



# Fly-Over Report

Mar-  
Tech

**Time Warner  
AKRON, OH  
January 18, 2005**

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# Summary

**System:** Time Warner: AKRON, OH

**Test Date:** January 18, 2005

A fly-over test for the system was performed to evaluate the system on the basis of signal leakage in the aeronautical band (108-140 MHz) as required by the F.C.C. (frequencies outside range will receive correction factor, see *Procedure* step 2a), and to determine the location and levels of any non-complying leaks (leaks in excess of 10 uV/m at 1500 feet). A description of the procedure, probability graph, a list of relative high readings, and a plotted map showing the system boundary, flight pattern and locations of relative high readings are included. Listed below are the results.

1. Generator level input into calibration antenna	<b>6.55</b> millivolts
2. Receiver adjustment to force a 10 uV/m reading	<b>0</b> dB
3. Measure signal level of peak video carrier in aeronautical band at test point, and set generator level one dB higher.	
4. Number of sample points	<b>40,293</b> points
5. Number of points > 10 uV/m	<b>477</b> points
6. Minimum leakage	<b>1.74</b> uV/m
7. Maximum leakage	<b>45.87</b> uV/m
8. Average field intensity	<b>2.27</b> uV/m
9. Percentage of points < 10 uV/m	<b>98.81</b> %

**F.C.C. requirements status: PASSED**

# Procedure

1. Determine system boundaries and correlate to Topo map using either a 7.5' or a 1:100,000 scale print.
2. Determine proper channel and time for testing, using a modulated carrier between 108 and 140 MHz.

**Date:** January 18, 2005

**Time:** 1:00 AM

**Frequency:** 138.2500 MHz

- 2a. Apply Correction factor:

**Frequencies above 140:** (Data Sample) + 20 \* log( f/140 )

**Frequencies below 108:** (Data Sample) + 20 \* log( f/108 )

3. **Calibration of Receiver**

Establish signal generator input levels which will be used to calibrate AOR receiver. If calibration graph is not provided with the report, the calibration was performed at 3 feet above the ground. If calibration graph is provided with the report, the calibration was performed at 1,500 feet above ground level.

10 uV/m field (at 3 or 1,500 feet & 138.2500 MHz)

**Convert uV/m to dBmV:**

$$\begin{aligned} \text{dBmV} &= 20 * \log( E ) - 20 * \log( 20.7 * f ) \\ &\quad (\text{where } E = 10 \text{ uV/m and } f = \text{frequency in MHz}) \\ &= 20 - 20 * \log( 20.7 * 138.2500 ) \\ &= -49.1327 \text{ dBmV} \end{aligned}$$

$$\begin{aligned} \text{dBuV} &= -49.1327 + 60 \quad (\text{dBuV} = \text{dBmV} + 60) \\ &\quad (\text{we increase this amount by a factor of 20 dB to increase our sensitivity}) \\ \text{dB} &= 20 * \log( x/10 ) \text{ where } x=100 \text{ uV/m or expected reading in receiver is } 100 \text{ uV/m} \end{aligned}$$

$$\text{dBuV} = 10.8673 + 20 \text{ dB}$$

**Determine Free Space Loss:**

$$\begin{aligned} \text{FSL} &= -37.87 + 20 * \log( f ) + 20 * \log( d ) \\ f &= \text{frequency in MHz and } d = \text{distance feet} \\ &= -37.87 + 20 * \log( 138.2500 ) + 9.54 \\ &= 14.4833 \text{ dB} \end{aligned}$$

**Determine Signal Level Input:**

$$\begin{aligned} 100 \text{ uV/m} &= (\text{free space and cable loss}) \\ &\quad - (\text{dipole and reflector gain}) \\ &\quad - (\text{impedance mismatch: } 50 \text{ ohm to } 75 \text{ ohm}) \\ &\quad + (22 \text{ dB gain amp} + \text{input}) \end{aligned}$$

**Cable and Filter Loss (from antenna to receiver) = 4 dB**

$$\begin{aligned} \text{Dipole gain} &= 0 \text{ dB at } 138.2500 \text{ MHz} \\ &\quad (\text{reflector gain} = 2 \text{ dB; impedance gain} = 1 \text{ dB}) \end{aligned}$$

$$\begin{aligned} \text{Free space loss} &= 14.4833 \text{ dB} \\ \text{dBuV} &= 22 \text{ dB} - 4 \text{ dB} - 14.4833 + 3 \text{ dB} + X \text{ (where } X = \text{generator input)} \\ 30.8673 &= ( 21 - 14.4833 ) + X \end{aligned}$$

