

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

*for*

**INTENTIONAL RADIATOR**

**302 MHz CAR ALARM TRANSMITTER**

**MODEL NO: DROOE3C**

**FCC ID NO: ELVATOF**

**REPORT NO: 00E8905**

**ISSUE DATE: AUGUST 25, 2000**

*Prepared for*

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

*Prepared by*

**COMPLIANCE ENGINEERING SERVICES, INC.  
*d.b.a.***

**COMPLIANCE CERTIFICATION SERVICES**

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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: NUTEK 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: 302 MHz CAR ALARM TRANSMITTER

MODEL NAME/NUMBER: DROOE3C

FCC ID: ELVATOF

DATE TESTED: AUGUST 14, 2000 ~ AUGUST 25, 2000

REPORT NUMBER: 00E8905

TYPE OF EQUIPMENT	SECURITY EQUIPMENT (INTENTIONAL RADIATOR)
EQUIPMENT TYPE	302 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.

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RICK YEO / EMC MANAGER  
COMPLIANCE ENGINEERING SERVICES, INC.

## 2. Product Description

Fundamental Frequency	<b>302 MHz</b>
Power Source	<b>12V Battery</b>
Transmitting Time	<b>Periodic <math>\leq</math> 5 seconds</b>
Associated Receiver	<b>FCC ID: ELVAR5B</b>

## 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)	09/00
EMCO	3142	Antenna (30-2000MHz)	06/01
H.P.	8447E B	Amplifier(30-1300MHz)	09/00
MITEQ	NSP2600-44	Amplifier(1-26GHz)	12/00

**7. POWERLINE RFI LIMIT**

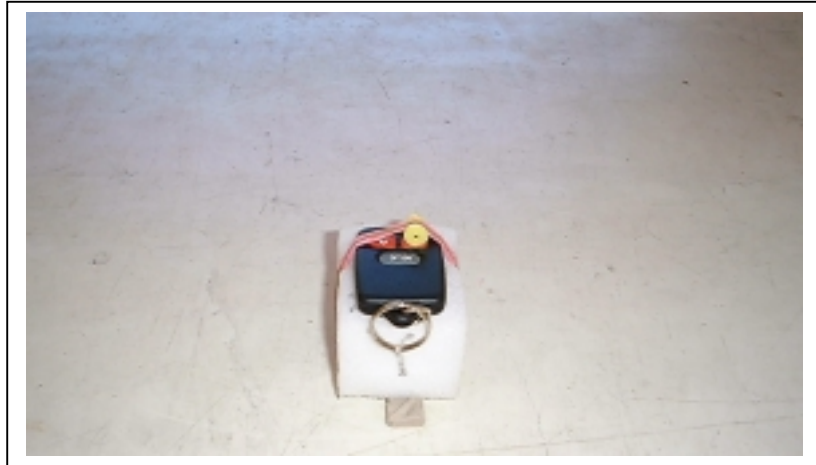
CONNECTED TO AC POWER LINE	SECTION 15.207
CARRIER CURRENT SYSTEM IN THE FREQUENCY RANGE OF 450 KHZ TO 30 MHz	SECTION 15.205 AND SECTION 15.209, 15.221, 15.223, 15.225 OR 15.227, AS APPROPRIATE.
BATTERY POWER	NO REQUIRED.

