

# GETTING STARTED ON 1296 EME

BY AL, K2UYH



INTRODUCTION

WHY 1296 EME?


IT'S EASY!

HOW DONE

WHAT YOU NEED

CONCLUSION

# WHY WORK MOONBOUNCE?

- IT IS EXCITING!
- MOST FUN IN HAM RADIO IS MAKING RARE, UNUSUAL, OR DIFFICULT CONTACTS.
- EME ALLOWS YOU TO WORK WORLDWIDE DX – MORE GRIDS
- ON 1296 IT IS EASY.
- 1m AND 100 W 

**MORE STATIONS ON  
1296 EME IN OK THAN  
ALL OF USA!**

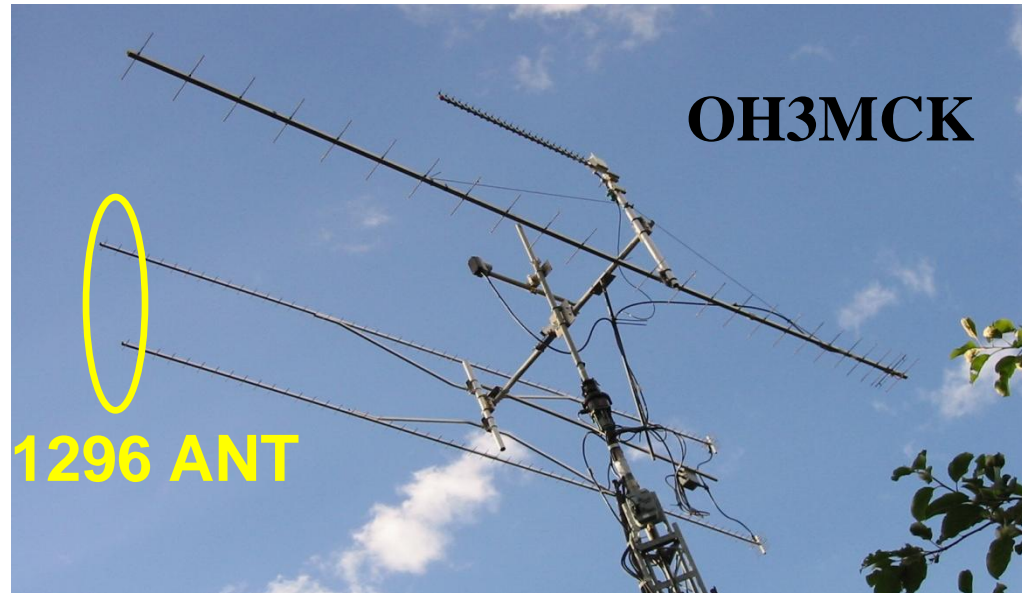


# EME BY SMALL STATION

0017 OK1DFC, 0023 G3LTF, 0035 SP6ITF, 0038 I1NDP, 0042 **WA9FWD**,  
0049 SP6JLW, 0055 EA3UM, 0100 I5MPK, 0105 DL3EBJ, 0115 OK1CS, 0121  
9A5AA, 0133 DF3RU, 0143 OE5JFL, 0159 OK2DL, 0207 G4CCH, 0214  
YL2GD, 0235 **W4OP**, 0251 SM3AKW, 0258 RA3AUB, 0315 I5YDI, 0322  
VE4SA, 0334 **N0OY**, 0341 **K9KFR**, 0351 F5SE/P, 0355 RA3EC, 0411 **W7JM**,  
0415 **WA6PY**, 0420 VA7MM, 0436 DL6SH, 0449 SV3AAF, 0501 SP3XPO,  
0510 CT1DMK, 0515 IK3COJ, 0543 VE6BGT, 0602 **W6YX**, 0722 **KL6M**, 1031  
JA8ERE, 1045 JA8IAD, 1106 **N6OVP**, 1113 VK5MC and at 1131 JA4BLC, and  
on 9 Nov at 0036 ON5TA, 0044 OZ6OL, 0050 SP7DCS, 0100 OK2ULQ, 0119  
IK5VLS, 0125 IK2RTI, 0159 ON5GS, 0229 **K1JT**, 0245 TI2AEB, 0254  
S53MM, 0311 PI9CM, 0352 DG5CST, 0405 **WA8RJF**, 0413 SM4IVE, 0420  
**W1AIM**, 0432 **K1DS**, 0516 OK1KIR, 0541 PA2DW, 0658 LU1C, 1127  
JA6XED, 1140 JR4AEP, 1149 JA6AHB, 1202 VK4CDI and at 1226 JA1WQF

