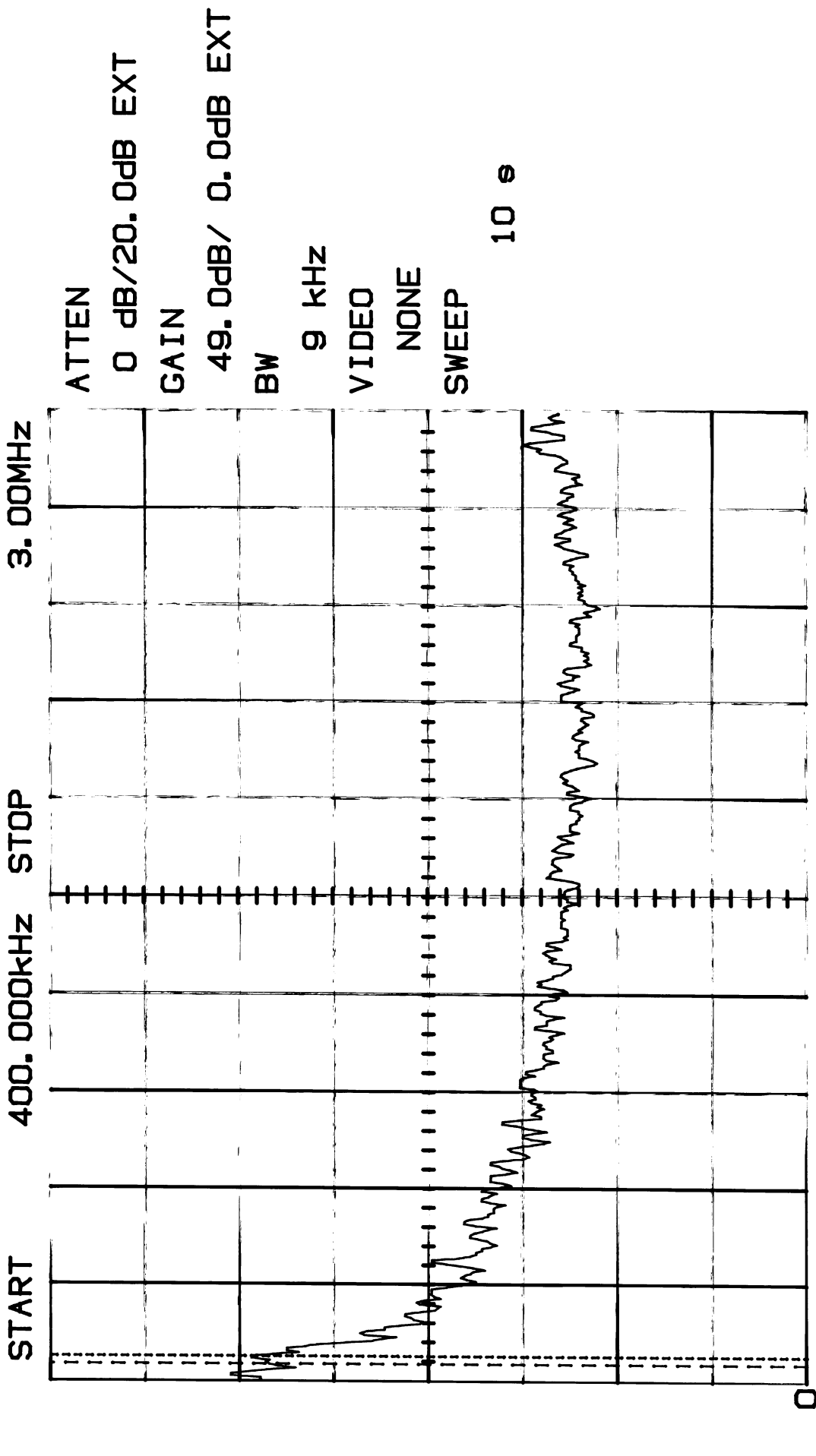
M1 14 $\mu$ V / 4.5MHz

10:36:28 06-06-2001

DIMMER AT MAX. / QP MODE  
 20dB Pad (300W Load)  
 MODEL RC270D  
 SIDE: A

250.9

µV



M1 178µV / 450.000kHz M2 184µV / 470.000kHz

11:41:53 06-05-2001

# DIMMER AT MAX. / QP MODE

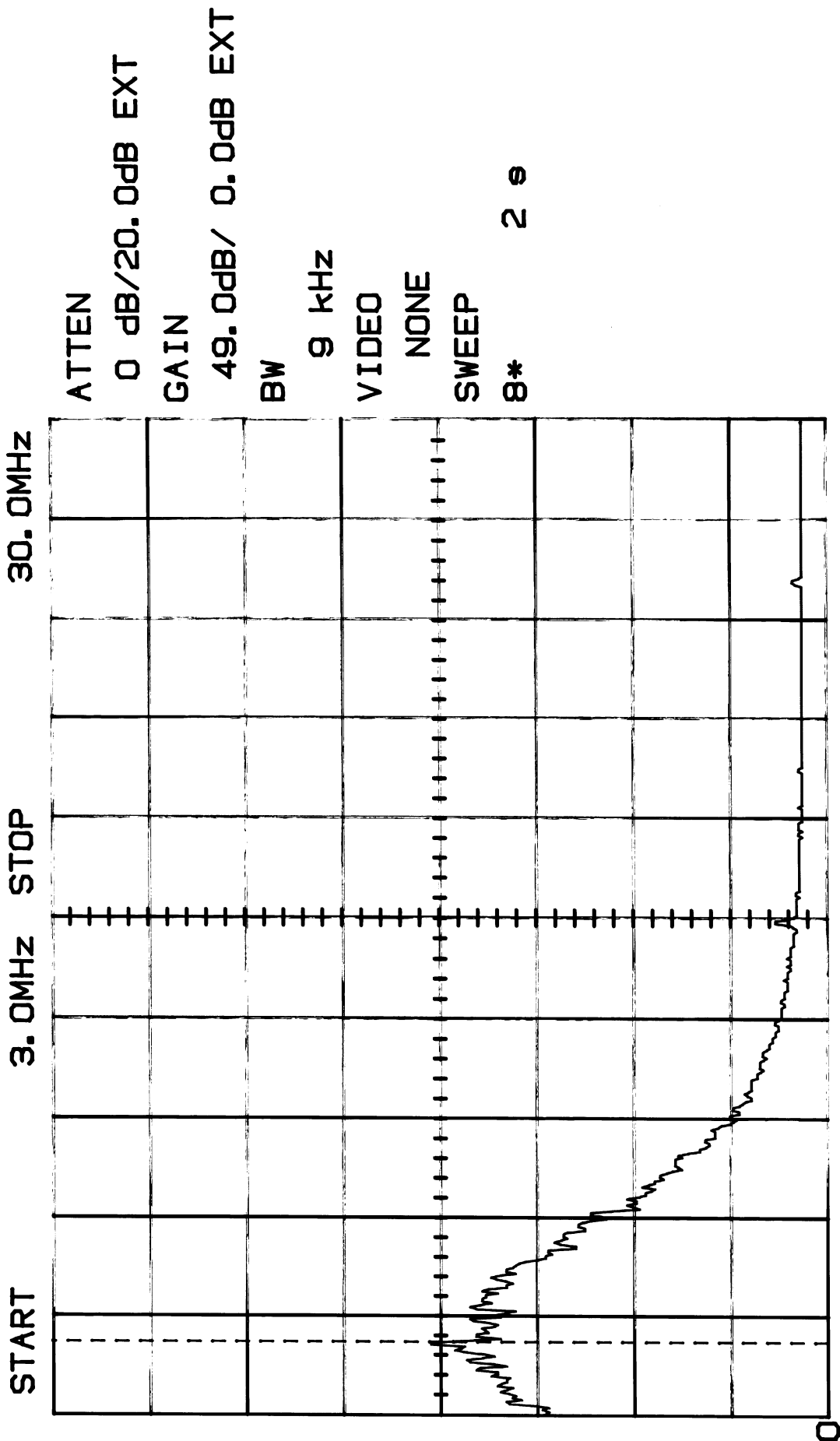
20dB Pad (300W Load)

