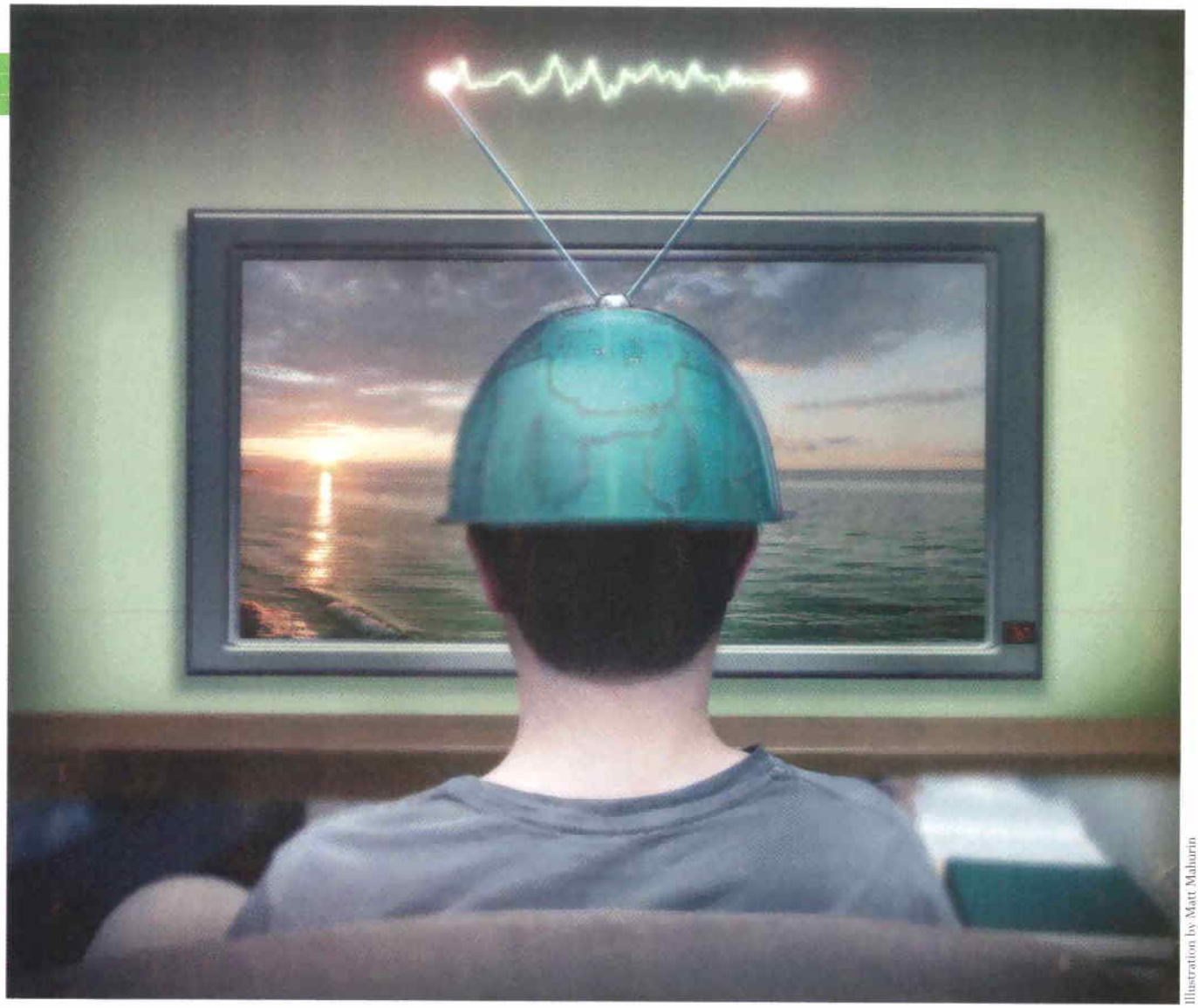


Illustration by Matt Mahurin

Indoor DTV Reception

Does it finally work? BY PETE PUTMAN, CTS, ISF

It seems like only yesterday that the first digital TV stations went on the air, way back in 1997. Time has sure flown by since then, with the original analog broadcasting shutdown date of January 1, 2007, pushed back a little over two years to February 17, 2009.

Now that date appears to be set in stone. Slowly and inexorably, we're heading for a massive change in the way television is broadcast all over the United States. All new TV sets must have digital tuners, including the smallest screens and (believe it or not) combination VCR/DVD players. DTV plug-in cards are widely available for computers, and there are still one or two DTV set-top boxes on store shelves.

