



CW Academy

CWA Advanced Class Notes

Joe Attili – AA2IL
Jim Mueller - N7AUE

January-February, 2023



Session 0

CW Academy

- Meet and Greet
- Introduce ourselves
- Test Jitsi and Sidetone audio
- Do the first three h/w assignments before 1st class
 - Some students do not like the “new” audio practice files
 - The “old” files are available on my Github repository:
 - <https://github.com/aa2il/CWA>



CW Academy

Overview

- 8-weeks (M & Th 6-7PM on the West Coast)
 - MST follows immediately after on Mondays
 - **Please use headphones!!!**
- Daily Practice
 - Two 15-minute sessions per day is much more effective than one 4-hour block once per week
 - Homework: Short stories, QSOs and CWT exchanges
 - RufzXP and MorseRunner
 - **GET ON THE AIR!!!**
- In-class exercises will reinforce skills but are no substitute for practice and OTA time
- We will supplement each class with related topics to help improve your operating skills and overall enjoyment of our great hobby



CW Academy

About AA2IL

- Grew up in Upstate New York, moved to San Diego in 1993 (job transfer)
- First licensed in the late 1970s as a teenager
 - Went silent for over 20-years
- Retired in Oct. 2021 after 35-years as an Electrical Engineer (signal processing)
- Radio activities include
 - Chasing DX and contesting
 - VHF/UHF and satellites
 - Antennas, Linux software development and micro-controllers
- Modest HF station
 - 100W and wire antennas
- I took this class last spring because couldn't seem to get my "fist" back and wanted to see how it all worked
 - Biggest take-away was how crucial daily practice is to improving speed



Week 1 - Session 1

CW Academy

- Go over h/w and OTA activities
- The NAQP CW contest is on Saturday
 - Exchange is NAME and STATE (same as SST)
 - One of my favorites because power is limited to 100W and lasts only 12-hours
- DX - If you have any ambitions of “working them all:”
 - Crozet Island (FT8WW, #3) – One guy, active for a couple more weeks, seems mainly 20m & 30m FT8 & CW
 - Bouvet Island (3Y0J #2) – Expected by the end of the month
 - The Congo (TN8K) – Just started, big pile-ups
- Get on the air!
 - There's always rags to chew, POTA/SOTA/SES stations s...
- A few comments regarding this course
- Word game drill
 - Animals
 - Colors



CW Academy

Philosophy

- Its a hobby, not a competition!
 - Keep it fun!!!
- Just like on the air (OTA), there are different skill levels coming into this class
 - Compare yourself **only to yourself**, not your classmates
 - Don't get frustrated or worry about slowing down your classmates
 - All os us, even the CW "speed demons," have been where you are now
 - More skilled ops, PSE QRS! GET THE MESSAGE THROUGH!!!
- Challenge yourself
 - Listen to homework a little faster than you are comfortable with
 - Strive to make a few more QSOs in the CWTs
 - Try "running" in the SSTs and MSTs
 - Practice sending a little faster ...
- Practice, get OTA and HAVE FUN!!!



CW Academy

GitHub Repository

- I have set up a repository on GitHub for items related to CW and this class:
 - <https://github.com/aa2il/CWA>
- There have been complaints about the “new” CWA practice files. The “old” versions of these files are available there. Use these instead if you prefer:
 - “OLD Advanced QSOs”
 - “OLD Advanced Short Stories”
- The sub-folder “N1MM” contains a collection of “quick-start” guides for N1MM logger
 - N1MM is the most popular contest logging program but certainly not the only one available
- The file “Panagrams.pdf” contains a long list of panagrams you can use for sending practice.
 - Panagrams are helpful in that they hit each letter of the alphabet at least once
- Poke around and feel free to suggest other material to include there



CW Academy

Session 2

- Jim N7AUE led
 - Went over h/w & on the air activities
 - Discussion of various aids and techniques that he found helpful for building speed



Week 2 - Session 3

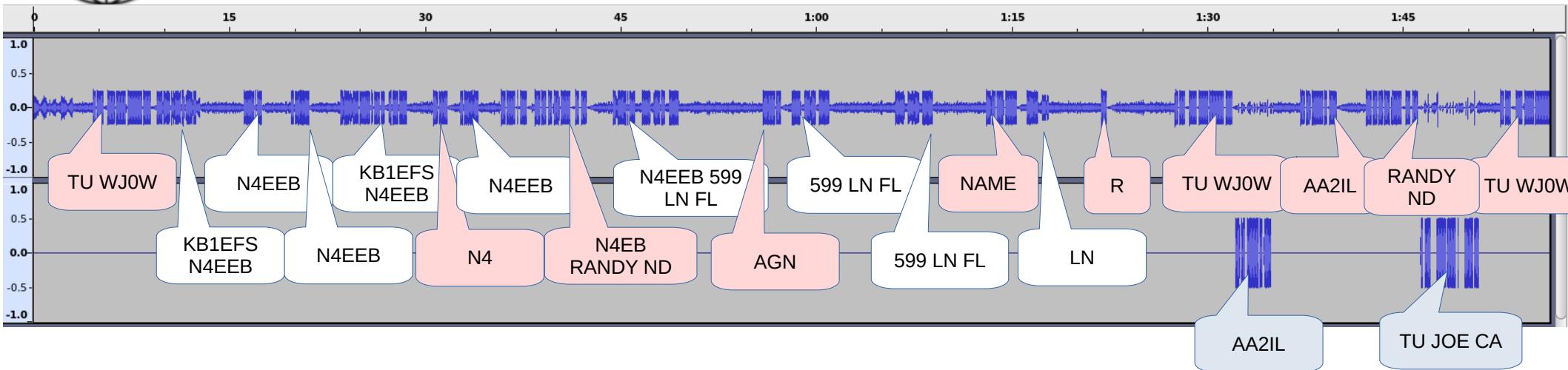
CW Academy

- Questions on h/w & on the air activities?
 - NAQP ?
- Faster is NOT always better
 - Slow down for slower ops to get the message through!
- Word game drill
 - Colors
 - Hardware Store
- My setup and S/W



CW Academy

Fast is NOT Always Faster

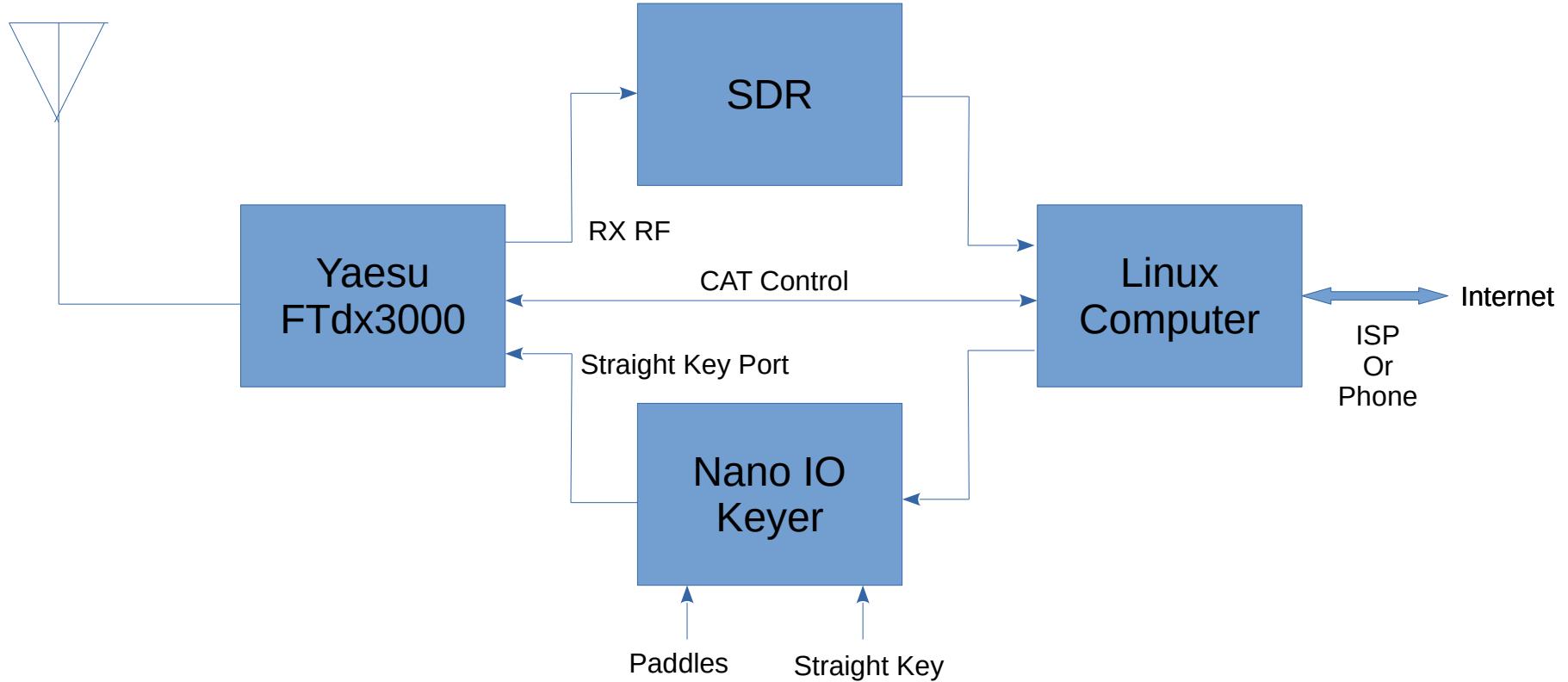


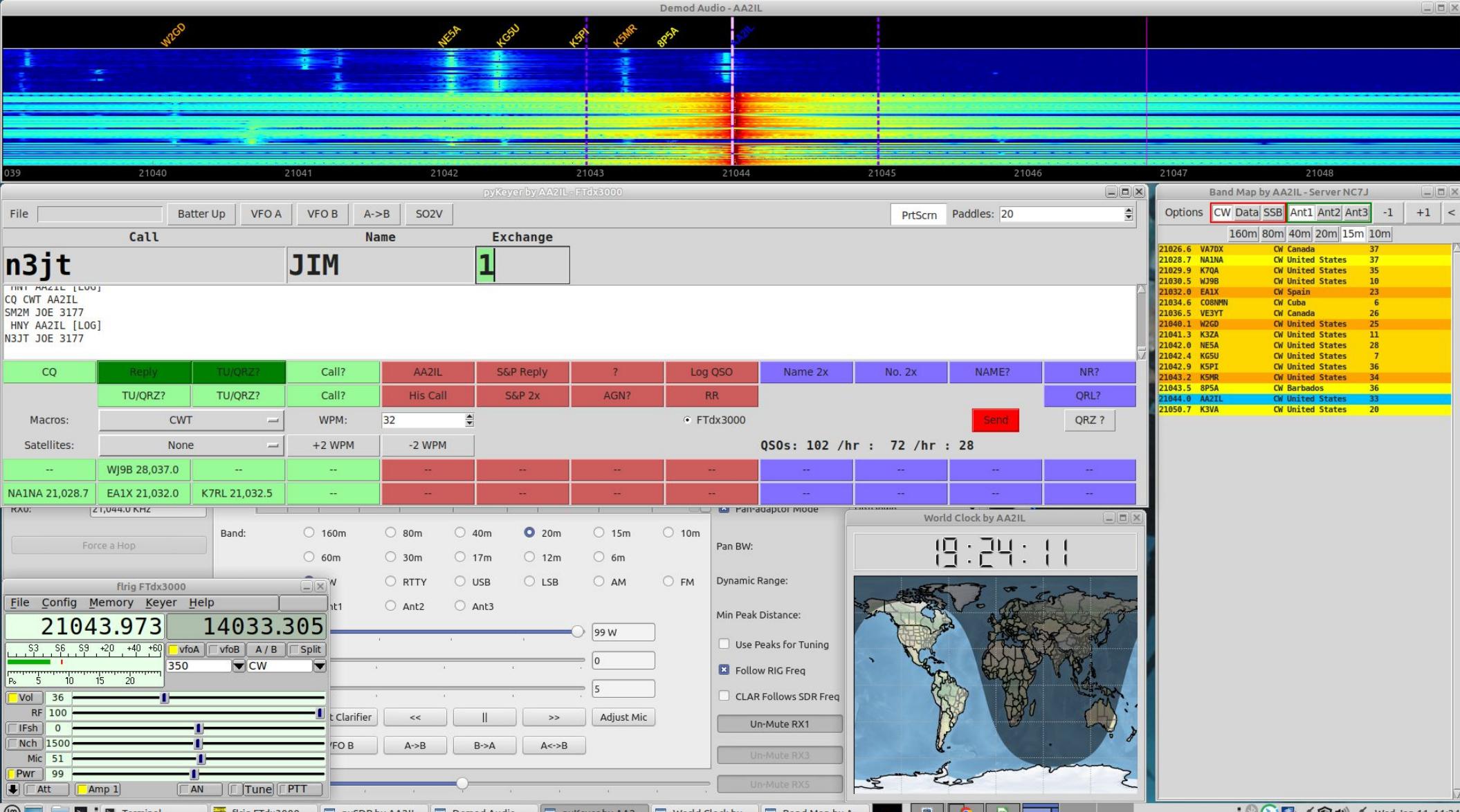
- Audio Clip from Jan. 2023 NAQP – PSE_QRS.mp3
- Runner is clearly struggling (major kudos for putting ND on the air!)
- Persistent Pouncer with difficult call and name only finally slows down after several repeats
 - Other pouncer gave up and moved on
 - “LN” is probably a shortened version of “ELLEN” but just doesn’t work in this context
- Runner never gets call correct so won’t get credit for QSO
- I was able to complete a contact quickly with no repeats simply by tapping on the brakes



AA2IL HF Station

CW Academy







Week 2 - Session 4

CW Academy

- Questions on h/w & on the air activities?
- NAQP SSB is this Saturday
- The ARRL January VHF Contest is this weekend
 - Exchange is 4-character maidenhead grid square
 - Look for CW activity 50.09 MHz +/- and 144.2 MHz +/-
 - Look for SSB activity around 50.125 MHz, 144.2 MHz and 432.1 MHz, all +/-
 - Look for FM activity around the calling frequencies: 144.52 MHz and 446.0 MHz
 - FT8 dominates 6m with sporadic activity on 2m and 70cm
- Contesting Intro
- Simulated SST
 - Each student gets to run and others call



CW Academy

Why Radio Sport?

