

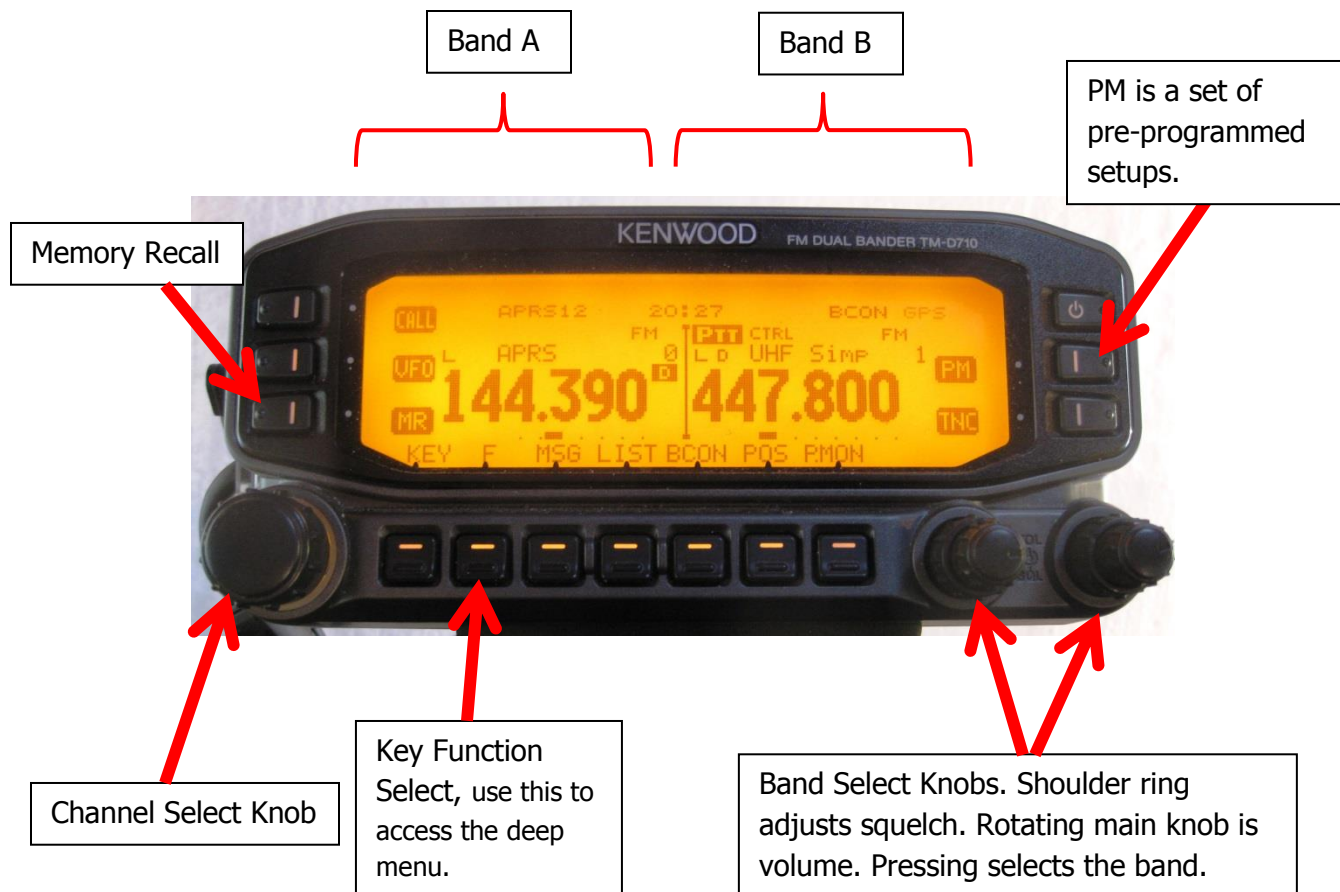
Special Note: The radio in the larger black-yellow case must be set to “Narrow FM” (NFM) to be able to receive from the other radios. See the special note at the end.

