AD-A053 050 HYDROACOUSTICS INC ROCHESTER N Y F/G 17/1
HVLF-1 CALIBRATION DATA.(U)
FEB 78
UNCLASSIFIED HA-105-78 N00039-76-C-0461
NL

1 OF 1
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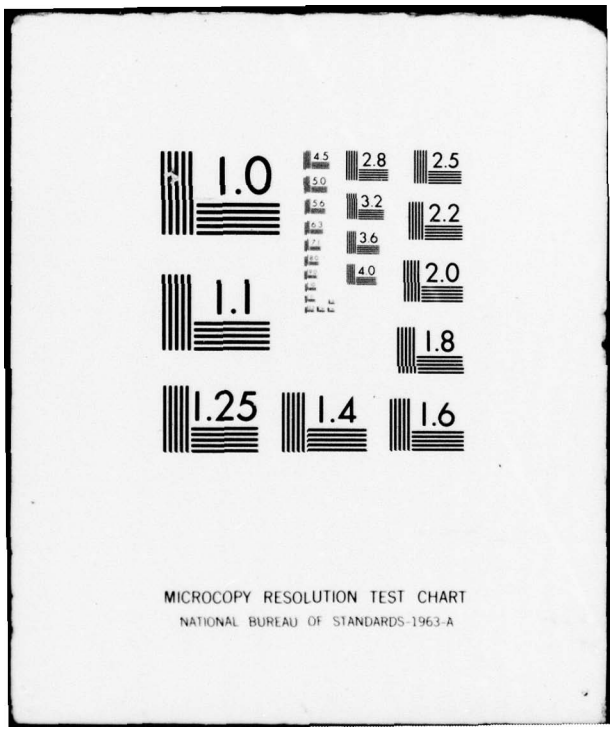
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

(2) SC

(14) Report No. HA-105-78

(6) HVLF-1

CALIBRATION DATA.

(11) 14 Feb 78

(12) 42 p.

(15) N00039-76-C-0461

Submitted to:

Naval Electronic Systems Command
Code ELEX 3203
PME 124-62

HYDROACOUSTICS INC.

321 NORTHLAND AVE. P.O. BOX 3818 ROCHESTER, N. Y. 14610

390 674 FOB

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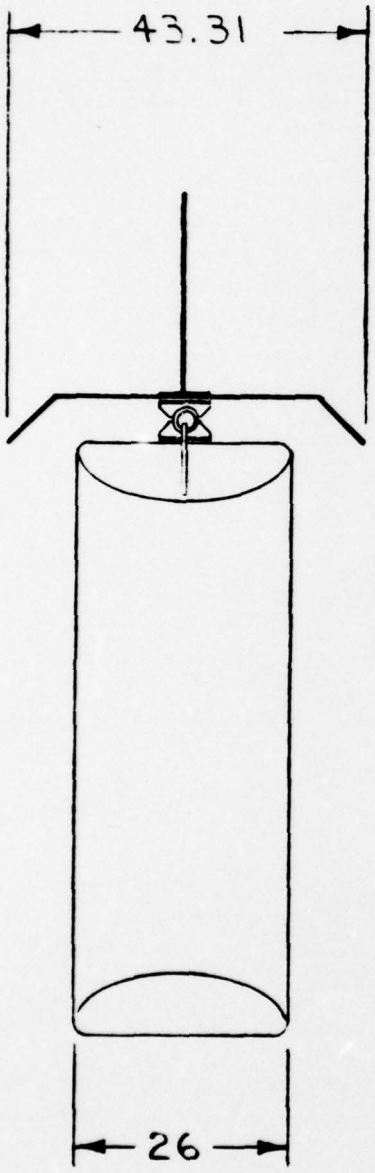
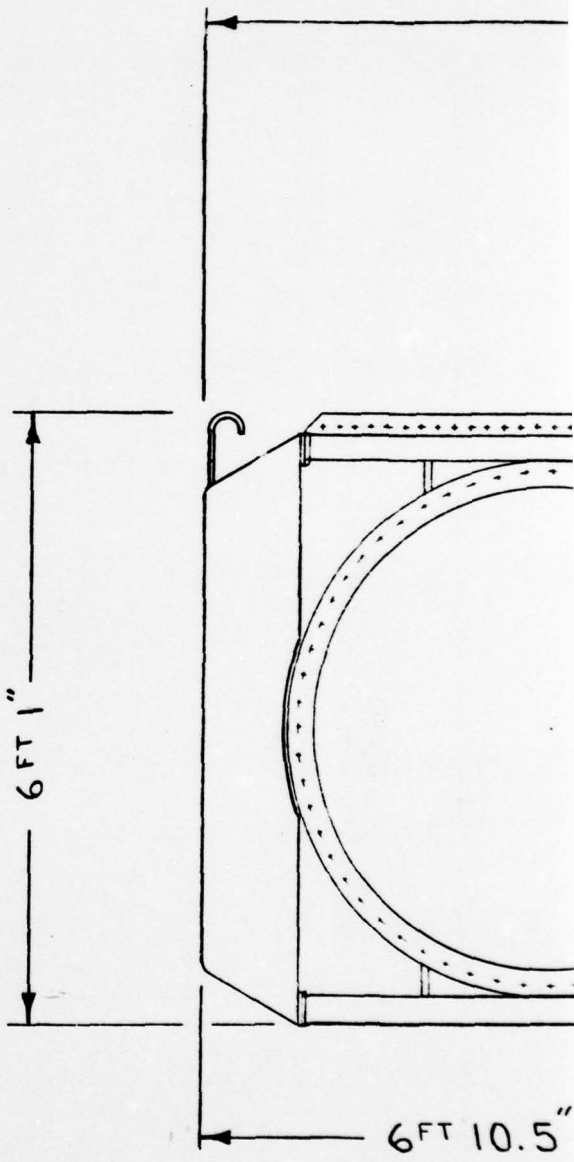
1.0 INTRODUCTION

The HVLF-1 acoustic source was developed for NAVELEX Codes 320 and PME-124 under Contract N00039-76-C-0461. The source is incorporated in a tow body, whose outline dimensions are illustrated in Figure 1.1. The principal characteristics of the source are listed in Table 1.

After 160 hours of nearly non-stop operation in the laboratory, the source was taken to NUSC's calibration facility at Seneca Lake where an additional 130 hours of operating time was accumulated. The only service required on the source during this total running time was a filter change at 135 hours. This report summarizes the results of the Seneca Lake calibration.

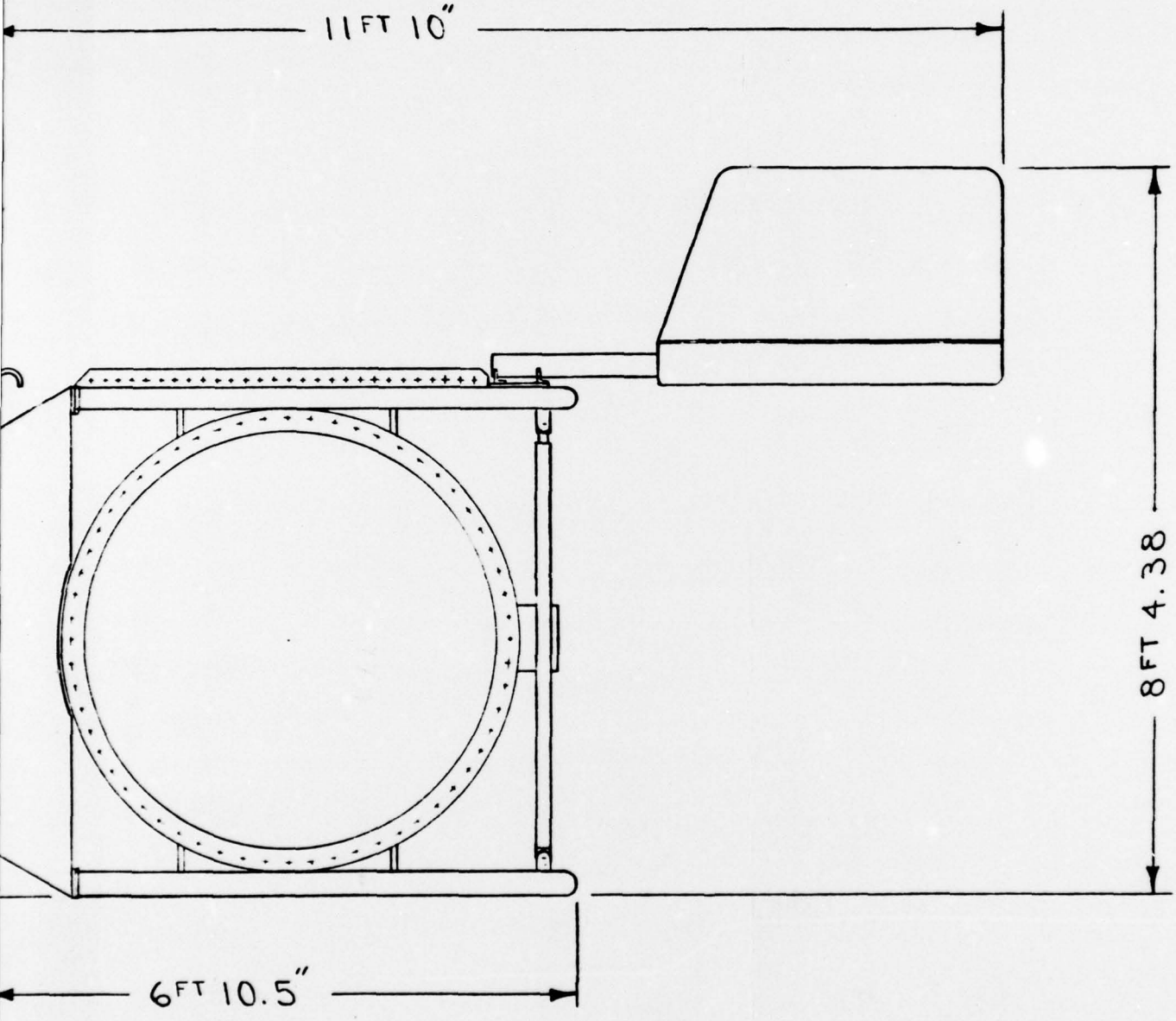
The source includes its own 30-hp hydraulic power supply as well as instrumentation to monitor source level, radiator acceleration (a signal output monitor), sea water temperature, depth, pitch and roll. Additional performance and diagnostic monitoring functions, including supply pressure, oil flow, main stage pressure, first stage pressure, internal pressure, oil temperature, motor temperature, filter condition and leak indicator are also provided.





COMMERCIAL TOLERANCES GOVERN MATERIAL STOCK SIZE. FOR MFG TOLERANCES INCLUDING ROUND PUNCHED AND DRILLED HOLES SEE 52000	UNLESS OTHERWISE S DIMENSIONS ARE IN TOLERANCES XX DEC ± XXX DEC ±
	MATERIAL
NEXT ASSY / USED ON	UNREL: X / REL ENGRG / R
APPLICATION	

1



ES GOVERN	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON XX DEC ± XXX DEC ± ANGLES ±		CONTRACT NO.	HYDROACOUSTICS INC. 321 NORTHLAND AVE. P.O. BOX 3818 ROCHESTER, N.Y. 14610			
NCLUDING RILLED	MATERIAL		DRAWN W. Hovey, Mar 18, 1977	Figure 1. HVLF-1 Towbody Outline			
			CHECKED				
			ENGINEER				
SED ON	UNREL X	REL ENGRG	REL FINAL	DESIGN ACTIVITY APPROVAL	SIZE B	CODE IDENT NO.	DRAWING NO. 2117B53306
ON					SCALE 3/64	1-2	SHEET 2

Table 1
HVLF-1 Parameters

Source Level, dB re 1 uPa @ 1 m	182
Frequency Range, Hz	8-32
Weight, with Tow Body (in Air) lb	5000
Weight, with Tow Body (in Water) lb	2400
Maximum Operating Depth (Uncompensated) ft	300
Input Power, 460 V, 3 Ø, 60 Hz	30 kW

2.0 CALIBRATION RESULTS

2.1 RESPONSE

Figure 2.1 illustrates frequency response data from 6 to 60 Hz at six different drive levels, +3, 0, -6, -12, -18, and -24 dBV. Note that although the source saturates near 0 dBV drive, its response is quite linear below that level over most of the band. Figure 2.2 illustrates the response to a one-volt rms input signal to 200 Hz.

Figure 2.3 is a repeat of Figure 2.1 at the one-volt drive level except that the Monitor Hydrophone (displaced -10 dB) and accelerometer outputs are also plotted. Note that both monitor signals are in excellent agreement with the far-field hydrophone data.

Figure 2.4 repeats the accelerometer data of Figure 2.3 and adds the acoustic pressures within the source; main stage pressure is the pressure driving the radiators, and the first stage pressure is the acoustic pressure driving the main stage valve. The reason for the saturation between 18 and 30 Hz is apparent in Figure 2.4 since the main stage pressure is seen to approach a 1050-psi peak which is a modulation coefficient of the main stage hydroacoustic amplifier of 100%.

2.2 DIRECTIVITY

Figures 2.5 through 2.7 are polar patterns in the horizontal plane at 10, 20, and 100 Hz. No significant deviation from omnidirectionality is apparent in these frequency ranges.