**13 from US, 6 from OK, 6 from I, 4 from VE, 7 from JA of 65**

# EME BY SMALL STATION



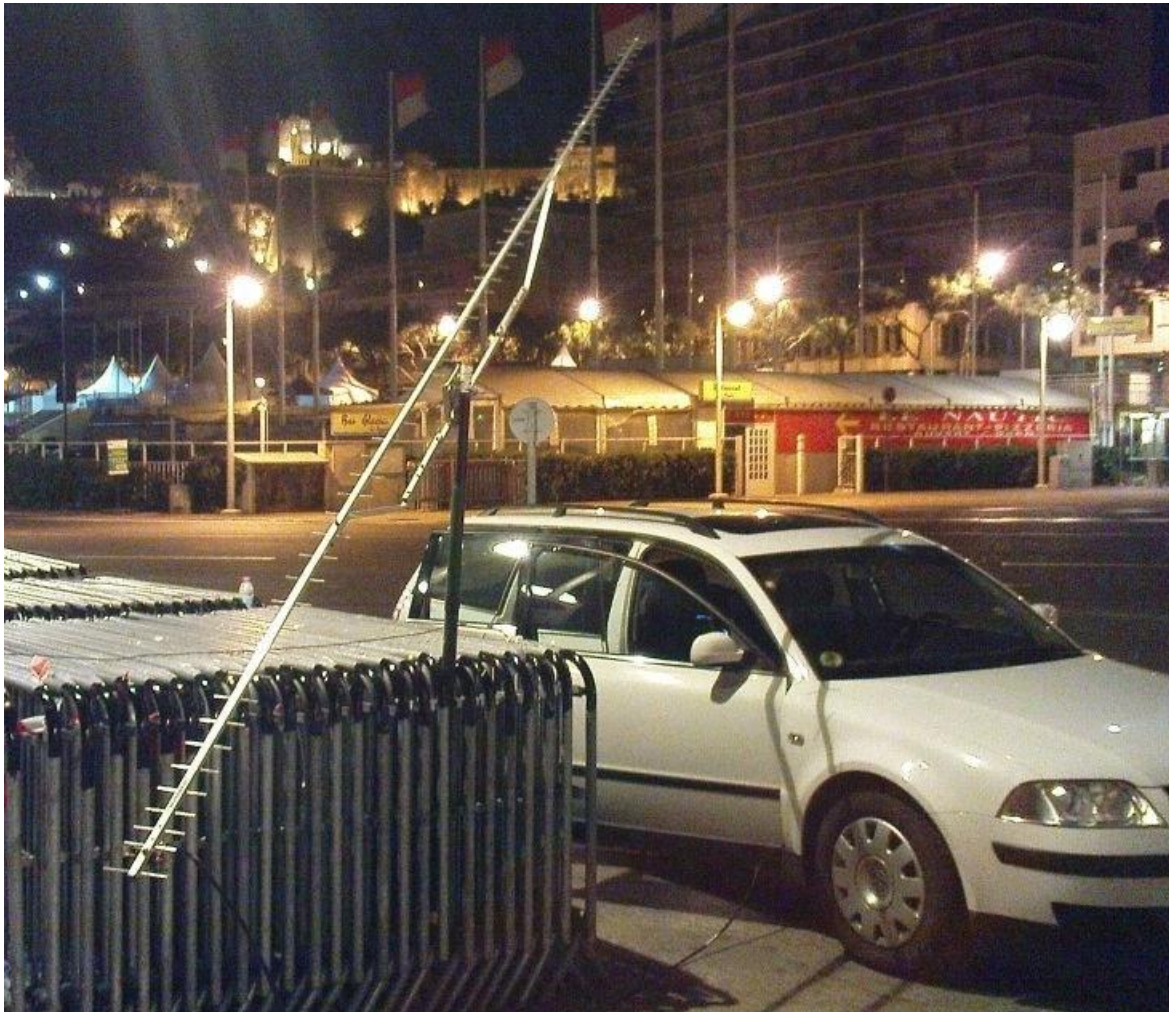
- MY 1<sup>ST</sup> DIGITAL CONTACT WAS ON 23 CM WITH OH3MCK.
- OH3MCK WAS USING 2 X 22 dBi YAGIS (LINEAR POL.) AND **40 W.**



**DP1POL – Felix & 67 EL YAGI  
WINTER AT SOUTH POLE!**



# 3A/DL30CH ON 23 CM FROM MONACO ONE OF MOST SUCCESSFUL EME DXPEDITION OPS USES SINGLE 59 EL (5 m) YAGI, NO PREAMP & 80 W!



