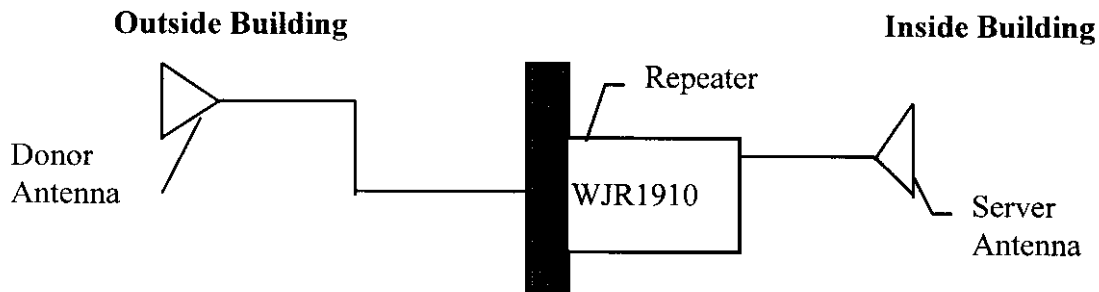


The following information is in accordance with FCC Rules, 47CFR Part 2, Subpart J, sections 2.983 - 2.999.

- | | | |
|-----------------|---------------------------------|---|
| 2.983(a) | Applicant: | Watkins-Johnson Company.
3333 Hillview Avenue
Palo Alto, CA 94303 |
| 2.983(b) | FCC ID: | NTTR1910-1 |
| 2.983(c) | Quantity production is planned. | |
| 2.983(d) | Technical Description | |

The WJ-R1910 Repeater is used to extend the coverage of a PCS basestation. Inside buildings that do allow sufficient signal strength from the basestation there exists a hole in the coverage for wireless service. The repeater receives the basestation signal via an external antenna. This signal is amplified and filtered by the repeater and ultimately retransmitted via a second antenna. The entire process is duplicated for the reverse path where the handset signal is amplified and filtered and retransmitted to the basestation. This technique provides PCS coverage inside buildings that previously did not have sufficient signal strength.



Subsections

(1) Types of Emissions

- (a) CDMA: FXW
(b) TDMA: DXW (NADC)
(c) PCS-1900(GSM) : GXW

(2) Frequency Range

CDMA: Block A - F
Forward : 1930-1990 MHz
Reverse: 1850-1910MHz
TDMA : Block A-F
Forward: 1930 - 1990 MHz
Reverse: 1850 - 1910 MHz

GSM(PCS-1900) : Block A-F
Forward: 1930 - 1990 MHz
Reverse: 1850 - 1910 MHz

(3) Range of Operating Power

40 - 70dB gain (-40-/ +28dBm)

(4) Maximum Power Rating

CDMA :Maximum output power is 0.2 W
TDMA :Maximum output power is 0.6 W
GSM: Maximum output power is 0.6 W

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

4.8 VDC at 1.2 A on Q409 and Q415

(6) Function of Each Active Device

Refer to Exhibit 2, Schematic and Functional Block Diagram. Confidentiality is requested for these items

(7) Complete Circuit Diagrams and Functional Block Diagram

Refer to Exhibit 2 ,Schematic and Functional Block Diagram. Confidentiality is requested for these items.

(8) Instructions/Installation Manual

Refer to Exhibit 5.

Refer to installation manual, Exhibit 5.

(10) Means for Frequency Stabilization

U502: 10mhz reference for L.O. PLL U501

(11) Means for Limiting Modulation

Not applicable.

(11) Means for Limiting Power

Software that limits the output power to the maximum output power specified. If the unit detects that the output power exceeds this power then attenuation is added to keep the power at maximum. When no more attenuation can be added the unit is turned off.

(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%

DC Supply Voltage: 12V (option)

AC Supply Voltage: Autoranging 100-230 VAC, 50/60Hz. <1A

The transmitter was aligned and tuned up according to manufacturer's alignment procedure, prior to testing. All data presented represents the worst case parameter being measured.

Section 2.983(f) Equipment Identification

A drawing of the equipment identification nameplate appears in Exhibit 5.

Section 2.983(g) Photographs

Photographs of the equipment, internal and external views, are found in Exhibit 3.

Section 2.983 Description of Various Base Station Configurations

Not Applicable

Section 2.983 Use of Various Power Supplies

Current version uses AC autoranging supply. Anticipated future option will be 12VDC input.

Section 2.987 Measurement Required: Modulation Characteristics

Not Applicable

Section 2.989 Measurement Required: Occupied Bandwidth

Limits:24.238

Measurement Equipment Used:

HP 8563E Spectrum Analyzer

QIM "The Workhorse" low loss cable, 9 ft (loss: 0.85 dB/ft@ 26 GHz)

Tektronix Digital Radiocommunications Tester/ Model:CMD80(CDMA)

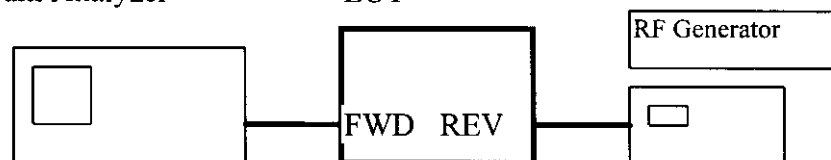
Marconi Instruments/ Digital and vector Signal Generator/ Model:2051(TDMA/GSM)

HP Signal generator / Model:8648C

Test Set-up

Spectrum Analyzer

EUT



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=1 Mhz..Spectrum plot is supplied.

Please refer to page 16 for summary .

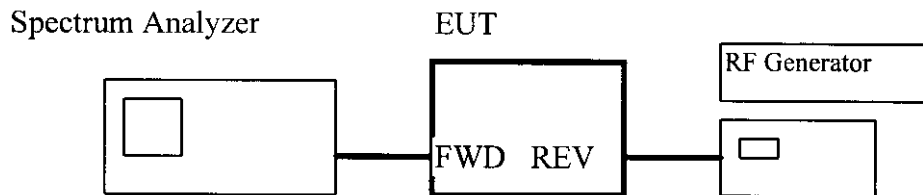
**Section 2.991 Measurements Required: Spurious and Harmonic Emissions
at Antenna Terminals
Section 24.238 Limits**

Measurement Equipment Used:

HP 8563E Spectrum Analyzer

QIM "The Workhorse" low loss cable, 9 ft (loss: 0.85 dB/ft@ 26 GHz)

Test Set-up



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 $43+10 \log(\text{mean output power in watts})$ 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

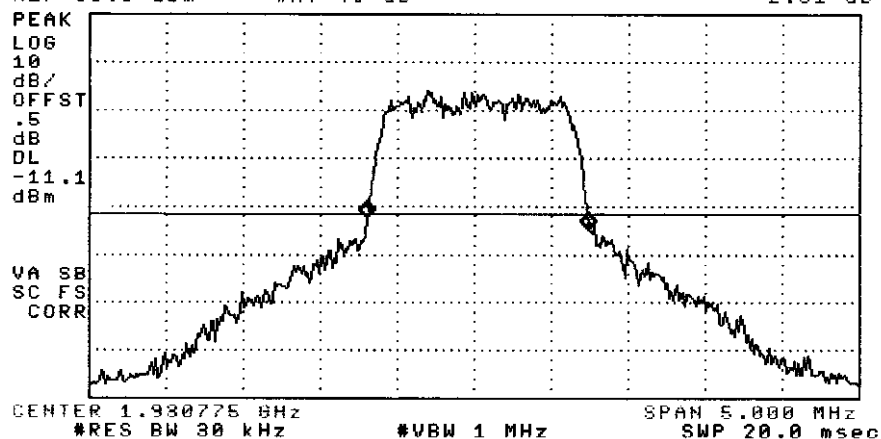
$.01 * 1.438\text{MHz} = 14.38\text{kHz}$. A RES BW of 30kHz was used for measurement.

Test Results

Please refer to the following table which indicates the chart number associates with Low , High , Bandwidth and Spurious Emissions.

			Lo	Hi	BW	Spurious
C D M A	Block A	Forw	2	4	1	3
		Rev	9	10	1	57
	Block D	Forw	5	6		
		Rev	8	7		
T D M A	Block B	Forw	20	19	21	69
		Rev	13	14	11	12
	Block E	Forw	18	17		
		Rev	15	16		
G S M	Block C	Forw	30	31	27	32
		Rev	23	24	22	83
	Block F	Forw	28	29		
		Rev	25	26		
C D M A	Block B	Forw	35	34	33	
		Rev	44	43		
	Block E	Forw	36	37		38
		Rev	42	40	41	39
C D M A	Block C	Forw	53	54	55	56
		Rev	45	48	46	47
	Block F	Forw	52	51		
		Rev	49	50		
T D M A	Block A	Forw	72	66		
		Rev	58	61		
	Block D	Forw	65	64		
		Rev	62	63		
T D M A	Block C	Forw	73	74	71	70
		Rev	79	80	81	82
	Block F	Forw	76	75		
		Rev	77	78		
G S M	Block	Forw	93	92	93	94
	A	Rev	86	87	85	84
	Block	Forw	91	90		
	D	Rev	88	89		
G S M	Block	Forw	97	98	96	95
	C	Rev	104	103	105	106
	Block	Forw	99	100		
	F	Rev	102	101		

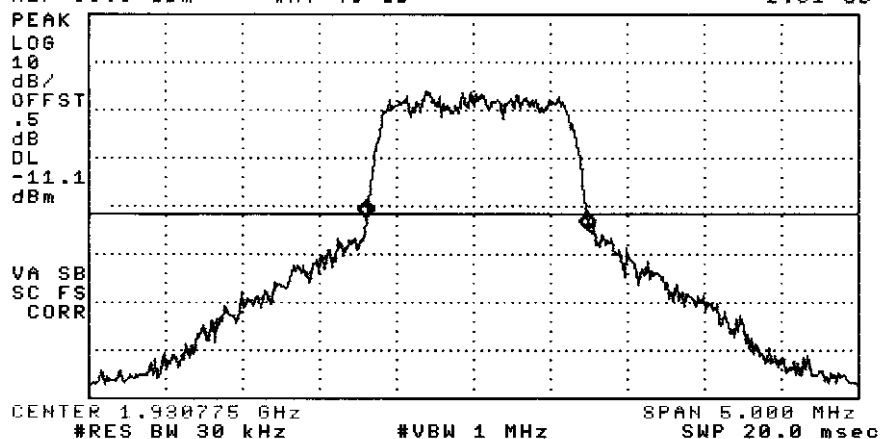
14:22:22 MAR 17, 1998
WJ EMISSION BANDWIDTH
REF 30.5 dBm #AT 40 dB MKRΔ 1.438 MHz
-2.51 dB



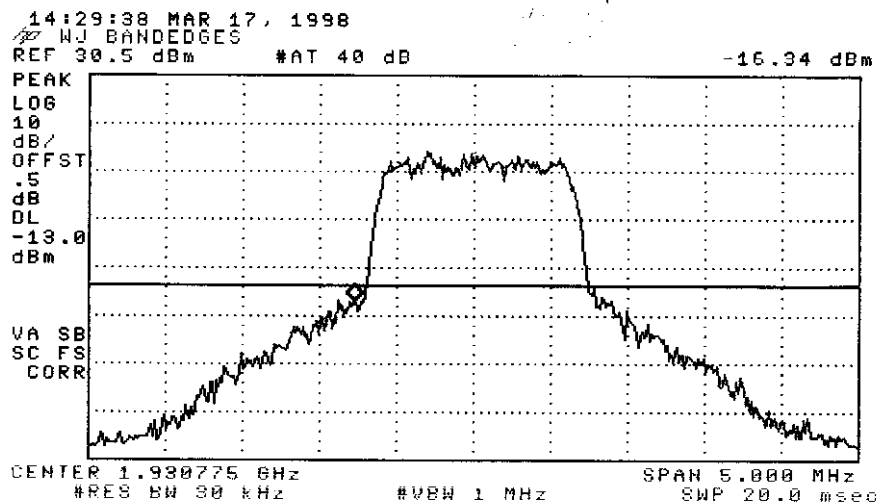
PK

#1

14:22:22 MAR 17, 1998
WJ EMISSION BANDWIDTH
REF 30.5 dBm #AT 40 dB MKRΔ 1.438 MHz
-2.51 dB

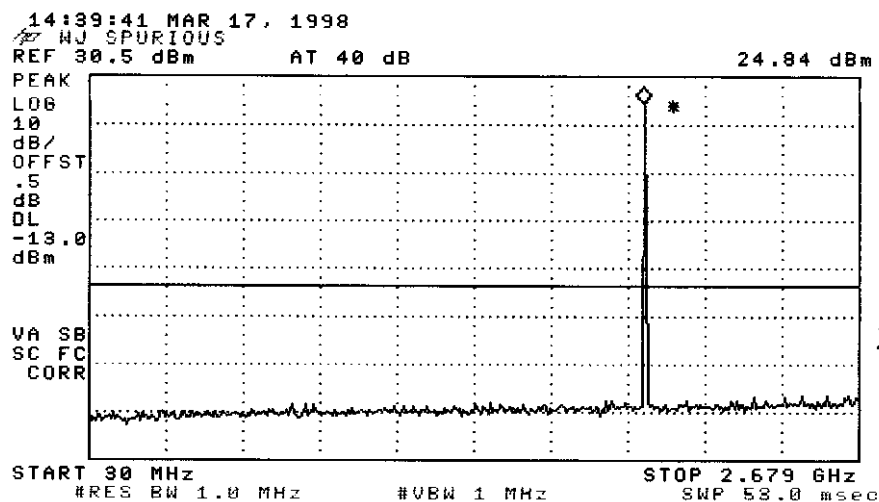


#2

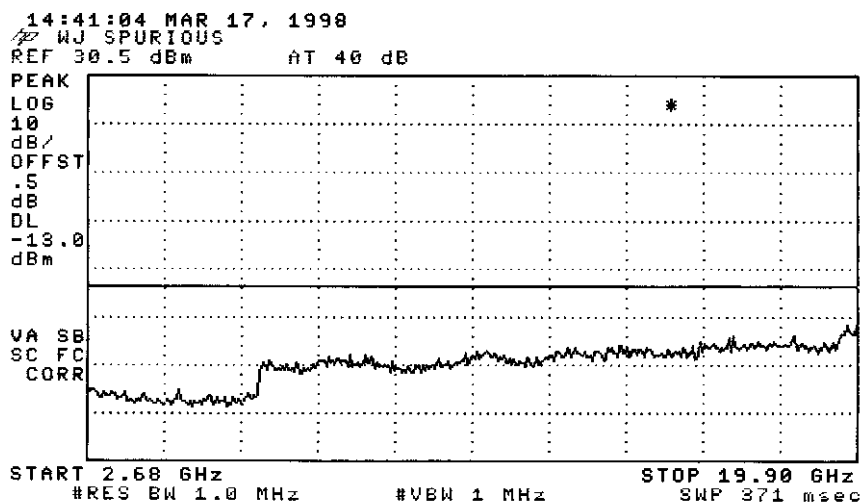


PK

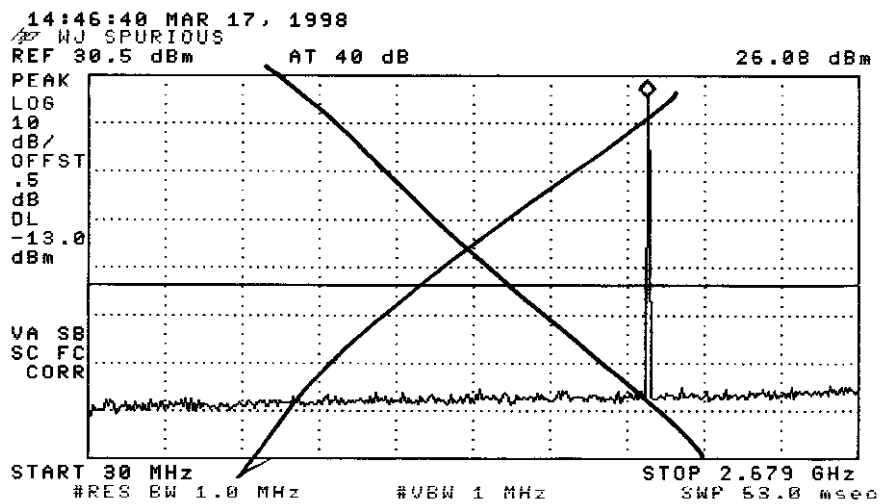
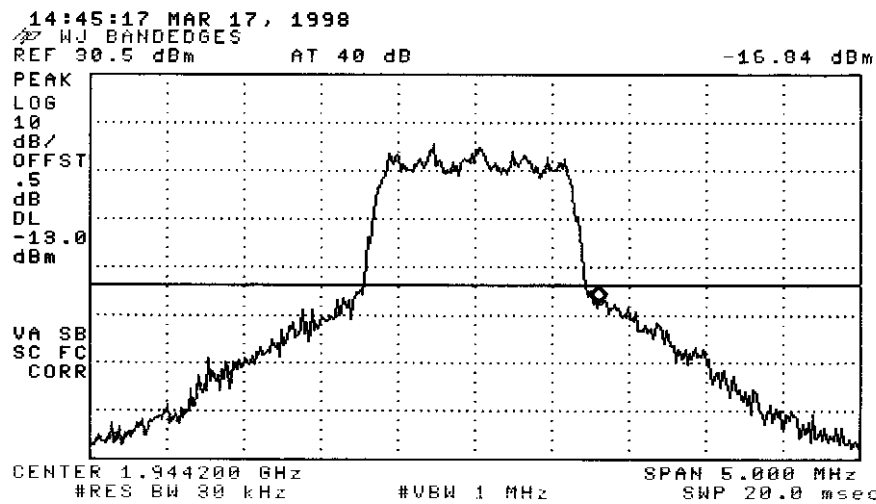
#2

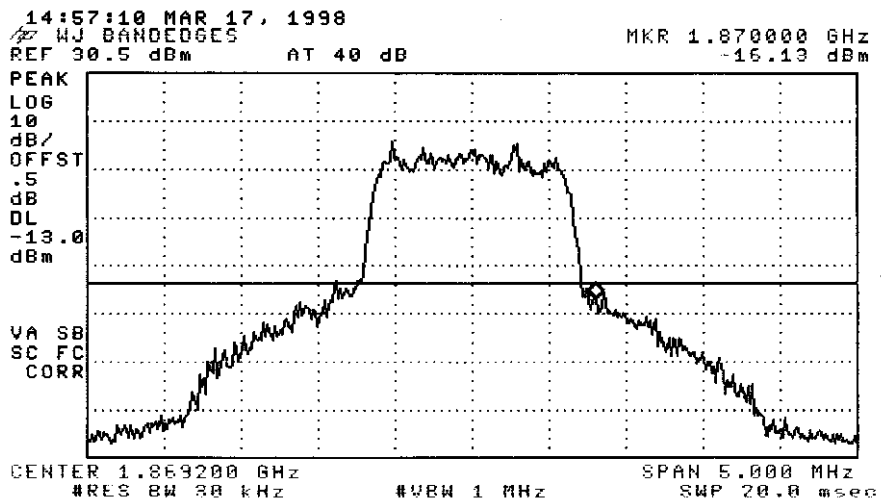
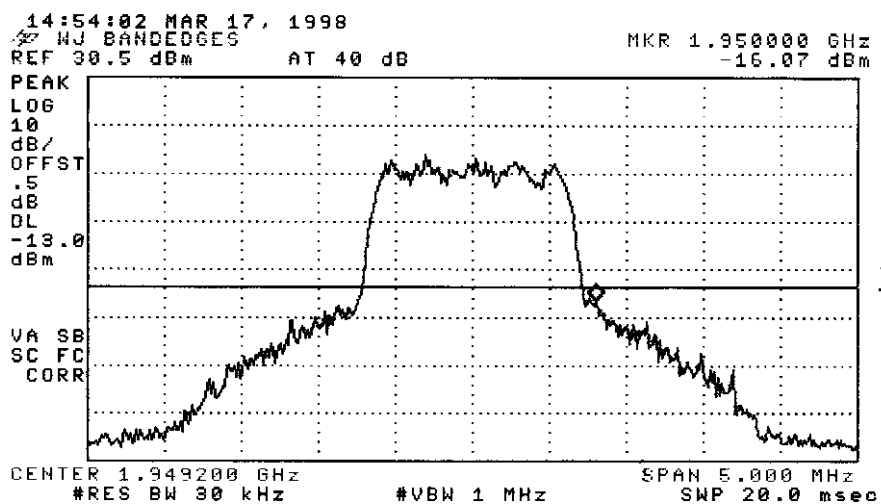
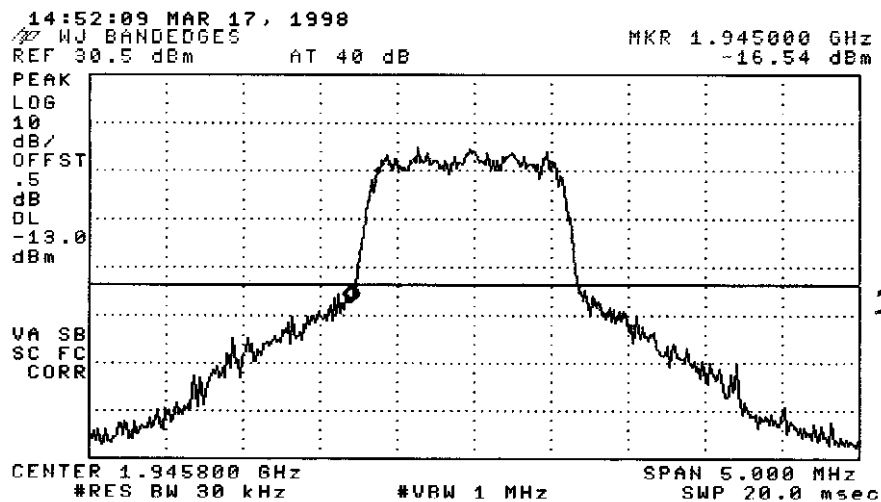


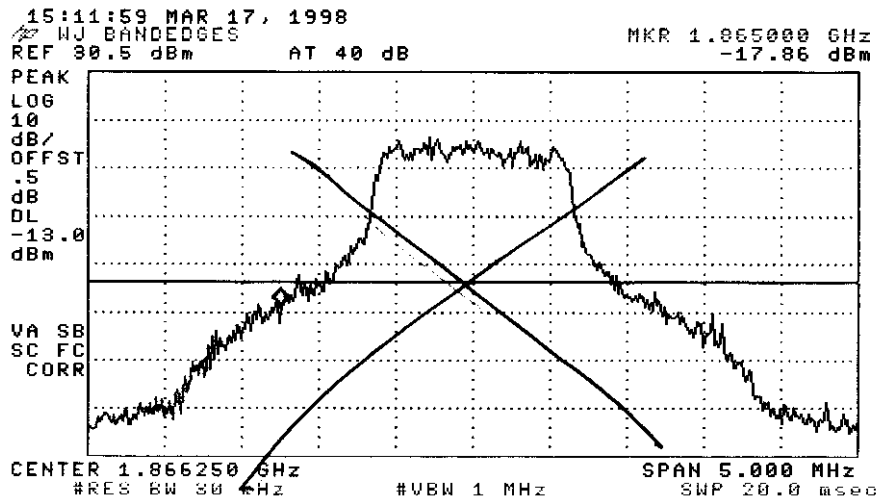
#3



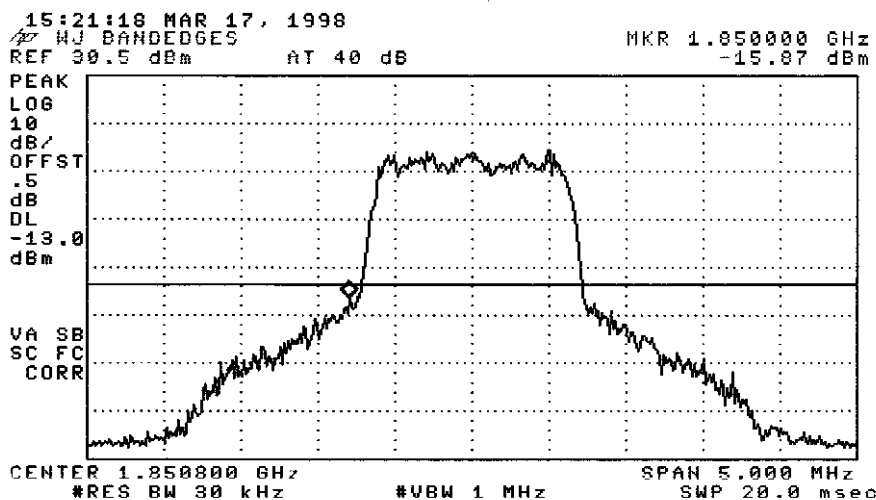
#3.



