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A portable flyswatter for 47 GHz

August 10, 2024

KM5PO

The Problem

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- Some rover locations are blocked by 20-25 foot high trees, otherwise good and support 10 & 24 GHz contacts.
- Clearing near field obstructions will open up more usable (47 GHz) locations for contesting purposes.
- Need to extend our current DX record beyond 99 km!
- Adding a larger flyswatter aperture would yield 24 and 10 GHz.
- Rotating mast would make a good home based flyswatter.
- If we used a mirror could we reflect a laser pwm modulated signal?
  - Laser aimed at reflective tape in the center of flyswatter reflects well

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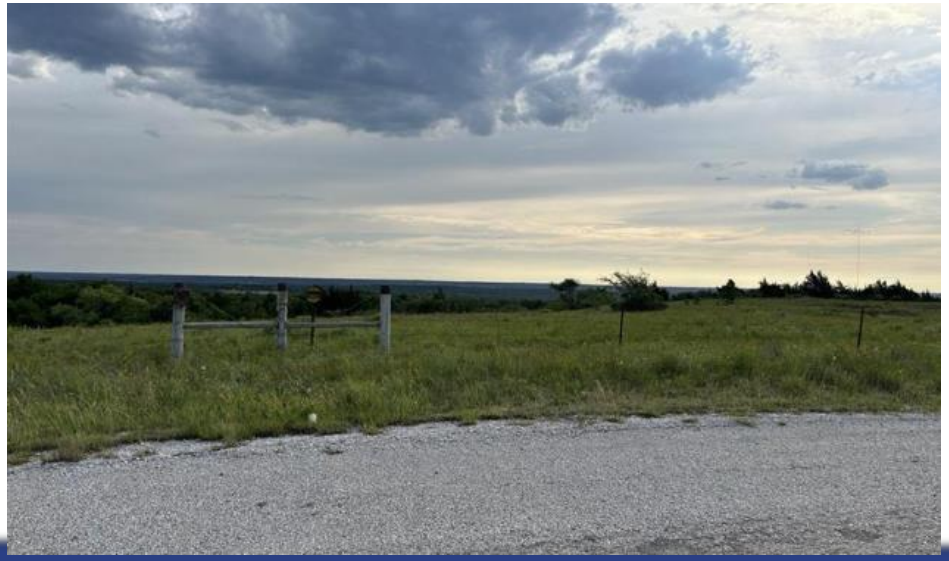
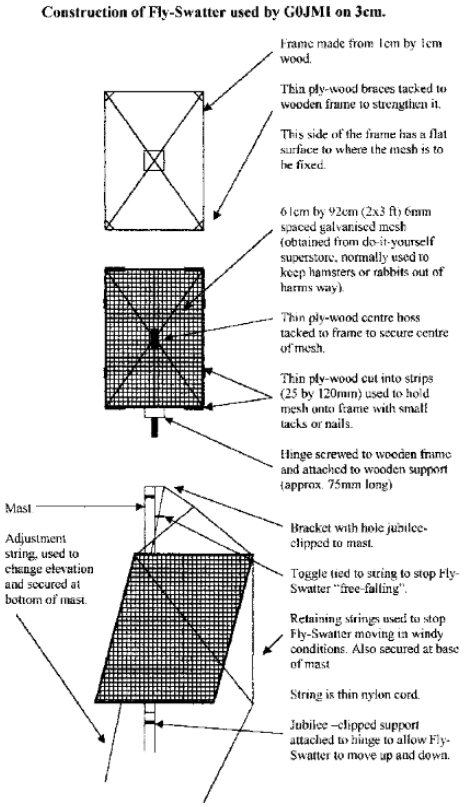
Good vs iffy



Temporary setups



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A Fly swatter in EM01

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A Fly swatter in EM01

Various designs

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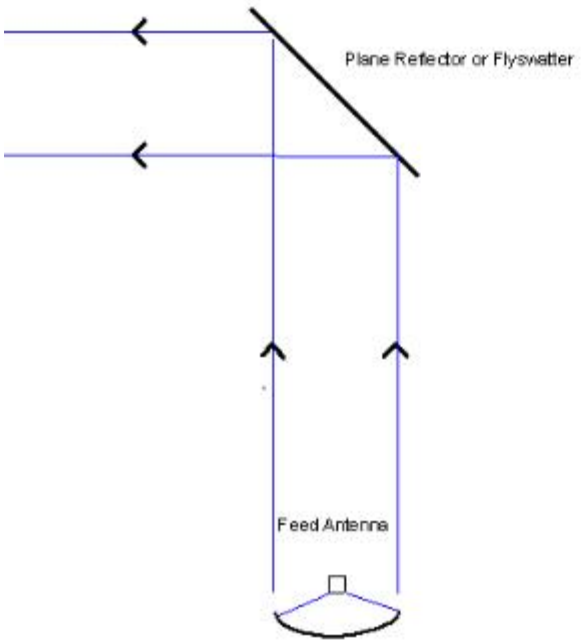
W5LUA



Design considerations

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- Using W1GHZ “Periscope” calculator an optimum spacing and aperture size was determined.