**T7/HB9EHJ**

**San Marino**



# VP9/K2UYH IN BERMUDA



**IF FLYING NEED  
PORTABLE ANTENNA  
THAT FITS IN A  
SMALL PACKAGE!**



# WHAT DO YOU NEED?

## 1) ANTENNA

- CAN BE A YAGI  
(5 m GOOD; CAN BE SMALLER)

PROB – LOSE 3 dB CROSS POL  
CIRCULAR STANDARD

SOLVE - USE CROSS POL YAGI

- USE A DISH WITH CIR FEED  
(6' GOOD, CAN BE SMALLER)





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# **OFFSET STRESSED DISH ALL SCREEN TIED TO SPOKES**

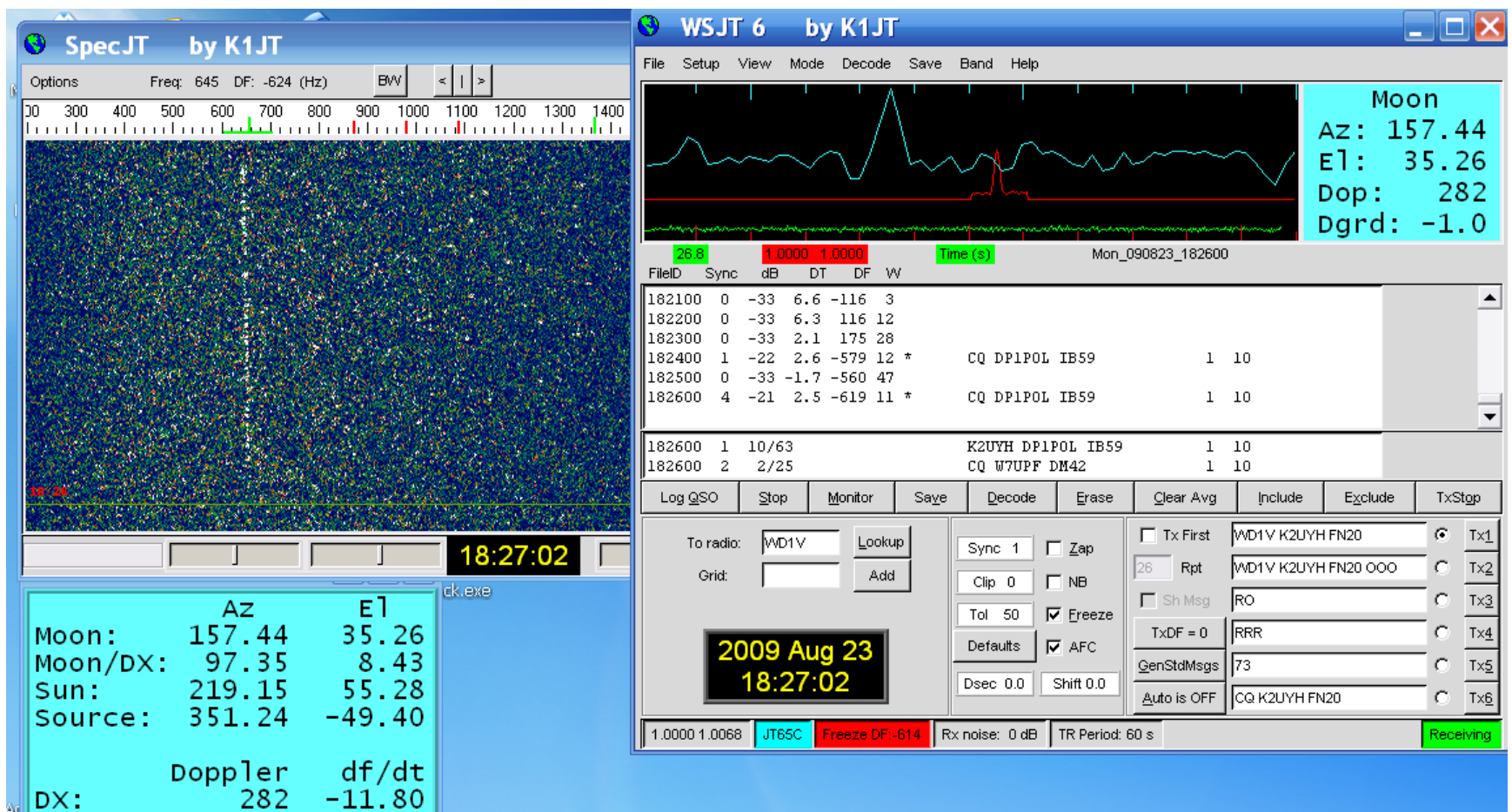