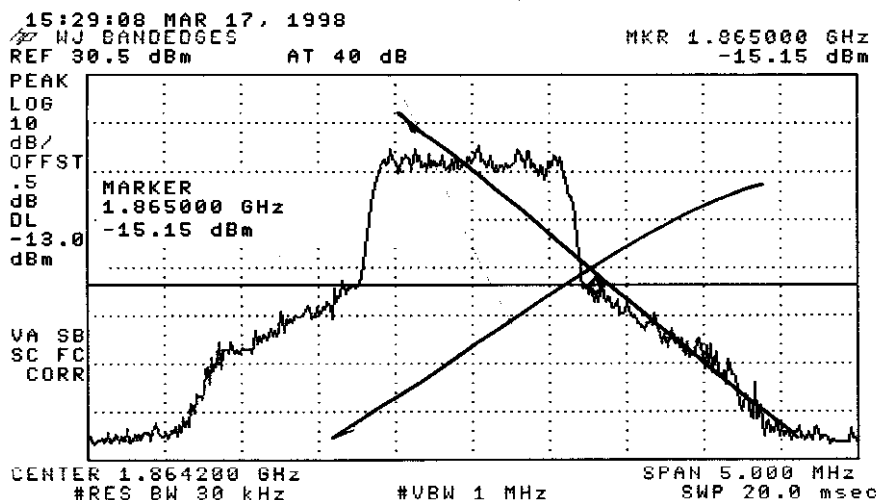




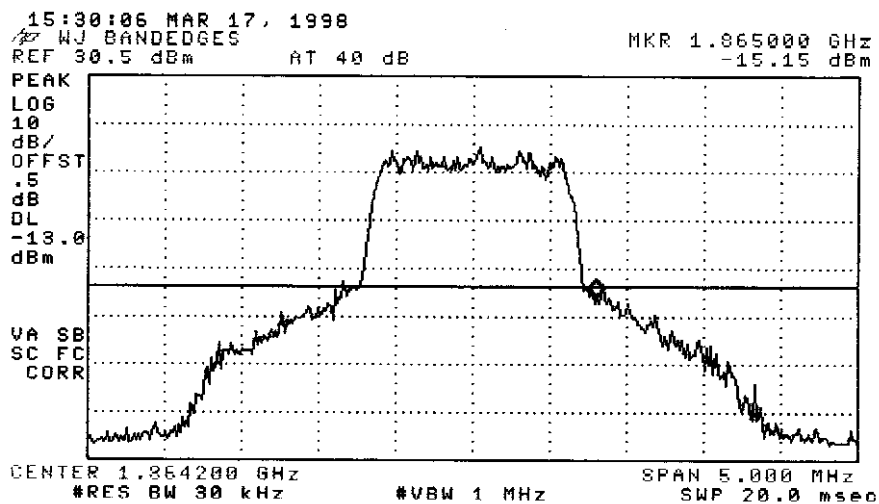
PK



#9

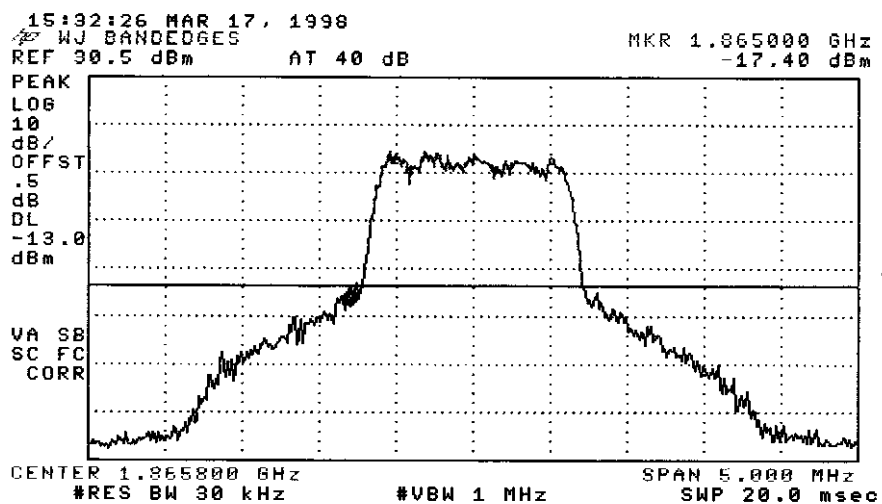


CLEAR
WRITE A
MAX
HOLD A
VIEW A
BLANK A
Trace
A B C
More
1 of 4

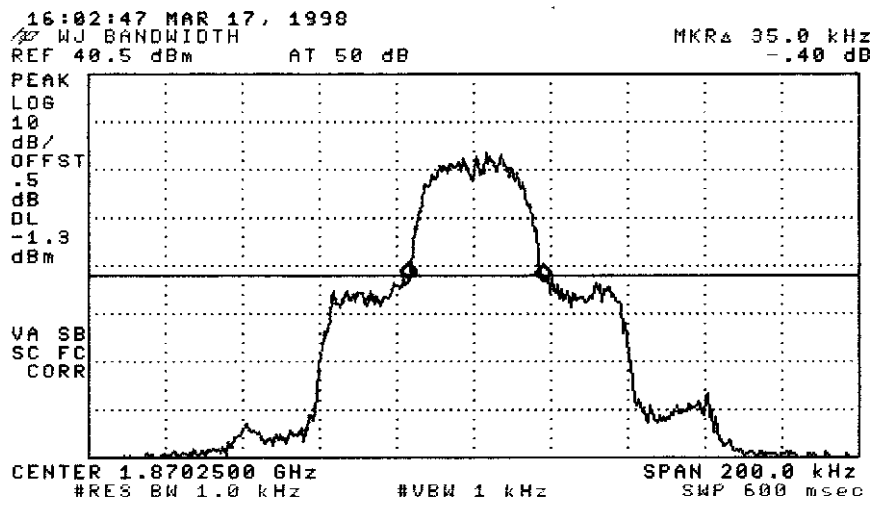


pk

#10

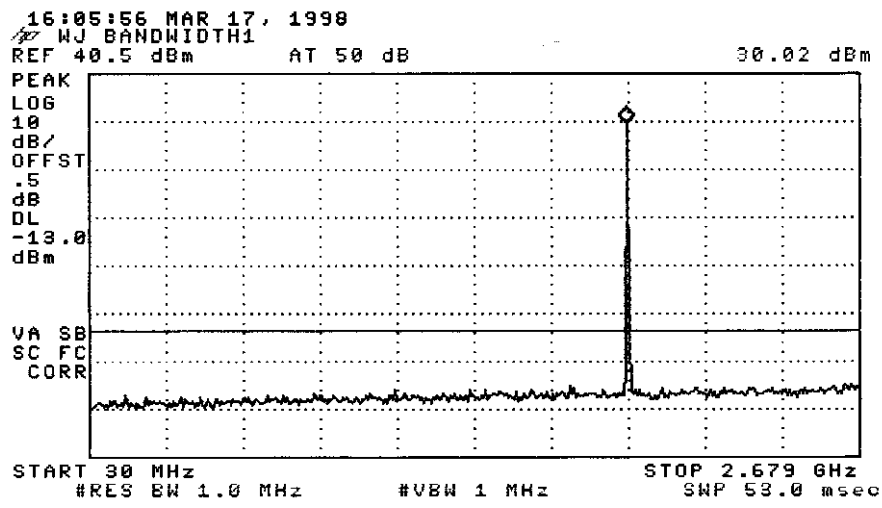


#8

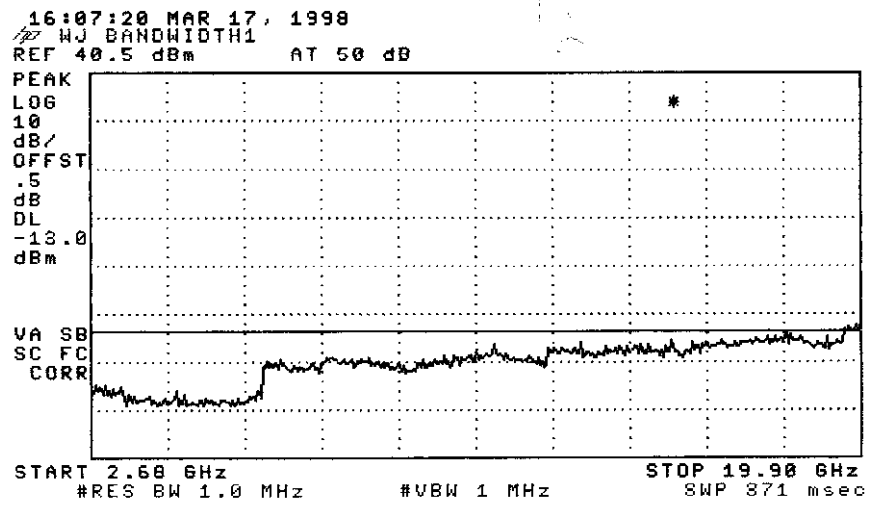


pk

#11

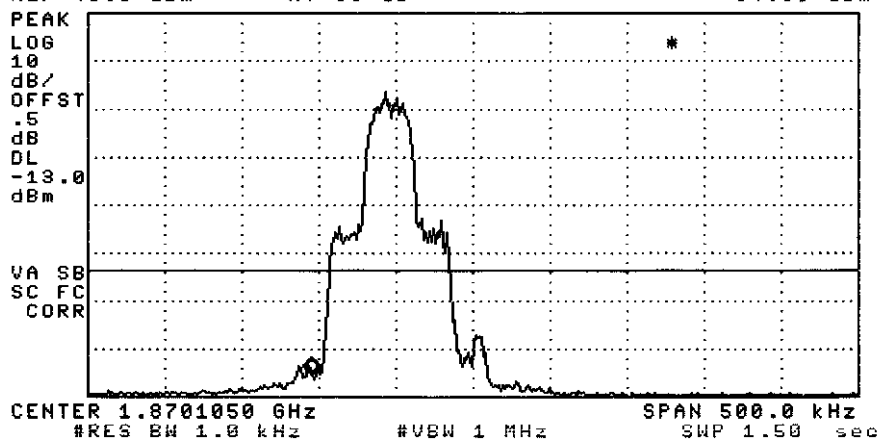


#12

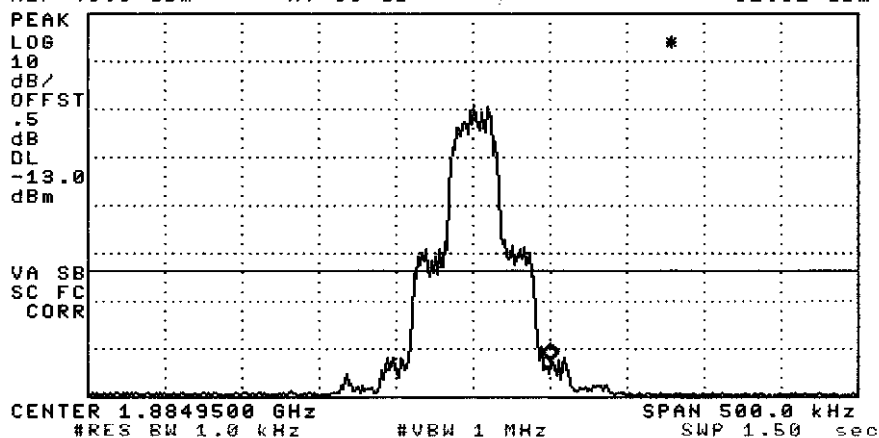


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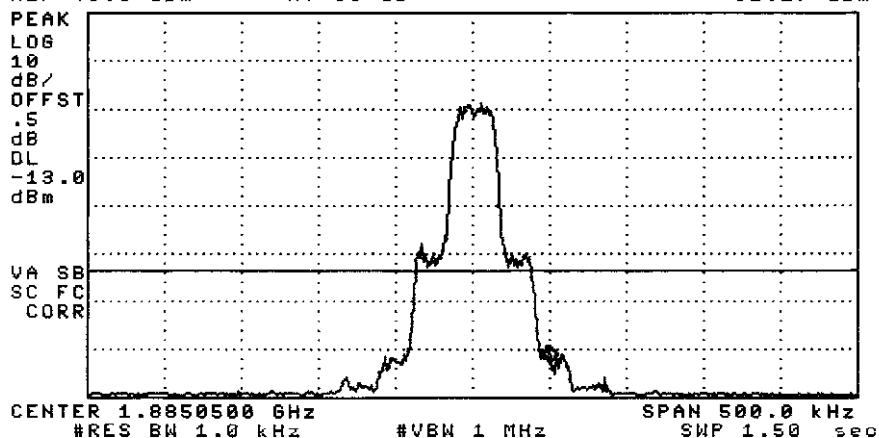
16:12:59 MAR 17, 1998
WJ BANDEDGES
REF 40.5 dBm AT 50 dB MKR 1.8700000 GHz
-34.60 dBm

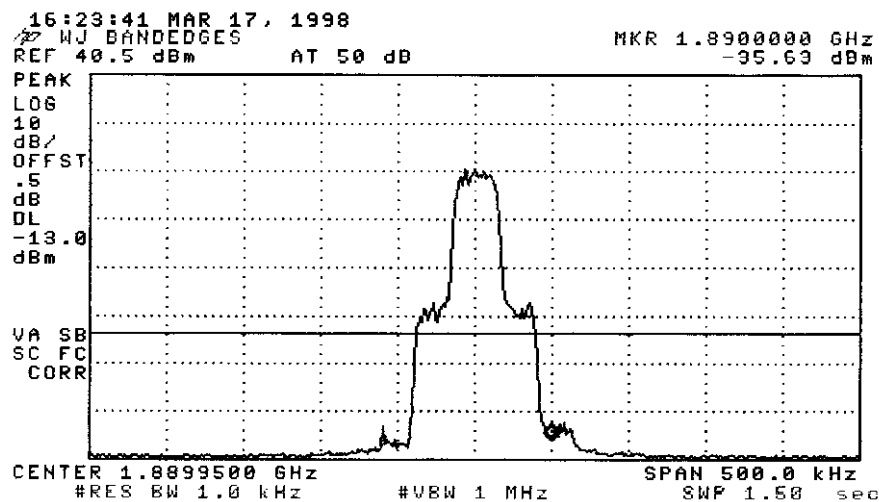


16:15:35 MAR 17, 1998
WJ BANDEDGES
REF 40.5 dBm AT 50 dB MKR 1.8850000 GHz
-31.91 dBm



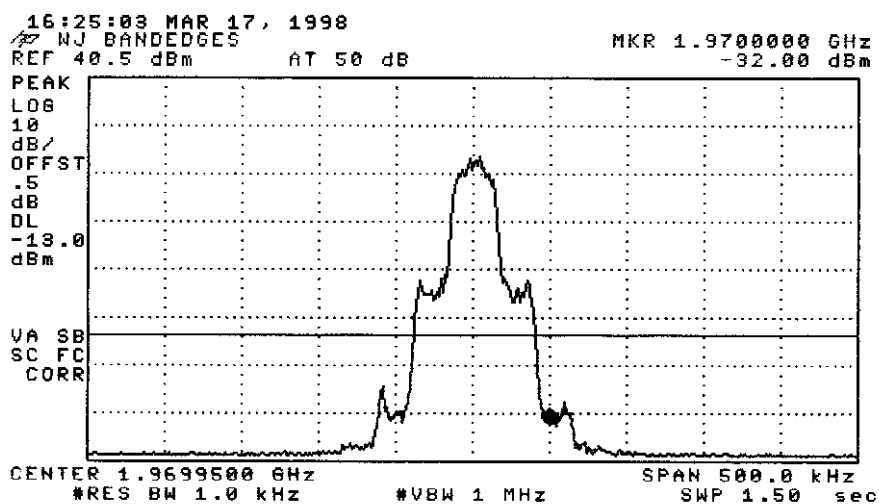
16:19:10 MAR 17, 1998
WJ BANDEDGES
REF 40.5 dBm AT 50 dB MKR 1.8851000 GHz
-32.17 dBm