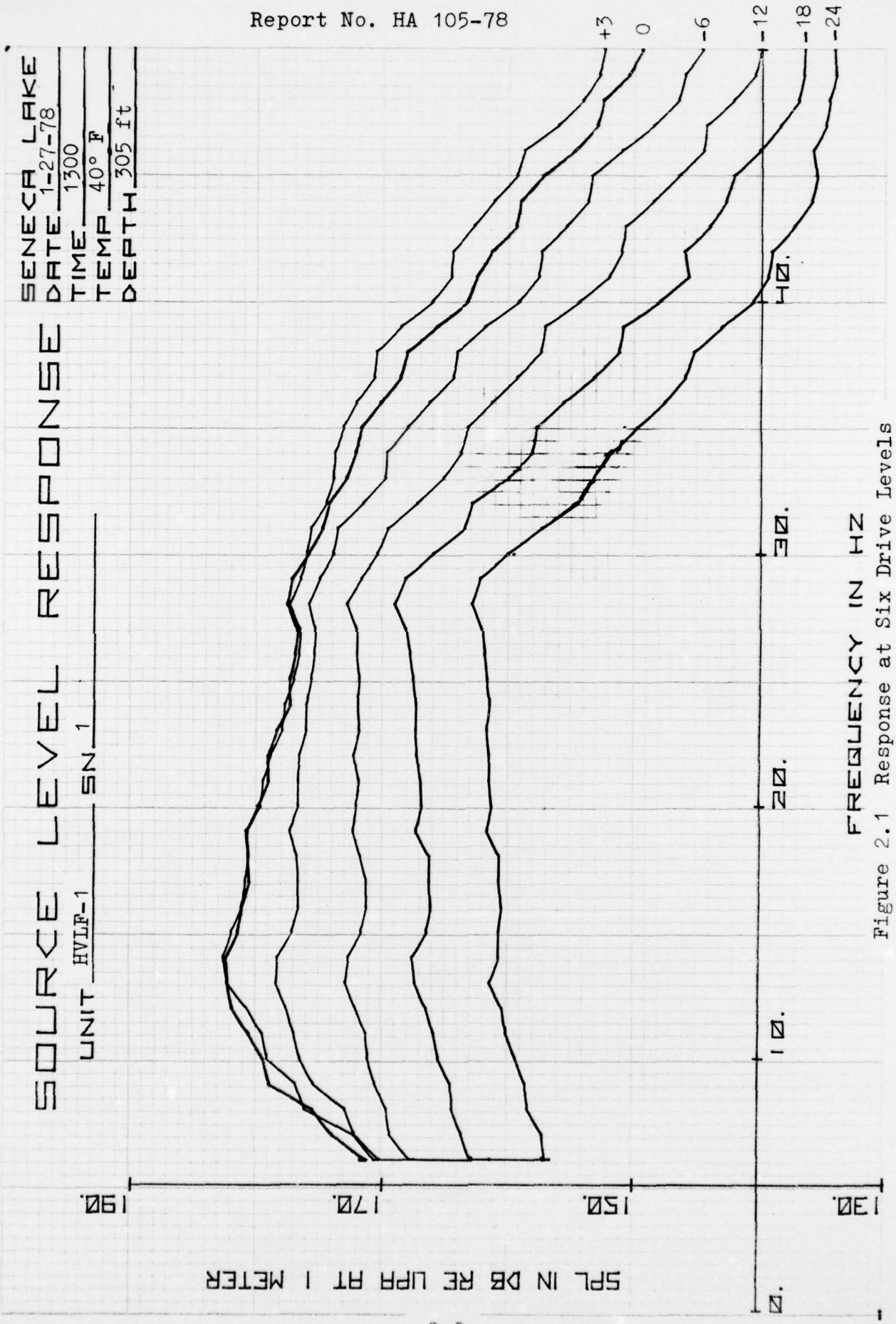


Figure 2.1 Response at Six Drive Levels

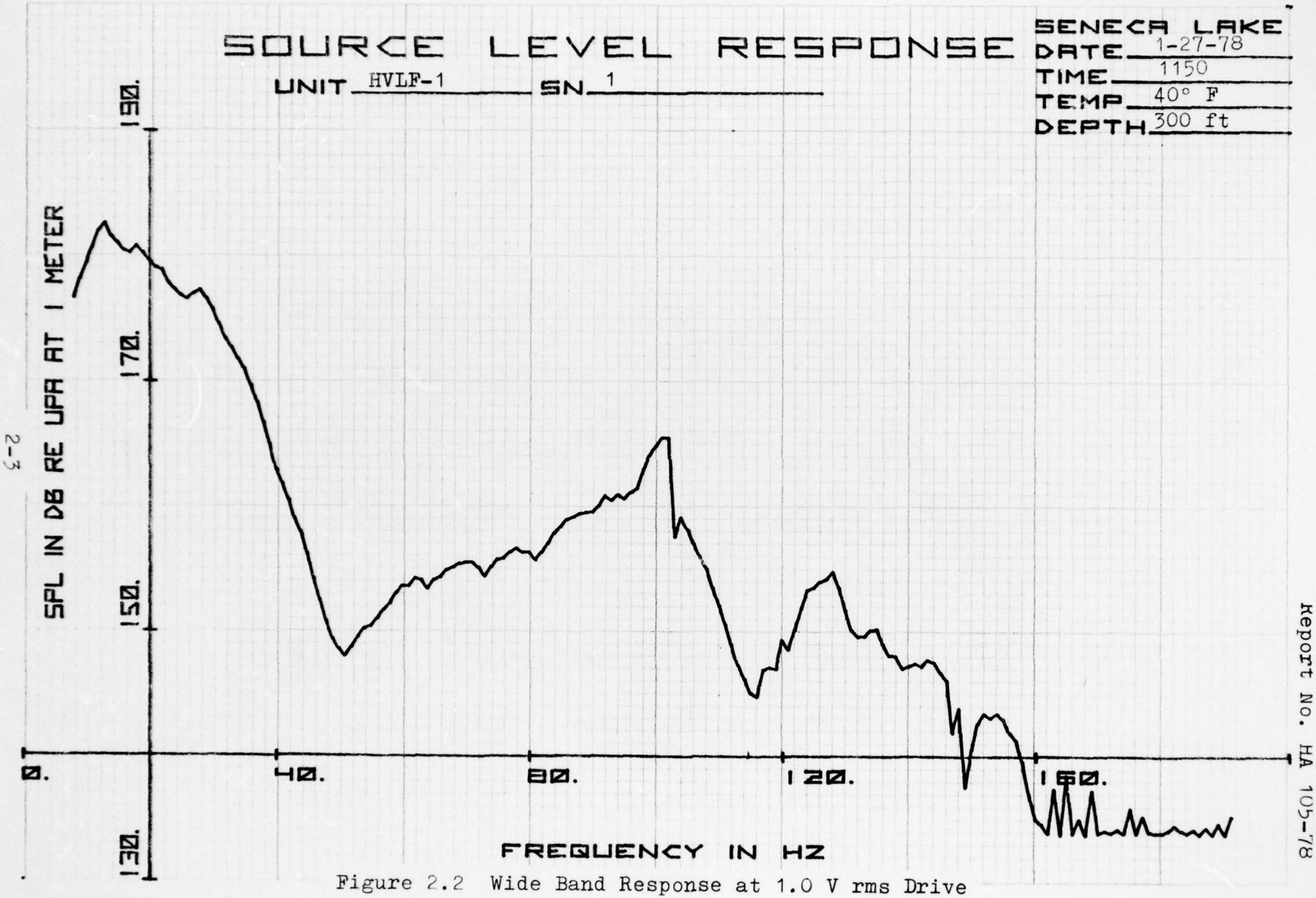


Figure 2.2 Wide Band Response at 1.0 V rms Drive

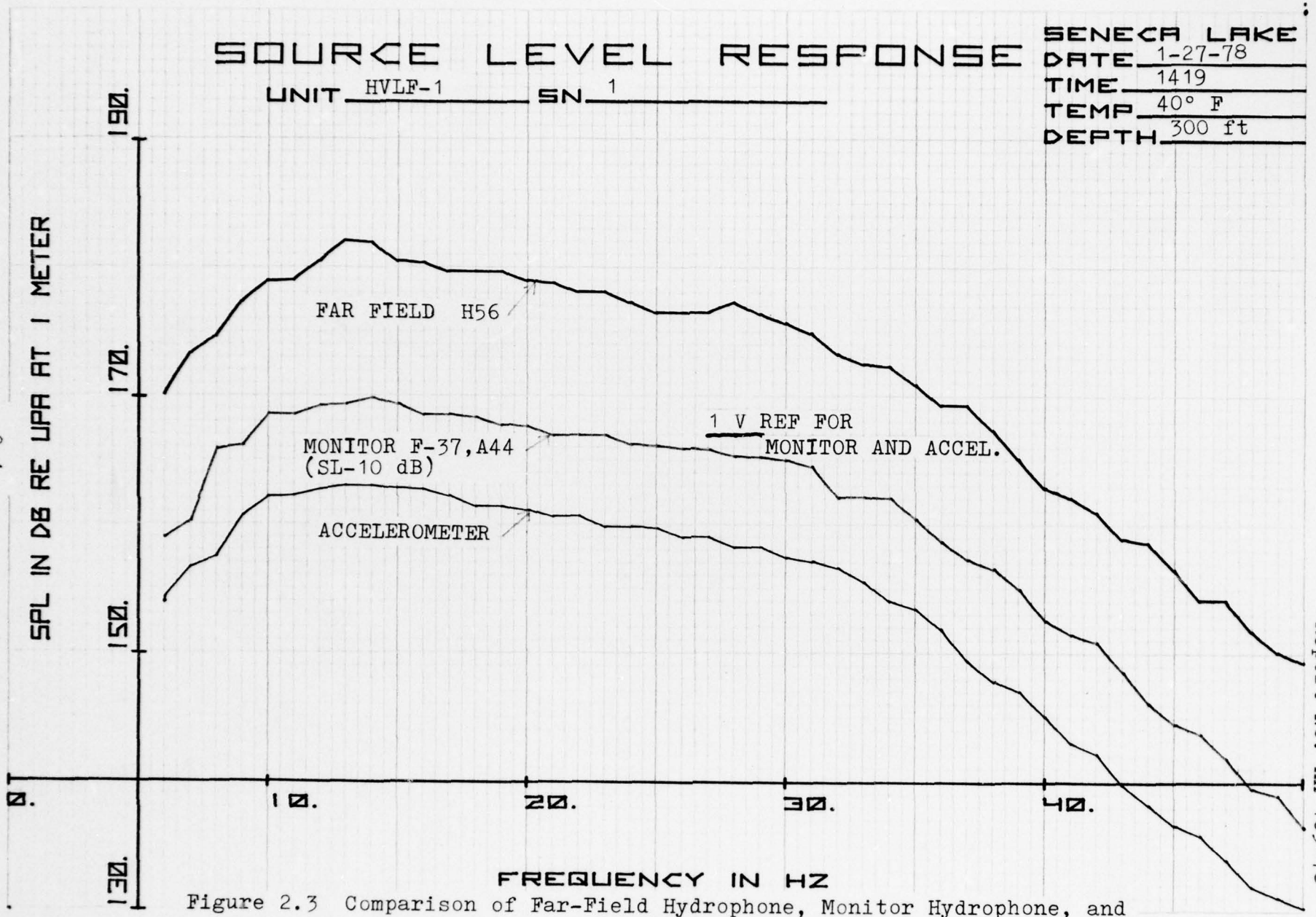


Figure 2.3 Comparison of Far-Field Hydrophone, Monitor Hydrophone, and Accelerometer Monitor