PERISCOPE ANTENNA GAIN CALCULATOR

W1GHZ 2000

ENTER INPUT PARAMETERS HERE:			
Frequency	**47.088**	GHz	
Dish diameter	**0.46**	meters	Note: 1 meter = 3.28 feet
Flyswatter Aperture	**0.4**	meters	
Height (reflect. Spacing)	**10.5**	meters	
Suggested flyswatter =	*0.4*	*meters - for this height and frequency*	
READ FINAL RESULTS HERE:			
System Gain	**38.0**	dBi	
Dish Gain	**44.5**	dBi	
"FEEDLINE" equivalent	**-6.5**	dB (effective gain of periscope over dish)	

Design considerations

- To support the flyswatter-
  - Spiderbeam 10 meter aluminum mast + 5’ standpipe

Aluminium Telescopic Mast 10m HD (33ft)

Aluminium HD telescopic push-up mast 10m (33ft)	
fully extracted length (height)	10m (33ft)
transportation length	1.70m (5ft 7")
weight	10.5kg (23 lbs)
bottom diameter	70mm (2 3/4")
top diameter	40mm (1 1/2")
wall thickness	2mm (1/12")
number of segments	7
pole material	high quality anodized aluminium strong interlock clamps made from stainless steel

45mm standpipe for Spiderbeam

Separate tube segment with stainless steel clamp:

outer diameter	45mm
wall thickness	2mm
length	150cm
suitable for	all masts with a top segment of 40mm diameter

Design considerations

- To support the flyswatter-
  - Base for mast consists of 2” receiver plate, DX Engineering hinge plate

Design considerations

- To rotate the flyswatter-
  - Yaesu G-450 rotator. Uses step transition to match rotor to mast bottom 70mm
  - Guy rings allow for mast rotation

Design considerations

- Flyswatter elevation control
  - Actuator with 4” stroke gives approx. +/- 5 degrees from 45 degrees
  - Arduino and DC driver board supplies +/- 12 v PW modulation to actuator
  - Easy to add speed control

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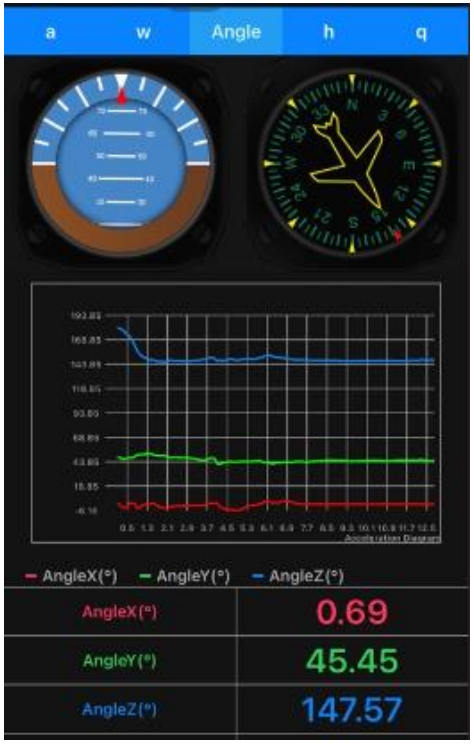
Design considerations

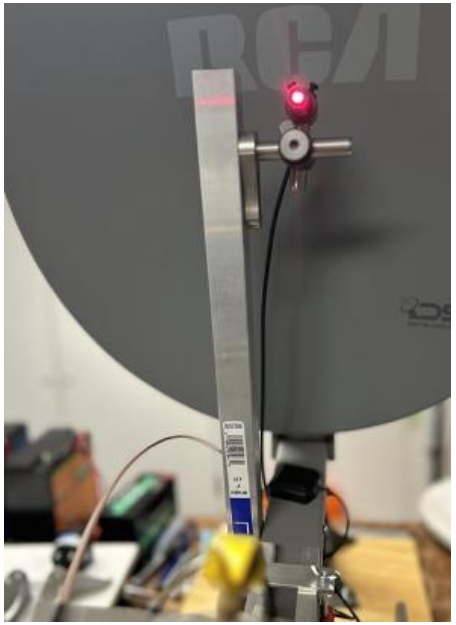
- Flyswatter elevation readout
  - Witmotion sensor broadcasts elevation value via blue tooth to cell phone

Insert Witmotion sensor mounted and cell phone app screen



Design considerations

- Flyswatter calibration
  - Calibration of rover dish to flyswatter uses laser temporarily mounted to dish



Design considerations

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- CSVHF conference – Cedar Rapids, IA – July 2024

Next steps

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- Stabilization arms to reduce mast movement
- Real time feedback from WitMotion to Arduino
  - Set the angle with a CAL button
  - Arduino then sends compensating commands to actuator based on real time WitMotion sensor feedback
- Build a second stack for fixed station use.
  - Trees are 30 feet tall so only need flyswatter at 35 feet!

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Questions?