DIGITAL COMMS

Part One: Overview and Demonstrations

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WHAT IS DIGITAL COMMS?

➤TX & RX computer-generated sounds via radio

➤Ways to MOdulate and DEModulate signals

➤Software apps to create & translate signals

➤Signals are encoded (not encrypted) in *modes*

WHY USE DIGITAL MODES?

➢Fast & accurate data transfers for EMCOMM

➢Low Power – never need to run more than 25 W

➢Many modes – select for conditions

➢Reliable comms – succeed when even CW fails

(some error corrections work below -20 dB s/n!)

FLdigi Application Suite

"FL" in name indicates GUI built with Fast Light Toolkit

FLdigi – digital modem *

FLarq – Automated Repeat reQuest *

FLmsg – message forms management *

FLamp – Amateur Multicast Protocol *

FLrig – transceiver control *

FLwrap – file encapsulation *

+ other W1HKJ apps not part of NBEMS

* collectively referred to as NBEMS
(Narrow Band Emergency Messaging Software)

Many thanks to creator W1HKJ Dave Freese

FOR OPERATING SYSTEMS

➢Linux / Unix

➢Windows – Win7 / Win8 / Win10

➢OSX – i386 or x86

➢Desktop / Notebook / Netbook / Tablet

➢"AndFlmsg" for Android

FLDIGI DEMONSTRATIONS!

Three computers set up,

with speakers and microphones only (no radios):

➢Windows

➢Linux (on Raspberry Pi 4)

➢Mac

fldigi ver4.1.15 – K7AVR

File   Op Mode   Configure   View   Logbook   Help

☐ Spot   ■ RxID   ■ TxID   ☐ TUNE

14070.000

Frq 14071.380   On ___   Off 0053   In ___   Out ___
Call _____   Op _____   Az ____
Qth _____   St ___   Pr ___   Loc _____

USB

14072.91 o&ilte e

14072.17 ta aeet e oe enn e
14072.02 in eeEo setn ioe

14071.69 DX BGod Bless an
14071.62 t

14071.38 n r C let o-t-ei

14071.21 o1ln,

14070.87 %PeeO e Tgw n

CQ

3.0   Clear

How
 Your my 6,861 PSK31 QSO

Report : 599 599
Name   : Rich Rich
QTH   : Ft Lupton, CO Ft Lupton, CO
Grid   : DN70oc DN70oc
County : WELD WELD - 35 miles NE of Denver, Colorado

WX currently its 13 °F - cloudy skies with flurries -Low abt 0 tonight Winds ENE at 10
to 15 mph Humidity 70%

How copy? BTU Bob, KD8QZE de KB0QC pse kn oenleh
rxQC d
KD8Q
ipe te meee

| CQ | ANSWER | QSO ▶▶ | KN ∥ | SK ∥ | Me/Qth LV | Brag LV | Me/QTH SV | Brag SV | Olivia 16/500 | DominoEX 8 | DominoEX 4 | 1 |
| CQ DX | CQ DX 2X | CQ 2X | CPS Test | Call | Log QSO | CW-CQ ▶ | WEFAX | BPSK 31 | BPSK 63 | BPSK 63F | BPSK 125 | 2 |

500   1000   1500   2000   2500   3000   3500
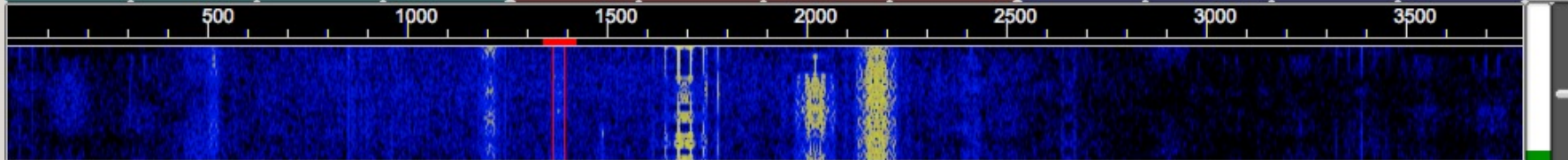
WF ◀ -12 ▶ ◀ 70 ▶ ◀ x1 ▶ ◀ ∥ ▶ FAST ◀◀ ◀ 1380 ▶ ▶▶ QSY Store ☐ Lk ☐ Rv ☐ T/R