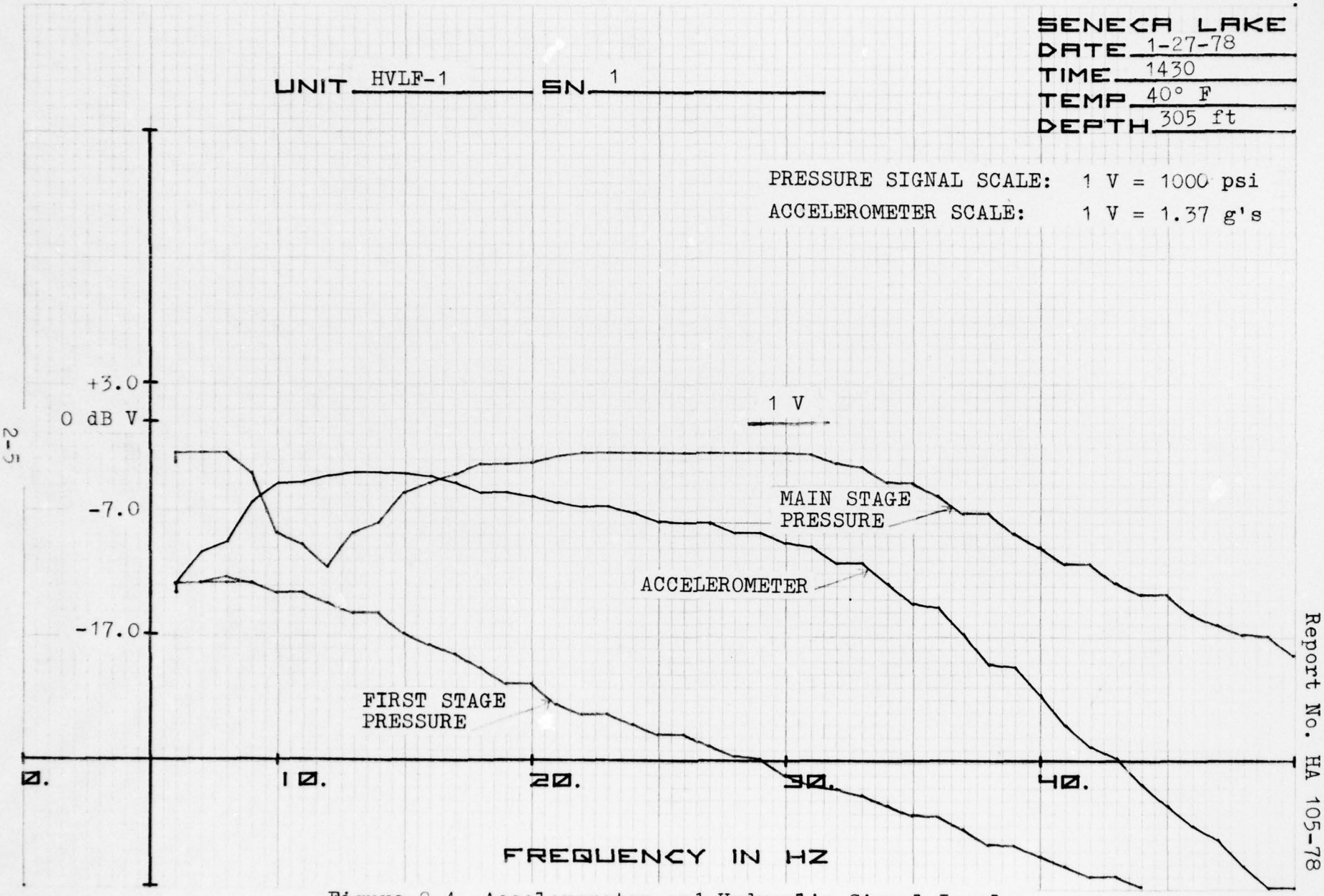


Figure 2.4 Accelerometer and Hydraulic Signal Levels

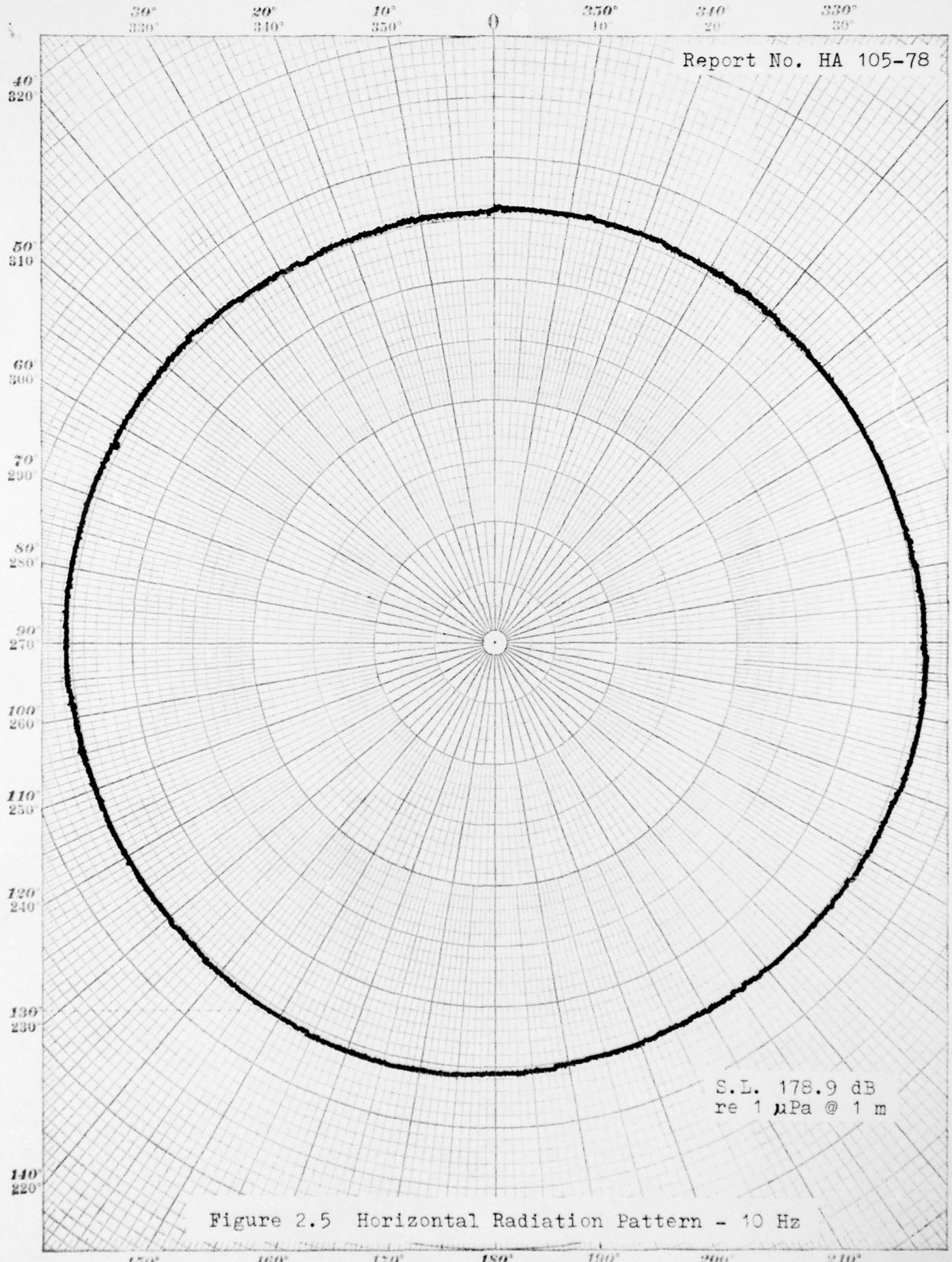


Figure 2.5 Horizontal Radiation Pattern - 10 Hz

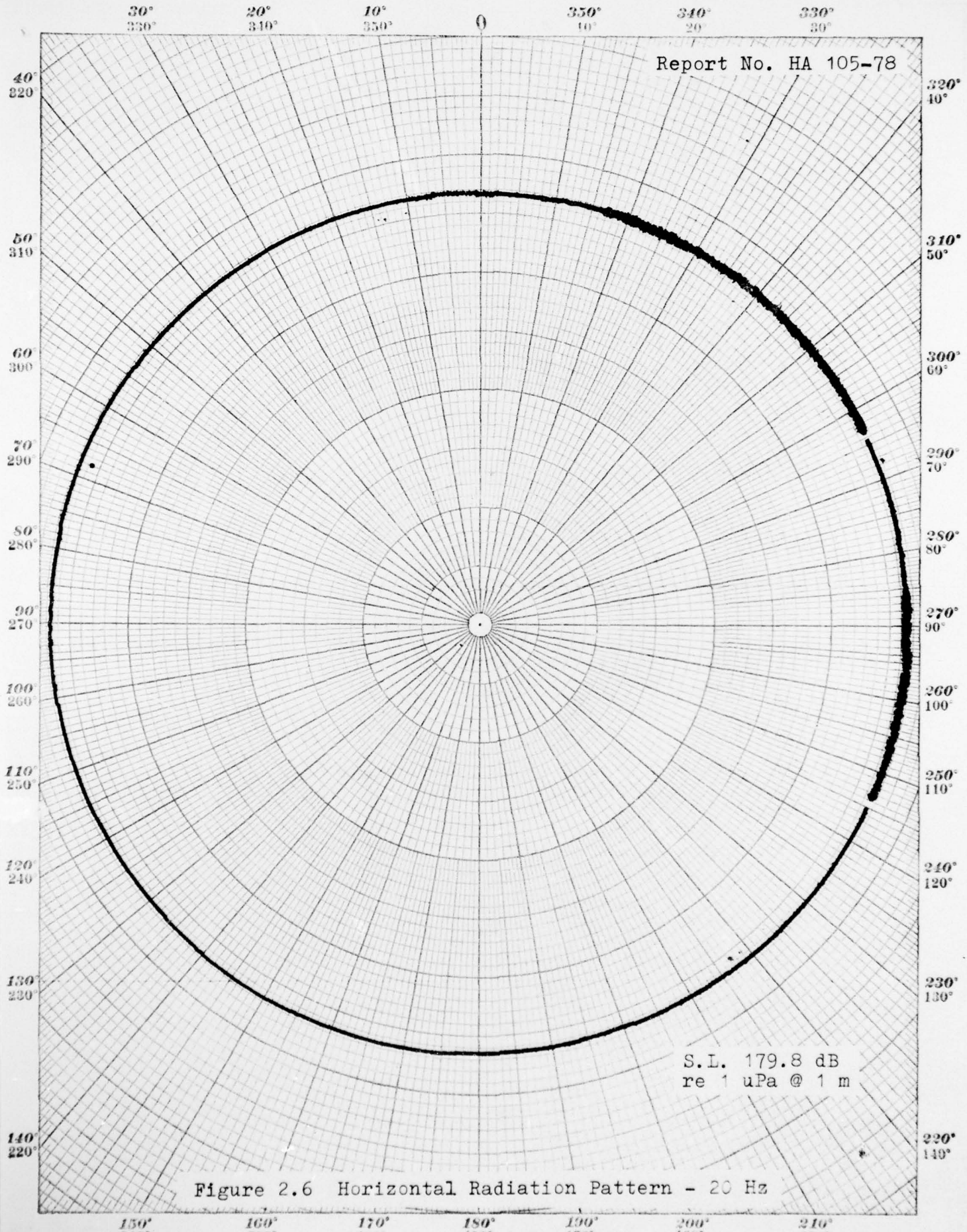


Figure 2.6 Horizontal Radiation Pattern - 20 Hz

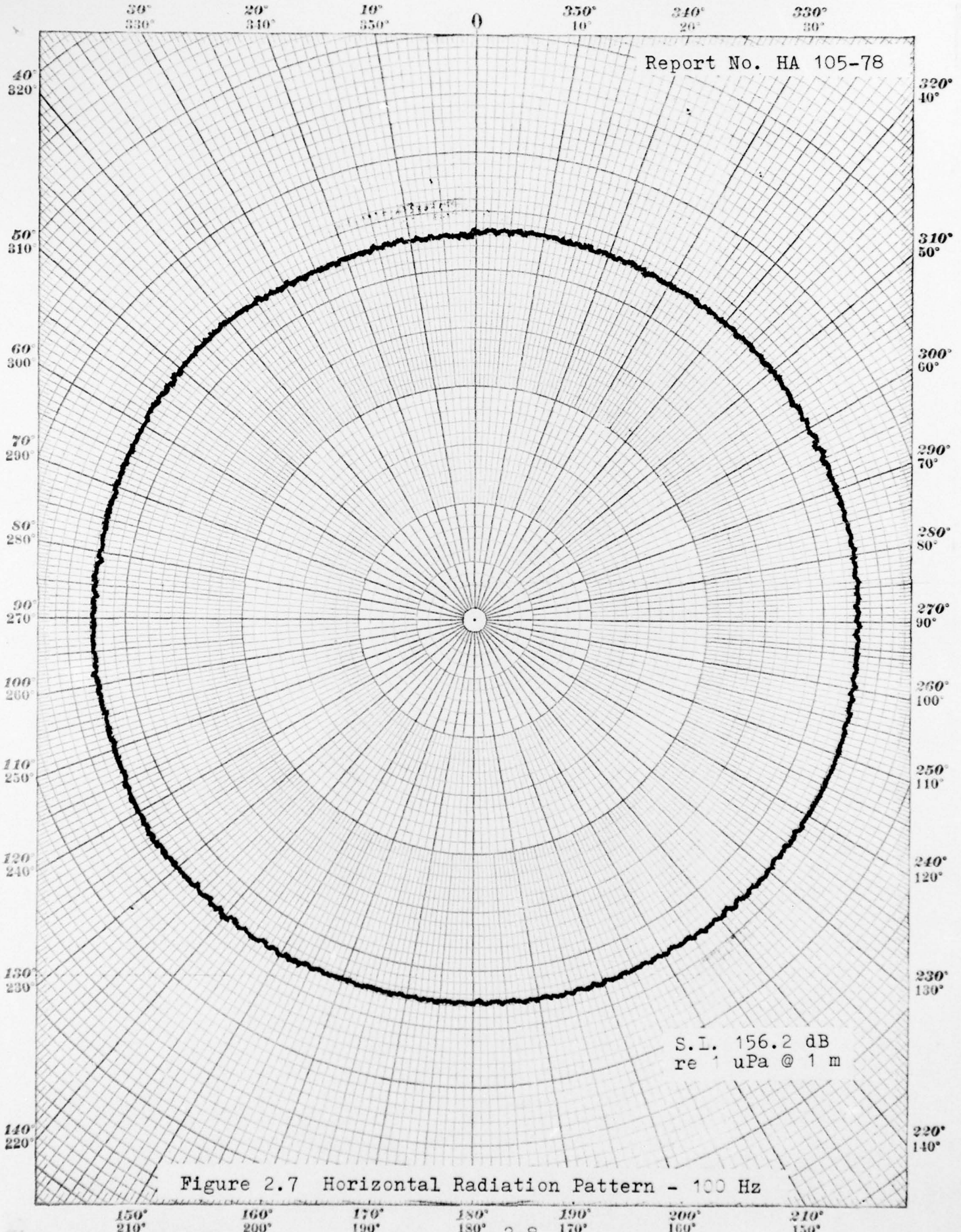


Figure 2.7 Horizontal Radiation Pattern - 100 Hz

2.3 OUTPUT SPECTRA

Figures 2.8 through 2.21 are spectra of the source acoustic signal from 0 to 200 Hz taken in the far field. The spectra were collected from 6 to 32 Hz in two Hertz increments.

2.4 ADDITIONAL DATA

Mr. David Diehl of NRL collected cross correlation data of bi-phase and quadrature phase modulated signals of several bandwidths and center frequencies. The fidelity of transmission of these signals was generally excellent and will be reported separately by Mr. Diehl.

Additional point by point data were collected by Western Electric personnel and are included as Appendix A.

