

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
CERTIFICATION TO FCC PART 15 REQUIREMENTS**

for

INTENTIONAL RADIATOR

434 MHz CAR ALARM TRANSMITTER

MODEL NO: PROOE4BS

FCC ID NO: ELVAT0E

REPORT NO: 00E8947

ISSUE DATE: SEPTEMBER 19, 2000

Prepared for

**NUTEK CORPORATION
5F, NO. 3, ALLEY 6, LANE 45
PAO-HSING ROAD, HSIN TIEN, TAIPEI
TAIWAN, R. O. C.**

Prepared by

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TEST DATA

- Maximum Modulation Percentage Plot
- Emission Bandwidth Plot
- Radiated Emission Worksheet for Peak Measurement
- Radiated Emission Worksheet for Average Measurement

1. VERIFICATION OF COMPLIANCE

COMPANY NAME: NUTЕК CORPORATION
5F, NO. 3, ALLEY 6, LANE 45, PAO-HSING ROAD
HSIN TIEN, TAIPEI, TAIWAN
R. O. C.

CONTACT PERSON: RUBY HSIEH

TELEPHONE NO.: 02-2918-9478

EUT DESCRIPTION: 434 MHz CAR ALARM TRANSMITTER

MODEL NAME/NUMBER: PROOF4BS

FCC ID: ELVAT0E

DATE TESTED: SEPTEMBER 6, 2000 ~ SEPTEMBER 15, 2000

REPORT NUMBER: 00E8947

TYPE OF EQUIPMENT	SECURITY EQUIPMENT (INTENTIONAL RADIATOR)
EQUIPMENT TYPE	434 MHz CAR ALARM TRANSMITTER
MEASUREMENT PROCEDURE	ANSI C63.4 / 1992
LIMIT TYPE	CERTIFICATION
FCC RULE	CFR 47, PART 15

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC CFR 47, PART 15. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties. **Warning** : This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification will constitute fraud and shall nullify the document.

Rick Yeo

RICK YEO / EMC MANAGER
COMPLIANCE ENGINEERING SERVICES, INC.

PAGE NO: 1

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2. Product Description

Fundamental Frequency	434 MHz
Power Source	12V Battery
Transmitting Time	Periodic \leq 5 seconds
Associated Receiver	FCC ID: ELVAR5G

3. Test Facility

The 3/10/30 meter open area test site and conducted measurement facility used to collect the radiated data is located at 561F Monterey Road, Morgan Hill, California, U.S.A. A detailed description of the test facility was submitted to the Commission on May 27,1994.

4. Measurement Standards

The site is constructed and calibrated in conformance with the requirements of ANSI C63.4/1992.

5. Test Methodology

For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 KHz, up to at least the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. (CFR 47 Section 15.33)

6. Measurement Equipment Used

Manufacturer	Model Number	Description	Cal Due Date
H.P.	8566B	Spectrum Analyzer (100Hz – 22GHz)	12/00
H.P.	8595EM	Spectrum Analyzer (9KHz – 6.5GHz)	01/01
EMCO	3115	Antenna (1-18GHz)	09/01
EMCO	3142	Antenna (30-2000MHz)	06/01
T.E.C.	PA-102	Amplifier(30-2000MHz)	05/01
MITEQ	NSP2600-44	Amplifier(1-26GHz)	12/00

7. POWERLINE RFI LIMIT

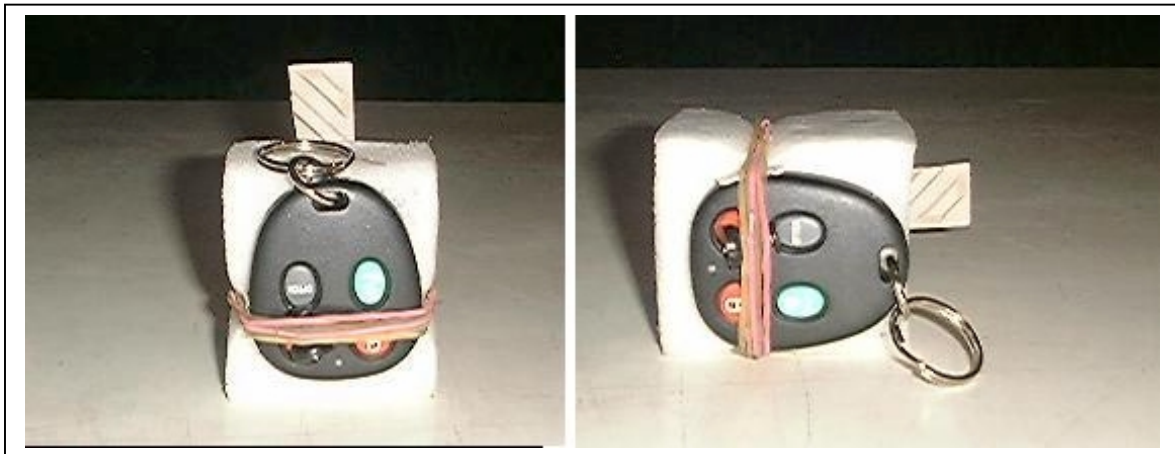
CONNECTED TO AC POWER LINE	SECTION 15.207
CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 KHZ TO 30 MHz	SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE.
BATTERY POWER	NO REQUIRED.

