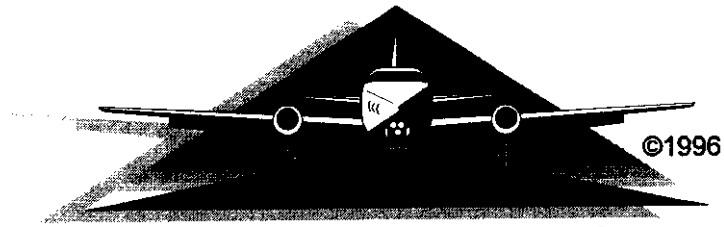
F : Acceptance Test Procedure

Transponder Landing System
Tactical Transponder Landing System



Advanced Navigation
& Positioning Corporation

CALIBRATION / BIT ASSEMBLY

DOCUMENT# 920-00123-070 REV. A

Approved: _____ **Date:** _____

Name: _____ **Title:** _____

ENGINEERING CHANGE ORDER RECORD

CALIBRATION / BIT ASSEMBLY

Document# 920-00106 REV. A

REVISION LEVEL	ISSUE DATE	REVISION DESCRIPTION	ECO #
A		INITIAL RELEASE	

TABLE OF CONTENTS

1. SCOPE

1.1 PURPOSE

The purpose of this test procedure is to check the operations of the Cal / BIT Assembly, P/N 920-00106, to the specifications set forth in the Calibration / BIT Assembly Specification document P/N 920-00123-010. Appendix A shows the cross reference between the specification and this test procedure.

2. EQUIPMENT NEEDED

Oscilloscope
Pulse Generator
Cal / BIT Assembly test drawer

3. PERFORMANCE TESTS

3.1 VISUAL INSPECTION

3.1.1 Visually inspect the Calibration BIT Assembly for test readiness. Check all connections are properly made, circuit breakers in the "ON" position and general workmanship.

3.2 OUTPUT PULSE CHECK

Note: Ensure unit is powered on for 30 minutes prior to the commencement of data collection.

Caution: To minimize the potential for damaging the assembly, ensure the output has proper load prior to powering up the assembly.

3.2.1 Connect the Calibration / BIT Assembly to be tested per *Figure* 3-1.

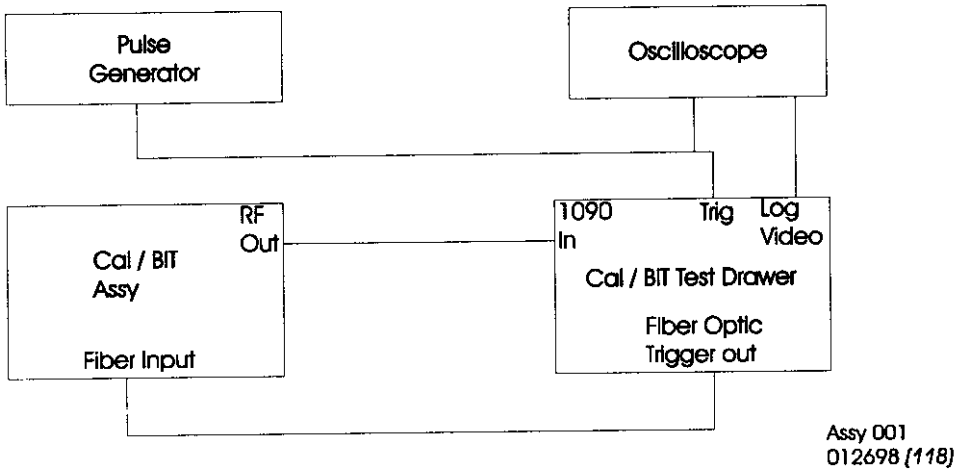


Figure 3-1

3.2.2 Set the Output of the Pulse generator as follows:

Pulse Width	450 nSec
Leading Edge	4.5 nSec
Trailing Edge	4.5 nSec
High Level	4.5 V
Low Level	0 V
Period	1 mSec

