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The Kenwood VC-H1 Interactive Visual Communicator

The M^2 6M7JHV 6-Meter Yagi Antenna

PC Electronics TC70-10 70-cm ATV Transceiver

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

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With the ever-increasing integration of the home computer into the modern ham shack, many of the modes of operation that used to be handled by some fairly complex external hardware and/or circuitry, such as RTTY, the generation of CW characters and messages, and slow scan amateur television (SSTV) to name a few, are now reduced to just a hand full of components, inexpensive (or free!) software, and some simple audio connections between our home computers and our transceivers. This has led to a rapidly growing number of participants in these interesting alternative communication modes.

Let's consider SSTV. While transmitting pictures over radio is certainly not a new activity (hams were there in the early development of television), up until only a few years ago SSTV required expensive dedicated external equipment. Now, anyone with a fairly up-to-date computer with a sound card can download a file from the Web and be up and running on slow scan in no time! Even those with more modest computers can build SSTV interfaces with a few bucks worth of parts and join in. The pictures are often full color and the resolution is surprisingly good.

You'll soon find that trading pictures over the air is great fun, but you may also discover that generating your own original pictures for transmission will require either a digital camera, a video camera and some computer interface equipment, or your existing photographs and a computer image scanner.

Lose the Weight

Kenwood's latest offering, the VC-H1, brings an entirely new level of convenience and portability to SSTV. No longer are you tethered to that bulky computer and limited to retransmitting received pictures or images found on the Web. Here's a handheld battery-powered unit just a bit larger than your average H-T that, much like the digital photographic cameras that are becoming so popular, can capture and store full-color still pictures. A few quick connections to your H-T, mobile, or HF transceiver (no computer required), and you're ready to share pictures of yourself, your friends and family, your shack… heck, you can even bore your ham buddies with pictures of your vacation. (OK, so I'm guilty of this one.) It doesn't matter if they are around the corner or on the other side of the planet!

In addition to its capture, store, and transmit capabilities, this unit will also receive pictures in eight of the most popular SSTV modes and a new "Fast FM" 9600 baud mode, and will instantly display them on its built-in 1.8-inch TFT (thin film transistor) LCD color display. Received pictures, much like those you collect yourself, can be stored in one of 10 memories.

As delivered, the VC-H1 includes the main unit with the display screen and a half-dozen rubberized pushbutton controls, a rotatable, removable color CCD camera, a wall transformer power supply, an interconnect cable wired for use with Kenwood handheld radios, a carry strap, a soft cloth for cleaning the camera lens and display screen and a simple, well-written operator's manual. You'll also find several addendum sheets with some clarifications on operation and information on wiring the unit to Kenwood VHF/UHF mobile radios with the mini DIN type packet connector and to the 13 pin accessory jack on the TS-570 and TS-870 HF transceivers. (These connections will also work with Kenwood's earlier HF transceivers that have the 13-pin accessory jack.) A prewired cable, the PG-4T, for the DIN type packet connector on the mobile radios is available as an accessory. When using the included cord and a Kenwood H-T, the VC-H1 also performs double-duty as a speaker microphone.

The Bottom Line

The VC-H1 is a complete slow scan television system in a highly portable package. Just add a transceiver and you're ready to go. Beyond casual picture swapping, this unit should find many applications in public service and emergency communications.

Get the Picture?

Operating the VC-H1 is easy. It is not necessary to have the unit attached to a transceiver when collecting pictures. To take a picture, simply switch the power on, press the **S** button, which activates the camera, and aim the camera and frame your shot by viewing it on the screen. A second press of the **S** button captures the image. Pushing the **MR** button will enter the captured picture into one of the unit's memories. A **HOLD** button allows you to protect selected images from being overwritten.

The included fixed-focus color camera does a nice job in a wide variety of range and lighting conditions, but, as with almost any camera, it can be susceptible to washout in bright sunlight. The camera attaches to the top of the unit using a 3.5-mm stereo plug and a keyed mechanical interlock system and is easily removable. An extension cable can be used to remote mount the camera away from the main unit.

