PCARA Update

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Mobile at last

For the first time in almost four years there's a mobile radio in my car; KB2CQE Mobile rides again! Why almost 4 years? Well, these things just take time. You have to figure where you're going to mount the radio, where to mount the control head, how to run the wires, where to mount the antenna etc., all without trashing the vehicle too much. I managed to finally get it all worked out!

Kenwood TM-V7 control head, newly mounted in the KB2CQE vehicle.

As you probably know, there has been some repeater work going on at the Putnam Valley site. Both the 2m and 70cm repeaters at that location require some infrastructure upgrades in order to keep running well. This will involve the club spending some funds to accomplish this. We will be discussing these expenditures at our October Meeting, so please come and join us.

I hope to see each of you at the October 7th meeting at Hudson Valley Hospital Center at 3:00 pm.

-73 de Greg, KB2CQE

Are you a member?

Joe, WA2MCR points out that if you have not paid your 2007/2008 dues yet, then your subscription to PCARA is very much due. Membership renewal letters were sent out in May. The application/renewal form is also available at http://www.pcara.org/application. If members have not sent in their dues yet, please remember to do so.

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I Own A Polar Bear!

What weighs a thousand pounds, comes out only at dawn and lives for Morse code? It's Brutus, the silly polar bear. Born in January, 2003, his natural habitat is on shortwave radio. Brutus lives in Northern Westchester, right outside of New York City. He has also been sited at the home of a fly-fishing lawyer in Savannah, Georgia. We are never sure what he will do next, but he is always out of control ready for comic adventure!

Brutus had an unusual beginning. Believe it or not, in the year 2007, there are still many people who communicate with Morse code. Most all of them are ham radio operators who always seek new adventure and fun. It's not easy to become fluent in Morse, and newcomers cringe and pale when faced with fast-paced dits and dahs from afar. To keep the Morse community fresh and alive, several enthusiastic clubs actively train others in this skill.

One dominant club is called Fists, (referring to the anatomical part needed to operate a key.) I met Gil, callsign KG4VCG, through the Fists' tutorial Code Buddy program. Gil was learning the code and I was his teacher. It all started, via shortwave radio, in the first days of 2003. We mutually decided to meet on the air daily at 5:30 a.m., right before we both left for work, to practice Morse code on the air with our amateur radio transmitters. At first, it was rough going. I had to send very slowly to Gil so he could register each character accurately. Not much was said, but we were communicating! Gil's comprehension improved rapidly, and before long, the basic material was not enough to fill a conversation. After a basic exchange of name, location and signal strength we needed more to talk about!

Suddenly, Brutus was born! One technique I had used with other Morse code students was to send text that was highly illogical. It demanded that the student receiver of the coded message be very accurate in their "copy." One morning, I told Gil I had a big, white and furry visitor sitting next to me. He was kind of a big guy and really liked to eat nearly anything he could. His name was Brutus and, by the way, he was a polar bear!

Gil was very cool about this! He understood my goofy message word perfect! His response did not miss a beat: "OK on the bear. I'll send up a bucket of fish!" This story went on for days and days and the story grew. "When will the fish get here?" I cried. "The bear is getting really cranky!" I can only imagine what passersby must have thought if they were casually reading our "mail." Was this a spy operation speaking in a cryptic code?

Over the next few weeks of practice, the stories became more and more elaborate. Brutus the polar bear participated in a parade in downtown Savannah, took a specially-arranged plane trip up to New York City and befriended a group of nuns who adopted him and tried to provide him with spiritual guidance. The amounts of fish and ice Gil and I needed for Brutus' well-being were enormous.

We started to build a small audience. When Morse code operators sign off, they often use a quick signature borrowed from the classic vaudeville jingle of closure. One station sends (in Morse code dits) "shine and a haircut" and the other station replies "two bits" (dit dit.) When other stations were listening in, they will also sign "dit dit" to indicate they were monitoring the conversation. I heard extra "dit dits" more and more often as the adventures of Brutus continued.

Gil Stacy, NN4CW

In the end, Gil became the finest student I had ever tutored. I must have had quite an influence on his perspective on amateur radio. Gil changed his callsign from KG4VCG to NN4CW. This was quite an honor for myself and Mr. Morse! NN refers to the U.S. Navy where many of the finest telegraphers practiced their trade. CW stands for Continuous Wave, the kind of radio signals telegraphers send through the air. Gil kindly sent a couple of momentos of thanks for my tutelage: a Navy sparkproof Morse code key and a keepsake tie clip, in the shape of a code key, embellished with the old logo of RCA (The Radio Corporation of America.) I will always treasure these gifts!

