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1. VERIFICATION OF COMPLIANCE

COMPANY NAME : R.L. DRAKE COMPANY
230 INDUSTRIAL DRIVE
FRANKLIN, OHIO 45005

CONTACT PERSON : MR. NEIL LE SAINT/ SENIOR ENGINEER

TELEPHONE NO : (513) 746-4556

EUT DESCRIPTION : ALTB72 ASSISTIVE LISTENING TRANSMITTER

MODEM NAME : 2105

DATE TESTED : APRIL 08,1999

LIMITS AND TEST RESULTS	
TECHNICAL LIMITS	TEST RESULT
A band 200 kHz wide centered on the operating frequency	Confined
Field Strength within 200 kHz band @ 3 meter	Passed
Field Strength outside 200 kHz band @ 3 meter	Passed
The above equipment was tested by Compliance Engineering Services, Inc. for compliance with the requirements set forth in CFR 47 PART 15 SUBPART C. This said equipment in the configuration described in this report shows that maximum emission levels emanating from equipment are within the compliance requirements.	
	
MIKE C.I. KOU/ VICE-PRESIDENT COMPLIANCE ENGINEERING SERVICES, INC.	

2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

CHASSIS TYPE	PLASTIC
Operating Frequencies	72.1 - 72.9 MHz, 74.7 MHz, and 75.3 - 75.9 MHz
Frequency Generation	PLL Synthesis
Tuning Step Size	200 kHz
Modulation	FM, 180K0F3E
Antenna	Internal antenna permanently attached.
Associated Receiver	FCC ID: CAR1002100

The Eut is a Wide-band FM Assistive Listening Transmitter, which operates in the 72 - 76 MHz frequency band. The ALTB72 is synthesized to permit user selected operation on one of the ten FCC designated. Together, with a compatible personal receiver, the ALTB72 is designed for hearing assistance in places of public access for people who need help overcoming background noise, reverberation, or distance from sound source. Applications involving tour guide use, classrooms, and meetings, among many others.

3. TEST LOCATION

All emissions tests were performed at:

Compliance Consulting Services
561F Monterey Road
Morgan Hill, CA 95087

CCS has site descriptions on file with the FCC for 10 meter and 3 meter site configurations. CCS is a NVLAP accredited facility.

Radiated emissions from the digital portion of the EUT were performed on A site , one of the 3 meter sites.

4. TEST PROCEDURES AND TEST RESULTS

Radiated Emissions Test Requirement: 15.237(c)

Measurement Equipment Used:

HP 8546A EMI Receiver, 9kHz -6.5GHz

Bilog Chase-CBL6112 (S/N2049)

Test Set-up for frequency range 30 – 1000 MHz

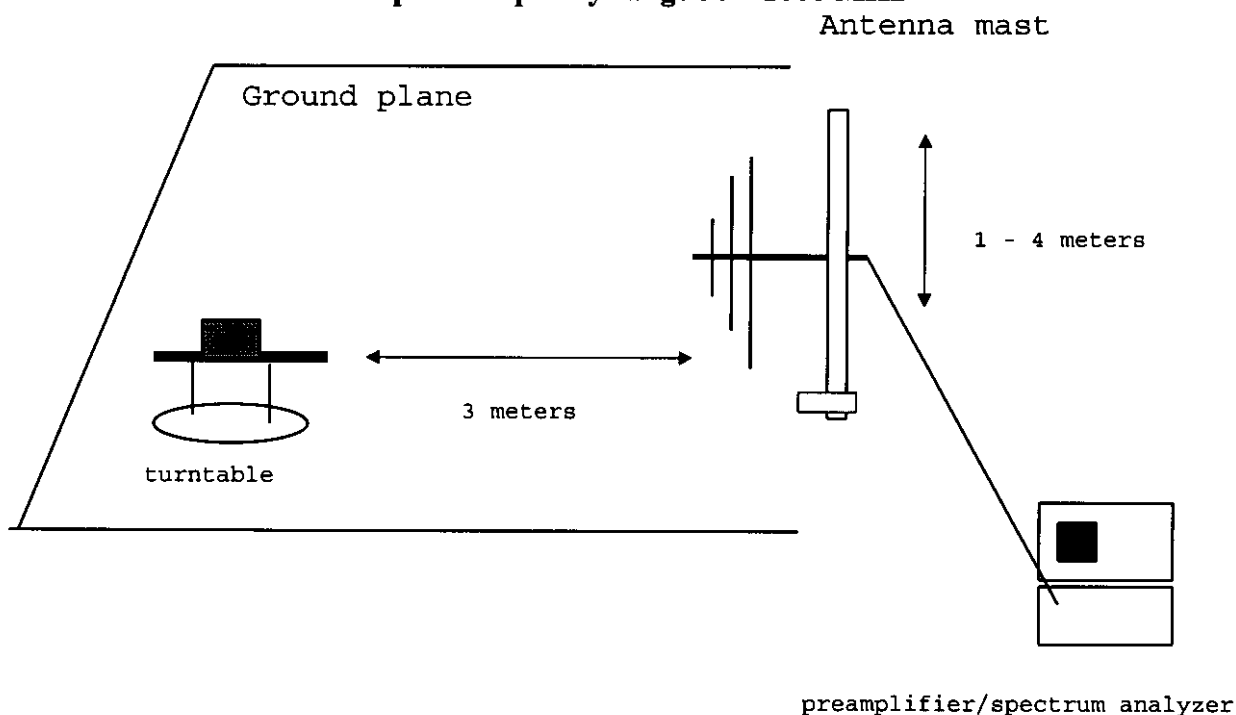


Fig. 1

Test Procedure:

1. Set the Eut to transmit CW mode, which produced the highest emissions.
2. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3 ft from the EUT.
3. The turntable was slowly rotated to locate the direction of maximum emission at each emission. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarization. The maximum readings so obtained were recorded.

4. Since Eut is a BELTPACK unit, 3 orientations were tested X, Y, and Z for low, middle, and high channels. Steps 1-3 were repeated for all orientations and channels.

Test Results:

Please refer to attached tabular data sheets.

Compliance Engineering Services Inc.

Project No. : 99U0160

Report No. : 990408A1

Date : 04/08/1999

Time : 15:04

>> 3 M RADIATED EMISSION DATA <<

Test Engr : JUAN MARTINEZ

Company : R.L. DRAKE COMPANY

Equipment Under Test : BELTPACK ASSISTIVE LISTENING TRANSMITTER

Test Configuration : EUT ONLY

Type of Test : FCC 15.237(C)

Mode of Operation : TX

Freq. dBuV PreAmp Ant Cable dBuV/m Limit Margin Pol Hgt(m) Az
NOTE ALL READINGS ARE IN PEAK MODE.

Z-axis(ch. 9):

Bilog 2049 ; No Pre-amp :

75.90	73.29	0.00	7.02	1.17	81.48	98.00	-16.52	V	1.7	45
151.80	29.03	0.00	12.63	1.74	43.39	63.50	-20.11	V	1.0	225
227.70	27.79	0.00	12.53	2.16	42.49	63.50	-21.01	V	1.0	135
303.60	26.51	0.00	13.95	2.52	42.97	63.50	-20.53	V	1.0	45
379.50	27.40	0.00	15.82	2.86	46.07	63.50	-17.43	V	1.0	180
759.00	19.49	0.00	19.93	4.31	43.72	63.50	-19.78	V	1.0	315
531.30	20.45	0.00	18.39	3.46	42.29	63.50	-21.21	V	1.0	45

Y-axis(ch. 9)

75.90	75.33	0.00	7.02	1.17	83.52	98.00	-14.48	V	1.5	180
151.80	31.52	0.00	12.63	1.74	45.88	63.50	-17.62	V	1.0	90
227.70	18.64	0.00	12.53	2.16	33.34	63.50	-30.16	V	1.0	225
303.60	27.01	0.00	13.95	2.52	43.47	63.50	-20.03	V	1.0	135
379.50	32.91	0.00	15.82	2.86	51.58	63.50	-11.92	V	1.0	0
455.40	17.60	0.00	17.21	3.15	37.97	63.50	-25.53	V	1.0	0
607.20	20.90	0.00	19.41	3.78	44.09	63.50	-19.41	V	1.0	0
759.00	20.00	0.00	19.93	4.31	44.23	63.50	-19.27	V	1.0	315