With the VC-H1 connected to a transceiver, receiving pictures transmitted by others is even easier. Just turn on the power and the unit does the rest. When the VC-H1 detects an SSTV transmission with sufficient level and clarity (and you are not currently in the live picture capture mode), it will automatically switch into the picture receive mode and display the incoming picture. Pictures received over the air can also be saved to memory. If interference or fading signals cause the unit to fail to activate the automatic receive function, an **RX** button allows you to start receive manually. An addendum sheet explains some of the limitations of the manual receive feature. Our reviewers found it successful in salvaging usable images in only a small number of instances.

Holding various combinations of buttons while turning on the power provides control of a number of advanced features.

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These include call sign overlay, battery save, display contrast adjustment, auto transmit and memory reset.

The text overlay feature lets you superimpose up to eight alphanumeric characters in the lower portion of the display. This is handy for adding your call sign to transmitted pictures. In "auto transmit" the VC-H1 will automatically capture and transmit a picture once every three minutes. This could be a useful feature for "remote viewing" of a location during a public service event, for example.

The VC-H1 operates on four double-A batteries or the included wall transformer power supply. We found battery life is relatively short. A battery save feature can be set to automatically shut power off to the camera and screen if no operations are performed in over 30 seconds. When this is activated, the unit is still capable of receiving incoming pictures. This greatly reduces power consumption. For portable operation, it's a good idea to keep some spare batteries handy. The manual cautions against using NiCds.

Peripheral Vision

Beyond its built-in features, the VC-H1 provides connection points for a variety of external devices. While the included display is adequate for portable operations, you may find the 1.8-inch screen a bit on the small side for fixed station use. A 2.5-mm jack on the side of the unit serves as an NTSC video output and can be used to connect an external monitor. (Most current TVs provide an NTSC video input, typically an RCA type jack.) This is a great feature when you want to share the incoming pictures with a group of people. This output would also allow you to record your received pictures, slideshow style, onto a similarly equipped VCR.

Alternative NTSC video sources can also be fed in through the camera jack. I connected this to the output of my VCR. With the VC-H1 in its picture capture mode (hit the **S** button once), full motion video can be viewed on the unit's screen. Activate the capture function (hit **S** a second time) and you capture a single frame for SSTV transmission. This arrangement allowed me to use some of my previously recorded vacation videos as a source of still pictures. You could also substitute an alternative camera with an NTSC output, such as a camcorder, in place of the stock camera. Now you can take advantage of some of that camera's more advanced features, such as telephoto or wide-angle lens, for your SSTV picture compositions.

Though Kenwood does not offer accessory cords for these applications, the manual provides enough information to easily determine the necessary cabling. When using any external source or monitor, first verify the device's input or output levels are compatible with the specifications given in the VC-H1's manual.

Speaking of interconnection, specific information on wiring the unit to radios of other manufacture is not included. Those wishing to use the VC-H1 with other transceivers will find wiring to be basically similar to that required when attaching packet or multimode TNCs. If you intend to cannibalize the included H-T cord for use with other transceivers, study the Kenwood radio wiring diagrams very carefully. Rewiring, especially for use with mobile or HF transceivers, will probably require relocating some connections in the tiny 16-pin data port connector that attaches the transceiver interface cable to the VC-H1. Disassembly of the connector is pretty straight forward, but the internal connections are extremely small and can be a challenge to work on. For HF and mobile radios, I've found the easiest solution seems to be to purchase the Kenwood PG-4T accessory mini DIN mobile cable, locate the mating mini DIN jack, (available from Radio Shack and others) and wire interconnections between the jack and the transceiver's microphone, PTT and speaker connection or, if available, the unit's accessory jack. Plug the PG-4T into this homebrew adapter cable, and you're ready to go.

Back to that Bulky Computer

What fun would any modern piece of equipment be if you couldn't hook it up to your computer? The Kenwood companion computer software and cabling was still under development during our review period. The *Windows 95/98* software is now available.