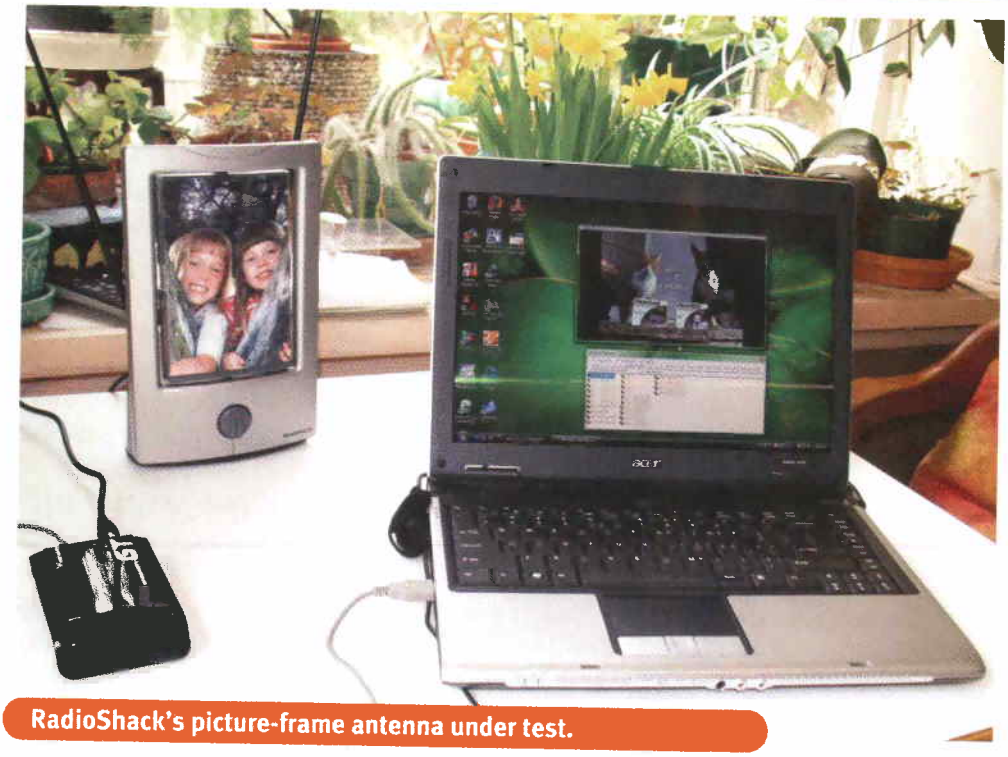
Ten years ago, reception of ATSC DTV stations was largely a black art. Early adopters fumed as signals popped in and out on their $2,000 set-top boxes. Expensive antennas fared no better than homemade paper-clip-and-coat-hanger designs in locking on to DTV broadcasts. Signal levels varied with the weather and time of day.

But that was then; this is now. All new DTV sets and the latest set-top receivers are using fifth-generation 8VSB technology, which is to first-generation sets what a Lexus is to a Model A. Multipath isn't the bogeyman it used to be for outdoor reception, and indoor reception has largely become a plug-and-play task—not plug and pray.

With that in mind, it seemed like a good time to run some updated indoor DTV-reception tests, using off-the-shelf antennas from RadioShack and online retailers. In previous tests, I had determined that signal strength was the key to reception. If they were strong enough, even third- and fourth-generation DTV receivers could successfully pull in signals with light to moderate multipath.

My evaluations of fifth-generation DTV receivers last fall showed a significant improvement over third- and fourth-generation models for outdoor reception, particularly in valleys and near tall buildings. Would it be possible for suburban and city viewers to simply stick any old antenna on a new HDTV set or set-top box and expect similar results?

For my first test location, I chose a suburban home about 7 miles from the DTV transmitter farm in Roxborough (Philadelphia), Pennsylvania. This location isn't atop a hill, nor is it in a deep gully. It is, however, surrounded by trees and other obstructions and doesn't have a clear path to the antennas.



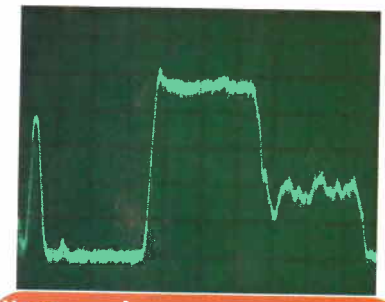
RadioShack's picture-frame antenna under test.

