



# A Review of the FlexRadio 6300

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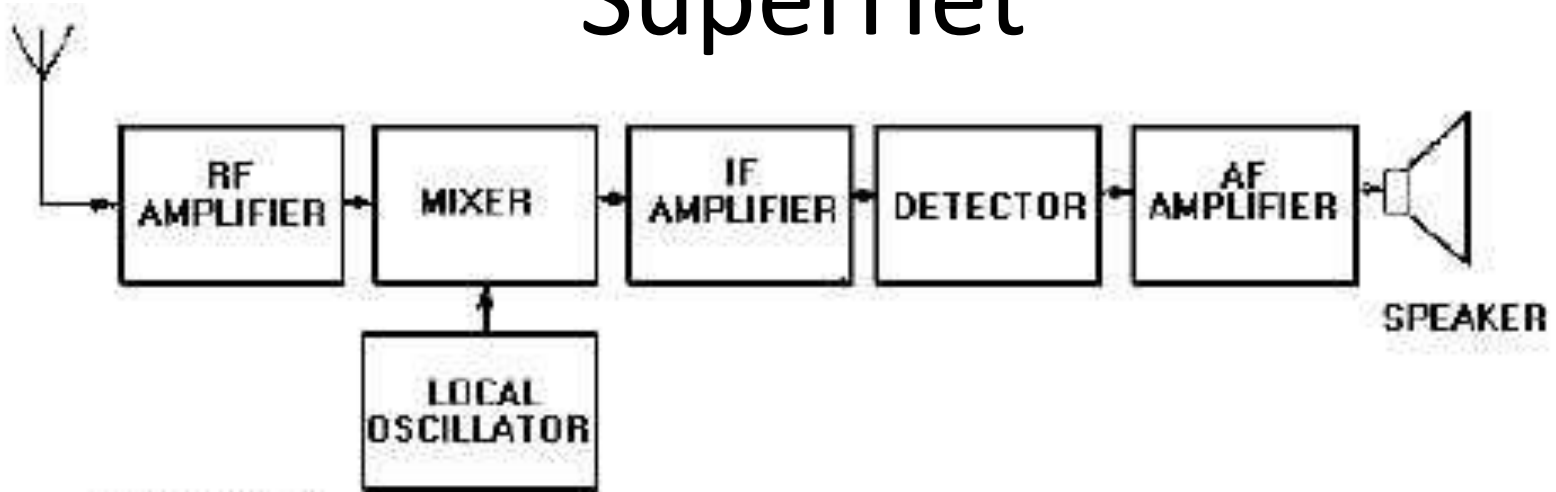
# What is an SDR\*?

\*Software Defined Radio

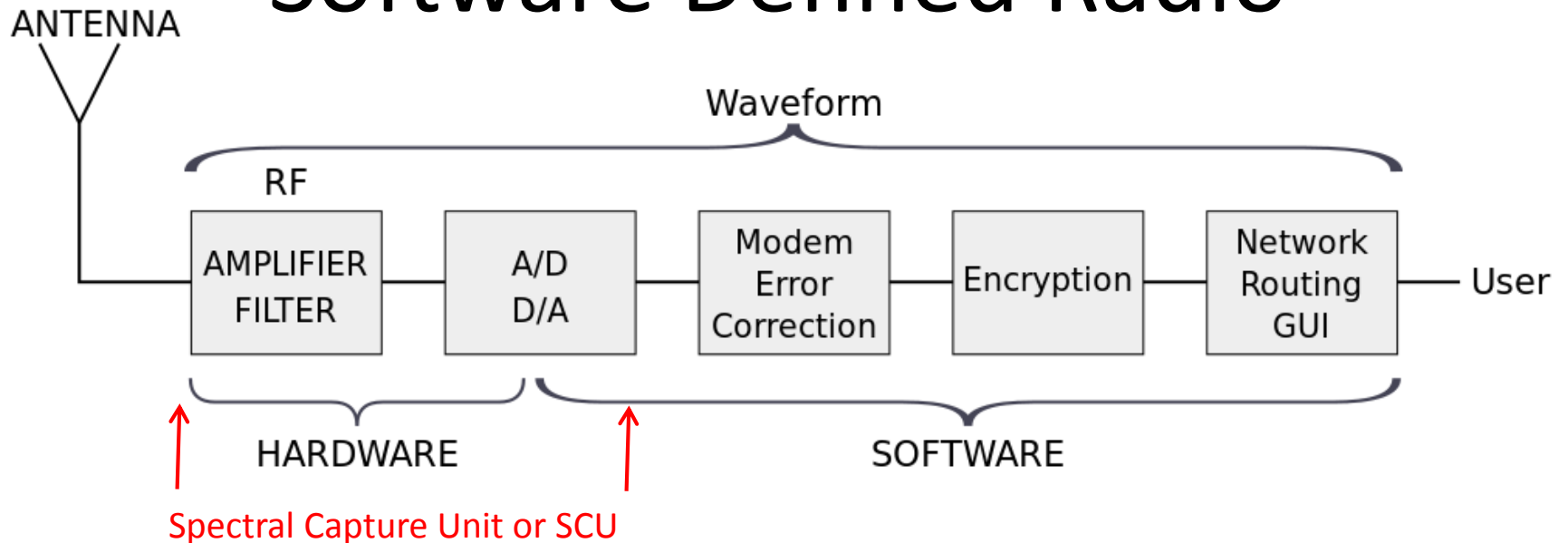
# SDR vs Superheterodyne

- In superheterodyne (also called “superhet” or “multiconversion”) radio systems, a series of down-conversions using local oscillators is performed on the RF input ultimately resulting in a baseband signal. This signal is generally only a few kilohertz wide and is ready to be demodulated and presented to the operator in the form of audio. In a superheterodyne architecture, generally only a single receiver is available at a time and the receiver has limited bandwidth.
- In a wide-band sampling radio, a large portion of the spectrum is sampled (turned into digital information) all at once. This sampling provides the basis for the use of a number of analysis tools and receivers in the spectrum simultaneously, all from the one hardware sampler.

# SuperHet



# Software Defined Radio



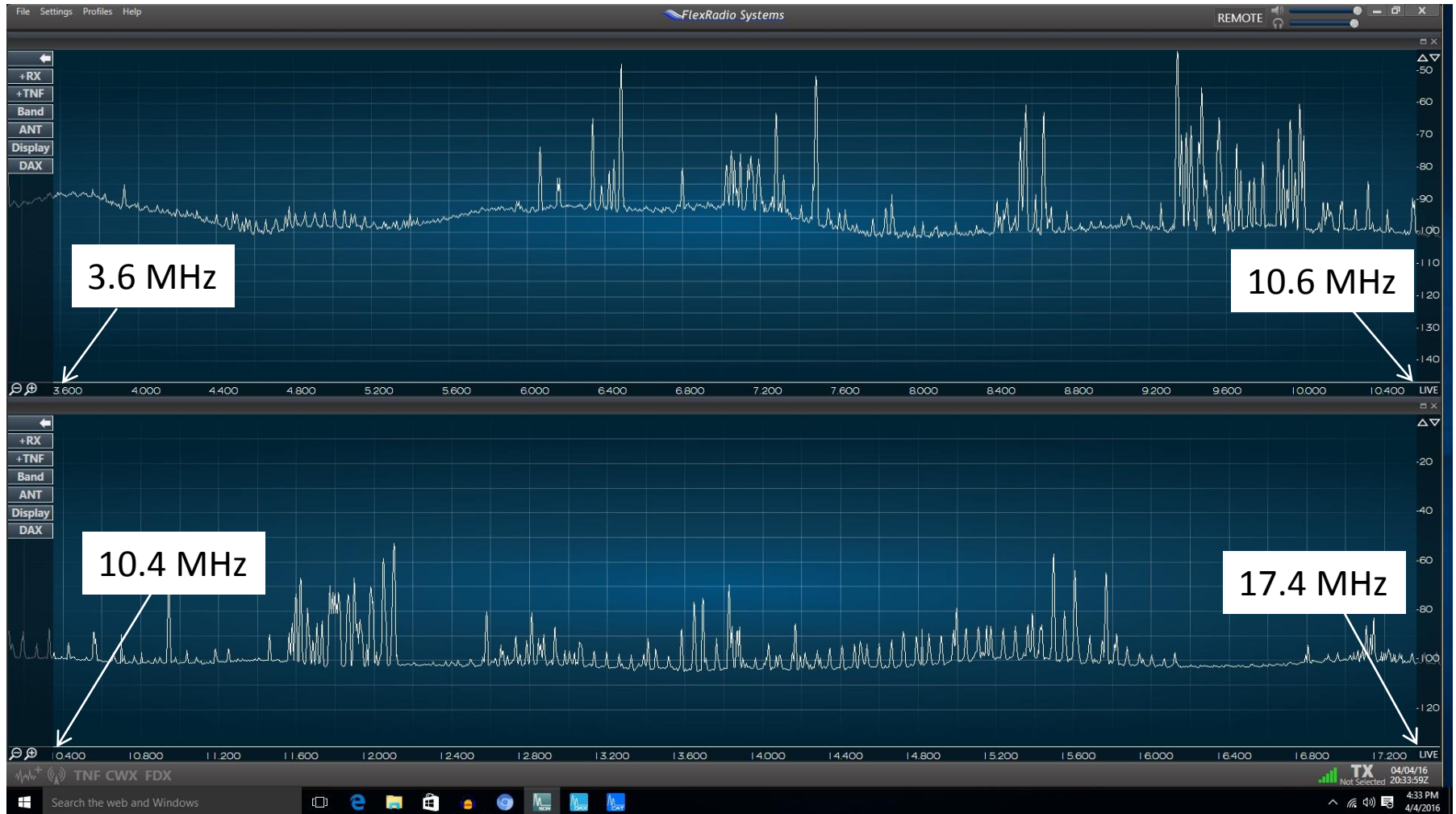


# The 6300 SDR

# Spectral Capture Units

- The 6300 has one “Spectral Capture Unit”, or SCU.
  - Collect wide-band data from the RF spectrum.
  - The main SCU components are:
    - Antenna input
    - Amplifiers and filters
    - Analog-to-digital converter (ADC)
  - The SCU feeds up to two 7Mhz wide swaths of data to up to 2 panadapters
    - 1 -4 Gbps data rate

