

EXHIBIT "D"

TEST REPORT

FCC ID: JHD-CEN2

Retlif Testing Laboratories

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FCC COMPLIANCE REPORT OF MEASUREMENTS ON KNOGO NORTH AMERICA RFID TRANSMITTER MODEL NO. EC1A FCC ID: JHD-CEN2

CUSTOMER NAME: North American Technical Services

CUSTOMER P.O.: 0498

DATE OF REPORT: May 7, 1998

TEST REPORT NO.: R-7513-2

TEST START DATE: April 17, 1998

TEST FINISH DATE: April 28, 1998

TEST TECHNICIAN: D. Cortes

TEST ENGINEER: T. Schneider

SUPERVISOR: R.J. Reitz

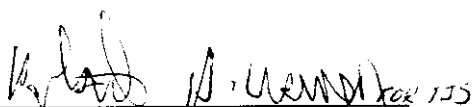
REPORT PREPARED BY: L. Anderson

GOVERNMENT SOURCE INSPECTION: Not Applicable

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CERTIFICATION AND SIGNATURES

We certify that this report is a true report of the results obtained from the tests of the equipment stated. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.



Thomas J. Schneider
EMC Test Engineer
NVLAP Approved Signatory



Richard J. Reitz
Laboratory Manager
NVLAP Approved Signatory

NON-WARRANTY PROVISION

The testing services have been performed, findings obtained, and reports prepared in accordance with generally accepted testing laboratory principles and practices. This warranty is in lieu of all other warranties, either express or implied.

NON-ENDORSEMENT

This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation endorsement, or certification of the product or material tested. This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.



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Test Report No. R-7513-2
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REPORT OF MEASUREMENTS

Para. 2.1033(b)(6)



Retlif Testing Laboratories

Test Report No. R-7513-2
FCC ID: JHD-CEN2

APPLICANT Identec, Ltd. Mercantile Road Rainton Bridge Industrial Estate Houghton-le -Spring, County Durham England DH4 5PH	MANUFACTURER SAME
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TEST SPECIFICATION: FCC Rules and Regulations Part 15, Subpart C, Para. 15.209

TEST PROCEDURE: ANSI C63.4:1992

TEST SAMPLE DESCRIPTION

BRANDNAME: KNOGO MODEL: EC1A

TYPE: RFID Transmitter

POWER REQUIREMENTS: 12 VDC Derived from Stancor # STA-4812A AC Adapter

FREQUENCY OF OPERATION: 153.6 kHz

TESTS PERFORMED

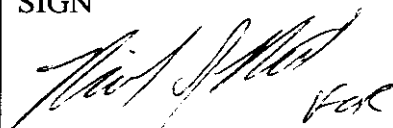
Para. 15.209(a), Radiated Emissions

Para. 15.207(a), Conducted Emissions

Duty Cycle Determination

I HEREBY CERTIFY THAT: The measurements shown here were in accordance with the procedure indicated and that the energy emitted by this equipment was found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements and vouch for the qualifications of all persons taking them.

I FURTHER CERTIFY THAT: On the basis of the measurements made, the device tested is capable of operation in compliance with the requirements of Part 15 of the FCC Rules under normal use and maintenance.

SIGN 	PRINT Thomas J. Schneider	TITLE EMC Test Engineer
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	Retlif Testing Laboratories
	Test Report No. R-7513-2 FCC ID: JHD-CEN2

REPORT OF MEASUREMENTS

Applicant: KNOGO North America
Device: RFID Transmitter
FCC ID: JHD-CEN2
Power Requirements: 12 VDC derived from Stancor # STA-4812A AC Adapter
Applicable Rule Section: Part 15, Subpart C, Section 15.209

DETERMINATION OF DUTY CYCLE

The unit's RF output was directly coupled to the input of the spectrum analyzer. The analyzer was set for a frequency span of 0Hz. The sweep time was then adjusted in order to display one full pulse train. The transmitter on time was then summed and compared to the time for one full cycle in order to obtain the duty cycle.

$$\text{Duty Cycle} = 48.2 \%$$

SPECTRUM ANALYZER DESENSITIZATION CONSIDERATIONS

Due to the nature of the emissions being measured, care was taken to ensure that the resolution bandwidth of the spectrum analyzer was adequate to provide accurate measurements. The following formula was utilized:

$$\text{Pulse Desensitization} = 20 \text{ Log (PW * BW * 1.5)}$$

Setting pulse desensitization equal to zero and utilizing the minimum observed pulse width of 1200 microseconds yields a minimum required bandwidth of 555 Hz. FCC specified bandwidths of 10kHz were utilized for 9 kHz to 30 MHz and 100 kHz for 30 MHz to 1 GHz for all measurements taken.



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REPORT OF MEASUREMENTS (continued)

GENERAL NOTES:

1. All readings were taken utilizing a Quasi-Peak detector function, except for 110 kHz to 490 kHz range which was measured in Peak. All measurements below 30 MHz were taken at a test distance of 10 meters and all measurements from 30 MHz to 200 MHz were taken at a test distance of 3 meters.
2. The duty cycle was applied to the peak readings in order to determine the average value of the emissions.
3. The frequency was scanned from 9 kHz to 200 MHz. All emissions not reported were more than 20 dB below the specified limit.