X-axis(ch. 9)

75.90	73.36	0.00	7.02	1.17	81.55	98.00	-16.45	V	2.0	45
151.80	26.75	0.00	12.63	1.74	41.11	63.50	-22.39	V	1.0	45
227.70	24.55	0.00	12.53	2.16	39.25	63.50	-24.25	V	1.0	135
303.60	29.11	0.00	13.95	2.52	45.57	63.50	-17.93	V	1.0	90
379.50	31.47	0.00	15.82	2.86	50.14	63.50	-13.36	V	1.0	0
531.30	21.30	0.00	18.39	3.46	43.14	63.50	-20.36	V	1.0	45
759.00	16.33	0.00	19.93	4.31	40.56	63.50	-22.94	V	1.0	0

X-axis(ch. 0)

72.10	75.76	0.00	6.80	1.14	83.71	98.00	-14.29	V	1.6	90
144.20	28.10	0.00	12.79	1.69	42.58	63.50	-20.92	V	1.0	90
216.30	26.51	0.00	12.09	2.09	40.70	63.50	-22.80	V	1.0	225
288.40	26.28	0.00	13.75	2.45	42.48	63.50	-21.02	V	1.0	135
360.50	31.79	0.00	15.35	2.77	49.91	63.50	-13.59	V	1.0	0
504.70	24.40	0.00	18.00	3.34	45.74	63.50	-17.76	V	1.0	90
721.00	16.10	0.00	19.74	4.13	39.97	63.50	-23.53	V	1.0	225

X-axis (ch. 0)

72.10	74.16	0.00	6.98	1.14	82.28	98.00	-15.72	H	3.0	270
144.20	27.33	0.00	11.84	1.69	40.86	63.50	-22.64	H	2.5	90
216.30	27.13	0.00	11.51	2.09	40.73	63.50	-22.77	H	1.4	135
288.40	31.10	0.00	13.96	2.45	47.51	63.50	-15.99	H	1.0	45
360.50	35.49	0.00	15.94	2.77	54.20	63.50	-9.30	H	1.0	315
504.70	25.20	0.00	17.80	3.34	46.34	63.50	-17.16	H	1.0	315
721.00	15.10	0.00	19.96	4.13	39.20	63.50	-24.30	H	1.5	135

X-axis (ch. 9)

75.90	73.82	0.00	7.42	1.17	82.41	98.00	-15.59	H	2.2	270
151.80	23.90	0.00	11.53	1.74	37.17	63.50	-26.33	H	1.5	315
227.70	34.04	0.00	11.93	2.16	48.13	63.50	-15.37	H	1.0	45
303.60	33.50	0.00	14.42	2.52	50.44	63.50	-13.06	H	1.0	315
379.50	34.74	0.00	16.45	2.86	54.05	63.50	-9.45	H	1.0	315
455.40	22.72	0.00	17.41	3.15	43.28	63.50	-20.22	H	1.0	315
683.10	20.86	0.00	19.65	3.99	44.50	63.50	-19.00	H	1.0	315
759.00	17.02	0.00	20.28	4.31	41.61	63.50	-21.89	H	1.0	315

y-axis (ch. 5)

74.70	74.64	0.00	7.28	1.16	83.08	98.00	-14.92	H	2.6	270
149.40	21.94	0.00	11.62	1.73	35.28	63.50	-28.22	H	2.6	225
298.80	30.84	0.00	14.28	2.49	47.62	63.50	-15.88	H	1.2	315
373.50	36.37	0.00	16.29	2.83	55.49	63.50	-8.01	H	1.0	315
448.20	22.00	0.00	17.36	3.13	42.49	63.50	-21.01	H	1.0	315
747.00	15.48	0.00	20.18	4.25	39.91	63.50	-23.59	H	1.0	315

Y-axis (ch. 9)

75.90	74.53	0.00	7.42	1.17	83.12	98.00	-14.88	H	2.5	270
151.80	22.38	0.00	11.53	1.74	35.64	63.50	-27.86	H	2.0	45
227.70	37.70	0.00	11.93	2.16	51.79	63.50	-11.17	H	1.5	270
303.60	35.53	0.00	14.42	2.52	52.46	63.50	-11.04	H	1.2	315
379.50	34.90	0.00	16.45	2.86	54.21	63.50	-9.29	H	1.0	45
531.30	25.17	0.00	18.12	3.46	46.74	63.50	-16.76	H	1.0	315
759.00	23.27	0.00	20.28	4.31	47.86	63.50	-15.64	H	1.2	315
683.12	24.40	0.00	19.65	3.99	48.04	63.50	-15.46	H	1.4	315

Y-axis (ch. 0)

72.10	74.37	0.00	6.98	1.14	82.49	98.00	-15.51	H	2.5	270
360.50	36.30	0.00	15.94	2.77	55.01	63.50	-8.49	H	1.0	315
288.40	28.18	0.00	13.96	2.45	44.59	63.50	-18.91	H	1.0	315
216.30	27.25	0.00	11.51	2.09	40.85	63.50	-22.65	H	1.5	270
144.20	23.12	0.00	11.84	1.69	36.65	63.50	-26.85	H	2.0	45
504.70	21.81	0.00	17.80	3.34	42.95	63.50	-20.55	H	2.0	135
721.00	14.38	0.00	19.96	4.13	38.48	63.50	-25.02	H	1.0	135

Z-axis (ch. 0)

72.10	74.82	0.00	6.98	1.14	82.94	98.00	-15.06	H	2.8	270
144.20	23.83	0.00	11.84	1.69	37.36	63.50	-26.14	H	1.5	45
216.30	31.46	0.00	11.51	2.09	45.06	63.50	-18.44	H	1.5	135
288.40	29.30	0.00	13.96	2.45	45.71	63.50	-18.33	H	1.2	45
360.50	36.62	0.00	15.94	2.77	55.33	63.50	-8.17	H	1.0	0
504.70	25.16	0.00	17.80	3.34	46.30	63.50	-17.02	H	1.0	45
721.00	14.90	0.00	19.96	4.13	39.00	63.50	-24.50	H	1.0	45

Y-axis (ch. 0)

72.10	73.86	0.00	6.80	1.14	81.81	98.00	-16.19	V	1.5	90
144.20	29.28	0.00	12.79	1.69	43.76	63.50	-19.74	V	1.0	45
216.30	26.14	0.00	12.09	2.09	40.33	63.50	-23.17	V	1.0	225
288.40	25.20	0.00	13.75	2.45	41.40	63.50	-22.10	V	1.0	135
360.50	35.99	0.00	15.35	2.77	54.11	63.50	-9.39	V	1.0	0
576.80	19.93	0.00	19.05	3.66	42.64	63.50	-20.86	V	1.0	0
721.00	17.86	0.00	19.74	4.13	41.73	63.50	-21.77	V	1.0	45

Z-axis (ch. 0)

72.10	74.60	0.00	6.80	1.14	82.55	98.00	-15.45	V	1.8	90
144.20	30.00	0.00	12.79	1.69	44.48	63.50	-19.02	V	1.0	45
216.30	25.79	0.00	12.09	2.09	39.98	63.50	-23.52	V	1.0	225
288.40	25.56	0.00	13.75	2.45	41.76	63.50	-21.74	V	1.0	135
360.50	35.78	0.00	15.35	2.77	53.90	63.50	-9.60	V	1.0	315
576.80	18.00	0.00	19.05	3.66	40.71	63.50	-22.79	V	1.0	135
721.00	15.87	0.00	19.74	4.13	39.74	63.50	-23.76	V	1.0	225

Z-axis (ch. 5)