# The Panadapters Show What the SCU “Sees”



# Slice Receivers

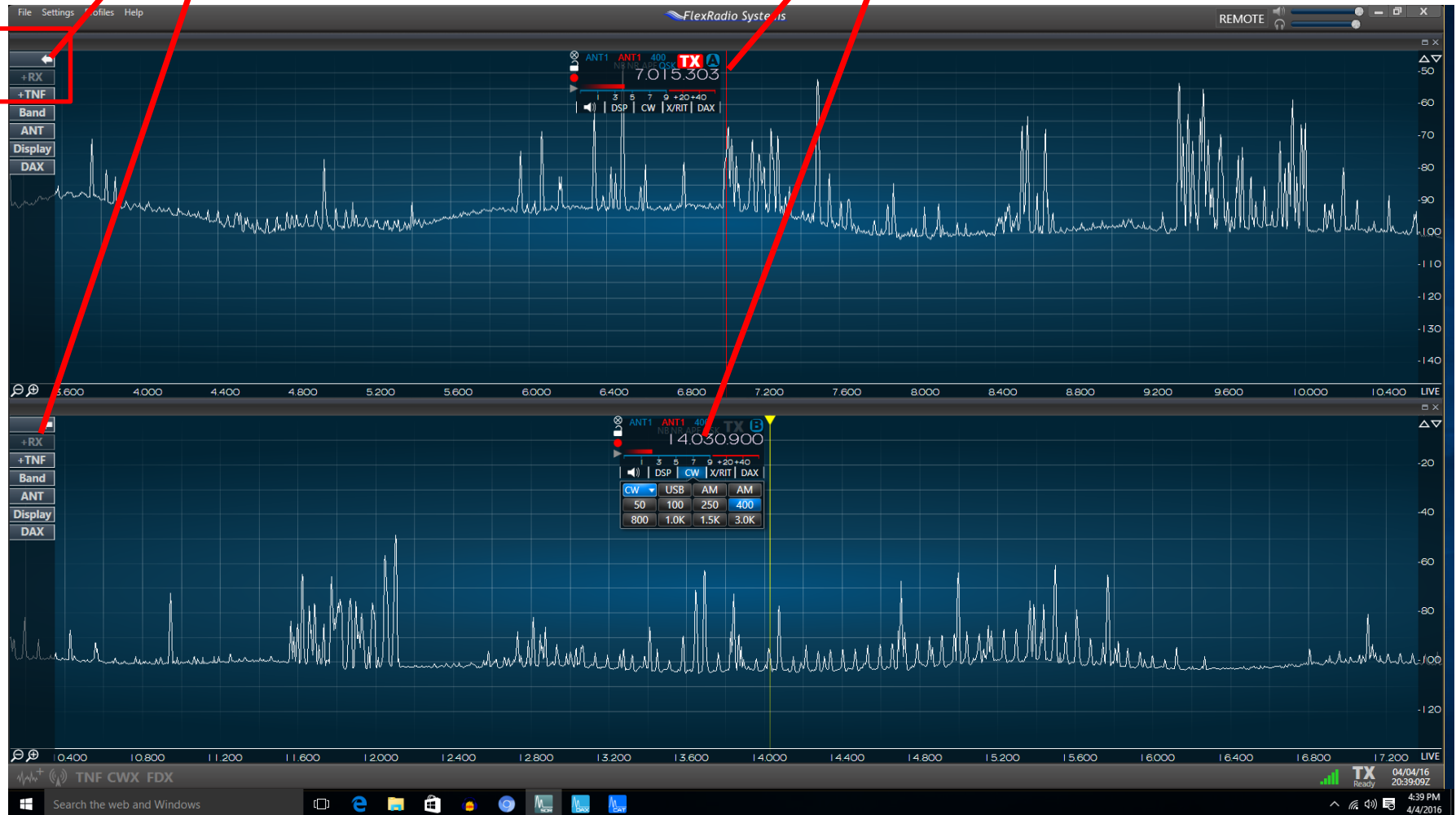
- The 6300 can create 2 separate receivers out of the data collected from the SCUs.
- Each Slice Receiver is tuned to a specific frequency
  - Just as a Variable Frequency Oscillator (VFO) would be in a traditional radio.
- The Slice Receiver then takes this more manageable amount of data
  - Typically describing 10-20kHz
  - Performs operations to output the signals required by the operator.