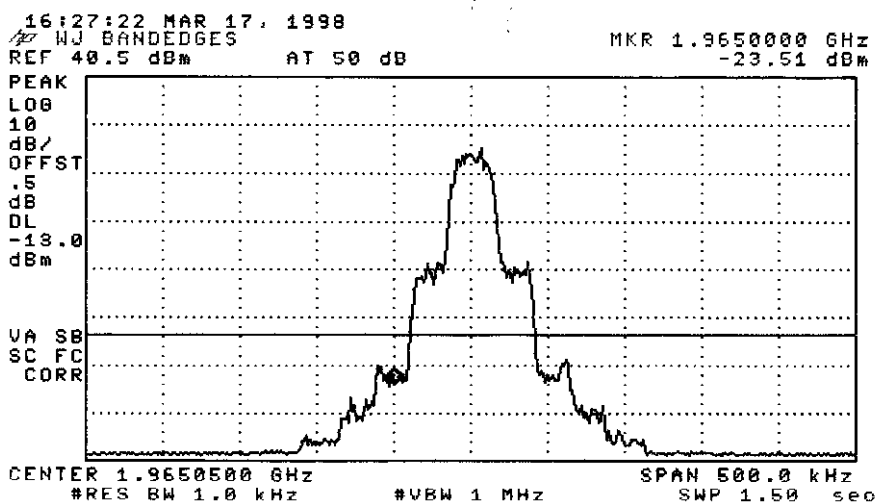


PK

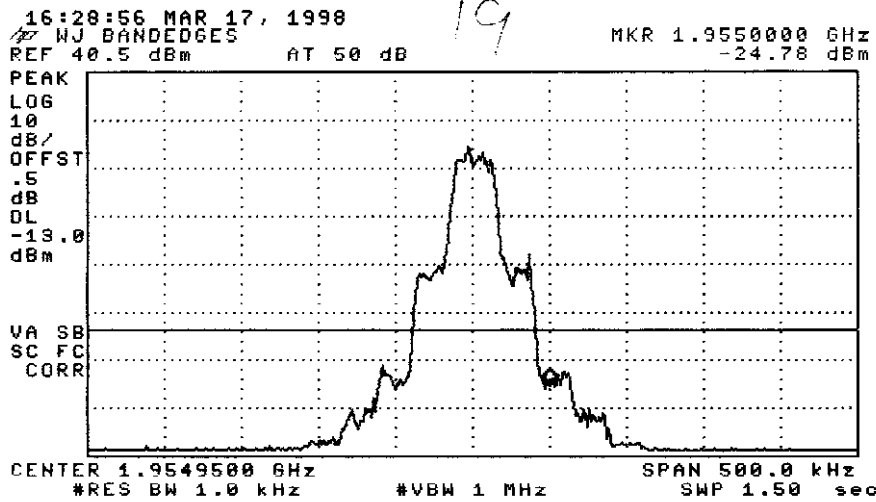
#16



#17

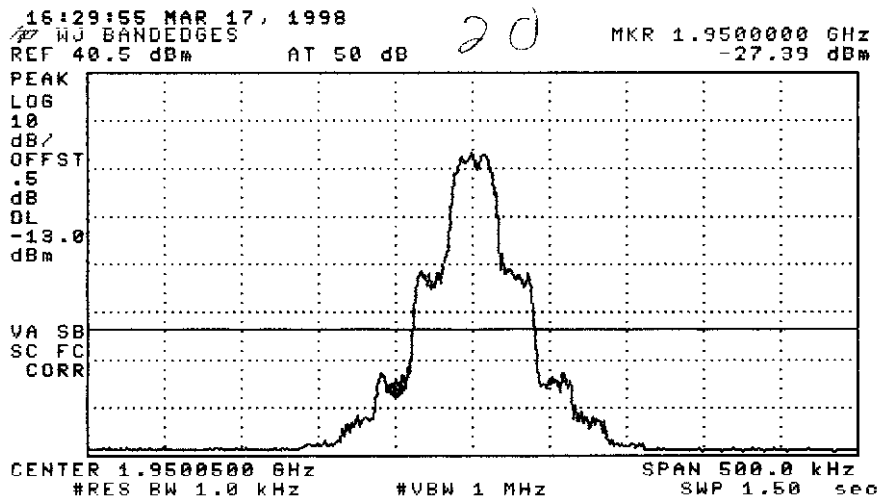


#18

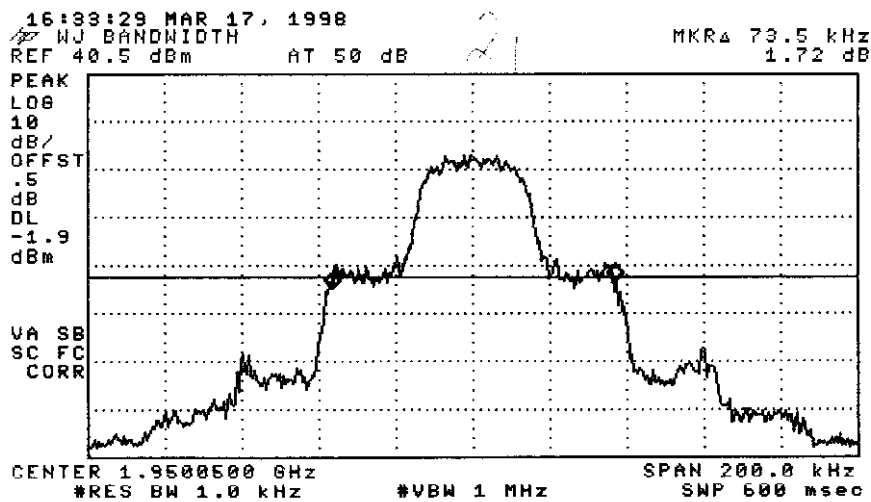


pk

#19



#20



#21

22

#22-1

HP

WJ BANDWIDTH
REF 20.0 dBm

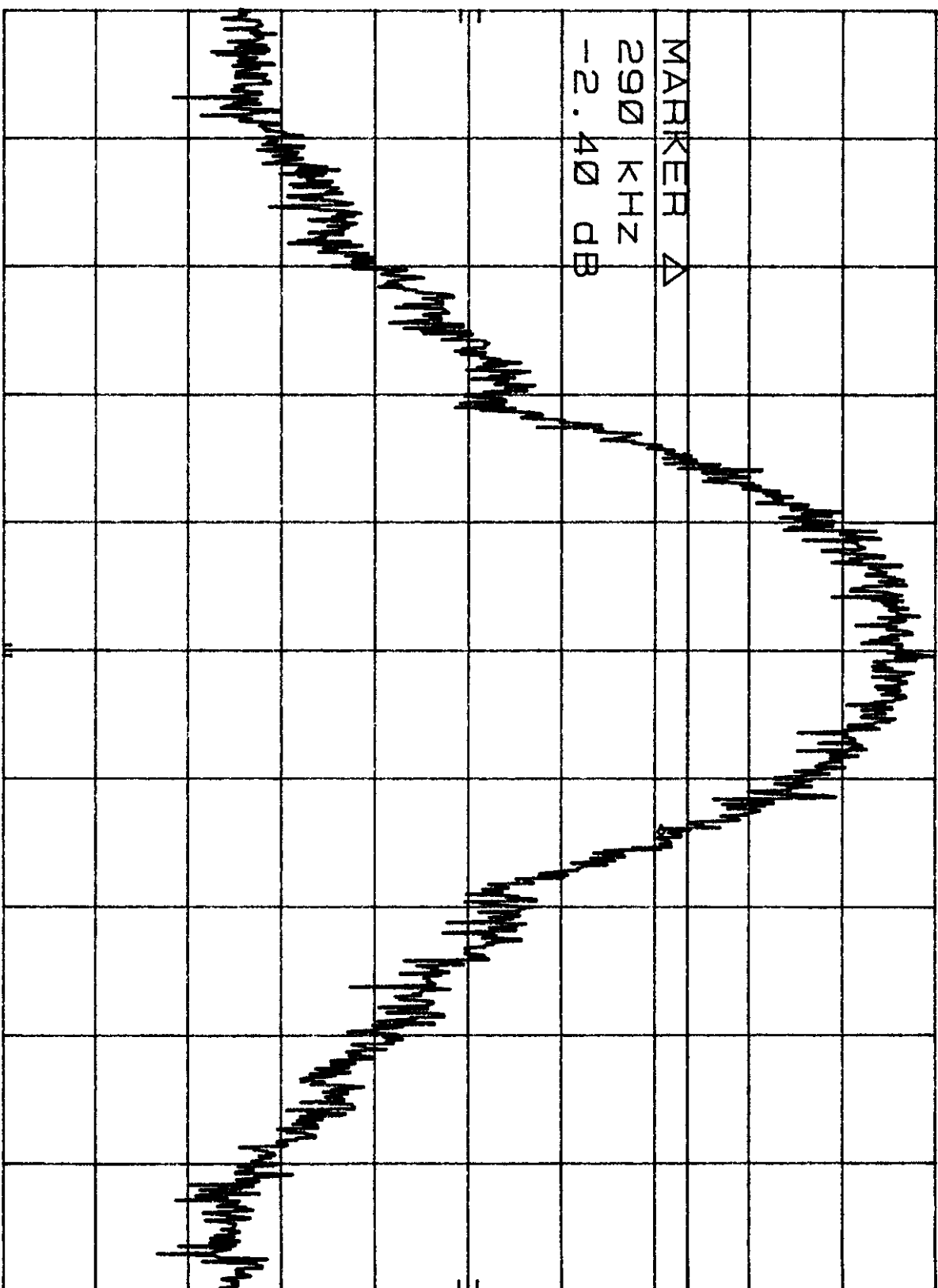
ATTEN 30 dB

MKR Δ 290 KHz
-2.40 dB

10 dB/

DL
-6.5
dBm

MARKER Δ
290 KHz
-2.40 dB



CENTER 1.895 20 GHz
RES BW 3 KHz

VBW 30 KHz

SPAN 1.00 MHz
SMP 300 msec

#22

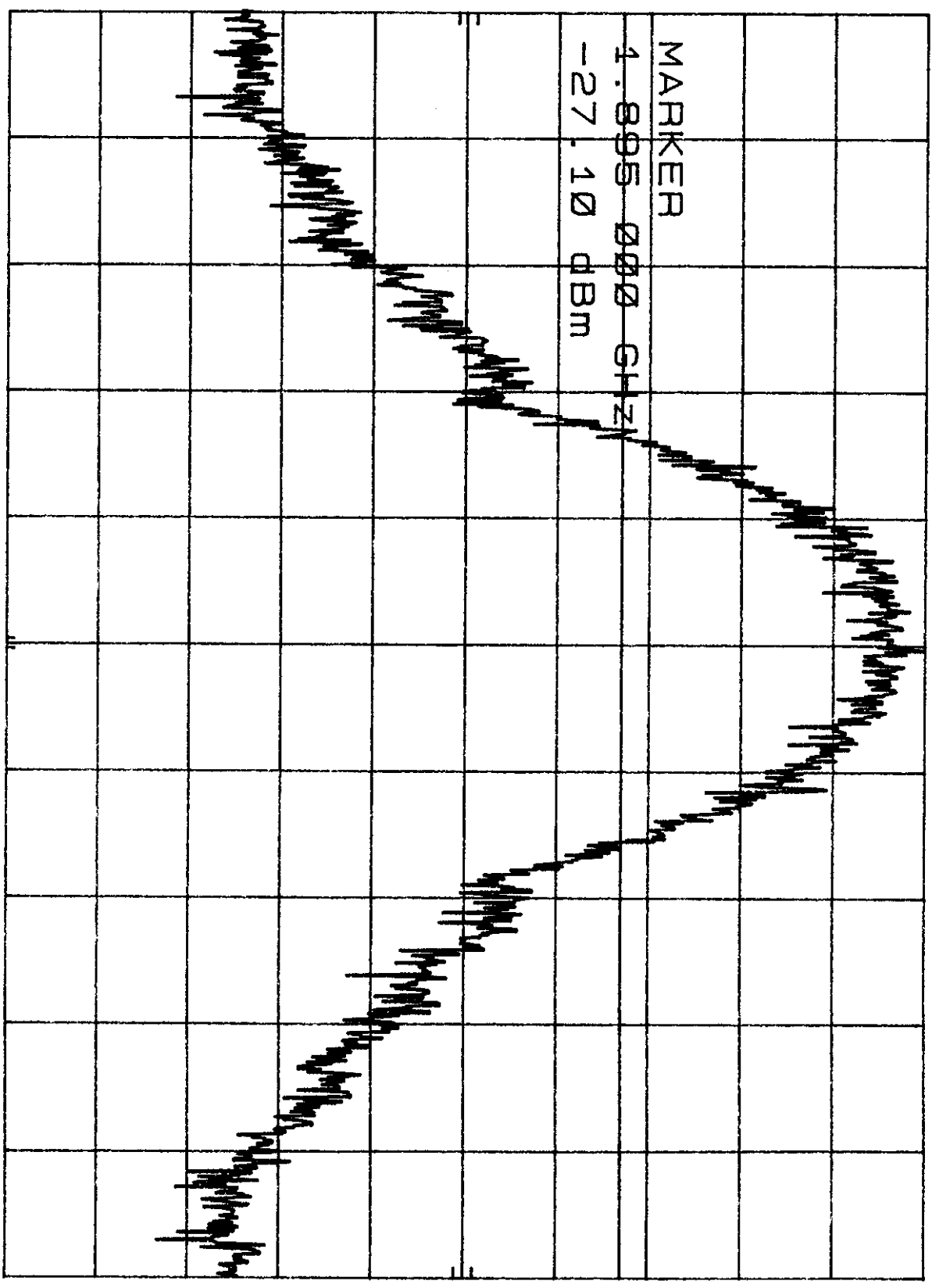
23

#23 R

WJ BANDEDGES
hpf REF 20.0 dBm ATTN 30 dB MKR 1.895 000 GHz
-27.10 dBm

10 dB/

DL
-13.0
dBm



CENTER 1.895 20 GHz RES BW 3 KHz VBW 30 KHz SWP 300 msec

#23

21

#24 R

WJ BANDEDGES

ATTEN 30 dB

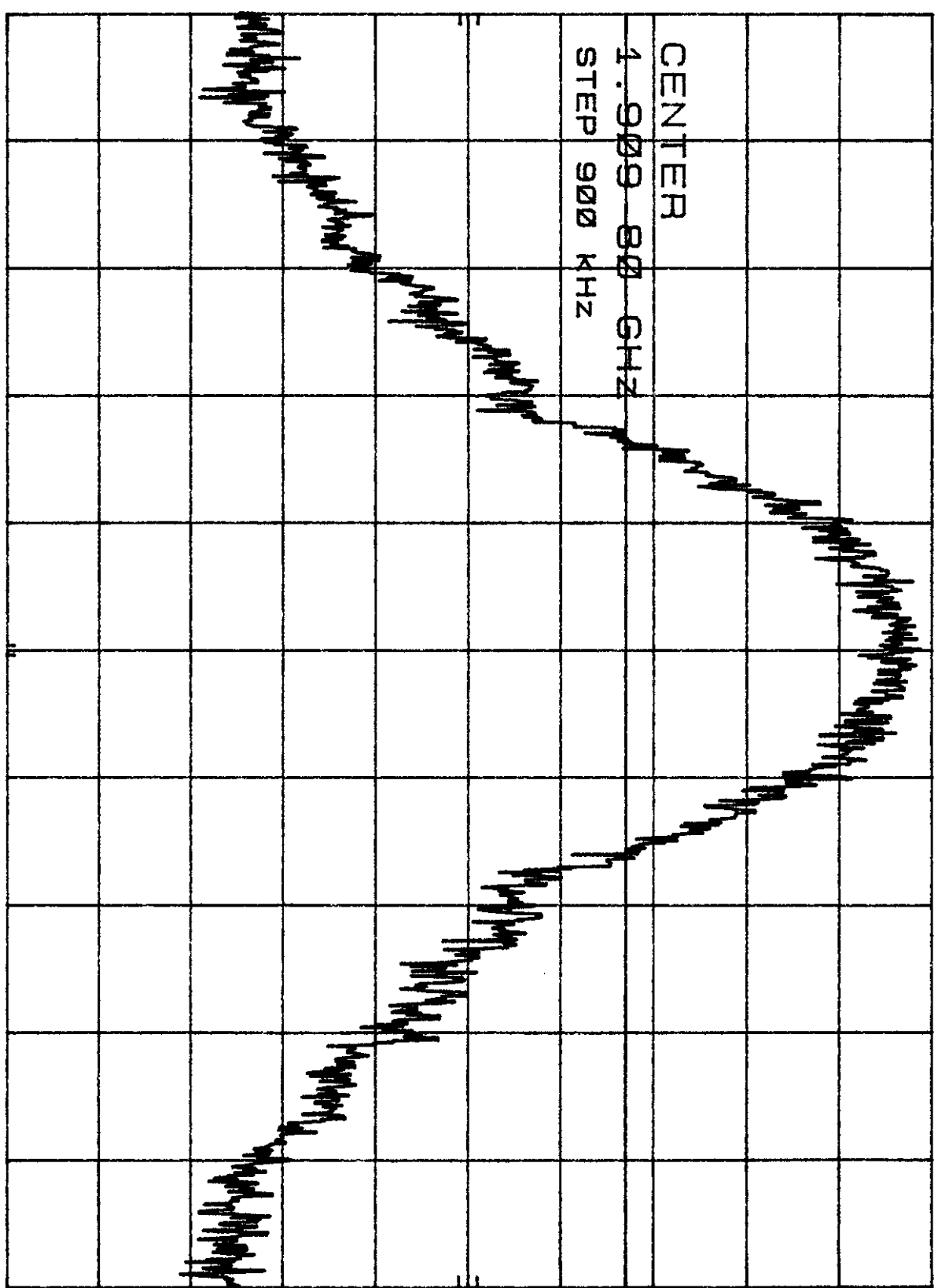
MKR 1.910 000 GHz
-25.50 dBm

10 dB/

HP

REF 20.0 dBm

DL
-13.0
dBm



CENTER 1.909 80 GHz

RES BW 3 KHz

VBW 30 KHz

SPAN 1.00 MHz
SWP 300 msec

#24

27

#27
PK

WJ BANDWIDTH
REF 20.0 dBm

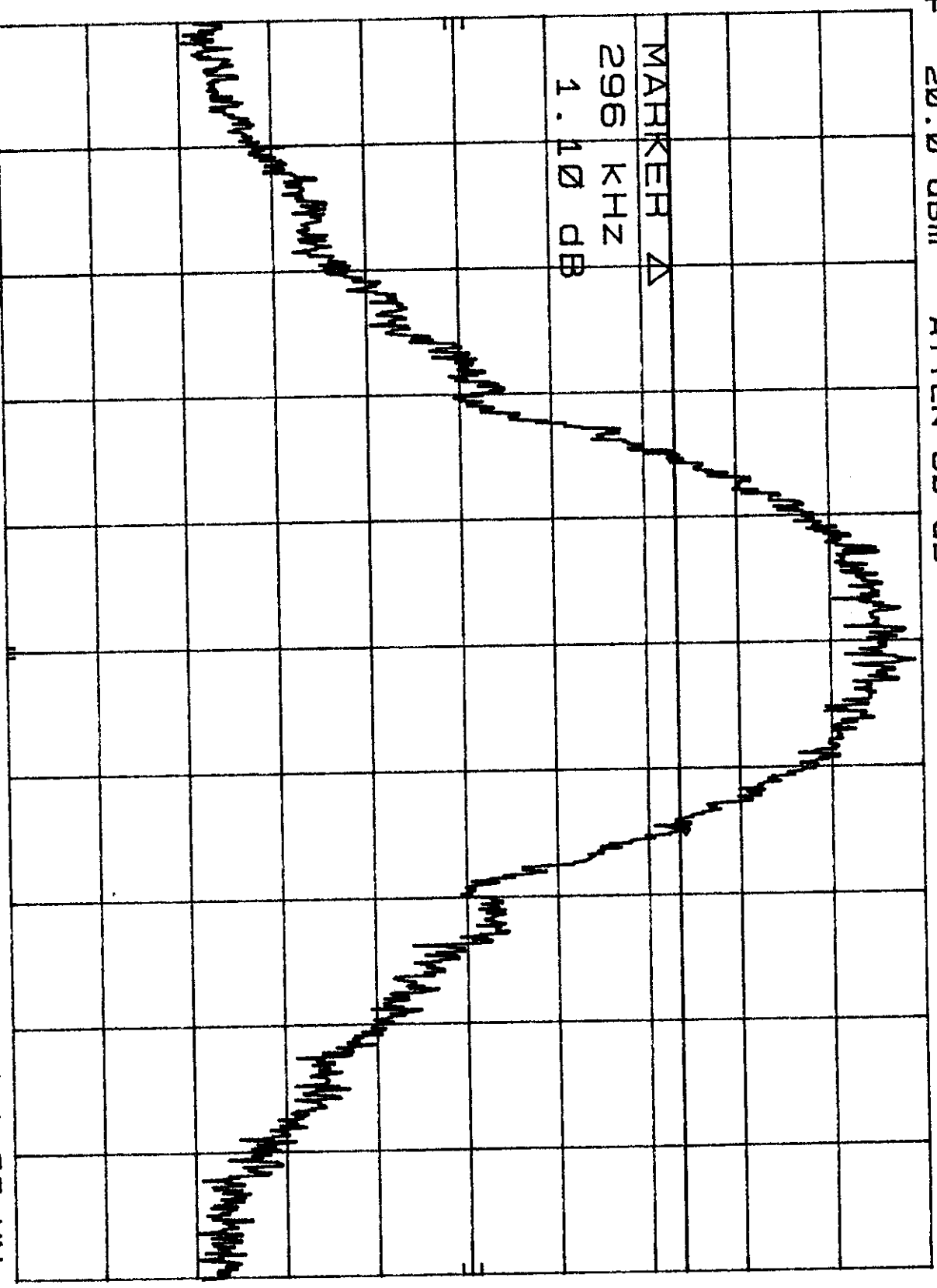
ATTEN 30 dB

MKR Δ 296 KHz
1.10 dB

hp

10 dB/

DL
-6.6
dBm



CENTER 1.970 20 GHz

RES BW 3 KHz

VBW 30 KHz

SPAN 1.00 MHz
SWP 300 msec

#27

28

#28

HP