74.70	73.35	0.00	6.95	1.16	81.47	98.00	-16.53	V	2.0	135
149.40	31.83	0.00	12.40	1.73	45.96	63.50	-17.54	V	1.0	90
298.80	27.10	0.00	13.85	2.49	43.44	63.50	-20.06	V	1.0	225
373.50	34.33	0.00	15.67	2.83	52.83	63.50	-10.67	V	1.0	0
448.20	18.33	0.00	17.10	3.13	38.55	63.50	-24.95	V	1.0	180
597.60	17.39	0.00	19.35	3.75	40.49	63.50	-23.01	V	1.0	315
747.00	17.38	0.00	19.86	4.25	41.50	63.50	-22.00	V	1.0	135

Y-axis (ch. 5)

74.70	74.40	0.00	6.95	1.16	82.52	98.00	-15.48	V	2.0	135
149.40	32.09	0.00	12.40	1.73	46.22	63.50	-17.28	V	1.0	90
298.80	26.60	0.00	13.85	2.49	42.94	63.50	-20.56	V	1.0	225
373.50	35.49	0.00	15.67	2.83	53.99	63.50	-9.57	V	1.0	0
448.20	18.93	0.00	17.10	3.13	39.15	63.50	-24.35	V	1.0	90
552.90	17.84	0.00	18.70	3.55	40.10	63.50	-23.40	V	1.0	90
747.00	19.18	0.00	19.86	4.25	43.30	63.50	-20.20	V	1.0	180

X-axis (ch. 5)

74.70	76.35	0.00	6.95	1.16	84.47	98.00	-13.53	V	1.8	90
149.40	27.91	0.00	12.40	1.73	42.04	63.50	-21.46	V	1.0	315
298.80	29.92	0.00	13.85	2.49	46.26	63.50	-17.24	V	1.0	225
373.50	35.63	0.00	15.67	2.83	54.13	63.50	-9.37	V	1.5	45
448.20	20.06	0.00	17.10	3.13	40.28	63.50	-23.22	V	1.0	45
597.60	18.86	0.00	19.35	3.75	41.96	63.50	-21.54	V	1.0	315
747.00	15.20	0.00	19.86	4.25	39.32	63.50	-24.18	V	1.0	0

74.70	73.66	0.00	7.28	1.16	82.10	98.00	-15.90	H	2.5	315
149.40	23.30	0.00	11.62	1.73	36.64	63.50	-26.86	H	2.0	270
298.80	33.78	0.00	14.28	2.49	50.56	63.50	-12.94	H	1.0	45
373.50	34.25	0.00	16.29	2.83	53.37	63.50	-10.13	H	1.0	315
448.20	21.68	0.00	17.36	3.13	42.17	63.50	-21.33	H	1.0	315
597.60	20.15	0.00	18.91	3.75	42.81	63.50	-20.69	H	1.5	315
747.00	14.70	0.00	20.18	4.25	39.13	63.50	-24.37	H	1.2	315

Z-axis (ch. 5)

74.70	74.12	0.00	7.28	1.16	82.56	98.00	-15.44	H	2.5	270
224.10	25.90	0.00	11.80	2.14	39.84	63.50	-23.66	H	1.5	90
298.80	32.04	0.00	14.28	2.49	48.82	63.50	-14.68	H	1.0	45
373.50	34.81	0.00	16.29	2.83	53.93	63.50	-9.57	H	1.0	45
448.20	19.82	0.00	17.36	3.13	40.31	63.50	-23.19	H	1.0	45
597.60	19.84	0.00	18.91	3.75	42.50	63.50	-21.00	H	1.0	45
747.00	18.79	0.00	20.18	4.25	43.22	63.50	-20.28	H	1.0	315

Z-axis (ch. 9)

75.90	74.98	0.00	7.42	1.17	83.57	98.00	-14.43	H	2.8	270
151.80	24.50	0.00	11.53	1.74	37.76	63.50	-25.74	H	2.2	135
227.70	33.54	0.00	11.93	2.16	47.63	63.50	-15.87	H	1.5	90
303.60	33.50	0.00	14.42	2.52	50.43	63.50	-13.07	H	1.1	315
379.50	35.28	0.00	16.45	2.86	54.59	63.50	-8.91	H	1.0	315
455.40	20.83	0.00	17.41	3.15	41.39	63.50	-22.11	H	1.0	315
683.10	20.86	0.00	19.65	3.99	44.50	63.50	-19.00	H	1.0	315
759.00	25.23	0.00	20.28	4.31	49.82	63.50	-13.68	H	1.3	45

Total # of data 127

V. a2.2

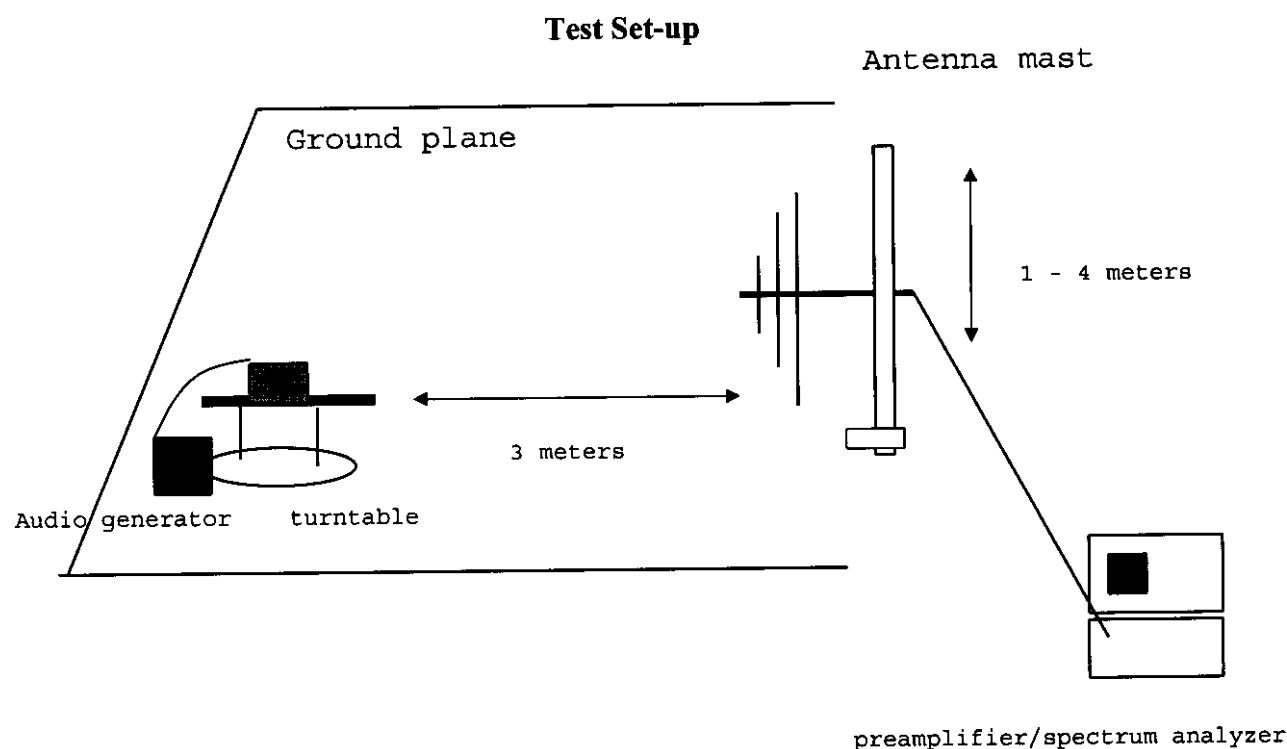
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Occupied Bandwidth Test Requirement: 15.237(b)**Measurement Equipment Used:**

HP 8546A EMI Receiver, 9kHz -6.5GHz

Bilog Chase-CBL6112 (S/N2049)

HP 230C Audio Generator

**Fig. 1****Test Procedure:**

1. Set the Eut as demonstrated above. The modulated carrier signal must be contained within 200 kHz bandwidth.
2. To determine compliance, a RES BW of 1 or 3 kHz was used. First step was to determine the unmodulated carrier amplitude and then subtracted 20 dB from the unmodulated carrier's peak. Place display line 20 dB down from the peak and modulated the carrier with an audio tone. Using Delta Marker functions set them were the 20dB display line touches the edges of the modulated carrier.
3. For the first test, set audio generator to modulated carrier with a 100 Hz tone and set modulation level to manufactures specification. Repeat step 1 to 2 with audio generator set to 2.5 kHz and 10 kHz. Low, middle, and high channels were tested.

