DIGITAL Journal

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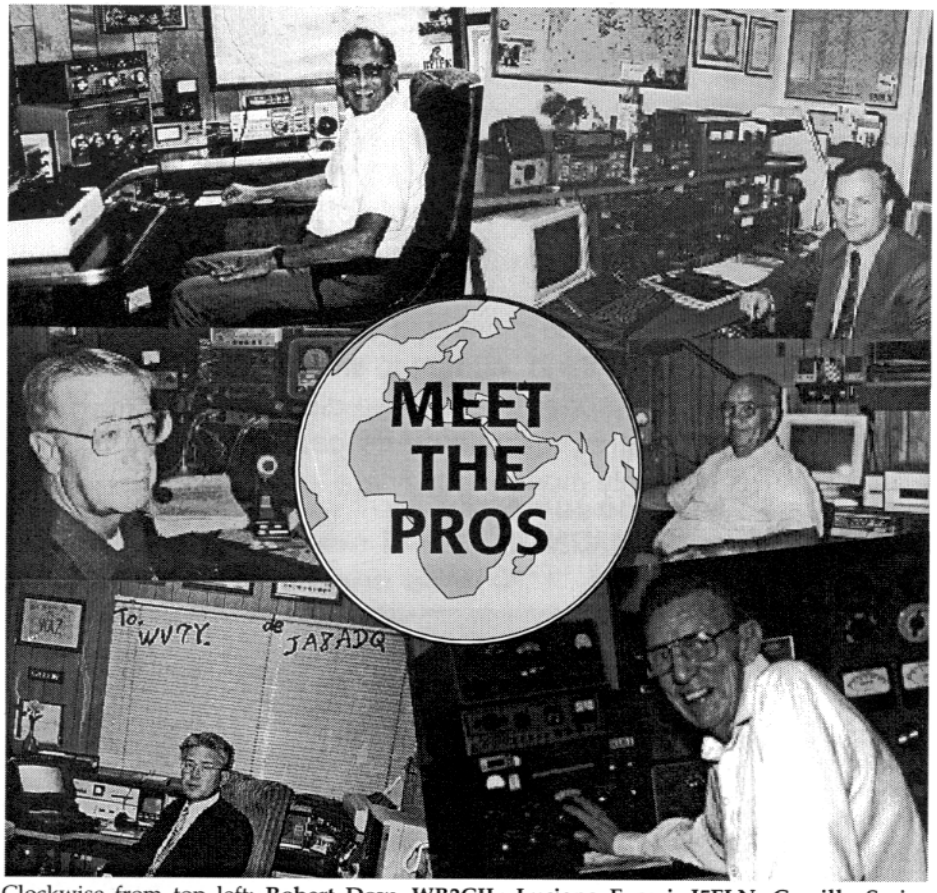
DX ON THE DIGITAL MODES



Clockwise from top left: **Robert Dow, WB2CJL; Luciano Fusari, I5FLN; Camille Serio, KA5CQJ; Carl Steavenson, K6WZ; Shigetaka Shisibori, JA8ADQ; Arthur Albert, K2ENT**

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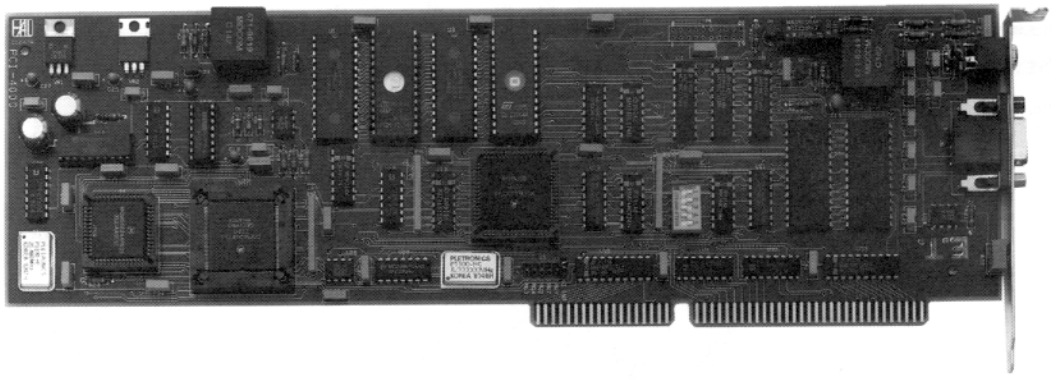

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HITS & MISSES

Dale Sinner, W6IWO

What to Buy Next?

If you have asked yourself that question a time or two, then I have an answer for you. Why don't you attend the next Ham Convention or Hamfest in your area? Now that was a simple answer to a simple question, agreed? However, in reality, how many of us do go to the Ham shows around the country? As for Dayton, sure there is always good attendance, but what about all the other fine shows that take place throughout the year?

I just recently spent a weekend working our ADRS booth at the San Diego ARRL Southwestern Division Convention. Frankly I was a little disappointed in the turnout this time. I had attended this same show four years ago and I also had a booth and it just seemed to me that four years ago there was a larger crowd each day. Where did everyone go? Where were you?

I have been pondering the last two questions for some time now and I have a theory. Southern California has some very large clubs and they are all very active in all areas of Ham radio. Because of these large numbers, flea markets and local hamfests have become very popular. Consequently, my belief is that Hams attend more of this type event than they do the shows. After all, a person can only be away from home so many weekends out of each month without enduring some flack from those left at home. If every family was totally Ham oriented it would be different. But, alas, not so in our society!

Let's Give Some Thought to the Exhibitors.

I like going to the shows better than just going to the local candy store. When I go to a show, I get a first hand look at what is new and different. I get to turn all the knobs and push all the buttons, also. There is always someone available to answer my questions about a product. They know every one of their products and can give you all the pertinent information you might need or want while contemplating the purchase of a new item. When you are about to spend some of your hard earned dollars for new equipment, don't you think you should know everything there is to know about this, about to be, acquisition? *You're darned right, you should!. Going to the big shows is where you will get all this information.*

Stop and think for a minute what it takes for the manufacturer or exhibitor to bring his booth to your town. Let's assume he is located on the East Coast of the US and the show is in Seattle, WA. First the manufacturer must crate up all needed gear and material for shipment to the show sight. This could encompass many boxes half the size of a small car. No matter how many boxes are to be shipped, a great deal of money is spent before convention day rolls around. I could exaggerate this many times over if the convention were to be held in Europe.

After shipment plans are made, who will man the booth must be decided, and then arrangements made to transport these personnel to the convention city. More expense. Then add rented cars, hotel rooms, meals and other incidentals and suddenly a capital expense has been accrued.

Why Do They Do It?

Each manufacturer/exhibitor believes that if he can show you his product and properly demonstrate it to you, then he has a good chance of selling it to you. That's the business way. We have been exposed to this method for years. But, if we do not go to the show and stop by these booths, we have lost the opportunity to properly evaluate what is new and different. We have caused the exhibitor to spend untold dollars to show his wares and we stayed home.

The Result

You didn't go to the last convention, maybe because you were lazy. The next time you go to the local club meeting you hear others talking about all the new stuff they saw at the convention. Now you are probably sorry that you did not go in the first place. *You just plain missed out, my friend.*

Maybe your argument is that you already have new equipment and therefore felt like it was not necessary to attend the show. My answer to that is simply, *you still missed out.* What about all the technical forums held at these conventions? *You missed them.* You also didn't get a chance to meet with a lot of your friends who were there. And I'll bet a "C" note that you missed out on the introduction of some new piece of gear also. How could you be so mean to yourself and stay home? Just for a moment think about this. Thousands of dollars were spent on your behalf, many hours were expended by your local clubs, in concert, to bring you a convention, and on top of all that some people took time out to give a technical forum to enlighten you. Shame on you!

Please don't think that I'm painting a dismal picture here. That is not my intent. My intention is to encourage you to go to the next Ham show and take part in every aspect. Turn the knobs and push the buttons, ask questions, look over what is new, enjoy the comraderie of your friends, and while you're at it, thank the exhibitors for coming to your city. And the next time you plan to make a purchase, give these people who spend thousands to provide you with a show, first shot at your dollars. For the New England Division there is a fine show coming up in Boxboro, MA on October 1-2.

If all goes as planned, I will see many of you at some of the upcoming conventions around the US. Stop by the ADRS booth for an eyeball QSO. Maybe we'll talk about keyboarding, DXing, Contesting, or some other digital topic. And wherever possible, I intend to bring a digital forum to your city. See you soon.

73 de **Dale, W6IWO** ■

HINTS & TIPS ON DIGITAL DX

Discover what it takes from interviews with the pros

By Betsy Townsend, WV7Y/HC8J

Dxers... an important segment of the Digital Community

After many months of waiting to send my cards in to the ARRL for my DXCC on RTTY (I was waiting for the backlog to become computerized), I finally held the prize in my hands: DXCC Number 512 on RTTY for WV7Y. This was indeed one of the biggest highlights of my ham career!

But that was not all I received. I also got a copy of the "DXCC YEARBOOK 1993" from the ARRL. I eagerly turned the pages to see if my name was in print. Page 28 held the RTTY results. Some of the calls at the top of the list surprised me\; after all, weren't there several prominent RTTY DXers that weren't listed? Ah, there I was, under "113 confirmed". My call was on the DXCC listing at last!

What of the missing callsigns? Hams need to be actively working towards DXCC awards to be listed, which means that you have to submit cards occasionally to be considered active.

There were several hams in the top 10 that I recognized: **I5FLN**, Luciano, who had shared pictures of his family with me earlier; **WB2CJL**, Bob, who was a lot of fun at Dayton in 1994:**K6WZ**, Carl, whose friendship Jay and I both cherish\; and there were other familiar callsigns: **JA8EAT, JA8ADQ, KA5CQJ, K2ENT, W3DJZ, I8AA** and **JA3MNP**.

It seemed that I had a long way to go to match Luciano's 325. What was it that kept him going and how long had he been in the hunt? My chance to find out came a few months later when I was asked by Jim, N2HOS, to write an article on the top 10 RTTY DXers. To be fair, I had to use an official list, and that brought me back to the ARRL's "DXCC YEARBOOK 1993." I figured that not everyone would respond to my plea for information, but that I would get enough response to determine why they are so successful.

I was fortunate to receive replies from six on the list and their stories follow.

While working on this article, I learned that **I8AA, C. Pentimalli Rosario**, had become a silent key. His listing at **#324** is an example for us all and he will be missed.

With #325 countries confirmed on RTTY, Luciano Fusari, I5FLN, should be no stranger to readers of the RTTY JOURNAL. In the May/June issue of 1989 he was featured as the DXer of the month. Luciano has been licensed since 1968 and has been working DX all these years. An interest in new places got him hooked on Digital DX. The ideal QTH for Luciano would be in the country. He lives in "downtown" Florence and says that he has a lot of QRM that makes working weak signals difficult. But his total confirms that patience and a lot of skill will overcome a less than ideal radio location. I'm sure that Luciano knows how lucky he is to live in one of the world's most beautiful cities. If I had my choice between the Uffizi and the scenery of rural Tuscany, I'm not sure which one I would pick.

Luciano is also active on pactor, amtor, packet, cw and ssb and lists six meters as a special interest. I wonder what his neighbors think of that? His present radios are Kenwood's TS850s, TS690s, TR7 and a homebrew solid-state transceiver. His favorite rig is the TS850s "which currently is used with my Winlink MBO."

A friendship with TG9VT, John Troost, was very special to Luciano. *"I had the joy to know him in person since he stayed with me for a week's time and from him I learned many things. He has been like a father for me." He continues: "I learned also from Gin, JA1ACB and Jean, F8XT many other things when they have been here in Firenze visiting and I can really say that each one transmitted to me his own enthusiasm on RTTY and DXing."*

Support from his wife Sandra, IK5HGV, is very important to him. Luciano credits her with "patiently permitting this hobby." I'll have to meet her someday to compare notes on husbands who love DX.

#312 Don't let **Carl Steavenson's** callsign **K6WZ** fool you. His QTH is in the heartland of America, in Herrington, Kansas. Carl has been a ham since 1938 but only got interested in RTTY DXing around 1968. I don't know if he's ever owned a microphone, but I assume that at least one rig must have come supplied with one!

Carl says that articles in the RTTY JOURNAL got him interested in chasing RTTY DX with articles by John Possehl, W3KV, as being influential. In the recent past, Carl thinks that 5R8DG was the hardest one to bag. *"I think he needed filters,"* notes Carl. By the way, patience must be one of Carl's strongest traits. He waited seven years to confirm TI9WI!

With Carl's location in Kansas, you'd think that he had plenty of room for some serious aluminum out amongst the corn. His antennas are a Hygain EX-14 tribander on a 30 foot wood tiltover "treated for termites" and a 40 meter vee and 5 band vertical. No wonder he dreams of stacked rotary rhombics, but I have to tell you, Carl, that you seem to be doing just fine. If you told me you were loading up the corn, I would go to the local garden supply store and buy some seed.

The radios at K6WZ are: a 75A-4, 32S-3 and a homebrew amplifier he built recently with a pair of 3-500z's. I've seen pictures of the amplifier and have to report that it is a fine piece of workmanship.

Carl thinks it took about eight years to get his DXCC on RTTY. *" There were never a hundred countries active on RTTY at one time."* He eagerly awaits the arrival of new countries on RTTY and hopes that the DXAC will grant his wishes so he can spend more time on the radio and less time outside in the pasture.

#310 Camille Serio, KA5CQJ, lives in Baton Rouge, Louisiana. He was first licensed in 1978 and started working RTTY three years later. *"My interest in DXing started just as a personal challenge to prove to myself that I could work hams in other countries with a mere 100 watts, as I did not own an amplifier for the first three years of my operating time."*

I asked Camille what his technique was for successful DXing, and he responded *"I really do not have any special technique except patience and tuning the bands when there appears to be nothing on."* This diligence earned him his first DXCC on mixed mode within nine months and his RTTY DXCC in about two years.

Like many of us, he began by enjoying RTTY rag chewing. Many DX operators get tired of endless pileups and take up the digital modes so they can enjoy a conversation. The main equipment at KA5CQJ consists of a TEN-TEC Paragon and a Titan amplifier. Camille says *"I have always used TEN-TEC gear as my main rig."* His antenna is a HY-GAIN TH6 at 50 feet. When not chasing DX, he enjoys working in the yard and garden, working around the house and taking long walks. He also has the pleasure of seeing his son get his first license, and Camille feels that the Paragon will see plenty of use.

His QTH in Louisiana has a little advantage into South and Central America. And he looks fondly at one memorable QSO: he was the first operator to work N3JT/HK0 on San Andres Island.

"I think the qualities of a RTTY DXer would be patience and consideration of others," offers Camille. "I have seen, as I am sure you have, stations who would not listen before transmitting, stations who call the DX station before the QSO is finished with the previous station, and others who would get in the pileup although they have the country already confirmed, and possibly keeping someone who needed the country from making a contact. After all, I consider ham radio a hobby, and while I would like to work all the new ones that come up, if I miss one, someone else will go there eventually and the world will not end."

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I was reminded of all the times I had heard others voice the same thoughts, and noted that RTTY has always had a following of "gentlemen" operators. It's one of the things I like best about RTTY.

#309 Oceanside, New York is the home of **Arthur Albert, K2ENT**. His QTH is on the coast of Long Island with a great shot across seawater to Africa and Europe, but Arthur feels that his best advantage is *"just being there at the right time for the DX."*

Arthur got his first license in 1954 and started DXing in 1960 when he worked on a transmitter that belonged to K2GLG. The awards and cards on the wall caught his eye and he later went on to filling his own walls with wallpaper.

Perseverance is his technique for DXing. He needed a lot of it while working E31A because "he kept getting my call wrong." But his hard work paid off as he worked his first 100 countries in about four months — while holding down a job and going to college at night.

The radio at K2ENT is a Kenwood TS940, which Arthur calls a good, quiet radio. I asked him which radio, of all he had ever owned, was his favorite and he responded *"The old Collins S line, the reason being good selectivity, easy to repair and you could not kill it. It's a real work horse."*

Arthur has quite a collection of antennas: 3 element monobanders on 10, 15 and 20 meters and wire antennas for 40 and 80 meters.

He admires the QTH of 4X6UO, Arie, because *"his signal is always so strong."* I suspect that many stations copying the signals from K2ENT must say the same thing.

Spare time is used spotting for others in the Long Island DX Association and rounding up equipment for DXpeditions to use.

#308 Shigetaka Shisibori, JA8ADQ, responded first to my letter. I enjoyed his letter very much, and was impressed with his awards in the photo he sent — see cover. You'll note that everything is easy to reach, making it a very comfortable station for the single operator. Collectors of old RTTY JOURNAL'S can look back to the February 1978 cover to see how his station and wallpaper have evolved.

Shigetaka got his first license in 1960, when he was into phone and cw operation. Later, in 1972, he started working RTTY and says he has "enjoyed the DX for 35 long years." He credits his location in Japan with starting his interest in radio. *"We Japanese live in a small island country, surrounded with sea, so that gives me an interest in any foreign radio."*

He credits no special operating technique, but, as with the others, it's a presence on the bands that counts. Shigetaka calls it *"samurai spirit."*

The longest wait for QSL cards to arrive was from several USSR stations during the period of 1973-1979. He still waits for a TI9 card to arrive.

The equipment at JA8ADQ includes a HAL DS3000 KSR and a ST6000, which explains, in part, why he prevails over the DX. *"The HAL ST6000 has good discrimination for weak DX signals,"* he notes. Shigetaka uses yagi antennas, which include an impressive 5 element monobander on 20 meters.

Working rare prefixes will be his next challenge after DXing. His downtown QTH will make that a real challenge as *"it's a bad location for dxing,"* according to Shigetaka. In case you think he isn't very serious about DXing, since the 1993 listing as published by the ARRL, he has confirmed 319 on RTTY!

#308 Will the real **WB2CJL, Robert Dow**, please stand up! Those who missed the 1994 RTTY dinner at Dayton may not understand the inside joke . That night we had a lot of fun poking fun at Dale Sinner, and it only goes to show you that a good sense of humor should be added to the list of qualities in a top DXer.

Bob was interested in radio back in 1946, when he was an associate member of the ARRL. Other commitments kept him busy until he could get his first license in 1964. The following story may remind you of when you experienced your first DX.

"The third day on the air I heard a pileup on 15 meters CW and did not know what to think of the commotion. After listening for sometime I picked out the call, HV3SJ. I wasn't sure where it was coming from. After talking to some ham friends that evening, they told me it was the Vatican City. So, the next day, not knowing anything, I listened to see if the station would show up again. Low and behold, he was on again! I called him and he came back to me. It put me in shock and I fell out of my chair. This to me was the greatest thrill and I have been hooked on DX ever since."

Through the years Bob has had a lot of good equipment grace his shack: a Model 15, a 28 ASR with three speed gear shift, a ST6 and a terminal with Model 1 computer (say what?) He currently uses (roll brag tape): an ICOM 765 radio, an IBM 386 with 130 meg hard drive, a PK900 tnc, and an SB220 amplifier. For packet he uses an IBM 8088 with a Kantronics KPC3 to link to the local DX Packetcluster (tm) on VHF. His 50 foot tower holds his TH6DXX tribander and he has slopers on 40 and 80 meters.

Bob's ideal station would probably be Gin's, JA1ACB, in Japan. He credits Gin with not only having a top station and top operating skills, but for helping hams throughout the world.

Besides DXing, Bob is an ARRL DXCC Field Representative and a check point for CQ Magazine, WAZ. He also passes traffic on Winlink, is working towards DXCC on cw and phone, and helps with the W1AW broadcast for the DX Bulletin.