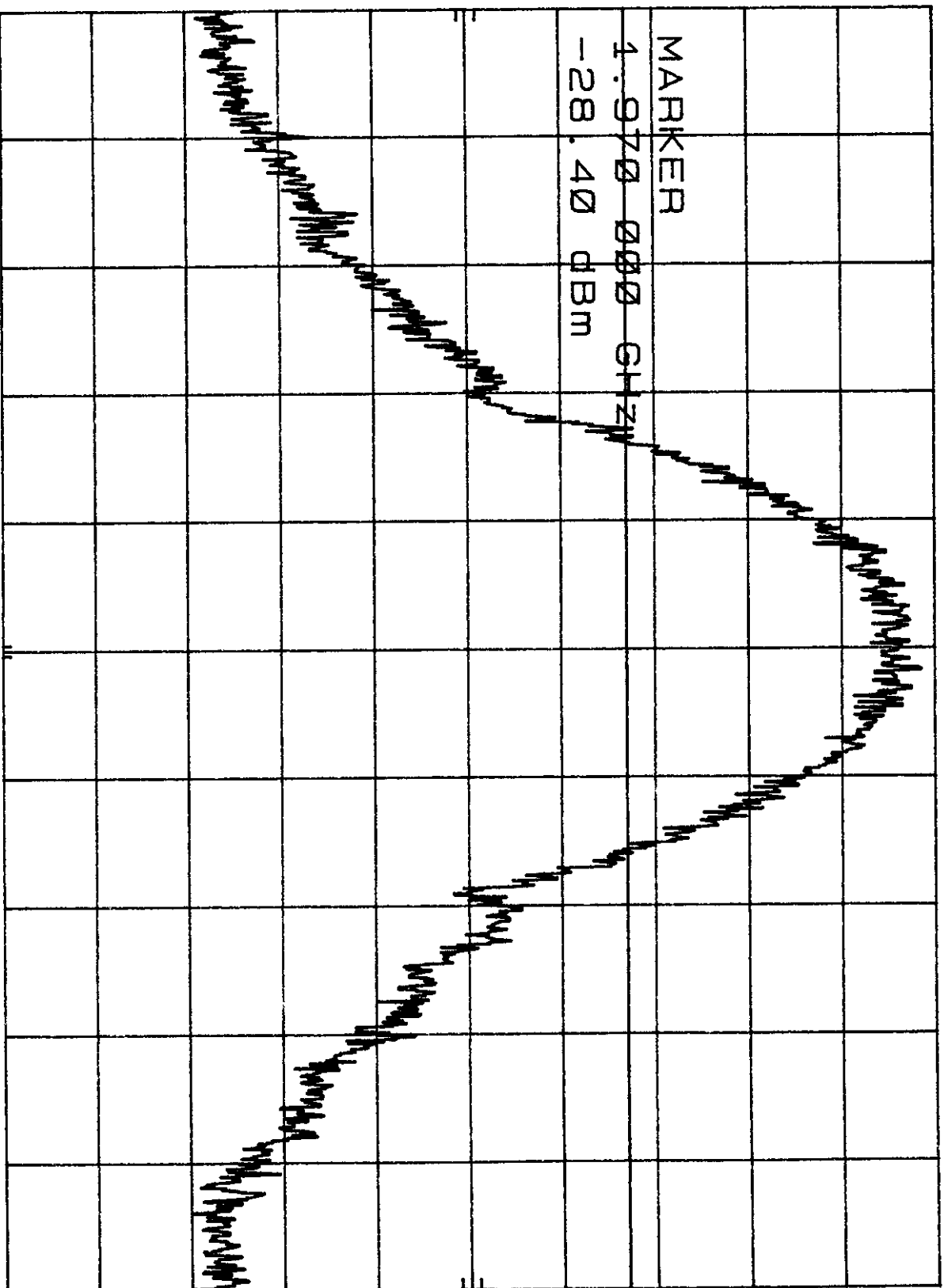
WJ BANDEDGES
REF 20.0 dBm

ATTEN 30 dB

MKR 1.970 000 GHz
-28.40 dBm

10 dB/

DL
-13.0
dBm



CENTER 1.970 20 GHz

RES BW 3 KHz

VBW 30 KHz

SPAN 1.00 MHz
SWP 300 msec

#28

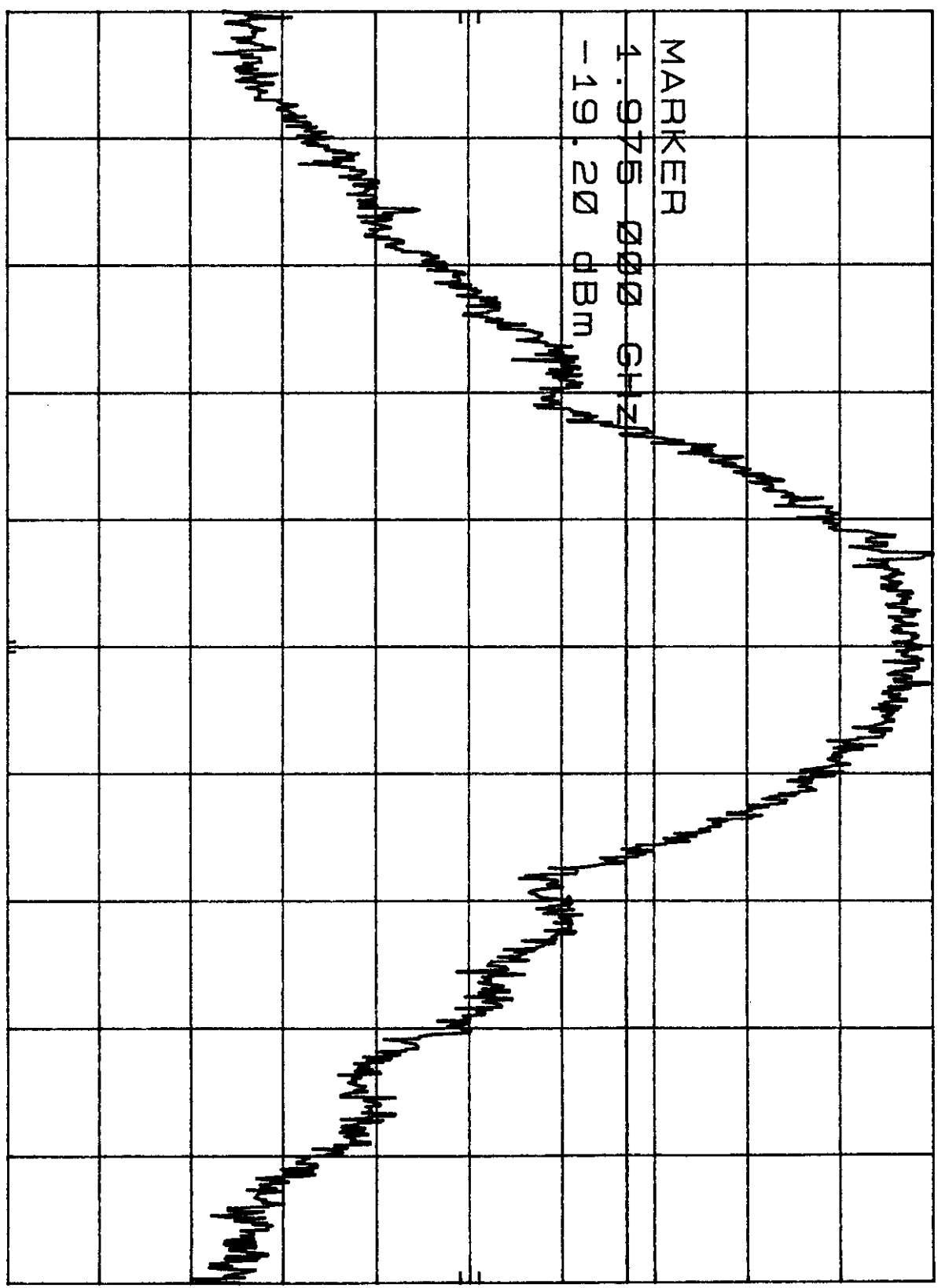
29

#29 K

WJ BANDEDGES
REF 20.0 dBm
ATTEN 30 dB
MKR 1.975 000 GHz
-19.20 dBm

10 dB/

DL
-13.0
dBm



CENTER 1.974 80 GHz
RES BW 3 KHz
VBW 30 KHz
SPAN 1.00 MHz
SWP 300 msec

#29

30

#30 SK

hp

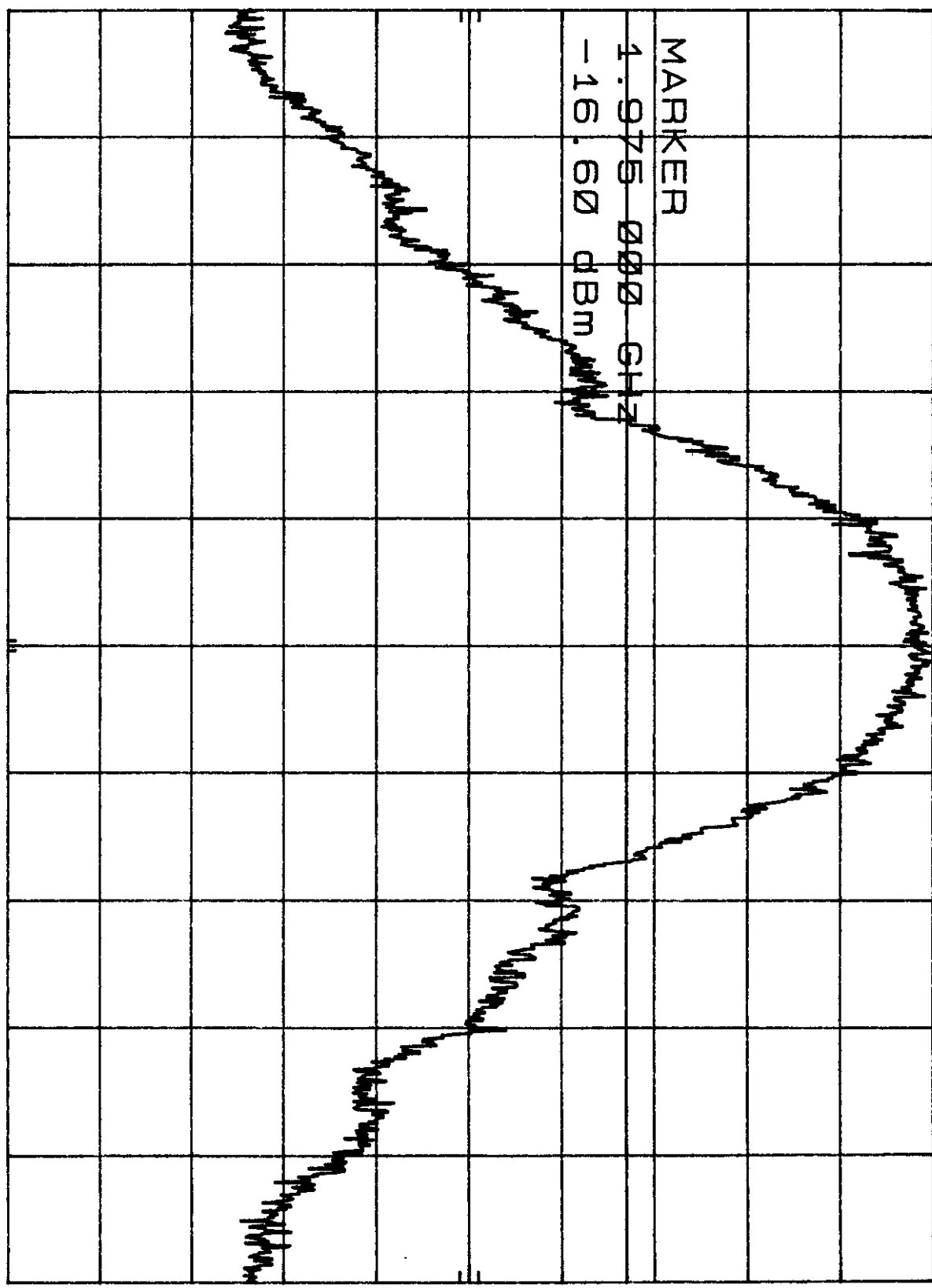
WJ BANDEDGES
REF 20.0 dBm

ATTEN 30 dB

MKR 1.975 000 GHz
-16.60 dBm

10 dB/

DL
-13.0
dBm



CENTER 1.975 20 GHz

RES BW 3 KHz

VBW 30 KHz

SPAN 1.00 MHz
SWP 300 msec

#30

31

#31
OK

WJ BANDEDGES
REF 20.0 dBm

ATTEN 30 dB

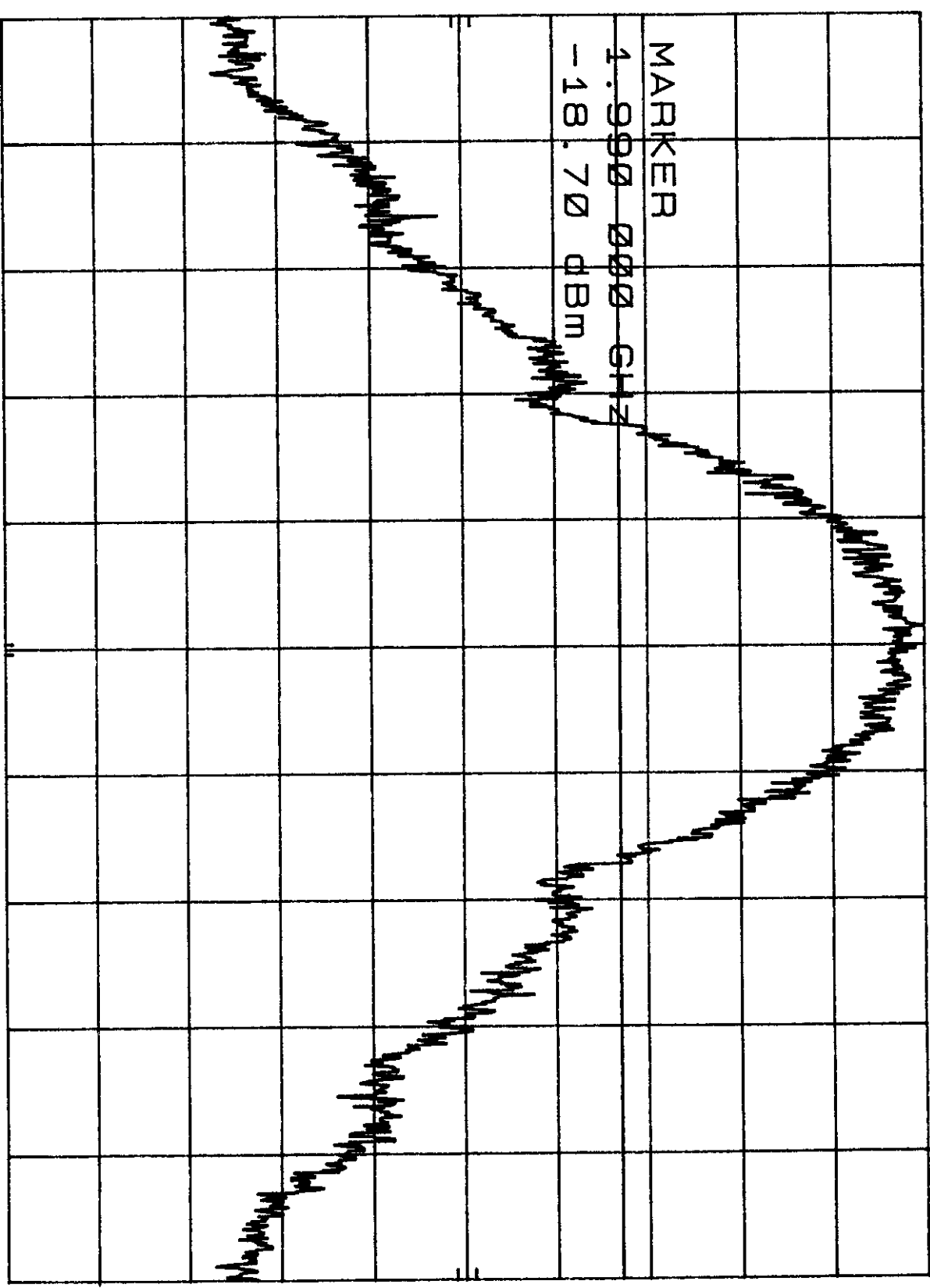
MRK 1.990 000 GHz
-18.70 dBm

10 dB/

DL
-13.0
dBm

MARKER

1.990 000 GHz
-18.70 dBm



CENTER 1.989 80 GHz
RES BW 3 KHZ

VBW 30 KHZ

SPAN 1.00 MHz
SWP 300 msec

#31

hp

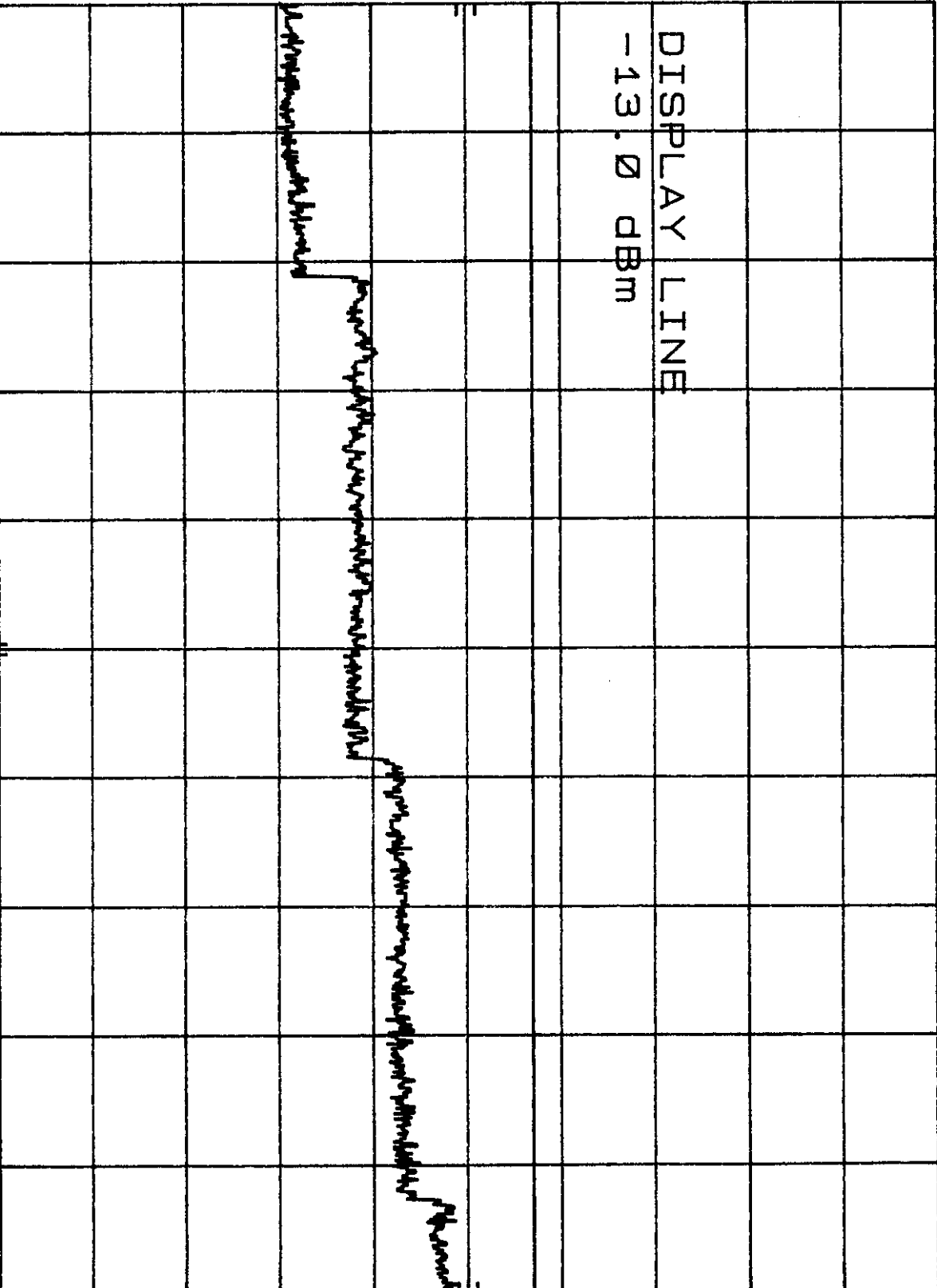
WJ SPURIOUS
REF 30.0 dBm

ATTEN 40 dB

MKR 19.81 GHz
-22.10 dBm

10 dB/

DL
-13.0
dBm



START 2.0 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 19.9 GHz
SWP 448 msec