**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

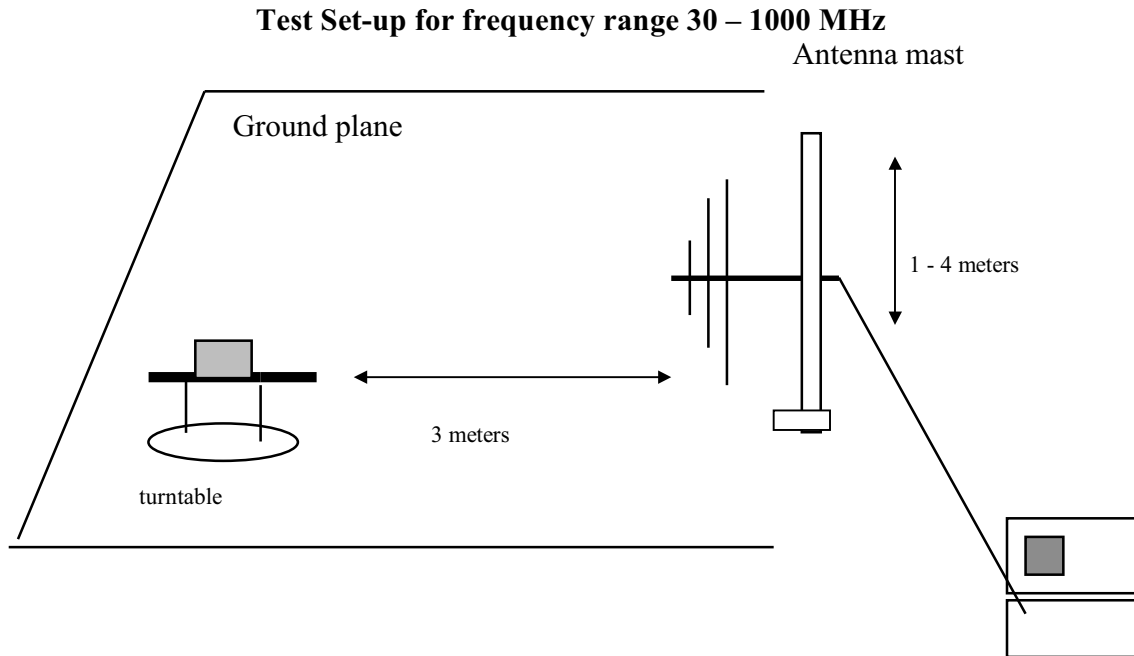
Use a block of foam and combined it with EUT wrapping rubber band around it. This way it can test X,Y, and Z axis. To activate continuous transmission, place a small plastic block between rubber band and EUT push button.



Radiated Open Site Test Set-up

## 10. Test Procedure

### Radiated Emissions, 15.231(4)(b)



preamplifier/spectrum analyzer

**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.

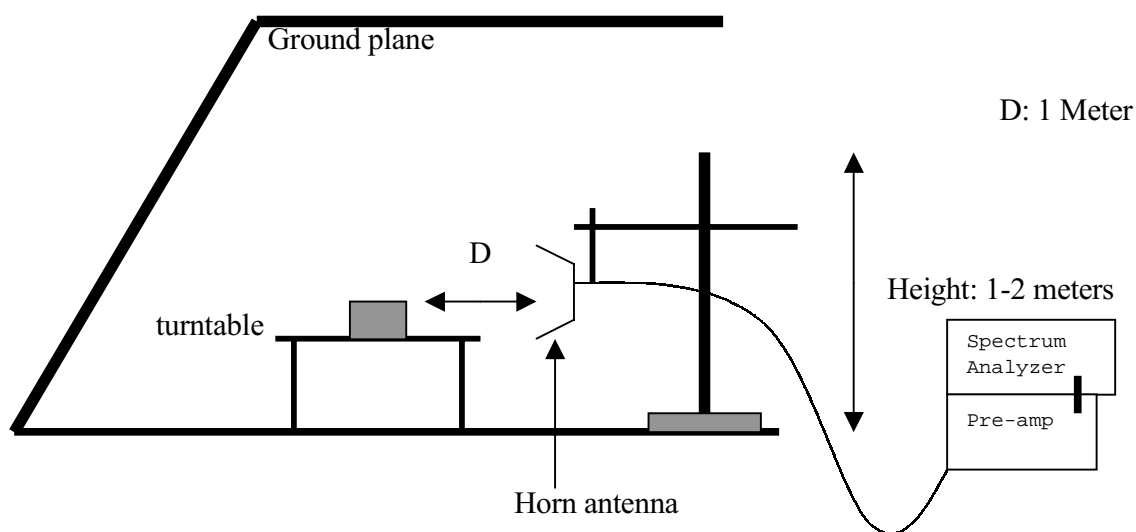
**Test set-up for measurements above 1GHz**

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 = 75.5 mS > 100mS. Use 100mS for calculation.  
 Long pulse = 1.125 mS  
 Short pulse = 0.5 mS  
 No of Long pulse = 11  
 No of Short pulse = 14

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

Duty Cycle = ((11x1.125)+(14x0.5))/75.5=25.66% or -11.815dB

**12.2 The Emissions Bandwidth**

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

Center Frequency	Measured	Limits
302 MHz	611.1 kHz < (refer to plot)	302X0.25%=755 kHz



