

2.983 (e)

Test Data

Refer to 2.983 (e) (1) through 2.983 (e) (7)

2.983 (e) (1) Measurement of RF Power Output per 2.985

Definition: For RF Power Amplifiers.

Test Method: See Figure 2.

Output power is measured across a precision 50 ohm load with a wide-band sampling RF voltmeter.

Test Results:

POWER OUTPUT

Frequency	Nominal Voltage	85% Voltage	115% Voltage
451 MHZ	70.0 W	70.0 W	70.0 W
470 MHZ	70.0 W	70.0 W	70.0 W
451 MHZ	100.0 W	100.0 W	100.0 W
470 MHZ	100.0 W	100.0 W	100.0 W

2.983(e)(2) **Measurement of Modulation Characteristics per
2.987(b)(1)**

This EUT is a power amplifier and contains no circuitry to modify the RF signal provided by the driver except to raise the power level.

2.983(e)(3) **Measurement of Occupied Bandwidth per 2.989**

Definition: Occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean power radiated by a given emission.

Test Method: Connect the equipment per Figure 3.

Measurements were made with the modulating signal at 2.5 kHz with 5 kHz of FM deviation.

Test Results: See Plots following Figure 3.

The center frequency of the signal did not shift with modulation. The spectrum bandwidth was well within the limits specified in the FCC regulations

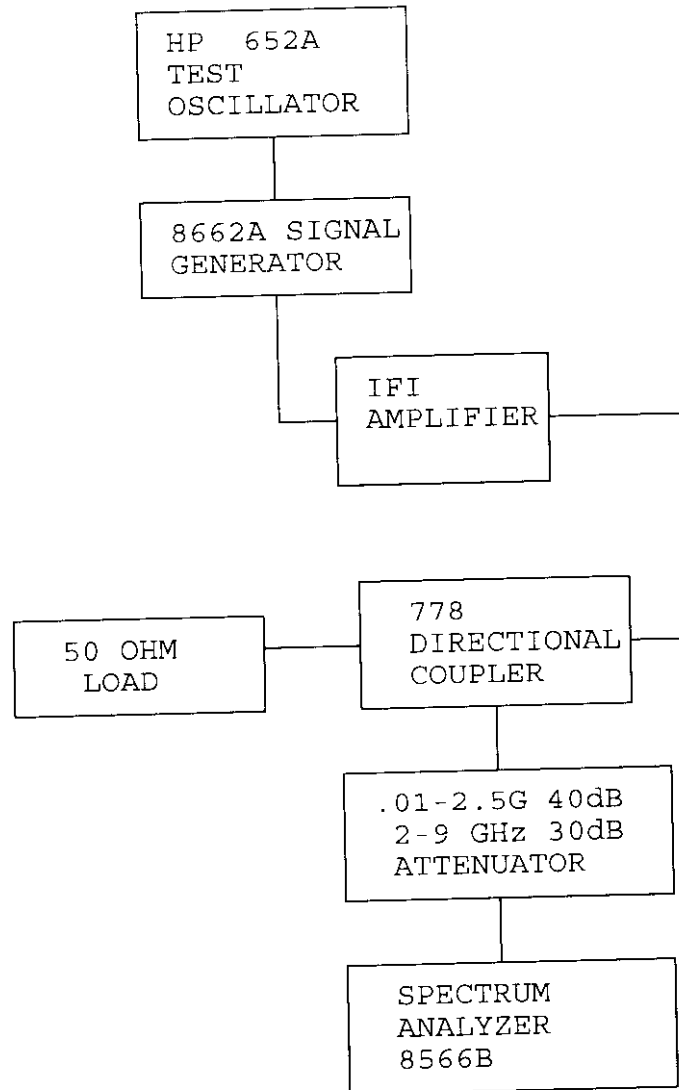


FIGURE 3. BLOCK DIAGRAM.
(OCCUPIED BANDWIDTH)

PA6-1BE-MS1
UNMODULATED CARRIER

MRK 451.000 0 MHz
48.50 dBm

ATTEN 10 dB

REF 62.0 dBm

hp

10 dB/

POS PK

OFFSET

62.0

dB

MARKER

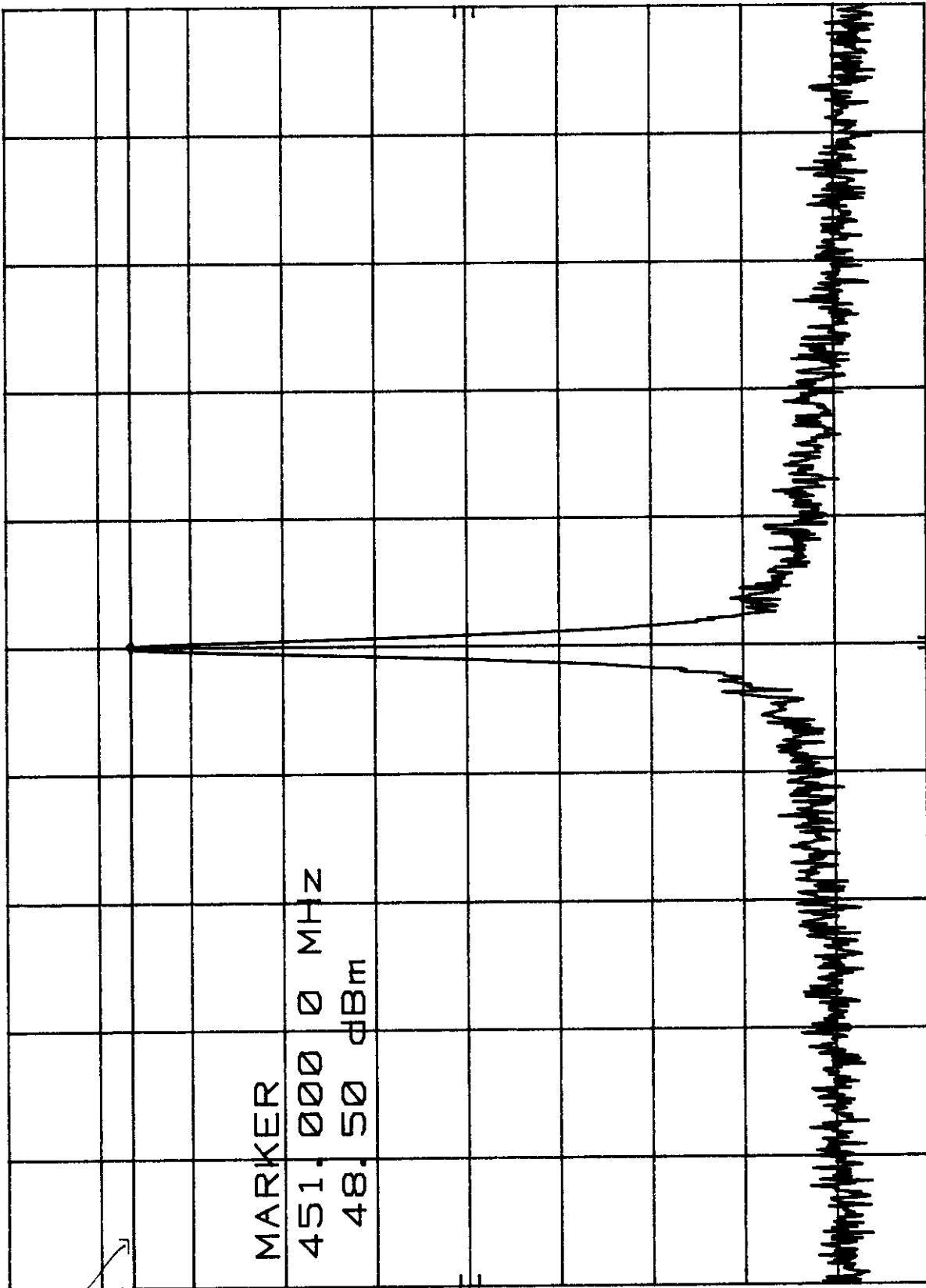
451.000 0 MHz

48.50 dBm

DL

48.5

dBm



CENTER 451.000 MHz

RES BW 300 Hz

VBW 1 kHz

SWP 3.00 sec

SPAN 100 kHz

PAG-1BE-MSI
OCCUPIED BANDWIDTH PART 90

70 WATTS

MKR 451.000 0 MHz
36.50 dBm

ATTEN 10 dB

hp

10 dB/

POS PK

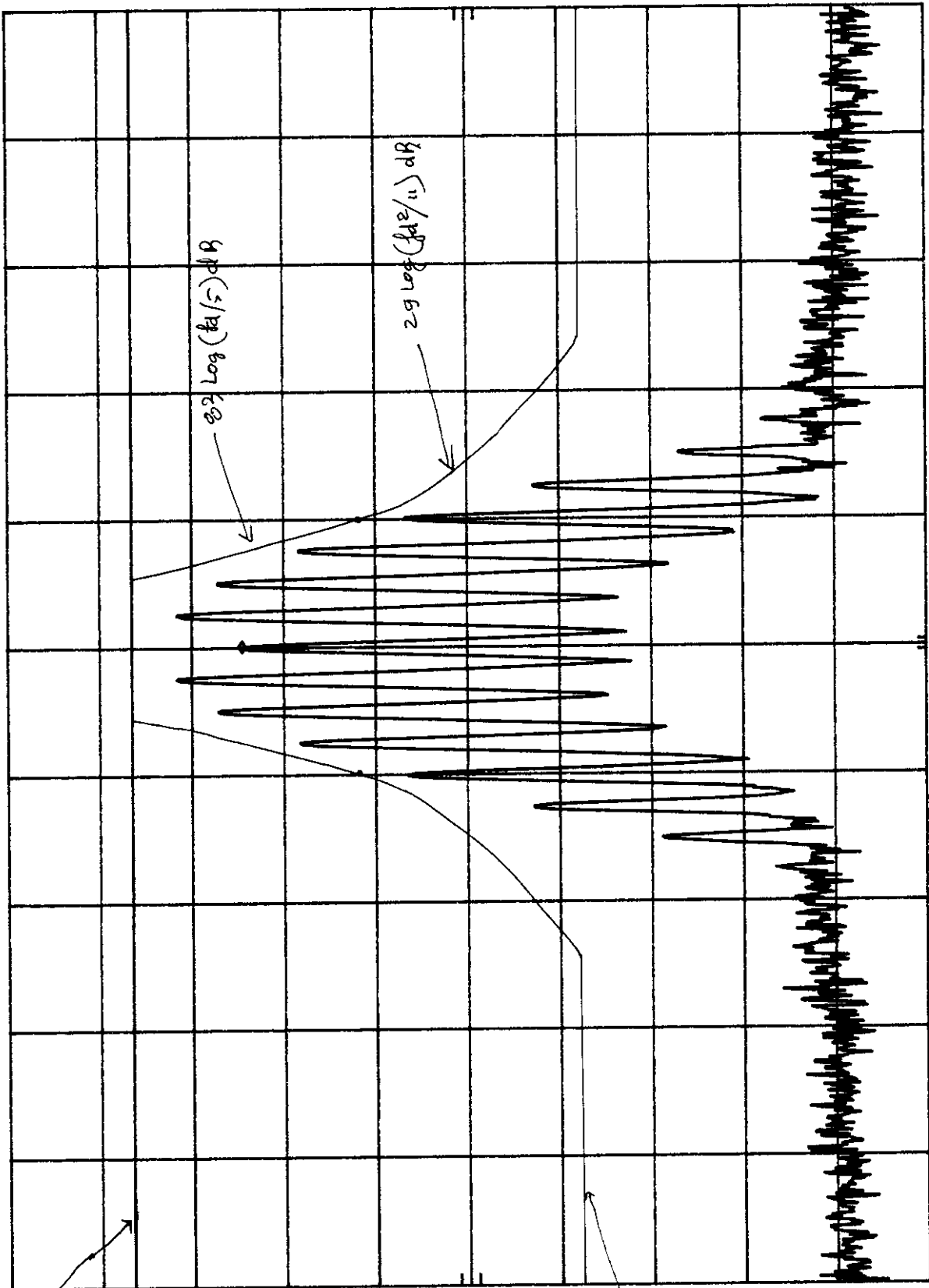
OFFSET

62.0
dB

DL

48.5
dBm

Fcc UNIT



SPAN 100 kHz
SWP 3.00 sec

VBW 1 kHz

CENTER 451.000 MHz
RES BW 300 Hz

PAG-13E-MS1
UNMODULATED CARRIER.