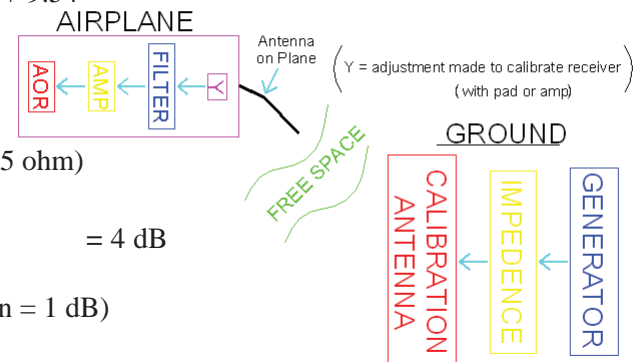
$$X = 30.8673 - ( 21 - 14.4833 )$$

$$X = 24.3506 - 108.75 \text{ (the signal generator level to create an } 100 \text{ uV/m leak at receiver)}$$

$$X = -84.3994 \text{ dBm ( dBm} = \text{dBuV} - 108.75 )$$

**Convert to millivolts:**

$$\begin{aligned} \text{mV} &= 10 ( \text{dBuV}/20 ) \\ &= 32.9253 \text{ uV} \end{aligned}$$



# Procedure

4. Test signal level input of generator with signal level meter to insure accuracy.
5. **If using video carrier:**  
Flyover performed using channel **D** video carrier.  
**If using modulated carrier:**  
Insert generator to combining network at **138.2500** MHz.  
Measure signal level of channel **D** video carrier at headend trunk output test point with signal level meter.  
Set generator output one dB above measured channel **D** video carrier level.
6. Perform system fly-over at 1500 feet in a grid pattern (all plant covered within 1/2 mile of pattern) at 120mph, combining GPS and signal level readings simultaneously with our software into an on-board computer (see *Test Configuration*).
7. Using system boundary polygon, filter all data points outside of system using custom software.
8. Develop a frequency distribution graph (see Probability Graph ) and a listing of all relative high readings.
9. Plot all leak levels on digitized map showing the exact locations of all relative high readings along with the flight pattern .
10. An Enhanced test is a test performed with a test level inserted 2 dB or higher than adjacent video carrier levels. To generate the FCC standard report, all test data is reduced utilizing the following formula:  
$$\text{dB} = 20 * \log( x / 10 ).$$

# Probability Graph

**Probability Graph not available. Please contact Mar-Tech with the following missing file name:  
c:\websites\140588kk6\data\cli\_info\January-2005\TIME\AKROPROB.pdf**

# Relative High Readings

**Relative High Readings data not available. Please contact Mar-Tech with the following missing file name:  
c:\websites\140588kk6\data\cli\_info\January-2005\TIME\AKRO.hpt**

# List of Equipment (Partial)

Equipment	Calibration
<b>Aircraft</b> Partenavia P69B Cessna 210 Cessna T210 Beechcraft B76	N/A N/A N/A N/A
<b>Apollo 2001 GPS NMS</b>	N/A
<b>Leakage Detection Meters</b> Wavetek CLM - 1000 AOR AR - 1	Yearly Yearly
<b>Signal Level Meters</b> Wavetek SAM - 1550 Wavetek SAM - 2000	Yearly Yearly
<b>Frequency Synthesized Generators</b> HP 8467 - A Wavetek - Model 2407 Wavetek - Model 3000-200	Yearly Yearly Yearly
<b>Interfacing Combining Equipment</b> Band Pass Filter 20 dB Pre-Amp 28-13 DC Voltage Converter	N/A N/A N/A
<b>Lindsay Airborne Dipole Antenna</b>	N/A
<b>Lindsay Calibration Dipole Antenna</b>	N/A
<b>Laptop Computers</b>	N/A
<b>Mar-Tech Custom Software For Collecting And Interpreting Data And Filtering Points Outside The Polygon (System Boundary)</b>	N/A

# Test Configuration



# Map

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