

# User review of the ICOM IC-756PRO



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& [Adam Farson VA7OJ/AB4OJ](#) comments & technical data

Serial # 026xx

## Introduction:

In this review, unlike some I have done in the past, I will make no mention of any other "product reviews", published in, QST, CQ, 73, or any other Ham magazine.

I have done this in past articles, but it would be pointless to continue here.

As I have stated in my past review articles, I will not be doing any "Lab" tests, as I don't have any lab gear to do it with, and 99% of all hams don't either. Besides, lab numbers mean little or nothing to most hams.

My reviews are more realistic, based in a real world user orientated point of view.

The "John Q. Ham" approach.

## Out of the box

I traded my IC-775DSP for the IC-756PRO I have now. Prior to the 775, I used an [IC-756](#) (old ver.).

The "old" 756 was a great rig in its own light, but there was room for improvements.

I then stepped up to the IC-775DSP. This was a great rig too, with many desirable features, and an excellent receiver. See my review on the [IC-775DSP](#) for more details.

To keep the confusion at a minimum, I'll refer to the IC-756PRO as the "PRO" in the rest of this review, and the old 756, as the "756".

My first impression of the "PRO", right out of the box, much like the old 756, the color and finish are excellent. The color seems to be deeper black than the old version. I notice that the bare die-cast aluminum rear panel is enamel painted on the PRO, and the 756 was bare.

The front panel is basically the same as the 756, with minor changes to layout & labeling.

My overall opinion of the exterior layout, color, texture, & finish, is: Excellent!

As a standard practice, when I first receive a new/used rig, I put the unit on WWV, to check the rig's frequency calibration.

The PRO straight out of the box was dead-on, zero-beat, and in perfect calibration.

There are few rigs that I have used that didn't need at least a little adjustment on the master oscillator. Some of the few that didn't need any adjustment are: FT-1000D, IC-775DSP, and now the IC-756PRO.

The PRO should stay calibrated for a very long time too.

I researched the PRO on the Internet, and found a [web site](#) that is used by the government for test results on equipment that is proposed to be used by the military/government. This site tells the users the equipment meets the minimum specifications/requirements for that service. Found on this site are the specs for the PRO.

The PRO has a built-in TCXO with an accuracy of 0.67 PPM. This level of accuracy is **nearly** the same as that of an "atomic" clock.

Over the units range of temperature there should be little to no noticeable change in frequency error.

## **Power ON!**

Since the unit is a "used" rig, I decided to do a CPU reset to clear all prior user settings and return the rig to the fresh, "NIB" configuration.

The reset is: holding in the M-CL & F-INP buttons while pushing the POWER button.

After the rig powers up, the first screen you see is the DSP calibration "boot-up" screen. As the system boots up, the screen has a bar graph that counts off 10 seconds, before the rig is ready for operation. The color screen takes a few minutes to reach full brightness, this is normal.

After you input your "Call Sign" into the "my call" settings, your call sign will appear at the bottom of this, "boot-up" screen.

On my "coolness" scale of, 1-10, this part is a 3, fairly cool, a bit boring.

## **Display**

Clearly this is the central operating point of the PRO, and it s most intriguing feature.

I feel that a sightless or visually-impaired person will be missing out on some of the Pro s finest operating features.

Big changes in the display, from the 756, the PRO is full color, very high resolution, and, **WAAAY COOL!** 10 on the coolness scale.

I m not going to tell you everything that the display does, but some of the new cool stuff, and many of the improvements over the 756.

The main thing the Pro s display has, is lots of color contrast. One of the main complaints about the 756 was lack of contrast.

Thus, the color contrast of the PRO, makes the display highly readable in any light condition.

Many people have eyes that see better in some colors, than others. For the "color blind" operator, there are high contrast monochrome screens too.

The display has (4) distinct color schemes, so most operators, will find one that suits them best.

There is a good selection of "fonts", that can be selected independent of the display type selected.

My preference for display type is mode "B", with a blue background, and the spectrum scope has a black background, with yellow "active" sweep, and orange "peak-hold" "shadow".

I have changed the fonts several times and found an eye pleasing combination that works for me; your choice is up to you.

In the display menu, there are more adjustments that an operator can experiment with to find what

he/she likes best.

**New:** A user selectable digital multi-meter which can simultaneously monitor all the functions that the full-time analog multi-meter does only one at a time.