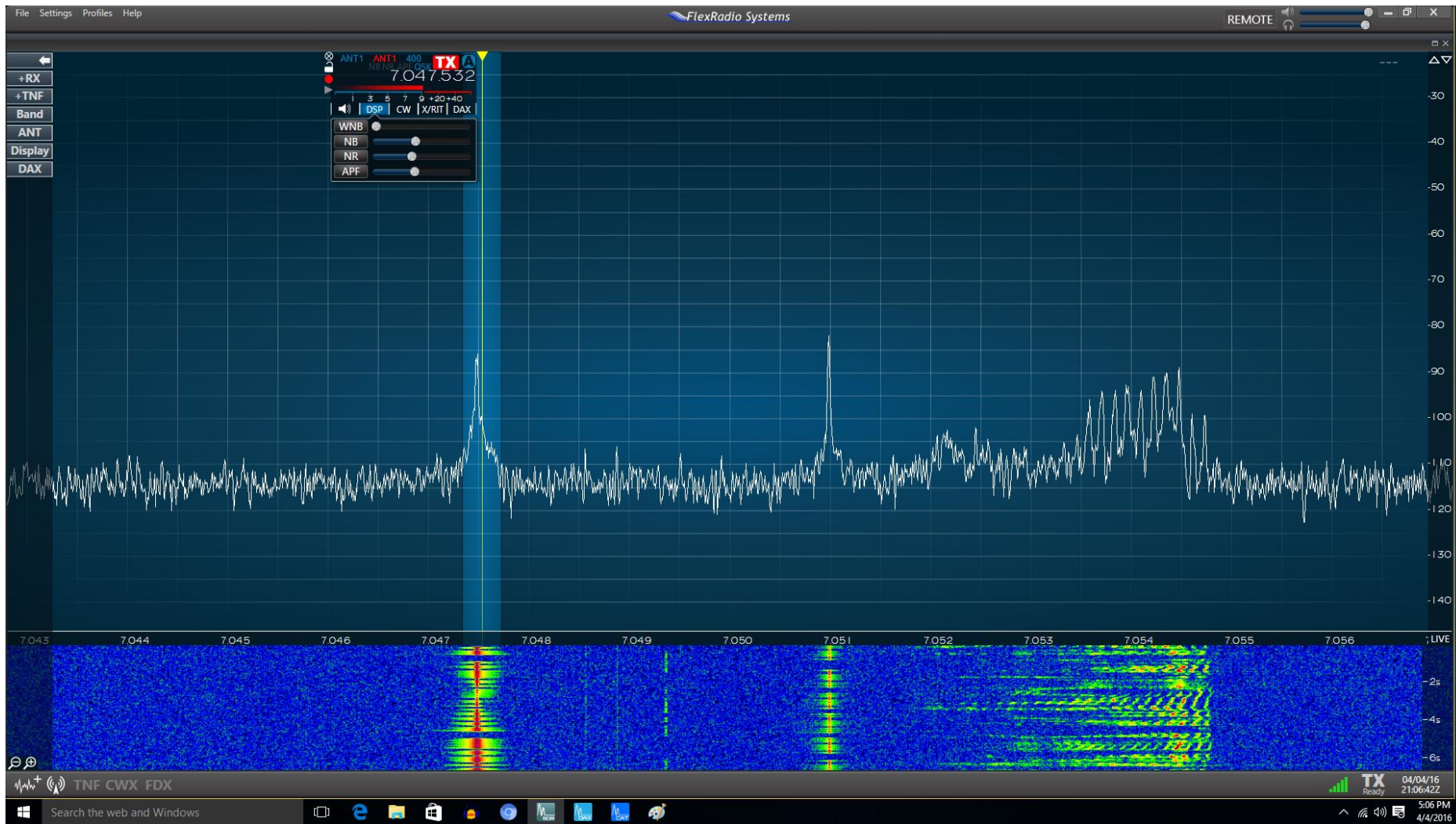


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Slice Receivers



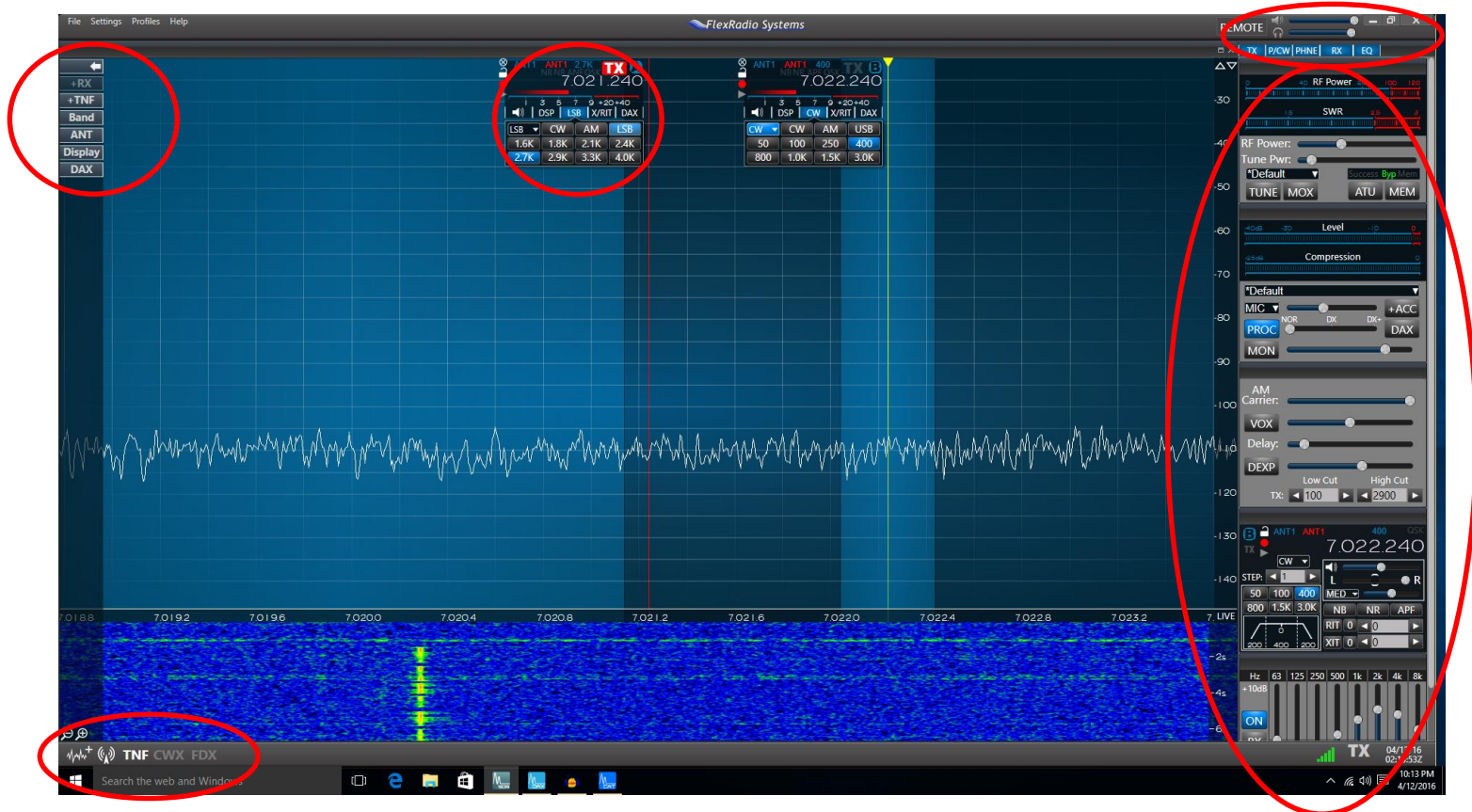
# The Waterfall Display





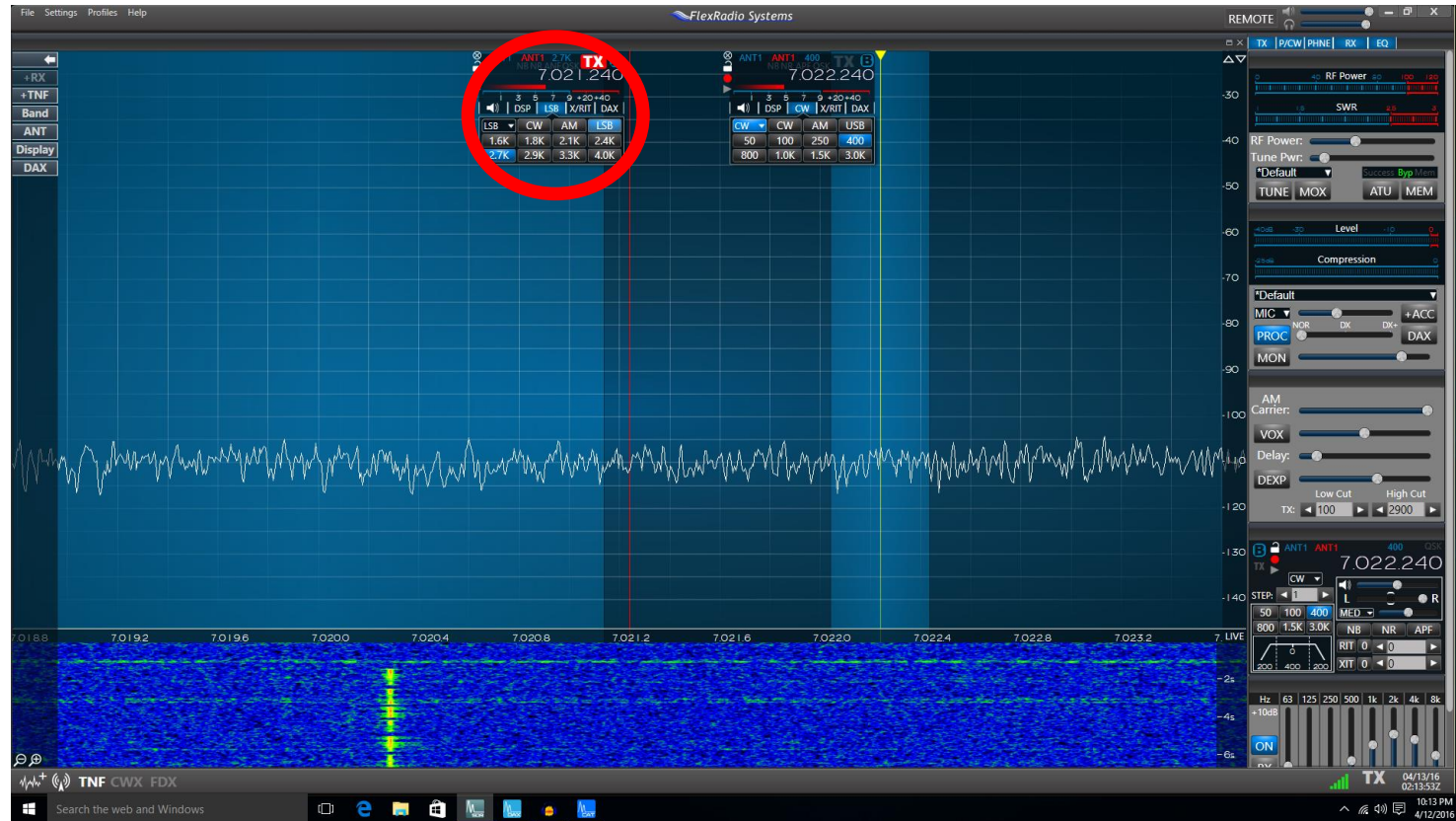
# The 6300 User Interface

# High Level View





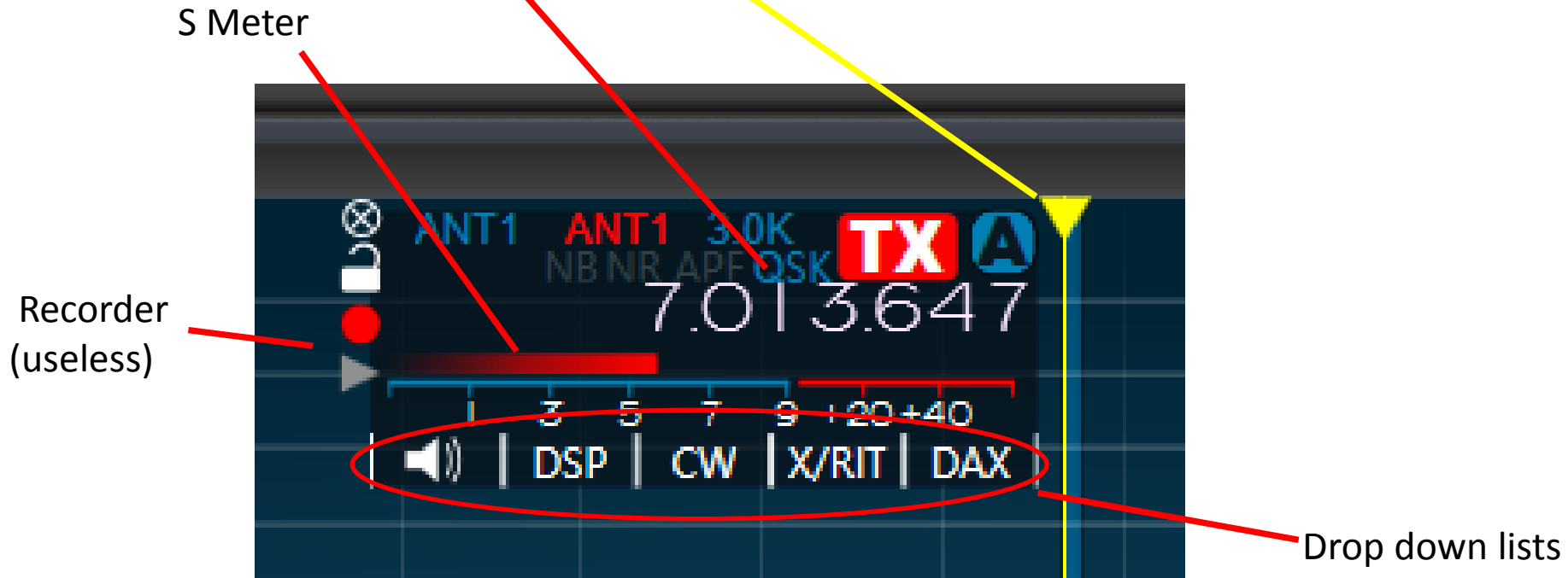
# Slice Receiver Flag



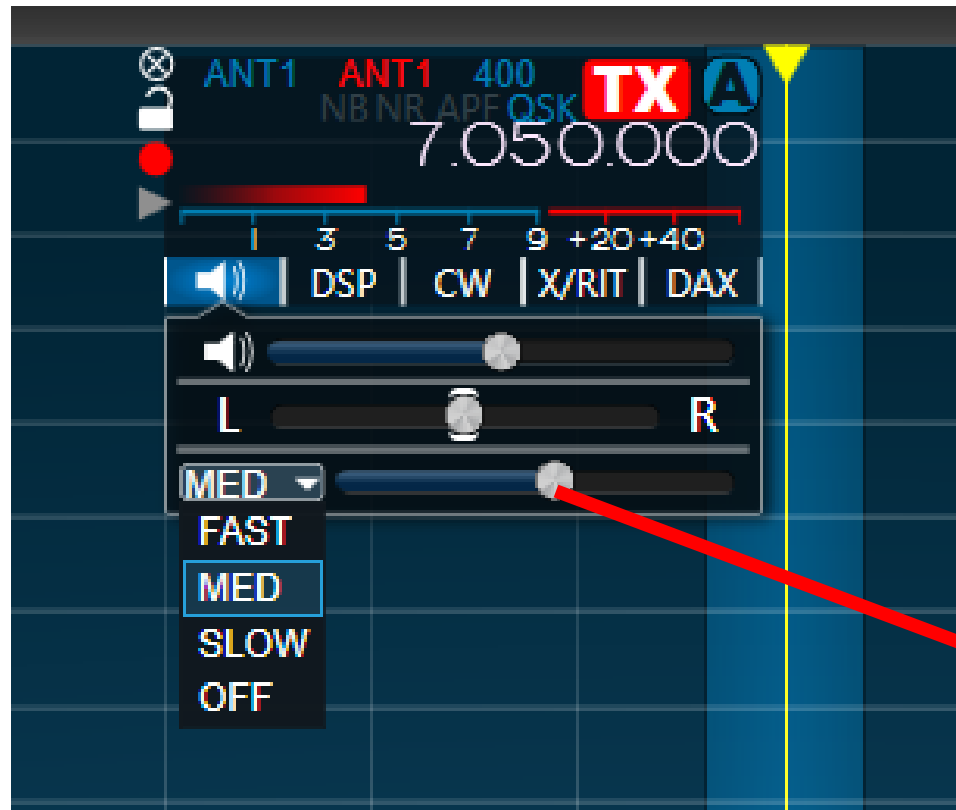