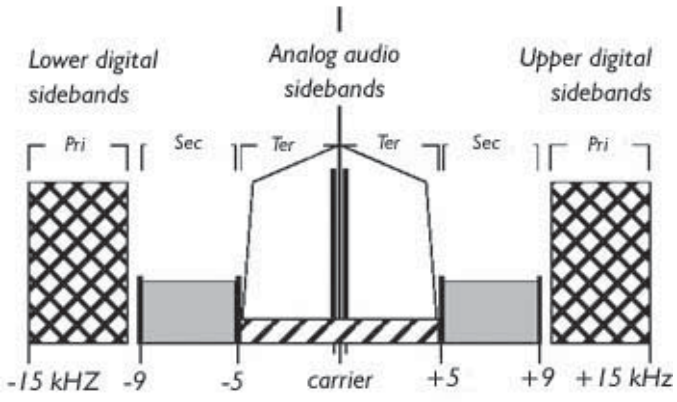
RCA tie-clip

Brutus lives on to this day! Gil and I still mention him frequently in our e-mails and, of course, any time we meet on the air. Pass the seal meat and fish and shovel the ice! Here comes the polar bear of the airwaves! If you are lucky, maybe you'll hear us talking about him someday (especially if you understand Morse code!) For more information regarding the Fists club, surf to: http://www.fists.org.

Night of the Bees

Radio listeners across America are trying to hide from a monster, but there is no shelter. After spending its adolescence in technical trials during daytime hours, IBOC has now come out at night. IBOC is the acronym for in-band on-

channel, a method of sending digital audio along with old-fashioned analog radio signals. It's marketed, confusingly, as HD Radio. In theory, HD Radio should be transparent to the end user listener. In reality, the system is anything but on-channel. It actually uses about five channels to convey its information.



Frequency spectrum of IBOC AM HD Radio. Signal carries simultaneous analog audio (5 kHz) plus digital sidebands. Especially at night, the digital sidebands can cover up weaker AM signals on the adjacent channels, spaced at every 10 kHz interval.

For example, in New York City, WOR broadcasts on 710 kilohertz. When it turns on its IBOC equipment, the digital noise it produces can be heard on 690, 700, 720 and 730 kilohertz with a reduced fidelity analog audio signal remaining on 710. During the daytime, AM radio signals only travel, at best, 100 miles, so the effects of IBOC's digital noise are somewhat contained. At night, AM radio signals can be heard long distances from their origin. With thousands of AM stations broadcasting simultaneously every night, the result is a chaotic soup. Now add wideband digital noise via IBOC. Only the very strongest signals can survive to provide useful reception.

Adding to this problem, the receivers that can decode HD Radio require a very potent signal to resolve digital audio. The end result can be digital audio delivered via the AM band, but it is only available to a limited audience with close proximity to the broadcaster. So many of us hear the noise, but so few of us can hear the intended clear signals! It sounds like a thousand bees relentlessly heading in your direction!

The signature of AM radio has always been highly reliable and resilient long distance communications. With the advent of HD Radio, AM has been scaled back to a local medium with limited distribution. Shows that enjoyed nearly nationwide coverage, like WSM Nashville's Grand Ole Opry, are being shattered by all the new interference produced by the wideband nature of HD Radio.

HD Radio broadcasters are also in conflict with themselves. CBS owns both KDKA 1020 Pittsburgh and WBZ 1030 Boston. AM radio DXers have noticed that both stations have only been operating their HD Radio equipment irregularly at night trying to reach a compromise to keep both station's coverage area whole. We have met the enemy and he is us! The effects of HD Radio interference may be the final death blow to struggling small local radio stations trying to compete in very difficult market situations. This noisy hash may extinguish all hope of local stations being heard in the clear ever again.

A similar IBOC system is being used on the FM band. FM allows for more bandwidth allowing IBOC stations to broadcast more than one audio source on their frequency. Noise to neighboring channels is similar, but the relative short range of FM contains the mêlée. The FM version of HD Radio also requires a very strong signal to be decoded. Reception can be finicky in nature. These signals need to be received perfectly to provide the intended results to the consumer.

HD Radio may be a short term band-aid for aging over-the-air technology. Multi-channel digital satellite radio and WiFi-delivered radio and television will probably be the standards for the future. Large conglomerate broadcasters, who own hundreds or thousands of stations, are desperate to counteract the onslaught of competition from the Internet, iPods and various other methods of streaming. It seems ironic that the industry that insisted on narrowing the fidelity of AM radio to 10 kilohertz over a decade ago to clean up adjacent channel interference now allows 30 kilohertz or more bandwidth to compete with other digital media!

AM DXers are hoping that two strategies may help silence nighttime HD Radio. The rallying cry has already begun to complain directly to the FCC and the offending broadcasters about the reduced coverage and noise that HD Radio brings. Possibly more significantly, our neighbors in Canada and Mexico are not yet participating in HD Radio or endorsing its use. The deluge of interference American HD broadcasts inflict on their signals may create quite a dilemma that can only be solved by silencing HD's use at night. Time will tell! If you notice new broadband noise on AM radio, you are probably listening to the sound of 'progress!' Stay tuned, (if you can stand it!) Even better, hear it for yourself at: http://www.wysl1040.com/media_files/wysl/IBOC_OBSERVATIONS.mp3

See more from N2KZ at: http://karlzuk.blogspot.com.

Until next month, 73 de N2KZ
"The Old Goat" dit dit

Repeater Basics - N2CBH

Last time I described some recent changes to our 146.67 and 448.725 MHz repeaters. I am happy to report that the changes in August provided mostly positive results. To help understand these changes, let me go back and describe some repeater basics.

A repeater — as many of you know — receives a weak signal on one frequency and retransmits the same signal on another frequency. There are two types of conventional repeater systems that do this. An FM repeater such as ours receives the FM signal, decodes it to recover the audio and then feeds the audio from the receiver to the transmitter for rebroadcast. A second type of system is called a linear translator repeater.