Test Results:

Please refer to attached spectrum plots of bandwidth measurements.

100Hz

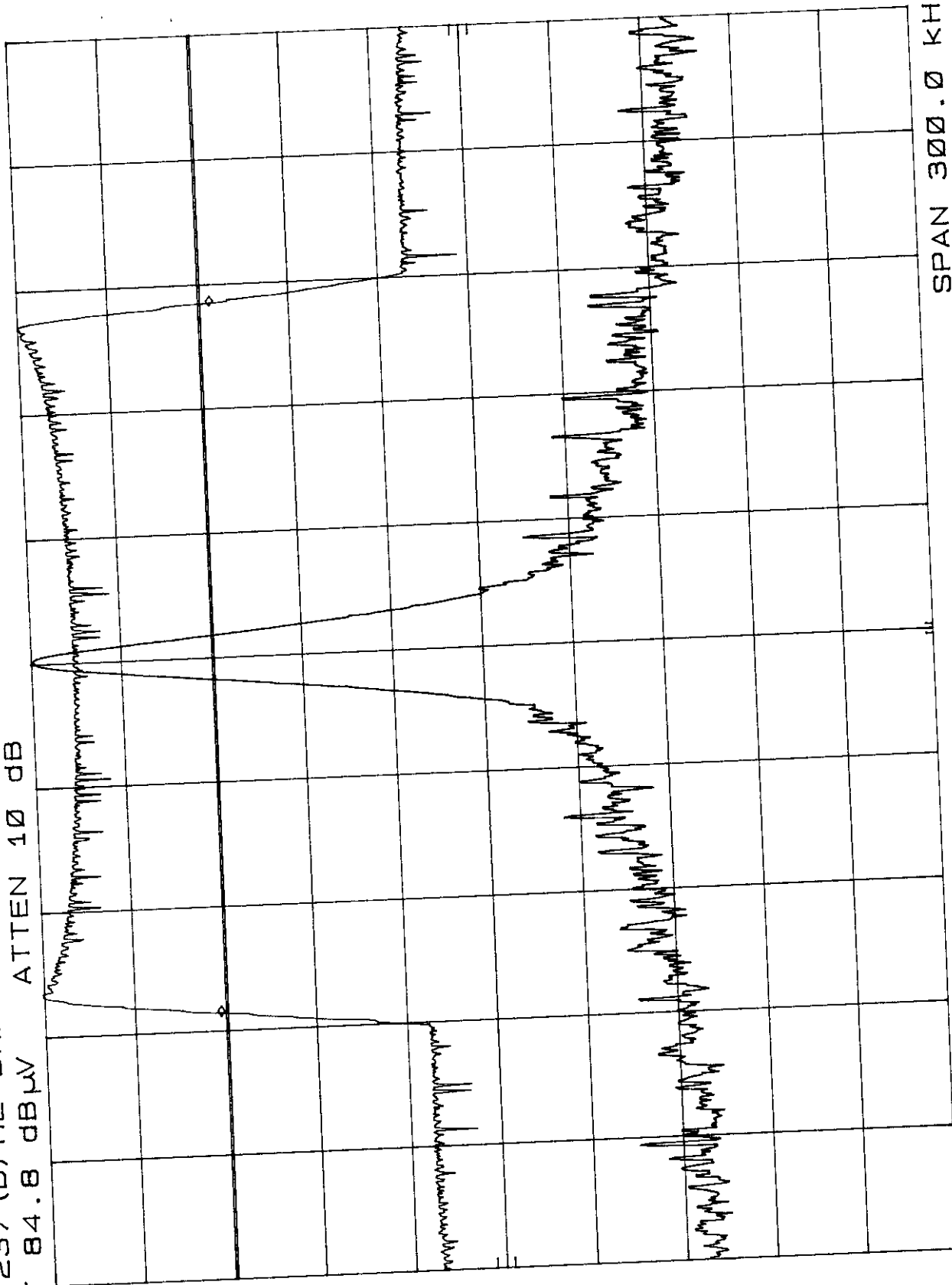
MKR Δ 171.3 KHZ
-1.80 dB

15.237 (B) RL DRAKE (FCC ID-CAR1002105)
REF 84.8 dB μ V ATTN 10 dB

HP

10 dB/

DL
64.5
dB μ V



CENTER 72.1005 MHZ
RES BW 3 KHZ

VBW 3 KHZ

SPAN 300.0 KHZ
SWP 100 msec

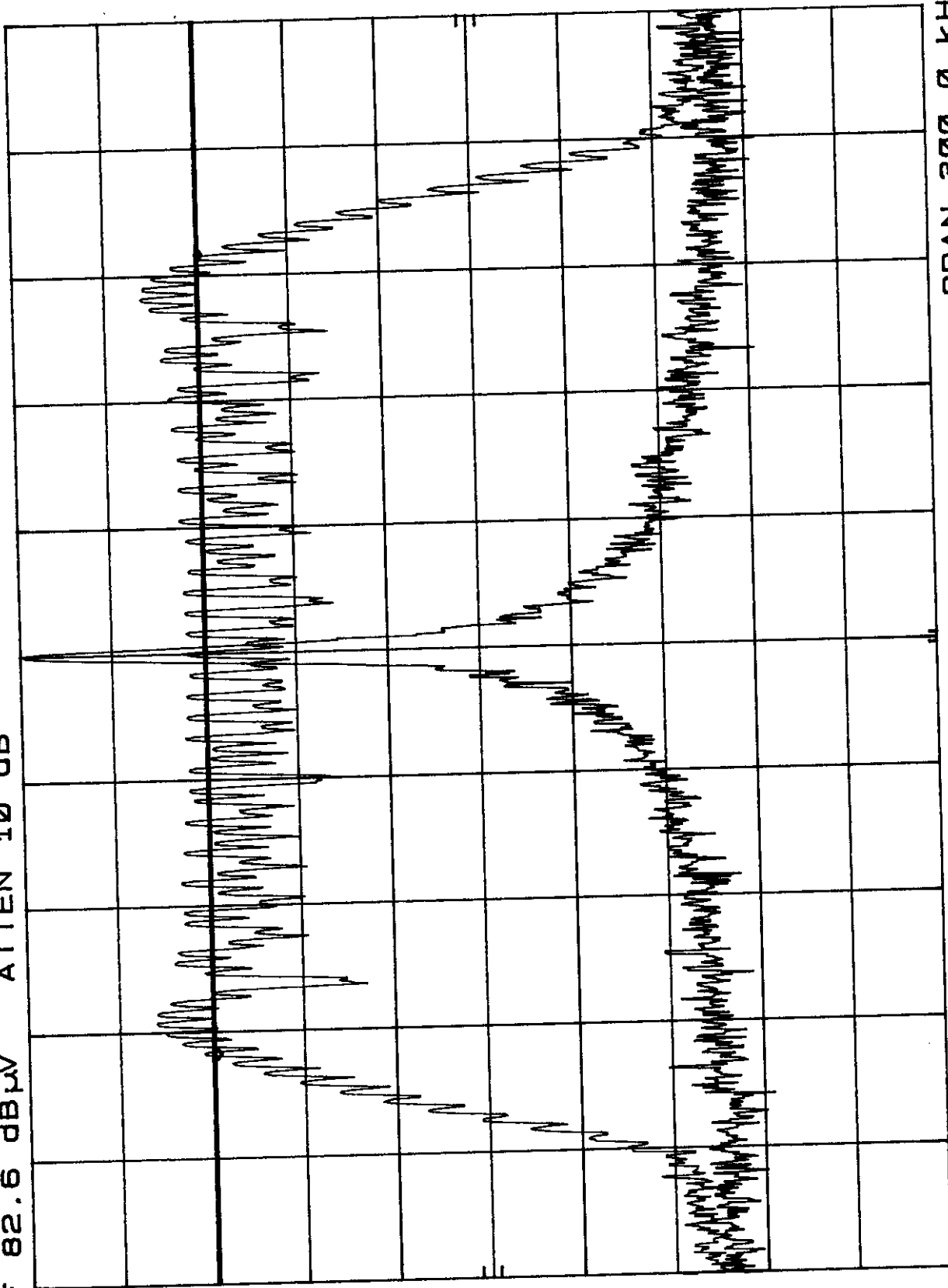
15.237 (B) RL DRAKE (FCC ID-CAR1002105)
REF 82.6 dBμV ATTEN 10 dB