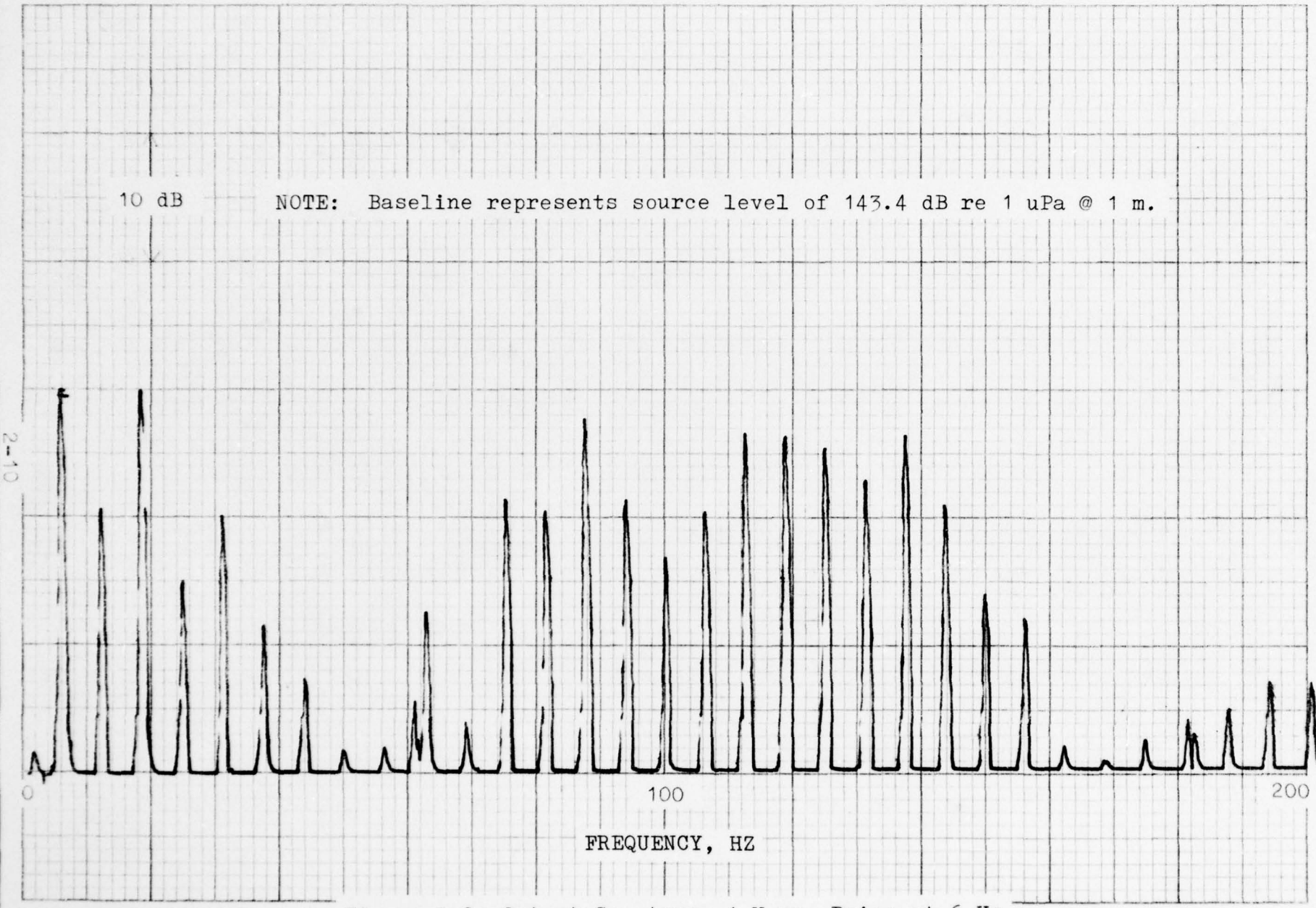


Figure 2.8 Output Spectrum, 1 V rms Drive at 6 Hz

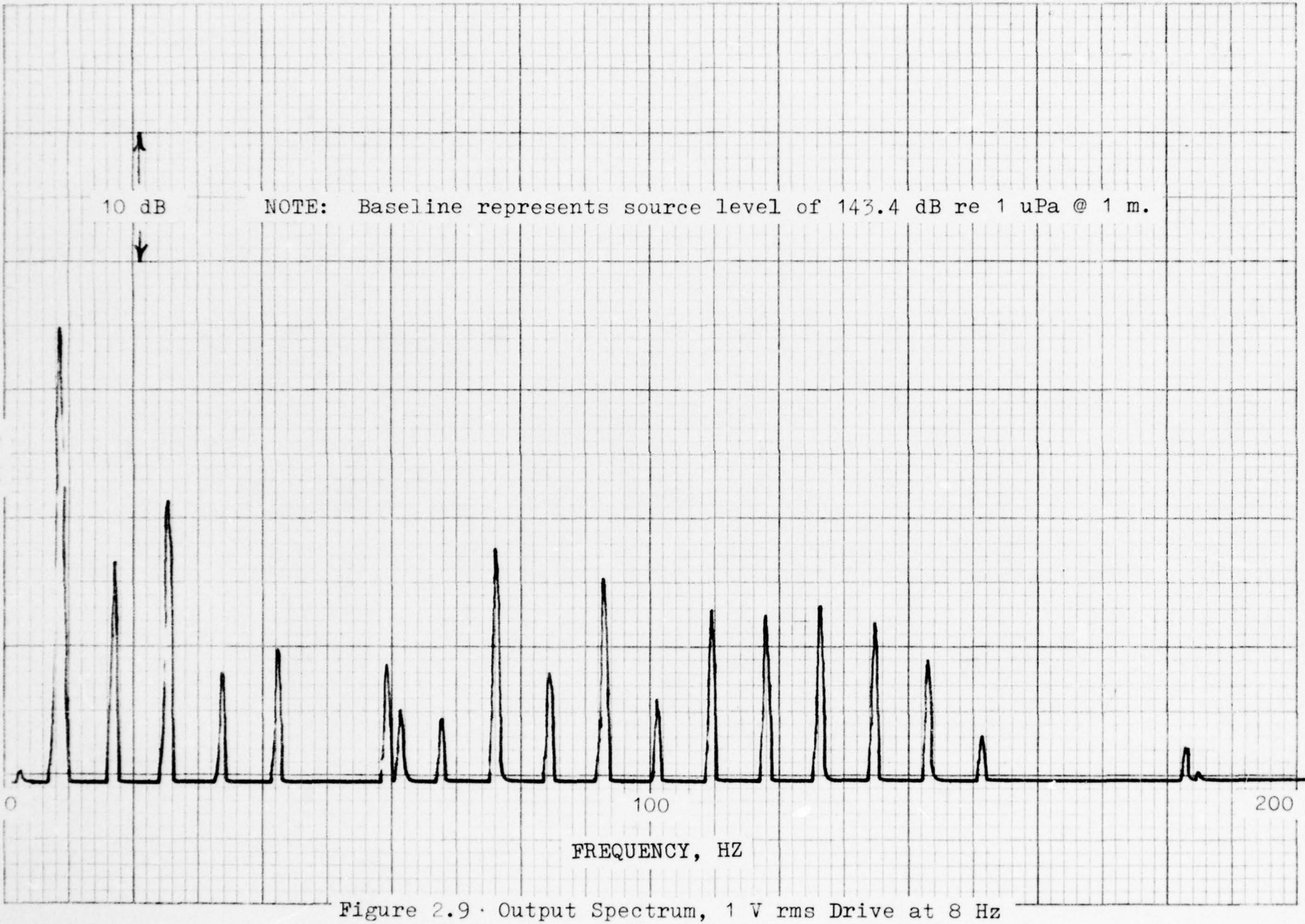


Figure 2.9 · Output Spectrum, 1 V rms Drive at 8 Hz

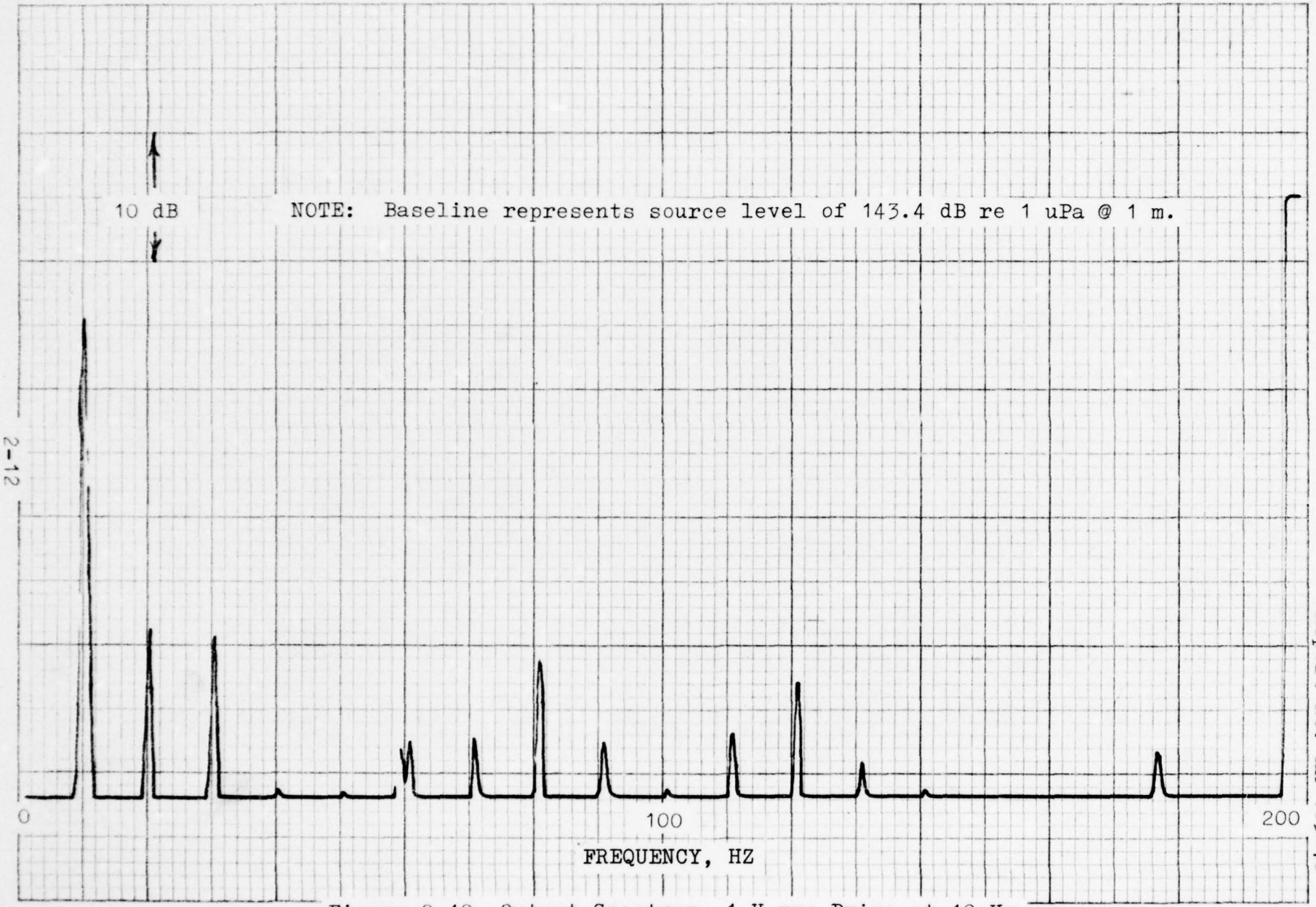


Figure 2.10 Output Spectrum, 1 V rms Drive at 10 Hz

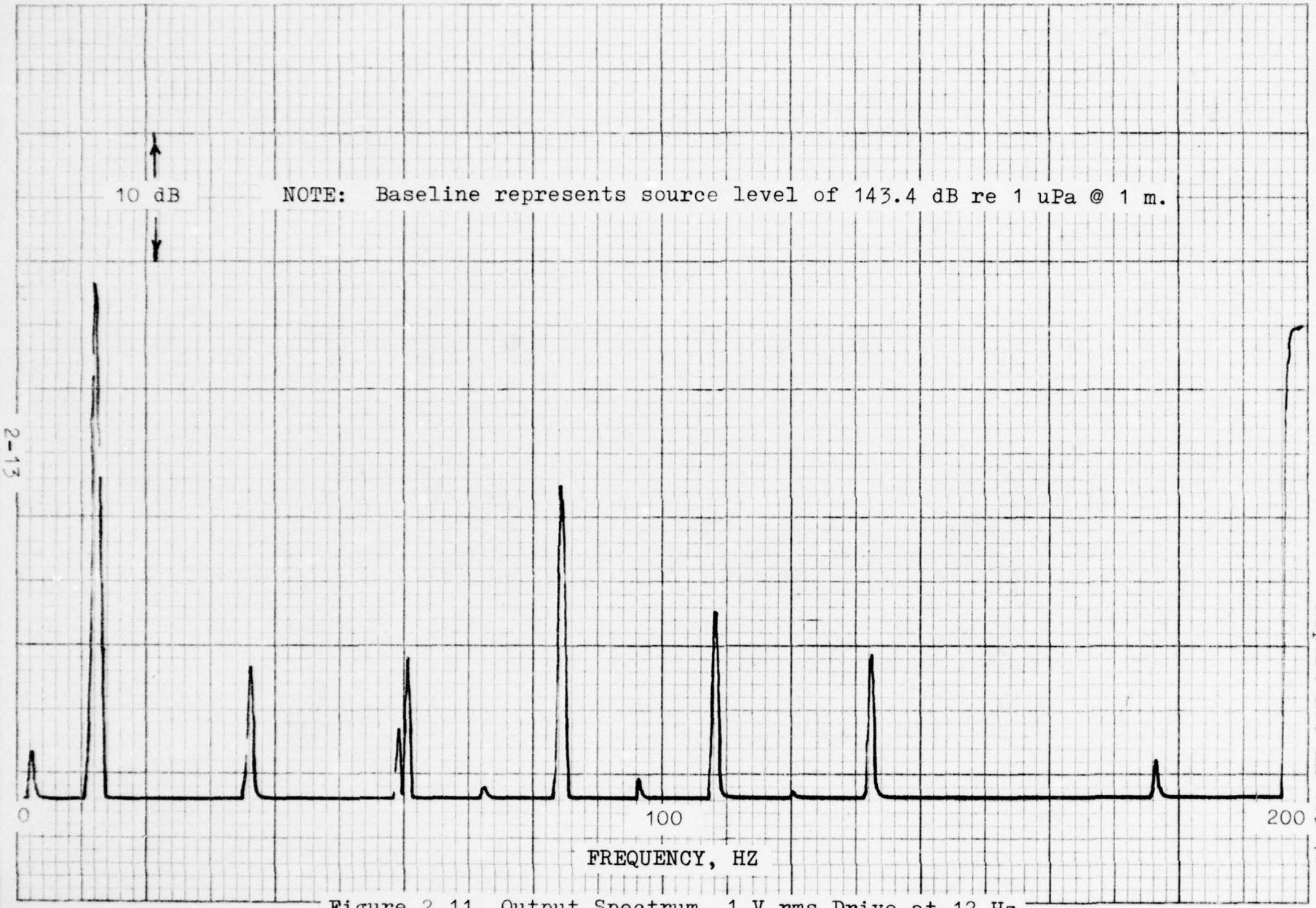


Figure 2.11 Output Spectrum, 1 V rms Drive at 12 Hz

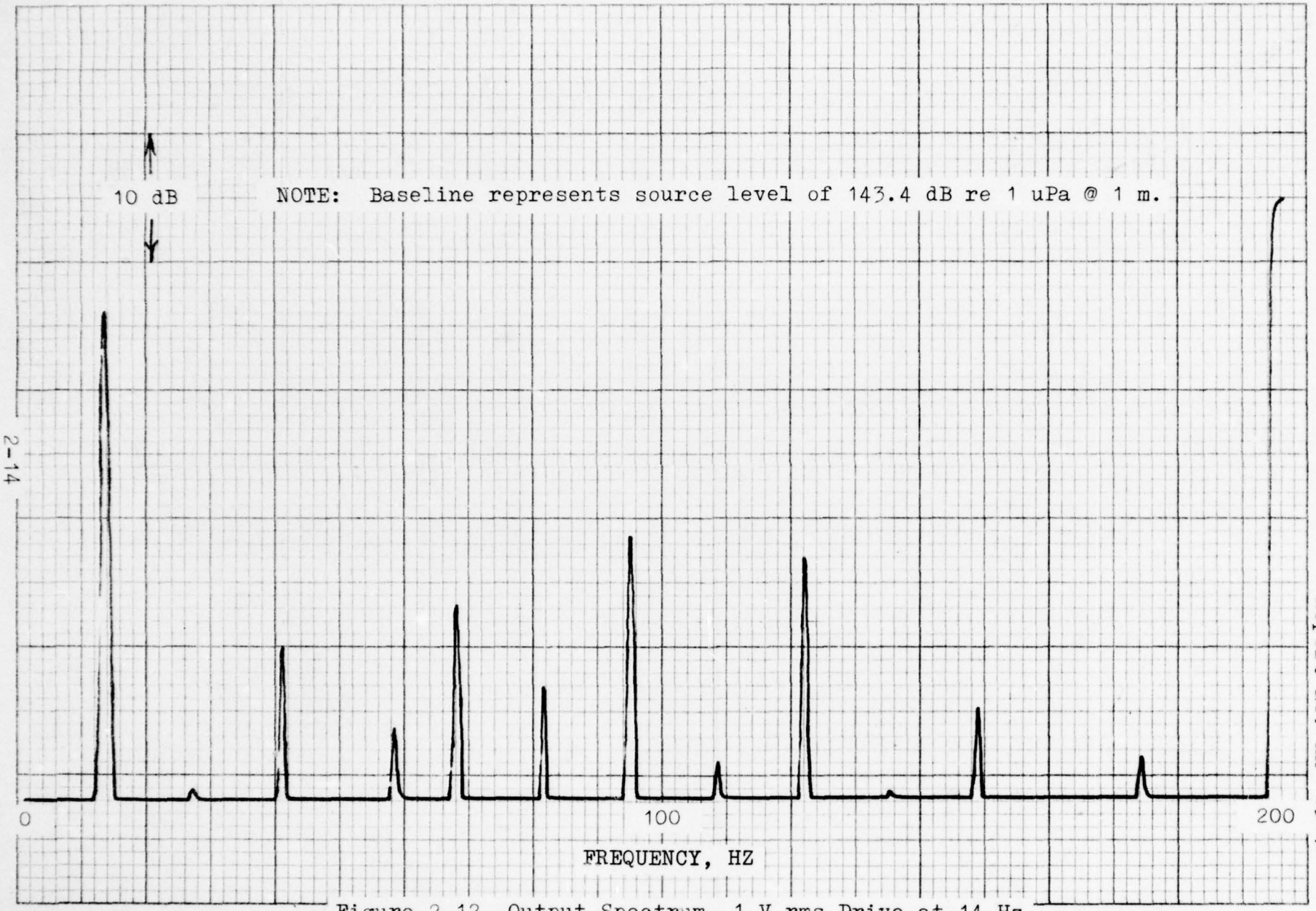


Figure 2.12 Output Spectrum, 1 V rms Drive at 14 Hz

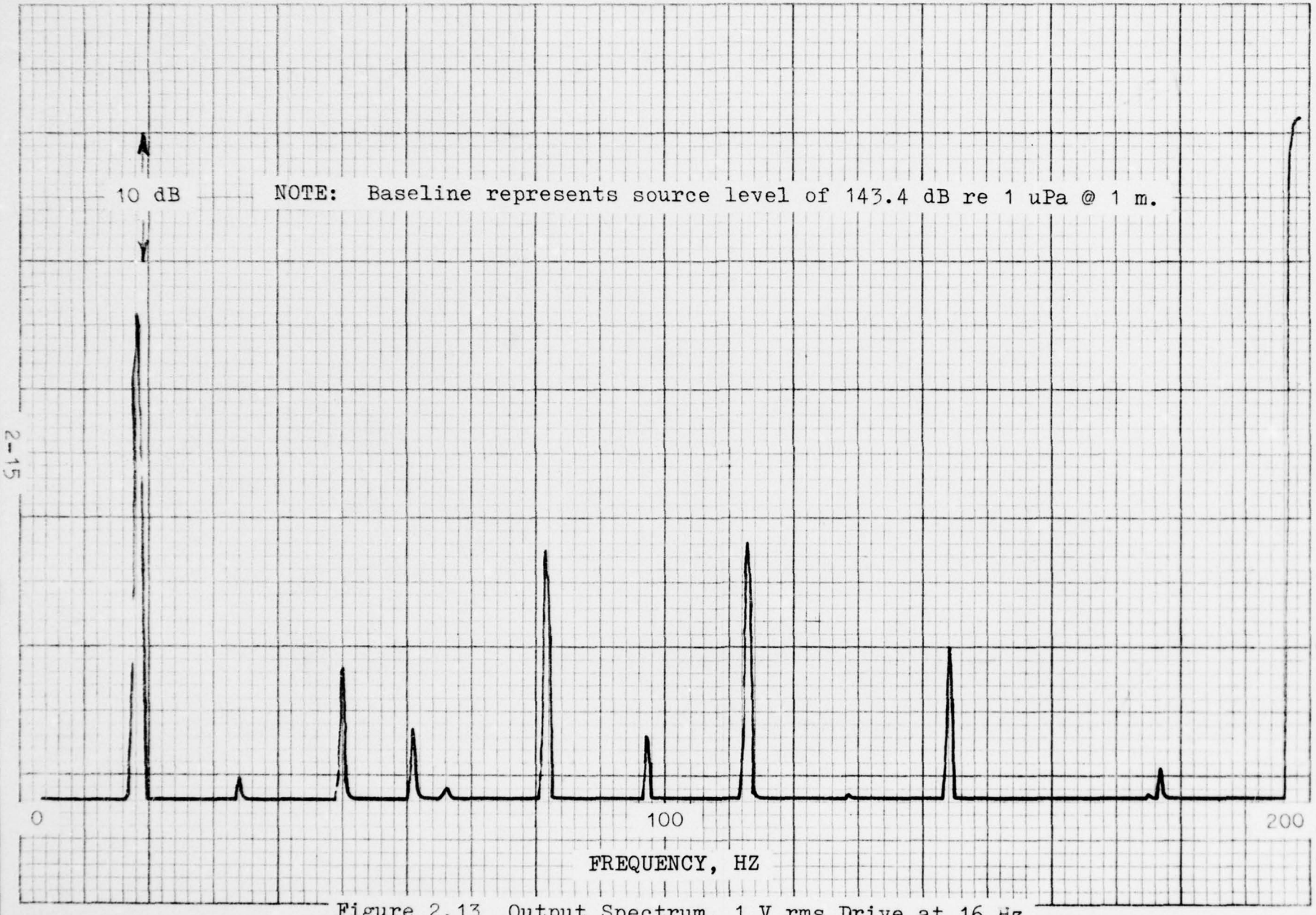


Figure 2.13 Output Spectrum, 1 V rms Drive at 16 Hz

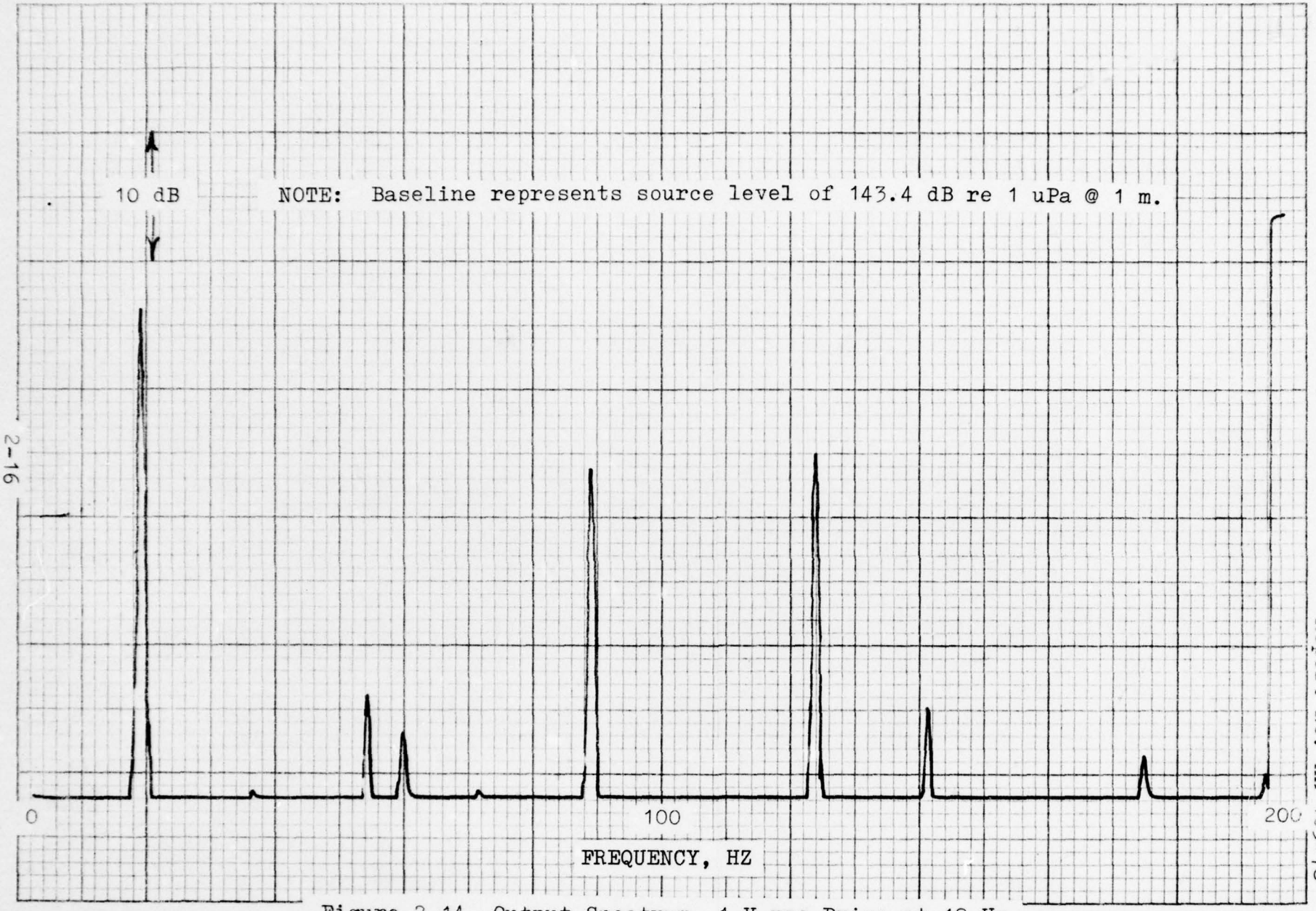


Figure 2.14 Output Spectrum, 1 V rms Drive at 18 Hz

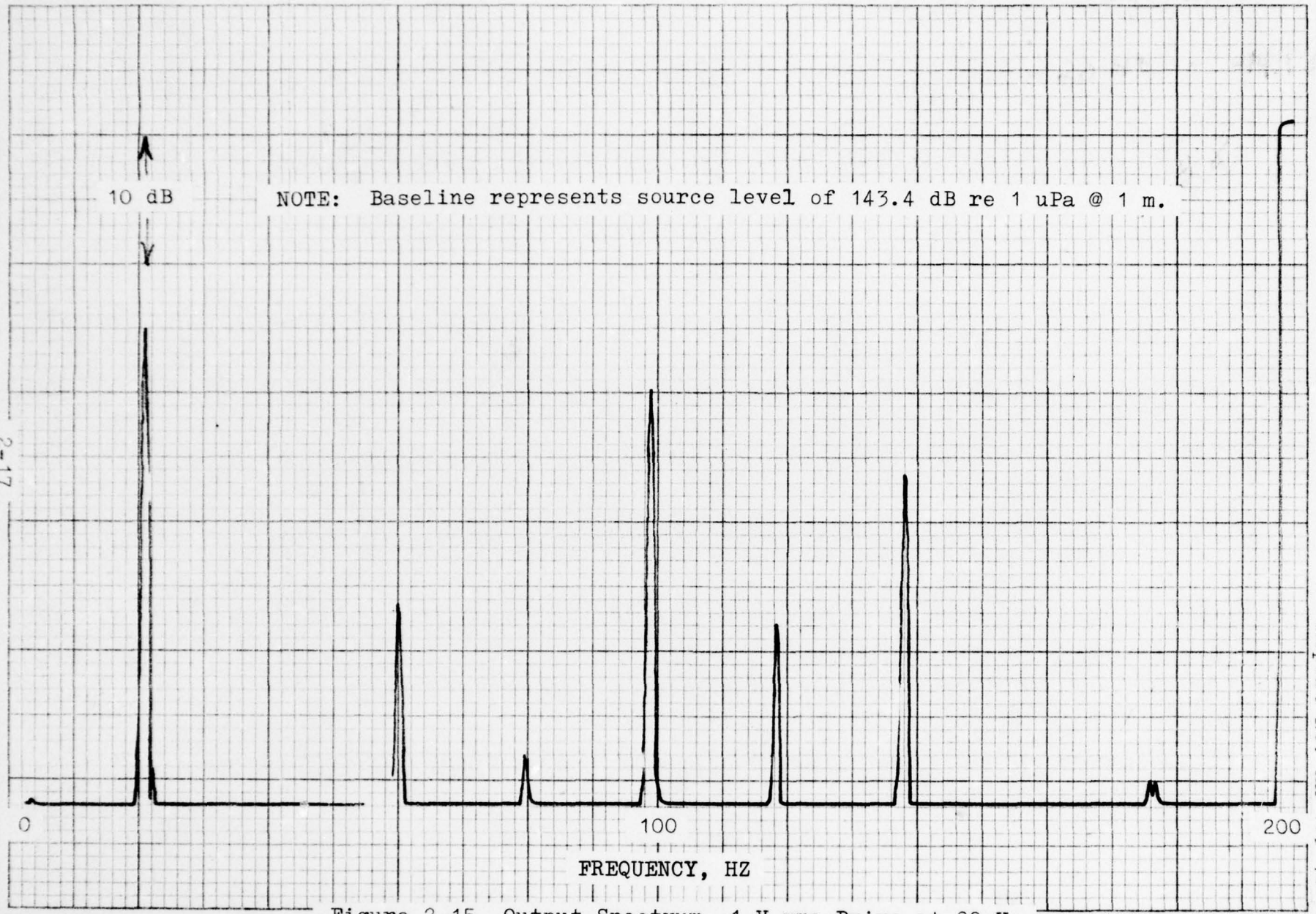


Figure 2.15 Output Spectrum, 1 V rms Drive at 20 Hz

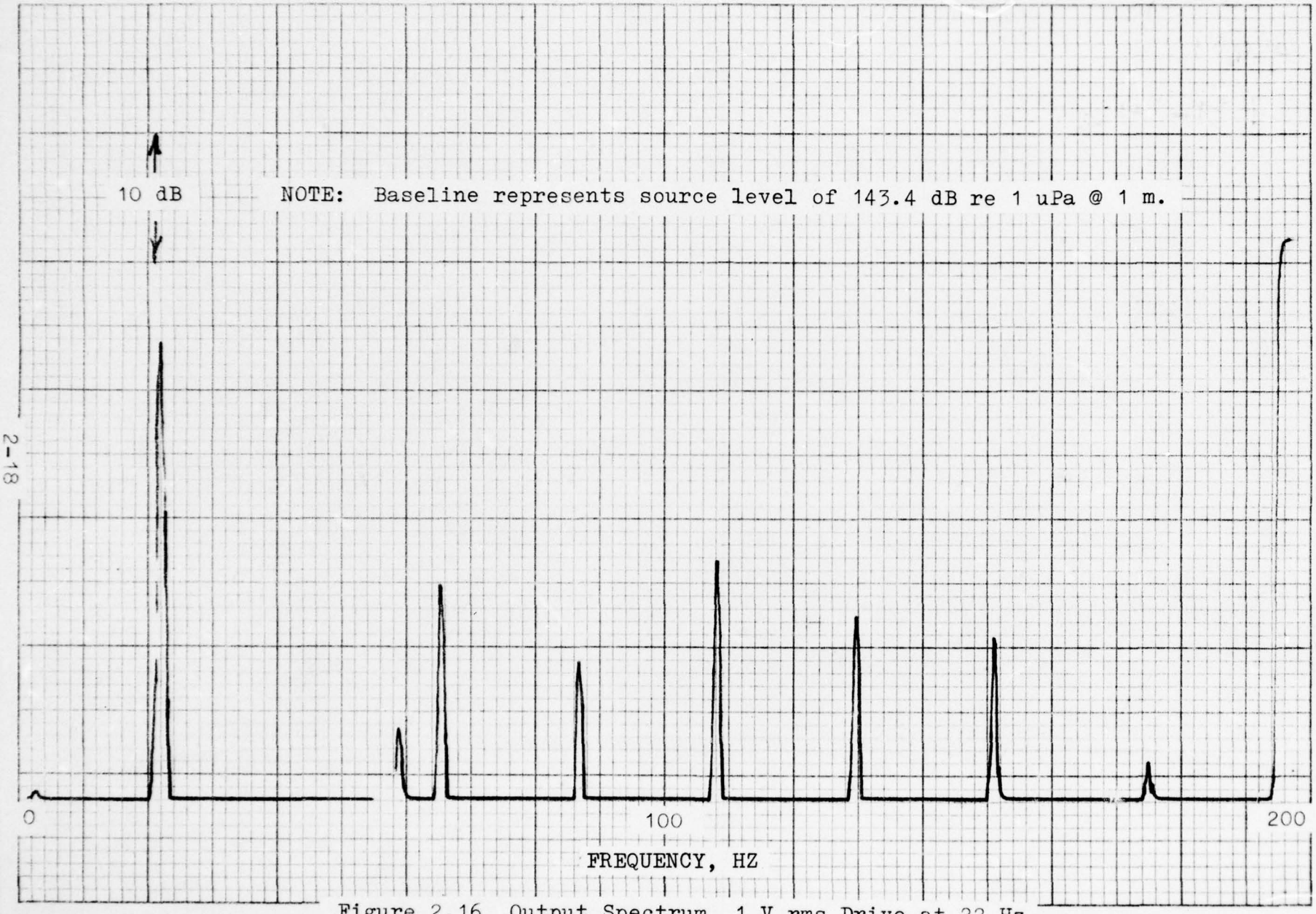


Figure 2.16 Output Spectrum, 1 V rms Drive at 22 Hz

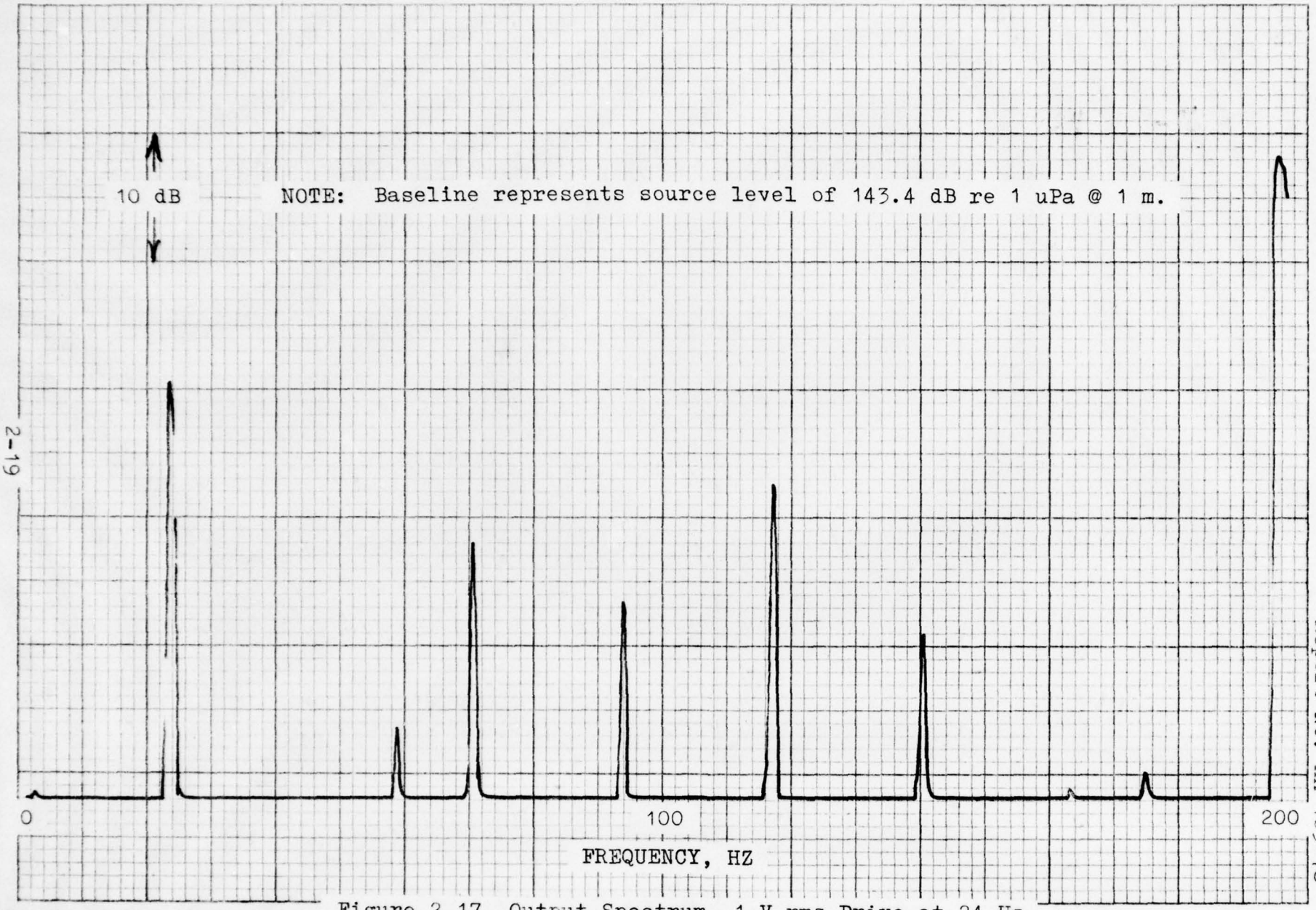


Figure 2.17 Output Spectrum, 1 V rms Drive at 24 Hz

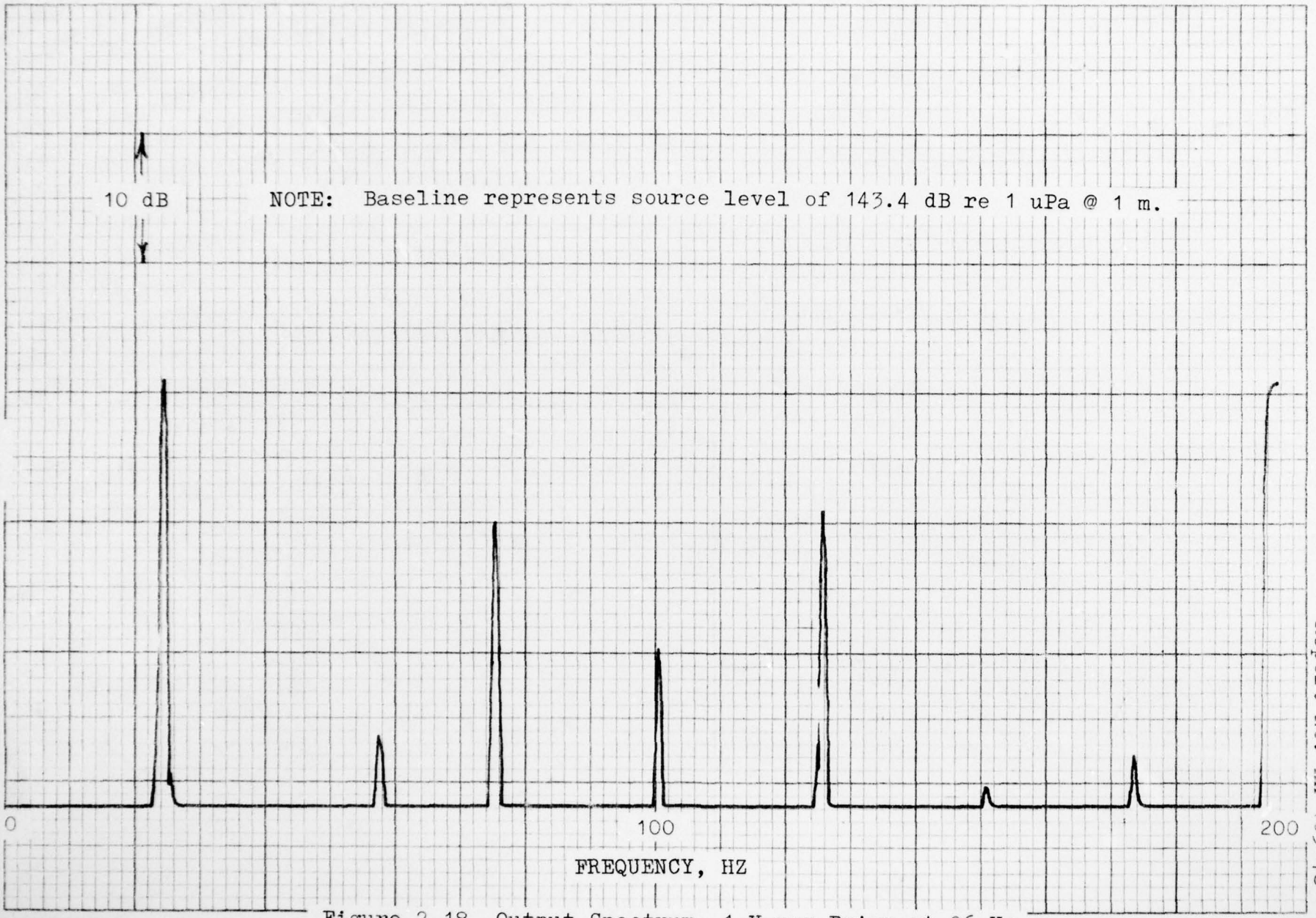


Figure 2.18 Output Spectrum, 1 V rms Drive at 26 Hz

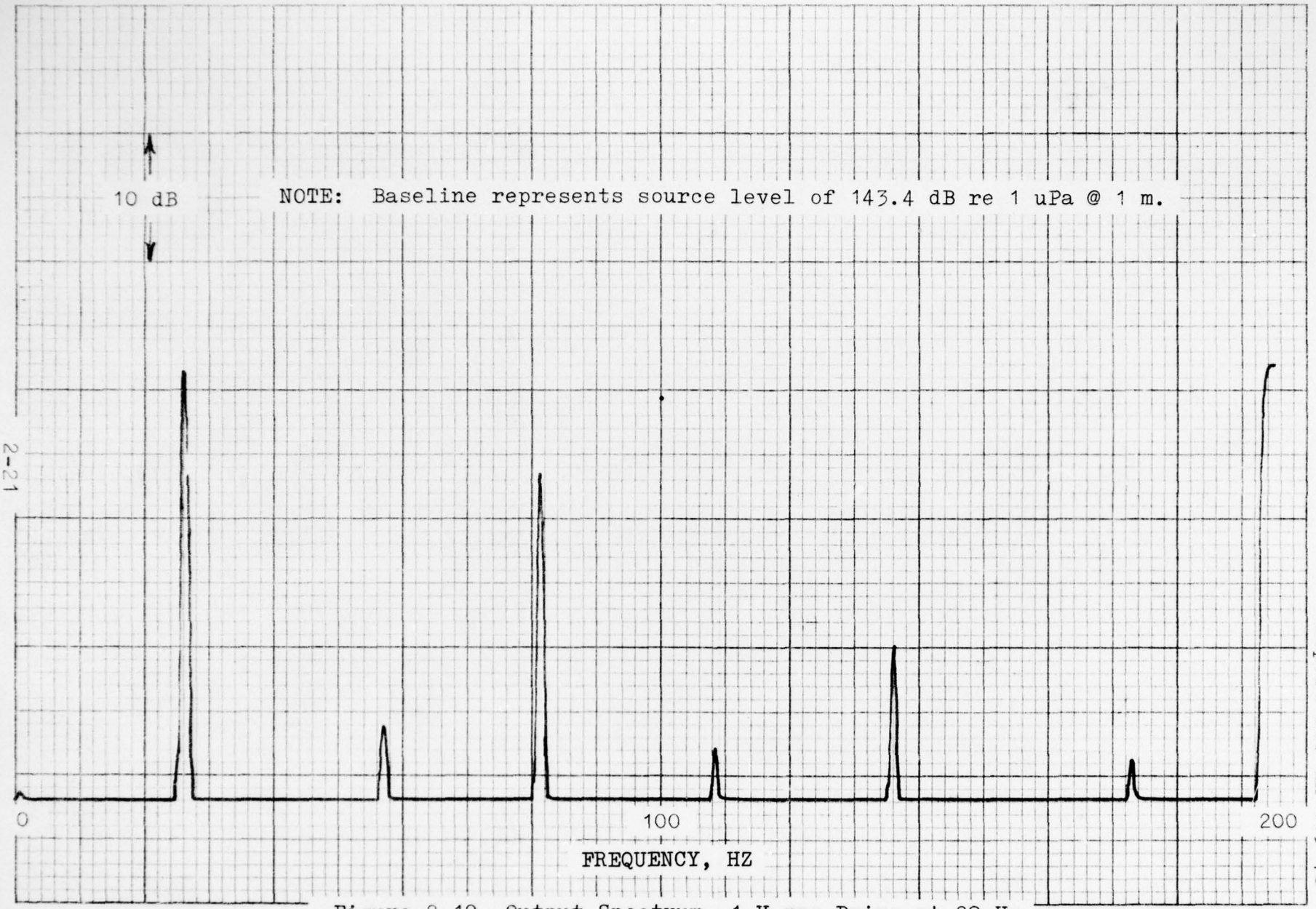


Figure 2.19 Output Spectrum, 1 V rms Drive at 28 Hz

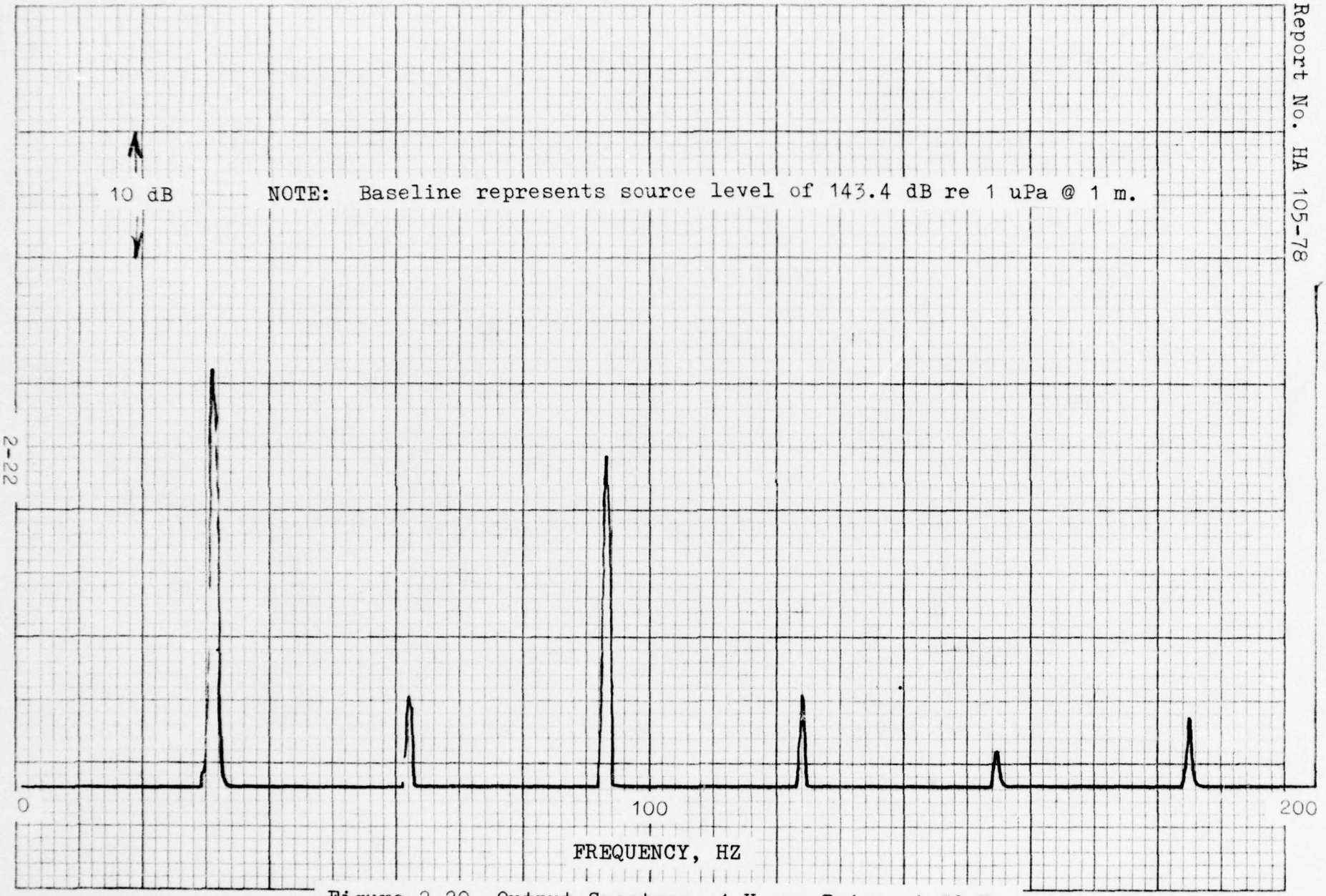


Figure 2.20 Output Spectrum, 1 V rms Drive at 30 Hz

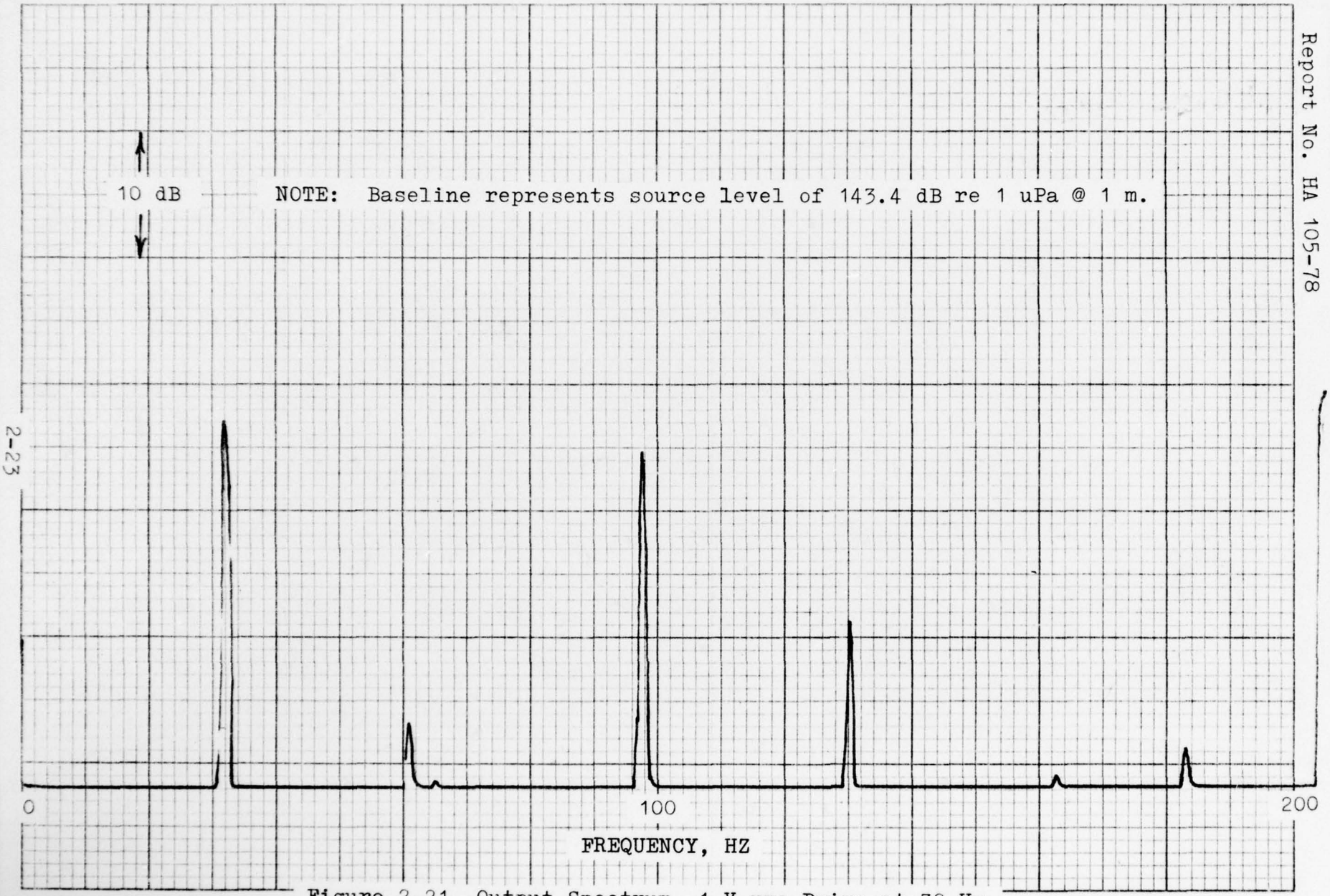