For the test, I selected five new DTV antennas, three of which came from RadioShack (Model 15-1868 Indoor Contemporary, $22.69; Model 15-1886 Indoor Picture Frame, $14.99; and Model 15-234 UHF Bow Tie, $4.19, all *www.radioshack.com*); one from AV Tool (ATSC 50, *www.avtoolbox.com*); and a prototype UHF panel antenna from Kowatec (no price yet, *www.kowatec.com*).

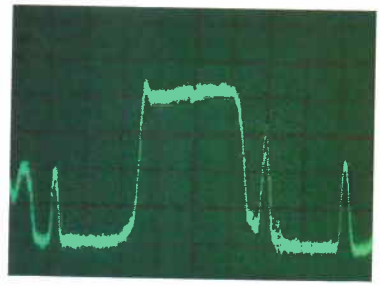
My receiver for these tests would be the OnAir Solution HDTV-GT ($179, *www.autumnwave.com*). This product uses a fifth-generation 8VSB receiver and connects to a standard PC or laptop through a USB 2.0 connection. The OnAir software allows you to not only receive a DTV station, but also record the SD or HD program stream to a hard drive for later playback.

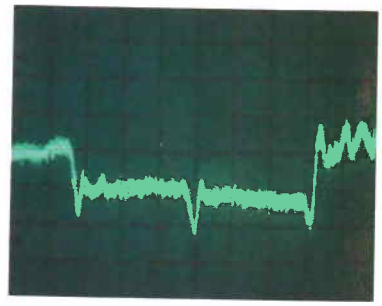
Kowatec's UHF panel antenna receiving a telenovela from WUVP-66.

The test location would be a ground-floor kitchen/breakfast room at the rear of the house, facing into the garage, a dense stand of trees, and several commercial buildings. For my tests, I placed each antenna on the table—sometimes laying them flat—and performed a channel scan to see what I could pick up.

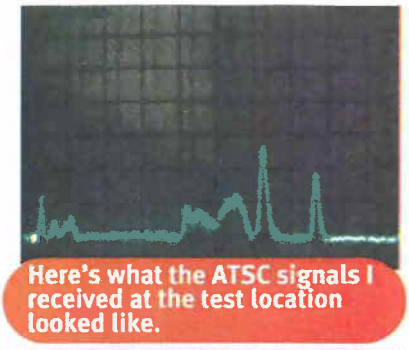


Here are what near-perfect ATSC digital TV signals should look like.

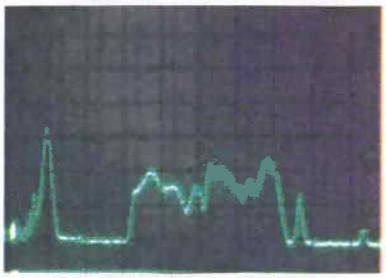


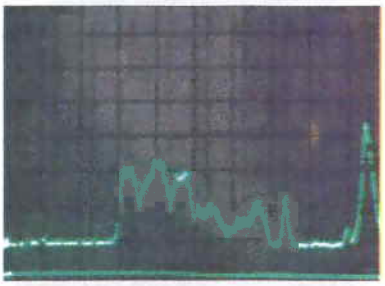


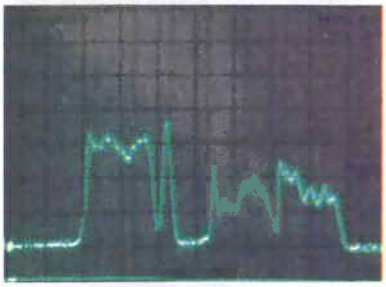
Indoor DTV Reception



Here's what the ATSC signals I received at the test location looked like.







I also watched each DTV station to verify clean reception for at least three minutes to ensure that there were no hits, no dropouts, and no MPEG glitches. There were 12 DTV stations on the air during my test, eight of which broadcast HDTV programming at some point during the day.

The results were gratifying, to say the least. With RadioShack's plain-vanilla UHF bow-tie model draped over the front of the kitchen's small LCD TV, I was able to receive nine of the 12 stations reliably, including the major networks (ABC, CBS, Fox, NBC, PBS, and CW) and a handful of smaller networks (ION, Trinity, MyTV, and Univision). Reception was strong, despite severe multipath echoes as deep as 16 decibels.