For those interested in writing their own control software, an interface cable wiring diagram and command list are included in the manual.

A look through the command set indicates that computer interconnection will provide duplication of most of the unit's existing controls, additional text overlay features (in a variety of colors) and the ability to manually select specific SSTV modes. Kenwood indicates that their cabling and *Windows 95* software should be available shortly.

Playing to a Wider Audience

While the VC-H1 proved very reliable and easy to use for local FM communications with both computer-based SSTV systems and other VC-H1 equipped stations, our reviewers had mixed results when participating in picture swapping on the popular HF SSTV frequencies. One limitation is the inability to manually select the SSTV mode. The unit's default mode is Robot 36. The most popular currently used mode on HF seems to be Scottie 1. The VC-H1 will automatically identify the mode in use when receiving a picture and will select that mode for subsequent transmissions, so if you find activity on a frequency and allow the unit to capture a picture before your first picture transmission, you'll be ready to transmit in that mode. If the unit has not yet successfully captured a picture, let the receiving stations know that you will be transmitting in Robot 36. (Most current SSTV equipment has Robot 36 capability.) Turning the power off and on will

This view of W1AW was captured using a VC-H1. It was transmitted on VHF using FM and received on a second VC-H1 equipped station.

Just an example of the wide variety of pictures you'll see passed around on HF. This image was received on 14.230 MHz using a VC-H1 connected to a Kenwood TS-570.

Robert Robinson, WB9VCL's tongue-in-cheek warning to contesters who stray too close to occupied 20-meter SSTV frequencies!

A VCR connected to the VC-H1's camera input allowed me to use my vacation videos as a picture source.

switch the mode back to Robot 36.

As with the operation of any SSTV system when using SSB, proper tuning of the operating frequency is imperative. Carefully tune in the pitch of the sending station's voice before they begin their picture transmission. Many of the existing software-based systems provide some form of tuning scope to facilitate tuning. Unfortunately, the VC-H1 does not. With a bit of practice, you should be able to maximize the number of pictures you successfully capture when using SSB.

I ran the VC-H1 and one of the most popular SSTV sound-card based software programs simultaneously using my Kenwood TS-570 transceiver. I found the ability of either system to automatically identify and synchronize to received pictures over a wide variety of signal strengths about equal. Curiously, while there were several instances where one system would receive a picture the other missed, neither system seemed to consistently outperform the other in this respect.

If you haven't yet tried SSTV, I highly recommend you consider it. Trading pictures locally over FM or long distance on HF is loads of fun! Members of our review team had a blast passing shots of family, homes, shacks and various personal treasures around. If economic considerations put the VC-H1 out of your present reach, and you have a computer in the house, get your hands on some software and give it a go. If you want a system that offers extreme portability, picture capture capability and freedom from the ubiquitous computer, the VC-H1 certainly deserves a closer look. For a more complete picture of the VC-H1, you can download a copy of the owner's manual at **ftp://ftp.kenwood.net**.

Thanks to Pete Budnik, KB1HY; Bill Moore, NC1L; and Larry Wolfgang, WR1B for their contributions to this review.

Manufacturer: Kenwood Communications Corp, 2201 E Dominguez St, Box 22745, Long Beach, CA 90801; tel 310-639-5300; fax 310-537-8235; **http://www.kenwood.net**. Manufacturer's suggested retail price, $585.

The M² 6M7JHV 6-Meter Yagi Antenna

Reviewed by Bart J. Jahnke, W9JJ
ARRL/VEC Manager

Whether you've been a 6-meter aficionado for many years, or are new to the "magic band," thoughts of the increased enjoyment that would come from adding a monster skyhook to your arsenal no doubt occasionally cross your mind. Granted, when 6 meters is open—and the propagation gods are smiling on you—a simple antenna and a modest amount of power will net you many enjoyable contacts. When the band is not wide open, however, or when longer distance E-skip, F2, TE, or scatter contacts are possible but weak, you might wonder how you can raise your presence on the band and participate in this exotic DX.

