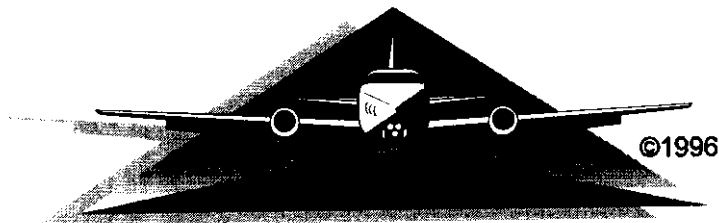


F: Acceptance Test Procedure

Transponder Landing System Tactical Transponder Landing System



*Advanced Navigation
& Positioning Corporation*

GTU TEST PROCEDURE

DOCUMENT# 920-00101-070

Approved: _____

Date: _____

Name: _____

Title: _____

Document# 920-00101-070

[illegible]

TABLE OF CONTENTS

Company Proprietary Data

ACRONYMS AND ABBREVIATIONS

ANPC	Advanced Navigation & Positioning Corporation
FAA	Federal Aviation Administration
TLS	Transponder Landing System and variants
TTLS	Transportable Transponder Landing System

Scope

This procedure provides for the setup and performance validation of the TLS Guidance Transmitter Unit (GTU) (ANPC P/N 920-00101).

3. TEST PROCEDURE

3.1 VISUAL INSPECTION

Prior to the application of power, visually inspect the GTU for complete and proper connections and good workmanship. Indicate completed inspection on the test data sheet.

3.2 CALIBRATION OF TEST CABLES

3.2.1 Connect localizer test cables per *Figure 1*.

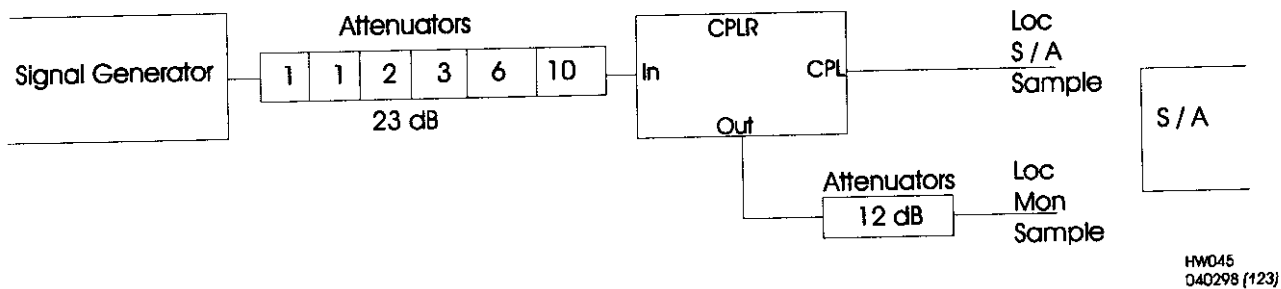


Figure 1

3.2.2 Verify carrier off on Signal Generator until S/A settings are verified. Set Signal Generator at 110 MHz 0 dBm. Measure and record the Loc S/A Sample and Localizer Monitor Sample power levels with the Spectrum Analyzer.

3.2.3 Calculate

3.2.4 Connect GS test cables per *Figure 2*.

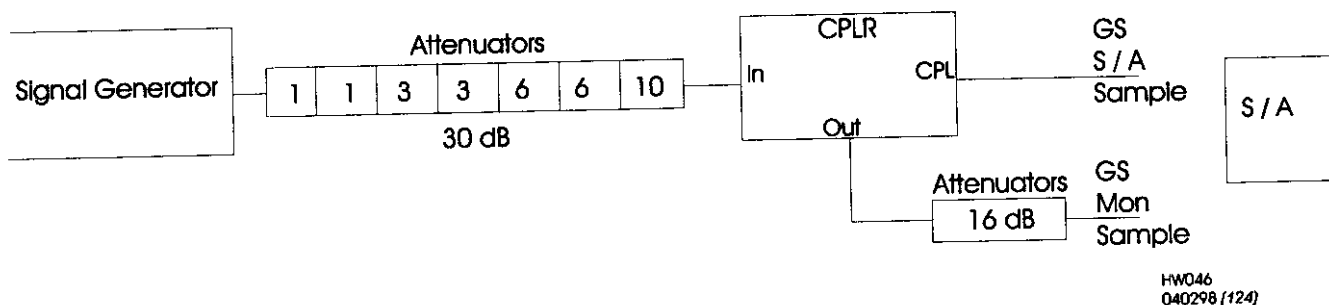


Figure 2

3.2.5 Set Signal Generator at 332 MHz 0 dBm. Measure and record the GS S/A Sample and GS Monitor Sample power levels with the Spectrum Analyzer.

3.2.6 Calculate

3.3 DC POWER FORMS

Apply AC power to the GTU. Turn the front panel power switch to the ON position.

3.3.1 Verify and indicate on the data sheet that the power ON indicator lights, and that both fans run.

3.3.2 Use test harness to enable 24V supply. Using a DMM, measure and record the voltages at the Power Supply DC connector. Verify that each power is within 2% of its expected value. Measure the +12V at the power pin of the Frequency Synthesizer .

3.4 LOCALIZER POWER / SDM SETTINGS

3.4.1 Connect test setup per *Figure 3*.

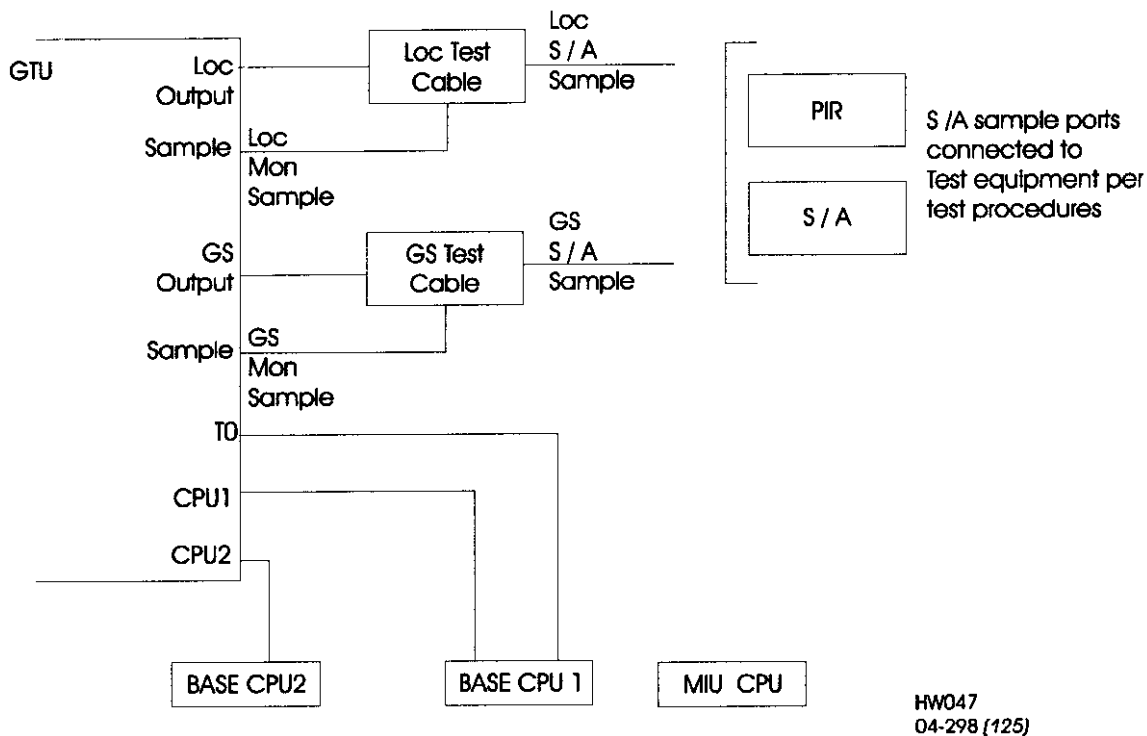


Figure 3

3.4.2 Connect the LOC S/A Sample to the PIR. Set the PIR to the Channel of test, Normal, SDM.

3.4.3 On the Localizer Transmitter Assembly, (ANPC P/N 920-00103), adjust the GAIN potentiometer fully clockwise (20 turn potentiometer).

3.4.4 Initiate test software by following the:

- a. Stop all base station Software
- b. On CPU1, run "ulCal_base".
- c. On CPU2, run "ulCal_base" by double clicking on the desktop shortcut of the same name.
- d. On MIU, run MIU
- e. On MIU interface "Tools" pulldown, select GTU Test.
- f. In the Control Field, enable the Localizer enable "button".
- g. In the Control Field, enable Localizer reset "button". Note that this reset is a "rising edge" reset and will have to be cycled if it is required to reset the transmitter. At this point, the Transmitter Status indicators should indicate both ON and SWR OK, and there should be non-zero numbers in the Monitor Carrier 90 Hz and 150 Hz fields.

With the transmitter enabled, let the transmitter warm up for 15 minutes.

3.4.5 Adjust the Loc Gain potentiometer CCW until the SDM reads 39.5% as read on the PIR.

3.4.6 Move the Loc S/A Sample to the Spectrum Analyzer.

Center = Channel of Choice Ref Value +10 dBm
SPAN = 2.4 KHz
RBW = AUTO
VBW = 3 Hz

3.4.7 Calculate desired carrier power = 24 – Localizer S/A Sample setup loss of paragraph 3.2.3.
Record desired carrier power.

3.4.8 Adjust the Localizer Gain potentiometer so that the carrier power matches the desired value. Record value.

3.4.9 By moving the Localizer S/A sample to the PIR and the S/A, adjust the GAIN potentiometer such that the SDM is $40 \pm 0.5\%$, and the carrier power is the desired value ± 1 dB. Record final % mod and power levels.

3.4.10 Turn the transmitter power off and put the test enable cable in power supply J1 (enables 24V). Turn Transmitter ON. Do NOT enable the transmitter with the SW interface.

3.4.11 Move the Localizer S/A Sample to the S/A.

Center = Channel of Choice
SPAN = 1 MHz
Ref level = -50 dBm
RBW = 300 Hz

3.4.12 Adjust the XMTR NULL potentiometer to minimize the signal. This nulled signal shall be a minimum of 40 dB below the “enabled” carrier level. Record the peak value. Make sure that any oscillations are tuned out.

3.4.13 Turn power off. Replace regular cable at power supply.

3.4.14 SA / Settings to :

Center = Channel of Choice
SPAN = 2.4 kHz
RBW = Auto
VBW = 3 Hz
Ref level = +10 dBm

3.4.15 Turn power on and enable the transmitter. Measure peak power. Verify that it is still equal to desired power ± 1 dB. Record carrier power.

3.4.16 Move the LOC S/A Sample to the PIR and verify that the SDM equals $40 \pm .5$. Record % MOD.

3.4.17 Carrier Frequency

Using the S/A, verify that the carrier frequency is equal to desired frequency ± 2 kHz. Record the carrier frequency.

3.4.18 Spurs

3.4.18.1 Move the LOC S/A Sample to the S/A. Change the S/A span and measure the largest signal in each Frequency window from the 150 Hz side tone. For each window, record frequency and power (Delta from 150).

	S/A Span	Frequency From 150 Hz Tone	Spec Limit
1	2.4 kHz	25 Hz – 145 Hz	-20 dB
2		145 Hz – 300 Hz	-25 dB
3		300 Hz – 800 Hz	-35 dB
4	20 kHz	800 Hz – 10 kHz	-40 dB
5	200 kHz	10 kHz – 100 kHz	-40 dB

3.4.19 Tones

3.4.19.1 Change the S/A span to 6 kHz.

3.4.19.2 In the GTU test interface, Tone Control window, enable the Morse tone.

3.4.19.3 On the S/A, verify that the tone is at 1020 ± 10 Hz and the power indicates $10 \pm 2\%$ modulation. Record Delta Frequency and power.