Bob's advice to new DXers is: *"You start off with the simple antennas and as you go along, improve your station along with the skills you need to work the hard ones. The qualities of a good DXer would be to listen, listen and listen. Find out what is going on before transmitting, look for a pattern, and remember, it is not the end of the world if you do not make it. Be friendly and help each other out. Remember, DX don't sleep."*

These hams have achieved something really remarkable: over 300 countries confirmed on RTTY. You'll note that they share a great amount of patience and skill. Perhaps you thought that they would all have huge antennas or live on at least 40 acres or possibly had a room full of the latest and greatest equipment. These hams show what you can do with a lot of enthusiasm and a lot of hard work. They are constantly listening for a new one. Are you?

JA8ADQ told me *"They're all easy — after you've worked them."* Haven't we all felt that way after working a station on our needs list. While we push the chair back from the operating position, we smile and reflect on how much fun Dxing can be. Sometimes the contacts must be a quick signal exchange, but if you're lucky, you sometimes get to spend a little bit of time getting to know the operators behind the callsigns.

My QSL card from the 1994 3Y0PI operation reminds me of the flip side of DXing: operators willing to spend many hours on the air so that hams everywhere can experience the thrill of DXing. While I don't have anywhere near 300 countries confirmed yet, I know that each new one I work will edge me up the list. I may even catch Jay, WS7I one of these days. Then we can trade places and he can clean the house while I work DX and ragchew for hours. Hummmm.. *de Betsy, WV7Y.*

About the author

Betsy, WV7Y, with her OM, WS7I, have been frequent travelers to Ecuador and to the Galapogos Islands. Betsy has operated in many contest from HD8CQ, HD8EX and as HC8J outside the RTTY contest. She is the official photographer for the Digital Journal and is frequently found snapping pictures.

Betsy was first licensed as KA7URT and then was found in the pileups as KE7PL. She changed calls because of the confusion with the OM in getting those elusive QSL's. She was the last Awards Editor for the RTTY Journal and is presently the president of the local radio club.

--Betsy Townsend, WV7Y, P.O. Box 644, Spokane, WA 99210-0644.

SOFTWARE CONTROL OF YOUR STATION . . . FROM ANYWHERE!

PART I -- By Paul Richter, W4ZB

INTRODUCTION

Most modern digital mode ham stations now have at least one computer which operates an AX-25 TNC connected to a VHF or UHF radio transceiver. Packet radio is the most likely use, but sometimes the computer also controls operation of the station transceiver, amplifiers and antenna switching systems as well. Most stations also have a modem for dial-up connection to other computer systems over a telephone line. All told, this is a powerful but often under-utilized combination of hardware elements.

It was, until very recently, difficult and expensive to remotely control a ham station without custom hardware and software. (W2AX described an early system in the Nov. 1991 QST). But if you have the lineup mentioned above, we will now show you how easy it is to remotely control the basic operations of a modern digital mode ham station from another computer over a dial-up telephone line. This can often be done with the addition of nothing more than low cost, readily available remote control software. No special hardware and no custom computer programs are needed! And remote control operation is perfectly legal!

To begin, we first introduce the basic concepts of remote control software. We then provide guidance on how to select, setup and operate any of the three different remote control software packages evaluated in this article. Specific examples follow to show how to remotely operate a digital mode ham station, with specific implementation tips for getting everything to work. Finally, we offer observations how such remote control software may be integrated to perform more tasks in a more complex digital mode ham station of the future.

WHAT DOES REMOTE CONTROL SOFTWARE DO?

The essential function of remote control software is to permit the operator of a remote computer to "link" to a host computer and then to control the host computer from the remote keyboard and mouse. It is as if the operator were sitting at the host computer using its keyboard and mouse. In the digital mode ham station setting, the host computer will be located in the ham shack. The software must also allow the remote user to observe on his monitor the output which is appearing on the host computer's monitor with minimal time delay.

The "linking" of host and remote computers in this manner is most commonly achieved by modems over a telephone line. The link may also be achieved over a null modem cable connection between serial ports of the host and remote computers or via a VHF/UHF data link. And in an even more exotic way, remote control software may also "link" host and remote computers over a local area network ("LAN") to which the two or more computers are connected. (See box). The techniques are virtually identical whichever method is used, but for our purposes now, only the telephone link will be discussed.

> Computer Ethernet LAN arrangements in digital mode ham stations link multiple computers together and offer many advantages. Network adapter cards and highly capable networking software such as Windows for Workgroups are now available at low cost and are easily set up. LAN networks permit older model computers (e.g. 286s) to be returned to productive use in the ham shack. It is also an easy way to add COM ports and IRQ's to your setup. Such LANs can also permit computers using different operating systems (e.g. DOS, Windows, Unix, Windows NT, Macintosh) to be interconnected. (Note: "Shack LAN," a major series, will begin in the December issue of the Journal.)

Several basic questions about "compatibility" between computers arise whenever remote control software is being considered. What happens if one computer is running Windows applications, but the other computer is only running DOS applications or cannot run Windows applications? What happens if one computer uses a high resolution color monitor, but the other computer has only a monochrome monitor or a low resolution color monitor? What happens if the keyboards are not identical, or if one computer has a mouse but the other does not? Within limits the software reviewed here automatically detects these incompatibilities and compensates for the differences.

Another very important issue is system "slow down." How much of it will be perceived by the operator who is remotely controlling the host computer? Ideally, the speed of the control link between the remote computer and the host computer will be fast enough so that slow down is barely perceptible. The faster the link speed the better.

The digital control "link" needs to support bi-directional data flows for the transfer of keyboard and mouse data, of the monitor screens data and other control signaling. Manual keyboard usage has relatively low signaling requirements. Monitor screens with simple DOS text displays can be sent quickly compared to monitor screens containing more complex graphics, images or color. Generally, the simpler the monitor screen at the host location the better the performance, i.e. the less perceptible the slow down.

Most telephone lines in the United States now support 9600 BPS (and sometimes 14400 BPS) data rates with readily available, low cost data modems. Direct wire null modem cables (using RS-232 signaling) can support reliable data transmission at 56 KBPS or higher over distances of several hundred feet without special hardware. Better remote control performance is achieved with the higher rate channels up until system slow down is no longer perceived by the user. Performance is acceptable at 9600 BPS, although some system slow down is perceptible. Performance is tolerable for the patient among us but there are very noticeable slow downs when using 2400 BPS modems.

Each remote control software package evaluated offers an array of other features which are important for remote link ups: 1) password procedures to prevent remote access or log-on to the host computer by unauthorized remote users; 2) options for logging remote control sessions; 3) options for action by the host computer (e.g. automatic rebooting) upon termination of a remote control link; 4) remote file transfer capabilities; and 5) customizable script capabilities to automate operations.

HOW DOES REMOTE CONTROL SOFTWARE ACTUALLY WORK?

The basic operation of remote control software is simple, as is the setup. First, remote control software must be installed in both computers. No more than a few minutes is required for this step. There are no mysteries here. The link also requires a modem at each end of the link. It may be attached to a COM port or occupy an internal slot. We assume you already have this hardware in place.

Before a remote control session can occur, the "host" program portion of the remote control software must be started on the host computer (remember, the host is in the shack). Usually, the host program runs in the background and sits there waiting to receive (i.e. answer) a call from a distant computer which initiates the session. No operator needs to be present at the host computer once the program is started. A local user of the host computer may continue using the host computer until a call is received, at which point control of the machine is taken by the remote party. Typically, the remote control setup parameters may be adjusted to disable local keyboard (and mouse) control of the host

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computer once a remote control link up is established. In another, more complex type of arrangement, the host computer is at an unattended location and is not turned on until an incoming call is received. This type of operation requires use of a special answering device which will switch on the host computer after a call is received and then wait for the host computer to boot up before the remote control link is actually established.

At the remote end, the user must first start the program on his remote computer before initiating his call to the host. The remote computer can be anywhere a telephone line can reach. Once the host computer answers an incoming call from the remote computer, an automatic exchange (and checking) of preset passwords occurs during an automatic log-on sequence. Once log- on is completed, the remote user initiates steps (usually with a "hot key" sequence) to take over control of the host computer.

Once taking over control, the remote user has full access to the host computer exactly as though sitting at the keyboard there, watching its monitor. If the host computer is in control of a digital mode ham station though various interfaces and application programs, the remote user may then operate and control the ham station from the remote location! More on this below. When the remote session is finished, the remote user initiates steps with a "hot key" sequence to log-off and terminate the remote control link.

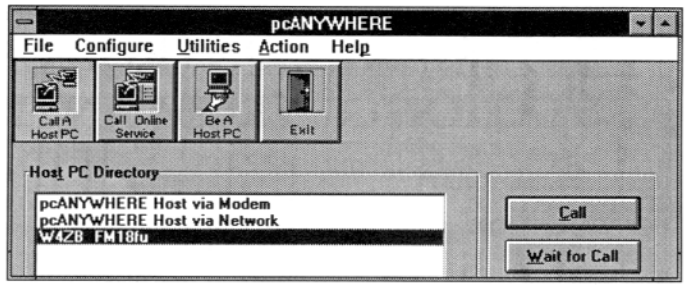
WHAT ARE THE REGULATORY ASPECTS OF REMOTE CONTROL OPERATIONS?

This sounds too good to be legal, but there is no cause for concern. The FCC rules say that "remote control" of an amateur station occurs whenever the control operator at the control point indirectly manipulates the operating adjustments in the station through a control link. Remote control may be accomplished over a wire line, through a facility provided by a common carrier (ie. Telephone) or by means of permitted radio links. Every amateur station is required to have a "control point" and the control operator must be present at the control point during either "local control" or "remote control" operation. The control operator requirements to be on duty at the control point distinguish local and remote control operation from automatic control operation during which the control operator does not have to be present at the control point. (47 CFR Sec. 97.109 - Station control). The control operator is required to assure immediate proper operation of the station regardless of the type of control. (47 CFR Sec. 97.105 - Control operator duties). "Good engineering practices" and "good amateur practices" are required at all times. (47 CFR Sec. 97.101 - General standards).

Former versions of the current rules explicitly required that provision be made for shutdown of the transmitter within three minutes in the event of malfunction of a remote control link. Transmitter shut down requirements no longer explicitly exist under the current rules; however, "good engineering practices" continue to require some means for transmitter shut down appropriate to the remote control link situation in the event of control link failure. Absolute fail-safe perfection may not be reqquired but good engineering practice surely demands such safeguards. The rules once stated that the remote operator monitor the frequency being used. Such monitoring is no longer explicitly required. However; "good amateur practices" appropriate to digital mode operations continue to require that some type of monitoring is needed to prevent unnecessary interference. This does not require the operator to listen to demodulated audio from a receiver.

WHAT ABOUT THE REMOTE CONTROL SOFTWARE PACKAGES EVALUATED?

The writer first started using remote control software in 1987 with an early DOS version of Carbon Copy for a business use with 2400 BPS modems. Our requirements then changed primarily to unattended file transfers between computers at multiple locations. We automated that process using Carbon Copy's scripting capabilities which worked flawlessly. Certain computers were left on most of the time



at various locations so that we could call into them any time or from anywhere to retrieve or upload files. At the beginning of 1992, we upgraded to higher speed modems and learned, to our annoyance, that our then current versions of Carbon Copy (Ver. 5.2) would not recognize the new high speed modems no matter what we tried and despite the insistence of Microcom tech support. At that point, we switched to HyperAccess, a superb communications program with excellent file transfer and automation capabilities which we have used in several versions since that time.

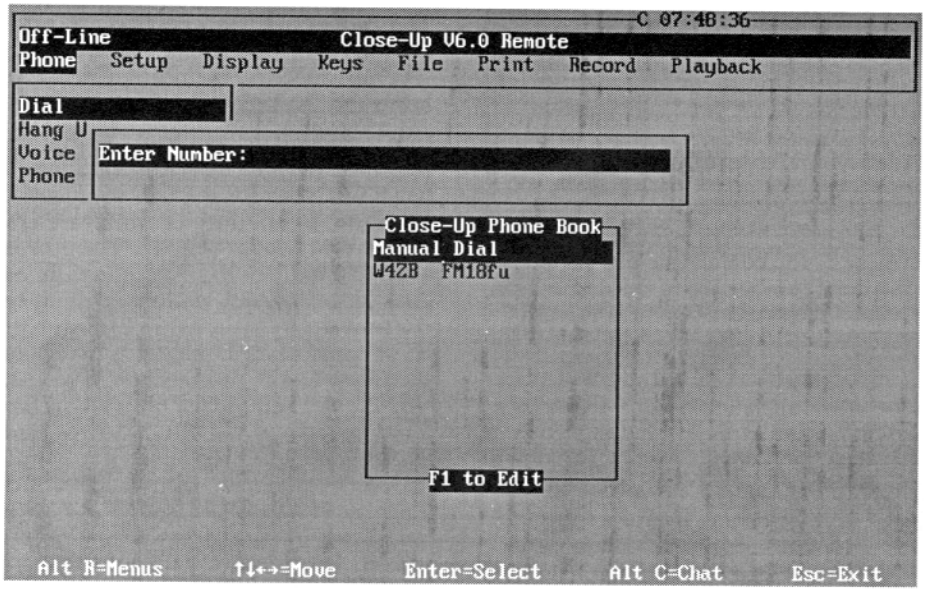
When I became interested in setting up remote control of a digital mode ham station earlier this year, I acquired Carbon Copy for Windows v2.5, Close Up v6.0 and PC-Anywhere for Windows v1.0 for comparative evaluation. Each of these remote control software packages is available from mail order suppliers for about $120, but you should consider contracting the sources directly about competitive upgrades which may be available at lower prices. (Some sources might allow competitive upgrades for communications software such as Procomm.) Call Microcom for Carbon Copy at (617)-551-1000, Norton-Lambert for Close Up at (805)-964-6767 and Symantec for PC-Anywhere at (408)-253-9600. You need only purchase one copy of any of these software packages to get both the "host" and the "remote" versions which are needed to function together for remote control operation.

My evaluation of these different packages revealed that the functional differences were quite narrow. Each product was stable under remote control operation with the DOS and Windows applications I tested. Certain of the packages do not function in certain environments which may be of specific interest, and certain work better in particular environments than others. There is no exact answer to which remote control software package is "best" as the answer depends upon the specific uses to be made of the software in a specific setting, and to a considerable degree, the personal preferences of the user(s).

The Carbon Copy for Windows package includes Carbon Copy for DOS - Ver. 6 as a subpackage. The remote computer adapts to the DOS or the Windows version depending upon which version is running on the host computer. If the host computer is running only Windows applications under Windows and the remote cannot run the Windows version, then remote control operation is not possible with Carbon Copy. On the other hand, if the host computer is running DOS applications alone or DOS applications under Windows, remote control operation by the remote computer is possible even if the remote computer cannot run Windows applications.

For purely DOS based operations, Close Up and Carbon Copy are both very capable. For purely Windows based applications, PC-Anywhere for Windows and Carbon Copy for Windows are both very capable. PC-Anywhere for Windows can remotely operate DOS applications, including DOS applications running under Windows, but this software requires that both the remote and the host computer be capable of running Windows applications.

Close Up has the unique ability to run on a DOS only remote computer to access a host computer running only Windows applications, including DOS applications running under Windows. This works very well and is a capability of particular value for operations in which all remote computers may not be capable of running Windows applications. It is initially perplexing, for example, to see an old '286 computer with only 1 meg of RAM apparently running Excel 5 which, in fact, is running remotely on



a fast '486 computer! This capability is desirable or essential if you wish to use remote computers which cannot run Windows applications to control a ham shack computer running Windows applications.

Norton-Lambert uses a proprietary technique it calls "photographic memory" to give Close Up a speed advantage over Carbon Copy and PC-Anywhere in the transfer of screen images from the host to the remote computer. While a speed advantage was noticeable, it did not seem to be nearly as great (5 to 9 times as fast) as claimed in Norton-Lambert's advertising literature.

The basic install procedures for each of the programs are automated and work well with minimal input from the user. The Close Up install is aggressive in the sense that it detects the other programs, if installed, and requires that they be disabled or removed! On the other hand, the Close Up install is benign in that it does not modify either the WIN.INI or the SYSTEM.INI control files used by Windows. Carbon Copy and PC-Anywhere both modify those Windows control files. Each of the programs allows advanced users to exercise detailed control over the set up.

PC-Anywhere for Windows has the best user's manual. It contains a considerable amount of useful, general information. In each instance, the manuals do not provide all of the details and the user must install and operate each remote control program to really learn how to use it. The "hands on" learning process is straightforward.

I did not experiment with the scripting facilities in any of these software packages, but scripting and automation capabilities appeared comparable for each. Based on my experience, a steep learning curve is required to use script facilities effectively, and I did not wish to expend the effort due to lack of an immediate need. On a quick look, PC-Anywhere appears to have the easiest to use script capabilities (even providing a separate manual for its script features), with Close Up in second place, close to Carbon Copy.

Each of these packages includes a terminal emulation program but I spent almost no time looking them. Each appeared considerably less capable than the primary communications software program (HyperAccess - both DOS and Windows versions) which I regularly use. I did not test the remote file transfer capabilities either for they have limited uses for ham type remote control operations.

Overall, I liked PC-Anywhere for Windows the best for remote control operation with Windows applications. I found it particularly easy and intuitive to use, although it performed slightly slower than Close Up in remote control operation. Because I still use some older computers in the ham shack which cannot run Windows, I find Close Up to have a significant feature advantage which interests me. My plan at this point is to continue comparison testing with PC-Anywhere for Windows and Close Up.

(Next month, Paul takes us through all of the steps in setting up, de-bugging and operating the rig from 35 miles away. Everything from password security to RFI prevention is included.)

Is it time to renew your ADRS membership and subscription to the *Digital Journal*?

Please check your mailing label for the date of your "last issue." If the date on your label says 10/94 this is your last issue and it is time to renew - *NOW!!*

DX NEWS

Jules Freundlich, W2JGR

Despite poor propagation, there is still plenty of Digital DX.

If you have not yet sent in your list of needed Digital DX Countries, on the form published in last month's Journal, please do so now. Since this is a very comprehensive survey of the digital modes, using ALL of the DXCC countries, the results should prove of interest not only to the Big Guns, but also to the Little Pistols.

The 13th ARRL Digital Communications Conference, in August, was held about a 25 minute drive from my home. Thus, I was able to take in some of the sessions. To review the whole of the conference is outside the scope of this column. Mike, KI7FX, will be doing that elsewhere. As expected, there was nary a word about DX, per se. These conferences traditionally have been highly technical. This one was heavily oriented to packet radio. I found two subjects, however, of particular interest to DXers.

First, several presentations by Kantronics describing the G-TOR protocol were extremely well done, and added to my understanding of this very sophisticated system. I feel it's claim to permanence, like all new protocols, will have to await it's adoption by the user community.

Second, an interesting paper was presented by David Wortendyke, N0WGC, of the Institute of Telecommunications Sciences at Boulder, CO. He described an automated test program, in which six modem protocols were subjected to repeatable simulated propagation paths for a wide range of signal-to-noise (S/N) ratios. The six protocols tested were AX.25, Amtor, Pactor, Sitor, Clover II, and Baudot. Six clear channel paths as well as three degraded conditions were used: Gaussian noise, CCIR good paths, and CCIR poor paths. The main parameters evaulated were throughput, in characters per second, and errors. The mass of data collected was reduced to a series of charts, several of which were shown. One of the interesting conclusions of the data analysis of this very thorough test was that there is no one system that is the "best", under all situations and conditions. The "best" for you is determined by what your operating needs are, what kind of equipment you use, and what environments you experience.