MKR Δ 190.2 KHZ
.30 dB

h_p

10 dB/

DL
62.3
dBμV



CENTER 72.1005 MHZ
RES BW 1 KHZ

VBW 3 KHZ

SPAN 300.0 KHZ
SWP 750 msec

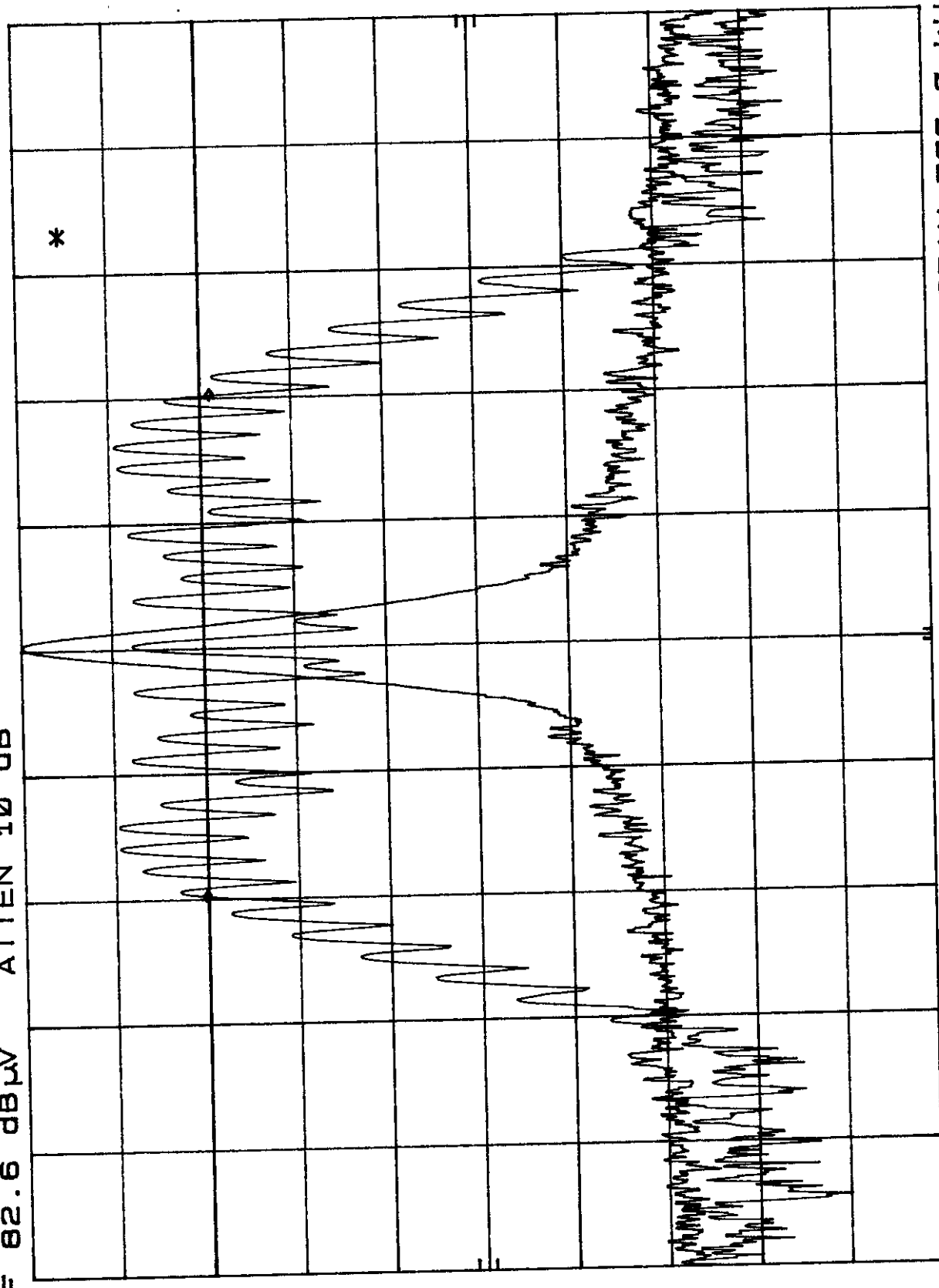
10KHz 10dB

15.237 (B) RL DRAKE (FCC ID-CAR1002105) MKR Δ 200.0 KHz
REF 82.6 dB μ V ATTN 10 dB -1.20 dB

hp

10 dB/

DL
62.5
dB μ V



CENTER 72.1005 MHz RES BW 3 KHz SPAN 500.0 KHz
VBW 3 KHz SWP 100 msec

100Hz 10dB

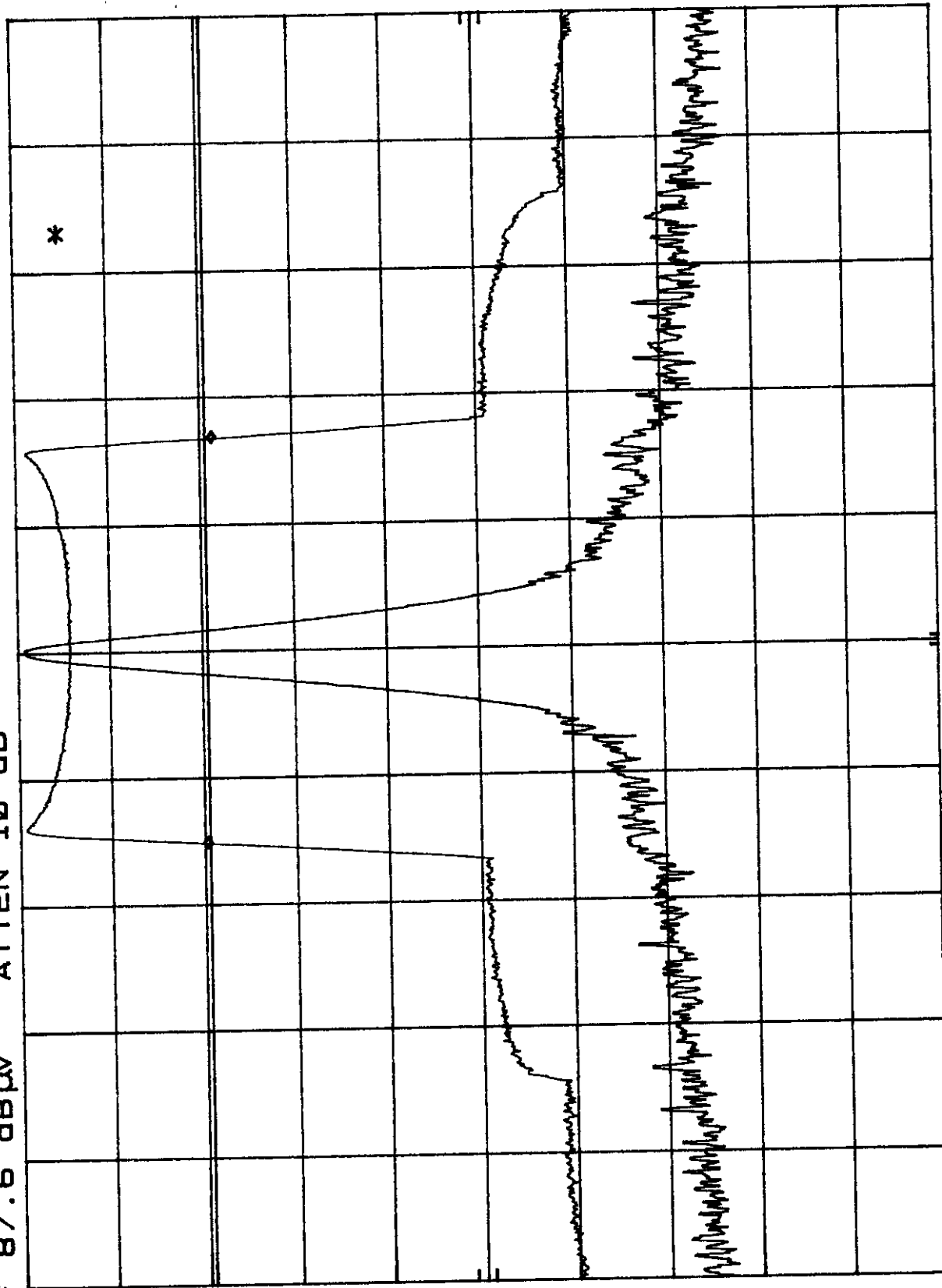
MKR Δ 159.5 KHz
-1.00 dB