3.4.19.4 In the GTU test interface, Tone Control window, enable Tones A, B, and C.

3.4.19.5 On the S/A, verify that the tones are at 2000 ± 10 Hz, 700 ± 10 Hz, and 2500 ± 10 Hz for atones A, B, and C respectively and the power is indicates 30 to 35% modulation. Record Delta Frequency and power for each tone.

3.4.20 Carrier Harmonics

3.4.20.1 Disable the GTU

3.4.20.2 S/A settings to:

SPAN = 20 kHz
Ref level = -70 dBm
RBW = 10 Hz

Change the S/A Center frequency per the table. Enable the GTU and verify that the carrier harmonics are below - 70 dBm. Record the level of each carrier harmonics.

Carrier from 2x
3x
4x
5x

3.4.21 Harmonic Distortion

3.4.21.1 Connect the test equipment per *Figure 4*.

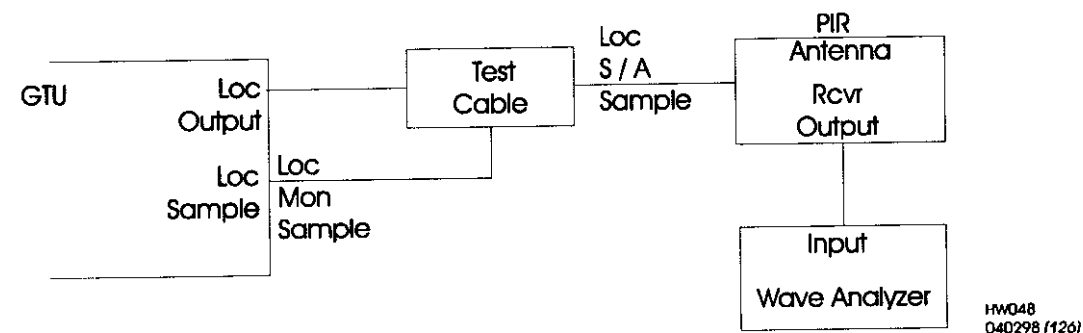


Figure 4

3.4.21.2 Turn Wave Analyzer function to FAST. Use AC input power only. Adjust the CAL knob full counter clockwise. Set the METER RANGE knob for 1V full scale.

3.4.21.3 Ensure that the Transmitter is enabled by checking that SDM is $40 \pm 1\%$ and DDM is $0 \pm .004$ on the PIR.

3.4.21.4 Tune the FREQUENCY knob to 90 Hz. Fine tune the FREQUENCY knob while increasing the CAL knob until a peak is clearly found. Adjust the CAL knob so that the 90 Hz peak is approximately 0.5 V.

3.4.21.5 Tune the FREQUENCY knob to the 150 Hz peak. If the 150 is less than full scale, do NOT change the CAL knob. Record the max value. If the 150 Hz peak is at full scale, adjust the CAL knob so that the 150 Hz peak is approximately 0.8 volt, and repeat measurement of the 90 Hz peak per step 3.4.21.4 . (Both 90 and 150 recorded measurements are with same CAL knob setting).

3.4.21.6 Peak the FREQUENCY knob for the lower amplitude of the two frequencies. Adjust the CAL knob so that the peak is full scale (10 volt mark). *Do not adjust the CAL knob after this step.*

3.4.21.7 Tune the FREQUENCY knob to peak reading at each of the following frequencies: 30, 60, 120, 180, 240, 270, 300, 360, 390, 450 Hz. At each frequency, change the meter range as required to get an on scale reading. Record the peak voltage (in MV) for each frequency.

3.4.21.8 Calculate and record harmonic distortion for each frequency.

$HD\% = (\text{Amplitude at harmonic frequency (MV)} / 1000 \text{ MV}) * 100$. Each harmonic shall be less than 5%.

3.4.21.9 Calculate total harmonic distortion. $TH = \text{RSS}$ (square root of the sum of the squares of all of the harmonic elements measured in 3.4.21.7. The total harmonic distortion % is then = $(\text{RSS amplitude of all harmonic (MV)} / 1000 \text{ MV}) * 100$ and shall be less than 10%.

3.5 GLIDE SLOPE POWER / SDM SETTINGS

3.5.1 Connect test setup per *Figure 3*, (paragraph 3.4.1).

3.5.2 Connect the Glide Slope S/A Sample to the PIR. Set the PIR to the Channel of test, Normal, SDM.

3.5.3 On the Glide Slope Transmitter Assembly, (ANPC P/N 920-00103), adjust the GAIN potentiometer fully clockwise (20 turn potentiometer).

3.5.4 Initiate test software by following the:

- a. Stop all base station Software
- b. On CPU1, run "ulCal_base".
- c. On CPU2, run "ulCal_base" by double clicking on the desktop shortcut of the same name.
- d. On MIU, run MIU

- e. On MIU interface “Tools” pulldown, select GTU Test.
- f. In the Control Field, enable the Localizer enable “button”.
- g. In the Control Field, enable Localizer reset “button”. Note that this reset is a “rising edge” reset and will have to be cycled if it is required to reset the transmitter. At this point, the Transmitter Status indicators should indicate both ON and SWR OK, and there should be non-zero numbers in the Monitor Carrier 90 Hz and 150 Hz fields.
- h. In the Control Field, enable the Glide Slope enable “button”.
- i. In the Control Field, enable Glide Slope reset “button”. Note that this reset is a “rising edge” reset and will have to be cycled if it is required to reset the transmitter. At this point, the Transmitter Status indicators should indicate both ON and SWR OK, and there should be non-zero numbers in the Monitor Carrier 90 Hz and 150 Hz fields.

With the transmitter enabled, let the transmitter warm up for 15 minutes.

3.5.5 Adjust the Glide Slope Gain potentiometer CCW until the SDM reads 79.5%.

3.5.6 Move the Glide Slope S/A Sample to the Spectrum Analyzer.

Center = Channel of Choice Ref Value +10 dBm
SPAN = 2.4 KHz
RBW = AUTO
VBW = 3 Hz

3.5.7 Calculate desired carrier power = 34 – Glide Slope S/A Sample setup loss of paragraph _____. Record desired carrier power.

3.5.8 Adjust the Glide Slope Gain potentiometer so that the carrier power matches the desired value. Record value.

3.5.9 By moving the Glide Slope S/A sample to the PIR and the S/A, adjust the GAIN potentiometer such that the SDM is $80 \pm 1.0\%$, and the carrier power is the desired value ± 1 dB. Record final % mod and power levels.

3.5.10 Turn the transmitter power off and put the test enable cable in power supply J1 (enables 24V). Turn Transmitter ON. Do NOT enable the transmitter with the SW interface.

3.5.11 Move the Glide Slope S/A Sample to the S/A.

Center = Channel of Choice
SPAN = 1 MHz
Ref level = -50 dBm
RBW = 300 Hz

3.5.12 Adjust the XMTR NULL potentiometer to minimize the signal. Record the peak value. Make sure that any oscillations are tuned out.

3.5.13 Turn power off. Replace regular cable at power supply.

3.5.14 SA / Settings to :

Center = Channel of Choice

SPAN = 2.4 kHz

RBW = Auto

VBW = 3 Hz

Ref level = +10 dBm

3.5.15 Turn power on and enable the transmitter. Measure peak power. Verify that it is still equal to desired power ± 1 dB. Record carrier power.

3.5.16 Move the Glide Slope S/A Sample to the PIR and verify that the SDM equals $80 \pm .1$. Record % MOD.

3.5.17 Carrier Frequency

Using the S/A, verify that the carrier frequency is equal to desired frequency ± 6 kHz. Record the carrier frequency.

3.5.18 Spurs

3.5.18.1 Move the Glide Slope S/A Sample to the S/A. Change the S/A span and measure the largest signal in each Frequency window from the 150 Hz side tone. For each window, record frequency and power (Delta from 150).

	S/A Span	Frequency From 150 Hz Tone	Spec Limit
1	2.4 kHz	25 Hz – 145 Hz	-20 dB
2		145 Hz – 300 Hz	-25 dB
3		300 Hz – 800 Hz	-35 dB
4	20 kHz	800 Hz – 10 kHz	-40 dB
5	200 kHz	10 kHz – 100 kHz	-40 dB

* Note: Use data hold max – in Measurement Display menu

3.5.19 Carrier Harmonics

3.5.19.1 Disable the GTU

3.5.19.2 S/A settings to:

SPAN = 20 kHz

Ref level = -70 dBm

RBW = 10 Hz

Change the carrier frequency per the table. Enable the GTU and verify that the carrier harmonics are below - 70 dBm. Record the level of each carrier harmonics

Carrier from 2x
3x
4x
5x

If unmeasurable at these settings, i.e. , less than -120 dBm, just mark as such.

3.5.20 Harmonic Distortion

3.5.20.1 Connect the test equipment per Figure 5.

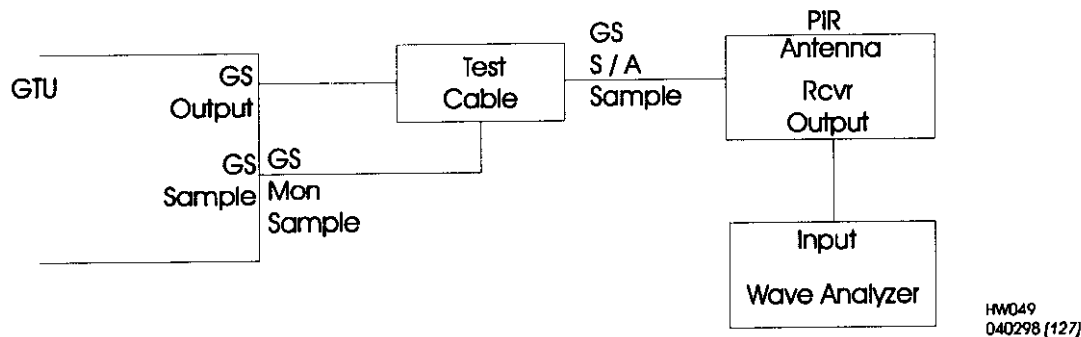


Figure 5

3.5.20.2 Turn on the Wave Analyzer. Use AC input power only. Adjust the CAL knob full counter clockwise. Set the METER RANGE knob for 1V full scale.

3.5.20.3 Ensure that the Transmitter is enabled by checking that SDM is $80 \pm 1\%$ and DDM is $0 \pm .004$ on the PIR.

3.5.20.4 Tune the FREQUENCY knob to 90 Hz. Fine tune the FREQUENCY knob while increasing the CAL knob until a peak is clearly found. Adjust the CAL knob so that the 90 Hz peak is approximately 0.5 V. Record the max value.

3.5.20.5 Tune the FREQUENCY knob to the 150 Hz peak. If the 150 is less than full scale, do NOT change the CAL knob. Record the max value. If the 150 Hz peak is at full scale, adjust the CAL knob so that the 150 Hz peak is approximately 0.8 volt, and repeat measurement of the 90 Hz peak per step 3.5.21.4. (Both 90 and 150 recorded measurements are with same CAL knob setting).

3.5.20.6 Peak the FREQUENCY knob for the frequency with the lower amplitude of the two frequencies. Adjust the CAL knob so that the peak is full scale (10 volt mark). *Do not adjust the CAL knob after this step.*

3.5.20.7 Tune the FREQUENCY knob to peak reading at each of the following frequencies: 30, 60, 120, 180, 240, 270, 300, 360, 390, 450 Hz. At each frequency, change the meter range as required to get an on scale reading. Record the peak voltage (in MV) for each frequency.

3.5.20.8 Calculate and record harmonic distortion for each frequency.

$HD\% = (\text{Amplitude at harmonic frequency (MV)} / 1000 \text{ MV}) * 100$. Each harmonic shall be less than 5%.

3.5.20.9 Calculate total harmonic distortion. $TH = \text{RSS}$ (square root of the sum of the squares of all of the harmonic elements measured in 3.5.21.7. The total harmonic distortion % is then = $(\text{RSS amplitude of all harmonic (MV)} / 1000 \text{ MV}) * 100$ and shall be less than 10%.

