

IC746PRO vs. IC756PROII — A Contester's Comparison

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This is a companion article to the one I wrote for the May/June 2002 issue of *NCJ* entitled *A Contester's View of the IC-756PROII*. Since that article was written, I have put considerable mileage on a pair of '756PROII's, and ICOM has introduced the IC-746PRO.

What I have provided in this article is a qualitative evaluation of my overall experience with the '756PROII and a comparison of the '756PROII to the '746PRO. I do not generally operate data, VHF, RTTY, AM or FM, so I have not included any evaluation of these modes.

QST published detailed product reviews by Rick Lindquist, N1RL, of the IC-756PROII and IC-746PRO in February and May 2002, respectively. Each of these articles provided excellent technical reviews of the radios, including performance characteristics, laboratory measurements and comparisons to previous versions of each model. The May 2002 article also provided a "side by side" comparison of the two radios. A detailed study of the '746PRO receiver's performance numbers described in that article will lead you to conclude that the receiver is on balance with that of the '756PROII — a conclusion that I can second after doing on the air comparisons of both radios. I recommend a review of these two articles, which are available to members on the ARRL Web site.

My two IC-756PROIIs have been subjected to heavy use in contests, routine daily operation and three trips to Dominica (J7) where multiple operators used them. With the exception of one failure caused by lighting and another from operation with a faulty amp, these '756PROIIs have performed flawlessly.

A new IC-746PRO used in the August NAQP SSB contest and during two weeks of daily operation (rag chewing and chasing DX) was the basis for comparing the performance of the '746PRO to that of the '756PROII. I found the sensitivity and selectivity of the '746PRO's receiver, as well as its dynamic range — the ability to copy a weak signal in the midst of adjacent strong QRM — to be excellent. On the transmit side, I found the '746PRO to be equal to the '756PROII. I have not had a chance to use a '746PRO in a CW contest, but I have no doubt that its basic performance would score on a par with my '756PROIIs.



The author standing over the '746PRO and '756PROII

Similar Features of the Two Radios

Many features of the '746PRO and the '756PROII are identical and I have nothing further to add about their functionality. These features include: MIC, PHONES, SPEAKER, NUMBER KEY-PAD, RIT & ?TX, TWIN PBT, NB, MEMORIES and XFC.

Other apparently similar features of both radios are important to discuss, however. These are features of the radios that I feel are especially important to understand, either because I have learned something about them through experience, or because they are subtle and I believe need to be highlighted.

Basic Radio Functions

When it comes to the basic receive and transmit capabilities of the two radios, they are essentially equal in terms of functionality and performance. Both have 100 W output transmitters. They both use the same DSP engine. Both cover 160 through 6 meters, although a big differentiator is that the '746PRO also includes 2 meters (with the full 100 W output on 2 meters!). Both offer general coverage receivers covering 30 kHz through 60 MHz. The '746PRO also has additional receiver coverage from 108 MHz to 174 MHz. There is approximately



Close-up of '746PRO and '756PROII

a \$1,000 difference in the street price of the two radios, with the '756PROII being the more expensive.

DSP Functionality

DSP filter shape and filter bandwidth controls on both radios appear similar. On both the '746PRO and the '756PROII, the DSP filter shape can be set to either soft or sharp and filter bandwidth (BANDWIDTH) is adjustable from 50 Hz to 3.6 kHz. On the '746PRO, adjusting both filter shape and bandwidth is easily done with a one second push of the FILTER button which brings up the filter adjustment display. Accessing the same function on the '756PROII is more difficult. On the '756PROII, a one second push of the FILTER button only brings up a filter bandwidth adjustment display (no shape adjustment). Changing filter shape requires four pushes of the EXIT/SET button to get to the DSP filter set display. I definitely liked the ability on the '746PRO to set BANDWIDTH and SHAPE from the same display.

DSP noise reduction (NR) is an outstanding feature of both radios. The level of NR is fully adjustable with the front panel control. At times, during marginal band conditions — weak signals buried in QRN — I found that introducing NR, just to the level where it begins to take effect, provides the best results for pulling weak signals out of the noise. I found no difference in NR functionality between the '746PRO and the '756PROII.

Frequency Tuning

Both radios are very flexible in selecting rates of tuning. Frequency is displayed to the nearest 10 Hz as the default. A one second push of the TS button turns on an additional digit, thereby providing frequency resolution to one Hz. On CW, pushing the 1/4ON button provides band spread to an amazing 125 Hz per dial revolution on the '756PROII (150 Hz on the '746PRO)! A momentary push of TS turns on quick tuning. This function allows the operating frequency to be changed in selectable steps from 100 Hz to 25 kHz for "quick tuning" from one end of a band to the other. Activating Main Dial Auto TS will cause quick tune to kick in automatically when rapidly turning the main dial.