**Ideal 1296 EME antenna: Easy to build, low cost, set flat on ground when not in use.**

# WHAT YOU NEED

## 2) A WAY TO TRACK THE MOON

- NOT DIFFICULT WITH SMALL ANT
- USE WSJT – YOUR OPERATING SYS

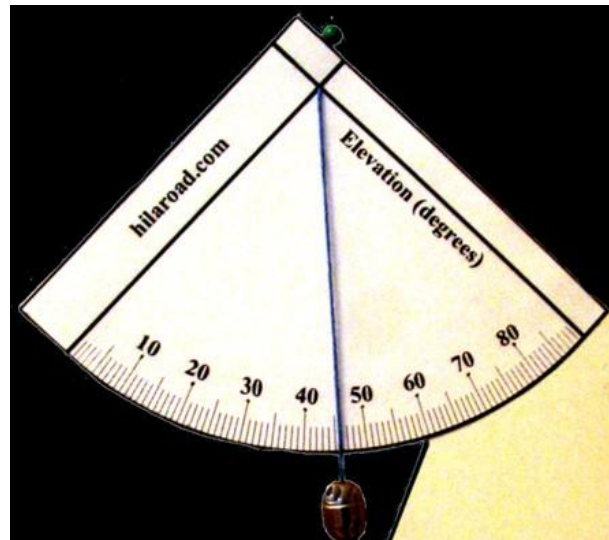




# WHAT YOU NEED

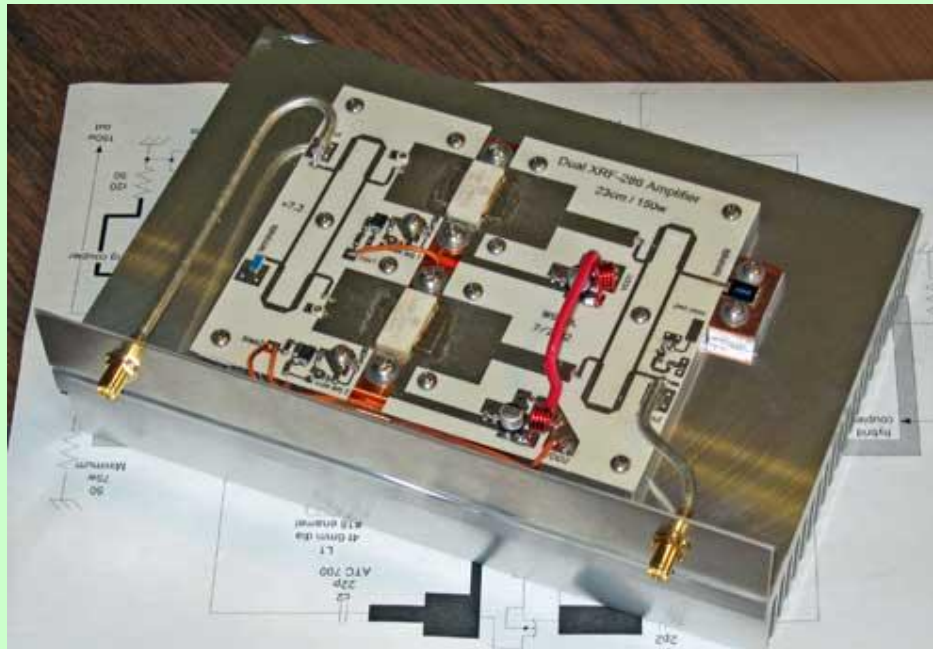
## 2) A WAY TO TRACK THE MOON

- NOT DIFFICULT WITH SMALL ANT
- USE WSJT – TELLS WHERE TO POINT
- USE ROTATOR FOR AZ  
(OR DEGS ON A CIRCLE – COMPUS ROSE)
- ARMSTRONG FOR EL WITH TILT READOUT
- CALIBRATE ON SUN OR MOON