3.6 MONITOR ADJUSTMENT

3.6.1 Turn the GTU Transmitter OFF

3.6.2 Remove the transmitter cover and insert a header jumper across the two pin connector labeled FRQ KEY at the back/ top of the GTU control board.

3.6.3 Set up the transmitter per Figure 3. Connect the S/A sample to the PIR.

3.6.4 Turn the GTU ON. Enable the transmitter via the Maintenance Interface.

3.6.5 Adjust both the LOC Mon Gain and GS Mon potentiometers full clockwise. Adjust these potentiometers counter clockwise until GTU test window Monitor readings for carrier power are 3000 ± 100 .

3.6.6 Place cover on transmitter and allow 15 minutes transmitter ON time prior to continuing evaluation / test.

3.6.7 Change Localizer DDM control settings and record carrier 90 and 150 Hz monitor levels and PIR SDM and DDM values at +0.18 and -0.18 DDM.

Note: Localizer PIR DDM polarity is opposite of MIU display.

3.6.8 For the Glide Slope, change DDM control settings and record carrier 90 and 150 Hz monitor levels and PIR SDM and DDM values at +0.20 and -0.20 DDM.

Note: Glideslope PIR DDM polarity is opposites of MIU display.

3.6.9 Using Excel worksheet "Monitor Correction Calculator.xls", size ____KB, created _____. Enter the carrier, 90 and 150 Hz values in the entry fields per instructions on the worksheet. Print out the worksheet and attach to the data sheet.

3.6.10 In the GTU Test Interface, depress the Monitor Scale Factors button. In the Monitor Scaling window, enter the calculated ratio and offset numbers.

3.6.11 In the Monitor Scaling window, depress the Send to Bases button. Verify that the Base 1 and Base 2 readbacks are the same as the control fields.

3.6.12 Remove the jumper from the FRQ KEY convector on the GTU control board. Replace the transmitter cover.

3.6.13 In the Monitor Scaling window, depress the Read from Bases button. Verify that the Base 1 and Base 2 readbacks are the same as the control fields.

3.6.14 In the Monitor Scaling window, depress the Done button. Re-enter the Glideslope and Localizer outputs.

3.6.15 For the Localizer signal, change DDM control settings per list below and record monitor SDM, monitor DDM, PIR SDM, and PIR DDM values. SDM values for Localizer shall be $40 \pm 1\%$ and DDM values shall be setting $\pm .002$.

+ .18, + .015, .012, .09, .06, .03, .00, -.03, -.06, -.09, -.12, -.15, -.18

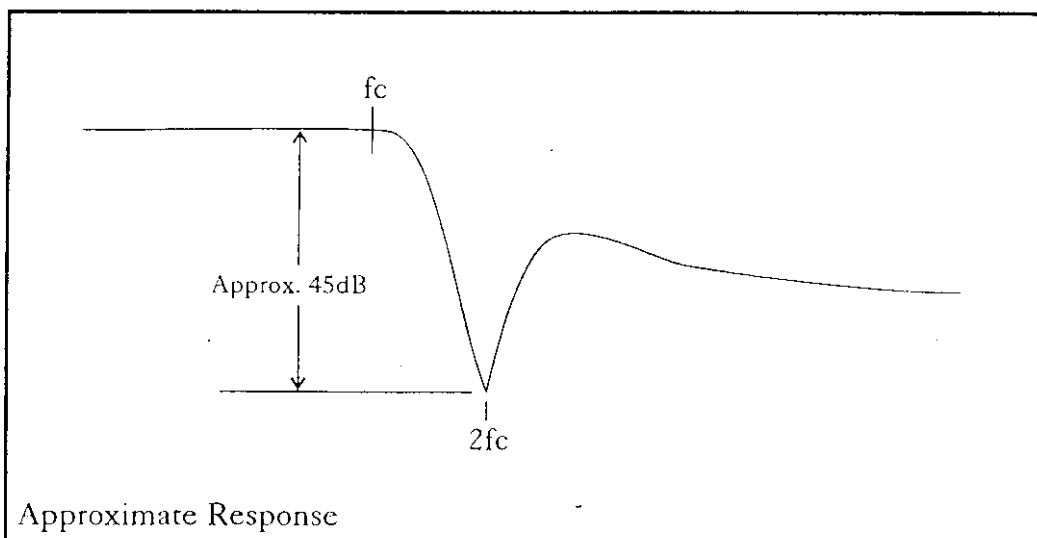
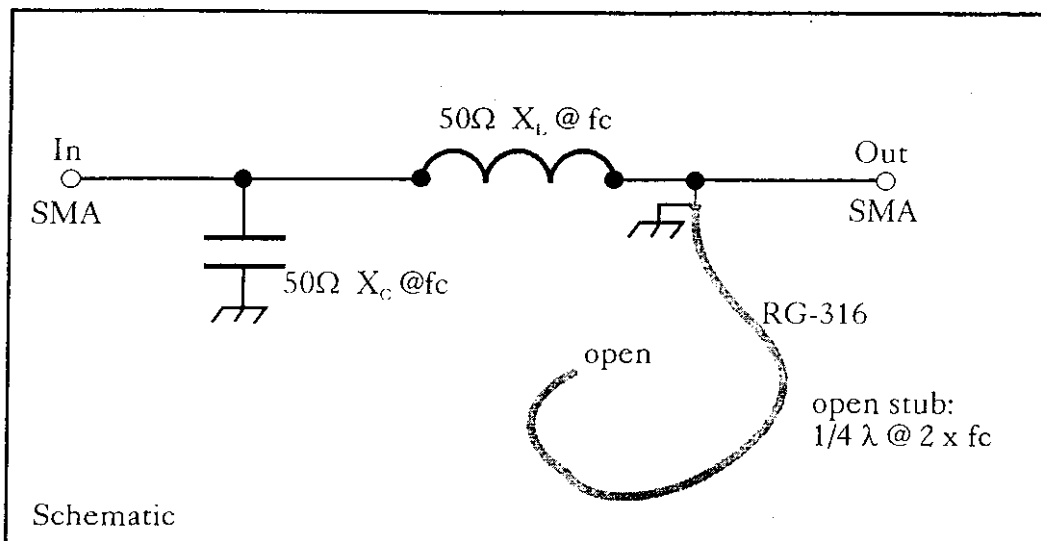
Note: PIR readings on DDM are reversed polarity.

3.6.16 For the Glideslope signal, change DDM control settings per the list below and record monitor SDM, Monitor DDM, PIR SDM, and PIR DDM values. SDM values for Glideslope shall be $80.0 \pm 2\%$ and DDM values shall be setting $\pm .004$.

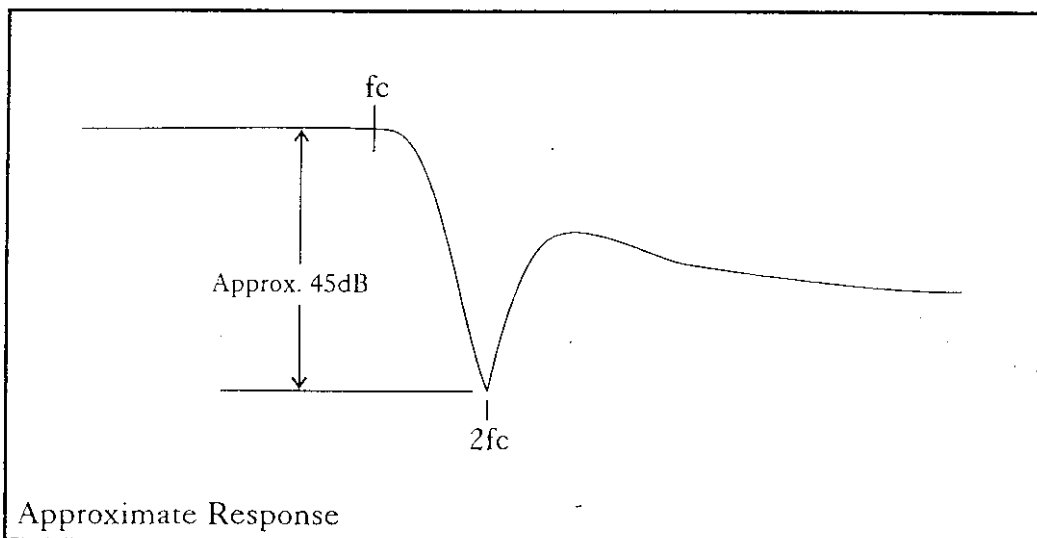
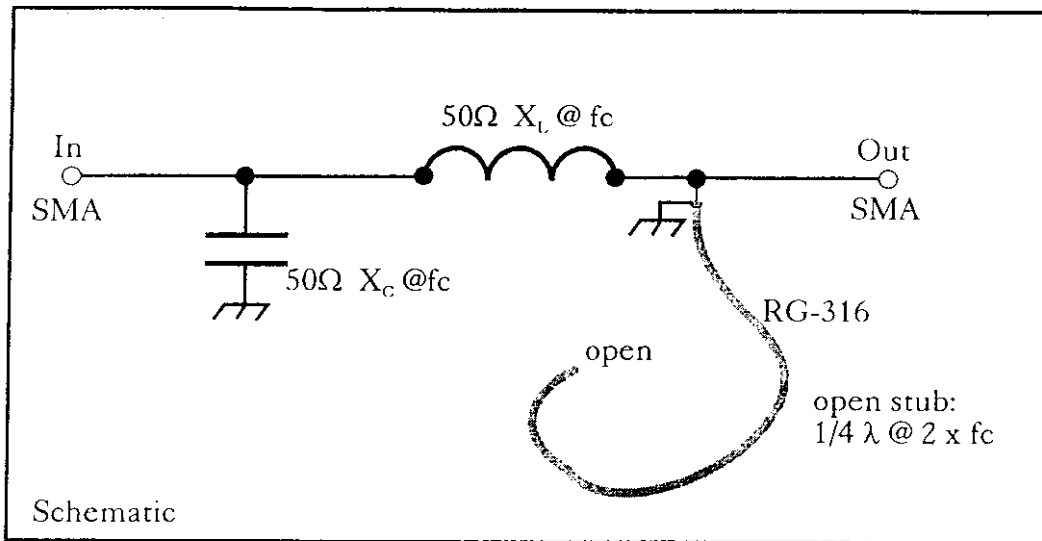
.2, .18, .14, .10, .06, .02, 0.00, -.02, -.06, -.10, -.14, -.18, -.2