Memo Pads

Both radios have a memo pad function which stores frequency and operating mode for easy recall. A push of the MP-W button stores the current frequency and operation mode. Change frequency or operating mode and push MP-W again, and the new frequency and operating mode will be stored — and

so on, up to five or ten (user selectable) levels of storage. A push of MP-R recalls the stored frequencies and operating modes, last in first out (LIFO). This feature is especially useful when chasing DX or searching and pouncing in a contest, and is somewhat analogous to the search and pounce memory function in *WriteLog*.

Split Operation

The '746PRO and the '756PROII have similar split frequency features, including "quick split". With quick split activated (in the SET menu), a one second push of the SPLIT button sets the frequency of VFO B to that of VFO A. F-INP is then used to input a kHz split (e.g., 1 kHz or 2 kHz) on the number keypad. When SPLIT is pushed again, VFO B is then changed to the split transmit frequency.

CW Operating

Semi break-in works equally well on both radios. Full break-in, however, sounds slightly "choppy" at higher CW speeds; this is true with both the '746PRO and the '756PROII. The only way I have discovered to cure this problem is to use an external Logikey keyer (www.idiompres.com). The Logikey keyer has built in adjustable "keying compensation" that increases keying on-time and decreases keying off-time by a few milliseconds to correct the full break-in distortion. Setting the keying compensation anywhere from 6 to 10 milliseconds cures the problem and produces beautiful sounding, high speed CW using full break-in.

In both the '746PRO and the '756PROII, a keyer rise time adjustment sets the time it takes for output power to raise to the set transmit power level. It is adjustable from 2 to 8 milliseconds. I received complaints of key clicks during my early days with the '756PROII, and discovered that a rise time of 2ms was causing the problem. I adjusted rise time to 6ms and received no further complaints. Like the '756PROII, the '746PRO also produces key clicks when rise time is too short. Setting the '746PRO's rise time to 6 or 8ms will reduce the clicks to a tolerable level.

John Seney, WD1V, did an excellent analysis of '756PROII rise times using a digital oscilloscope to view the keyed waveforms at various settings of rise time. This analysis is available at www.qsl.net/wd1v/756cw.html. John explains that "too fast a rise time can cause key clicks that are essentially analog distortions of the CW waveform that contain out of band products that produce noise (clicks). If the keying circuit lets the transmitter go from zero power to full power too rapidly the transmitter's output becomes distorted."

Both the '746PRO and the '756PROII have four memories for storing CW messages to be transmitted. A push of one of the four MEMORY KEYS buttons (M1 through M4) transmits the respective CW message. A momentary push of the same memory button or a tap of the paddle stops the message from being sent. Messages are transmitted at a speed controlled by the internal keyer's KEY SPEED adjustment on the front panel.

When sending stored CW messages on the '746PRO, Menu M1-KEY-SND displays scrolling characters of the CW message as it is being sent — a clever feature that is useful for code practice.

There is a repeat timer on both radios that allows you to automatically repeat any of the four CW messages at intervals from 1 to 60 seconds. Holding the MEMORY KEYS button (M1 – M4) for one second activates the repeat timer.

A CW paddle connected to the ELEC-KEY jack on the front panel of the radio keys the internal keyer. The KEY jack on the rear panel bypasses the internal keyer and must be used with an outboard keyer or for computer generated keying. In my case, I use both a Logikey K-3 keyer and computer generated keying, so I use a stereo Y connector for paralleling the two 1/4 inch plugs into the rear KEY jack.

Voice Operation

Since different microphones have different audio characteristics, it is a good idea to do some on-the-air testing with a friend to determine the TX bandwidth, TX treble and TX bass that sounds best for your set up. The monitor function will also allow you to listen to your TX audio while you make the adjustments. There are also RX treble and RX bass adjustments that should be set to your preferences.

Accessories and Connections

The I-MATE is an accessory for the '746PRO and the '756PROII, developed and sold by The BetterRF Company (www.betterRF.com). Its purpose is to provide the external keypad function to trigger the sending of voice and CW messages. Using the I-MATE with the '756PROII allows the spectrum scope to be visible while having access to the memory send function. The I-MATE works equally well with both radios. However, since the '746PRO does not have a recorder for storing voice messages to be transmitted, the I-MATE will only trigger CW messages with that radio. The repeat timer works well with the I-MATE. Holding down any one of the I-MATE's MEMORIES buttons for one second activates the repeat timer for that

message.

