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RTTY

DIGITAL JOURNAL™

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L. to R. Margaret Thatcher a previous Prime Minister of England is shown having an eyeball QSO with Bob Valler, VP8BFH, and his lovely XYL Danota, VP8BOQ. Bob and Danota are loyal RTTYers living in Port Stanley, Falkland Islands. See story page 27.

RTTY
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HITS & MISSES

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Digital Digest Forum

For many years this forum has been held at the Dayton Hamvention on Saturday, even before I took over and renamed it to the Digital Digest. But, not so this year. The DARC has elected to move me to Sunday morning to make room for the "Information Highway" group who are expected from Washington, DC. If the Digital Digest had drawn small crowds in the past then I could understand their decision. But, that is not true. I have filled the room to capacity each year by providing the best speakers covering the hottest topics in digital communication. Should I be upset? I think so. For all those who look forward to the Digital Digest each year, I do hope that you have provided enough time this year to attend my forum on Sunday. The time slot is 1100 to 1400 hours.

In defense of the Technical Forms chairman, I have been told that if at all possible they are still going to try to find some time on Saturday for our forum. But, don't hold your breath. However, if that should happen, I will be sure to have a flyer at the hotel to inform everyone of the change. I will also try to have flyers at all the key booths at the Hamvention. This year we will have three speakers for the forum. First, Phil Anderson, W0XI, President of Kantronics who will speak on their new mode G-TOR. Second, Peter Helpert, DL6MAA, one of the authors of PACTOR who will speak on the new improvements in PACTOR and introduce us to PACTOR II. Third, Peter Schulze, TY1PS, author of Express 2 for Clover and other software programs will speak on Data Compression using the Clover mode.

The one good thing about having our forum on Sunday morning is that I will have a full 2 hours something I have not been able to get on Saturday. I hope everyone will be able to attend the Digital Digest forum to hear these three great speakers make their presentation.

Other Forums

On page 19 of this issue you will find the ADRS agenda for Friday. Their sessions will be held at the Radisson hotel in the Jade room. The new room is located at the rear of the hotel on the second floor. I will try to have a flyer at the hotel front desk giving all pertinent information on the ADRS sessions and the Jade room location. The Jade room is also where the hospitality gathering will take place. In the past we have always been in the Premier Room but we have outgrown that room. The hotel has now made the Jade room available to us and it is much larger and has restrooms. Stop by on either Friday night or Saturday night after the RTTY dinner for a highball and an eyeball with your favorite person. See you there.

Classified Ads

The Classified Ads section of the RDJ has been suffering from lack of ads for some time now. I'd like to encourage everyone to advertise in the RDJ. If you have piece of digital gear to sell there is no better place than in this publication. You will be reaching those who are interested in the digital modes and the RDJ readers are the most likely to buy your gear. So next time you have gear to sell try the pages of the RDJ. We are cheap and we are the best place to be.

Back Issues

Since the ADRS has taken over publication of the RDJ you may be wondering what is going to happen to the back issues program. ADRS has elected to turn the entire program over to Red Wilson, WB0ESF, in Cedar Falls, Iowa. Red has been providing a back issue service for years and has the equipment and background to give this program the attention it needs. All the back issues I have are being shipped to Red, so in the future please end all requests for back issues to Red. (See his ad in the Classified Ads section.) Red also has an index available upon request. There is a wealth of material in some of those back issues, a copy of his index might just be the right tool to have around the shack for reference. Write to Red and get connected for back issues.

All For Now

Next month will be our Dayton issue. Stay tuned to the RDJ for all the latest in digital information. No doubt you will agree, this month's issue is filled with intersting articles that you will not find elsewhere in Hamdom. That's what the RDJ is all about. Bringing you the lastest digital information each month is our goal. When I took over the RTTY Journal in 1986 I had trouble filling 16 pages and now I have to squeeze and pull some fancy publishing tricks in order for all the material to fit in 32 pages. *We are growing.* Don't ever let anyone tell you that digital is dead. By golly, we are in our infancy. Keep your membership current and grow with us.

73, see you in Dayton.

de **Dale, W6IWO** ■

NOTICE of MEETING

To: Members of the American Digital Radio Society

PLEASE TAKE NOTICE that the American Digital Radio Society, a not-for-profit Delaware Corporation, will be held at the Radisson Hotel, Dayton, Ohio on Friday, April 29, 1994 between the hours of 1100 and 1200 hours in the Jade Room.

PACKET

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Last month, I mentioned work on a new modem design for packet radio. It is based on the new MLT-3 standard that is presently used for fast Ethernet systems. Last month, I discussed the waveforms that are presently used for packet radio transmission, with supporting figures. This is my adaptation of the MLT-3 standard based on the specifications presented last month.

A REVIEW

The MLT-3 code is a three level code. Most binary codes rely on either a one or a zero data level to carry information. The MLT-3 format relies on having three distinct data levels broadcast serially, not in parallel. Changes in level signify a one and no change in signal level represents a zero.

The process of encoding the signal is easy on paper and then the hardware has to be designed to match the paper logic. This design process can involve several repetitions to get everything running smoothly. The following will cover the Modulator for the modem system.

TIMING

Timing is the name of the game in any logic system. If the timing is not correct, forget it. The source of the timing signals for this project will be the transmit data clock from the TNC. However, with that comes a problem. The clock that drives the communications chip in the TNC may use one of two frequencies. Either 32 times the packet data rate or 16 times the data rate. The timing signal that I need, which I will call the "Process Clock" has to be at the packet data rate.

To solve that situation, I run the Transmit Clock through a 4040 CMOS divider chip and pick off my divided timing signal. With a PK232, there are a couple of options. Either pick off the Transmit Clock that runs at 32 times the packet data frequency or the Receive Clock that runs at the packet data frequency. For this situation, I picked the Transmit Clock and divided it by 32 using the 4040 and then used that signal as the Process Clock.

The correct Process Clock signal is fed to U1A, which is a Flip Flop. With this JK Flip Flop, the Process Clock feeds the clock input of the JK Flip Flop and the NRZI Data In, which is the raw packet data to be transmitted, and is fed into both J and K inputs together. This must be done because the Flip Flop will not switch states when both the J and K inputs are at logic zero. The outputs will switch repeatedly when both J and K inputs are high when in the presence of a clock signal. Since I did not want the state changing at the logic zero data point, I chose this path.

The second JK Flip Flop is wired for constant toggle operation by having both J and K inputs tied high. Clocking for this section is derived from the Q output of U1A. This Flip Flop and the previous one form a two stage binary counter. This is a bit different from the classic two-stage binary counter but I wanted to save parts and the whole circuit fell into place with the incoming data. The use of the NOR gates U2A through U2C provides the three outputs that will be used for sending the data. The NOR gates are arranged in the same relative position as the outgoing data streams. The following figure shows the logic states involved with the encoder. I will show only the Q outputs from the binary divider chain. If you look at the figure and compare it to the circuit, there is a difference. This was done to take advantage of the gates that are available and keep the parts count down but the output remains the same. (see Table I and Diagram below)

Table I

U1A-Q	U1B-Q	OUTPUT
0	0	0
1	0	+1
0	1	0
1	1	-1

To digression for a bit. In digital logic, you have three logic gate styles, AND, OR, and NOT. When plugged together they can form anything you want. If you were going to build something, various combinations of these gates could be used. A NOR gate or a NAND gate are gates that can serve a dual purpose. They can perform their function or be used as a NOT gate by tying all of the gate inputs together. This functionality, is why things do not appear to be the same as the logic flow but still come out correctly at the end.

Attached to the NOR gates that select the states needed from the divider chain, are three LEDs that display the output state of the encoder chain. At low data rates (110 baud), you can follow the LEDs with your eyes when the system is not transmitting data and is in the idle state. When the system is sending data, you can follow the general pacing of the data flow. At high data rates, the lights appear to be a blur with the middle level light being

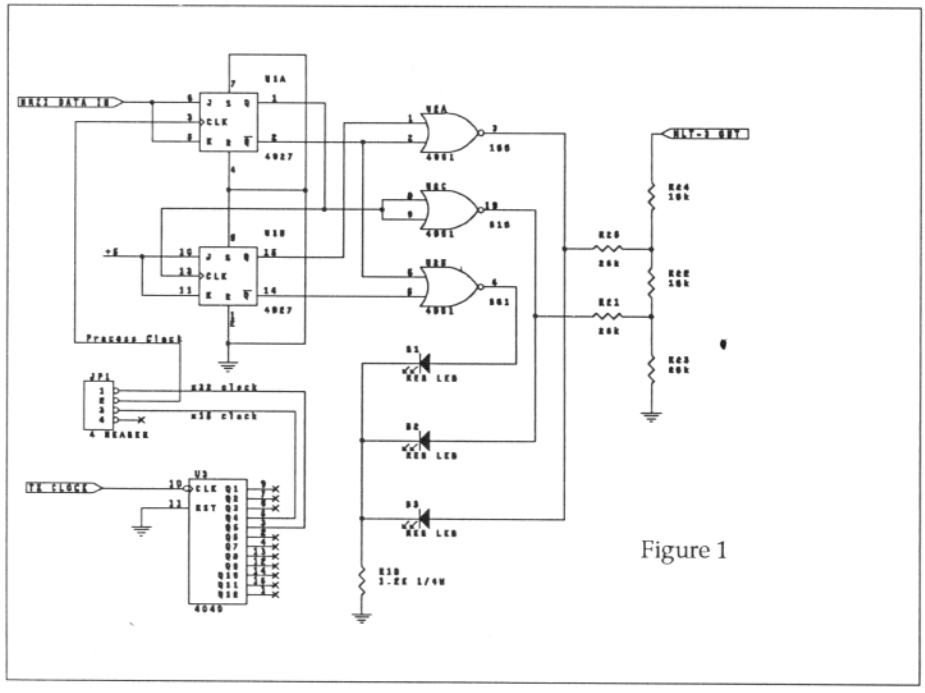

Figure 1

brighter than the other two because it will be on for twice as long as either the top or bottom LEDs. This LED will be lit twice per baseband cycle.

From here, the three data streams head to a 2R/R Digital-to-Analog converter. The output of the D/A converter is referenced to ground. The output of this D/A system does not go entirely to the positive rail. For this to happen, both inputs would have to be high and that cannot happen with this encoding scheme. The output then goes to a buffer to clean up the signal. From there, the signal could go to a varactor modulator for direct FSK or to a phase-continuous sine wave VCO for AFSK transmission. If one is using the varactor modulator, you have to remember that the middle level is at channel center and the other two states will be above and below carrier center. The adjustment will involve trial and error. Be advised this circuit is still in the developmental stage. The output is what it should be and can be adapted for any modulator.

The subject of filtering of a digital signal is uppermost in all minds. A square wave is the summation of a fundamental frequency and all of the odd harmonics above it. To send a square wave would require tremendous bandwidth to send it cleanly. Unfortunately, that is not possible on the amateur bands. Therefore, the waveform has to be filtered to round off the edges of the square wave and limit the transmitted bandwidth. That is why you see output filters on 9600 baud modulators. These filters limit the instantaneous swing of the data signal to keep the transmitted sidebands at a minimal amount. It would be great to send square waves but the transmitted spectrum would be awesome. If one was to use this unit on FSK, then a filter would have to be provided. If, on the other hand, AFSK was to be used, then no filter would be required since tones would be sent and sine wave tones are, by nature, clean and pure.

It might be possible to use this system on AFSK at 9600 providing a VCO is furnished that works on a phase-continuous basis. I am presently working on one to add to this circuit.

NEXT MONTH

I plan to cover the AFSK modulator and the demodulator. The demodulator is a two input section demodulator depending on the signal that is being demodulated. The journey of a thousand miles starts with the first step. The first step has been achieved.

de **Richard, N6NKO** ■

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OPINIONS

From those who chose to write

Bo W8ISG finishes up a CompuServe message with the following observation: "About appliance operators--I don't think the term is a useful one. I see it as derogatory. I am someone who enjoys operating, so I am an appliance OPERATOR, not an appliance technician. And I am not ashamed at all. In order to service my "781" I'd have to go back to college for several years and then take a specialist course for months, not to mention buying thousands of dollars of test equipment. Some of us do work and have limited time. Should we forgo the joys of modern equipment just to please the name callers? I built my own equipment in the 40's, which was a challenge because my parents had an apartment where only 220V DC was available. My buddies and I solved that problem by using 25L6's in the final and big, hot dropping resistors for the filament currents. I will not now be insulted into quitting. I will continue to be someone who figures out how to interface all the black boxes and be on the air with a good signal and, of course, enjoy the heck out of it all."

Another can of worms opens up because Bob AA4PB writes a worthy letter. He first wants to add a final comment though about N6HM's plea for simpler software. Bob essentially agress with Howard but places the blame on the controller firmware developers. He states that..."without exception, the hardware and its firmware are designed to operate as a stand-alone unit connected to a dumb terminal. Even when a host mode is provided it is usually a simple adaptation rather than a ground-up development with a terminal program in mind. What a waste of terminal power to be running a dumb terminal program on a 486! What is needed is a ground-up, coordinated development where the controller and the PC software work hand in hand. Too often, they also get carried way and add a tremendous amount of complexity to the sofware and that gets in the way of the less experienced user."

Bob then steps into another area and delivers an interesting comment. "And now for a slightly different subject--binary data transfer via HF. I have been seeing more and more about this lately and I question whether it is efficient use of the crowded spectrum. There are exceptions where no other means of communication exists . . . but shouldn't we use telephone lines or VHF packet? Consider a 100K EXE file. Figuring data expansion necessary to avoid control character conflicts, the data compression, the protocol overhead, the file expands to about 800K! At 100 bits per second, the file will take over two hours to send at that rate. If you drop the link due to QRM or propagation you will probably have to restart from the beginning. This is not efficiency! I think it is one of those things we do just to prove we can do it."

Not to be outdone, Dave WO5H in PACKET POWER, comes at the same subject from a different angle. "My friend raised an issue that has been gnawing at me . . . it involves the use of Internet, wormholes, landline forwarding and wireline networks. These all facilitate *faster forwarding* but do they facilitate the continued *health* of ham radio? The question I raise is, if communication is taking place somewhere along the path by some other means than ham radio, is it still amateur radio communication? Part of our justification for existence is to provide alternative communications and support for the public when conventional communication is disrupted. If part of the communication paths that we routinely rely on are the very ones we are supposed to be augmenting in an emergency, what will happen when an emergency comes? Forget skill if you can't even communicate!"