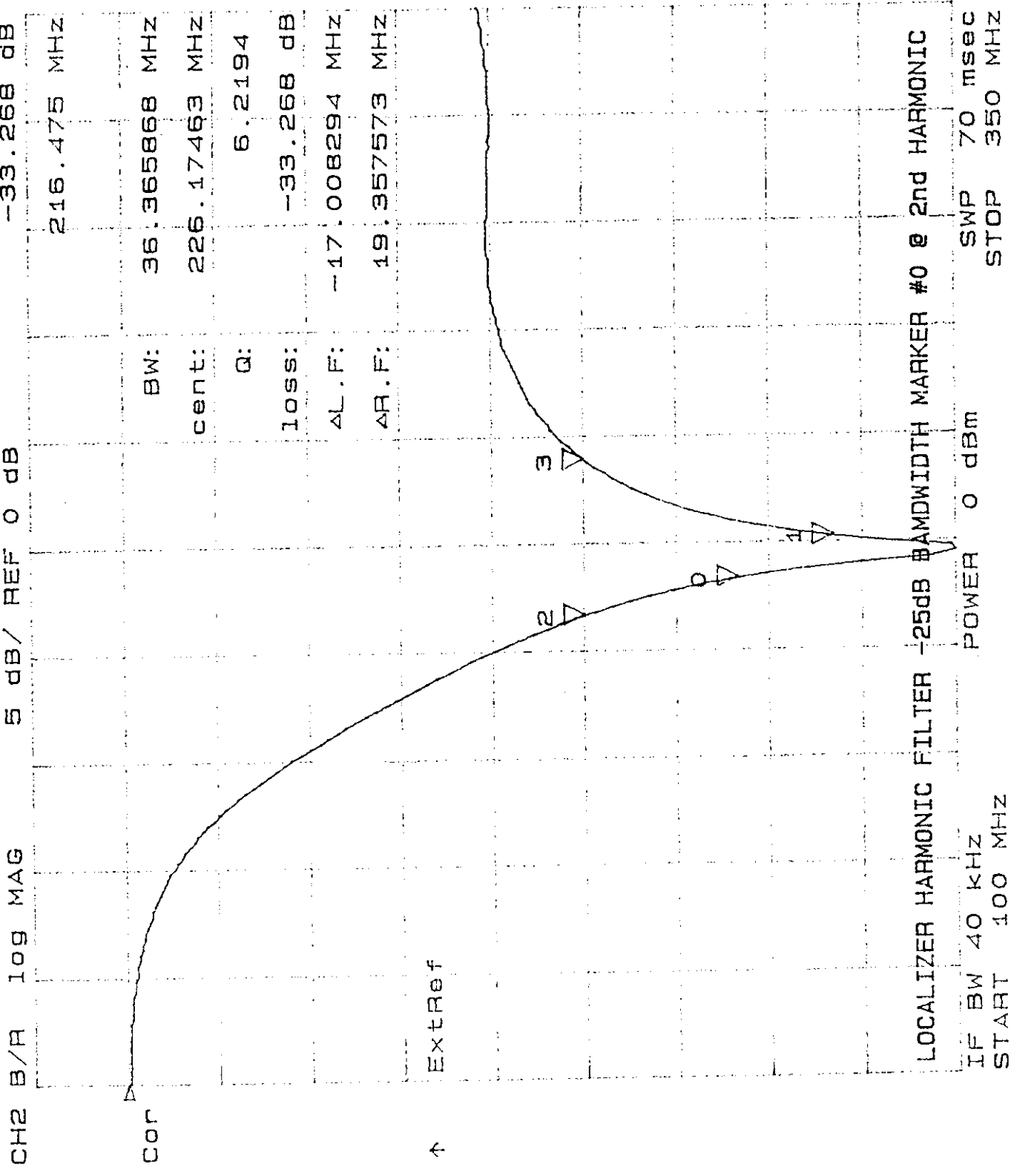
G: Filter Data

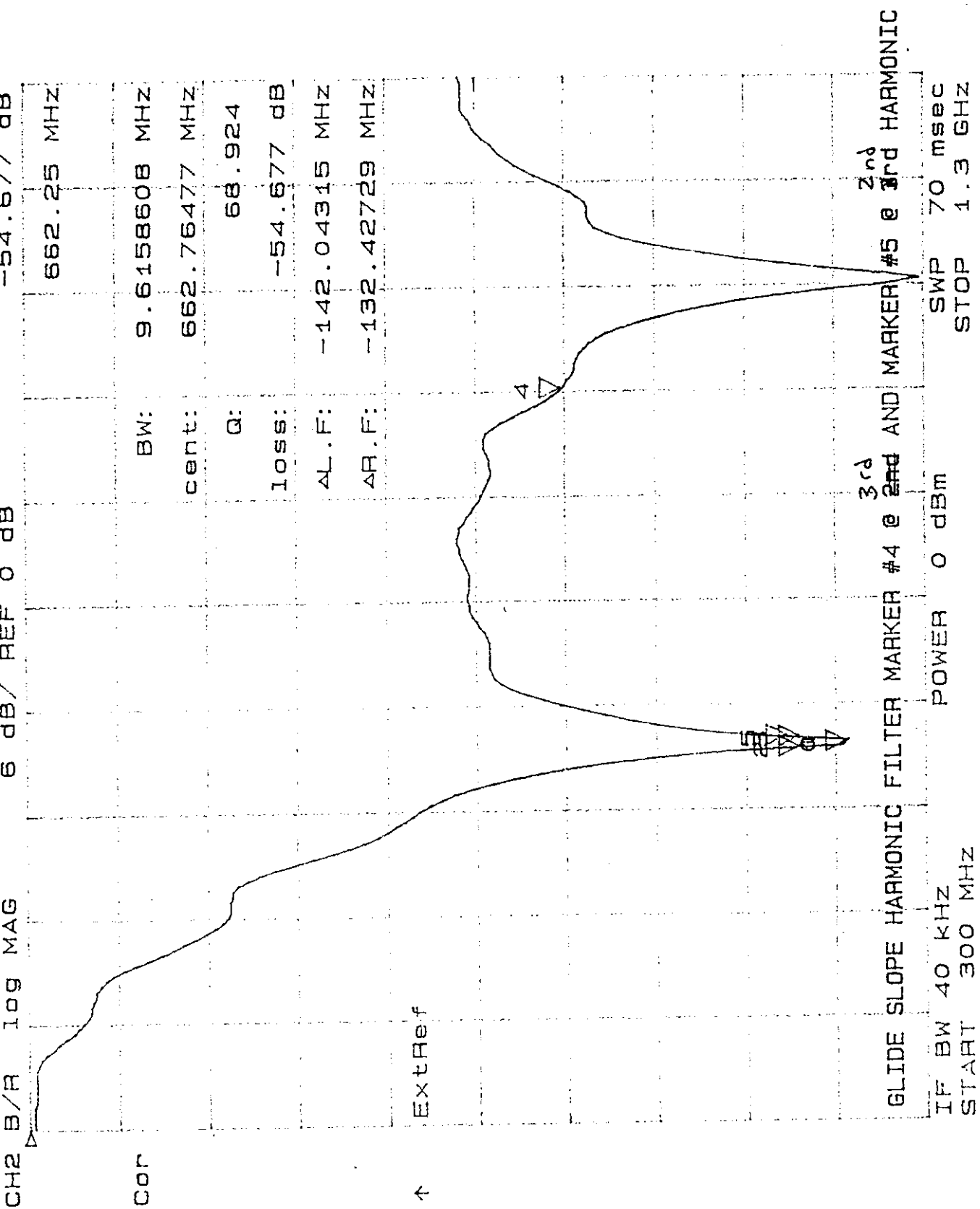
Final Harmonic Filter for Model 920-0101 Transmitter



Final Harmonic Filter for Model 920-0101 Transmitter







H: RF Output Measurements

GTU Transmitter Glide Slope Spectrum Analyzer Plots

For all plots, carrier is at 333.95 MHz.

- Figure G1

Plot shows that the 2nd harmonic is the only measurable signal out to the 5th harmonic.

- Figure G2

Using a 2 MHz span, plot shows that no close-in spurious products above 70 dB down from desired frequency exist.

- Figure G3

Using a 10 kHz span demonstrates that no harmonics out to the 5th harmonic of the 90 and 150 sidebands exist above 20 dB down. Note the measurable spurs at 3.6 kHz are remnants of the modulation synthesizer sample frequency.

- Figure G4

Using a 1 kHz span shows the 90 and 150 sidetones and their harmonics. Measured harmonics were all more than 20 dB down from the 90 and 150 Hz sidebands.