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

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**Project #:** 00E8905  
**Report #:** 8905D1  
**Date & Time:** 8/21/00 10:41  
**Test Engr:** VINCE CHIANG

**Company:** NUTEK CORPORATION  
**EUT Description:** DROOE3C (Alarm TX / 302MHz)  
**Test Configuration :** EUT ONLY  
**Type of Test:** FCC CLASS B  
**Mode of Operation:** NORMAL MODE

D-Ste

E-Ste

$M\% = ((t1+t2+t3+...)/T) * 100\% = 25.66 \%$

$Av\ Reading = Pk\ Reading + 20 * \log(M\%)$   
 $20 * \log(M\%) = -11.815$

	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	301.93	65.18	53.37	14.44	1.99	22.37	47.43	74.80	-27.38	3mV	90	1.00
X	603.67	27.75	15.94	20.36	3.29	23.20	38.15	54.79	-16.64	3mV	90	1.20
X	905.72	24.39	12.58	23.84	4.14	22.27	31.64	54.79	-23.15	3mV	270	1.00
Y	301.87	76.42	64.61	14.44	1.99	22.37	58.67	74.80	-16.13	3mV	180	2.00
Z	301.86	79.09	67.28	14.44	1.99	22.37	61.34	74.80	-13.46	3mV	90	2.00
X	301.91	77.77	65.96	14.44	1.99	22.37	60.02	74.80	-14.79	3mH	90	1.30
Y	301.87	69.42	57.61	14.44	1.99	22.37	51.67	74.80	-23.13	3mH	90	2.00
Z	301.87	72.72	60.91	14.44	1.99	22.37	54.97	74.80	-19.83	3mH	0	1.75
	Button #2:											
X	301.76	63.62	51.81	14.44	1.99	22.37	45.87	74.79	-28.93	3mV	180	1.50
Y	301.74	78.38	66.57	14.44	1.99	22.37	60.63	74.79	-14.17	3mV	270	1.50
Z	301.74	79.27	67.46	14.44	1.99	22.37	61.52	74.79	-13.27	3mV	90	1.70
Z	603.46	36.71	24.90	20.36	3.29	23.20	37.15	54.79	-17.64	3mV	270.00	1.00
Z	905.21	29.60	17.79	23.84	4.14	22.27	35.31	54.79	-19.48	3mV	0	1.50
X	301.77	82.66	70.85	14.44	1.99	22.37	64.91	74.79	-9.89	3mH	270	1.00
Y	301.74	75.76	63.95	14.45	1.98	22.16	58.22	74.78	-16.56	3mH	270	1.00
Z	301.75	74.37	62.56	14.44	1.99	22.37	56.62	74.79	-18.18	3mH	0	1.75
	Total data #: 16											





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

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*Project #:* 00E8904  
*Report #:* 8904D2  
*Date & Time:* 8/28/00 09:47  
*Test Engr:* BILL HUANG

*Company:* NUTEK CORPORATION  
*EUT Description:* DROOE3C (Alarm TX / 302MHz)  
*Test Configuration :* EUT ONLY  
*Type of Test:* FCC CLASS B  
*Mode of Operation:* NORMAL MODE

D Site

E Site

6 Worst

Descending

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (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)
1208	51.38	25.2	27.1	43.32	-9.5	50.82	74.0	-23.18	1mV	90	2.0	P
1208	38.20	25.2	2.7	43.32	-9.5	13.24	54.0	-40.76	1mV	90	2.0	A
1510	50.44	25.2	3.0	43.16	-9.5	26.01	74.0	-47.99	1mV	90	1.3	P
1510	36.63	25.2	3.0	43.16	-9.5	12.20	54.0	-41.80	1mV	90	1.3	A
1208	50.42	25.2	2.7	43.32	-9.5	25.46	74.0	-48.54	1mH	270	1.0	P
1208	37.66	25.2	3.0	43.32	-9.5	13.07	54.0	-40.93	1mH	270	1.0	A
1510	48.54	25.2	3.4	43.16	-9.5	24.45	74.0	-49.55	1mH	270	1.0	P
1510	35.67	25.2	3.7	43.16	-9.5	11.85	54.0	-42.15	1mH	270	1.0	A

\* No other emission were found within 20dB under the limits upto 3.02 GHz.