This is an interesting, timely concern and we are all involved. Some are convinced we should use all forms of communication available at all times, emergency or no. They make a good case. Others, in a more traditional frame of mind, feel strongly that only RF on the amateur bands can even remotely qualify as legitimate communication. Let us hear from more of you about one of the most interesting issues of the year.

de **Jim, N2HOS**

SOFTWARE

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STAPLES PART II

It happens every time! As I sorted through the hard drives in search of programs deserving special mention, I looked at each directory and every utility in a new light. I subjected each to a mental checklist, a "what-does-this-bring-to-the-table" analysis. Some failed and were discarded, not just from this hallowed list, but from the hard disk as well! A good exercise, we should do it every six months or so. I treat it exactly like I clean out a closet. The rule--if it hasn't been worn for a year out it goes to the Salvation Army or the rummage sale at the local Congregational church. I haven't found a suitable outlet for used files but the trash pile demonstrates how fluid the hit parade of favorites can be.

Some applications or utilities thought to be shoo-ins didn't make it, and vice versa. And two utilities I thought were perpetual winners have been replaced by new discoveries, much to my pleasant surprise. Since the computer configuration hasn't changed, I can only assume that my understanding of the task to be performed has, and for the better. Take the next two utilities for example. Quite different in concept (one a program organizer, the other a clock) they help solve an omnipresent problem, each from a different angle. The problem--*resources*, the most misunderstood detail of the Windows environment.

The situation is as common as table salt, the oldest of staples. Whether you are running Win3.1 with 4 or 16 megs of memory, one or ten programs, the message has presented itself to you, usually at the most inopportune time. Nothing is more frustrating than to be told NOT ENOUGH MEMORY . . . when it is obvious there is virtually no demand on the machine's memory. It's just another one of Win3.1's little white lies. Memory is available, gobs of it. What your computer is saying is that there aren't enough *resources* available. This peculiar facet of Windows takes a bit of explaining before discussing the solution.

We think of the word *resources* having something to do with our assets, perhaps our assets in total. That is one correct use, but Webster reminds us it also measures ". . . our ability to meet and handle situations." Microsoft built the Win3.1 around that meaning, then messed everything up by sending the wrong message when our *resources* are running low! *Resources* are related to memory because they are priority users of that asset. Windows counts every seen or unseen icon, button, window, font or dialog box as a tax on memory; as a used *resource* if we wish to be more accurate. If you dig into the system, you can find out how many assets are unspent, what you have in reserve so to speak, but it is an effort. Besides, what can we do about it anyway?

Somehow it doesn't sound like a big deal, not until you realize how stingy Win3.1 is. There is a memory section called "user heap" and one called "GDI heap." Both are given a fixed 64K of space. There are no adjustments to this limit. Thus, when you pack your desk top with all those pretty little icons, even those hidden in Program Manager, you erode your assets byte-by-byte even before you load an application. Before long the heap diminishes to a small mound and you get the memory death sentence. However, you can do something about it and do it without much effort at all. Enter two of my favorite utilities.

GROUP.EXE

Russell Holcomb of Muncie, IN (CIS 70062,2236) gave us all a wonderful gift last holiday season. I stumbled on to it on the BBS in Clearwater, FL. I can say, thanks to this piece of freeware, that I now sport an efficient and well managed screen. Group's beauty stems from its ability to accomplish two critical tasks. First, it shows you (probably for the first time) what a mess your Program Manager is in. Second, after you get ProgMan all straightened out, it launches any program or utility at the click of a mouse. And it does so with a miniscule use of scarce *resources*.

Place this 42K file in the Windows directory and it will pop up in the upper left hand corner of your screen the next time you open Windows. But first you must put it on the "Run=" line of the Win.ini file (In System directory, find Sysedit.exe, double click it and edit the Win.ini. Be sure and save the change). The primary box labelled Groups (see Figure I) lists all of the groups residing in ProgMan. If you are like me you will be astonished to find 10, 12 or 15 groups on the list on the first try! There is no mistake. Each piece of software installed since you purchased the computer chose to put a group window into ProgMan, and each of the windows contains from two to eight icons. And, almost without exception, they have no reason for occupying space in such a high rent district. They sap your resources and clutter up your files.

Do this. Move the application icon from the group window established by the software to an appropriate group like "Jim's Apps." Then delete the remaining icons and the group window, using the Delete function under the File menu. At least ten percent of your *resources* go to waste because of this debris in ProgMan. There should be nothing but real, honest, hardworking groups there. Note that I have boiled down to five major categories (see Figure I), and every application icon logically fits in one of them. You may need one or two more or less, but keep it to a reasonable level so you can read them all at a glance.

Figure 1

Now, to Group's operation. Click any one line on the primary box and the Items list pops up, listing everything in alphabetical order (see Figure II). Click your choice once and Group launches the application. Generally, unless it is a program used almost steadily, I chose to close rather than minimize the program when you are through with it. After all it is only one mouse click away. Active programs, like your word processor or spreadsheet, are best minimized. I am told that a program like Word Perfect leaves some cards in on the table in ProgMan when closed. When reopened, rather than reusing those it duplicates them, thereby adding to the program's drain on the *resource* inventory. Ah, sweet mystery of Windows!

By the way, this little utility stays on the desktop, but does not stay on top of the heap. If you open an application, Group

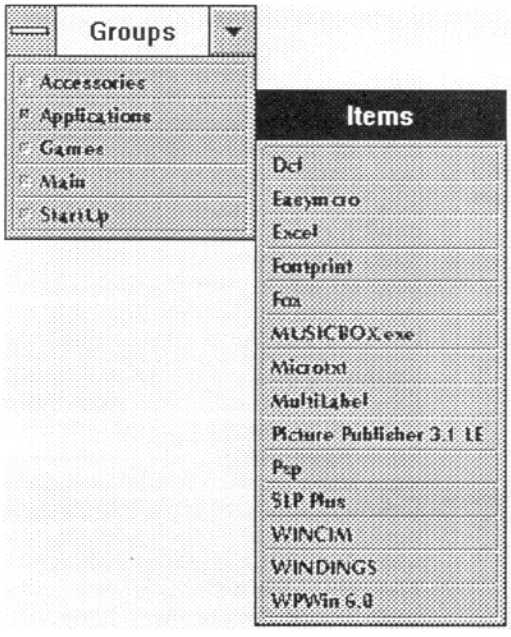

Figure 2

stays put under the new window. It is easy enough to get to by simply minimizing or moving whichever window is covering the upper left hand corner of the screen.

Get this fine utility. Download Group.exe from the ADRS BBS. It is only 42K and goes directly into the Windows directory. And don't forget to send Russell a note of thanks.

WCLOCK.ZIP

Resources. It is important to measure how few you have and how easily they are chewed up. Another piece of freeware helps solve this aspect of the problem. I had been using Statline until about mid-December when I discovered WCLOCK.ZIP. Statline (generally available shareware, even on CIS) does this job well, and a few others besides. It launches a limited number of programs, gives you a small notepad utility and tells you about available memory and remaining *resources*. But it had some problems as well. First, it was too big, about twice the size of WC Clock. Since it was always on top, it often got in the way of what I was doing. Moving it was a bit quirky. WC Clock is much better behaved, thanks to Robert Salesas, CIS 76625,1320.

WC Clock stays on top as well. But it goes directly to the far lower right hand corner of the screen and rarely gets in the way of anything (about 5/16" high and four inches wide on my screen). Clock gives the time, day/date, free memory in KB's and free resources in percentage.

I keep an eye on it and watch the meter plunge when I load WordPerfect. It takes 20% plus every time it is opened. ACCESS about the same. Open the two of them and the free number drops down to 30 percent or below. Avoid such levels if you can because your computer starts slowing down about then and the chance for a locked up screen increases sharply.

One way to minimize the chance for such a mess is to remove all the trash that takes up the first 30-40 percent of the resource. Close every unneccesary icon in ProgMan and your desktop (as above). Then, place no applications in the StartUp group unless they are in regular use. Get to the point where you have about 75 percent free after you boot up. Right now I am running my DOS word processor (under Windows in a window), have five icons on the screen and two very small applications running . . . and have 70% free. That's about right. Keep experimenting with your configuration. Watch what happens to your availablility. Your machine (and you) will be much happier about *resources* if you do.

While on the subject of clocks, I keep another one around as well. It has nothing whatsoever to do with the current subject but it is worth a mention. VBCLOCK.ZIP by Charles K. Snider is on the BBS and deserves downloading. This tiny freeware application sits on the desk top with an alarm clock icon. I don't really need it because the WC Clock takes care of the time problem. But VB Clock has another feature or two that make the redundancy worthwhile. There is an alarm for one thing. Want to make a phone call at 2PM? Click the icon and alarm bell in the small screen and set the time (in 24 hour mode). At 2PM, a window pops up and says, "Blimey it's 14:00 hours." Just below is a timer. Push the start button and time anything from a phone call to the time wasted playing Solitaire. Get it.

AutoFrag

This costs real money . . . $8.00. Send your check to Michael Berg, 851 Faribault Road, Apt. #301, Faribault, MN 55021. Tell him what size disk you wish, then receive this classy piece of work in return. What does it do? To begin with, it does automatically what you and I should do regularly. And don't!

First, it defragments your disk at regular intervals. Then, on the same or a different interval it searches your drives for any stray virus. What more can we ask? AutoFrag installs in two seconds then takes you through a simple setup menu. If first asks how frequently you wish to run the defrag utility. Once in every fifteen bootups is suggested, and seems right to me. The same question follows regarding virus checks, with a suggestion of every thirty bootups. Fine.

Then you are given a choice of applications, the utility source it looks to when the clock says it is time to do something. (AutoFrag does not furnish the utility). You can select DOS (if you have 6.0 or 6.2), PC Tools, Norton or Custom. That covers the waterfront. Make your choice . . . then forget about either problem. It is that simple and that good. AutoFrag is very cheap insurance.

SAM

This data base is a sleeper. It grows on you and soon becomes a staple without your realizing it has happened. I have just installed the 1994 update and look forward to the mid-year supplement (and the 1995 edition because they sent out a $10 discount coupon which I must remember to cash in!). I liked this application from the moment I put it on the disk and the favorable review a few months ago was no accident. Anybody who has fingers can find information here. Open the program, type a callsign and the answer is there instantly. Type a name, the possible answers are there. Browse the names or calls, look at zip codes, groups of zip codes, sort, print. It works like magic, even without the additonal modules that are available. You have 600 thousand callsigns (all USA and Canada) at your beck and call. SAM's accessability is very, very impressive.

The use of SAM is growing elsewhere, too. It is now in widespread use on some packet networks as a group data base. Some logging programs also integrate SAM. By coincidence I noted during the ARRL RTTY Roundup, a comment indicating that some station was using it. The quote, "Oh, I see you were born the same year I was." Obviously, the data popped up on the screen as soon as the callsign was entered.

Add it to your inventory. Data that would normally fill up most hard disks takes up only 15 or so megs. This is one program you will never remove due to lack of use. Believe me. Sam is available from RT Systems, Box 8, Lacey's Spring, AL 35754, and costs $45 plus $5 S&H.

WF1B

The Roundup has come and gone. My participation was limited to about 100 contacts on three bands. 40 meters impressed me the most. With my R7 and 50 watts, I made some surprising DX moves. An A22 created quite a pileup, of course, and I was a bit startled when he notified the world that he wanted "ONLY N2HOS" to respond. I did, to my great pleasure for my country count on 40 meters is not a long one. From my vantage point, though, it seemed like DX was not much involved this year. Europe was mostly non-existent, JA's were absent as well . . . at least during the hours I was around. Propagation was not on our side.

Be that as it may, Ray's RTTY program performed up to expectations and beyond. It took about an hour to get setup, but I hadn't used RTTY for a full year (and my memory is not that great!). A few minutes rehearsal sufficed. This is a staple for sure and represents software that is near perfection. The pickup on callsigns is virtually 100 percent effective. Dupe messages are never wrong. The smooth workings make a little or a lot of contesting a joyous experience. Don't miss out on it.

NOTES

Express 2.04 arrived on these shores the other day. It is now on the BBS, on several MBO's including mine. It is a single file "Exp204.exe." Delete the existing Express.exe, replace it with this file and rename it Express.exe. That's all.

Don't expect any dramatic changes when it arrives. Several minor bugs have been taken care of. There are a few changes in the Mailbox function, one of which allows you to turn it off completely (in the setup file). True keyboarders will like that one!

On the subject of Express, there have been some interesting on-air discussions of late about scanning DPI (dots-per-inch) rates. Most people think in a linear mode. Thus, if we have a 300 DPI laser printer, we must scan a full color snapshot at 300 DPI. Right? Wrong! Peter trained me to scan with DPI set in the 70-90 range and it is perfect. Anything above that is wasted effort. File size explodes in size if you go much higher and drastically expands the time required for the file transfer. And it makes no difference to the quality of the picture on the screen anyway. Believe me.

73 de **Jim, N2HOS SK** ■

UPDATE

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NEW DIGITAL MODE

Kantronics has announced a new proprietary digital mode called G-TOR ($34.95 List). G-TOR, to be available to KAM and KAM Plus owners, is discussed in an article in this issue of the Journal. The upgrade is expected by the end of March. Phil Anderson, W0XI and president of Kantronics has been kind enough to answer questions I sent him regarding the development. As the article mentions the new mode is an ARQ mode. The data frame length of 1.92 seconds within the ARQ cycle of 2.4 seconds. The PACTOR data frame length by comparision is 1.12 seconds within an ARQ cycle of 1.44 seconds.

G-TOR uses link quality based baud rates of 100, 200, and 300 with the standard FSK tone pair. The G-TOR mode uses extended Golay error correction code along with data interleaving. This technology was used by Voyager to transmit color images from Jupiter and Saturn. These features are targeted at reducing errors resulting from burst noise. The data is first coded then it is interleaved before transmission. The purpose of interleaving is to spread the bits from each word of the data over the entire data block. As a result, burst noise only affects relatively few bits in any one word after the data are de-interleaved at the receiving end. Any errors, up to 3 errors per 24 bits of data/parity word combination, will be corrected by the error correcting code without retransmitting the data. The mode also uses a CRC check to determine if any errors are present at all in the data. Only if the CRC check fails does the transmitter send the parity words so that the receiving end can perform the necessary error correction. The length of the parity information is the same as the data.