I use *WriteLog* for contests and my everyday logging. Since *WriteLog* does not have a "Rig Type" selection for either the IC-756PROII or IC-746PRO, I used Rig Type "ICOM-756PRO" on *WriteLog's* setup menu to control both radios. In each radio, the CI-V Baud Rate is set to 9600 and the CI-V Address to "5Ch".

The specifications for the SEND relay contacts are 16 V dc at 500ma. An early version of the IC-756PROII manual indicated 16 V dc at 2 A, but this was wrong and was corrected in a later version of the manual. If you are going to use the transceiver's SEND jack for keying a linear amplifier, be sure that the amp does not exceed these specifications, else the radio's internal reed relay may be damaged. If the amp's keying relay requires a higher current than 500ma, or exceeds 16 V dc, you can use pin 7 (+13.8 V dc) and pin 3 (TX Ground) of either ACC(1) or ACC(2) to key an external 12 V dc relay which, in turn, can key an amplifier.

These are nominal 12 V dc radios, and any good, electrically clean, 13.8 V dc supply capable of delivering at least 23 A should handle them just fine. The ICOM PS-125 power supply is popular because it is currently being offered at no additional cost by some dealers with the purchase of a new '746PRO or '756PROII. The ICOM PS-125 is a physically compact unit that powers either radio quite nicely. Note, however, that it has a 16 inch 12 V dc power cable that makes it necessary to locate the power supply adjacent to the radio. A slight amount of fan noise is noticeable. Curiously, the fan cycles on and off even with the 12 V dc cable unplugged from the radio. In my shack, I power the radios with an Astron power supply.

The label marking the various connections on the rear panel is quite small and difficult to read. I used a Brother P-Touch label maker to make labels for each rear panel jack and connector. As I pointed out in my previous article, I keep a flashlight handy!

Features That Differ Between the Two Radios

Displays

Clearly a major difference between the '746PRO and the '756PROII is the LCD display. The basic display functions (frequency readout, function switch menus, memory channels, set up modes, etc.) are quite similar, but their looks are totally different, with the primary difference being color. The '746PRO has a bright white screen with crisp blue lettering that I find very pleasing to use. It displays all of the many

pieces of information I need as an operator conveniently and legibly. The color display on the '756PROII, however, is magnificent — with the colors adding a dimension that makes it exceptionally easy to recognize the wealth of information that is displayed.

There is no comparison between the spectrum scope on the '756PROII and the band scope on the '746PRO. The '756PROII's spectrum scope provides an active, real time display of the relative strengths of signals around a center frequency. The span can be set to +/- 12.5 kHz, +/-25 kHz, +/-50 kHz and +/-100 kHz. I have become so accustomed to this spectrum display, especially during heavy contest conditions, that to do without it at this point in my life is unthinkable. The scope is an invaluable tool for "finding holes" and moving away from offending QRM in a crowded band and for finding signals on a "dead" band.

The '746PRO's band scope allows — in a limited way — the ability to check signal conditions around a center frequency. The scope indicates the relative strength of signals and their locations with respect to the center frequency. The sweep width is adjustable in steps from 500 Hz to 25 kHz. Unlike the '756PROII's spectrum scope, the signal display is not active in real time. Each time you want to see a profile of the signals above and below the center frequency, you must push the F1 button to activate a scan to refresh the display. The scan lasts only a moment but, during that time, the audio is muted. You can turn on an active display of the signals by holding down the F1 button for one second. You can even tune up and down the band, "looking" for signals while the active scan is underway. However, once again, the audio is muted, thus making the "active" scan virtually useless. My personal conclusion about the '746PRO's band scope is that it is a very marginal feature on the radio, one that certainly would not be useful in a contest. Furthermore, I find the loss of audio while scanning to be unacceptable.

The many menu selections on both the '746PRO and the '756PROII will lead you into the inner depths of the radios, not unlike exploring an Egyptian tomb. I am constantly amazed at the functionality that brilliant engineers design into modern day radios and these ICOM models are an embodiment of that talent. Virtually anything an operator would wish to set, adjust, manipulate, influence, control, regulate, alter, fiddle with, bend, amend or modify can be found somewhere in a menu! The trick is knowing how and where to set, adjust, manipulate, etc., etc...you get the point. It is difficult to say if the menu layout in the '756PROII is superior to that of the

'746PRO. They are both complex, and each requires a thorough study of their manuals to get a complete understanding. I do, however, personally prefer the menus of the '756PROII since many selections are presented in a convenient table on the color LCD screen. I will make one last point about the many features buried in the menus. That is, in researching this article, I have discovered features in the '756PROII that I had no idea were there, and I have been actively using this radio for two years!