3.2.3 Set the oscilloscope up as follows:

Horizontal Scale	200 nSec / Div
Vertical Scale	500 mV / Div
Input Imp.	∞

3.2.4 Measure the rise time of the log video pulse from the 10% to 90% level. Record the value on the data sheet.

3.2.5 Measure the fall time of the log video pulse from the 90% to 10% level. Record the value on the data sheet.

3.2.6 Measure the pulse width of the log video pulse from the 90% level of the rising edge to the 90% level of the falling edge. Record the value on the data sheet.

3.2.7 Measure the log video pulse height and record the value on the data sheet.

3.2.8 Using the equation on the data sheet, calculate and record the output power of the Cal/BIT assembly.

APPENDIX B

Cal/BIT ASSEMBLY DATA SHEET
ANPC P/N 920-00106

Technician:_____ Date:_____ Time:_____
Calibration / BIT Assembly S/N:_____
BIT / Cal S/N:_____
Power Supply S/N:_____

Para.	Test	Min.	Actual	Max.	Units
3.2.4	Rise Time (10% to 90%)	60		90	n Sec
	Fall Time (90% to 10%)	75		200	n Sec
	Pulse Width (90% to 90%)	400		500	n Sec
	Pulse Height				V
3.2.5	Calculated Power	40		42	dBm

$$P_{out} = P_{cal} - \frac{(V_{cal} - V_{meas})}{L}$$

$$P_{out} = \_\_\_\_\_ - \frac{(\_\_\_\_\_ - \_\_\_\_\_)}{\_\_\_\_\_} = \_\_\_\_\_$$

Where P_{out} = output power of the assembly being tested
P_{cal} = the calibrated power level of the Cal / BIT assembly test drawer
V_{cal} = the calibrated voltage level of the Cal / BIT assembly test drawer
V_{meas} = the measured pulse height from the tested assembly data sheet
L = the log amp response in the Cal / BIT assembly test drawer

G : RF Output Measurements

BIT/Cal Transmitter Spectrum Analyzer Plots

Cal / BIT is a pulsed modulated signal source, making it difficult to see spurious outputs. Figures B1 and B2 shows the CW carrier leakage when the transmitter is in the OFF State. Leakage level is attenuated by 40 dB prior to S/A so actual leakage output power is –26 dBm.

- Figure B1

  B1 shows a 1.46 GHz span, looking for far out spurs (not present).

- Figure B2

  B2 shows a 1.0 MHz span, looking for near in spurs (not present).

- Figure B3

  B3 shows the pulse-modulated spectrum. Note the clean pulse shape.