NOTE: If you get hopelessly lost, try pressing the PM key (right side, middle) then select “Off”, 1, 2, or 3.

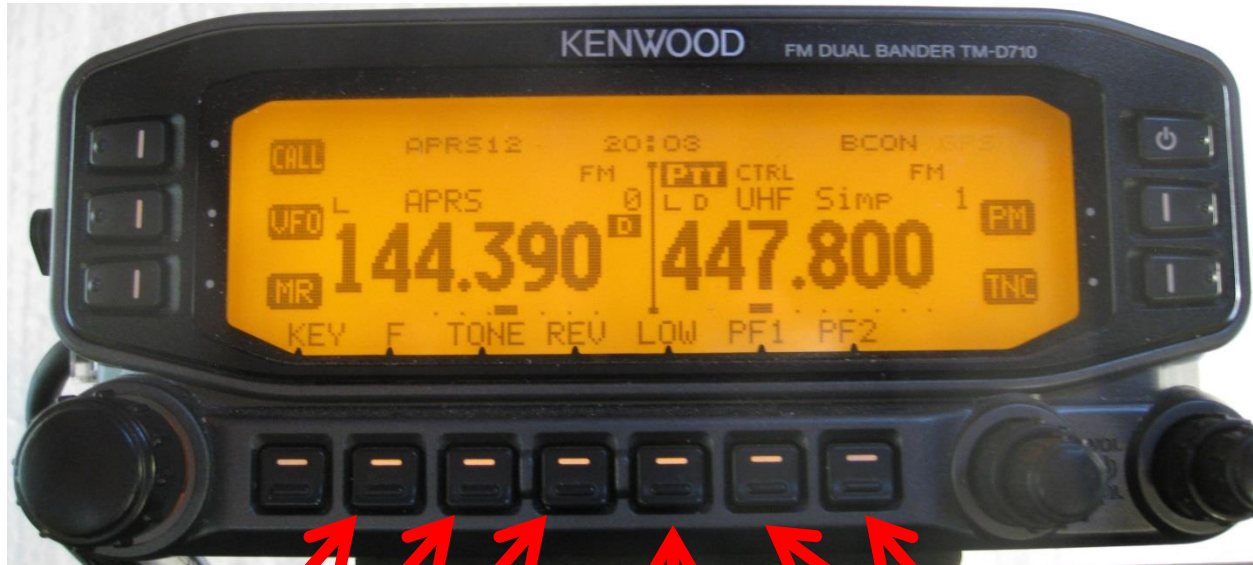
When you power up (top right button) the radio it should give you a default window that looks like:



This next image is the same thing but cluttered with annotations:



Press the “Key” button (bottom row, left most button) to toggle between the APRS keys and the radio control keys. The radio control keys look like:



Don't mess with these three. If you do the TONE or REV, letters will light up just left of the FM in the display. Cycle the buttons until any letters here go away and the display looks like the one in this image.

The “LOW” key adjusts radio transmit power. This key toggles between low, medium, and high: L, M, H on the display.

The usual rule is to use the lowest power that gets the job done. Note that high power will overdraw most vehicle 12V accessory jacks.

PF1 will give you access to weather broadcasts. There are 10 different channels you can try. (Use the large channel select knob, bottom left.) You get out of this mode by pressing the MR key (left side, bottom). The PF2 key passes a control feature between band A and B. Just leave the CTRL on the right side (band B).

