

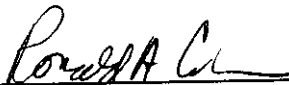
CHOMERICS

TEST SERVICES**TEST REPORT****FOR****SPEED PRODUCTS****COMPANY PRODUCT NAME****TRUSPEED****FCC PART 15, SUBPART B CLASS B (DIGITAL DEVICES)****AND SUBPART C (INTENTIONAL RADIATORS)****Submitted to:**

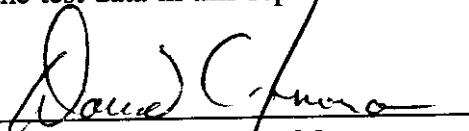
Roland Cadotte
Speed Products
219 Ticonderoga Road
Freehold, NJ 07728

Prepared by: Ronald H. Crooker**Date:** April 25, 1997**Test Report:** TR1056.97**Purchase Order:** MasterCard**Number of Pages:** 14

I attest to the accuracy of the test data in this report:



Test Engineer/Technician



Test Services Manager

Official responsible for marketing this equipment

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Chomerics Test Services.

TEST REPORT
NVLAP Accredited Laboratory

ADMINISTRATIVE DATA

Purpose of Test:	Compliance FCC Part 15
Test Specification:	FCC Part 15, Subpart B (Class B) and Subpart C.
Manufacturer:	Speed Products
Manufacturer's Type or Model Number:	TRUSPEED
Number of Items Tested:	One Prototype
Date of Test:	April 25, 1997
Test Observed By:	R. Cadotte
Affiliated With:	Speed Products
Test Location:	Chomerics Open Area Test Site and Test Chamber C.
Tests Conducted By:	Ronald H. Crooker
Condition of Test Equipment Upon Arrival:	Good
Customer's Equipment Returned VIA:	Hand Carried

SUMMARY OF RESULTS

The Speed Products TRUSPEED met the FCC Part 15, Subpart B (Class B) and Subpart C radiated emissions limits as configured and operated for testing. The TRUSPEED operates on internal batteries; therefore no conducted emissions were performed.

The Speed Products TRUSPEED is a device that provides speed analysis of sport related objects (balls, pucks, etc). The TRUSPEED operates on internal batteries, 9VDC power, and has no external cables.

The Normal mode of operation was used for emissions tests.

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TEST SERVICES FACILITY INFORMATION

Chomerics Test Facility is recognized under the National Voluntary Laboratory Accreditation (NVLAP) Program for NVLAP Codes 12/C01 and 12/R01. Tests within this report not conforming to 12/C01 and 12/R01 NVLAP Codes are not covered under Chomerics NVLAP accreditation.

Chomerics Test Facility operates under Chomerics Quality Assurance Manual Document Number QA002, Revision D dated March 1, 1996.

The QA manual has been constructed to reflect a quality program in accordance with the requirements of the National Institute of Standards and Technology (NIST), ISO 9002, ISO Guide 25, NIST Handbook 150, EN 45001, MIL-I-45208A, MIL-STD-461D, 462D and Chomerics Quality Assurance Program (QAP).

The QA manual outlines and describes the procedures for establishing and maintaining the quality of analysis, research, inspection, and testing within Chomerics Test Service (CTS).

The results and/or conclusions within this test report refer and/or apply only to the unit(s) tested as defined by this report.

There were no deviations, additions to, or exclusions from the test specification(s) made.

The system amplitude accuracy for the measurements made during the radiated emission tests was $\pm 3\text{dB}$.

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TEST SITE DESCRIPTIONS

The following is a description of Test Services open field test sites. Refer to Administrative Data on page 2, line 9 for the specific test site used for testing.

OPEN AREA TEST SITE A: Chomerics open area test site "A" is located in the parking lot behind the Broderick Building at Chomerics, 77 Dragon Court, Woburn, Massachusetts.

The open area test site "A" is a wooden "A" frame, bounded by Dragon Court, a one story brick building, and a paved area. Photographs of the site and site attenuation data are on file with the Federal Communications Commission.

The supporting structure used for support of the equipment under test is a wooden rotatable platform .8 meters high. A similar supporting structure is used for the measuring equipment. The mast supporting the antenna can be adjusted from one to four meters in height.

OPEN AREA TEST SITE B: Chomerics open area test site "B" is located in the lower parking lot behind the Seeger Building at Chomerics, 77 Dragon Court, Woburn, Massachusetts.

Photographs of the site and site attenuation data are on file with the Federal Communications Commission.