# WHAT YOU NEED

- **TRANSMITTER – PA (WANT  $> 50$  W)**
  - **SSPAS FOR 1296 IN  $>50$  W TO 1 KW AVAILABLE**



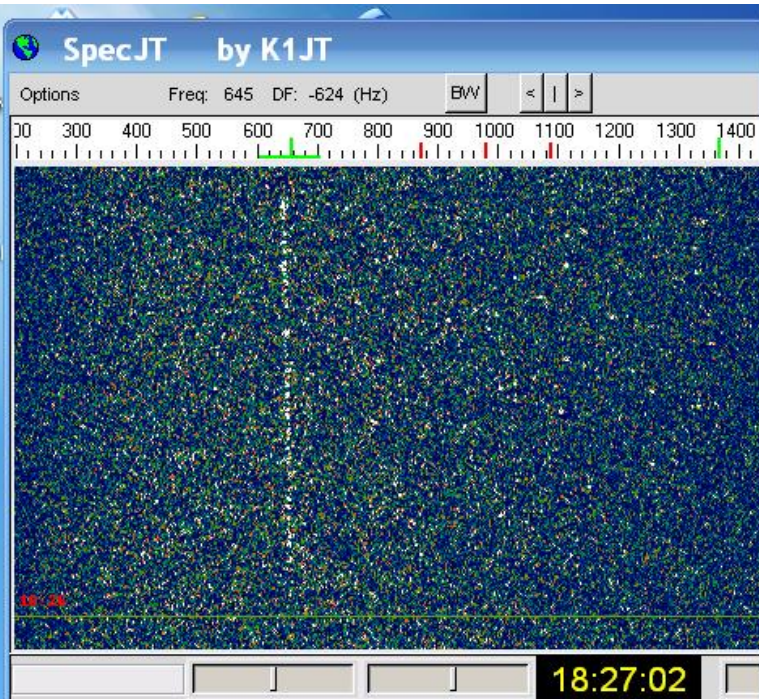
**W6PQL 150 W 23 CM SSPA**

- **RECEIVER – DON'T NEED PREAMP! WHY?**

# WHAT YOU NEED

- A WAY TO DETECT WEAK SIGNALS
    - CW WORKS, BUT JT WILL ALLOW YOU TO WORK EVEN WEAKER SIGNALS
  - JT65C USED FOR DIGITAL QSOs ON 23 CM
  - EASY TO IMPLEMENT
    - CONNECT XVRTER SPEAKER TO COMPUTER MIC
    - CONNECT COMPUTER MIC OUT TO XVRTER SPEAKER
    - CONNECT SERIAL PORT TO REED RELAY
- NO SPECIAL BOX NEEDED! NEED SOUND CARD**



