Mar-Tech

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Fly-Over Report

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Summary

System:

Test Date:

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 inexcess 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	millivolts
2.Receiver adjustment to force a 10 uV/m reading	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	points
5. Number of points > 10 uV/m	points
6.Minimum leakage	uV/m
7.Maximum leakage	uV/m
8.Average field intensity	uV/m
9.Percentage of points < 10 uV/m	%

F.C.C. requirements status:

How to Use this Report

1) Not all out of compliance leaks will be visible on the maps. We try to show the hottest locations in your system and highlight those areas on the maps. Therefore the number of out of compliance leaks in the report will usually be much higher than the number of leaks shown on the maps.

2) The leak locations may or may not be the actual location of a leak. The leak registered at 1500 ft is a cumulative affect and may be the result of one or many hot spots. Therefore it is best to use the leak locations as a starting point to look for possible hot spots on the ground and to work in a radius of up to 1 mile around that area. It is possible to have a leak shown on the map where there is no cable and be the influence of a hot spot within a 3/8 mile on either side the aircraft at the time of the test.

3) Only leak levels of 10 or greater are considered to be out of compliance and affect the final score negatively. We show leaks which are 6 or greater on the map, for you to use, to find possible hot spots. Small leaks will be more visiable on the enhanced reports.

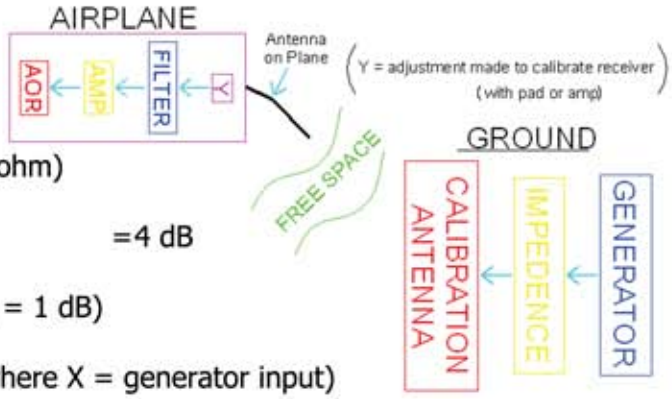
Procedure

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:
   Time:
   Frequency: 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 & MHz)
Convert uV/m to dBmV:
dBmV = 20 * log(E) - 20 * log(20.7 * f)
(where E = 10 uV/m and f = frequency in MHz)
= 20 - 20 * log(20.7 *)
= dBmV
dBuV = + (dBuV=dBmV + 60)
(we increase this amount by a factor of 20 dB to increase our sensitivity)
dB = 20 * log(x/10) where x=100 uV/m or expected reading in receiver is 100 uV/m
dBuV = + 20 dB
Determine Free Space Loss:
FSL = -37.87 + 20 * log(f) + 20 * log(d)
f = frequency in MHz and d= distance feet **(For Digital Test See Exhibit A)**
= -37.87 + 20 * log( ) + 9.54
= dB
Determine Signal Level Input:
100 uV/m = (free space and cable loss)
– (dipole and reflector gain)
– (impendence mismatch: 50 ohm to 75 ohm)
+ (22 dB gain amp + input)



Cable and Filter Loss (from antenna to receiver) =4 dB
Dipole gain = 0 dB at MHz
(reflector gain = 2 dB; impedence gain = 1 dB)
Free space loss = dB
dBuV = 22 dB - 4 dB - + 3 dB + X (where X = generator input)
= (21 -) + X
X = - (21 -)
X = - 108.75 (the signal generator level to create an 100 uV/m leak at receiver)
X = dBm (dBm = dBuV - 108.75)
Convert to millivolts:
mV = 10 (dBuV/20)
= uV

Procedure

4. Test signal level input of generator with signal level meter to insure accuracy.

5. **If using video carrier:**
   Flyover performed using channel video carrier.

If using modulated carrier:
   Insert generator to combining network at MHz.
   Measure signal level of channel video carrier at headend trunk output test point with signal level meter.
   Set generator output one dB above measured channel 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.

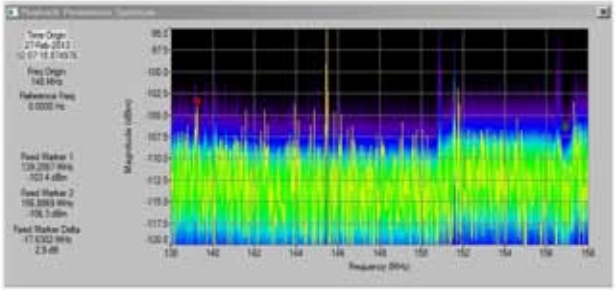
9. Plot all leak levels on digitized map showing the exact locations of all relative high readings along with the flight pattern .

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: dB = 20 * log(x / 10).