Linear Translator

This type of system receives the weak signal and then by use of the heterodyning principle converts the incoming frequency to a different output frequency. This is a novel approach and has several advantages over a conventional FM repeater in that a receiver is not needed and the actual translating mixer is a linear device, so that it can repeat any type of signal presented to it. This includes CW, AM and SSB signals. This is the type of repeater the popular Oscar satellites have on board.

There are some drawbacks too. The linear translator is also an RF amplifier and needs to run in linear mode in order not to distort incoming linear modulation signals like AM and SSB. This means that the amplifier used must be low distortion and therefore less efficient than an FM system. They are inherently more wideband and therefore will repeat nearly anything in the pass band.

FM Repeaters

A little more detail is in order about FM repeaters, which are commonly used by amateurs and commercial operators. An FM repeater consists of a receiver, controller, transmitter, filter network and an antenna system. Most repeaters use a filter network, also known as a duplexer, to combine the receiver and transmitter together so that one antenna can be used for both. This is done mostly for economic and space saving reasons. One antenna is cheaper than two and one antenna uses less room.

Duplexer

The duplexer is an important part of a well-designed repeater. It has to isolate the high powered transmitter signal from the receiver input so that the receiver can have a wide enough dynamic range to hear the weakest signals. In addition, the duplexer functions as a filter to prevent out-of-band signals from appearing at the receiver and the transmitter. At the receiver this

Part of the six-cavity duplexer currently in use on the 2 meter test repeater. Bob N2CBH was able to tune this set of cavities to 146.67/146.07 MHz.

is important because a strong signal — even out of band — may cause the receiver front end to overload, rendering it deaf to extremely weak signals. The transmitter's signal, if not sufficiently suppressed by the duplexer, can cause the same problem. This is commonly referred to as desensitation, desensitization or "desense".

Desirable attributes in a repeater receiver include good sensitivity and better than average selectivity. Good repeater receivers today use double conversion techniques or a band-selective preselector which is essentially a tight band pass filter allowing only the desired receive frequency to get through. Other signals are attenuated so that they do not drive the receiver front-end into compression. Good sensitivity assures even weak signals will get through.

The transmitter needs to amplify the signal while at the same time not adding any additional signal components to the output. Most FM repeaters use class C amplifiers in the power output stage and class C amplifiers run in a non-linear mode that can cause distortion products to be added to the output signal. These signals are formed when the desired output signal mixes with an unwanted signal that appears at the power amplifier (PA) output. This signal can be of any frequency and can be fed into the PA through the antenna connection. The duplexer is designed to filter out these signals but sometimes it needs a little help from a device known as a circulator.

Circulators

A circulator is a three port device that has an input to which the PA output is fed. The next port around the "circle" is the output that is connected to the antenna. A third port is known as the load port, to which a 50 ohm dummy load is connected. Imagine the circle I just drew to be a clockwise system whereby the PA output travels in a clockwise direction until it reaches the antenna. The circulator has another function as well. Imagine an interloping signal fed in from the antenna appearing at the antenna port of the circulator. It now moves in a clockwise path to the circulator load whereby it is absorbed. This way the offending signal never appears at the PA so there is no mixture of signals.

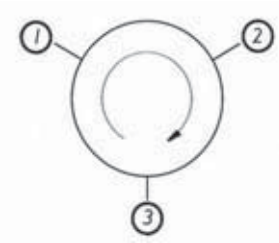


Diagram of a 3-port circulator. Signals can only travel clockwise from port 1 to port 2, port 2 to port 3 etc.

The circulator load has another important function. If the antenna were removed from the system and the transmitter keyed, normally this would cause an infinite VSWR. Without the circulator this high VSWR would appear on the feeder connected to the power amplifier. Instead, the reflected wave coming back from the antenna line travels in a clockwise path to — you guessed it — the circulator load. If the load is large enough it can absorb the entire reflected signal, thereby protecting the PA from heat damage. Circulators use a ferroresonant technique for their operation. The theory behind how they work is a bit beyond the scope of this article but if you are interested in this technique do a Google search and you will find lots of information on the subject.

Circulator and dummy load on 2m test repeater.

Repeater antennas

A repeater antenna is something that should be given careful consideration. I must confess that this advice comes from hard experience in how "not to" choose the proper repeater antenna. First, the type of antenna chosen will have a lot to do with the terrain and the intended purpose of the repeater. Smooth terrain allows for high gain antennas to be effective. Lower gain antennas usually work better in rough terrain such as found in the lower Hudson valley. The reason is that a lower gain antenna forces more signal down to earth, filling in those pockets and valleys that we are all familiar with. A high gain antenna will tend not to put as much signal down in the canyons and can cause a repeater to be ineffective particularly in local proximity to the repeater location. 5.5 dB is considered moderate gain and useful in rough terrain areas such as ours and is what is in use at the new repeater site.