- Major activity in our hobby
- Fun Competition
 - Some say its the most fun you can have with your clothes on
- Become a better operator
 - Difficult conditions
 - Emergency Comms
- Quickly rack up entities for “paper chasing” (WAS, DXCC, DX Challenge ...)
- Dormant bands suddenly light up
- Test effectiveness of your station
- ...



CW Academy

Some Terminology

- **Runner**
 - Station Calling CQ (soliciting contacts)
 - Usually achieve a higher QSO rate, especially if you are a “big gun”
 - Need to be able to recognize calls and exchanges without too many repeats
- **Search and Pounce (S&P)**
 - Tune across band answering runners
 - Often lower rate because you are tuning and competing with other S&Pers
 - Much easier – can listen to runner until you get call and info
 - Be careful with serial numbers, not always consecutive
 - Often a better strategy for “little pistols” in larger contests
- Some mix of these is needed to work everybody



SST Weekly Practice Contest

CW Academy

- “Slow” Speed Test
- Friday 2000z and Monday 0000z
- Very Relaxed Pace - Speed limit is 20 wpm
- Exchange: NAME and STATE

CQ SST N0RPM

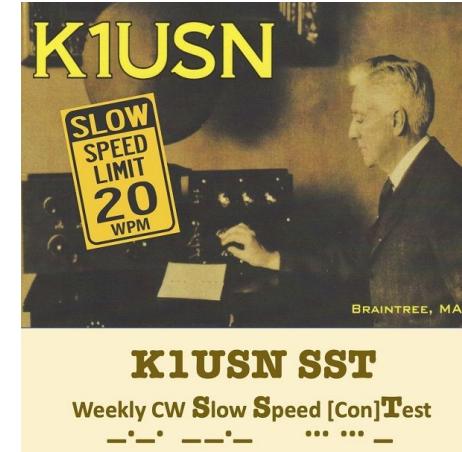
W5CYN

W5CYN TU JASON MN

GE JASON JIM TX

GL JIM 73 N0RPM

- If you miss something, send ?, AGN, CALL?, NAME?, QTH?, ...
- Great place to get used to contesting and to try running





Week 3 - Session 5

CW Academy

- Go over h/w and on air activities
- Upcoming contests
 - CQ 160m CW is this weekend (5NN + STATE)
- Practice Contests
 - MST and CWT
- Simulated MST
 - Each student gets to run and others call



MST Weekly Practice Contest

CW Academy

- Medium Speed Test
- Monday 1300z and 1900z, **Tuesday 0300z**
- Relaxed Pace - Speed limit is 25 wpm
- Exchange: NAME and SERIAL No.



You don't need to wait for another CQ

- Great place to build up confidence and skill





CW Academy

CWT Weekly Practice Contest

- Wednesday 1300z and 1900z, Thursday 0300z and 0700z
- Very popular and very fast – average speed ~39 wpm
- Exchange: NAME and MEMBER No. or STATE or “CWA”

CQ CWT AA2IL



KM6GOX

KM6GOX TU JOE 3177

TU DEREK CA

or DEREK CWA

73 AA2IL

or R or EE

- If you are aspiring to become a member of CWops, this is the easiest place to get your call recognized and build up sponsorship



Week 3 - Session 6

CW Academy

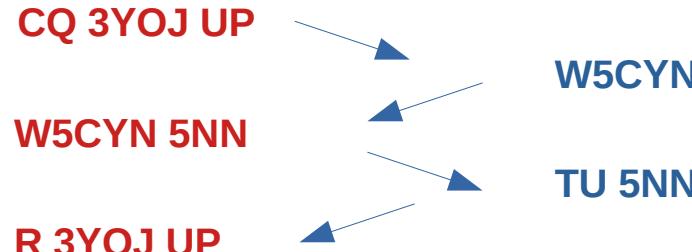
- Go over h/w and on air activities
- CQ 160m CW is this weekend (5NN + STATE)
- Anatomy of a QSO
 - Hit and Run
 - Rag Chewing (Part 1)
- Practice “cookie cutter” Rag Chews
 - CQ/Greeting
 - “Big Three:” RST, Name, QTH



CW Academy

“Hit and Run” QSOs

- By convention, a valid QSO must exchange some type of information in addition to call signs
- The minimal amount of “information” is a signal report (however meaningless it might be)
- Example – A “rare” DX station running a pile-up
 - His goal is to work as many stations as possible
 - Your goal is to bag an ATNO



- Contest exchanges (and FT4/8) obviously fall into this category



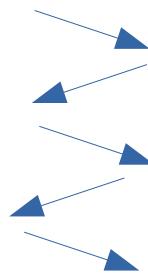
Short QSOs

- Special Event, POTA, SOTA, etc. ops also are generally trying to work as many stations as possible so they might only send a 5NN signal report (or RST + STATE)
- Some ops will exchange more meaningful information quickly (e.g. Actual RST and/or Op NAME)
- Example – A not-so-rare DX station who's not in a hurry

CQ CQ CQ SV2HUD SV2HUD

KM6GOX GM 559 OP VAS VAS BK

QSL DEREK TNX ES 73



KM6GOX KM6GOX

GM VAS UR 569 IN CA CA OP DEREK DEREK BK

TU VAS 73

- He may or may not want to engage further depending on conditions (QSB, QRN, etc.)



CW Academy

Rag Chew QSOs

- There's no precise definition for a "rag chew" QSO but they generally begin with "the big three"
 - Signal Report (RST)
 - Location (QTH)
 - Name (OP)

CQ CQ CQ AA2IL AA2IL AA2IL K

AA2IL DE KB1FGC KB1FGC KN

**KB1FGC DE AA2IL = GE OM ES TNX FER CALL = UR 57N 57N IN RAMONA, CA
RAMONA, CA, ABT 30 MILES NE OF SAN DIEGO = NAME HR IS JOE JOE = HOW
CPY? <AR> KB1FGC DE AA2IL <KN>**

**AA2IL DE KB1FGC RR FB JOE TNX FER RPRT, SOLID COPY = UR RST 55N
55N = OP RICH RICH ES QTH PROSPECT, CT PROSPECT, CT = HW? BK**



CW Academy

Week 4 - Session 7

- Go over h/w and on air activities
- This weekend, VT, MN and BC kick off the State/Prov. QPs for 2023
 - Vermont, British Columbia: RST + STATE
 - Minnesota: NAME + STATE (Jason: NAME + COUNTY)
- Does anyone use N1MM?
- Rag Chew (Part 2)
- Practice inner part of a Rag-Chew QSO
 - Rig, Ant, Power ...
 - Weather ...
 - Job, family, ...
 - Ham exploits, activities, other hobbies...
 - Etc. etc.



CW Academy

Common Abbreviations

ABT	About	FT	Feet	PWR	Power	WX	Weather
AGN	Again	GA	Good afternoon	R	Roger, Decimal point	XCVR	Transceiver
ANT	Antenna	GB	God bless	RIG	Radio equipment	YL	Young lady
B4	Before	GBA	God bless America	RPT	Report	YR	Year
BK	Back to you	GD	Good day	RPRT	Report	YRS	Years
BTU	Back to you	GE	Good evening	RCVR	Receiver	XYL	Wife (Ex-young-lady)
BURO	QSL Bureau	GL	Good luck	RX	Receiver	73	Best regards
C	Yes ("Si")	GM	Good morning	SIGS	Signals	88	Hugs and Kisses
CONDX	Conditions	GN	Good night	SRI	Sorry		
CPY	Copy	GUD	Good	TKS	Thanks	<AR>	End of Message
CU	See you	HI	Laugh	TNX	Thanks	<AS>	Stand by
CUL	See you later	HPE	I hope/I hope to	TU	Thank you	<BT>	Break
CQ	Calling anyone ("Seek You")	HR	Here	TX	Transmitter	K	Go (anyone)
DE	From ("de")	HW	How	U	You	<KN>	Go only
DR	Dear	LID	Bad operator	UR	Your/You're/You are	<SK>	End of contact
DX	Long-distance	NIL	Nothing	URS	Yours		
EL	Element	NR	Near	VERT	Vertical	BN	BEEN
ES	And	OM	Old Man	VY	Very	MT	MEET
FB	Fine business	OP	Operator	W	Watt(s)	And so on	And so on and so on
FER	For	PSE	Please	WID	With		



CW Academy

Rag Chew QSOs (cont.)

- At this point, I can continue the QSO or politely end it

**KB1FGC DE AA2IL = RR SOLID CPY RICH ES GUD TO MEET U = XYL IS RINGING DINNER
BELL SO MUST SAY 73 FOR NW = HPE CU AGN SN = 73 <SK> KB1FGC DE AA2IL <KN>**

**AA2IL DE KB1FGC = FB JOE TNX FER QUICK CHAT ES WILL LOOK FER U AGN 73 73 <SK>
AA2IL DE KB1FGC K EE**

EE

- There is a lot more detail than in a “Hit an Run” QSO
- A lot of jargon and abbreviations are used to shorten the messages
- I like to use the “break” or “double dash” (=,<BT>) to separate various thoughts and also to bide a little time while I’m thinking of the next thing to say
- I also like to use accepted pro-signs to help with flow of transmissions



CW Academy

Rag Chew QSOs (cont.)

- If we both choose to continue the conversation, there are a lot of things to talk about:

KB1FGC DE AA2IL = RR SOLID AGN = RIG HR IS A YAESU FTDX300 ABT 100W TO A MOXON BEAM UP 30 FT =
WX HR TODAY SUNNY AND HOT, TEMP NR 100 DEG F = SO BTU RICH <KN>

R FB JOE DIDNT MISS A DIT = UR RIG AND ANT DOING NICE JOB HR IN CT = RIG HR IS KNWD TS2000 WID
AMP RUNNING 500W TO A DIPOLE UP 45 FT = WX HR IS COOL AND RAIN, TEMP IN LOW 50S = FALL IS HR IN
THE GREAT NE = BTU JOE KN

VY GUD RICH = I GREW UP IN UPSTATE NY AND MISS THIS TIME OF YR = WENT TO THE BEACH WID MY XYL
YESTERDAY TO REMIND US WHY WE LIVE HR HI HI = I RETIRED LAST YR AFTER 35 YRS AS AN ELEC ENGR =
NW I HV LOTS OF TIME TO PLAY RADIO = WHAT DO YOU DO FOR WRK RICH? <KN>

AA2IL DE KB1FGC R SOLID AGN JOE = MY FAMILY RUNS AN ANTIQUE TRUCK MUSEUM AND I USED TO
DRIVE BIG RIGS = BEEN A HAM FER 25 YRS, I ENJOY CW RAG CHEWING AND CHASING DX. I ALSO LIKE TO
REPAIR VINTAGE RIGS AND IM WORKING ON A SATELLITE SETUP

...

- ... and so on and so on
- Be sure to identify every 10-minutes
- Keep subject matter friendly and upbeat and non-controversial



Week 4 - Session 8

CW Academy

- Go over h/w and on air activities
- VT, MN and BC State QSO Parties are this weekend
- Also a CW Sprint Contest this weekend
- Logging
- Round-robin Sentences
 - First op sends a short sentence
 - Next op repeats sentence and send a new sentence
 - Only repeat last sentence, not both



CW Academy

Computers and Logging

- Computers are a fixture in most ham stations now and are invaluable for contesting
 - Logging & Scoring
 - Keeping track of duplicates
 - **Sending**
- N1MM logger is the most popular logging program used for contesting
 - Many useful features
 - Windoz Only
 - No comparable option for Linux
- At this point, **you should be using a contest logger**
 - Its a good idea to let the computer do the **sending** for you (other ops will appreciate the “machine” code!)
 - For S&P, you can also use the memory keyer in your rig (e.g. Yaesu FH-2)
 - When in “assisted” category, use the “band map” to help with S&P (**verify** the call sign!)
- **Do not** use the “call history files” and “auto-fill” until you can consistently copy exchanges
 - When you begin to use these features, you still need to verify that the information is correct!



CW Academy

Rig Memory Keyer

- Most (all?) modern rigs have a built-in memory keyer to which you can program several short messages
- My “default” messages are:
 - Msg 1 = AA2IL
 - Msg 2 = TU 5NN CA
 - Msg 3 = OP JOE
 - Msg 4 = 73
 - Msg 5 = BK
- For S&P in a CWT (or SST), you might use something like this:
 - Msg 1 = AA2IL
 - Msg 2 = TU JOE 3177 or TU JOE CWA or TU JOE CA
 - Msg 3 = JOE
 - Msg 4 = 3177 or CWA or CA
 - Msg 5 = AGN? or ?
- Yaesu rigs also have a serial counter so feasibly, you use this facility to S&P in almost any contest
- **This is NOT cheating** – contesting is fatiguing and you want to employ any fair means that will maximize your BIC time and therefore your enjoyment and score!!!





