Working DX with Low Power and Restrictions

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K0FYI

Overview

- Introduction
- Antennas
- Needed rig/hardware features
- Efficient operating modes
- Operating venues
- Operating aids
- Logical progression of techniques

Introduction

- Restrictions (HOAs): e.g., no antenna outside home
- Why operate under these conditions?
- Why DX? Challenge; QSL cards on the wall; Awards
- Accept: you are not going to be a Big Gun; you are going to be a Little Pistol
- Need to work "smart"; then achieve success
- Success of techniques – 164 of 218 DXCC entities from restricted location
- No claim of ultimate wisdom; suggestions cheerfully accepted

Antennas

- Higher is better for doublets
    - (lower radiation elevation angle)
- Attic doublets with autotuner at middle
- Attic loops
- Flagpoles
- Magnetic loops?

Rigs/Hardware

- CW with split receive/transmit frequency capability
- Adequate narrow signal filters
- RTTY capability: AFSK or FSK
- Digital modes with internal/external soundcard interface
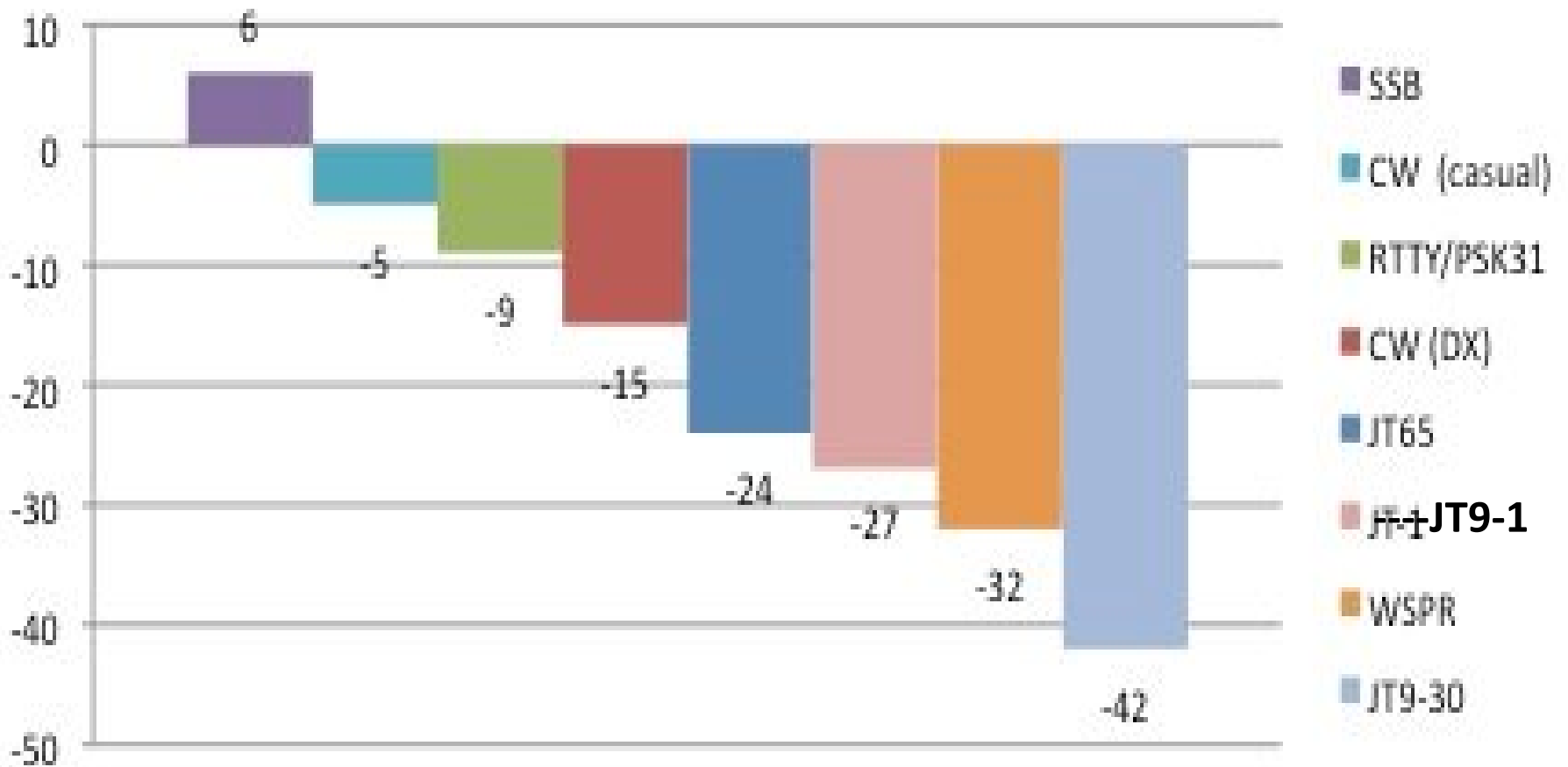- Rig control by computer