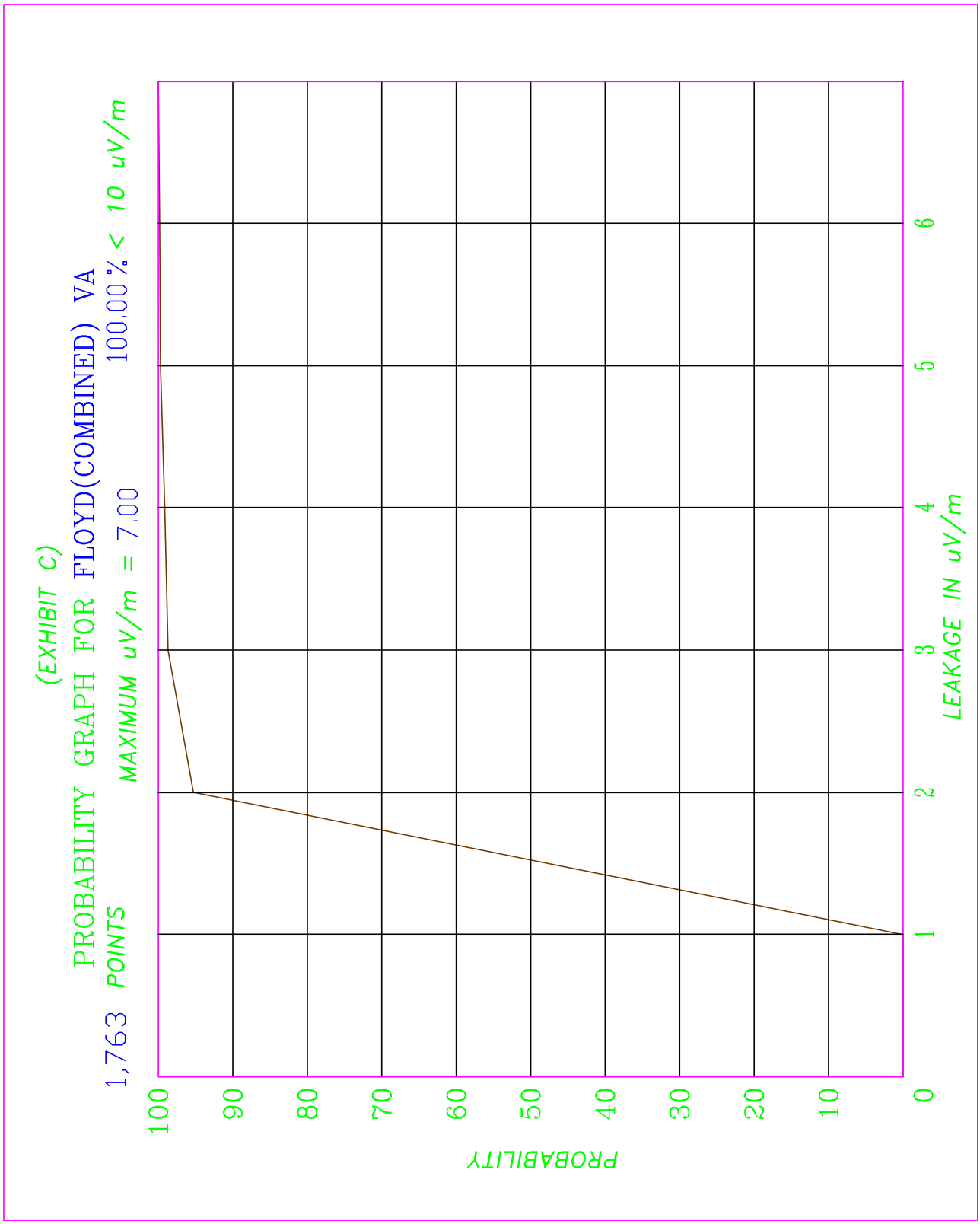
11. For digital tests the gain signals are recorded across the entire spectrum. A particular channel is evaluated and existing FCC specficiations are applied to the calculations. (See Exhibit B)