MODEL RC270D

SIDE: A

250.9

uV



M1 127uV / 5.0MHz

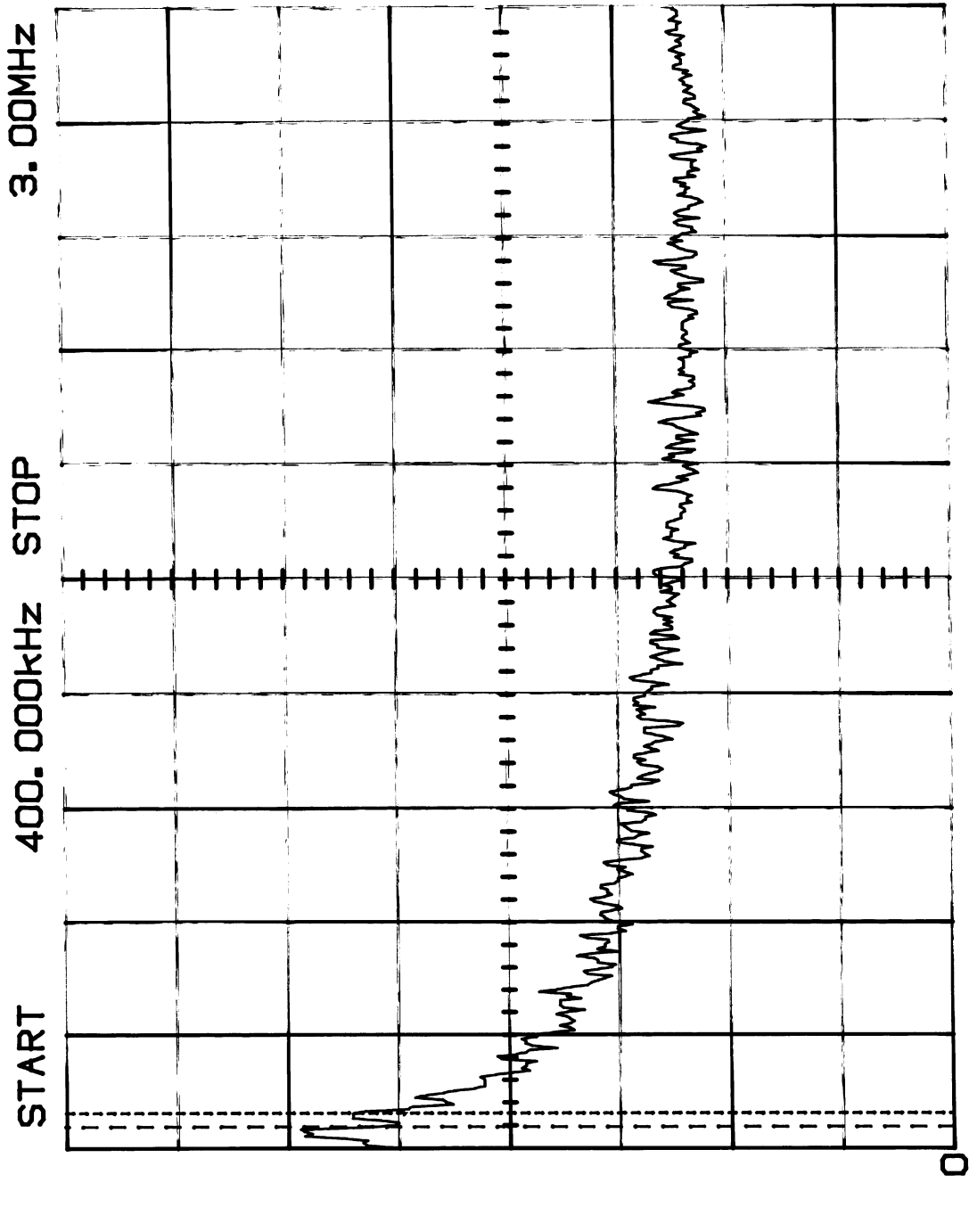
DIMMER AT MAX. (300W) SETTING  
20dB Pad (300W Load)

