



**ABØPC**

**Park County Radio Club**

**COLORADO**

# Using and Programming Your Anytone Radio



# Topics

- Radio overview and features
- Display and buttons
- Antennas
- Analog/DMR
- Programming

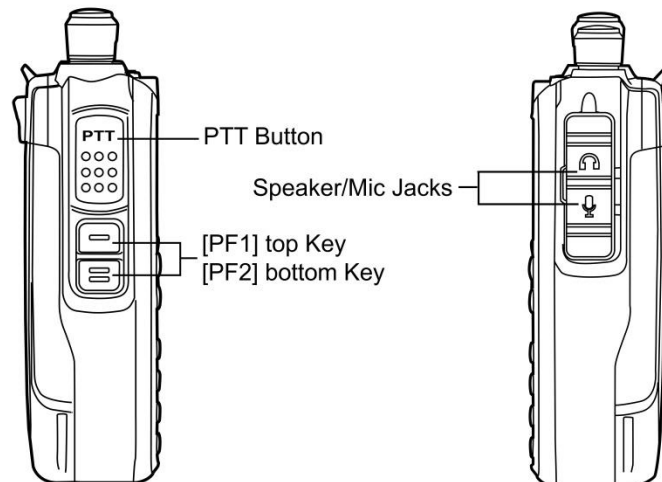
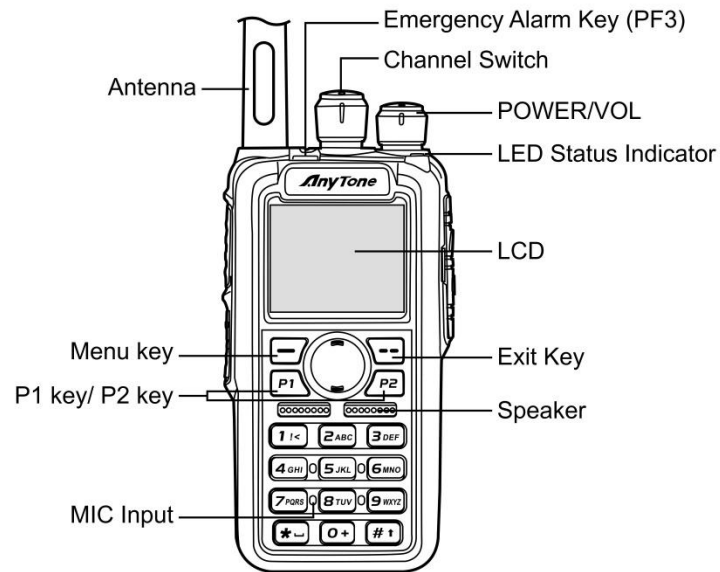
# Radio Programming



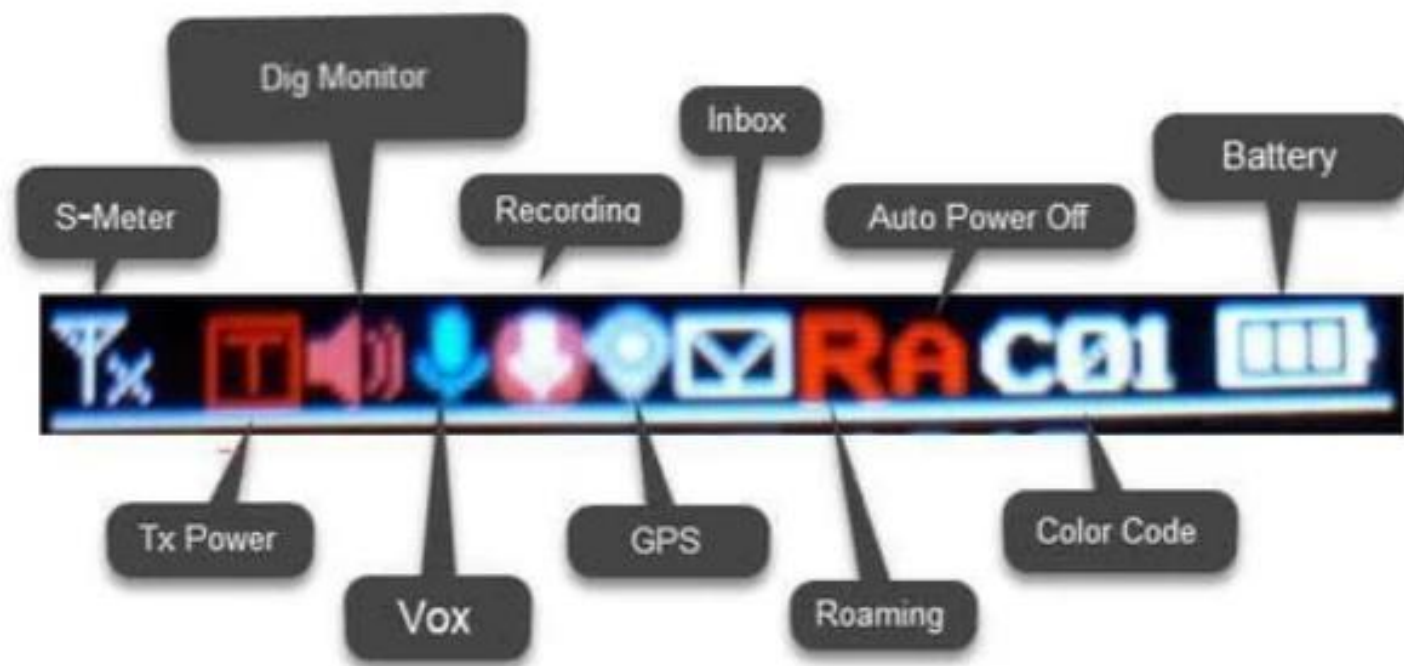
- Firmware
- CPS
- Optional Settings
- Channels and Zones
- Scan list
- Radio ID
- Contacts/Talk groups
- Digital Contacts
- Importing and Exporting