Bandwidth of the antenna is another important consideration. Many vertical antennas on the market for amateur VHF use tout wide bandwidth as a virtue. For repeater use wide bandwidth can cause inappropriate signals to more easily get back into the system and mix in the PA. So a more appropriate choice for repeater use is a narrow band type preferably tuned to the desired 0.6 MHz region where the repeater will operate. Physical integrity of the antenna and its feed line is also an important consideration. Light duty antennas such as found in the pages of *QST* might offer good performance for low cost, but they are not appropriate for repeater use because they do not stand up to the elements as well as a commercial-grade antenna. Examples of commonly used repeater antennas include the venerable RF Systems Station Master series and folded dipole arrays made by companies such as Sinclair.

Where's dipole? The repeater antenna for N2CBH/R is somewhere in this picture, hiding among several others.

Some repeater installations actually use separate receive and transmit antennas. If the budget will allow it and there is enough room on a tower, two antennas — like heads — are better than one. If you separate the antennas physically by say 30 or more feet for a VHF system you can gain approximately 20 dB more isolation between the transmitted signal and the receiver input. This is a 100 fold increase in isolation! Unfortunately, most systems don't have the luxury of being able to support separate antennas. Another way to get more isolation is to use more cavities in the duplexer. The disadvantage of this is increased loss. A good compromise can be made by using a sensitive receiver and a clean transmitter.

In Control

I have so far talked about the essential parts of the repeater system but there is one more part that is needed. The interface between the transmitter and receiver is called a repeater controller. It serves a couple of important functions. The controller normally takes the unfiltered discriminator audio output from the receiver and processes it for application to the transmitter. First, if the repeater is operated using a continuous tone coded squelch system or CTCSS tone, the controller decides whether the incoming carrier is valid by comparing the incoming tone to the one stored in memory. If all is OK it then opens the squelch and allows the audio to be presented to the transmitter. At the same time, the controller issues a push to talk or PTT signal to key the transmitter.

Pacific Research Solutions repeater controller in the 2 meter test machine is shown arrowed.

If the repeater is operated in CTCSS encode mode, the controller will apply the intended tone to the transmitted audio, along with the audio from the receiver. One more thing the controller does is to band-pass filter the audio to pass 300 Hertz to about 2.5 kHz response and add pre-emphasis if desired. Pre-emphasis is a technique whereby the audio frequencies above 1 kHz are boosted in level upon transmitting. At the other end the receiver has a complementary de-emphasis circuit to drop the level back so that the audio response is flat. This is done so as to increase the signal to noise ratio of the received signal. The high frequencies are boosted above the level of noise in the system so that they can be decoded at the other end.

Many of you may be familiar with Dolby noise reduction which works in a similar manner. The Dolby system is an active one using compressors at one end and expanders at the other end. Pre- and de-emphasis used in two-way radio and FM broadcasting is a passive system using only resistors and capacitors to accomplish noise reduction. Many think that Ray Dolby actually invented this technique but he didn't. He stood on the shoulders of Edwin Howard Armstrong, the inventor of FM and pre-emphasis noise reduction techniques. Dolby's techniques are more advanced than those developed by Armstrong in the 1930s, but it is essentially the same complementary idea.

What I have described above are the essential aspects of what the controller should do. Modern controllers have other functions including telephone interfaces, which allow for phone patch operations. Identification and time-out timing are also performed by a modern controller.

Most of us have used repeaters for years and perhaps not thought too much about how they work or what it takes to build a well-performing system. I hope that this article has shed some light on repeater operation.

- 73 de Bob, N2CBH

VHF activity

Ray, W2CH reports taking part in the Fall 144 MHz Sprint contest sponsored by the Southeastern VHF Society, 7-11 p.m. local time on September 17. W2CH worked K1TEO and KB1DFB in Connecticut, plus N2GHR in Suffolk County. Best DX was WA3FGK near Wilkes Barre, PA.

Discone antenna atop W2CH M² 3 element 6 meter beam.

Ray received the certificate shown alongside for first place in New York in the SMIRK (Six Meter International Radio Klub) QSO Party contest that took place on June 16-17. Congratulations Ray! For more details, see http://www.smirk.org/

PCB to SDR –

A Software Defined Radio Project - N2EAB

It all began so innocently, what started as an exercise in learning, using and adopting new homebrewing construction methods turned out to be a project that took on a life of its own…

Quite some time ago I had taken interest in an easier method for homebrewing printed circuit boards. There is quite a bit of information on the Internet in regard to this and many forums dedicated to PCB making. Having monitored various forums and digesting all that was offered, I decided to try my hand at the toner transfer method.

I won't go into the details of this process but basically it involves printing the reverse image of printed circuit art work to paper using a laser printer, then transferring the toner from the paper to a blank copper PCB by using heat and pressure.

Homebrew circuit board as used by N2EAB in his latest construction project.

After some trial and error with this process, I found what appeared to provide good results at laying down intricate circuit patterns on to copper board. Not wanting to waste copper boards in the etching experiment phase, I figured I should etch something that would make for a good project, but what? Having previously built the SoftRock 40 and a direct conversion DRM receiver, both fixed frequency devices, I thought it would be nice to have something that could cover more of the radio spectrum.

Surfing the web brought me to the Elektor.com site where there was just what I was looking for in their May 2007 issue, a USB controlled 0-30 MHz Software Defined Radio. All of the plans were available for downloading, including the PCB artwork and software to program/control the receiver. If the PCB construction proved adequate and the parts were obtainable, then why not build it?