Bottom Line

A heavyweight performer with a lightweight design, the M² Antenna Systems 6M7JHV offers plenty of punch for the weak-signal 6-meter enthusiast.

One way to extend your available communications range without resorting to additional aluminum is to add an amplifier and a receive preamp. But a more economical and certainly more efficient way to improve your chances of working those signals down in the noise is through the use of a high performance directional antenna. The focused pattern of a highly directional beam will allow you to choose the direction of the sources and destinations of your signals with surprising accuracy. This review covers this method for enhancing the performance of your 6-meter station: adding a multi-element long-boom Yagi.

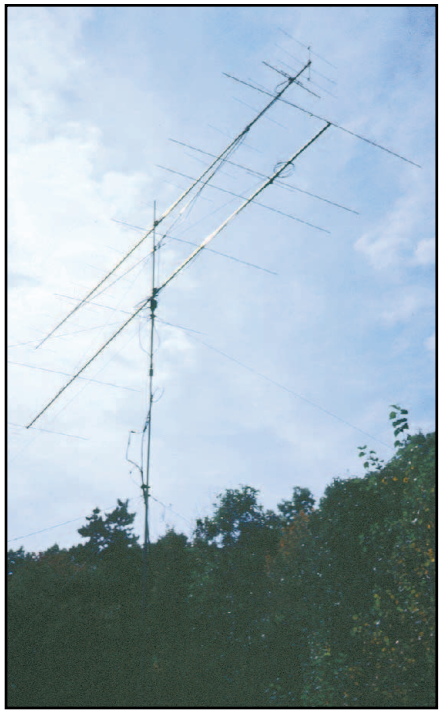
The 6M7JHV antenna is a mid-sized (in today's marketplace) 7-element Yagi constructed on a 30-foot 8-inch boom. The "JHV" in the model number refers to the fact that M² originally designed the antenna for Dave Batcho, N5JHV. (Dave has a high performance 6-meter station and uses several stacked 'JHV Yagis). What sets this antenna apart from other 6-meter Yagis is its light weight, clean pattern and performance characteristics carefully optimized for its boom length. These attributes make it an ideal choice in single Yagi or stacked array use for long-distance terrestrial, scatter or EME (moonbounce) communications.

One of the reasons I felt the 6M7JHV was right for my station was its performance to weight ratio. As you may be able to see from the photo, my antennas are mounted on a 36-foot tall steel push-up mast. With the combined weight of the push-up mast

Table 1
M² 6M7JHV 6-Meter Yagi

Manufacturer's Specifications:
Frequency of operation: 50.0-50.4 MHz

Number of elements	7
Longest element (half)	57.625"
Boom length	368" (30'8")
Weight	17 lbs
Wind load	2.5 ft² (85/mph)
Power rating	1500 W
SWR	1.2:1 typical



itself, the rotator, an additional 10-foot mast and my 28-foot long 2-meter Yagi, the 6-meter antenna I selected needed to be kept as light as possible without compromising performance for weight. The 6M7JHV, at just 17 lbs, seemed to fit my needs perfectly.

Antenna Assembly

When the 6M7JHV arrived in its 5-foot by 4-inch square shipping container, I began to wonder where the second box of antenna components had gone. Certainly an antenna as big as the 'JHV couldn't possibly fit in a box this small! Once I opened it up and began checking the contents against the parts list, it quickly became clear that all of the antenna's parts were neatly nested in this single package.

After locating the simple tools required, (Phillips screwdriver, a couple of wrenches and a tape measure) construction began. The boom is seven sections of 1 1/2-inch aluminum tubing, six of these with swaged ends for connecting them together. The sections are fastened together using two 8-32 stainless steel screws with elastic locknuts at each connection. (Stainless hardware is used thoughout.)

The elements are constructed of 3/8-inch aluminum tubing. Assembly involves identifying the correct length element halves for each of the seven elements, then bolting the halves to the machined-aluminum element mounting blocks with additional 8-32 screws and locknuts. Each completed element is then mounted in its proper location on the boom using similar hardware.