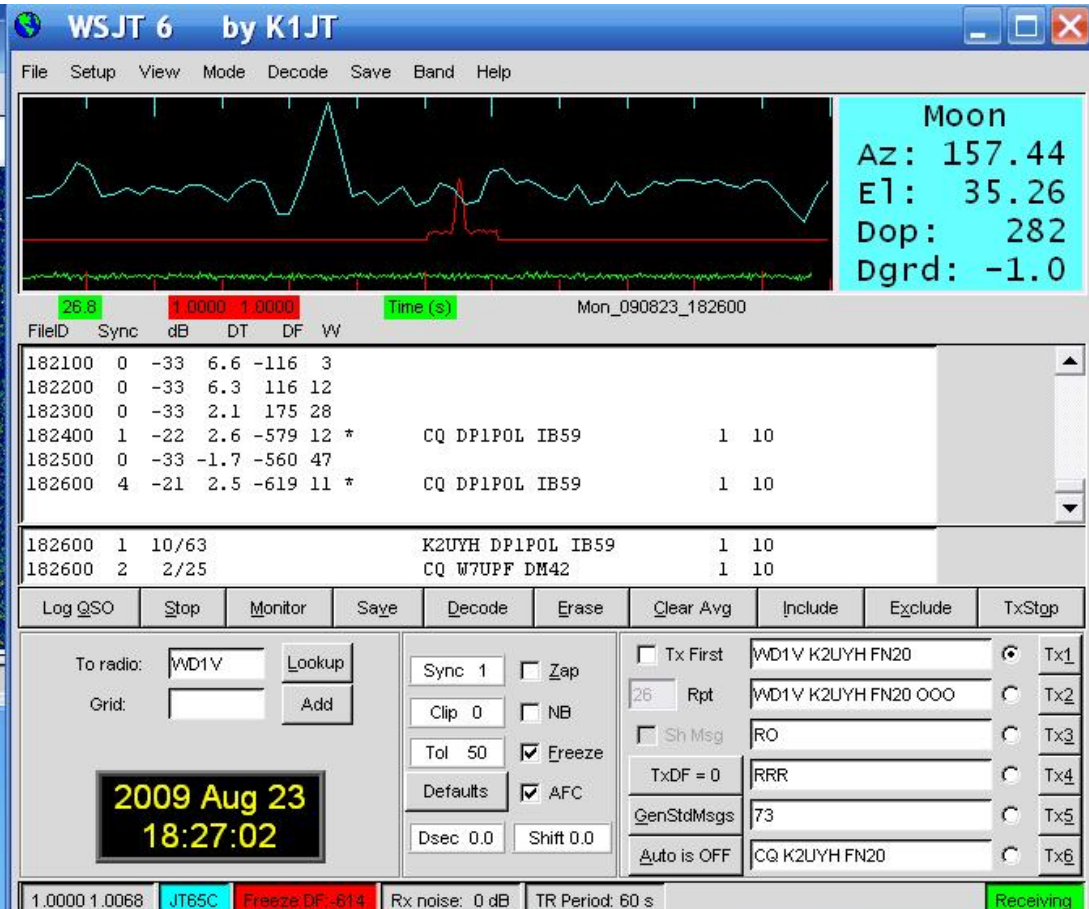


AZ E1  
 Moon: 157.44 35.26  
 Moon/DX: 97.35 8.43  
 Sun: 219.15 55.28  
 Source: 351.24 -49.40

Doppler df/dt  
 DX: 282 -11.80  
 Self: 282 -11.80

RA DEC  
 Moon: 12:51 -11.67  
 Source: 00:00 0.00

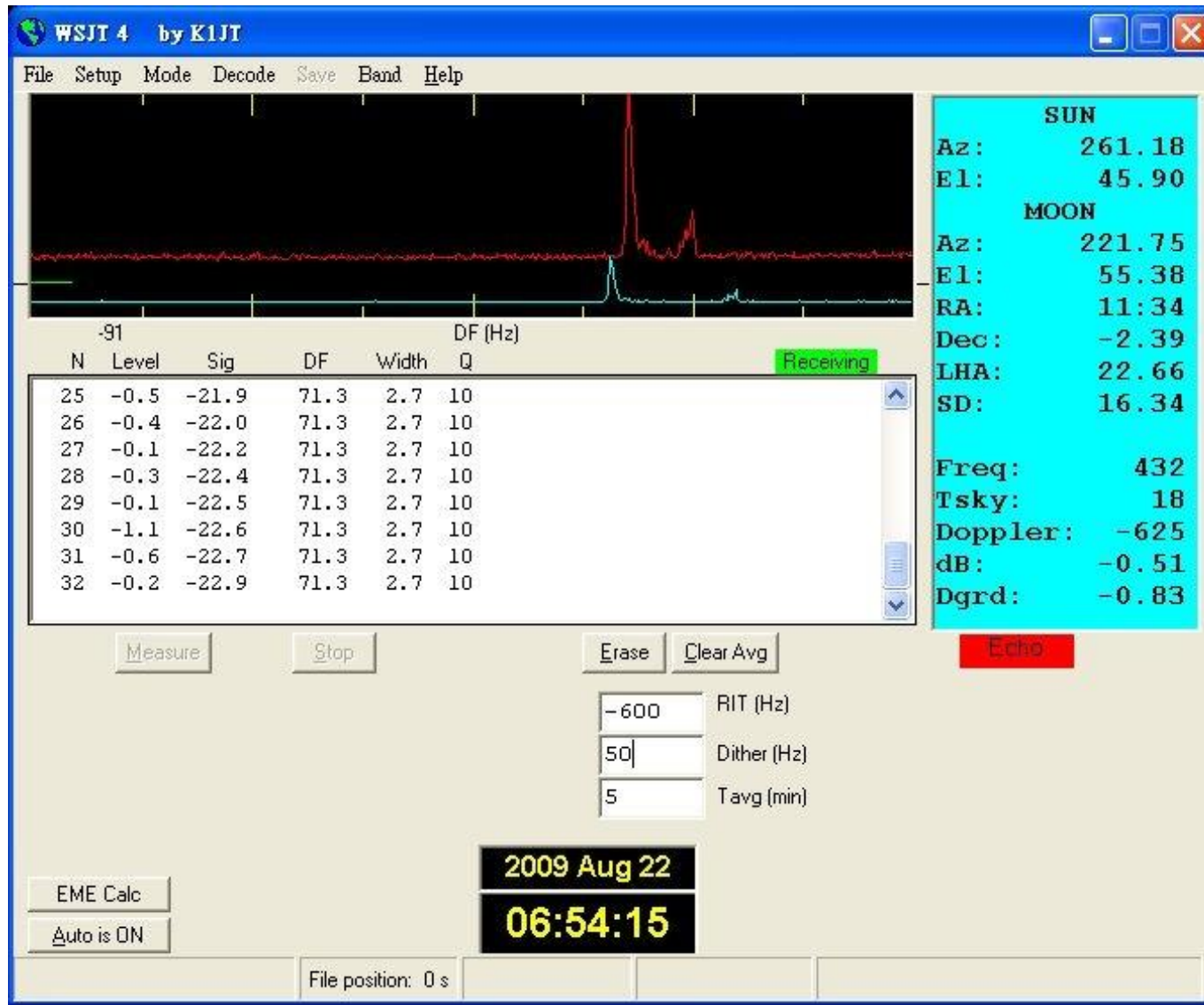
Freq: 1296 Tsky: 3  
 MNR: 0.0 Dgrd: -1.0  
 DPOL: -32 SD: 15.99