The PCB turned out ok, not perfect, but good enough for me. Parts were ordered, weeks went by before all were on hand. Two of the integrated circuits were very fine pitched surface mount devices, of the like I have not dealt with before. After much trepidation and with the help of strong "optical enhancers" these parts were soldered to the board along with the standard through-hole parts.

Power was applied and voltage tests showed all was well, so connecting to my PC via the USB port was next. The EEPROM was programmed with the appropriate software, but the receiver seemed deaf when connected to an antenna. Some troubleshooting and a few days later, it was decidedly found to be construction errors, a very fine unetched trace bridging part of the signal path to ground, and an IC pin that should have been grounded.

Hmm - guess the initial optical enhancers weren't strong enough.

Solving these problems brought the receiver to life. I couldn't stop playing with this new toy. A week passed and I figured it was time to put this neat receiver into an enclosure. An old Commodore printer interface had just the right sized enclosure for this SDR.

A brass panel was fabricated to allow mounting an RCA jack for the antenna input and provide some additional PCB protection.

There are several SDR control programs available and others being developed. G8JCF's software is my favorite to date, it allows you to program, calibrate,

G8JCF SDR software controlling the Elektor receiver.

configure and control the SDR.

Where the SDR really shines is in receiving DRM (*Digital Radio Mondial*) broadcasts.

Another software program is necessary to decode these signals — *Dream* is available and what I've been using. Use of the G8JCF and Dream software simultaneously proved to be too much for my 850MHz Athlon PC. However, once the receiver frequency is entered

Dream software receiving DRM broadcast

using the control software, that program can close and the Dream software opened, the old PC worked fine.

Once all of this testing proved to not blow up my PC, I of course installed all the applications to my screaming duo-core laptop, which lets me run everything at once and more.

As you can see, one thing has led to another where I have touched many different aspects of technology, learned quite a bit along the way and am sure will continue to do so.

Radio sure is fun!

73 de Mike N2EAB

Twisted Vista

If you are reading this edition of *PCARA Update* then it means a transition has 'successfully' taken place at your editor's shack.

That transition involves the arrival of a new PC… running Microsoft Windows Vista and Office 2007. My previous desktop PC has been running Windows XP for five years… and Windows XP has been around for nearly six years… practically a lifetime in terms of personal computer software. Issues of the *PCARA Update* from Dec 2002 were all produced on that trusty old XP system, using Adobe Pagemaker.

The first thing I found when connecting my new PC together was all the things that were *missing*. Gone were the serial ports, parallel port, floppy drive and VGA connector. In their place were lots of USB ports for external devices such as printers, and a 24-pin DVI

Inside the new PC. The thick red 'spaghetti' strands are SATA cables connecting the hard drives and DVD drives to the motherboard.

connector (digital visual interface), for connection to the LCD flat panel display.

Another item that was missing was anything with an IDE (Integrated Drive Electronics) connector and flat ribbon cables. Instead, the two hard drives and the DVD/CD-writer were connected with tiny SATA cables (Serial ATA) as opposed to the old parallel ATA ribbon cables used with IDE. (ATA = Advanced Technology Attachment)

Wireless mouse and keyboard operating on 2.4GHz may let you share your typing with the neighbors.

The new PC also came with a wireless keyboard and mouse, operating on 2.4GHz through a special USB adapter. Two things caused me to give up on the wireless keyboard – one was the awful layout and "dead" feel to the keyboard. I still prefer the "clacky" keys of a classic IBM keyboard, which always remind me of a Selectric typewriter. The other reason was security. There are stories of HP wireless keyboards in Norway mysteri-

ously typing text on a *neighbor's* PC! HP's advice at the time was to check with your neighbors in a 100 meter radius then change your keyboard to a different wireless channel! No thanks, I think I'll stay with a wired keyboard for now.

With the hardware all connected, it was time to take a look at Microsoft's latest operating system — "Windows Vista". If you were thinking about a Vista upgrade for your existing PC, my first word would be – don't! Vista needs some pretty powerful hardware to operate well… at least 1 gigabyte of memory, a state-of-the-art graphics adapter and a very fast hard disk are a good place to start. Even with fast hardware, Vista crawls along. My old PC running Windows XP starts faster, feels livelier and shuts down much faster compared to Vista running on my latest 2007 PC with its Intel Core 2 Quad processor. Some have complained that Microsoft so overloaded Vista with digital rights management software that it can hardly keep up with everyday tasks.

By the way, Microsoft is quite serious about safeguarding its *own* digital rights… you need to register legitimate copies of Windows Vista and Microsoft Office 2007 on a single set of hardware to keep the Legal Microsofties happy.

The next thing you'll notice about Vista is that the Windows sounds are very quiet – too quiet for my ears. If your PC is about to do something awful, then you need a warning sound that will grab your attention, and not a feeble 'baaa' that sounds like a faraway sheep on a distant hill. I've already mentioned the very long startup and shutdown times for Vista—Microsoft's remedy for these problems is to leave the PC running continuously, and simply send it to "sleep" when you are finished using it. The actual "shut down" choice is hidden away, unless you change Start menu settings.