MODEL RC270D

SIDE: B

250.9

μV



ATTEN

0 dB/20.0dB EXT

GAIN

49.0dB/ 0.0dB EXT

BW

9 kHz

VIDEO

NONE

SWEEP

2\*

10 s

M1

165μV/ 450.000kHz

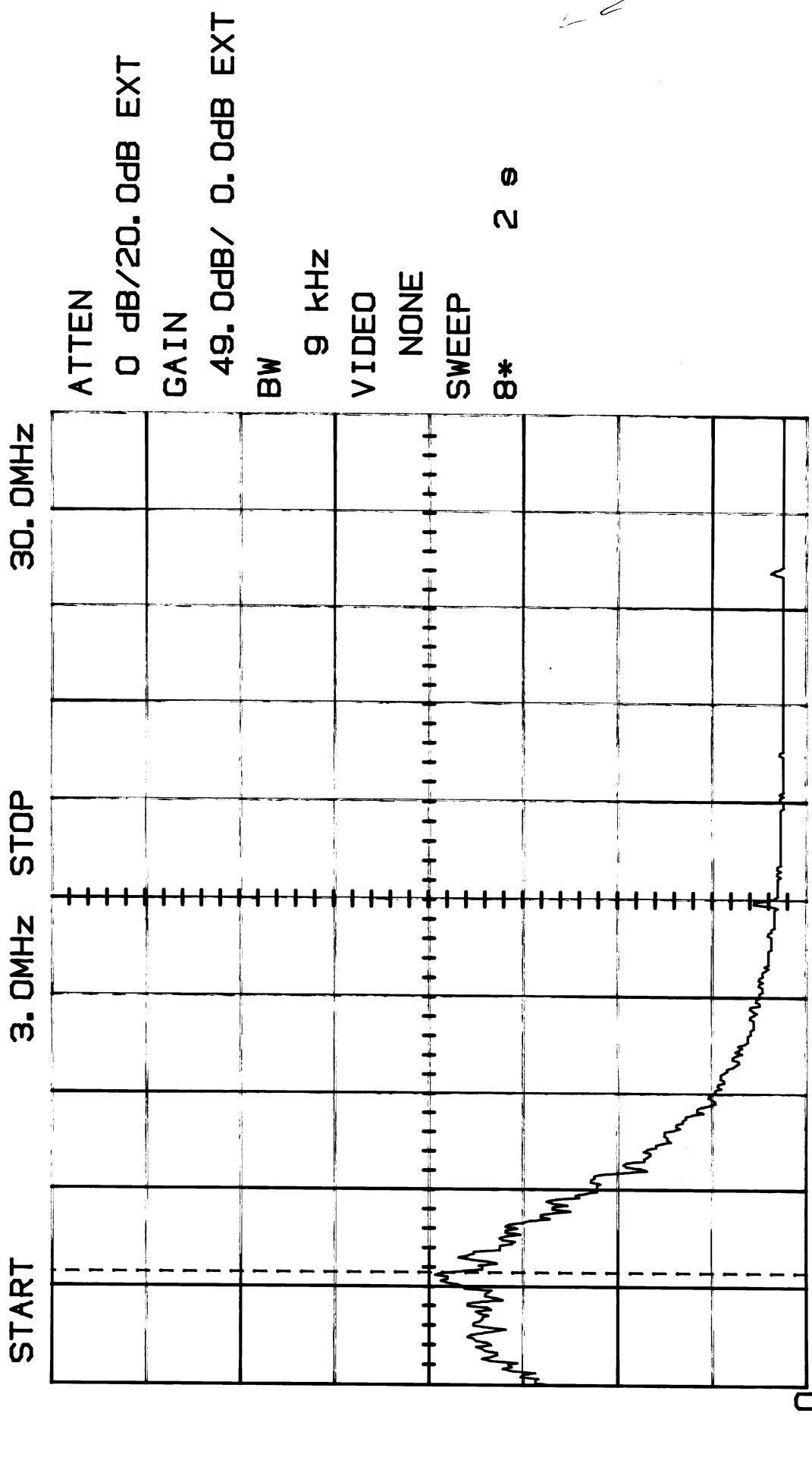
M2

169μV/ 480.000kHz

11:28:58 06-05-2001