Figure 2.21 Output Spectrum, 1 V rms Drive at 32 Hz

APPENDIX A

ADDITIONAL HVLF-1

SENECA LAKE CALIBRATION DATA

DATE 1/31/78
SHEET 1 OF 10
BY B. Daugherty

DRIVE (VRMS) 1.000
DC BIAS 458
PRECHARGE 41.9 psia
OIL TEMP 51.9°C
MOTOR TEMP 45.2
WATER TEMP 23.8

ANALYZER CORRECTIONS
OFFSET 20dB
SYS. GAIN 30dB

MON HYDROPHONE S/N
TYPE E-37
SENS -203.1
DIST
SPREAD LOSS 3.9dB
CORRECTED TERMINAL SENS -177.0

CAL HYDROPHONE S/N 28
TYPE H-56
SENS -171.8
DIST
SPREAD LOSS 2.6
CORRECTED TERMINAL SENS -193.4

ACCELEROMETER CORRECTION FACTOR

TYPE ANALYZER SD 335
S/N

		MONITOR PANEL						SPECTRUM ANALYZER (0.3 Hz BW)						
TIME (EST)	FREQ (Hz)	MTR CUR (AMPS)	VM MTR (VOLTS)	PWR SUP PUMP FLOW (GPM)	PWR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTING (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
1515	6.0	27.5	-2.5	—	2106	1131	1005	30	-22.0	-11.3	-10.6	-18.0	-22.6	-33.5
	6.5										-9.9	-15.3	-20.0	-31.1
	7.0										-10.5	-14.2	-19.2	-29.9
	7.5										-9.9	-11.9	-17.0	-28.1
	8.0										-10.6	-11.5	-16.7	-27.4
	8.5										-9.9	-10.3	-15.7	-26.4
	9.0										-10.4	-10.2	-15.7	-26.2
	9.5			ACC							-9.9	-9.2	-14.9	-25.3
	10.0	30.8	+0.5	+6.2	1710	931	1027		-23.6	-20.4	-10.3	-9.2	-14.7	-25.0
	10.5			+4.2							-10.0	-8.5	-13.9	-23.9
	11.0			NON							-10.2	-8.2	-13.8	-23.5