MKR 470.000 0 MHz
48.50 dBm

ATTEN 10 dB

REF 62.0 dBm

hp

10 dB/

POS PK

OFFSET

62.0

dB

DL

48.5

dBm

MARKER

470.000 0 MHz

48.50 dBm

SPAN 100 kHz
SWP 3.00 sec

VBW 1 kHz

Hz

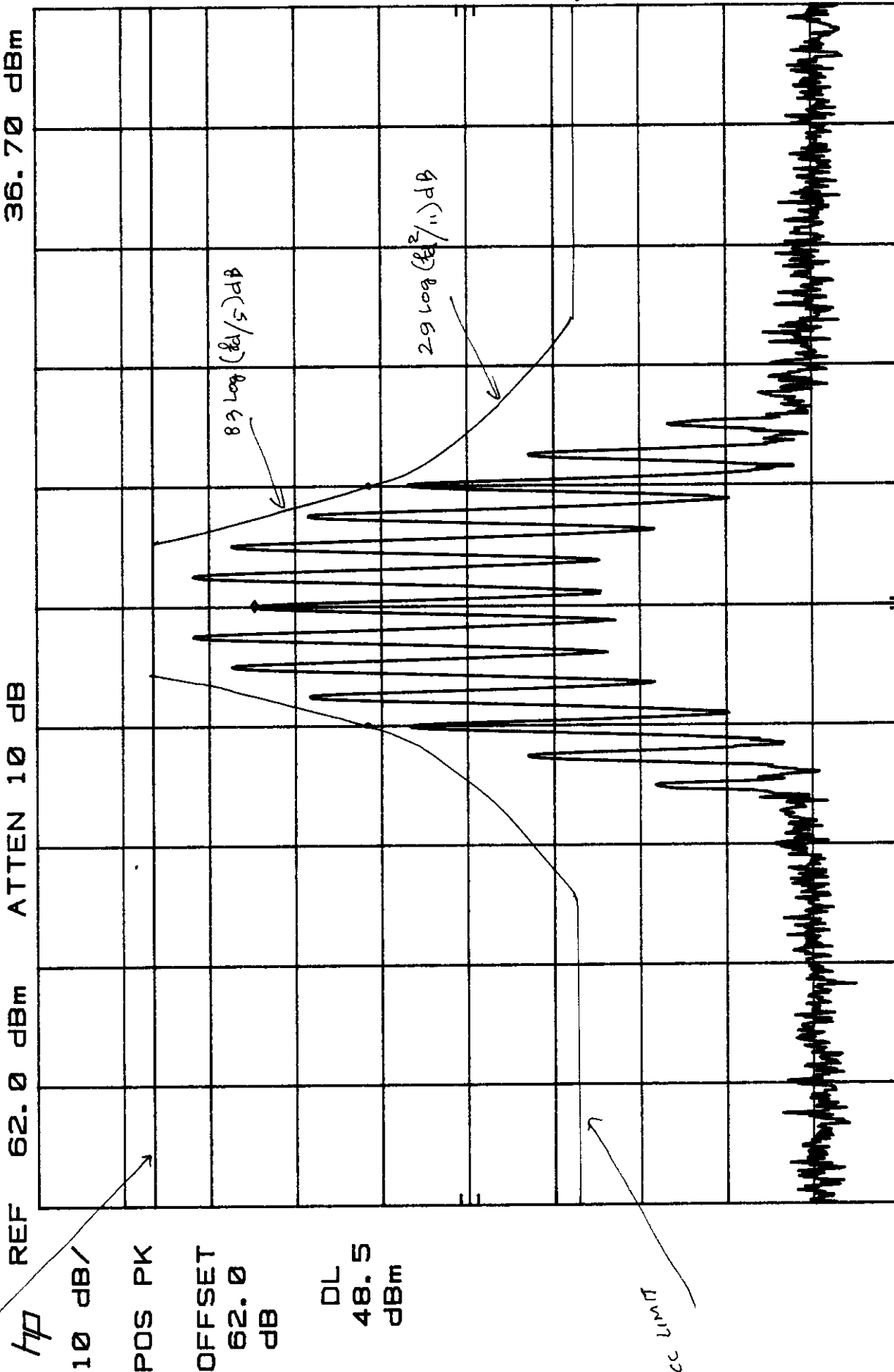
CENTER 470.000 MHz

RES BW 300

PA6-1BE-MS1
OCCUPIED BANDWIDTH PART 90

70 WATTS

MKR 470.000 0 MHz
36.70 dBm



SPAN 100 KHz
SWP 3.00 sec

VBW 1 KHz

Hz

CENTER 470.000 MHz
RES BW 300

100 WATTS

PA6-1BE-MS1
UNMODULATED CARRIER

MKR 451.000 0 MHz
50.00 dBm

hpo REF 62.0 dBm ATTN 10 dB

10 dB/

POS PK

OFFSET

62.0

dB

DL

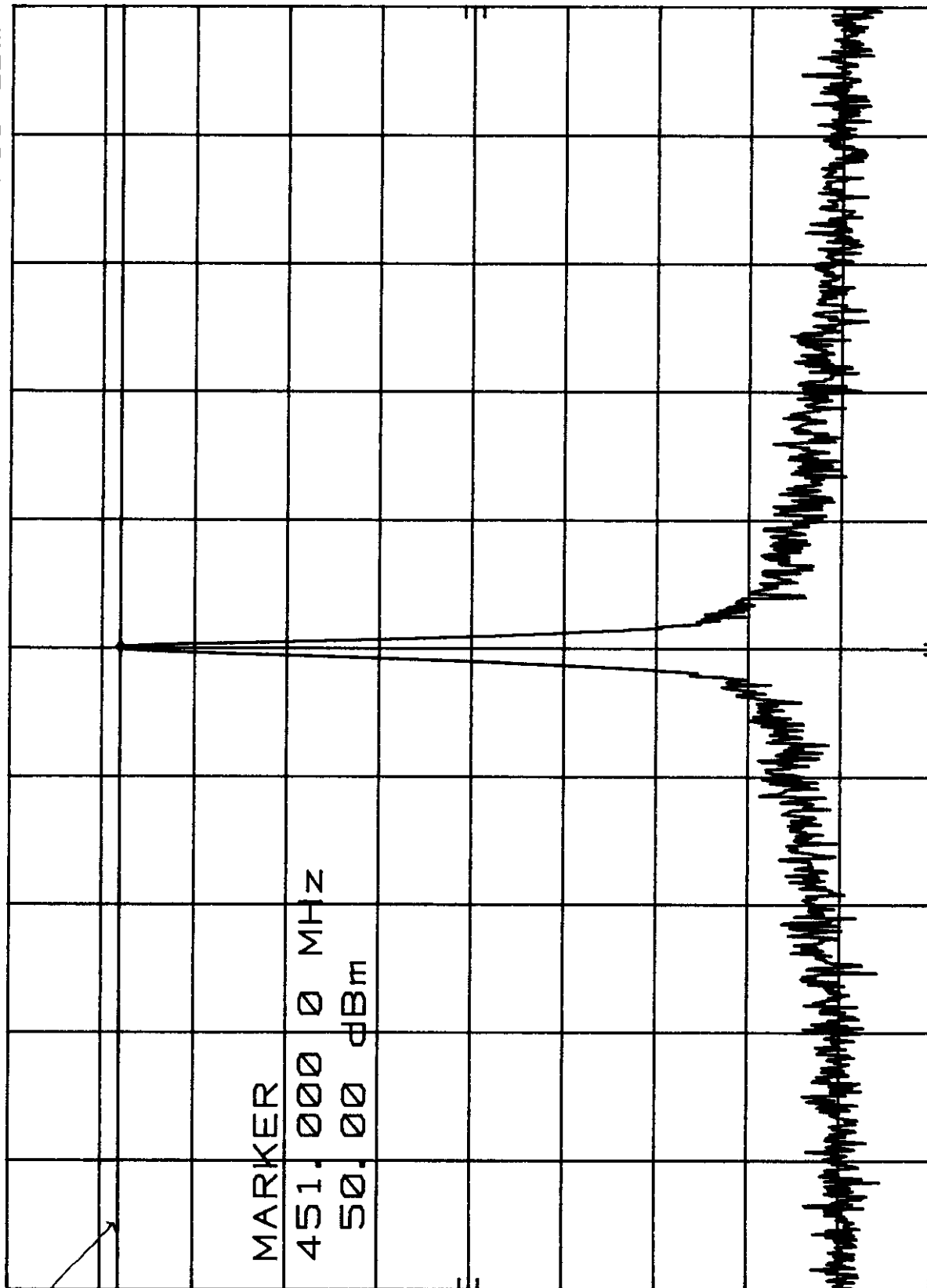
50.0

dBm

MARKER

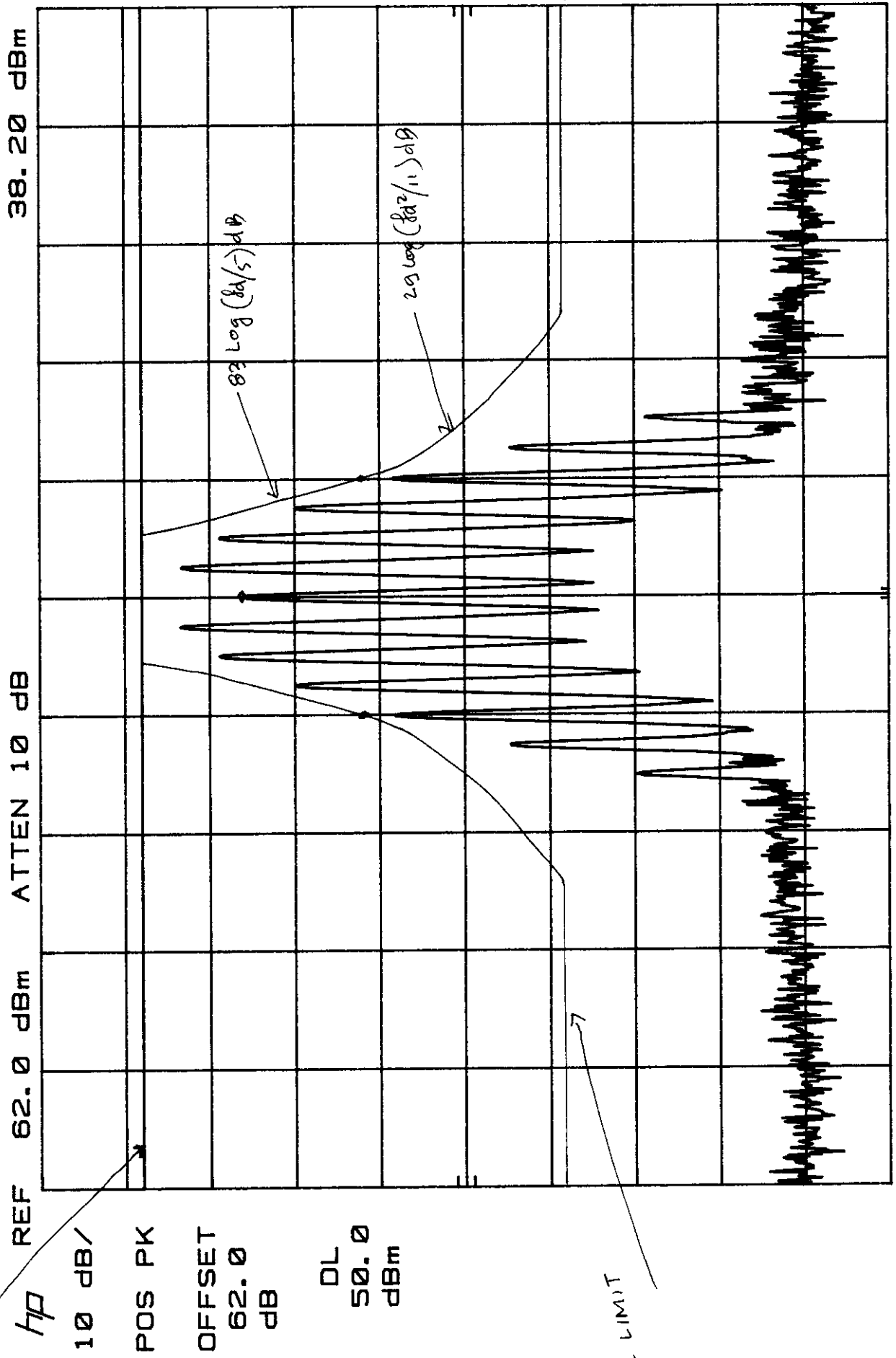
451.000 0 MHz

50.00 dBm

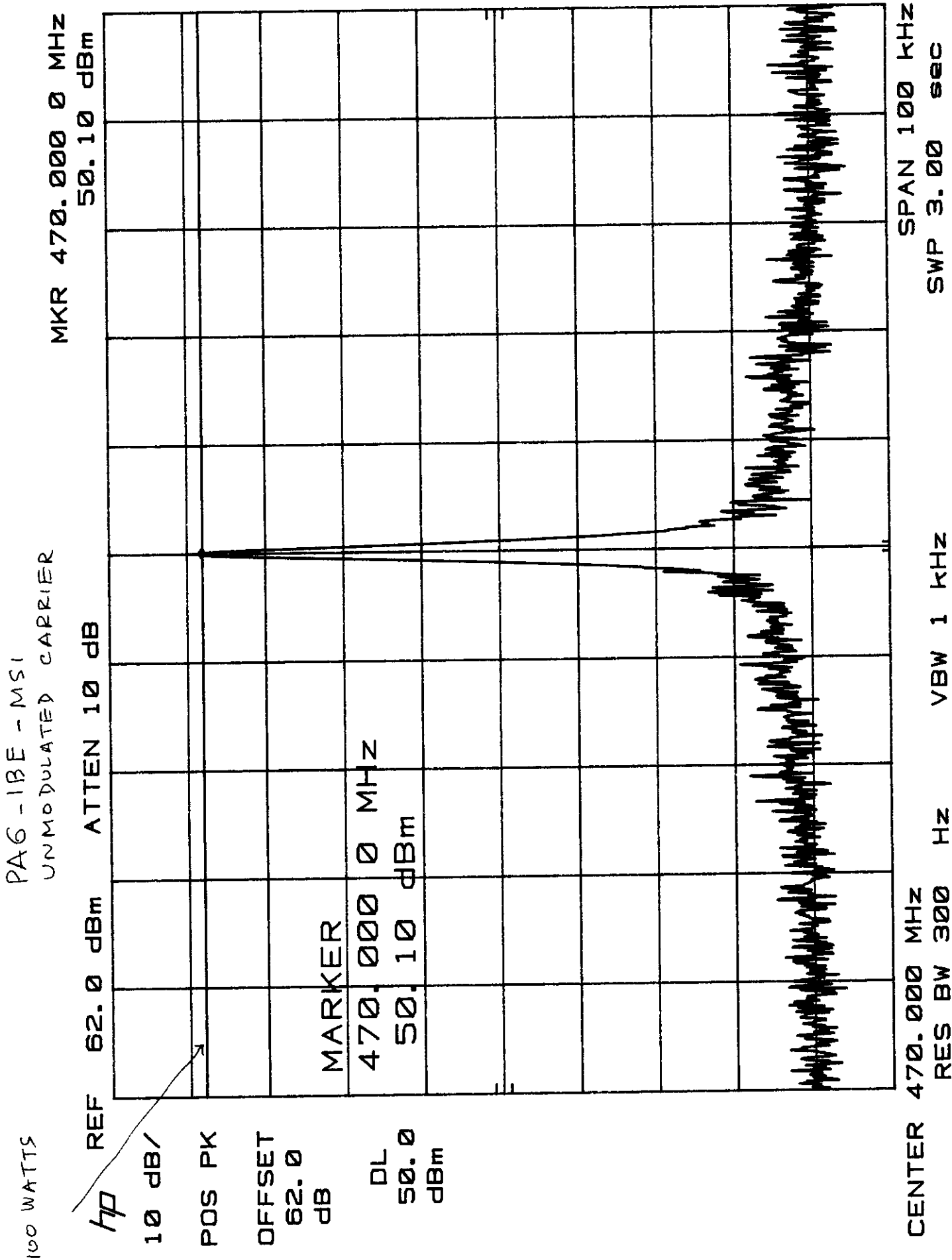


CENTER 451.000 MHz
RES BW 300 Hz
SPAN 100 kHz
SWP 3.00 sec
VBW 1 kHz

100 WATTS
 PA6-1BE - M51
 OCCUPIED BANDWIDTH PART 90