#32

32

#32

WJ SPURIOUS

MKR 1.990 GHz

REF 30.0 dBm

ATTEN 40 dB

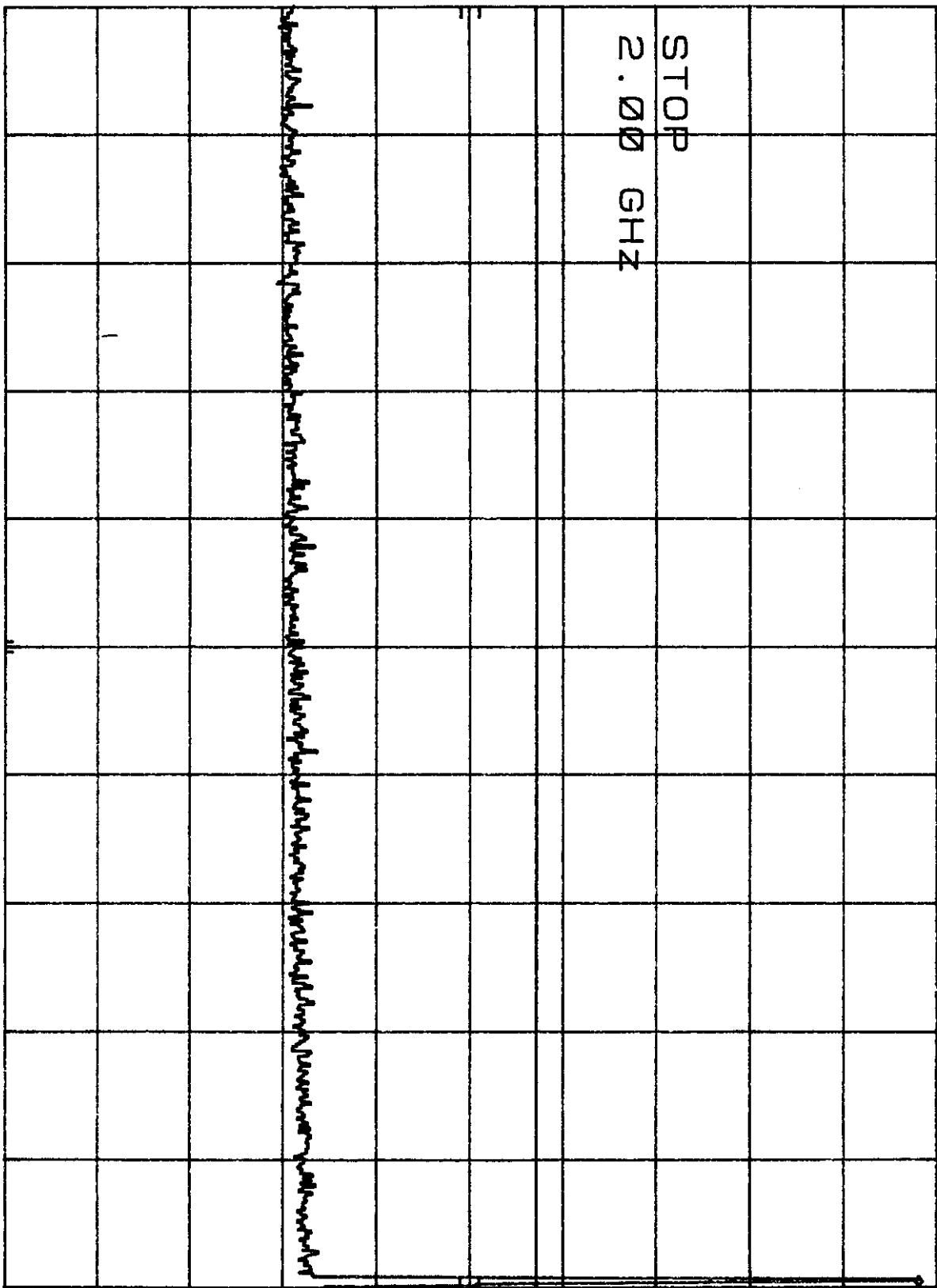
28.00 dBm

HP

10 dB/

DL
-13.0
dBm

STOP
2.00 GHz



START 30 MHz

RES BW 1 MHz

VSW 1 MHz

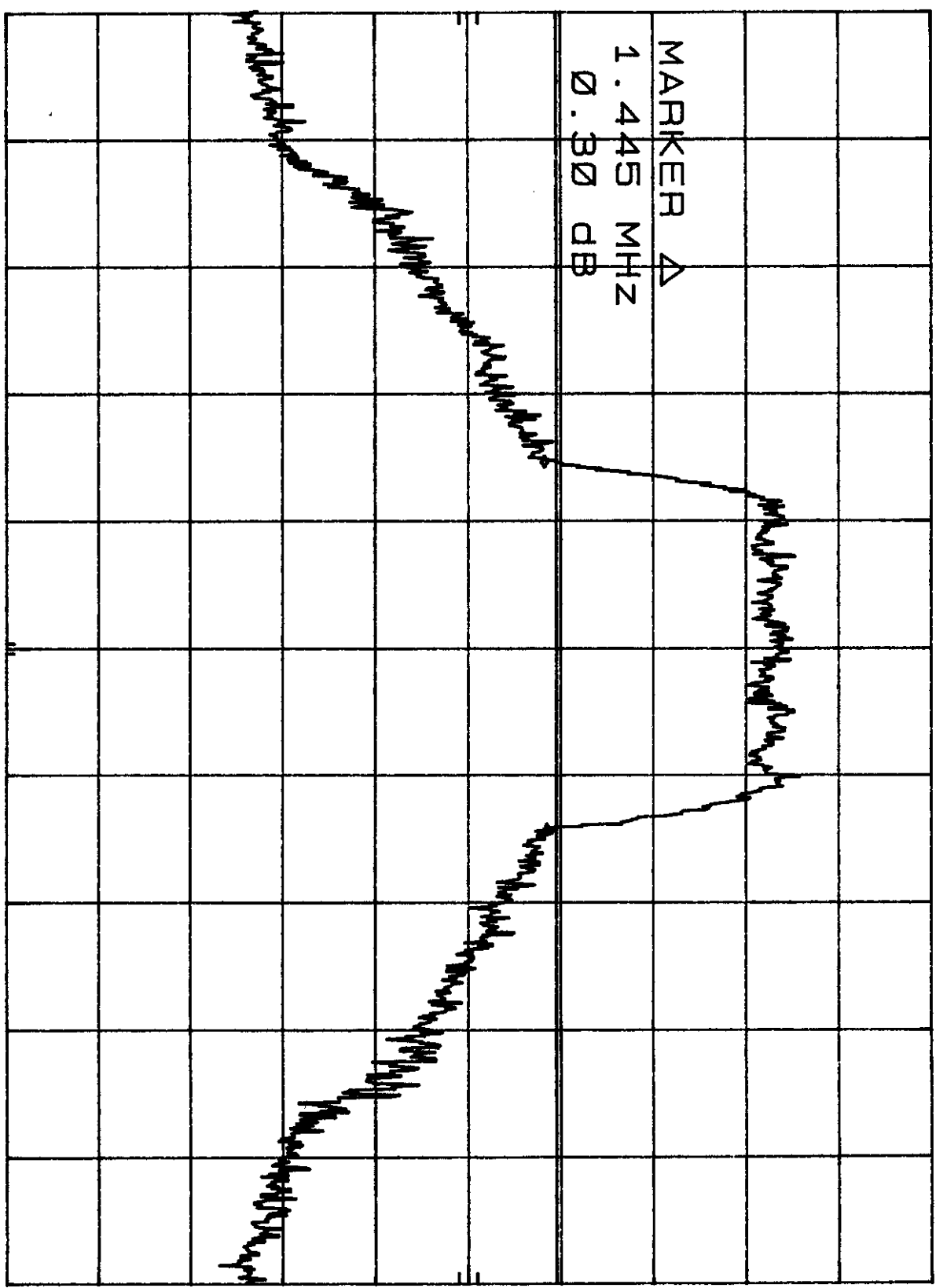
STOP 2.00 GHz
SWP 49.3 msec

#32

44
#33 R

WJ BANDWIDTH
REF 30.0 dBm
ATTEN 40 dB
MKR Δ 1.445 MHz
0.30 dB

DL
-10.5
dBm



CENTER 1.950 GHz
RES BW 30 KHz
VBW 1 MHz
SPAN 5.00 MHz
SWP 20.0 msec

#33

35

#35 PK

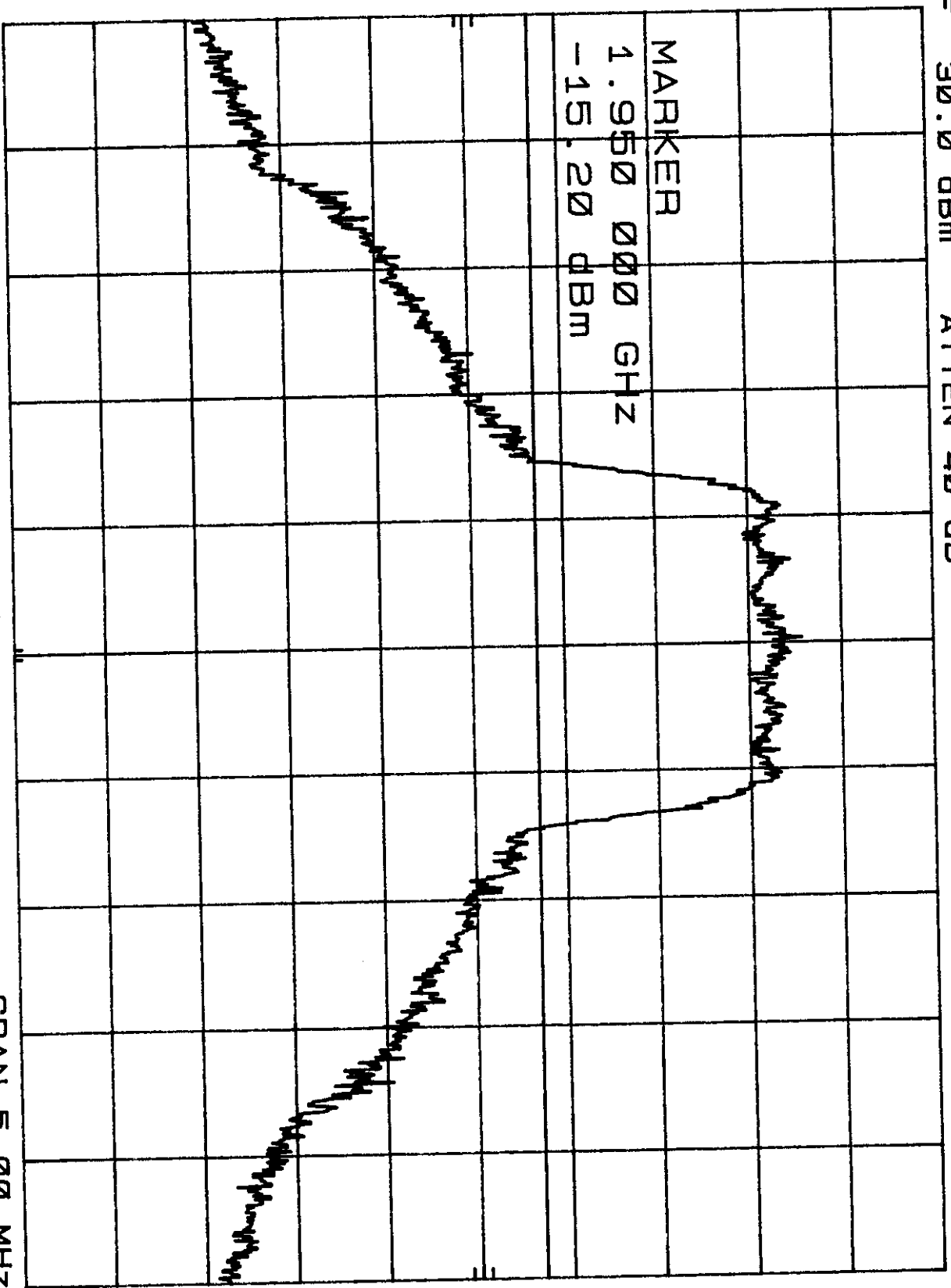
hp WJ BANDEDGES
REF 30.0 dBm

ATTEN 40 dB

MKR 1.950 000 GHz
-15.20 dBm

10 dB/

DL
-13.0
dBm



CENTER 1.950 80 GHz
RES BW 30 KHz

VBW 1 MHz

SPAN 5.00 MHz
SWP 20.0 msec

#35

WJ BANDEDGES

hp

REF 30.0 dBm

ATTEN 40 dB

34

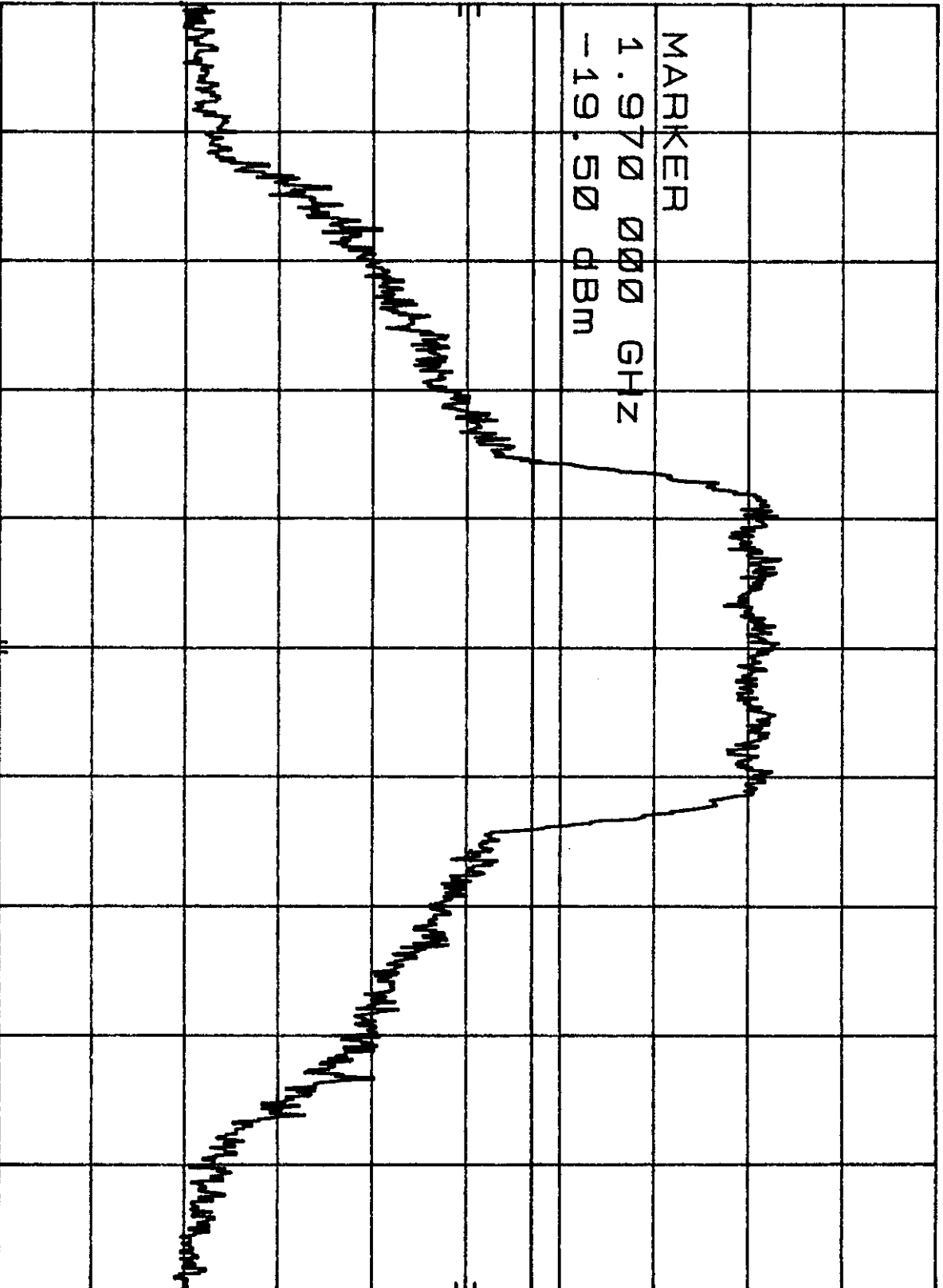
MARK 1.970 000 GHz

-19.50 dBm

#37 PK

10 dB/

DL
-13.0
dBm



CENTER 1.969 20 GHz

RES BW 30 KHz

VBW 1 MHz

SPAN 5.00 MHz
SWP 20.0 msec

#37

hp

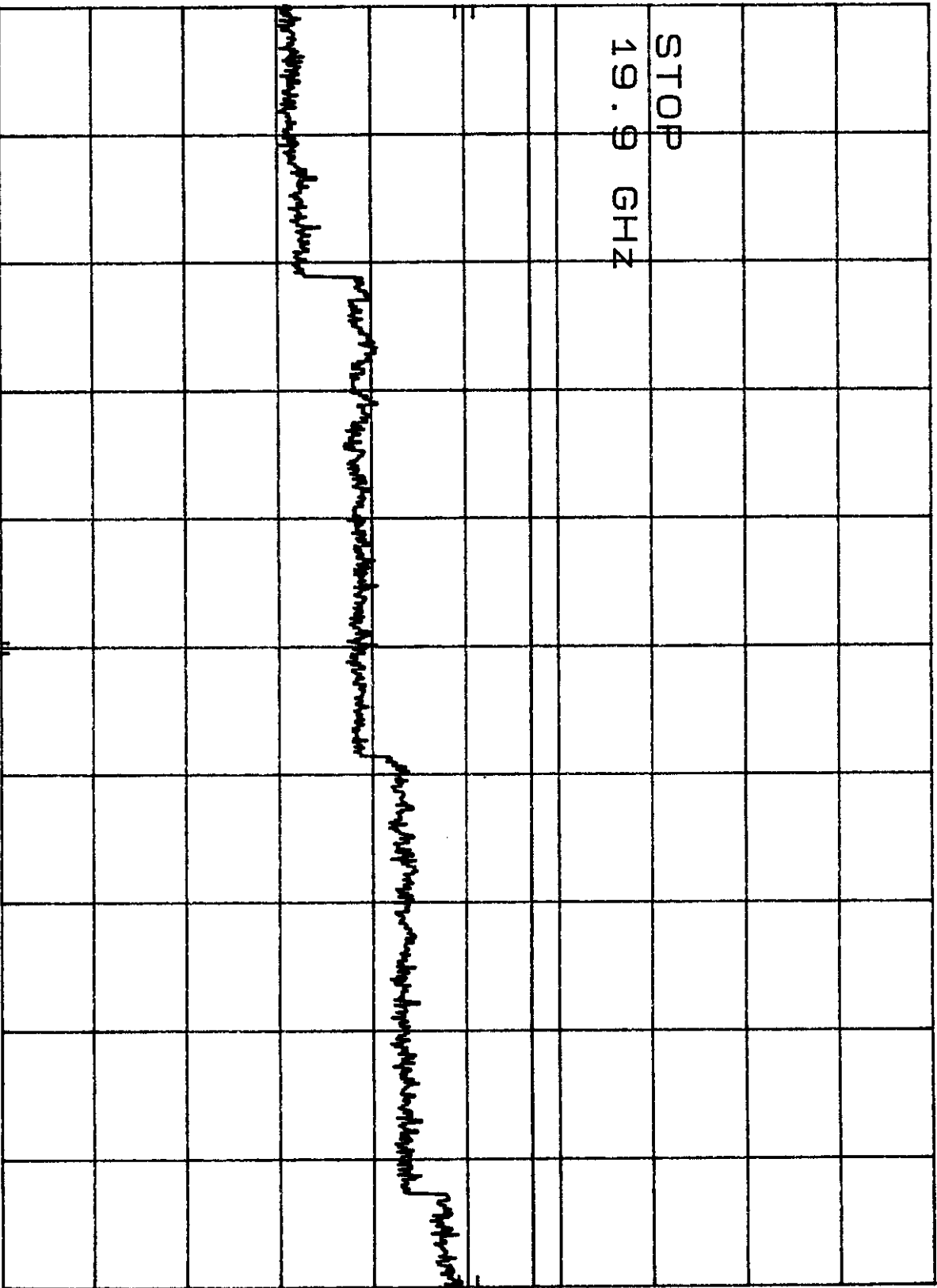
WJ SPURIOUS
REF 30.0 dBm

ATTEN 40 dB

MKR 19.65 GHz
-22.00 dBm

10 dB/

DL
-13.0
dBm



STOP
19.9 GHz

START 2.0 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 19.9 GHz
SWP 448 msec