Figure G1

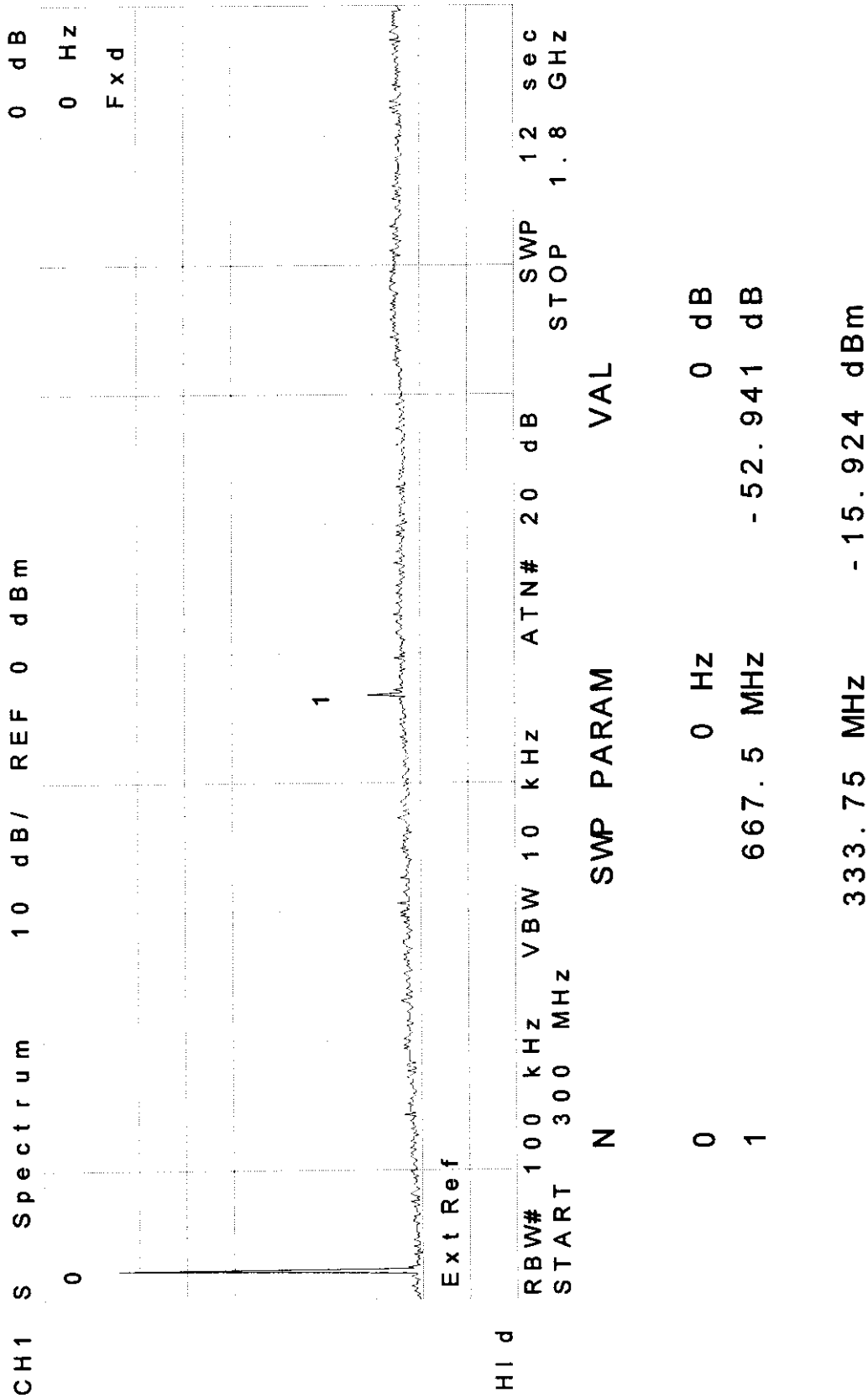


Figure G2

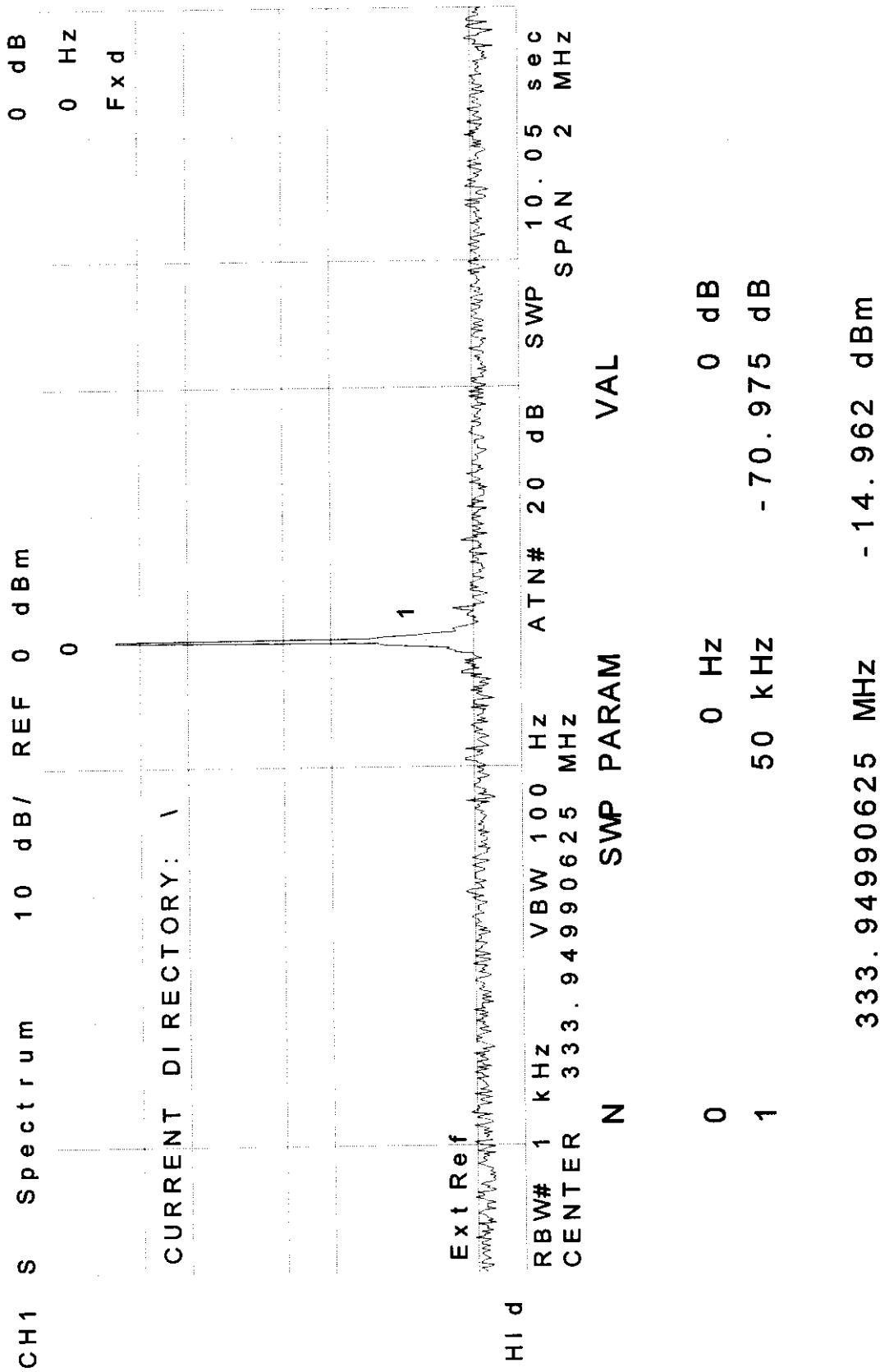


Figure G3

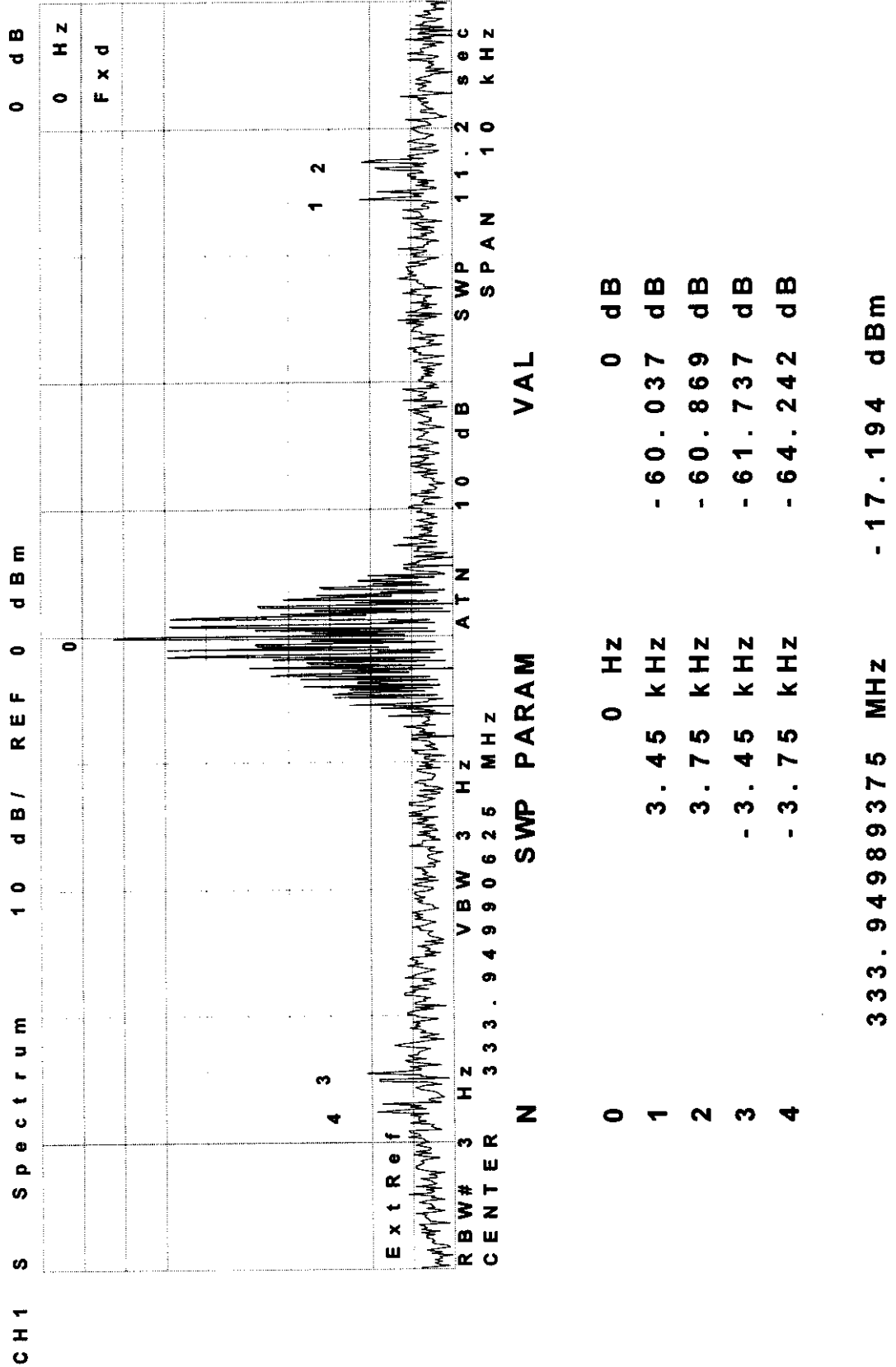
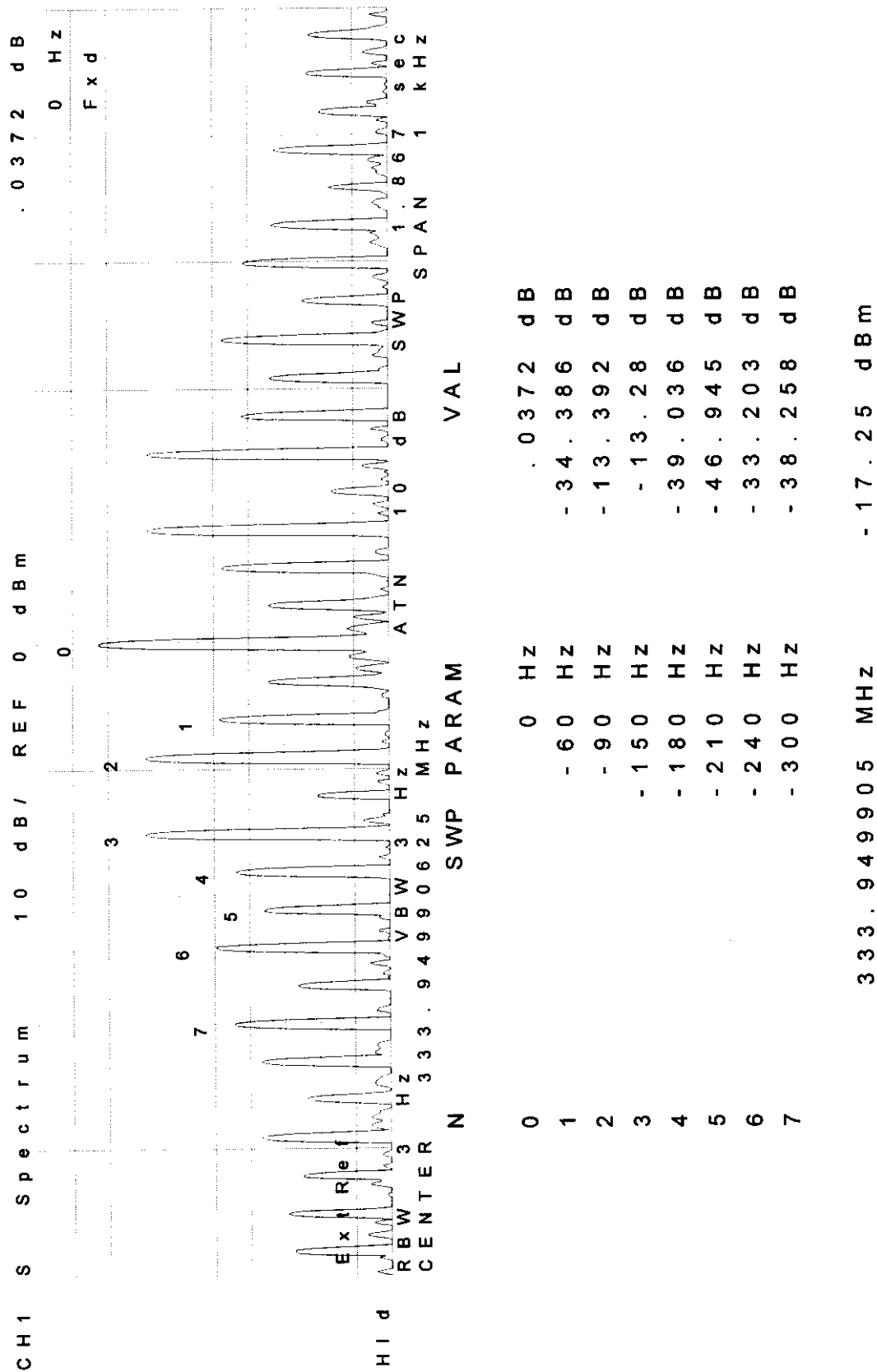


Figure G4



GTU Transmitter Localizer Spectrum Analyzer Plots

For all plots, carrier is at 108.35 MHz.

- Figure L1

Plot shows that the 1st harmonic is the only measurable signal out to the 5th harmonic.

- Figure L2

Using a 2 MHz span, plot shows that no close-in spurious products above 67 dB down from desired frequency exist.

- Figure L3

Using a 10 kHz span demonstrates that no harmonics out to the 5th harmonic of the 90 and 150 sidebands exist above 20 dB down.

- Figure L4

Using a 1 kHz span shows the 90 and 150 sidetones and their harmonics. Measured harmonics were all more than 20 dB down. Note the measurable spurs at 3.6 kHz are remnants of the modulation synthesizer sample frequency.

- Figure L5

Using a 10 kHz span with the 700 Hz tone on, harmonics were greater than 30 dB down.

- Figure L6

Using a 10 kHz span with the 1020 Hz tone on, harmonics were greater than 35 dB down.

- Figure L7

Using a 10 kHz span with the 2000 Hz tone on, harmonics were greater than 30 dB down.

- Figure L8

Using a 10 kHz span with the 2500 Hz tone on, harmonics were greater than 30 dB down.