(A set of the conference papers is Publication Number 186 of the Radio Amateur's Library, and is available from the ARRL for $12.00).

I expect that we will see all these modes for some time. "The fittest will survive." With particular regard to the virtues of Baudot keyboard DXing, some will paraphrase Mark Twain and aver that "the impending demise of RTTY has been greatly exaggerated." What is your opinion?

Do you wonder when, and where, the digital DX is operating? As previously reported in this column, a prime source of fresh information are the "VK2SG RTTY DX Notes" These on-the-air bulletins are compiled each week from world-wide inputs, and are disseminated mainly through the international APlink mailbox network. They are also on the Internet. They generally start to be available late Thursday, or early Friday UTC, depending on propagation conditions.

The Notes were originally started back in 1975 (for a detailed history, see the RDJ, Sept. 1993, page 11) by Sid, VK2SG, and Bill, VK2EG. Sid and Bill have since retired from the weekly chore. The Notes are currently being edited by I5FLN, WB2CJL and W2JGR, on a rotating basis. Each week the bulletin lists about 100 or so DX "spots" showing time and frequency of digital operations reported during the past week. Currently, about eight percent of these reports are of Pactor, the balance being 45 Baudot RTTY, with a very infrequent Amtor or Clover report. Using this information, and a rudimentary knowledge of band openings to your area (See the monthly propagation charts in QST, and listen to the WWV announcements at 18 minutes past the hour), you can get a good idea as to when and where to look for the DX that interests you. These VK2SG RTTY DX Notes are the only bulletins regularly published on the air, world wide, that are devoted exclusively to reporting digital DX activity. APlink stations known to be carrying them include I5FLN, JA5TX, OH2BAW, N5UXT, TG9SO, VK2AGE, W2JGR, W2TKU, W5KSI, W7DCR, WA8DRZ, WB2CJL, 4X6SL, and 9K2EC. Please let me know if you know of others, not listed here.

The Notes are also carried by non-APlink VHF BBS packet networks in several countries, including Germany, Italy, and the U.S.A.

I am reminded by Don, W6PQS, that the International RTTY DX Association still has RTTY gear for loan, or permanent donation, to any rare or semi-rare DX station that needs/wants it. The gear is available for loan to DXpeditions, or as gifts to permanent stations, willing to commit to a reasonable amount of RTTY operation. Equipment available includes HAL Telereaders, PK-232, VIC-20, etc. Requests should go to Don Simons, W6PQS, IRDXA, 1714 SW 23rd St., Loveland, CO 80537.

DX DOINGS

(Signals are 45.5 Baud RTTY unless noted.)

ARMENIA, EK - We have not seen any RTTY action from here in the aftermath of the earthquake of a couple of years ago. Many still need this one. Any enterprising travelers? The IRDXA will gladly furnish the necessary items to enable a RTTY operation.

BELAU, KC6 - Jim, WV5S, and Coy, N5OK, promise some RTTY from here and V6. before and after the CQ WW SSB contest 29-30 October. They will sign KC6SS and KC6OK respectively starting 26 October. On 2 November, they will move to Federated States of Micronesia. (See below.)

BOTSWANA, 8O - This new prefix has shown up in the form of 8O6RY on Pactor around 2220Z on 14075 khz. QSL route is needed.

CENTRAL AFRICAN REPUBLIC, TL - A new one from here is TL8GM who has been reported on 20 meters around 1730Z. QSL to IN3EYY.

CEUTA AND MELILLA, EA9 - It's good to see EA9 once again active on RTTY after such a prolonged silence. Look for EA9NP on 20 meters around 2100Z. QSL route is needed.

EAST MALAYSIA, 9M6,8 - Dave, 9M8BT, is very active around 1200-1300Z on 20 meters. QSL to N5FTR. 9M6HF is also active a little later, around 1530-1600Z. Asians QSL to JH1ROJ, all others to WE2K.

EGYPT, SU - SU1ER likes 20 meters as early as 1300Z, and as late as 2000Z. QSL Ezzat to P.O. Box 78 Heliopolis, Cairo 11341. SU1AH may be found on 20 meters around 1800Z. QSL to Hahmed Hassen Ahmed, 40 Al-Zahraa St., Ein-Shams, Cairo.

ETHIOPIA, ET - Sid, ET3SID, is back on 20 meters around 1630Z. QSL to Sid May, Box 60229, UNECA, Addis Ababa, Ethiopia.

FAROE ISLANDS, OY - OY1CT has been active on 20 meters as early as 1045Z, and as late as 1430Z and 2300Z. QSL route is needed.

FEDERATED STATES OF MICRONESIA, V6 - Following their stint at Belau, (see above) Jim and Coy will operate from Yap from 2-7 November as V63SH, and V63OH.

GHANA, 9G - Six members of the Central Arizona DX Association will be in Ghana from 26 October through 4 November for the CQ

WW SSB contest. The contest callsign will be 9G5TL. Individual callsigns are:

K5VT.....Vince Thompson....9G5VT

AA7NO.....Mike Bill.....9G5MB

K7FAY.....Warren Hill.....9G5WH

WA7LNW.....Jack Reed.....9G5JR

WY7K.....Millie Thompson....9G5MT

Before and after the contest, they will have three stations working 160-10 meters on SSB, CW and RTTY. QSL 9G5TL via KG7XC. QSL other callsigns via home calls.

GUERNSEY, GU - After a lapse of some time, this channel island has once again become activated. Look for GU0SUP on 20 meters between 1100Z and 1530Z. QSL route is needed.

HUNGARY, HA - HA2VB plays Pactor on 20 meters around 14078 khz. QSL route is needed.

INDIA, VU - VU2YK likes Pactor on 14077 khz around 1745Z, while VU2RAK may be found on RTTY around 1230Z. QSL VU2YK to W9FAM. QSL route for VU2RAK is needed.

KAMPUCHEA, XU - Sanyi, HA7VK, will be operating as XU7VK until early 1995. Reports of him on RTTY have become very scarce. This spring he had been heard on 20 meters around 1500Z. We hope that he will spend more time on digital. For QSL route see the DJ, May/June 1994, p. 9.

KENYA, 5Z - 5Z4FO may be found on Pactor around 0530Z on 14073 khz. QSL via KB4EKY.

KYRGYSTAN, EX - Look for EX2U on 20 meters around 1600Z. QSL to DL8FCU.

LEBANON, OD - OD5PL continues to be active on 20 meters around 1530Z. QSL to HB9CRV.

MACAO, XX9 - Alberto, XX9AS, often appears on 20 meters, with an outstanding signal, between 1245Z and 1400Z. QSL to KU9C.

MADEIRA ISLAND, CT3 - Look for CT3AR on Pactor on 20 meters near 14077 khz. QSL route is needed.

MALAWI, 7Q - In addition to 7Q7JL, another Pactor operator is 7Q7LA who can be found either on 14068 or 14078 khz, between 1700Z and 1800Z. QSL both stations to G0IAS.

MOLDOVA, ER - There is no dearth of activity from here. Look for ER1PE or ER2CQ anytime on 20 meters between 1400Z and 2100Z. QSL ER1PE to I8YGZ, and ER2CQ to OE3SGU.

MOUNT ATHOS, SV/A - Monk Apollo came back on the air, on a Sunday in mid-August, working transceive on 14082 khz. The ensuing pileup afforded contacts with Europe and Japan, with only one stateside station making it. The reactivation is due in large part to the generosity of Dominik, DL5EBE, who shipped $6000 worth of solar cells and batteries to support the station in the new monastary. Later in the month, Dominik operated the station for four days. We do not know how much time Apollo will have available to devote to his radio, but it seems that we can now expect more action from this rare, and somewhat controversial individual. QSL direct to Monk Apollo, Dochiariou Monastery, GR-63087 Dafni, Mount Athos, Greece.

NAMIBIA, V5 - Four intrepid hams from the midwest will fly to Namibia on 23 October to participate in the CQ WW SSB contest. They are Craig, AH9B, Mike, N9NS, Pete, N0AFW, and Glenn WA0PUJ. They should be QRV by 26 October. Before and after the contest they will be active on all bands and modes, including RTTY. They have all been issued V51/home-call licenses, and V59T for the contest. They were hoping to obtain permission to use that call outside of the contest. While in Namibia, the group will be hosted by Gerd Bruns, V51GB. QSL via WA2FIJ, Jay Kobelin, 10628 Grandview Place, Rancho Cucamonga, CA 91730. Departure from Namibia will be 7 November.

NEPAL - 9N - The three homeland operators, 9N1AA, 9N1HA, and 9N1RB, have been joined by Kyoko, 9N1KY. She will be remembered as the one who gave many of us several new RTTY countries during her extended Pacific tour a few years ago. Kyoko has been worked in the upper midwest U.S.A. on SSB but, as of the beginning of September, had not yet been reported on RTTY. Since she is an ardent RTTYer, we should expect to see her on this mode. I understand she plans to be in Nepal for a couple of years. In the meantime look for 9N1AA on RTTY on 20 meters, when propagation favors your area. If you recently worked 9N1MD around 1130Z, QSL to N6ER. I have no other information on this station.

NEW CALEDONIA, FK - FK8GM may be found, possibly using reverse tones, on 20 meters around 0300Z. QSL to WB2RAJ.

NIGERIA, 5N - 5N3ALE is now on Pactor. Look for him around 1815Z near 14078 khz. or 2245Z on 14070 khz. QSL route is needed.

OMAN, A4 - A41KB operates Pactor on 14073 khz around 1715Z, while A41KC may be found operating RTTY at 1630Z. QSL A41KB via ON6BY, while cards for A41KC go to KA1XN. Old faithful Max, A45ZX, often found on 20 meters around 1800Z can be QSL'd to Max B. Broward, Jr., P.O. Box 123, Muscat, Sultanate of Oman.

PAKISTAN, AP - AP2PJ is likes 20 meters around 1600Z. QSL to Box 1944, Islamabad 44000, Pakistan, Asia. Look for AP2KS around 1400Z. QSL route is needed.

PERU, 4T - 4T0SL recently showed up on Pactor on 14078 khz around 1340Z. QSL via OA4ED.

SAUDI ARABIA, 7Z - 7Z1AB has been worked on Pactor on 14080 khz around 0550Z. QSL to KN4F.

SOMALIA, 6O - KB1WN/6O was running Pactor on 21081 khz around 1400Z. With the pullout of U.S. forces in process, chances are this station has been deactivated by now.

SRI LANKA, 4S - As I still need this one in my log, I too am looking for 4S7AVR on 20 meters around 1630Z. QSL to Noel, 15/2 Balanenmulla Lane, Colombo 6, Sri Lanka.

SUDAN, ST0 - Luigi, ST2AA/ST0K, is anxious to give out new country Pactor contacts. He is active around 1400Z to 1530Z, and sometimes as early as 0700Z on 14068 khz. His equipment is ICOM-735 running 50 watts with a SCS PTC-Plus TNC, and an old small PX8 computer with 32 kb memory . QSL to Airport P.O. Box 73, Khartoum International Airport, Sudan, Africa.

SURINAME, PZ - PZ2AC operates Pactor around 2330Z on 14073 khz.. He also is active on RTTY a bit earlier. QSL Lie to Box 4224, Nickerie, Suriname, S.A.

SWAZILAND, 3DA0 - Look for action from here on RTTY and Amtor as soon as Jon, 3DA0CA, repairs the lightning damage suffered by his KAM plus. The last we heard, he was in need of a LMC 6034IN driver chip for the KAM, and a COM1 driver chip for his Toshiba T-2000SX notebook computer. I do not know if any help has been forthcoming from the amateur community. Jon will be resident in Swaziland for several years. QSL to Jon Rudy, Box 329, Mbabane, Swaziland.

TAJIKISTAN, EY - This once semi-rare country is now well represented by EY8MM who frequents 20 meters between 1330Z and 1500Z, with an occasional appearance around 0230Z. QSL to DL8WN. EY2WW is also active around the same time. QSL route for him is needed.

TONGA, A3 - Craig, A35CT, continues to be very active on 20 meters starting as early at 0000Z, and sometimes operating as late as 0500Z. For QSL route see the DJ, Sept. 1994, p.11). I observed Craig one evening battling the pileup on his own frequency. Finally he sent CQ "listening up". Nary a call. Back to his own frequency, and the pileup returned!!! I thought all transceivers had at least an RIT/XIT that enables limited split operation.

TURKEY, TA - TA2II frequents 20 meters between 2000Z and 2100Z. QSL via TA2DV. TA4BC may be found around 1030z, and TA2EH around 1300Z. QSL routes are needed for these two.

TURKISH REPUBLIC OF NORTHERN CYPRUS, 1B - As you probably know by now, the DX Advisory Committee (DXAC) voted to reject this one by a vote of 14 to 1. They felt it did not meet DXCC Criteria Point 1, Government. Nice try, Igor (and the one "YES" voter).

WEST MALAYSIA, 9M2 - Tan, 9M2DW, (Dancing Witches) has been noted to be active on 20 meters around 1500Z. QSL route is needed.

ZIMBABWE, Z2 - Z21HD now comes on 20 meters as early as 1700Z. QSL route is still needed.

HAVE DX NEWS?

Leave a message in the W2TKU/4(1) mailbox (AMTOR or CLOVER), find me on RTTY, OR via any of the following:

Packet: W2JGR @ WB0GDB.#STP.MN.USA.NA

Amtor: WJGR on 14070 khz.

Telephone: (612) 377 7269

FAX: (612) 374 8161

or use the U. S. Postal Service.

THANKS - Thanks to the following for all your information: I5FLN, K6OZL, N0AT, NJ0M, W5KSI, WA0PUJ, WB2CJL, W2TKU, W6GO, W6PQS, and ZS5S, See you all next month. For now, bye bye from Minnesota,

PAX....73 de **Jules, W2JGR** ■

1. W2TKU/4 scans 7070, 7076, 14072, 14076, 14078, 21074, and 21080 khz. on AMTOR. On CLOVER, he scans 7066, 7068, 10136, 14066, 14067, 14068, 21064,and 21066 khz.

Electronics Workbench

Steve Holton, N2QCA

It was more fun playing with project than writing about it.

If you're at all interested in the electronics end of our hobby, or would like to be but didn't have the equipment or weren't aware of how to start. Read on, this is a really fascinating program! It's a very easy to use software tool that enables you to build and test both analog and digital circuits. Electronics Workbench is produced by Interactive Image Technologies of Toronto Canada. It comes in DOS, Windows and Macintosh versions. The Windows version 3.0E was the basis of this review. This version requires Windows 3.1 running on a 80386 or better with 2MB of RAM and about 2MB of disk space. It can utilize up to 16MB of RAM and a math coprocessor if available. The more memory the more complex circuits you can analyze. I was tempted not to mention the price of this product until the end of the review on the thinking that by the time you read about all of it's capabilities you'd consider it a real bargain. But let's deal with it here - the list price is $299. When you consider what you're getting I think it's a real price performer! While we Hams do have a rather parsimonious reputation, when it comes to software we can be downright stingy. Yet we could easily plunk down this kind of money on the latest electronic gadget du jour. I hope this review will at least get you to pause and consider the value and capability of software like this - this is a powerful and intuitively easy program to use!

The basic concept is to build a circuit by selecting parts from the parts bin window and placing them on the circuit window by dragging them with the mouse. The mouse can then be used to connect the components. Component values can also be adjusted and test instruments can be added to the circuit to analyze the results. The circuit analysis begins when you turn on the power switch. Figure 1 shows a sample screen for an analog circuit and figure 2 a example of a digital circuit. Many of the capabilities and techniques are the same in both the analog and digital modules. I'll start by describing the analog module in some detail and cover the digital module more succinctly as it shares a lot of common features with it's analog cousin.

The analog parts bin contains over 30 basic components. Passive components include resistors, capacitors, indicators, relays and transformers. You have full control over their values. Active components include diodes, Zeners, NPN and PNP BJTs, opamps, JFETS and MOSFETS. Also included are independent as well as voltage and current-controlled sources. For each active component you can use either an ideal or real world model for a device. Opamps, for example come with an ideal model with near-infinite open loop gain and slew rate or a number of real world devices like an LM741 to choose from. You can also alter or create your own models for active devices. Interactive also sells a model set containing over 300 real world active devices for $29.95.

You can also create new parts out of combinations of components. You create new parts by creating a circuit and then making it into a sub-circuit. This subcircuit now appears in the parts bin with it's own icon and can be replaced in the circuit window schematic with that icon. You can now treat that subcircuit just as any other part. You can even build subcircuits into more complex subcircuits. Subcircuits are added to the parts bin for the current circuit. If you wish you can add a subcircuit to the standard parts bin that appears in every circuit or you can copy the subcircuit to the parts bin of another individual circuit. You can also select the default model used for standard parts. For example, if you place a NPN transistor in a circuit the default is to use the ideal model. You can alter the default model in the parts bin to, say, a 2N2222 or a 2N3904 and that will become the default within this circuit. You can also override the default model for an individual part by double clicking on it in the schematic and selecting a specific model.

One of the key things that differentiates this package from other ones is the incorporation of test instruments directly into the circuit. A dual-trace oscilloscope, function generator, multimeter and Bode plotter (for frequency response curves) are included. They can be selected by dragging them onto the schematic with the mouse and connecting them into the circuit you wish to analyze. You can zoom in on the instrument to see it's output or adjust it's controls by double clicking on the instrument. Fig. 1 shows the oscilloscope in the circuit schematic (the icon in the upper left) and the actual scope display and adjustable controls in the bottom. You can adjust the time base, triggering and volts/die on the scope. When the simulation runs the results are displayed on the instruments.

In addition you can open a description window and add a circuit description. When you save a circuit: the schematic including all the values; the parts bin used to create it; the settings of any test instruments; and any description are all saved together. You can also print the circuit schematic and any of it's other elements. It can also produce a parts list when printing.

The analog circuit simulation is based on the well known SPICE-2 algorithms. If you are familiar with other SPICE based programs you may recall defining circuits and components with text based input net files etc. - well there's absolutely no evidence of that here as you can see. All the circuit definition is done by the visual creation of the schematic as described above and the simulation just runs when you "throw the switch". You can select either a transient or steady-state analysis in the analysis options window as well as the tolerance and points per cycle if you wish to fine tune the analysis.

