

A wide-angle photograph of the Grand Canyon, showing the layered red and orange rock formations under a blue sky with scattered white clouds. The canyon's depth and scale are emphasized by the perspective.

AG 7 GK

Digital Modes Workshop

11/03/2018

Digital Mode Agenda

- Recap
- Equipment requirements
- Examples of Modes and Interactive Demos (Bring your stuff)
- Digital Net Planning

Introductions

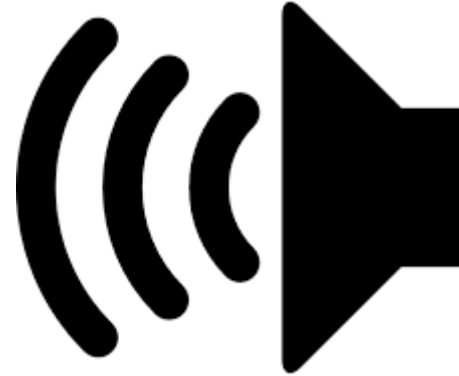
- Aaron Jones – AG7GK first licensed in 2016 as KI7DUK
- Go around the room:
 - Name and Callsign
 - License level
 - Any goals you care to share in relation to Digital Modes
 - Experience with Digital Modes
 - APRS
 - NBEMS (FLDIGI)
 - WINLINK
 - DX MODES

Equipment

- Computer OR Tablet / Phone
- Cables
- Radio with APRS
- GPS
- RADIO
- TNC or Soundcard
- Pactor Modem (In case of Network modes like Winlink)

HT Acoustical Coupling

- Tablet / Phone / Computer
- Apps:
 - Android SSTV
 - AndFLMSG
 - Droid PSK
- HT with HT specific cables
 - Baofeng HT
- APRS Specific Setup
 - HT
 - MOBILINK TNC and Cable
 - APRS Droid



HT / Audio Cable

- Tablet / Phone / Computer
- Apps:
 - Android SSTV
 - AndFLMSG
 - Droid PSK
- HT with HT specific cables
 - Baofeng HT
 - Baofeng BT Tech APRS Cable using VOX PTT OR
 - Custom Audio interface cable to trigger PTT
- APRS Specific Setup
 - HT
 - MOBILINK TNC and Cable
 - APRS Droid



Basestation

- Computer / Tablet
- Soundcard either built in or USB
- Apps:
 - MMSSTV
 - FLDIGI- FLMSG-FLRIG
 - WSJTX
 - WSJT-X JTAlertX
- Bastation
- Any Antenna – Mag Loop, Dipole, Vertical, anything to get a signal in and out



Warning about Duty Cycle

- Reduce your power!
 - Unlike SSB, these modes either run at 100% duty cycle, or use multiple tones sensitive to intermodulation distortion!
 - Be kind to your finals!
 - Keep **peak** power out well below key-down CW maximum to minimize distortion.
 - Keep ALC to zero
- Turn off speech processing or compression

Software

- WSJTX – used for FT8, JT Modes, WSPR, and Meteor Scatter
- MMSSTV – Used for Slow Scan TV
- FLDIGI – Many modes and options with companion software such as:
 - FLAMP - Amateur Multicast Protocol (One to Many Transmission of Files)
 - FLMSG – Message sending, one to many including CSV data, Text, Images, Radiograms, and many ICS related Emcomm forms
 - **ANDFLMSG** – Android version of FLMSG
 - Other FL related software
- Winlink RMS Express
- APRS Software (Many versions for all platforms)

Propagation Websites

- PSKreporter.info: <https://pskreporter.info/pskmap.html>
 - Use the stats page to see what modes are happening:
<https://pskreporter.info/cgi-bin/pskstats.pl>
- Wsprnet for WSPR results; <http://wsprnet.org/drupal/wsprnet/map>
OR alternative: <http://wspr.aprsinfo.com/>
- Hamspots.net: <https://hamspots.net/>
- APRS.fi: <https://aprs.fi>
- Online listing of hosted SDR receivers, great for verifying your signal on voice OR digital: <http://websdr.org/>

