

The Icom IC-746PRO as a Communications Receiver?

By Jim Clarke, NR2G

In a recent telephone conversation, the gentleman I was talking with suggested that there are a number of people who have purchased amateur radios with no intention of using anything other than the receiver. My initial reaction was to disagree, but I guess I had just never thought about that possibility. I mean, why would you buy a transceiver – the contraction of transmitter and receiver – with no intention of transmitting?

His contention was that the transceivers today are providing generous feature-sets, excellent quality, and at such a relatively low price, that you might actually get receive-features on the amateur rig that you wouldn't on a comparatively priced dedicated receiver. In light of that conversation, this month I'll take a look at an amateur radio that may very well support his contention.

The Icom 746PRO is a tabletop HF/VHF all-mode transceiver and is, according to Icom, an improved version of the 746, incorporating many of the suggestions they received from its users. Its receiver covers 30 kHz to 60 MHz, and 108 MHz to 174 MHz. The transmitter covers all amateur bands from 160 through 2 meters and includes an internal antenna tuner. As it does not have a built-in power supply, some source of 12 Vdc, power supply, or adequately rated battery, is necessary to operate the radio.

❖ Ergonomics

At about 5"H x 11"W x 12"L, the 746PRO is not very large; I thought the front panel was a bit cramped for a tabletop radio. Perhaps that's just my history with "large real estate" vacuum tube radio front panels talking. The LCD display, on the other hand, at 2.5"H x 3.5"W, is very generous in size. All information on the display is easy to read and logically grouped. It has a lighted whitish background with the displayed information in black. Frequency display resolution is selectable at either 10 or 1 Hz; I personally like the 1 Hz position.

Many of the front-panel buttons are multi-function, and at first, this seemed to be a hassle. But, once I learned the methodology, I

found it a rather clever way to condense as many as four functions into one button. For instance, pressing a button will toggle between two predetermined settings, but, if you hold the button down for one second, you are given the opportunity to modify the setting that is currently selected. Once changed, that now becomes one of the toggled settings.

Most of the other functions not configured using the one-second-hold method, are covered by a series of function keys corresponding to a menu displayed at the bottom of the screen. The contents of that menu changes, depending on the operating mode you have selected. Even the menu button has a group of second functions accessed using the one-second-hold method. This second menu allows customization of the more static system-level settings, such as the display's backlight and contrast.

The tuning knob is large and has a front-panel-accessible brake adjustment to achieve whatever rotational resistance is desired. The tuning finger recess has an independent rotating fingertip cup that provides smooth rotation at fast or slow speeds. The volume and tuning knobs are located on opposite sides of the display, allowing two-handed operation while tuning your favorite portion of the receive range without arm contortion or visually obstructing the display.

One feature that I really appreciated is audio tone control. The 746PRO allows you to set the bass and treble of the receive audio, something I'm not used to. This gives you the ability to compensate, to a degree, for a wide range of speakers. Yet, even with the ability to contour the audio, I still consider the internal speaker to be strictly utilitarian. An external speaker is a must to realize the

full sound potential of virtually any communications receiver.

❖ Keypad Tuning

The 746's keypad entry system is definitely designed with the ham radio operator in mind. The keys are marked with an amateur band frequency on the left, in white, and a number from 0 to 9 on the right, in green. Each key's primary function is to immediately change the operating frequency to the corresponding amateur band.

To enter a frequency instead of an amateur band, a key, separate from the numeric pad, must be pressed first. While I'm sure this works well for hams, I found myself repeatedly hitting one of the numeric keys in an attempt to enter a frequency, only to end up in the 40 meter band.

❖ IF Filtering

Your first line of defense against adjacent channel interference is IF filtering. If the filters are too wide, transmissions adjacent to your listening frequency can virtually eliminate your ability hear the desired signal. If they are too narrow, the audio fidelity is so poor that, although you have eliminated adjacent channel interference, you cannot understand the desired signal. The IF of the 746PRO uses 32bit Digital Signal Processing (DSP), which has provisions for the operator to modify, at least somewhat, the configuration of the radio's IF. Out of the box, each mode has three preprogrammed bandwidths and an associated shape. The shape of the filter is a reference to how sharp the filter's skirts are. Typically, the steeper the skirts, the better the filter.

In CW, SSB, and RTTY, it is possible to modify not only each of the default widths and shifts, but also the shape. Width adjustments are 50 to 500 Hz in 50 Hz steps for CW, 600 to 3600 Hz in 100 Hz steps for SSB, and 50 to 500 Hz in 50 Hz steps, plus 600 to 2700 Hz in 100 Hz steps for RTTY. Filter shape is either sharp or narrow, and when selected, it applies to all three filter widths for that particular mode. At any time, while in receive, the



Photo Courtesy of www.RigPix.com

bandwidth and shift can be adjusted using the concentric Twin PBT knobs. Each of the two knobs, moved independently, can tailor the upper and/or lower cutoff frequency. If turned together, the entire passband is shifted up or down in frequency. As the IF is adjusted, there is a graphic on the LCD display to indicate the current configuration.