EXHIBIT A

EXHIBIT B



Probability Graph

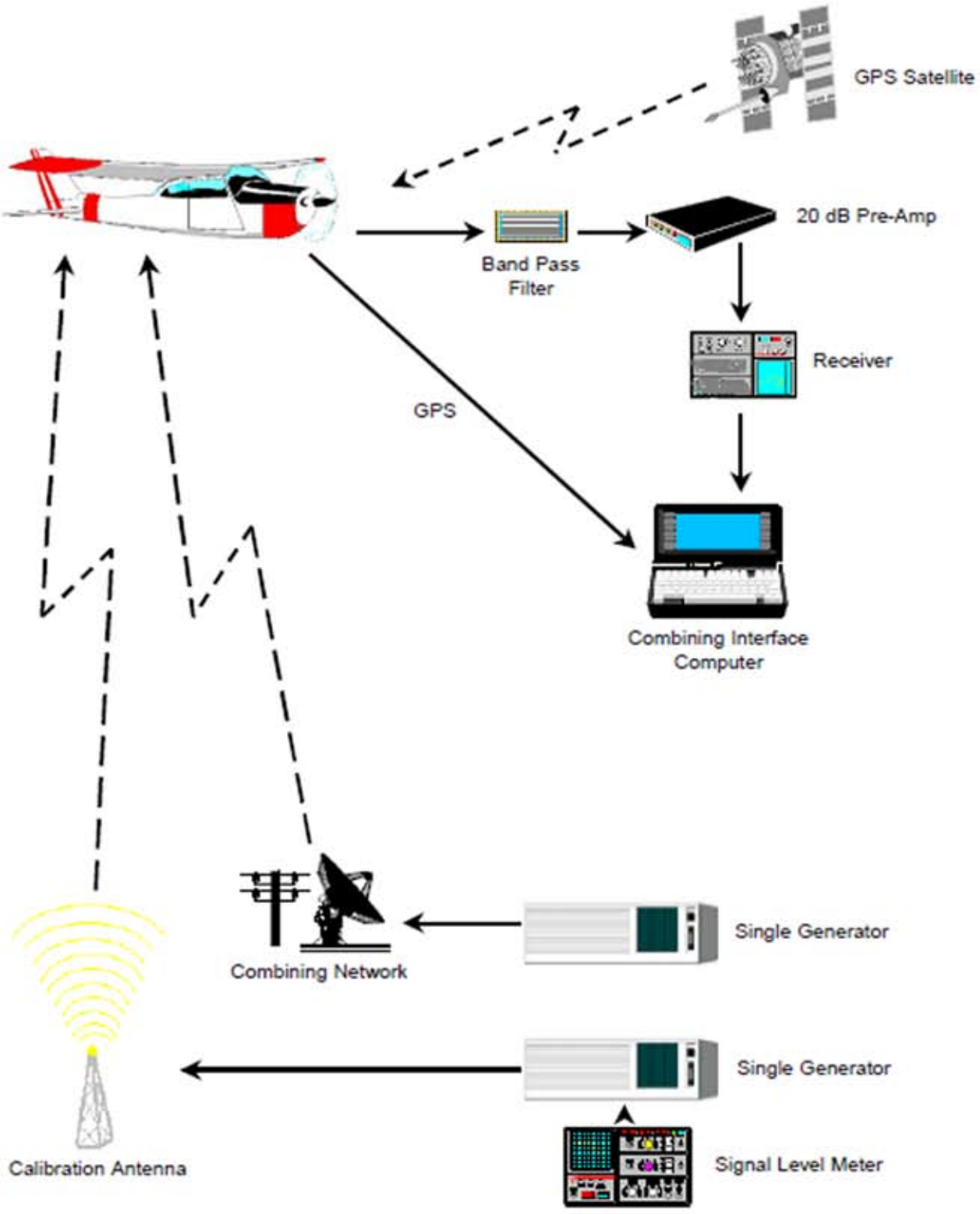


Relative High Readings

List of Equipment (Partial)

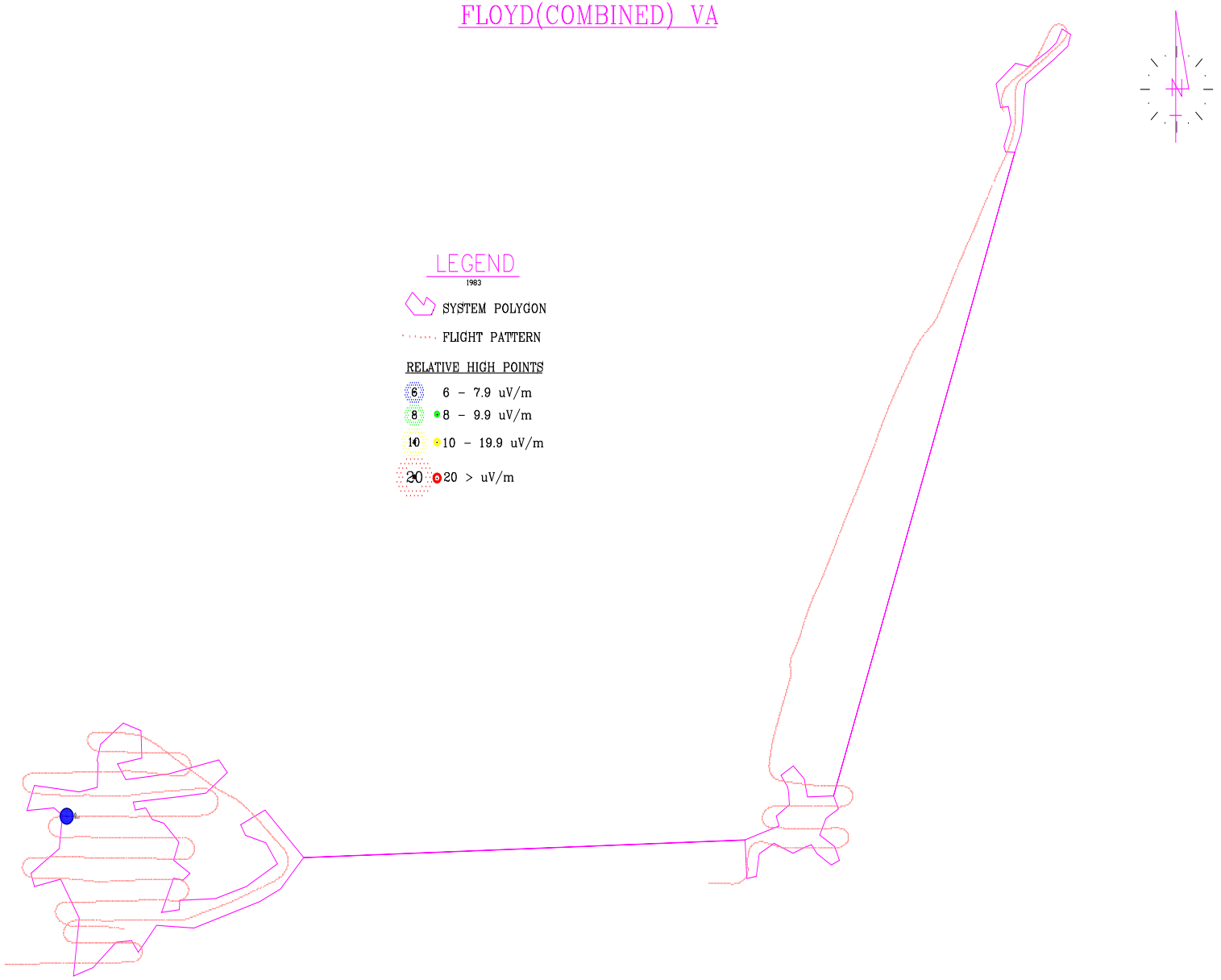
Equipment	Calibration
Aircraft	
Cessna 210	N/A
Cessna T210	N/A
Beechcraft B76	N/A
Garmin 430	N/A
Leakage Detection Meters	
AORAR- 1	Yearly
Signal Level Meters	
Wavetek SAM - 1550	Yearly
Wavetek SAM- 2000	Yearly
Sadelco MiniMax 800	
Frequency Synthesized Generators	
HP 8647 -A	Yearly
Interfacing Combining Equipment	
Band Pass Filter	N/A
20 dB Pre-Amp	N/A
28-13 DC Voltage Converter	N/A
Lindsay Airborne Dipole Antenna	N/A
Lindsay Calibration Dipole Antenna	N/A
Laptop Computers	N/A
Mar-Tech Custom Software For Collecting And Interpreting Data And Filtering Points Outside The Polygon (System Boundary)	N/A