NBEMS / FL “Suite”

- Narrow Band Emergency Messaging System
- <http://www.w1hkj.com/NBEMS/NBEMS.ppt>
- Software (All free):
 - FLDIGI – Main application for mode selection, rig control, QSO’s
 - FLAMP – Application for sending files in chunks, allows for retries and relays of missing chunks
 - FLMSG – Your go-to application for sending text and forms (Radiograms)
 - **ANDFLMSG** – Android version
 - FLRIG – Rig control application if you have a CAT control interface to your RIG

NBEMS - Demo

- FLDIGI Interactive Demo
- ANDFLMSG on a tablet and Handheld using Acoustic Coupling



NBEMS - Demo

Using FLRIG if you have CAT control, otherwise set your frequency on your Radio
145550.000

Note Frequency at Offset

Set rig to 145550.000 Digital

VIDEOID Macro

RxID & TxID On

Frequency offset selected in Waterfall

TX Locked

Squelch ON

FLMSG Running

Squelch Slider to avoid garbage decodes

The screenshot shows the NBEMS software interface. At the top, a window titled 'flrig IC-7100' displays a frequency of 145550.000. Below it, the 'flrigi ver4.0.17 / IC-7100 - AG7GK' window shows the same frequency and various control buttons. A 'Waterfall' display at the bottom shows a signal at the selected frequency. To the right, the 'FLMSG-4.0.7' window is open, showing a 'Send' button and 'NOT CONNECTED' status. A physical radio is visible in the bottom right corner of the screenshot.

SSTV DEMO

- A single image is converted to individual scanned lines and those lines sent as variable tones between 1500 and 2300 Hz
- A color image takes about 2 minutes to transmit, depending on mode. Some black and white modes can transmit an image in under 10 seconds
- Uses for Emcomm? Pictures of flooding, storms, damage, wellness checks, documentation.
- Many options for PC, MAC, Linux, Android and IOS software

SSTV

- SSTV Software “MMSSTV”
- Captured on 145.500 Mhz VHF from International Space Station from Russian Cosmonauts celebrating 40 years in space
- Fun mode for sending pictures and various software options for computer, Android, and IOS

The screenshot displays the MMSSTV software interface. At the top, the window title is "AG7GK (AG7GK.MDT) - MMSSTV Ver 1.13A". The menu bar includes "File", "Edit", "View", "Option", "Profiles", "Program", "RadioCommand", and "Help". Below the menu bar are tabs for "sync", "RX", "History", "TX", and "Template".

The main display area is divided into several sections:

- Left Panel:** A large image of a received SSTV frame. It features a collage of photos and text celebrating the 40th anniversary of the first human spaceflight. Key text includes "Владимир Джанибеков, Dziggferdemidijn Gürragcsaa" (23th March 1961 - Soyuz 28 - Salut 6), "Леонид Попов, Dumitru Prunaria" (14th May 1961 - Soyuz 40 - Salut 6), and "INTERKOSMOS 40th YEARS". Logos for RSOISS, ISS, and the Russian Space Agency are visible.
- Right Panel:** A control panel for the receiver. It includes an "RX Mode" dropdown menu with options: "Auto", "Robot 36", "Robot 72", "PD120", "Scottie 1", "Scottie 2", "ScottieDX", "Martin 1", "Martin 2", and "SC2 180". Below this is a "Log" section with fields for "Call" (K7VEY), "His" (595), and "My". There are also fields for "Name" and "Qth", and a "Note" field. A "QSL" field is present with sub-fields for "RxID", "TxID", and "RBC".
- Bottom Panel:** A DSP (Digital Signal Processing) section with buttons for "AFC", "LMS", "QSO", "Data", "Find", "Clear", and "List". A frequency display shows "3.573". There are also checkboxes for "Show with template" and "Draft", and a page indicator "1/25".
- Bottom-most Panel:** A grid of thumbnail images. The first row shows "QSSSTV AG7GK", "CQ AG7GK", and "K7VEY 595". The second row shows "AG7GK ARIZONA", "AG7GK ARIZONA", and "AG7GK ARIZONA".