# The Slice Receiver Flag

Frequency – change by

- Typing in new Frequency
- Double click in panadapter
- “Dragging yellow triangle

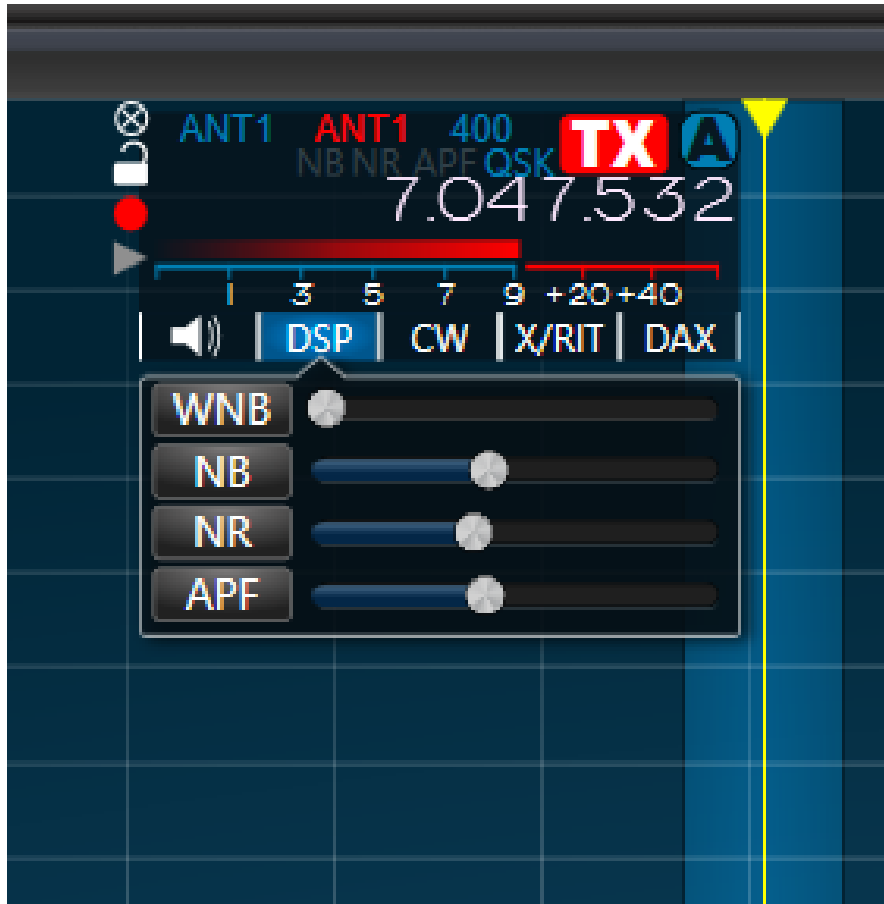


# Speaker Drop Down Menu



AGC  
Threshold

# DSP Drop Down Menu



WNB = Wide Noise Blanker  
NB = Noise Blanker  
NR = Noise Reduction  
APF = Audio Peak Filter