Talking on the radio

Rules:

1. Never talk on the APRS frequency. Press the bottom right push-button-knob to toggle the PTT (Push To Talk) indicator over to the right side of the display. (The left push button of the bottom right pair toggles control to the left side, etc.).
2. Hold the microphone about 30cm from your mouth and speak loudly and clearly (but don't shout). Pretend you are talking in a room with ten people in it.
3. Starting a conversation: Wait and listen to the channel for a moment to make sure no one else is using it right now. Key the mic and wait for about a second before talking. Always start with who you want to talk to, and then identify yourself, "KF7WIG, this is KE7ROS." Another example, "HARBOR team, this is KE7ROS."
4. You must announce your call sign at least every ten minutes.
5. If you have a long message to say, finish it with "*your-call-sign* Over." ("KE7ROS Over")
6. When you are completely done with using the radio for a few minutes or more say "*your-call-sign* Clear."

Our standard channels are

Channel 1: 447.800 MHz = UHF Simplex (This is also our UHF "CALL" channel.)

Channel 2: 146.540 MHz = VHF Simplex (This is also our VHF "CALL" channel.)

TIP & TRICK: If you can't find our channel, twiddle things until you have something in the 4xx.xxx MHz range on the display, then press the CALL key (left side, top button). That will bring up our main communications channel 447.800 MHz.

To change channels, first make sure you are in MR = memory recall mode, left side, bottom key. Rotate the large bottom left knob to select channels. Make sure the PTT indicator is on the side you want to use. You can toggle this with the pair of push-button-knobs on the bottom right.

If you want to control the frequency itself for some reason, press the VFO key. Now you can turn the channel select knob and change the frequency. If you press and release the knob you can toggle between course and fine control. Pressing MR will get you back to the preprogrammed channels.

Using APRS to send your location.



Press KEY to get to the key-function display shown here.

Basic Stuff:

If the display doesn't say "APRS12" then press the TNC key (right side, bottom button) sequentially until the display looks like the above.

If "BCON" isn't displayed, press the BCON key. (Note, you might need to have "CTRL" and "PPT" both active on the left side (band A) first. If so, press the left knob of the small knob pair. If it still won't indicate BCON then the problem is more advanced and must be solved by going into the menu structure. See below.

If "GPS" isn't blinking you might try making sure all the wires are solidly plugged in. The external GPS plugs in with the wire and connector that looks like an audio wire. If it still doesn't light and both APRS12 and BCON are indicated, then the problem is in the menu.

MSG allows you to use APRS to send a text message. This is slow, but can be fun.

Don't mess with these three keys. BCON turns on/off your location transmission. The display should show three things: BCON, a flashing GPS, and APRS12.

Advanced Stuff (dragons live here).

You might be asked to go into the APRS menu. To access it press and release the F key (bottom row, second from left) then press the channel select knob (the large knob on the bottom left). You only have a few seconds between pressing F and then the channel select knob. Don't hold them at the same time.

You can now rotate the channel select knob to move the pointer. Press the knob when the pointer is at APRS to access these settings. Be very careful here!