8. RADIATED EMISSION LIMITS

GENERAL REQUIREMENTS	SECTION 15.209
RESTRICTED BANDS OF OPERATION	SECTION 15.205
PERIODIC OPERATION IN THE BAND 40.66 -40.70 MHz AND ABOVE 70 MHz.	SECTION 15.231

9. SYSTEM TEST CONFIGURATION

Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X.Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



Radiated Open Site Test Set-up

10. Test Procedure

Radiated Emissions, 15.231(4)(b)

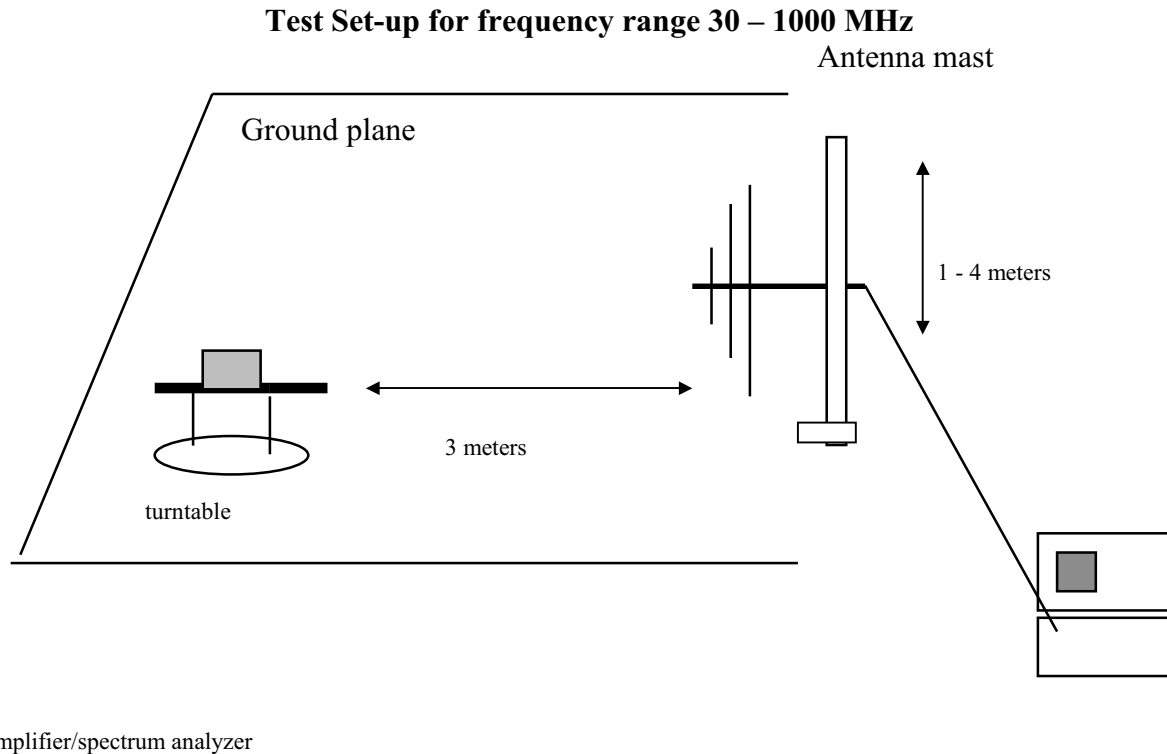


Fig. 1

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 3-meters from the EUT.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. The EUT was moved throughout the XY, XZ, and YZ planes to maximize emissions received by the search antenna.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