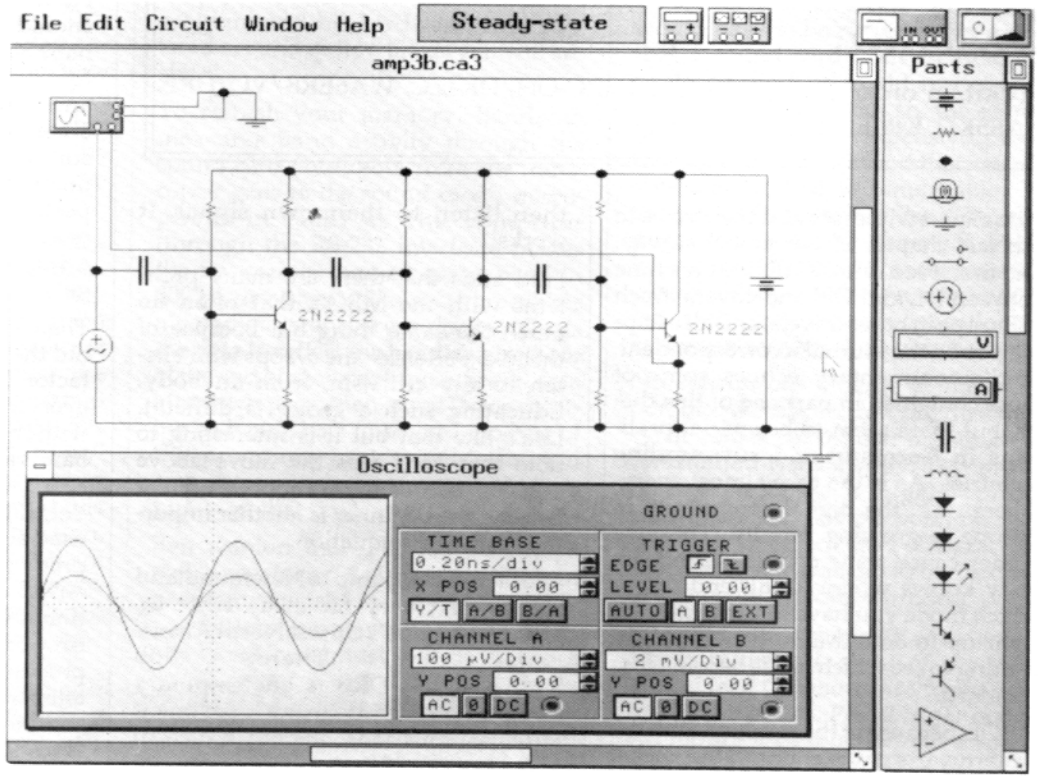
The digital module is very similar to the analog one in it's look and feel as well as the basic principles of circuit construction and operation. The digital parts bin includes: AND, OR, XOR, NOT, NAND and NOR gates; RS, JK and D flip-flops; a half-adder, LED probe and seven segment displays. Again you can combine these into more complex parts via subcircuits. For test instruments you have an 8 channel logic analyzer, and a word generator that can produce up to 16 8 bit words to drive the simulation. Figure 2 shows a sample digital circuit and the word generator and logic analyzer. Also available is a logic convertor. With this you can convert between a truth table, a circuit (gate or NAND gate), and Boolean expressions. Enter a truth table and it can produce the gate schematic in the circuit window. Connect up to 8 inputs and single output of a circuit schematic to it and it will produce the equivalent truth table and Boolean expression.

There's an excellent 285 page manual as well as a reference card and quick start card. The manual is well organized and complete containing for both the analog and digital module: an overview; tutorial; component and instrument descriptions; explanation of the

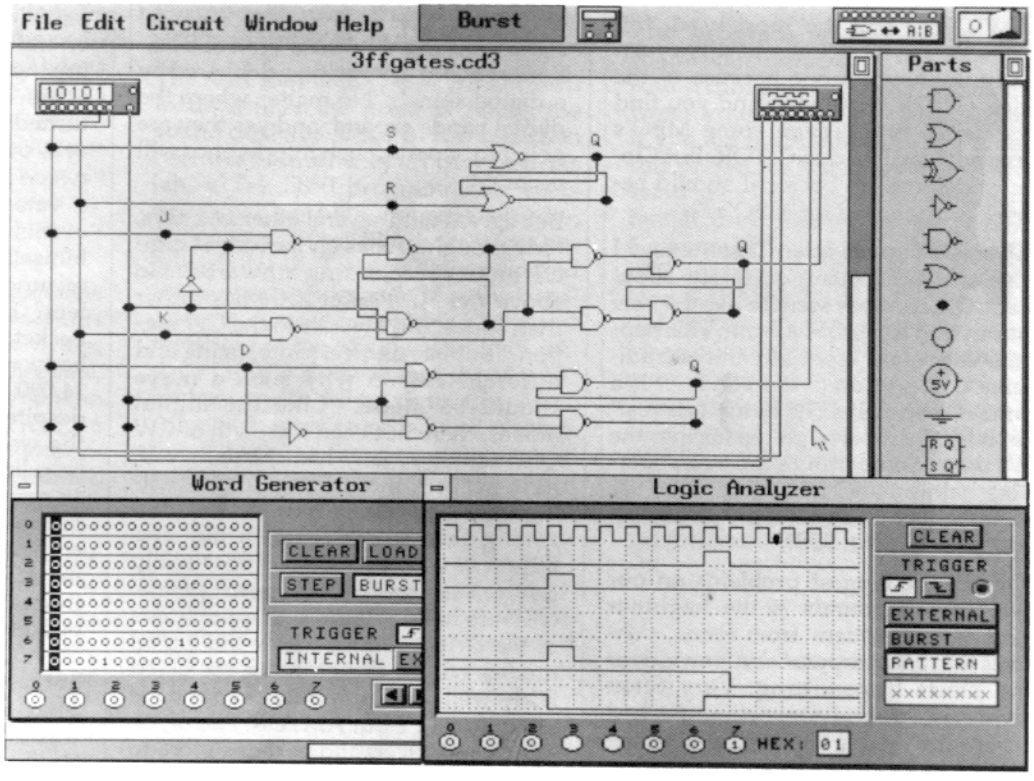
simulation techniques. In addition there is a reference section defining the user interface, menu interface, and system files. This is really an excellent model of what quality documentation should be! In addition there are a good number of documented sample circuits provided that both demonstrate the capabilities of Electronics Workbench and provide a starting point for using the program. Interactive also offers a package of over 150 of the most frequently-used RLC, diode, transistor, opamp, filter and amplifier circuits for $39.95.

What would you use this program for? Well there are a least two obvious areas to me. The first is education: for oneself; or other hams or prospective ham; or in any basic electronic classroom situation. This package is certainly a lot simpler, more portable and less expensive than the equivalent real workbench. For pedagogical purposes it let's one focus on the basic theory and design concepts. The second is, of course, using it to design actual circuits, examine design alternatives before building an actual breadboard. It allows you to examine more alternatives and adjust component values much more rapidly than actual breadboarding. While this may not have that hands-on atmosphere with the smell of that ol' soldering iron, it does have a number of advantages. For those without a well instrumented workbench it is a very quick and relatively inexpensive route to get into this end of the hobby. As Jim, N2HOS, can attest it's not been easy to get this review completed because it's been much more fun playing with Electronics Workbench than writing about it - it's far easier to use than describe! So guess what I'm doing now!

73 de **Steve, N2QCA** ■



Sample circuit from the Analog module of Electronics Workbench: a three stage amplifier.



Sample circuit from the Digital module of Electronics Workbench: flip-flops built out of gates.

WHAT'S GOING ON OUT THERE?

PART TWO

(Cast, in order of appearance: DK4ZC-OH/DK4ZC, WA6ERB/VO1DRB, AB5KD, KR6E, TY1PS)

Two expert witnesses add their voice to this last chapter of our global survey. The first, Fred DK4ZC divides his time between DL and OH and covers much of Europe in other travels, and also happens to be the Journal's correspondent. Fred's commentary echoes some of those contained in part one of this thesis, but there seem to be special problems in Germany and surrounding countries. As is the case almost everywhere . . . "the digital community in Europe is growing rapidly. The new modes cause some confusion and nobody knows where it will end up, or which mode you have to use next to be right up-to-date. Many hams are just waiting to see which mode becomes the standard."

"In DL, because of the re-union with the eastern parts of the country, the packet net is badly overloaded. Many hams use packet as the only way for DX contacts. "A" Class hams are not allowed on HF. Also many hams like to play with their computer and packet."

"AMTOR is still the most used, followed by Pactor. Clover is still a relatively unknown mode because of the price. G-TOR is growing and you find new users often, even some MBO's have now switched to G-TOR. But Clover and someday Pactor II should become the standard for MBO's."

"The new signals interest some and I have answered many questions about them. Others don't seem to like the new sounds and try to QRM them. This happens very often especially in the traditional CW portion of the bands. It is a game of 'Who Has The Better Nerves?' But it is a mistake to go too far into the CW band. Some MBO's are even operating below 14063 LSB. Why don't we go above 14120, into the gray zone between Packet and SSB?"

"One of the biggest problems on our overcrowded bands is the beginner who gets a modem from Santa, connects it to his computer and transceiver and starts transmitting. Very often there is no ground connection or a bad one, or the final is overdriven--and the result is you can read them 2Khz either way from the center frequency! It's easy to help them solve the problem if we will but take the time. I tell them to take their old receiver. use the CW filter, then listen to their own signal. It works!"

Fred adds that there are many problems with the MBO's that often do much the same thing but because of their "experience" the sysops won't listen to any criticism, from anybody. Educating such a group is difficult. Life's like that but it is interesting to note that Fred sees the move above 14120 as part of any solution. And that helping the beginner is another important part of the equation.

We take a short jump to Newfoundland which isn't very far away since St. John's is Europe's closest North American city. There, Bob WA6ERB/VO1DRB is on temporary assignment, living in an apartment with the limitations inherent in such an arrangement. His antenna farm includes an MFJ mini-loop and a long wire (no doubt draped out the window!). Operation is devoted largely to listening on the digital bands. And in a city where the US and Europe are about equi-distant, he hears a lot of digital signals getting clobbered by a SSB station, and QRP CW getting clobbered by a digital signal. "No matter where the digital bands expand, and yes they are going to expand, such interference will occur."

Bob agrees with several other and says, "My thoughts focus on the idea of digital modes expanding upwards. Go above the HF Packet activities rather than squeezing down into the CW section." But he has a very interesting and different reason why such a move should be made. "Like the digital modes, there has been a growth of CW QRP activity. Many hams, like myself, have not only moved over to the exciting digital arena but have also started getting back 'to our roots' by building little five watt transceivers that really do work and are loads of fun to operate. QRP-ers hand around the upper limits of the CW subbands below the digital modes where things have coexisted fairly well for years. But now we have not only RTTY but AMTOR, Pactor, G-TOR and Clover, and perhaps more to come."

"Where will these hams go on a band like 20 meters? The area between 14.110 and 14.150 is seldom used by US hams. The subband is mainly occupied by foreign (including Canadian) SSB stations. I don't see why this portion of the band should not be shared SSB/Digital. Perhaps SSB won't even exist in its present form within a few years. Digitized voice and graphics may change how we operate. It isn't that far fetched. There is surely much less opportunity for harmony if we move down into the CW portion for CW will always be around in some form or other. It offers the ham a very simple and inexpensive way to get on the air."

Then is a creative outburst, Bob points out the obvious, with a twist. "Another factor in this whole equation is that everything has become more intense with the lull in propagation--rendering bands above 20 meters less useful. Everyone wants a piece of 20 and 40 meters! Yet, digital and CW have a great unused advantage called 30 meters. It is a pretty good band in these times and the ADRS should push its use." Right on, Bob and thanks. He also enclosed the proposed Canadian bandplan being prepared for the Region 2 IARU in September 1995. (Please see *Last Word* for comment.) The digital modes (not including Packet) receive a narrow piece of 20 meters--14.070 to 14.095, a major piece of 30 meters--10.130-10.150.

Finally, I reached out to get some last minute news and opinions. And struck gold in Texas. There was no way I could participate in SARTG , but I did look in on traffic from time to time. Some surprising things were going on there, so I ask an expert for some comments. As it turned out, I could see the fire in Ron's eyes over the 1623 mile phone link between Austin and Briarcliff. AB5KD is a veteran contester and takes these events quite seriously. And expresses himself in language that is not easy to misunderstand! So, what was the problem? Packet, for one. Persistent HF Packet, not above 14.095 where everybody agrees they should be, not above 14.090 where they continue to practice despite the Region 2 "bandplan," but all the way down to 14.084! Good filters help limit their damage, and of course an amplifier overcomes all opposition. But they keep burping away with their endless repeats, passing no traffic, for the RTTY signals in and around the frequency make mincemeat of each packet. In such circumstances there is no hope for effective communication but, assuming most of the stations are unattended, who cares about the waste? Sad to say, everybody but the absent sysop.

There was something else on the prowl as well. I heard it and Ron confirmed it. There was a Pactor station on 14.085

mark frequency! Right in the middle of the action. He couldn't seem to link with another station, oddly enough, but it didn't keep him from trying. This misguided soul either hates contests or was so pleased to have figured out how to send out a Pactor CQ that he paid no attention to the frequency he was trying in vain to occupy. Or, maybe he thought he could link with a RTTY station!

This invasion of the RTTY portion of the 20 meter band is nothing new. The pressure on that traditional space from both bottom and top is relentless, and it exists for good reason. There is simply not enough RTTY activity to anchor the space until that rare DX station pops up . . . or until the occasional contest fills the weekend. I candidly asked, "Ron," I said, "how is the RTTY contest gang going to have any place to work if this kind of thing keeps up?" And Ron, without hesitation admitted that there is not enough RTTY activity to keep those frequencies open. "But," said Ron, "can't they at least give us the use of the space during those few contest weekends during the year?" Good point, Ron. Many might argue the point but the old "use it or lose it" rule is very much in evidence.

Last month we introduced Peter's (TY1PS) new BandCheck/Chart program. By this time I had hoped to have logged a few dozen hours at the computerized rig. But somehow the 31 days of August collapsed into about six, as I recall. I call it the "Black Hole" effect. That's what buying and selling houses and preparing for the move will do to any month. August was measurably worse because of the muggy, warm and wet weather.

Fortunately, there is always someone else we can call on. In most cases it is someone even busier than this writer, but they never let me down. This time, it was Ben KR6E. For those of you who don't know Ben or know about him, he is a technological wolf in sheep's clothing. He is a multi-career professional, but it is our good fortune that he doesn't seem to change hobbies. I am pleased he remains deeply involved in the wonders of HF digital communication.

The original copy of Bandscan went to Ben via Clover/Express the first time around. Conditions were marginal and he openly doubted whether the ".EXE" file would work. In fact, the 500K file survived its transcontinental journey and fired up without difficulty. He enjoyed experimenting with the software and made several suggestions to Peter regarding modifications. After the changes were made, he delved more deeply into the inner-workings of the program and his hardware. And puttered around quite a bit, as you will see shortly.

To refresh your memory, Bandscan measures band activity through the sound card (audio-out from the transceiver goes to the sound card's microphone-in jack) as the computer (through the RS-232 interface) makes the transceiver scan an entire band in 500 Hz increments. The software makes a complete scan very quickly, adjusts the data to reflect the band's noise floor at the end of each pass, averages all data after each pass, then saves it for charting in BandChart (a second module of the program). Last month's Journal cover was a typical example of the output . . . at that time.

Ben wanted more, so his putterings took a new turn. "As I observed the scan program at work I saw it was not sufficiently sensitive to weak signals . . . and any BandCheck must include that ability." Curious about the source of the problem, he quickly realized it was the AGC configuration of the sound card itself. AGC on the transceiver is turned to the OFF position for this program, but the Media Vision sound card was something else. A call to the manufacturer didn't add much except to discover that the AGC was imbedded in the proprietary chips and was not subject to adjustment.

The next step required a series of tests to determine the point at which the sound card's AGC fully recovered. Ben borrowed some heavy artillery from his lab, a Tek 5850 programmable spectrum analyzer with an event recorder, a Coumbs 500hz filter set at the receiver's 1st IF. Tek's 5850 was clocked to the same step increment as the transceiver's computer control. The event threshold of the 5850 was set at .5 *uv.* An FT1000D receiver was set at a 500 Hz bandwidth, RF maximum, no AGC. All events were recorded and plotted. BandCheck ran five passes for each 20 millisecond data group. Tests were run from 40 ms to 800 ms, at 20ms increments, then compared with the Tek 5850 results. A simple correlation "R" was developed for comparison. The optimum correlation appeared at the 480 ms delay. Any further delay degraded performance.

The tests were run on several bands and with different filters but little change was noted. The results might vary from one sound card to another, of course. While further tests would have to be run, it is Ben's belief that a sound card with an AGC that could be disabled could run at much faster step rates. Even so, the correlation between a very expensive, precise tool like the Tek 5850 and this inexpensive sound card is remarkable. The bandplots (courtesy of BandChart) on page 18 speaks for themself. Please keep in mind that all of these tests took place in Hollywood, CA using wire antennas at a time when propagation was at the summer low (in a very bad year).

Delay	40 ms	100 ms	200 ms	300 ms	400 ms	480 ms
R	.30	.44	.66	.75	.89	.94

No conclusions emerge at this point, nor did we expect any at this stage. What comes next? Peter designed and contributed the software. Ben proved that a sound card is a highly capable instrument for this purpose, and also how best to deploy the software. Now we need to move ahead to the next step in a long and involved process.

Some feel such a snapshot of the critical bands in critical areas of the world should lead to a more intelligent use of the digital bands. Possible, for certain, but hardly probable without a significant and sustained effort on the part of a few dozen dedicated amateurs scattered around the world. Think about it, try the program and contribute your thought and talents to the project. Let us hear from you.

The program is now ready to go. (Bandscan requires Windows 3.1, a sound card and an RS-232 interface between your transceiver and computer). If you are interested in contributing to this project, or if you are merely interested in looking into the program's potential, download it from the HI-TECH Gateway BBS run by Dick W4KAU. His BBS operates on 706 604 3295. Download BANDCK.zip. If you do not have the PKZIP utility download it as well for you must have it to unzip the program wherever you get the program. After unzipping the file print out the README.TXT file using Windows WRITE or any other Windows word processor. This file includes complete instructions for installation and use of the program. Good luck.

We arrive now on this railroad at a station called **Summing Up**. But let me

9,600 and 19,200 BPS Modems

Phil Anderson WØXI

In March 1985, Steve Goode, K9NG, planted the seed for 9,600 bits per second (BPS) packet modems in a paper presented at the ARRL 4th Computer Networking Conference. Previously, all terminal node controllers (TNCs), or packet units, utilized 1200 BPS AFSK modems and worked directly with unmodified FM transceivers (radios). Steve's landmark modem sparked such interest in higher speeds that radios and TNCs have now evolved to the point of 9600 or higher speeds "out of the box."

In his paper, entitled "Modifying the Hamtronics FM-5 for 9600 BPS Packet," Goode showed that it was necessary to modify "standard" FM radios of the day in order to operate at 9600 BPS. Goode's modem featured direct varactor drive, direct discriminator reception, and a transmit/receive data scrambler, all features which were, at the time, evolutionary.

The next step in this evolutionary process was taken by James Miller, G3RUH. When experimenting with 9600 BPS radio systems, he and other amateurs experienced great difficulty using radios of differing brands, even after making Goode's modifications. Miller addressed this problem in a paper he wrote for the ARRL 7th Computer Networking Conference in October of 1988 entitled "9600 Baud Packet Radio Modem Design." Miller's modem departed from Goode's in that it included a new carrier detect circuit, both transmit and receive scramblers for full-duplex operation, an ultra-accurate digital-and-analog PLL clock system, and an FIR pulse-shaping transmit filter with adjustable taps. By adjusting the taps, it was possible to adapt some combinations of radio models for successful 9600 BPS operation. Miller's 9600 modem, referred to as the 'RUH', is now an ad-hoc standard.

Following the publication of Miller's paper in 1988, RUH kits became available for attachment to TNCs; however, 9600-ready radios were not yet available. Amateurs wishing to operate at 9600 baud had to find crystal-based radios, for the most part, and modify them as Goode did. Shortly thereafter, Kantronics developed their Data Engine, which could be configured with two modems in various combinations: two 1200, one 1200 and one 9600 RUH, or a pair of RUHs. The continued lack of 9600-ready radios in 1990 prompted Kantronics to design several to match the RUH. Thus, the Kantronics DVR 2-2 and D4-10 were born. The RUH modem is capable of 19,200 with modification, and Kantronics' D4-10, crystalled for 430.55 MHz, remains in production today as the only 19,200 BPS data-ready radio on the market.