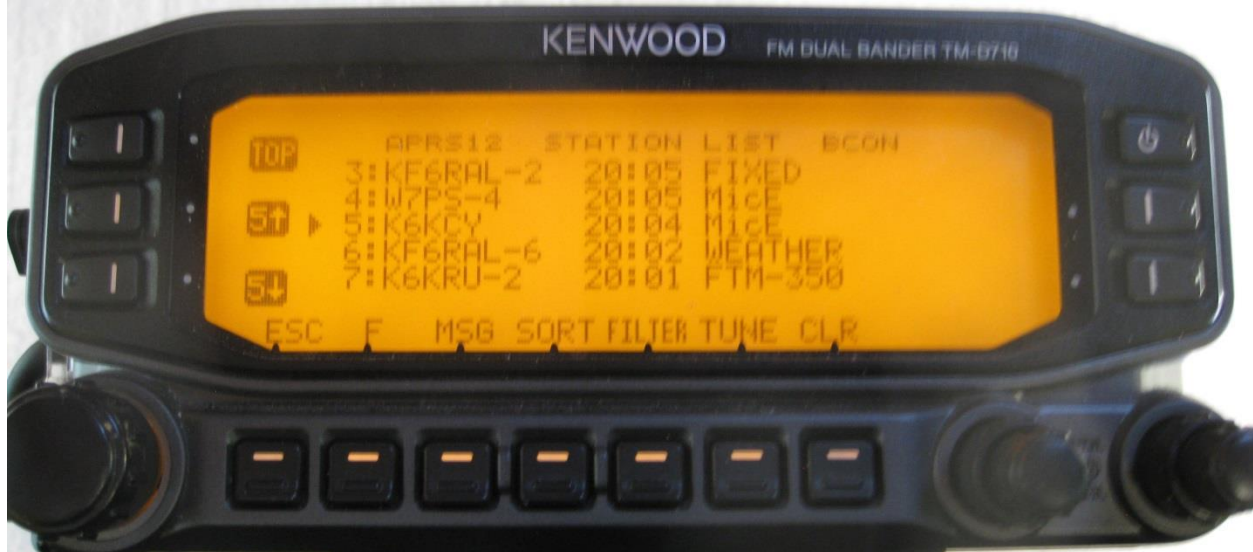


Using APRS to find someone, including HARBOR.



Press KEY to get to the key-function display shown here.

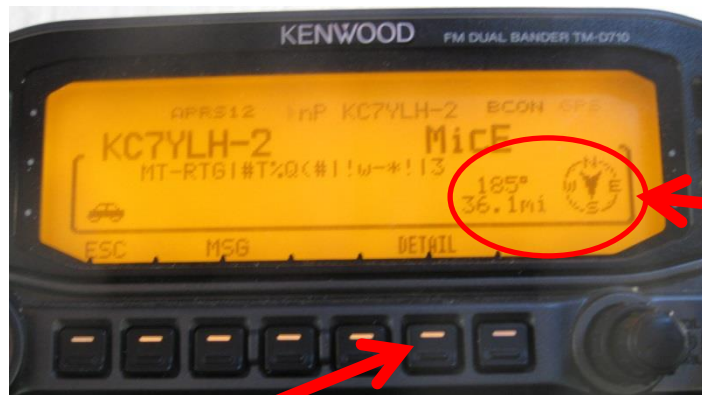
LIST will display a list of recent APRS packets that have been received. The screen will look like:



You can scroll by rotating the channel select knob (bottom left), pressing it will select the target. The left side keys will let you page through the list or jump to the top. Don't mess with TUNE. You can explore SORT, FILTER, and CLR. They do what you would expect.

You can also just wait until an APRS broadcast arrives and access the data from this next screen:

This screen is what typically appears when you are just using the radio and a packet arrives. You can get back to your normal display by pressing almost any key. If in doubt, press ESC.



This is how far away and in which direction your target is located.

The **DETAIL** key will display a lot more information:

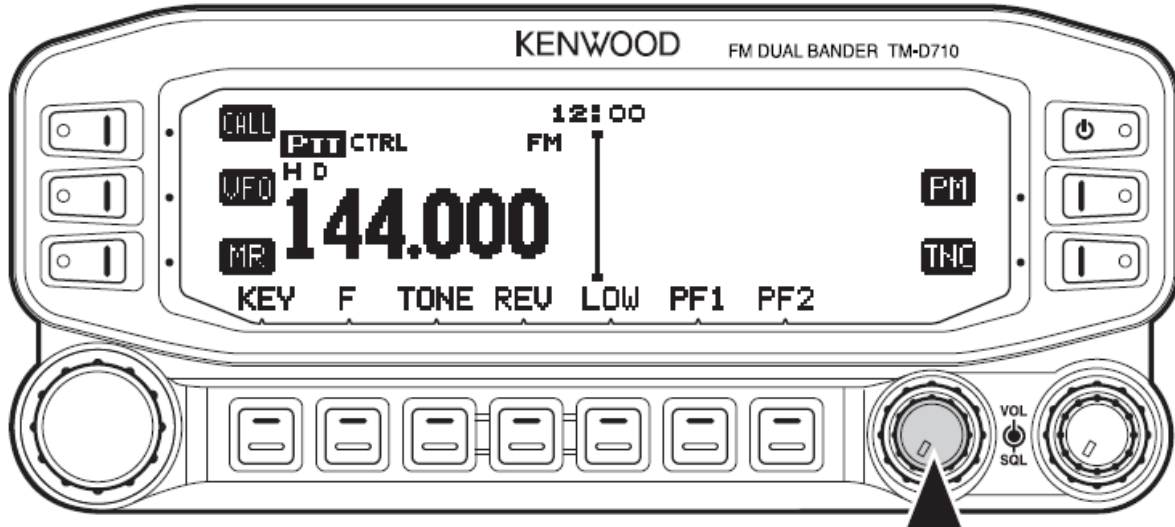


Use the arrow keys (bottom buttons, center) to move between the 3 APRS information displays. Page 1 isn't so helpful at first. Shown above is page 2 with the speed/direction of the target and the altitude (when reported). **This is a very handy page for finding the HARBOR near-spacecraft! This tells you how far away and in what direction to look, it also tells you how high.** (The ALTitude is referenced to sea level. You have to do some trigonometry in your head to determine what angle to look above the horizon. Convert the altitude "feet" into miles then do an inverse tangent in your head to get the angle.) Page 3 of the APRS detail display will provide you with the latitude and longitude.



Emergency Fixes and Problems

Problem: Oh No! Half my display is gone!



Fix: Press one of the band select knobs (the pair at the bottom right) for about 1 second. Your missing display half should return.

Problem: It is just all screwed up.

Fix 1: Select PM and chose one of the ones (OFF, 1, 2, 3) that you have not yet screwed up.

Fix 2: Press the MR key and then rotate the channel select knob (large knob at the bottom left) until channel 1 (447.800 MHz) appears and then call for help.

Problem: The large black/yellow boxed radio will not receive other radios, but they can hear you.

Fix: You need to force it into “narrow band” mode. Press and release the F key then press the channel select knob. Rotate the knob until TX/RX is selected.

Press the channel select knob to get into the TX/RX menu item. Then, rotate the knob until MODULATION can be selected. Press the knob to select MODULATION. Then rotate until you can select NFM (“narrow frequency modulation”). Press the knob to select NFM then press either the BACK or ESC keys. Your display should now have an N where you used to have FM.



Appendix/Reference, Channels Programmed

Notes about channel selection and the use of ham radio repeaters.

Normal Communications Between Vehicles

Most of the time we should use the “simplex” channels 0 through 7. Also, use the lowest transmit power that will get the job done.

Simplex means direct communication between two radios. This happens all on one frequency and only goes one way at a time. That is, when you talk, you cannot also listen.

Longer Range Communication, Repeaters

If we are having problems reaching each other because of distance, we can use repeaters.

Repeaters use two frequencies and special tones. While you are talking on one frequency, the repeater is immediately rebroadcasting on a slightly different frequency. That means that your radio has to have two frequencies in use at once. The frequency that **you** receive (Rx) on is the frequency shown below in the table. The repeater then sends your signal back out with a lot more power and from a better vantage point (typically from the top of some high point in the area). The repeater expects your Tx frequency to be shifted by the amount shown in the table. The shift might be positive or negative and the amount of the shift is up to the owner of the repeater. (Positive shift means that the Tx frequency offset is higher than the Rx frequency.) Some repeaters also use a “tone” to make the broadcast cleaner (you only “listen” to transmissions with the hidden tone and your radio ignores any other radio signals on that frequency; same for the repeater).

Repeater Protocol

1. **Listen for a good bit first** to make sure no one else is using the repeater.
2. You must key the mic and **hold the PTT key for one second before you start** to talk.
3. When you first “logon” to a repeater frequency, it is normal to announce your presence by saying something like “This is KE7ROS listening in on the Roosevelt repeater.”
4. If in doubt, you can verify your connection to the repeater by keying the mic for about 3 seconds without saying anything then listen in for the automated announcement from the repeater. Do not do this very often though; it is annoying to other users.