Figure L1

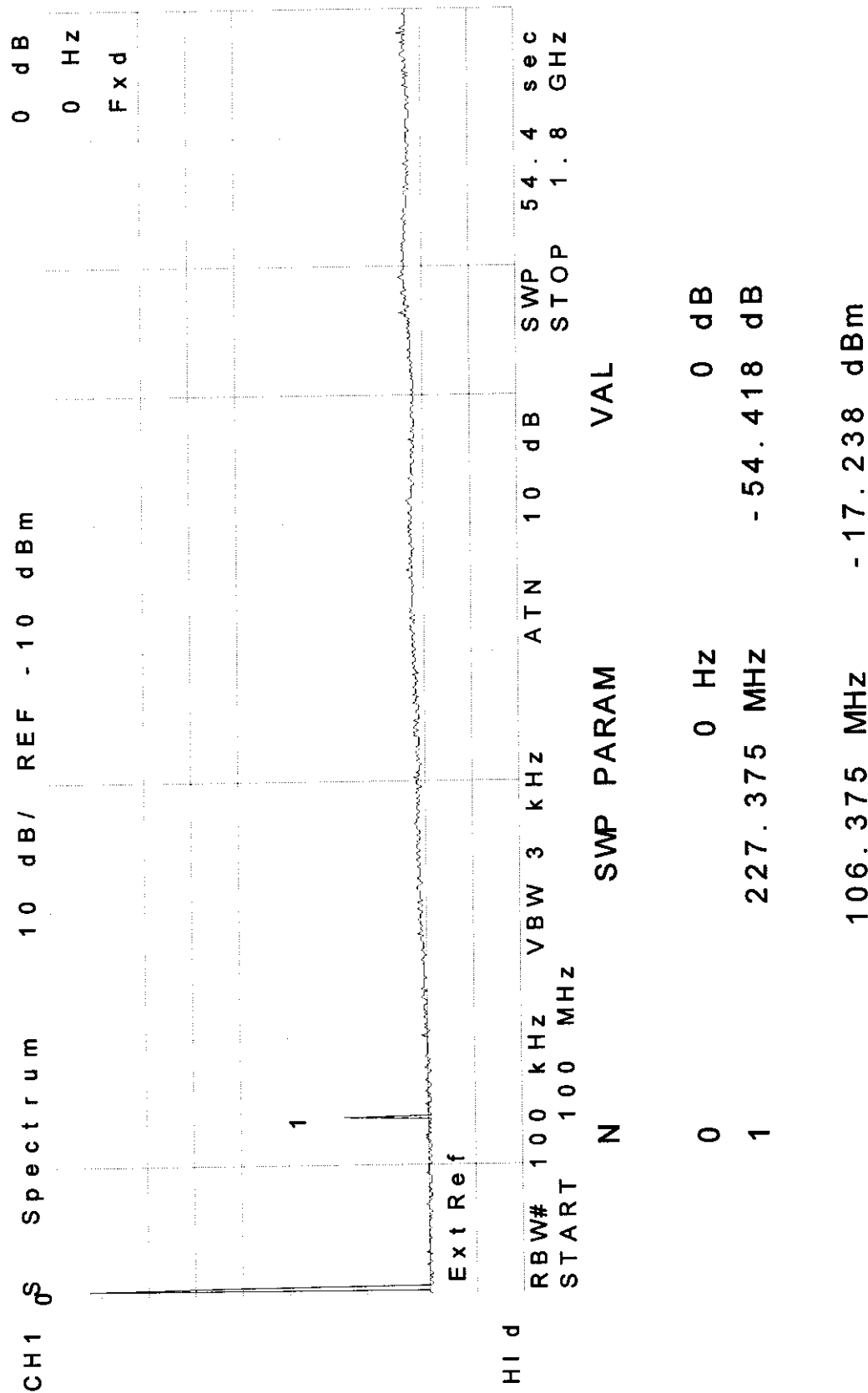


Figure L2

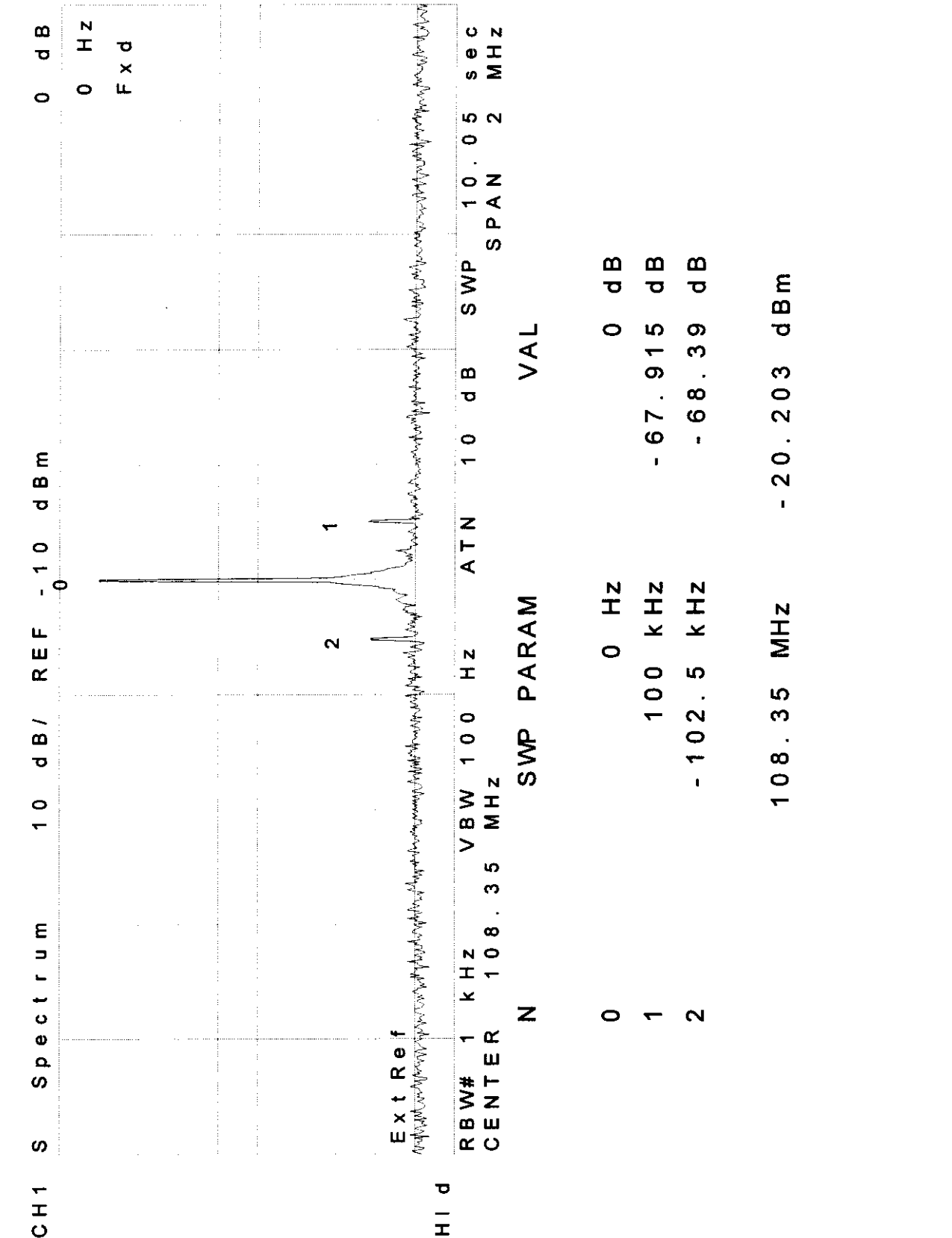


Figure L3

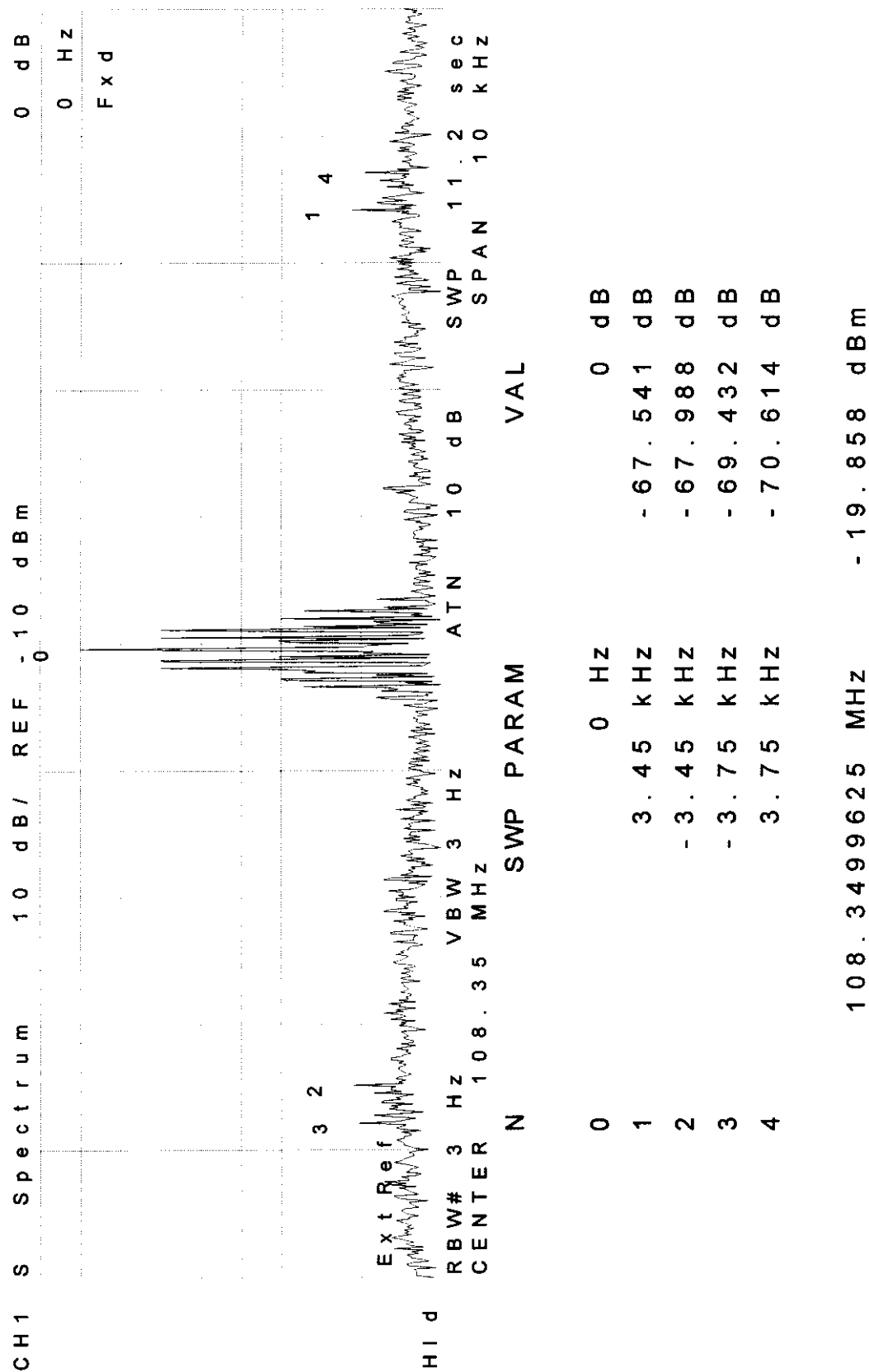


Figure L4

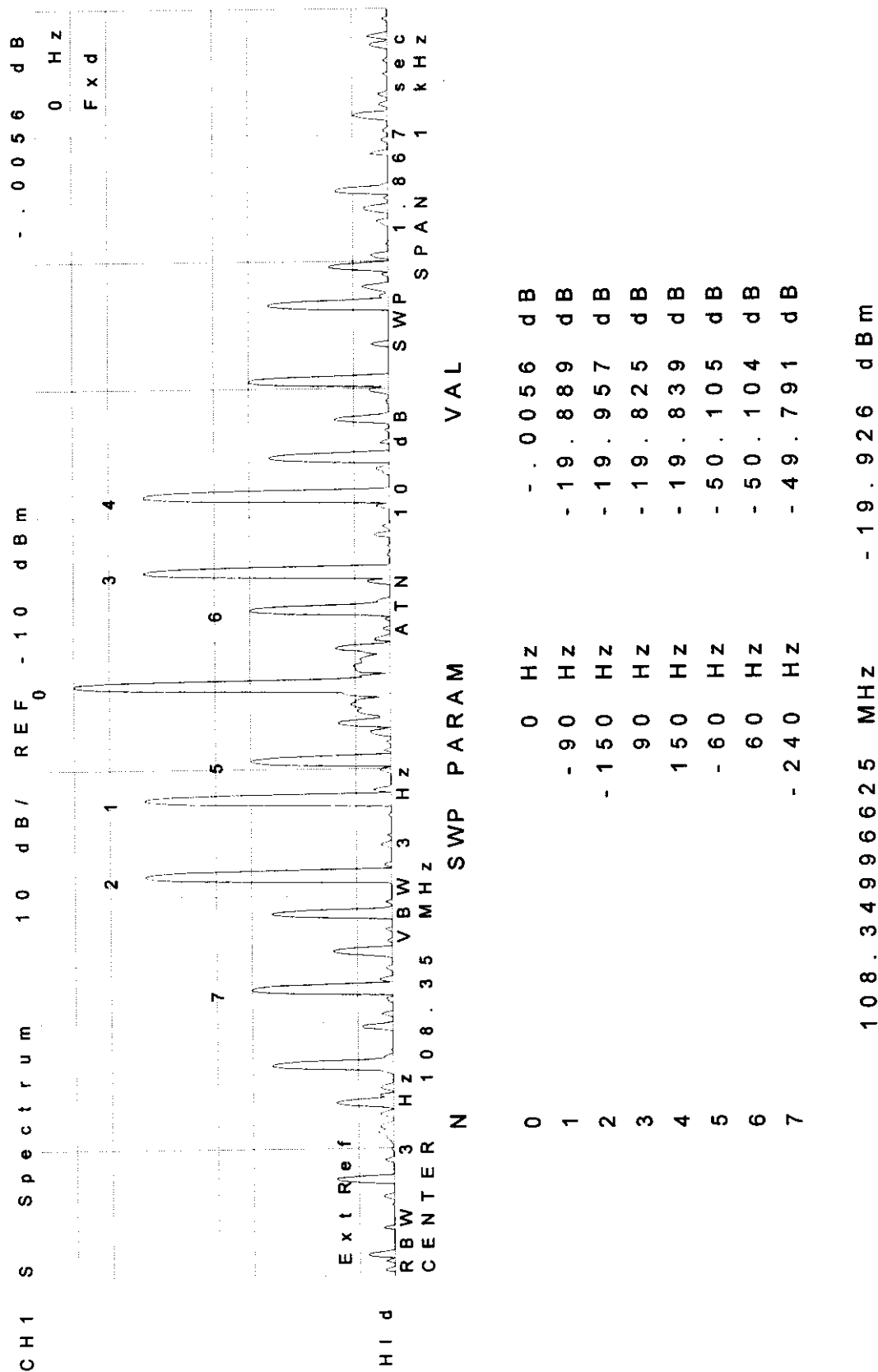


Figure L5

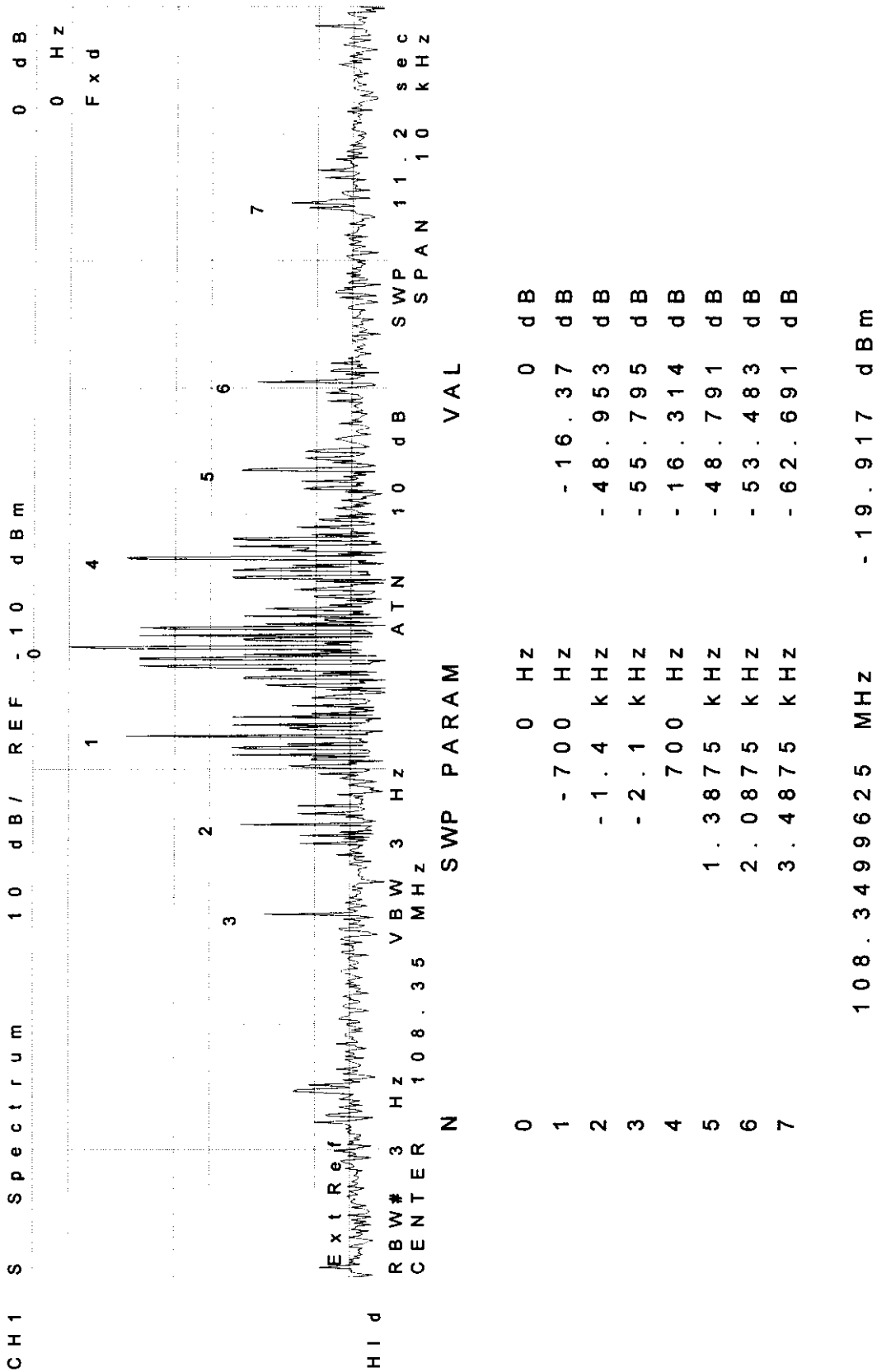


Figure L6

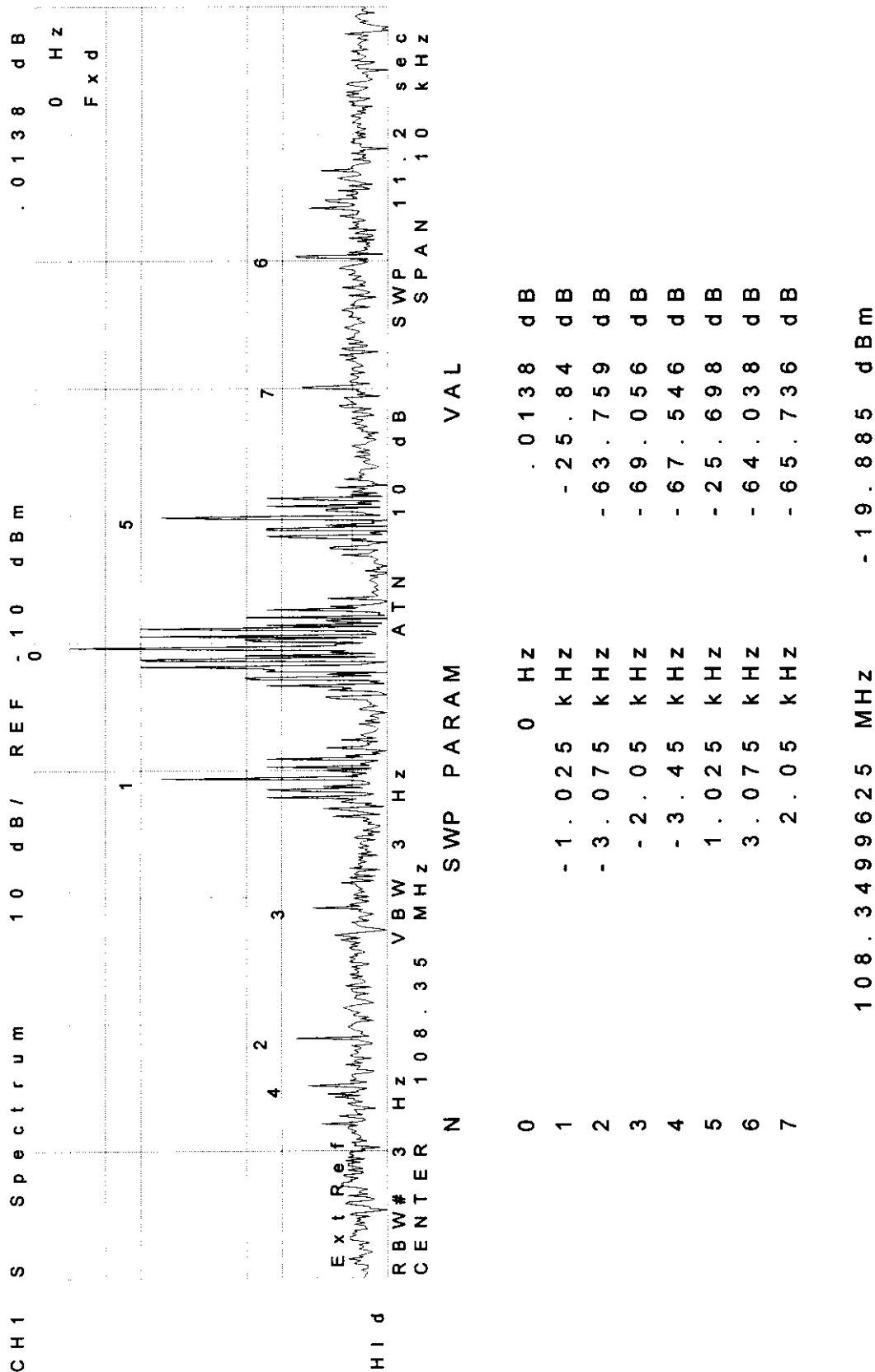


Figure L7

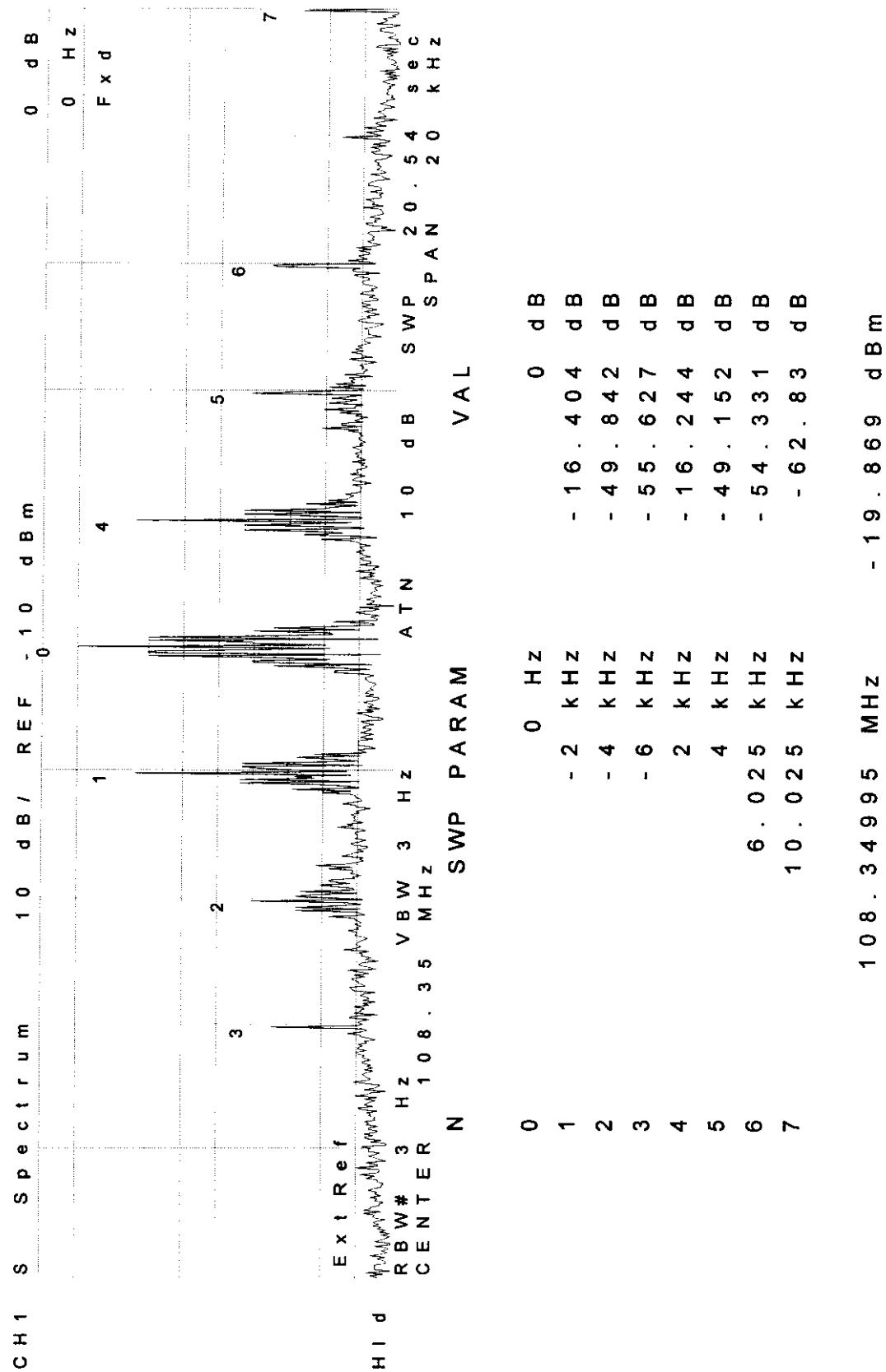
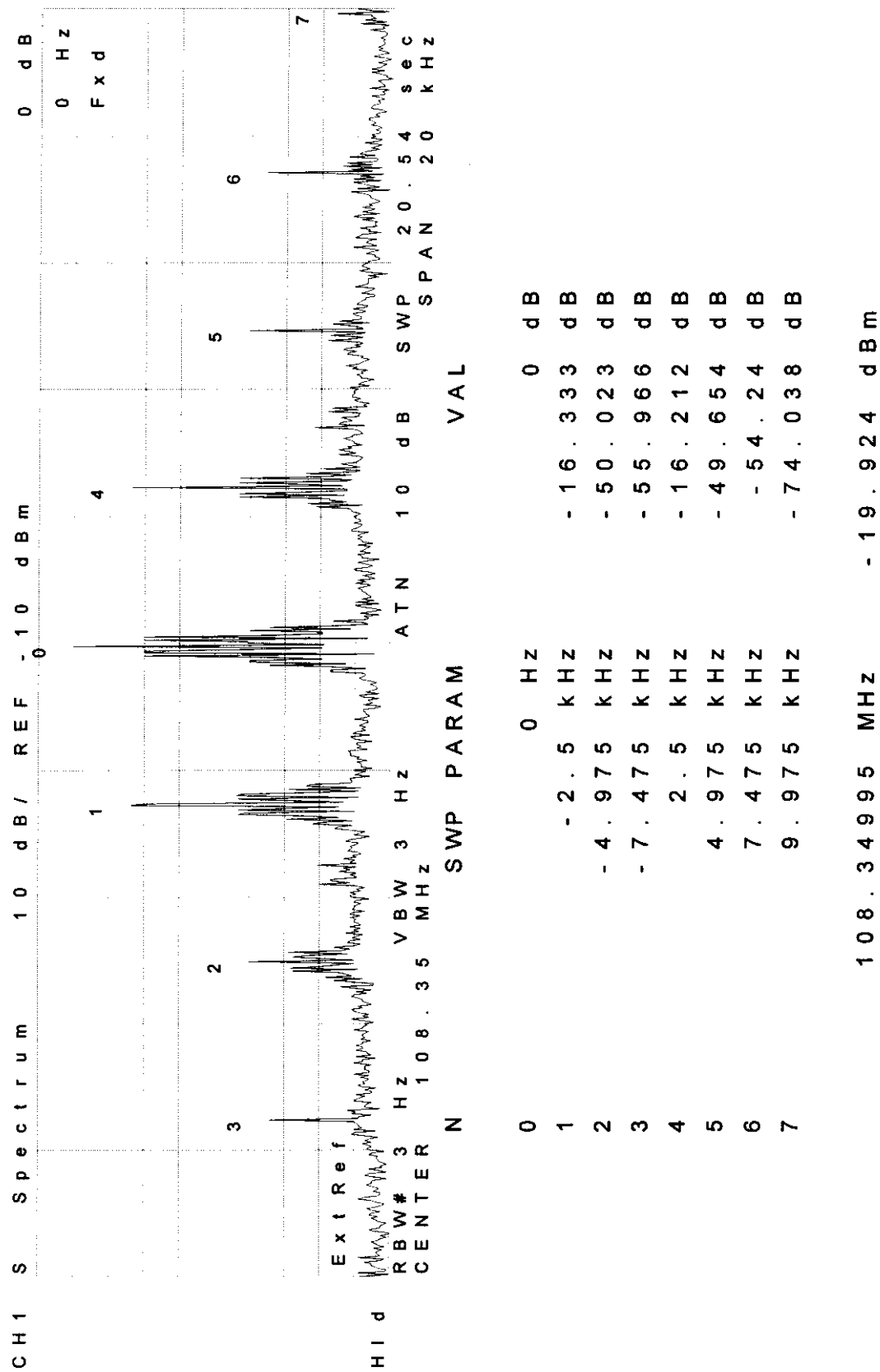


Figure L8



I: Radiated Spurious Emissions

Radiated Spurious Emissions; ANPC Model 920-00101

Radiated Spurious measurements were done 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 data report.

Field Strength:

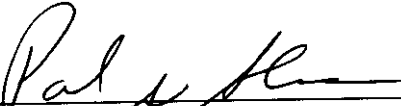
See enclosed data report.

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.

FCC PART 87
REPORT OF MEASUREMENTS

DEVICE: GLIDESLOPE/LOCALIZER TRANSMITTER
MODEL: 920-00101
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:


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CHIEF EMC ENGINEER

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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

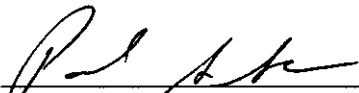
Summary of Test Results

920-00101 Glideslope/Localizer Transmitter

<u>Paragraph No.</u>	<u>Test</u>	<u>Status</u>