The information from Kantronics indicates their tests comparing the speed of Pactor and G-TOR showed G-TOR outperformed Pactor at least 2 to 1. These tests were conducted on all bands, but the majority were on 20 meters. Kantronics says "Based on the tests and information cited in the article, "A Practical Comparison Between Clover and Pactor Data Transfer Rates," Van Der Westhuizen, CQ, Feb. 1994, G-TOR appears to outperform Clover as well."

PROPOSED 219-220 MHz BAND PLAN

An ad hoc Committee created by the Executive Committee of the ARRL Board has released a draft of their report. The proposed plan would use the band on a secondary, non-interference basis specifically for coordinated, high speed digital point-to-point communication. The proposal requires that no Amateur station shall cause interference to maritime mobile, fixed stations or other mobile licenses operating in the band. All classes of licenses may use the band. The Amateur operation must cease if harmful interference is not corrected otherwise. The maximum symbol rate of 56 KBaud for codes specified in part 97.309(a) and a maximum of 100 KHz bandwidth for codes not specified in 97.309(a). The proposal suggests 10 100 KHz channels starting at Channel A centered on 219.050 MHz up to Channel J centered on 219.950 MHz. The stated objective of the band would be for the creation of a nationwide high speed Amateur radio data link.

NTS TRAFFIC

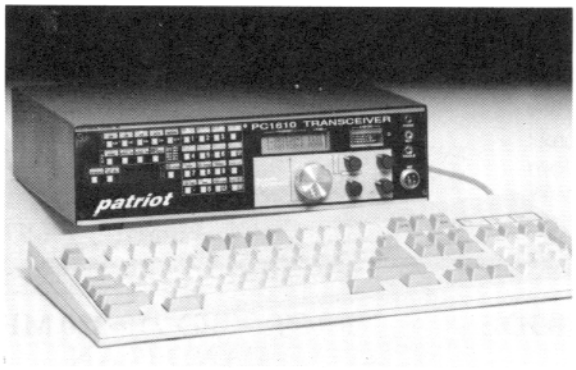
Nick Zorn, N4SS, has recommended that NTS traffic being forward on the HF network be forwarded to either N2JAW, KK4CQ, or W1FYR for further handling. These MBO's handle primarily NTS traffic and they all scan published AMTOR frequencies.

HF DIGITAL BAND PLAN

As you may know the Digital Committee of the ARRL has been working on a suitable band plan for the digital modes on HF. The information that I have is that a report has been submitted to the executive of the ARRL, but no action has been taken or recommended at this point.

NEW AEA PRODUCTS

A couple of new AEA products have been introduced that I did not mention last month. They are the KK-1 Keyboard Keyer ($199 List) and Log Windows ($99 List). The Keyboard Keyer uses a standard PC-compatible 101-key keyboard. If the keyboard is already attached to a computer the KK-1 has cables to mount



Patriot PC-1610 Digital Radio

in the line so that the keyboard can be easily switched from the PC to the keyer. The KK-1 is a CW sending device, it does not receive CW. It has a number of features including stored messages and an extensive code practice mode. The user can control the sending rate from 5 to 90 WPM and has variable weight settings.

Log Windows is a fully integrated Windows program that combines the functions of logging, rig control, and DX Cluster monitoring with award tracking and reporting. In addition it has a comprehensive database for storage of QSO information, spot grabbing, and support of a slew of award types and report types. There are features for record searches, log printing, and the importing of data from major logging programs. The program will export data in an ASCII format and interfaces to the SAM and Buckmaster on-line callbooks for automatic display of name and QTH when a call sign is entered. The software supports COM1-COM4 for the data controller and radio serial ports.

THE PATRIOT PC-1610 DIGITAL RADIO

Patriot Communications Technology has announced a new HF radio targeted to digital users. Actually, the PC-1610 transceiver ($995 List introductory) is an all mode radio with USB/LSB/CW/FSK modes supported. With the addition of a PC keyboard, the unit will work CW, RTTY, and ASCII using the internal microprocessor to decode and encode the data. Received and transmitted data appears on the LCD screen of the radio that is split. The top portion is received data and the bottom portion is transmitted data. There is a 16 character transmit buffer. All functions of the radio may be controlled from the keyboard as well as from the front panel. The frequency coverage is the Amateur bands 160 - 10 meters with 20 KHz extra on each band edge. Direct Digital Synthesis techniques are used for the direct generation of CW and FSK signals.

The frequency display can be set for either 10 Hz or 1 Hz resolution. There is a built-in 24 hour clock, digital power/SWR meter as well as 2.4KHz, 1.8KHz, 500Hz, 200Hz SSB filters and a 700Hz RTTY filter and notch filter. After a short telephone conversation with Frank Delfine of PATCOMM I found out that the RTTY filter is only available in the FSK mode. He said it was a simple software change to make it available in the SSB modes for those that might want to use an external controller (he will do it!). The dimensions of the radio are 13 (W) x 12 (D) x 3.5 (H). This makes it just a tad wider than the Kenwood TS-450S. An external 13.8 volt supply is needed.

The radio has some very nice innovations I think. For example, there is a time-out feature on the RIT. If you use the RIT for a contact then move to another frequency, the RIT goes away automatically. A switch selects QSK mode for CW operation.

Features that are not yet implemented but which Frank says are in the mill allow the connection of an external monitor screen in addition to data transfer via an RS-232 port. If this radio lives up to its press, it will be a fine addition to the amateur equipment list.

PACTOR PLUS

We just got information from Gwyn Reedy, pres PacComm which will be of interest to PACTOR users. The Germans are saying there is a world wide chip shortage that is hampering production of PACTOR PLUS and forced a redesign of their unit. Gwyn bought plenty of ICs and the new PacComm PACTOR PLUS box is in full production. He indicated there is no shortage of ICs for repairs either.

Well, that's it for this month.

God Bless and 73 **Jim, KE5HE** ■

URGENT!

Going To Dayton? Read Dinner Announcement Below!

Annual RTTY Dinner

Radisson Hotel - Dayton, OH

Regency Room

Saturday April 30, 1994

Buffet Dinner

Salad Bar
Fresh Vegetable tray
Au Gratin Potatoes
Mixed Vegetables
Tips of Beef in Bordelaise Sauce
Breast of Chicken Marsala
Seafood Newburg
Assorted Breads
Dessert Table

No-host bar from 1800 to 1900

Dinner promptly at 1900

Tickets $23.00 person

Tickets must be ordered in advance. This is necessary to meet Hotel requirements. Please make your plans now to attend this Gala affair where you will have a great evening with your digital friends. Following dinner there will be a short program.

Order your tickets from our Dinner Host, Steve Waterman, K4CJX.

Make checks payable to:

Steve Waterman, K4CJX
5828 Beauregard
Nashville, TN 37215
Phone: (615) 665-0952

BOOK REVIEW *"What is Your TNC Doing?"*

Wayne Renardson, NZ4W[1]

Two roads diverged in a wood, and I---
I took the one less traveled by
And that has made all the difference
--- Robert Frost

Frost was correct about the rarely taken path often being the best route to a destination. DXers often transmit a signal from their station to a rarely active location by the most expedient route, the short path, but it can seem like an eternity before they actually hear their call sign acknowledged. A packet station can send traffic from its location to a nearby state, but the packet will sometime travel a circuitous route to San Francisco or Boston before it reaches its destination. AMTOR/APLink stations often try to improve routing schemes by linking with stations that will pass the traffic in the most expedient possible manner, and conscientious operators are always seeking better pathways to insure speedier delivery.

But not all of us give serious thought to how the signals we rely on to convey information over various networks actually get from the keyboard to the transmitter. The path from the computer to the antenna is a tortuous one. It passes through a number of stages, each critical to the end result: information reaching its final destination. Just exactly what roads are traveled between the time an operator strikes the keyboard, sends a signal to the CPU and on to the Terminal Node Controller (TNC), and from the TNC to the transmitter?

To answer these and other questions, Gloria Medcalf, KA5ZTX, wrote What Is Your TNC Doing?, a book that traces the signal's path from the computer to the transmitter, delineating the stumbling blocks met along the way and turning them into stepping stones of understanding. Do most digital communications users know what their TNC is doing while they merrily peck away at the keyboard, scan messages, or connect with the local digipeater? Many simply do not care, being more interested in the content of the messages or how quickly the information arrived at the delivery point. But for anyone, novice or experienced user alike, with the curiosity to ask what happens to the signal before it is generated from the antenna, Medcalf's book is an excellent point of departure.

Since the path taken by the signal always travels a well-worn, familiar route, Medcalf's book is laid out in linear fashion. She begins her explication with the computer, tracing the signal's travels from the keyboard through the cable to the CPU, up another cable into the TNC, and finally, to the RF transmitter, where the signal is sent out over the airwaves to be relayed to the proper destination.

Using an XT as her model, Medcalf explains how a computer works by discussing the functions of the Interrupt Controller and Interrupt Request Lines (IRQs), required when a device such as a keyboard or serial port wants to communicate with the CPU. Anyone who has added a device such as a modem to their computer knows the problems that can arise from attaching it to an IRQ that is occupied by another device. She contrasts the IRQ route with the Direct Memory Access (DMA) path used by disk controllers, demonstrating how the disk controller signal uses DMA to bypass the interrupt request to travel directly to the CPU. Since most digital communications starts with a keystroke, she begins her discussion with the role of the keyboard controller and, using a clearly drawn block diagram, demonstrates how various controllers access memory addresses in RAM and ROM.

The basis of all digital communication is the binary notation system. Morse code, the original digital mode, uses two signals, dih and dah, (some would suggest it is actually a tertiary system, since the spacing in CW is as significant as the dits and dahs) as the foundation for a language that is understood by millions of people. Since electricity can only exist in one of two states, on or off, binary notation is the mathematical system of choice for digital communications. States can be on or off, high and low, mark and space, or 1 and 0, and it is this binary system that forms the foundation of our digital modes.

Medcalf's chapters are not dependant on each other, so the reader can skip those that are not relevant to their immediate inquiry. But she cautions that an understanding of binary and hexadecimal (hex) notation is necessary to benefit from some of the information in later chapters. She might have added that it is fundamental to understanding the groundwork of all digital communications.

Computer books are rife with explanations of the binary/hex system of notation. In order to understand the basic language ASCII code, it in necessary to learn how binary uses the two-digit number 10 to represent the decimal 2, and how the binary number 10110001 is equal to 177. Knowing that it is the position of the number in the group that gives it meaning or value is a beginning toward understanding.

Hex grew out of the cumbersome binary system. The inherent problem when dealing with large groups of 8-bit numbers is solved by using hex, where each position's value is a multiple of 16. With the help of the alphabet, 8-bit binary can be represented as a 2-bit alphanumeric hex character. The binary 10110001 is equal to hex B1, and Medcalf's book provides a thorough explanation of the process involved traveling from binary to hex.

Moving inside the computer, Medcalf discusses the differences in serial and parallel communications, devoting most of the chapter to serial ports since this is the device used by RTTY and other digital systems to communicate. Serial communications are carried out as either synchronous, using a timing signal, or asynchronous, by adding a start and stop bit to every byte of data. Different bits require a signal or voltage change over time to send asynchronous data, and Medcalf provides a clear explanation to illuminate the concept. It is, after all, the computer's serial port to which amateur radio operators attach their beloved TNCs, and it is serial data that travels from the computer, down the serial cable, to the serial device on the TNC.

Since serial communication is accomplished by changing voltage on a wire, the quantity of voltage designates a change in meaning, such as 5 volts representing a value of 1 while 1 volt represents a value of 0. In order to accomplish more than one thing simultaneously, more than one wire is required to concurrently allow the computer to communicate with the TNC and the TNC with the computer in full-duplex mode. In addition, other wires perform necessary handshaking and signal grounding, and Medcalf explains the function of each wire to arrive at the RS-232 standard used by PCs. Not to omit users of Macintosh computers, she devotes time to explaining the Macintosh RS-422 standard, which evolves into an explanation of flow control and how it permits data to be received faster than it can be processed by the serial device. She provides details about hardware and software methods of flow control.

Packet radio and the RS-232 implementation are well covered in the book. Medcalf explains TXD, RXD, SG, RTS, CTS, DSR, DTR, and DCD paths and their functions, and how each line is used by both DB-9 and DB-25 connectors. For users of the trusty Commodore 64 and 128 machines, Medcalf compares Transistor-Transistor-Logic (TTL) levels and RS-232 functions.

Some Kantronics TNCs have a jumper that permits connection using either TLL or RS-232, while others provide two separate ports. Medcalf also illustrates various wiring schemes for different machines, including the Macintosh and C-64/128. She also includes a cable trouble shooting guide, suggesting what cables should be tested for proper voltage levels to insure reliable communications between the computer and TNC.

Once the signal reaches the TNC, many things happen to it, and TNCs have a variety of commands that affect the behaviour of the signal on its journey through the device. Speed, character length, types of parity, duplex modes and echo functions, buffers, XON/XOFF flow control, and even the ramifications of pounding the "Return" or Enter key are all explained in a clear, concise manner by Medcalf, demonstrating how the various parameters within the system work in tandem to allow communications to occur.

Since the primary purpose of the TNC is to process serial data for transmission, Medcalf devotes a chapter to a discussion of the basic process used to transmit and receive packets, and the various characteristics that affect the flow of information. How does the TNC know if the frequency is in use before starting to transmit the packet? How does the TNC tell the RF transmitter that the time has arrived to send data? And what can and often does go wrong, necessitating a retry, is clearly explained using a block diagram to demonstrate what happens when errors occur. Medcalf not only explains how packets are transmitted, but offers recommended TNC settings with clear explanations for such functions as PACLEN, MAXFRAME, TXDELAY, DWAT and/or PERSIST/SLOTTIME, FRACK, and RESPTIME.

Once the packet is complete, the signal must somehow travel to the radio. Medcalf reminds us that one of the major obstacles to understanding this leg of the journey is that there are no standards. There are none for connectors, the pins on the connectors, and none for types of signals. While every TNC to radio connection requires 4 wires (PTT, transmit, receive, and ground), the type of modulation used determines where the wires are connected. The differences between audio and DFSK modulation are well covered. FM quality, TNC drive levels, deviation, impedance, and transmitted tones are discussed in relationship to the quality of the transmitted packet, while volume, equalization, and carrier detection are included in the receive functions, which includes the path from the antenna to the radio and then to the TNC. The PTT circuitry used to key the transmitter is both explained and illustrated with diagrams that enhance the explanation. A small section on trouble shooting is included along with wiring diagrams for various Mic connectors including a basic 3.5mm speaker plug, an Icom and Yaesu 8-pin Mic connector, and an 8 and 13-pin Kenwood Mic connector. Additional diagrams are furnished for a generic older radio that uses a 4-pin Mic connector.