JT Modes (JT65, JT9, FT8)

- Origin: Created by Joe Taylor W1JT in 2003 for EME work
 - A way to have a QSO using a computer
 - A weak signal digital communications mode for Amateur Radio
 - A Multi-Frequency Shift Keying scheme employing Forward Error Correction with 65 tones
- Bandwidth: 50-180 hz
- Prevalence: Predominant modes for DX contacts
- Equipment requirements: HF Radio, Soundcard(ext/int), Computer, Rpi can work, WS-JTX software, other options exist
- Pros: Widespread, with FT8 very fast QSO's, SNR resilience
- Cons: Not conversational

JT Modes (JT65, JT9, FT8)

- Exchange with TAIWAN
- 30 Meters
- Very weak signal, BV1EK reported my signal at -18 SNR and I reported his at -14

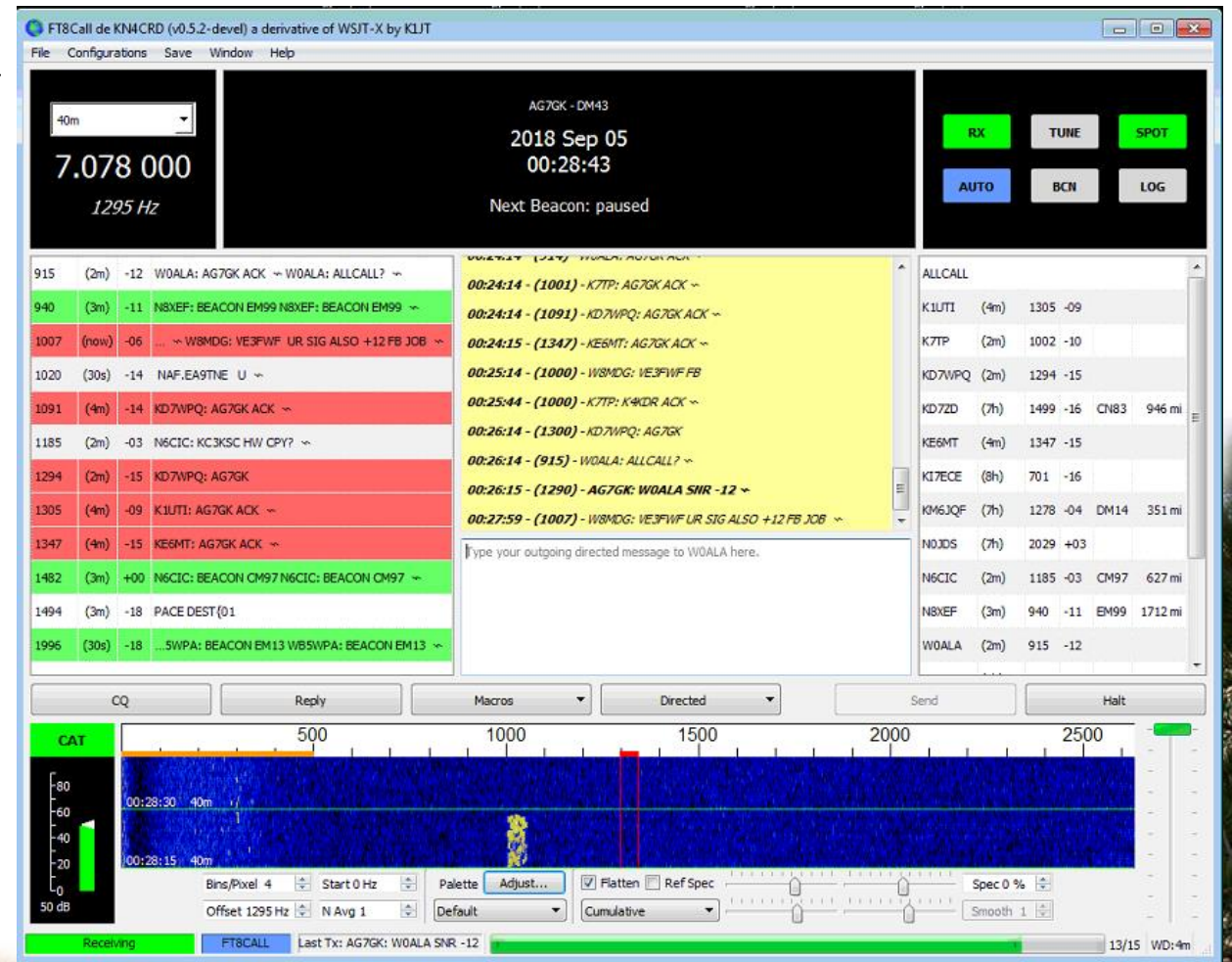
The screenshot displays the WSJT-X software interface. At the top, a 'Wide Graph' shows a frequency spectrum with a red box highlighting a signal at approximately 1500 kHz. Below the graph, a 'Band Activity' table lists received signals with columns for UTC, dB, DT, Freq, and Message. The table shows several signals from S. Africa, U.S.A., and Taiwan. A 'Rx Frequency' table on the right shows the received signal's details. The bottom section of the interface includes a '30m' band selection, a frequency display of 10.136 000, and a 'Generate Std Msgs' list with various call signs. The system tray at the bottom shows the date and time as 2017 Oct 06 14:43:51.