 MKR 451.000 0 MHz
 38.20 dBm



CENTER 451.000 MHz
 RES BW 300 Hz
 VBW 1 kHz
 SPAN 100 kHz
 SWP 3.00 sec



100 WATTS

PAG-1BE - MSI
OCCUPIED BANDWIDTH PART 90

MKR 470.000 0 MHz
38.30 dBm

ATTEN 10 dB

REF 62.0 dBm

hp

10 dB/

POS PK

OFFSET

62.0

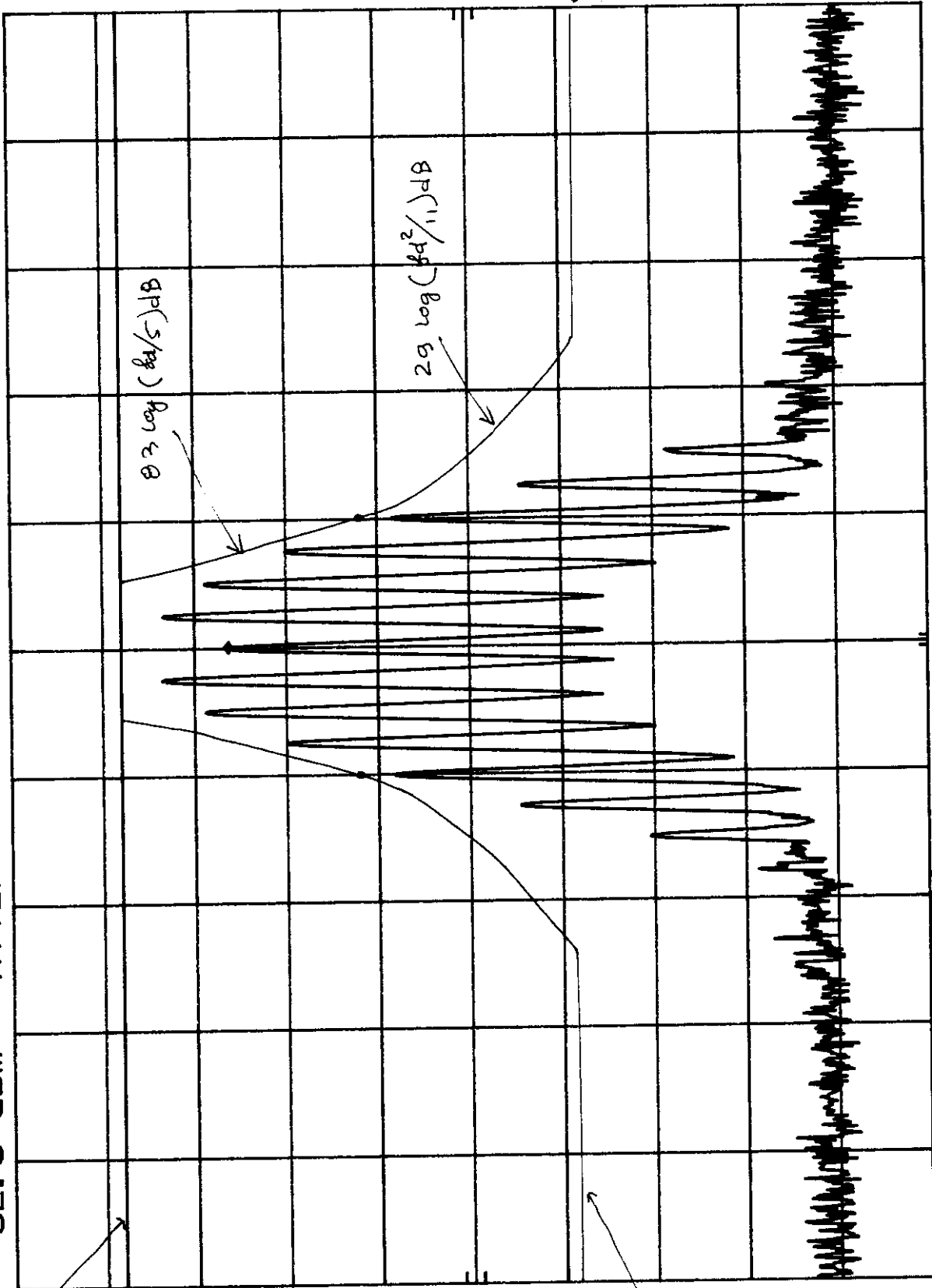
dB

DL

50.0

dBm

FCC LIMIT



SPAN 100 kHz
SWP 3.00 sec

VBW 1 kHz

Hz

CENTER 470.000 MHz
RES BW 300

dBm

6 WATTS

FOR 70 WATTS
DRIVER OUTPUT: MODULATED CARRIER

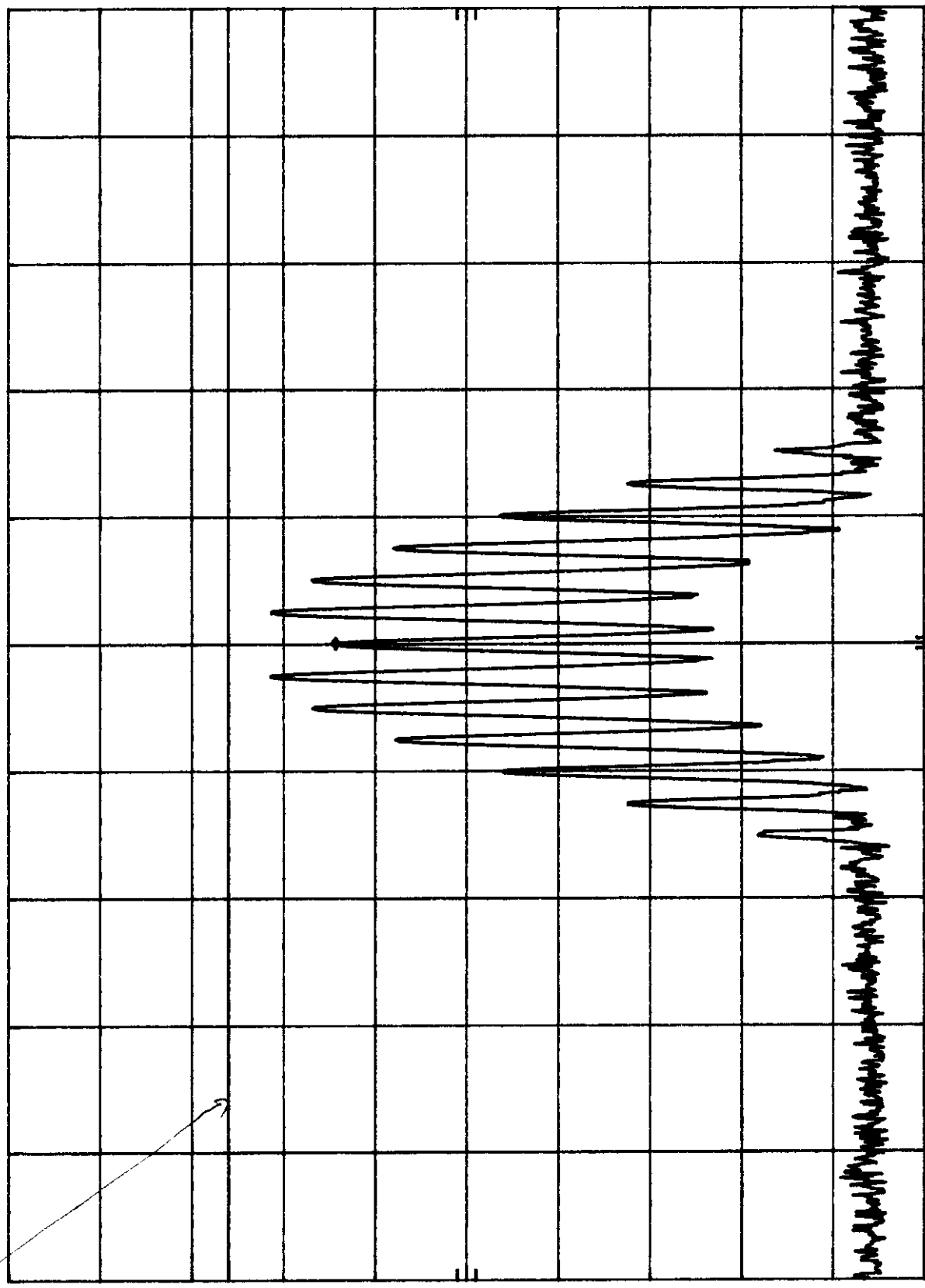
MKR 451.000 0 MHz
26.30 dBm

HP REF 62.0 dBm ATTN 10 dB

10 dB/

OFFSET
62.0
dB

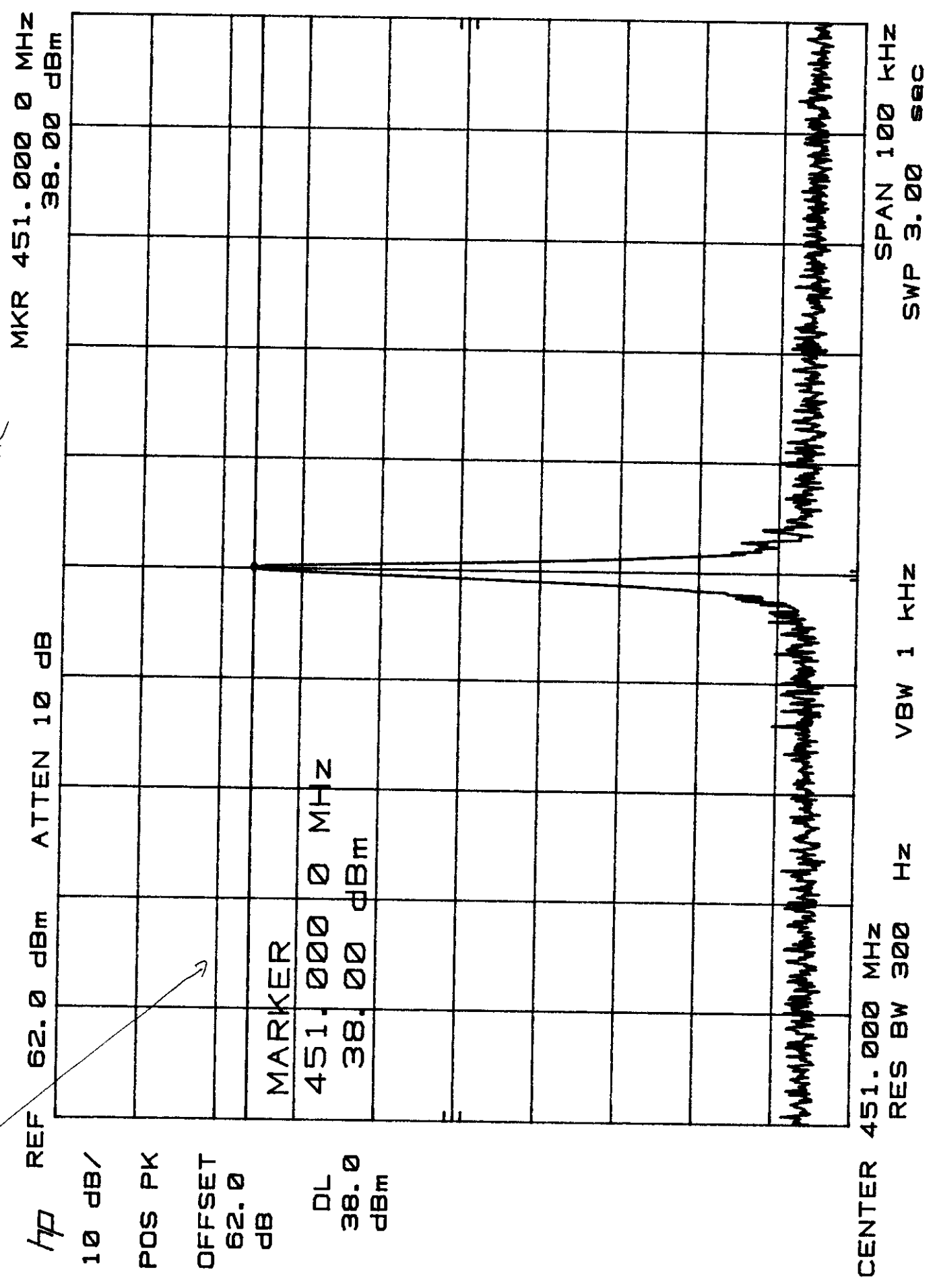
DL
38.0
dBm



CENTER 451.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec

6 WATTS

FOR 70 WATTS OUTPUT
DRIVER OUTPUT : MODULATED CARRIER



FOR 100 WATTS OUTPUT
 DRIVER OUTPUT: MODULATED CARRIER

MKR 451.000 0 MHz
 27.10 dBm