Parking is permitted on one side of test site "B" at a discrete distance from the imaginary ellipse.

The open area site B enclosure is a wooden structure measuring 56 X 30 X 25 feet in size with galvanized steel sheet metal used as the ground plane. The structure is sized to allow both 3 and 10 meter measurements and is heated and/or air conditioned.

The structure used to support equipment under test is a 14 foot diameter motorized turntable. The sheet metal surface is flush with the ground plane. To ground the turntable, 175 copper fingers (1" x 1.5") are mounted around the outer edge of the turntable using machine screws. The spring fingers are equally spaced and provide a uniform interface between the turntable metal surface and ground plane. When needed for table top equipment, a wooden table measuring 3 x 6 feet in size is positioned at the center of the turntable.

The addition at the end of the open area test site is the location for the test personnel and equipment to ensure they are outside the imaginary ellipse.

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TEST CHAMBER C: Chomerics Test Chamber C, if used for this test program, is located in the Seeger Building at Chomerics, 77 Dragon Court, Woburn, Massachusetts (see Figure 2). The shielded enclosures (test chambers) were manufactured and installed by Universal Shielding Corporation of Deer Park, New York.

Attenuation tests have demonstrated that the shielded enclosures meet the attenuation requirements of MIL-STD-285 and NSA 65-6. The main test chamber is 16 x 20 x 10 feet in size with two adjacent enclosures on either side which are 8 x 8 x 8 and 8 x 12 x 10 feet in size, respectively.

Test Chamber C is lined with Emerson-Cuming RF absorber material. This absorber material meets the following absorption specifications: 80MHz 6dB, 300MHz 30dB, 500MHz 35dB, 1GHz 40dB, and 3 to 24 GHz 50dB. Each of the two adjacent rooms used for support equipment and the main test chamber are connected together and referenced to the same single point ground.

When needed for table top equipment, a wooden table measuring 3 x 9 feet in size is positioned within the test chamber. When used for MIL-STD-461D tests, the table top surface is covered with a copper sheet and grounded to the test chamber wall so that the resistance is less than 2.5 milliohms. When used for radiated electromagnetic field tests, the copper table top surface is removed.

The available AC power in Test Chamber C is 120V 60Hz AC Single Phase 60Amps; 230V 50Hz AC Single Phase 50Amps; 115V 400Hz AC Single Phase 30Amps (through access panel); 208V 60Hz AC Three Phase AC 30Amps (through access panel).

The power line filters supplying the power to the enclosures, provide 100dB of attenuation from 10kHz to 10GHz. Each of the two adjacent rooms used for support equipment and the main test chamber have independent AC power obtained from independent AC power line filters.

Only one power line frequency is available in the chamber at a time, 50, 60 or 400 cycle, unless power is brought through an access panel.

TEST EQUIPMENT

Test Equipment		Asset #	Serial #	Cal Date
X	Tektronix 496 Spectrum Analyzer	0056	B0100206	5/98
X	Hewlett Packard 8566 Spectrum Analyzer	0047	2637A04064	5/98
X	Hewlett Packard 11975A RF Amp	0206	2738A01696	NCR
X	Hewlett Packard 11970U Mixer	WL901	2332A00237	5/98
X	Hewlett Packard 11974A Preselecting RF Section	0119	3001A00119	UWC
X	Hewlett Packard 11970K Mixer	0348	3003A02298	UWC
X	Eaton Horn Set	0333,0348	136,145	8/97
X	Emco 3120 Tuned Dipole Antenna B1	0477	0021	1/98
X	Emco 3120 Tuned Dipole Antenna B2	0478	0176	1/98
X	Emco 3120 Tuned Dipole Antenna B3	0479	0728	1/98
X	Alpha 86IU/383 Horn	WM257	111	NCR
	Hewlett Packard 182T Main Frame	51	2010A08446	8/97
	Hewlett Packard 8447D Pre Amp			
	Hewlett Packard 8640B Signal Generator	403	2153A18354	2/98
	Hewlett Packard 654A Signal Generator	49	0951A06087	9/97
	Solar 50 Ohm/50uH L.I.S.N.			

Equipment Calibration: The calibration of Chomerics test facility equipment is controlled under Chomerics Laboratory Test Equipment Calibration Manual Document Number QA001, Revision F dated March 1, 1996.

The test equipment used throughout this test sequence conforms to laboratory calibration standards, MIL-STD-45662A, traceable to the National Institute of Science and Technology. The date of the next due scheduled calibration is listed in the table above for Chomerics Test Services equipment used during testing.