Test Configuration

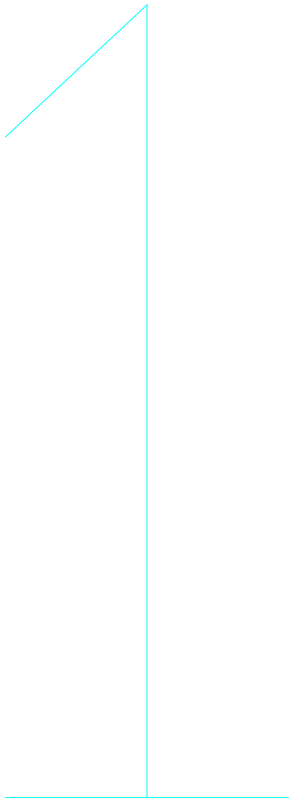


Map

FLOYD(COMBINED) VA



Map



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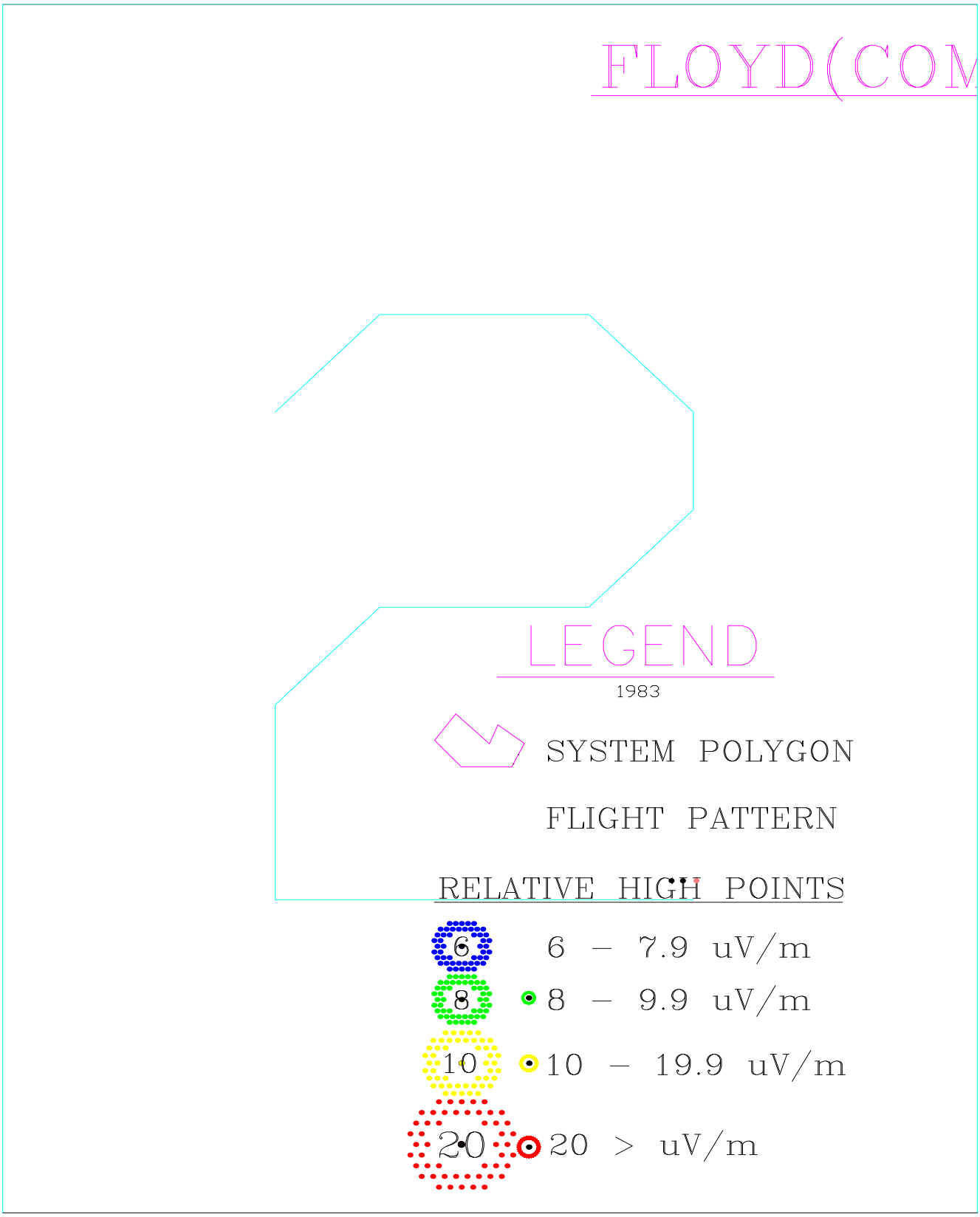