Figure B1

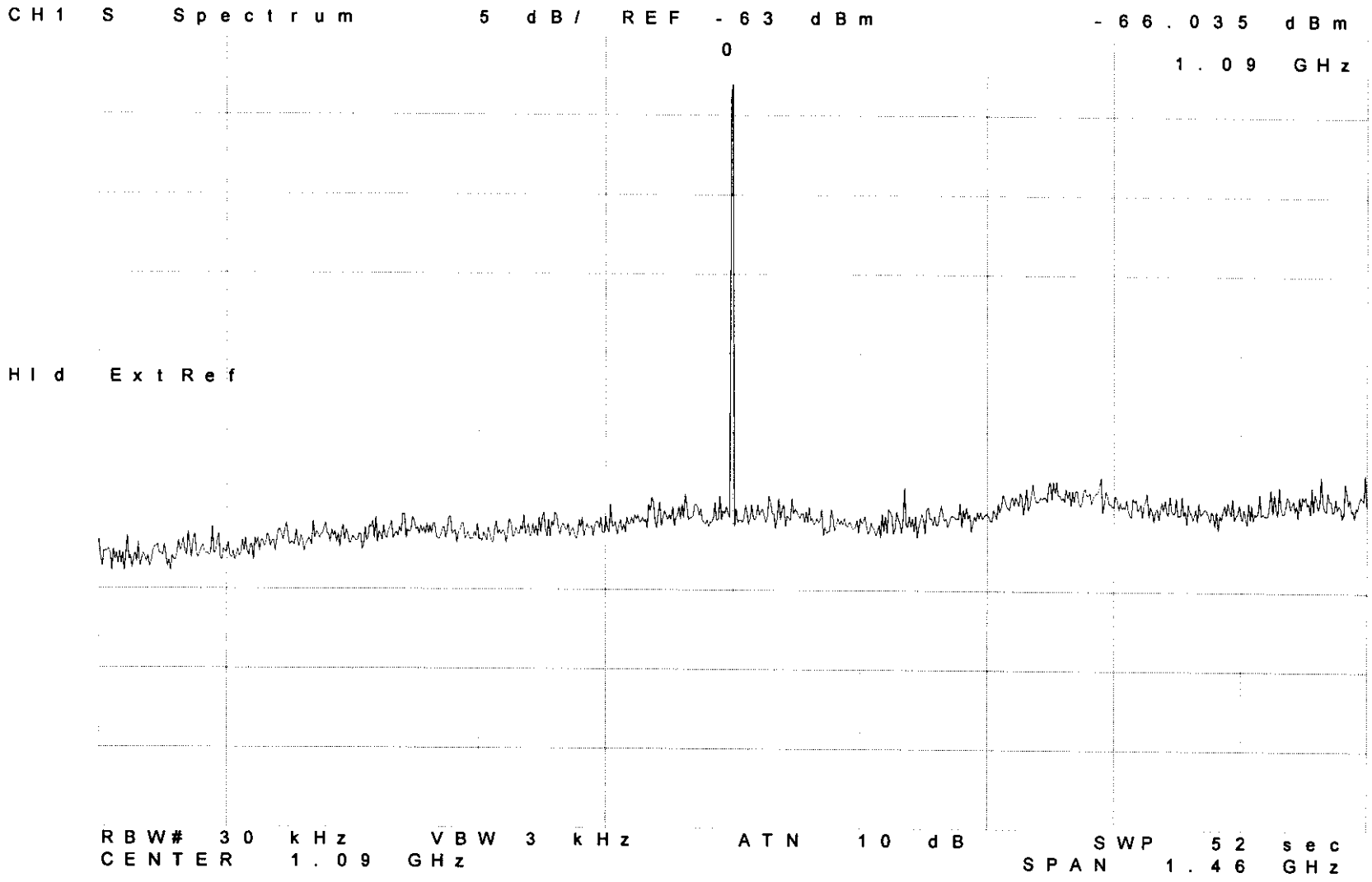

CH1 S Spectrum 5 dB/ REF -63 dBm
-66.035 dBm
0
1.09 GHz
Hld Ext Ref
RBW# 30 kHz VBW 3 kHz ATN 10 dB SWP 52 sec
CENTER 1.09 GHz SPAN 1.46 GHz