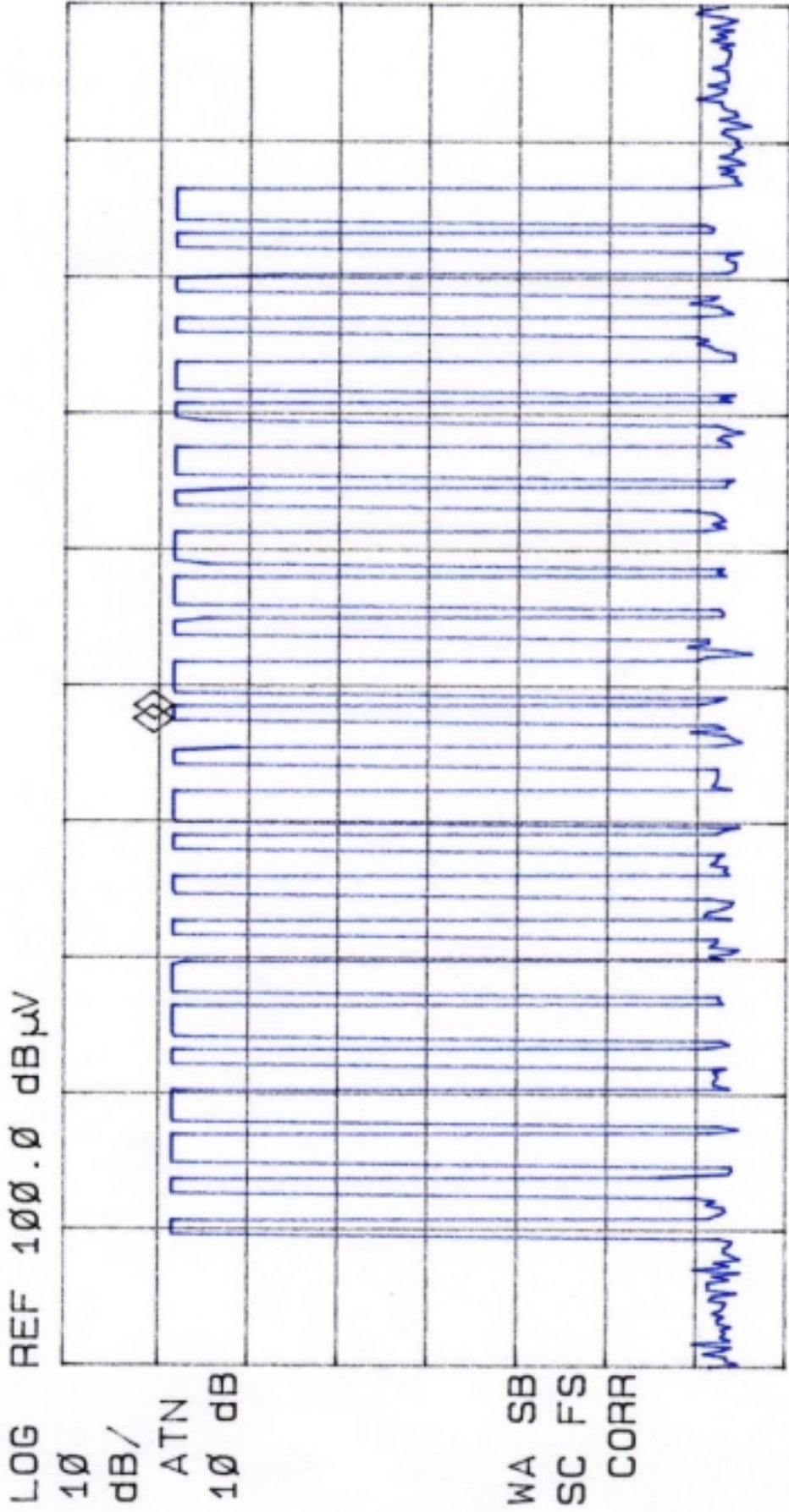
Total data #: 8  
V.2d

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

Distance =  $20\log(1/3) = -9.5\text{dB}$

18:09:19 AUG 14, 2000  
HP

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 500.00  $\mu$ sec  
--.05 dB