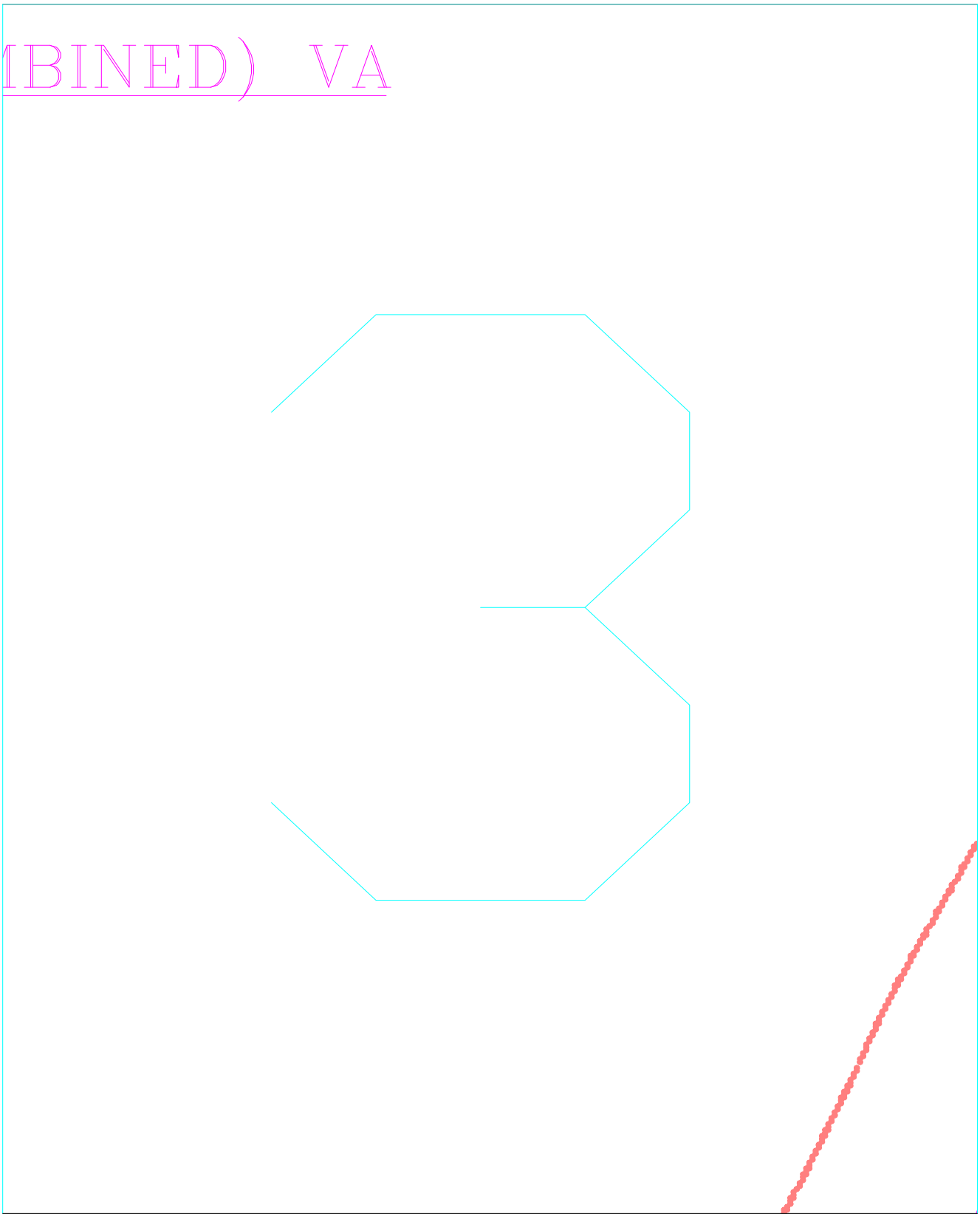

FLOYD(COM
LEGEND
1983
SYSTEM POLYGON
FLIGHT PATTERN
RELATIVE HIGH POINTS
6
8
10
20
6 – 7.9 uV/m
8 – 9.9 uV/m
10 – 19.9 uV/m
20 > uV/m