	11.5										-10.0	-7.5	-13.3	-22.7
	12.0										-10.2	-7.4	-13.1	-22.2
	12.5										-10.0	-6.8	-12.6	-21.3
	13.0										-10.2	-7.0	-12.7	-21.7
	13.5										-10.0	-7.0	-12.6	-22.0
	14.0										10.1	-7.3	-12.8	-22.6
	14.5			+4.6							-10.0	-7.3	-12.9	-22.7
	15.0	28.8	-0.5	+2.1	2095	1124	1029		-26.7	-15.0	-10.1	-7.7	-13.2	-23.3
	15.5										-10.0	-7.7	-13.3	-23.5
	16.0										-10.0	-7.9	-13.5	-23.8
	16.5										-10.0	-8.1	-13.7	-24.2
	17.0										-10.1	-8.4	-14.1	-24.2
	17.5										-10.1	-8.5	-14.2	-24.1
	18.0										-10.1	-8.7	-14.4	-23.8
	18.5										-10.0	-9.1	-14.7	-23.8
	19.0										-10.1	-9.2	-15.0	-24.4
	19.5			+1.8							-10.1	-9.6	-15.3	-24.9
	20.0	23.1	-1.5	-0.6	2149	1185	1033		-31.1	-12.4	-10.1	-9.5	-15.3	-24.8
	20.5										-10.2	-9.9	-15.8	-25.4
	21.0										-10.0	-9.9	-15.7	-25.3
	21.5										-10.3	-10.3	-16.2	-25.5
	22.0										-10.0	-10.3	-16.2	-25.8
	22.5										-10.3	-10.8	-16.6	-26.5
	23.0										-10.0	-10.7	-16.6	-26.5
	23.5										-10.3	-11.2	-17.0	-27.0
	24.0										-10.0	-11.0	-16.9	-27.1
	24.5			-0.7							-10.3	-11.6	-17.5	-27.6
	25.0	21.2	-1.4	-2.0	2175	1221	1023		-35.2	-12.0	-10.0	-11.4	-17.4	-27.8
1615	25.5							30			-10.3	-11.9	-18.0	-27.8

* input drive level appeared unstable.

