

# Product Review

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*Edited by **Joe Bottiglieri, AA1GW** • Assistant Technical Editor*

# PC Electronics TC70-10 70-cm ATV Transceiver

Reviewed by Steve Ford, WB8IMY

In a world of telecommunication marvels, you can still astonish your friends and neighbors by telling them that hams can set up their own TV stations. I've been in love with the idea for decades, but until I signed on to do this review, I didn't have much first-hand experience. Let me be the first to tell you, in case no one else has, that amateur television (ATV) is an extraordinary experience!

You can't imagine what it's like to see moving images sent and received with your own equipment. We're not talking about herky-jerky Internet video. ATV is smooth, colorful and fluid. When someone waves to the camera from 50 miles away, you see real movement in real time. And hams are doing more than waving to each other. You can swap home "movies," show off your latest projects, embarrass and annoy your cats, or just about anything else you can imagine. After all, it's *your* TV station.

My introduction to ATV was at the

controls of the PC Electronics TC70-10 transceiver. My 70-cm antenna was a four-element Yagi in my attic. I appropriated the family's Sony camcorder as my "studio camera" and for my receive display I used the STB video tuner/capture card in my PC.

## Antenna and RF Power Considerations

An ATV signal gives a whole different meaning to the term "broadband." When you're talking to someone on SSB, you're spreading your transceiver's RF output over about 3 kHz of spectrum. If you're

running CW, your power occupies only about 100 Hz. Now consider the fact that a typical analog ATV signal spreads its power over nearly 6 MHz.

With RF power being diluted across so much spectrum, it's easy to see why having plenty of output can be important to ATV success. This is especially true if you can't count on the assistance of a nearby ATV repeater to boost your useable range. The TC70-10 offers 10 W PEP, which is adequate for short-range work (5 to 10 miles) if you're using omnidirectional antennas over average terrain. You may be able to routinely span distances of up to 100 miles if high-gain antennas are in use at both ends of the path, or if you have help from an ATV repeater. Many of the people I communicated with during the process of writing this review were running in the range of 100 to 300 W. A few were using TC70-10's to drive 150-W amplifiers.

Regardless of your RF output, having a

### Bottom Line

The TC70-10 is about as close as you can get to plug and play amateur television. Add a power supply, camera, TV and an antenna and you're on the air!



Peek-a-boo! The author monitors his transmitted ATV signal. The monitor port on the rear panel of the TC70-10 samples the signal directly at the output.



The TC70-10 had no problem receiving this simplex "Halloween" signal at a distance of about five miles, despite the author's attic antenna system.



**Table 2**  
**PC Electronics TC70-10 70-cm Fast-Scan Television Transceiver**

<i>Manufacturer's Claimed Specifications</i>	<i>Measured in the ARRL Lab</i>
Frequency Coverage: Receive, 420-450 MHz; Transmit: ordered with 434.0 and 439.25 MHz (see text).	As specified.
Mode of operation: DSB video with 4.5 MHz audio subcarrier.	As specified.
Power requirement: 12-14 V dc, current consumption not specified.	2.5 A, tested at 13.8 V dc.
<i>Receiver</i>	
Noise figure: Not specified.	2.9 dB.
Conversion gain: Not specified.	20.6 dB.
IF output: TV channel 2, 3 or 4.	As specified.
<i>Transmitter</i>	
Transmit power output: 10-14 W PEP.	13.6 W.
Spurious signal and harmonic suppression: Not specified.	56 dB. Meets FCC requirements for equipment in its power output class and frequency range.
Size (height, width, depth): 2.9x7.5 x7.4 inches; weight, 2.9 lb.	

gain antenna is the most critical asset. Using the WINRE ATV repeater in New Haven as my test signal, I switched between my small Yagi and a 70-cm omnidirectional antenna (eggbeater). On the Yagi I could see clear images with a little noise; on the omni the picture deteriorated to mostly noise with rolling sync bars. It's worth noting that both antennas were horizontally polarized. That is the ATV convention in many areas. If you use a vertically polarized antenna the "mismatch" between you and a station with horizontal polarization could cost you a whopping 20 dB of signal strength! Try to determine the convention in your area (horizontal or vertical polarization) before deciding upon your antenna.

Antenna height can be critical as well. You want to project your precious RF without too many obstacles in its path. The roof didn't seem to seriously degrade the performance of my attic antenna, but the nearby trees were another matter. One distant ATV repeater was totally uncopyable until autumn when the leaves finally disappeared from the trees in my backyard!

When it comes to selecting antennas for 70-cm ATV, the more gain (translating to more elements and a longer boom), the better. But not just any 70-cm beam will do for

ATV. Remember the fact that your signals occupy at least 6 MHz of spectrum. That means the antenna of your choice must be capable of offering a decent SWR across 6 MHz.

Finally, it goes without saying that you must feed your antenna with low-loss coaxial cable. I use about 50 feet of Belden 9913. I do not have a receive preamplifier in the line, but that didn't seem to affect my ATV reception. The TC70-10 has a fairly hot receiver with a GaAsFET front end. If I was going to dabble in ATV DXing, however, a preamp would be high on my purchase list.