Medcalf does not ignore users with hand-held radios. She provides wiring diagrams for the Kenwood 2600 and newer models, a Kenwood and Icom with a transformer, and the Icom 2AT, W2A, and newer style radios. She also provides port wiring for the Kantronics VHF DNB-9 connection, the HF 8-pin DIN Connector, and the omnipresent AEA-PK-232 Radio Connector.

The remainder of Medcalf's book is devoted to an examination of AX.25 Level 2 Version 1 and Version 2 protocols and their differences by sampling the same QSO illustrating both protocols. She numbers each line of the QSO, explaining the meaning of such arcane header symbols as <RR2>, <REJ6>, and <DM>. Different frame types are illustrated, including Disconnected Mode, Information frames, acknowledgement frames (<REJ1>), and connect frames.

The penultimate chapter, which should have preceded the previous one, breaks the AX.25 protocol frame down into its significant parts, defining Flags, the Address Field, the Protocol Identifier (PID) the Frame Check Sequence (FCS), destination and digipeater address, and the NonReturn-to-Zero Inverted (NRZI) encoding, where a high tone that normally has a value of 1 no longer has a specific meaning. Medcalf rounds out her book with a final chapter on trouble shooting, touching on everything from problems communicating with the TNC, garbage characters, command problems, technical glitches, lack of display and difficulty making connection trauma, and other bugaboos that can plague both the newcomer and seasoned operator.

The text is indexed, the terms clearly defined, and the book is well written using quality paper and clean printing. While there are not many illustrations or diagrams, those that exist are helpful in clarfying points and concepts. The 120-page paperback book is published by ZM Xpressions, 1544 N 1000 Rd., Lawrence, Kansas 66046-9610, USA but Medcalf prefers that it be purchased through dealers or your local bookstore.

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HARDWARE

Mike Candy, KI7FX
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Greetings to all RDJ readers. The great weather of the Inland Northwest is still holding out this year - not much snow and lots of sunshine! Many thanks to Jim (WB7AVD) and Jay (WS7I) for helping me with last month's article when I was suddenly called away for a family emergency. We are back on track once again and ready to explore the latest HARDWARE aspects of our fine hobby. There are quite a few new developments in the digital hardware horizon this month. Check elsewhere in this issue for the great news on G-TOR, the new HF digital mode for KAM Plus and KAM Enhancement Board owners. I hope to get a full report on this new mode as well as a complete review of it's features to everyone very soon.

Other Forms of Keying

A few months ago, a new ADRS member, John E. Brolley from Los Alamos, NM. asked me about the hardware required to decode MSK, QPSK and other forms of keying. He really sparked my interest in some of these digital modes so I decided to do a little checking. First off, this magazine couldn't possible hold all of the information that I dusted off concerning digital keying methods - there sure are a lot of them! I will attempt to cover a few basics. MSK, PSK, QPSK, 4QPSK, and other keying methods are primarily "Packet" protocols meaning they simply transfer data by subdividing it into packets.

According to my trusty 1994 ARRL Handbook, The reason for some of these unique forms of keying is because "analog communications that transmit speech have an analog baseband bandwidth of approximately 3 kHz. A relationship exists between this bandwidth and the data rates that it can accommodate. A 3 kHz analog channel can accommodate 1200 bits per second easily, and speeds as high as 9600 with more difficulty using complex modulation techniques".

Since I just mentioned 9600 baud, I feel obligated to also mention another item that seems to be overlooked by many people venturing into high speed packet protocols. It is very important to note that 9600 baud packet cannot be done effectively using the usual connections to your transceiver's audio and FSK outputs. Mainly, the audio out and mic input of your transceiver. For high speed packet to encode and decode properly at 9600 baud, the AFSK line of your Terminal Node Controller (TNC) must be connected directly to the Varactor modulator stage of the transmitter and the receive audio must be taken directly from the discriminator section of the receiver. These special 9600 baud connections must be located on the radio's schematic diagram by the user. Most often these connections are not available on any external connector and must be wired carefully inside the transceiver. Many radio manufacturers are starting to re-design their radios to include this Varactor modulator and discriminator stage as back-panel connections. Let's keep the pressure on radio manufacturers by demanding high quality rigs with the necessary connection points already engineered into the design! Kenwood, Icom, Yaesu and others are now taking the steps necessary to market radios with these connections already in place. Keep checking the pages of the RDJ for the latest information on high speed data connections. An upcoming issue of the RDJ will have a complete reference for connecting virtually any radio to any data controller!

I have been doing quite a bit of experimenting with Amateur Satellites recently, and sure enough, a lot of these unusual and high speed forms of shift keying were being discussed and used on a regular basis on the Amateur satellites - Orbital Satellites Carrying Amateur Radio (OSCAR). The unique problems of satellite communications including weak signals and doppler shift make for some special modulation - demodulation (modem) requirements. A basic overview of these modes is listed below:

Binary frequency-shift keying (FSK) is the most common form of modulation for Amateur radio data transmission. This technique translates a binary 1 to a mark (audio) tone and a binary 0 to a space (audio) tone.

Minimum-shift keying (MSK) is a form of FSK in which the frequency shift in hertz is one half the signaling rate in bauds. Thus, a 1200 baud signal shifted by 600 Hz is MSK.

Binary phase-shift keying (PSK) is the most widely used digital satellite mode. At 1200 baud this mode is found on OSCAR's 16,18,19 and 20. One of the fundamental reasons for PSK is that it offers at least a 16-dB performance increase over FSK. Data can be successfully extracted from a PSK signal that is 16-dB farther down in the noise than an FSK signal. At 9600 baud, this mode is used on OSCAR's 14 and 22.

Modes like 8PSK, QPSK and Manchester-encoded FSK are variations using different protocols of the same basic shift keying methods. The most popular mode to watch in the next few months is 9600 baud FSK. This mode is widely available but seldom used - until now!

AEA has just announced the release of the PK-96 Controller. It is a cost-effective, high speed, single-mode data controller offering 1200 baud AFSK as well as 9600 baud FSK that is K9NG and G3RUH compatible. Watch for the K9NG/G3RUH compatibility - it is fast becoming the standard for high speed packet data links, terrestrial comm, and satellite work. The PK-96 should be at your AEA dealer by the time you read this for less than 200 bucks.

An important link in all this shift-keying mess and the one item that allows Amateurs to run multi-speed, multi-protocol modes in a single TNC is a single electronic micro-chip called a Digital Signal Processor (DSP). It's the greatest thing to hit Amateur Radio in years. Although they have been around for 20 years, they have only recently come into the price range of most Hams. In the next year, we will see some great developments in DSP technology that will be to the benefit of all Hams. We have already seen CLOVER, which is a pure DSP protocol that would not be here today without low cost DSP technology. Hams will commonly use two closely related forms of digital signal processing in the future - radio modems and audio filters. In some cases, the modem and filter will be in the same box. The DSP can replace the TNC's analog filters, FSK demodulator or tone encoder on digital modes and/or be used as a digital audio filter for CW and SSB modes.

Transmitted or received signals are processed, converted and/or REGENERATED by the DSP device. During this regeneration stage, noise can be digitally eliminated, adjacent carriers can be killed, or complex encoding/decoding of digital shift-keying can be accomplished. Digital Signal Processors are common and come in many different shapes and sizes. The SoundBlaster(c) in my computer uses a DSP, Digital Modems like AEA DSP-2232 use the DSP chip to process an unlimited number of different modem types. For example you can select anything between a 45 baud BAUDOT

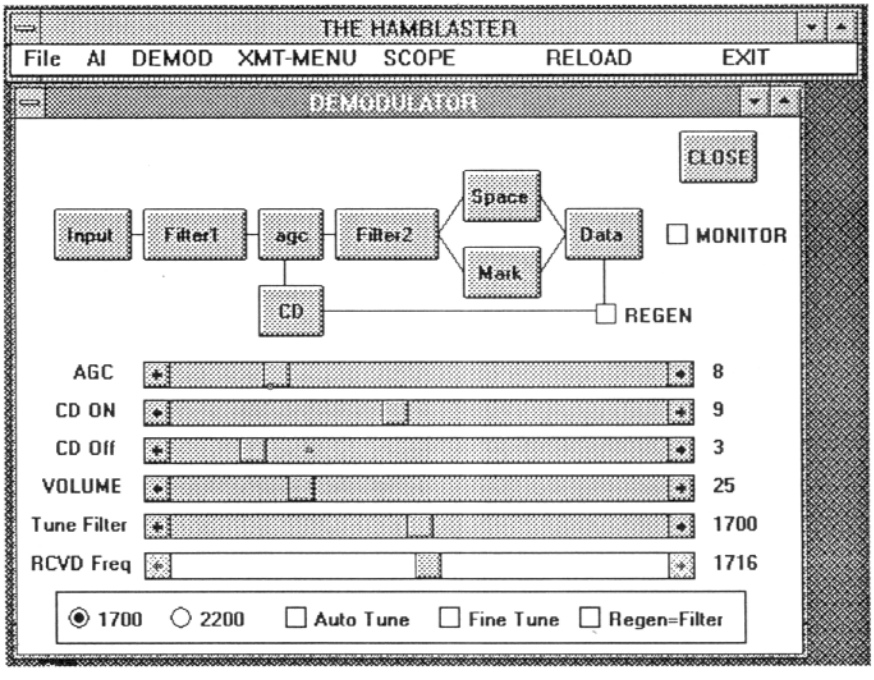
(RTTY) modem to a high speed 9600 baud K9NG/G3RUH modem - all in the same terminal unit. When you think about it, the Digital Signal Processor is an incredible device pressed into a chip the size of a standard computer CPU. DSP's and their associated Digital to Analog (DA) and Analog to Digital (AD) converters can be easily programmed or reprogrammed to produce a virtually unlimited range of spectrum processing. As new digital modes become available in the future, you simply upload or reprogram your DSP to operate the new mode. You can store a library of modems on a floppy disk or hard disk drive and load them on command. The modems are actually DSP filter programs that use mathematics to convert the FSK signal to a serial digital bit stream. The serial bits are then processed by the TNC's microprocessor, converted into ASCII characters and sent to the computer. With this in mind, DSP based modems and other devices may never become obsolete.

Hamblaster

Speaking of "other devices", a promising newcomer to the Ham scene is the soon to be released Hamblaster for the PC. Developed by long time RTTY/Digital aficionado Jack Albert (WA9FVP), the Hamblaster is a sound board type device that plugs into a PC's 8 bit expansion bus. Unlike conventional sound boards however, it has a Texas Instruments TMS320C25 digital signal processor chip and high speed memory. From a disk file, modems or filters are loaded into the memory by the user. Once the filters are loaded and configured, you can view the signals on the display's digital oscilloscope while changing filter parameters to improve reception, or exit the software and run other applications. The Hamblaster comes with DOS or MS-Windows software. The Windows software interfaces with PC-Packratt for Windows by AEA or HamWindows Plus from California Software. Without good software, DSP hardware is pretty meaningless and it looks like Jack has done an outstanding job of programming as well. Figure 1 shows the Hamblaster demodulator control panel. Changing the block diagram on the screen actually changes modems that are implemented by the hardware. The Hamblaster can interface to any packet modem and allow you to load improved filters for RTTY, AMTOR, PACTOR, Packet Radio, or CW. Other filters will improve SSB and AM reception or copy Morse code. It even has a Touch Tone and PL decoder and can generate music. One of the nicest features of the Hamblaster appears to be the "Auto-Tune" feature. Jack says "When it's invoked, the pre filters and mark/space filters track together and lock to the FSK signal. The process only takes about 2 seconds. You don't have to be right on frequency and you don't have to use tuning scopes or indicators although an on screen tuning indicator is available." Unfortunately, Jack has told me the Hamblaster is not yet available, but to look for it at Dayton this year! I will do a full review and description of the Hamblaster as soon as they are released.

DSP Audio Filters

While working with DSP Modems and trying to learn about the DSP based digital modes, I decided to investigate digital audio filtering a little bit as well.



Digital audio filtering is a relatively new method of handling CW and SSB signals. In recent months, there have been audio DSP filters available to help filter out heterodynes, adjacent carriers, static, and other noises. The external audio DSP units basically filter the speaker audio on your receiver. There is really no excuse for not building low cost DSP filter INTO more of the new transceivers - DSP filtering of the receivers IF passband is a great leap forward in receiver technology, and a great improvement over filtering the speaker audio. If you are running DSP Audio filtering, please drop me a line and let me know your thoughts. Most of the high quality external audio DSP units are in short supply these days, so I haven't yet been able to get my hands on one to try out. I will keep you posted on the progress of this project as things happen. In checking with some manufacturers of DSP Audio filters, I found that demand far exceeds the available supply. Hopefully, they will catch up soon. I am anxious to try out the DSP audio filters on the HF and Satellite bands!

G-TOR

Well, that's about all the room I can use up this month. KAM Plus users pay special attention to Kantronics G-TOR information. It sounds like a great mode and I hope to share some hands-on experience with everyone very soon. I still have a lot of work/project tied to DSP in the upcoming months. With the help of AEA and their DSP-2232, we can all learn a lot about how digital signal processing can really make our hobby easier and more enjoyable. The DSP-2232 is an incredible device, and although it has been reviewed a number of times, I hope to try out some of it's new features including the just released Node/Gateway Option!

Please, drop me a line if you have any concerns or comments. I always answer mail, and if you send your message electronically, you will usually get a response within a few days. I can be reached via a number of different mediums these days including the Internet, Packet Radio, and my telephone Bulletin Board, the Think Tank II.

73, de Mike, KI7FX ■

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REVIEW

Capman ... *new propagation software*

Steve Holton, N2QCA[1]

When Jim, N2HOS, asked me at a very snowy weekly breakfast gathering of local hams if I wanted to review a propagation program for the RDJ, I didn't hesitate to say yes as I had been wanting to explore this area for some time. The program is question is CAPMAN(tm) by Kangaroo Tabor Software and Lucas Radio. CAPMAN stands for Computer Assisted Prediction Manager and I evaluated Version 1.51 which lists for $89.95. Despite my curiosity about this subject, I knew almost nothing about propagation prediction programs before I started.