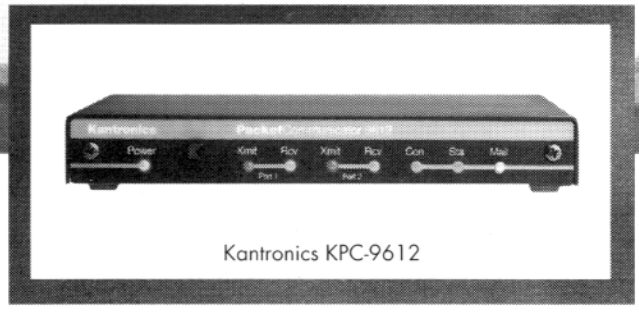
Earlier this year, Kenwood, ICOM, Yaesu, Alinco, and Standard announced and began shipping '9600-ready' radios. In April of this year, Kantronics announced a second 9600 baud modem product, the KPC-9612. Kantronics incorporated the traditional 1200 BPS modem into the same package, recognizing that a transition from 1200 to 9600 may take time. This dual-port unit can operate at 1200 and 9600 BPS at the same time and requires very little power. (It can even run on a 9-volt battery.) The KPC-9612 takes advantage of the features of the new 9600-capable radio models with its "oneradio" command and dual port design. The "oneradio" command allows users to connect both of the TNC's ports to one radio. The KPC-9612 can receive either 1200 or 9600 automatically, and will transmit either speed. In addition, users can attach a radio to each port and operate one radio at 1200 and the other at 9600. Cross-connecting and cross-digipeating are supported.

With this evolution of equipment, 9600 BPS packet networks and point-to-point links will spring up everywhere. These systems will give the amateur community an opportunity to increase traffic throughput. At the same time, interoperability problems will most likely appear, hopefully for a reasonably short period of time, until manufacturers adjust their designs to a common standard. For example, since not all '9600-ready' radios offer identical transmit waveforms or signal compensation on reception, some radio links - formed by different models of modems and radios - will be problematic. The Kantronics KPC-9612 was tested with both the RUH and single-chip modem TNCs in system settings, and with decent radios, the RUH and KPC-9612 combination was found to be excellent. Those modem-radio combinations that work in early applications of this emerging technology will become the ad-hoc standards. The shakeout should be complete by Dayton of 1995.

Like the KPC-9612, nearly all the 9600 baud modems designed within the last year are chip-based rather than discrete. They differ, in part, from the RUH in that they are advanced single-chip modems, while the RUH is made up of a number of 1980s 16-pin DIP chips and a pair of EPROMS for transmit and receive circuitry. Both designs are excellent, but economies of scale will dictate that the chip modems will be the long-term survivors – the modems of choice. Due to price pressures, compatibility, and performance, the manufacturers will be forced to follow the single-chip design.

Although Steve Goode's early modem featured direct varactor drive, direct discriminator reception, and a transmit/receive data scrambler, the problems were not solved. As Goode discovered, the modem was not really the problem. What he really uncovered was that it is easy to "do 9600" if the radio is stable and data-ready; that is, the mic and audio amplifier circuitry must be bypassed and the IF filters must be widened. Each of these steps is straightforward but are best accomplished at the factory due to surface mount construction. The first generation of 9600-ready radios are now out, and some perform very well. As with most evolutionary equipment, the second-generation radios should operate well.

Comparing the KPC-9612 to any other TNC of equal cost would be like comparing what you see here to a gentle breeze.



Kantronics KPC-9612

Until now, all TNCs in this price range could operate at only one baud rate at a time. Now, Kantronics has created a whirlwind with its newest TNC: the KPC-9612. This is a dual-port TNC, meaning it can send and receive messages at 9600 baud and 1200 baud *at the same time*. So what you get with the KPC-9612 is twice the power for the same price. You can also choose a 32K RAM or, for extra mailbox space, a 128K RAM. Either way, the KPC-9612 is portable and is only a wisp larger than the KPC-3, and it can run on a single 9-volt battery.

If you've been asking where you can find a small, inexpensive, dual-port TNC, look no further. The answer is blowin' in the wind.

Kantronics

For more information, contact your authorized Kantronics dealer or Kantronics at 1202 E. 23rd St., Lawrence, KS 66046-5006 913-842-7745 FAX 913-842-2021.

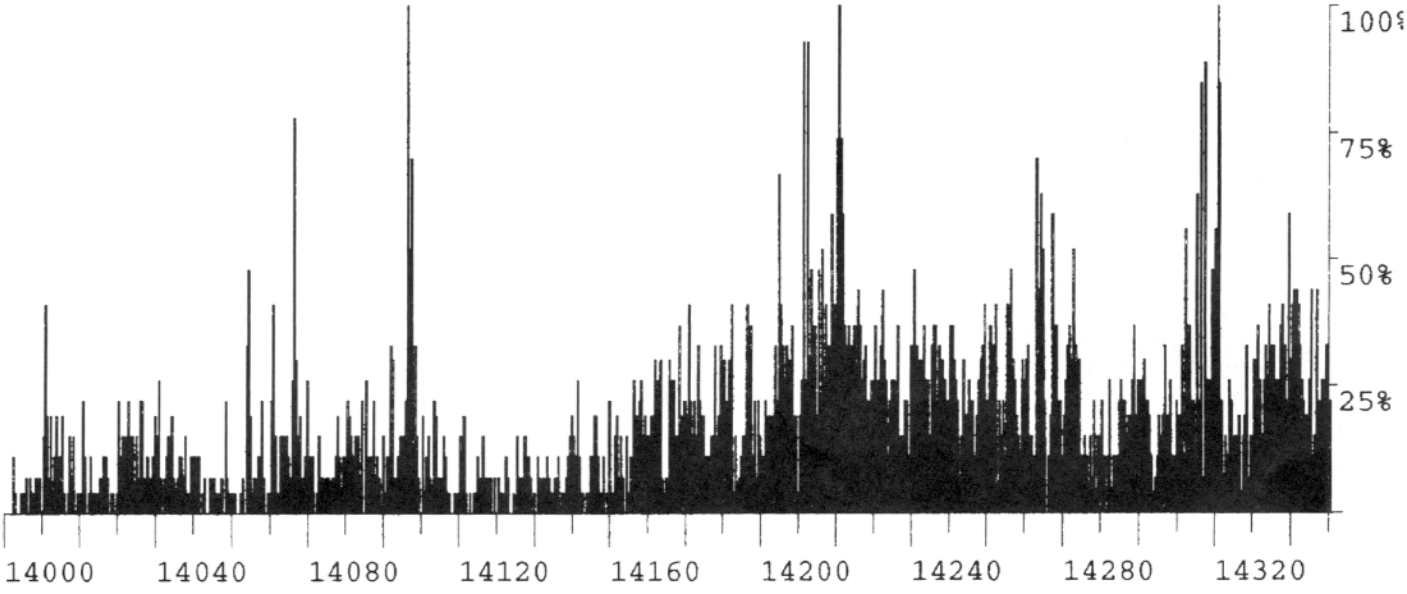


Chart A:

The "1" in 14.080 is directly beneath the actual frequency. Note that several passes were made over this almost 3 hour prime time period. If a signal was present on the band for each pass, utilization (scale on the right) would equal 100% Very few frequencies qualify.

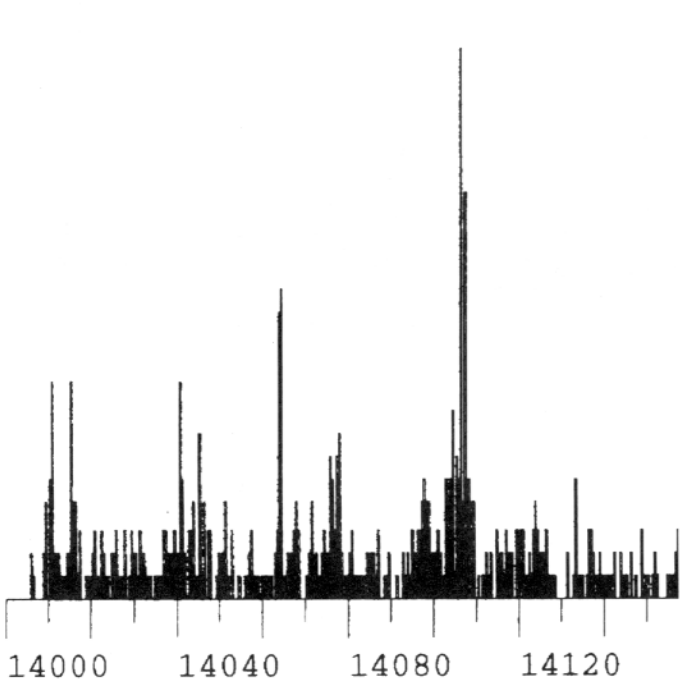


Chart B:

This plot, taken between 10PM and 1AM Pacific Time on the same day reflects the declining activity at the later hour. Average occupancy is well below 25% with very few peaks in the CW/Digital portion of the band.

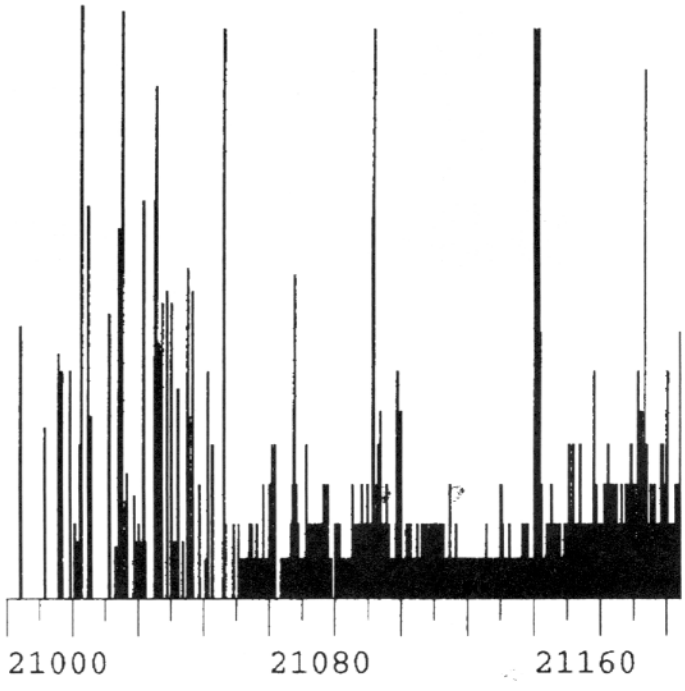


Chart C:

15 Meters, during the afternoon Pacific time was quite dead. Interesting to note, however, that the CW guys found there was life in the band despite the propagation numbers. Check it out before writing it off!

delay our progress for one more minute, time enough to thank each one of the contributors involved in this project. The observations and recommendations of this global panel meet the highest standards. Even the open admission of individual prejudices adds credibility to their commentary. Let's not deny our own bias as we ponder these issues, and admit to them as freely as this group. If we are able to do so, and if we convince those on the other side of the argument to reach the same degree of candidness, the problem is already half solved. We owe this panel a large vote of thanks for starting what we hope will be a lively discussion regarding the issues so critical to the future of the digital modes. And remind them, at the same moment, that their task is not complete for we will no doubt call upon them again, and again before the discussion reaches its conclusion.

No bullet-proof solutions emerge from this discussion, nor were they expected. But what we do have, if we read and ponder the comments collected here, is an agenda filled with tentative action steps. If these suggestions, which represent the distillation of the best this panel has to offer, create some changes; and if the new steps are taken in a positive frame of mind, many of the problems will diminish and ultimately disappear. The easy part of the list contains those items that fall squarely on the shoulders of the individual, wherever the digital art is practiced. These are simple, straight forward rules, legal mandates if you will. More complex are those suggestions involving groups, different countries, varying habits, rules and regulations. But even there we can make a start . . . if we really want to.

As individuals we must cultivate the basics, the "ABC's" of ham radio operation, the applicable rules wherever we live. If we practiced what we know, if we practiced what we preach, we would obey the primary rule-- LISTEN BEFORE TRANSMITTING. If there is a signal present don't call, even if it is from a mode unlike ours or unfamiliar to us, even if the signal is arguably in the wrong place on the band, **move to another frequency**. At least half of the problems may trace to this one common, avoidable cause. Pileups aside (DX or Contest), let basic courtesy prevail.

And now the second one. Regardless of tradition, past usage, power, antenna, reputation or country count, the universal fact is, except in officially declared emergency situations, NOBODY OWNS THE FREQUENCY. Or, to put it another way, occupancy is 10/10ths of the law! This is as true for the CW station who fumes and QRM's because some digital signal or other has invaded some favorite frequency, as it is for your RTTY station when you hear the G-TOR signal on 114.084 at the very moment you absolutely have to make your schedule on "your frequency" with your nephew in Boise.

Third, and this rule is equally basic, TUNE YOUR STATION PROPERLY, and help others, particularly beginners, tune theirs. Good engineering standards, required by all licensing authorities everywhere, take a beating in the digital modes. While it may be particularly true among those brand new to digital, or those beginners who have moved from one digital mode to another, there is a powerful amount of man-made noise out there. We should listen to our transmissions more, work with friends on monitoring the quality of our output and offer to help those who obviously have adjustment problems. Let's put up some "No Littering" signs on the bands and clean up our act.

Fourth, CUT THE POWER. Most digital modes thrive on 100 watts or less. (I have never used over 50-60 watts on Clover). An acceptable neighboring signal at 100 watts becomes an intolerable signal at 500 watts. And a kilowatt (except for free-for-all contest or DX work) is inexcusable.

Now to the gray area, to those actions that might seem advisable even though no regulation mandates that we do anything other than that which we do now. Yet something must be done, somebody must give. There are toes to be stepped on here whatever the suggestion, but after coming this far why shouldn't we lay out a few thoughts without regard for anybody's feelings. When the smoke clears, perhaps the discussion can proceed. The solution may not be as complex as we imagine.

Suppose, for a moment, we all agreed that in general the 14.065-14.095 area (using 20 meters as the example, but using the same principal elsewhere) was the land of the keyboarder. "Can't be done," would be the immediate response. But in fact, much can be accomplished without great dislocations. Understand that the term keyboarder in this case covers both keyboard-to-keyboard links and well as keyboard-to-BBS traffic. Thus the BBS stations would continue to scan in here, but would respond only to keyboard interrogation. Also, understand that the 14.065-14.095 keyboarder space doesn't fit in every country. There may have to be a bit of give at the top or the bottom of the space, but the core of it fits everywhere.

Tactic number one is easy. Move all automatic, unattended US stations out of the keyboarder area now and into the FCC's proposed subbands. By late this year, the law will require the move. Let's get the unattended stations where they belong without delay! They might as well get used to the new territory.

Tactic number two. Move all BBS-to-BBS traffic forwarding operations out of the keyboarder's space. They must utilize 20 meters, but why not move all traffic forwarding operations above 14.110. This portion of 20 meters is grossly underused and even a casual weekend of listening demonstrates its availability for those long, multi-hour links required to move one hundred plus messages at a time. Second, go one step further and exploit both 17 and 30 meters. Both these bands perform very well, often as well as 20 meters, even in the worst of this summer's conditions. There is no reason the heavy-duty BBS operators can't expand their use of these two fine bands. Impossible? Not at all, for there are but a few dozen stations involved in significant traffic forwarding and they talk to each other regularly. It's worth a try.

Last, but certainly not least, there is the question of RTTY. Can we in good conscience continue to look at the 14.080-14.095 space and say "Oh, it's reserved for RTTY DX and contests?" The space is already eviscerated by Packet, the invasion now often well into the .085 area. Under the "Use it or lose it" rule there can be little complaint, for nothing illegal ocurred. But the digital community's observance of the old gentlemen's agreement has resulted in the worst of all fates--the ceding of over half of the RTTY space to a mode that a) has more than ample, unused space in those higher frequencies where it belongs and b) really has no place on HF regardless of the above. This is an unaffordable loss and steps must be taken now to rectify the problem and reclaim the frequency. Since there are so few RTTY signals present on the bands, such a strategy suggests that the other digital modes should move right in. The pressure is on right now. Perhaps it is time to discuss a major shift, encouraging Pactor to move into the space up to 14.085.; Now that should start the discussion ball rolling! Sound off now! Do something, or the space will be gone forever.

de **Jim, N2HOS** SK ■

DSP MODEM

Johan Forrer, KC7WW

A Low Cost DSP Modem for HF Digital Experimentation - Part II

DSP SOFTWARE

Sample Rate

As an example, software for a 2125 Hz mark, 2295 Hz space (170 Hz shift), 100 baud FSK demodulator will be shown. Specific details of the actual implementation of the demodulator should be read in conjunction with the source code. For availability of the DSP modem source code, please see the appendix.

The sample rate of matched filters for the DSP demodulator implementation is set at 6250 Hz. Since the space tone is set at 2295 Hz and the 100 baud modulation rate will extend the side lobes of the spectrum to some extent. It thus appears that the chosen sample rate is adequate, (6250 2 x 2300 Hz).

Input Stage

(decimator)

Consider the input decimator. The function of this stage, as previously discussed, is four fold:

a) Provide rejection of out-of-band signals, i.e. reject signals below 2125 Hz or above 2295.

b) Increase the dynamic range of the demodulator, i.e. for a 14-bit A/D the dynamic range is $20\log(1/(2^{14}-1)) = -84$ dB. It will be shown that the decimator used in this DSP demodulator behaves like a 21-element moving-average filter. The effect of such an arrangement is that each data value output is the result of a complex interpolation, i.e. each of the 2^{14}=16384 quantized steps of the A/D convertor is further subdivided into much smaller steps. The actual dynamic range of such input stage will thus be in excess of 84 dB, which is quite impressive, however required for limiterless operation.

c) Increase the S/N ratio. If we assume that the input noise has a truly random behavior, the moving-average type input filter, will then by virtue of the additive nature of the signal component and noise components, cause the signal component to increase, while the noise component will tend to cancel. Unfortunately, some types of noise, such as static crashes etc., does not behave in this way.

d) Reduce the sample rate for the matched-filter discriminator to 6250 Hz.

Decimators are actually rate downconvertors. They function by taking input samples, pushing them through a lowpass filter, and returns every N-th filter output for the result. The reason for the lowpass filter is to avoid new aliasing products being formed due to the lowered output sample rate. Since the matched-filter discriminator operates at 6250 Hz, the decimator is a x2 downconvertor and thus designed to operate at a sample rate of 12500 Hz. A special bandpass filter, shown in Figure 4, is used with this decimator instead of the usual low pass filter.

Matched-filter discriminator

A matched filter is simply the inverse of the impulse response of the wanted signal. Consider an input train of alternating zeroes and one's (Figure 5 (A)) where each bit time represents one signalling element, i.e. a baud. Then for 100 baud rate, each signalling element duration would be 1/100 th second. A signal period as seen by each filter, though would be twice this duration, or only 50 Hz as shown in Figure 5 (B) and (C). The matched filter should thus only respond to these tone pulses that has a repetition rate of 50 Hz. It can be shown that such an idealized filter would require very steep skirts, i.e. nearly infinitely small band-edge transition zones. Approximating such a filter in DSP would also require an inordinately large filter order. Practical use of the demodulator relies on the ability of a human operator to "tune" to received tones. This implies that the design should include some degree of tolerance, however, too loose tolerances will degrade performance. The DSP filters used in this DSP demodulator is shown in Figure 6.