REF 62.0 dBm ATTEN 10 dB

10 dB

POS PK

OFFSET

62.0

dB

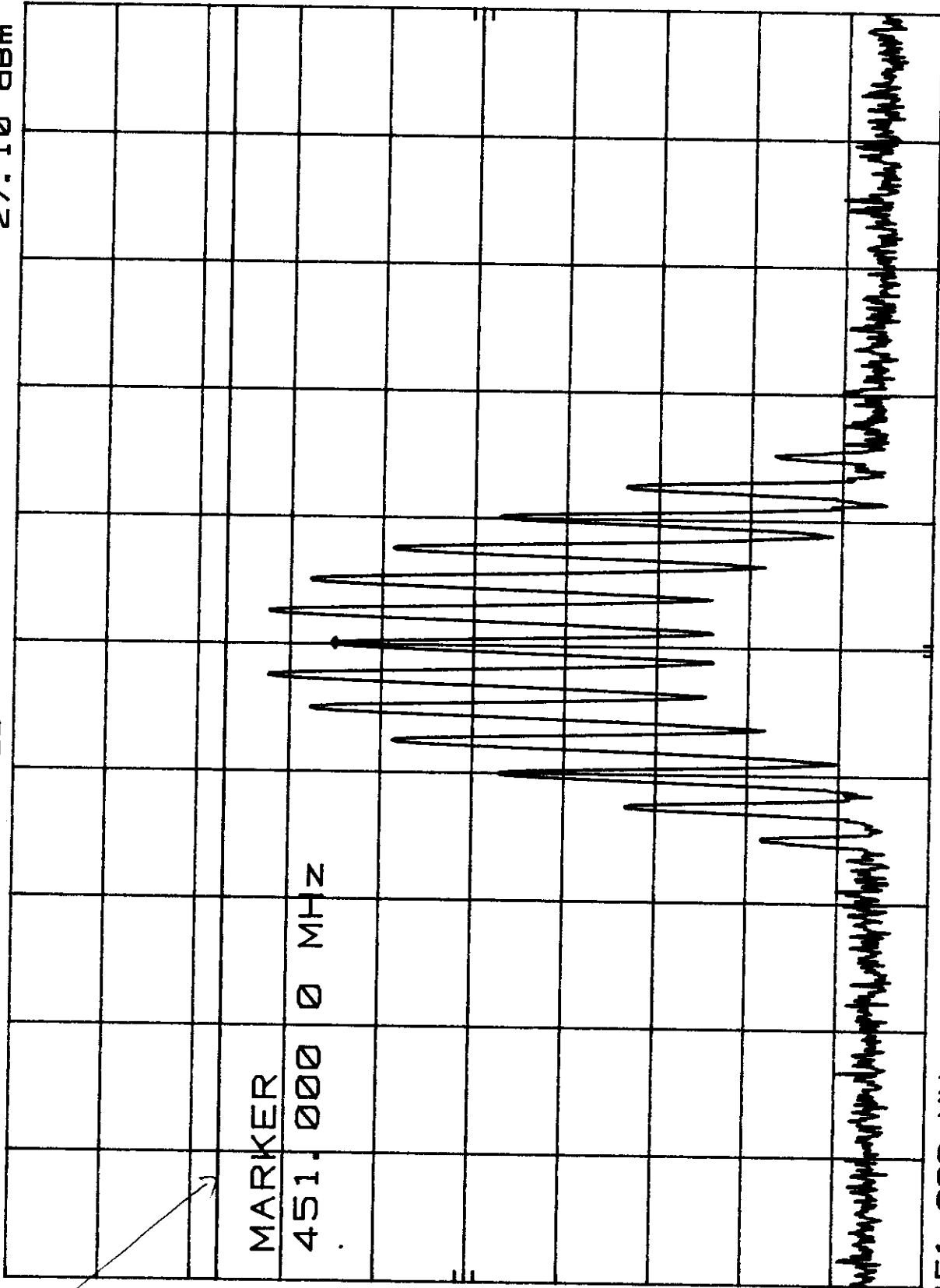
DL

39.0

dBm

MARKER

451.000 0 MHz



CENTER 451.000 MHz

RES BW 300 Hz

VBW 1 kHz

SPAN 100 kHz
 SWP 3.00 sec

FOR 100 WATTS OUTPUT
 DRIVER OUTPUT: UNMODULATED CARRIER

MKR 451.000 0 MHz
 39.00 dBm

ATTEN 10 dB

REF 62.0 dBm

70

10 dB/

POS PK

OFFSET

62.0

dB

MARKER

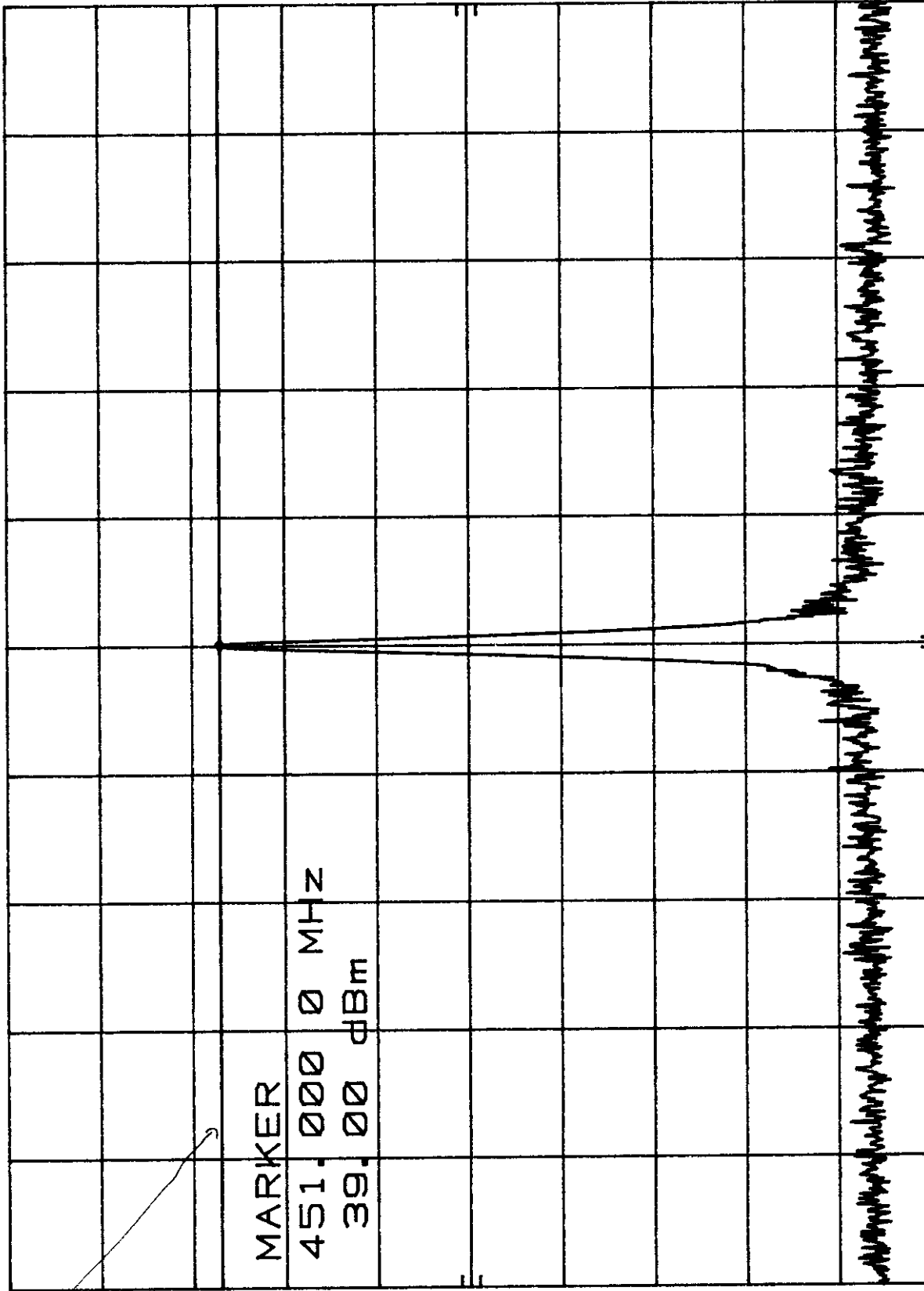
451.000 0 MHz

39.00 dBm

DL

39.0

dBm



CENTER 451.000 MHz
 RES BW 300 Hz
 VBW 1 kHz
 SPAN 100 kHz
 SWP 3.00 sec

FOR 100 WATTS OUTPUT.
DRIVER OUTPUT: MODULATED CARRIER

MKR 470.000 0 MHz
26.10 dBm

ATTEN 10 dB

REF 62.0 dBm

hp

10 dB/

POS PK

OFFSET

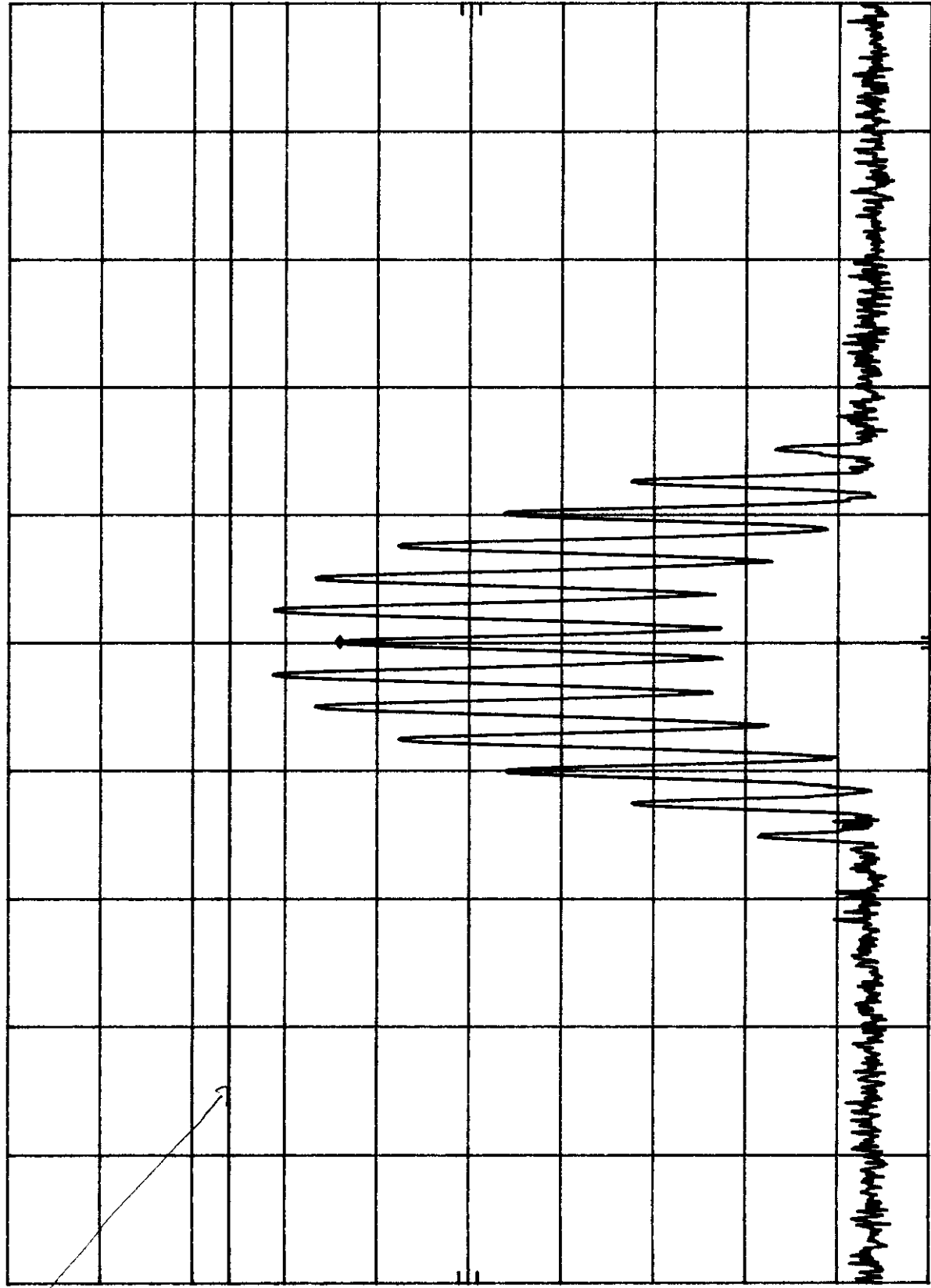
62.0

dB

DL

38.0

dBm



SPAN 100 KHz
SWP 3.00 sec

VBW 1 KHz

CENTER 470.000 MHz
RES BW 300 Hz

6 WATTS

FOR 100 WATTS OUTPUT.