DIMMER AT MAX. (300W) SETTING  
 20dB Pad (300W Load)  
 MODEL RC270D  
 SIDE: B

250.9  
 $\mu$ V



M1 120 $\mu$ V/ 6.1MHz

DIMMER SET AT 150W / QP MODE

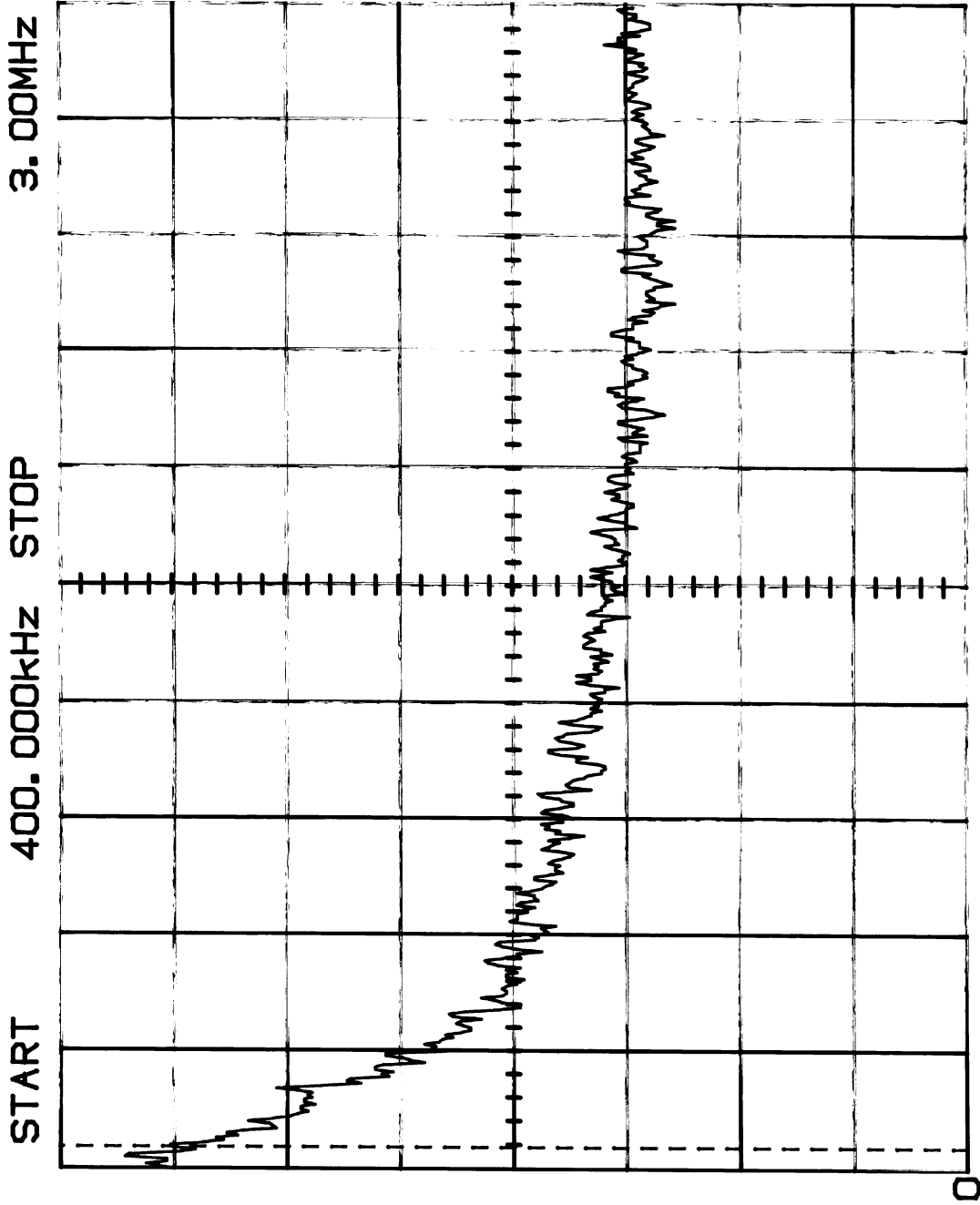
20dB Pad (300W Load)