## WSJT GIVES INFO YOU NEED

- WHERE TO POINT AT MOON
- DOPPLER SHIFT
- POLARIZATION – NOT NEEDED

# ECHO MODE – WANT TO TRY EVEN IF DON'T USE EME



**RA0ACM 49  
EL YAGI  
75 W**



**GET ECHOES!**

- LETS YOU EVALUATE EME SYSTEM CAPABILITY.
- NOT GOOD FOR COMMUNICATIONS.



# SHOULD ALSO KNOW

- DOPPLER SHIFT MOVES FREQUENCY  
# LISTEN ON MUTUAL DOPPLER  
OR ECHO
- FARADAY POL ROTATION NIL ON 1296  
# GEOMETRIC POL ROTATION – NO  
CONCERN WITH CIRCULAR POL
- FREQ SHOULD BE STABLE (~ HZ)
- BEST IF KNOW FREQ WITHIN < 500 HZ
- ON0EME BEACON ON 1296.000
- TIME NOT CRITICAL BUT IN A FEW SECONDS
- DISTANCE TO MOON VARIES (2 dB)

	AZ	El
Moon:	157.44	35.26
Moon/DX:	97.35	8.43
Sun:	219.15	55.28
Source:	351.24	-49.40

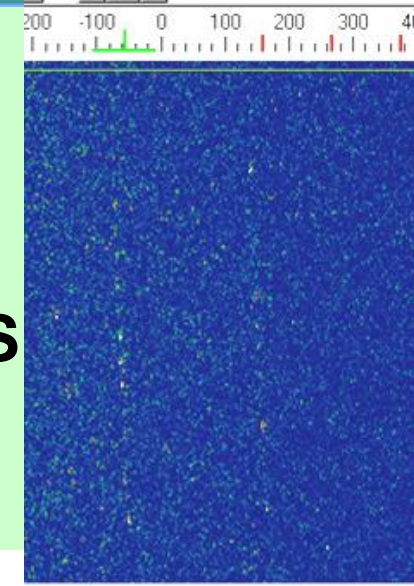
	Doppler	df/dt
DX:	282	-11.80
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Moon:	12:51	-11.67
Source:	00:00	0.00

Freq:	1296	Tsky:	3
MNR:	0.0	Dgrd:	-1.0
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# 3 cm SMALL STATION EME