General		
Frequency Range	136-174MHz (V) , 400-480MHz (U)	
Channel Capacity	4000 channels	
Channel Spacing	25KHz (Wide Band) , 12.5KHz (Narrow Band)	
Phase-locked Step	5KHz, 6.25KHz	
Operating Voltage	7.4V DC $\pm 20\%$ /(2100mAh)	
Frequency Stability	$\pm 2.5$ ppm	
Operating Temperature	$-20^{\circ}\text{C} \sim +55^{\circ}\text{C}$	
Size	129×61×39mm (with battery pack)	
Weight	282g (with battery pack, antenna)	
Receiving Part		
	Wide band	Narrow band
Sensitivity(12dB SINAD)	$\leq 0.25\mu\text{V}$	$\leq 0.35\mu\text{V}$
Digital Sensitivity	0.3uV/-117.4dBm (BER 5%) 0.7uV/-110dBm (BER 1%)	
Adjacent Channel Selectivity	$\geq 70\text{dB}$	$\geq 60\text{dB}$
Spurious Emission	$\leq -57\text{dB}$	$\leq -57\text{dB}$
Spurious Rejection	$\geq 70\text{dB}$	$\geq 70\text{dB}$
Blocking	84db	
Hum & Noise	$\geq 45\text{dB}$	$\geq 40\text{dB}$
Audio Distortion	$\leq 5\%$	
Audio Power Output	1000mW/16 $\Omega$	
Transmitting Part		
	Wide band	Narrow band
Power Output	VHF: 7/5/2.5/1W, UHF: 6/5/2.5/1W	
Modulation	$\pm 5.0\text{KHz}@25\text{KHz}$	$\pm 2.5\text{KHz}@12.5\text{KHz}$
Adjacent Channel Power	$\geq 70\text{dB}$	$\geq 60\text{dB}$
Hum & Noise	$\geq 40\text{dB}$	$\geq 36\text{dB}$
Spurious Emission	$\leq -36\text{dBm}$	$\leq -36\text{dBm}$
4FSK Digital Modulation	12.5KHz ( data ) 7K60FXD 12.5KHz ( data+voice ) 7K60FXE	
Audio Distortion	$\leq 5\%$	
Error rate	$\leq 3\%$	