Figure B2

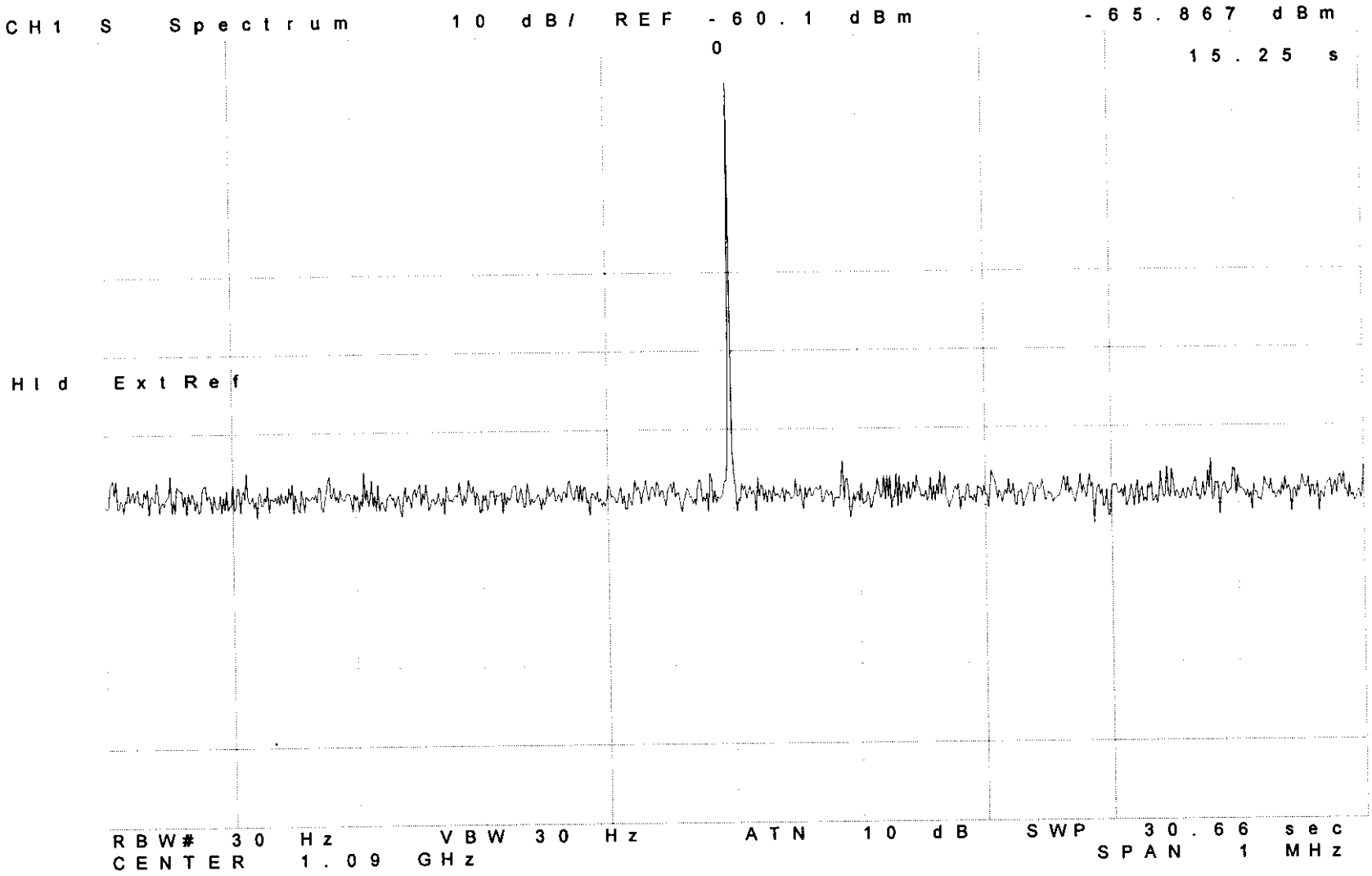