N1MM Logger

(Screenshot courtesy of N0RPM)

CW Academy

N1MM Logger Screenshot (courtesy of N0RPM)

The screenshot displays the N1MM Logger software interface during a CWops Mini-CWT Contest.

Log Window: Shows a list of contacts made on 2023-02-09 from 03:04 to 03:48. The columns include MM-DD HH:MM, Call, Freq, Mode, Name, Exch, M1, Pts, and Mult. Key entries include N4YDU (3528.82 CW NATE), K4FN (3534.44 CW DAN), NN3Q (7034.46 CW RUSS), K3WW (7029.00 CW CHAS), N3QE (7033.73 CW TIM), N7NR (7042.24 CW DAVE), W6QX (7044.66 CW STEVE), KR2Q (7041.28 CW DOUG), KC4WQ (7042.78 CW BUD), and KT5V (7037.49 CW DAVID).

Score Window: Shows the current score for station W0UO (JIM) with a total of 1069 points. The window includes a menu bar (File, Edit, View, Tools, Config, Window, Help), a toolbar with buttons for F1-QRL, F2-Exch, F3-Tu, F4-NORPM, F5-His Call, F6-Repeat, F7-RptEx, F8-Agn?, F9-Nr?, F10-Call?, F11-Spare, F12-Wipe, Esc-Stop, Wipe, Log It, Edit, Mark, Store, Spot It, and QRZ. Below the toolbar is a status bar showing Regional Hdg 203° LP 24° 477mi 768km SR 13:23Z SS 23:57Z Weatherford TX.

Scoreboard Window: Displays the contest scores for CWOPS. The table shows QSOs, Pts, Mlt, and Pt/Q for bands 3.5, 7, and Total. The total score is 100, with a multiplier of 1.0 Q's.

Check Log/Master/Telnet/E... Window: Shows a log entry for W0UO with callsigns W0UO, W0UO, W0UO, W0UO, W0UO, W0UO, W0UO, W0UO, W0UO, and W0UO.

ExtIO Spectrum Window: Displays the spectrum for RSP1 (Radio 1). The top part is a CQ plot with frequency markers at 7012, 7017, 7022, 7027, 7032, 7037, and 7042. The bottom part is a spectrogram showing signal activity over time. Labels for stations include K3WW, W0UO, E71A, NN3Q, N3QE, KT5V, N4ZZ, W6AYC, KC7V, K0WA, N7NR, NBKH, KR2Q, and KC4WQ. A legend on the left indicates > 4.0, 55 sigs, 31 Hz, and 31 kHz.

System Status: The taskbar at the bottom shows system icons for weather (35°F, Clear), search, file explorer, browser, and task manager, along with the N1MM icon.



CW Academy

Other Loggers

California QSO Party

57th Running Of The CQP!
1600 UTC October 1, 2022 to 2200 UTC October 2, 2022
CQP 2022 Begins:
2 :01 :37 :47
Days Hrs Mins Secs

CQP Logging Software

Top 10 Most Common Logging Software Programs Used in CQP
Based On Logs Received in 2021

Contest Logger	Links and Notes
N1MM+	1. https://n1mmwp.hamdocs.com 2. How to log a county-line QSO in N1MM+
N1MM+ Call History File For 2022 Search for qsop_ca on this page:	https://n1mmwp.hamdocs.com/mnfiles/categories/callhistory/
N3FJP	1. http://www.n3fjp.com/ 2. How to log a county-line QSO in N3FJP
Writelog	1. https://writelog.com Version 12.41 and after: Update of county line QSOs in Cabrillo file. 2. How to log a county-line QSO in Writelog
DX Log	http://www.dxlog.net/
GenLog	https://www.qsl.net/w3km/
SkookumLogger (for Mac)	https://www.k1gq.com/SkookumLogger/
CQPWIN	CQPWIN
RUMLogNG (for Mac)	https://dl2rum.de/rumssoft/RUMLog.html
TR4W	https://www.tr4w.net/
TLF (for Linux)	https://tlf.github.io/
Utility	Links and Notes



My Screen During a Contest

CW Academy

Demod Audio - AA2IL

7022 7024 7026 7028 7030 7032 7034 7036 7038 7040

pyKeyer by AA2IL - FTdx3000

File Batter Up VFO A VFO B A->B SO2V PrtScrn Paddles: 20

Call Name Exchange

WABK JUL 3177
TU AA2IL [LOG]
WABKAN JOE 3177
TU AA2IL [LOG]
CQ CWT AA2IL

CQ	Reply	TU/QRZ?	Call?	AA2IL	S&P Reply	?	Log QSO	Name 2x	No. 2x	NAME?	NR?
QRZ?	TU/QRZ?	TU/QRZ?	Call?	His Call	S&P 2x	AGN?	RR				ORL?
Macros:	CWT		WPM:	32			FTdx3000				Send
Satellites:	None		+2 WPM	-2 WPM							ORZ ?
NSRZ 7,040.7	14,036.1	--	--	--	--	--		7,043.0	7,034.6	--	--
--	--	--	--	--	--	--		--	--	--	--

QSOs: 72 /hr : 82 /hr : 74

160m 80m 40m 20m 15m 10m

Call	Name	Country	Grid
7028.3 W8FJT	CW United States	34	
7028.3 KM4CRJ	CW United States	28	
7028.3 K6TTT	CW United States	25	
7028.3 SN5J	CW Poland	33	
7028.7 K3JT	CW United States	35	
7028.7 VE3EJ	CW Canada	37	
7028.7 VE3ET	CW Canada	41	
7028.7 KE3EJ	CW United States	40	
7029.4 N5W	CW United States	31	
7029.8 N4BP	CW United States	33	
7029.8 N4TIP	CW United States	32	
7029.8 NJ6Q	CW United States	28	
7030.1 K70A	CW United States	37	
7030.1 K7UD	CW United States	33	
7030.5 N0WTT	CW United States	32	
7030.5 NT2W	CW United States	34	
7030.5 SP9ADG	CW Poland	20	
7030.5 WF4I	CW United States	31	
7030.9 K6WA	CW United States	35	
7031.3 WABY	CW United States	35	
7031.7 AA2IL	CW United States	32	
7031.7 TAZIL	CW Asiatic Turkey	32	
7032.8 K3WW	CW United States	40	
7032.8 KG6SU	CW United States	33	
7032.4 W6SX	CW United States	37	
7032.7 H48RM	CW Hungary	32	
7032.7 K3T	CW United States	31	
7032.7 WA8RM	CW United States	30	
7032.7 HA7RM	CW Hungary	33	
7033.1 N3RS	CW United States	37	
7033.1 N3RA	CW United States	35	
7033.1 N3RN	CW United States	37	
7033.4 KY4GS	CW United States	28	
7033.4 W4GS	CW United States	28	
7033.5 KY4G	CW United States	28	
7033.9 K1VUT	CW United States	32	
7033.9 KK7RR	CW United States	30	
7034.3 W0UO	CW United States	33	
7034.3 E5555	CW Estonia	37	
7034.5 I13WRTC	CW Italy	32	
7034.5 TT3WRTC	CW Italy	20	

Band Map by AA2IL - Server NC7J

Options CW Data SSB Ant1 Ant2 Ant3 -1 +1 < >

160m 80m 40m 20m 15m 10m

World Clock by AA2IL

03:56:09

Pan BW: Dynamic Range: Min Peak Distance:
Use Peaks for Tuning Follow RIG Freq CLAR Follows SDR Freq

Un-Mute RX1 Un-Mute RX3 Un-Mute RX5

AF Gain: Terminal flrig FTdx3000 pySDR by AA2IL Demod Audio - ... pyKeyer by AA2... World Clock by ... Band Map by A... Un-Mute RX1 Un-Mute RX3 Un-Mute RX5

EN Wed Jan 25, 19:56



AA2IL Homebrew Software

CW Academy

- Source and some binaries are available at github.com/aa2il
 - Integrated suite of apps
 - Developed under linux but most recently ported to Windoz
 - Windoz binaries also available – see “Releases” on RHSs
 - Very little documentation
 - Would welcome collaboration!
- **pyKeyer**
 - Contest rig control (via flrig) and logging
 - Practice mode for contests and sending
- **bandmap**
 - DX Cluster spots
 - Worked/”Need” tracking
- **wclock** – World clock with gray-line map
- **pySDR**
 - Software Defined Receiver
 - Panadapter
 - Does not work yet on Windoz

The screenshot shows the GitHub repository page for `aa2il/pyKeyer`. The page includes a code editor, issue tracker, and various project management tools. A prominent red circle highlights the 'Releases' section, which contains a single entry for 'pyKeyer v1.0 by AA2IL' with a green 'Latest' badge. The repository has 147 commits and 2 stars. The 'Languages' section shows Python as the primary language.

Releases 1

pyKeyer v1.0 by AA2IL [Latest] last week

Languages

Python 93.0% Shell 5.6% Other 1.4%



Week 5 - Session 9

CW Academy

- Go over h/w and on air activities
- Upcoming contests
 - CQ WPX RTTY (World Prefix)
- Chasing DX
 - The bands have come back to life!
 - DXpeditioners are traveling again
 - Look for increased activity in the days surrounding the ARRL International DX contest
- Sentences Drill



CW Academy

Chasing (Rare) DX

- This is quintessential ham radio and, for many, its most exciting aspect
- CW is the best mode for working weak stations rapidly
 - For better or worse, much DX activity has migrated to FT8
 - However, most large DXpeditions will operate CW as part of their effort
- Your QRQ and contesting skills will serve you well!
- The Internet and SDR have changed the landscape
 - Instant pile-ups once a rare station is spotted
 - A Panadapter gives “situational awareness”
 - Can do this to some extent with dual VFOs or XIT/RIT
 - Consider using a WebSDR, be creative!
 - Embrace it and use it to your advantage!



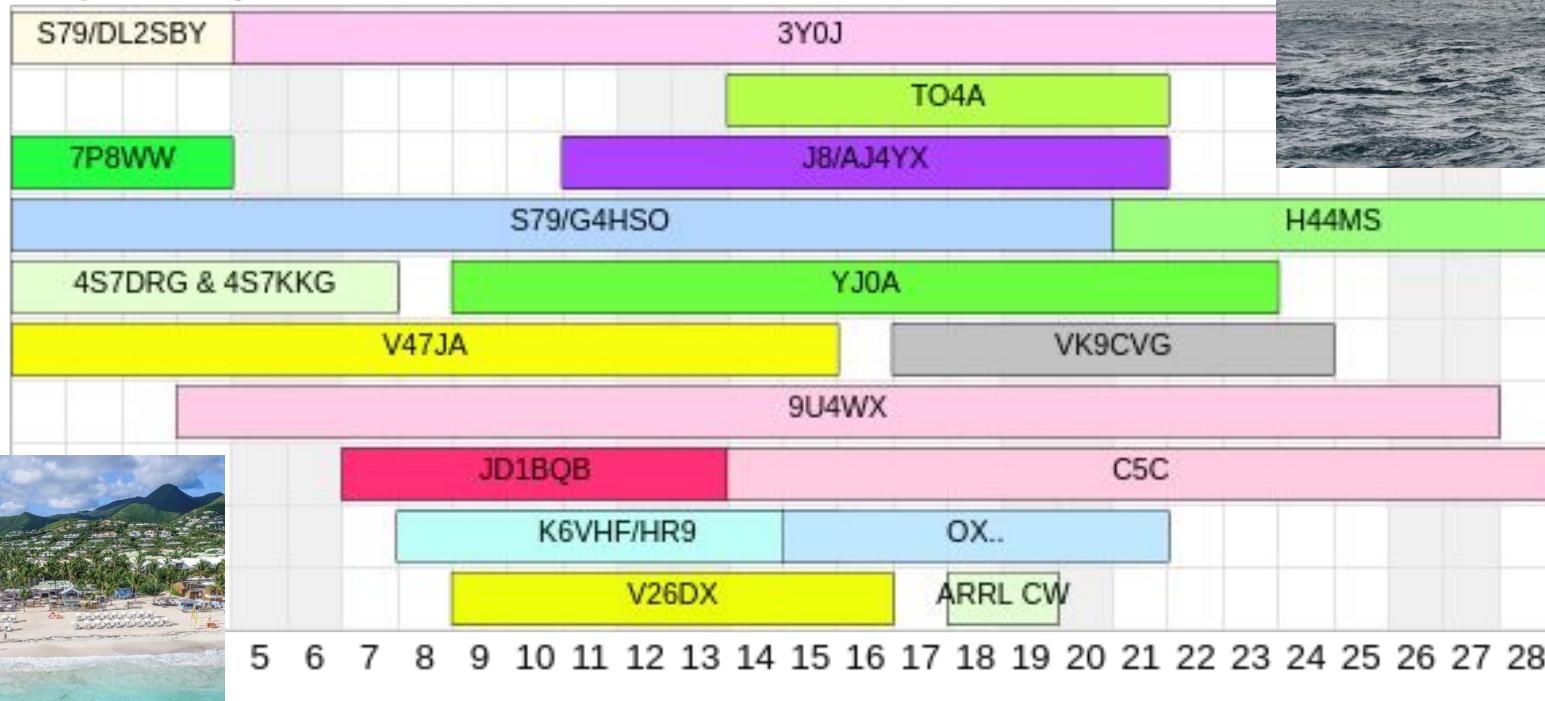
Up-coming DXpeditions

CW Academy



FEATURED DXPEDITIONS TIMELINE

Last update: January 24, 2023



5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

DX

FEBRUARY

CC IK8LOV Max Laconca



CW Academy

Chasing DX (cont.)