## 4. RADIO OVERVIEW



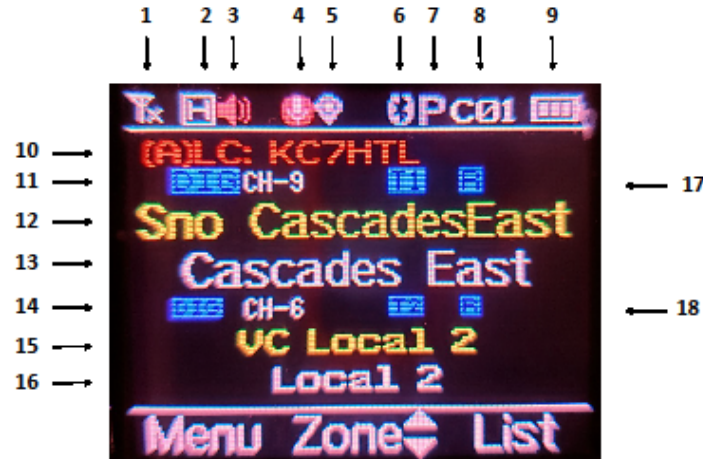
## AnyTone DMR Radio Top-Row Icon Cheat Sheet



PA3CQJ

## Anyone D878UV Plus Display Indicators

25 July 2019 as of Firmware version 1.13a



1	Antenna icon : Received Signal Strength (1 to 4 bars, x = no signal)
2	Transmit Power Level: L = Low, M = Medium, H = High, T = Turbo
3	Speaker icon: Digital Monitor (displayed = on for 1 or both Time Slots, not displayed = off)
4	Microphone icon: Audio Record (displayed = on for up to 3 hrs, not displayed = off)
5	GPS Location icon: grey = no GPS signal, red = GPS is receiving location; not displayed = off
6	Bluetooth icon: grey = BT on, not connected; blue = on & connected; not displayed = off
7	P icon: Bluetooth PTT button (grey = not connected, blue = connected)
8	Color Code: DMR color code number that is in use
9	Battery icon: remaining battery level (1 to 3 bars, none = battery empty)
10	Last Call: displays last user callsign or DMR ID received, and on which A or B channel
11	Channel number position in current Zone for A, and whether Digital (DIG) or Analog (ANA)
12	Current Talk Group (TG) selected for A
13	Current Zone selected for A
14	Channel number position in current Zone for B, and whether Digital (DIG) or Analog (ANA)
15	Current Talk Group (TG) selected for B
16	Current Zone selected for B
17	Time Slot in use for A (T1 = 1, T2 = 2); "R" = Repeater, no "R" displayed = simplex, red "R" = Tx & Rx frequencies reversed from normal
18	Time Slot in use for B (T1 = 1, T2 = 2); "R" = Repeater, no "R" displayed = simplex, red "R" = Tx & Rx frequencies reversed from normal



# Antennas

**Vehicular Antenna Gain.** The mobile antenna gain depends on the location and type of antenna. A quarter-wave antenna on the center of a metal roof of a vehicle has a gain of approximately  $-1$  dB with respect to dipole.

**Portable Antenna Gain.** Portable antennas have a much greater loss than vehicular antennas. Estimates are given in Table 15-5.

**TABLE 15-5** Portable Antenna Gain<sup>a</sup>

Portable antenna type	Gain (dB) above half-wave dipole	
	VHF high band	UHF band
Quarter wave	-9	-2
Head level		
Hip level	—	-14
Helical coil spring	-13	-8
Head level		
Hip level	-24	-17

<sup>a</sup>The portable data are adapted from the guide by D. J. Lynch listed in the Bibliography.

# Rubber Ducks

The National Bureau of Standards ran some tests that proved what we had long suspected. The efficiency of a hand-held is dependent upon how much antenna it has and how good the ground plane. Most portables have very poor ground planes; the more metal the better. Also the more antenna the better. Hence the rubber duck is a woeful but often necessary compromise. But if a portable is not going to be subjected to the abuse of fireground or street cop utility, you should consider the telescopic quarter-wave antenna if range is important. Compare the figures and discussion that follows.

Be aware that the telescopic antenna is nowhere as rugged as the rubber duck but it will talk circles around it. You might say that the quarter wave whip is to the rubber duck what a 106 inch CB quarter wave whip is to a 36 inch whip on a base loaded coil to compromise range for low garages. Our reference antenna in the Public Safety high band and 2-meter Amateur radio measurements below is a quarter-wave telescopic antenna, extended, and held at face level:  
One-quarter wavelength extended and at face level = 0 dB  
One-quarter wavelength collapsed and worn at belt level = -40dB  
Rubber duck held at face level = -5dB  
Rubber duck worn at belt level = -20dB  
Translated, this means that a 5-watt hand-held with a rubber duck worn on the belt has an effective radiated power not of 5 watts but only .05 watt. Held at face level the radio has an ERP of 1.6 watt. 15dB is quite a difference!