DATE 1/31/78
SHEET 2 OF 4
BY BDaugherty

DRIVE (VRMS) ____
DC BIAS ____
PRECHARGE ____
OIL TEMP ____
MOTOR TEMP ____
WATER TEMP ____
ANALYZER CORRECTIONS
OFFSET ____
SYS. GAIN ____
MON HYDROPHONE
TYPE ____
SENS ____
DIST ____
SPREAD LOSS ____
CORRECTED TERMINAL SENS ____
CAL HYDROPHONE
TYPE ____
SENS ____
DIST ____
SPREAD LOSS ____
CORRECTED TERMINAL SENS ____
ACCELEROMETER CORRECTION FACTOR ____
TYPE ANALYZER ____
S/N ____

		MONITOR PANEL						SPECTRUM ANALYZER (0.3 HZ BW)						
TIME (EST)	FREQ (HZ)	MTR CUR (AMPS)	VIB MTR (G's)	PWR SUP PUMP FLOW (GPM)	PWR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTING (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
1615	26.0							30			-10.0	-11.7	-17.8	-27.7
	26.5										-10.5	-12.3	-18.6	-28.3
	27.0										-10.0	-11.9	-18.3	-27.4
	27.5										-10.5	-12.5	-19.0	-27.1
	28.0										-10.0	-12.4	-18.7	-27.0
	28.5										-10.6	-13.1	-19.5	-27.9
	29.0										-10.0	-12.9	-19.2	-27.7
	29.5			-3.3							-10.6	-13.4	-20.0	-28.6
	30.0	20.6	-5.0	-5.5	2181	1248	1032		-38.3	-12.4	-10.1	-13.1	-19.7	-28.6
	30.5										-10.6	-13.8	-20.6	-29.7
	31.0										10.1	-15.3	-20.5	-29.8
	31.5										-10.6	-16.0	-21.6	-30.8
	32.0										-10.1	-15.7	-21.4	-31.1
	32.5										-10.8	-16.6	-22.5	-32.2
	33.0										-10.1	-16.3	-22.4	-31.8
	33.5										-10.7	-17.4	-23.5	-32.8
	34.0										-10.1	-17.4	-23.4	-33.0
	34.5			-5.6							-10.6	-18.5	-24.6	-33.9
	35.0	20.6	-10	-7.7	2175	1248	1038	30	-42.1	-15.3	-10.1	-18.6	-24.9	-33.9
	36.0							20	0dB =	1VRms	+0.1	-9.6	-16.1	-24.9
	37.0										0.1	-11.1	-17.7	-26.2
	38.0										0.1	-12.2	-19.4	-27.8
	39.0										0.1	-14.0	-21.3	-29.7
	40.0	20.4	-18	+2.3	2180	1240	1028		-35.1	-9.7	0.1	-15.5	-22.8	-32.1
	45.0			0.0							0.1	-23.3	-31.1	-38.3
	50.0										0.2	-31.7	-38.8	-45.5
	55.0										0.2	-27.4	-36.6	-44.1
	60.0										0.2	-27.0	-25.1	-40.3
	65.0										0.3	-24.4	-38.0	-41.4
	70.0										0.3	-23.8	-38.0	-39.7
	75.0										0.2	-22.8	-36.5	-39.1
	80.0										0.2	-21.8	-36.5	-38.0
	85.0										0.2	-20.4	-36.5	-35.6
	90.0										+0.1	-18.5	-40.1	-34.7
	95.0										-0.1	-19.9	-38.0	-37.0
	100.0										-0.5	23.3	-41.0	-38.6
	105.0										-0.3	-38.1	-38.2	-52.0
	110.0										+0.2	-33.2	-34.0	-49.0
	115.0										-0.2	-27.2	-30.5	-44.8
1710	120.0							20			+0.2	-23.7	-30.0	-41.2

Band Width changed to 0.6 Hz BW

0 dB = 3.16 VRMS

DATE 1/31/78
SHEET 3 OF 10
BY D. Kidd

DRIVE (VRMS) 1.430
DC BIAS 458
PRECHARGE 40.3
OIL TEMP 47.9
MOTOR TEMP 36.4
WATER TEMP 2.3

ANALYZER CORRECTIONS
OFFSET 20 dB
SYS. GAIN 30 dB

MON HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS

CAL HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS

ACCELEROMETER CORRECTION FACTOR

TYPE ANALYZER
S/N

			MONITOR PANEL						SPECTRUM ANALYZER (0.3 HZ BW)						
	TIME (EST)	FREQ (HZ)	MTR CUR (AMPS)	VU MTR (dB)	PWR SUP PUMP FLOW (GPM)	PWR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTING (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
		6.0													
		6.5													
		7.0													
		7.5													
	1730	8.0										-7.4	-11.0	-16.4	-27.1
	↑	8.5										-6.9	-9.9	-15.3	-25.9
		7.0										-7.3	-9.9	-15.4	-25.9
		9.5										-6.9	-8.9	-14.5	-24.9
	1715	10.0	29.5	0.0	ACC +6.5 +4.8 MON	1686	920	1026	30	-23.3	-19.9	-7.2	-9.0	-14.4	-24.8
	1730	10.5										-6.9	-8.1	-13.6	-23.8
	↓	11.0										-7.1	-7.9	-13.5	-23.4
		11.5										-7.1	-7.4	-13.4	-22.4
		12.0										-7.1	-7.0	-12.7	-21.8
		12.5										-7.0	-6.3	-12.2	-20.8
		13.0										-7.1	-6.2	-12.1	-20.9
		13.5										-6.9	-5.8	-11.6	-20.9
		14.0										-7.4	-6.3	-12.0	-21.8
		14.5										-6.9	-6.0	-11.7	-21.3
		15.0	29.7	+1.5	+6.6 +4.4	2071	1118	1045		-25.0	-13.9	-7.1	-6.3	-12.0	-21.9
		15.5										-7.0	-6.4	-12.0	-22.0
		16.0										-7.0	-6.6	-12.3	-22.6
		16.5										-7.0	-6.8	-12.5	-22.7
		17.0										-7.0	-7.1	-12.9	-23.1
		17.5										-7.0	-7.3	-13.1	-22.8
		18.0										-7.0	-7.5	-13.4	-22.6
		18.5										-7.0	-7.8	-13.7	-22.7
		19.0										-6.9	-8.2	-14.0	-23.3
		19.5			+4.8							-7.1	-8.6	-14.4	-23.8
		20.0	22.4	-.5	+2.4	2144	1172	1035		-28.5	-11.6	-7.0	-8.6	-14.6	-24.0
		20.5										-7.2	-9.1	-15.0	-24.6
		21.0										-7.0	-9.0	-15.1	-24.7
		21.5										-7.2	-9.4	-15.6	-24.8
		22.0										-7.0	-9.6	-15.7	-24.9
		22.5										-7.2	-10.1	-16.1	-26.0
		23.0										-6.9	-10.1	-16.1	-25.9
		23.5										-7.2	-10.5	-16.6	-26.6
		24.0										-7.0	-10.5	-16.5	-26.6
		24.5										-7.3	-11.1	-17.2	-27.5
		25.0	20.8	-2.5	+2.0 -0.2	2171	1206	1041		-32.7	-11.6	-7.0	-10.9	17.0	-27.2
	1810	25.5							30			-7.5	-11.5	-17.6	-27.5

* UNSTABLE

0 dB = 3.16 Vrms

DATE 1/31/78
SHEET 4 OF 10
BY D. Kidd

DRIVE (VRMS) ____
DC BIAS ____
PRECHARGE ____
OIL TEMP ____
MOTOR TEMP ____
WATER TEMP ____
ANALYZER CORRECTIONS
OFFSET ____
SYS. GAIN ____
MON HYDROPHONE
TYPE ____
SENS ____
DIST ____
SPREAD LOSS ____
CORRECTED TERMINAL SENS ____
CAL HYDROPHONE
TYPE ____
SENS ____
DIST ____
SPREAD LOSS ____
CORRECTED TERMINAL SENS ____
ACCELEROMETER CORRECTION FACTOR ____
TYPE ANALYZER ____
S/N ____

			MONITOR PANEL						SPECTRUM ANALYZER (0.3 HZ BW)						
TIME (EST)	FREQ (HZ)	MTR CUR (AMPS)	VL MTR (VLTS)	PWR SUP PUMP FLOW (GPM)	PWR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTING (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
1810	26.0							30			-6.9	-11.4	-17.4	-27.4
	26.5										-7.5	-11.9	-18.2	-28.0
	27.0										-7.0	-11.5	-17.7	-27.1
	27.5										-7.5	-12.2	-18.5	-26.8
	28.0										-7.0	-12.1	-18.2	-26.8
	28.5										-7.5	-12.7	-19.0	-27.6
	29.0										-7.0	-12.5	-18.7	-27.4
	29.5			-0.5							-7.5	12.9	-19.6	-28.1
	30.0	20.3	-5.	-2.6	2177	1231	1042		-36.3	-11.8	-7.0	-12.5	-19.2	-28.1
	30.5										-7.5	-13.2	-20.1	-29.1
	31.0										-7.1	-14.6	-19.9	-29.0
	31.5										-7.6	-15.2	-20.8	-30.0
	32.0										-7.0	-14.7	-20.4	-30.1
	32.5										-7.7	-15.6	-21.4	-31.0
	33.0										-7.1	-15.1	-21.4	-30.5
	33.5										-7.7	-16.2	-22.4	-31.5
	34.0										-7.1	-15.9	-22.2	-31.3
	34.5			-2.6							-7.8	-17.0	-23.6	-32.4
	35.0	20.7	-9.	-4.7	2170	1250	1024		-39.3	-13.7	-7.1	-17.0	-23.2	-32.2
	36.0										-7.1	-18.1	-24.5	-33.4
	37.0										-7.2	-19.4	-25.8	-34.7
	38.0										-7.1	-20.6	-27.1	-36.2
	39.0			-4.8							-7.1	-22.1	-28.6	-37.9
	40.0	20.5	-15.	-6.9	2176	1252	1039		-42.8	-17.4	-7.0	-23.5	-30.3	-40.1
	45.0										-7.0	-31.0	-39.2	-46.3
	50.0										-7.0	-39.5	-43.6	-53.4
	55.0										-7.0	-35.3	-44.0	-51.4
	60.0										-6.9	-34.8	-40.5	-47.6
	65.0										-7.0	-31.8	-43.7	-48.4
	70.0										-6.9	-30.8	-42.8	-46.9
	75.0										-7.0	-29.8	-43.4	-45.9
	80.0										-7.1	-28.6	-44.5	-45.3
	85.0										-7.1	-27.1	-42.7	-42.2
	90.0										-7.2	-25.2	-44.8	-41.8
	95.0										-7.4	-26.2	-44.0	-43.0
	100.0										-7.9	-28.9	-43.0	-44.2
	105.0									↓	-7.6	-43.	-41.5	-56
	110.0									SA	-7.0	-39.2	-37.2	-55
	115.0									on 200 BW	-7.6	-33.3	-36.3	-50
1850	120.0							30			-7.0	-29.2	-33.5	-47

X UNSTABLE

0 dB = 3.16 Vrms

DATE 1/31/78
SHEET 5 OF 10
BY BDaugherty

DRIVE (VRMS) 2.000

DC BIAS

PRECHARGE

OIL TEMP

MOTOR TEMP

WATER TEMP

ANALYZER CORRECTIONS
OFFSET
SYS. GAIN

MON HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS

CAL HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS

ACCELEROMETER CORRECTION FACTOR

TYPE ANALYZER

S/N

		MONITOR PANEL						SPECTRUM ANALYZER (0.3 HZ BW)						
TIME (EST)	FREQ (HZ)	MTR CUR (AMPS)	VLV MTR (AMPS)	PWR SUP PUMP FLOW (GPM)	PWR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTING (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
1850	30										-4.0	-12.2	-19.1	-27.8
	31										-4.1	-14.2	-19.6	-28.6
	32										-4.1	-14.2	-20.1	-29.6
	33										-4.1	-14.4	-20.7	-30.0
	34										-4.1	-14.8	-21.2	-30.6
	35										-4.1	-15.7	-22	-30.9
	36										-4.1	-16.6	-23.2	-32.0
	37										-4.1	-17.6	-24.2	-33.0
	38										-4.1	-18.6	-25.3	-34.2
	39										-4.1	-20.0	-26.7	-36.0
	40										-4.1	-21.2	-28.2	-38.3
	45										-4.1	-28.8	-35.5	-43.8
	50										-4.1	-27.6	-42.7	-51.0
	55										-4.0	-33.0	-39.9	-49.0
	60										-4.0	-31.6	-36.0	-45.6
	65										-3.9	-28.9	-37.7	-45.5
	70										-4.0	-27.7	-37.8	-43.5
	75										-4.0	-26.5	-37.1	-42.9
	80										-4.1	-25.3	-37.8	-41.7
	85										-4.1	-23.8	-38.8	-39.2
	90										-4.1	-22.1	-39.7	-38.6
	95										-4.4	-22.7	-39.0	-38.4
	100										-4.9	-24.9	-42.7	-40.2
	105										-4.6	-28.7	-41.2	-51.0
	110										-4.0	-26.2	-37.8	-51.8
	35													
	40													
	45													
	50													
	55													
	60													
	65													
	70													
	75													
	80													
	85													
	90													
	95													
	100													
	105													

dB = 3.16 VRMS

DATE 1/31/78
SHEET 6 OF 10
BY T Davis

DRIVE (VRMS) 0.500

DC BIAS

PRECHARGE

OIL TEMP

MOTOR TEMP

WATER TEMP

ANALYZER CORRECTIONS
OFFSET
SYS. GAIN

MON HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS

CAL HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS

ACCELEROMETER CORRECTION FACTOR

TYPE ANALYZER

S/N

			MONITOR PANEL						SPECTRUM ANALYZER (0.3 HZ BW)						
TIME (EST)	FREQ (HZ)	MTR CUR (AMPS)	VLT MTR (VLTS)	PWR SUP PUMP FLOW (GPM)	PWR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTING (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
	6.0										-16.6	-18.6	-23.1	-34.3
	7.0										-16.5	-15.2	-20.4	-31.2
	8.0										-16.4	-13.1	-18.6	-29.3
	9.0										-16.3	-12.2	-17.9	-28.2
	10.0										-16.3	-11.8	-17.4	-27.7
	11.0										-16.2	-11.6	-17.2	-27.1
	12.0										-16.2	-11.4	-17.2	-26.5
	13.0										-16.2	-11.7	-17.4	-26.3
	14.0										-16.3	-11.8	-17.4	-27.1
	15.0										-16.1	-12.0	-17.6	-27.6
	16.0										-16.0	-11.9	-17.6	-27.9
	17.0										-16.1	-12.2	-17.8	-28.0
	18.0										-16.1	-12.3	-18.0	-27.3
	19.0										-16.1	-12.4	-18.0	-27.6
	20.0										-16.0	-12.3	-18.1	-27.7
	21.0										-16.0	-12.4	-18.2	-27.9
	22.0										-16.0	-12.6	-18.5	-27.9
	23.0										-16.0	-12.7	-18.5	-28.4
	24.0										-16.0	-12.8	-18.6	-28.9
	25.0										-16.0	-13.0	-18.9	-27.2
	26.0										-16.0	-13.2	-19.2	-29.3
	27.0										-16.0	-13.4	-19.6	-28.4
	28.0										-16.0	-14.0	-20.3	-28.9
	29.0										-16.0	-14.6	-21.1	-29.4
	30.0										-16.0	-15.1	-21.9	-30.6
	31.0										-16.1	-17.7	-22.9	-32.2
	32.0										-16.1	-18.6	-24.3	-34.1
	33.0										-16.1	-19.6	-25.5	-35.2
	34.0										-16.1	-21.0	-27.1	-36.8
1950	35.0										-16.1	-22.5	-29.2	-37.7

@ 10 – 3.16 Vrms

DATE 1/31/78
SHEET 7 OF 10
BY D A. KIDD

DRIVE (VRMS) 250
DC BIAS
PRECHARGE
OIL TEMP
MOTOR TEMP
WATER TEMP
ANALYZER CORRECTIONS
OFFSET
SYS. GAIN
MON HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS
CAL HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS
ACCELEROMETER CORRECTION FACTOR
TYPE ANALYZER
S/N

		MONITOR PANEL						SPECTRUM ANALYZER (0.3 HZ BW)						
TIME (EST)	FREQ (HZ)	MTR CUR (AMPS)	VIB MTR (VOLTS)	PWR SUP PUMP FLOW (GPM)	PWR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTING (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
1950	6.0							30			-22.3	-20.8	-25.6	-36.4
	7.0										-22.2	-18.7	-24.3	-34.7
	8.0										-22.1	-17.7	-23.5	-34.0
	9.0										-22.0	-17.1	-22.7	-33.4
	10.0										-22.0	-17.0	-22.4	-32.5
	11.0										-21.9	-16.5	-22.1	-31.8
	12.0										-21.9	-16.4	-22.1	-31.2
	13.0										-21.9	-16.5	-22.2	-31.0
	14.0										*-22.3	-16.7	-22.4	-32.0
	15.0										-21.9	-16.7	-22.1	-32.2
	16.0										-21.6	-16.6	-22.4	-32.7
	17.0										-21.7	-16.6	-22.3	-32.6
	18.0										-21.7	-16.5	-22.4	-31.6
	19.0										-21.8	-16.6	-22.4	-32.0
	20.0										-21.7	-16.6	-22.3	-32.1
	21.0										-21.7	-16.5	-22.4	-32.2
	22.0										-21.7	-16.4	-22.3	-31.8
	23.0										-21.7	-16.3	-22.2	-32.2
	24.0										-21.7	-16.3	-22.2	-32.6
	25.0										-21.6	-16.3	-22.1	-32.5
	26.0										-21.7	-16.4	-22.3	-32.6
	27.0										-21.7	-16.4	-22.6	-32.0
	28.0										-21.7	-17.1	-23.3	-31.7
	29.0										-21.7	-18.0	-24.1	-33.0
	30.0										-21.8	-18.6	-25.3	-34.3
	31.0										-21.7	-21.7	-27.0	-36.2
	32.0										-21.7	-23.0	-28.6	-38.4
	33.0										-21.8	-24.1	-30.1	-39.9
	34.0										-21.8	-25.7	-31.4	-41.6
2010	35.0							30			-21.8	-27.4	-33.2	-42.9