UTC	dB	DT	Freq	Message
143830	-12	0.3	1505	~ KAPUA BV1EK RRR
143830	-17	0.1	1921	~ CQ ZS2EZ KF26 S. Africa
143900	-18	-0.6	1437	~ CQ AJ4HW EM75 ~U.S.A.
143900	-15	0.3	1507	~ RX9JX BV1EK 73
143930	-16	-0.6	1436	~ CQ AJ4HW EM75 ~U.S.A.
143930	-16	0.3	1507	~ CQ BV1EK PL05 a1 Taiwan
143930	-18	0.1	1921	~ CQ ZS2EZ KF26 S. Africa
143945	6	0.1	1507	~ BV1EK WBOFTY DM99
144000	-15	0.1	1921	~ CQ ZS2EZ KF26 S. Africa
144100	-17	-0.6	1432	~ CQ AJ4HW EM75 ~U.S.A.
144100	-14	0.1	1916	~ WA0JIM ZS2EZ RRR
144130	-16	0.1	1916	~ WA0JIM ZS2EZ 73
144230	-14	0.3	1510	~ AG7GK BV1EK -18
144230	-17	0.1	1915	~ CQ ZS2EZ KF26 S. Africa
144300	-16	0.3	1513	~ AG7GK BV1EK RRR
144300	-14	0.2	1914	~ CQ ZS2EZ KF26 S. Africa
144330	-16	0.3	1515	~ AG7GK BV1EK 73

UTC	dB	DT	Freq	Message
143830	-13	0.2	1752	~ CQ ZS2EZ KF26
143230	-13	0.2	1752	~ CQ ZS2EZ KF26
143315	-18	0.1	1753	~ ZS2EZ KB0GUS EM28
143930	-16	0.3	1507	~ CQ BV1EK PL05 a1
143945	6	0.1	1507	~ BV1EK WBOFTY DM99
143930	-16	0.3	1507	~ CQ BV1EK PL05 a1
144015	Tx		1507	~ BV1EK AG7GK DM43
144045	Tx		1507	~ BV1EK AG7GK DM43
144115	Tx		1507	~ BV1EK AG7GK DM43
144145	Tx		1507	~ BV1EK AG7GK DM43
144215	Tx		1507	~ BV1EK AG7GK DM43
144230	-14	0.3	1510	~ AG7GK BV1EK -18
144245	Tx		1510	~ BV1EK AG7GK R-14
144300	-16	0.3	1513	~ AG7GK BV1EK RRR
144315	Tx		1513	~ BV1EK AG7GK 73
144330	-16	0.3	1515	~ AG7GK BV1EK 73

FT8CALL New Software

- New software being built TODAY
- Uses FT8 Protocol but allows keyboard to Keyboard Conversational Style
- Integrated with APRS to allow location updates and EMAIL-2 directed messages
- Getting Popular but get ready to WAIT, very slow.