CAPMAN includes two basic components. The first is a program called IonCAP. If you have wondered where the propagation predictions graphs in the How's DX column in QST are produced, now you know - they come from IonCAP. IonCAP is the result of extensive work by the Instutute for Telecommunications Science and it's predecessors in the U.S. Department of Commerce in collecting ionospheric data and developing computer models for predicting HF propagation. IonCAP also has a notorious reputation for user unfriendliness as it is firmly rooted in the 80 column card batch FORTRAN era! (Boy does that bringback memories to someone whose first program was in absolute 650 machine language!) CAPMAN's raison d'etre is to make IonCAP user friendly. CAPMAN simply put is an interactive, user-friendly front end to IonCAP. It guides you through preparing the input with an interactive set of menus and windows with context sensitive help. It then runs IonCAP, which is an integral part of the package and finally graphically displays the results.

CAPMAN requires a 80386 or better processor running DOS 3.3 of higher and at least 545K bytes of free low memory. Unlike most 32-bit programs I've used or written (that's been my livelihood the last 8 years), this one seems to be unusually greedy for low memory using expanded memory only for swapping. If enough expanded memory is not available then 520K of disk space is used for swapping. Well I just didn't have that kind of free memory available, which forced me to make the upgrade to IBM DOS 6.1 I'd been putting off. I now have 612K of free low memory. By the way the memory configuration process of DOS 6.1 is the smoothest I've ever seen.

The installation is itself is very straight forward. Create a sub-directory and run a single self-extracting archive file to install all the program files. These files occupy about 2.25MB of disk space. Two additional archive files are provided. One provides pictures and a viewer for the predefined IonCAP antennas. These are useful in showing visually the parameters that you provide to IonCAP for a specific antenna and requires 305K bytes of disk space. The second file requires 194K bytes of disk space and contains the IonCAP manual. It should be noted that almost all of the manual is included in the on-line help included in CAPMAN.

The next step is to configure the program. A utility is provided to step you through the process starting with such things as your call, QTH, Latitude and Longitude etc. It next asks for the difference between local time and GMT/UTC time. Here was the first minor glitch - CAPMAN assumes that you keep your computer's system clock on local time. I don't think I'm alone in this but I keep mine on UTC time as it simplifies many things with other Ham software. To date I have been able to keep everything happy running this way. After looking into this, it turns out only to be a minor annoyance. CAPMAN uses your latitude and longitude for calculations. It is only the display of local time, sunrise, sunset, etc., that you have to mentally adjust by the difference from local to UTC.

CAPMAN allows you to specify a number of antennas and other system parameters. Unless you are already familiar with IonCAP you will probably want to take the defaults for most things as a starting point.

In order to make a run you must a) select a target location that you want to make predictions for b) have CAPMAN build the necessary input file for IonCAP and then c) run it. There is a location file containing over 500 entries from which you can select. All DXCC countries are included and prefix, CQ and ITU zones etc are part of the HF Location database. You can add to and edit the records as well. Having selected a location you can execute it. It takes less than 30 seconds to perform the calculations for one month on my machine - a 16Mhz PS/2 with a 33MHz 486 processor upgrade installed.

I used the Peter Island DXpedition for my first try. Having selected the specifics from the location database and I executed it. CAPMAN produces tabular output data which you can view, print and edit. In addition, for most of the common methods it will also produce a very nice graphical display of the output. The display format is very readable and includes the MUF plotted versus time and one of seven additional parameters. They include signal-to -noise ratio, reliability, transmitter take-off angle, etc.. These are selected by typing a number from the menu display and appear immediately. In addition each parameter can be examined on any one of up to 10 different frequencies. The default setup is 10 frequencies between 2 an 30 Mhz. One drawback is that is seems you cannot directly view the graphical output if you do either a multi-month or multi-location calculation in a single run. You can however, do the calculations in a single execution, then break up the tabular output into single elements using the editing capabilities included. This seems to be a real annoyance as the program does have the ability to prepare multi-location libraries of input records. The program sets them up for multi-month calculations and executes them as a unit. Anyway, the Peter Island output was impressive and easy to view and understand. Of course, you really didn't even need to turn on your rig to hear the pileups - Hi Hi - and yes, I did work 3Y0PI.

There are 29 different output methods that can be used to model propagation. The default-- method 20 Complete System Performance-- is a good place to start. There are up to 22 output items that are computed depending on the method selected. CAPMAN also can interface to the antenna modelling programs Mininec and Elnec to pick up antenna definitions and use them with IonCAP. Having neither of these programs, I wasn't able to explore this capability. You can also define your own antenna patterns with a provided program called MAKEANT.

Technical support is available from Don Lucas of Lucas Radio.He knows whereof he speaks. Look at the copy of the official IonCAP users manual provided with CAPMAN and you'll note that the same Don Lucas is one of the authors!

This is very powerful program to say the least, but it will require some investment in time to learn how to use it to it's fullest. If you're already familiar with IonCAP you'll find this a real treat. If you're really interested in propagation prediction you can get a great deal from this program. If you're not willing to put at least a little time into learning to exploit the capabilities of this program - we'll maybe this isn't for you.

de **Steve, N2QCA** SK

1. 115 S. Spring Valley Rd., Wilmington, DE 19807

Note: *The same day Steve's article arrived in Florida, I heard again from Jim KU5S. Thirty or more patches, fixes and additions have been inserted in the program since the disk was originally sent to me. Customers will receive an upgrade in exchange for either answering a questionaire or a small s/h charge. The offer will be "decided soon."*

Among the more interesting changes is an improved Help file. Since that is the primary manual we assume that to be good news. There is also now less demand on RAM. based on Steve's comments, that is good news as well.

de Jim N2HOS

A Paid Advertisement

Error-Correcting Codes

by Phil Anderson, WØXI[1], and Glenn Prescott, WBØSKX

Dealing with noise, fading, burst errors, and interference is a way of life for digital mode operators on the HF bands. Since Bell invented the telephone, noise and interference have been a major deterrent for long distance voice communications too. Modern-day modems must also contend with the same conditions in order to pass error-free data between computers. Over the years, telephone network designers have developed strategies to combat noise and interference on the telephone line. One way is to include extra bits with each block of data sent to enable the receiver to determine what the transmitted message must have been. The other way is to include only enough extra bits to allow the receiver to deduce that an error occurred, but not which error, and have the receiver request a retransmission if necessary. This second method is familiar to operators of AMTOR, Packet, or Pactor.

The first strategy, adding extra bits, is beginning to appear in amateur modes, such as Clover and G-TOR. The data and extra bits *(called parity)* form error correcting codes. There are two types of codes in common use today, block and convolutional. We'll concentrate on the block codes. For block codes, **r** bits of parity are added to **m** bits of data to form a new code of **n** bits. The ratio **m/n** is then called the *code rate,* and it can be thought of as the number of information bits entering the encoder per transmitted code. For example (Figure 1), if we added 4 parity bits to 4 input data bits, the number of bits transmitted would be 8, and the rate for this code would be 1/2.

At first glance it might appear that we've simply cut the data rate in half! However, if a system such as AMTOR misses even a single bit in a transmission, the whole transmission must be repeated. By adding parity bits to the data, some of the these errors can be corrected and retransmissions can be avoided; hence, data throughput can be increased. The Clover and G-TOR systems demonstrate this.

Figure 1: Error Correcting Encoder

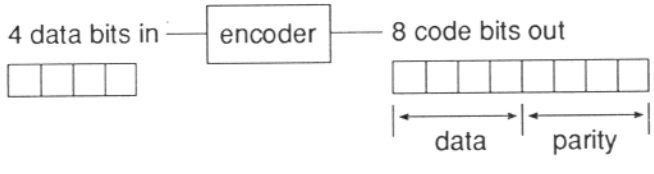


Figure 2: Coding 0 and 1 as 000 and 111.

original code	acceptable code table
000	000, 001, 010, 100
111	111, 011, 101, 110

How can errors be corrected? To understand this, it is necessary to look closely at what we accept as an error. As previously stated, a message with error-correcting bits consists of **m** data bits and **r** redundant parity bits; combined they form a codeword of **n** bits. Let's take the simplest possible example; let's suppose that our message is one bit – a 0 or a 1. To that let's add two parity bits and define our codewords as 000 or 111. Therefore, our code has **m** = 1 and **n** = 3 and it is a rate 1/3 code.

Next, let's decide that we wish our system to detect and correct all one-bit errors which may be present in any received code. With noise, our receiver, of course, will receive any one of eight possible codes listed in Figure 2. However, if we assume that only one of the bits changes as each three-bit character is sent, due to noise, then a 000 might be received as a 001, 010, or 100. Likewise, the 111 code might become a 011, 101, or 110. Note, however, that no one-bit changes from 000 equate with any of the one-bit changes from 111. Hence, we assume that 001, 010, or 100 is equivalent to 000! In other words, we don't accept these one-bit changes as in error; hence the transmission has been corrected.

In general, at the receiver, we wish to decode only the original message bits. If we sent only **m** bits, we could receive 2^m different messages. By adding **r** additional parity bits, however, the actual number of possible messages sent is 2^n; that is, there are 2 to the **n**th possible ways to send **n** bits. So, if we design the acceptable codes of a message so that they are evenly spaced throughout the larger number of codes, then all received codes that differ from a valid codeword by only one bit can be easily corrected as illustrated in the previous example!

What happens if we have a system that detects 3 errors in 24 bits but more than 3 bits are in error? Does the system fail? Not likely, if we set things up right. Transmitted data frames should contain, perhaps, hundreds of codewords. It is very unlikely then that the bits in all of the codewords would have more than 3 errors. If we add the requirement that the total frame – after each codeword is corrected – must pass a CRC check like packet, then frames passing without detection of an error are nil.

References

1. Kantronics Co., Inc, 1202 E 23rd Street, Lawrence, KS 66046.

2. Tanenbaum, Andrew, *Computer Networks,* Second Edition, Prentice Hall, 1988, pp 206.

3. Lin and Costello, *Error Control Coding,* Prentice Hall, 1983.

CONTESTING

Richard Lawton, N6GG
14395 Bevers Way
Pioneer, CA 95666

RTTY Contests - Coming Events

Rules and logsheets are in the RTTY Contester's Guide

Date:	Contest:
APR 16-17	SARTG WW AMTOR (Swedish)
APR 23-24	SP DX RTTY (Polish) --NEW!
MAY 14-15	VOLTA RTTY DX (Italian)
JUN 11-12	ANARTS WW Digital (Australian)
JUL 3	DARC CORONA 10M Digi (German) --*NEW*!
JUL 9-10	BARTG AMTOR/PACTOR (English) --*NEW*!
JUL 16-17	DARC HF RTTY Part II (German) --*NEW*!

NOTE: We have 4 new contests during April through July! (See below)

FLASH! ADRS SPONSORS NEW CONTEST!

The American Digital Radio Society announces that they will sponsor the first, annual, "**ADRS WW RTTY WPX Contest**" starting with the first full weekend in February 1995. (4-5 FEB 1995) The formal announcement will be made at Dayton Hamvention in April. Rules will appear in the May/June '94 issue of the ADRS RTTY Digital Journal. Stay tuned (up).

-- -- REMINDERS: -- --

EA WW RTTY Contest log entries mailing deadline: April 9, 1994

Mail logs to:

EA RTTY Contest Manager
Antonio Alcolado, EA1MV
P.O.Box 240
09400 Aranda de Duero (Burgos)
SPAIN

DARC HF RTTY Contest, Part I, log entries mailing deadline: May 1, 1994

Mail logs to:

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

DARC CORONA 10M Digital Contest (March) deadline: May 6, 1994. Mail to DF5BX.

BARTG SPRING RTTY Contest (March) log entries deadline: May 25, 1994.

Mail logs to:

BARTG c/o John Barber, G4SKA
32 Wellbrook Street
Tiverton, Devon
EX16 5JW, ENGLAND

-- -- COMING UP: -- --

SARTG WW AMTOR Contest - April 16-17, 1994

Sponsored by the Scandinavian Amateur Radio Teleprinter Group.

Contest periods are: 0000-0800Z Sat., 1600-2400Z Sat., and 0800-1600Z Sun.

MODE: AMTOR ONLY. Use FEC (mode B) only for calling.

Use ARQ (mode A) for contest exchange.

NOTE: Exchanging of contest messages in FEC or in any other mode than ARQ is subject to disqualification.

BANDS: 80, 40, 20, 15, and 10M.

CLASSES:

A) Single op, all band

B) Single op, single band

C) Multi-op, sing. xmtr

D) SWL

EXCHANGE: RST + Name + QSO number (starting with 001).

MULTIPLIERS: Each DXCC country counts as one multiplier on each band, including the first QSO with Australia, Canada, Japan, and USA. Each call district in Australia, Canada, Japan, and USA will also count as one additional multiplier on each band. (Band multipliers)

QSO POINTS: QSO with your own country; five points. QSO with other stations on your own continent; ten points. QSO with other continents; fifteen points.

FINAL SCORE: Total QSO points x total multipliers.

AWARDS: To the top stations in each class, country, and district, if the number of QSO's is reasonable.

LOGS: Use separate logsheets for each band. Logs must show: BAND, DATE and

TIME (UTC), CALLSIGN, MESSAGE Sent and Received, MULTIPLIERS and QSO POINTS.

Summary sheet must show full scoring, class, YOUR CALL, NAME, and ADDRESS, and a signed declaration that all contest rules and regulations for your own license have been observed. For multi-op stations, all calls or names of all operators should be listed. Logs must be received by June 10, 1994.

Mail logs to:

SARTG Contest Manager
Bo Ohlsson, SM4CMG
Skulsta 1258
S-710 41 Fellingsbro
SWEDEN

COMMENTS: This contest is for AMTOR only. Note that there are three operating periods, each eight hours long. In between are two eight hour rest periods. Pileups must all be in FEC mode, which is always interesting. After contact is established, each station must switch over to ARQ (mode A) for the exchange.

SP DX RTTY CONTEST

April 23-24, 1994

Sponsored by: Polski Zwiazek Krotkofalowcow (PZK). Organized and run by Polish Radiovideography Club (PK RVG).

CONTEST PERIOD:

From 1200Z Sat. to 2400Z Sun. (36 hours) No rest periods required.