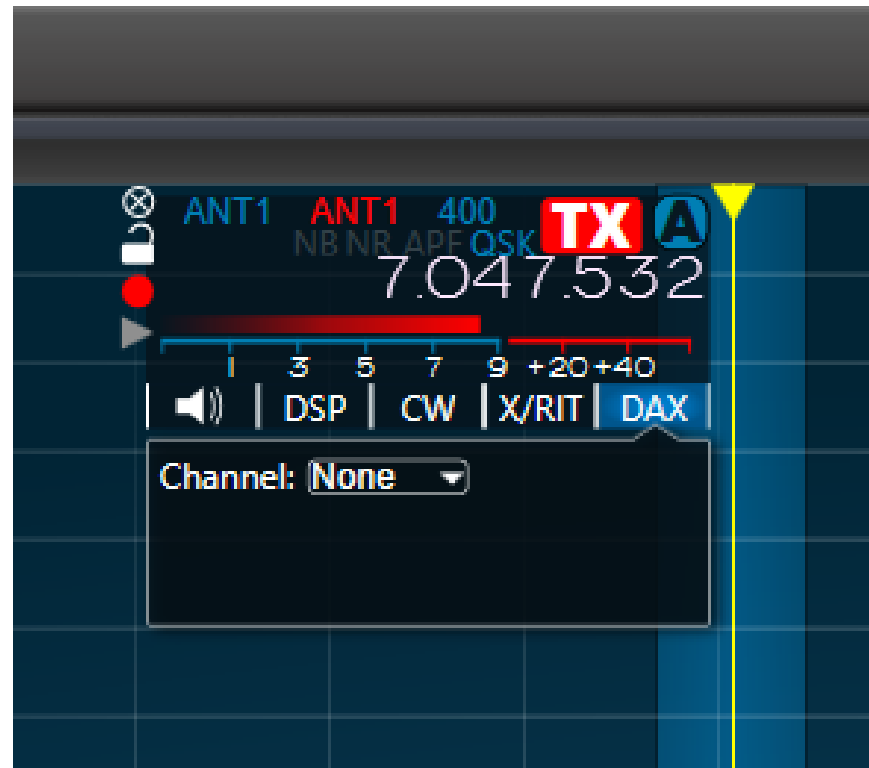
# Mode Drop Down Menus



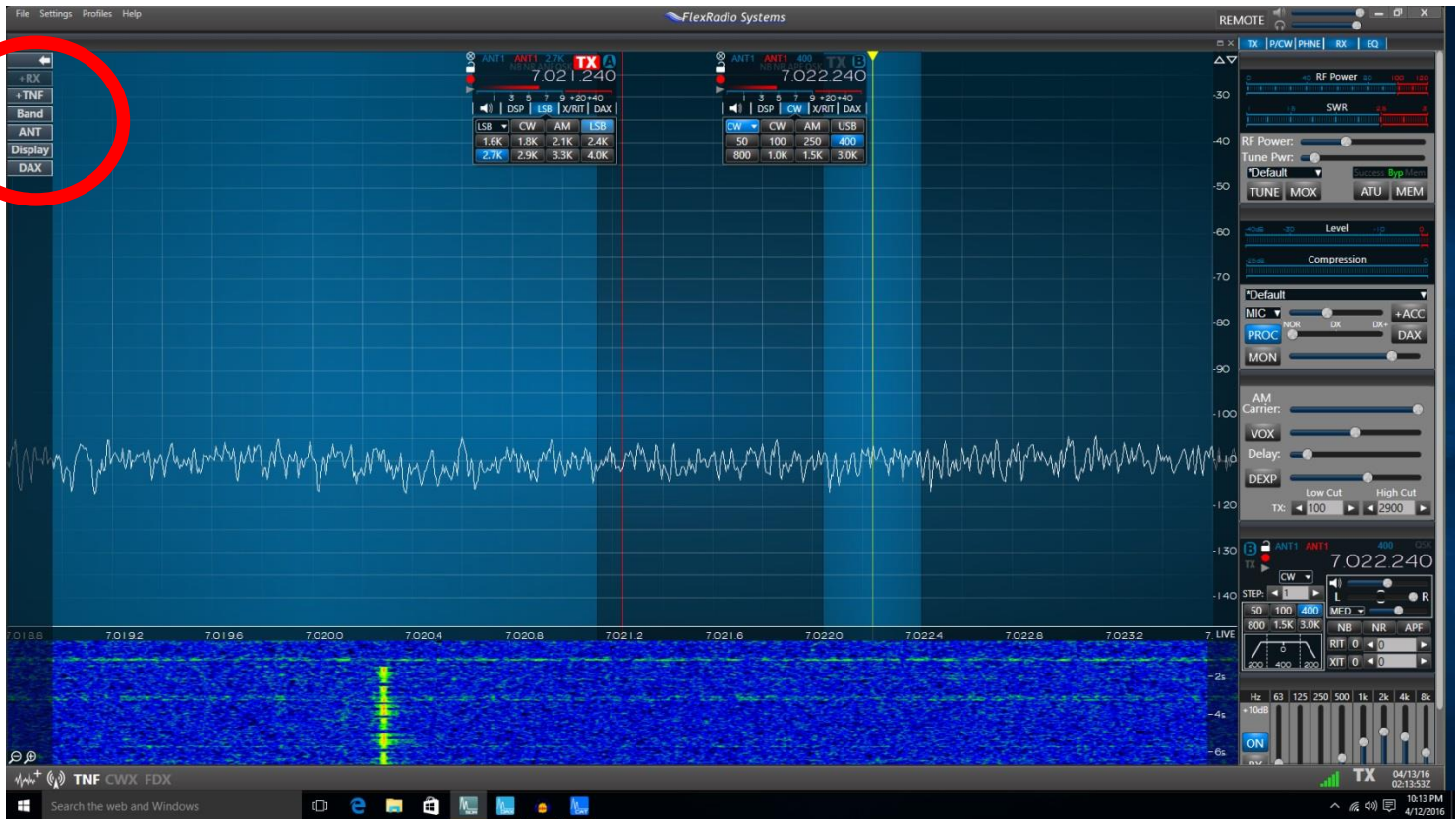
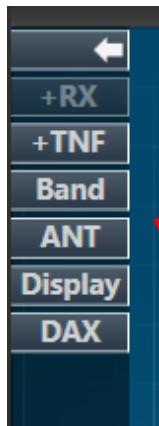
# RIT Down Menu



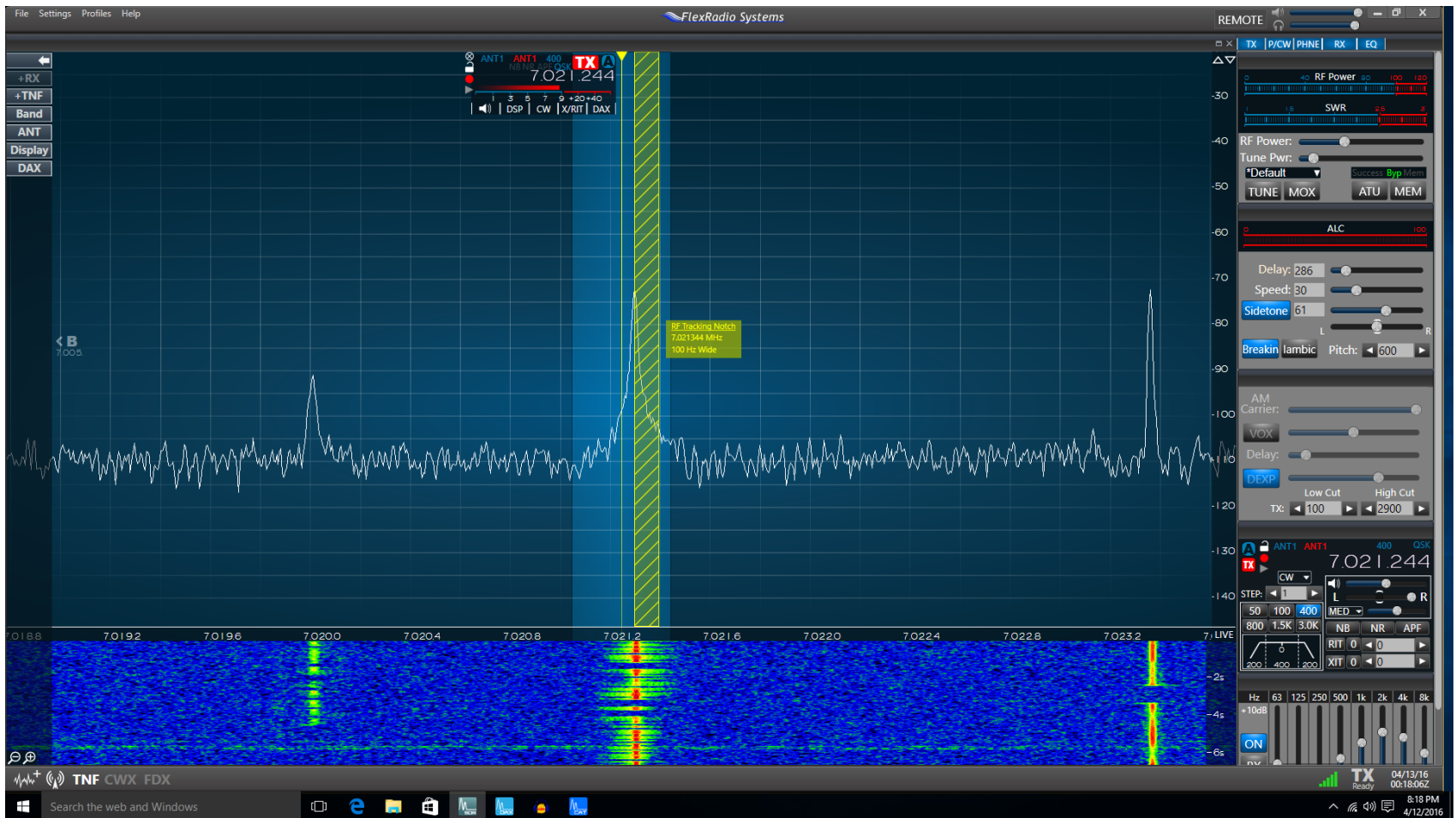
# Digital/Audio Exchange Drop Down Menu (DAX)