Map



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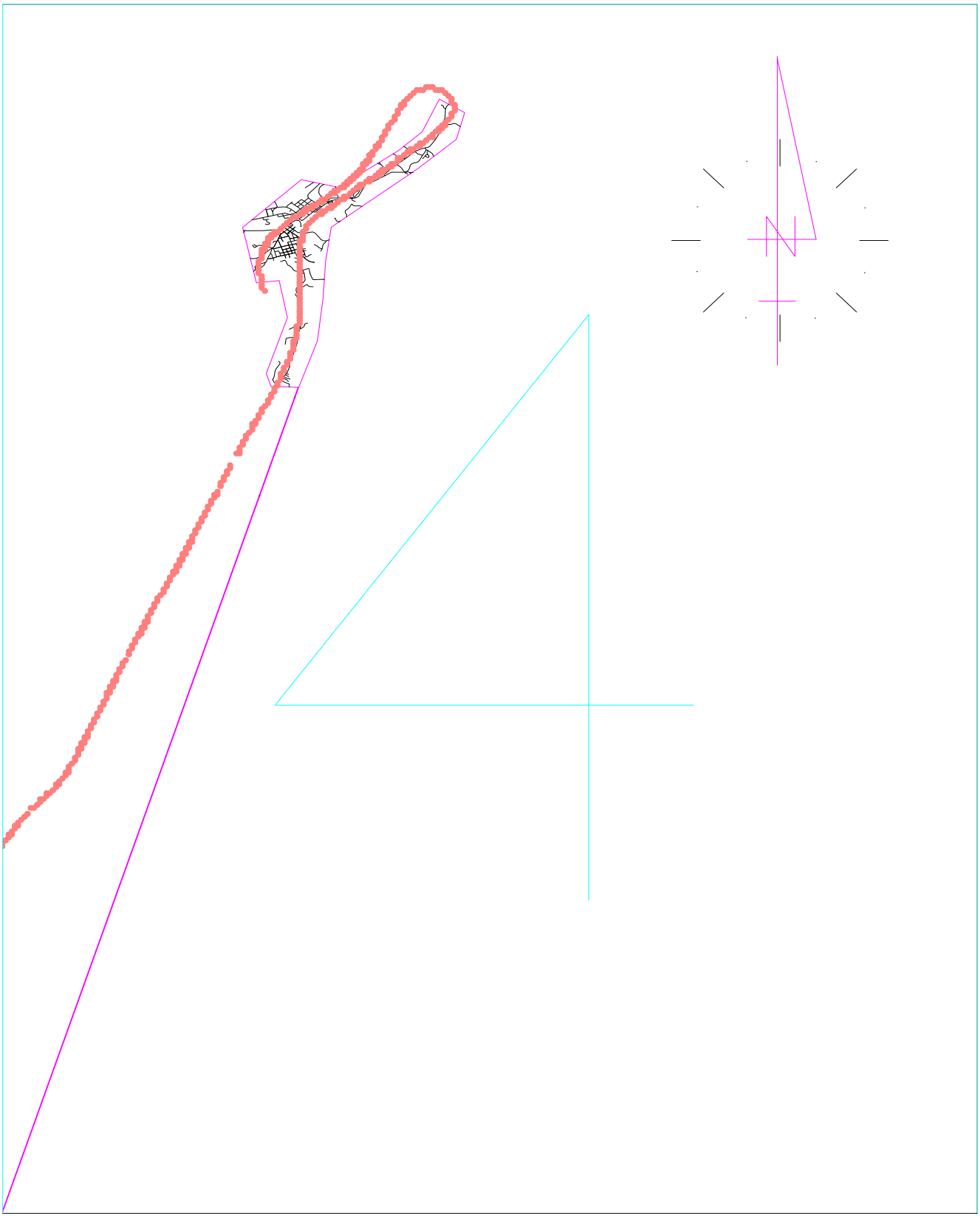

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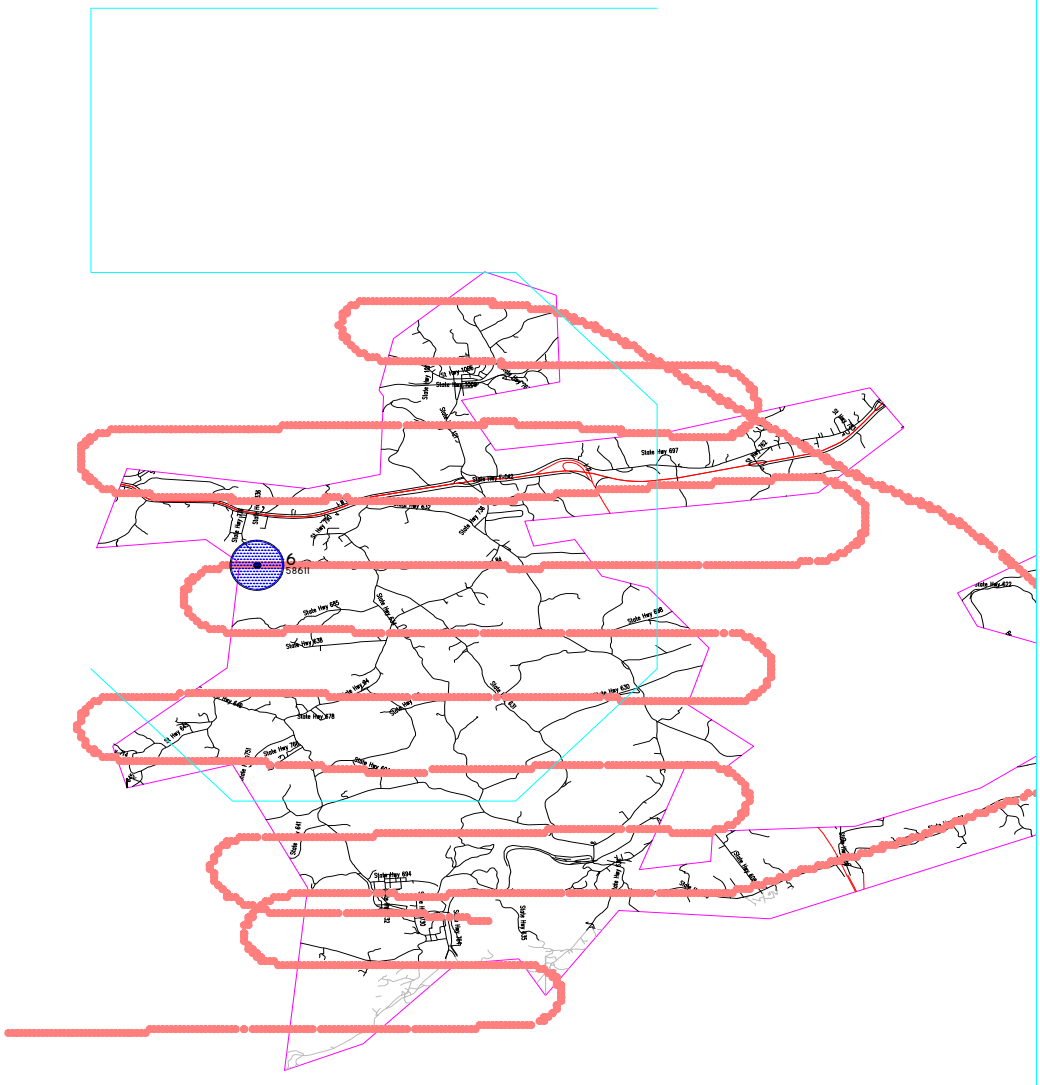