# Antennas



- \* **NA-701**
- \* Frequency : 144/430 MHz
- \* **Gain : 2.15 dBi**
- \* VSWR : Less 1.5:1

# Antennas

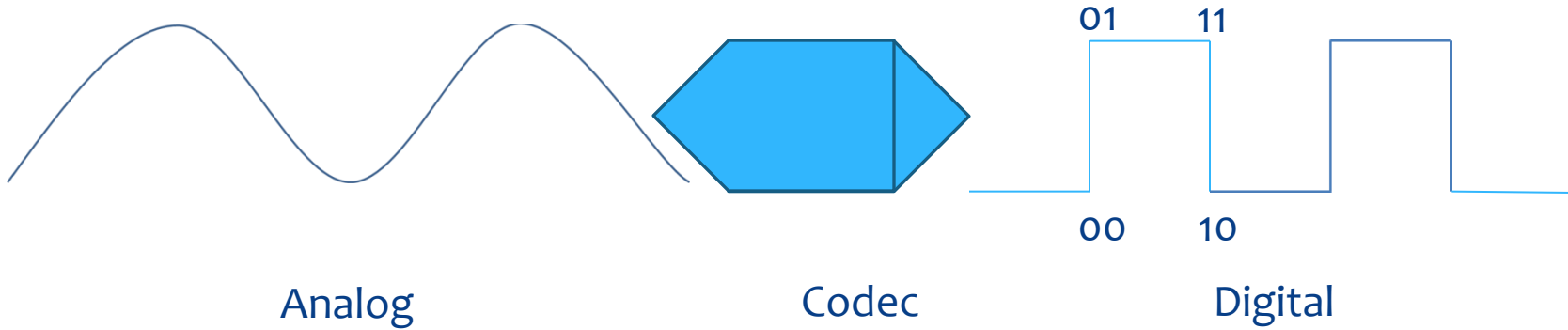


- \* **Portable Antenna Height (in.):**
- \* 15.000 in.
- \* **Portable Antenna Power Rating:**
- \* 10 W
- \* **Notes:**
- \* Extended receive to 900 MHz.
- \* **Relative Antenna Gain (dB):**
- \* **6.0 db (@5 watts = 50+ watts ERP)**

# Antenna Comparison

- \* NA-701
  - \* 5 watts = 37 dB
  - \*  $37 - 9 = 28$  dB
  - \* 28 dB = .6 watts ERP
- \* Diamond SRJ77CA
  - \* 5 watts = 37 dB
  - \*  $37 - 6 = 43$  dB
  - \* 43 dB = 20 watts ERP