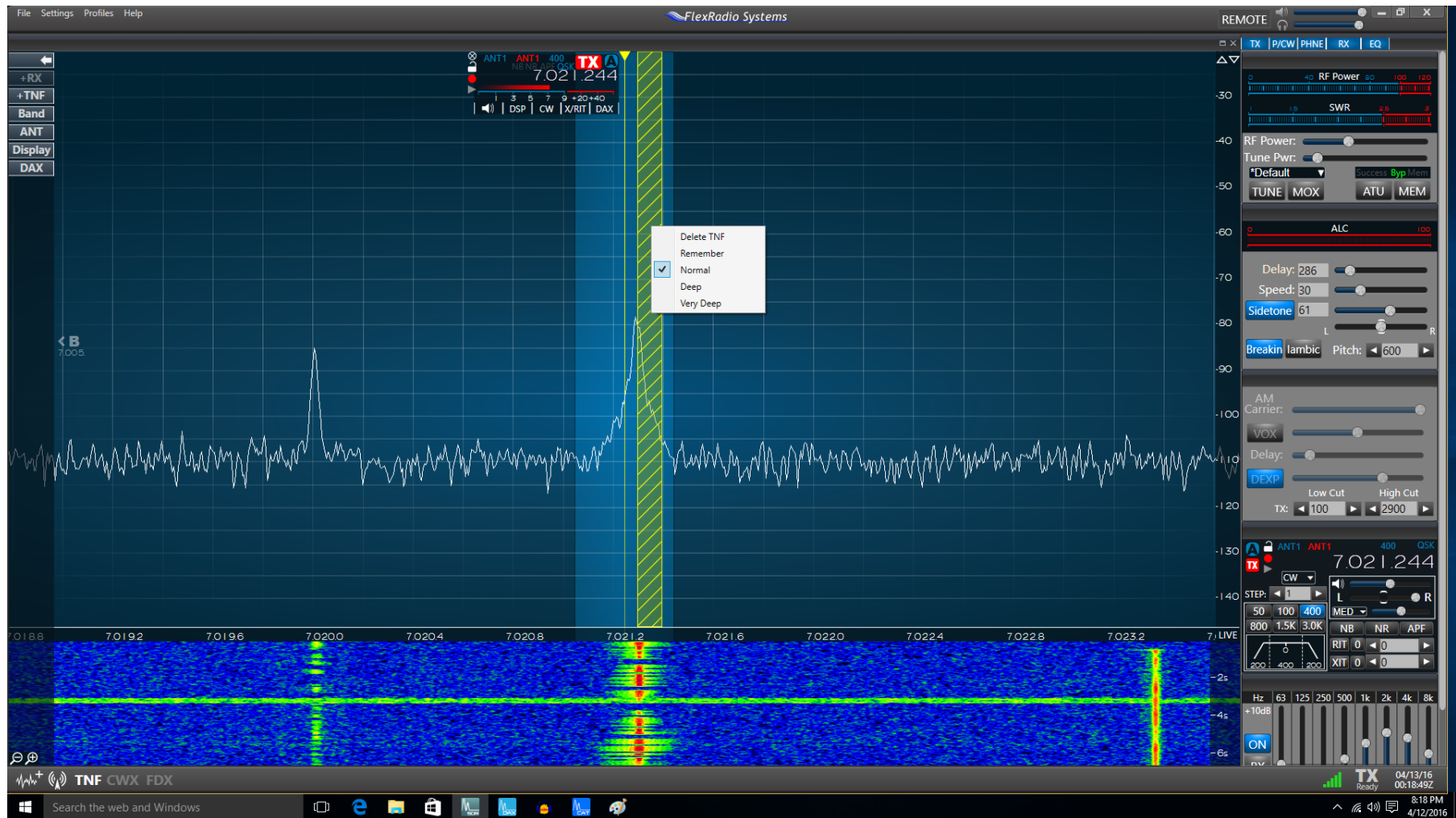
# Left Side Menu



# Tracking Notch Filter (TNF)

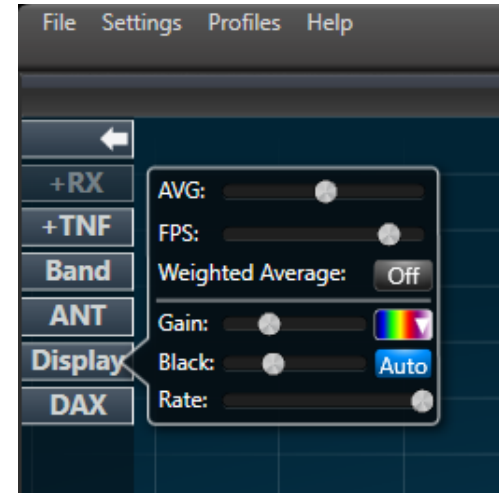
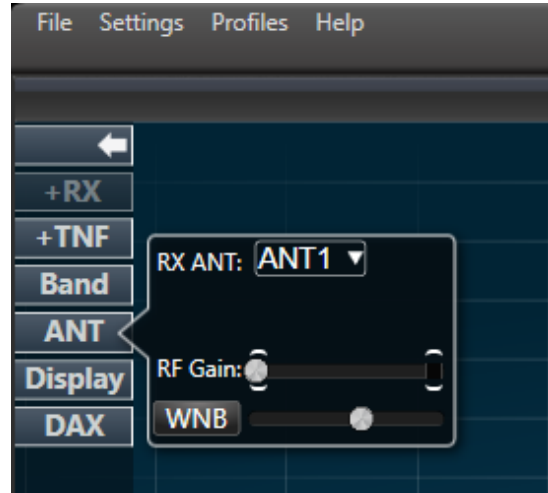


# Tracking Notch Filter (TNF)

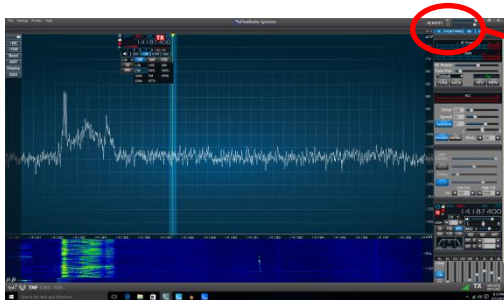
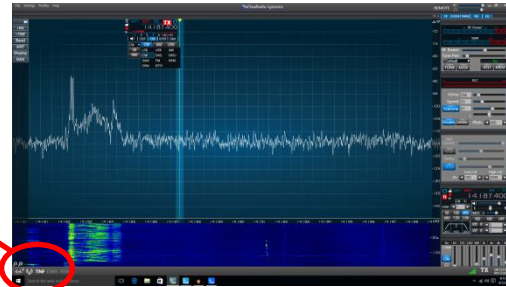