#38

39

#39
OK

WJ SPURIOUS

MKR 1.890 GHz

REF 30.0 dBm

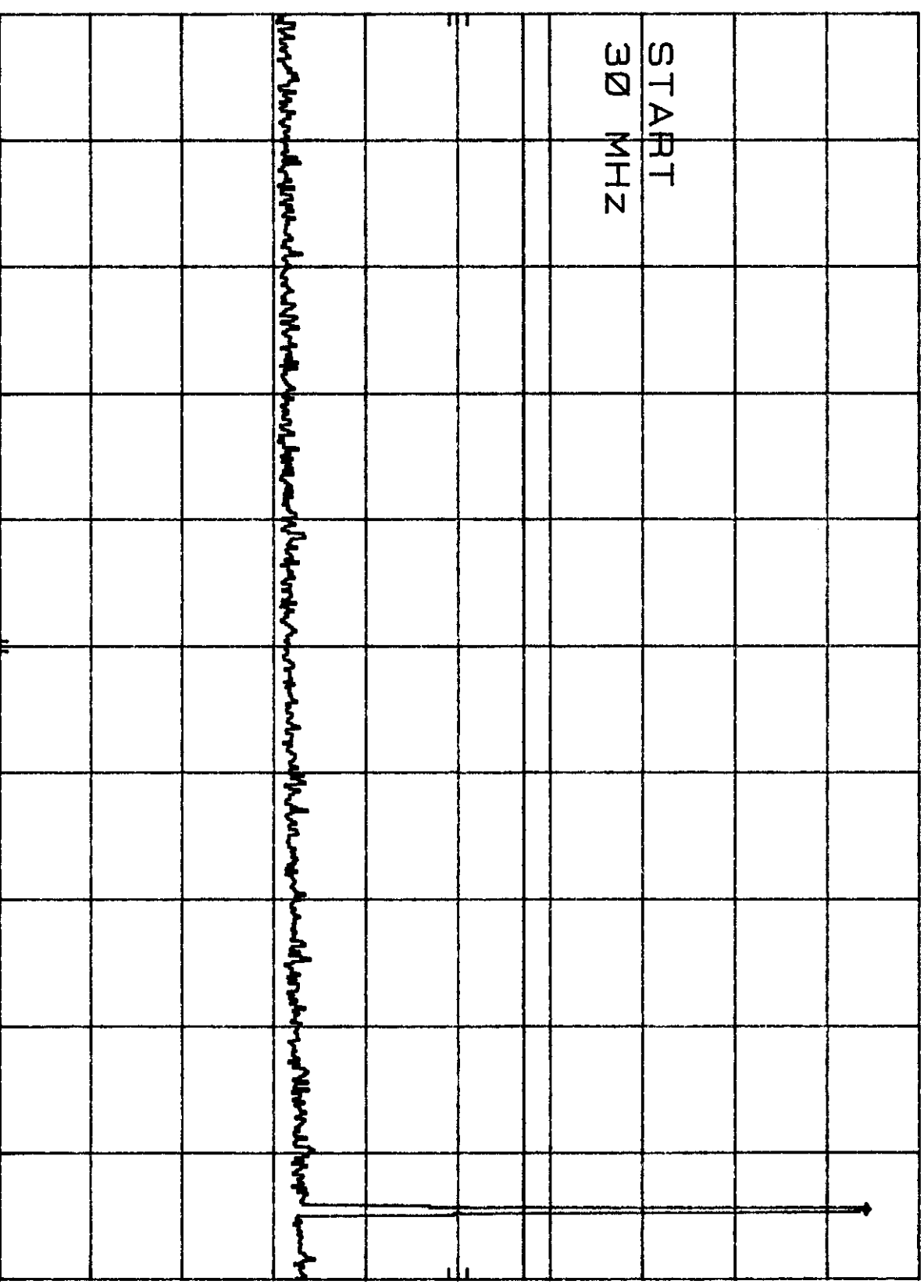
ATTEN 40 dB

24.30 dBm

10 dB/

HP

DL
-13.0
dBm



START 30 MHz

RES BW 1 MHz

VBW 1 MHz

STOP 2.00 GHz

SWP 49.3 msec

#39

hp

WJ BANDWIDTH
REF 30.0 dBm

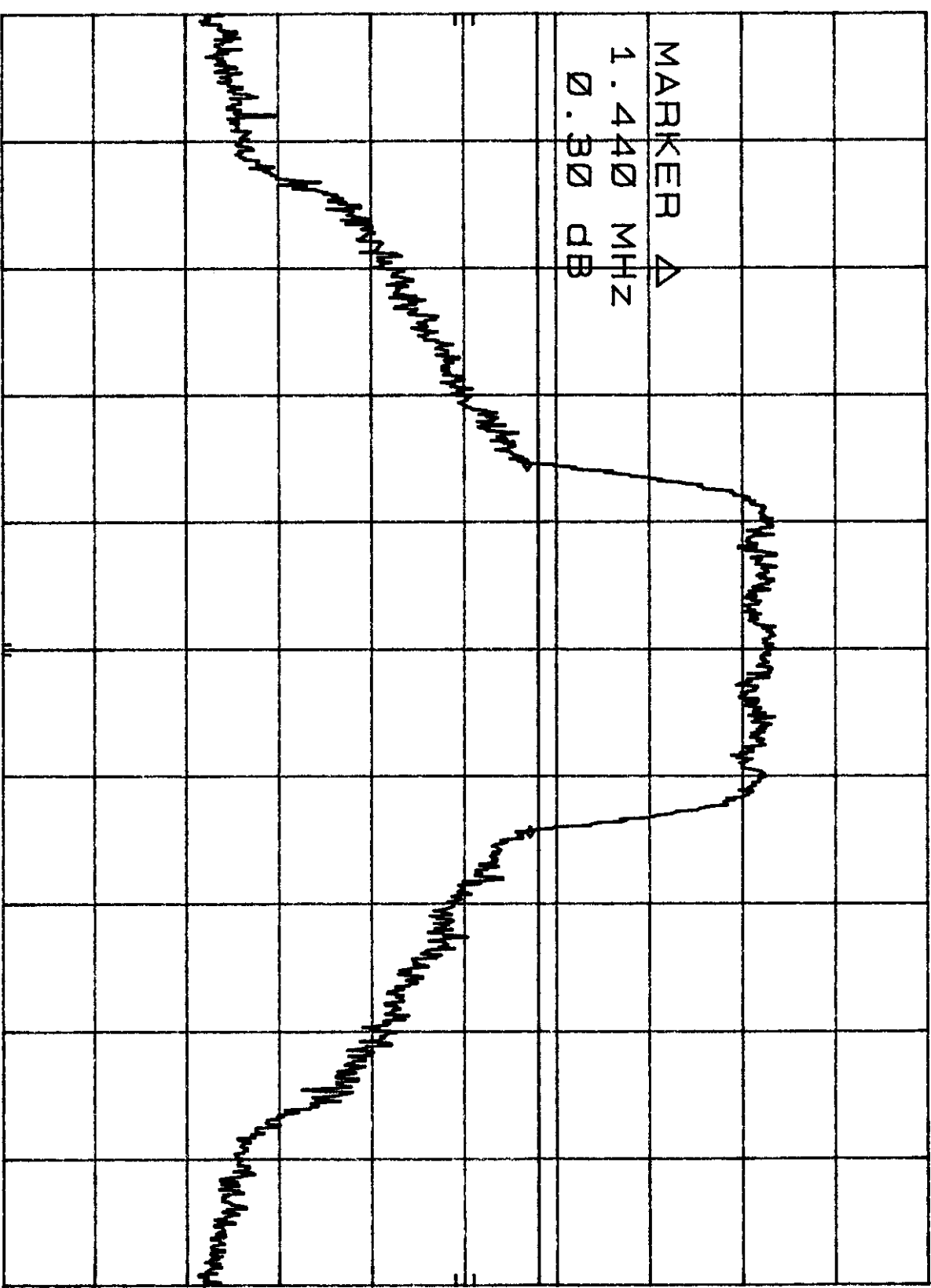
ATTEN 40 dB

MKR Δ 1.440 MHz
0.30 dB

10 dB/

DL
-12.0
dBm

MARKER Δ
1.440 MHz
0.30 dB



CENTER 1.089 20 GHz
RES BW 30 KHz

VBW 1 MHz

SPAN 5.00 MHz
SWP 20.0 msec

41

#41

PK

#41

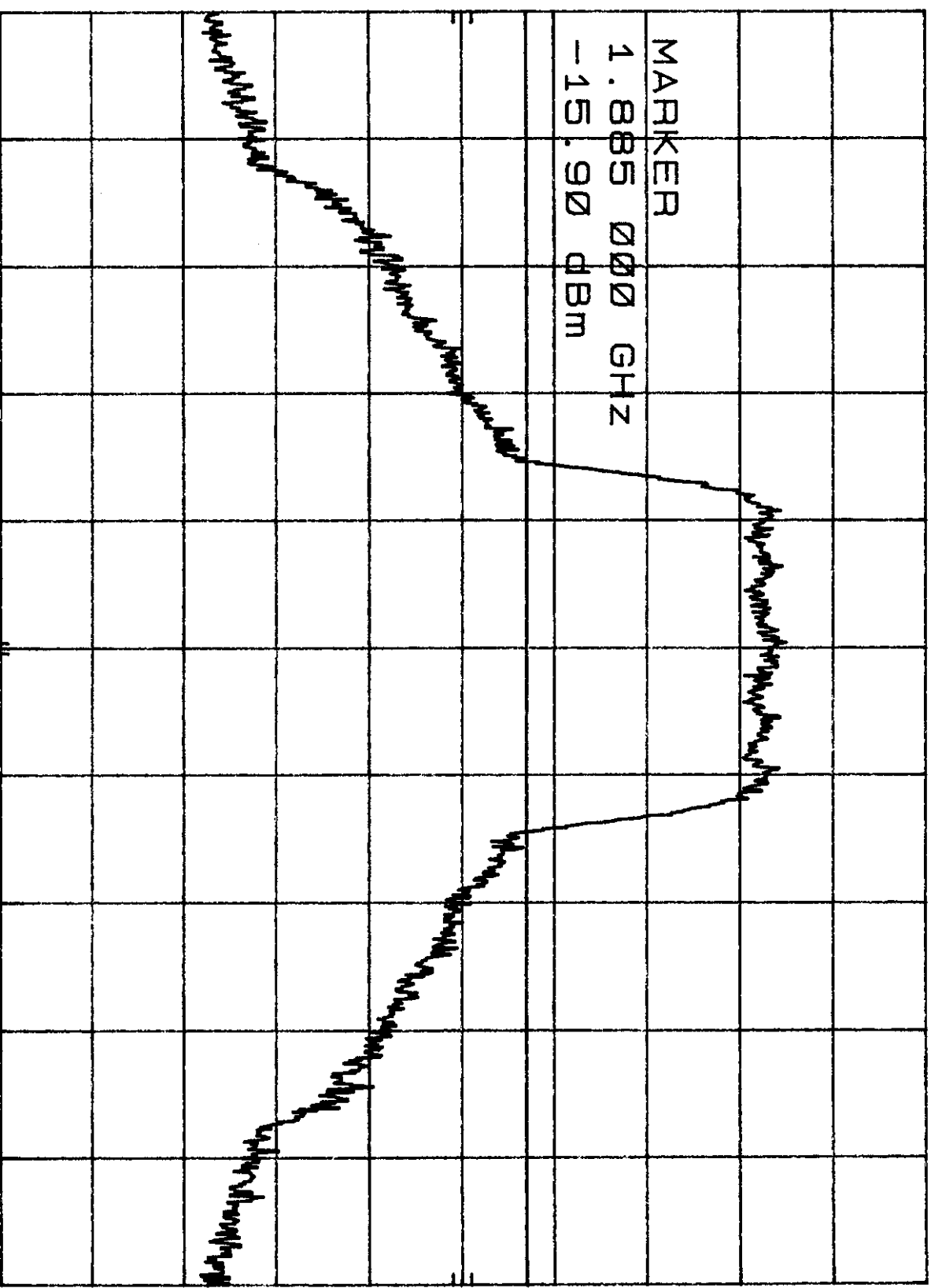
42

#42
PK

WJ BANDEDGES
REF 30.0 dBm
ATTEN 40 dB
MKR 1.885 000 GHz
-15.90 dBm

10 dB/

DL
-13.0
dBm



CENTER 1.885 00 GHz
RES BW 30 KHZ
VBW 1 MHZ
SPAN 5.00 MHZ
SWP 20.0 msec

#42

43

#43 PK

WJ BANDEDGES

MKR 1.885 000 GHz

REF 30.0 dBm

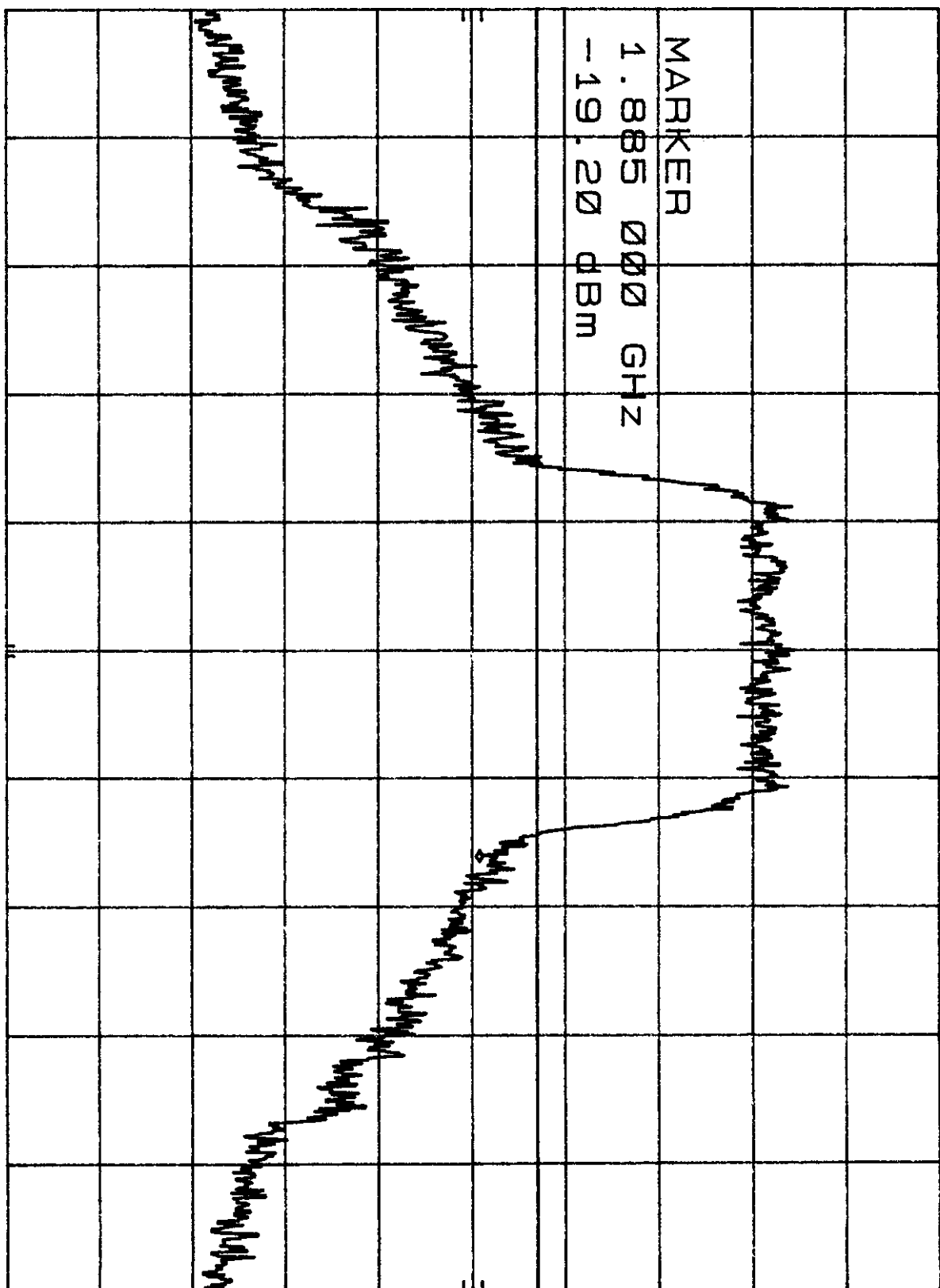
ATTEN 40 dB

-19.20 dBm

HP

10 dB/

DL
-13.0
dBm



CENTER 1.884 20 GHz
RES BW 30 KHz

VBW 1 MHz

SPAN 5.00 MHz
SWP 20.0 msec

#43

44

#44 PK

WJ BANDEDGES

MKR 1.870 000 GHZ

REF 30.0 dBm

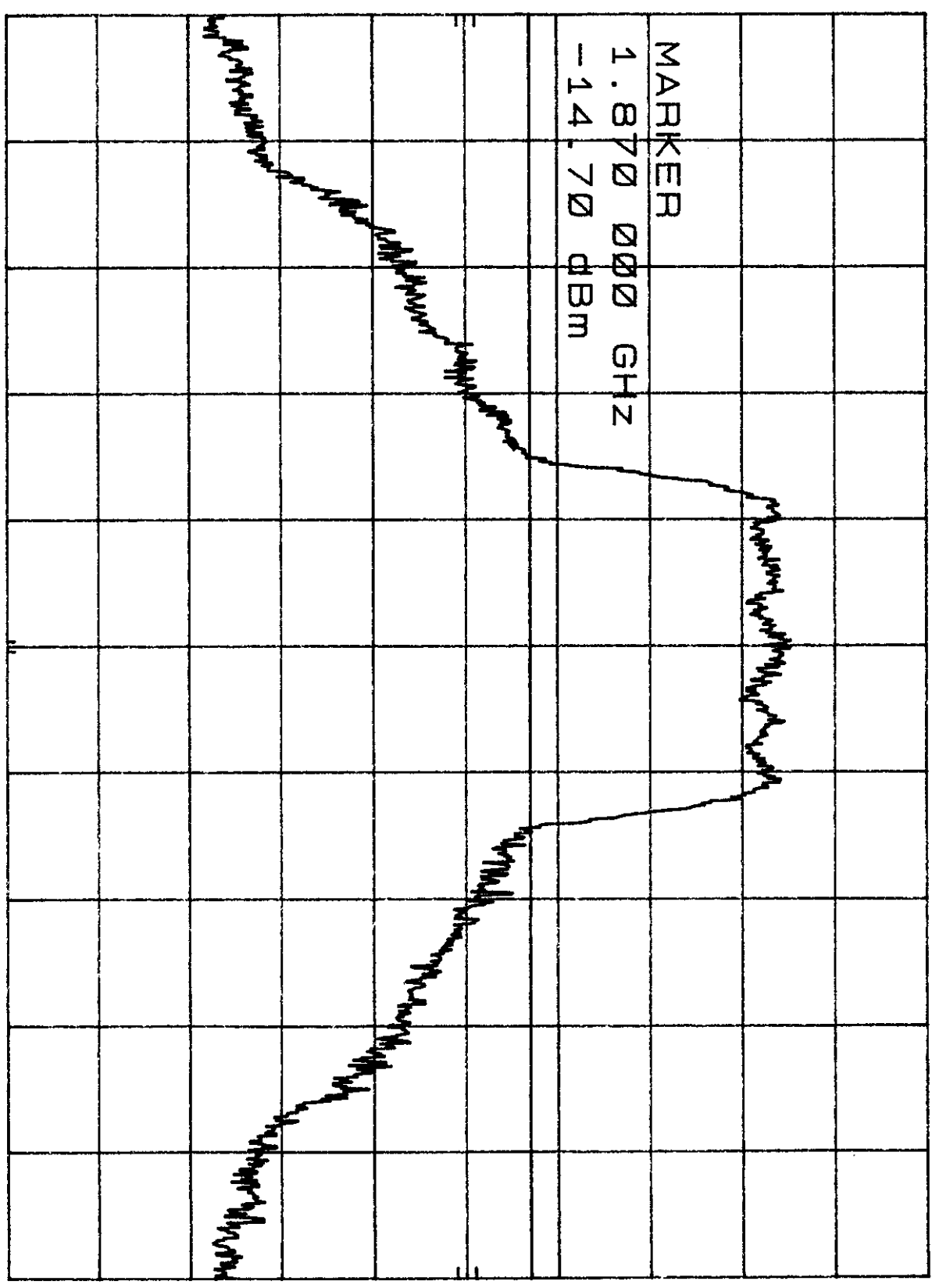
ATTEN 40 dB

-14.70 dBm

HP

10 dB/

DL
-13.0
dBm



CENTER 1.870 80 GHZ
RES BW 30 KHZ

VBW 1 MHZ

SPAN 5.00 MHZ
SWP 20.0 msec

#44

45

#45 PK

hp

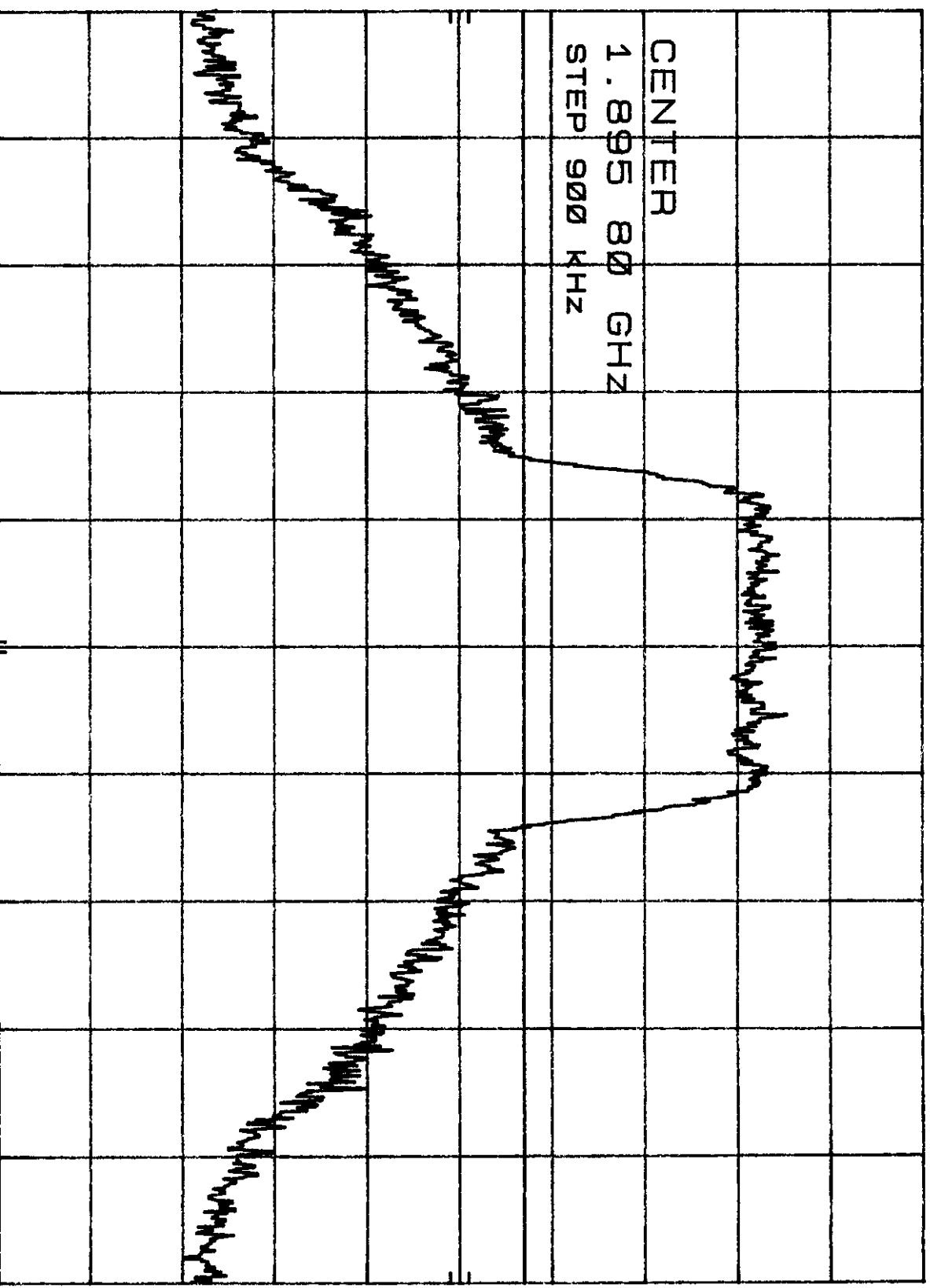
WJ BANDEDGES
REF 30.0 dBm

ATTEN 40 dB

MKR 1.895 000 GHz
-16.10 dBm

10 dB/

DL
-13.0
dBm



CENTER 1.895 80 GHz

RES BW 30 KHZ

VBW 1 MHZ

SPAN 5.00 MHz
SWP 20.0 msec

#45

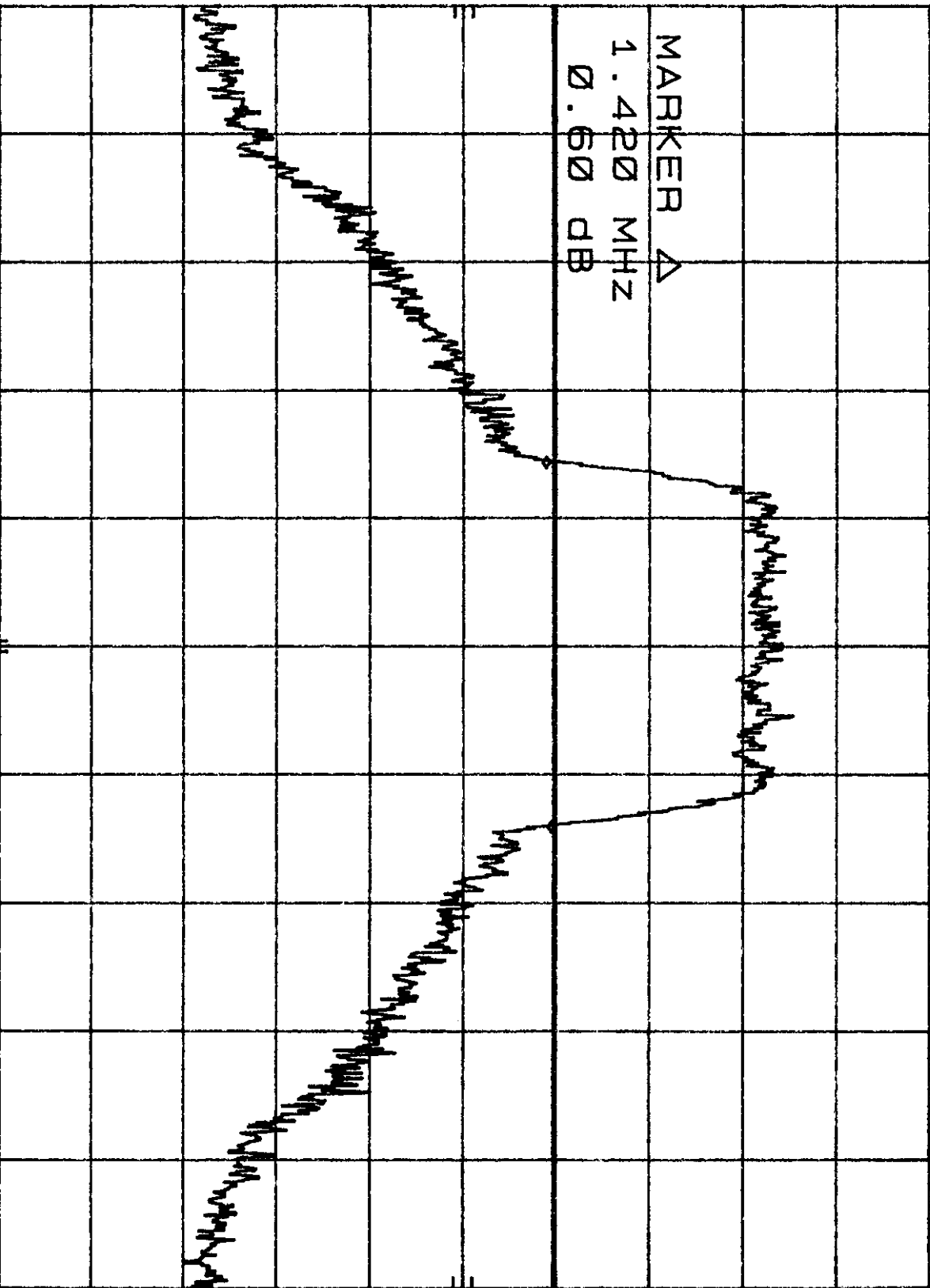
46

#46
PK

WJ BANDWIDTH 30.0 dBm REF 30.0 dBm ATTN 40 dB MKR Δ 1.420 MHz 0.60 dB