In FM, and unfortunately also in AM, it is not possible to modify these preprogrammed bandwidths, or shapes. The fixed widths for AM are 9, 6, and 3 kHz, with 15, 10 and 7 kHz for FM. Also, now only the inner Twin PBT knob is active, acting as an IF shift.

For all modes, returning to the preset default bandwidth and shift is as easy as the one-second-hold of a button.

❖ Auto-Tune/Manual-Tune Notch

Here's a feature I really like. I do a fair amount of shortwave broadcast listening, and even with the flexibility of the IF, it's sometimes necessary to eliminate a heterodyne or two. Not only can the 746PRO automatically notch out one signal, but it can do so to three or more signals, and actually track them if they move in frequency. Or, if you prefer, you can manually tune the notch for a single interfering signal. I've used the notch in both modes and found them to work beautifully.

❖ Multiple Antennas

If you're like me, you usually have at least two antennas for HF, one vertical and one horizontal. It's nice to be able to switch between the two depending on various conditions. The 746PRO has two antenna connections for HF and 6 meters, and one dedicated to 2 meters, all accessible on the back panel. Selection is made via a button on the front panel.

❖ Noise Reduction and Blanking

Icom includes two features to combat noise: a noise reducer, and noise blanker. The blanker is intended for pulse type noise, and the reducer is for hiss type noise. While these features would seem to be quite useful, I have to admit I never found a case where they really did anything. I don't think they are useless; I apparently just didn't have the type of noise they were designed for.

❖ Voice-Activated Squelch

Not only does the 746PRO come equipped with a signal-level squelch, but

Table 1. Receive Sensitivity (10 dB (S+N)/N)

Freq. MHz	Pub NP	Meas NP	Pub P1	Meas P1	Pub P2	Meas P2
0.400	ND	1.2 μ V	NA	NA	NA	NA
1.000	ND	2.0 μ V	NA	NA	NA	NA
3.000	ND	0.36 μ V	0.16 μ V	0.13 μ V	NA	0.09 μ V
6.000	ND	0.31 μ V	0.16 μ V	0.13 μ V	NA	0.09 μ V
12.000	ND	0.33 μ V	0.16 μ V	0.15 μ V	NA	0.10 μ V
18.000	ND	0.33 μ V	0.16 μ V	0.15 μ V	NA	0.10 μ V
29.990	ND	0.36 μ V	0.16 μ V	0.18 μ V	NA	0.10 μ V
54.000	ND	0.56 μ V	ND	0.22 μ V	0.13 μ V	0.14 μ V
144.000	ND	0.24 μ V	ND	NA	0.11 μ V	0.12 μ V

Pub = Published
 Meas = Measured
 P1 = PreAmp 1
 P2 = PreAmp 2
 NP = No PreAmp
 ND = No Data
 NA = Not Available

also a voice-activated squelch. I was first exposed to this type of squelch almost twenty years ago while working at a former employer. I would imagine it works the same today as it did yesterday, except today it's done in software instead of hardware.

When we did it in hardware, we split the receive audio into two separate bands using filters. If the receive audio is noise, the output from each filter will be about the same; however, if it is speech, the output from each will vary at a particular rate. Using those outputs, you open the squelch if the outputs vary, and close it if they are equal. That's a rather simplified explanation, but I think you get the idea.

Having that capability now allows you to not only squelch out background noise, but also block audio to the speaker unless it satisfies the previously explained requirements.

❖ Receiver Preamplifiers

There are three preamp settings in the 746PRO: two different levels of preamplification for 1.8 - 60 MHz, and one for the 108 - 174 MHz band. I found the sensitivity to be adequate without the preamp, but did find instances where the preamp was actually able to transform a marginal signal into a usable one. For sensitivity measurements, with and without the preamp, see Table 1.

❖ Other Features

Unfortunately, space limits me from highlighting all of the receive features, such as scanning, memories, computer-control, and display of decoded RTTY signals, among others.

❖ How Does It Play?

As we all know, "the proof is in the pudding," so I hooked up my 200-foot end-fed longwire and proceeded to make the rounds. I stopped just long enough in each shortwave broadcast band to see if I could find a receive situation that would require multiple features to render the desired signal readable. In one case - of which I didn't

note the frequency or station ID - the desired signal was completely unreadable and, at times, undetectable. With the combination of the notch and IF-shifted narrow filter, the 746PRO had no problem pulling the signal up out of the mud.

To me, that's the bottom line. A radio can have all kinds of bells and whistles, but if it doesn't deliver you a readable signal from one that is otherwise unreadable, it is a waste of time, money, and front-panel real estate.

❖ Final Thoughts

Suggested retail is \$2265.33, but the usual street price is around \$1750. With Icom's current \$200 coupon offer, that brings it down around \$1550.

Suffice it to say, the 746PRO certainly provides a number of features that are not common on many communications receivers. I thoroughly enjoyed operating it for this review, and, in fact, didn't really want to send it back. This is truly a fine radio for the money!

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.