DRIVER OUTPUT : UNMODULATED CARRIER

MKR 470.000 0 MHz
37.90 dBm

HP REF 62.0 dBm ATTEN 10 dB

10 dB/

POS PK

OFFSET

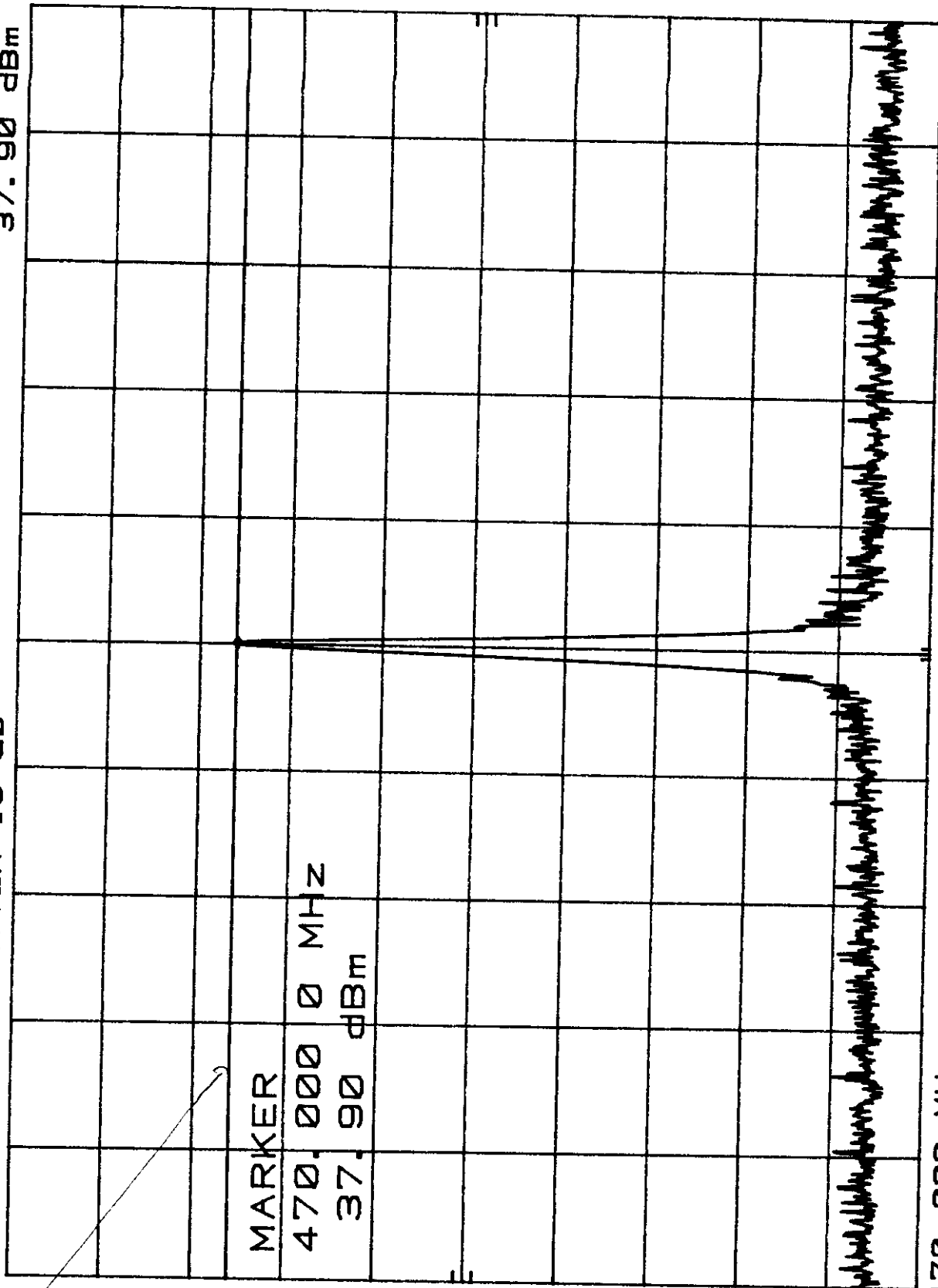
62.0

dB

DL

38.0

dBm



CENTER 470.000 MHz

RES BW 300 Hz

VBW 1 KHz

SPAN 100 KHz
SWP 3.00 sec

5W
 FOR 10 WATTS OUTPUT
 DRIVER OUTPUT : MODULATED CARRIER

MKR 470.000 0 MHz
 25.30 dBm

REF 62.0 dBm ATTEN 10 dB

10 dB/

POS PK

OFFSET

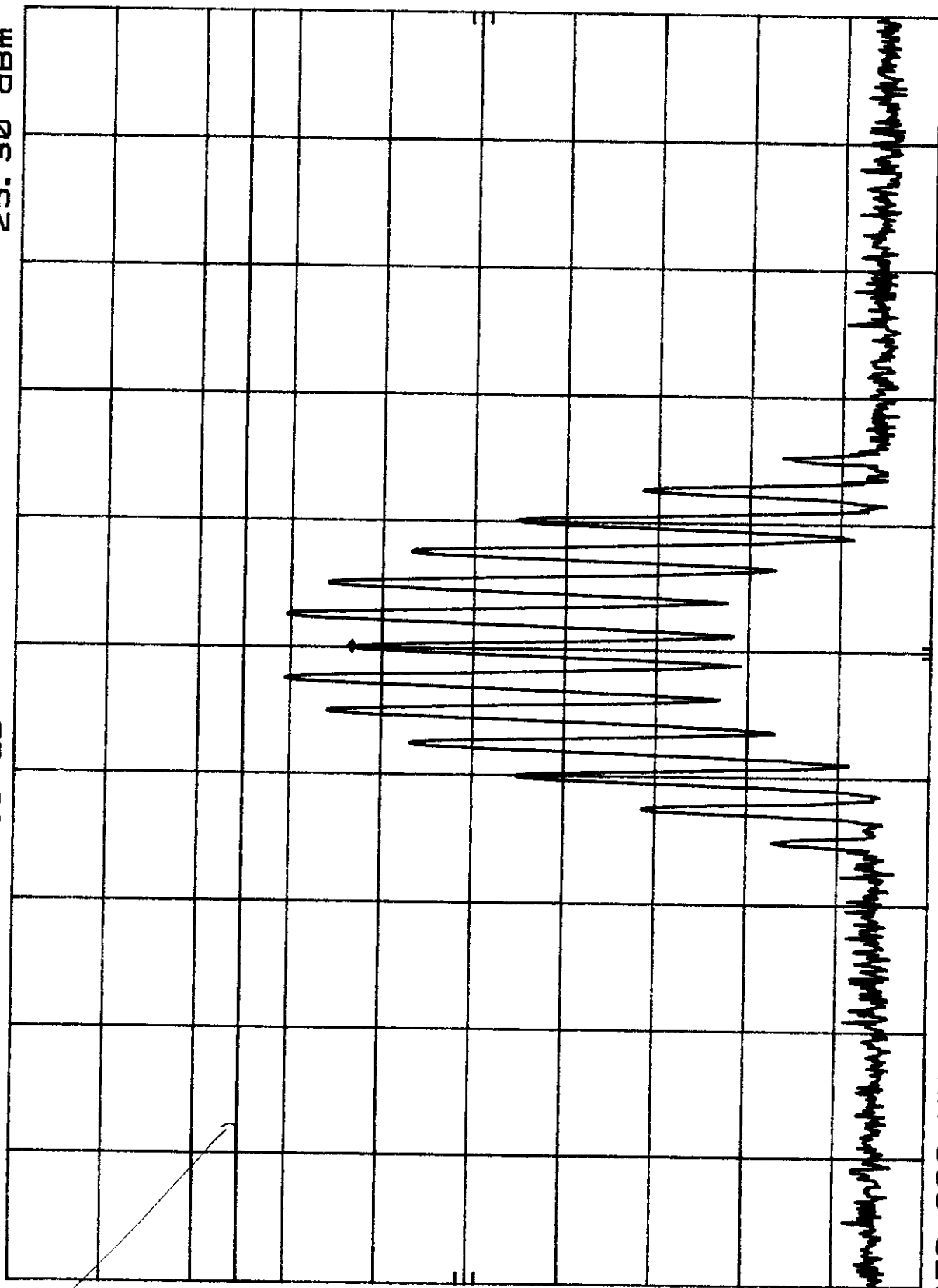
62.0

dB

DL

37.1

dBm



CENTER 470.000 MHz

RES BW 300 Hz

VBW 1 kHz

SPAN 100 kHz

SWP 3.00 sec

FOR 70 WATTS OUTPUT
DRIVER OUTPUT : UNMODULATED CARRIER

MKR 470.000 0 MHz
37.10 dBm

REF 62.0 dBm ATTEN 10 dB

10 dBX

POS PK

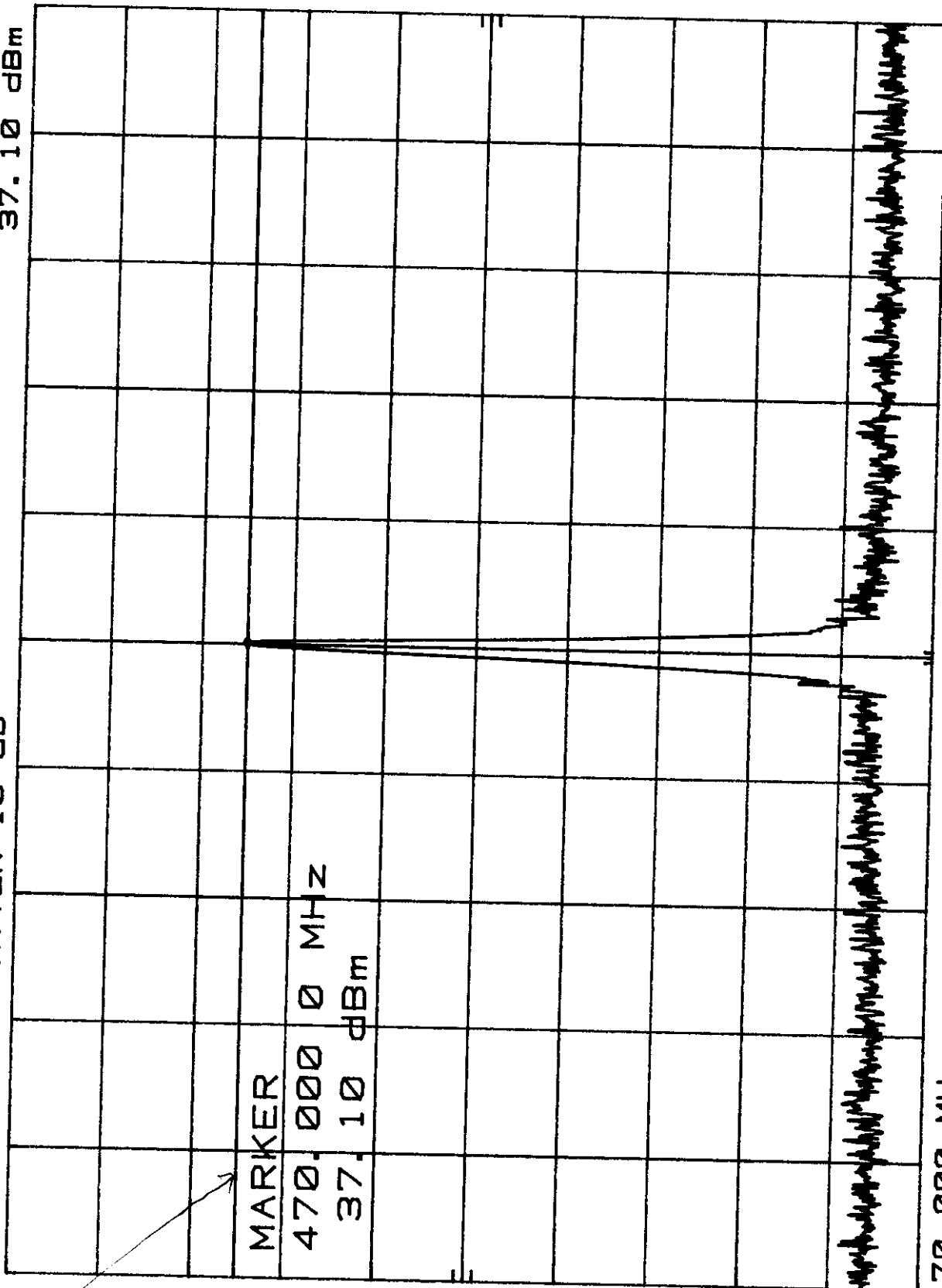
OFFSET

62.0 dB

DL
37.1 dBm

MARKER

470.000 0 MHz
37.10 dBm



CENTER 470.000 MHz

RES BW 300 Hz

VBW 1 kHz

SPAN 100 kHz
SWP 3.00 sec

2.983(e)(4) **Measurement of Antenna Conducted Spurious
Emissions Per 2.991**

Definition: Conducted Spurious Emissions are emissions at the antenna terminals on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communication desired. The reduction in the level of these spurious emissions will not affect the quality of the information being transmitted.

Conducted spurious emissions shall be attenuated below the maximum level of the carrier frequency in accordance with the following formula:

$$\text{Spurious attenuation in dB} = 43 + 10 \log_{10} P_o$$

Where P_o = output in watts

$$= 43 + 10 \log_{10} (70)$$

$$= 61.5 \text{ dB}$$

and

$$= 43 + 10 \log_{10} (100)$$

$$= 63.0 \text{ dB}$$

Test Method: Per EIA RS 152-B, Paragraph 4.

Connect the equipment as shown in FIGURE 4.

Adjust the audio oscillator so that the frequency deviation of the transmitter is 5 kHz at a modulation frequency of 2.5 kHz. Adjust the spectrum analyzer to display the modulated carrier.

Scan the frequency spectrum from the lowest radio frequency generated in the equipment through the 10th harmonic of the carrier frequency.

Test Results: See Plots Following Figure 4.

All spurious antenna conducted emissions are below the FCC specifications.