BPSK31   s/n 16 dB   imd -29 dB   ◀◀ ◀ -3.0 ▶ ▶ ◆ ☐ AFC ☐ SQL ☐ KPSQL

MOST COMMON DIGITAL MODES

➢ RTTY – legacy digital mode; not for QRP; poor s/n performance

➢ PSK-31 – ideal for keyboard to keyboard casual comms

➢ MT63 – immune to interference – moderate speed

➢ Thor-16 – forward error correcting multi-tone; very easy to tune; excellent s/n performance; FAX image transfers

➢ Olivia – 8/500 & 16/500 – very slow for keyboard communications, excellent s/n performance

➢ Contestia – 8/500 – like Olivia, upper case only; great casual comms at marginal s/n

➢ FT8 – QSOs only (-20 s/n!); not for comms

MODE IDENTIFIERS (RXID, TXID)
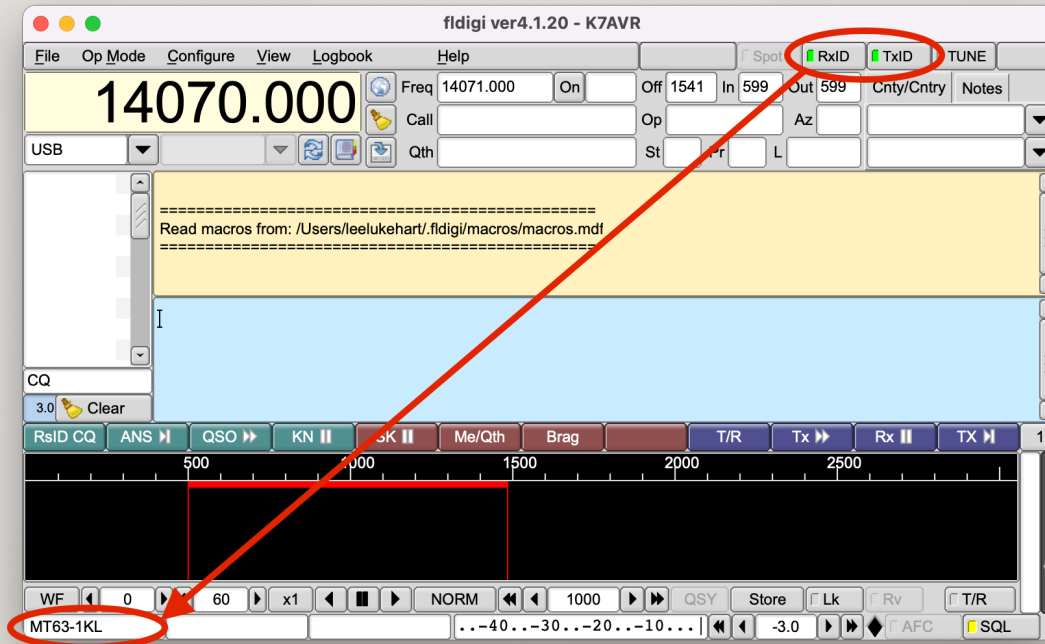
- Preamble Sequence of 15/30 tones before message to identify mode

- Reed Soloman encoding can be detected at -18 dB s/n

- Both TX and RX behavior configurable

CONFIGURE OPERATOR

Operator-Station

Station Callsign:	K7AVR
Operator Callsign:	K7AVR
Operator Name:	Lee Lukehart
Antenna:	Buckmaster OCF dipole
Station QTH:	Sandpoint, ID, USA
Station Locator:	DN18ri
State / Provinces	Idaho ▼ ID
Counties / Regions	Bonner ▼ BNR