MODEL RC270D

SIDE: A

250.9

μV



ATTEN

0 dB/20.0dB EXT

GAIN

49.0dB/ 0.0dB EXT

BW

9 kHz

VIDEO

NONE

SWEEP

2\*

10 s

M1

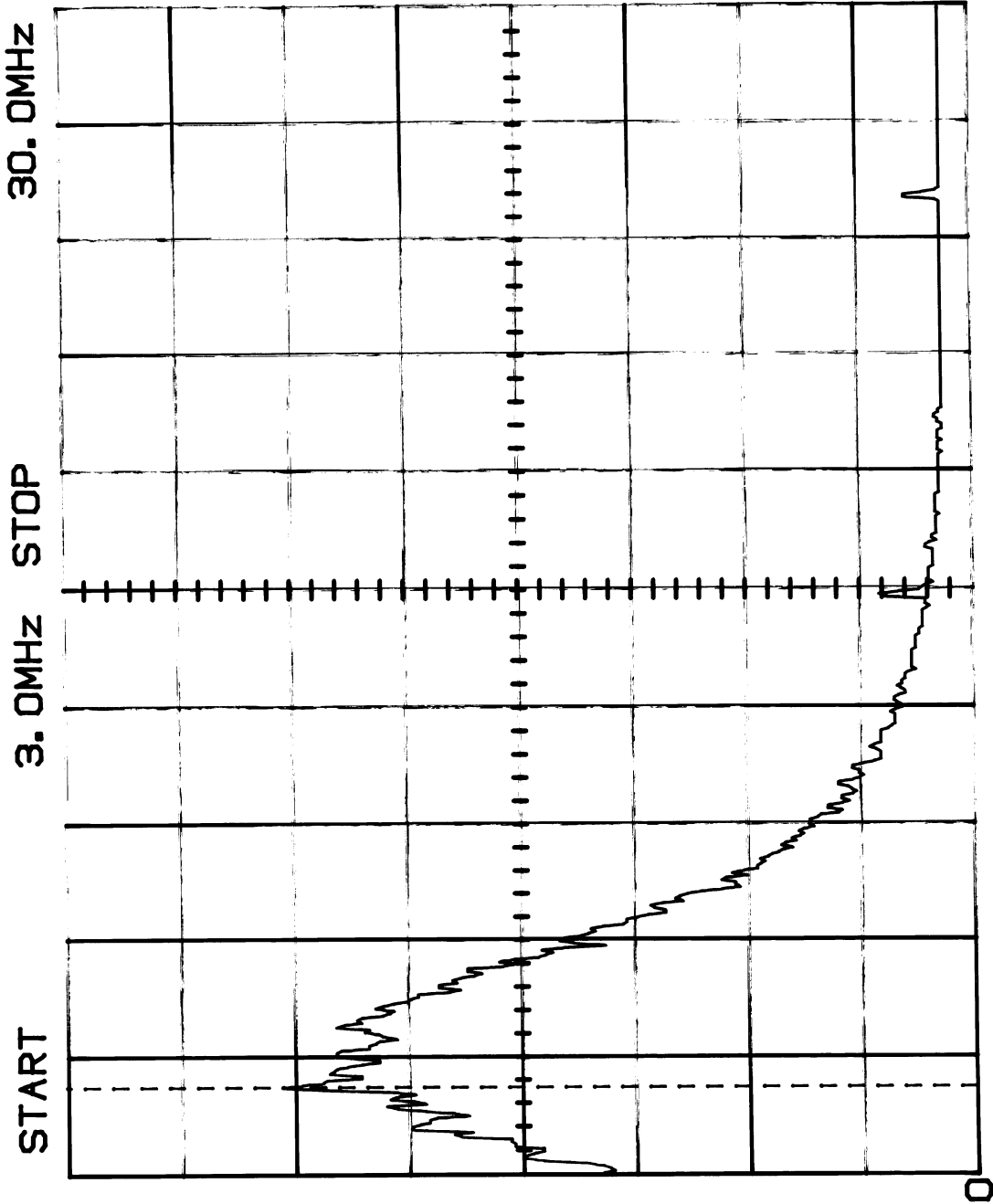
219μV / 450.000kHz

10:47:26 06-05-2001

DIMMER SET AT 150W / QP MODE  
 20dB Pad (300W Load)  
 MODEL RC270D  
 SIDE: A

250.9

uV



ATTEN  
 0 dB/20.0dB EXT  
 GAIN  
 49.0dB/ 0.0dB EXT  
 BW  
 9 kHz  
 VIDEO  
 NONE  
 SWEEP  
 8\* 2 s

M1 191uV/ 5.0MHz

11:07:24 06-05-2001

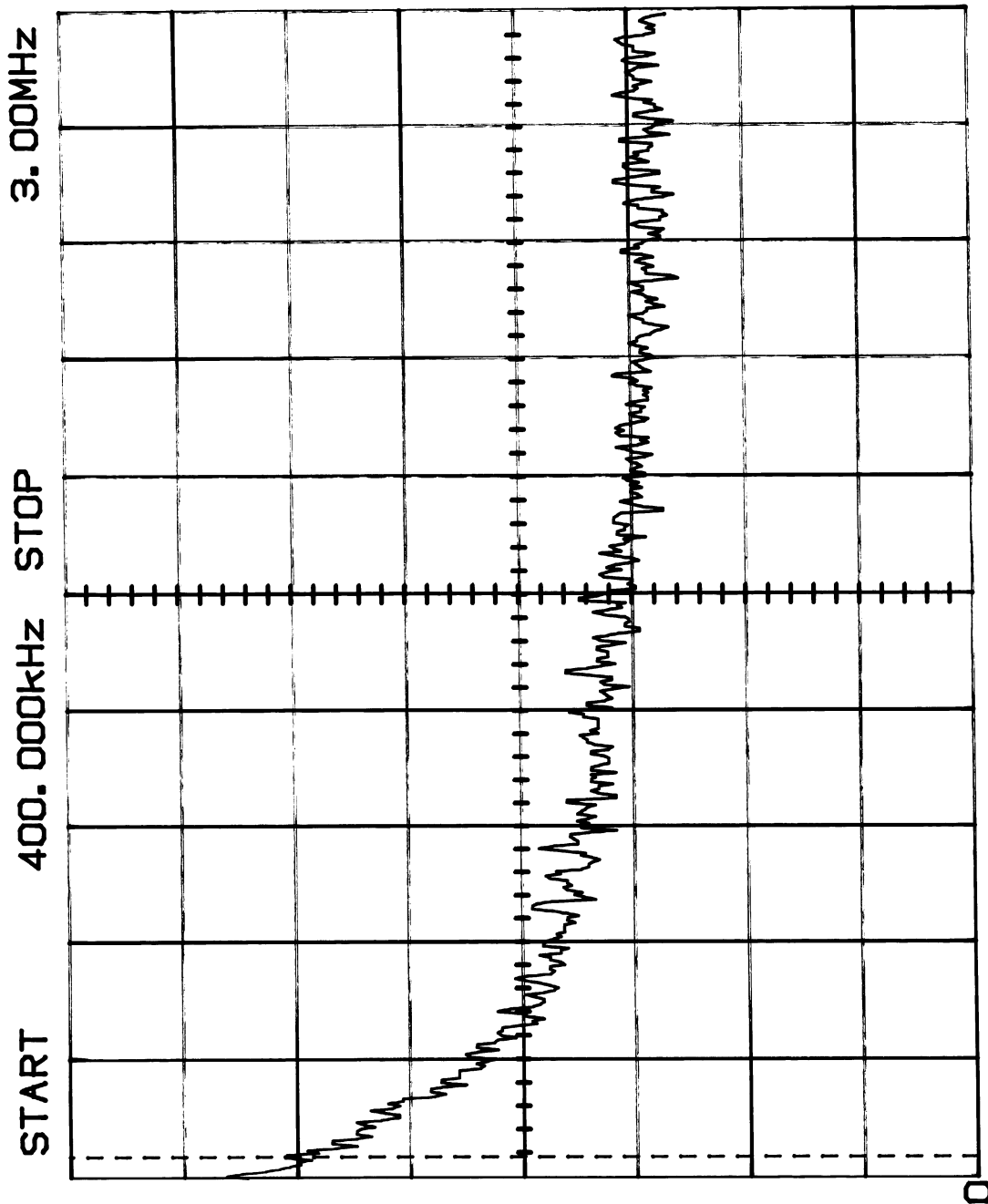


DIMMER SET AT 150W / QP MODE  
 20dB Pad (300W Load)  
 MODEL RC270D

250.9

uV

SIDE: B



ATTEN

0 dB/20.0dB EXT

GAIN

49.0dB/ 0.0dB EXT

BW

9 kHz

VIDEO

NONE