MODIFICATIONS:

1. During conducted emissions testing a ferrite, Fair-Rite P/N: 0443164151 was placed on the power lead of the unit.



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REPORT OF MEASUREMENTS

Radiated Emissions Test Data, Fundamental and Harmonics Para. 15.209(a)



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Test Report No. R-7513-2
FCC ID: JHD-CEN2

RETLIF TESTING LABORATORIES

TABULAR DATA SHEET

TEST METHOD: FCC Part 15 Radiated Emissions, 30 MHz to 200 MHz

CUSTOMER: N.A.T.S. (Knogo North America) JOB No.: R-7513-2

TEST SAMPLE: RFID system
FCC ID: JHD-EC1 JHD-LEN2

MODEL No.: EC1A SERIAL No.: N/A

TEST SPECIFICATION: FCC Part 15, Subpart C PARAGRAPH: 15.209(a)

OPERATING MODE: Continuously Transmitting 153.6 KHz Signal

TECHNICIAN: Dennis Cortes DATE: 4-17-98

NOTES: Detector Function: Quasi-Peak except for (110KHz-490KHz measured in peak)
Test Distance: Below 30 Mhz= 10 Meters (30-200) Mhz= 3 Meters

Test Frequency	Antenna Position	Turntable Position	Meter Reading	Correction Factor	Test Distance Correction fact.	Corrected Reading	Converted Reading	Limit
MHz	(H/V/C)-Height	Degrees	dBuV	dB	dBuv	dBuV/m	uV/m	uV/m
.009								266.7
V								V
.490								4.9
.490								48.9
V								V
1.705								14.0
1.705								30.0
V								V
24.80	C-1.5	248	34.2	-10.3	-19.0	4.9		
25.08	C-1.2	203	31.1	-10.3	-19.0	1.8		
25.38	C-1.0	203	27.5	-10.4	-19.0	-1.9		
25.72	C-1.0	225	27.3	-10.4	-19.0	-2.1		
26.04	C-1.0	225	27.1	-10.5	-19.0	-2.4		
V								V
30.00								30
30.00								100
32.00	V-1.0	203	35.3	-7.0	0.0	28.3		
37.90	V-1.0	158	38.3	-8.6	0.0	29.7		
43.10	V-1.0	158	33.0	-10.1	0.0	22.9		
47.50	V-1.0	135	36.3	-11.5	0.0	24.8		
50.60	V-1.0	180	46.3	-12.3	0.0	34.0		
61.60	V-1.0	248	40.7	-12.5	0.0	28.2		
71.50	V-1.0	158	36.3	-11.1	0.0	25.2		
V								V
88.00								100
88.00								150
V								V
200.00								V
The frequency range was scanned from 30 MHz to 200 MHz. All emissions not recorded were more than 10dB below the specified limit. Emissions observed from the EUT do not exceed the specified limit.								150

TABULAR DATA SHEET

REPORT OF MEASUREMENTS

Conducted Emissions Test Data, Para. 15.207(a)



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Test Report No. R-7513-2
FCC ID: JHD-CEN2