### The TC70-10—Setup

The PC Electronic TC70-10 is rather unassuming in appearance; it's a black aluminum case the size of a cigar box. Front panel controls are few. There is a XMIT/REC switch; transmit frequency switch; controls for mike, line and video gain; inputs for your camera and microphone; and a receive tuning control. On the rear panel you'll find the dc power input, antenna input (an N connector), output to your TV (a female F connector) and a phono jack for monitoring (more about this later).

For my setup I patched the camcorder's

composite video and audio outputs directly to the TC70-10. The TV output was routed to my tuner card via a short 75-Ω cable. The monitor output fed a small conventional TV monitor that I borrowed from a friend. Setup was a cinch and took all of about 15 minutes.

If you don't have a camcorder, you could just as easily use any of the cheap CCD cameras on the market these days, including those used for computer-aided video capture. For example, I recently saw an advertisement for a low-resolution color video camera for about \$140. You can find black and white cameras for half that. Add a cheap microphone and you're in business. Thanks to the TC70-10's simply layout, you can use anything you have available with minimal fuss.

### Watching the Action

Being the shy type, it took a little while before I could work up the courage to transmit my ugly mug through the ether. I spent weeks watching local ATV activity. Admittedly, signals were a bit sparse; ATV is not an overly popular mode. (This has been due in large part to the price tags involved, but in recent years the costs to get started in ATV, especially the prices on cameras, have been falling considerably.) I found a couple of repeaters just by tuning around at the tops and bottoms of the hours when they send their video identifications. Later I discovered that there are ATV "activity nights" when operators tend to gather. Tuesday at 8:30 PM, for example, was when I was mostly likely to find signals on the WINRE system. In many areas 144.34 MHz FM is used as an "intercom" frequency.

I copied a few ATV simplex conversations, including one station transmitting from Long Island, about 50 miles from my home as the crow flies. It was a matter of tuning slowly from 420 to about 440 MHz and watching for weak images in the noise.

The TC70-10's receive tuning knob is not calibrated by frequency; there is only a 0-10 scale. At first this may seem like a handicap, but you're tuning for best video and audio quality, not frequency. Yes, PC Electronics could have included a digital receive frequency display, but it would have added to the cost of the TC70-10 and offered little real value in return.

I was so intrigued with the TC70-10's receive capability that I broke down and purchased a tiny black-and-white video camera and a 250-mW ATV transmitter. Despite the meager output and my equally meager home antenna system, the TC70-10 was able to receive good-quality video when the miniature camera/transmitter combo was a half-mile away. You can create all kinds of mischief with one of these!

### Transmitting

The first lesson I learned about ATV transmitting was light—having enough, that is. My camcorder responds well in low light, but I still ended up looking like I was

in the Bat Cave. How do I know? Because I was able to view my transmitted signal quality via the TC70-10's monitor port. With another lamp on the scene, and after repositioning the camera, viewers could see me clearly—not that this was a notable improvement.

The TC70-10 can be ordered with your choice of two transmit frequencies. This may seem somewhat limiting, but ATV activity tends to concentrate on just a couple of frequencies. For this review we ordered the TC70-10 with transmit frequencies that corresponded to the inputs of two local ATV repeaters. You select between the two with a front-panel toggle switch labeled **F1** and **F2**. The frequencies are labeled on the TC70-10's shipping box, but you don't know which is **F1** or **F2**. A little experimentation provides the answer, but a clearer label would be a big help.

You can use a footswitch or other means to key the TC70-10 into transmit, but I simply used the front-panel toggle switch.

Once you're in the transmit mode, you can quickly adjust the panel controls for best picture. Since I was using my camcorder along with its built-in microphone, I adjusted the **LINE GAIN** for best transmit audio. I would adjust the **VIDEO GAIN** until the monitor image just started to "bloom," then I'd back it off slightly.

I received compliments on the quality of the TC70-10's signal. The video appeared to be particularly free of annoying jitter or distortion. I didn't make any DX contacts with the TC70-10, which is not surprising considering my station setup. Even so, Bob Doolittle, W1CTC, was able to detect my signal from a distance of about 15 miles on simplex despite several large granite ridges that separate us!

### Conclusion

As I stated at the beginning, the ATV experience is extraordinary and the PC Electronics TC70-10 makes it remarkably easy to get started. Thanks to its straightforward

design, this is about as close as you are likely to get to plug-and-play amateur television. If you can put up a gain antenna at a reasonable height (enough to clear most objects in the near field), the TC70-10 may be all you'll need to dive right into ATV. Even a so-so antenna like mine will do the trick if you are close to an ATV repeater (consult a recent edition of the *ARRL Repeater Directory*). If you find that you need an RF power amp and/or a receive preamplifier, PC Electronics sells these as well. Beyond that, the TC70-10 manual offers excellent guidelines for station setup and operating techniques. For more information on ATV, see Chapter 12 in the *ARRL Handbook*.

As far as your on-camera image is concerned ... well, they can't help you there!

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