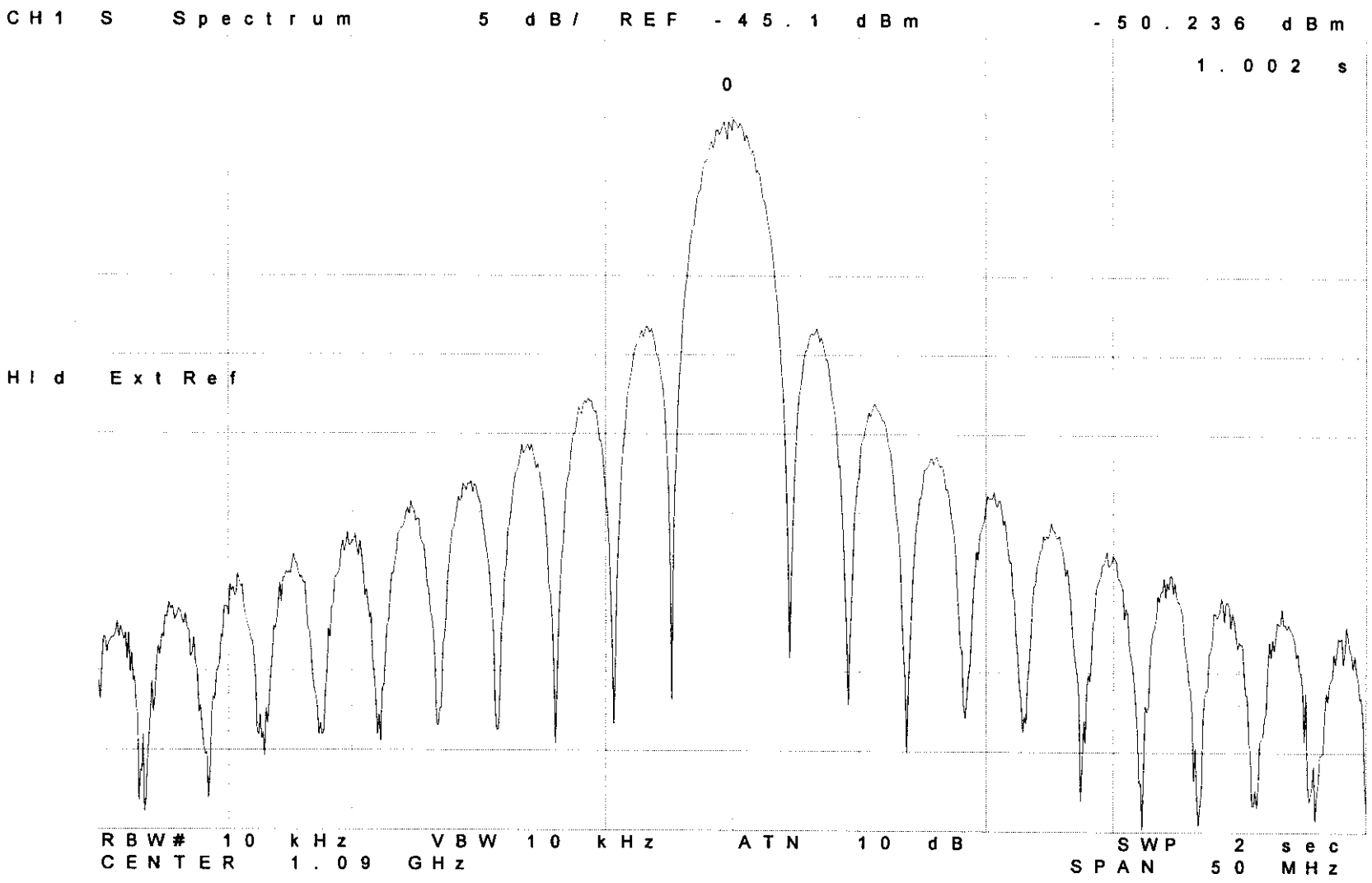