R-7513 KNOGO EC1A 15.207(a) CE TS 4/21/98 Lead- Hot

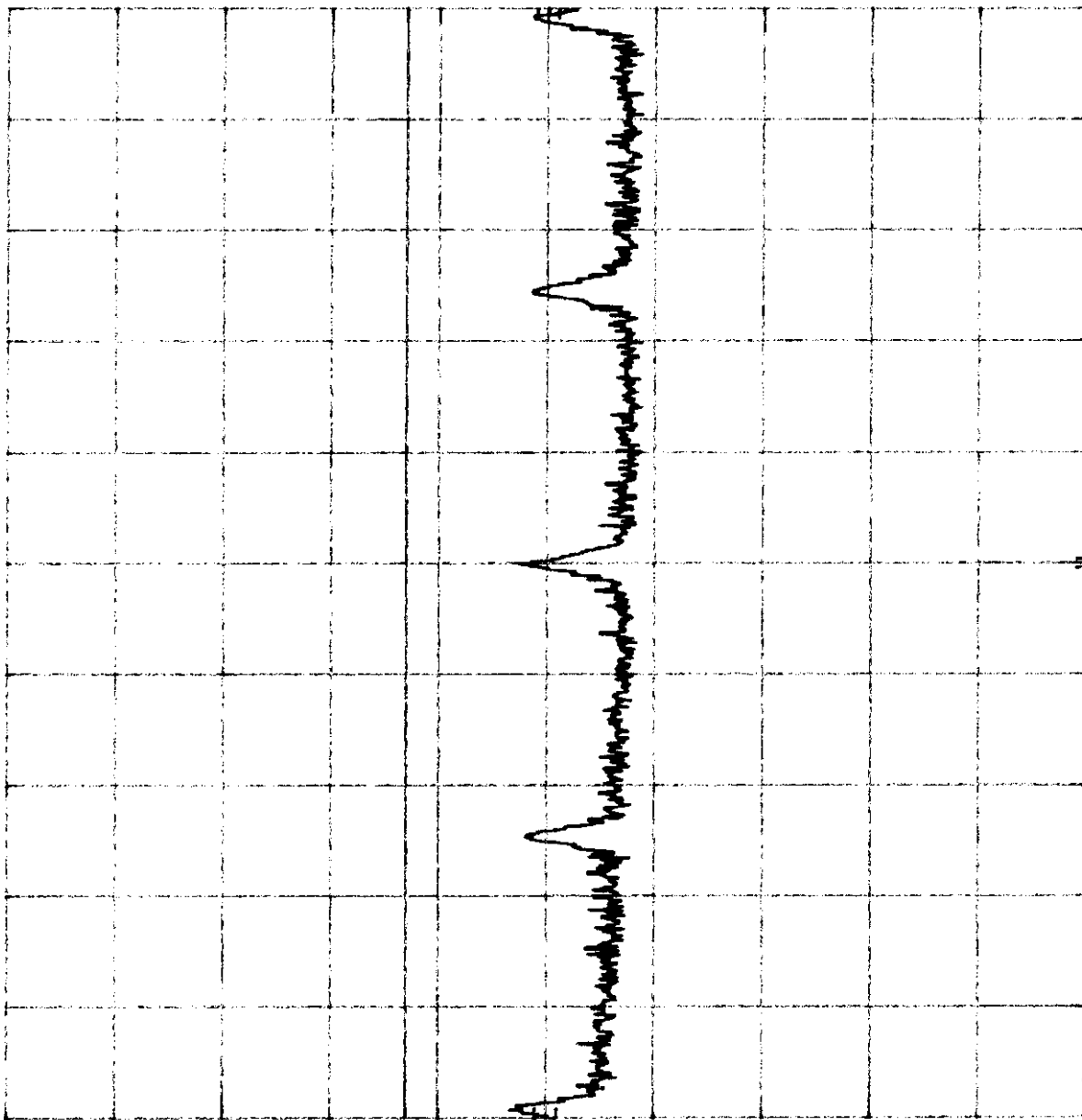
REF 85.0 dBμV ATTEN 10 dB

hp

10 dB/

OFFSET
10.0
dB

DL
48.0
dBμV



START 450 kHz RES BW 10 kHz VBW 30 kHz STOP 1.70 MHz SWP 20.0 sec

Customer:	NATS (KNOGO North America)		
Test Sample:	RF ID Transmitter		
Model No.:	EC1A, FCC ID: JHD-CEN2		
Test Method:	FCC 15.207(a), AC Line Conducted Emissions		
Notes:	Lead- Hot Detector- Peak		
Date:	April 21, 1998	Tech:	T. Schneider
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R-7513 KNOGO EC1A 15.207(a) CE TS 4/21/98 Lead-Neutral

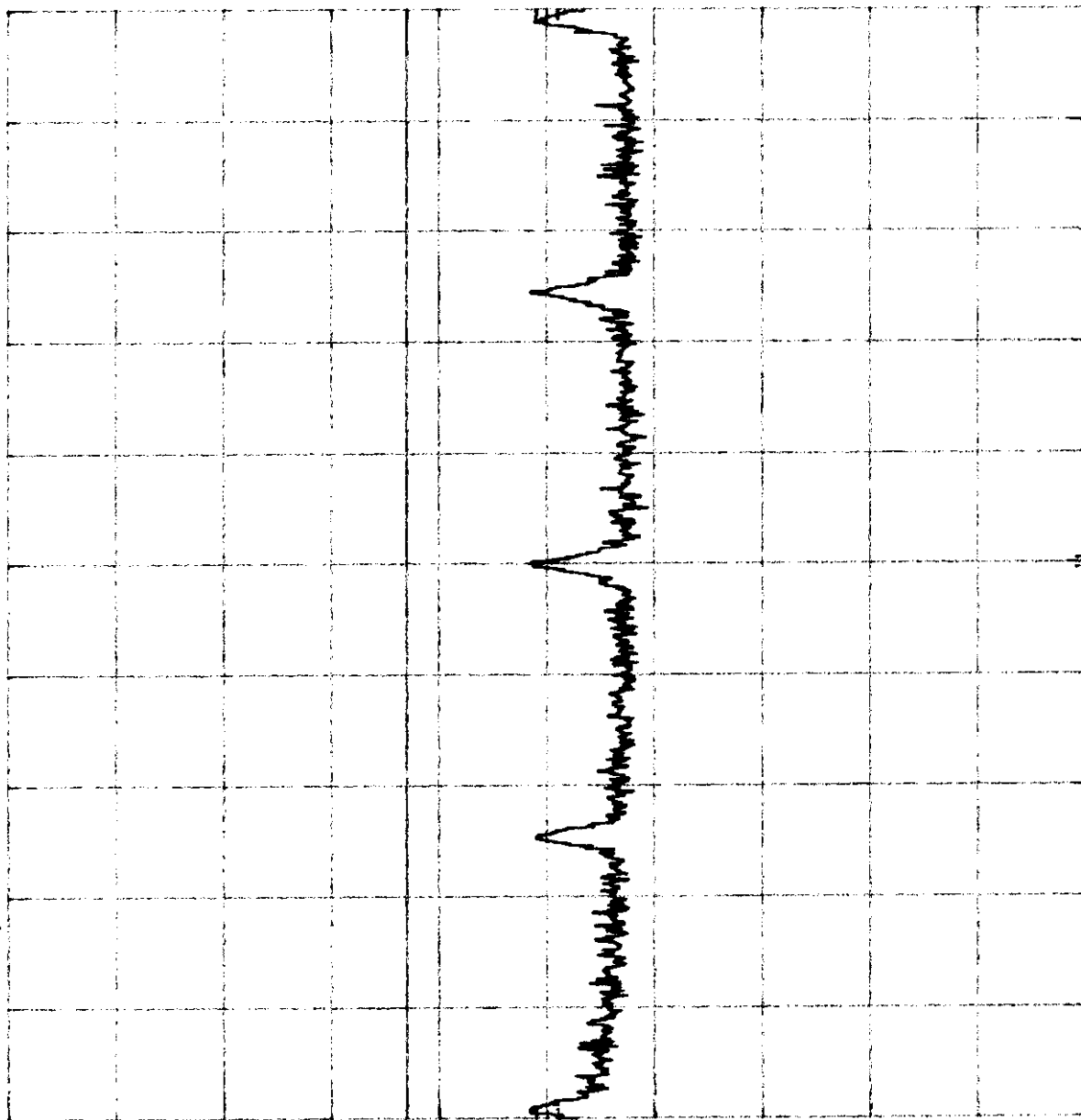
REF 85.0 dBμV ATTEN 10 dB

hp

10 dB/

OFFSET
10.0
dB

DL
48.0
dBμV



START 450 kHz RES BW 10 kHz VBW 30 kHz STOP 1.70 MHz SWP 20.0 sec

Customer:	NATS (KNOGO North America)
Test Sample:	RF ID Transmitter
Model No:	EC1A, FCC ID: JHD-CE1 JHD-CEN2
Test Method:	FCC 15.207(a), AC Line Conducted Emissions
Notes:	Lead- Neutral Detector- Peak
Date:	April 21, 1998
Tech:	T. Schneider
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Report No. R-7513