Rigs/Hardware (Cont.)

- Nice to have
  - RF noise canceller – Timewave ANC-4
  - Secondary CW and RTTY decoding device – AEA/Timewave PK-900

SNR Requirements of Various Modes
http://kf6hi.net/SNR.html

(by permission)

Mininum SNR, dB in 2500 Hz BW

Value	Mode
6	SSB
-5	CW (casual)
-9	RTTY/PSK31
-15	CW (DX)
-24	JT65
-27	JT-1 JT9-1
-32	WSPR
-42	JT9-30

Efficient operating modes: CW

- Above website lists ~ 0 dB as lowest S/N for SSB DX in 2500 Hz BW

- Thus the advantage of various digital modes over SSB for <u>DX</u> are:
  - RTTY: ~ 9 dB
  - PSK31: ~ 9 dB
  - CW: ~ 15 dB
  - JT65: ~ 24 dB

- Chart does NOT imply can hear -15 dB S/N CW DX. Need to adjust by BW ratios, e.g., 10 log (2500/100) = +14 dB (for 100 Hz BW)

Efficient operating modes: CW (Cont.)

- Very popular mode for DX station - high QSO rate
- Working "split" receive/transmit frequencies offer advantages:
  - DX chasers spread out in frequency, not on top of each other on DX transmit frequency
  - Restricted DX chaser not competing as much with high power and directional antennas on same frequency
  - Split mode seen more on CW than some other modes

Efficient operating modes: CW (Cont.)

Myth: need to be Morse code whiz to use

- Need to recognize own call at, say, 30 wpm
- Have repeated chances to decode DX call by ear/brain
- Can use secondary CW decoders: CW Skimmer (or other) software and/or hardware decoders
- Can program transceiver to send canned CW exchange with DX

Efficient operating modes: PSK31

- Good S/N
- Not used for most major DX contests
- Split operations not as common

Efficient operating modes: JT65A (WSJT Variant)

- Can work in mid minus 20s dB S/N domain
- Orchestrated QSO consists of 6 one-minute, one way exchanges (low QSO rate)
- Not particularly popular with rarer DX stations due to low QSO rate
- Not used in popular DX contests
- JT65-HF popular software

Efficient operating modes: RTTY

- Good S/N ratio
- Contests are great opportunities for DX
- Heard more for contests than casual DX

Efficient operating modes: SSB (less so)

- Big Guns have big advantage if working at same time & frequency

- Split used but less common than CW due to signal BW

- Little Pistols can pick the moment and sneak in. Have patience.