In fact, a whole slew of settings that we were familiar with in Windows XP have been hidden away. Microsoft seems to have tried to push lots of things – including disk defragmenting – into the background so everyday users don't need to worry about them. This is all very well, but it becomes far more difficult to check whether things are working correctly.

Another major problem with Windows Vista is hardware and software compatibility. As with past Windows upgrades, Microsoft has done its best to make sure that Vista works well with previous versions of popular software – and failed miserably. Device drivers for older hardware are missing or forgotten. I have a Netgear network print server that is no longer supported by the manufacturer. I persuaded it to work with Vista but only after much research and heartache. I also have the very last version of Pagemaker, designed by Adobe to operate with Windows XP. It is not supported under Vista and crashes every time I exit from the program. And don't get me started on the accompanying version of Acrobat Distiller. It's a miracle that the September issue of the *PCARA Update* appeared at all!

Microsoft made sure that its own software was compatible with Vista — the latest version of Office 2007 is all new — and not in a good way. Microsoft Word, Excel and PowerPoint all have new interfaces. Gone are the tiered "File" menu, "Edit" menu and "Help" menu. Instead, the "ribbon" at the top of the screen is supposed to offer a host of relevant options depending on your current needs. In my opinion, this is the dumbest thing Microsoft has done in a while. Millions of people know how to do hundreds of things with the old-style Office menus, but those choices are now buried or missing altogether. Where is "Edit" –>"Undo" when you need it? Gone! Instead there is a tiny blue arrow on the "Quick access toolbar" at the top of the screen. What good is that when you are trying to help somebody over the phone or through an e-mail?

Perhaps we will all have to get used to Vista and Office 2007 — the combination comes with most new PCs today and Microsoft has been pushing hard since the end of 2006 for manufacturers and users to switch… but on September 28, Microsoft relented and said it would extend availability of the full version of Windows XP for PC manufacturers and retailers by a further five months, until June 30, 2008. Independent firms can continue to offer Windows XP as an option until 30 January 2009.

So perhaps we'll see Windows XP around for a couple more years. Apart from the fancy graphic interface, the present version of Vista offers few advantages for everyday computing, and a whole slew of problems.

- Ye editor

Holiday dinner

Ray W2CH and Marylyn KC2NKU have already contacted "At the Reef" restaurant regarding PCARA's 2007 holiday dinner, scheduled for Sunday December 2. If you would like to make an early booking, please contact Ray and Marylyn. Here is the menu.

MENU

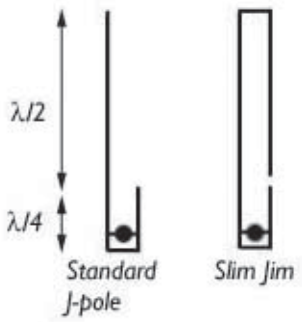
Tossed green salad

Choice of entrées with Baked Potato and Vegetable:

Prime Ribs of Beef
Chicken Cordon Bleu
Boneless Breast of Chicken Marsala
Broiled Stuffed Filet of Sole
Broiled Filet of Salmon
Penne à la Vodka with Chicken <- New!
Cake of the Day, Coffee or Tea

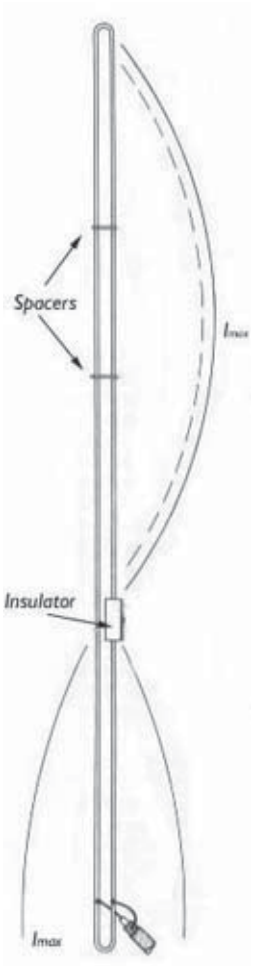
Simple Slim Jim

Some PCARA members have been looking for a simple 2-meter antenna that could be erected in the clear to reach the new test site for the 146.67 MHz repeater. For people around Peekskill, distance to the new machine has roughly doubled, from 3½ to 7 miles.



One solution is the J-pole. This antenna consists of a vertical half wave of wire or tubing, which is end-fed using a quarter wave matching section. The shorted matching section, with the half wave radiator sticking up on one side, looks like a large letter "J", hence the name.

Another antenna worth considering is the "Slim Jim". This modification of the J-pole was devised by Fred Judd, G2BCX and published in *Practical Wireless* in April 1978 and in the "Two Metre Antenna Handbook" (Newnes, 1980).



Slim Jim antenna has a folded ½ wave radiator above a ¼ wave matching section.