## **Spectrum scope**

An improvement I noticed right away is that the sweep is faster, and more precise than the 756. The vertical calibration is tightly tied to the S-meter readings, and a scope ATT, is available to reduce "over-shoot", useful on the bands below 20 meters.

The "peak-hold" function on the scope is excellent. The 756 had a problem with peak-hold, the signals would fill the scope screen and the operator couldn't see the "active" display anymore. The PRO and its contrasting color scope display, are the cure. The Spectrum Scope works on transmit too.

I tested the scope to find the sweep speed, which is about 1 sweep per second (faster than the 756), with about 1 second of decay time (longer than the 756).

The vertical sensitivity of the 756Pro Spectrum Scope is significantly higher than that of the 756. A signal of less than 1 uV is visible, whereas the 756 required at least 20 uV to produce a spike. A new feature is a vertical attenuator, selectable via the ATT softkey below the screen. The operator can insert 10, 20 or 30 dB of vertical attenuation.

The Spectrum Scope can also be used as a simple spectrum analyzer. With SPAN set to +/- 12.5 kHz, the operator can obtain a rough estimate of third- and fifth-order intermodulation products (IP3 & IP5) on a received 2-tone signal. In normal operation, the Spectrum Scope will give a fairly accurate indication of the occupied bandwidth of the received signal and also show any insufficiently-suppressed carrier or opposite-sideband components.

## **A quick look under the hood**

If you are familiar with the 756's interior, there are only a few changes that can be seen in the PRO.

The same large die-cast chassis that doubles as the unit's main heat-sink; the same cast compartments for the main circuit boards are here; there is lots of shielding everywhere. ICOM did not rely on the outer covers for the sole shielding, there is an inner shield that is bolted to the die-cast chassis.

A person who knows what to look for will notice that there are no crystal filter slots - none at all.

What you do notice, is that these circuit boards are nearly 100% SMT parts, and are of very highly refined design and incredibly precise layout.

The only cooling fan is the muffin type mounted behind the front panel, blowing toward the rear of the PA section. With this much heat sink, in the chassis, it does not need much fan to keep cool. Less fan means less noise in the shack, and less dust in the rig.

Over all, the interior has the look of high tech NASA type gear. This rig should last many, many years.

## **Receiver**

Even if you read no farther than this paragraph, I can sum up the receiver in two words: "Amazingly quiet!"

Even without the Noise Reduction turned on, the receiver is super quiet, and with the NR on, it s "spooky" quiet.

Most operators who listen to the PRO s receiver are simply awe-struck.

## **Digital IF filters**

Nearly all the digital filters in the PRO are user adjustable, meaning that the operator can change the band-width to nearly anything you want. The skirts of these filters are STEEP, and tough. These are the closest thing we have to the "brick wall" filter.

I found that even with very narrow filter settings, there was little to no "ringing effect", such as would be found in crystal filters of the same bandwidth.

No need to go into great detail on how it s done, you can rest assured that there is a filter configuration that will suit you.

## **Twin PBT**

Fully digital, and awesome good. The PBT is usable with any filter configuration.

There is a digital readout, and graphic on the screen, that tells you what the PBT settings are. An audible "blip" can be heard when the PBT is tuned to the "centered" position. Neat! If you get lost with the PBT settings, simply push "PBT clear", and your back to default settings on both.

A good way to look at the use of the PBT is, as if you are "stretching, squeezing, and shifting", the selected filter.

Between the configurable filters and the PBT, the PRO has superior weapons in its QRM fighting arsenal.

The 756 s Twin PBT was good; the Pro s is GREAT (with the added bonus that there are no filters to buy to make it work better!) .

## **AGC**

Three levels of time constant are easy to select. Hold the AGC button in, and a menu pops-up, to let you configure the time constant of each of the three AGC speed levels.

I liked the 775 s variable AGC control, and the PRO is close to variable.

There should be a group of settings here that will please every operator .

This is another weapon in the PRO arsenal. Can make the listening experience more pleasurable too.

## **New mode "Fine scan"**

New on the PRO is the scanning mode, "Fine". This mode allows an operator to scan very slowly a section of band around a given center frequency. The scan range is selectable from + -5kHz to + - 1000kHz.

I can see where an operator hunting weak intermittent signals that don t "show" on the scope, can use this mode for just that purpose.

## **Other receiver observations**

While using the PRO on 20 meters, under extremely crowded conditions, I found that the PRO receiver held up incredibly well. With strong signals all around my center frequency lighting up the spectrum scope, I was still able to work stations well down to the S-1 level with little or no trouble. I was able to do this with a medium filter setting of 2.4kHz.