Test Personnel: The test personnel used to perform or supervise the tests are accredited by the National Association of Radio and Telecommunications Engineers, Inc. (NARTE) as Certified Electromagnetic Compatibility Engineers (N.C.E.) and Technicians (N.C.T.).

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RADIATED EMISSIONS
30 MHZ to 55000 MHZ

Test No: **ONE (1)**

Equipment Tested: Speed Products TRUSPEED

Configuration: The Speed Products TRUSPEED was set up on a wooden turntable three meters from the tunable dipole antenna for Subpart B testing (30MHz-1000MHz) in Open area Test Site B. The EUT was set up in Test Chamber C at one meter from the receiving microwave horn for Subpart C testing (1GHz-55GHz).

There was no support equipment is needed to run the TRUSPEED in a Normal mode of operation.

Any emissions radiating from the TRUSPEED were maximized by rotating the EUT.

Test Mode: Normal

Results: The Speed Products TRUSPEED met the FCC Part 15, Subpart B (Class B) and Subpart C radiated emissions limits as configured for testing.

Fixes: None required

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CABLE CONFIGURATION

There are no cables exiting the equipment under test.

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SUMMARY OF RECOMMENDATIONS

The Speed Products TRUSPEED will not require any modifications in order to insure compliance with the radiated emission requirements of FCC Part 15, Subpart B (Class B, digital devices) and Subpart C (intentional radiators).

Please note that if any modifications and or fixes were implemented to the EUT to achieve compliance, that other approaches to solving the problem may exist. In addition, any EMI/EMC shielding products listed in this report may be substituted with an equivalent.

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APPENDIX A

TEST DATA

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CUSTOMER: SPEED PRODUCTS PROGRAM: Commercial
EUT: "TRUSPEED" S/N PROTO #1 LOG BY: lc

PRE-TEST CHECKLIST		DATE						COMMENTS	
		4/25/97						Test Plan/Procedure: <u>ANCE C63.4</u> Test Specification: <u>FCC PART 15 SUBPARTS B & C</u> Chomerics Procedure: CHO <u>TPEC T1</u> EUT Power Requirement Verified: Voltage <u>9VDC</u> Frequency <u> </u> Phase <u> </u> Voltage <u> </u> Frequency <u> </u> Phase <u> </u> Voltage <u> </u> Frequency <u> </u> Phase <u> </u> EUT Functional Operational Check: [☒] Pass [☐] Fail Environmental: Ambient Temp <u>72</u> °F Humidity <u>51</u> Bonding/Grounding: <u> </u> Safety Issues: <u> </u>	
IN-PROCESS TEST CHECKLIST		DATE	TEST TYPE	TEST EQUIP CAL'D	TEST PERFORMED PROPERLY- DATA ACCEPTED	EUT SETUP CHECK / OPERATIONAL CHECK	EUT PASS/FAIL		
		4/25/97	RAD	✓	✓	✓	PASS		
		DOCUMENT #: TR1056.97 DATE: April 25, PAGE 11 OF 14							
POST TEST CHECKLIST		DATE	EUT Functional Operational Check:			Test Engineer/Tech <u>R. Rooker</u> Technical Manager <u>David C. Finner</u>			
		4/25/97	[☒] Pass [☐] Fail						

RADIATED E FIELD EMISSION MEASUREMENTS

CUSTOMER: SPEED PRODUCTS

DATE: 25 APRIL 97

EQUIPMENT: "TRUSPEED"

TEST NUMBER: _____

TESTED BY: R

OPERATING MODE: NORMAL

BANDWIDTH: [☒] 100 kHz (PEAK) / 120 kHz (QP) 30M-1000M

TEST SPEC: FCC PART 15, SUBPARTS
BAND C

OTHER (SPECIFY) 1MHz ABOVE 1GHz (CW)

PROCEDURE: ANSI C63.4

FREQUENCY RANGE: [☒] 30MHz - 1GHz

ANTENNA DISTANCE: [☒] 3 METERS [☐] 10 METERS

OTHER (SPECIFY) 1GHz - 55GHz

[X] 1 METER

Frequency MHz	Peak Measured Level dBm	Quasi-Peak Measured Level dBuV	Antenna Height (Meters)	Turntable Azimuth (Degrees)	Antenna H/V	Antenna Fac/Cable Loss dB	Field Level dB uV/m **	Limit dBuV/m (QP)
NO SIGNALS 30 MHz - 1000 MHz CLASS B SUBPART B								
10530	-39.3		1M	0°	V	37.88	105.58	137.5 ✓ (1m)
21061	-64.4		1M	0°	V	33.9	76.5	87.0 ✓ (1m)
21062 MHz - 55000 MHz NO SIGNALS								