CONTEST CALL: "CQ SP RVG TEST"

MODE: RTTY only

BANDS: 80, 40, 20, 15, and 10M

CATEGORIES:
A. Single Operator, All Band

B. Multi-Operator, All Band

MESSAGE EXCHANGE:

Send: RST + CQ Zone Number

SP stations send: RST + Province (2 letters)

NOTE: Polish stations will use a two letter abbreviation of their province. There are 49 SP provinces.

MULTIPLIERS: Count each DXCC country and each SP province on each band. (Band Multipliers) Also, each continent (6) will count once, not once per band.

NOTE: CQ Zones do NOT count as multipliers.

QSO POINTS:

■ Count 2 points for QSO with your own country

■ Count 5 points for QSO with other countries on your continent.

■ Count 10 points for QSO with countries not on your continent.

FINAL SCORE: Total QSO points x total mults x number of continents (max 6).

SWL rules apply as above.

LOGS: Use separate log sheets for each band. Logs must show: BAND, DATE and TIME in UTC, CALLSIGN, MESSAGE sent and received, country multiplier and points claimed. Entries with more than 100 QSOs must submit duplicate check sheets. Multiple operator stations should include names and callsigns of all operators.

Those submitting logs on disks: please send us your computer disk. IBM, MS-DOS compatable disks are encouraged. The format we prefer is your CT.BIN file, for example; SP2JPG.BIN, or your K1CC.DAT file, or your SP1LOP.DBF files.If you use a different program than mentioned above, the generic format we want is a separate file for each band, containing vertical single column of calls in chronological order.

DISQUALIFICATION: Violation of the rules of the contest or taking credit for incorrect QSOs or multipliers, or duplicate contacts in excess of 3% of the total made, will be deemed sufficient cause for disqualification. *"The decision of the SP DX RTTY Contest Committee are final and not contestable."*

DEADLINE: Logs must be received by 15 June 1994 to qualify. An extension may be granted if requested.

Mail logs to:

SP DX RTTY Contest Manager
Christopher Ulatowski, SP2UUU
P.O. BOX 253
81-963 GDYNIA 1
POLAND

COMMENTS: And yet another RTTY contest comes on board! This time Poland steps forward, presenting a 36 hour contest with no rest periods required, and has band multipliers. Their use of the 49 Polish provinces as multipliers, as the Spanish and others do, stimulates interest, too. This is their first WW RTTY contest, and will be held each year on the last full weekend in April. (This year it's the week before the Dayton Hamvention!)

These rules are very simular to the EA RTTY Contest but with one BIG exception; each QSO with your own country counts for 2 points, rather than zero points. It is also 12 hours longer.

NOTES:

■ Everyone, mainly W/VE stations: don't forget to count 1 multiplier for your first W/VE QSO *on each band.*

■ CQ Zones do NOT count as multipliers. It's just part of the exchange.

■ Notice the 10 points for off-your-continent QSOs. That means you have to work 5 locals to equal 1 DX station.

■ Since there is little time to prepare logsheets, you could use the EA RTTY logsheets in the **"RTTY Contester's Guide."** They can be horsed to make do.

Let's give the SP Club our full support for their first World-Wide effort!

VOLTA RTTY WW Contest

May 14-15, 1994

Sponsored by SSB and RTTY Club of COMO and A.R.I. (Associazoine Radioamatrore Italiani) honoring Italian discoverer of electricity, ALESSANDRO VOLTA.

CONTEST PERIOD: from 1200Z Saturday, to 1200Z Sunday.

(24 hours, no rest periods required)

BANDS: 80, 40, 20, 15, and 10M.

CLASSES: A1 - Single op, all bands

- A2/xx - Single op, single band (xx = band)
- B - Multi-op, single transmitter
- C - SWL.

EXCHANGE: Send: RST + QSO nr. + CQ Zone nr.

MULTIPLIERS: DXCC Country List + each call area in VK, VE, and USA. DO NOT

COUNT VK, VE, or USA as separate country. (USA stations with callsign from one district but are now living in a different district should give proper identification, such as: K6WZ/0.) The same multiplier counts again on a new band. An additional multiplier is given for each INTERCONTINENTAL COUNTRY worked on at least four bands. Contacts between stations within the same country will not be valid, such as: A W2 station can work W1, W3, W4, etc. but not W2. Contacts made OUTSIDE one's own continent on 80 or 10M are worth double QSO points. A contact with a station that would count as a multiplier will only be valid if that station appears in at least 4 other logs, or a contest log is received from that station.

FINAL SCORE = total QSO points x total mults (band mults + each INTERNATIONAL COUNTRY worked on 4 bands) x total number of QSOs. Use Exchange Points Table to determine points scored for each QSO.

AWARDS: A SPECIAL trophy will be awarded to the top stations in each class. In addition, a certificate with special sticker to all entrants.

LOGS: Use separate logsheets for each band. Logs must show: BAND, DATE and TIME (UTC), CALLSIGN and MESSAGE Sent and Received, POINTS and NEW MULTIPLIER PREFIX. Summary sheet must show full scoring, and list of multipliers worked.

Logsheets, summary sheets and multiplier and dupesheets and the EXCHANGE POINTS TABLE are all available for copying from the RTTY Contester's Guide, published by RTTY Journal.

Logs must be received by July 30, 1993, to qualify.

Mail logs to:

Francesco Di Michele, I2DMI
P.O. Box 55
22063 Cantu
ITALY

COMMENTS: This is a 24 hour contest. The QSO points are determined by the EXCHANGE POINTS TABLE. This table, based on the 40 CQ Zones, is arranged so that the further away the QSO is from your zone, the higher the points scored.

NOTES:

■ **CQ zones DO NOT count as multipliers**. The Table is on page 24 of the RTTY Contester's Guide uses CQ Zones. It also appeared in the March 1992 issue of the RTTY Journal, page 22.

■ Since W/VE/VK call areas count as separate countries on each band, CQing will be the best way to make a good score for W/VE/VK ops. Band multipliers will spread out the CQing, too, and should make the low bands more active.

■ Don't forget to try working DX on 40 and 80M, as QSO's with countries on other continents will increase your multiplier if you manage to work those countries on the high bands.

■ QSO's outside your own continent on 80 and 10M are worth double QSO points.

■ This contest uses the number of QSO's as an additional multiplier, and that creates astronomical scores... millions!

NEWCOMER'S CORNER

WannaBe RTTY/Digital Contesters...

taking the first step.

RTTY/Digital contesting is one of the fastest growing ham radio activities. We now have over 18 world-wide RTTY/Digital contests, and more is in the making. USA currently has only 2 (TWO) major Digital contests: ARRL Roundup, and the CQ WW Digital. All the rest are from outside USA, and get lots of activity. Here are some reasons for this popularity, both inside and outside USA:

■ The home computer technology is expanding by leaps and bounds, producing more practical ways to combine ham radios with computers. (Contesting/logging and regular QSO software for RTTY, Packet, Amtor/Pactor, Networking, BBS, Traffic handling, etc.)

■ Learning to touch-type while your eyes are on the monitor screen is becoming more and more mandatory. Might as well combine learning that skill along with mastering the digital modes.

■ Ham radio all over the world seems to be jumping into this "learning experience." Consider this: *Combining computers with digital ham radio creates an exciting and novel way to learn the english language that includes spelling and grammar.*

("POOR SPELLERS OF THE WORLD... UNTIE!")

■ "Digital" is the magic word of future communications technology. We even have TV commercials that now expound this!

After buying a good computer and mastering its quirky ways, the very next item to get is a good, multi-mode TNC (Terminal Node Controller) that is compatible with your ham equipment and your computer. (Most of them are.) A multi-mode TNC enables your transceiver to send and receive in just about all of the digital modes. The main reason for the multi-mode start is to check out what's going on in the digital community by simply exploring all the various modes. It's really fascinating!

If you are new to ham radio, or have been a ham for some time, and are looking for new, enjoyable activities to pursue, consider getting into the unique world of RTTY/Digital communications and contesting. It's friendly, it's fun, its challenging, and it keeps growing - and growing - and growing - all over the planet!

((73)) See you in the (Dayton) 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!

American Digital Radio Society

1994 Conference scheduled

SPOKANE, WASHINGTON, March 1 -- The ADRS today announced that it has scheduled its annual meeting and the 1994 ADRS Digital Conference for April 29th at the Raddison Inn in Dayton, Ohio during the Dayton Hamvention .

This year's conference, the first American Digital Radio Society symposium will feature a forum for digital operators, sysops, users and experts to meet and discuss various topics. Saturday's agenda for the one day event features a series of activities for attendees and includes the ADRS membership meeting.

Time	Activity	Moderator/Panel
0800 - 0900	Early Birds	Phil Sussman, KB8LUJ
0900 - 1000	Packet Radio	Al Matlick, W2TKU
1000 - 1100	Introduction to Digital	Jim Jennings, KE5HE
1100 - 1200	ADRS Meeting	Warren Sinsheimer, W2RNE
1330 - 1430	Digital DX Forum	Jules Freundlich, W2JGR
1430 - 1530	Digital Contest Forum	N6GG, WF1B, WS7I, AB5KD
1530 - 1630	Digital Sysops	Jim Mortensen, N2HOS

Your co-chair's, Jim, KE5HE, and Jay, WS7I, look forward to sharing with you the members an exciting time in Dayton. See you there on Friday April 29th.

911

You Can Help

I recently became the owner of an Ten-Tec Omni VI rig and am enjoying it very much. I also have a Macintosh computer and would like to use it to control the new radio, but most of the software out there is written for IBM PCs.

I called a logging software outfit in Georgia (Logic 3) and found they may come up with something later in the year and maybe looking in the RDJ would help me find Mac software. To worsen my plight, I am a snowbird, normally in Durham, NC and believe my November copy of the RDJ is there. I know it has an article on Mac only software but I can't remember what it said.

So I thought it wouldn't hurt to ask you if you can shed any light on this subject with respect to what, when, where, etc.

Seems to me that Ten-Tec has gone to great lengths in its owners manual to provide the proper data so that a user might write his own program for his computer, so far, I am not smart enough to do that. However, I should think it would be pretty easy for an established programmer to do.

I'm sure there are a lot of Mac users out there looking just as I am and any comments will be appreciated.

Jim Bailey, KM4DJ

G-TOR™
The New, Faster HF Digital Mode for the KAM Plus

by Phil Anderson[1], WØXI, Michael Huslig,
Glenn Prescott, WBØSKX, and Karl Medcalf, WK5M

On New Year's Day, WØXI and WK5M transmitted a 9,718 byte file from Kansas to WA4EGT[2] in California on 20-meters in 5 minutes, 20 seconds. The mode was G-TOR. Immediately thereafter, the file was transmitted again, this time using Pactor. It took 20 minutes, 15 seconds. Throughout the month of January these tests were repeated with over one-million bytes transferred error-free. The average character/second rate for G-TOR was 23.7 and for Pactor[3] 8.64.

G-TOR, short for Golay-TOR, is an innovation of Kantronics Co., Inc. It's a new HF digital communications mode for the amateur service. The error correction coding outlined in MIL-STD-188-141A[4] forms the basis for G-TOR. In order to keep costs low yet take advantage of concepts prescribed in the standards, G-TOR makes use of existing multi-mode TNC hardware but establishes a completely new hybrid-ARQ system in firmware.

The benefits of these innovations are exceptional:

- dramatically increased throughput
- apparent reduction in the effects of interference and multi-path
- low cost.

The key features of G-TOR are atypical:

- extended Golay forward error correction coding
- full-frame data interleaving
- on-demand Huffman data compression with run-length encoding
- link-quality based baud rate: 300, 200, or 100
- 2.4 second hybrid-ARQ cycle
- fuzzy acknowledgments
- reduced overhead within data frames
- standard FSK tone pairs (mark and space).

Background Research

It occurred to us after porting Pactor into the KAM that this protocol did not go far enough. It did not incorporate any of the potential strengths prescribed by MIL-STD-188-141A. In addition, we knew that commercial and military systems use forward error correction (FEC) and data interleaving. So, we decided to evaluate the potential of using FEC coding with interleaving to increase data file transfer throughput with existing multi-mode TNCs such as the KAM and KAM Plus.

We collected signatures of HF error patterns by sending Pactor idle characters through a DSP-based HF simulator. The simulator was programmed for various types of channels and conditions. In particular, we gathered error signatures using the good, moderate, poor, and flutter fading channels prescribed by the CCIR[5] as recommended simulator test channels.

We then exclusive-ORed the error patterns with random data files on a PC and tested various coding schemes. Random data files were Golay encoded, interleaved, and mutilated by the error signature. The process was then reversed; each file was de-interleaved, decoded, and the data displayed. We were encouraged with the results, so we moved on to the remaining major design tasks: designing a robust hybrid-ARQ protocol and determining whether or not the TNC could handle the necessary computing task!

A protocol evolved over time that met the challenge. We coded and ported it into the KAM Plus and conducted real-time tests using the HF simulator. Minor adjustments were made and we began on-the-air tests. G-TOR performed even better than our simulator predicted. Through a combination of coding and interleaving, G-TOR 'hung in there' even when interference appeared and signals were weak but readable.

G-TOR Frame Structure and Hybrid-ARQ Cycle

G-TOR operates as a synchronous hybrid-ARQ mode, see Figure 1. Regardless of transmission rate, the cycle duration is always 2.4 seconds, data frames are 1.92 seconds long, and the acknowledgments take 0.16 seconds. At 300 baud, each data frame contains 69 bytes of data, one control byte, and a two-byte CRC. Frame makeup is noted in Figure 2.