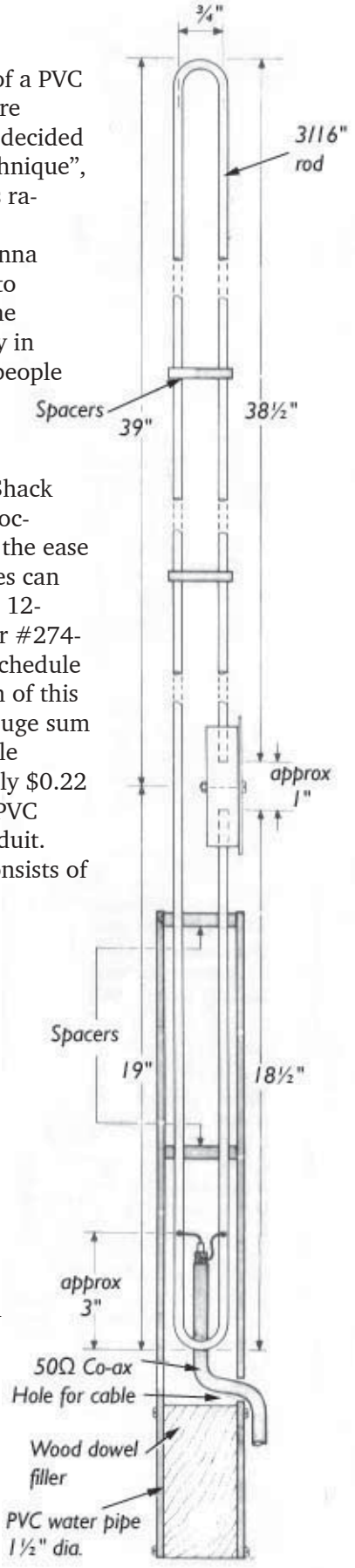
The Slim Jim design replaces the single, vertical half-wave element of the J-pole with a folded half-wave, which is left open at the lower end. The antenna was christened a "Slim Jim" because it is so slender—no ground plane elements are sticking out—and it has a "**J**-type **I**ntegrated **M**atching stub".

Does the folded radiator give any great advantage? L.B. Cebik, W4RNL has an article "What is a Slim Jim?" on his excellent web site http://www.cebik.com/vhf/sj.html. W4RNL's analysis with NEC suggests that an optimized J-pole and a Slim Jim have similar performances, including the low angle of maximum radiation. There may be a somewhat wider bandwidth for the Slim Jim.

Slim Jims have been constructed in a variety of ways. The original design by G2BCX employed metal rod or tubing, supported at the base in a plastic pipe, with the top element exposed to the air. (See the Slim Jim diagrams on this page, adapted from the originals, with the metric dimensions converted to U.S. inches.) Other constructors have made Slim Jims out of 300 ohm ribbon cable, out of 450 ohm ladder line, out of insulated wire wrapped around the *outside* of a PVC pipe and with bare copper wire arranged *inside* a PVC pipe. I decided to try the "inside the pipe technique", which is a kind of poor-man's radome.

If you suspend this antenna inside a pipe, then you need to fabricate spacers to fit over the copper wire and hold it firmly in place within the pipe. Some people have used photographic film containers, but I decided to use European-style **barrier strip**, available from Radio Shack and known in the U.K. as "choc-block" connectors because of the ease with which two or three pieces can be "broken off" the strip. The 12-position strip, catalog number #274-680, slides nicely inside ¾" Schedule 40 PVC pipe. A 10 foot length of this white PVC pipe cost me the huge sum of $1.82 at Home Depot, while suitable ¾" end caps were only $0.22 each. Hint — pick the white PVC pipe, not the gray plastic conduit.

The antenna element consists of a single 117" length of 14 gauge solid copper wire. You may have some suitable wire to hand, or you might have to use insulated wire, from which the plastic covering can be stripped, six inches at a time. Cut the 12-position barrier strip into six blocks, with two terminals in each block. Slide the six blocks of barrier strip onto the middle of the copper wire, then fold the wire into the shape shown in the Slim Jim design and in the photograph (next page), threading the other side of the barrier strip blocks onto the folded-over sections. The radiating section of the antenna is 39" long and the matching section is 19" long. Note that one barrier strip block is located around 3" - 4" from the bottom end, ready for the coaxial cable. Two more barrier strip blocks are used



Original Slim Jim design by G2BCX has the radiating element exposed to the air.

to firmly hold apart the gap in the folded section (see photos).

Connect the 50 ohm coaxial cable to the lowest barrier strip block, 3" - 4" from the bottom of the antenna. The shield is usually connected to the short, 18½" side of the matching section, while the inner conductor is fastened to the 58" longest side. I recommend winding several turns of the coaxial cable into a loop to act as a choke balun, or winding several turns through a ferrite clamp, close to the antenna.

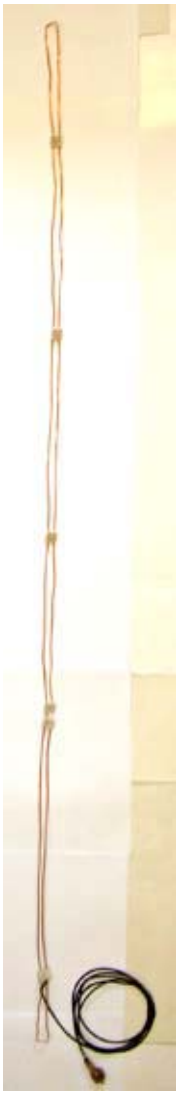
Gap in the folded section is held apart by two barrier strip blocks.