  - St. Helena, both of us with 100 W and wire antennas

Operating venues - Contests
CW

- ARRL CW DX
- CQ WW WPX CW
- CQ WW DX CW
- DARC WAE DX CW

Operating venues – Contests
RTTY

- ARRL RTTY Roundup (also PSK31 and some other digital modes)
- CQ WW RTTY
- CQ WW WPX RTTY
- DARC WAE DX RTTY

Operating venues – Contests
Phone (SSB)

- ARRL SSB DX
- CQ WW WPX SSB
- CQ WW DX SSB
- DARC WAE DX SSB

Operating aids

- Books
  - AC6V's "DX101x HF + Six Meters DXing Reference Guide"
  - W9KNI's "The Complete DXer"
- Telnet DX Clusters & Filtering Software –
 - Filter by:
    - Mode
    - Band
    - Neighboring reporter vs. worldwide
    - Un-worked DXCC entity
  - HRD Logbook (improved cluster filter by WA9PIE)
  - Band Master – shows <u>only</u> spots passing all four filters

Operating aids
Modeling Software

- Antenna modeling – EZNEC – lobe azimuths and elevations
  - Overlay of antenna azimuthal patterns on azimuthal world map at different frequencies to determine DX coverage
- RF circuit modeling – ACE-HF

EZNEC Antenna Azimuthal
Pattern Superimposed on
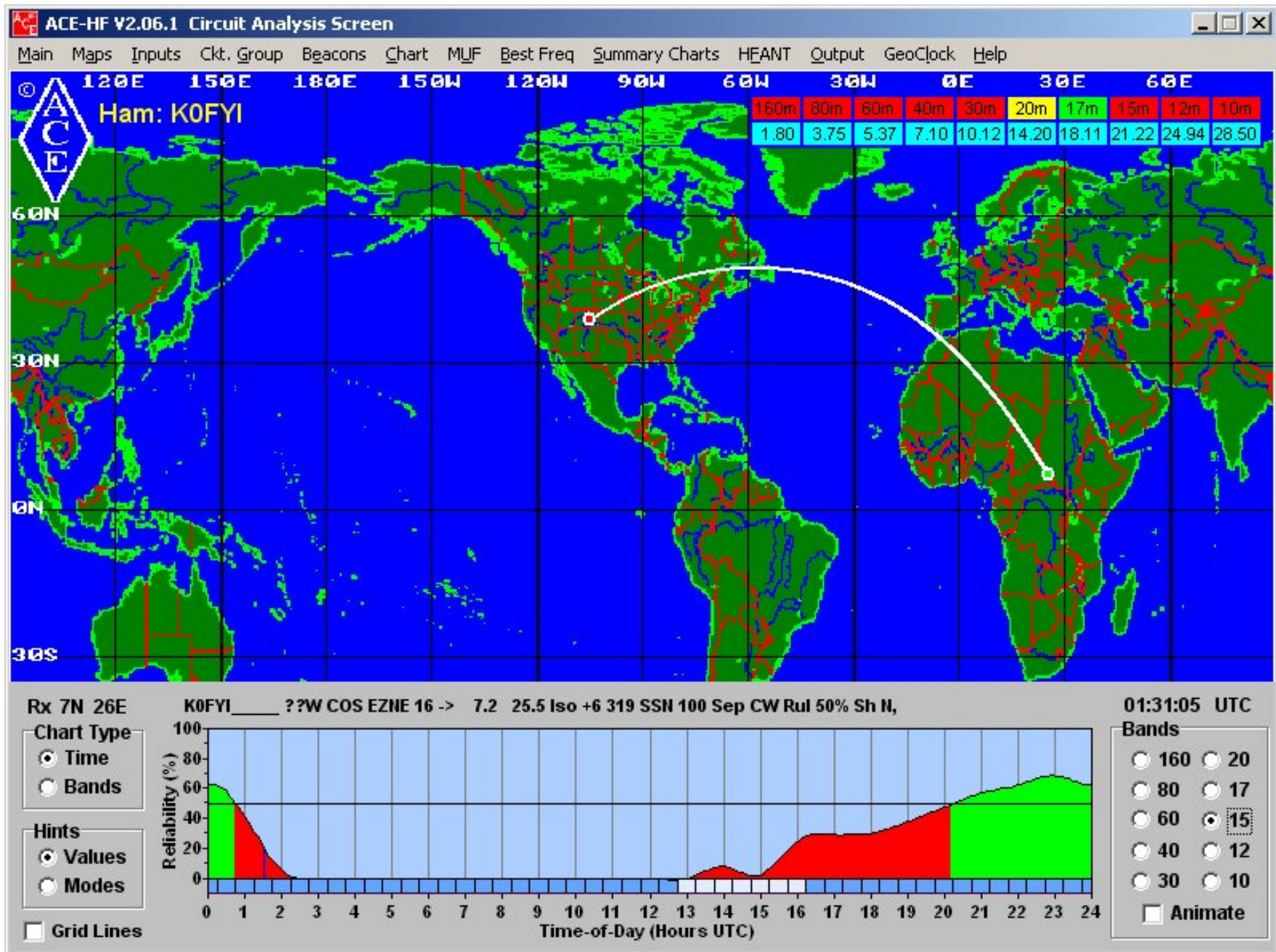Azimuthal World Map
Centered on Colorado Spr
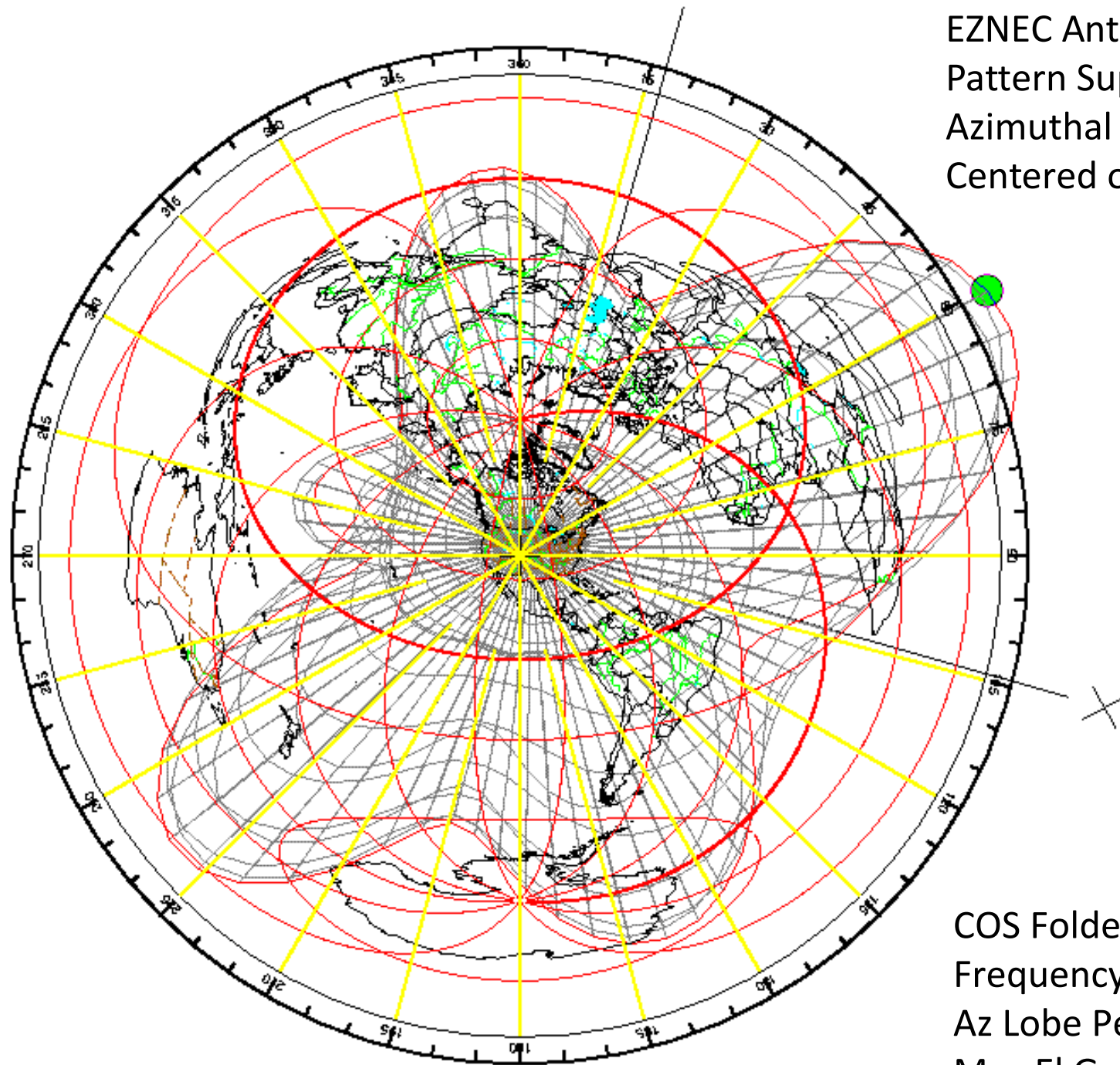
COS Folded Attic Dipole
Frequency: 21.05 MHz
Az Lobe Peak: 10.6 dBi
Max El Gain: 20 deg