The screw that holds the driven element also secures the **T**-match mounting block to the boom (this assembly includes the feedpoint N-connector and comes completely assembled and weather sealed by M^2). A 1/2-wavelength RG-6 coax balun with O-ring sealed F-connectors is then attached to its connection points on the block. The balun coax is wrapped in a few loops and fastened to the boom using cable ties. Finally, two machined-aluminum **T**-match shorting blocks are slid onto the driven element tubes and smaller **T**-match tubes. These blocks are locked in place using setscrews. *Be sure to tighten these setscrews snugly*—I found that I hadn't tightened mine enough—resulting in one of the shorting blocks beginning to slide off the element and **T**-match tubing. (Fortunately for me this was quickly rectified because I was transporting the antenna to the mast at the time.) *Double-check the tightening of the setscrews!*

The mast-to-boom mounting plate and a turnbuckle mounting plate for the boom support system are aluminum. The included **U**-bolts will accommodate masts up to 2 inches in diameter.

After wrestling the antenna to its location and fastening it to the mast, I attached a length of quality low-loss feedline and positioned and secured the turnbuckle mounting plate. Final tension adjustments were then made to the Dacron cord boom support system, and the push-up mast was extended.

While transporting and raising the antenna, I inadvertently rubbed, banged and snagged the ends of the antenna on several small shrubs and tree limbs. The antenna proved quite resilient. Even when the most forward element appeared misaligned (more than once I might add) as soon as the impeding obstruction was detangled it sprang back to its intended position unscathed from the experience. Even a healthy bump to the most forward director did not damage it, the mount or the boom.

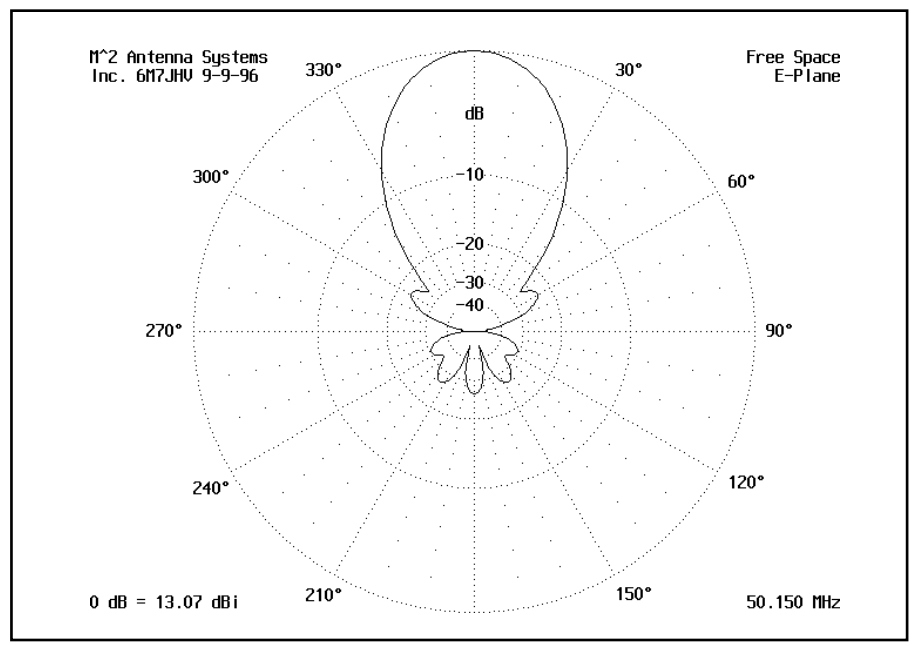
On the Air

The 6M7JHV is one of two antennas that I have for 6 meters. The other is essentially a stacked wire loop array (similar to the "Hentenna"). One of the first things I noticed when using the 6M7JHV is the antenna's ability to reject some nearby noise sources. I suffer from both power line noise and what appears to be one or more of my neighbor's poorly shielded computers. While my bidirectional loop array suffers from this man-made interference at nearly any beam heading, the 6M7JHV allows me to choose a broad range of headings where no noise is present.