- Do:
 - Listen Listen Listen and Listen some more!
 - Make sure you can hear him and verify his call!
 - Figure out his timing and where he is listening then transmit accordingly
 - Often UP 1-KHz or more, depending on demand
 - Use full QSX (break-in) and “Split”
 - Learn how to rapidly use dual VFOs and/or XIT/RIT functions on your rig
 - Be courteous and concise
 - Understand Propagation and Be Patient
 - Take a look at QRZ.com and/or the DXpedition website for operating plans and QSL info
- Don't be the lid who:
 - Tunes up and/or transmits on top of the DX!!!
 - Continues to operate simplex when the DX is running split (3Y0J UP)
 - Continues to call when the DX is clearly calling someone else
 - Thinks he's the “DX Police” (These guys usually cause more QRM than the errant simplex op!)



My Contact Last Fall with D60AE (Comoros)

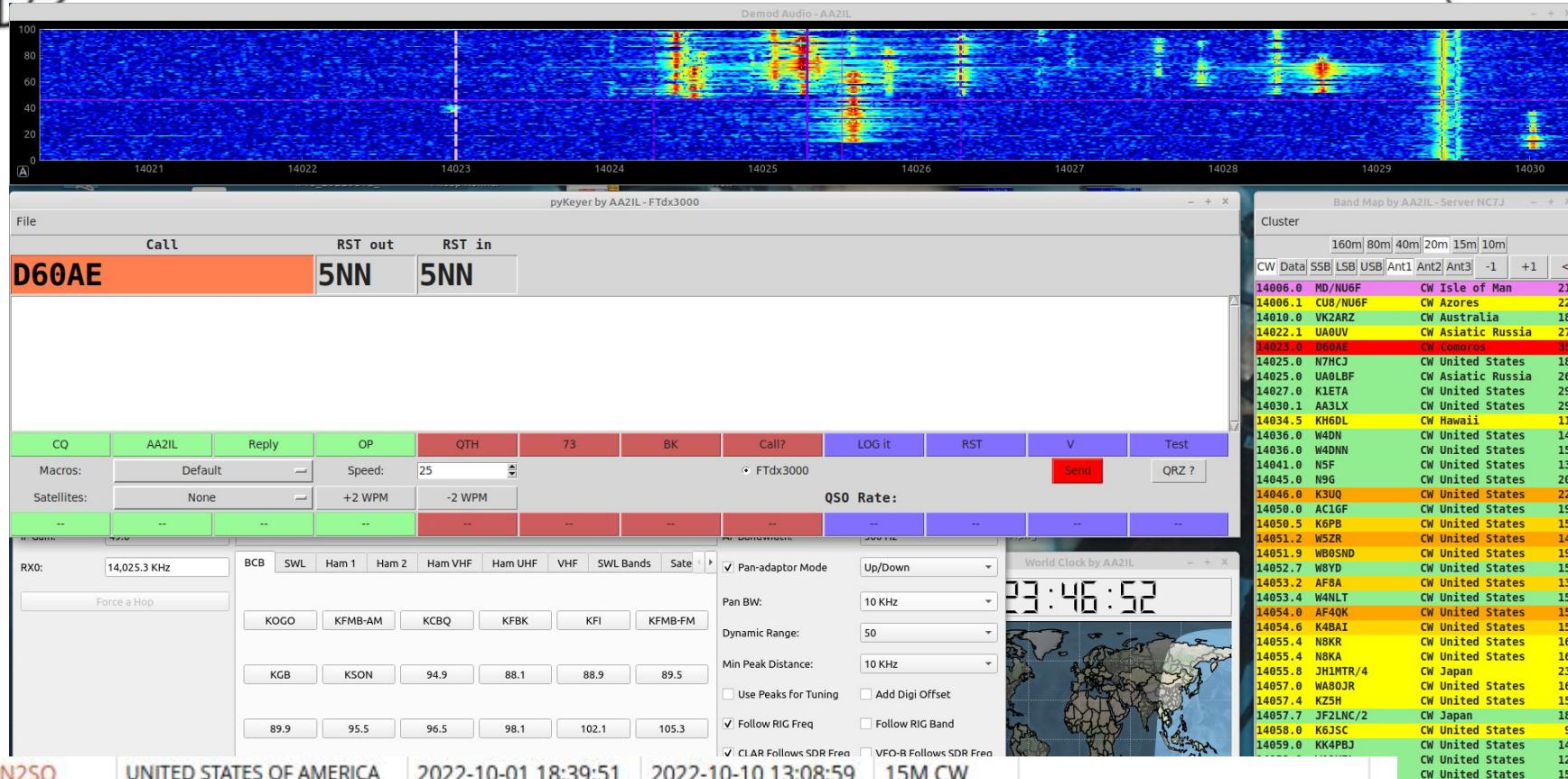
CW Academy

- Turned on radio to participate in SST
- Saw D60AE Spotted on 20m – clicked on it
- He was ~539 and a large pile-up extending up ~10 KHz
- Watched SDR waterfall to see who he was working and his patterns
 - About 7.5 KHz up, slowly moving down
- Set my rig to “split” while listening to a few more contacts
- Moved my XIT down a little more, threw out my call
 - After 4 or 5 tries, he came back with WW2IL
 - I sent AA2IL one more time, he responded correctly
 - Exchanged 5NNs and 73s
 - Confirmed “In the Log” the next day on Clublog
- Remember, my station is a “little pistol” - 100 W and wire antennas
 - Approximately 10,500 miles distance



SDR Panadapter (Post-QSO)

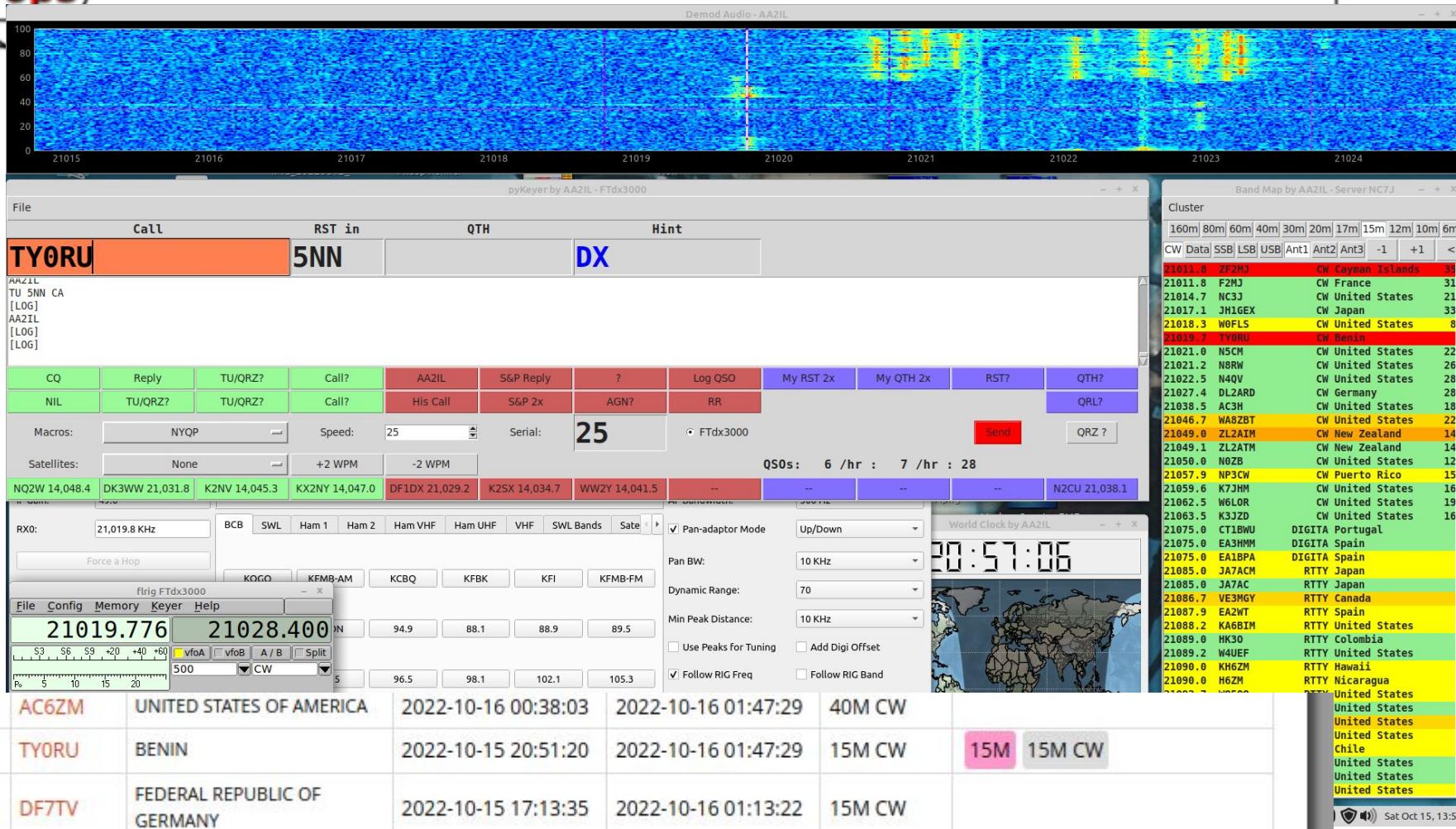
CW Academy





SDR Panadapter (Benin TY0RU)

CW Academy





Week 5 - Session 10

CW Academy

- Go over h/w and on air activities
- Upcoming contests
 - CQ WPX RTTY
- Contesting Left Overs
 - Terminology
 - Strategy
 - Etiquette
- Drill - More sentences



CW Academy

Some More Terminology

- **SO1R/SO1V** – Single Operator, One Radio/One VFO
 - Most of us mere mortals
- **SO2V** – Single Operator, Two VFO's
 - One transmitter and two receivers (one in each ear)
- **SO2R** – Single Operator, Two (or more) Radios
 - Generally running on one radio and searching for multipliers on the other
- **2BSIQ** – Two-band Simultaneous Interleaved QSOs
 - Running on two bands, alternating CQ calls
- **Multi-Operator**
 - Larger contest stations with two or more ops



Some Contest DOs and DON'Ts

- Do
 - Start off S&Ping until you build up skills and confidence – this is all many ops ever do
 - If you are running, ask for a repeat if you have **any** doubt about what you copied
 - If you are S&Ping and miss part of his exchange, you can either ask for a repeat or just listen to his next QSO
 - When you ask for a repeat, try to be specific which element that you missed
 - If the runner misses your call, send it again then give your exchange
 - Courtesy demands that we look out for each other
 - Be courteous but concise
- Don't send unnecessary information
 - Runner's Call – he knows what it is (and its your problem if you are S&P and get it wrong!)
 - DE before your call or NR before Serial Number – wastes time, throws off timing and can be confusing
 - Signal report if it is not part of the contest exchange
 - Anything other than 5NN if a signal report is required
 - Long greetings/chatter – SST and MST are exceptions as friendly greetings are encouraged



CW Academy

More DOs and DON'Ts

- Before the contest:

- Become familiar with the rules (who to work, exchange, scoring, multipliers, log submission deadline)
- Update and test computer OS and logging software (Also test your rig and antennas)
- Take a look at the NCJ for hints from top-tier contestants

- After the contest:

- Upload your summary to 3830scores.com
 - Track your progress
 - Get more visibility for your call sign
 - Credits toward club awards
- Upload your log to LoTW and Clublog
 - The final courtesy of a QSO is a confirmation (QSL)
- Submit your log to the contest sponsor
 - Helps with log checking

- During the contest:

- Don't send "B4" to a Dupe
 - Just work him again - Its almost always faster
 - He may not have you correctly in his log
 - He may be using an old-school paper log
- Call your CWA advisors/classmates/friends for extra brownie points!!!



CW Academy

Scoring & Classifications

- **YOUR SCORE = QSO POINTS x MULTIPLIERS**
- **Unassisted** – No spotting assistance or multi-signal decoder
- **Assisted** – Use of Spotting Assistance
 - DX Cluster, Reverse Beacon Network, CW Skimmer, WSJT-X ...
- **QRP** – 5-Watts or less
- **Low Power** – 100-Watts or less
- **High Power** – Over 100-Watts
- Single Op, Multi-op, ...



CW Academy

What If You Miss Something?