15.237 (B) RL DRAKE (FCC ID-CAR1002105)
REF 87.6 dB μ V ATTN 10 dB

HP

10 dB/

DL
67.0
dB μ V



SPAN 500.0 KHz
SWP 100 msec

VBW 3 KHz

CENTER 74.7009 MHz
RES BW 3 KHz

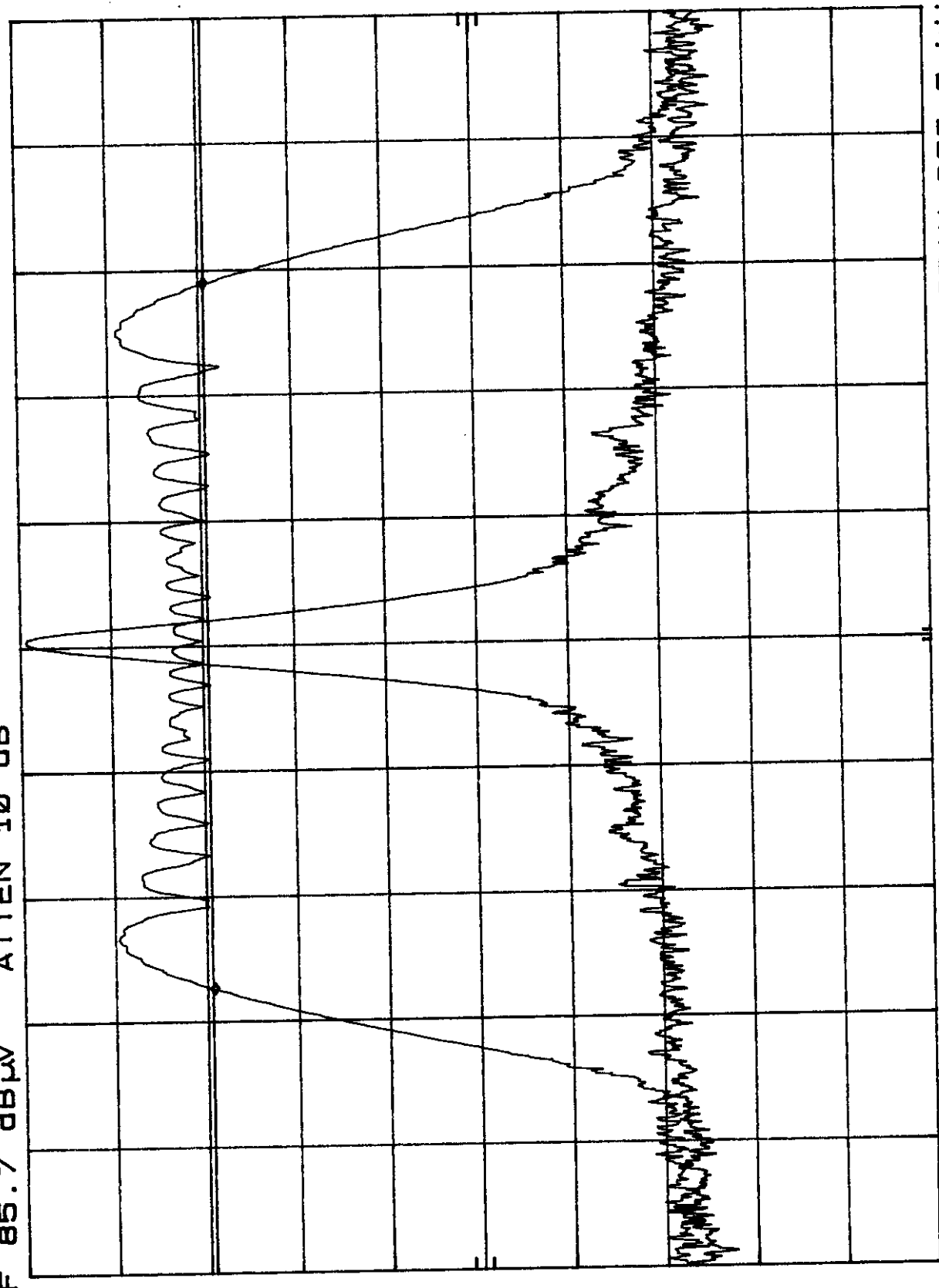
2.5 kHz 10V

15.237 (B) RL DRAKE (FCC ID-CAR1002105) MKR Δ 168.9 KHZ
REF 85.7 dB μ V ATTN 10 dB .20 dB

hp

10 dB/

DL
65.1
dB μ V



CENTER 74.7000 MHZ SPAN 300.0 KHZ
RES BW 3 KHZ SWP 100 msec
VBW 3 KHZ

10KHz 10dB

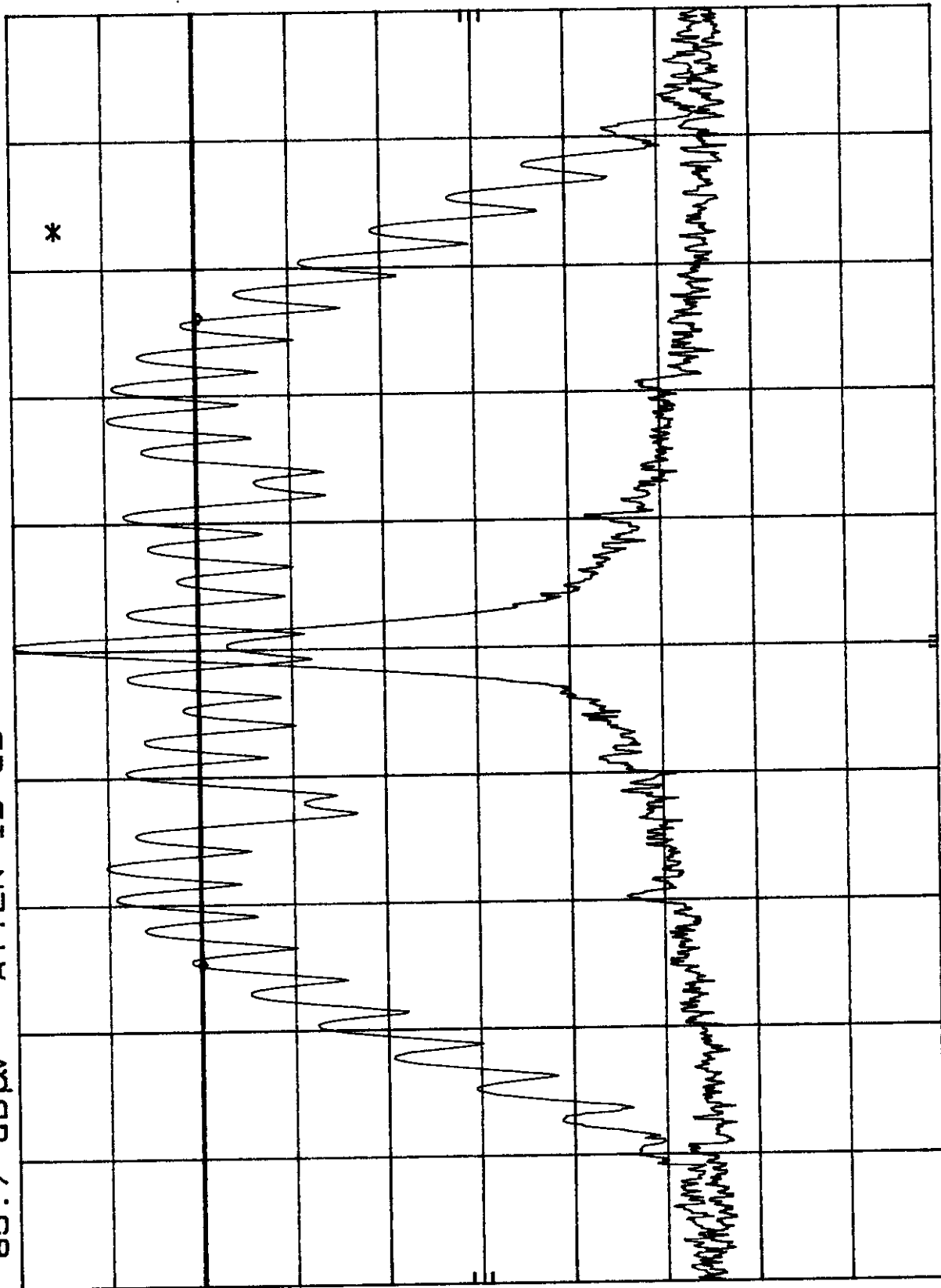
MKR Δ 177.8 KHz