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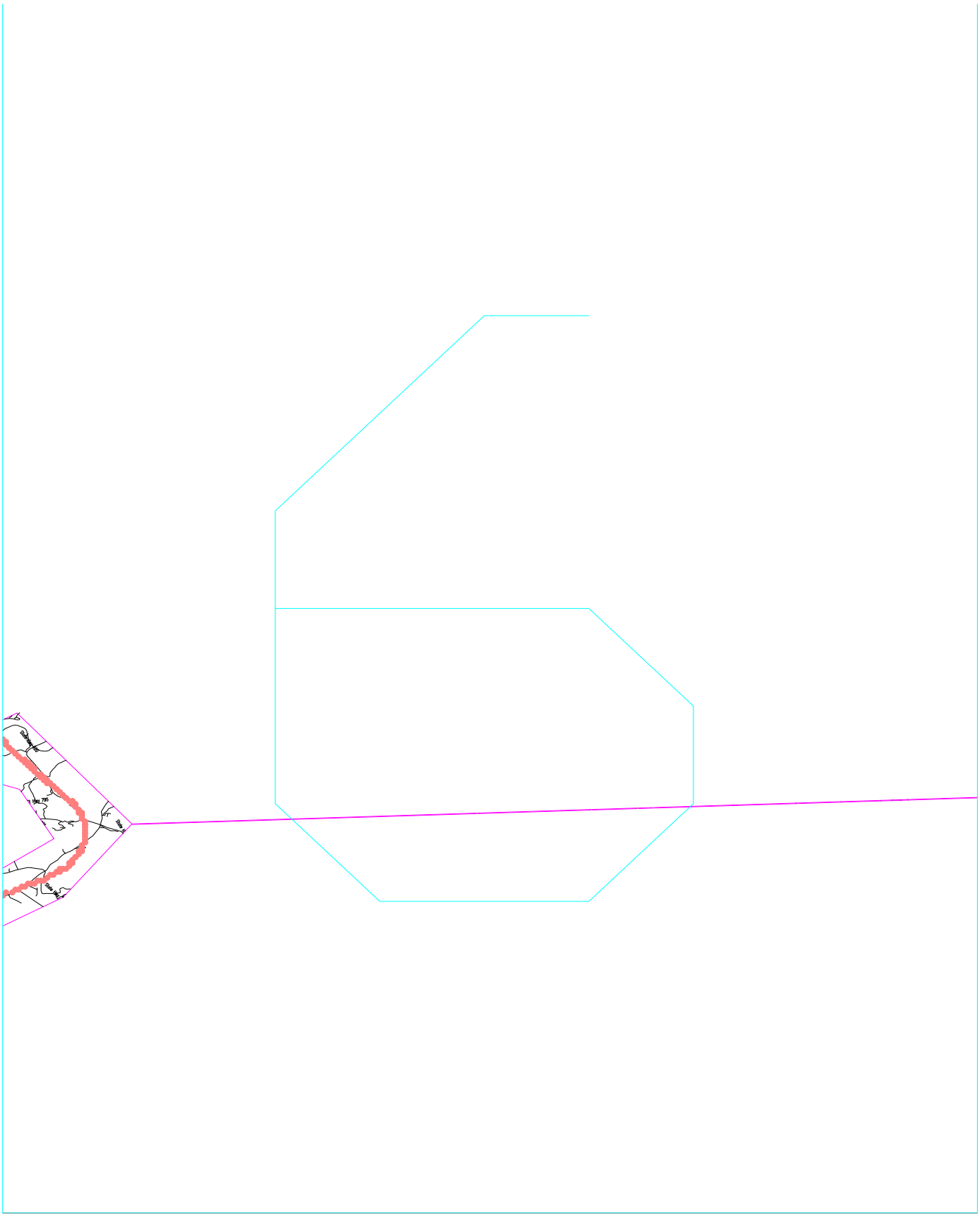