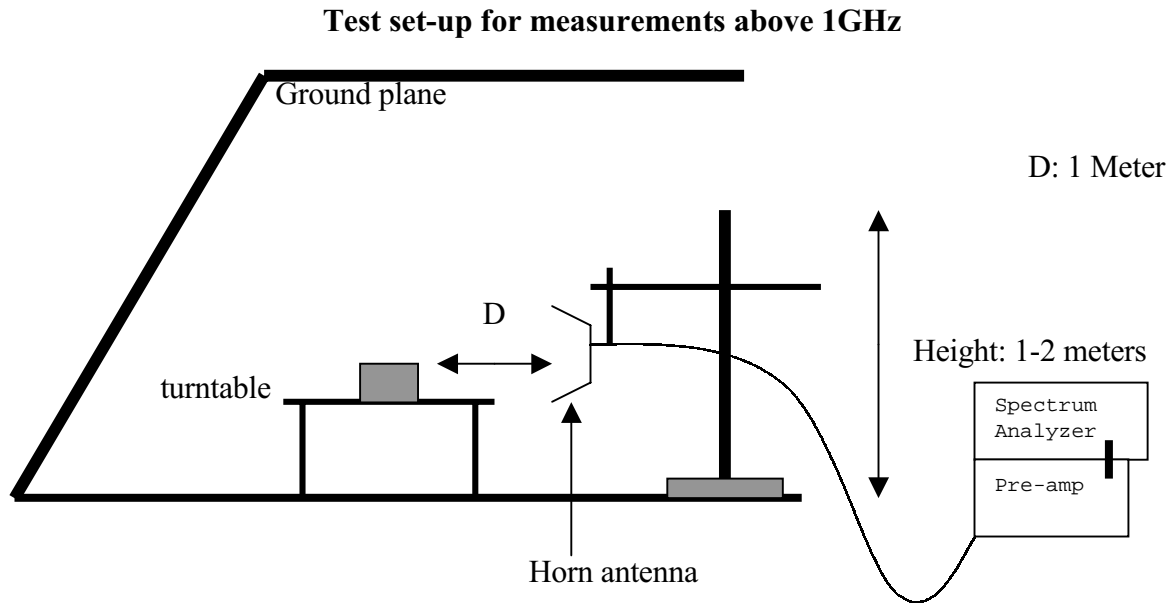


FIG. 2

1. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 1-meters from the EUT. The EUT antenna was mounted vertically as per normal installation.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205. The EUT was moved throughout the XY, XZ, and YZ planes to maximize emissions received by the search antenna.
3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

11. Equipment Modifications

To achieve compliance to FCC Section 15.231 technical limits, the following change(s) were made during compliance testing:

NONE

12. TEST RESULT

Powerline RFI Class B	Eut	Radiated Emission Limits	Eut
SECTION 15.207		SECTION 15.209	X
SECTION 15.205, 15.209, 15.221, 15.223, x 15.225 OR 15.227		SECTION 15.205	
BATTERY POWER	X	SECTION 15.231 (b)	X
		SECTION 15.231 (e)	

12.1 Maximum Modulation Percentage (M%)

CALCULATION:

Average Reading = Peak Reading (dBuV/m)+ 20log (Duty Cycle)

In order to determine possible Maximum Modulation percentage, alternations are made to the EUT. We measured:

WHERE 1 Period = 112.8 mS > 100mS. Use 100mS for calculation.
 Long pulse =0.889 mS
 Short pulse = 0.378 mS
 No of Long pulse = 16
 No of Short pulse = 21

Duty Cycle = (N1L1+N2L2+...+Nn-1Ln-1+NnLn)/100 or T

Duty Cycle = ((16x0.889)+(21x0.378))/100=0.2216=22.16% or -13.01dB

12.2 The Emissions Bandwidth

The bandwidth of the emissions were investigated per 15.231(c)

Center Frequency	Measured	Limits
434 MHz	426.6 kHz < (refer to plot)	434X0.25%=1085 kHz



FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

No. 199 Chung Sheng Road
Hsin Tien City, Taipei, Taiwan, R.O.C.
PHONE: 02-2217-0894 FAX: 02-2217-1254

Project #: 00E8947
Report #: 8947D1
Date & Time: 9/15/00 17:18
Test Engr: VINCE CHIANG

Company: NUTEK CORPORATION
EUT Description: PROOE4BS (Alarm TX / 434MHz)
Test Configuration : EUT ONLY
Type of Test: FCC CLASS B
Mode of Operation: NORMAL MODE

D-Ste

E-Ste

6 W orst

Descending

$$M\% = ((t1+t2+t3+...)/T) * 100\% = 22.16 \%$$

$$Av \text{ Reading} = Pk \text{ Reading} + 20 * \log(M\%)$$

$$20 * \log(M\%) = -13.089$$

	Freq. (MHz)	Pk Rdg (dBuV)	Av Rdg (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)
Button #1:												
X	433.91	61.59	48.50	17.50	2.58	21.28	47.30	80.82	-33.52	3mV	90.00	1.00
Y	433.93	77.36	64.27	17.50	2.58	21.28	63.07	80.82	-17.75	3mV	270.00	1.50
	867.86	46.18	33.09	23.37	4.47	20.69	40.24	60.82	-20.58	3mV	270.00	1.30
Z	433.89	75.71	62.62	17.50	2.58	21.28	61.42	80.82	-19.40	3mV	270.00	1.60
X	433.91	74.44	61.35	17.50	2.58	21.28	60.15	80.82	-20.67	3mH	0.00	1.00
	867.82	41.38	28.29	23.37	4.47	20.69	35.44	60.82	-25.38	3mH	90.00	1.00
Y	433.91	71.47	58.38	17.50	2.58	21.28	57.18	80.82	-23.64	3mH	270.00	1.30
Z	433.92	73.80	60.71	17.50	2.58	21.28	59.51	80.82	-21.31	3mH	90.00	1.80
Button #2:												
X	433.92	70.76	57.67	17.50	2.58	21.28	56.47	80.82	-24.35	3mV	180.00	2.10
Y	433.92	77.06	63.97	17.50	2.58	21.28	62.77	80.82	-18.05	3mV	90.00	1.80
	867.84	44.10	31.01	23.37	4.47	20.69	38.16	60.82	-22.66	3mV	270.00	1.30
Z	433.93	67.92	54.83	17.50	2.58	21.28	53.63	80.82	-27.19	3mV	180.00	1.80
X	433.91	74.65	61.56	17.50	2.58	21.28	60.36	80.82	-20.46	3mH	270.00	1.00
	867.81	43.95	30.86	23.37	4.47	20.69	38.01	60.82	-22.81	3mH	180.00	1.00
Y	433.91	73.30	60.21	17.50	2.58	21.28	59.01	80.82	-21.81	3mH	0.00	2.10
Z	433.93	73.26	60.17	17.50	2.58	21.28	58.97	80.82	-21.85	3mH	270.00	1.60
Total data #: 16												



FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

No. 199 Chung Sheng Road
Hsin Tien City, Taipei, Taiwan, R.O.C.
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Project #: 00E8947
Report #: 8947D2
Date & Time: 9/15/00 18:45
Test Engr: VINCE CHIANG

Company: NUTEK CORPORATION
EUT Description: PROOE4BS (Alarm TX / 434MHz)
Test Configuration : EUT ONLY
Type of Test: FCC CLASS B
Mode of Operation: NORMAL MODE

D-Ste

E-Ste

6 W orst

Descending

$M\% = ((t1+t2+t3+...)/T) * 100\% = 22.16 \%$

$Av \text{ Reading} = Pk \text{ Reading} + 20*\log(M\%)$
 $20*\log(M\%) = -13.089$

	Freq. (MHz)	Pk Rdg (dBuV)	Av Rdg (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)
Button #3:												
X	433.91	72.51	59.42	17.50	2.58	21.28	58.22	80.82	-22.60	3mV	0.00	1.20
Y	433.93	77.87	64.78	17.50	2.58	21.28	63.58	80.82	-17.24	3mV	180.00	1.50
	867.88	46.05	32.96	23.37	4.47	20.69	40.11	60.82	-20.71	3mV	270.00	1.20
Z	433.93	74.75	61.66	17.50	2.58	21.28	60.46	80.82	-20.36	3mV	180.00	1.30
X	433.91	77.36	64.27	17.50	2.58	21.28	63.07	80.82	-17.75	3mH	270.00	1.10
	867.83	42.22	29.13	23.37	4.47	20.69	36.28	60.82	-24.54	3mH	180.00	1.20
Y	433.91	73.63	60.54	17.50	2.58	21.28	59.34	80.82	-21.48	3mH	0.00	1.50
Z	433.92	71.79	58.70	17.50	2.58	21.28	57.50	80.82	-23.32	3mH	270.00	1.80
Button #4:												
X	433.93	67.21	54.12	17.50	2.58	21.28	52.92	80.82	-27.90	3mV	270.00	1.70
Y	433.93	77.64	64.55	17.50	2.58	21.28	63.35	80.82	-17.47	3mV	270.00	1.40
	867.84	43.72	30.63	23.37	4.47	20.69	37.78	60.82	-23.04	3mV	90.00	1.80
Z	433.92	66.24	53.15	17.50	2.58	21.28	51.95	80.82	-28.87	3mV	270.00	1.50
X	433.92	75.89	62.80	17.50	2.58	21.28	61.60	80.82	-19.22	3mH	0.00	1.20
	867.83	44.35	31.26	23.37	4.47	20.69	38.41	60.82	-22.41	3mH	0.00	1.10
Y	433.91	75.48	62.39	17.50	2.58	21.28	61.19	80.82	-19.63	3mH	270.00	1.00
Z	433.89	70.95	57.86	17.50	2.58	21.28	56.66	80.82	-24.16	3mH	0.00	1.30
Total data #: 16												



FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

1366 BORDEAUX DRIVE, SUNNYVALE, CA 94089
PHONE: (408) 752-8166 FAX: (408) 752-8168

Project #: 00E8947
Report #: 8947D3
Date & Time: 9/14/00 22:59
Test Engr: Vince Chiang

Company: NUTEK CORPORATION
EUT Description: PROOE4BS (Alarm TX / 434MHz)
Test Configuration: EUT ONLY
Type of Test: FCC CLASS B
Mode of Operation: NORMAL MODE

D-Site E-Site 6 W out Dec

Freq. (MHz)	Reading (dBuV)	AF (dB)	Class (dB)	Pre-amp (dB)	Dist dB	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
1302	69.22	25.1	2.8	43.27	-9.5	44.40	74.0	-29.60	1mV	90	1.0	P
1302	45.18	25.1	2.8	43.27	-9.5	20.36	54.0	-33.64	1mV	90	1.0	A
1736	54.79	26.1	3.3	43.04	-9.5	31.67	74.0	-42.33	1mV	90	1.0	P
1736	41.97	26.1	3.3	43.04	-9.5	18.85	54.0	-35.15	1mV	90	1.0	A
1302	61.51	25.1	2.8	43.27	-9.5	36.69	74.0	-37.31	1mH	270	1.0	P
1302	46.52	25.1	2.8	43.27	-9.5	21.70	54.0	-32.30	1mH	270	1.0	A
1736	48.55	26.1	3.3	43.04	-9.5	25.43	74.0	-48.57	1mH	270	1.0	P
1736	34.69	26.1	3.3	43.04	-9.5	11.57	54.0	-42.43	1mH	270	1.0	A

No other emissions were found within 20dB under the limits upto 5GHz.