2.993	Field Strength of Spurious Radiation	Pass

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.

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.



Paul G. Slavens
Chief EMC Engineer

24 APRIL 1998
Date of Issuance

3. Description of Equipment

3.1 Equipment Under Test (EUT)

Device: Glideslope/Localizer Transmitter
Model Number: 920-00101
Serial Number: None
FCC ID: MPO920-0101
Power: 120 V/60 Hz
Grounding: AC
Antenna Distance: 3 m

3.2 Mode of Operation

The EUT was exercised by constantly transmitting @ 24 dBm with 110.1 MHz for the localizer and transmitting 34 dBm @ 332.0 MHz for the Glidescope.

4. Field Strength of Spurious Radiation

Paragraph No: 2.993

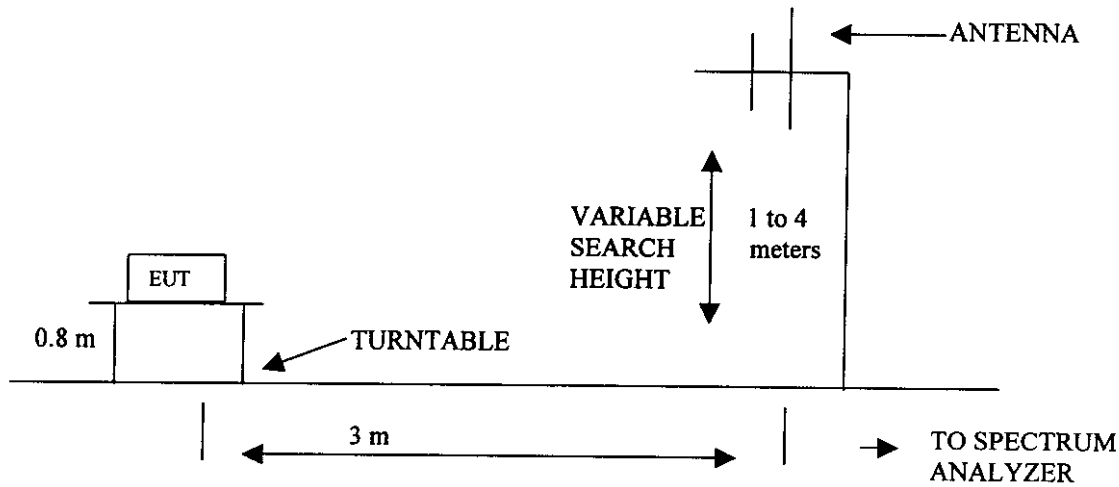
4.1 Test Procedures

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
- ⇒ 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

Localizer Transmitter Attenuation = $43 + 10 \log_{10} 0.25 \text{ Watt} = 37.0 \text{ dB}$

Glideslope Transmitter Attenuation = $43 + 10 \log_{10} 2.50 \text{ Watt} = 47.0 \text{ dB}$

4.5 Test Results

Localizer Transmitter

Frequency	Field Strength	Effective Radiated Power	Attenuation
(MHz)	(dBuV/m)	(dBm)	(dBc)
220.067	35.2	-62.2	-96.2
330.074	39.5	-57.9	-91.9
440.09	43.7	-53.7	-87.7

Glideslope Transmitter