The indoor picture-frame antenna did slightly better. It pulled in 10 of the 12 stations reliably, despite multipath echoes to 22 dB. So did the contemporary UHF antenna, aided by its 12-position phasing switch. Kowatec's prototype UHF panel antenna did best of all; it pulled in 11 of the 12 stations reliably.

The AV Tool ATSC-50 UHF panel antenna was the only model in the test that used a built-in amplifier. It didn't seem to help much, though, as the antenna only pulled in eight of the 12 active stations reliably. The problem with amplifiers is that they can often make things worse, amplifying interference and sometimes creating their own unwanted signals. That was probably the case in this instance.

I ran a second set of tests in an upstairs bedroom with similar results. The Kowatec antenna performed best, even with low-level signals from New Jersey Public TV station WNJS in Camden, NJ (10 miles distant) and Lenfest Broadcasting's WMCN (a home-shopping and infomercial channel), located about 20 miles away.

For my final set of tests, I took the Kowatec antenna with me to the 2007 Home Entertainment Expo in New York City. My hotel room was on the seventh floor of the Grand Hyatt hotel, next to Grand Central Station. It had an obstructed view of the other side of the hotel, looking east down 42nd Street.

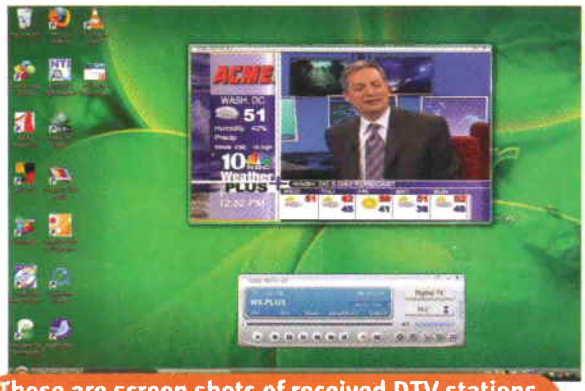
The results were comparable to those of my suburban Philly tests. Of 12 active DTV stations broadcasting from the Empire State Building and the Conde Nast building at 4 Times Square, I was able to receive each one reliably. During my presentation the Saturday morning of the show, several floors down on the conference-room level, I was able to pull in all four of the five major networks and two of the minor networks using the OnAir Solution HDTV-GT. In both locations, analog TV reception was extremely noisy, or nonexistent.

I gave things one more quick try the following Monday, just down the street at the Westin Hotel on Times Square where Mitsubishi was staging their 2007

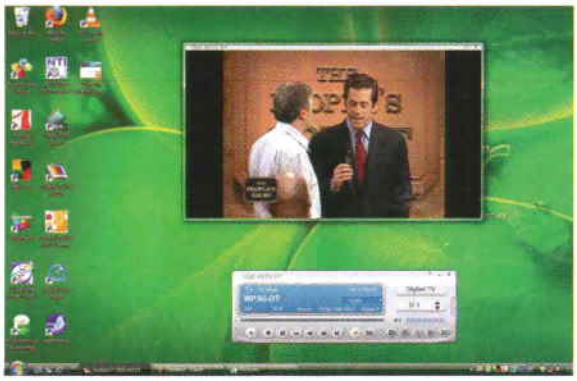
RadioShack's contemporary antenna is a work of art.

AV Tool's ATSC-50 amplified antenna is quite small.

Indoor DTV Reception



These are screen shots of received DTV stations as seen on my Acer laptop.



I conducted my indoor DTV reception tests in the rear of this house, about 10 miles from Philadelphia DTV stations.

line show. Setting up on a third-floor banquet table, I quickly found out that analog TV reception wasn't possible, nor would my cell phone work in this particular location.

Even so, I managed to pull in WFUT-DT on UHF channel 53 from 4 Times Square quite nicely. When I moved closer to the windows, I got several more DTV stations from Empire, including WABC, WCBS, and WNBC.

Does this mean we're finally out of the woods with indoor DTV reception? It would seem that way, especially if the signals are strong enough for those workhorse adaptive equalizers in every DTV receiver to work their magic on echoes and multipath. Of course, this doesn't mean that every indoor DTV reception problem is now solved. Some locations may still have difficult reception due to interference, severe multipath, or low signal levels.

But those folks who have second, third, and fourth TVs scattered aound their homes might just be able to chuck the extra cable or satellite box, particularly if they live less than 10 miles from the transmitter site. And, if they are true HDTVs, watching free over-the-air HD programming is just icing on the cake.