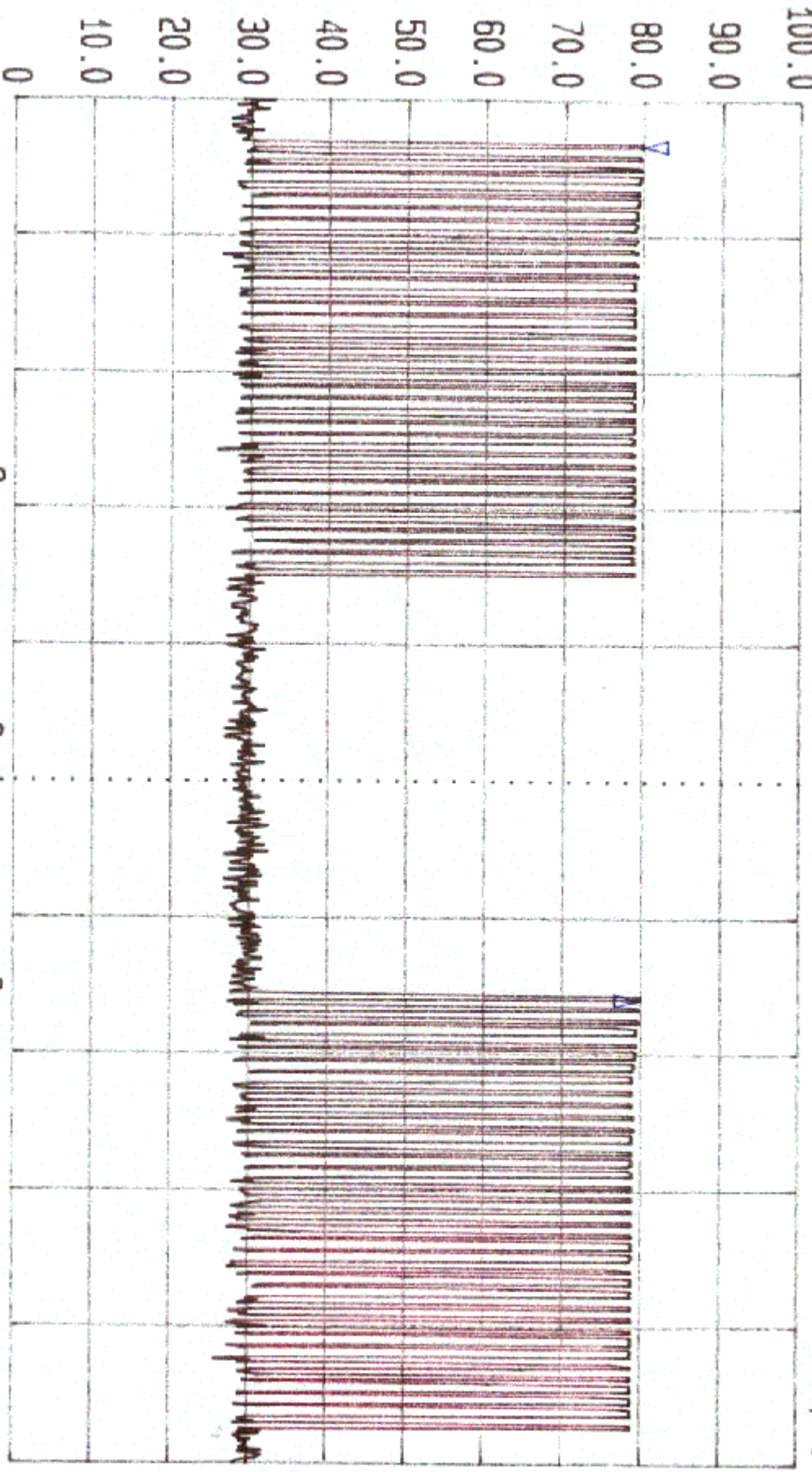
Total data #: 8
V.2d

Peak: RBW=VBW=1MHz
Average: RBW=1MHz, VBW=10Hz

Distance = 20log(1/3) = -9.5dB



Date 06.Sep.'00 Time 09:29:16 TRG
Ref.Lvl 100.00 dBµV Delta -0.13 dB
Res.Bw 120 kHz [Imp] Vid.Bw 300 kHz
TG.Lvl 12.000 kHz off
CF.Stp
RF.Att Unit [dBµV]