** All signals greater than 3dB from the limit are calculated to the nearest whole number.

** Field Level (dBuV/m) = (107 - Measured Level (dBm)) + Antenna Factor/Cable Loss (dB)

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APPENDIX B

SET UP PHOTOGRAPHS

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410

REF --10.0 dBm

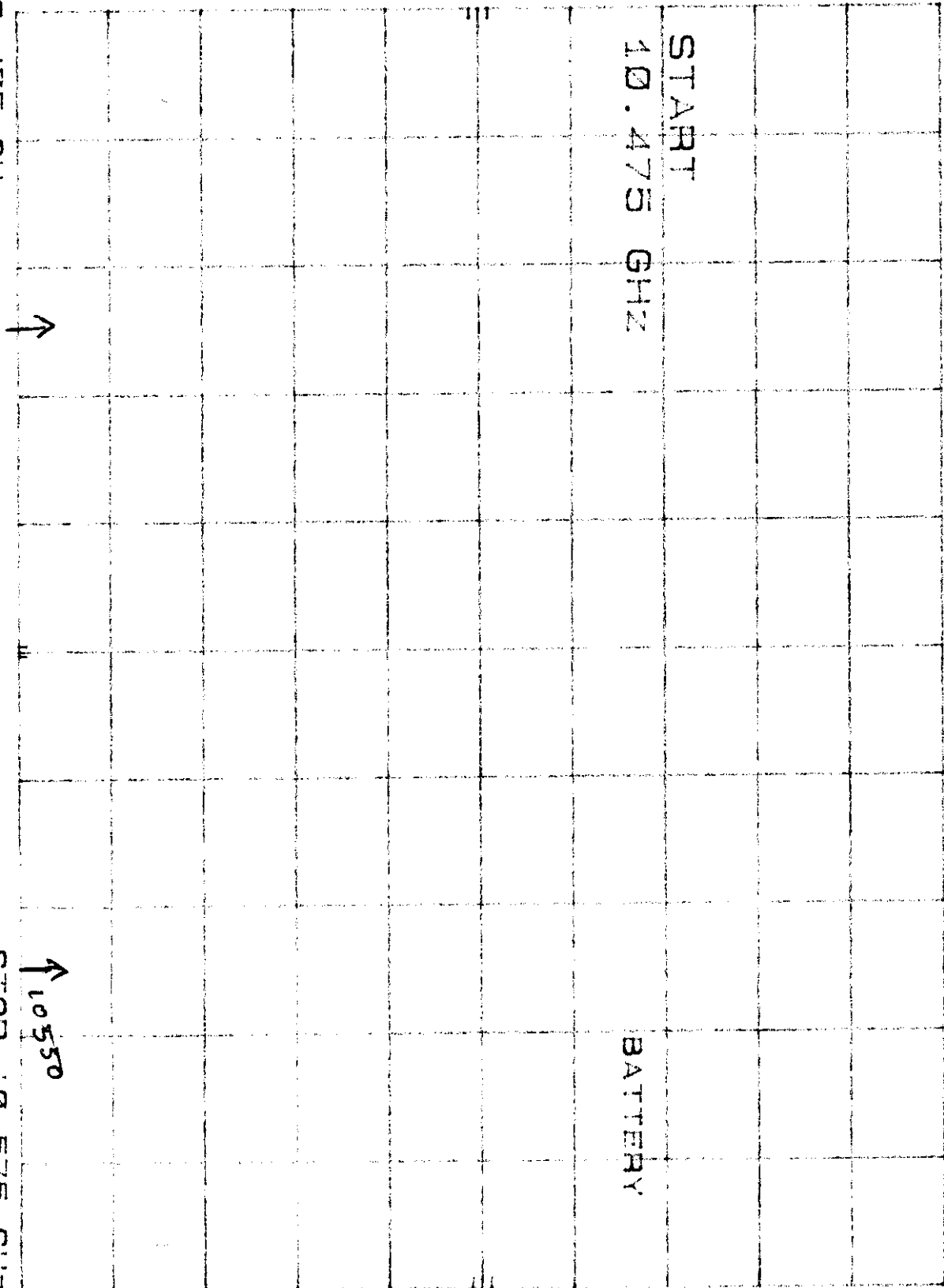
ATTEN 0 dB

10 dB/

Speed Products Inc.
Roland Cadotte
True Speed radar gun
FCC ID: NHWSPED

START
10.475 GHz

BATTERY



START 10.475 GHz
RES BW 10 KHz

VBW 30 KHz

STOP 10.575 GHz
SWP 10.0 sec

10 MHz/div

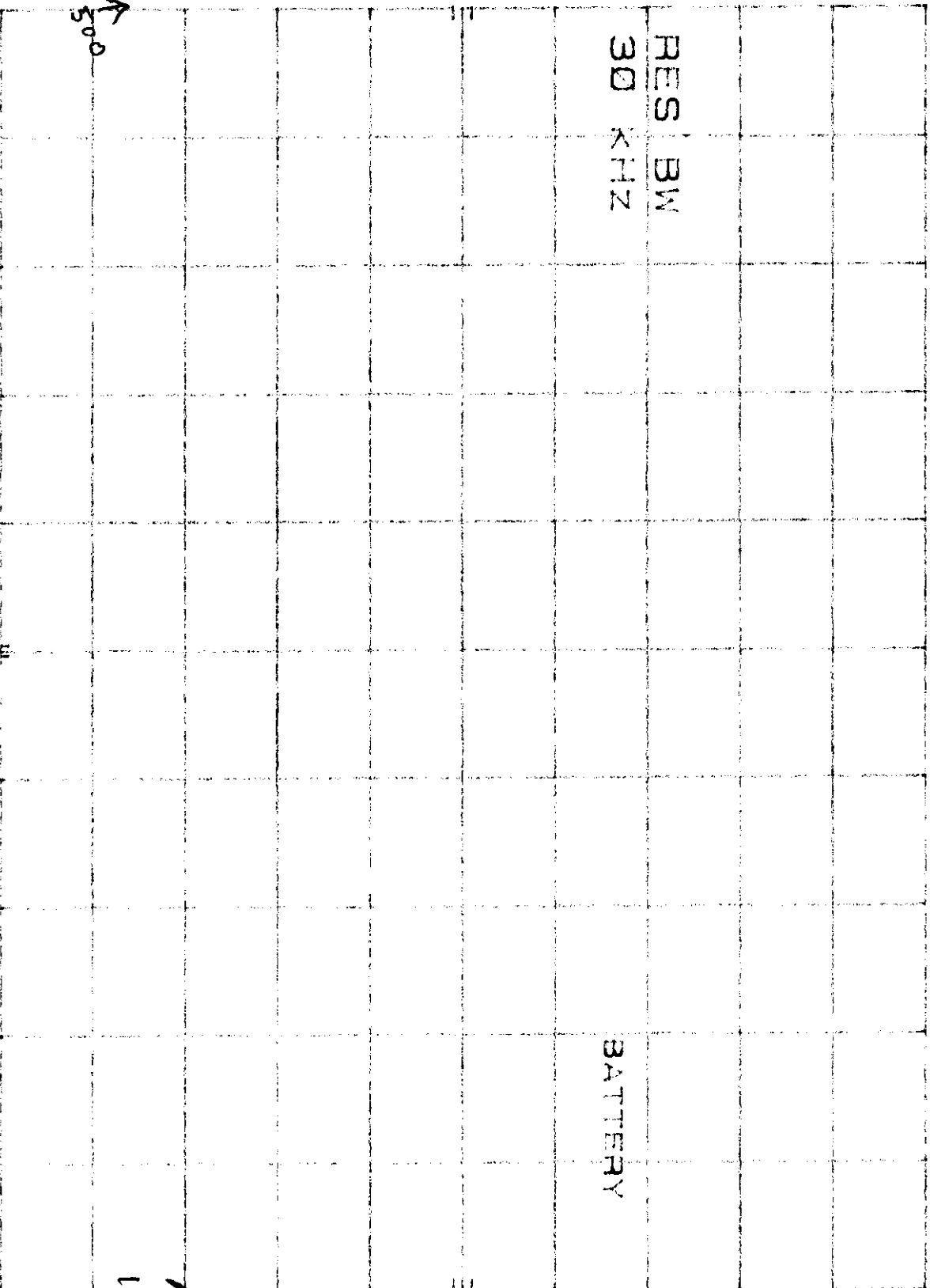
Speed Products Inc
Roland Cadotte
TruSpeed radar gun
FCC ID: NHHWSPED