CH1 S Spectrum 10 dB/ REF -60.1 dBm
-65.867 dBm
0
15.25 s
Hld Ext Ref
RBW# 30 Hz VBW 30 Hz ATN 10 dB SWP 30.66 sec
CENTER 1.09 GHz
SPAN 1 MHz

Figure B3


CH1 S Spectrum
5 dB/ REF -45.1 dBm
-50.236 dBm
1.002 s
0
Hld Ext Ref
RBW# 10 kHz
VBW 10 kHz
ATN 10 dB
SWP 2 sec
CENTER 1.09 GHz
SPAN 50 MHz

H : Radiated Spurious Outputs

Radiated Spurious Emissions; ANPC Model 920-0123

Radiated Spurious measurements were conducted at Acme Testing in Acme, Washington. This testing facility is listed with the FCC and should have a facility description on file.

Carrier data:
See enclosed test report

Field Strength:
See enclosed test report

Most of the harmonics were not measurable or even locatable. This is in part due to good engineering practices in the design and construction. The photographs of the hardware construction delineate this point. Also, because this is all class-A amplification, fewer harmonics are generated.

ACME TESTING, 2002 VALLEY HWY, P.O. BOX 3, ACME, WASHINGTON 98220-0003 888 226-3837.

FCC PART 87
REPORT OF MEASUREMENTS

DEVICE: CAL/BIT

MODEL: 920-00123

MANUFACTURER: ADVANCED NAVIGATION & POSITIONING CORPORATION

ADDRESS: 11 THIRD STREET
PO BOX 838
HOOD RIVER OR 97031

THE DATA CONTAINED IN THIS REPORT WAS COLLECTED ON 20 & 21 APRIL 1998 AND COMPILED BY:

PAUL G. SLAVENS
CHIEF EMC ENGINEER

1. General

1.1 Manufacturer

Company Name:	Advanced Navigation & Positioning Corporation
Contact:	Mark J. Zanmiller
Street Address:	11 Third Street
Mailing Address:	PO Box 838
City/State/Zip:	Hood River OR 97031
Telephone:	541 386-1747
Fax:	541 386-2124
E-mail:	ANPC1@aol.com

1.2 Test location

Company:	Acme Testing
Street Address:	2002 Valley Highway
Mailing Address:	PO Box 3
City/State/Zip:	Acme WA 98220-0003
Laboratory:	Test Site 2
Telephone:	888 226-3837
Fax:	360 595-2722
E-mail:	acmetest@acmetesting.com
Web:	www.acmetesting.com
Receipt of EUT:	20 April 1998

1.3 Test Personnel

Paul G. Slavens

2. Test Results Summary

Summary of Test Results

920-00123 Cal/BIT

Paragraph No.	Test	Status
2.993	**Field Strength of Spurious Radiation**	**Pass**

The measurements contained in this report were made in accordance with the referenced standards and all applicable Public Notices received prior to the date of testing. Acme Testing assumes responsibility only for the accuracy and completeness of this data as it pertains to the sample tested.

The signed original of this report, supplied to the client, represents the only "official" copy. Retention of any additional copies (electronic or non-electronic media) is at Acme Testing's discretion to meet internal requirements only. The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units, and meet the requirements of the specifications referenced herein.

Paul G. Slavens
Chief EMC Engineer

24 APRIL 1998
Date of Issuance

3. Description of Equipment

3.1 Equipment Under Test (EUT)

Device:	Cal/BIT
Model Number:	920-00123
Serial Number:	None
FCC ID:	MPO920-0123
Power:	120 V/60 Hz
Grounding:	AC
Antenna Distance:	3 m

3.2 Mode of Operaton

The Cal/BIT was set up to generate 1090 MHz RF pulses at 40 dBm (peak power). 450 ns pulses were generated at a 10 ms period (10x normal operating prf).

4. Field Strength of Spurious Radiation

Paragraph No: 2.993

4.1 Test Procedures

The method of measurement is TIA/EIA-603 2.2.12.

4.2 Test Equipment

⇒ Spectrum Analyzer: Hewlett-Packard 8566B, Serial Number 2747A-05662, Calibrated: 4 September 1997, Calibration due Date: 4 September 1998

⇒ RF Preselector: Hewlett-Packard 85685, Serial Number 2510A-00106, Calibrated: 4 September 1997, Calibration due Date: 4 September 1998

⇒ Quasi Peak Adapter: Hewlett-Packard 85650A, Serial Number 2521A-00931, Calibrated: 4 September 1997, Calibration due Date: 4 September 1998