- Occasionally, you will miss a call sign or part of an exchange:
 - QSB, QRM, QRN, Poor Fist, Fatigue ...
- If you are running, you **must** ask for a repeat if you have any doubts:
 - Call sign: NO? or PM? or 0? or CALL? or ? or “the pregnant pause”
 - Serial: NR?
 - Name: Name?
 - QTH: QTH?
 - Entire Call or Exchange: ? or AGN?
- If you are S&Ping, use your discretion whether to ask for a repeat or just listen to the next QSO
 - How competitive are you?
 - How busy is the runner?
 - Try not to slow the runner or next caller down
 - Don't ask for his call sign unless he hasn't ID'd in several QSOs
 - Be careful with serial numbers – they are not always consecutive!
- In either case, try to be specific what you need
- Perfection is not necessary in an un-scored practice contest



Week 6 - Session 11

CW Academy

- Go over h/w and on air activities
- Upcoming contests
 - ARRL International DX CW
 - International → We only work stations outside of the U.S.
 - You send 5NN + STATE
 - DX sends 5NN + Power
 - Best strategy for “little pistols” is S&P for this one
 - Look for plenty of DX activity before and after the contest
 - Can you get DXCC in one weekend?
- Math Drill
- Cut Numbers



CW Academy

CW Math Drill

- 1 plus 2
- Is 3 R 3 times 5
- Is 15 R 15 div 3
- ? 15 div 3 Is 5 R 5 minus 1
- Is 6 NO 5 minus 1 Is 4 R ...
- Etc.
- Use ? Or AGN? for repeats and R to confirm answer
 - Try not using “voice” since you can’t do that on the air
- No Cut Numbers this time -We’ll do that on Thursday



Cut Numbers

- In the CWTs and many of the larger contests (e.g. ARRL Intl), you will hear ops use abbreviations for numbers in the exchange
 - 599 → 5NN or even ENN
 - 11 → AA
 - 100 → 1TT or ATT
 - 1090 → ATNT
 - 2198 → UAND
- Other than 5NN, I don't like this practice and advise against it
 - However, others use it so you need to understand it!
- I find the easiest way to deal with a cut number is to log it and unwind actual meaning later
- One place where a cut number can be somewhat useful is if you enter a contest late, you can send a leading "T" in your serial number to alert the other station to this:
 - 4 → T4 or TT4
- I advise against sending leading zeros for numbers above 9
 - Don't send TT7 or T25 in MST, just 7 or 25 – very few ops get over 100 Q's in the MST



CW Academy

Cut Numbers (cont.)

- Acceptable:
 - 0 → T
 - 1 → A
 - 9 → N
- Creative (Don't Use!):
 - 0 → the letter O
 - 5 → E
 - 2 → U
 - 8 → D
 - 3 → V NO!!!! Sound too much like 4
 - 7 → B NO!!!!!! Sounds too much like 6
- ARRL Intl DX:
 - 599 → ENN
 - 1000 → K or KW
 - 99 → NN
 - Some ops are very creative!



Week 6 - Session 12

CW Academy

- Go over h/w and on air activities
- Upcoming contests
 - ARRL International DX CW
 - International → We only work stations outside of U.S.
 - You send 5NN + STATE
 - DX sends 5NN + Power
 - Best strategy for “little pistols” is S&P for this one
 - Look for plenty of DX activity before and after the contest
 - Can you get DXCC in one weekend?
- DX Cluster and Reverse Beacon Network
- Math Drill with cut numbers



CW Academy

CW Math Drill

- 1 plus 2
- Is 3 R 3 times 5
- Is 15 R 15 div 3
- ? 15 div 3 Is 5 R 5 minus 1
- Is 6 NO 5 minus 1 Is 4 R ...
- Etc.
- Use ? Or AGN? for repeats and R to confirm answer
 - Try not using “voice” since you can’t do that on the air
- You can use Cut Number this time – T, A and N only!



CW Academy

Spotting Networks

- The DX Cluster refers to websites that list DX stations that other ops have “spotted”
 - Rare and not so rare DX
 - Running stations in a domestic contest
 - dxwatch.com and dxheat.com are my favorite sites but there are many others
- Reverse Beacon Network (RBN)
 - Set of SDRs monitoring one or more bands and using automatic decoders
 - CW and RTTY Skimmers
 - You can view data “live” or download and analyze historical data off-line
 - This is an excellent tool for assessing your station’s performance
 - Send CQ <YOUR_CALL> or TEST <YOUR_CALL> a few times to get spotted
 - reversebeacon.net – can also get cluster servers to forward RBN spots
 - PSK Reporter does something similar for FT4/8 signals → Almost everyone is a spotter/monitor!
- The use of these tools, even once, puts you in the assisted category in a contest
- These tools have altered the landscape for chasing DX
 - No longer have to endlessly “spin the big knob” to find DX
 - Generates instant pile-ups



Reverse Beacon Network (RBN)

CW Academy

REVERSE BEACON NETWORK

Hosted by
www.dxwatch.com

SSN:206 SFI:180 A:8 K:3

DxWatch Callsign Lookup:

welcome main dx spots nodes FT8 downloads about contact us



630m 160m 80m 60m 40m 30m 20m 17m 15m 12m 10m 6m 4m 2m

cw rtty psk31 psk63

CQ DX BCN /B NCDXF

Leaflet | © OpenStreetMap contributors

Unfreeze Zoom

Max rows: 100 Max age: 10 Hours

New spots: 0

Show Spotters Advanced Mode

CW Speed: Min Max

Copy URL to Clipboard

Show Elements:

map

distance mi

distance km

freq

mode

type

speed

time

seen

● Spotter (de)

● Spotted (dx)

● Spotter (de)

ft8ww,9n7aa

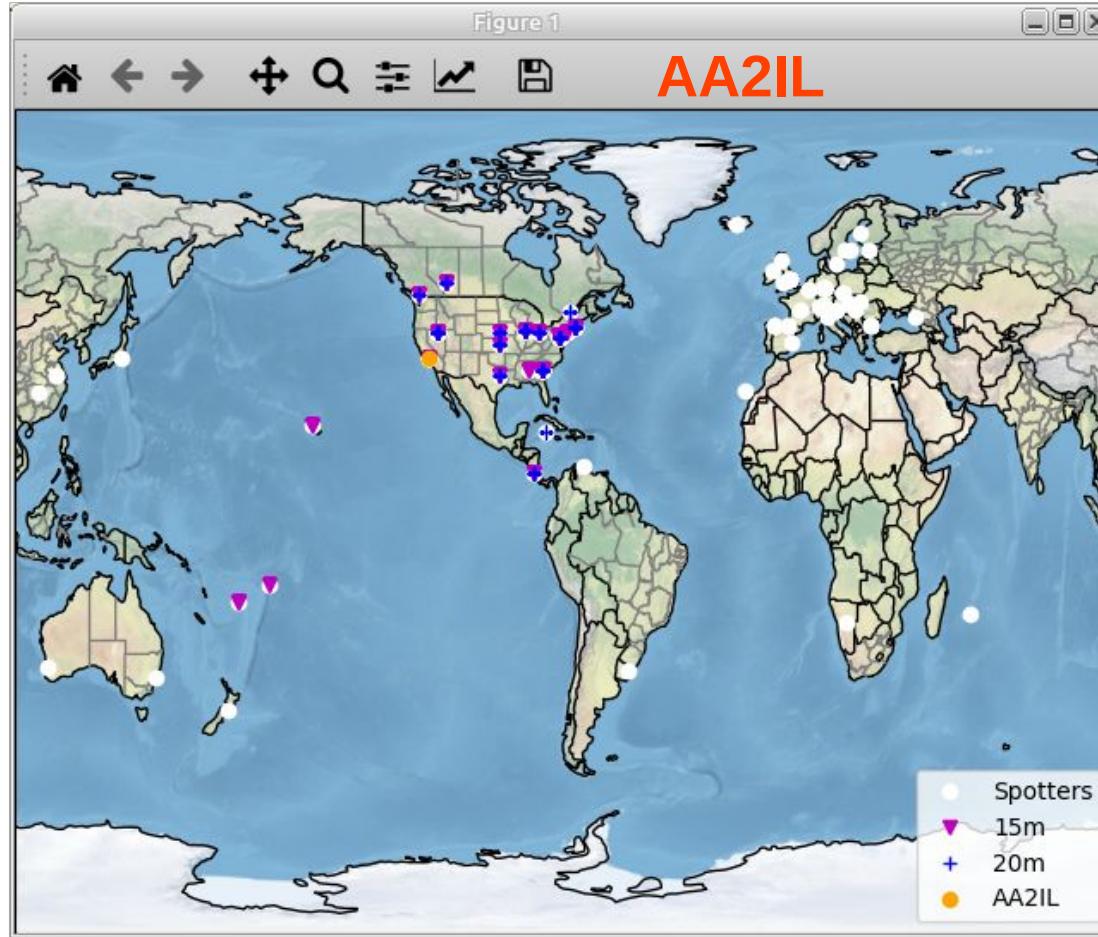
callsign	spotter-callsign	distance mi	freq	mode	type	snr	speed	time	seen
● spotter	● spotted								
USA KM3T-3	USA FT8WW	9707 mi	14034.0	CW	CQ	8 dB	22 wpm	0442z 15 Feb	77 minutes ago
USA KM3T-3	USA FT8WW	9707 mi	14034.0	CW	CQ	22 dB	22 wpm	0419z 15 Feb	100 minutes ago
RSA VK6ANC	USA FT8WW	3476 mi	14034.0	CW	CQ	9 dB	22 wpm	0408z 15 Feb	111 minutes ago
USA KM3T-3	USA FT8WW	9707 mi	14034.0	CW	CQ	13 dB	22 wpm	0407z 15 Feb	111 minutes ago
USA KM3T-3	USA FT8WW	9707 mi	14034.0	CW	CQ	13 dB	22 wpm	0355z 15 Feb	2 hours ago
● JH7CSU1	GBR 9N7AA	3202 mi	28031.1	CW	CQ	23 dB	33 wpm	0213z 15 Feb	3 hours ago
● JN1ILK	GBR 9N7AA	3131 mi	28030.9	CW	CQ	14 dB	35 wpm	0213z 15 Feb	3 hours ago
USA K2POI7	GBR 9N7AA	7085 mi	28031.0	CW	CQ	13 dB	33 wpm	0212z 15 Feb	3 hours ago
SVK VR2FUN-74	GBR 9N7AA	1797 mi	28030.9	CW	CQ	14 dB	32 wpm	0211z 15 Feb	3 hours ago
PHL UA0S	GBR 9N7AA	1963 mi	28031.0	CW	CQ	15 dB	34 wpm	0211z 15 Feb	3 hours ago
PHL 9M2CNC	GBR 9N7AA	2014 mi	28030.9	CW	CQ	7 dB	33 wpm	0210z 15 Feb	3 hours ago
PHL W6YX	GBR 9N7AA	7599 mi	28030.9	CW	CQ	15 dB	33 wpm	0206z 15 Feb	3 hours ago
SVK VR2FUN	GBR 9N7AA	1693 mi	28031.0	CW	CQ	23 dB	33 wpm	0205z 15 Feb	3 hours ago
● JN1ILK	GBR 9N7AA	3131 mi	28030.9	CW	CQ	16 dB	33 wpm	0200z 15 Feb	3 hours ago
PHL E28AC	GBR 9N7AA	1227 mi	28031.1	CW	CQ	7 dB	34 wpm	0200z 15 Feb	3 hours ago



Can You Hear Me Now?