Keying the mic allows the repeater to “wake up” and recognize that a real signal is arriving, not noise. If you immediately talk when you key the mic, your first word **WILL** be lost. A common problem is people saying “OK” or “Roger” or “Yes/No” and not waiting for the repeater to start up. What the rest of the world hears is a click as you open and close your mic and they never hear your one-word response.

Primary Rule: LISTEN for several minutes first to make sure no one else is using the repeater.

HARBOR D710 Preprogrammed Memory Channels (If it doesn't say "simplex" it is a repeater.)

No.	Memory Name	Rx(Tx) Freq.	Rx Step	Offset	Tone/CT/DCS	Tone Freq.	CT Freq.	DCS Code	Shift	Lockout
0	APRS	144.390	5.0	0.00	Off	88.5	88.5	023	Simplex	Off
1	UHF Simp	447.800	25.0	0.00	Off	88.5	88.5	023	Simplex	Off
2	VHF Simp	146.540	5.0	0.00	Off	88.5	88.5	023	Simplex	On
3	NtnlSmpV	146.520	5.0	0.00	Off	88.5	88.5	023	Simplex	Off
4	NtnlSmpU	446.000	5.0	0.00	Off	88.5	88.5	023	Simplex	Off
5	V Smplx2	146.560	5.0	0.00	Off	88.5	88.5	023	Simplex	Off
6	U Smplx2	446.500	25.0	0.00	Off	88.5	88.5	023	Simplex	Off
7	U Smplx3	447.825	25.0	0.00	Off	88.5	88.5	023	Simplex	Off
8	RdoSonde	403.000	25.0	0.00	Off	88.5	88.5	023	Simplex	On
10	Mt Ogden	146.820	5.0	0.60	Tone	123.0	88.5	023	Minus Shift	Off
11	Lit Mnt	146.900	5.0	0.60	Tone	123.0	88.5	023	Minus Shift	Off
12	Coalvill	147.360	5.0	0.60	Tone	100.0	88.5	023	Plus Shift	Off
13	Park Cty	145.230	5.0	0.60	Tone	123.0	88.5	023	Minus Shift	Off
14	Midway	147.200	5.0	0.60	Tone	88.5	88.5	023	Plus Shift	Off
15	WSU	145.250	5.0	0.60	Off	88.5	88.5	023	Minus Shift	Off
16	Red Spur	145.310	5.0	0.60	Tone	103.5	88.5	023	Minus Shift	Off
17	Logan	147.200	5.0	0.60	Tone	103.5	88.5	023	Minus Shift	Off
18	Mt Logan	146.720	5.0	0.60	Tone	103.5	88.5	023	Minus Shift	Off
19	Herd Mtn	146.680	5.0	0.60	Tone	123.0	88.5	023	Minus Shift	Off
20	Morgan V	147.060	5.0	0.60	Off	88.5	88.5	023	Minus Shift	Off
21	Antlp Is	147.040	5.0	0.60	Tone	123.0	88.5	023	Minus Shift	Off
22	Prom Pt	145.490	5.0	0.60	Tone	123.0	88.5	023	Minus Shift	Off
30	BlueMtnV	147.100	5.0	0.60	Tone	136.5	88.5	023	Plus Shift	Off
31	Duchesne	147.260	5.0	0.60	Off	88.5	88.5	023	Plus Shift	Off
32	Roosevel	146.920	5.0	0.60	Tone	136.5	88.5	023	Minus Shift	Off
33	BlueMtnU	449.700	25.0	5.00	Tone	136.5	88.5	023	Minus Shift	Off
34	FlatTop	147.040	5.0	0.60	Tone	136.5	88.5	023	Plus Shift	Off
35	MirrorLk	147.380	5.0	0.60	Tone	100.0	88.5	023	Plus Shift	Off
36	Altamont	146.700	5.0	0.60	Off	88.5	88.5	023	Minus Shift	Off
37	LtlMtnVn	147.340	5.0	0.60	Tone	136.5	136.5	023	Plus Shift	Off
40	Air2Air1	122.800	12.5	0.00	Off	88.5	88.5	023	Simplex	Off
41	Air2Air2	123.450	12.5	0.00	Off	88.5	88.5	023	Simplex	Off
42	Air2Air3	122.750	12.5	0.00	Off	88.5	88.5	023	Simplex	Off
50	Mt OgdU	448.600	25.0	5.00	Tone	123.0	88.5	023	Minus Shift	Off
51	Lit MntU	448.575	25.0	5.00	Tone	100.0	88.5	023	Minus Shift	Off