- .30 dB

15.237 (B) RL DRAKE (FCC ID-CAR1002105)
REF 85.7 dB μ V ATTN 10 dB

hp

10 dB/

DL
65.9
dB μ V



SPAN 350.0 KHz
SWP 100 msec

VBW 3 KHz

CENTER 74.7000 MHz
RES BW 3 KHz

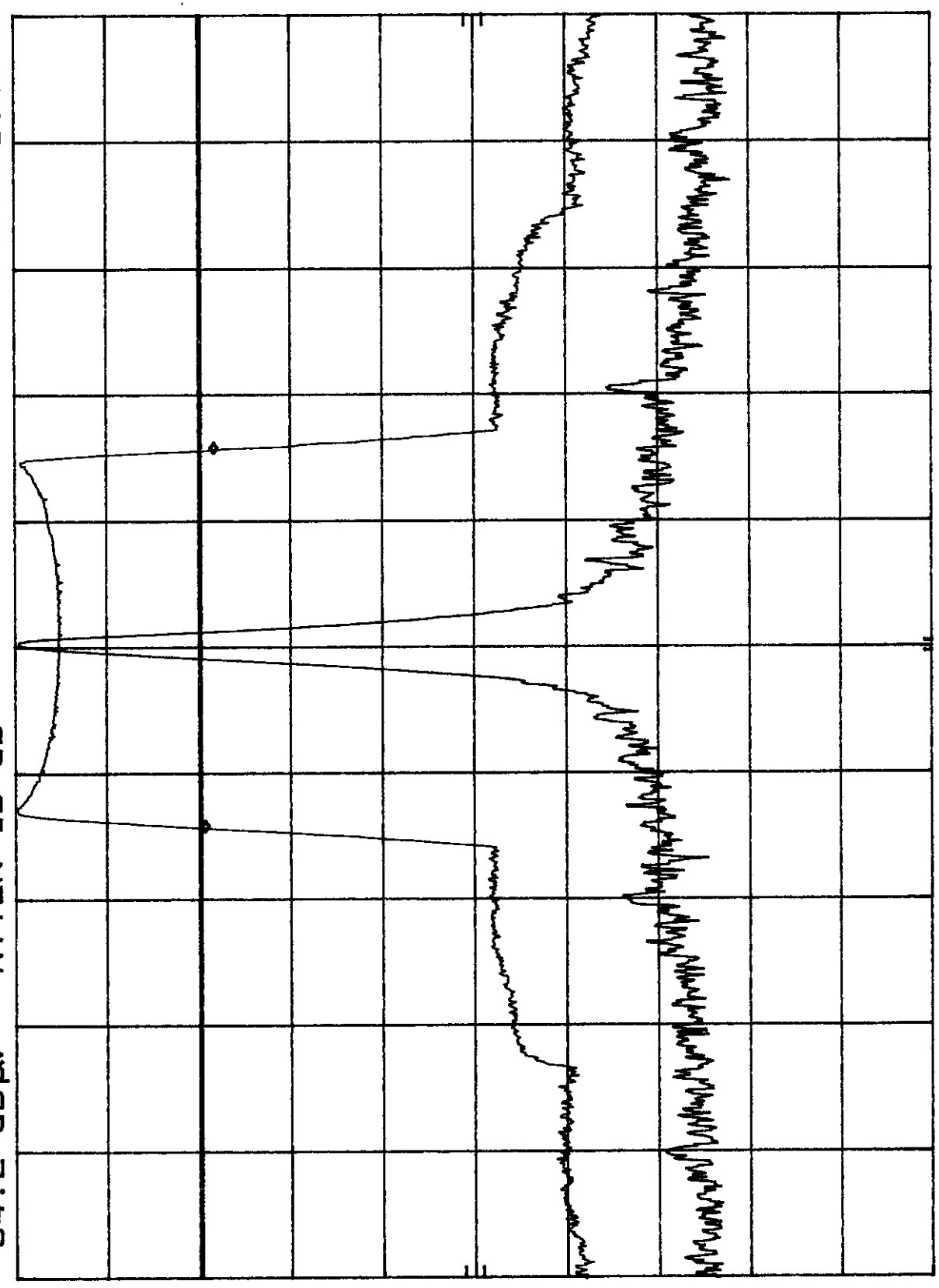
100Hz TONE

15.237 (B) RL DRAKE (FCC ID-CAR1002105) MKR Δ 149.5 KHZ
REF 84.2 dB μ V ATTN 10 dB -1.00 dB

hp

10 dB/

DL
63.9
dB μ V



CENTER 75.9000 MHZ RES BW 3 KHZ SPAN 500.0 KHZ
VBW 3 KHZ SWP 100 msec

15.237 (B) RL DRAKE (FCC ID-CAR1002105)

