

# BASICS OF SO2R OPERATION

Randy Farmer, W8FN

DFW Contest Group

Presented at Ham-Com 2014

Plano, TX

13 June, 2014



# SO2R: Single Operator 2 Radio

- Listen On Two Frequencies Simultaneously
- Rapidly Select Either Frequency As Transmit Frequency
- Ability To Listen On One Frequency While Transmitting On The Other



# WHAT IS SO2R GOOD FOR?

MORE QSOs = Higher Score!

- Maximize Rate With Simultaneous Run And S&P
- Two-band S&P When Run Is Non-productive
- Check Conditions On Another Band
- Multiplier Spotting
- Moving Mults From Band To Band
- Maximizes Potential For Small Station With Limited Antennas



# WHEN SHOULD I CONSIDER SO2R?

- Run and S&P Rate Capability Has Maxed Out
- Contests With Limited Rate Potential (e.g., SS)
- Additional Equipment Is Available



# WHAT EQUIPMENT IS NEEDED?

- Two Radios (doh!)
- At Least Two Antennas
- Antenna Switching
- Switching Control For Key, Mic, PTT
- Headphone Audio Switching



# GETTING STARTED

- Start Simple
- Low Power, At Least On Second Radio
- Modest Antenna For Second Radio
- Simple Antenna Switching
- Manual Control Switching
- Manual Headphone Audio Switching



# GETTING USED TO SO2R

- You **WILL** Have Trouble At First
- Your Rates **WILL** Be Low
- You **WILL** Want To Quit — ***DON'T!***
- Practice, Practice, Practice!
- Listen To Two Radio Audio Outside Of Contests
- Practice In Low-Intensity Contests (e.g., QSO Parties, etc.)



# STATION OPTIMIZATION FOR S02R

- Multiple Antennas Available
- Flexible Antenna Switching
- Flexible Audio Switching
- More Automation Is Better
- Compatible Logging Software
- Identical Or Similar Radios
- Ergonomic Station Layout
- High Quality Comfortable Headphones





# ANTENNAS & SWITCHING

- Multiple Antennas Available To Each Radio
  - Monoband Antennas Best But Not Mandatory
  - Antennas Arranged For Minimum Coupling
- Flexible Antenna Switching *With Good Isolation*
  - Automatic Lockout Antenna Switches (SixPak, etc.)
  - Clear Indication Of Antenna Selections



# FLEXIBLE AUDIO SWITCHING

- Stereo Audio
  - One Radio In Each Ear
  - Quick Switching Between Mono & Stereo
- Multiple Audio Modes
  - Left + Right (Default)
  - Mono For Active Radio
  - Mono For Non-Transmitting Radio



# MAXIMIZE AUTOMATION

- Automatic Antenna Switching
  - Programmable Antenna Selection
  - Same Band **Hardware** Lockout & Transmitter Inhibit
- SO2R Control & Audio Switching Unit
  - Top Ten Devices DX Doubler
  - microHAM micro2R Or MK2R/MK2R+
  - YCCC SO2R Box
  - Ham Radio Solutions EZMaster
  - Homebrew



# COMPATIBLE LOGGING SOFTWARE

- Windows® Software
  - WriteLog
  - N1MM Logger / N1MM Logger Plus
  - Win-Test
  - TR4W (UA4WLI)
  - Others?
- DOS Software
  - CT / CTWin
  - NA (K8CC)
  - TR LOG (N6TR)
- Mac & Linux Software??



# POTENTIAL SO2R PROBLEMS

- Mutual Interference
  - Excessive RF From Antenna Coupling
  - Transmitter Phase Noise
  - Harmonics
  - Poorly Shielded Cables / Common Mode RF
  - QRO Is MUCH More Difficult
- Additional Hardware Complexity Reduces Reliability & Increases Maintenance



# SO2R STATION ERGONOMICS

- Use Identical Or Similar Radios If Possible
  - Similar Control Layouts & Displays
  - Both Radios Tune In Same Direction
- Left Radio Audio In Left Ear, Right Audio In Right
- Logging Software Windows On Same Side As Radios
- Dedicated Antenna / Rotator Controls Located Near Associated Radio
- Keep Your Hands On the Keyboard
- Use High Quality Comfortable Headphones



# EXAMPLE STATION LAYOUT



# N1MM LOGGER SO2R LAYOUT

The screenshot displays the N1MM Logger SO2R interface with several key windows:

- 7055.74 CW FT-1000:** Shows a list of contacts with columns for TS, Call, Freq, Sent, NR, Prec, CK, and Sect. A summary table below shows:
 

Band	QSOs	Pts	Sec
8.4	76	150	4
7	287	574	10
14	262	524	14
21	255	510	62
28	100	200	3
<b>Total</b>	<b>979</b>	<b>1968</b>	<b>83</b>
- 3546.91 CW FT-1000:** Shows a 'Mults' table:
 

Mults	Qs
0	160
0	80
0	40
0	20
0	15
0	10
- 7055.74 (7055.74) CW Elecraft K3:** A split window for logging contacts, showing columns for Snt Nr, Nr, Prec, CK, and Section.
- 7055.74 (7055.74) CW FT-1000:** A split window for logging contacts, showing columns for Snt Nr, Nr, Prec, CK, and Section.
- Multipliers - Sections - 83 of 83:** A grid of call sign sections for logging multipliers.
- W8FN:** A window showing contest statistics and a bar chart for 'Last 5 min'.
- N1MM Rotor Control:** A window for controlling the rotor, showing a 'Turn' button and a table of positions:
 

File	Tools	Help
0	Turn	
16	45	90
210	270	301
	330	359
- NaP3 - Elecraft K3 - v2.2.4.2:** A waterfall plot showing frequency activity around 7.000 MHz.





# PRINCIPLES OF SUCCESSFUL SO2R

- Start With Modest Hardware
- Design The Station Carefully
- Be Prepared For The Learning Curve
- Increase Station Complexity And Capability As Operator Skill Grows
- ***Practice, Practice, Practice!***



# RESOURCES

- K5ZD Videos:
  - Part 1: [http://www.youtube.com/watch?v=kHCveAeju\\_A](http://www.youtube.com/watch?v=kHCveAeju_A)
  - Part 2: <http://www.youtube.com/watch?v=eij1bs8Mg0E>
  - Part 3: <http://www.youtube.com/watch?v=3YJZ4-StwRs>
- [http://www.k8nd.com/Radio/SO2R/K8ND\\_SO2R.htm](http://www.k8nd.com/Radio/SO2R/K8ND_SO2R.htm)
- <http://www.qsl.net/ct1boh/so2r.htm>
- [www.pvrc.org/Powerpoint/SO2R\\_v4.ppt](http://www.pvrc.org/Powerpoint/SO2R_v4.ppt)
- <http://zs6aa.files.wordpress.com/2008/02/a-simple-so2r-contest-station.pdf>

**MANY MORE: GOOGLE IS YOUR FRIEND!**



# QUESTIONS?