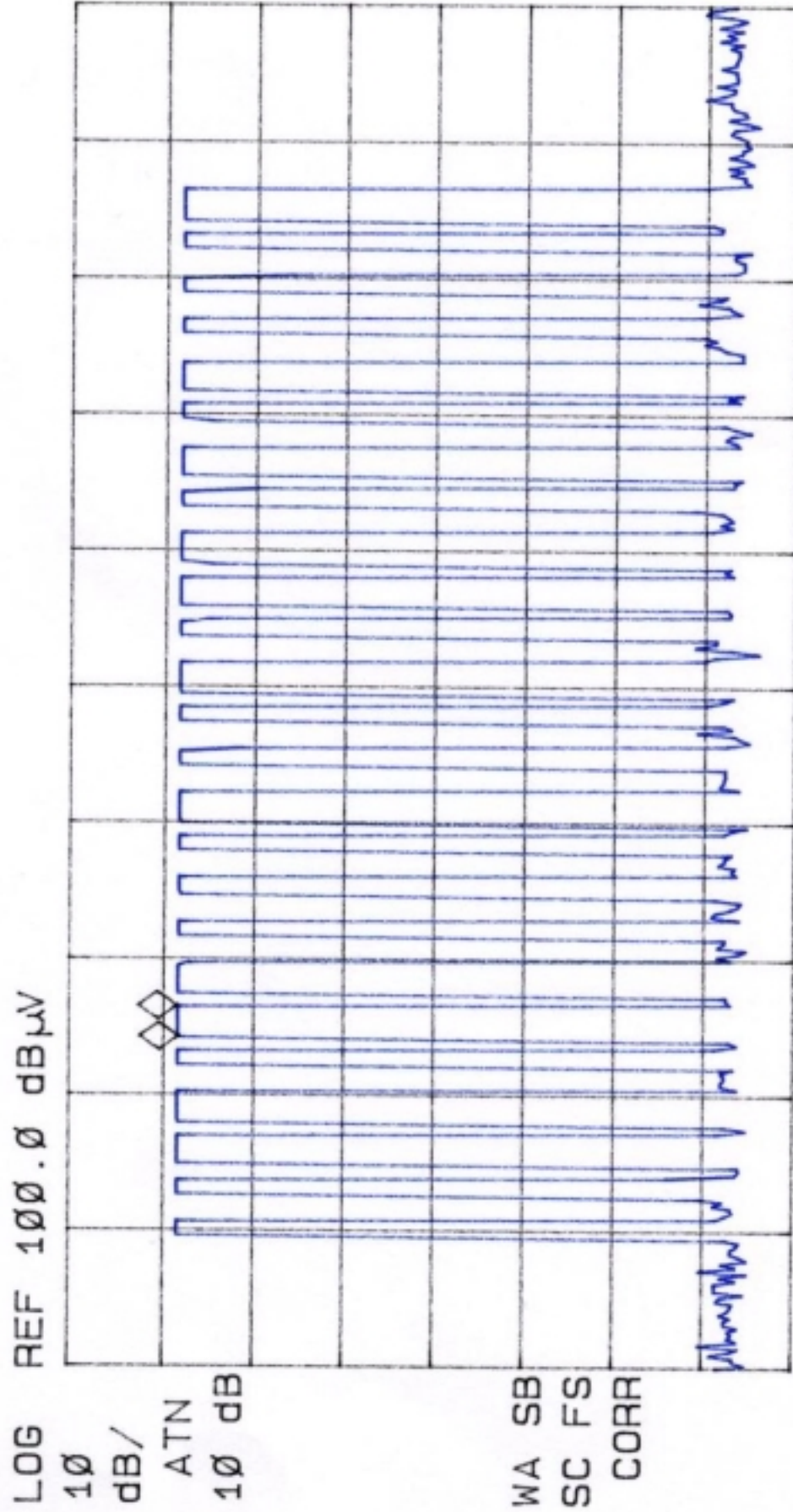


CENTER 301.799 MHz  
IF BW 120 KHZ  
AVG BW 300 KHZ  
SPAN 0 HZ  
#SWP 50.0 msec