The discriminator filters as presented in Figure 6, shows minimum ripple in their passband, excellent rejection (better that 60 dB), and very steep skirts. The final function left in the discriminator, is envelope detection and signal combining. This is a rather simple task in DSP as all that is required is to take the absolute values of the discriminator signal filters and determine their difference. There still remains some audio frequency components in this difference signal, the removal of which is the subject of the next section.

Post-descriminator processing

The highest audio tone of interest is 2295 Hz, while the recovered modulation frequency is only 50 Hz. It is thus obvious that a simple low pass filter may be used to remove the unwanted audio frequencies. If a cutoff frequency around 50 Hz is as well as sharp rolloff characteristics, then only the 50 Hz

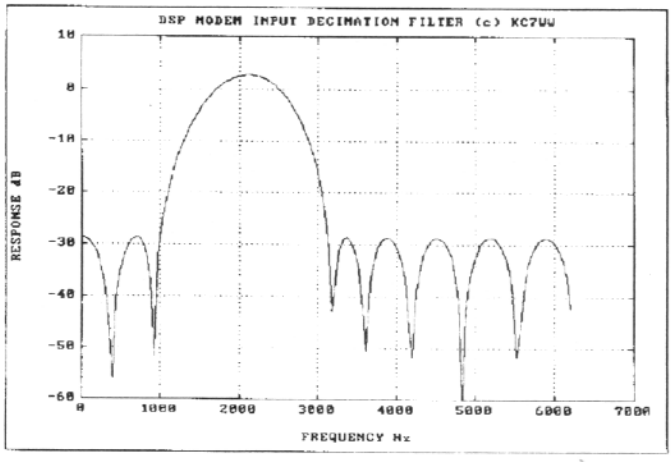


Figure 4. Input decimator filter. Note a bandpass filter is employed instead of the usual lowpass filter. Input sampling rate is 12500 Hz, output rate is 6250 Hz.

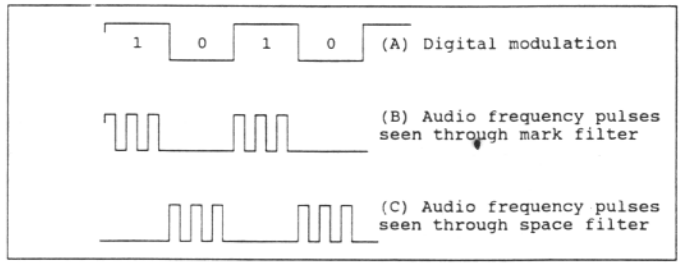


Figure 5. Summary of signals at various places in the discriminator. (A) The digital modulation, (B) mark, (C) space.

modulation will pass, however, the intended square-wave modulation signal will be degraded to a signal with heavily rounded edges. Some applications, such as RTTY, such slightly distorted waveforms is adequate as asynchronous character transmission is employed and it is relatively easy to estimate the center of each bit. In other instances, i.e. AMTOR and PacTOR, bit transitions are used for purposes such as bit phasing and the ability for

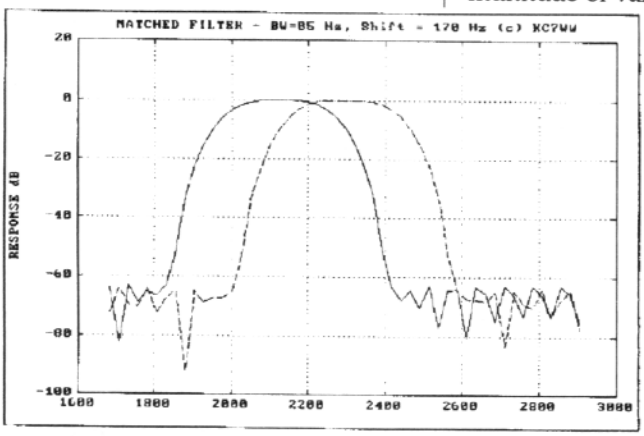


Figure 6. Matched filter pair as used for the DSP descriminator. This example shows 85 Hz wide, 81 th order FIR filters centered at 2125/2295 Hz. Sampling frequency is 6250 Hz. The passband of such filters are somewhat wider than an ideal matched filter to accommodate some degree of operator and equipment tolerances.

accurately locating the bit transitions will influence the overall performance of such systems. For this reason and low pass filter with a gentle rolloff characteristic is more suitable.

There is a further consideration for the low pass filter design. At the sample rate of 6250, the output of the low pass filter would be updated every 160 microseconds. This translates to a small amount of uncertainty to where the exact bit transition occurs. As it turns out, a 6250 Hz sample rate DSP low pass filter with a cutoff frequency of 50 Hz, would require a relatively high filter order but if the sample rate could be reduced, a lower order filter with better characteristics could be designed. This DSP demodulator uses every other sample from the descriminator, i.e. reducing the sample rate to 3125 Hz before the actual low pass filter. This arrangement is effectively is also a decimator, and like in the case for the input decimator, has some desirable features that will improve overall performance. The low pass filter response is shown in Figure 7. Note that this is a very gentle low-pass filter that have been found to be adequate for most applications,i.e. RTTY, AMTOR, PacTOR, and HF Packet.

PERFORMANCE COMPARISONS

Performance testing and quantitive modem comparison is indeed a very difficult task. Engineering mathematicians often derive so-called "likelihood" (so-called BER) functions to estimate probable error rates in the presence of disturbances. However, this assumes that one can model the interaction of a multitude of variables such as modem architecture (whether it has a limiter or not) as well as the nature of noise on the different HF bands. This has proven to elude even the most basic of questions. What has been done successfully, however, is the application of specialized electronic atmospheric simulators. These "black boxes" is used to compare different demodulators under similar simulated "band" conditions. The DSP demodulator described in this article has not yet been tested using such sophisticated equipment, however, extensive testing against a high performance analog modem (please see AN-93 modem listed in bibliography). Under good conditions, no discernable difference could be found, however under very adverse conditions the DSP demodulator has been found to be as good, perhaps marginally better.

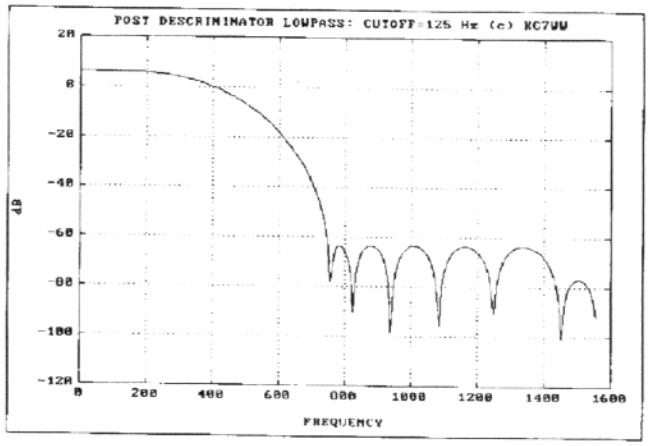


Figure 7. Post discriminator low pass filter. Cutoff, 150 Hz, filter order 15.

SUMMARY AND CONCLUSIONS

A low cost DSP based modem for HF digital experiments have been described. It was shown that nearly ideal filters could be implemented in DSP with relative ease. Besides the added cost/performance benefits offered by a DSP approach, implementation of different modems is just a matter of downloading new code to the DSP. This flexibility implies that optimal modems for each application is readily available, something that is nearly impossible to achieve with an analog counterpart.

The author wishes to acknowledge that this article is based on the works of many gifted individuals without whose generous contributions this would not have been possible. A short bibliography is provided for further reference.

A source listing for the DSP modem, including a schematic for interfacing the DSK to an HF transceiver is available on the ADRS bulletin board for downloading as file HFDSP.ZIP[1]

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1. A software disk that includes further DSP modems, filter design tools, programs for RTTY/AMTOR/PacTor is availale from the author at CBA for $20. SASE for more details.

CONTESTING

Richard Lawton, N6GG

Some Hints on Buying a Computer.

RTTY Contests - Coming Events

Date:	Contest:
SEP 24-25	CQ WW RTTY DX (the BIG one!)
OCT 15-16	JARTS WW RTTY (Japanese)
NOV 6	DARC Corona 10M Digital (German)
NOV 12-13	WAE WW RTTY (German)

-- -- COMING UP: -- --

JARTS WW RTTY Contest
October 15-16, 1994

Sponsored by JARTS (President: JA1ACB)

Supported by Japanese CQ Magazine

CONTEST PERIOD: STARTS at 0000 UTC Saturday, October 15th, and ENDS at 2400 UTC Sunday, October 16th, a total of 48 hours. You can operate all 48 hours. (No OFF periods required.)

BANDS: 80, 40, 20, 15, and 10M (five bands). Japanese RTTY segments are:

BAND JA RTTY SEGMENT

80M 3.520 --- 3.525 MHz note!

40M 7.025 --- 7.040 MHz note!

20M14.070 -- 14.112 MHz

15M21.070 -- 21.125 MHz

10M28.070 -- 28.150 MHz

MODE: Baudot (RTTY) only.

OPERATOR CLASSES: A) Single Operator, All Band

B) Multi-Operator, Single Transmitter

C) SWL

MESSAGE EXCHANGE: RST + Operator's age. (00 acceptable for YL and XYL) All Multi-op stations must send 99 as operator age.

QSO POINTS: Two (2) points for QSO within your own continent.

Three (3) points for QSO outside your own continent.

MULTIPLIER: Each DXCC country and JA/VK/W/VE call area count as a multiplier. But you cannot count JA/VK/W/VE *country* as a multiplier. **Multiplier will count once per band**. You can count your own country or call area (JA/VK/W/VE) as a multiplier.

FINAL SCORE: Total of QSO points times total of multipliers. (For SWL's, same rules as above.

AWARDS: First place plaques to top winner in all three classes. First through fifth place will receive certificates, all three classes in each continent, if number of QSO's is reasonable. Special award for 13th from last in all three classes.

LOGS and SUMMARY: The logs to contain: BAND, DATE/TIME UTC, CALLSIGN, RST/AGE sent and received, MULTIPLIERS, and POINTS claimed. Any entry making more than 200 QSOs must submit duplicate checksheet. Use separate logsheets for each band, and include a Summary Sheet showing the scoring, class, your call, name and address. Multi-Op stations please include names and callsigns of all operators. Logsheets and Summary sheets are available from Contest Manager, JH1BIH.

DEADLINE: Logs must be received by December 31, 1994. Mail to:

JARTS Contest Manager, Hiroshi Aihara, JH1BIH
1-29 Honcho,
4 Shiki Saitama
353, JAPAN

COMMENTS: This is the 3rd Annual JARTS WW RTTY Contest, and is really a lot of fun. From the clever "age exchange" we find just how young we all are, and who the bashful YL ops are, too! Band multipliers will open up ALL the bands. Note the JA RTTY segments on 40 and 80M. October propagation conditions are usually getting good again, with less low band static and better high band paths, world-wide. There are no time-off periods that must be taken, so you're free to pace yourself based on band conditions, and not on running out of time. If you don't intend to make a huge score, consider going for the award for 13th from last place in your class. It will require very precise timing and judgement on your part - and you have to send in your logs to JARTS Contest Manager, JH1BIH. Only he can decide. This is probably the most difficult award one can ever achieve in Contesting! Good Luck!

DARC CORONA 10M
Digital Contest
November 6, 1994

Sponsored by Deutscher Amateur-Radio-Club e.V. (DARC)

CONTEST PERIOD: Sunday, November 6, from 1100Z to 1700Z (6 hours)

NOTE: Contest will take place on the first Sunday of March, July, September, and November of each year.

MODES: RTTY, AMTOR, PACTOR, and CLOVER

BANDS: 10M ONLY

CLASSES: A - Single op B - multi - op C - SWL

CONTEST CALL:

for RTTY: **"CQ CORONA TEST DE ....."**

for AMTOR/PACTOR: **use FEC (mode B) for "CQ CORONA TEST de sellcall XXXX"**

Use ARQ (mode A) for answering and contest exchange. Contest exchange in any other mode is subject to disqualification.

EXCHANGE: USA stations: send RST + QSO nr. + name + State

All others: send RST + QSO nr. + name

CONTACTS: Additional QSOs are allowed with same station on different mode after a 15 minute interval, or after a QSO with another station.

MULTIPLIERS: Each DXCC/WAE country, and each USA state, and each call district in JA,VE,and VK, (NOT USA). Count only the first QSO with a USA station as a DXCC/WAE country multiplier.

QSO POINTS: Count 1 point for each completed QSO.

FINAL SCORE: Total QSOs x total multipliers.

AWARDS: To top stations in each class, country, and district mentioned above.

LOGS: Use separate logsheets for each mode. Logsheets must contain: Date, Mode, Time UTC, Callsign, message sent/received, name, USA-State, first-time multiplier prefix, and QSO points. Also required is a Summary sheet with a list of claimed multipliers. If entry is multi-op, please list names and callsigns of all ops. Comments are very much appreciated.

DEADLINES: All logs must be received by 60 days after the Contest. Mail to:

Werner LUDWIG, DF5BX
P.O. Box 12 70
D--49110 Georgsmarienhutte
GERMANY

COMMENTS: This is an all-digital 10M contest, except for HF Packet, and it is 6 hours long. It occurs on Sundays, 4 times a year. There are no multipliers for USA call areas. Just the STATES count for mults. This means that only your FIRST USA QSO in the contest will count for a DXCC/WAE country mult, along with the State mult. No indication was made about counting multipliers again after changing digital modes. No mention was made in the official rules about how to count KH6/KL7. Are they USA states or separate countries? Most contest rules count them as separate countries. I plan to do that. It makes more sense and is less confusing. With the propagation forecasts looking rather poor for 10M, this Contest will really be a 6-hour challenge. Let's see if the really high power stations can ionize some paths for us. Stay tuned (up).

NCCC's Choices on Computers

In the August '94 issue of "The JUG," (Newsletter of the *Northern Cal Contest Club*), Editor Jack Troster, W6ISQ wrote about an informal survey he did on what kind of computer equipment NCCC members were using. While these very active contesters are SSB/CW types, the majority of them live and work around the Silicon Valley, where disk drives and computer chips were born, and are still maturing. They ALL use some kind of computer for logging and station control. Here's some of their comments on an article by contester Dave Pruitt, K8CC in "FLASH," the April '94 Newsletter of the Mad River Radio Club, titled: **"Buying a Logging Computer."** (Dave has 7 computers)

K8CC states: Don't buy anything less than a 386 CPU, and 2 to 4 MB of RAM. 40MB hard disk is ample for logging plus Packet Cluster, but larger disks are now a good way to go, now that they're so cheap (less than $1 per MB). Only one floppy disk is needed (3 1/2 inch preferred). Never skimp on the monitor, the thing you are staring at for hour after hour. Get a GOOD color monitor, 14" or 15" VGA, 0.28 mm dot pitch, 1024 x 768 resolution. We're talking about $300 here. Ask to see the monitor in operation, as there are some really poor ones around. Mini-tower cases are preferred because they can be mounted beneath the operating desk and out of the way. For keyboards, I like the 101 with the function keys on top.

Comments from NCCC members: Virtually all agreed with Dave on the CPU minimum (386). But most thought that

the 486 is getting so cheap that upgrading to 486 is best way to go, especially if you like to run Windows programs, a real drag for speed, disk size, and memory size. (Windows is not needed for logging programs.) Many comments were about building your own computer, as prices in Silicon Valley are so dirt (silicon?) cheap.

Memory: **WA6SDM:** 2 MB minimum, more is better. **W1FEA:** 4 megs is best deal these days. **N6IP:** CT ver. 9 (K1EA Contest logging program) requires 2 MB memory, but using DVP voice keyer you'll need at least 4 MB. **W6QHS:** I use four 1 MB plug-ins (about $40 each). Get 70 nsec speed for later upgrading to even faster computers.

Hard Disk: **WA6SDM:** Disk prices are realy dropping. Recommend 170 to 200 MB. **W1FEA:** I found smaller drives (like 200 MB) are more expensive (per MB) than 210 and up. I recently bought a 210 MB Connor for about $160 and works very nicely. **W6QHS:** 40 MB IDE drives are now near $100, but a 100+ MB drive with cache is a better long-term buy. Don't buy bargain drives in older formats. Get the size that fits in 3 1/2 inch floppy mount. Need DOS 5.0 or later to install. Only need one floppy drive: 3 1/2 inch size ($45) and get all software in this format. **N6IP:** Get a hard drive that was manufactured in the past year or so. Newer drives are much more reliable and rugged that those built a few years ago. **AA6WM:** A large drive is not necessary for contesting, but is becoming essential for most other programs. Don't buy anything less than 200 MB.I recommend installing both 3.5 and 5 1/4 inch floppy drives. There is still a lot of software distributed on 5 1/4 inch diskettes (especially at hamfests!). **N6RA:** I recommend at least 300 MB HD with fast seek time.

Serial and Parallel Ports: **W1FEA:** A second serial board for COM3 and COM4 runs OK using interrupt lines IRQ4 and IRQ3 respectively. Then COM3 and COM4 port addresses can be set appropriately. **WA6SDM:** With IDE type drives, get a controller card with 2 serial and 1 parallel port (LPT). Then get a second parallel port card (price about $15). Most controller cards do not allow toggling of DTR line required by CT and other logging programs that use the serial line to drive the CW. Use the second parallel for this duty. **N6IP:** The IDE disk drive controller board with 2 serial and 1 parallel port runs your disk drives and communications ports. The parallel port is used for CW keying interface during contest and for printer afterwards. The serial ports talk with your computer controlled radio, packet, and other computer links tied together for multi-op stations. **AA6WM:** Be sure the serial card uses a 16550 UART, which is necessary for high speed modem operation.

Monitor: **W1FEA:** A 14 or 15 inch color monitor with .28 dot pitch is a good choice. Larger monitors are harder on the eyes at close range. RFI to your receiver and video modulation by your transmitter can usually be eliminated with a ground braid to the keyboard. **W6QHS:** You don't actually need non-interlacing. A .28mm monitor (14 inch) runs about $200+. Check for RFI and magnetic susceptibility from transformers in rotator control boxes. **WA6SDM:** Be careful of cheap color monitors. They can be loaded with lots of RFI. I've used 2 higher priced monitors ($350 to 400 class) without any problems. **W6XX:** A good color monitor well placed for easy viewing will minimize operator fatigue. **N6IP:** The earlier monitors, like MGA, CGA, EGA, etc, have poor RF shielding and high emmissions.

Case: **WA6SDM:** Definitely a tower. **W6QHS:** I use the standard floor-style mini-tower case ($50). For RFI reasons, don't get one of the real cheap ones that are riveted rather than spot-welded. I always put an extra 12volt, 0.1 amp fan inside to blow air aimed at the CPU and HD disk circuitry. Some manufacturers are now using mostly plastic cases. Most of tower and mini-tower cases are metal.

Keyboard: **W6XX:** For contesting I use a compact keyboard (Suntouch Jr.) because it conserves desk space. Width is only 12 inches as compared to the 17 to 19 inch standard 101 size. Price around $40. **N6IP:** Get a good quality 101 keyboard. You'll be happy about the pleasant touch after several hours into a contest. **AA6MC:** The old, original IBM PC and XT keyboards were notoriously RF sensitive and tended to emit characters when your hands are near the keys in the presence of strong RF fields, especially on the lower bands, and mainly on 160M. **NI6T:** I was disappointed to find that the keys used on the old style keyboards used capacitive switches and were highly prone to RFI. I like the 101 keyboards, and the 12 Function keys on top, compared to 10 keys on left side. **W6QHS:** Found I could only go really fast on the old MaxiSwitch 84-key keyboard with function keys on the left and no keys between letters and number pad (I had a 376 QSOs per hour run at P40V this year). Keyboards are cheap at surplus places ($5-10) but also cheap new ($30). **W1FEA:** Inexpensive keyboards are not a good idea because of key failure problems. I normally run a ground braid from metal plate under keyboard to case of computer to help keep RF out of the keyboard circuits. I like the function keys across the top where I place a strip key legend. **W6RGG:** I agree with K8CC's recommendation for the "101" keyboard.