Figure 1 – G-TOR Frame Timing

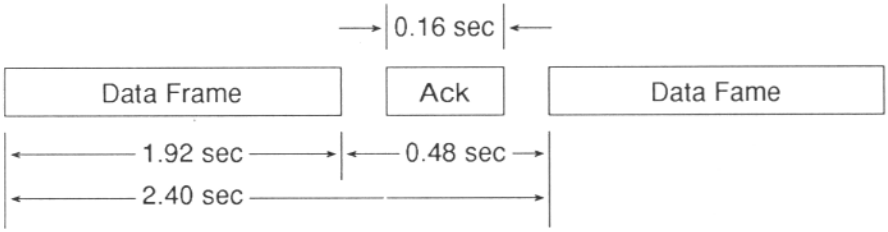
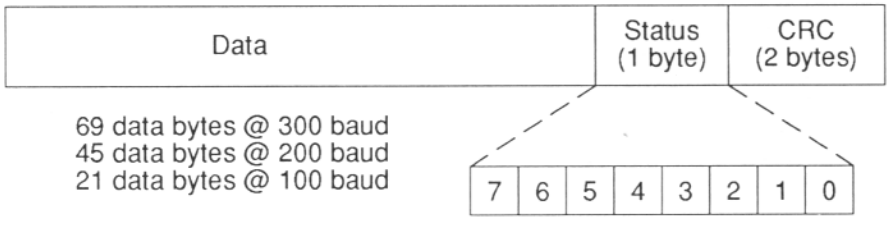


Figure 2 – G-TOR Frame Structure Before Interleaving



To establish a link, the master station transmits the callsign of the intended receiver and the information receiving station (IRS) synchronizes to it. Once in step, the IRS sends <link established> to its terminal and sends an acknowledgment to the master. Transmission of data can then begin. Sufficient time is left between data frame and acknowledgment transmissions for propagation between stations over an HF path. The IRS changes its acknowledgment frame into a full-length data frame to effect a change in direction in information flow. Once the other station acknowledges this action, changeover is complete. Link quality, denoted by a set number of consecutive good or bad frames, determines link speed.

The effective performance of stations, while communicating over adverse HF channels, relies on the combined use of forward error correction, interleaving, and redundancy. These tools for improvement are incorporated in G-TOR within the firmware of the KAM Plus (or KAM with Enhancement Board). We adopted an extended version of the (24,12,3) Golay code for G-TOR. The generator polynomial is

$$g(x) = x^{11} + x^9 + x^7 + x^6 + x^5 + 1.$$

Procedures for data formation, transmission, reception, and data recovery are outlined below. Prior to transmission, 300 baud frames are divided into 48 12-bit words and matched with 48 error correction words of 12 bits each. The entire 72 byte data frame is then interleaved bit by bit, resulting in 12 bins of 48 bits, and transmitted . Upon reception by the IRS, the reverse process is carried out. The frame is synchronized, de-interleaved, decoded, and checked for proper CRC. If the frame is found to be in error, the IRS will request that the matching parity frame be sent. Upon receipt, the parity frame is used in combination with the data frame in an attempt to recover the original data bits. If unsuccessful, the ARQ cycle begins again. The dispersement of noise-burst errors via interleaving combined with the power of the Golay code to correct 3 bits in every 24 usually results in the recovery of error-free frames.

On-The-Air Testing

During the month of January over a million bytes were transferred error-free from Lawrence, Kansas to Laguna Niguel, California. During these tests, TRACE was set ON at each station, enabling the display of acknowledgment bytes and data frames including control bytes. This allowed us to view and count data and acknowledgment frames received with and without the aid of forward error correction and interleaving.

The results were somewhat surprising! While Pactor often dropped in transmission speed from 200 to 100 baud, G-TOR nearly always kept on crunching frames at 300 baud! Enough frames are corrected to keep the system running at 300 baud, regardless of man-made interference and mild multi-path conditions. Transfer duration for the entire test file varied from 12 to 27 minutes for Pactor but only 5.5 to 7.5 minutes for all but one G-TOR transfer. G-TOR simply maintained its highest pace better than Pactor, resulting in a substantial increase in average throughput.

Operation of G-TOR is much like AMTOR. Establish a link by typing <GTOR callsign> and <return> at the cmd: prompt. Enter standby to copy CQs or to receive a link request by typing <GTOR> and <return>. Tune to a G-TOR CQ call as you would in AMTOR. G-TOR uses the AMTOR FEC mode for calling CQ and as its broadcast mode. Change the direction of information flow using the directives <control-C T> and <control-C E>.

Conclusion

G-TOR features include Golay forward error correction coding, full-frame interleaving, on-the-fly Huffman data compression with run-length encoding, fuzzy acknowledgments, a long hybrid-ARQ cycle, and a link-quality based transmission rate. Combined, these techniques result in a very robust, interference-resistant mode for HF digital communications for the amateur radio service. Throughput exceeds other existing all-mode TNC modes by better than two-to-one.

G-TOR will be standard in the KAM Plus and the Enhancement Board for the KAM (predecessor of the KAM Plus). G-TOR will not be available for KAMs without the Enhancement Board since the EPROM space is too small. Firmware EPROM updates will be available for the KAM Plus and KAM with Enhancement Board.

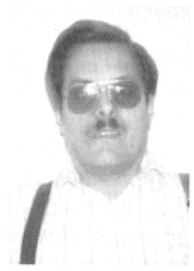
1. Kantronics Co., Inc., 1202 E 23rd Street, Lawrence, KS, 66046, 913-842-7745, fax 913-842-2021.

2. Towle, Jeff, InterFlex Systems, PO Box 6418, Laguna Niguel, CA, 92607.

3. Van Der Westhuizen, Mike, ZS6UP, "A Practical Comparison Between Clover and Pactor Data Transfer Rates," *CQ*, February 1994, pp. 40-42.

4. *MIL-STD-188-141A, Interoperability and Performance Standards for Medium and High Frequency Radio Equipment*, Department of Defense, September 1988, pp. 61-66.

5. *Recommendations of the CCIR, 1990, Volume III.* (Fixed Services at Frequencies Below About 30 MHz), Recommendation 520-1, page 28.



PACTOR

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Clayton, OH 45315

*** CONNECTED: KB8LUJ

Thank goodness the warm up is on the way. As the memory of this last bitter midwest winter lulls into memory, our thoughts traditionally turn toward Dayton. You should visit Dayton at least once, because it's an experience not to be missed. The ADRS will be there, so join us at the Digital Digest forum or the hospitality suite. And certainly don't forget the RTTY Digital Journal dinner on Saturday night. At the risk of "overworking Dayton", I'll postpone further comment. Hopefully we'll see you there.

In the mail this month there were messages from Ari, 4X6UO; Bob, AA4PB; Steve, AC4IW; Tom, DL2FAK; Peter, DL6MAA; Andy, G3ZYP; Radhames, HI3AB; Mike, KC4TCV; Jim, N2HOS; Ken, N4SO; and Joe, W3/G3ZCZ.

PACTOR NEWS

Here's an update of PACTOR news topics. I need your help to keep ahead of the crowd! So please send whatever information you can muster. Thanks.

* HAL is introducing PACTOR as an additional mode on the PCI-4000. Look for more details in the near future.

* Peter, DL6MAA, will be speaking in Dayton on the topic of PACTOR II. Watch for the time and date of the Digital Digest Forum.

* Bob, AA4PB; says PakTerm is now at rev 1.03, not 1.04 as last reported.

* The DK0MHZ BBS still not answering (lightning?) More info needed, please.

* Steve, AC4IW, of Schnedler Systems, the US distributor of BMK-MULTY, advises a name change to SPHERETRON and that BMK-MULTY has a new upgrade to Rev: 3.23. See below for more details.

* Dual port LAN-LINK, for the AEA PK-900, PK-1232, and PK-2232 is slated to be released soon, hopefully at Dayton, says Joe Kasser W3/G3ZCZ.

Look to this column for the most up to date information in the field!

PACTOR BASICS

SETTING UP A PACTOR STATION
CONNECTING THE RIG

Part Two

This is the second of three parts concerning the assembly of a PACTOR station. In the last part we discussed the basic elements of a PACTOR station and the hookup of RS-232 data between a computer and a terminal node controller (TNC). Now we continue with connecting a TNC to your rig and next month we'll talk about PACTOR operation.

The connection between a computer and a TNC is relatively easy, using commonly available cables and standardized RS-232 connectors. Wiring a TNC to a rig is somewhat more complex, because there are no standard connectors and as many ways to connect the wiring as there are different rigs. These connections are where many people experience difficulty and most operational problems occur. Here is a list of connections that are usually needed:

* Push-to-Talk (PTT) - The wire which triggers the rig to change over from receive to transmit. The TNC usually connects this wire to ground when to desiring a transmit condition.

* Ground - A common connection to the chassis, and used as a return for all signals.

* Transmit Audio - For AFSK stations, an audio output from the TNC to an audio input of the rig, used to modulate the transmitter in the SSB mode.

* FSK switch - For FSK stations, the TNC usually toggles this wire to and from ground when desiring a change between Mark to Space.

* Receive Audio - An audio output from the speaker (high level) or discriminator (low level) of the rig to an audio input of the TNC or MODEM for decoding. Connecting to the lower level discriminator is preferential since it avoids distortion of the rig's audio section and is not dependent on the setting of the volume control.

When making an interconnect cable, we first need to determine which wires are needed and then where to make a connection. To do so we need to know the 'pinouts' of the connectors. Good documentation is the key, so it is best to start with the instruction manuals for the rig and the TNC. Start a wiring diagram by creating two columns on a piece of paper. Then list the connections and pin numbers for the TNC in one and for the rig in the other. Next list the applicable functions lines between respective pins. Here's an example:

Connections to most TNCs are pretty straightforward, but connections to the rig can sometimes be tricky. Does the rig have an auxiliary jack or will the microphone jack do. Sometimes a combination of both is needed. Generally an accessory jack is preferable to a microphone jack.

When an accessory jack is not available and the microphone jack needs to be shared between a TNC and a microphone, a switch box may be desired to keep the two functions separated. Although such boxes are commercially available, they can also be easily constructed. There are two types: manual and automatic. In the manual system, a double pole double throw (DPDT) toggle switch is used to switch from the MIC to the TNC. In the automatic system a relay is used to do the switching. The advantage of using a relay is that the toggle switch is never in the wrong position. The disadvantage of using a relay is that it introduces additional key-up time, which will reduce the maximum effective range of an AMTOR or PACTOR link.

Of course, you need right connectors. Some TNCs furnish a cable prewired at one end which means only the proper connector for the rig needs to be added. When building your own cable, it is wise to use a shielded cable; however, there should only be ONE ground path. So, if an internal conductor (one within the shield) is used, only ONE END of the shield should be wired. (The prewired cable for the PK-900 recognizes this fact and shield is 'clipped' within the molded plug) If your rig supports FSK operation, it is preferred. If you don't have FSK support, you need to hook up the TNC for AFSK. In our example, the ICOM IC-761 will operate BOTH AFSK and FSK, but the PK-900 uses a second 5 pin DIN con-

TNC (PK-232) 5 pin DIN (Radio Shack #274-003)	Function	RIG (ICOM IC-761) 8 pin DIN (Radio shack #274-026)
1	Transmit Audio High	4
2	Ground Return	2
3	Push-to-talk (PPT)	3
4	Receive Audio High	5
5	Option (Not used)	

5 pin DIN (FSK 1/2)
(Radio Shack #274-003)

4 ——— FSK Port #1 Normal ——— 1

nector to supply the FSK switching signal. A second cable (preferably shielded and having the shield connected at only one end) needs to be merged at the 8 pin accessory DIN plug going into the ICOM. Each rig is a little different, but here are some general rules to observe.

* If you operate in the AFSK mode, you will be transmitting on LSB. Make sure your local microphone is disconnected or disabled. If you operate FSK, make sure the local microphone has no other effects.

* Use good cable with adequate shielding. Avoid using more than one ground wire in any cable. If there are multiple grounds, connect them all at one side, BUT only ONE at the other. (leave the rest floating)

* When operating in the AFSK mode, don't overdrive your rig. A clean signal does more good than a distorted one. You don't need a lot of power. Keep the duty cycle down and operate at 50 percent power or less.

* Also in AFSK, check for the transmission of unwanted hum or noise. You may need to add resistance in series with the transmit audio line from the TNC.

Once assembled and connected follow the calibration instructions for both the manufacturer of your rig and the maker of your TNC or MODEM. The best way to resolve a conflict is by experimentation. If you obtain DC power from your rig to run your TNC, be sure the rig can supply adequate current. For a variety of reasons, some TNC manufacturers recommend you do NOT use the rig power to supply the TNC. If you're not sure, there's no harm in keeping them separated.

BMK-MULTY UPDATE

There has been a major BMK-MULTY update to level 3.23. Here is a short outline of improvements that have been made:

1. Offline database maintenance program, BMKLOG.EXE

2. Revert to BMKMULTY.LOG after using VIEW command

3. Improved PACTOR FEC transmission at IRATE 800

4. Corrected 'hot-key' problem when switching from AMTOR to PACTOR

5. User control of clearing the type ahead buffer

6. Repaired problem of screen going blank (TS 1) during a QSO

7. Refined operation of PACTOR on slower (4.77MHZ XT machines)

8. New interrupt based listen mode synchronizes bit phasing, long and short path requirements and signal inversion.

9. ISS CRC calculations done in parallel with data frame transmission

10. FAST parameter automatically set based upon computer processor speed

11. Modifications to avoid character loss (no repeats needed anymore) on speed-ups or speed-downs.

12. New Listen mode (STBY 3) which monitors all traffic but IGNORES any connect requests. Great for unattended monitor operation.

13. PACTOR ANSI interpreter invoked whenever ESC [encountered on any line rather than only at the beginning.

14. AMTOR timing routines improved making more reliability on 4.77MHz machines.

15. New parameter commands added for initial control of Audio Spectrum Analyzer/Tuner.

For additional information contact Steve Schnedler, AC4IW, of SPHERETRON (formerly Schnedler Systems) at PO Box 5964, Ashville, NC 28813, USA.

FEEDBACK

With the addition of all the ADRS members, I have received some suggestions for this column and the RTTY Digital Journal (RDJ), too. One repeated theme is the need for simplicity. I also received some very complementary letters about the scope and content of the PACTOR column.

Our ADRS members have a broad and diverse background, so I ask for your help to determine our future content. Some are more knowledgeable than others. This requires that we occasionally digress for those just starting. But, are we missing something that you think needs more coverage? Is the PACTOR theme too narrow? Should we should broaden our scope to include other new modes and technologies as well as PACTOR? What do YOU want to read about?

Now is the time to let your thoughts be known. Future articles are in the works and I need your assistance to make our column one of the best in any ham publication, anywhere! I can not accomplish this goal alone; I need your comments and your help. Please write to me at the address above.

Next month we'll conclude the series on assembling a PACTOR station and discuss making that first PACTOR connect. Be prepared to feel that same excitement that you experienced with your first HAM QSO. Don't worry about speed, but do practice those keystrokes. (HI) See you next month.

Thanks for sharing your time with me this month. Until next time, de **Phil - KB8LUJ**. May God Bless you and yours. Link d-o-w-n..