PAG-1BE - MSI
ANTENNA CONDUCTED SPURIOUS

MKR 450 MHz
49.10 dBm

ATTEN 10 dB

REF 62.0 dBm

h₀

10 dB/

POS PK

OFFSET

62.0

dB

DL

-13.0

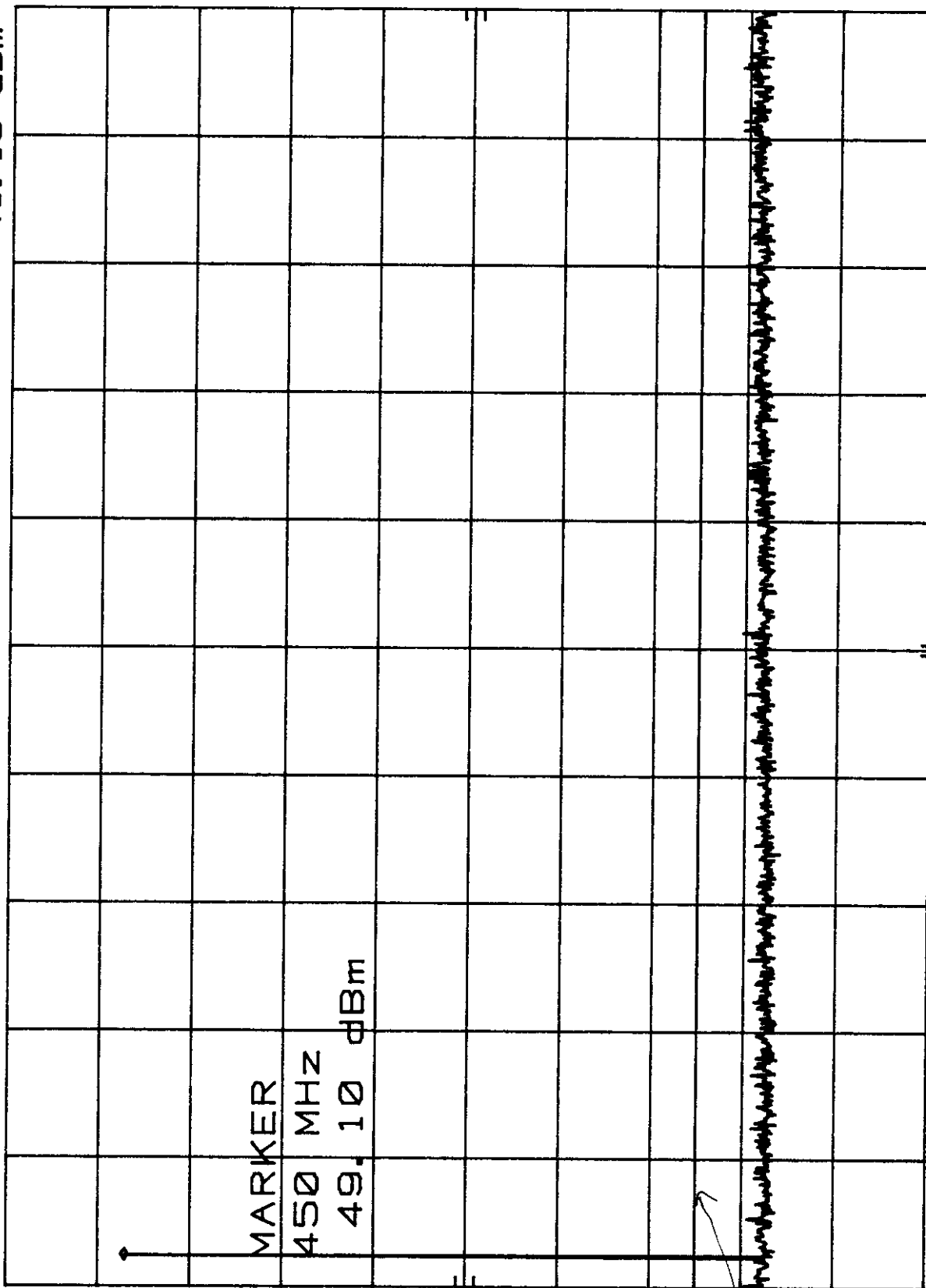
dBm

MARKER
450 MHz
49.10 dBm

70 WATT

61.5 dBc

FCC LIMIT



START 400 MHz

RES BW 30 kHz

VBW 100 kHz

STOP 2.50 GHz
SWP 6.30 sec

PA6-18E -MSI
ANTENNA CONDUCTED SPURIOUS

hp REF 62.0 dBm ATTEN 10 dB

10 dB/

POS PK

OFFSET

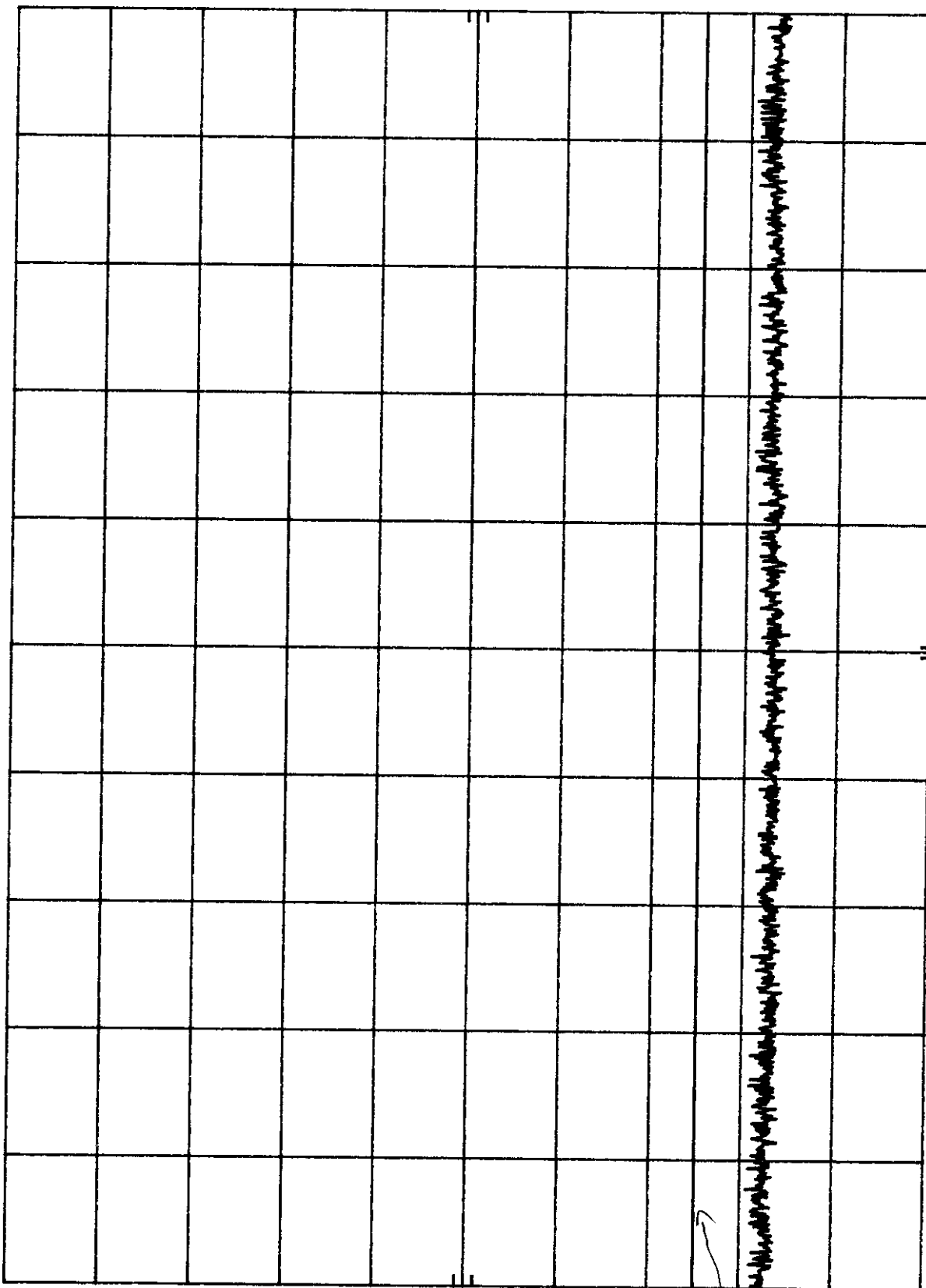
62.0
dB

DL
-13.0
dBm

70 WATTS

61.5 dBc

FCC LIMIT.