10 dB/

DL
-10.3
dBm



CENTER 1.895 80 GHz RES BW 30 KHz VBW 1 MHz SPAN 5.00 MHz SWP 20.0 msec

#46

47

#47-5

WJ SPURIOUS

MKR 1.898 GHz

REF 30.0 dBm

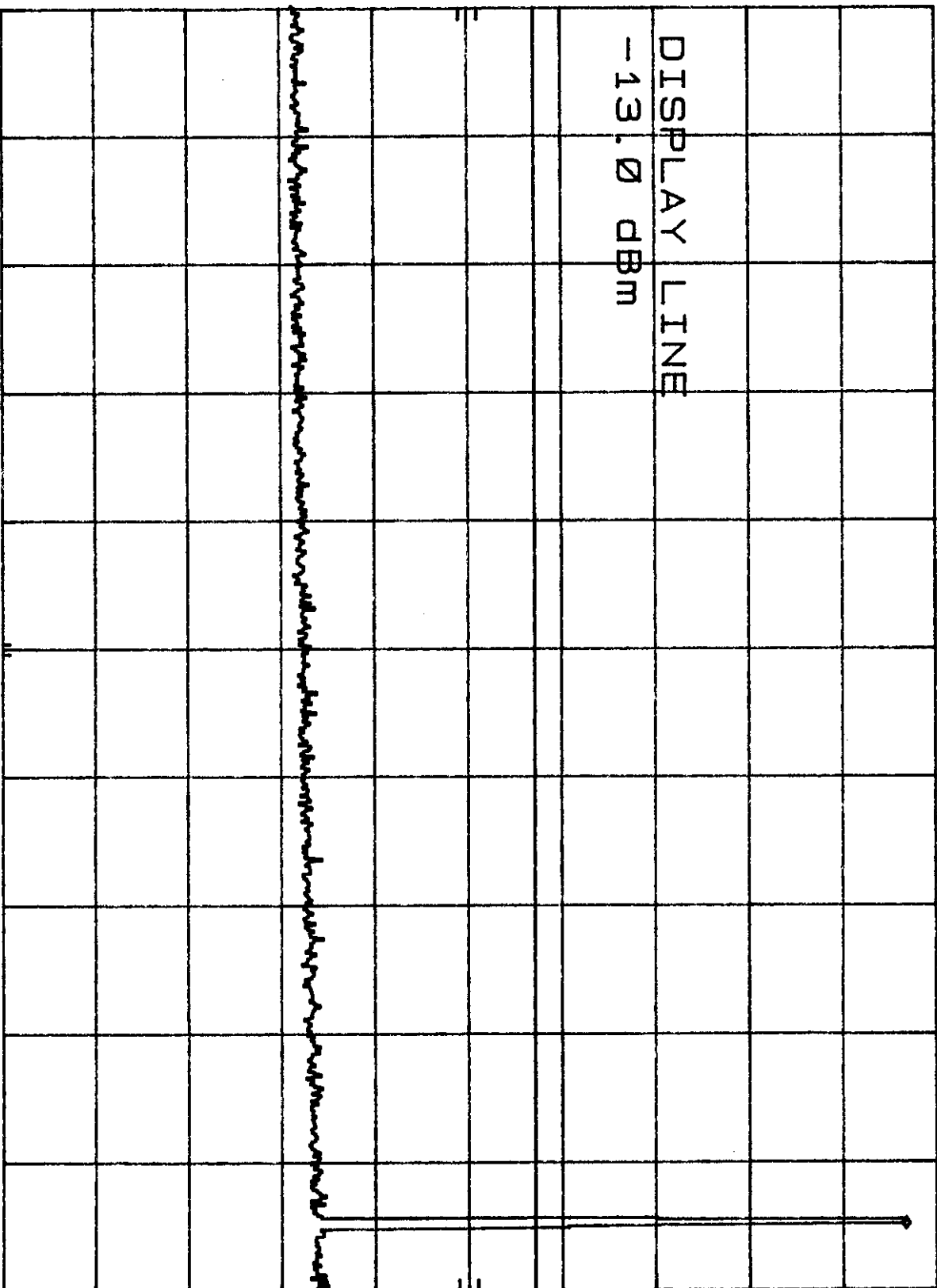
ATTEN 40 dB

26.70 dBm

hp

10 dB/

DL
-13.0
dBm



START 30 MHz

RES BW 1 MHz

VBW 1 MHz

STOP 2.00 GHz
SWP 49.3 msec

#47

hp

WJ SPURIOUS
REF 30.0 dBm

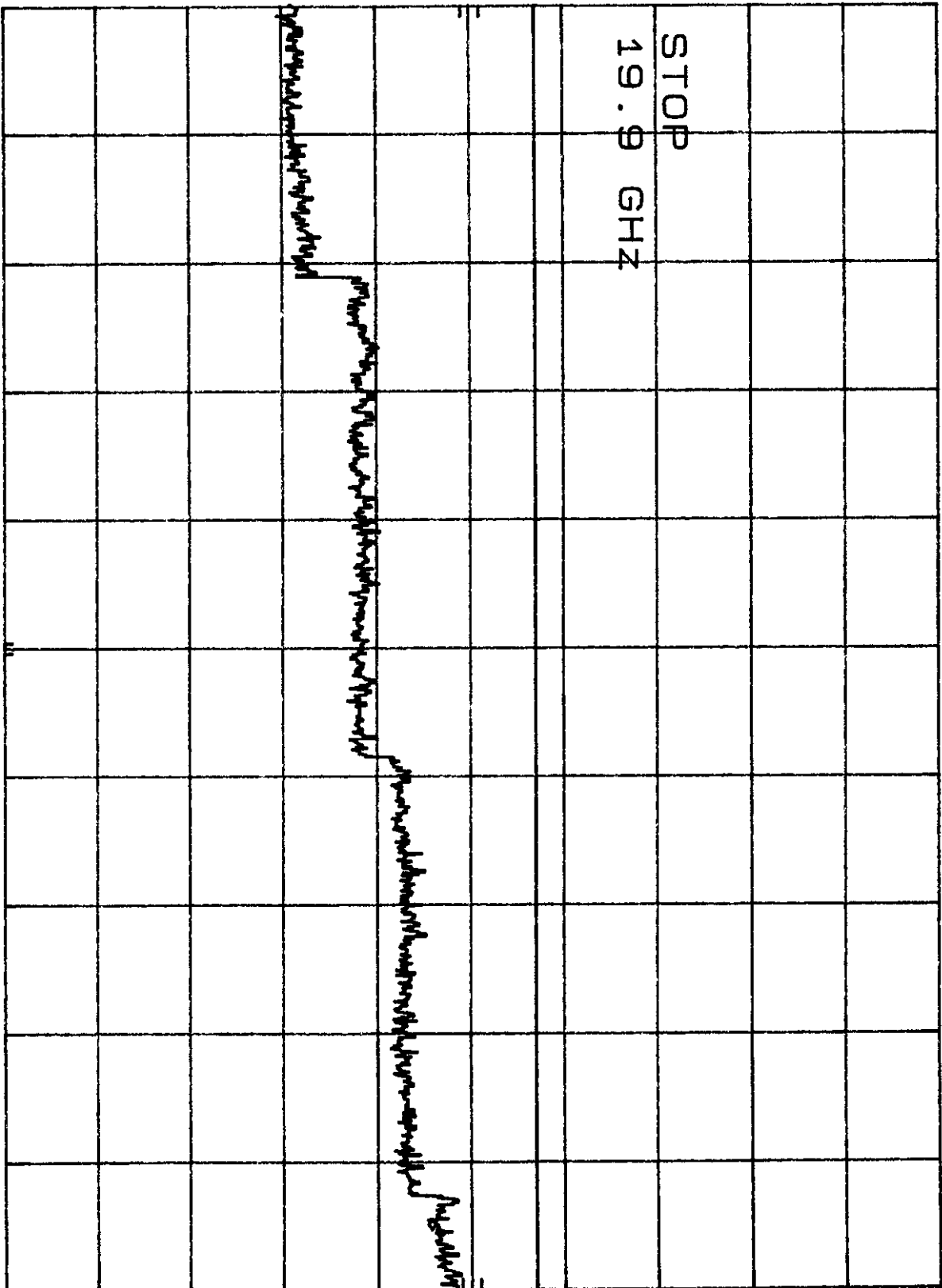
ATTEN 40 dB

MKR 18.97 GHz
-24.30 dBm

10 dB/

DL
-13.0
dBm

STOP
19.9 GHz



START 2.0 GHz

RES BW 1 MHz

VBW 1 MHz

STOP 19.9 GHz
SWP 448 msec

#47

WJ BANDEDGES
h₀ REF 30.0 dBm

ATTEN 40 dB

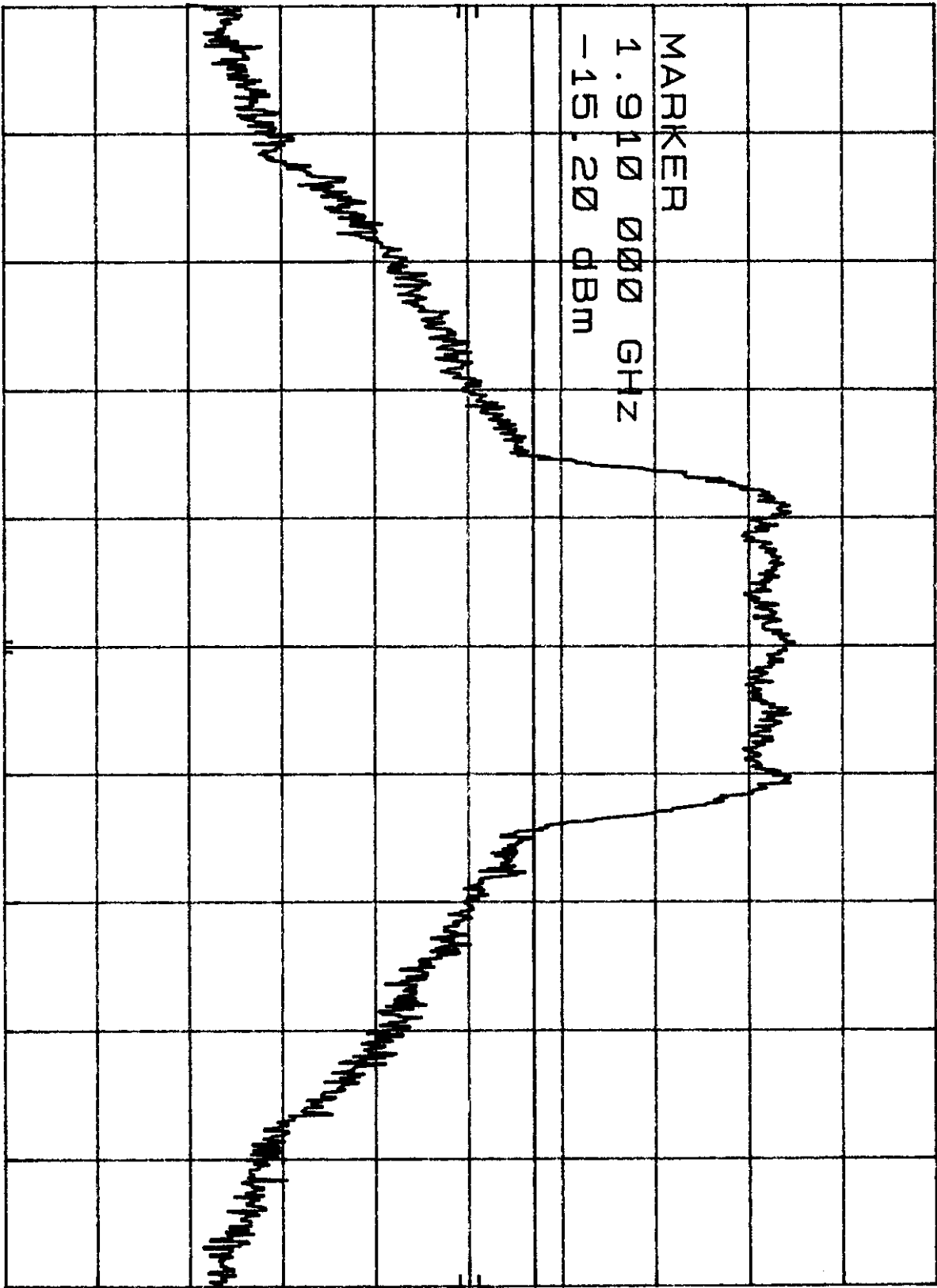
MKR 1.910 000 GHz
-15.20 dBm

48

#482

10 dB/

DL
-13.0
dBm



CENTER 1.909 20 GHz
RES BW 30 KHz

VBW 1 MHz

SPAN 5.00 MHz
SWP 20.0 msec

#48

HP

WJ BANDEDGES
REF 30.0 dBm

ATTEN 40 dB

MKR 1.890 000 GHz
-15.20 dBm

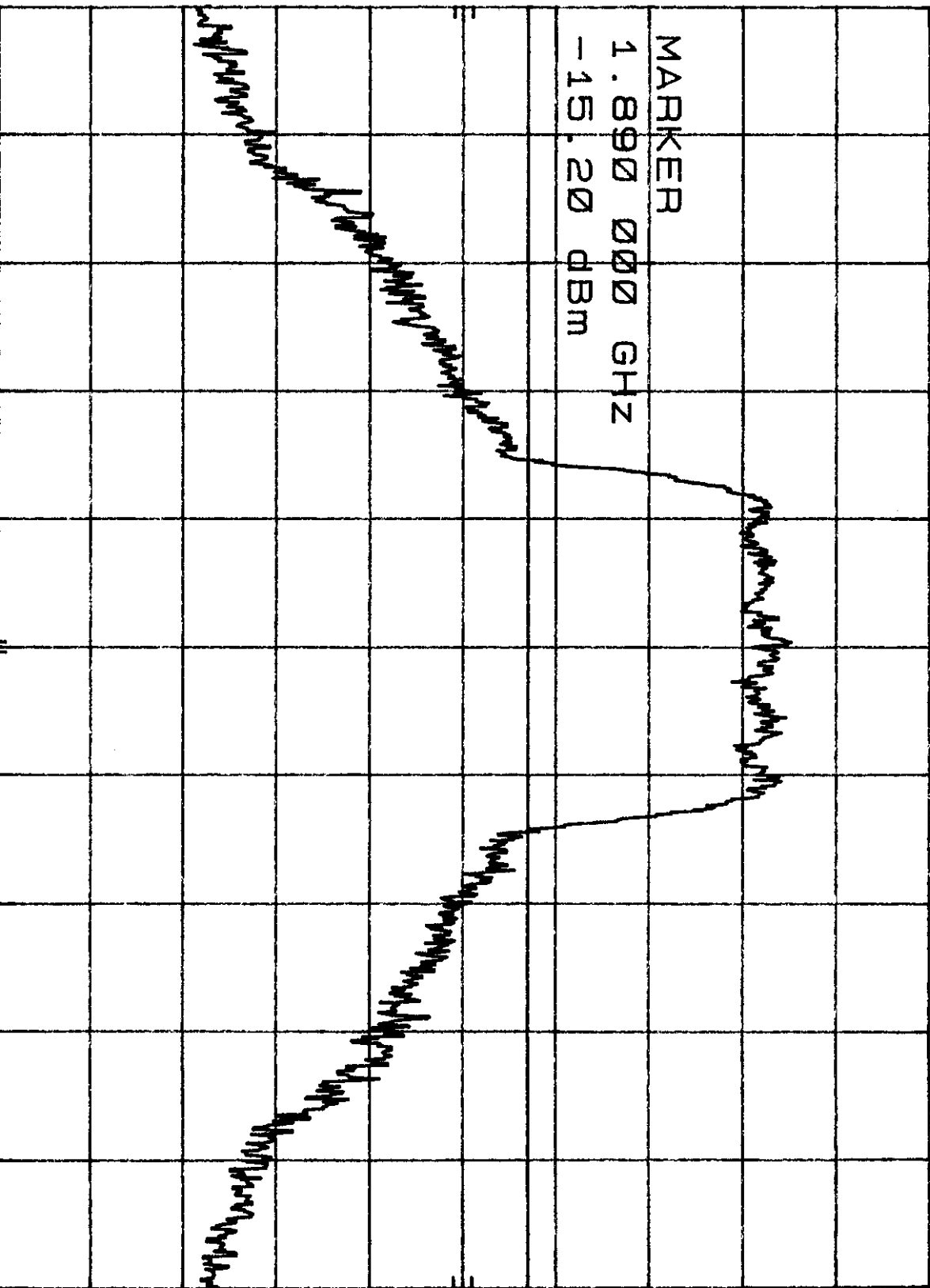
A9

#49
PK

10 dB/

DL
-13.0
dBm

MARKER
1.890 000 GHz
-15.20 dBm



CENTER 1.890 80 GHz
RES BW 30 KHz

VBW 1 MHz

SPAN 5.00 MHz
SWP 20.0 msec

#49

50

#50 7

hp

WJ BANDEDGES

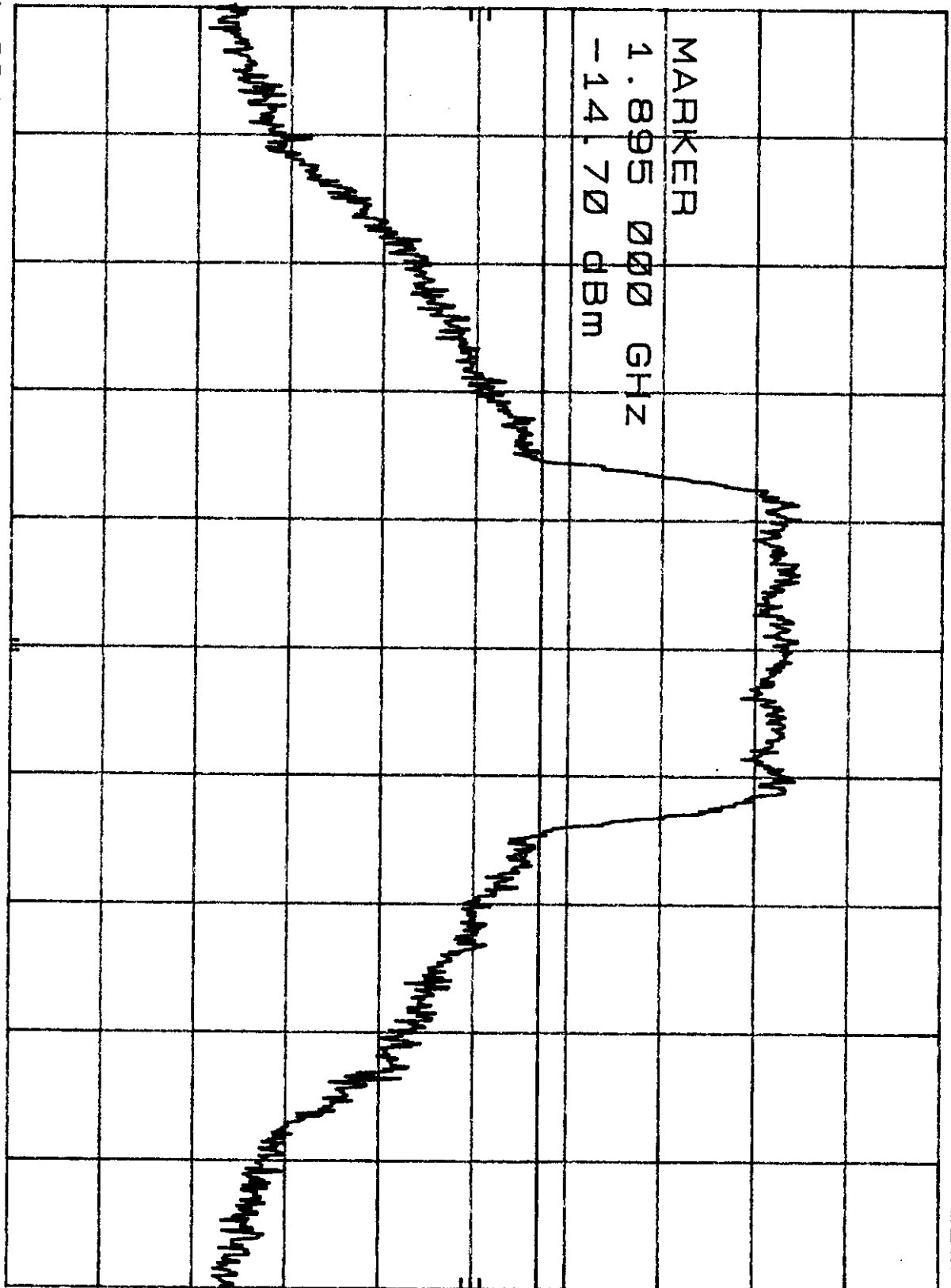
REF 30.0 dBm

ATTEN 40 dB

MKR 1.895 000 GHz
-14.70 dBm

10 dB/

DL
-13.0
dBm



CENTER 1.894 20 GHz
RES BW 30 KHz

VBW 1 MHz

SPAN 5.00 MHz
SWP 20.0 msec

#50

51

#51
PK

WJ BANDEDGES

MKR 1.975 000 GHz

h_p

REF 30.0 dBm

ATTEN 40 dB

-18.00 dBm

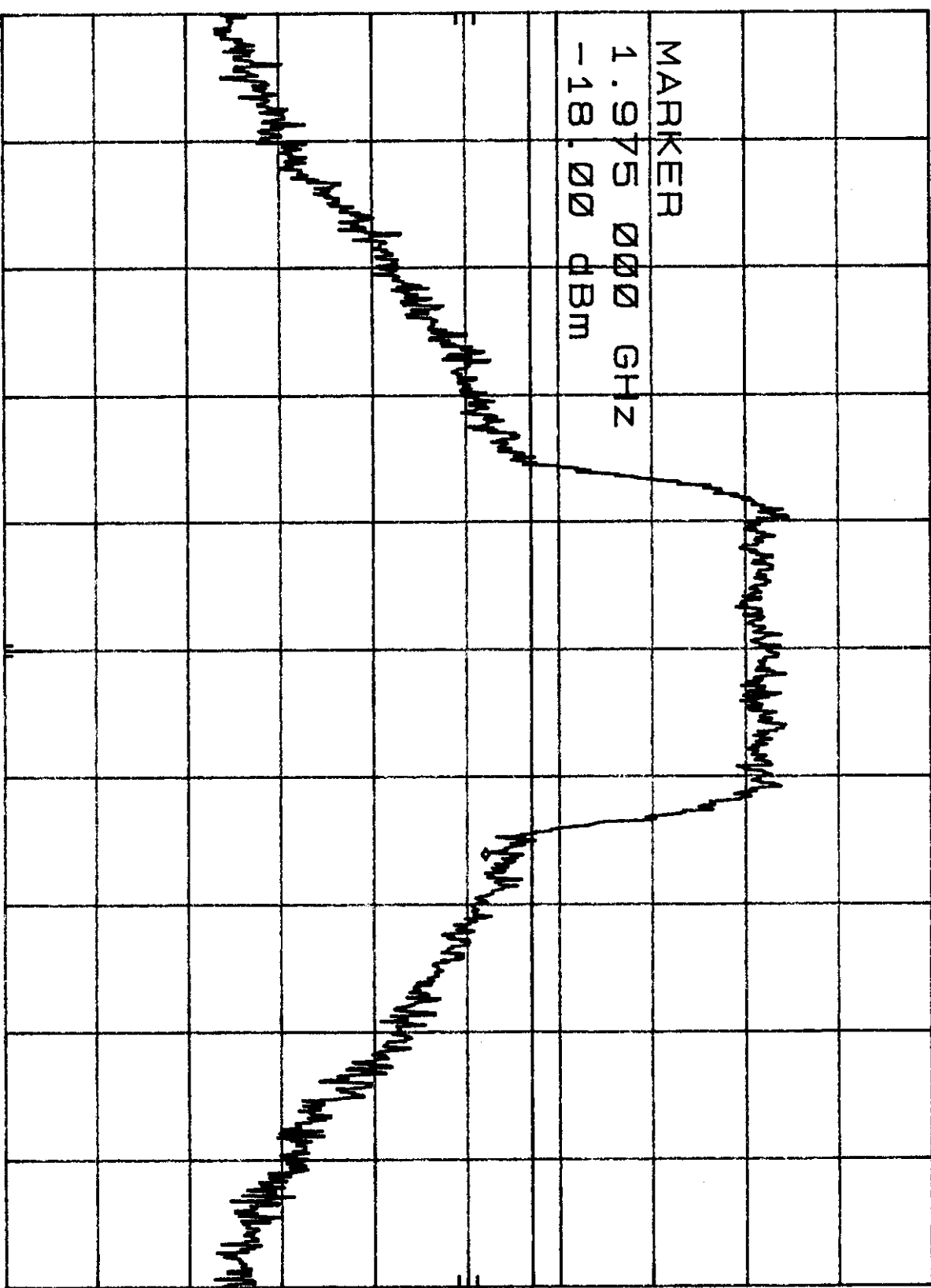
10 dB/

DL
-13.0
dBm

MARKER

1.975 000 GHz

-18.00 dBm



CENTER 1.974 20 GHz