18: 13: 24 AUG 14, 2000  
HP

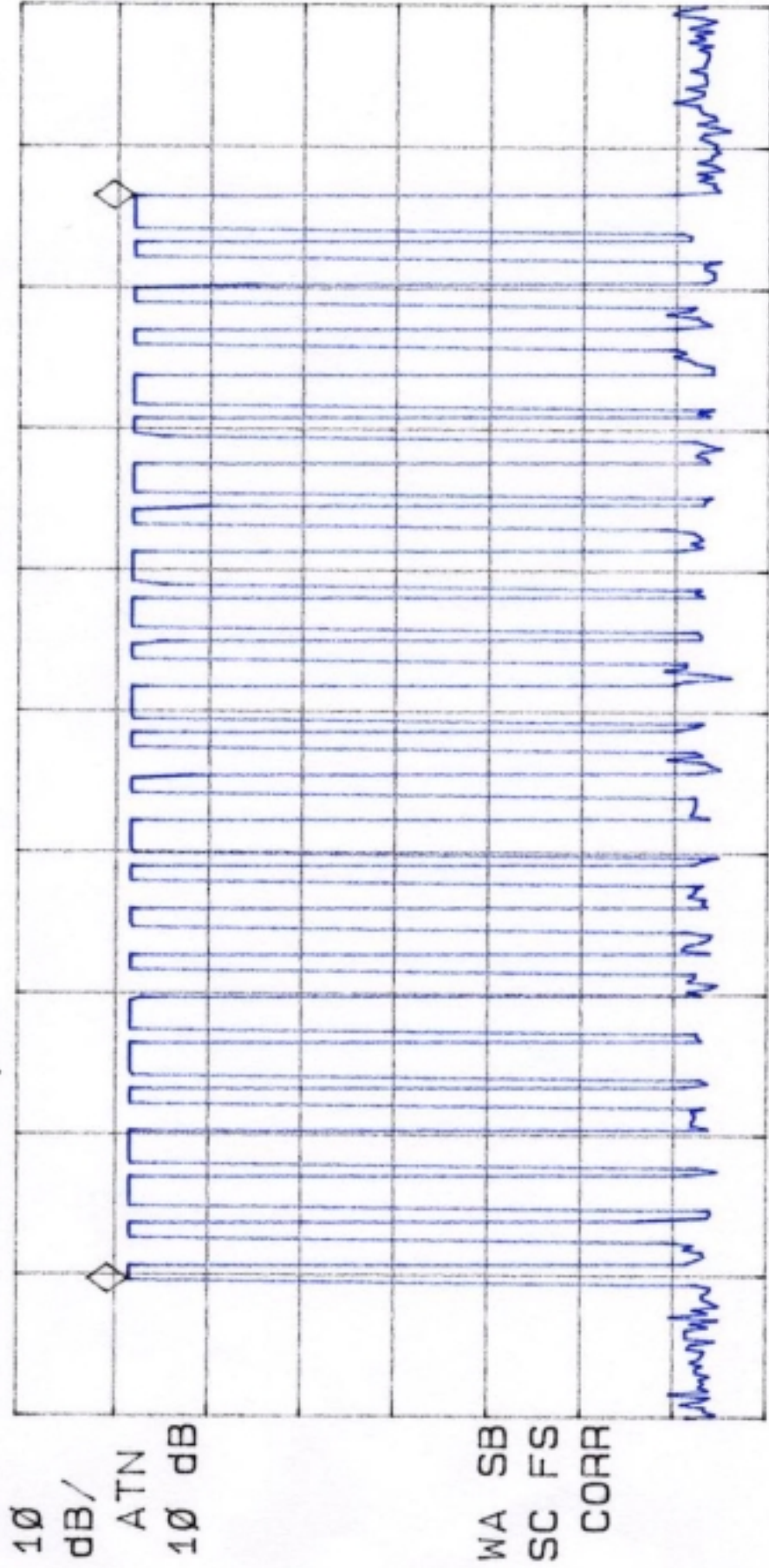
ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 1.1250 msec  
.16 dB