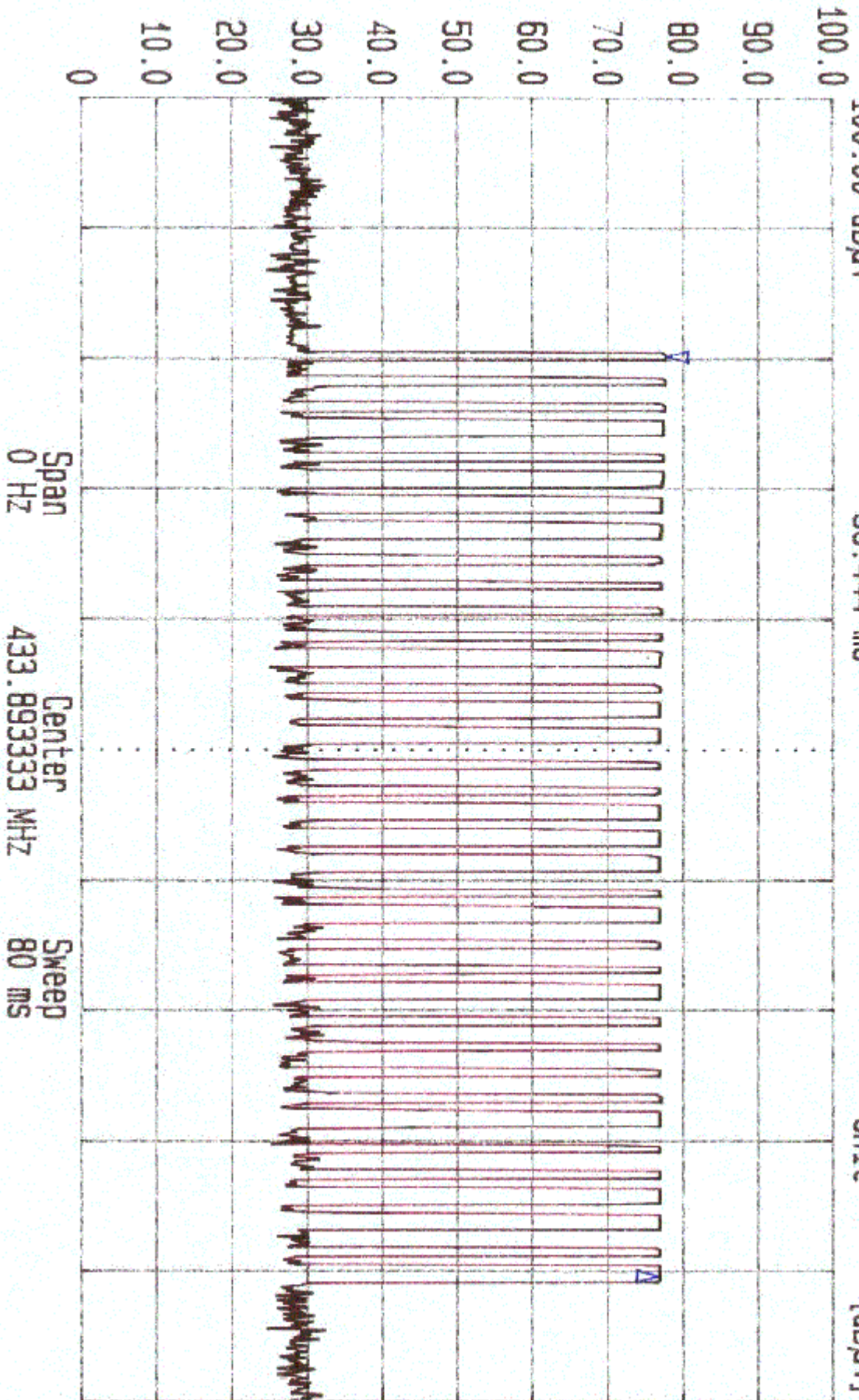


Span 0 Hz
Center 433.893333 MHz
Sweep 180 ms



Date 06.Sep.'00 Time 09:37:59 TRG
Ref.Lvl 100.00 dBuV Delta -0.99 dB
56.444 ms

Res.Bw 120 KHz [imp] Vid.Bw 300 KHz
T6.Lvl off CF.Stp 12.000 KHz
RF.Att 10 dB
Unit [dBuV]



