

# Satellite Communications

This presentation on “satellite communications” is designed to provide a broad introduction into this method of radio communications. The content of the presentation is directed towards the novice radio enthusiast and will provide the information necessary to access the many amateur radio satellites that predictably circle the globe each day. The content of the presentation will include an overview of satellite classification, tracking and operating satellites, and what type of radio you need to make your first satellite contact.



John Palmisano - KB8OIS

# Satellite Communications

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# Satellite Communications



# Satellite Communications

## OSCAR

(Orbital Satellites Carrying Amateur Radio)

What are they?

Orbiting (cross-band) repeaters

How are the satellites categorized?

Orbital Pattern : (sun-synchronous, dawn-to-dusk)

Altitude: LEO ( up to 1000 miles AGL)

Name: (AO=American OSCAR, FO=Fuji OSCAR)

Mode of Operation: (B or U/V)

# Satellite Communications

Unique Features Associated with Satellites :

1. Many can be operated with a Tech. License
2. Low, Timely, and Predictable Orbits
3. Low Power – 5 watts
4. HT Transceiver works great!
5. Rubber Duck or Hand-Held Antenna is all that is needed

# Satellite Communications

Mode	TX	Frequency	RX
A	145 MHz up /	29 MHz down	
B	435 MHz up /	145 MHz down	
JA	145 MHz up /	435 MHz down	
JD	145 MHz up /	435 MHz down	
K	21 MHz up /	29 MHz down	
S	435 MHz up /	2.4 GHz down	
T	21 MHz up /	145 MHz down	