Concluding Gems of Advice: **WA6SDM:** Choice for CPU should really be toward the 486 class. Look for a Pentium overdrive-ready board. Windows on a slow 386 tries the patience. Same reason for getting a large disk. It's amazing how fast disk space disappears once Windows is loaded and some applications follow. Same reason for minimum of 4 MB memory. If you have a 286 class computer, consider getting a new 386 or 486 motherboard. Takes about 30 minutes to install and is far cheaper than complete new computer. Later the disks and memory can be upgraded. I'm currently on my third motherboard, second case, second HD, and second monitor. Of course, I've been at this for about 10 years. **AA6MC:** An operating desk with a recessed well for the keyboard at proper height for typing makes for less fatigue and more desk space. **W6QHS:** Most contesters put the monitor on top of the radio, with the keyboard in front of it. You'll be surprised how little you touch the radio if you CQ enough, and remote tuning is getting more available. Any other layout will give you a stiff neck or back.

N6GG Comments on the NCCC Comments: I have a few final comments to add to this, and as it relates to my experiences in RTTY contesting. I bought a 386-DX 20MHz mini-tower system from HD Systems (Sunnyvale, CA) 3 years ago. It has been perfect for me... an 89 MB HD (18 msec Seagate), 4 MB RAM, both 5 1/4 and 1 3 1/2 floppie drives, and a 14 inch VGA color monitor with .28 dot pitch (Impression). Package included the "101" Key Tronics keyboard... has nice touch and 12 function keys on top. It mounts on a sliding tray ($12-15) that slips under the table below the monitor. For contesting I place it just to the left of the transceiver. The monitor is placed directly behind the keyboard.

I use WF1B RTTY logging program for all contests except the ones that Ray hasn't done yet. For the rest I log manually, using the AEA software that came with my PK-232 controller, Ver. 1.06, for RTTY contest QSOs.

For each contest I have made up "surround-type" templates for the "F keys" with my IBM ProPrinter 24P. Templates are clearly the best way to tell - in two words - what each key does. Templates are recommended by most applications critics in computer magazines. Why? Because that is where your eyes go when fishing for "F" keys, and not to some chart that usually gets covered up in the clutter around your desk.

My cure for keyboard hangup problems associated with RFI (mostly on 40M): I installed a 2 conductor white zipcord with ends joined together (paralleling conductors lowers inductance), run from bottom plate of keyboard to a wide ground braid that runs along rear of operating table. This braid is used to ground ALL equipment cabinets together. The braid comes from slipping the shield off of a piece of RG-8U coax. The shack

ground is fastened to the grounding bolt at rear of the Alpha PA-76 PA amplifier. It's a nice feeling to know that you can't get a shock or RF burn when touching any cabinet (or two!) when the rig is on the air.

In summary, it appears that most contesters agree on best choices for CPUs and, generally, on associated hardware, and have come up with some clever ideas for improvements.

Oh... one thing more: There's a general rule about electronics circuitry: the faster it is, the more harmonics it generates, and the more heat it radiates. So it would be prudent for 486 CPU users to consider W6QHS's suggestion of using a mini-fan inside the computer box pointed at the CPU and disk drive electronics. Fast read/write cycles created by goals of high QSO-per-hour rates could give the hard disk head electronics a real workout! Of course, if you don't plan to work at the rate of W6QHS's 376 QSO's per hour, you might consider just puffing at the computer once in a while...

((73)) See you in the pileups,

de **Rich, N6GG** ■

P.S.

Drop me a line with an idea to share,
Or, drop me a line with an item to air.
Drop me a line with anger to bare...
But don't drop ME... 'cause I care!

THE LAST WORD

Jim Mortensen, N2HOS

Big Change. On August 19, 1994, the Internal Revenue Service notified us that we had been designated a "501 (c) 3" organization. It means the ADRS is now a certified not-for-profit organization and is exempt from income tax. But there are other critical benefits. Our large monthly postal bill will be reduced to some extent. It is hoped it will be enough to keep our postage cost at the current level when all rates increase next January. Finally, it means that contributions (but not membership dues) to the ADRS will be deductible when it comes time to file your income tax. You will hear more about that soon.

More changes, BBS and FAX. The official ADRS BBS is moving south, too. Dick W4KAU volunteered to take over the care and feeding of this important aspect of our service. He runs a very busy generalBBS but will set up a special place for ADRS and ham-related material to ease your use of the board's software. He can run at speeds up to 28K baud but, like most BBS sysops, he will soon discontinue servicing 2400 baud callers. Those old modems are too slow and tie up the lines for too long a period of time . . . and of course are expensive for the caller as well. His data line is **706-694-3295**, voice line is 706-694-8369. We will have a brief tutorial on the use of the BBS soon.

The one sure way to get attention with a FAX is to send it to **407-671-0194**. This number reaches Tom WA8DXD seven days a week. And he will see that the message gets forwarded to the proper party without delay.

Early Warning #1. One subject in the "futures" section of the Digital Conference last August was a discussion regarding the development of another wideband mode for HF forwarding chores. It would be designed to replace those familiar packet signals we hear regularly in the RTTY portion of the band. Is this a good idea? We will be looking at this issue over the next few months.

Early Warning #2. The IARU Region 2 meeting takes place in September 1995. Canada is hosting the meeting and also preparing a proposed band plan. The ADRS opposes all "voluntary" band plans (just as most HF packet sysops in Region 2 ignore them), but this one is particularly easy to oppose. Large parts of the digital spectrum are labeled "Packet." And one portion is even labeled "International Packet," whatever that is. And the CW portion of the band is "CW Only." The subject will be on the ADRS board's agenda. What do you think of this new attempt to permanently carve up the bands? Let us hear from you.

Johan KC7WW concludes his DSP modem series in this issue. We have hopes that several follow-up articles will appear in the near future. The Texas Instrument chip is an experimenter's delight. If you come up with something new please get in touch with either Johan or Jim KE5HE because the rest of us would like to share it as well. Our special thanks to Johan who not only prepared the article but presented it at the Digital Conference in Minneapolis in August. We will hear from Johan again soon.

The remote control article by Paul W4ZB, begins a remarkable series by a most interesting amateur. A scientist-engineer-lawyer, Paul heads a law firm in Washington, DC and is also a director of ADRS. He takes both tasks quite seriously and contributes more time and talent to our organization than we can reasonably expect. This two part article on simplified remote control will be followed by a major study of the pros and cons of networking the ham shack computers . . . and how best to do it. Don't miss any of the chapters.

One more time. The date on the August issue confused many readers as well as the publisher! Many seemed to feel we changed the format of the Journal, reduced the size, fired all the writers, etc.. It isn't really that complicated. First, please understand once and for all, the August cover date had to be put on the front cover because, with that issue, the Journal changed from a 10-times-per-year publication to a monthly publication. The Post Office thus demanded that a single month be used rather than the traditional July/August title. The application for change does not allow any other definition. But more was afoot as well. ADRS accomplished something else. For the first time in years, the Journal will appear on or before the first day of the month of issue. Every issue! Big change!

Come the end of the year, you will realize that the August issue was the eleventh issue of 1994, one more than usual. Second, the August issue was a bonus issue and was free to all ADRS members. Third, if your membership expired in July or August 1994, it actually expired with the September issue. All records have been changed accordingly for, in fact, all memberships have been extended one month. Fourth, the Journal will now arrive each month, not ten times per year. And it will arrive on or about the first of the month shown on the cover date. Fifth, recognize however that US Second Class (and international Surface Class) mail service varies considerably from one area to another. So if the wallet can stand the toll, upgrade to Airmail whatever your location. (If you are in a DX location, upgrade and renew soon for the rates jump considerably in mid-1995). There are the facts. I trust you enjoyed the special issue.

ADRS Directors meet on October 29th in Charlotte. Warren W2NRE chairs the meeting, one which will be devoted principally to planning the future and scope of the Society. Band utilization is also on the agenda and it is hoped that several positive suggestions will emerge from the examination of current patterns. The value of the discussion will be considerably enhanced if you take the time to express your views to one or more of the directors listed on page three. Don't wait, do it today!

Next month brings new Windows software from KE5HE for the PCI-4000/M, a look at some of the great contesters of the world, a surprise or two.

73 de **Jim, N2HOS** sk. ■

DIGITAL DIGEST

Tom Arvo, WA8DXD
News, Views , Tips & Reviews

OPINION

HAVE WE REACHED THE IKM YET??

A Proposal For A New Mode

by Crawford MacKeand WA3ZKZ

From Baudot RTTY to AMTOR to Packet, and from PACTOR to Clover and G-TOR. We have come a long way. Even so, are there some aspects that may warrant fresh attention? This short argument will say that we have been giving a little too much attention to one set of paths and not quite enough to another. I hope to hear some disagreement with my views on how much and how little and what should come next! After all, that's what makes the cookie crumble and what might just build the Ideal Keyboard Mode of the future.

During all of this progress, the demand seems to have been for more and better and faster file transfer . . . and that demand still seems to be there. The commercial world came up with systems like PIC-COLO, and our equivalent appears to be Clover. And we now have a reasonable, developing counterpart for Packet on HF in the form of Pactor and soon, Pactor II. Likewise G-TOR seems to offer some of the same and some new features. Maybe there are others out there waiting to jump into the arena.

However, the keyboard-to-keyboard scene seems to have stood still for almost ten years. I would like to look and see what this means in terms of the new modes and what might be worth looking for in the IKM. The Ideal Keyboarding Mode doesn't yet exist and this proposal is just one ham's ideal of progress. Be that as it may, let me define this non-existent ideal system. IKM must handle full ASCII, complete with lower and upper case. This is an essential for more readable message copy. IKM also must use a packet length which is neither to short (as AMTOR arguably is) nor too long as Pactor seems to be in severe conditions. There should probably be an ARQ mode but also use some forward error (FEC) as well. The close-to-certain aspect of AMTOR that says "if it is printing out on your screen, then he or she is copying it," is a great morale booster in poor conditions. Memory ARQ would also be a wonderful feature, but let's not go into the respective merits of analog and digital implementations. Golay interleaving probably belongs here, too. Packet overhead is not a very important point. If it makes for a reliable link, use it. If not, dump it.

Now, turning the world a little topsy-turvy, **I would like to see the new mode slow down in poor conditions rather than speed up in good ones!** Semantics maybe, but even 45 Baud RTTY is too fast at times in multipath. Element length was the killer for HF ASCII wasn't it? And remember, we are talking about a keyboarder mode.

IKM should be easy to implement and should use straight FSK (two element AFSK). It could possibly be implemented as stand-alone software like the G4BMK BMKMulty system. Or should it tie in with an existing TNC? IKM obviously needs a listen mode as many keyboard QSO's follow a period of mail reading among friends. And a CQ mode which might be FEC as with AMTOR and Pactor or a chirp. I seem to remember that one proposed AMTOR CQ method would chirp with a selcal such as CQCQ. Maybe IKM could change automatically to a regular selcal as soon as link is established. And, of course, the selcal should be the Pactor variety, that is it should be one's plain and unadorned call with all of the numbers and letters and no ifs ands or buts. Finally, it might even have compatibility with existing modes. I am sure most developers would say "no way, Jose," but it is worth mentioning.

Is it practical? Can it be done? Will it be done? Will it be popular (like sliced bread)? Some yes answers in the audience, I hope. I wish I were good enough at real-time software to have a go at it myself. If you are and like the idea, there are many digital keyboarders out there who would love to expand on the live ham-to-ham keyboard tradition. Let the others pursue the worthy goal of high volume data transfer, and graphics and all those good things. I merely want to leave you with the thought that QSO work and hi-speed data transfer work cramp each other's style when forced into a single mode. If we continue along that line, we will cramp one style or the other. And we don't want to do that. Have fun and 73. *--Crawford WA3ZKZ*

#########

1200 Baud Packet on 20 Meters!

I have run across a 1200 baud packet mailbox/BBS operation on the twenty meter band (14.090 MHz)! The stations monitored were from Mexico & South America operating on lower sideband, with my PK232 set to VHF parameters. The radio baud rate was 1200.

The main problem with this is that it appears to violate existing international bandwidth limits, in that somewhat more than 2.5 kHz of bandwidth is consumed by such an operation. The second problem is that, since these guys are using LSB mode, their sidebands extend downward by at least 3 kHz into what has come to be considered the Baudot portion of the 20M digital mode subband. We on the narrowband modes cannot use anything between 14.0865 and 14.901 mHz even with our narrow filters.

I don't know where to start to address this problem, so please publish this in the hopes that our neighbors to the south will be made aware of the conflict. I would hope they would move, or decrease their baud rate (and thence, their bandwidth) or change to PACTOR and move their operation to the commonly accepted burst mode part of 20 meters, i.e. below 14.080 mHz. Thanks and 73' *--Bill Leahy, KOZL*

MINI REVIEW

Sidekick by Borland . . . sounds like the good old days, the early times when Sidekick was an industry standard utility. Virtually every DOS machine contained the ubiquitous product and Sidekick may have been the most widely and most effectively used program of its day. And then it disappeared, and at the same time Borland fell on hard times from which it has yet to recover. Yet someone at the company woke up and said, "Let's redesign Sidekick, make it a Windows program, price it so low nobody can refuse the offer and build a huge new user base." Somebody, perhaps Borland himself garnered the wisdom to approve the project. And they did it all, priced it at $29.95, and delivered an outstanding product and an extraordinary value.

I bought the product, installed it in moments, began to use it, then took every other product (from shareware to Lotus Notes) purporting to serve the same purpose off my disk. There is nothing around that begins to compare with Sidekick. Why? Let me explain what it is not and you will understand. It is not written for networks. I don't have a network and I am weary of the network overhead and penalty built into every new program or update that comes along these days, including Windows 3.11. Sidekick is not an all-purpose program that promises to do everything you need from morning until night. Sidekick is not a spreadsheet, not a full-featured word processor nor presentation maker, nor does it contain a terminal program, add more games to the inventory or come packed with "50 free True-type fonts of every description."

Sidekick is, on the other side of the coin, a masterful execution of its chosen task. The designers set out to devise a personal information manager that could do great things for a single user's notes, card file and calendar. They accomplished their goal and, in the process, probably devised one of the finest Win3.1 products ever. May they sell millions for they deserve it.

The product comes packed on one 31/2" disk and with a seventy page manual. Do read Chapter Two of the manual before you install the program in order to understand the installation options. I installed the entire package via ProgMan, including Quick Menu, a utility giving you instant access to Sidekick from virtually any other Win3.1 application. And it does it with one click of the mouse, not two. Make certain you get Sidekick and Quick Menu into your Startup Window. Reboot your computer and you are off and running.

The Notes section is a valuable ally. Use it by setting up a Folder, then adding individual notes to the folder. For example, if you had to worry about publishing this magazine, you (like me) would have a folder for each month for the next 12 months. Each folder would be stuffed with notes regarding each article for that issue. The notes cover such vital information as article subject, author, where and when to query (read prod) he or she, where to reach them, status and a million other things. Or, for a more distant issue, the notes might deal more with ideas about the issue, individual subjects or authors with tickler notes. The whole thing can be learned and put to use in minutes.

Card File is the data section, the phone book and address information we all must have to survive. But it is more, for it also has a log for each card entry. So, as an example, you can note when you last called or tried to call; make notes about the promises you made at the time of the call; add a date stamp of the call (with a Control T) and add comments about the next call. When the card is selected the log window is visible in the lower right corner of the screen. The default fields in the data base seem appropriate to me, but you can rearrange them in any way you wish. By the same token the search mechanism can find anything either in the Card File or the Log. I can't think of a missing feature.

But the Calendar is the masterpiece of design. Jot down long term projects in the Task list, appointments in Today's detailed diary, enter near term tasks in the To Do List (and if you don't finish them they roll over until tomorrow and tomorrow and tomorrow). When the task is done or the appointment met, just click the check mark column, Sidekick puts a line through the text, then deletes it when the screen is closed. Enter multi-day events in the weekly or monthly view, recurring events whether weekly, monthly or annually, enter special dates like birthdays and set an alarm any number of days or hours ahead. Print out the slickest calendar (day, week, bi-weekly, month or year) you have ever seen, in the format of your choice. All but the annual calendar show all of the scheduled activities, special dates, deadlines, etc.

The basic screen is first rate. Whether in Notes, Calendar or Cards, a click of a button switches the screen to either one oft he other two; and the date, time, trash can, phone dialer are always visible. Printing is a snap as is every feature of this program. The ease of access is complete with no obstacles, no mysteries, no secrets. Sidekick is the complete personal information manager at an unbelievable price. Buy it and discover how good software can be.

--de Jim N2HOS.

CLARIFICATION & AMPLIFICATION

In the September issue of the Journal, on page 18, Figure 1, the box labeled DECIMATOR should have been labeled LIMITER.

(It was the publisher's fault!-- ed.)

BITS, BAUDS, BAUBLES, AND BANGLES

Back in the days of yore (not mine, yore), when digital communications meant interrupted continuous wave (CW), folks measured transmission rates in words per minute. Then came Teletype and the favored "yardstick" for information transmission rates became the baud (after French keyboard pioneer Emile Baudot, first cousin of Bridgett Baudot).

As speed advanced to 300 baud, that measure of transmission rate over a digital communications link (which could be a telegraph wire or a radio path) served well. But technology continued to press forward. As rates passed 1200 bits per second (bps), 300

Continued on page 28

The CLO-VO STORY *(could this add new meaning to what is "multi-mode" communications — ed.)*

Clo-Vo? Its not WOO-DO0, no ghosts, no mystery. Just Clover-Voice. Some time ago, I had a clover qso with Glauco, 13FWY. We transferred a pic from Peters (TY1 PS) unlimited library and during the transfer we went on chatting about this and that (You know, it is possible, when using EXPRESS). - During the chat, Glauco told me that he could hear me typing in his speaker!? I was a little surprised, and looked at my mic. Yes, I forgot to switch it off when starting the clover qso. So I took it, and said HELLO to Glauco. He responded on my screen with: Hello Fred, I can hear you. It's easy to understand how he could hear me during my transmitting time, in parallel to the clover signal. But my voice should have disturbed my clover signal, and I expected that his station would send me ERRORs.

Instead, the file transfer went on without requests. How can it be possible? I think the reason for not getting interference is that Glauco used audio channel 4 while my voice has a lower frequency. DSP makes it possible, hi...

Now, can we REALLY speak to each other during a file transfer? NO, the bandplan does not allow us to do so! On which frequency segment shall we have a 'Clo-Vo'- qso? On an amtor or clover channel? Or in the SSB band? I don't dare to think what the "band watchers" will tell me when I use TWO modes on the same frequency. I suggest we should have another segment, of lets say 1 KHz, where we are allowed to do some experiments. In the 20 meter band, the experimental frequency could be from 13.999 to 14.000 khz. Is it a good idea? When will we have our first Clo-Vo qso?

—73, Fred, DK4ZC

CONTEST SURVEY

We need your opinion.