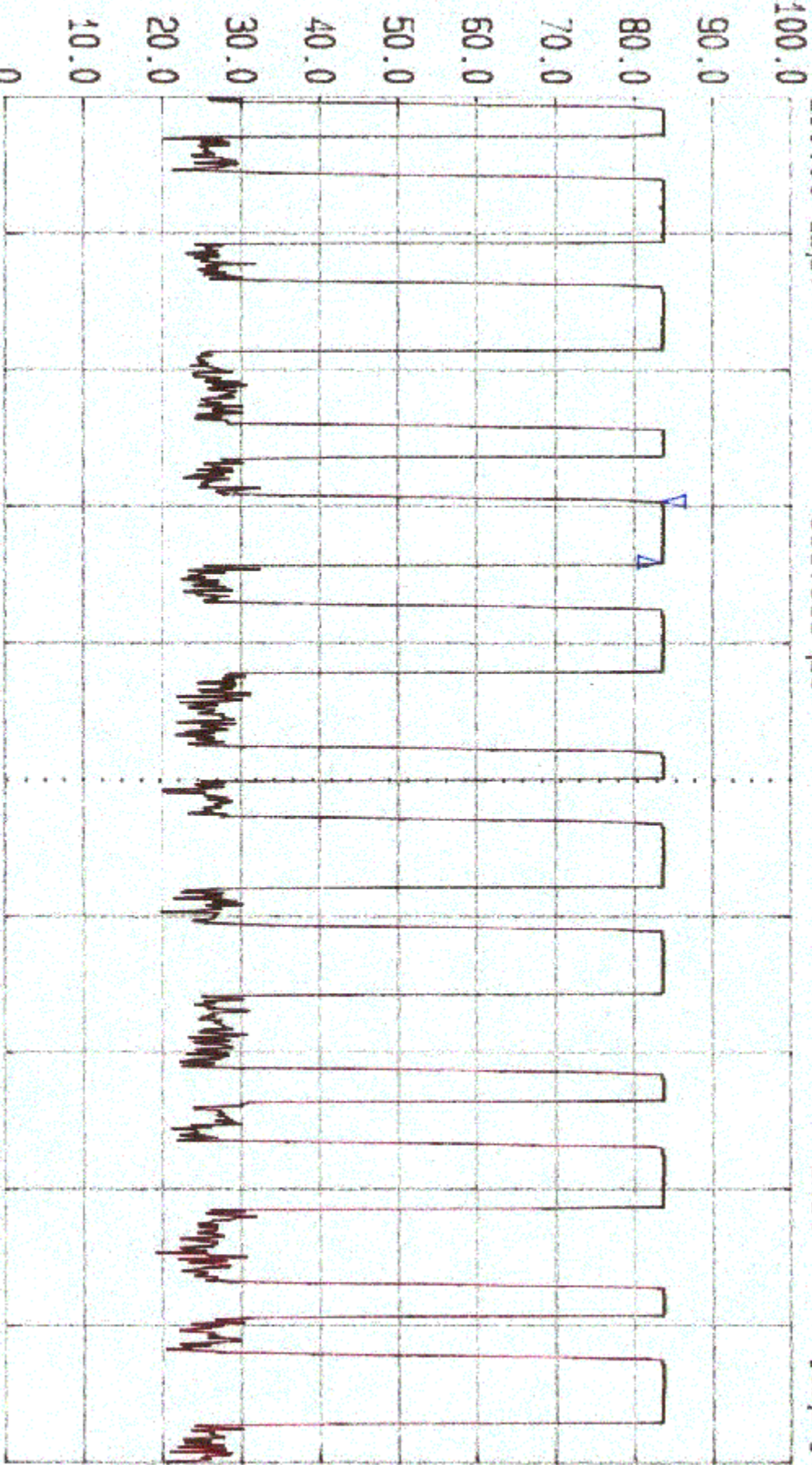
Span
0 Hz

Center
433.893333 MHz

Sweep
80 ms



Date 06.Sep.'00 Time 09:49:16 TRG
Ref.Lvl 100.00 dBuV Delta -0.03 dB
Res.Bw 120 KHz [imp] Vid.Bw 300 KHz
CF.Strp 12.000 KHz
AF.Att 10 dB
Unit [dBuV]



Span 0 Hz
Center 433.893333 MHz
Sweep 20 ms



Date 06.Sep.'00 Time 09:53:57 TR6

Ref.Lvl 100.00 dBuV Delta 0.02 dB

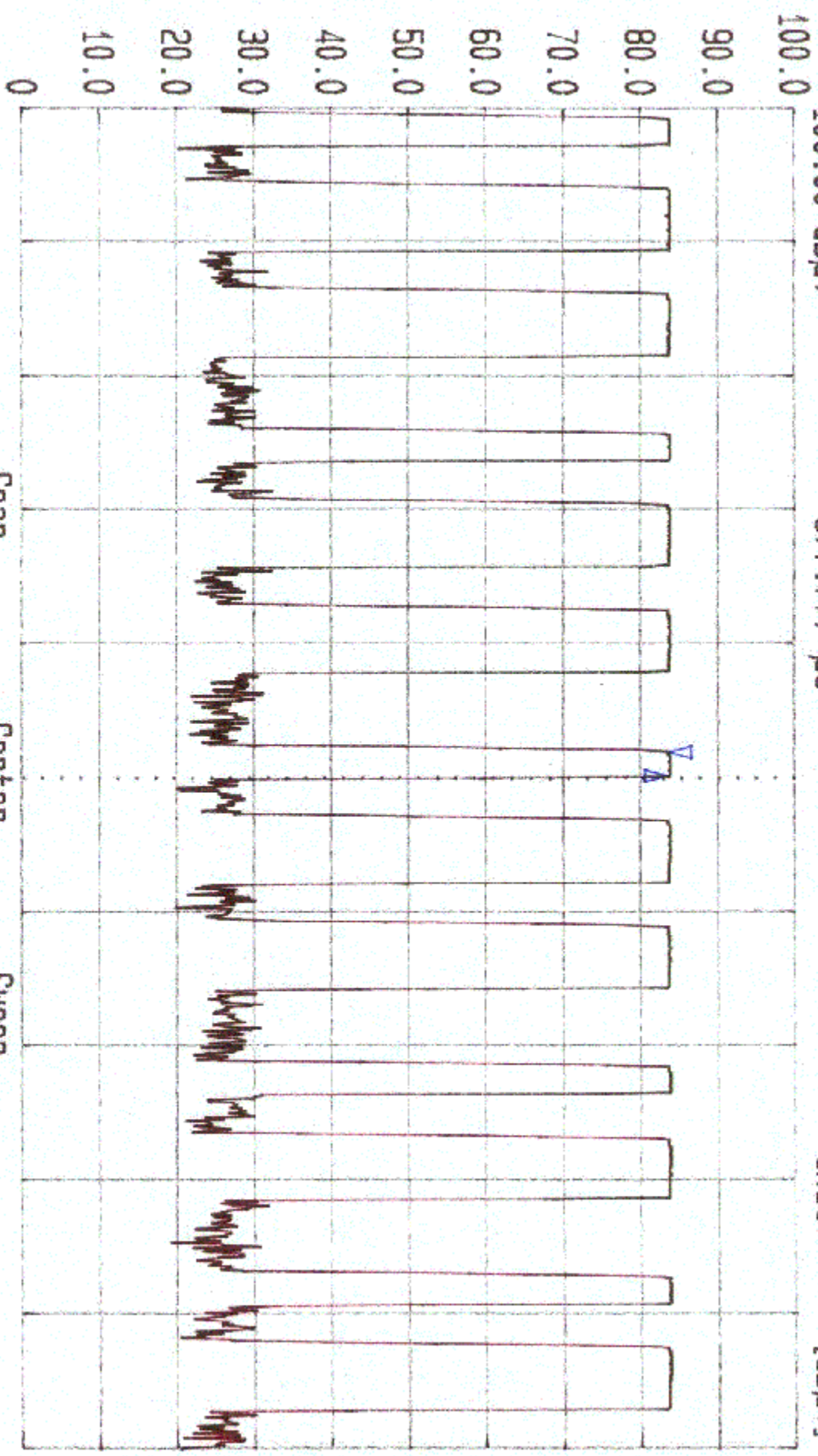
100.00 dBuV 377.777 μs

Res.Bw 120 KHz [imp]