Azimuthal Equidistant Projection
From K0FYI, Colorado Springs, CO.
Radial scale: 2000km/cm
http://www.wm7d.net/azproj.shtml

AZ_PROJ v1.1.6beta5, Jan 2002, (C) 1994-2002 Joseph Mack NA3T, Michael Katzmann NV3Z

ACE-HF System Simulation

Operating aids
Contesting Software

- Writelog/MMTTY

- N1MM

- N3FJP ACLog

Operating aids
Software
Digital modes

- Ham Radio Deluxe/DM780/ HRD Logbook
- FLdigi
- MixW
- DigiPan
- MultiPSK

Operating aids
Software (Cont.)

- ARRL's Logbook of the World – LOTW
- Band Master, Afreet Software, Inc., http://www.dxatlas.com/BandMaster/
  - Extensive filtering capability, e.g., by un-worked DXCC
  - Works seamlessly with other useful Afreet software: CW Skimmer, DX Atlas, IonoProbe, HamCap, Faros, OmniRig, DX Bulletin Reader, etc.
- HRD Logbook
- Mapping: DX Atlas puts different-colored pins on world map of contacts, made or confirmed, etc.

DX Atlas – K0FYI DXCC QSOs

Operating aids
Software (Cont.)

Virtual Serial Port Emulator – VSPE

- Desirable to have multiple Windows programs accessing the same serial port on computer simultaneously (several programs need rig frequency or ability to control rig frequency)

- Windows normally does not allow this

- Example: VSPE used to allow simultaneous use of HRD Logbook and CW Skimmer

18.073.000

Freq: 18.073.000 <
Band: 17m   ☑ track
Mode: CW   < ☑ track

QRZ

599
599

Locator:
State:
QTH:
WPX:

Country
French Polynes
ITU HQ
Italy
Saint Helena
Fed. Republic
Egypt
Thailand
Mexico
New Caledonia

Rotator
20m

Band Master

File   D-Load   View   Tools   Help

DX		Freq ▽	UTC		Spotter
⊞	XZ1Z	18.079.0	20:36	09/17	W3LPL
⊞	KH7Y	18.077.0	20:01	09/17	IK0GHE
	VA3KSF	18.075.7	20:17	09/17	DM5BB
⊞	XE2MVY	18.074.1	20:40	09/17	DL0FTL
	ER3MM	18.073.5	19:59	09/17	VE1DX
	JA7BXS	18.073.0	20:10	09/17	K8MEG
	KW7D	18.072.0	20:02	09/17	HA0NA
	KH6BB	18.071.0	20:33	09/17	KD6WK
⊟	XP3A	18.069.0	20:21	09/17	K2SX
	XP3A	18.069.0	20:14	09/17	WQ5R
	XP3A	18.069.0	19:55	09/17	N4NQ
	PY5QW	14.270.0	19:52	09/17	IZ8BXM
	IL7/IK4YCQ	14.260.0	19:52	09/17	UA3AG