R-7513 KNOGO EC1A 15.207(a) CE TS 4/21/98 Lead- Hot

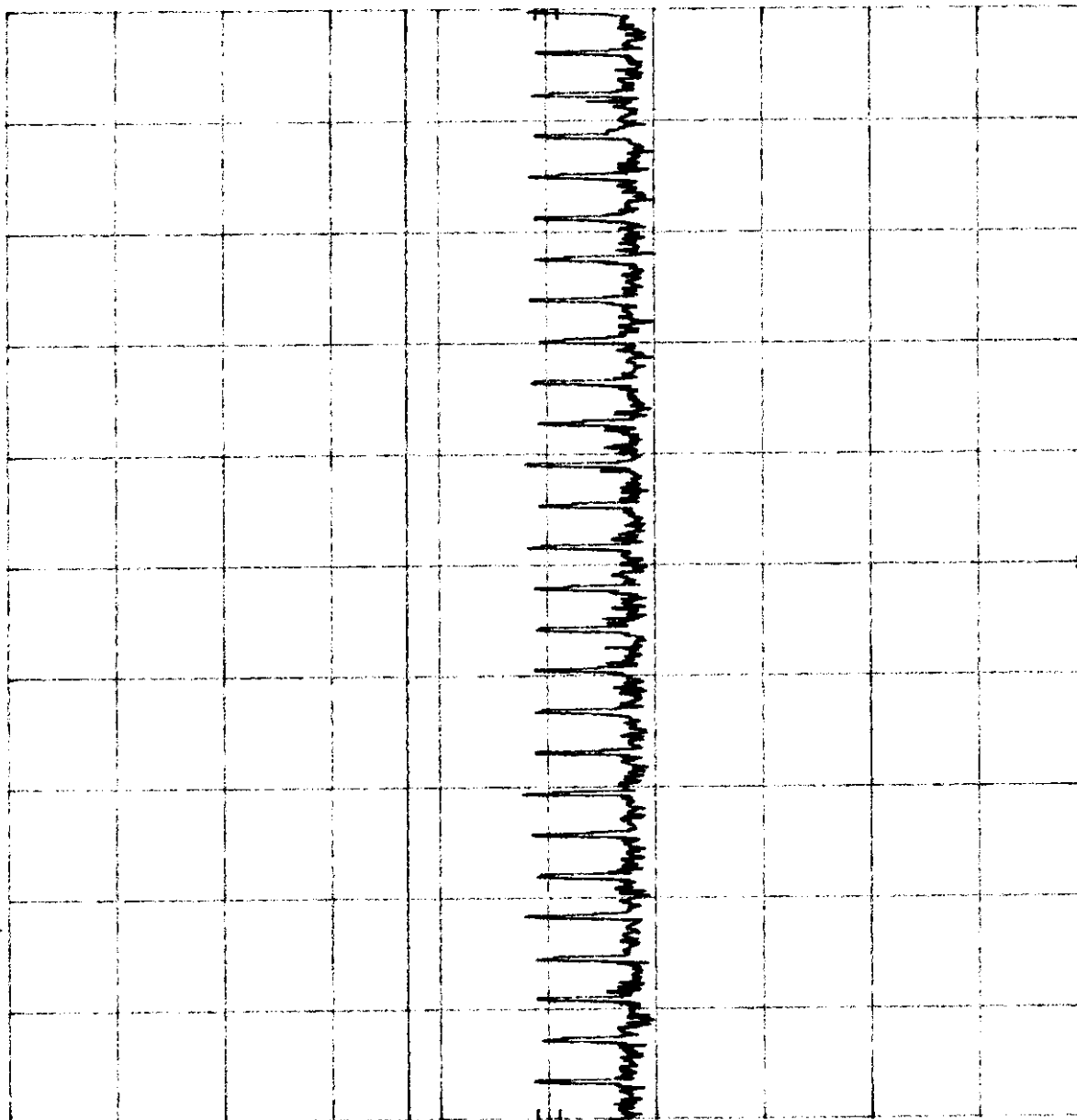
REF 85.0 dBμV ATTEN 10 dB

10 dB/

10 dB/

OFFSET
10.0
dB

DL
48.0
dBμV



START 1.70 MHz RES BW 10 kHz VBW 30 kHz STOP 10.00 MHz SWP 20.0 sec

Customer:	NATS (KNOGO North America)
Test Sample:	RF ID Transmitter [®]
Model No.:	EC1A, FCC ID: JHD-ECT JHD-CEN2
Test Method:	FCC 15.207(a), AC Line Conducted Emissions
Notes:	Lead- Hot
	Detector- Peak
Date:	April 21, 1998
Tech:	T. Schneider
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R-7513 KNOGO EC1A 15.207(a) CE TS 4/21/98 Lead-Neutral