The high front to back ratio and the clean, sharp pattern of the 6M7JHV helped me significantly during the ARRL September QSO Party. From my location in New England, a number of mountaintop contest stations are line of sight, and several local stations are within a few miles. The resulting QRM can easily obscure weaker signals. With the 6M7JHV, I found that there were several beam headings I could choose where stations with S1 or S2 signal strengths could be heard, and in most cases worked, even with my modest 100 W output. This was a considerable improvement over previous contest efforts using the loop array!

Fixed signal sources, such as beacons, also come alive with the 6M7JHV. A few of the 250-400 mile distant beacons could not be heard with the loops, they are now consistently present with the 6M7JHV.

While I have yet to try it, I hope to use the 'JHV to make an EME contact or two with a few of the largest 6-meter EME-capable stations in the coming months. (For this application, I also intend to increase my transmitter power output level to about



The E-Plane radiation pattern of the M^2 Antenna Systems 6M7JHV generated by the ARRL Lab using *Yagi Optimizer*. (Yagi Optimizer is available from Brian Beezley, K6STI, 3532 Linda Vista, San Marcos, CA 92069, tel 760-599-4962.)

600-1000 W and add a receive preamp.) Antennas of the 6M7JHV's boom length and performance category are probably close to the minimum single-antenna configuration capable of this mode (depending on the station power and antenna configuration on the opposite end of the contact). Stacking multiple 6M7JHV antennas and incorporating elevation control would yield a very capable EME antenna array allowing for consistent EME communications.

The performance of the 6M7JHV is optimized for frequencies between 50.0 and 50.4 MHz. In my case, I found the factory recommended initial match settings resulted in a nearly perfect SWR between 50.0 MHz and 50.15 MHz. SWR quickly climbs at 50.4 MHz and higher. The 6M7JHV and other high performance M² 6-meter Yagi antennas are primarily designed and marketed for the bottom (weak-signal portion) of the 6-meter band.

In Summary

The 6M7JHV features solid construction in an easily assembled package and meets the demanding needs for high performance in a wide variety of the weak signal challenges encountered in the lower portion of the 6-meter band. Its light weight and relatively reasonable boom length make it an excellent choice when tower, mast or real estate limitations prohibit stacked Yagis or longer (or heavier) antennas.

If you're looking to improve your existing 6-meter band performance, the 6M7JHV is worth serious consideration. By the way, if the performance or dimensions of the 6M7JHV don't meet your specific requirements, M² Antenna Systems offers several alternatives. Their product lineup includes a variety of 6-meter beam antennas that range in size from the 5-element 6M5 on a 15-foot 9-inch boom, to their 6M11JKV (designed for W6JKV) with a boom length over 69 feet! Designer Mike Staal, K6MYC and the friendly folks at M² Antenna Systems will no doubt be happy to discuss specific products or custom designs for antennas ranging in frequency from 1.5 to 3000 MHz that should fit nearly any need.

Manufacturer: M² Antenna Systems, Inc, 7560 N Del Mar Ave, Fresno CA 93711, tel 209-432-8873; fax 209-432-3059; **http://www.m2inc.com/**. Manufacturer's suggested retail price: $249

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

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
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.
Receiver	
Noise figure: Not specified.	2.9 dB.
Conversion gain: Not specified.	20.6 dB.
IF output: TV channel 2, 3 or 4.	As specified.
Transmitter	
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): 2.9×7.5 ×7.4 inches; weight, 2.9 lb.

gain antenna is the most critical asset. Using the W1NRE 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 back 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 W1NRE 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!

Manufacturer: PC Electronics, 2522 Paxson Ln, Arcadia, CA 91007-8537; tel 626-447-4565; **tomsmb@aol.com; http://www.hamtv.com**. Manufacturer's suggested retail price: $499. Add $20 for a second transmit frequency. QST