Band Map   Spot List

18073.00
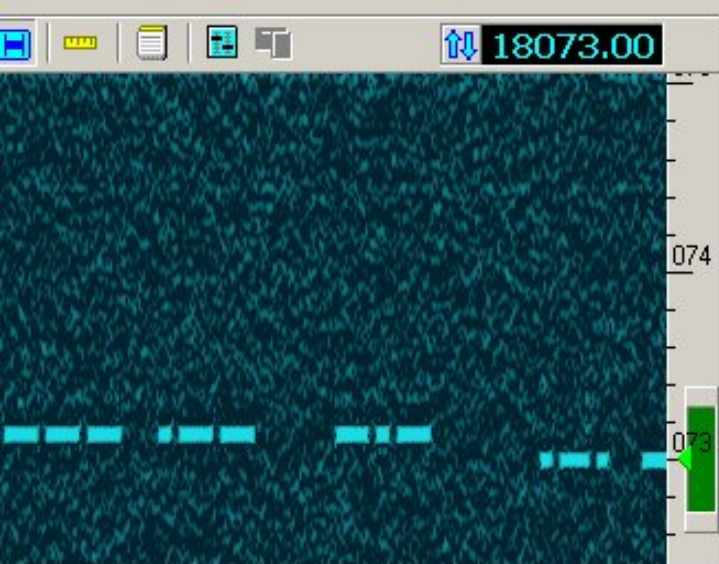
599

5Z95Z OS5ZN

599

FG7TASIEU AU2LEW
JA7BXS 599
JA7BXE ZW1OP 599 ▶

074
073

TX UR RST 579 57* 57N ES OP ES TAKAR TAKAR TAKAR = HWE ZW1OP DE JA7BXE I K »

Operating aids
Websites

- www.dxsummit.fi

- www.ac6v.com

- www.dxuniversity.com

Clubs

- Mile High DX Association
- Informal associations – breakfasts with enthusiasts

Logical progression of techniques
(as DXCC numbers increase and
new DX becomes harder to find)

- Contests
  - Search & Pounce rather than Running
  - Split generally not used, but sometimes responding slightly off DX xmit freq allows him to distinguish you from others
  - Data rate factor in contests reduces mass interest in any one DX station
  - CW
  - RTTY

Logical progression of techniques
(as DXCC numbers increase and new DX becomes harder to find)

- JT65A – some semi-rare DX

- PSK-31 digital mode

- Internet DX clusters
  - Very time efficient way to find rarer DX
  - Have to compete with many others (operating split helps)

- DX Nets – controversial

Logical progression of techniques
(as DXCC numbers increase and
new DX becomes harder to find)

- Smart Listening – target your needed DX
  - Use DX bulletins to identify target's operating dates, time, bands, mode
    - ARRL DX Bulletin
    - Ohio/Penn DX Bulletin
    - 425 DX News
  - DX expeditions
  - Remote QRV
  - Rare DX
    - Search spot history – e.g., BandMaster, DX Summit
  - Use greyline propagation enhancement
  - Use propagation predictors to listen at right time of day, band, season of year for specific geographic area
  - Monitor DX beacons – e.g., Faros

Summary

- Work smart
- Work efficient S/N modes favored by DX stations (I like split mode CW, RTTY and other digital modes)
- Use best antenna you can get away with
- Have rig with good characteristics for DX
- Work CW and RTTY contests
- Make use of operating aids
- Make use of a logical progression of techniques as the DX gets harder to get

Questions?

Comments?