The '756PROII has a dual watch feature and an audio balance (BAL) control that allows for monitoring of VFO B while listening on VFO A. The '746PRO does not have dual watch capability.

The '756PROII has four memories for storing voice messages to be transmitted. A push of one of the four MEMORY KEYS (T1 through T4) transmits the respective voice message. A momentary push of the same memory button stops the message. As discussed above, the I-MATE can be used to trigger the sending of the voice memories in the '756PROII. Note - the repeat timer only functions on CW and, therefore, does not work with the voice memory keyer on the '756PROII.

Antenna Options

Both the '746PRO and the '756PROII have two antenna ports for HF through 6 meters. Antenna Switch selection can be set to OFF, MANUAL or AUTO in the SET Menu. In the OFF position, antenna port 1 is "locked in" on each band, and cannot be changed from band to band. In the MANUAL position, selection of antenna port 1 or 2 must be done manually when switching from one band to another. In the AUTO position, selection of antenna port 1 or 2, as preset by the operator, is done automatically on each band.

The '746PRO has a separate antenna port for 2 meters.

The '756PROII has a rear panel RCA jack for connecting a separate receiving antenna. A one second push of the ANT button selects the receiving antenna and 1/R or 2/R is displayed as the antenna. A separate receiving antenna port is not available on the '746PRO, a severe limitation for serious contesters and low band DX'ers.

As protection from external RF voltages, I use an ICE Model 196 RF Limiter/Arrestor at the input to the '756PROII from my receiving antenna.

Dimensions

The '756PROII is some 34 cubic inches larger in volume and 1 pound 6 ounces heavier than the '746PRO, which is a consideration when packing for a DXpedition. The '756PROII is approxi-

mately 2 inches wider, 1¼ inch less deep and of equal height to the '746PRO.

Conclusion

The '746PRO and the '756PROII are both excellent radios and alike in many ways. The 756PROII has numerous features beyond those of the '746PRO. The more significant ones, in my opinion, include: LCD color display, real time band scope, multi-level attenuator, analog meter, clock, dual watch, TX voice memories, digital voice recorder and separate RX antenna port. On the other hand, the '746PRO has a 100 W, 2-meter capability that makes it an attractive "all in one" package.

In choosing one radio over the other it really comes down to how the operator values the extra features on the '756PROII relative to the \$1,000 difference in their cost AND his or her operating preferences.

For the casual operator who occasionally works a contest, likes to chase DX and spends much of his or her time rag chewing, the '746PRO offers excellent value as a full function HF, 6 and 2 meter

Additional differences are summarized below.

<i>Feature</i>	<i>IC-756PROII</i>	<i>IC-746PRO</i>
Analog meter	Yes – multi function	None
Clock & timer	Yes	None
Digital voice recorder	8 memory channels 15 sec. Ea 4 each for TX and RX,	None
Voice message recorder for TX	4 memory channels, 90 sec. total	None
CW message recorder for TX	4 memory channels, 55 char. max each	4 memory channels 50 char. max each
Attenuator (ATT)	6, 12 or 18 db	20 db
Preamp/ATT	Yes, separate buttons	Yes single button
Preamp 1	10db for all HF bands	1.8 to 21 MHz*
Preamp 2	16db for 24 MHz and up	24 to 50 MHz*
Preamp – 2 meters	N/A	108 to 174 MHz
Tx filter width – NAR	2.0 kHz	2.2 kHz
Tx filter width – MID	2.6 kHz	2.4 kHz
Tx filter width – WIDE	2.9kHz	2.8 kHz
ACC(2) on rear panel	Pin 6 activates on XVERT I/O	Pin 6 to gnd on 2m TX
Data Socket on rear panel	None	TNC jack

*Gain unspecified

radio that can be bought new for under \$1400. Price, weight and volume also make the '746PRO a serious contender as a DXpedition radio. For the active contester and serious DX'er, however,

the bottom line is that the LCD color display, real time band scope, multi-level attenuator, dual watch and separate RX antenna port most likely justify the additional cost of the IC-756PROII. **NCJ**