This would be nearly impossible or at least very difficult with a rig that uses older non-DSP, or crystal filter technology.

Weak-signal work is the Pro s true media. Tiny signals buried in noise & strong signals can be extracted, almost "surgically".

Where many other rigs are like using a shovel to pick up fleas, the PRO is a laser guided computer controlled forceps.

A shovel will get the job done, but you get a lot of dirt with the fleas your trying to pick up.

The PRO has pin-point surgical precision, with "Armor plating".

## Cool toys

### DVR

Digital Voice Recorder, DVR, built-in. Easy to use, fun, & very high quality sound. There are memory banks that can be used for various playback needs.

Recordings can be made from the airwaves, or the Mic, but airwave recordings can't be played back on transmit. There is no modification to change this.

I have used the DVR to ID for me, in my own voice, and nobody could tell it was a recording. That should say a lot for the quality.

For the DXer/Contester, the DVR can be used for calling CQ, etc.

Neat! Value built-in, not an optional "Add-on".

### CW memory keyer

Much like the DVR, this also has the memory banks, and on air playback. Well designed for the CW Dixer/Contester. Many options here to make most any CW operator happy. You can use a straight key, bug, paddles, etc. Normal or reverse keying polarity are menu selectable.

### RTTY decoder

Built-in decoder for Baudot/RTTY, no TNC or computer needed.

Simply switch to RTTY mode, tune in a RTTY signal, push the "decode" button, and the screen will start printing. To help with tuning, there is a bar-graph indicator at the top of the screen that works the same as an indicator on a RTTY TNC.

I tried it; it works great.

On the coolness scale it's a 9+, or **WAAY COOL!**

### Transmitter

SSB is the Pro's main design consideration. CW is a secondary design goal, but AM & FM is still good to excellent too.

SSB bass & treble adjustments are easy the same as the 756, but have more range and gain.

Good audio can be had, even with a hand Mic, which is not the normal result you would expect.

I use a Heil Gold-line GM-5 Mic on my PRO; the wide range element can give truly "broadcast quality" TX audio.

I use an in-line Pre-amp that brings the audio drive up to the same level that can be had from a ICOM pre-amp desk mic, like the SM-8, or SM-20.

With my mic gain on the front of the PRO at the 9 O clock position, with the bass at 0dB and the treble at +4 dB. These settings produce "life-like" TX audio.

It is not necessary to use outboard equalizing gear. A quality Mic, and careful adjustments of the TX bass & treble levels, will do all you need to do.

Compression: personally I try not to use speech compressors on rigs I own.

But, I have been taught that the PRO has another "trick" up it s sleeve.

The Comp on the PRO has three transmitted occupied bandwidth settings: Narrow (2.0kHz), Mid (2.6kHz), & Wide (2.9kHz).

With my COMP level set at 9 o clock, keeping the compression below 10dB. With the wide mode selected, I have been told the TX audio sounds, "Bold", and full. Probably not good for weak signal work, but a quick switch to the mid or narrow comp selections, or switching the GM-5 to the HC-5 element, would fix that, and turn the PRO into a Dxing machine.

So, you have a really fine "rag chewing" & "Dxing" rig in one unit.

I tried the PRO on AM, on 10 meters. The PRO should be set for about 20 to 25 watts of carrier, I know the manual says it can do 40, but it will NOT sound good at that carrier level.

For well balanced AM audio & carrier; the carrier must be from 20-25 watts, then set the Mic Gain for forward power output on the power meter. Also, the spectrum scope is a good indicator of proper AM modulation envelope. If the carrier drops significantly during peak modulation, the Mic Gain is too high or the carrier level is too high.

### **AM adjustment procedure using the Spectrum Scope.**

1. Select AM mode.
2. Adjust RF PWR for 20 to 25W carrier output (0% modulation)
3. Speak into Mic; adjust Mic Gain so that sideband amplitude is 6 dB below carrier on voice peaks.

Using this method, I got very good audio reports on AM. Pretty good for solid state gear designed for SSB.

The NR works on AM too, and works very well. A selection of filters 9.0kHz, 6.0kHz, & 3.0kHz, are useful for AM, but are not variable; they are fixed settings.

I found the PRO to be, "delightful & pleasant" on AM.