Collapse Tree   Restore defaults   Save   Close

MACROS

Automate routine operation; add program control
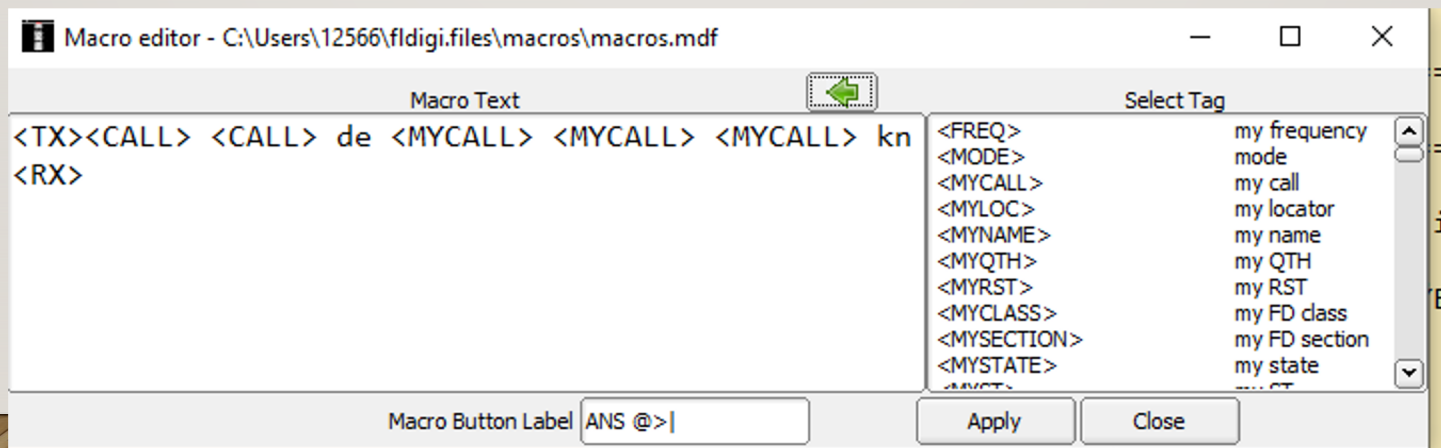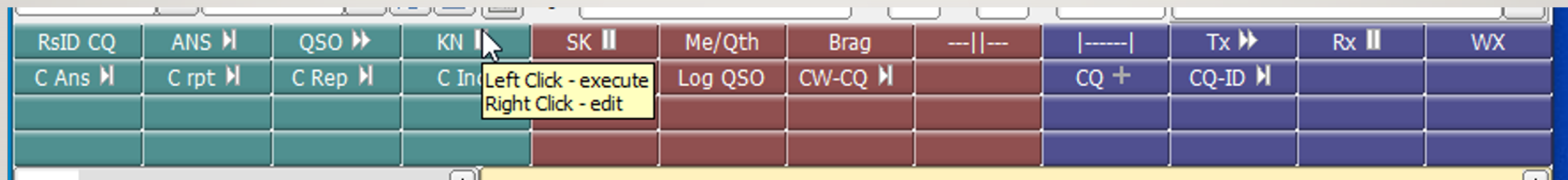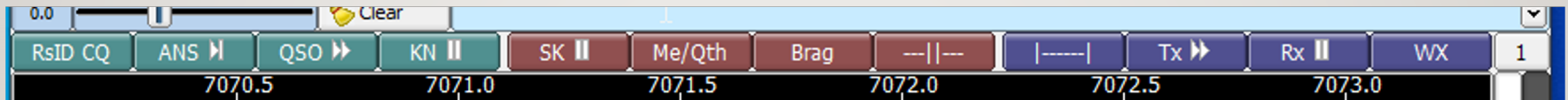
WHAT EQUIPMENT DO YOU NEED?