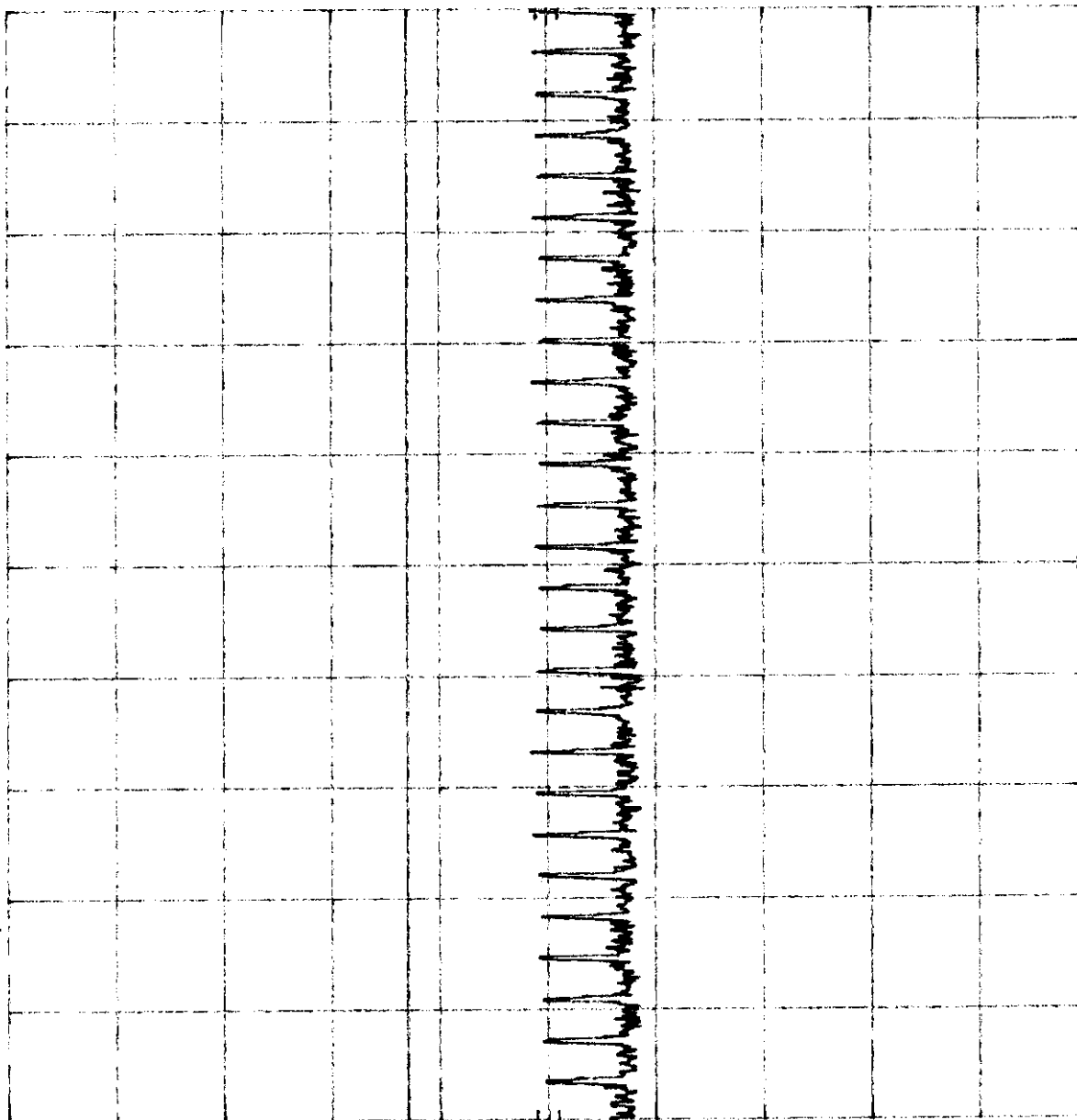
REF 85.0 dBμV ATTEN 10 dB

h₁

10 dB/

OFFSET
10.0
dB

DL
48.0
dBμV



START 1.70 MHz RES BW 10 kHz VBW 30 kHz STOP 10.00 MHz SWP 20.0 sec

Customer:	NATS (KNOGO North America)
Test Sample:	RF ID Transmitter
Model No:	EC1A, FCC ID: JHD-EG1 JHD-CEN2
Test Method:	FCC 15.207(a), AC Line Conducted Emissions
Notes:	Lead- Neutral
	Detector- Peak
Date:	April 21, 1998
Tech:	T. Schneider
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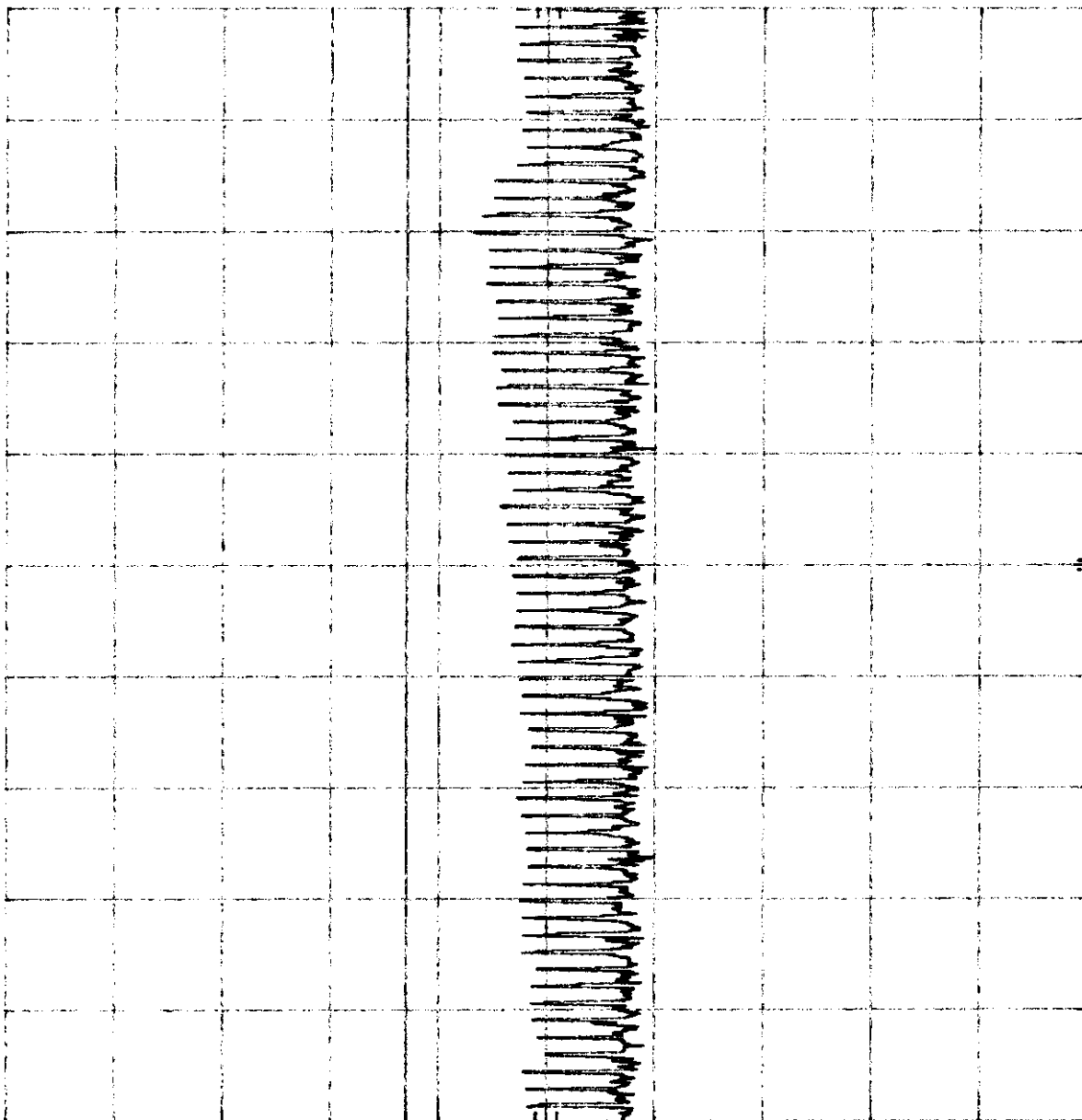
R-7513 KNOGO EC1A 15.207 (a) CE TS 4/21/98 Lead-Hot
 REF 85.0 dBμV ATTEN 10 dB