**PA0EHG WITH 0.5 m  
USED TO DEMO  
10 GHZ EME**



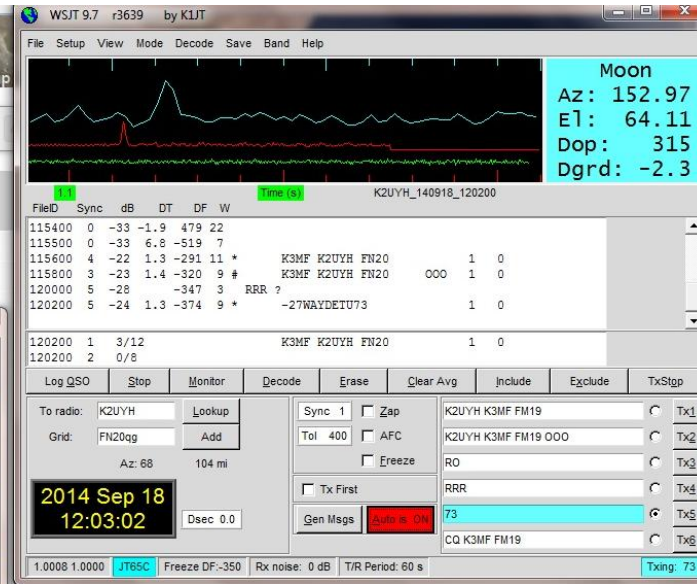
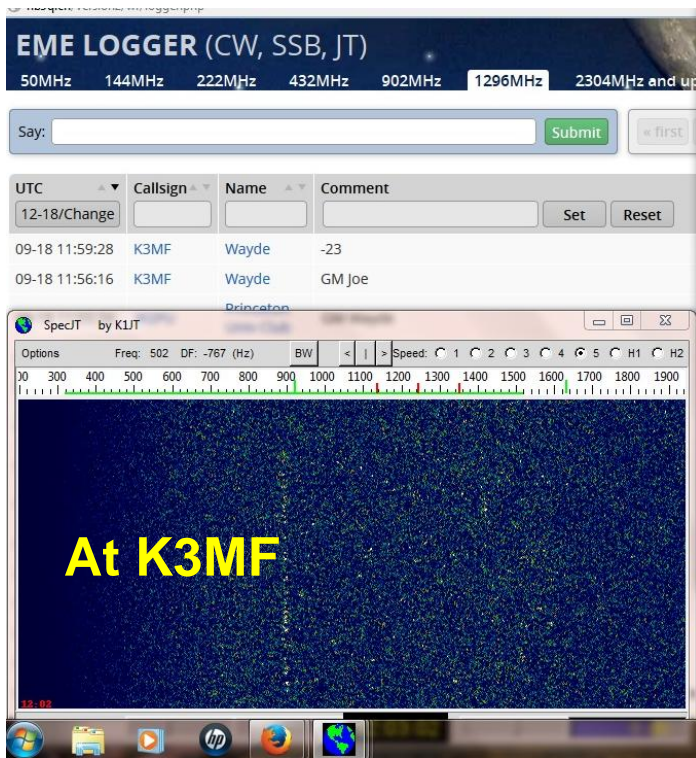
**PA0EHG's \$55 3 cm EME RX  
2 AVENGER PLL LNB'S  
& FUNCUBE DONGLE**

<http://www.pa0ehg.com/dl0shf2.htm>.



# PROOF OF THE PUDDING

## K3MF RAN TEST WITH HIS TROPO STATION



60 W SSPA, TS200X & AGO LNA



# 23 cm SMALL STATION EME FROM US VIRGIN IS



**K2UYH & KP2/W3XS WITH 7' DISH  
– 29 QSO WITH 3 ON CW**



# CONCLUSION

- EME IS CHALLENGING.
- ON 23 CM ALL YOU NEED IS A YAGI, ~50 W, A COMPUTER AND JT65!
- IT IS PRETTY EASY WITH A BIG STATION, BUT THERE IS STILL A LOT TO IT: ACCURATE FREQ, STABILITY, TIME, MOON TRACKING, DOPPLER, ETC.
- WITH A WEAK STATION, ALL THE ABOVE PLUS MUST UNDERSTANDING HOW TO USE JT65
- ACTIVITY CENTERED ~ .070
- NL [<http://www.nitehawk.com/rasmit/em70cm.html>](http://www.nitehawk.com/rasmit/em70cm.html)

# REFERENCES

- 1] A. Katz, "Small Station EME on 70 and 23 cm Using JT44/65,"  
[http://www.nitehawk.com/rasmit/jt44\\_50.html](http://www.nitehawk.com/rasmit/jt44_50.html).
- 2] B. Fritsche, "DL3OCH Report," 432 and Above EME Newsletter,  
May, 2003, <http://www.nitehawk.com/rasmit/NLD/eme0403.pdf>.
- 3] B. Fritsche, "DL3OCH Report," 432 and Above EME Newsletter,  
March, 2004 <http://www.nitehawk.com/rasmit/NLD/eme0305.pdf>.
- 4] P. Wade, "W1GHZ Online Microwave Antenna Handbook, Chapter 5,  
<http://www.w1ghz.cx/antbook/app-5a.pdf>.
- 5] A. Katz, "20' Portable Stress Dish," 432 and Above EME Newsletter,  
Oct. 1980, <http://www.qsl.net/pa3csg/Boek/BoekH3/art3-8.htm>
- [6] WSJT Homepage by K1JT,  
<http://www.physics.princeton.edu/pulsar/K1JT/>