➤Radio

➤Computer (Mac / Win / Linux)

➤Software

Also useful:

➤Sound card interface (e.g. SignaLink, RIGblaster)

SOUND CARD INTERFACE

➢ Connects computer sound card to the radio

➢ RF isolation

➢ Ground loop isolation (transformer coupling)

➢ Can automate the PTT when you transmit
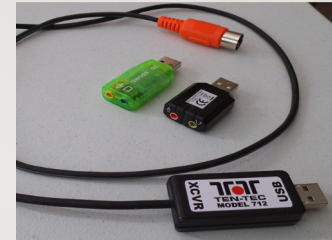
➢ Some radios have sound interface built-in

FLDIGI SETUP - AUDIO

➢ Install audio device drivers specific to OS, as needed (most PnP)

➢ On Windows & Apple – select PortAudio listed device

➢ On Linux – use PulseAudio or added library (e.g. PAVC)
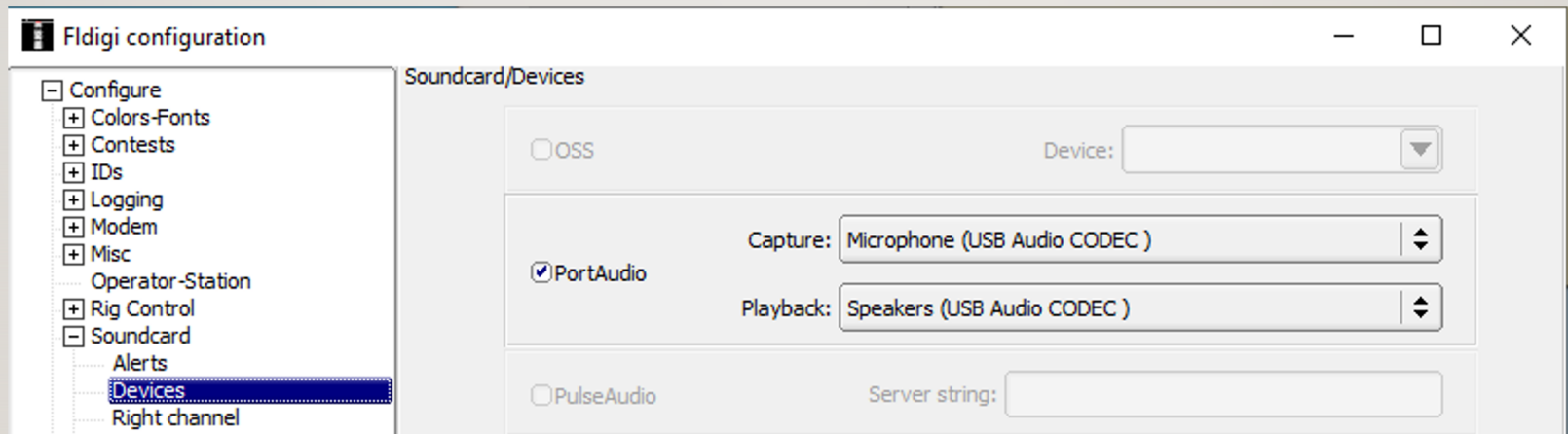
TRANSCEIVER CONTROL OPTIONS

- ➢ flrig – separate application
- ➢ rigcat – fldigi user-definable (XML)
- ➢ hamlib – public domain library
- ➢ other 3rd party control access using remote procedure calls (xmlrpc)

FLMSG

Simple Interface

Message manager

– Generate

– Store

– Send

– Receive

– Fixed format

– Custom HTML-5

FLMSG – EXPERT INTERFACE

FLMSG BUILT-IN FORMS

FLMSG CUSTOM FORMS

Useful Links

Main fldigi website:
http://w1hkj.com

Source Forge files download
http://sourceforge.net/projects/fldigi/files/

Fldigi on-line mode identification – sights and sounds
http://w1hkj.com/modes/

NBEMS EMCOMM user group:
https://groups.io/g/nbems

Windows fldigi user group:
https://groups.io/g/winfldigi

Linux / Mac fldigi user group:
https://groups.io/g/linuxham

Raspberry Pi 4:
https://www.raspberrypi.com/products/raspberry-pi-4-model-b/