h7

10 dB/

OFFSET
 10.0
 dB

DL
 48.0
 dBμV



START 10.0 MHz RES BW 10 kHz
 STOP 30.0 MHz SWP 20.0 sec
 VBW 30 kHz

Customer:	NATS (KNOGO North America)
Test Sample:	RF ID Transmitter
Model No.:	EC1A, FCC ID: JHD-EC1 JHD-CEN2
Test Method:	FCC 15.207(a), AC Line Conducted Emissions
Notes:	Lead-Hot Detector- Peak
Date:	April 21, 1998
Tech:	T. Schneider
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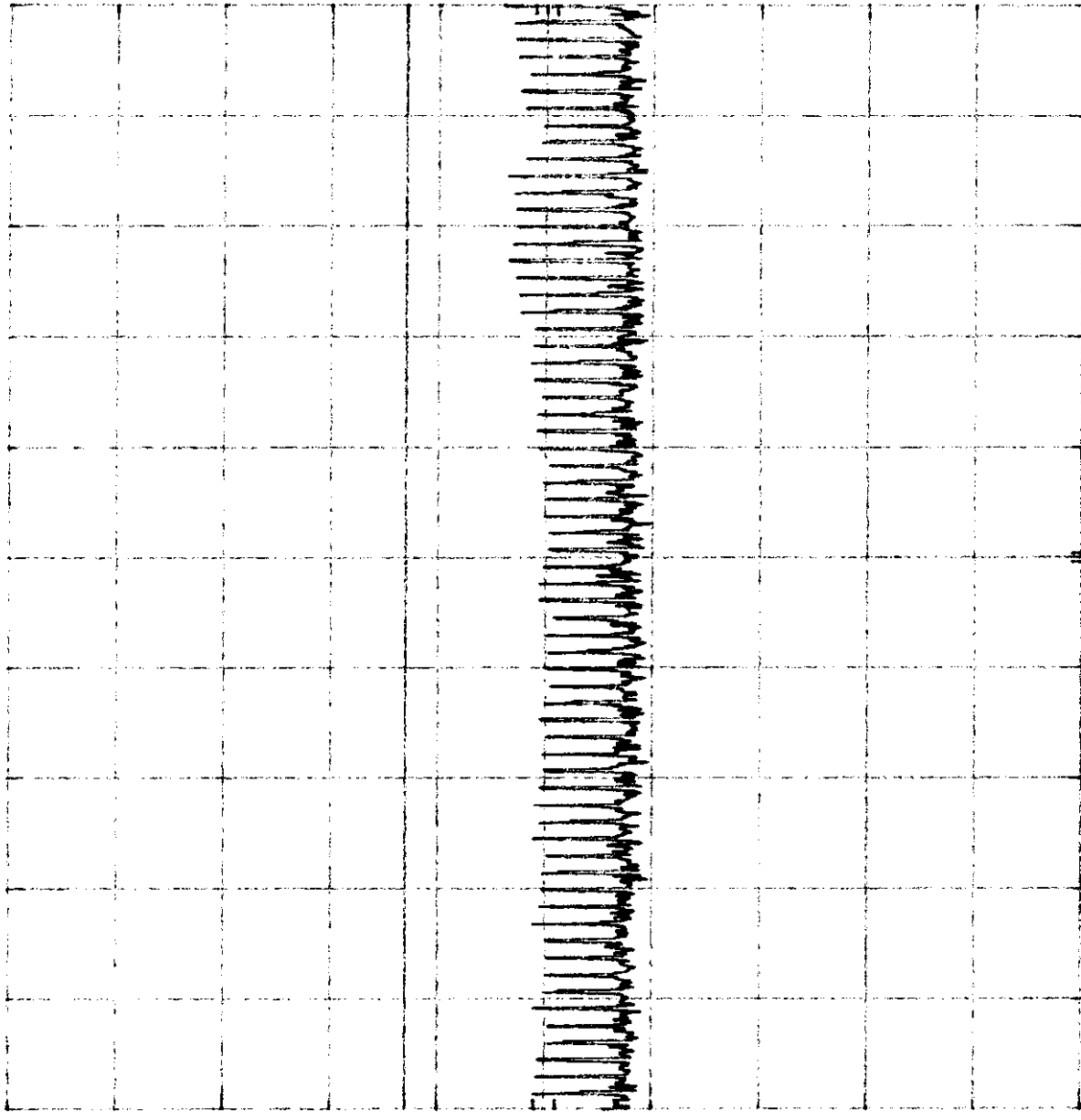
Report No. R-7513