* UNSTABLE

0 dB = 3.16 V rms

DATE 1-31-78/2-1-78
SHEET 8 OF 10
BY D. A. KIDD

DRIVE (VRMS) 0.105 *
DC BIAS
PRECHARGE
OIL TEMP
MOTOR TEMP
WATER TEMP
ANALYZER CORRECTIONS
OFFSET
SYS. GAIN
MON HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS
CAL HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS
ACCELEROMETER CORRECTION FACTOR
TYPE ANALYZER
S/N

			MONITOR PANEL						SPECTRUM ANALYZER (0.3 HZ BW)						
TIME (EST)	FREQ (HZ)	MTR CUR (AMPS)	VU MTR (VU)	PWR SUP PUMP FLOW (GPM)	PWR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTING (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
	6.0							30			-28.5	-26.0	-31.7	-41.4
	7.0										-28.5	-24.6	-29.9	-40.2
	8.0										-28.4	-23.6	-29.5	-40.5
	9.0										-28.3	-23.1	-28.6	-39.0
	10.0										-28.2	-22.9	-28.8	-39.1
	11.0										-28.2	-22.5	-28.2	-38.2
	12.0							30			-28.2	-22.4	-28.2	-37.6
0850	13.0							30			-28.3	-22.5	-27.8	-36.9
2030	14.0										-28.4	-22.7	-27.8	-38.6
	15.0										-28.2	-22.6	-27.6	-38.3
	16.0										-28.0	-22.5	-27.6	-38.7
	17.0										-28.1	-22.5	-28.0	-38.4
	18.0										-28.0	-22.3	-28.0	-37.5
	19.0										-28.0	-22.3	-27.8	-37.6
	20.0										-28.0	-22.3	-27.6	-37.8
	21.0										-28.1	-22.0	-27.5	-37.7
	22.0										-28.0	-21.9	-27.4	-37.4
	23.0										-28.0	-21.8	-27.2	-37.6
	24.0										-27.9	-21.5	-27.2	-37.8
	25.0										-28.0	-21.5	-27.3	-35.0
	26.0										-28.0	-21.4	-27.4	-37.9
	27.0										-27.9	-21.7	-27.8	-37.3
	28.0										-28.0	-22.5	-28.6	-37.5
	29.0										-28.0	-23.7	-29.6	-39.0
	30.0										-28.1	-24.8	-30.8	-40.6
	31.0										-28.0	-28.2	-32.4	-42.8
	32.0										-28.1	-29.4	-34.4	-45.4
	33.0										-28.0	-30.7	-35.6	-46.4
	34.0										-28.1	-32.6	-37.7	-48.4
2010	35.0										-28.0	-34.3	-39.8	-49.1
0820	29.0							30			-28.0	-23.2	-29.1	-38.3
								30						

* meter not accurate in this range

dB = 1uVrms

DATE 2-1-78
SHEET 9 OF 10
BY D. A. KIDD

DRIVE (VRMS) .037
DC BIAS
PRECHARGE
OIL TEMP
MOTOR TEMP
WATER TEMP
ANALYZER CORRECTIONS
OFFSET
SYS. GAIN
MON HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS
CAL HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS
ACCELEROMETER CORRECTION FACTOR
TYPE ANALYZER
S/N

		MONITOR PANEL						SPECTRUM ANALYZER (0.3 HZ BW)						
TIME (EST)	FREQ (HZ)	MTR CUR (AMPS)	VU MTR (VU)	PWR SUP PUMP FLOW (GPM)	PWR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTING (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
0900	6.0							20			-24.6	-22.1	-28.4	-38.0
	7.0										-24.4	-20.8	-26.0	-36.6
	8.0										-24.4	-19.9	-26.6	-36.4
	9.0										-24.3	-19.4	-26.6	-35.5
	10.0										-24.3	-19.3	-25.6	-35.0
	11.0										-24.2	-18.7	-25.9	-34.0
	12.0										-24.2	-18.5	-24.2	-33.7
	13.0										-24.2	-18.5	-23.7	-33.4
	14.0										-24.3	-18.8	-23.1	-34.0
	15.0										-24.1	-18.5	-23.1	-34.3
	16.0										-24.0	-18.6	-23.3	-34.0
	17.0										-24.1	-18.4	-23.0	-34.2
	18.0										-24.1	-18.3	-23.0	-33.3
	19.0										-24.0	-18.4	-23.1	-33.5
	20.0										-23.9	-18.3	-23.4	-33.9
	21.0										-24.0	-18.1	-23.2	-33.9
	22.0										-24.0	-18.2	-22.7	-33.9
	23.0										-24.0	-18.3	-23.0	-34.2
	24.0										-24.0	-18.2	-22.8	-34.5
	25.0										-24.0	-18.2	-22.9	-34.2
	26.0										-24.0	-18.4	-23.7	-35.3
	27.0										-23.9	-18.9	-24.6	-35.1
	28.0										-24.0	-20.1	-25.7	-35.1
	29.0										-24.0	-21.6	-27.0	-37.0
	30.0										-24.0	-23.2	-28.2	-38.6
	31.0										-24.0	-26.9	-28.4	-41.2
	32.0										-24.0	-29.1	-31.0	-45.4
	33.0										-24.0	-31.7	-33.5	-47.4
	34.0										-24.1	-33.6	-33.0	-50.6
0925	35.0							20			-24.1	-41.6	-32.5	-54.4

0 dB = 0.316 Vrms

DATE 2/1/77
SHEET 10 OF 10
BY D.A KIDD

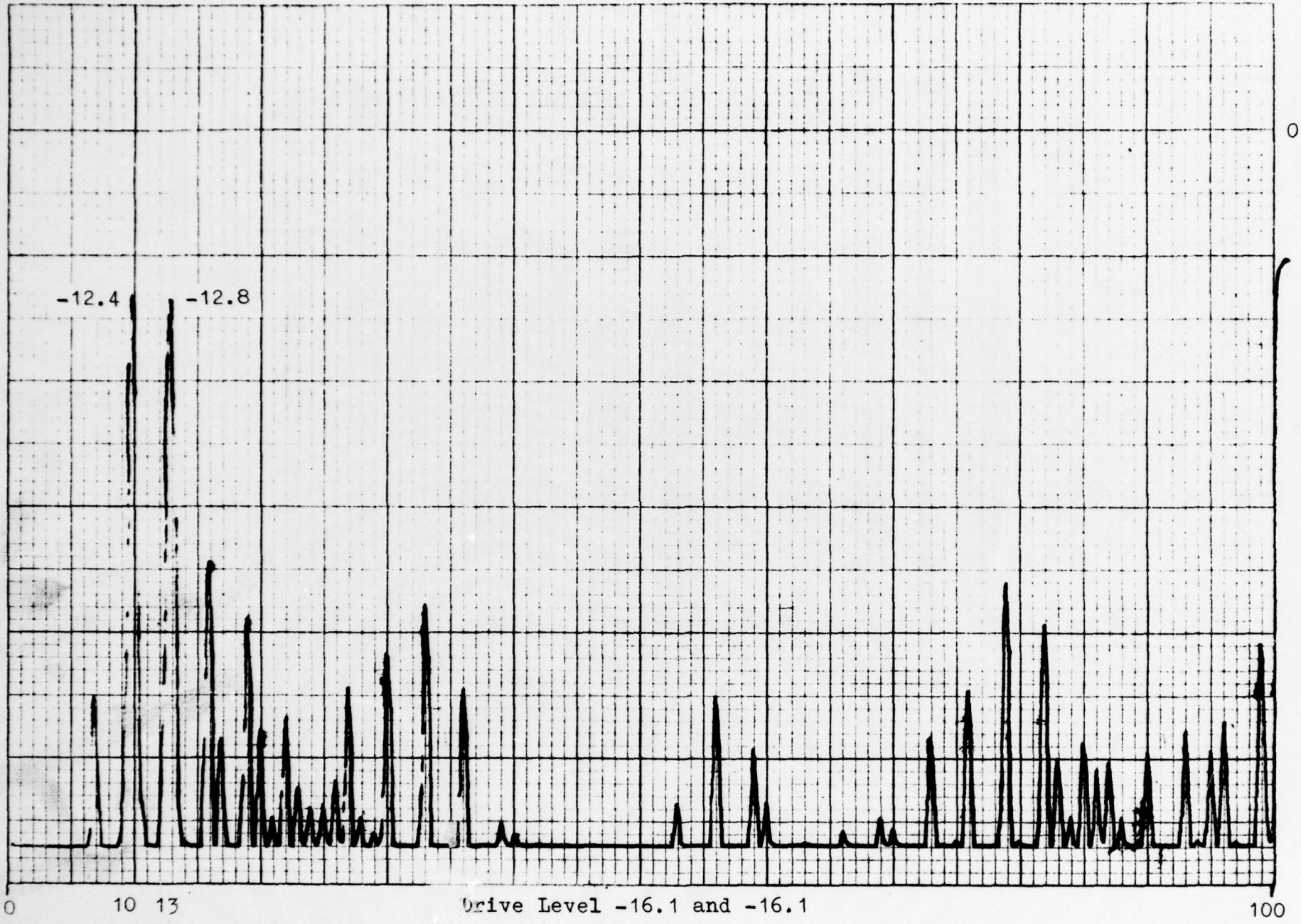
DRIVE (VRMS) 0.004
DC BIAS
PRECHARGE
OIL TEMP
MOTOR TEMP
WATER TEMP
ANALYZER CORRECTIONS
OFFSET
SYS. GAIN
MON HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS
CAL HYDROPHONE
TYPE
SENS
DIST
SPREAD LOSS
CORRECTED TERMINAL SENS
ACCELEROMETER CORRECTION FACTOR
TYPE ANALYZER
S/N

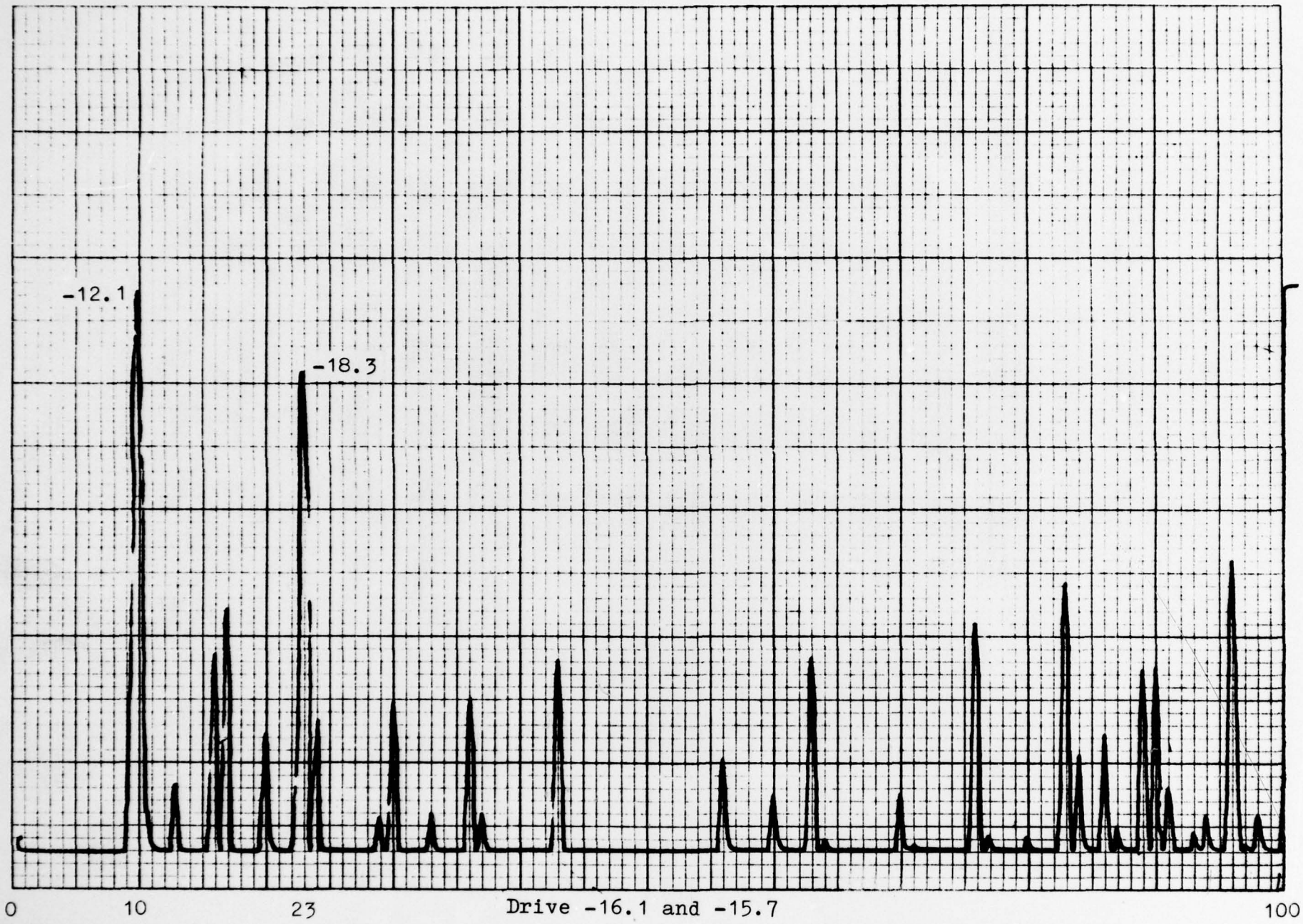
		MONITOR PANEL						SPECTRUM ANALYZER (0.3 HZ BW)						
TIME (EST)	FREQ (HZ)	MTR CUR (AMPS)	VLI MTR (VLTS)	PWR SUP PUMP FLOW (GPM)	PWR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTING (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
	6.0							10			-20.5	-19.4	-29	-35.4
	7.0										-20.4	-18.0	-27	-33.6
	8.0										-20.3	-17.0	-27	-33.3
	9.0										-20.1	-16.2	-26	-32.1
	10.0										-20.1	-16.0	-25.3	-31.8
	11.0										-20.1	-15.6	-22.2	-31.2
	12.0										-20.0	-15.5	-20.3	-30.5
	13.0										-20.1	-15.6	-20.4	-30.0
	14.0										-20.1	-16.1	-20.6	-31.9
	15.0										-20.0	-16.2	-17.9	-31.8
	16.0										-19.9	-16.4	-17.4	-32.6
	17.0										-19.9	-17.0	-18.8	-32.4
	18.0										-19.9	-17.3	-18.5	-32.6
	19.0										-19.9	-18.0	-19.3	-32.9
	20.0										-19.8	-19.0	-19.5	-34.8
	21.0										-19.9	-20.1	-20.1	-35.2
	22.0										-19.8	-21.7	-20.2	-37.6
	23.0										-19.9		-21.4	-40.3
	24.0													
	25.0													
	26.0													
	27.0													
	28.0													
	29.0													
	30.0													
	31.0													
	32.0													
	33.0													
	34.0													
	35.0													

DISCONTINUE TEST
OUTPUT IS NOT REPEATABLE
AT THIS LOW LEVEL

DATE 2/1/77
SHEET ___ OF ___
BY B DAU

		MONITOR PANEL						SPECTRUM ANALYZER (0.3 HZ BW)						
	TIME (EST)	FREQ (HZ)	MTR CUR (AMPS)	VH MTR (VLT)	PWR SUP PUMP FLOW (GPM)	PWR SUP PUMP PRESSURE (PSI)	FIRST STAGE PRESSURE (PSI)	MAIN STAGE PRESSURE (PSI)	INPUT ATTN SETTING (dB)	FIRST STAGE (dBV)	MAIN STAGE (dBV)	DRIVE LEVEL (dBV)	MON HYDRO-PHONE (dBV)	ACCELER-OMETER (dBV)	CAL HYDRO-PHONE (dBV)
DRIVE (VRMS) ___		10	30	-3 to 0		2068	1137	1040	30	-27.4	-22.4	-16.1	-12.4	-17.9	-28.0
		13								-31.1	-24.4	-16.0	-12.8	-18.7	-27.3
DC BIAS ___															
PRECHARGE ___		10	28.8	-2.5		2077	1147	1038	30	-26.7	-22.6	-16.1	-12.1	-17.6	-27.8
		23								-41.2	-20.1	-15.7	-18.3	-24.4	-34.2
OIL TEMP ___															
MOTOR TEMP ___															
WATER TEMP ___															
ANALYZER CORRECTIONS															
OFFSET ___															
SYS. GAIN ___															
MON HYDROPHONE															
TYPE ___															
SENS ___															
DIST ___															
SPREAD LOSS ___															
CORRECTED TERMINAL SENS ___															
CAL HYDROPHONE															
TYPE ___															
SENS ___															
DIST ___															
SPREAD LOSS ___															
CORRECTED TERMINAL SENS ___															
ACCELEROMETER															
CORRECTION FACTOR ___															
TYPE ANALYZER ___															
S/N ___															


-12.4
-12.8
0
0
10
13
Drive Level -16.1 and -16.1
100


-12.1
-18.3
0
10
23
Drive -16.1 and -15.7
100