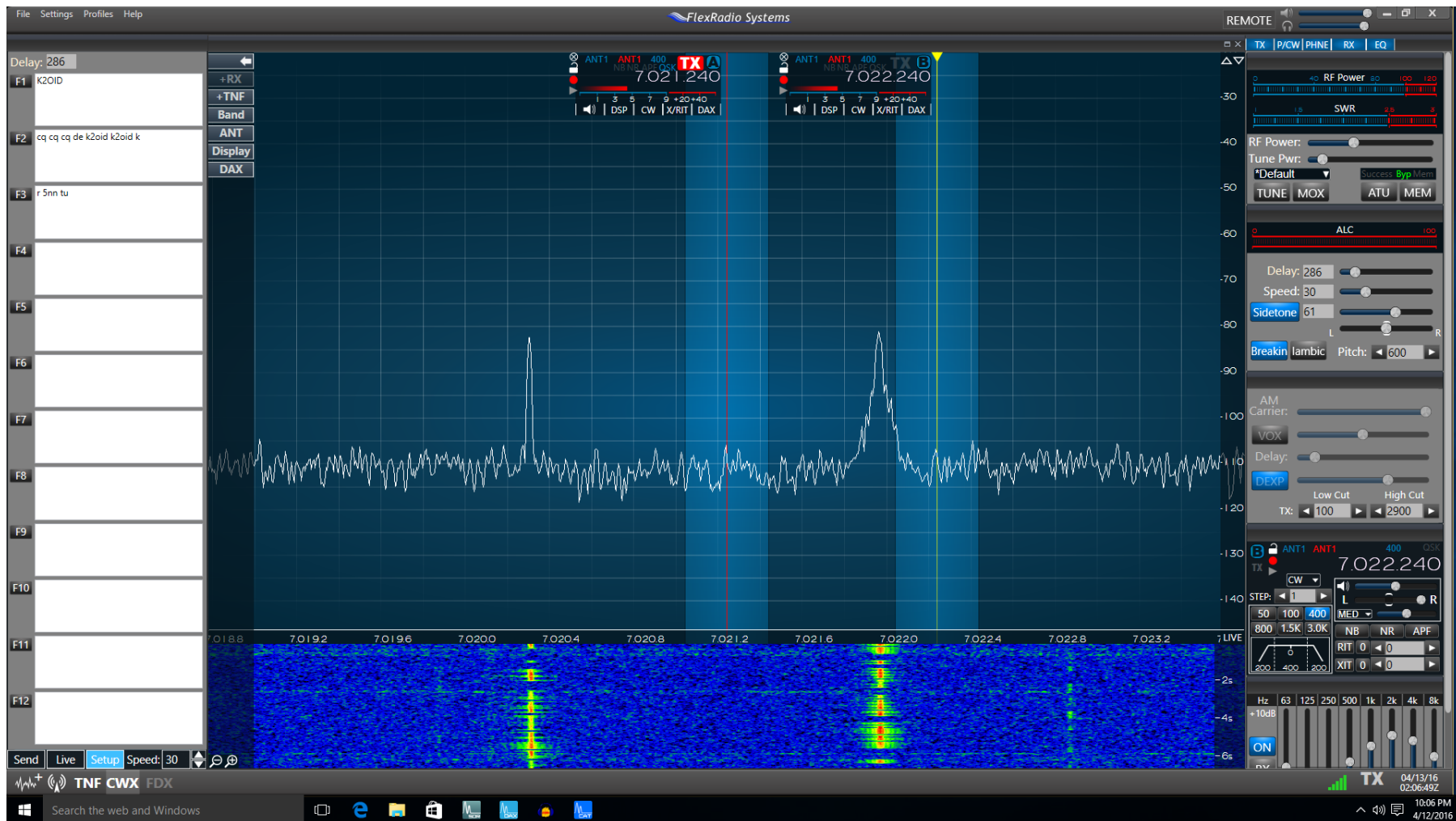
# Other Left Side Menus



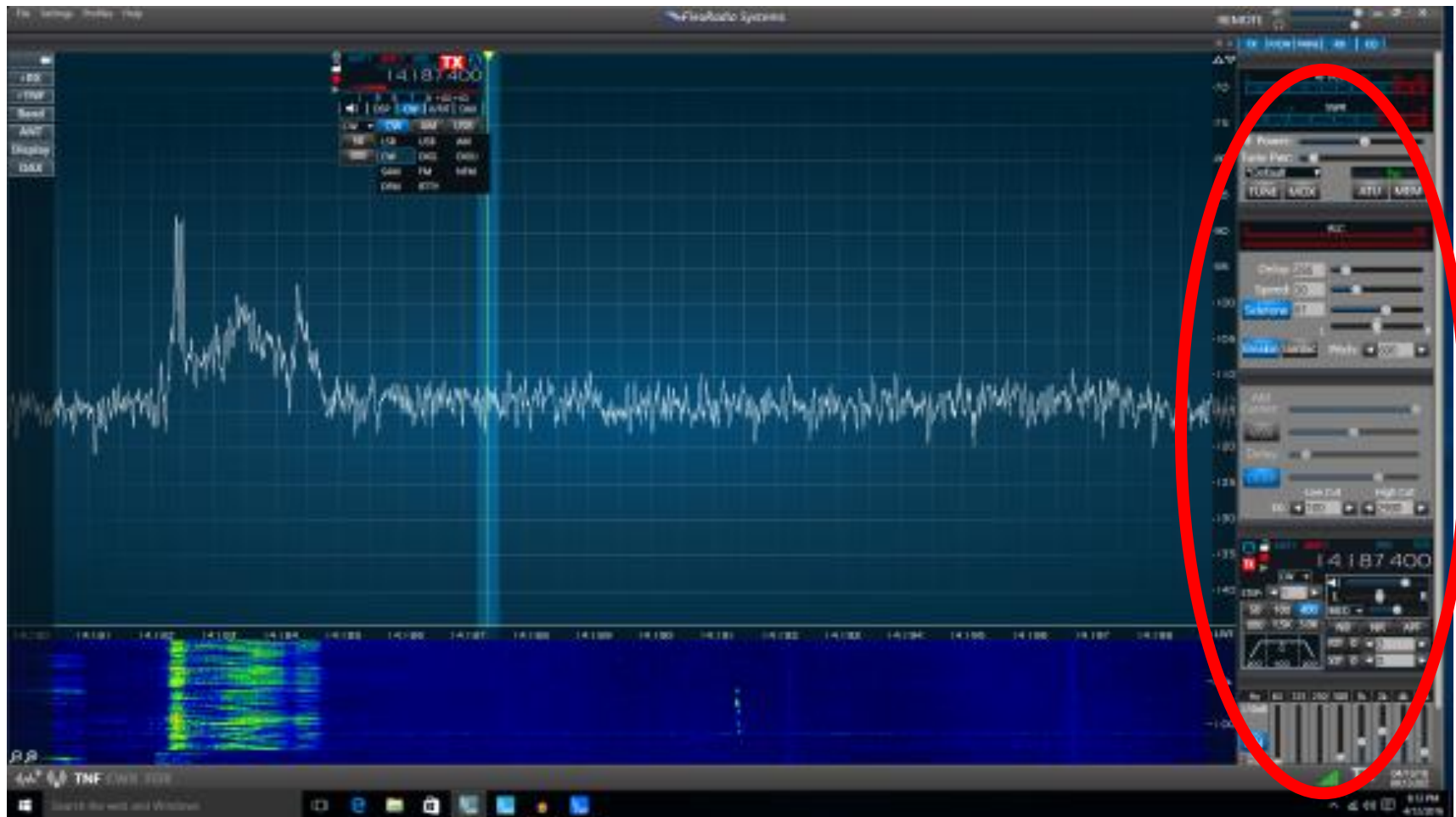
# Other Menus



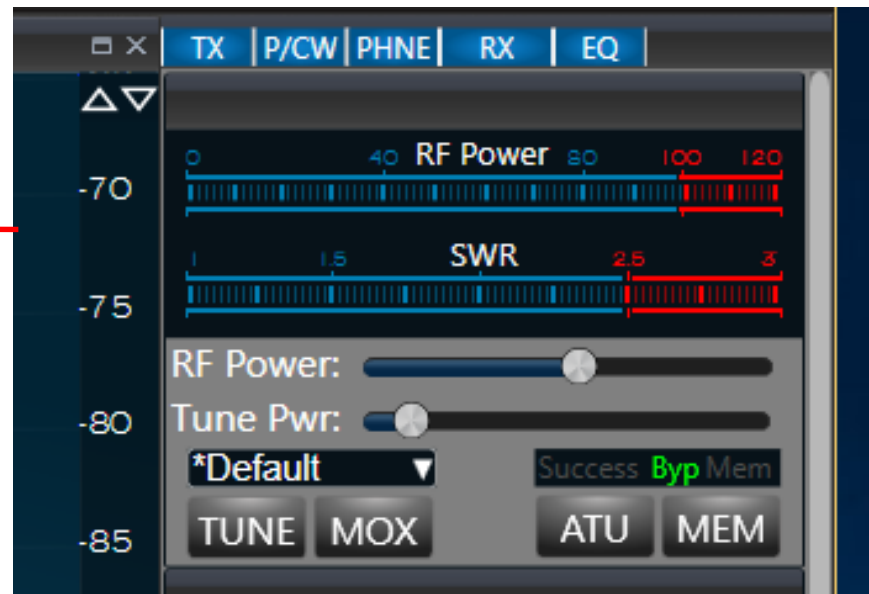
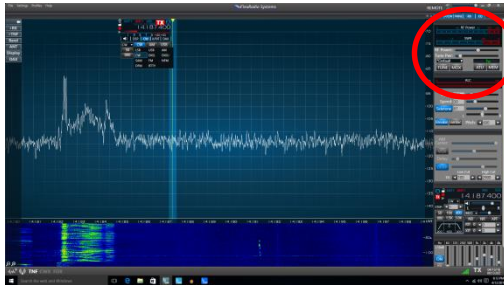




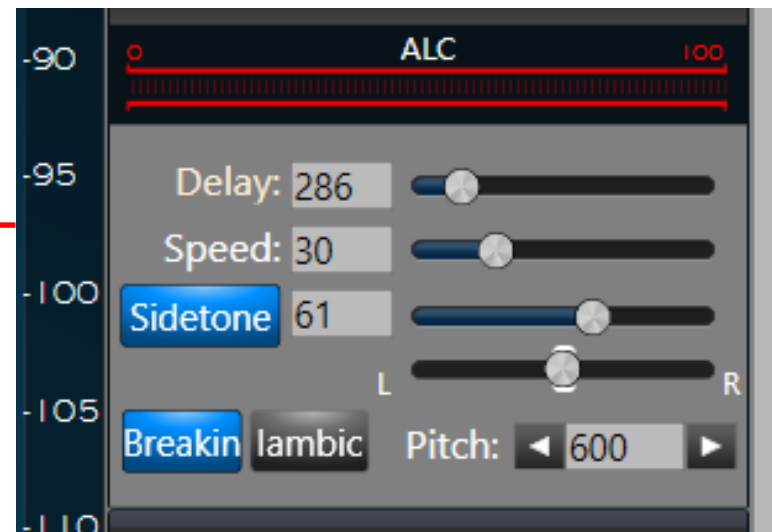
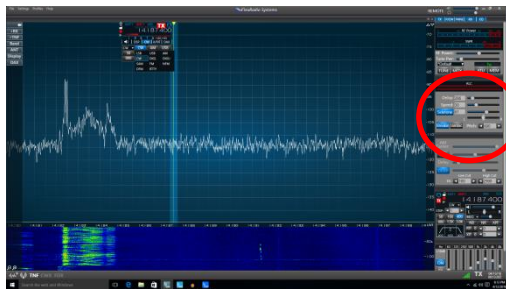
# Radio Set Up Menus



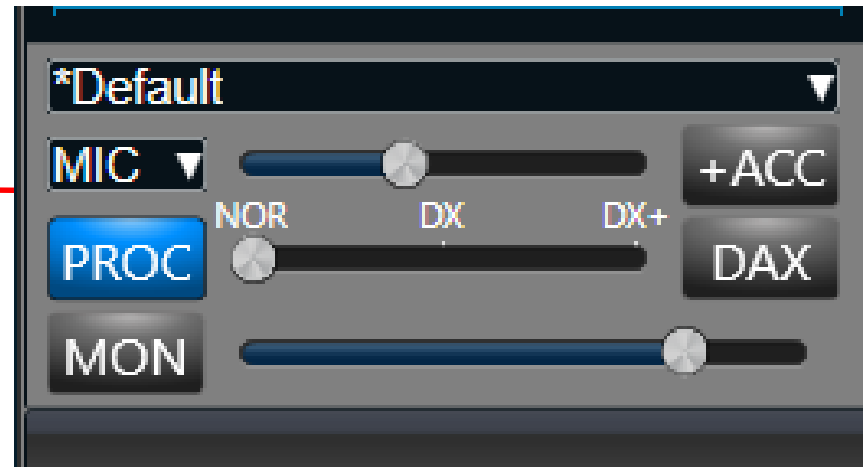
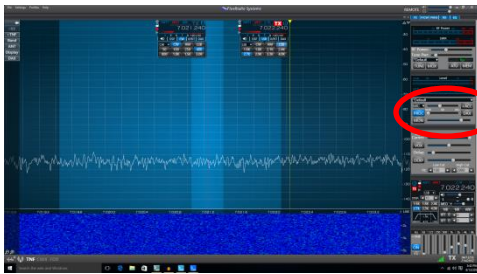
# Transmitter Control



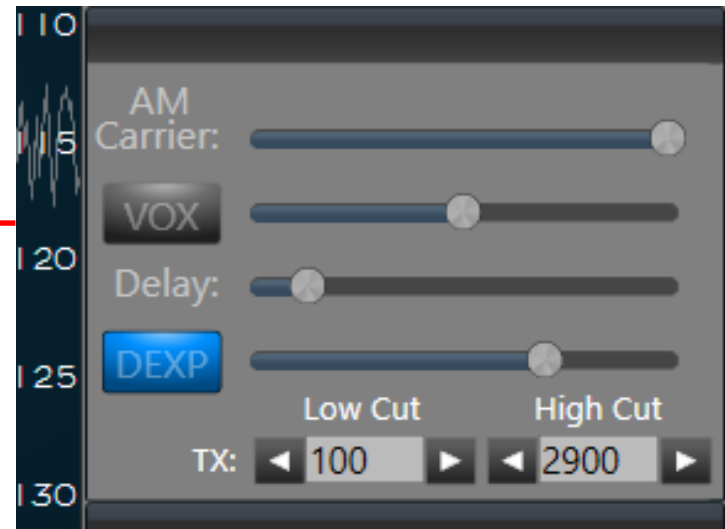
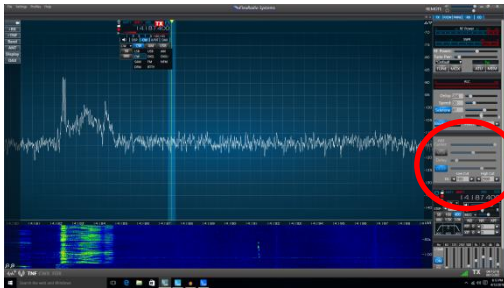
# Keyer/CW Control