Neutral

R-7513 KNOGO EC1A 15.207(a) CE TS 4/21/98 Lead- Neutral

REF 85.0 dBμV ATTN 10 dB

hp



10 dB/

OFFSET
10.0
dB

DL
48.0
dBμV

START 10.0 MHz
RES BW 10 kHz
VBW 30 kHz
STOP 30.0 MHz
SWP 20.0 sec

Customer:	NATS (KNOGO North America)
Test Sample:	RF ID Transmitter
Model No:	EC1A, FCC ID: JHD EC1 JHD CEN2
Test Method:	FCC 15.207(a), AC Line Conducted Emissions
Notes:	Lead- Neutral Detector- Peak
Date:	April 21, 1998
Tech:	T. Schneider
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REPORT OF MEASUREMENTS

Duty Cycle Determination



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Test Report No. R-7513-2
FCC ID: JHD-CEN2

R-7513 KNOGO EC1A DUTY CYCLE DETERMINATION MKR Δ/81700 msec
 REF 85.0 dBμV ATTEN 10 dB

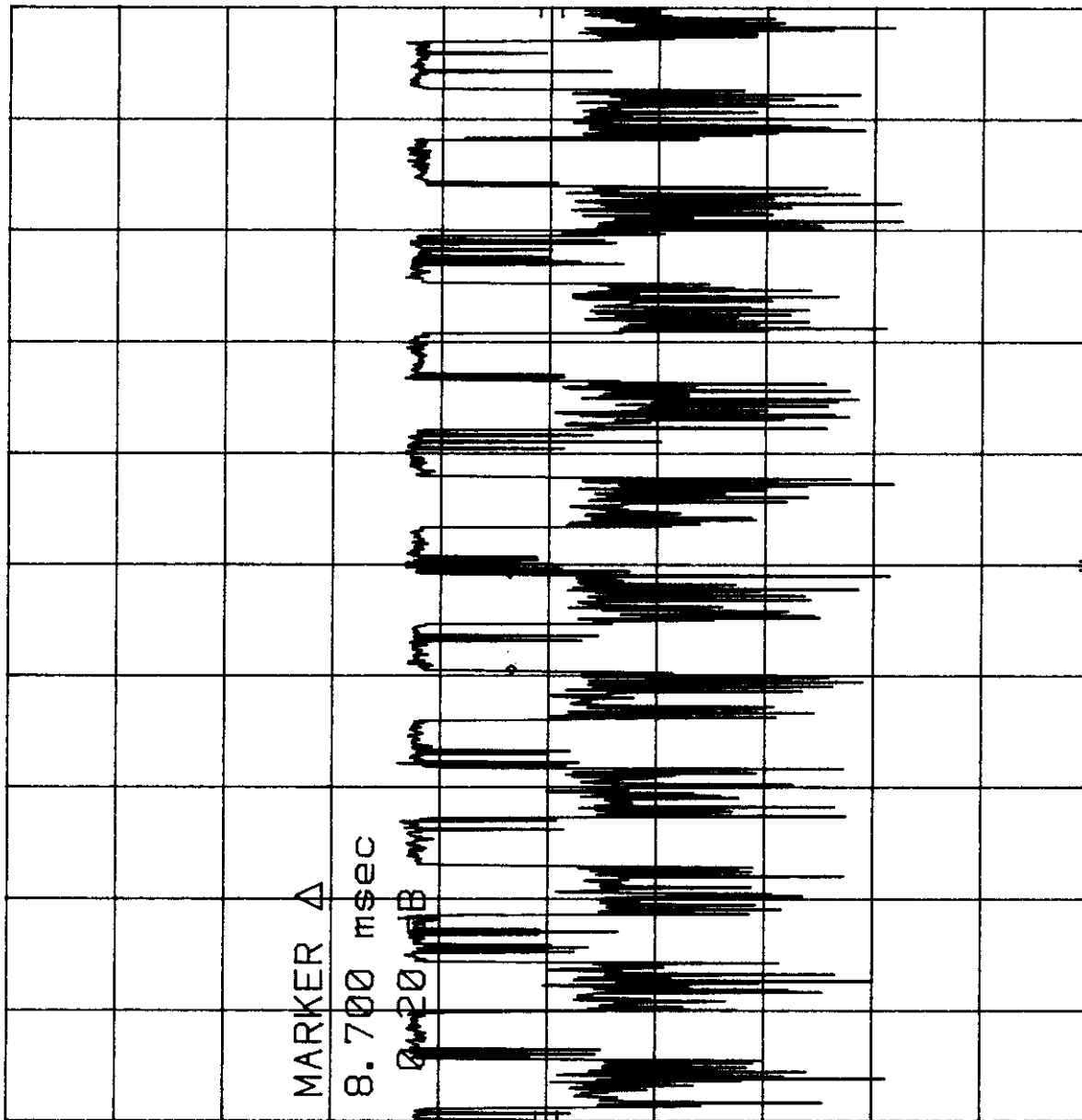
hp

10 dB/

OFFSET

10.0

dB



MARKER Δ

8.700 msec

0.20 dB

CENTER 153.300 kHz
 RES BW 10 kHz
 VBW 30 kHz
 SWP 100 msec
 SPAN 0 Hz

Customer:	N.A.T.S. (Knogo North America)
Test Sample:	RF ID Transmitter
Model No:	EC1A FCC ID: JHD-EG1 JHD-CEN2
Test Method:	Duty Cycle Determination
Notes:	Transmitter Cycle Time=8.7msec
Date:	April 21, 1998
Tech:	T. Schneider
Sheet:	1 of 2