# Satellite Communications

## Keplerian Elements

Epoch

Orbital Inclination

Right Ascension

Argument of Perigee Eccentricity

Mean Motion

Mean Anomaly

Drag

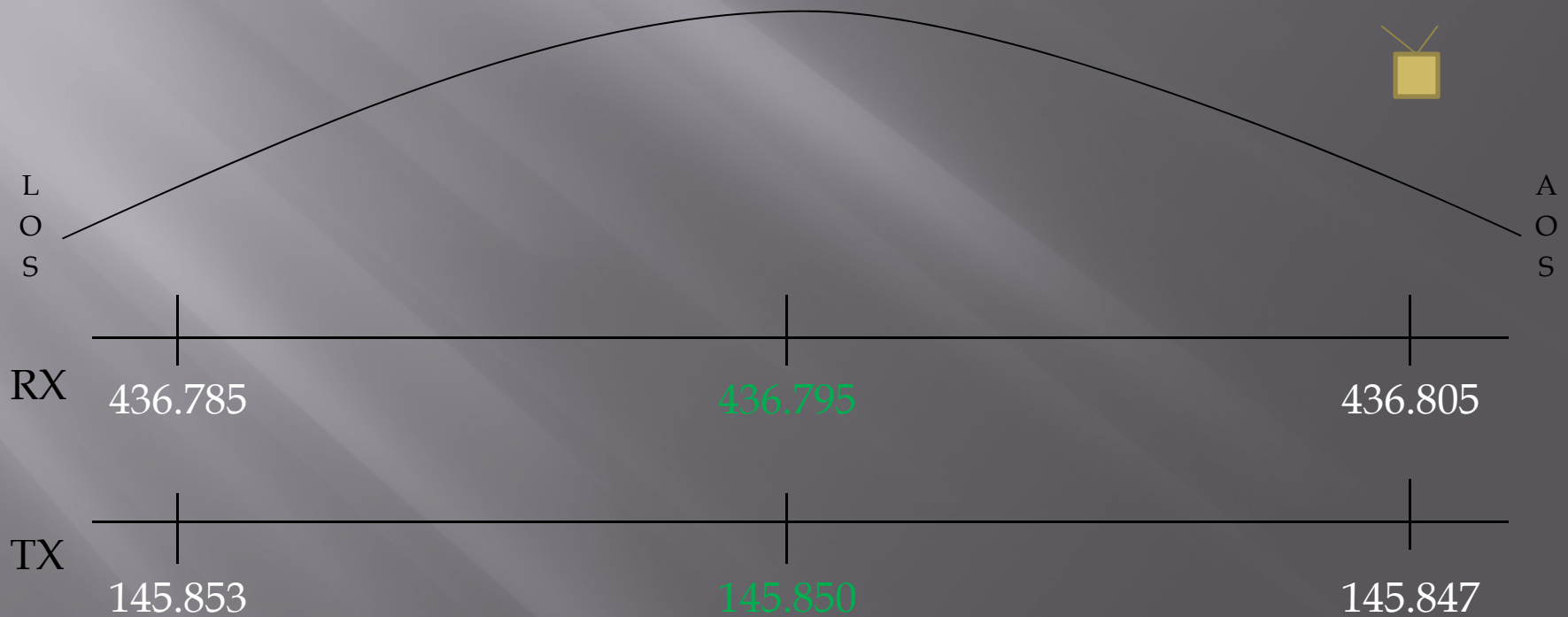
Epoch Revolution

Attitude

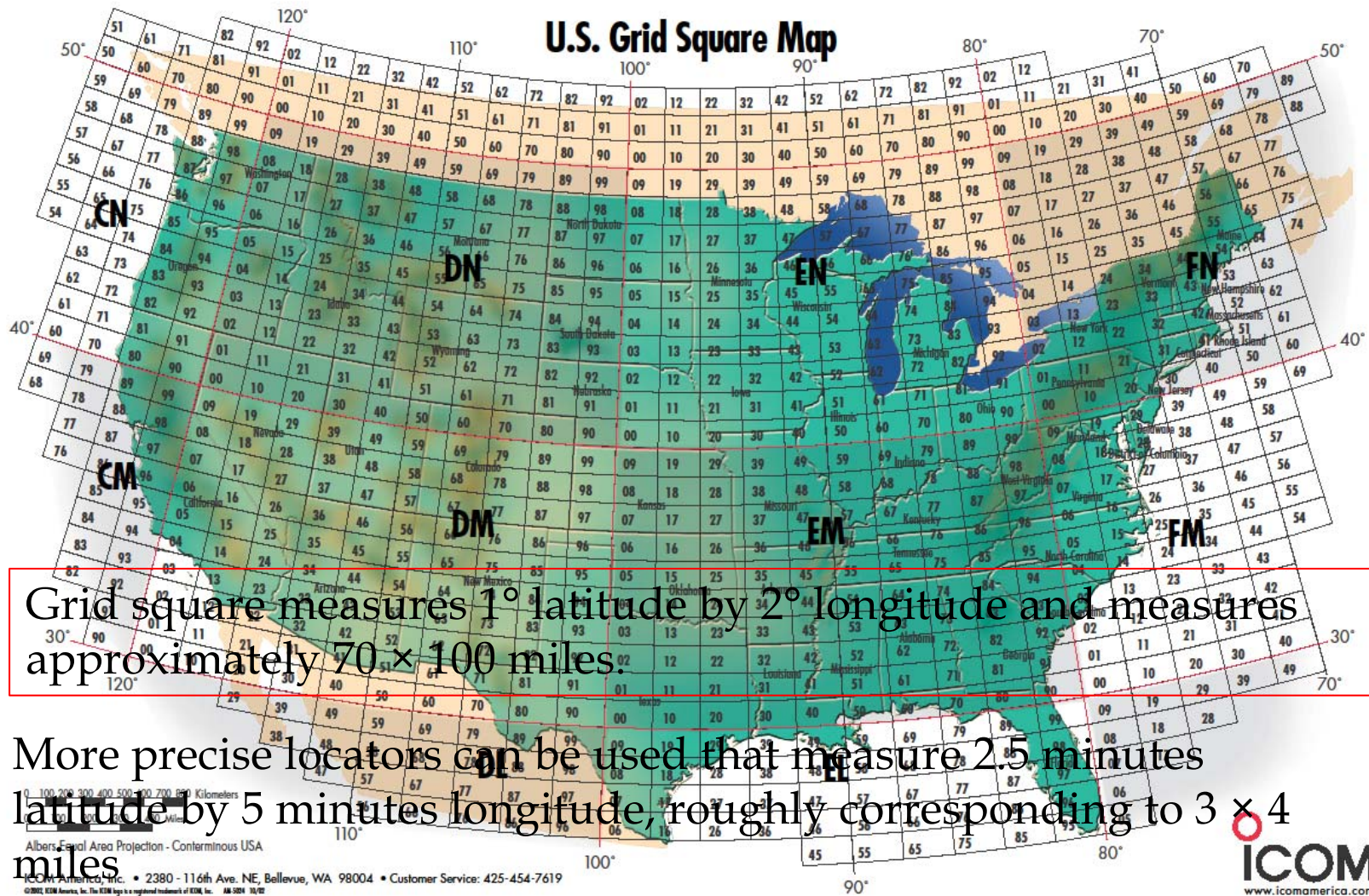
# Satellite Communications

## Doppler

Downlink Freq. 436.795  
Uplink Freq. 145.850



# Satellite Communications



# Satellite Communications

AMSAT Organization:

<http://www.amsat.org/amsat-new/>

Satellite Status - AMSAT

[www.amsat.org/amsat-new/satellites/status.php](http://www.amsat.org/amsat-new/satellites/status.php)

Pass Prediction - AMSAT

<http://www.amsat.org/amsat-new/tools/predict/>

# Satellite Communications

## What do you Need?

VHF / UHF Radio (“dual band”; Mobile/HT, or 2M/10M)

Antenna (cross-beam, rubber duck, camera tripod)

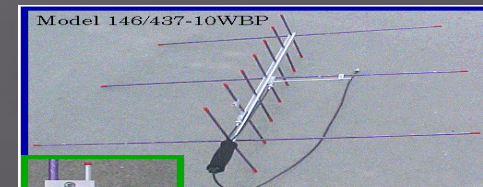
Compass

Computer Access

Satellite Location (Keplerian elements)

Satellite Operating Frequency / Instructions (AMSAT)

Headphones (can be helpful) & SQUELCH !!!



ertified

# Satellite Communications

Exchange Information (QSO):

UM v MSU Football Highlights

Call Sign

Whiskey Eight Uniform Mike

W8UM

Location (QTH) - Grid Square

Ann Arbor, Michigan about 40 miles west of Detroit

42 deg, 16 min, 14 sec N / 83 deg, 43 min, 35 sec W

EN82 (if needed; Echo November Eight Two)

Time Limited

# Satellite Communications

Courtesy & Patience

Acknowledge

Their call sign (and location; QTH), your call sign

Your Location (Grid Square)

EN82 / Echo November Eight Two

Listen for their Reply / Response

Next Contact

eQSL – Contact Confirmation

<http://www.amsat.org/amsat-new/index.php>

<http://www.eqsl.cc/qslcard/Index.cfm>

# Satellite Communications

You-Tube Video (AO-51)

[://www.youtube.com/watch?v=1HfvmU\\_utI8](https://www.youtube.com/watch?v=1HfvmU_utI8)

Note:

Doppler Adjustments to the HT

Direction & Inclination of the Satellite Pass

Simulation of the Satellite Pass

Contact & Acknowledgement

# Satellite Communications

Plan ahead!

What Mode of operation?

Which Satellite?

Is the satellite operational?

Uplink / Downlink Freq. and Instructions

What Time is the pass?

Which Direction is the pass?

What is the Duration of the pass?

What Elevation? (footprint)

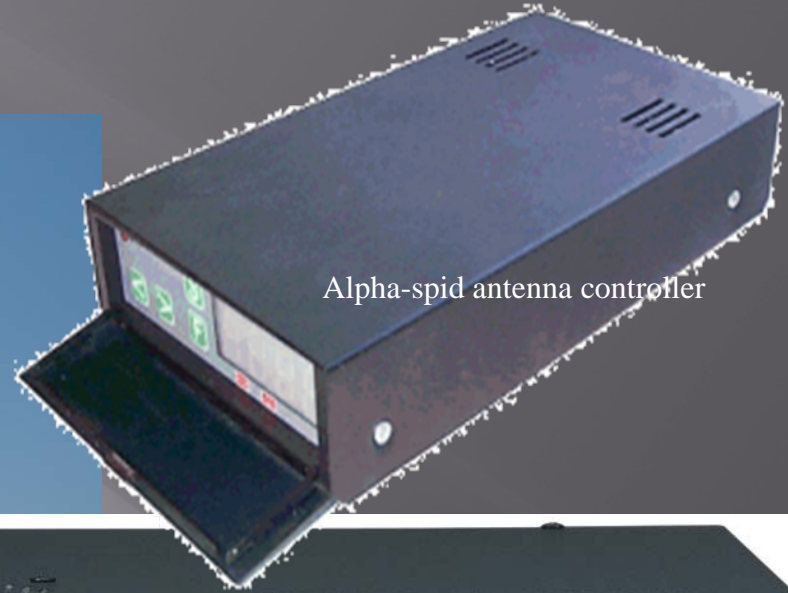
Simulate the pass (or Ham Radio Deluxe)

Tx Power (5w), Tx Vol . Off , Rx Vol. On, Rx Squelch OFF!

Use the 4<sup>th</sup> Floor Hallway to your advantage

# Satellite Communications

W8UM  
University of Michigan



Alpha-spide antenna controller



AO-51 at 6:57 pm



RX

TX

# Satellite Communications

HRD / Remote Access Program

<C:\Program Files\TightVNC\vncviewer.exe>

# Satellite Communications

Ninja Camera Mount

[http://www.x10.com/products/x10\\_vk74a.htm](http://www.x10.com/products/x10_vk74a.htm)