18:05:21 AUG 14, 2000  
hp

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 38.375 msec  
-.30 dB

LOG REF 100.0 dB $\mu$ V



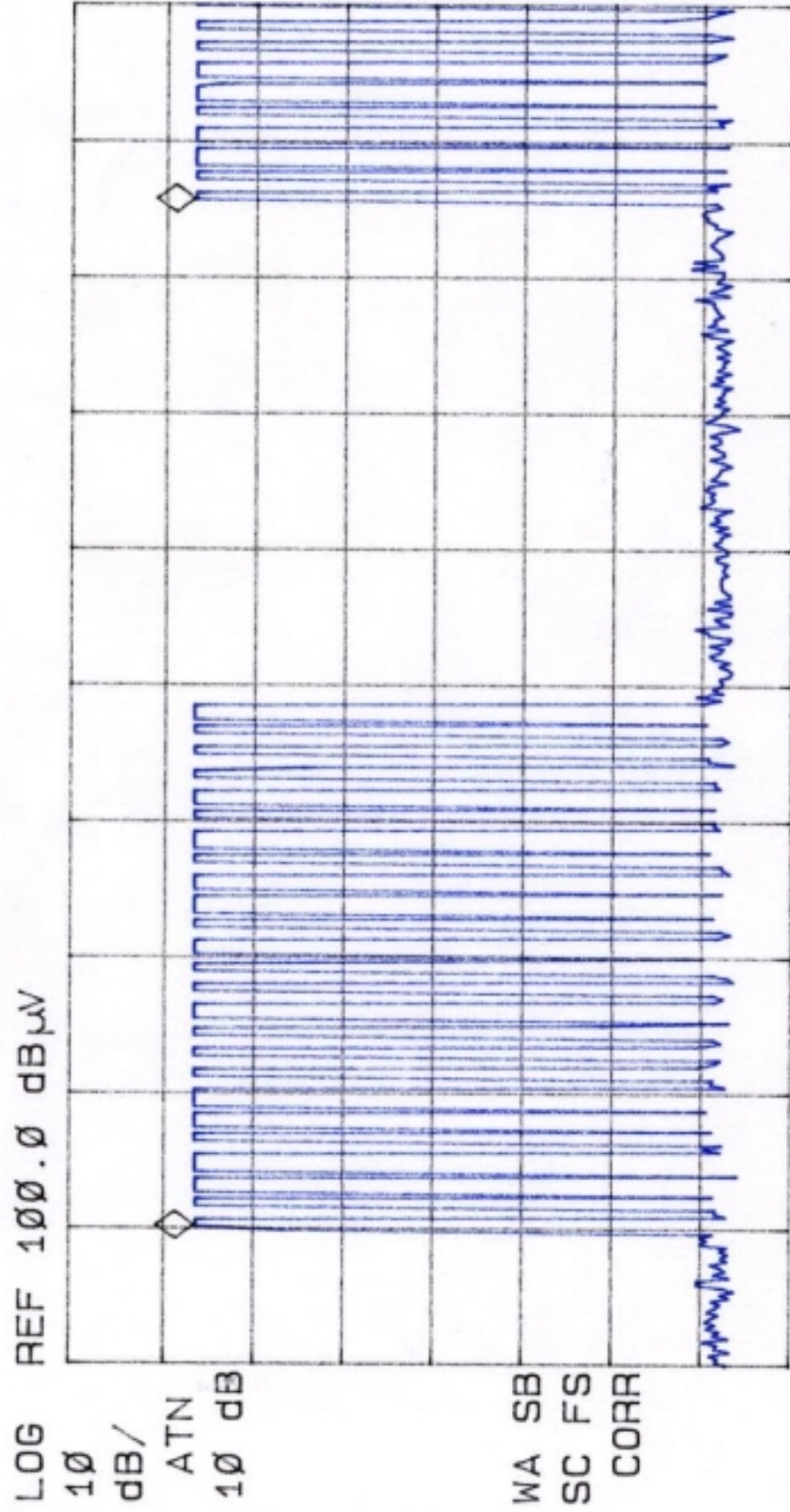
CENTER 301.799 MHz  
IF BW 120 KHZ

AVG BW 300 KHZ  
SPAN 0 Hz  
#SWP 50.0 msec



18:19:09 AUG 14, 2000  
AP

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 75.500 msec  
.32 dB



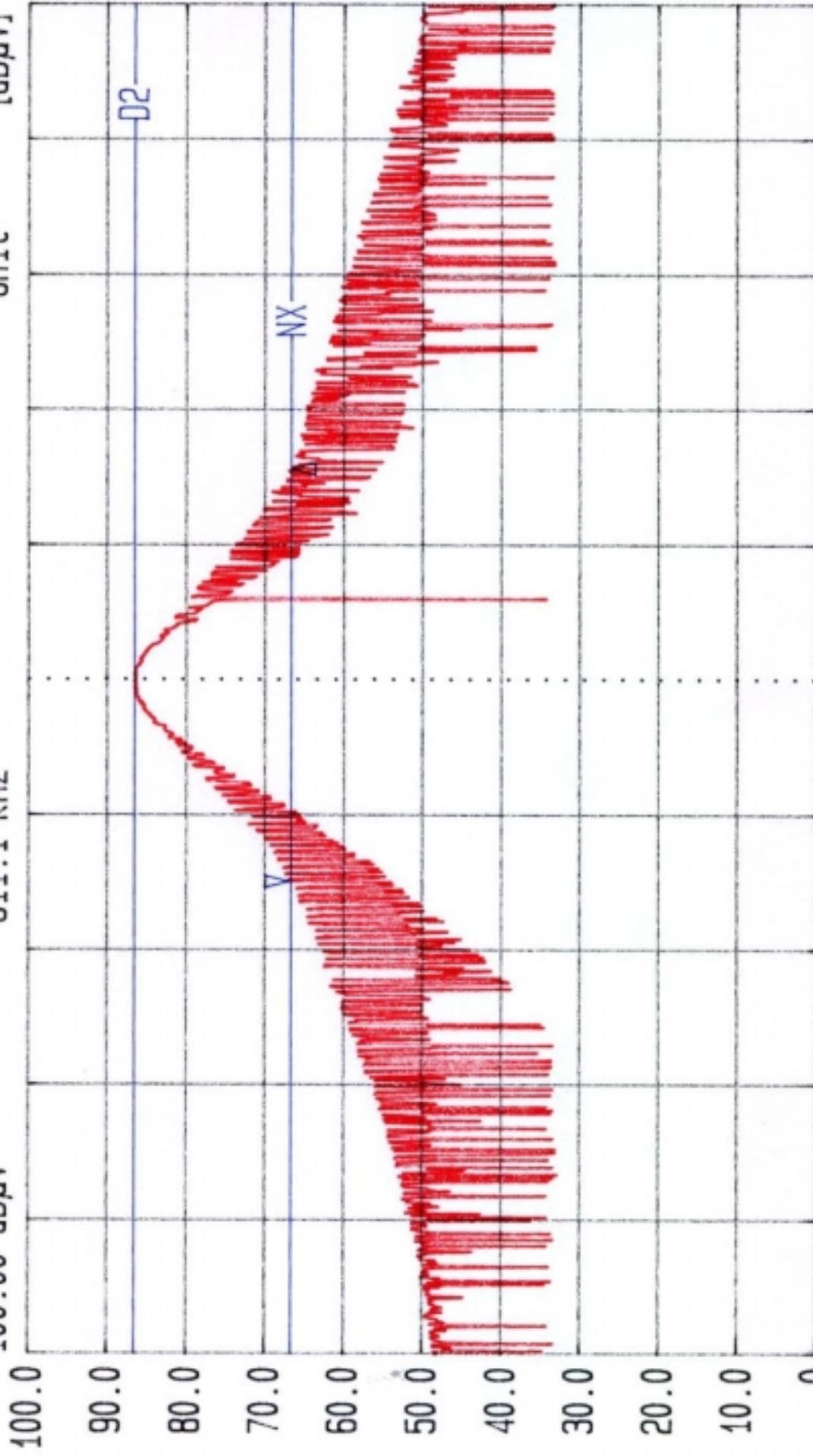
CENTER 301.799 MHz      SPAN 0 Hz  
IF BW 120 kHz      #SWP 100 msec  
AVG BW 300 kHz





Date 15.Aug.'00 Time 10:38:12  
Ref.Lvl Delta  
100.00 dB $\mu$ V -0.23 dB  
611.1 kHz

Res.Bw 121.2 kHz [3dB] Vid.Bw 300 kHz  
TG.Lvl Off  
CF.Stp 200.000 kHz RF.Att 10 dB  
Unit [dB $\mu$ V]



Start 300.775553 MHz Span 2 MHz Center 301.775553 MHz Sweep 100 ms Stop 302.775553 MHz

N dB down Level 20.0 dB  
DELTA MARK 611.1 KHZ