RES BW 30 KHz

VBW 1 MHz

SWP 20.0 msec

SPAN 5.00 MHz

#51

hp

10 dB/

DL
-13.0
dBm

WJ BANDEDGES
REF 30.0 dBm

ATTEN 40 dB

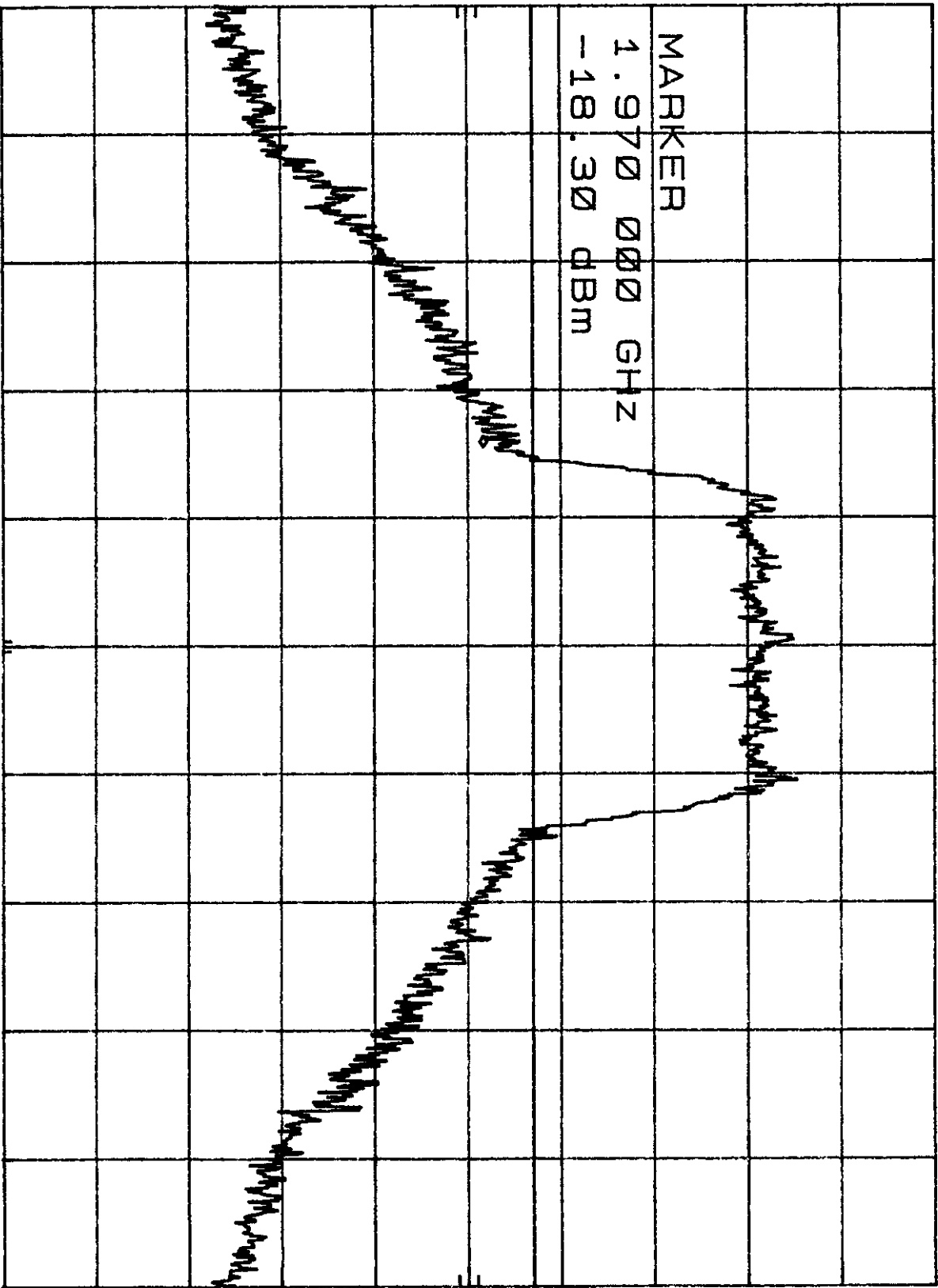
MKR 1.970 000 GHz
-18.30 dBm

52

#152
PR

MARKER

1.970 000 GHz
-18.30 dBm



CENTER 1.970 80 GHz
RES BW 30 KHZ

VBW 1 MHZ

SPAN 5.00 MHZ
SWP 20.0 msec

#152

53

#53 PK

hp

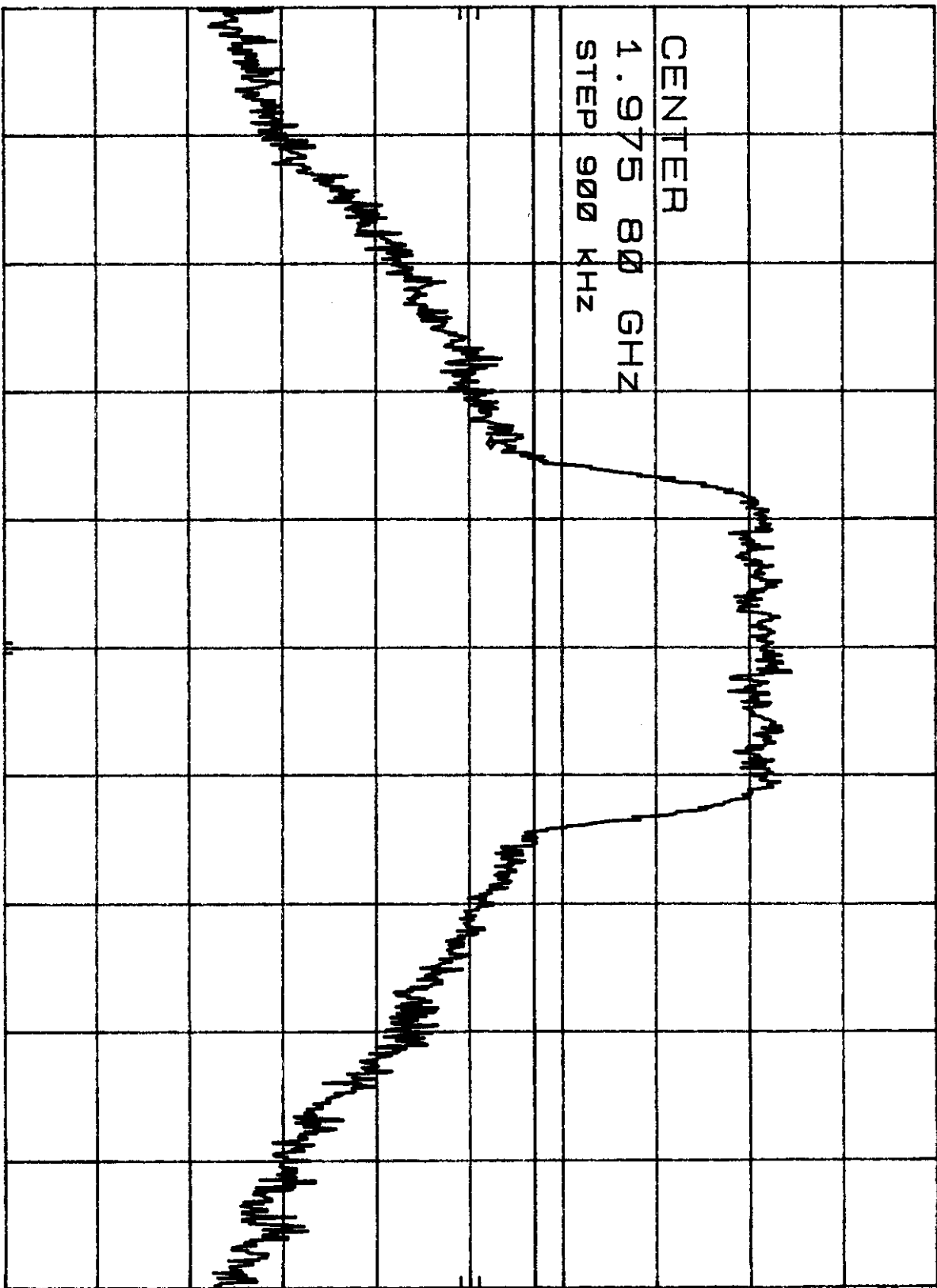
WJ BANDEDGES
REF 30.0 dBm

ATTEN 40 dB

MKR 1.975 000 GHz
-17.60 dBm

10 dB/

DL
-13.0
dBm



CENTER

1.975 80 GHz
STEP 900 KHZ

CENTER 1.975 80 GHz

RES BW 30 KHZ

VBW 1 MHZ

SPAN 5.00 MHz
SWP 20.0 msec

#53

54

#542

hp

WJ BANDEDGES
REF 30.0 dBm

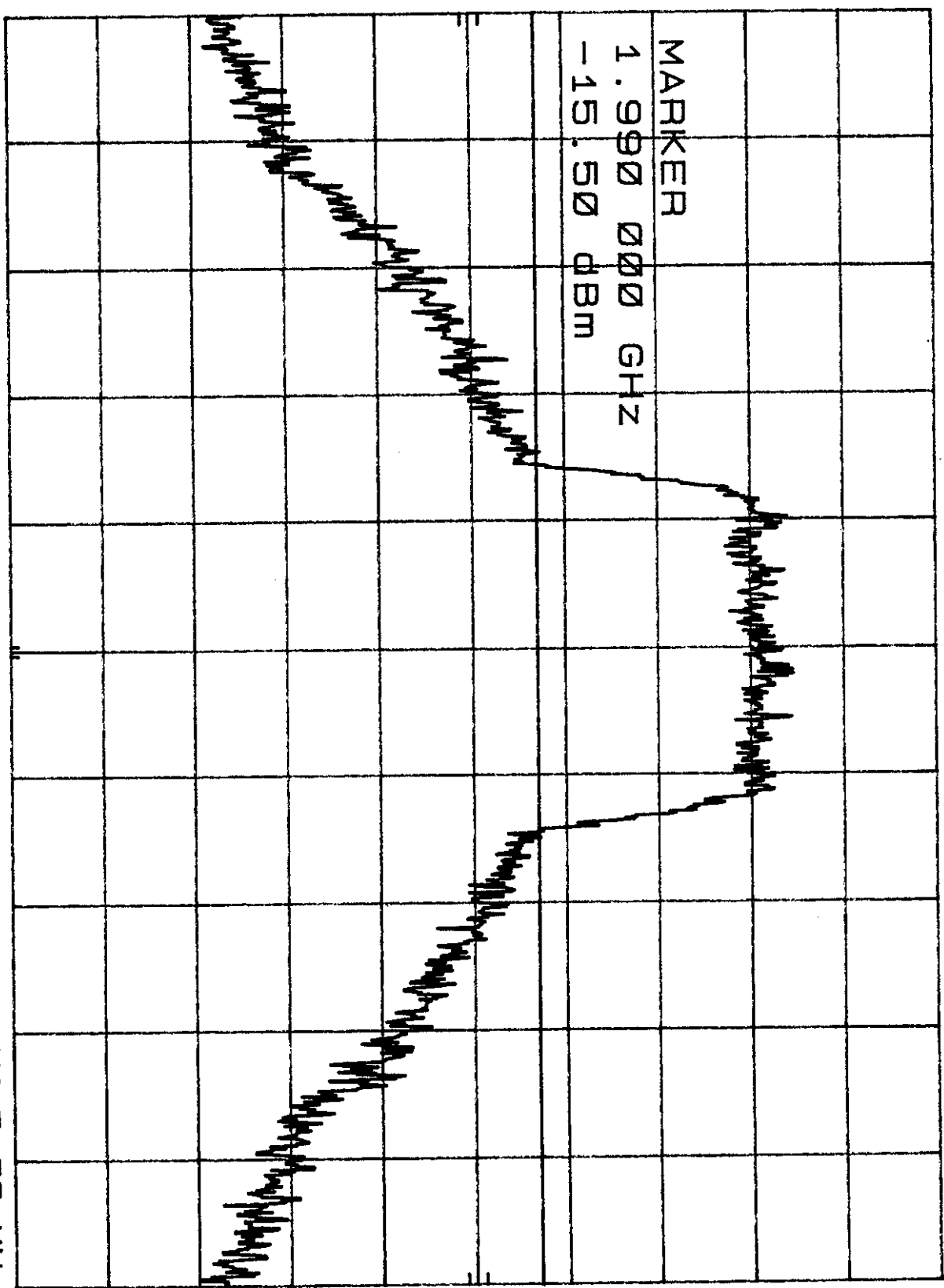
ATTEN 40 dB

MKR 1.990 000 GHz
-15.50 dBm

10 dB/

DL
-13.0
dBm

MARKER
1.990 000 GHz
-15.50 dBm



CENTER 1.989 20 GHz
RES BW 30 KHz
VBW 1 MHz
SPAN 5.00 MHz
SWP 20.0 msec

#54

55

#55 PK

WJ BANDWIDTH

REF 30.0 dBm

ATTEN 40 dB

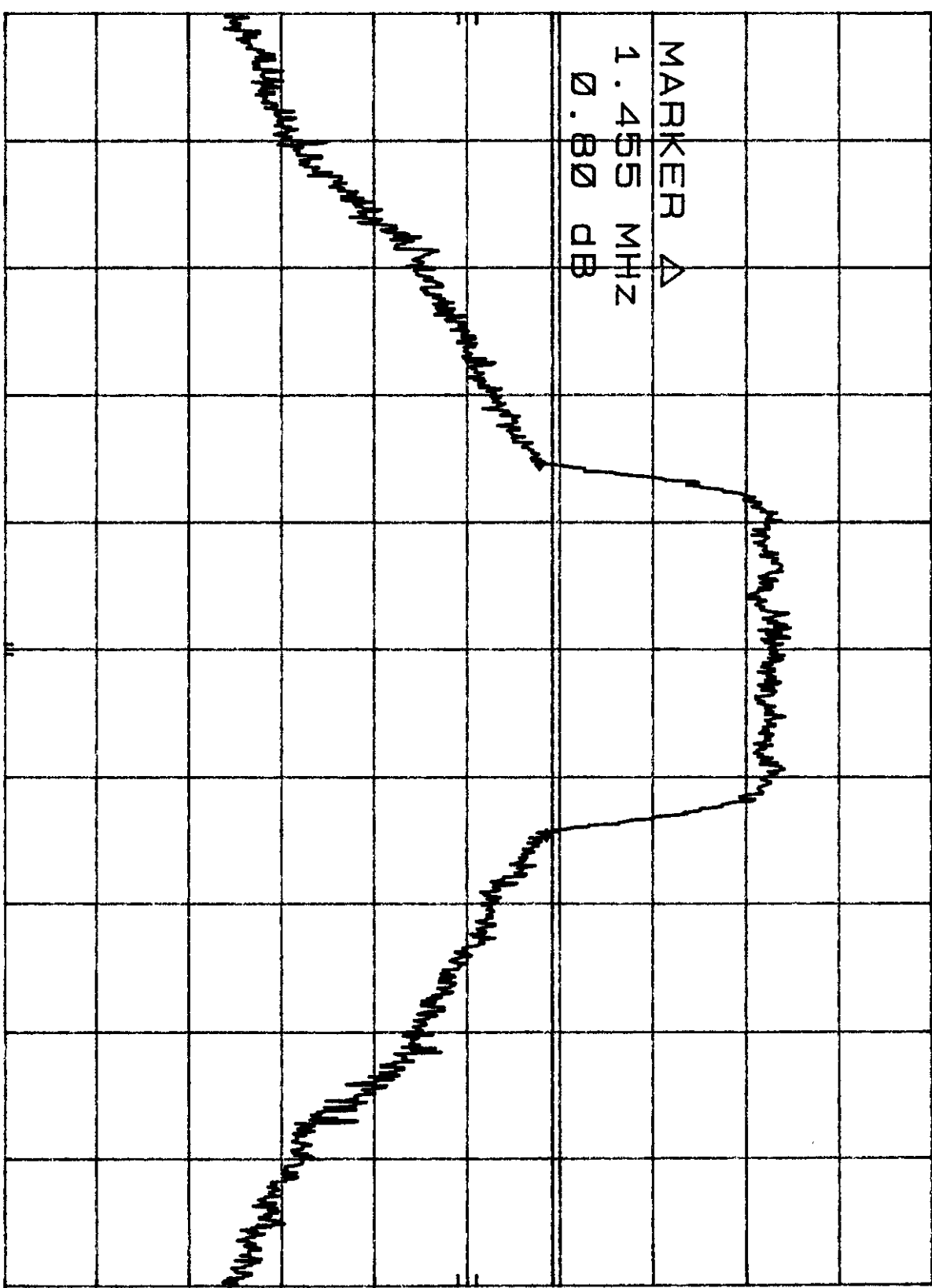
MKR Δ 1.455 MHz

0.80 dB

HP

10 dB/

DL
-10.8
dBm



CENTER 1.989 20 GHz

RES BW 30 KHz

VBW 1 MHz

SPAN 5.00 MHz

SWP 20.0 msec

#55

56

#56 PK

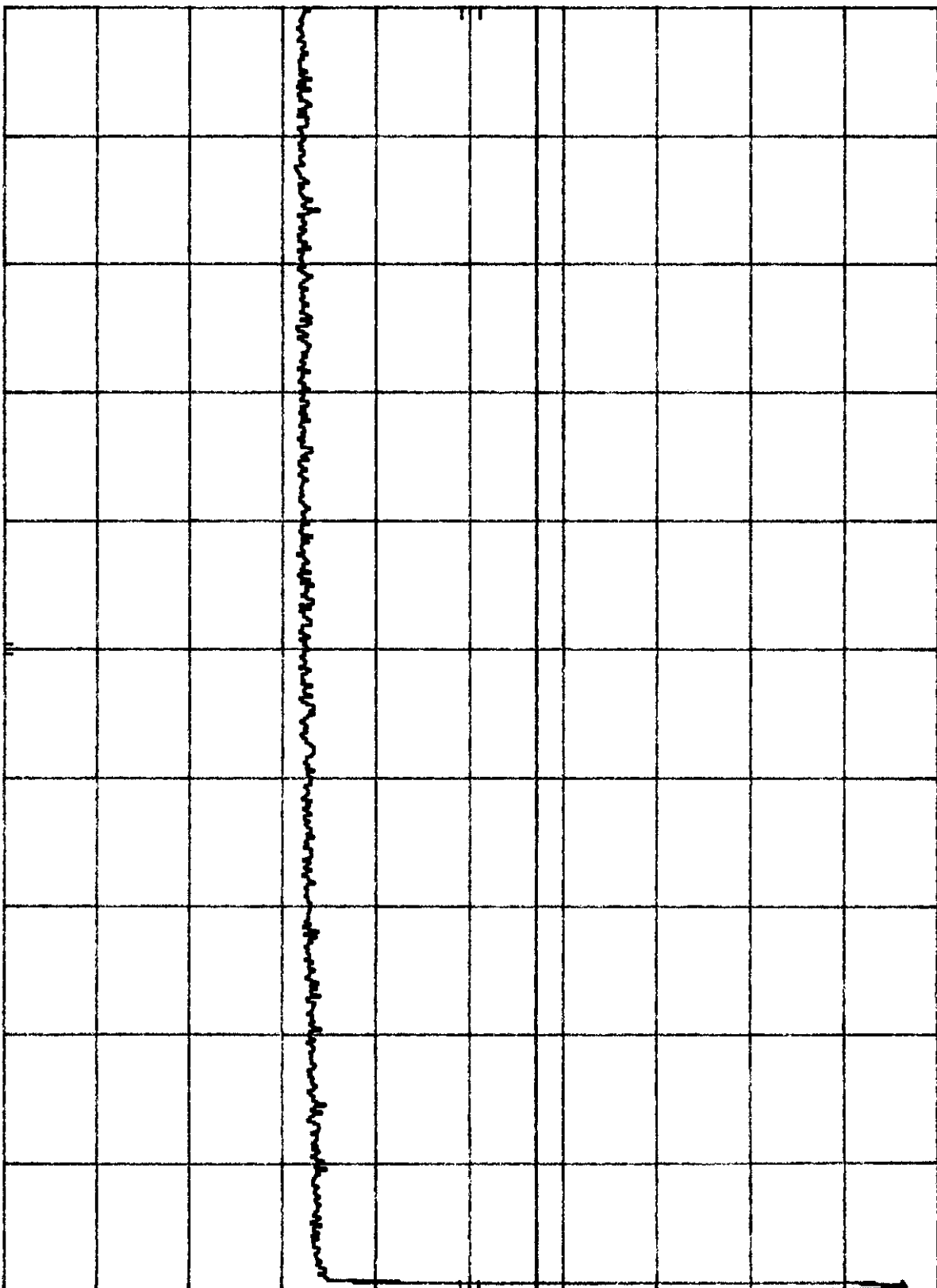
WJ SPURIOUS
h_p REF 30.0 dBm

ATTEN 40 dB

MKR 1.992 GHz
26.20 dBm

10 dB/

DL
-13.0
dBm



START 30 MHz

RES BW 1 MHz

VBW 1 MHz

STOP 2.00 GHz
SWP 49.3 msec

#56

HP

WJ SPURIOUS
REF 30.0 dBm

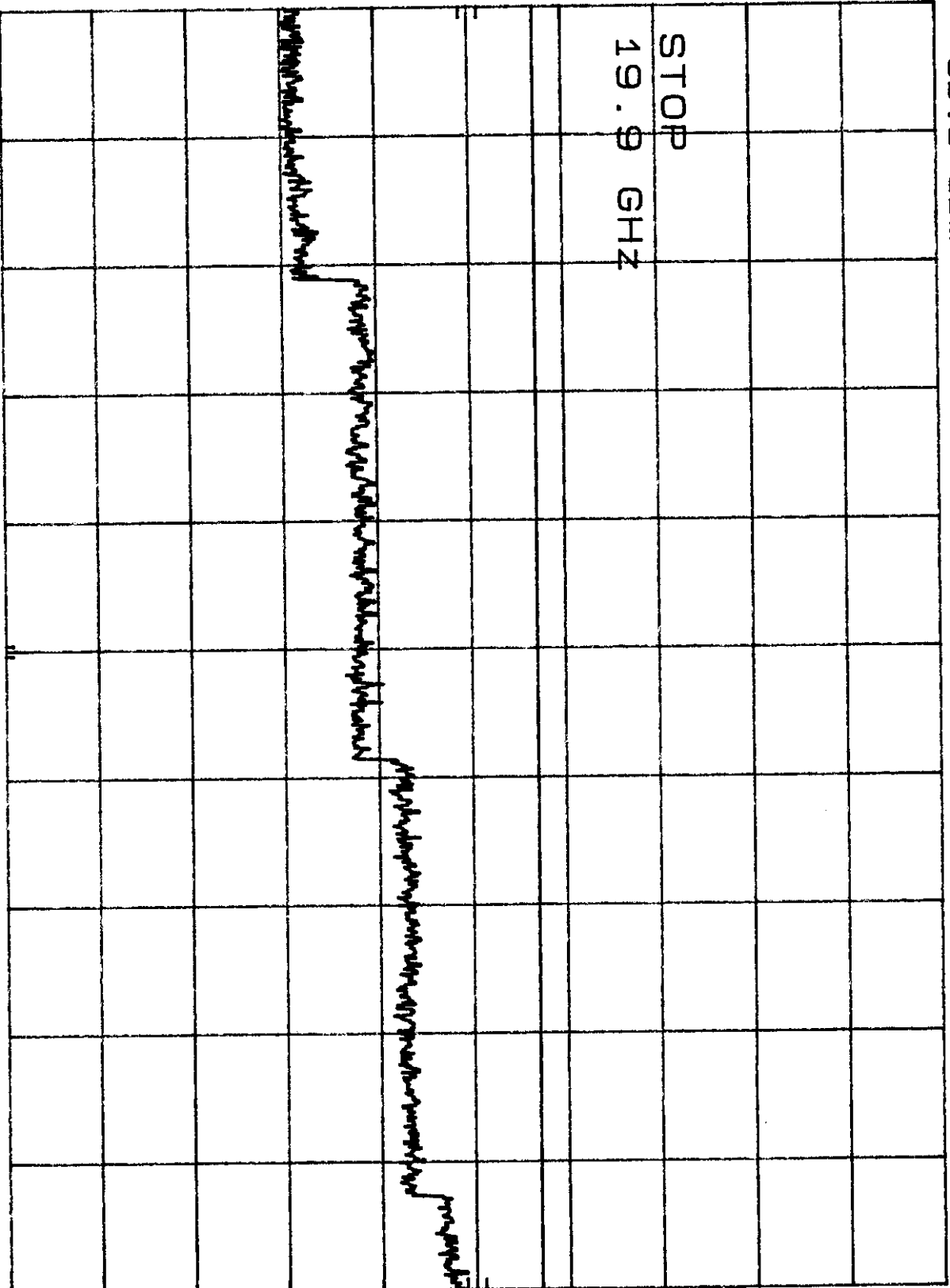
ATTEN 40 dB

#56

OK

10 dB/

DL
-13.0
dBm



START 2.0 GHz
RES BW 1 MHz

VBW 1 MHz

STOP 19.9 GHz
SWP 448 msec

#56