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R-7513 KNOGO EC1A DUTY CYCLE DETERMINATION MKR Δ 21200 msec
 REF 85.0 dB μ V ATTN 10 dB

hp

10 dB/

OFFSET

10.0
dB

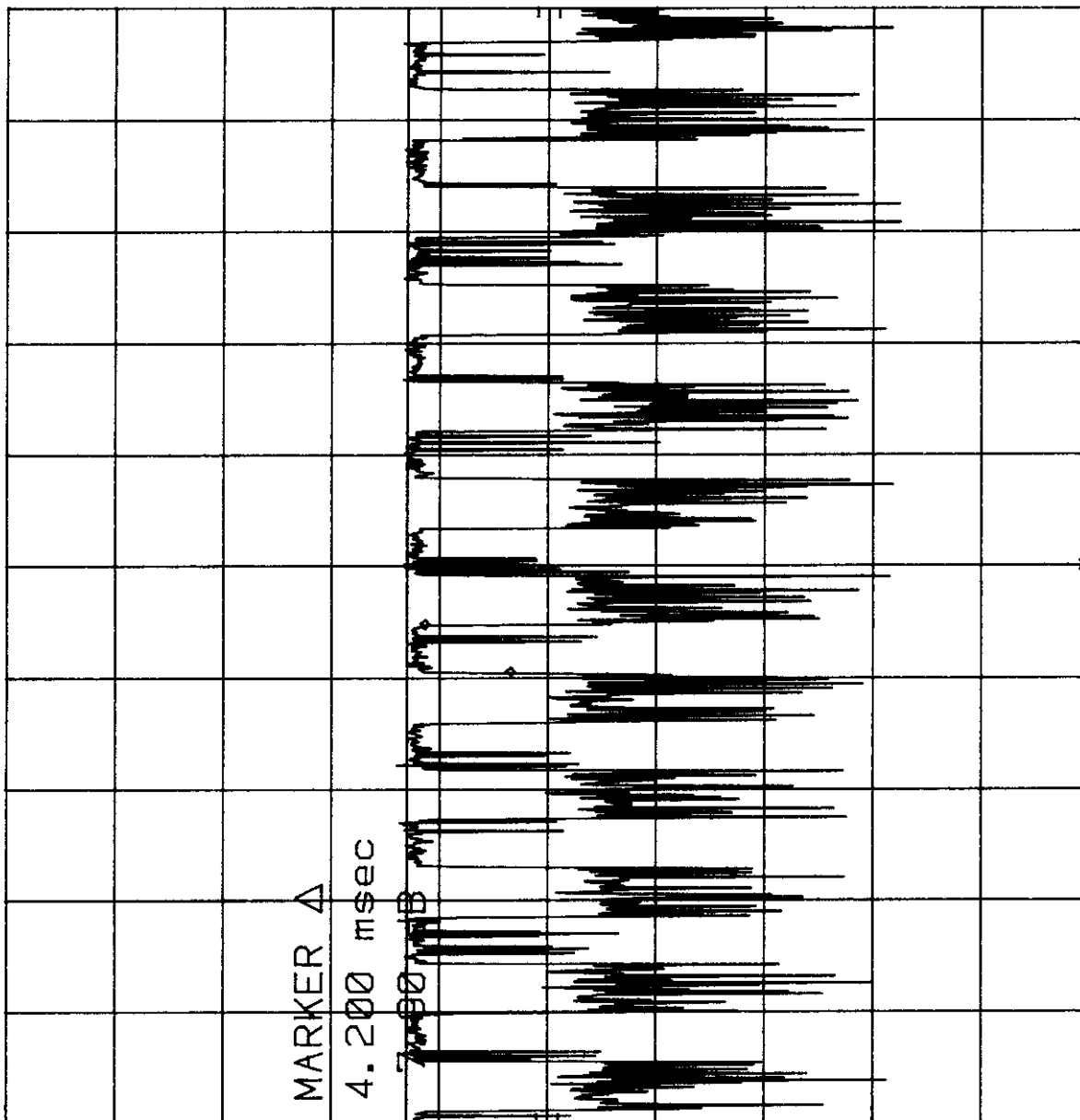
DL

48.0
dB μ V

MARKER Δ

4.200 msec

7.900 dB



CENTER 153.300 kHz
 RES BW 10 kHz
 VBW 30 kHz
 SWP 100 msec
 SPAN 100 Hz

Customer: N.A.T.S. (Knogo North America)
 Test Sample: RF ID Transmitter
 Model No: EC1A FCC ID: JHD-EC1 JHD-CEN2
 Test Method: Duty Cycle Determination
 Notes: Duty Cycle Pulse Width= 4.2msec

Date: April 21, 1998 Tech: T. Schneider Sheet: 2 of 2



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REPORT OF MEASUREMENTS

TEST EQUIPMENT LIST



Retlif Testing Laboratories

Test Report No. R-7513-2
FCC ID: JHD-CEN2

EQUIPMENT LIST

15.209(a) Radiated Emissions

EN	Type	Manufacturer	Frequency Range	Model No.	Cal Date	Due Date
012	Loop Antenna, Active	EMCO	9 kHz - 30 MHz	6502	10/10/97	10/10/98
067	Open Area Test Site	Retlif	3 Meter	RNY	8/30/97	8/30/99
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	6/20/97	6/20/98
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	3/2/98	9/2/98
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	3/4/98	3/4/99
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	3/3/98	9/3/98
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	6/20/97	6/20/98
523	Biconilog	Electro-Mechanics	26 MHz - 1100 MHz	3143	9/30/97	9/30/98



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