START 2.50 GHz RES BW 30 kHz VBW 100 kHz STOP 5.50 GHz SWP 9.00 sec

PAG-18E - MS1
ANTENNA CONDUCTED SPURIOUS

MKR 469 MHz
49.20 dBm

ATTEN 10 dB

REF 62.0 dBm

HP

10 dB/

POS PK

OFFSET

62.0

dB

DL

-13.0

dBm

MARKER

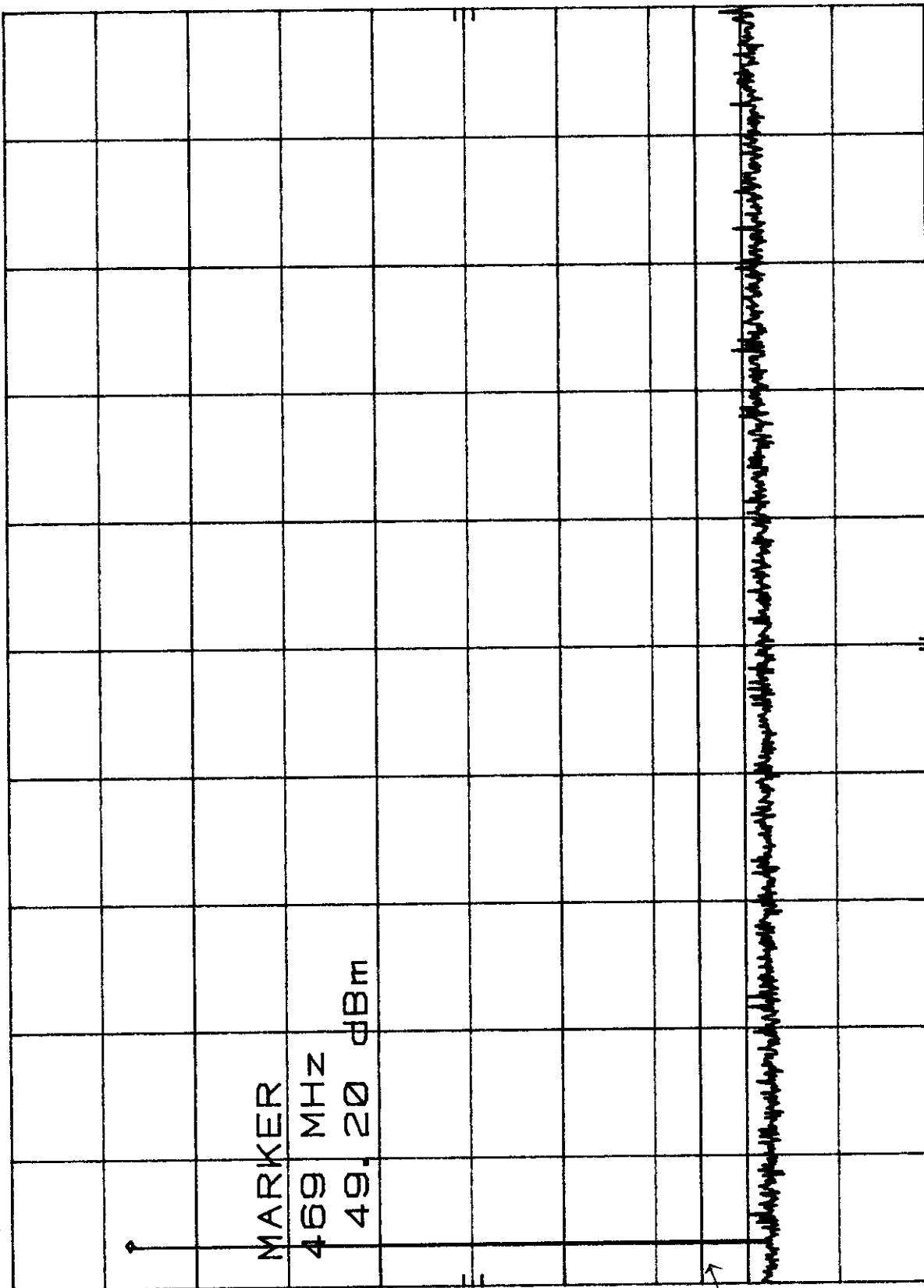
469 MHz

49.20 dBm

70 WATTS

61.5 dBc

FCC LIMIT



START 400 MHz

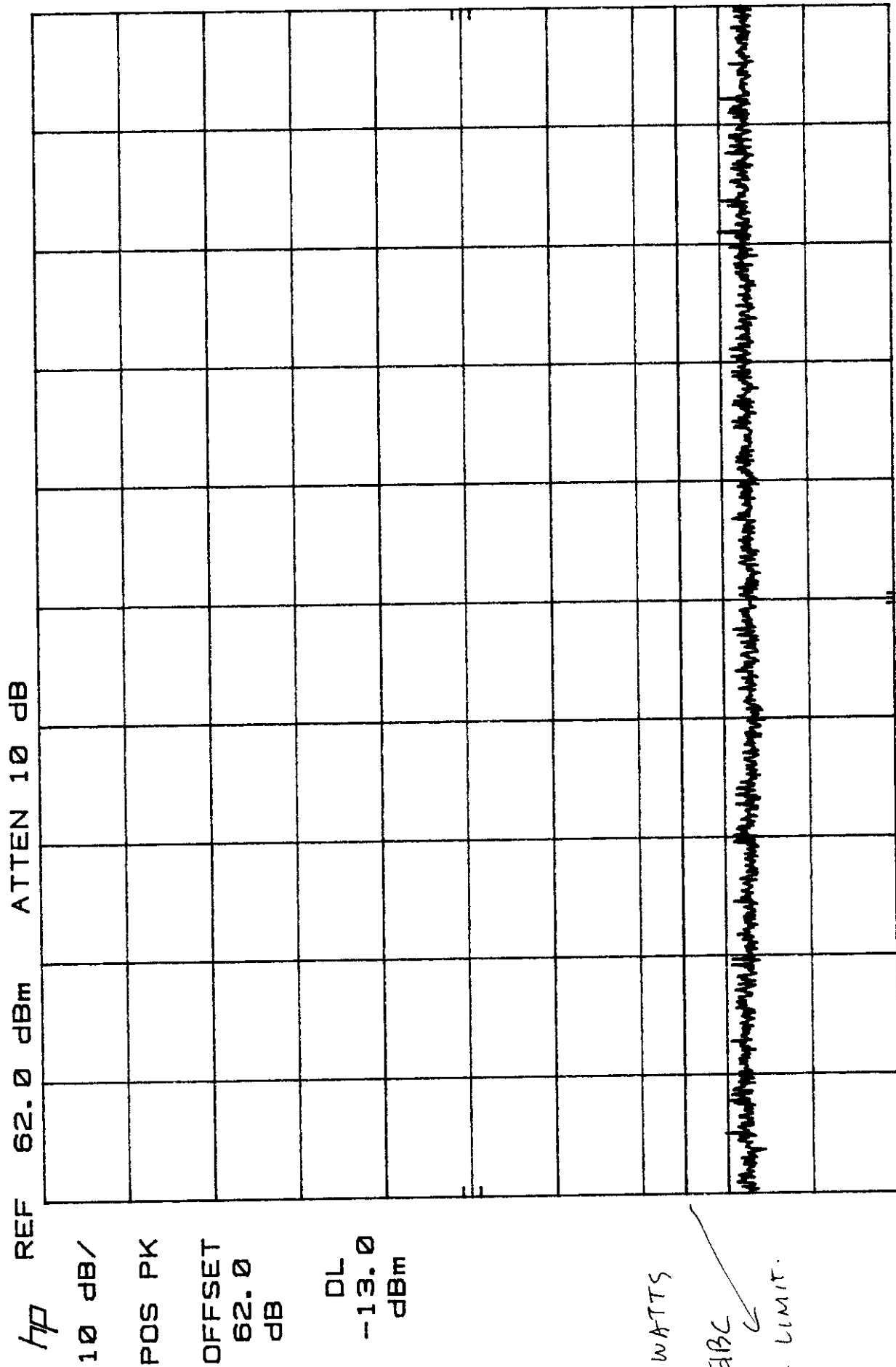
RES BW 30 KHz

VBW 100 KHz

STOP 2.50 GHz

SWP 6.30 sec

PAG-18E - MSI
ANTENNA CONDUCTED SPURIOUS



START 2.50 GHz STOP 5.50 GHz
RES BW 30 kHz SWP 9.00 sec
VBW 100 kHz

PAG - 18E-MS1
 ANTENNA CONDUCTED SPURIOUS

MKR Δ 449 MHz
 -66.10 dB

HP REF 62.0 dBm ATTEN 10 dB

10 dB/

POS PK

OFFSET

62.0
 dB

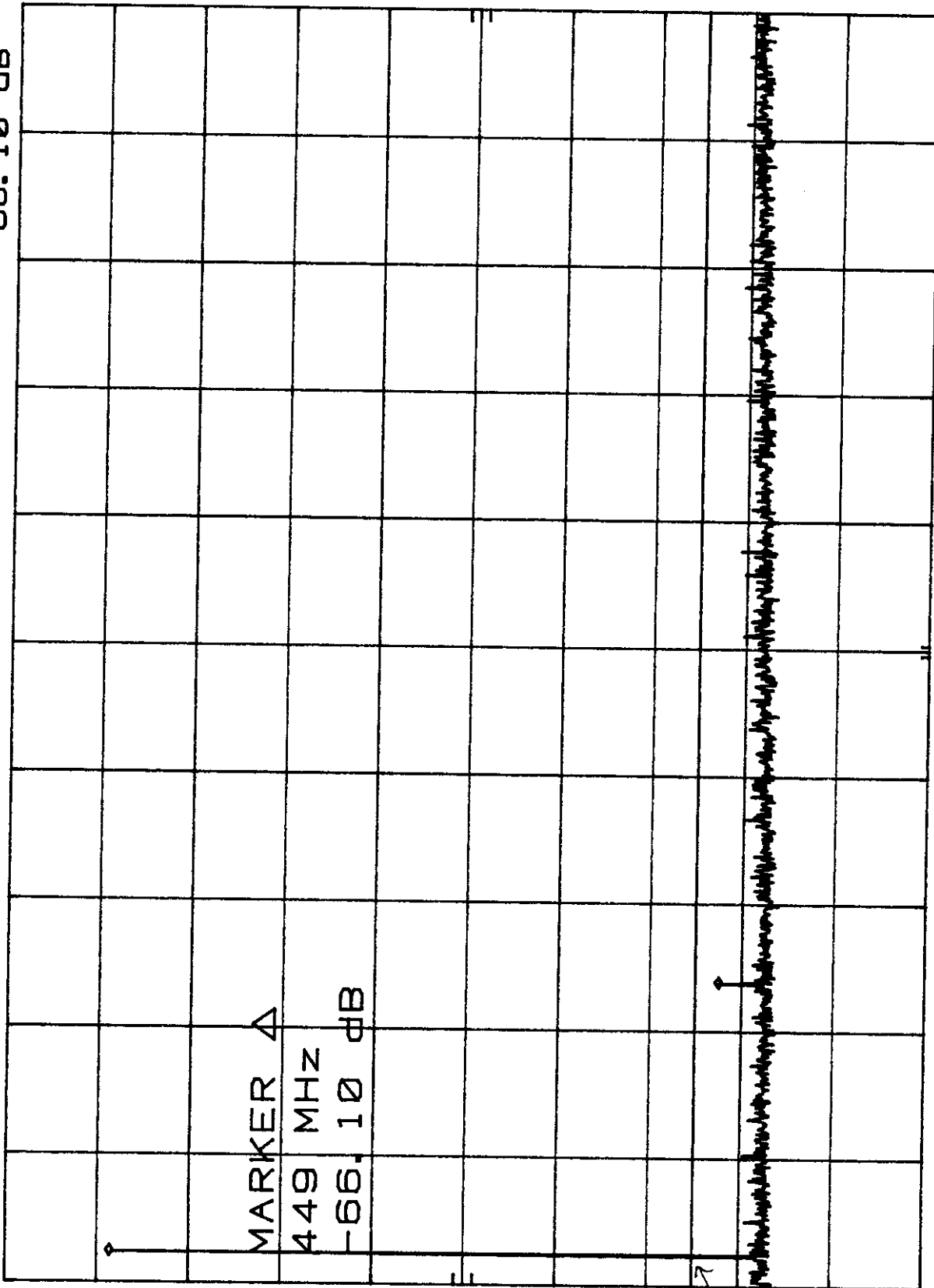
DL
 -13.0
 dBm

MARKER Δ
 449 MHz
 -66.10 dB

100 WATTS

63 dBc

FCC LIMIT



START 400 MHz RES BW 30 kHz VBW 100 kHz STOP 2.50 GHz SWP 6.30 sec

PAG-1BE-MSI

74

10 dB/

POSIX

OFFSET

200

10

-13.0
dBm

100 WATTS

63 dBC

FCC LIMIT

START 2.50 GHZ

RES BW 30 KHZ

VBW 100 KHZ

STOP 5.50 GHz

SWP 9.00 sec

PAG-10E-M51
 ANTENNA CONDUCTED SPURIOUS

MKR 469 MHz
 50.80 dBm

ATTEN 10 dB

REF 62.0 dBm

10 dB/

POS PK

OFFSET

62.0

dB

DL

-13.0

dBm

MARKER

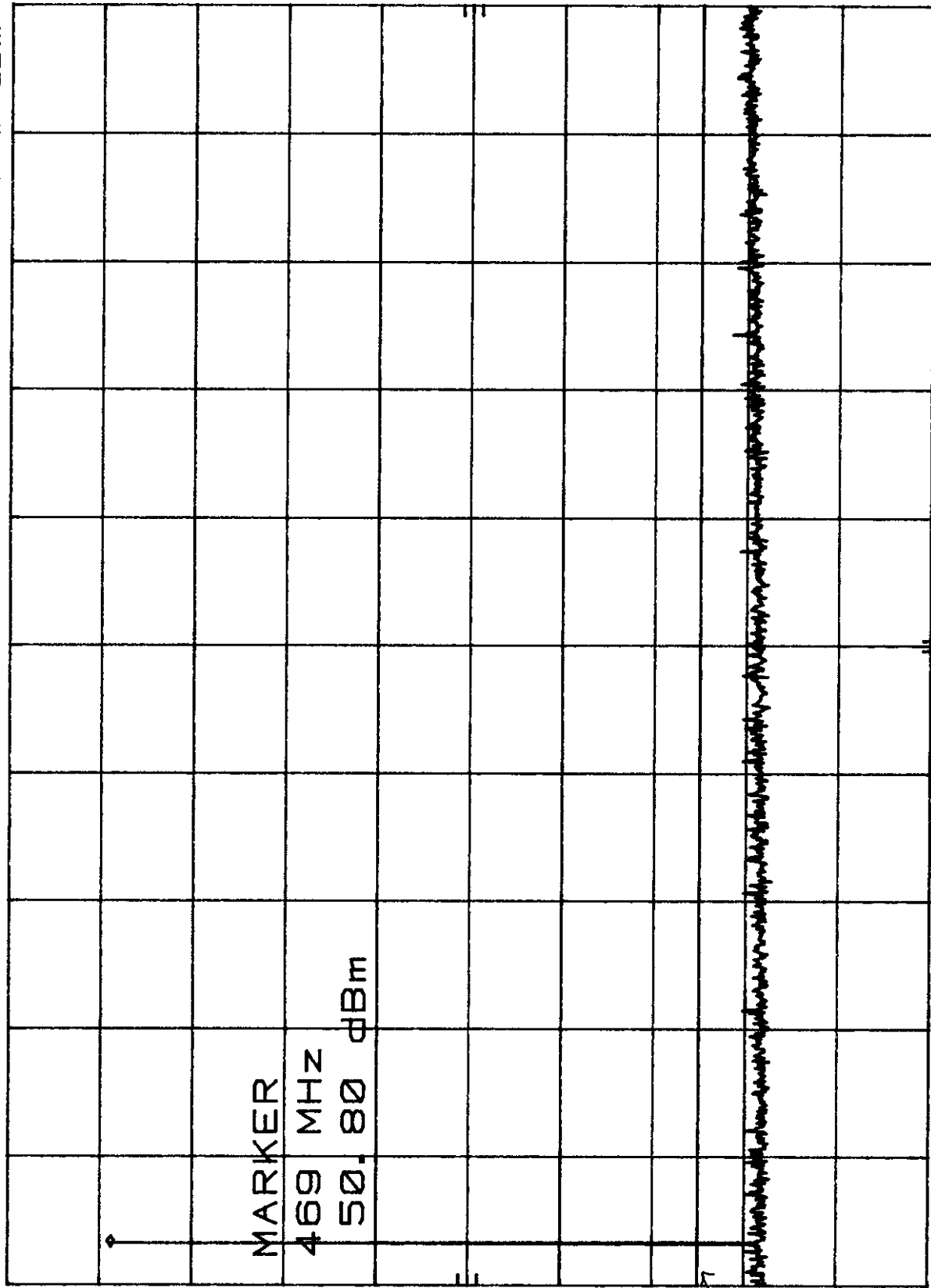
469 MHz

50.80 dBm

100 WATTS

63 dBc

FCC LIMIT.



STOP 2.50 GHz
 SWP 6.30 sec

VBW 100 kHz

RES BW 30 kHz

START 400 MHz

PAGE-18E-MS1
ANTENNA CONDUCTED SPURIOUS

HP REF 62.0 dBm ATTN 10 dB

10 dB/

POS PK

OFFSET

62.0
dB

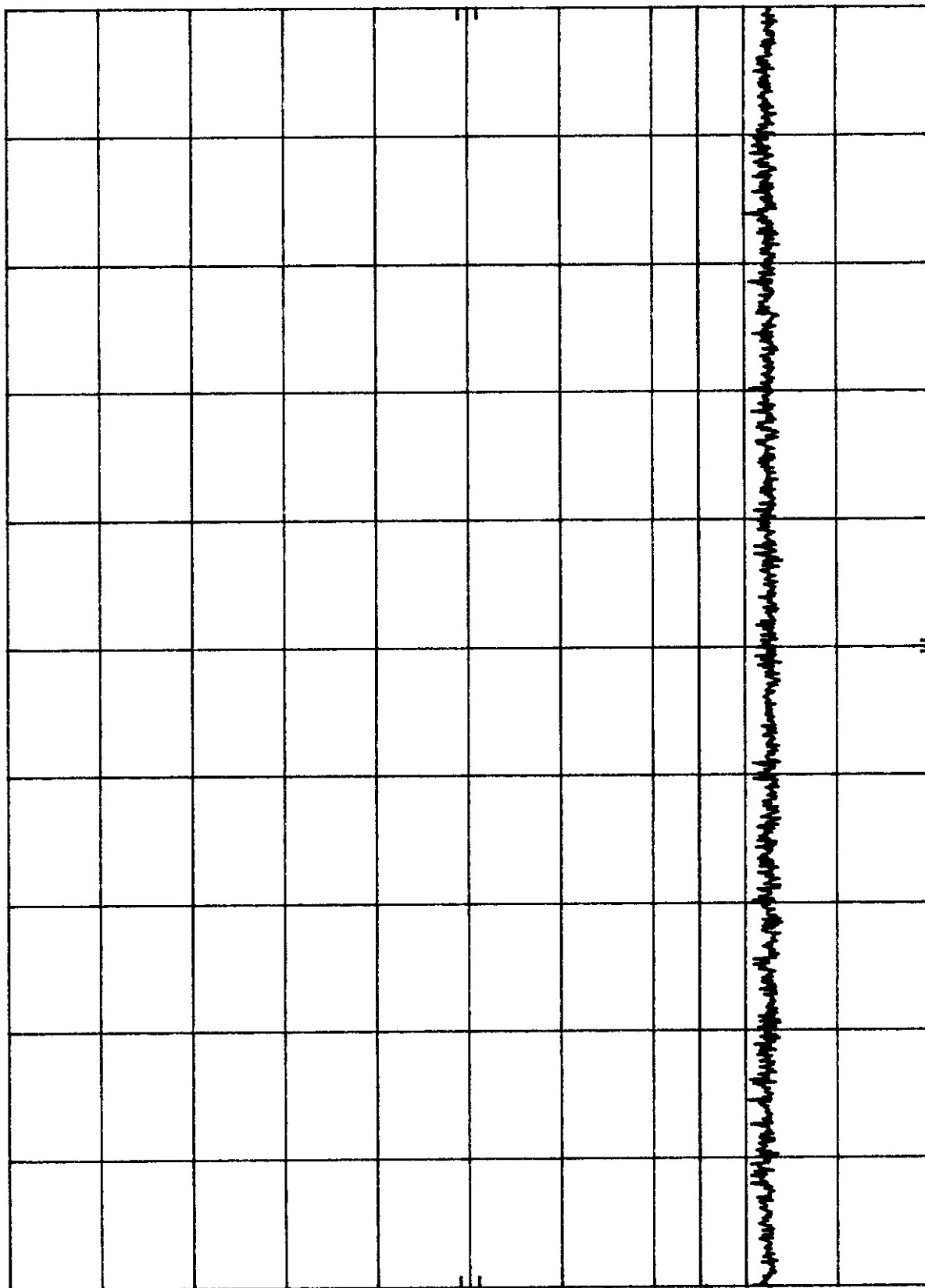
DL
-13.0
dBm

36

100 WATTS

69 dBc

FCC LIMIT



START 2.50 GHz RES BW 30 kHz STOP 5.50 GHz SWP 9.00 sec

VBW 100 kHz

ANTENNA CONDUCTED SPURIOUS
 PAG-1EE-LMS

MKR Δ 449 MHz
 -67.00 dB

ATTEN 10 dB

REF 60.5 dBm

HP

10 dB/

POS PK

OFFSET

60.5

dB

DL

-13.0

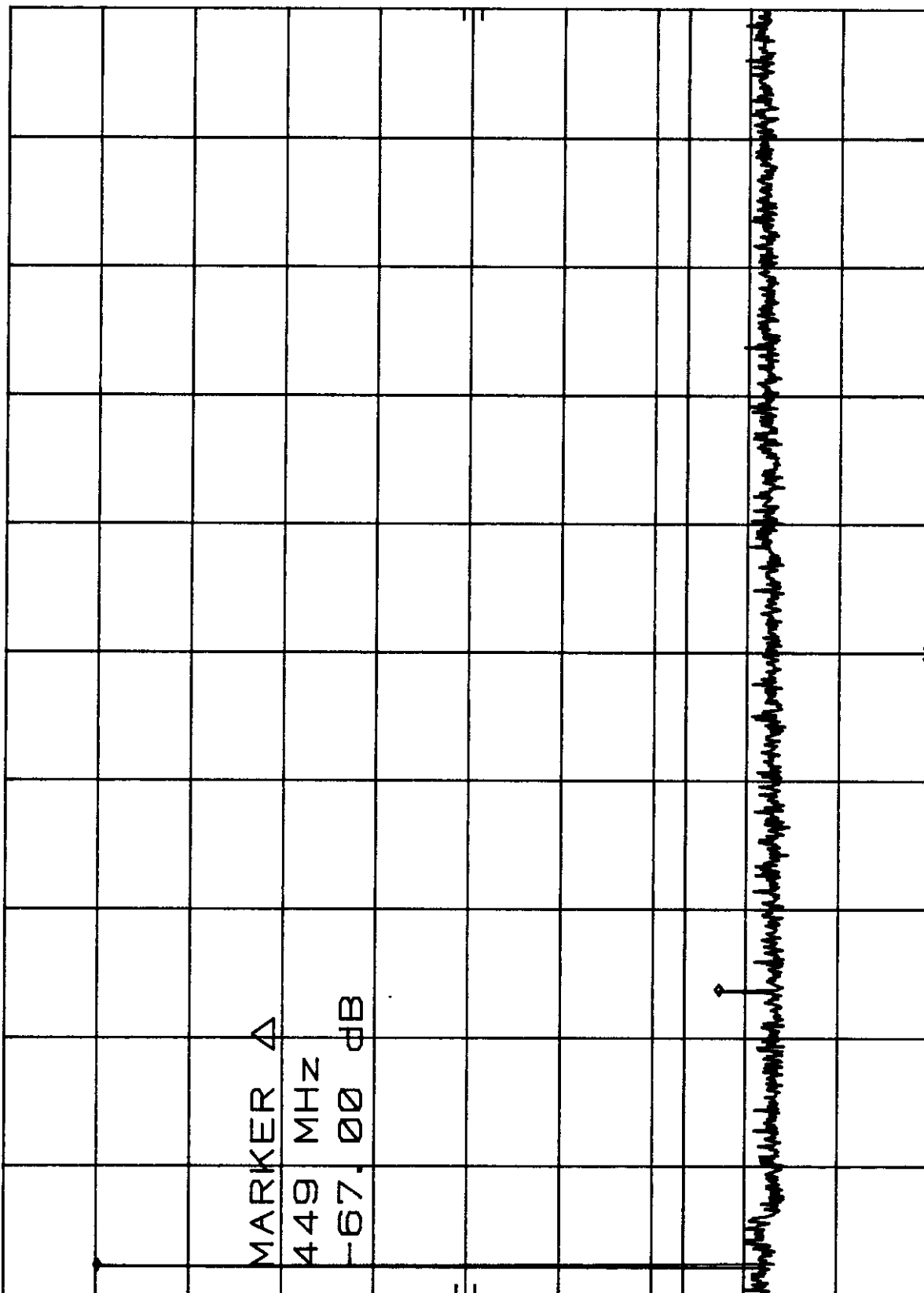
dBm

MARKER Δ

449 MHz

-67.00 dB

63 dBc
 Fac Limit.