SWEEP

2\* 10 s

M1 191uV / 450.000kHz

10:56:11 06-05-2001

# DIMMER SET AT 150W / QP MODE

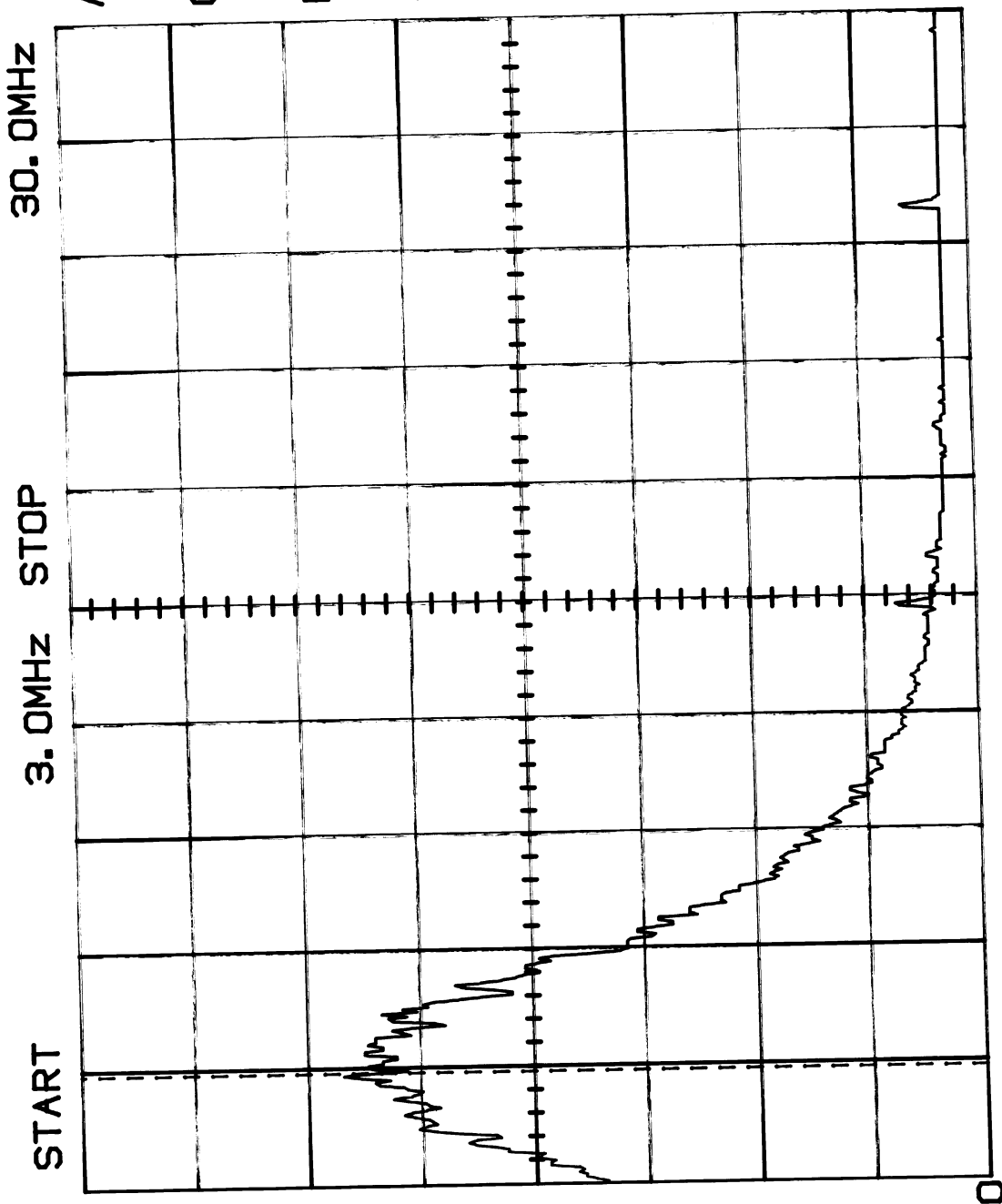
20dB Pad (300W Load)

MODEL RC270D

SIDE: B

250.9

uV



M1 171uV/ 5.6MHz

ATTEN

0 dB/20.0dB EXT

GAIN

49.0dB/ 0.0dB EXT

BW

9 kHz

VIDEO

NONE

SWEEP

8\*

2 s

## SPURIOUS RADIATED EMISSIONS

Page 1 of 2

### RESULTS

The maximum field strength of any spurious emission or harmonic, from 25MHz to 2,00MHz, while receiving was:

Models RC270 and RC270D:

Receiver:        **Maximum field strength of 45.19 $\mu$ V/M at 450.18MHz.**

### TEST CONDITIONS

Equipment Positioning:

Receiver:                      Laying on its back  
Transmitter:                   N/A

Antenna Polarization:        Horizontal

Measurement Bandwidth:    120KHz

Supply Voltage:

Transmitter:                   N/A  
Receiver:                      120 VAC, 60Hz

### METHODS OF MEASUREMENT

Receiver:

The receivers were placed individually on a one meter high non-metallic turntable. The EUTs were unmodified samples, as supplied by the manufacturer. Power was supplied via a 120 VAC cable fed upward through the centre of a turntable. The receivers were set in the receive mode, and the entire spectrum up to 2,000MHz was searched for spurious emissions. All emissions were measured and recorded.