⇒ Broadband Biconical Antenna (20 MHz to 200 MHz): EMCO 3110, Serial Number 1115, Calibrated: 27 June 1997, Calibration due Date: 27 June 1998

⇒ Broadband Log Periodic Antenna (200 MHz to 1000 MHz): EMCO 3146, Serial Number 2853, Calibrated: 27 June 1997, Calibration due Date: 27 June 1998

⇒ Broadband Log Periodic Antenna (2 GHz - 18 GHz) , A & H Systems SAS-200/518, Serial Number 252, Calibrated: 16 June 1997, Calibration due Date: 16 June 1998

⇒ Roberts Dipole Antenna Set (30 MHz to 1000 MHz): Compliance Design A 100

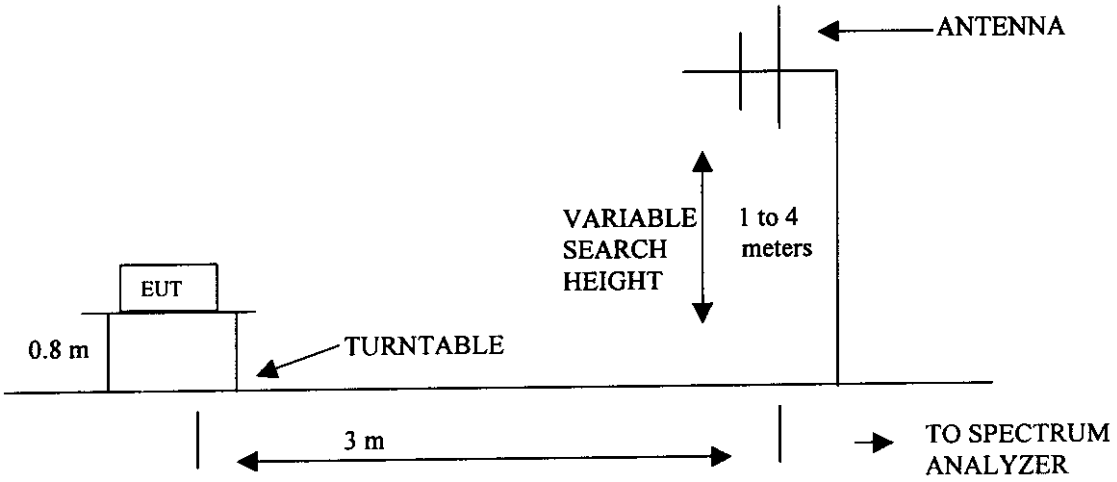
⇒ EUT Turntable Position Controller: EMCO 1061-3M 9003-1441, No Calibration Required

⇒ Antenna Mast: EMCO 1051 9002-1457, No Calibration Required

⇒ 2 GHz to 10 GHz Low Noise Preamplifier: Milliwave 593-2898, Serial Number 2494, Calibrated: 19 June 1997, Calibration due Date: 19 June 1998

⇒ Signal Generator: Wavetek 2500, Serial Number 001-4004, Calibrated: 21 July 1997, Calibration due Date: 21 July 1998

4.3 Test Set-up Block Diagram



4.4 Minimum Standard

When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth the attenuation for aeronautical station transmitters must be at least 43 + 10 $\log_{10}$ pY dB.

Calculation of necessary attenuation

Cal/BIT Transmitter Attenuation = 43 + 10 $\log_{10}$ 10 Watt = 53.0 dB

4.5 Test Results

Cal/BIT Transmitter

Frequency (MHz)	Field Strength (dBuV/m)	Effective Radiated Power (dBm)	Attenuation (dBc)
2142.83	62.0	-33.2	-73.2
3270.16	51.3	-43.9	-83.9
4359.71	69.9	-25.3	-65.3

5. Miscellaneous Comments and Notes

1. None.

6. List of Attachments

1. Photographs of EUT. (1)


ADVANCED
NAVIGATION
920-00123
20 APRIL 1998

I : Frequency Stability Measurements