# Digital

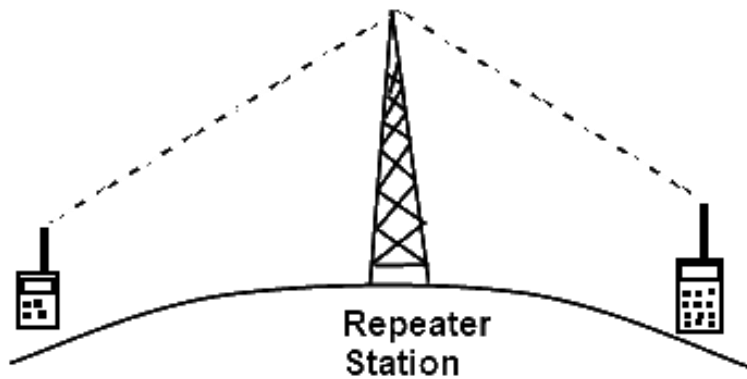


# DMR

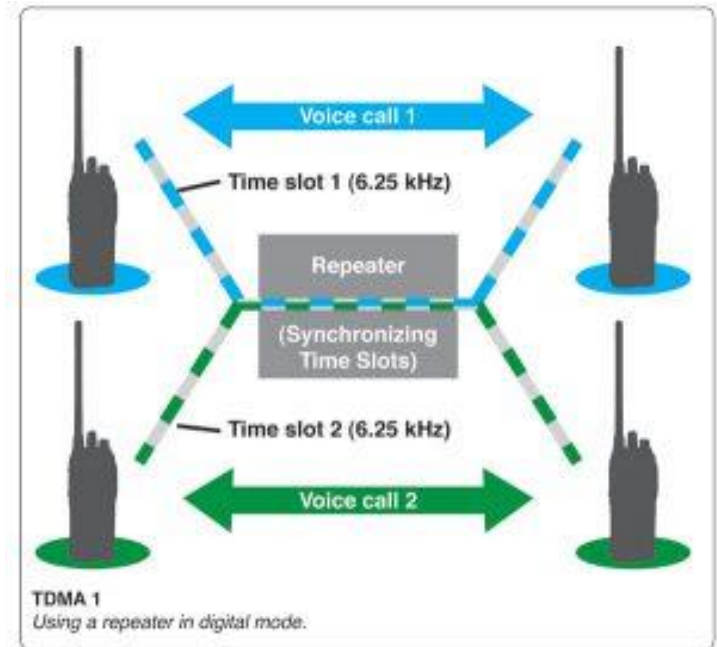
- \* DMR stands for Digital Mobile Radio. Like other digital modes such as D-Star, C4FM and APCO P25, the DMR protocol converts your voice into a digital form and sends it out via RF (with other bits of information included) and allows you to communicate to other DMR radios and also DMR repeaters, which are networked together around the world via the internet.
- \* What makes DMR stand out from some of the other digital modes is that it utilizes TDMA (Time-Division Multiple Access) to divide a single frequency into 2 distinct “channels” or time slots. By doing this, you can have two conversations going on at the SAME TIME, using one frequency.
- \* Imagine using one frequency while radio A is talking to radio B on time slot 1, and radio C is talking to radio D on time slot 2 ... SIMULTANEOUSLY.

# Analog/DMR

## \* Analog



## \* DMR





# Anyone Programming

# What Is A Code Plug

- \* Simply put, a code plug is a file that contains all of the programming information for a radio. It defines not only the frequencies on which a radio can transmit and receive, but also which **talk groups** that the radio can communicate over, as well as other operating parameters.

# Q: What is all this color code and time slots and talk group mumbo jumbo?

- \* **A:** Lets answer this one item at a time.
- \* 1) Color Code is just a fancy name for what would be “CTCSS” or “PL” in the analog radio world.
- \* 2) Time slots are what makes DMR unique. Your transmit signal is broken into 30mS digital packets and the transmitter switches on and off rapidly. Doing this allows two signals to share the same channel at the same time. One on Time Slot 1 and one on Time Slot 2.
- \* 3) Talk groups are the group calls so those listening to that group number can hear you. People have to have that group programmed in their radio and listening on THAT group and THAT assigned Time Slot.

# Firmware and CPS

- \* Determine your radio firmware version
- \* Firmware and CPS versions must match
- \* Read and save current code plug data
- \* Upgrade firmware to current version
- \* <https://bridgecomsystems.freshdesk.com/support/solution/articles/63000105978-anytone-878uv-cps-firmware-and-driver-downloads>
- \* CPS has 3 main sections
  - \* Common -- Digital - Analog



# Basic Programming Parameters

## Analog

- \* Receive Frequency
- \* Transmit Frequency
- \* Channel Type (Analog)
- \* Transmit Power
- \* Channel Bandwidth (25k)
- \* Scan List (Optional)
- \* CTCSS Decode
- \* CTCSS Encode
- \* Squelch Mode

## DMR

- \* Receive Frequency
- \* Transmit Frequency
- \* Channel Type (Digital)
- \* Transmit Power
- \* Channel Bandwidth (12.5k)
- \* Scan List (optional)
- \* Contact
- \* Radio ID
- \* Color Code
- \* Slot





# DMR ID

- \* Perhaps the most important parameter in a code plug is the **Radio ID**. Your radio ID is a unique number assigned to you (and your callsign) and identifies you on DMR networks and repeaters around the world. You can obtain a DMR ID at [RadioID.net](http://RadioID.net)



# Digital Contacts

- \* Download the world wide digital contact list at <https://www.radioid.net/database/dumps#!>
  - \* Download and import the user.csv file
- \* Update digital contacts list video tutorial
- \* <https://bridgecomsystems.freshdesk.com/support/solutions/articles/63000105994-anytone-878-878-plus-digital-contact-list>

# Links

## **DMR Modes Tutorial**

<http://www.miklor.com/DMR/ppt/DMR-BasicTutorial.pdf>

## **DMR for Dummies**

<https://www.dmrfordummies.com/>

## **Bridgecom Support**

<https://bridgecomsystems.freshdesk.com/support/home?ref=N7QRkpo7o>

# Questions





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