START 400 MHz

RES BW 30 kHz

VBW 100 kHz

STOP 2.50 GHz

SWP 6.30 sec

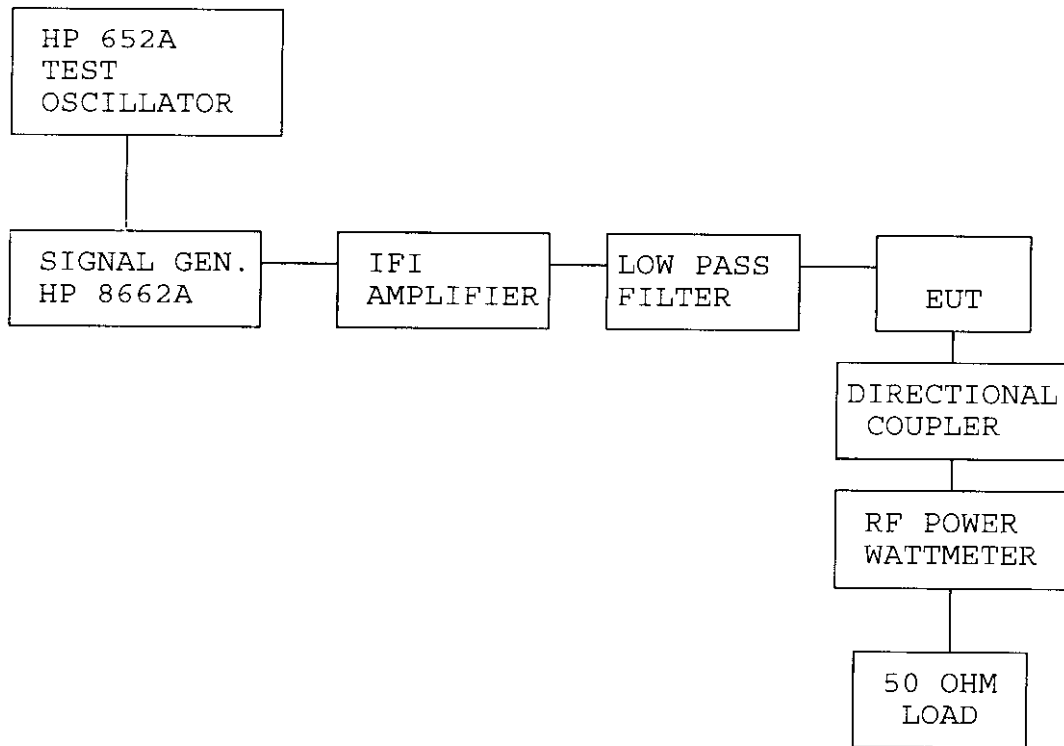


FIGURE 4. BLOCK DIAGRAM.
(SPURIOUS EMISSIONS TEST)

2.983(e) (5) **Measurement of Radiated Spurious Emissions Per 2.993**

Definition: Emissions from the equipment when connected into a non-radiating load on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired. The reduction in the level of these spurious emissions will not effect the quality of the information being transmitted.

Test Method: Per EIA RS 152-B.

Connect the equipment and follow the procedure described in paragraph 2.2.1.1 and paragraph 5.0. Measure the amplitude of each spurious radiated signal through the 10th harmonic. The level in dBuV/m is calculated on the following page. The spurious signals are then measured on the 3 meter range.

$$\text{Spurious attenuation dB} = 10 \log \frac{\text{Po Watts}}{\text{Calc spurious pwr}}$$

Test Results: See TABLE I.

All Radiated spuירים emissions are below the FCC specifications.

SPURIOUS RADIATED SIGNAL MEASUREMENTS

(Ref: Part 2, Subpart J, 2.991 & 2.993)

Date <u>4-24-98</u>	Pass <u>X</u> Fail <u> </u> (at Freq. <u> </u>)
EUT <u>RF Power Amplifier</u>	Operating Power <u>100 watts</u>
Part No. <u>PAG-1BE-MSI</u>	Operating Mode <u>Saturated</u>
Serial No. <u> </u>	Test Engineer <u>Bryan Benardus</u>

FREQUENCY TUNED TO 451 MHz

ANT POL	FREQ MHz	SPECTRUM ANALYZER (dBμV)	ANT. FACTOR (dB)	CABLE LOSS (dB)	AMP GAIN (dB)	dBμV/m	FUND FIELD STRENGTH dBμV/m	SPUR BELOW CARR- IER (dBc)
V	902	79.6	23.9	6.2	30	79.7	147.4	67.7
V	1353	76.1	25.1	6.8	30	78.0		69.4
V	1804	71.8	28.0	7.4	30	77.2		70.2
V	2255	66.3	28.7	7.9	30	72.9		74.5
V	2706	64.0	29.8	8.5	30	72.3		75.1
V	3157	60.2	31.5	9.5	30	71.2		76.2
V	3608	58.4	32.2	10.4	30	71.0		76.4
V	4059	58.5	33.0	11.6	30	73.1		74.3
V	4510	53.0	33.5	12.7	30	69.2		78.2

$$\text{Fundamental Field Strength (V/m)} = 1/3 (R_o \times P_o)^{1/2}$$

R_o = Amplifier Output Impedance (Ohms)

P_o = Amplifier Output Power (Watts)

$$\text{Conversion From V/m to dBμV/m} = (\text{V/m})^{\log} \times 20$$

$$\text{FCC Limit} = 43 + 10 \cdot (P_o^{\log}) = 63 \text{ dB}$$

SPURIOUS RADIATED SIGNAL MEASUREMENTS

(Ref: Part 2, Subpart J, 2.991 & 2.993)

Date <u>4-24-98</u>	Pass <u>X</u> Fail <u> </u> (at Freq. <u> </u>)
EUT <u>RF Power Amplifier</u>	Operating Power <u>100 watts</u>
Part No. <u>PAG-1BE-MSI</u>	Operating Mode <u>Saturated</u>
Serial No. <u> </u>	Test Engineer <u>Bryan Broadus</u>

FREQUENCY TUNED TO 451 MHz

ANT POL	FREQ MHz	SPECTRUM ANALYZER (dBμV)	ANT. FACTOR (dB)	CABLE LOSS (dB)	AMP GAIN (dB)	dBμV/m	FUND FIELD STRENGTH dBμV/m	SPUR BELOW CARRIER (dBc)
H	902	79.0	23.9	6.2	30	79.1	147.4	68.3
H	1353	75.1	25.1	6.8	30	77.0	}	70.4
H	1804	72.9	28.0	7.4	30	78.3		69.1
H	2255	67.2	28.7	7.9	30	73.8		73.6
H	2706	67.3	29.8	8.5	30	75.6		71.8
H	3157	66.5	31.5	9.5	30	77.5		69.9
H	3608	59.7	32.2	10.4	30	72.3		75.1
H	4059	58.2	33.0	11.6	30	72.8		74.6
H	4510	54.9	33.5	12.7	30	71.1		76.3

$$\text{Fundamental Field Strength (V/m)} = 1/3 (R_o \times P_o)^{1/2}$$

R_o = Amplifier Output Impedance (Ohms)

P_o = Amplifier Output Power (Watts)

$$\text{Conversion From V/m to dBμV/m} = (V/m) \log \times 20$$

$$\text{FCC Limit} = 43 + 10 \cdot (P_o^{\log}) = 63 \text{ dBc}$$

2.983(e)(6) **Measurement of Frequency Stability Per 2.995**

The EUT is a power amplifier and contains no circuitry for generating or stabilizing the RF signal. The driver will be responsible for this task.

2.983(e)(7) **Frequency Spectrum to be Investigated per 2.997**

The frequency was searched from the lowest radio frequency generated in the equipment through the 10th harmonic of the carrier frequency.

2.983(h) **Description and Test Data For Encoding Device(s)**

This section does not apply.

2.983(i) **Type acceptance Data For an External Power
Amplifier Used In Amateur Radio Service - Part 97**

This section does not apply

APPENDIX A
TEST EQUIPMENT

DNB ENGINEERING, INC. EMC TEST EQUIPMENT

<u>MANUFACTURER</u>	<u>DESCRIPTION</u>	<u>MODEL</u>
Hewlett Packard	Spectrum Analyzer	8566B
Hewlett Packard	Spectrum Analyzer	8568B
Hewlett Packard	Quasi Peak Adapter	85650A
Hewlett Packard	Computer/Controller	9825T
Hewlett Packard	Frequency Counter	5245L
Hewlett Packard	Printer	9876A
Hewlett Packard	Counter Plug-in	5253B
Hewlett Packard	Plotter	9872C
Hewlett Packard	Plotter	7470A
Hewlett Packard	Frequency Synthesizer	9662A
Hewlett Packard	Sweep Main Frame	8620C
Hewlett Packard	Plug-in 2-22 GHz	26290B
Polarad	Signal Generator 3.7 to 8.4 GHz	1107E
Telonics	Sweep Generator	4053A
Wiltron	Sweep Generator	6653A
Hewlett Packard	Signal Generator	614A
Hewlett Packard	Signal Generator	616B
Hewlett Packard	Signal Generator	618B
Hewlett Packard	Signal Generator	620B
Hewlett Packard	Signal Generator	626A
Hewlett Packard	Signal Generator	628A
Hewlett Packard	Signal Generator	8654A

DNB ENGINEERING, INC. EMC TEST EQUIPMENT

Hewlett Packard	Signal Generator	8662A
Hewlett Packard	RF Voltmeter	3406A
Solar	Pulse Generator	8282-1
Solar (2)	Clamp on Probe	6747-1
Electro-Metrics	Clamp on Probe	PCL-10
Electro-Metrics	Clamp on Probe	PCL-25
Electro-Metrics	Loop Sensor	ELS-10
Electro-Metrics	Electro-Static Field Probe	EFP-25
Electro-Metrics	LISN	FCC-5-2
Solar	LISN	8012-50-r-24 BNC
Solar	Audio Isolation Transformer	6220-1A
Solar	Isolation Transformer	7032-1
Solar (14)	10 mfd Capacitors	6212-106R
Schaffner EMC, Inc.	Absorbing Clamp	MDS 21
Solar	100 W Audio Amplifier	6552-1A
Solar (2)	LISN	8018-50-TS-24 BNC
Stoddart	FIM	NM-12T
Krohn-Hite	Audio Oscillator	4400
Stoddart	FIM	URM-6
IFI	Field Strength Meter	EFS-1
Solar	Precision Resistor	7144-1.0
Solar	Precision Resistor	7144-10.0
Solar	Coupling Network	7835-891

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Solar	Coupling Network	7835-896
Solar	LISN (5 μ h)	6338-5
Solar	LISN (50 μ h)	6338-57
Solar	High Pass Filter	7205-.35
Solar	High Pass Filter	7205-2.4
Mini Circuits	Amplifier Wide Band	ZHL42
Mini Circuits	Amplifier Wide Band	ZHL-1042J
Mini Circuits	Amplifier Wide Band	ZHL32A
Mini Circuits	Amplifier Wide Band	ZHL-1A
Mini Circuits	Amplifier Wide Band	ZHL2-8
ENI	Amplifier	510L
ENI	Amplifier	350L
Hewlett Packard	Preamplifier	11975A
Hewlett Packard	Preamplifier	8349A
IFI	1 kHz - 200 MHz Amplifier (15 Watt)	5300L
Narda	400 W 50 Ω Load	376NM
Eaton	WBA 500 - 1000 MHz	15100B
ENI	WBA 250 KHz - 150 MHz	3100LA
ENI	WBA 1.5 - 500 MHz	5501
Avantek	Low Noise Amplifier 6-12.4 GHz	AFT12635
Hewlett Packard	500 MHz Digitizing Oscilloscope	54111D
Tenney	Temperature Chamber	THjr

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Hewlett Packard	5 Hz - 200 MHz Network Analyzer	3577A
Hewlett Packard	Frequency Doubler	11721A
Hewlett Packard	Harmonic Mixers	11970A
Hewlett Packard	Harmonic Mixers	11970K
Hewlett Packard	Computer/Controller	9836
Hewlett Packard	Computer/Controller	9826
Avantest	Spectrum Analyzer	TR4131E
Hewlett Packard	Spectrum Analyzer	8558B
Hewlett Packard	Spectrum Analyzer	8554L
Hewlett Packard	Pulse Generator	212A
Hewlett Packard	Pulse Generator	214A
Hewlett Packard	Pulse Generator	215A
Tektronix	Oscilloscope	453A
John Fluke	High Voltage power Supply	408A
LeCroy	Digital Storage Scope (125 MHz)	9400
Biddle	Micro Ohm Meter	247800
Hewlett Packard	Pulse Modulator	11720A
Topaz	Ultra Isolation Transformer (2.5 kVA)	0211T21SR
ENI	Ultra Isolation Transformer (2.5 kVA)	91002-22
Singer (5)	Current Probe	91550-2
Stoddart (4)	Current Probe	91550-1

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Hewlett Packard	Dual Directional Coupler	778D
Narda	Dual Directional Coupler	3022
Narda	Directional Coupler	3045C-20
Narda	Directional Coupler	3003-20
Narda	Directional Coupler	3002-10
Narda	Directional Coupler	23964
Narda (2)	Directional Coupler	22355
Narda	Power Divider	4326-2
Narda	Power Divider	4035C
Narda	Power Divider	4033C
Englemann	Power Divider	PSK-210
Bird	50Ω Load 10 W 50's	80-53
Stoddart	50Ω Load	90514
Micro Lab	50Ω Load	TB-5MN
Tekscan	50Ω Attenuator Kit	FP-50
Tenuline	50Ω 100 W 20 dB Attenuator	8343-200
Micro Lab	50Ω 40 dB Attenuator	AD-40N
Hughes	20 Watt TWT L Band	1277H04
Hughes	20 Watt TWT C Band	1277H04
Hughes	10 Watt TWT S Band	1177H
Hughes	10 X/Ku Band	1177H
IFI	2kW cw 1 kHz - 200 MHz Wide Band Power Amp	410ULP
DNB Engineering	EMP Pin/Wire Test Set	844

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ANTENNAS

<u>MANUFACTURER</u>	<u>DESCRIPTION</u>	<u>MODEL</u>
AIL (3)	Dipole	DM105A-T1, T2, & T3
EMCO	Biconical	3109
EMCO	Log Periodic	3146
EMCO	Parallel Element	3107
Eaton	Vertical Rod	74607-1
Eaton (2)	Vertical Rod	75492-1
Ailtech	Loop	94608-1
Singer	Loop	LP-105 ASC
Electro-Metrics (2)	Biconical	BIA-25
Electro-Metrics (2)	Conical Log Spiral	LCA-25
Electro-Metrics (2)	Loop	ALP-10
Electro-Metrics (2)	Loop	ARL-25
Electro-Metrics (2)	Broadband Dipole	DBA-25
Electro-Metrics (3)	Turnable Dipole	TA-25, 25-1, & 25-2
EMCO	Double Ridge Guide	311525
Electro-Metrics (2)	Vertical Rod	RVR-25
Alpha	Standard Gain Horn	K861
Alpha	Standard Gain Horn	A861
Alpha	Standard Gain Horn	KV861
Solar	Loop Antenna	7429-1
Electro-Metrics	E Field SensorHorn	EFP-25