Please take the time to answer the following questions and reply to Ron AB5KD (address below)

1. Your Callsign _____ (optional)

2. Contesting Experience (years): Digital___ All Modes___

3. Would you be in favor of an ADRS Hall of Fame for contesters? (One addition per year, plaque to be presented at the Journal dinner at the annual meeting). Yes___No___

4. Would you be in favor of a Contester of the Year award? Yes___ No___

5. If you favor either or both of the awards. how should the winners be selected?

6. Should Contester of the Year award be for multiple categories (high power, low power, multi/single, etc). Yes___ No___

7. Should Contester of the Year award be a single world-wide award or broken down by geographic area? Yes___ No___

Please respond to

Ron, AB5KD, 504 Dove Haven Dr., Round Rock, TX 78664 or "Internet:ron48@austin.relay.ucm.org," or via packet at AB5KD@W5SYT.#AUS.USA.NOAM.

Results will appear as soon as possible.

PRODUCT ANNOUNCEMENTS

Advanced Electronic Applications, Inc., (AEA), recently began shipping their newest product, the DM-1 Deviation Meter. The DM-1 is a deviation meter designed for measuring the deviation of FM transmitters operating in the 144, 220, or 440 MHz amateur bands.

"The people using 9600 baud TNCs will benefit most from the DM-1," explained Kevin Cox, Director of Sales and Marketing, AEA, "because correctly setting deviation for 9600 baud Packet operation is nearly impossible to do by ear. Packet users that are used to the 'braaap' sound of the 1200 bps packet burst will only hear 'white' noise when using 9600 bps. The DM-1 allows users to correctly set deviation eliminating excessive retries, increasing data throughput, and increasing channel efficiency."

"People can't rely on subjective deviation tests anymore," said Terry Perdue, Sr. Design Engineer, AEA, "so we've designed the new DM-1 to provide users with a quick and simple way to make accurate measurements."

A unique feature of the DM-1 is that the tuning is crystal controlled which provides stable measurement and eliminates the need for manual tuning. Two deviation ranges allow sufficient resolution for accurate measurement of voice, data, DTMF, and subaudible deviation. Handhelds, mobiles, and base stations can be checked for correct audio deviation.

The DM-1 comes with a ten segment LED bar display and includes an output for external digital or analog meters which provide increased resolution. Also included is a low-level de-emphasized audio output for monitoring audio quality through an external amplifier.

Power is supplied by one standard 9 volt alkaline battery. When battery voltage drops below 5.5 volts, the DM-1 is automatically disabled to prevent erroneous readings.

The DM-1 is small, (6.125" W x 4.75" D x 1.377" H), and weighs less than a pound. It can be stored almost anywhere until you need it or it can be left in-line.

The DM-1 carries a suggested retail price of $169. Best prices are offered from authorized AEA Amateur Radio Dealers.

For more information, contact your local AEA dealer or:
Advanced Electronic Applications, Inc.
P.O. Box C2160 • Lynnwood, WA 98036
Phone: (206) 774-5554 • Fax: (206) 775-2340

The Official ADRS BBS Moving to New Location

More changes, BBS and FAX. The official ADRS BBS is moving south. Dick, W4KAU volunteered to take over the care and feeding of this important aspect of our service. He runs a very busy, general BBS, but will set up a special place for ADRS, and ham-related material to ease your use of the board's software. He can run at speeds up to 28K baud, but, like most BBS sysops, he will soon discontinue servicing 2400 baud callers. Those old modems are too slow and tie up the lines for too long a period of time... and, of course, are expensive for the caller as well. His data line is **706-694-3295**, voice line is 706-694-8369. We will have a brief tutorial on the use of the BBS soon.

Continued from page 26

baud began to seem snailish. (When I served in "Uncle Sam's Canoe Club" in the 60's, the Pacific Fleet HF broadcast in 65-baud FSK was "high speed communications.")

Today's fiber-optic lines allow data rates as high as 2.5 gigabits/second (2,500,000,000 bps). Even our relatively narrow UHF ham bands can easily carry data at 9,600 bps.

Most hams use baud to describe data rate regardless of the transmission medium. Yet confusing baud and bps clouds the discussion of data transmission rates. (It's a little like asking what time it is when you want to know is how much time is left.)

The problem with the indiscriminate use of the term baud stems from a misunderstanding of its meaning. According to Webster, the IEEE, and the ARRL, a baud is: a unit of signaling speed equal to one discrete condition or event per second. In CW, a "discrete signaling condition" occurs each time a radio transmitter is keyed on or off.

How does this relate to baud? If you key your transmitter at the rate of 5 words per minute and the average word length is six characters, and each character has an average of three dits and dahs, you are producing 180 symbols per minute (5 WPM x 6 x 6). You could say that you were transmitting CW at 6 baud because you are transmitting an average of 360 discrete conditions per minute, or 6 per second. Of course, we normally don't describe CW rates in baud, but in words per minute.

One often hears packet radio and voice frequency modems discussed in terms of baud. The actual rate at which data (i.e., digital information) flows depends on the ratio of bits per baud. Baud rate and bit rate are equal only at speeds of 300 baud and below, and only for FSK modulation without parity bits. Other modulation schemes such as phase-shift keying (PSK, BPSK, and QPSK), CLOVER, etc., stuff more bits into each baud. That's why, for the sake of accuracy, I encourage you to use the much less confusing bits-per-second measure rather than the baud.

by Jim Piper, KD6YKL

PS: Just kidding about the baubles and bangles.

from the Santa Cruz (California) ARC "short skip"
—Ron Baldwin, KC6VJT, Editor -- ARNS

#########

BANDWIDTH CONSIDERATIONS

Extracted from Nick, N4SS' comments to the FCC

I applaud the Commission's proposal, especially the proposed bandwidth limitation of 500HZ ... However, in my view, that limitation should apply to all digital stations rather than to only those being automatically controlled. In addition, there is a need for specification of the method to be used in measuring bandwidth being occupied.

Merely plugging numbers into a formula for minimum required bandwidth is not sufficient to provide a measure of on-the-air performance; something better is required. I propose that the standard be a bandwidth limit of 500HZ at 30 dB below peak amplitude of the signal in question.

According to a graph presented by Hal Communication, both Clover and AMTOR are contained within a 500HZ bandwidth at 30 dB down from peak. Actually, they show that AMTOR is noticeably less than 500HZ at that level, but it broadens out at further reduced levels while Clover is shown to remain almost constant down to about -50dB. On-the-air tests using quality test equipment could reveal whether Pactor and G-TOR could meet these proposed limits at 200 baud. If not, then they would have to reduce to 100 baud where their performance should be very similar to AMTOR. I recommend that the commission consider these factors in its final decision.

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RS-232C and COM PORT booklet: This is a compilation of all articles published in past issues of the RTTY Journal on these two very important topics. If you are using a computer in conjunction with Ham Radio, you will find this booklet an invaluable tool to have in your shack. The booklet contains information about COM ports 1,2,3 and 4 as well as the RS-232C information. Send $5.00 to the ADRS, PO BOX 2550, Goldenrod, FL 32733 and you will receive a copy of this invaluable booklet by return mail, postage paid.

What is your TNC doing? A book about how packet radio works and how to to make it work better. Author; KA5ZTX. Publisher: zm xpressions 913-842-6808. Available at amateur radio stores.

For Sale - AEA PK-64 with HF modem, Commodore C-64, disk drive, printer, Sanyo monitor, all cables and documentation. Worked DXCC and WAS RTTY with this gear. Sold as a system only $175.00. Dovetron MPC-1000R-II $250.00. Barry Fox, W1HFN, 431 Mulpus Road, Lunenburg, MA 01462 Ph: (Days) 603-889-6600 Ext 320 (leave voice mail if not there); (e-mail) fox@imagitex.com (eves) 508-582-7521.

For Sale - PCI-4000 HAL CLOVER board. Complete with cables and software. $600, I ship. Certified check or Money Order. Gary Kaehler, W7DCR, P.O. Box 750 LaPine, OR 97739; 1-503-536-3153.

BACK ISSUES - All Back Issues of the Following: RTTY Digital Journal - ATVQ - A5 SPEC-COM & ATV TODAY. Write for list & prices - SASE - ESF Copy Service, 4011 Clearview Dr., Cedar Falls, IA. 50613 (319) 266-7040

PCI-3000, PK-232 and RTTY/CW SOFTWARE FOR IBM-CP! With new features like Termianl Emulator window for TNC for DX Cluster! Contest features include ON-THE-FLY duping! CompRTTY 11/PCI uses bus interface on PCI-3000. CompRTTY II/PK uses host mode of PK-232 for complete control. CompRTTY 11/STD is for all other TUs. Supports COM3/COM4. Full editing of both transmit and receive text! Instant mode/speed change. Hardcopy, diskcopy, break-in buffer, select calling, text file send/reoeive, customizable full screen logging with duping, 24 programmable messages. $65.00 Send call letters (induding MARS) with order. C.O.D. add $3.00 - Call (315) 469-6009, or send check to: David A. Rice, KC2HO, 4452 Ashfield Terrace., Syracuse, NY 13215

RTTY CONTEST SOFTWARE: This is the program used by WINNERS. RTTY by WFlB is the premier teletype contest software. Supports CQWW, ARRL, SARTG, BARTG contests. New DXpedition mode recently used by AHlA. Supports HAL PCI-3000, PK-232, KAM, MFJ-1278, UTU, AMT-1, and Standard TUs. Online features: Automatic duping, Automatic multiplier identification, Automatic scoring, Mouse support, Break-in buffer, Buffer tags for dynamic custom transmissions, File transfer. Post Contest features: Complete paperwork generation, QSL labels, Statistics. Call (401) 823RTTY for fact sheet. IBM-PC, $41.95 (US/VE) $44.95 (DX). Specify disk size. Wyvern Technology, 35 Colvintown Road, Coventry, RI 02816-8509

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AEA's PK-96 Has The Speed You Need

The PK-96 is a plug-in and go 9600/1200 bps TNC loaded with exciting features. Advanced Electronic Application engineered the PK-96 to allow people to easily step up to 9600 baud. This was accomplished by employing proven TNC hardware, utilizing AEA's popular command set, allowing compatibility with AEA's PakRatt software programs, and including convenient features.

The PK-96 has a "true" Data Carrier Detect (DCD) state machine for open squelch operation. The PK-96 utilizes an HDLC hardware controller which guarantees accurate protocol conversion at 9600 bps. The main reason for using the HDLC hardware instead of firmware HDLC in this TNC is that 9600 bps is very demanding. Firmware implemented HDLC for 1200 bps operation, such as AEA's new PK-12, is the right thing to do. But under 9600 bps operation, internal software uses valuable processor time that could otherwise be used for managing MailDrop, running Gateway, or just keeping up.

Proven hardware allows packet users to send more data at faster rates. The HDLC chip is totally dedicated to encoding and decoding data. This means the processor does not have to share time for encoding and decoding data. As a result, the HDLC chip helps the PK-96 send and receive more data in a shorter amount time, and the processor is not worked as hard. It costs more, but its worth it.

The hardware is contained within a compact case measuring 6.1"W x 7.4"D x 1.3"H. It's small enough to fit most anywhere, yet big enough for external audio output controls to be accessible on the back panel. The engineers at AEA are Hams themselves and know the convenience of having adjustment controls on the back panel, not on the inside of the machine. The PK-96 has two external potentiometers, one TX level for 1200 bps operation and one for 9600 bps operation. AEA engineers decided that because the two modes are so different from each other there should be separate levels so users wouldn't have to make adjustments when switching speeds. Also located on the back panel is an external RX receive input jack, a RESET button, an RS-232 interface, a 5 pin DIN radio connector and the power connection.

For ease of use, the PK-96 utilizes the popular AEA command set and is compatible with PC-PakRatt 88, MacRatt, PC-PakRatt for DOS, and PC-PakRatt for Windows. The thousands of amateurs who have used AEA TNCs and software will not have any problems operating the PK-96. The only difference is that packets will travel higher-speeds. Further, anyone who knows how to use any of the AEA PakRatt programs already knows enough to operate the PK-96.

The PK-96 comes in two versions: the 32K RAM version which allows for 18K of battery-backed mailbox, and the 128K RAM version which allows for slightly over 100K of mailbox. The 18K version can easily be expanded to 100K. The MailDrop feature allows users to automatically receive mail and reverse forward messages.

One of the features built into the PK-96 is Gateway firmware which supports local acknowledgments (acks) of packets like a full-service node does. Up to three people at a time can use your PK-96 as a gateway to other stations. At the same time you can be digitally communicating with another station.

Another feature designed into the PK-96 is the modem disconnect header. As new modems develop, this TNC can accommodate them through its modem disconnect header. The PK-96 currently allows users to connect with 1200 bps systems and the 9600 bps systems now coming on line. The modem disconnect header allows faster modems, like a 19,200 bps modem, to be installed for terrestrial or satellite work.

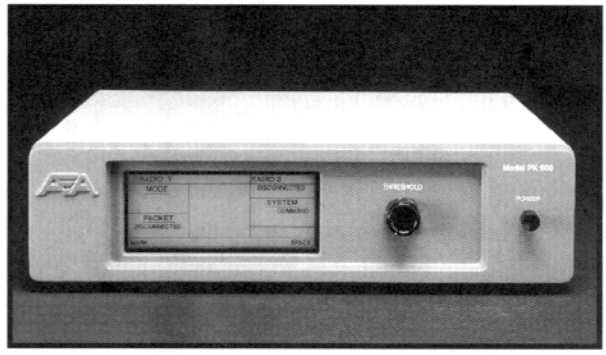
Like previous AEA TNCs, the 18 most recently heard stations can be displayed using the MHeard command. The PK-96 has an enhanced MHeard function which identifies TCP/IP, NET/ROM, and <The Net> stations.

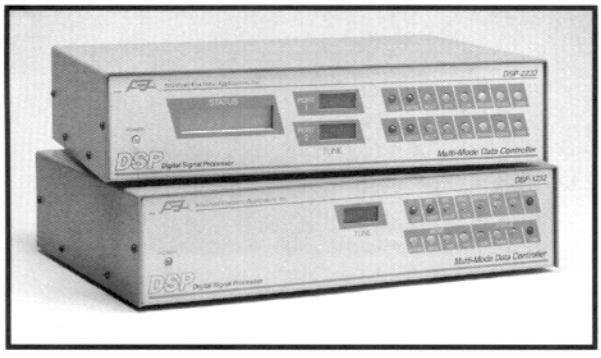
AEA has designed the PK-96 for those people who are just getting into packet radio as well as those who are stepping-up from 1200 to the 9600 bps level. All users will find the PK-96 easy to use. People who know the popular AEA command set will have no problem operating this TNC. Those who don't know the command set can learn quickly by disabling the EXPERT command which limits the command set to the most often used commands or they can use one of AEA's PakRatt programs which makes operating a data controller a breeze. The PK-96 is a straight-forward, 9600 bps TNC that is full of features and capable of accommodating new modems as they become available.❑

Data Controllers Put You In Control

PK-900

- Dual simultaneous ports.
- Automatic signal idenfication.
- 9600 bps modem option available.
- 8-pole Chebyshev bandpass filter.
- Dual-port Gateway: Packet to AMTOR, Packet to PACTOR, and Packet to Packet.
- Twenty software selectable modems.
- 17K Packet, PACTOR, and AMTOR MailDrop.
- 16-level gray scale fax with opt. software.
- Same modes as the PK-232MBX.
- Full PACTOR Memory ARQ.



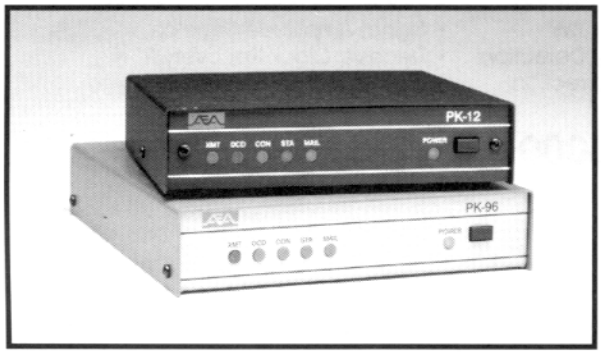


DSP-2232
DSP-1232

- DSP-1232 has two switchable ports.
- DSP-2232 has two simultaneous ports.
- Same modes as the PK-232MBX.
- Includes modems for satellite use.
- Automatic signal identification.
- 17K Packet, PACTOR, and AMTOR MailDrop.
- DSP-2232 has dual-port Gateway: Packet to AMTOR, Packet to PACTOR, & Packet to Packet.
- DSP-2232 features front panel LCD.
- Up/Down Doppler shift for PSK modems.
- 9600 bps modem included.

PK-232MBX

- Designed for multi-mode operation.
- Internal 1200 bps VHF modem.
- Automatic signal identification.
- 18K Packet, PACTOR, and AMTOR MailDrop.
- 2400 bps modem option.
- 8-pole Chebyshev bandpass filter.
- Modes: Morse code, Baudot, RTTY, ASCII, AMTOR/SITOR, PACTOR, VHF & HF packet, B&W fax receive/transmit, NAVTEX/AMTEX, and ARRL Information Services.
- Gateway as a node.



PK-12
PK-96

- PK-96 is a 9600 bps packet-only controller with 9600 bps K9NG and G3RUH compatible direct frequency modulation and 1200 bps VHF packet.
- PK-12 offers 1200 bps VHF packet at less than 80 mA of power.
- PK-96 features true DCD state machine for open squelch operation.
- 32K RAM, easily expandable to 128K.
- KISS mode for TCP/IP compatibility.
- Control of third-party MailDrop traffic.

Call (800) 432-8873 for a complete catalog or information on a specific product. Contact your favorite amateur radio equipment dealer for best pricing.

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P. O. Box C2160
Lynnwood, WA 98036
(206) 774-5554

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Wide Dynamic Range and Low Distortion – The Key to Superior HF Data Communications

- Dynamic Range > 75 dB
- 400 to 4000 Hz
- BW Matched to Baud Rate
- BER < 1 X 10^{-5} for S / N = 0 dB
- 10 to 1200 Baud
- Linear Phase Filters

ST-8000 HF Modem

Real HF radio teleprinter signals exhibit heavy fading and distortion, requirements that cannot be measured by standard constant amplitude BER and distortion test procedures. In designing the ST-8000, HAL has gone the extra step beyond traditional test and design. Our noise floor is at -65 dBm, not at -30 dBm as on other units, an extra 35 dB gain margin to handle fading. Filters in the ST-8000 are all of linear-phase design to give minimum pulse distortion, not sharp-skirted filters with high phase distortion. All signal processing is done at the input tone frequency; heterodyning is NOT used. This avoids distortion due to frequency conversion or introduced by abnormally high or low filter Q's. Bandwidths of the input, Mark/Space channels, and post-detection filters are all computed and set for the baud rate you select, from 10 to 1200 baud. Other standard features of the ST-8000 include:

- 8 Programmable Memories
- Set frequencies in 1 Hz steps
- Adjustable Print Squelch
- Phase-continuous TX Tones
- Split or Transceive TX/RX
- CRT Tuning Indicator
- RS-232C, MIL-188C, or TTL Data
- 8, 600, or 10K Audio Input
- Signal Regeneration
- Variable Threshold Diversity
- RS-232 Remote Control I/O
- 100-130/200-250 VAC, 44-440 Hz
- AM or FM Signal Processing
- 32 steps of M/S filter BW
- Mark or Space-Only Detection
- Digital Multipath Correction
- FDX or HDX with Echo
- Spectra-Tune and X-Y Display
- Transmitter PTT Relay
- 8 or 600 Ohm Audio Output
- Code and Speed Conversion
- Signal Amplitude Squelch
- Receive Clock Recovery
- 3.5" High Rack Mounting

Write or call for complete ST-8000 specifications.

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