Now is the time for a test. Suspend the wire antenna from a high spot with some insulating cord, preferably out in the open. Connect an antenna analyzer or low power transmitter with an SWR bridge to the end of the coaxial cable. Transmit around the middle of the two meter band and adjust the tapping point of the coaxial cable — by sliding the barrier strip block connector up and down the matching stub for lowest SWR reading. You may be able to optimize resonance in the middle of the 2 meter band by lengthening and shortening the gap between elements at the end of the matching section. Once again, slide the barrier strip block connectors together and apart, tightening the screws before taking another reading.

Coaxial cable connected to matching section using barrier strip block. Slide to adjust.

When the antenna is fully adjusted, tighten all the barrier strip connectors, take the antenna down from its support and slide it into the PVC pipe. This part is rather like pushing a ship into a bottle! With luck, the barrier strip connectors will slide smoothly in and hold the wire antenna in the middle of the pipe. The length of pipe used is a personal choice. Fifty eight inches will just cover the copper wire element, 2 more inches will give a little clearance for a small clamp below the radiating section. If you prefer to stand the whole antenna on end, simply cut the PVC pipe to a convenient, longer length.

Check the SWR again with the antenna inside the pipe – you may find that resonance has shifted a little lower in frequency.



Slim Jim antenna before insertion into PVC pipe.

If you are going to use the antenna indoors, then your work is almost done. Secure the antenna within the pipe so it will not fall out – I used a wad of sponge rubber pushed up tight, under the bottom of the antenna. You could also drill through the top of the pipe or through the end cap and use cord to suspend the antenna from the top.

If you intend mounting this antenna outdoors, then a little more care is needed. I would recommend applying conducting grease (for example, GC Electronics Series II Conductive Grease) to the barrier strip screws to prevent corrosion. I would also seal the exposed ends of the coaxial cable with silicone rubber to prevent the entrance of moisture. You can use PVC end caps to cover the open top and bottom of the PVC pipe. This should keep the space within dry and free from bugs. The antenna element is fabricated from a single length of copper wire, so there are no joints to corrode, apart from the tapping point of the coaxial cable on the matching stub. Secure the coaxial cable to the pipe before and after the balun, so that a tug on the cable does not break a connection or move the antenna.

A final word on multi-band operation. Although this particular 2 meter Slim Jim has a low SWR on 440 MHz, the RF is not necessarily going in the places you want it to. The situation is similar to feeding a quarter wave vertical antenna for 2 meters on 440 MHz – the RF flies up in the air instead of staying down on the horizon. But what do you expect from an antenna with a total bill of materials of $4.63?

- Malcolm, NM9J

Finished antenna in PVC pipe.

Peekskill / Cortlandt Amateur Radio Association

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Archive: http://home.computer.net/~pcara/newslett.htm

PCARA Information
PCARA is a **Non-Profit Community Service Organization.** PCARA meetings take place the first Sunday of each month* at 3:00 p.m. in Dining Room B of the Hudson Valley Hospital Center, Route 202, Cortlandt Manor, NY 10567. Drive round behind the main hospital building and enter from the rear (look for the oxygen tanks). Talk-in is available on the 146.67 repeater. *Apart from holidays.

PCARA Repeaters

W2NYW:	146.67 MHz -0.6, PL 156.7Hz
KB2CQE:	449.925MHz -5.0, PL 179.9Hz (IRLP node: **4214)**
N2CBH:	448.725MHz -5.0, PL 107.2Hz

PCARA Calendar
October 7: October meeting, 3:00 p.m. Hudson Valley Hospital Center.

Hamfests
Sat Oct 6: Bergen ARA Hamfest, Westwood Regional HS, 701 Ridgewood Road, Washington Township, NJ. 8 a.m.
Sun Oct 7: Hall of Science ARC Hamfest, New York Hall of Science Parking Lot (Flushing Meadows Corona Park) 47-01 111th Street, Queens NY. 9:00 a.m.
Sun Oct 21: TOBARES Hamfest, Fireman's Memorial Park, Hartford St., Lindenhurst, LI, NY. 9:00 a.m.
Sun Oct 28: Long Island Indoor Hamfair, Levittown Hall, 201 Levittown Parkway, Hicksville, LI, NY. 9:00 a.m.

VE Test Sessions *(No more code tests!)*
Oct 6: Bergen ARA, Westwood Regional HS, 701 Ridgewood Rd, Washington Township NJ. 8:00 a.m. Contact Donald Younger, (201) 265-6583.
Oct 7: Yonkers ARC, Yonkers PD, 1st Precinct, E Grassy Sprain Rd, 8:30 a.m. Contact D. Calabrese, (914) 667-0587.
Oct 11: WECA, Westchester Co Fire Trg Cntr, 4 Dana Rd, Valhall NY. 7:00 p.m. Contact: Stanley Rothman, (914) 831-3258.
Oct 15: Columbia Univ ARC, 2960 Broadway, 115 Havemeyer Hall, New York, NY 10027. 6:30 PM. Contact: Alan Crosswell, (212) 854-3754.
Oct 26: Orange Cnty ARC, Munger Cottage, Riverlight Park, Hudson St, Cornwall NY, 6:00 p.m. Contact Ronald Torpey, (845) 783-1692.

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