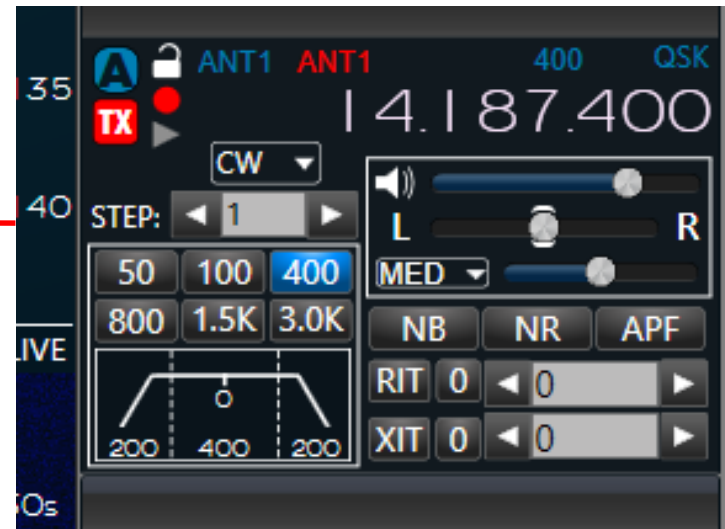
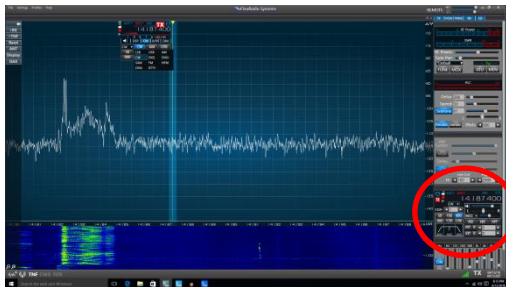
# XMIT Audio Control



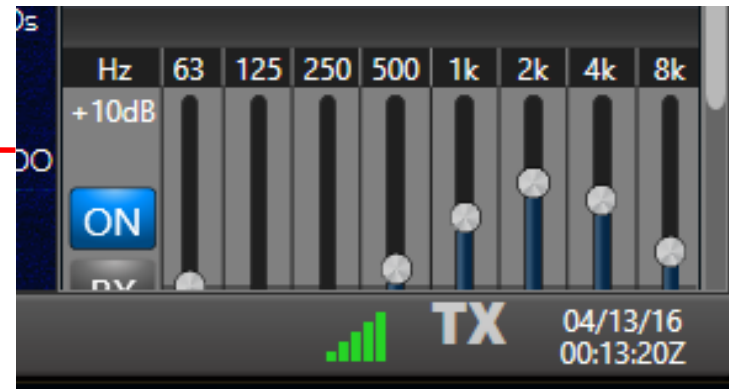
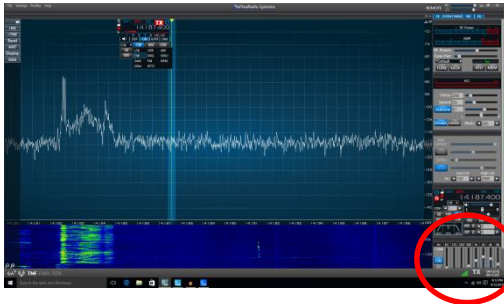
# AM/VOX Control



# Receiver Control



# Mic Equalization





# Operating Observations

## The Bad

- Inconsistent user interface
  - Gray out means different things in different parts of the screen
  - Related functions are not grouped together
  - Functions not implemented unless radio button is set
- Poor nearby strong signal rejection
- Noise blanker useless, Noise Reduction nearly so
- Voice recorder completely useless
- Audio ported to PC blanks in “send”
  - Claimed to be a “feature”
- > 1 minute boot up time
- RX receive delay of ~.2 seconds relative to a superhet
- Mediocre documentation

# Operating Observations

## The Indifferent

- Really it “hears” about the same as my 12 year old Icom 756 Pro
- Transmitter performance essentially the same

# Operating Observations

## The Good

- Fabulous panadapter
- Point and shoot tuning and QRM fighting both excellent
- Separate control of speaker and fone audio great
- Upgradable with new Software releases
- Lots of software to interface to
- High “fun factor”..... Lots of flexibility, bells, whistles
- Bulletproof software (at least this SW release)
- Lots of external software apps fairly easy to use
- Very active user’s group
- Very responsive company

# 6300 Specs

## Receiver Specifications

- Maximum Slice Receivers: Two (2)
- Maximum Panadapter Bandwidth: 7 MHz
- Antenna Connectors: SO-239×2; XVTR-BNCx1
- Digital Audio Exchange (DAX) Channels: 2
- DAX IQ Channels/Bandwidth per Channel (DAXIQ): 2 @ 24 kHz – 96 kHz
- Microphone Connector: Unbalanced 8-pin Foster
- Antenna Tuner Unit (ATU): Optional
- Wideband Frequency Coverage: 30 kHz – 54 MHz
- Transmit Frequency Coverage: 160-6m amateur bands, 100W nominal output
- Transverter IF Frequency Coverage: 100 kHz – 54 MHz

## Receiver Specifications

- Receiver Architecture: Direct Digital Sampling
- Spectral Capture Units: One (1)
- Maximum Slice Receivers: Two (2)

# 6300 Specs

- Maximum High Resolution Spectrum Displays: Two (2)
- Maximum Panadapter Width: 7 MHz
- ADC Resolution: 16-bits
- ADC Sampling Rate: 122.88 Msps
- Wideband Frequency Coverage: 30 kHz – 54 MHz
- DAX IQ Channels / Bandwidth Per Channel: Two (2) @ 24 kHz – 96 kHz
- DAX Audio Channels: Two (2)
- Amateur Band Preselector Coverage: NA
- Preamplifiers / Attenuators: 0 to +20 dB
- Spurious and Image Rejection Ratio: 80 dB or better
- External Powered Speaker Output Impedance Level: 600 Ohm Stereo Unbalanced

## Transmitter Specifications

- Transmitter Architecture: Direct Digital Up-conversion
- TX DAC Resolution: 16-bits
- TX DAC Sampling Rate: 122.88 Msps
- RF Output Power: 1-100W nominal SSB, CW, FM, RTTY, Digital; 1-25W nominal AM
- Amateur Band Coverage at Rated Power Output: 160m – 6m

# 6300 Specs

- Transverter IF Output Power: +0 dBm Typical; +15 dBm max
- Transverter IF Frequency Coverage: 100 kHz – 54 MHz
- Modulation System: Digital Low Power at Carrier Frequency
- Maximum FM Deviation:  $\pm 5$  kHz
- DAX Transmit Channel: Yes
- Carrier / Unwanted Sideband Suppression:  $< -80$  dBc typ /  $< -80$  dBc typ
- Harmonic Radiation 1.8 – 50 MHz Amateur Bands:  $< -50$  dBc;  $-70$  dBc 6m
- Transmit Bandwidth: Default 100-2900 Hz (Variable 50-10000 Hz)
- Microphone Connector: Unbalanced 8-pin Foster
- Microphone Impedance: 600 Ohms Nominal (200-10k $\Omega$ )

## Antenna Tuner Specifications

- Matching Range 80m – 10m: Optional, 8.3 Ohms – 300 Ohms
- Matching Range 160 and 6m: Optional, 16.7 Ohms – 150 Ohms

# 6300 Specs

## General Specifications

- USB 2.0 Ports (peripheral control): Two (2)
- Master Clock Frequency: 122.88 MHz
- Master Clock Phase Noise: -140 dBc@10kHz
- 10 MHz Reference Clock Stability: 0.5ppm TCXO
- GPSDO Frequency Stability (GPS locked): NA
- Emission Modes: USB, LSB, CW, RTTY\*\*, AM, Synchronous AM, FM, NFM, DFM
- Frequency Resolution: 1 Hz min.
- Antenna Connectors: SO-239×2, XVTRx1
- Antenna Impedance (w/o tuner): 50 Ohm Unbalanced

# 6300 Specs

## Electrical

- Power Supply Requirements: +13.8V DC nominal  $\pm 15\%$
- Current Drain (Receive/Transmit Max): 1.7A / 23A @ 13.8V

## Mechanical

- Height: 3.875" (7.1 cm) with feet
- Width: 13" (33 cm)
- Depth: 11.75" (29.8 cm)
- Weight: Approximately 10 lbs. / 4.5 kgs
- Operating Temperature: 0 to +50 degrees C; +32 to +122 degrees F

## Options

- Antenna Tuning Unit (ATU); greater than 3:1 on 80-10m, up 2.5:1 on 160 and 6m
- Front Handle Kit (adds 1 inch/2.5 cm to total depth)

Specifications subject to change without notice.

\*\* Requires 3rd party software.