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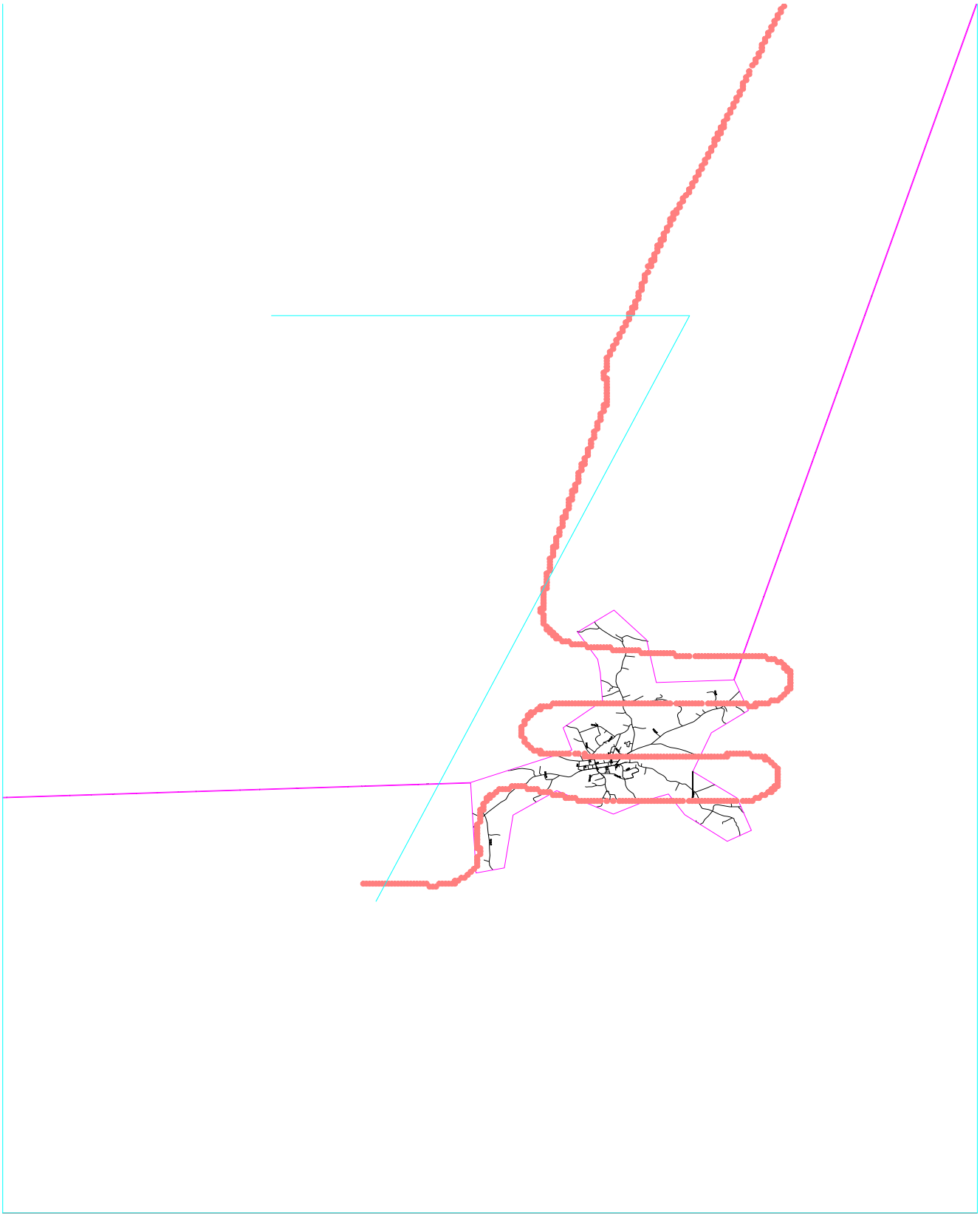

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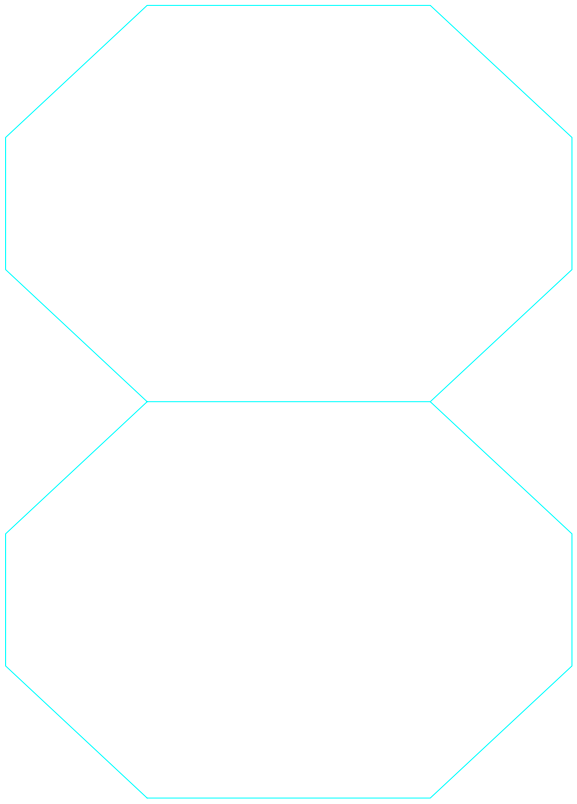

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3/24/2017