WSPR (Demo)

- Origin: 2008 by Joe Taylor
 - The Weak Signal Propagation Reporter
 - An automated system designed for sending and receiving low-power transmissions to test propagation paths on the MF and HF bands.
 - The program can decode signals with S/N as low as -28 dB
- Bandwidth: 6 hz
- Antenna propagation at: <http://wsprnet.org/drupal/wsprnet/map> OR <http://wspr.aprsinfo.com/>
- Equipment requirements: HF Radio, Soundcard(ext/int), Computer, Rpi can work, WS-JTX software, other options exist
- Pros: Great for seeing where your signal is going
 - "WSPR is about 11 dB better than ear-and-brain CW.
 - "For most operators, the difference is more like 15 dB."

APRS (Demo)

- **A**utomatic **P**acket **R**eporting **S**ystem
- Original Developed in 1984 to Map Navy Positions, with availability of GIS in the 90's became feasible for GPS integration
- The system is based on the AX25 Packet protocol, and was developed by Bob Bruninga WB4APR, a senior research engineer at the United States Naval Academy.
- North American frequency is usually 144.390, though operable at UHF, 6 meters and some HF
- Mostly a one-to-many system, though there are some one-to-one applications
- Public service and events, search and rescue, emergency services

Digital Net Discussion

- Interest
- Names / signup
- Examples
- Goals
- Netiquette
- Lessons Learned
- HF and VHF?

Useful Websites

- Comprehensive Guide to NBEMS / FLDIGI, equipment setup, instructions, etc:
<http://gblakesl.net/ARES/Basic-NBEMS-Workshop.pdf>
- Presentation on Winlink:
[http://www.philsherrod.com/Winlink/Winlink RMS Express.pdf](http://www.philsherrod.com/Winlink/Winlink_RMS_Express.pdf)
- Excellent Presentation on NBEMS and FLDIGI:
https://www.jeffreykopcak.com/drive/ham_radio/digital_modes/vhf_uhf_nbems_an_introduction_using fldigi_and flmsg_presentations/vhf_uhf_nbems.pdf
- Presentation on JT Modes:
<http://www.informationtechnologies.com.au/files/JT65%20Presentation.pdf>
- WSPR Presentation: [https://www.powershow.com/viewht/1a4552-ZDc1Z/What is WSPR powerpoint ppt presentation](https://www.powershow.com/viewht/1a4552-ZDc1Z/What_is_WSPR_powerpoint_ppt_presentation)
- Meteor Scatter Introduction: [Link](#)

More Useful Websites

- APRS: <http://www.aprs.org/APRS-mobile.ppt>
- A PRACTICAL EVALUATION AND COMPARISON OF SOME MODERN DATA MODES: <http://www.qsl.net/zl1bpu/MFSK/datmodes2.pdf>
- ARRL presentations on NBEMS (Narrow Band Emergency Message System) with FLDIGI
 - [http://www.arrl.org/files/file/On%20the%20Air/Tutorials/Introduction to NBEMS ARRL.pdf](http://www.arrl.org/files/file/On%20the%20Air/Tutorials/Introduction%20to%20NBEMS%20ARRL.pdf)
 - [http://www.arrl.org/files/file/On%20the%20Air/Tutorials/Advanced NBEMS 3 0.pdf](http://www.arrl.org/files/file/On%20the%20Air/Tutorials/Advanced%20NBEMS%203%200.pdf)
 - <http://www.w1hkj.com/NBEMS/NBEMS.ppt>
- Digital Mode Comparisons from FLDIGI Help files: <http://w1hkj.com/FldigiHelp-3.21/Modes/Compare.htm>
- Signal ID Wiki – listing of all digital signals, explanations, samples:
<https://www.sigidwiki.com/wiki>

Nerd Reading