Frequency	Field Strength	Effective Radiated Power	Attenuation
(MHz)	(dBuV/m)	(dBm)	(dBc)
995.984	51.7	-45.7	-69.7

5. Miscellaneous Comments and Notes

1. None.

6. List of Attachments

1. Photographs of EUT. (1)

J: Frequency Stability Measurements

Frequency Stability over Temperature

From 87.131, the frequency stability requirement is 20ppm. Part 2.995 gives temp range as -30 to +50C and 87.147 give -20 to +50C. This is part of a base station unit that will be installed in a temperature-controlled environment. The controller computer contains a temperature sensor that will shut down the entire system if temperatures go outside of the specified range of -10 to +50C, and maintenance warnings are given when any significant deviation in environment is noted.

While these safety mechanisms further ensure good performance, the unit passes the 20ppm requirement. Measured test data is presented below.

<u>Temperature</u> <u>(Deg C)</u>	<u>Glide Slope Frequency</u> <u>Freq = 333.95 MHz</u>	<u>Localizer Frequency</u> <u>Freq = 108.35 MHz</u>
-10	333.9501313	108.3500438
0	333.9503688	108.3501188
+10	333.9503063	108.3500938
+20	333.950075	108.350025
+30	333.9498438	108.3499438
+40	333.9497813	108.3499313
+50	333.9497213	108.3499225

Stability = 1.9 ppm 1.8 ppm

Stability = (Max - Min)/freq