HP

REF -10.0 dBm

ATTEN 0 dB

10 dB



CENTER 10.525 5 GHz

RES BW 30 KHZ

VBW 100 KHZ

SPAN 50.0 MHz

SMP 10.0 sec

5 MHz/div

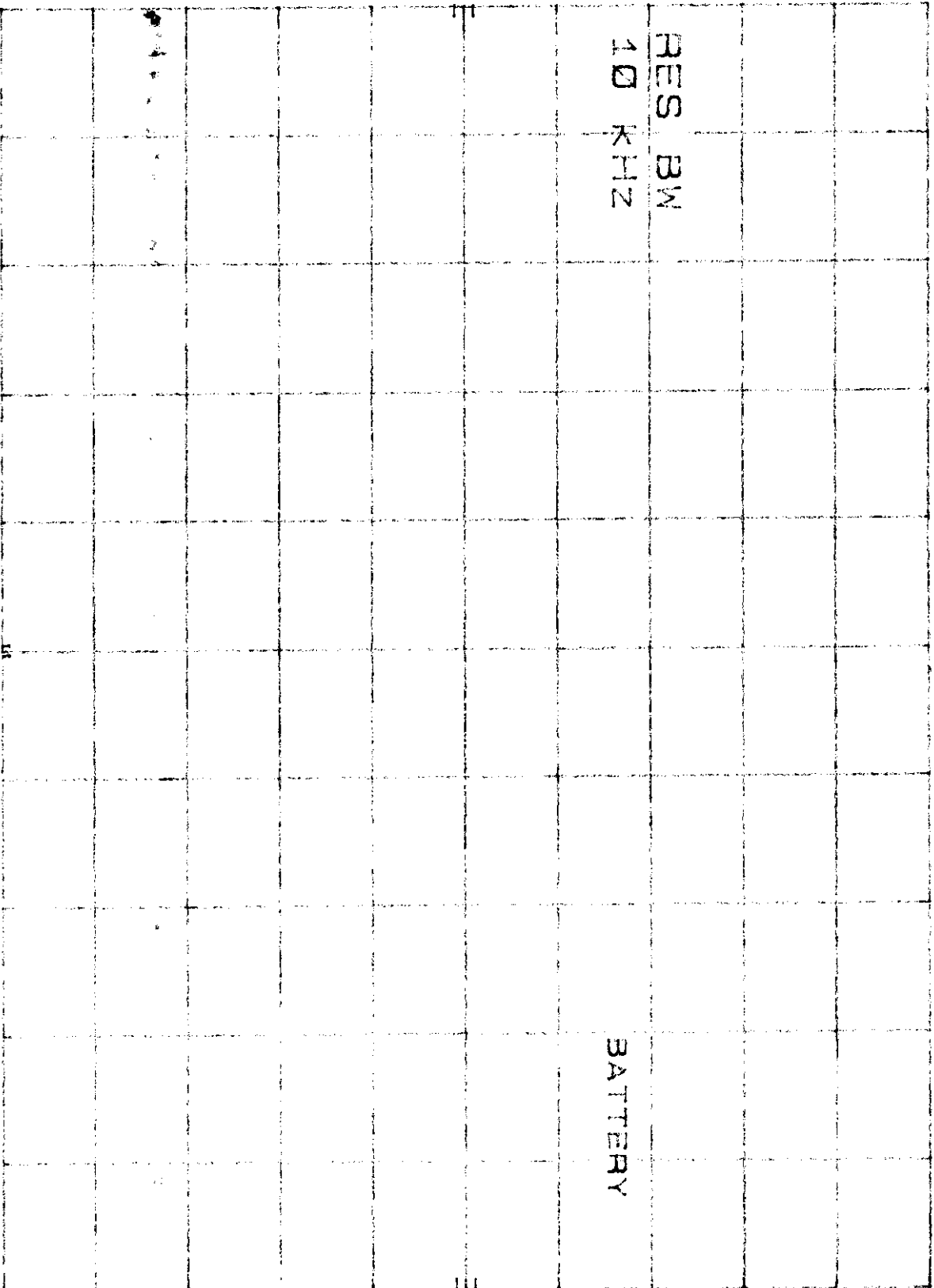
Speed Products Inc.
Roland Cadotte

TruSpeed radar gun

FCC ID: NHWSPEED

77 REF -10.0 dBm ATTEN 0 dB

10 dB/



CENTER 10.525 GHz

RES BW 10 KHZ

VBW 30 KHZ

SMP 3.00 sec

SPAN 100 MHz