52	Coalvill	449.550	25.0	5.00	Tone	100.0	88.5	023	Minus Shift	Off
53	Park Cty	448.475	25.0	5.00	Off	88.5	88.5	023	Minus Shift	Off
54	Midway	449.950	25.0	5.00	Off	88.5	88.5	023	Minus Shift	Off
55	Prom Pt	449.775	25.0	5.00	Tone	123.0	88.5	023	Minus Shift	Off
56	Mt Logan	449.625	25.0	5.00	Tone	103.5	88.5	023	Minus Shift	Off
57	Wellsvil	449.575	25.0	5.00	Off	88.5	88.5	023	Minus Shift	Off
58	Atelp Is	447.200	25.0	5.00	Tone	127.3	88.5	023	Minus Shift	Off
100	APRS	144.390	5.0	0.00	Off	88.5	88.5	023	Simplex	On
101	VHF Simp	146.540	5.0	0.00	Off	88.5	88.5	023	Simplex	Off
102	UHF Simp	447.800	25.0	0.00	Off	88.5	88.5	023	Simplex	Off
110	Blue Mnt	147.100	5.0	0.60	Tone	136.5	88.5	023	Plus Shift	Off
111	Duchesne	147.260	5.0	0.60	Off	88.5	88.5	023	Plus Shift	Off
112	Roosevel	146.920	5.0	0.60	Tone	136.5	88.5	023	Minus Shift	Off
113	Vernal	147.040	5.0	0.60	Tone	136.5	88.5	023	Minus Shift	Off
114	VrnlGriz	145.490	5.0	0.60	Tone	136.5	88.5	023	Minus Shift	Off
150	Blue Mnt	449.700	25.0	5.00	Tone	136.5	88.5	023	Minus Shift	Off
200	APRS	144.390	5.0	0.00	Off	88.5	88.5	023	Simplex	On
201	VHF Simp	146.540	5.0	0.00	Off	88.5	88.5	023	Simplex	Off
202	UHF Simp	447.800	25.0	0.00	Off	88.5	88.5	023	Simplex	Off
203	BeaconDF	433.925	25.0	0.00	Off	88.5	88.5	023	Simplex	Off
300	gpsl vhf	146.550	5.0	0.00	Off	88.5	88.5	023	Simplex	Off
302	gpsl	446.150	25.0	0.00	Off	88.5	88.5	023	Simplex	Off
303	ghv	146.550	5.0	0.00	Off	88.5	88.5	023	Simplex	Off

Notes

A lot of the channels show up more than once. This is historical, don't worry about it; channels 31 and 111 are identical.

Channels 30 through 37 are repeaters that might be helpful when in the Uintah Basin.

Channels 40, 41, and 42 are for listening in to private aircraft. It is illegal for you to broadcast on these channels since your ham license doesn't apply to these, you can only listen.

The "Rx Step" is the frequency spacing between channels that is normally used by the radio when you are in VFO mode and controlling your frequency manually.

Remember: When you are using a repeater, no one else can realistically have a conversation on that repeater at the same time. Also, your conversation is being sent over a VERY large area with a lot of power. Choose your words carefully.