Archived data from an SST in Jan. 2023

CW Academy





Evaluate Antenna/Propagation

SST Jan. 2023

CW Academy

Figure 1

WOWL

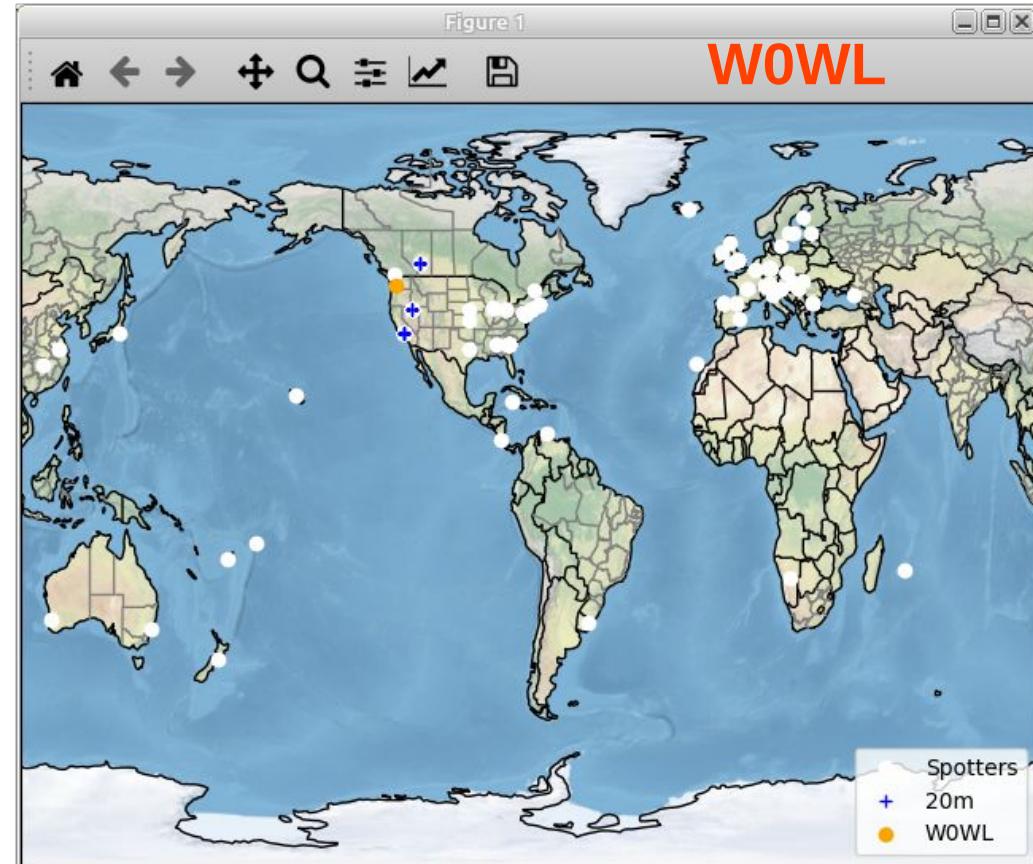
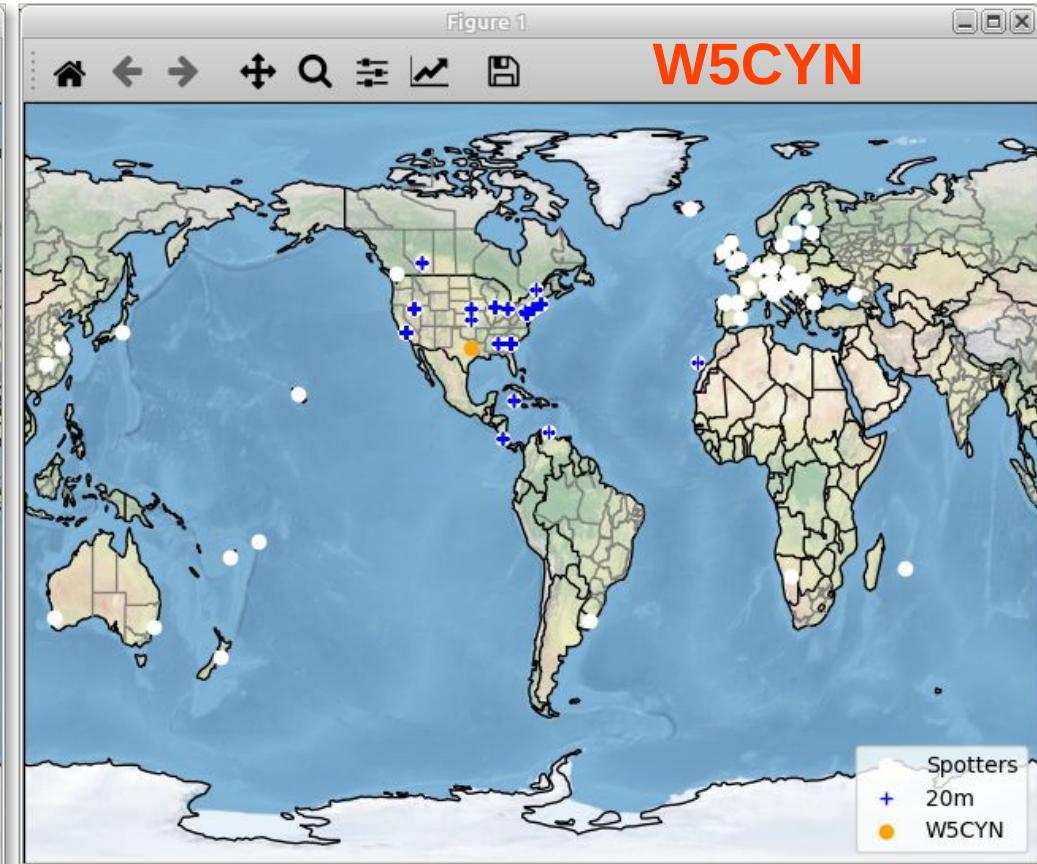


Figure 1

W5CYN

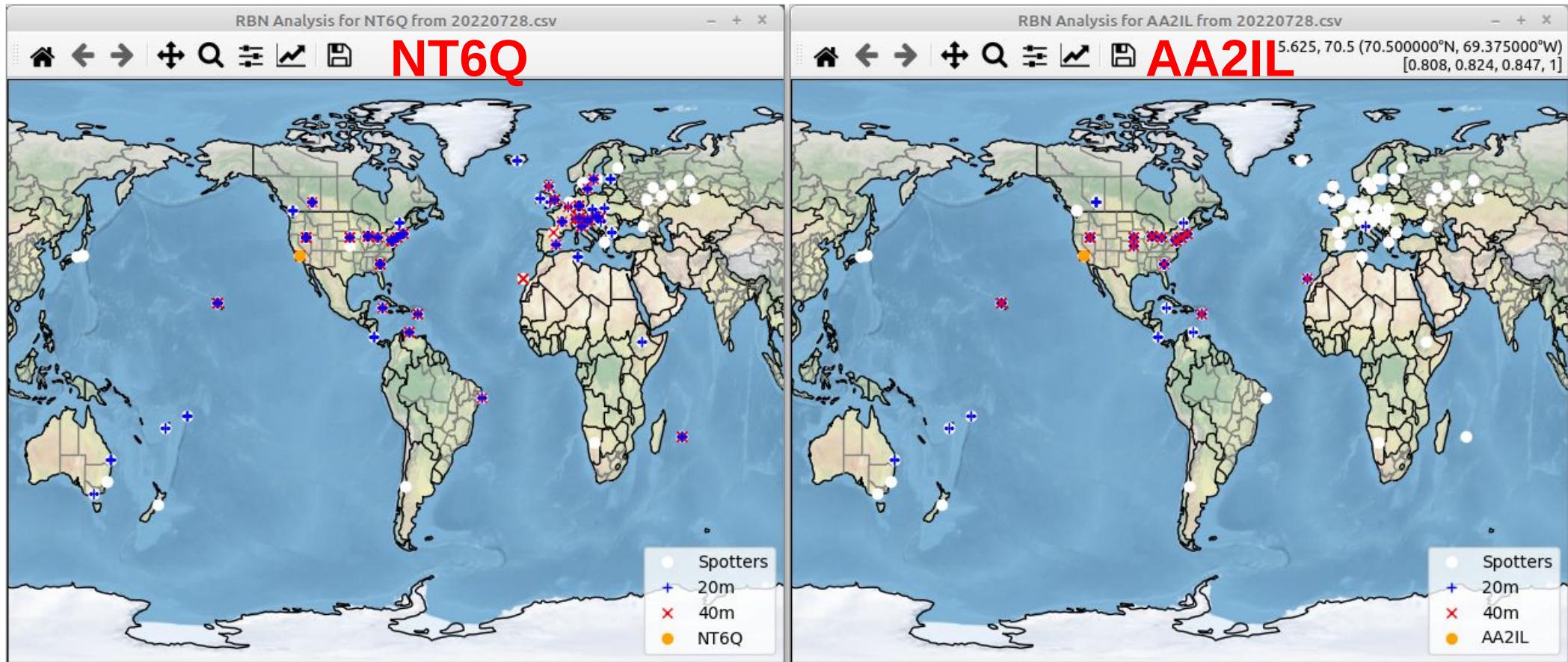




Big Gun vs Little Pistol

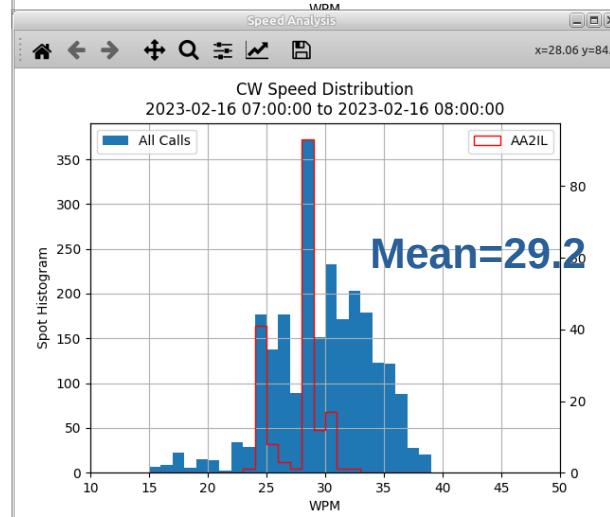
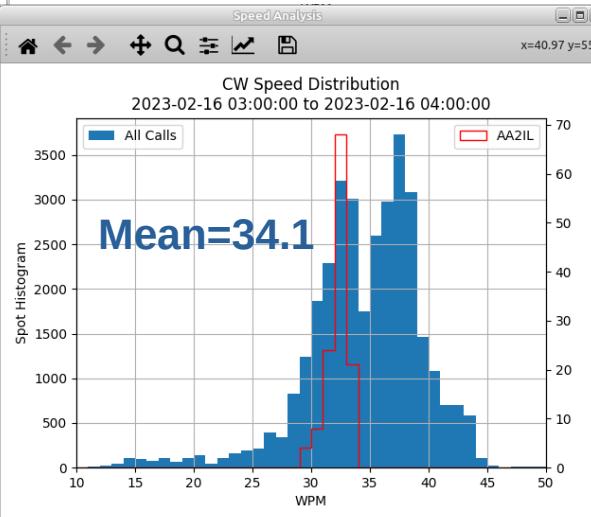
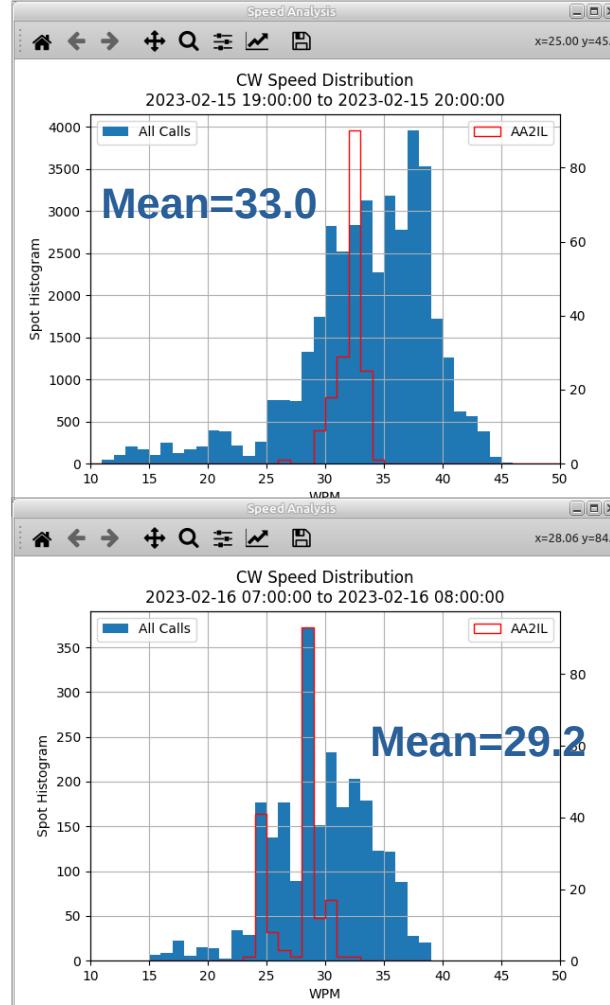
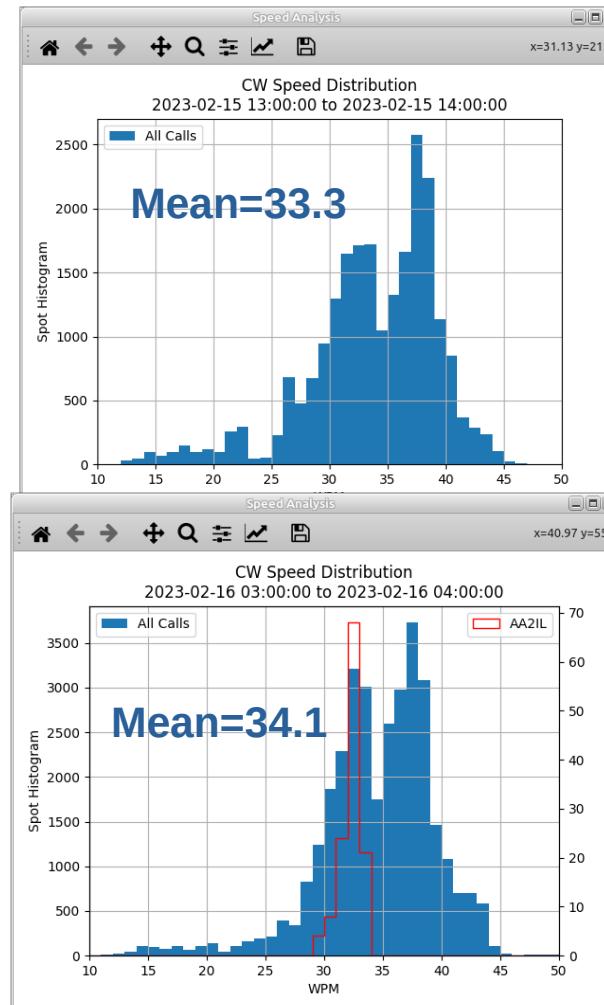
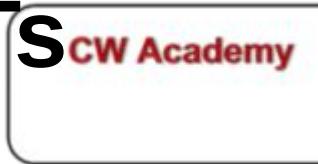
CWT 0300-0400 July 28, 2022