TG.Lvl 12.000 KHz off

CF.Stp Vid.Bw 300 KHz

RF.Att 10 dB Unit [dBuV]



Span 0 Hz

Center 433.893333 MHz

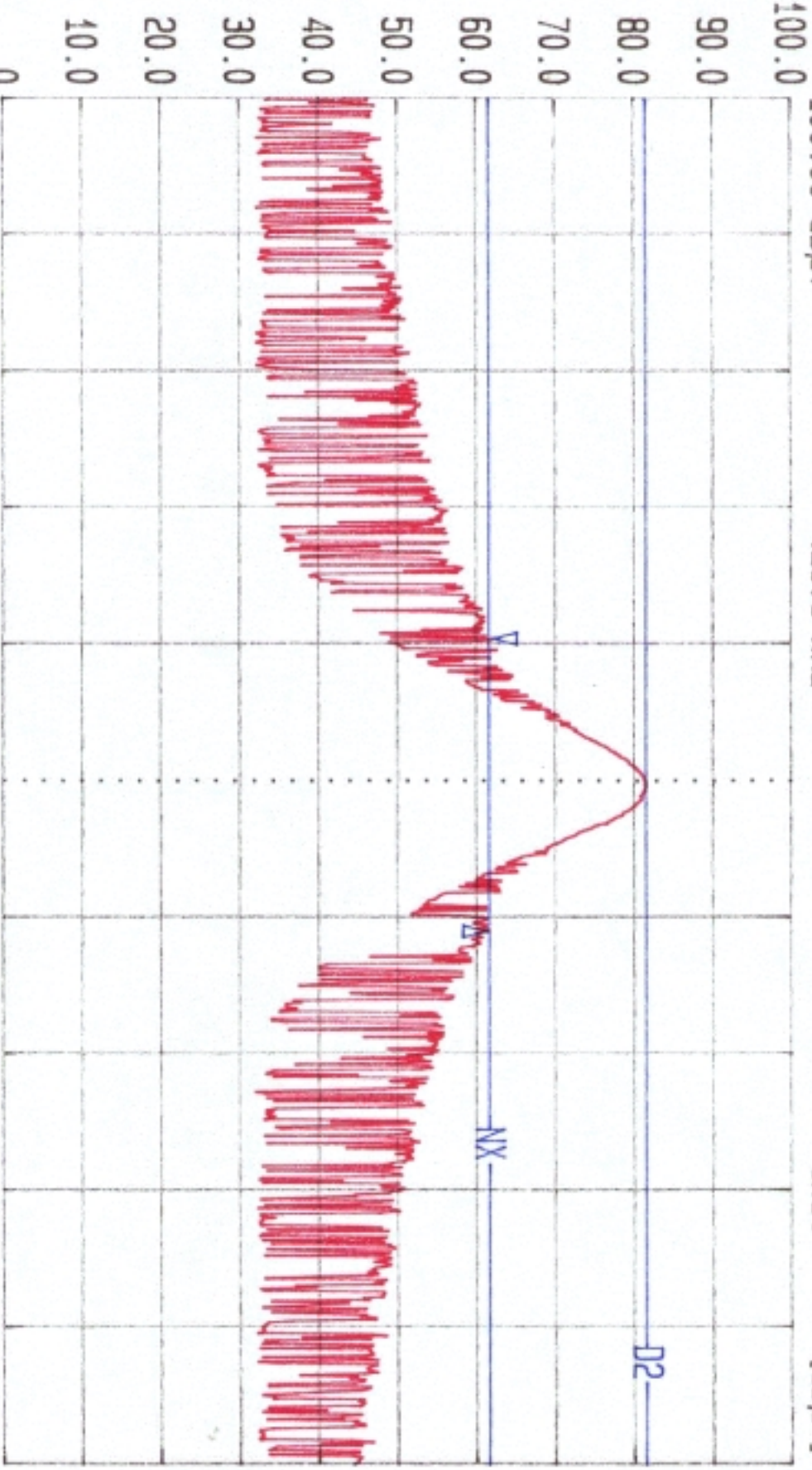
Sweep 20 ms



Date 06.Sep.'00 Time 10:27:25

Ref.Lvl1 100.00 dBuV Delta -0.71 dB

Res.Bw 120 KHz [imp] Vid.Bw 300 KHz
TG.Lvl1 off RF.Att Unit
CF.Strp 200.000 KHz [dBuV]



Start 432.893333 MHz Span 2 MHz Center 433.893333 MHz Sweep 20 ms Stop 434.893333 MHz
 N dB down Level 20.0 dB
 DELTA MARK 426.6 KHz