## **CW**

On CW the PRO has a clean & pure TX note. There is a menu setting that allows the operator to change the CW waveform rise time from 2ms to 8ms. A short rise time will make the CW note sound sharp and abrupt. A long rise time makes the note smoother, but should not really be used unless signals are very strong. Also, the long rise time can distort high speed sending, making the characters begin to blend together at speeds above 20wpm. For higher speeds and/or weak signal CW work, a shorter rise time would be more in line. In full QSK/break-in mode a short rise time is better, this prevents the first part of each note from being chopped off.

There is also a dot/dash ratio adjustment that can help the CW operator get his/her fist just right.

A CW reverse mode is an option too. This mode has become almost "standard" on many late model rigs.

Full QSK is smooth and effortless on the PRO; there are no noisy clattering relays to put up with. So smooth is the T/R changeover, that the operator can hardly tell when the PRO is in transmit, or receive.

## **FM**

Good on the PRO. But, then this is no really hard trick for most rigs to do.

What makes the PRO different on FM, is that the operator has three receiver IF filters to use: 15kHz, 10kHz, & 7.0kHz. Also, tones are built-in, and a preset repeater offset is user selectable. It is very simple to get the PRO up on any repeater, 10 or 6 meters with separate offsets for each band.

Finding repeater activity is as simple as looking at the spectrum scope.

The PRO has a clear advantage in the FM area too.

## **NB (or lack thereof)**

If you pressed me to say anything bad about the PRO, it would have to be here. The Noise Blanker exists; there is a button on the front panel. Does it work, I can't tell, I have not found a single noise that it can blank! The manual says that the NB is for "pulse type, ignition noise", but I don't have any of that at my QTH, and I don't plan to take the PRO mobile to find out either.

Here again, ICOM has totally ignored any new redesign of the NB. They have left the NB as-is for at least 10 years, carried down through several models of rigs, basically unchanged.

I m sure that the NB could totally remove the old "Woodpecker", but it has been at least 10 years since anyone has heard that signal.

On my coolness scale this is a 0, yuck!

*(Comment: I have found the NB, in combination with the NR, quite useful in removing power-line and ignition noise on 40m in the evening. VA7OJ)*

### **Auto Notch, Manual Notch**

The AN is good, very good, on the PRO. It is faster and more aggressive than the old 756. But, the AN is "outside the AGC loop" or "post-AGC", which causes the receiver to de-sense slightly when a carrier is notched. The MN on the other hand is "inside the AGC loop" or "ahead of the AGC derivation point", which means that a notched signal does not de-sense the receiver, nor will the signal be indicated on the S-meter. This is a significant improvement over older notch systems.

In the PRO, either AN or MN can be selected one at a time, but not both simultaneously. I was a bit disappointed by this. I guess I got used to the 775 system which allows the user to use the AN & MN at the same time. I realize that not every operator will need to use both.

A unique situation on 14.317 Mhz, where the ICOM net meets, requires the use of both notches.

There is a Cable TV sub-carrier on that frequency, all the time, under all conditions. Some times it is strong, others it is weak, but it s always there.

This signal contains multiple audio tones, at least three that I can tell.

The AN in my 775 could remove two of the audio tones, but not the third. The MN could get rid of the last tone, making the frequency usable again.

The PRO can not use both AN & MN at the same time, so one tone can not be removed. This would be my only "gripe" about the PRO AN/MN system.

### **NR**

WOW! What a BIG improvement has been made here! This NR system WORKS!

Much more effective noise reduction, with far less "echo" distortion effect.

Where the NB didn t work, the NR does. I was able to remove or reduce some nasty "line noise" at

my QTH, but the signals I desired to copy were still heard, with little echo effect.

The only other NR/NB system I have seen that can do this, was on a FT-990 Yaesu. The FT-990 NB is the best I have ever used.

The PRO NR, coupled with the all IF-level DSP facilities, makes the PRO a powerhouse QRN fighter.

### **Addendum; March, 2001**

I have recently notice a strange behavior in my PRO. When I use headphones, and turn on the Monitor, the audio I hear, changes tone & ambience with each transmission. It seems as though the AGC of the Monitor circuit is changing "attack" time from one transmission to another.

I consulted with Adam VA7OJ, who thought that it might be RF feed-back into the headphones.

My thought is that it has something to do with the way in which the DSP system derives the signal for the Monitor.

This behavior is not really a bother, but I found it a little strange. I would like to hear from anyone who has observed this behavior.

### **Addendum; June 2001**

#### **The "PRO" on Field Day!**

I brought out my mint condition PRO, to the Field Day, which a group of guys I have known for quite some time, do each year.