CW Academy





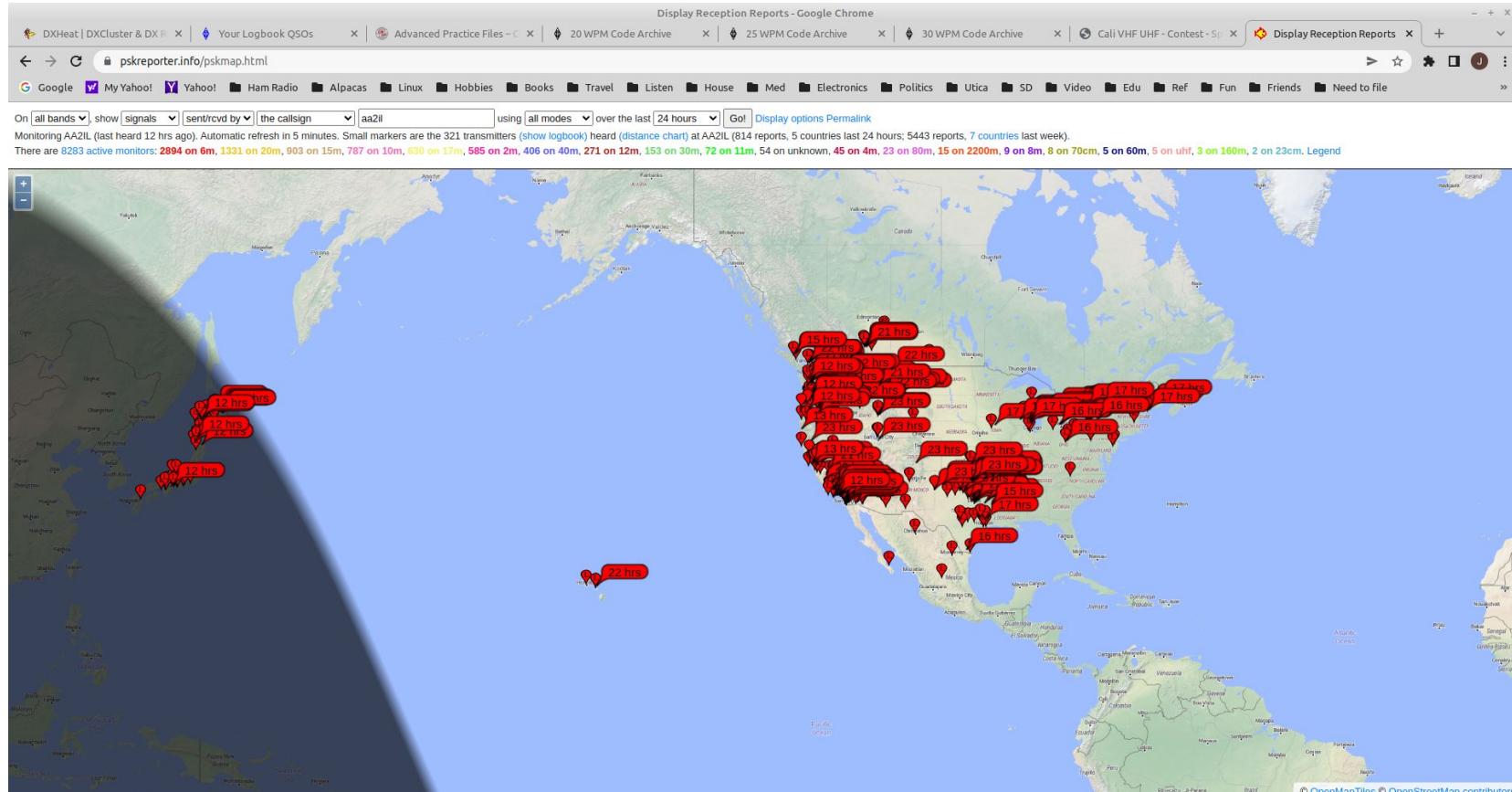
Speed Analysis – Yesterday's CWTs





PSK Reporter – Stations Who Heard Me on 6m During the June 2022 VHF Contest

CW Academy





Week 7 - Session 13

CW Academy

- Go over h/w and on air activities
- Upcoming contests
 - NAQP RTTY
 - SC & NC QSO Parties
- CWops
- Drill: 20-Questions:
 - AG5ZN: Skip, how is the wx?
 - KE7MPO: Bill, the wx here today is sunny and cold.
 - AG5ZN: RR TU
 - KE7MPO: Joe, what rig are u using?
 - W0WL: Skip, rig hr is IC7300 ...



CWops Membership Requirements

CW Academy

- Demonstrate Proficiency at 25-WPM or higher
 - Easiest way is to make several contacts in the CWTs
 - You can also schedule contacts with current members to gain sponsorship (or call/answer CQ or have a give-back QSO or ...)
- Nomination + 3-sponsors
- You don't need to be perfect!
 - Implicit is the understanding that you will continue to improve as you get more involved with the club activities
- Dues: \$15/yr or \$60 for 5-years or \$125 for life



CWops Activities

CW Academy

- CWTs, CW Open, OTA Give Back, QTX
- CWA - **Please consider becoming a Advisor**
 - You can also be a co-advisor
- Solid Copy - Monthly Newsletter
- E-mail Reflector
- Awards: CWT Participation, ACA, CMA, WAS, DXCC, WAE, WAZ ...
 - Upload your logs to <https://cwops.telegraphy.de/>
 - Post CWT summaries to <https://3830scores.com/>



Week 7 - Session 14

CW Academy

- Go over h/w and on air activities
- Upcoming contests
 - CQ WW SSB & CW – Look for DX activity B4 and after the contest
 - ARRL 160m (December)
 - I neglected to mention the Stew Perry 160m contest last weekend
 - 160m contests generally generate a lot of CW activity
 - ARRL 10m (December)
- Choice of topics for discussion
 - Contest terminology and strategies (see session 10)
 - DX Cluster and RBN (see session 12)
 - Timing and “Squeeze” Sending
 - “Sprint” Contests
 - Digi modes: RTTY and FT8
 - QTCs
 - Operating aids
 - ???
- 20-Questions drill



Week 8 - Session 15

CW Academy

- Go over h/w and on air activities
- Upcoming contests
 - ARRL International SSB
- Ragchew QSO or Numbers?
- Discussion Topic?



Session 16 – Graduation!!

CW Academy

- Go over h/w and on air activities
- Major CW contests:
 - NAQP – January and August
 - ARRL International DX CW – February
 - CQ WPX CW - May
 - IARU HF Championships – July (WRTC)
 - CWops CW Open – September
 - ARRL Sweepstakes - November
 - CQ WW CW – November
 - State QPs - February - November
- Certificates
- One last rag chew drill





Final Comments

CW Academy

- It has been a genuine pleasure working with each of you
 - You each have made significant progress
 - There is an optional self-evaluation on the CWops website
- Please keep in touch
- Keep on practicing
- Get on the air!
- Please provide feedback to me on this class:
 - Overall format (too much talk, not enough practice?)
 - Topics you would like to see
 - Topics that we should have skipped ...
- If any of you are linux hackers and are interested, I'd like some collaborators on the operating tools I showed you



CW Academy

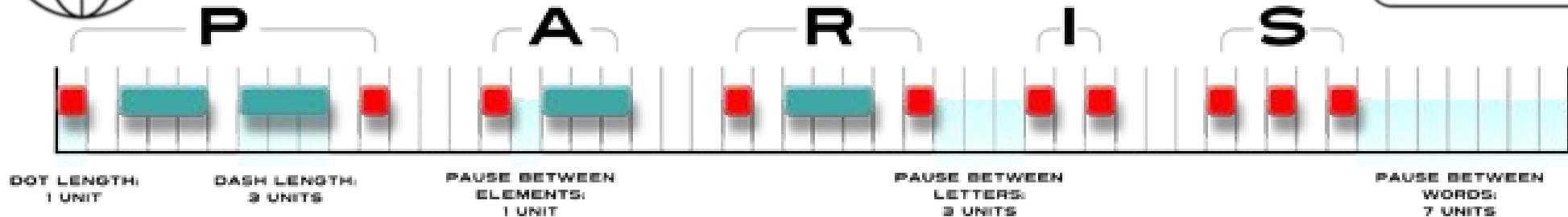
Additional Topics

- Sending
 - Timing
 - Squeeze sending
 - Arduino Nano Keyer/Code Practice Oscillator
- Digi Modes
 - RTTY
 - FT8
- More Difficult Contests
 - Sprints
 - ARRL Sweepstakes
 - QTCs
- Other operating aids



CW Academy

PROPERLY SPACED MORSE CODE TIMING



"PARIS" [at 50 units in length] is used to represent 1 word which can then be divided into a minute to get the WPM rate.

- T = Duration of a dit (seconds)
- “Paris” is the “standard” word length = 50 dits
- WPM = No. Times we can send this standard word in a minute = 60 sec. / (50 T)
- **T = 1.2/WPM seconds**
- e.g. For 25 WPM, each dit is $1.2/25 = 0.048$ s = 48 ms



CW Academy

“Squeeze” Sending

- CWops encourages use of paddles and electronic keyers
 - Cleaner fist at faster speeds
 - Most ops “hit a wall” at 15-20 wpm using a straight key
 - Eventually, you will hit a wall with a keyer also → keyboard sending
- There are two types of paddles
 - Single lever
 - Dual lever
- With a dual lever paddle, you can “squeeze” the levers together to form letters with alternating dit/dah patterns:
 - Reduces number of “motions” required to form a symbol
 - A, C, K, N, R, period, ...
 - Can even combine squeeze technique with “non-squeeze” to form most other symbols
 - K, R, L, F, Q, Y, ...



“Squeeze” Sending (cont.)

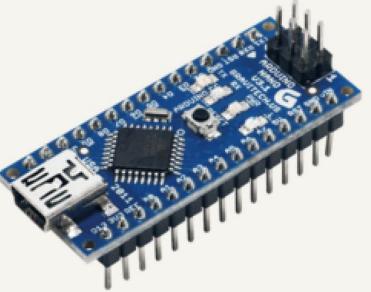
- If you don’t “squeeze,” there is no real difference between single and dual-lever paddles
- The advantage of squeezing dual-paddles over a single-lever paddle is not nearly as much as using an electronic keyer over a straight key
 - HST guys use single-lever paddles because less prone to making mistakes
- There are two Iambic “squeeze” modes:
 - Mode A: Sending stops after current element is sent
 - Mode B: Alternate element is sent before sending stops
- Excellent video demonstration by AA4OO:
 - <https://www.youtube.com/watch?v=6R4t3Wq1Gic>



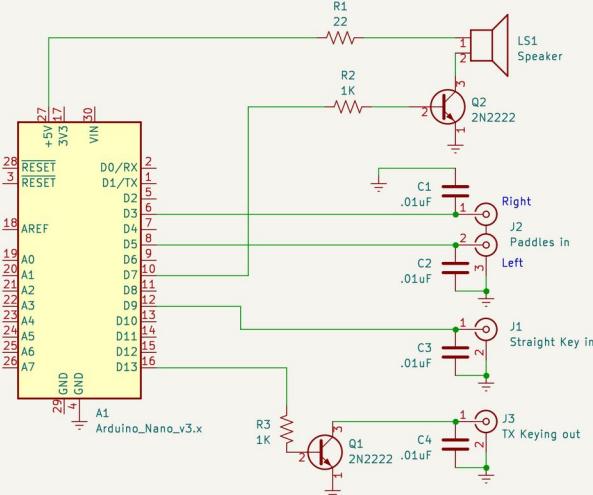
Homebrew Arduino Nano Keyer/Code Practice Oscillator

CW Academy

- A number of keyers are commercially available and are quite popular, e.g.
 - Winkeyer
 - Morseruino
- You can easily “roll your own” using a micro-controller (Arduino, ESP-32, ...)
 - This is a much cheaper option, especially if you have a well-stocked junk box
 - K3NG – Has every feature imaginable!
 - Flidigi Nano IO (W1FKJ) – easily fits in an arduino nano
- The keyer I use is an adaptation of W1FKJ’s Nano IO
 - Full schematics and firmware source are available at <https://github.com/aa2il/nanoIO>
 - Doubles as a code practice oscillator and gives you feedback on your timing
 - Minimal parts count
 - Current firmware is not compatible with Winkeyer protocol so will not work with N1MM logger



Schematic



Full-featured Keyer

File: Full_Featured_Keyer.kicad_sch

NOTES:

1. Circuit is powered via USB cable to Arduino Nano.
2. Firmware for Arduino Nano was originally based on nano io interface by W1HKJ.
3. Precise values of components is not critical. Use what you have in your junk box!
4. R1 controls the sidetone volume.
5. C1-C4 are bypass caps to suppress RF — precise values are not critical. If RF continues to be a problem, replace Q1 with an optocoupler.
6. LS1 is a small conventional magnetic speaker I scavenged from an old answering machine. If a different type of transducer is used, consider connecting R1 directly to Q2 and AC coupling the audio transducer through a 10uF electrolytic capacitor as shown on the next page.
7. Assignments of Arduino data pins is configured in firmware and easily changed.
8. PTT and RTTY signalling are also available via pin D10 and D12 respectively. Simply add two switching circuits similar to that shown for TX keying. A cleaner solution is to use an quad optocoupler as shown on the next page.
9. Device can be operated as stand-alone using default parameters. The full capabilities of the device can be accessed via a terminal program such as putty or minicom. Device is fully supported by pyKeyer by AA2IL.

Dr. J. B. Attili
AA2IL

Sheet:
File: keyer.kicad_sch

Title: Barebones Nano IO Keyer

Size: A4 Date: Feb. 2023 Rev: 1.0
KiCad E.D.A. kicad 7.0.0-da2b9df05c-163-ubuntu22.04.1 Id: 1/2



RTTY Contesting

CW Academy

- Many CW contesters also enjoy RTTY contesting
 - Fast paced, rates can approach those of CW
 - Most modern rigs have soundcard built-in so mostly plug-and-pray
 - Signaling is not as efficient as CW but higher than voice
 - Ops tend to naturally spread out so its not the QRM-fest typical of FTx contests
- Good place to experiment with SO2R/SO2V
 - Decoding is off-loaded to your computer so you can concentrate on juggling two radios
- Do NOT use cut numbers
 - All symbols are 5-bits
 - Cap. letters, digits, punctuation and control characters are obtained by switching between two tables with 32-symbols each
 - Result is that it actually takes longer to send 5NN than 599
- Send <CR> and spaces before and after your messages to help separate from noise/garbage
- See rttycontesting.com for more info



CW Academy

What about FT8?