The receive frequency was measured using an external unmodulated ambient RF carrier signal, tuned across the wideband of the receiver noise. The unmodulated carrier was emanating from an antenna in the proximity of the receiver. Care was taken so as not to overload the receiver, however the carrier level was varied in amplitude and frequency to obtain the highest level of spurious emissions from the receiver. This external signal was set to cause receiver "quieting" or to cohere the superregenerative receiver and cause single discrete noise components to appear. At this point, the largest emission or single frequency component within this band was measured and recorded.

For each of the above conditions, the turntable was rotated through 360 degrees, while the receiving antenna, at three (3) meters from the EUT, was varied in height from 1 to 4 meters, to find the maximum signal strength. The measured level was converted to a field strength using the antenna correction factors and cable losses.

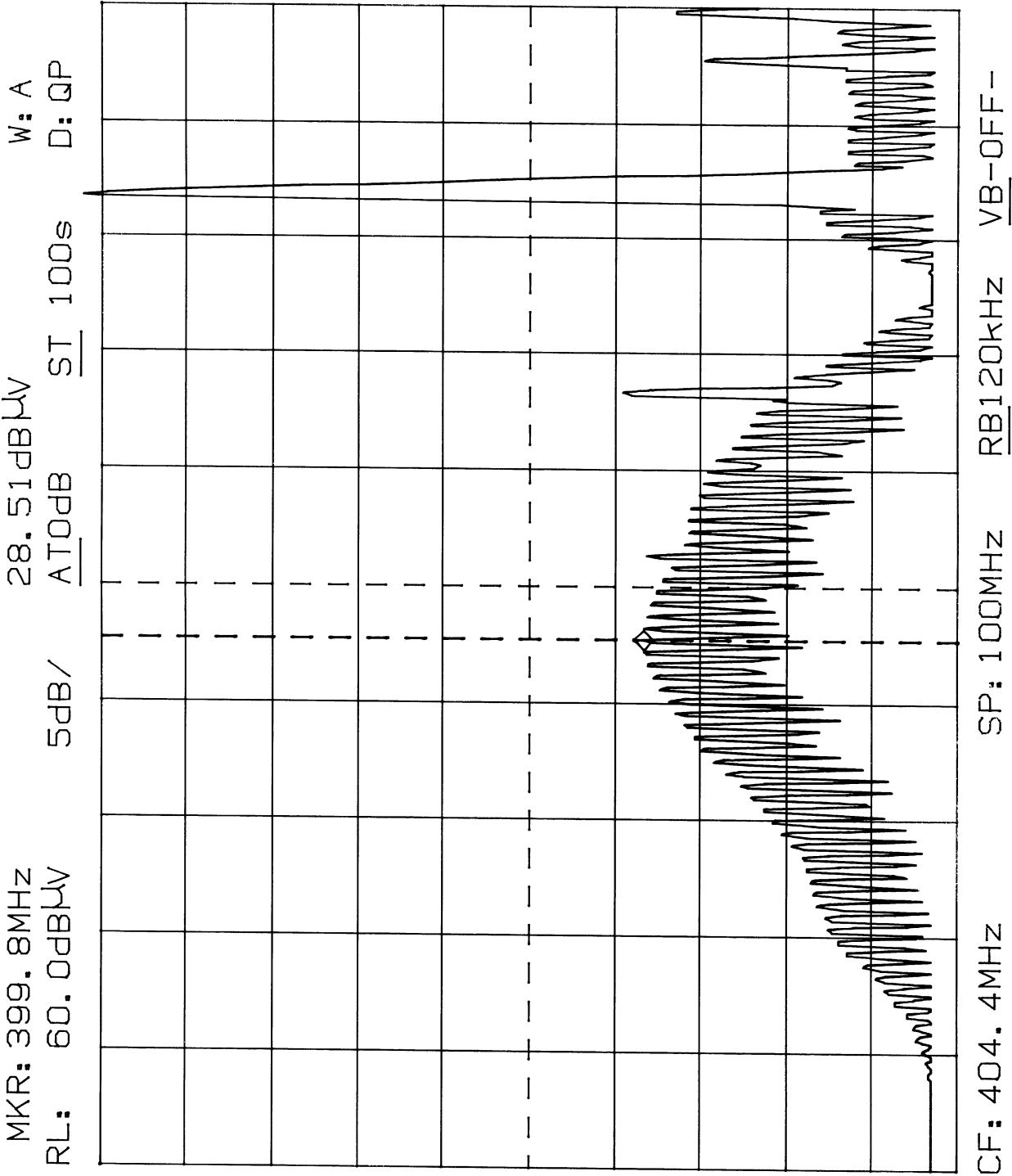
## FIELD STRENGTH OF EMISSIONS

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**Test Data:****RC270 and RC270D**

Emission Frequency MHz	Meter Reading @3m dB $\mu$ V	Antenna	Cable and ACF dB	Field Strength dB $\mu$ V/M	FCC Limit dB $\mu$ V/M	Margin dB	Detector & BW KHz
399.80	12.50	LP H	19.50	32.00	46	-14.00	QP 120
450.18	14.10	LP H	19.00	33.10	46	-12.90	QP 120

RECEIVER SPURIOUS RADIATION



# RECEIVER SPURIOUS RADIATION