REF 85.2 dB μ V ATTN 10 dB

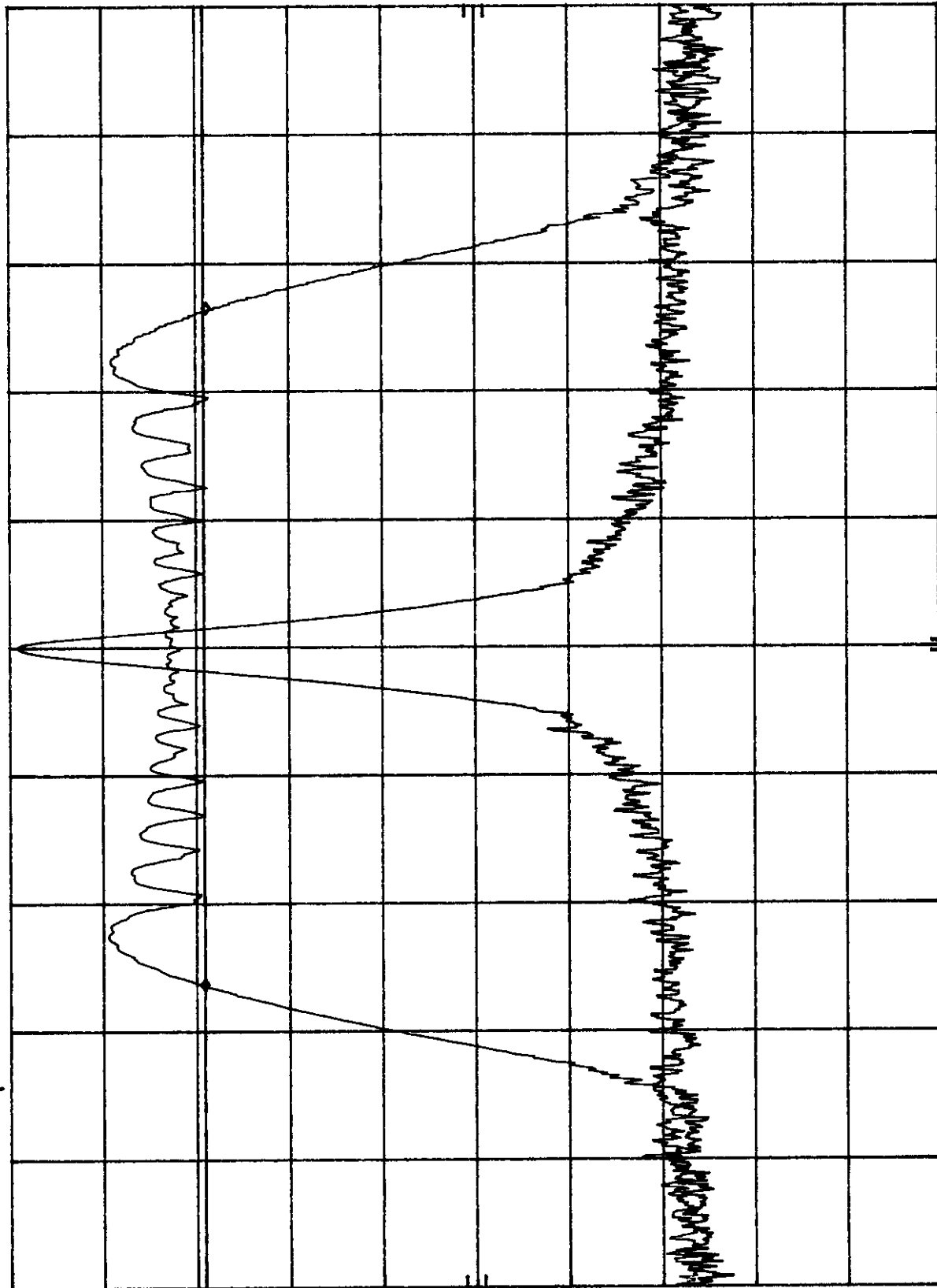
MKR Δ 158.4 KHZ

1.30 PB

4

10 dB/

DL
64.3
dB μ V



CENTER 75.9012 MHZ

RES BW 3 KHZ

VBW 3 KHZ

SPAN 300.0 KHZ

SWP 100 msec

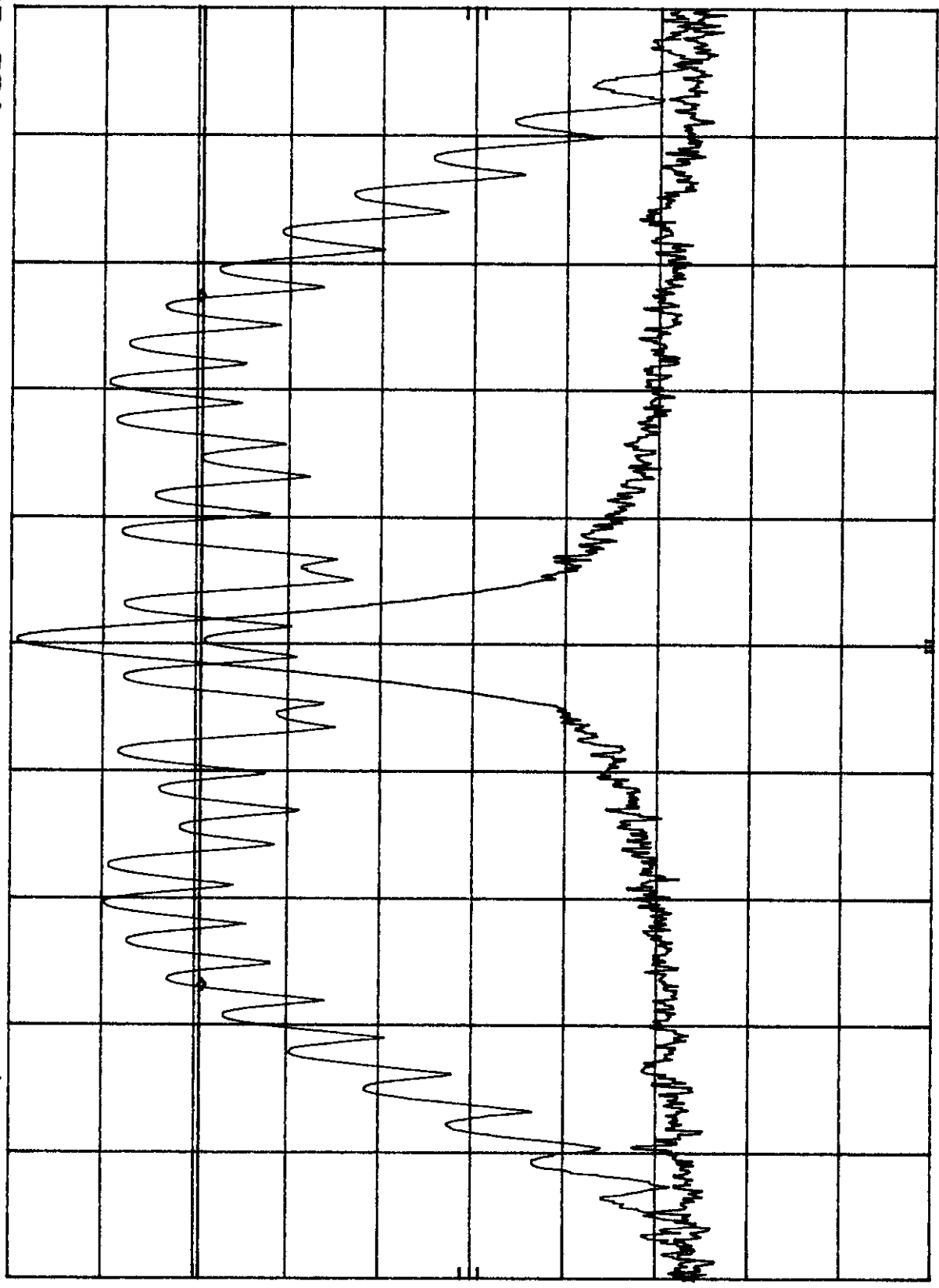
10KHz TONE

15.237 (B) RL DRAKE (FCC ID-CAR1002105) MKR Δ 162.6 KHz
REF 85.2 dB μ V ATTN 10 dB .50 dB

hp

10 dB/

DL
64.6
dB μ V



CENTER 75.9000 MHz RES BW 3 KHz SPAN 300.0 KHz
VBW 3 KHz SWP 100 msec



March 31, 1999

Federal Communications Commission
Authorization and Evaluation Division
Equipment Authorization Branch
7435 Oakland Mills Road
Columbia, MD 21046

To whom it may concern:

We, the undersigned, hereby authorize Compliance Engineering Service, Inc. to act on our behalf in all manners relating to application for equipment authorization, including signing of all documents relating to these matters. Any and all acts carried out by Compliance Engineering Service, Inc. on our behalf shall have the same effect as acts of our own.

We, the undersigned, hereby certify that we are not subject to a denial of federal benefits, that includes FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

This authorization is valid until further written notice from the applicant.

Sincerely Yours,

A handwritten signature in black ink, reading "Neil Le Saint". The signature is written in a cursive, flowing style.

Neil Le Saint, Senior Engineer
R.L. Drake Company