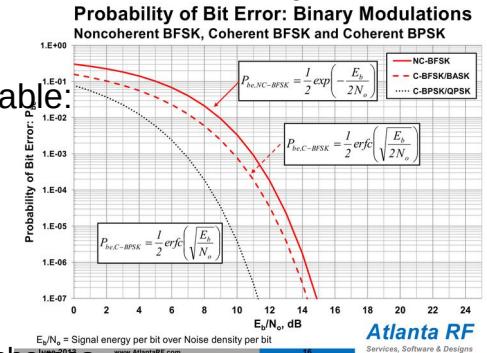
- There is no question that FT8 is by far the most popular mode in use these days
 - Nearly all DXpeditions include a significant FT8 component in their operating plan
- There is also no denying that this mode stirs up some very heated comments amongst CW devotees.
- On the plus side:
 - The use of error control coding introduces redundancy that improves performance compared to RTTY
 - In an age of ever increasing restrictions (e.g.HOAs) and RF noise, it offers many ops an opportunity for many to still enjoy our great hobby
 - It can provide a gateway to newcomers (who we hope will eventually become bored with FT8 and endeavor to learn CW!)
 - It is possible to enjoy being on the air while doing something else
 - There's always a party to be found on somewhere!



CW Academy

FT8 – The Rest of the Story

- Major Objections include:
 - The existence of “robot” variants of WSJT-X that don’t require any human intervention – not as prevalent as it is made out to be
 - Lack of a conversational capability - JS8CALL is not very popular
- IMHO, the WSJT software and operating technique have not kept up with the explosive popularity of this mode
 - Confining a large number of ops into a single voice channel with no standard methods to “spread out” results in a “QRM-fest”
- Its sensitivity/capabilities are greatly exaggerated:
 - Referencing the SNR of a signal that only occupies a few Hz of bandwidth to 2.5KHz is questionable:
 - $\text{SNR}_{\text{ft8}} = S / N = [E_b R] / [N_0 B_{\text{ref}}] = E_b/N_0 R/B_{\text{ref}}$
 - E_b = Average Energy per Information bit
 - N_0 = Noise Power Spectral Density (assumed white)
 - R = Information data rate = ~77-bits/15-sec.
 - $R/B_{\text{ref}} = (77/15)/2500 \sim -27 \text{ dB}$
 - $E_b/N_0 = \text{SNR}_{\text{ft8}} + 27 \text{ dB}$ is the standard measure of SNR when evaluating the performance of a digital comm schemes
 - **The myth that FT8 somehow magically digs signals out from well beneath the noise floor and is therefore much more sensitive compared to other modes, including CW, is simply not true!**
- The F/H mode is confusing and of dubious value since it reduces the fox’s signal by 6-dB each time he doubles the number of streams
 - Burying this option in an obscure menu doesn’t help – turns out “hounds” don’t need it if they stay above 1-KHz!
 - Signals from MSHV variant look similar but are not F/H





Why do I Still Use FT8 Occasionally?

CW Academy

- Its radio – it still requires some skill to navigate through propagation and QRM
 - CW much more satisfying!!!
- Chasing DX
 - You need to be where the action is
 - The behavior in some recent CW DX pile-ups has been a blemish on our great hobby (DQRM, lids, cops). The FT8 pile-ups were much more orderly (not at all perfect!).
- Although exaggerated, the signal reports are real and objective measures (unlike the usual 5NN)
- PSK Reporter immediately shows what bands are open and who's on
- I can still play radio while doing something else



CW Academy

Sprint Contests

- The QSY requirements make these events quite different compared to a typical contest:
 - If you call CQ, you must QSY at least 5-KHz before you can call CQ again
 - If you pounce, you can answer one caller and then you must QSY
- The order of the elements in the exchange indicates who is the CQer and who is the pouncer:
 - **CQ NA AA2IL**
 - **N7AUE**
 - **N7AUE AA2IL 123 JOE CA**
 - **AA2IL 456 JIM NV N7AUE**
 - **TU**
 - **W0WL**
 - **W0WL N7AUE 457 JIM NV**
 - **N7AUE 789 JOE WA W0WL**
 - **TU**
- See <https://www.kkn.net/n6tr/sprint.html> for an in depth look



CW Academy

ARRL Sweepstakes (CW)

- First full weekend in November
- Very popular “treasure hunt”
- Non-trivial Exchange:
 - SERIAL, PRECEDENCE, YOUR CALL, CHECK, SECTION

CQ SS AA2IL

N7AUE

N7AUE TU 123 A AA2IL 78 SDG

TU 456 U N7AUE 74 NV

73 AA2IL

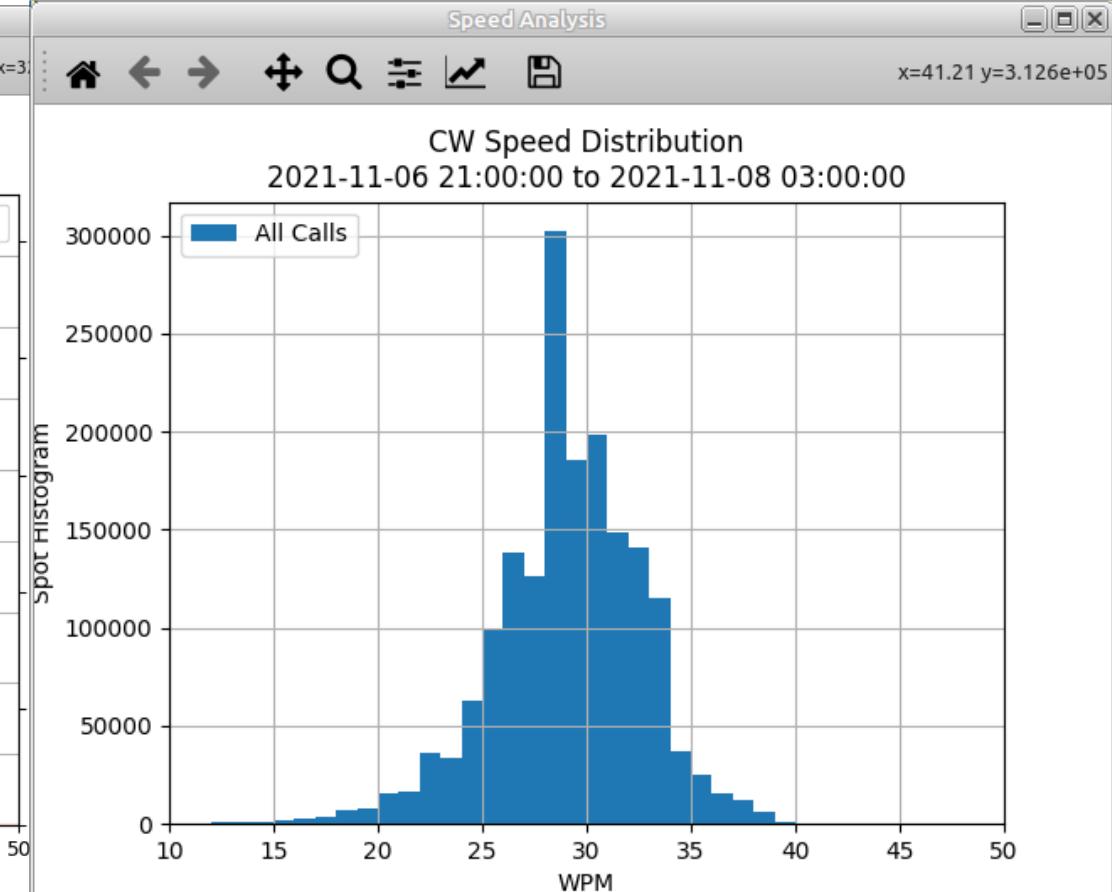
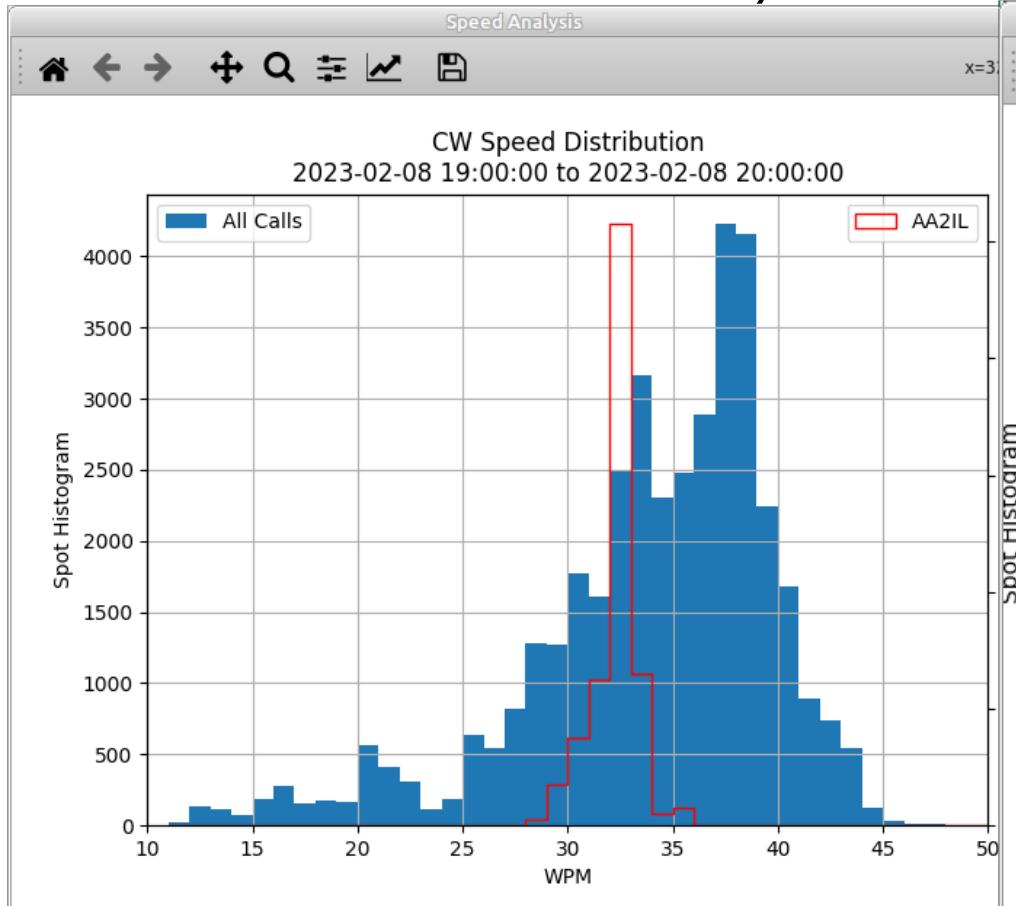


Speed Analysis

CW Academy

CWT 1100-1200 Feb. 8, 2023

ARRL SS CW Nov. 2021

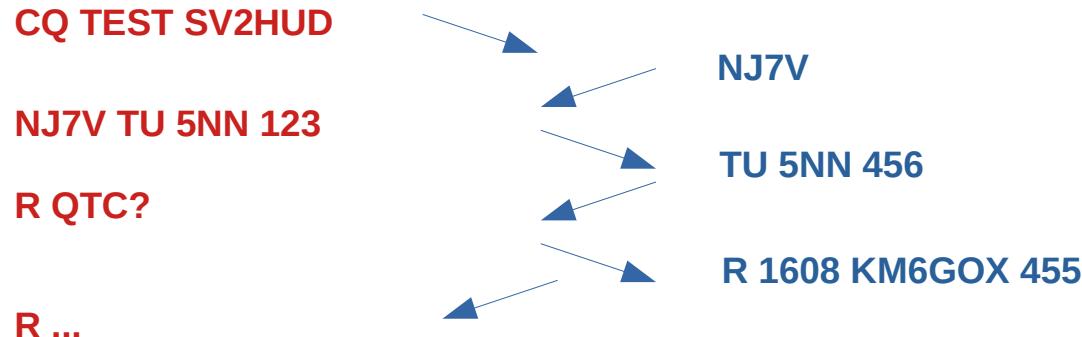




CW Academy

QTCs

- Some European contests include “QTCs” which add another level of difficulty to the exchange
 - A QTC is info from a previous contact you had in the contest
 - True test of skill since nearly impossible to predict
- Example (Time Call Number)



- YL3JD's QTC Trainer: <https://yl3jd.fizioikskile.lv/qtc/>
- YL3JD's Contest Trainer: <https://yl3jd.fizioikskile.lv/fsm/>



CW Academy

My Favorite Ham Websites

- Contesting related:
 - WA7BNM's Contest Calendar: contestcalendar.com
 - WA7BNM's Contest Score Rumors: 3830scores.com
- DX Cluster:
 - DX Heat: www.dx-world.net
 - DX Watch: dxwatch.com
- Activity:
 - Reverse Beacon Network: reversebeacon.net
 - PSK Reporter: pskreporter.info
- Chasing DX:
 - DX World: dx-world.net
 - DX News: <https://dxnews.com/>
- There are many other very good sites



Other Topics – Next Time?

CW Academy

- SOTA/POTA
- VHF+ and Satellite Contacts