I used the PRO on 20 meter SSB in the middle of the night from 1am to 4am and used the 2.0khz SSB filter I had configured for it. The PRO was nothing short of FANTASTIC!! I really didn't have to use the Twin PBT much at all, I didn't even need to use the NR, or the NB. WOW!

I used the Voice DVR to send the station call, and the FD exchange, which saved a great deal of wear on my voice, and made my calls very consistent. Way cool!

Then my buddy Mike N5JO, came out to run CW(he is an excellent CW op.), I asked him to use the PRO on CW, to give a real work out, and try all the CW features. I hung around while he worked a number of CW contacts.

His comments were;

"The narrow CW filters, have no ringing at all." "Having an adjustable CW filter is a very cool

feature." "The Full Break-in QSK is as smooth as I have ever seen, it's not just an extension of my hand, but an extension of my brain." His final comment was; "Using the PRO was like the first time I drove a Mercedes-Benz, you don't forget a thing like that." *Dr. Mike Williams N5JO*

The only draw-back to the PRO on FD, is the fact that the PRO uses a good deal of standby current(about 2.5A.)This makes it a bit hard on the batteries during FD weekend. Aside of this, the PRO performed beautifully.

A great rig, in the shack, or out in the field.

### **Addendum; August 2001**

I have purchased an "old" 756 recently. This has afforded me the chance to do a side-by-side comparison of the PRO and it's older version. This was not done prior to the writing of this review. Now it can.

The PRO does have a noticeably "quieter" receive, than that of the 756. I found that the NB of the 756 is a good bit more aggressive than the PRO, and can remove noise that the PRO can't, however, the use of the 756 NB can distort the received signals, if there is a strong signal outside the center frequency, but still within the I.F. band-pass.

The Mic gain on the 756 must be 1/4 higher to drive the output to the same level as the PRO, but my "pre-amped" Heil Gold-line mic has no trouble driving either rig.

Timing of the AGC on the 756 is much faster then the range offered by the PRO, but it is still pretty good.

The NR system is nearly the same, DSP noise reduction on the 756, can "de-noise" the receive as well as that of the PRO, there has not been a great deal of change to the DSP random noise algorithium.

A quick read-thru of the [756 review](#) and the PRO review will show you the rest of the differences.

### **Addendum Dec. 2001 "The cello-phane noise", in regards to CW;**

It was reported in the beginning, on some of the Internet news-groups, and e-mail reflectors, that a curious audio distortions on CW were noted. The best description was that of somebody crinkling cello-phane wrapper, as on a cigarette package.

I have investigated this matter, and have this conclusion;

The aforementioned audio distortion, appears to be related to the DSP system overload, which can be a function of the use of either pre-amp 1 or 2 with signals that don't need any pre-amp, and or

improper AGC selection. I can't stress it enough, DO NOT use any pre-amp, on the PRO, on any band, BELOW 21mhz ! It CAN and WILL overload the DSP ADC(Analog-to-Digital-Converter).

A few simple changes will reduce or completely remove the distortion for the receiver. If you are using any pre-amp below 21 mhz, or if the signals anywhere on the band are greater then 10dB-over S-9, TURN IT OFF!

If the distortion is still present, change the AGC to a slower time-constant (i.e. 0.1 is TOO fast for non-QSK CW) use 0.2 or more.

Use a more narrow digital filter. For high speed QSK type CW, a very narrow filter will always be needed. I found that 100hz was good, even in the face of very strong signals.

The worst distortions I encountered, were while using AGC fast, and 1.5khz filter, with signals about 20dB-over S-9.

Any time the [ADC is overloaded](#), no matter the mode, or concentration of signals, there WILL be distortion on the received audio. The key to reducing or removing the distortion, is to lower the signal input to the ADC.

This is done by;

- (1) Turning off any pre-amp, in use.
- (2) Reducing the RF gain.
- (3) Change the AGC settings to a more suitable time-constant.
- (4) Use a more narrow filter.
- (5) Any combination of the above items.

When you learn how the PRO's [DSP](#) system works best, you truly harness it's POWER!

If you try to operate the PRO like any **other** "Analog" radio, you will not realize this power.

**January 2003**, The "old" PRO that served me very well for over two years, is now serving my Elmer, in his shack. **August 2003**, the unit continues to operate perfectly in my Elmer's shack, He really loves the radio.

Another place to find some PRO info is: <http://www.linearlinks.com> and <http://www.qsl.net/ab4oj/>

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