*** DISCONNECTED: KB8LUJ

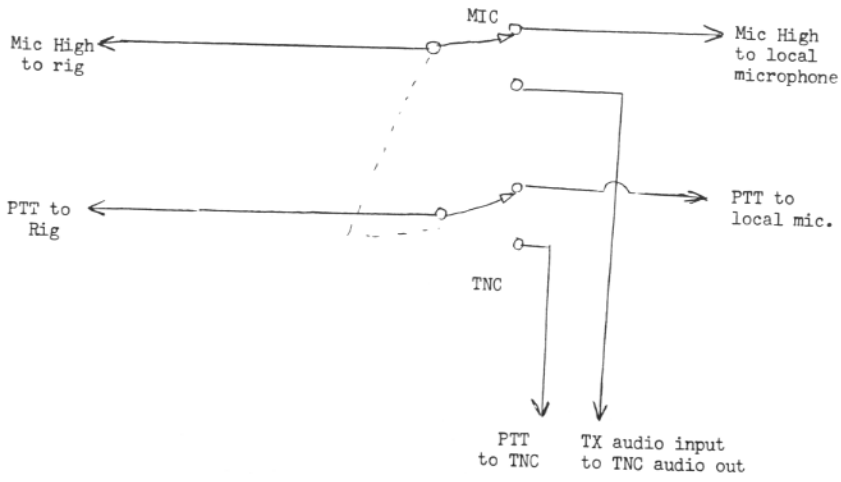

DIAGRAM A

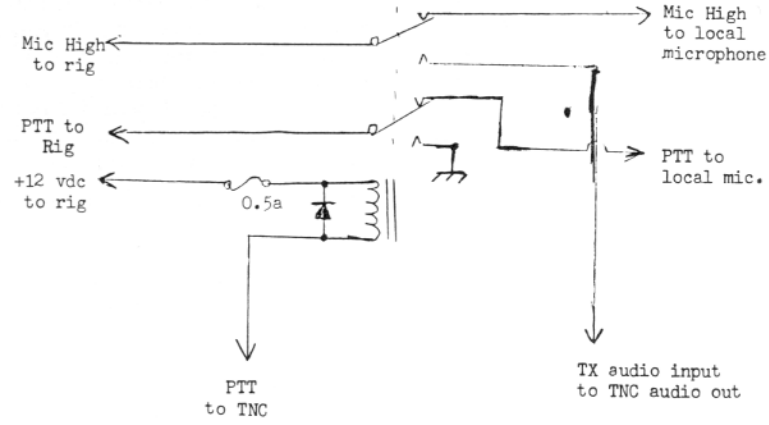

DIAGRAM B

DX NEWS

Jules Freundlich, W2JGR
825 Summit Ave., Apt 1401
Minneapolis, MN 55403-3188

The ARRL DXCC Yearbook 1993 appeared as promised in early February. Alas! There was no sign of the RTTY Honor Roll. My latest imformation is that the first listing is to appear in the May issue of QST. The surprising thing is that only ONE callsign will appear. This is a disappointment, as it was my impression that we could expect to see in the order of half a dozen callsigns. Apparently only one of you submitted enough cards during 1993 to reach the magic number. Don't be reticent. RTTYers are not known to be the bashful types. Send in those cards so we all can see your premier accomplishment.

With the successful, though harrowing, completion of the second DX'pedition to Peter I Island now history, it is interesting, once again to reflect upon the circumstances of such endeavors.

As one of the three designated "pilot" stations in the U.S.A., (the other two being Bob, WB2CJL in western New York, and Jay WA2FIJ, in southern California), I had the unique opportunity of being in touch with the group on a daily basis. This daily contact enabled each of us to issue daily status bulletins, which were promulgated through local packetclusters, as well as on VHF BBS and HF Aplink stations. In addition, copies of my bulletins were FAXed daily to John, ON4UN, the pilot station in Europe. In turn John sent me copies of his daily bulletins. Passing of Health and Welfare traffic, for the team members, was also an important function we were able to fulfill.

Two networks were in place, both on 20 meters. One was a SSB net, set up by Peter, ON6TT, and the other was a digital link, utilizing mostly Pactor. The digital link consisted of Bob, WB2CJL, Jules, W2JGR, Dean, ZP6XD, Peter, VP8WA, and Tony/Luis at 3Y0PI. While the SSB net held daily schedules, the digital link was used on an "as required" basis. On SSB I had the good fortune to be joined by Bill, W0YDB, and Glenn, WA0PUJ. WB2CJL was the stateside anchor for the digital net, which had been set up by WA4JQS, prior to departure.

Much will be written in the forthcoming months about the team's experiences, by the Dx'peditioners themselves. Their stories should make for interesting and exciting reading. It is to the credit of the group and to the amateur radio community at large, that the operation went as smoothly as it did, despite a series of adverse happenings on the island, such as blinding snowstorms, high winds, freezing temperatures, and equipment failures. The presence of radio policemen, jamming, and other obnoxious practices, which have plagued other expeditions in the past. were at a minimum. Despite all the problems experienced, 61500 QSOs were made. This was short of the 100000 targeted, but it was a remarkable accomplishment, nonetheless, by Ralph, K0IR, Tony, WA4JQS, Bob, N4GCK, Bob, KK6EK, Terry, W6MKB, Willy, HB9AHL, Peter, ON6TT, and Luis, XE1L..

Of major concern to RTTYers, was the unfortunate damage done to a PK-900, and a PK-232, due to a crate being dropped in the loading/unloading process. The PK-900 was totaled. Several days of effort on the part of Tony, WA4JQS brought the PK-232 back to life for a limited amount of RTTY operation. I do not know how many RTTY QSOs were made, but I am sure there are still many who still need 3Y0/P. Our hats are off to Tony, for a magnificent performance in the face of adversity.

Finally I have some general comments about the smart*** "Monday Morning Quarterbacks", who always have a better way of doing it. I borrow freely from some comments made by ON4UN.

If you need them only on 160, and you worked them, it will be a good DX-pedition, despite everything. If you need them on RTTY, and you are one of the few who made it, then "they have done a wonderful job." If you did not work them on a particular band/mode you wanted, then "it was a lousy show".

How often have you heard such comments on the air as:

- He started on 4's but by the time he came to the 9's we had lost propagation.
- Why don't they start on 0's and work down to 4's?
- He went QRT right after working 4's, and my call has a 5 in it.
- Why not use a larger split and not numbers?
- Why doesn't he use a smaller split?
- Why were they working Europe, when they were strong in USA?
- I can't work split. Why don't they listen on their own frequency?
- What kind of a lousy propagation forecast program are they using?
- etc., etc., etc., ad nauseum.

Well, Lads and Lassies...When you have spent the last year and a half planning and organizing such a venture, committing a sum of money that exceeds most family assets, recruiting the best possible operators, enduring the effects of motion sickness, braving the elements at their fiercest, risking personal injury and exhaustion, and spending endless hours in front of a radio until your fingers are numb, or you are hoarse and/or bleary eyed, then, and only then, can you justifiably second guess an expedition, such as Peter I, and others like it.

I hope you managed to work them as you had wished.. If not, you will just have to shrug it off, and wait until next time.

The 3Y0PI/South Sandwich DX Group has promised to tell us, at Dayton, about their next little "vacation". Could it be, they are planning to go to Heard Island? I hope so. I need that one on RTTY.

Glenn, WA0PUJ, has noted that this expedition is estimated to have cost in the neighborhood of $250,000. At 61500 QSOs, each QSO cost about $4.07. I hope you have been especially generous with your support. The members of the expedition deserve no less than the maximum you can spare, to show your appreciation for their efforts. Gerry Branson, AA6BB is still accepting contributions.

DX DOINGS

ANTARCTICA , VP8 - Brian, VP8CFM is back in the cold climate following his visit to the U.K. after he completed his assignment on Signy Island in the South Orkneys. Brian gave a new country from that place to many a RTTYer. Now, I am told he has been assigned as Base Commander at Halley Base. Look for him under his old call as VP8CFM, or as VP8HAL. QSL, as before, to GM4KLO.

ASCENSION IS., ZD8 - ZD8M is often on 15 meters around 1130Z. QSL to Michael Wadsworth, Box 73, Ascension Island.

BELIZE, V3 - Bruce, V31JU, is one of the most active hams here. Bruce is a conservation biologist. He has been working in the rain forest for about 7-1/2 years. His QTH of Gallon Jug, despite its name, is a very civilized clearing in the tropical forest. If you dare flaunt the pileup, Bruce will give you a thumbnail sketch of his work and location. Look for him on 20 meters after 2000Z. QSL to WA2NHA.

CHAGOS, VQ9 - VQ9WL plays Pactor on 20 meters on 14070 around 2000Z.. Otherwise you may find him on RTTY on 15 meters around 1630Z. QSL route is needed.

COCOS IS., TI9 - A multinational group is planning to operate multimode multiband stations here starting around May 14 for a week. Operators will include AD1S, AH6MM, AH9B, N5MIH, NH6UY, N0AFW, TI2JJP, V73C, and XE2CQ. They have promised to have one station dedicated to RTTY. QSL via the OKDXA, Box 88, Wellston, OK 74881.

CRETE - SV9 - SV9ABG has been reported on 20 meters around 1400Z. QSL route is needed.

CUBA, CO - C02AW frequents 20 meters around 2230Z. QSL route is needed.

CYRPUS, 5B - 5B4ABU likes 20 meters around 1630Z., QSL route is needed.

GUANTANAMO BAY, KG4 - KG4HG likes 15 or 20 meters between 1630 and 2330Z. QSL to WB9APE. KG4CW can often be found on 20 meters around 1430Z. QSL to K3HSK.

HONG KONG, VS6 - If you are loooking for a Pactor station in Hong Kong, keep an eye out for VS6FN around 1215Z around 14079 khz. QSL via AB4MD.

INDONESIA, YB - YB3AQF can often be found on either 15 or 20 meters between 1330 and 1530Z. QSL route is needed.

IRAQ, YI - Propagation permitting you may find YI1AL on 15 meters around 1430Z. QSL route is needed.

IVORY COAST, TU - Look for TU4EV on 15 meters around 1300Z. QSL via WD4IFN.

KAMPUCHEA, XU - Be on the lookout for Laszlo, HA0HW operating from here during early April.

MADAGASCAR, 5R - 5R8DS has been appearing on 15 meters as early as 1450Z, while 5R8DG shows on 20 meters around 1530Z. QSL 5R8DS and 5R8DG via F6FNU.

MOROCCO, CN - Old faithful, Frank, CN8NP, in addition to keeping 20 meters interesting after 2030Z, will take advantage of 15 meter openings when they occur around 1715Z. For QSL route see RDJ for February 1994.

MOUNT ATHOS, SV/A - It now appears that Mt. Athos has returned to the air, although on a limited basis. At the end of the year, we saw a bulletin dated December 25th from Apollo, SV2ASP/A, addressed to DX @ WW. In it Monk Apollo stated that "as a result of requests from individuals and clubs all over the world, for the amateur radio voice of Mount Athos to be heard again...", he will once again see to it that "the serene and -out of this world- voice of Mt. Athos will once again be spread to the end of the earth. And this despite my justified grievances toward ARRL...."

A bulletin issued by Dominik, DL5EBE, at the beginning of February, detailed equipment donations from several German hams. As the monks on Mt. Athos don't have any money themselves, they must depend upon donations. A 40/80/160 vertical, a generator (which can only be run in the day) and solar panels (to charge his batteries for night time operation), are typical of what they are hoping to provide. If you are interested in helping with the purchase of such gear, you can contact DL5EBE @ DK0MWX.#NRW.DEU.EU.

SV2ASP/A has been reported on the 14242 khz European DX net, and the 14243 OE6EEG net, as well as on 3790. No RTTY activity has been noted since the confirmed contact made by Luciano, I5FLN last August. We have had no updated information on the status of Apollo's malfunctioning laptop computer, which some JA's had hoped to repair for him.

MOZAMBIQUE, C9 - Do you remember, not so long ago, when this country did not allow amateur radio? Revel in the availability of C91AI who prowls 15 and 20 meters, following the propagation. QSL via CT1DGZ.

NEPAL, 9N - We are happy to see the appearance on RTTY of 9N1AA on 15 meters around 1030Z. I understand this is a local, recently licensed. For those of you who missed DJ6JC on his recent trip as 9N1HL, here is a chance to catch this very rare RTTY country. QSL to Statish, P.O. Box 4292, Kathmandu, Nepal.

NEW CALEDONIA, FK - In addition to FK8GS, FK8BG is usually active on 20 meters around 0730Z. QSL FK8BG via F6EWK.

NICARAGUA, YN - You can still catch this elusive country by finding YN5JAR on 20 meters after 1930Z. For QSL try P.O. Box 122, Jinotepe, Nicaragua.

NORTHERN CYRUS, 1B - From 5B4JE@5B4TX we have the following: "Hi all. This is to remind once more that the 1B prefix used in the Turkish occupied part of Northern Cyprus is absolutely illegal. Check your ITU prefixes and you will see that it does not exist. For all Cyprus which has one legal government recognised by all United Nations, except Turkey the occupying power, is the REPUBLIC OF CYPRUS. The Republic of Cyprus has the official ITU prefixes 5B, C4, H2, and P3. All other prefixes are absolutely illegal and the official prefixes can be used by all licensed amateurs even at the northern part. But the problem is that they may be arrested by the illegal security forces of the illegal regime or the Turkish occupation troops. 73 de Aris 5B4JE@5B4TX.CYP.MDLE."

PARAGUAY, ZP - Look for ZP6EM after 2330Z on 20 meters. QSL route is needed.

SAO TOME & PRINCIPE, S9 - S92ZM can now be found at almost any time of the day on 20 meters, depending on propagation. For QSL route see the RDJ of January 1994.

SENEGAL, 6W - Jean, 6W6JX, livens up things on 20 meters starting around 0630Z. QSL to Jean-Louis Pipien, B.P. 10, Kaolack, Senegal.

SRI LANKA - 4S - 4S7RM has been reported as being active as early as 1145Z on 15 meters, and 1300Z on 20 meters. QSL route is still needed.

ZAMBIA, 9J - You can often find 9J2HN on 15 meters around 1915Z. QSL via JH8BKL.

STILL MORE REFLECTIONS

If you read this far last month, you know that I have had a few cockpit problems with EXPRESS. EXPRESS is TY1PS's enhanced program for Clover, with the capability of handling data comprising binary files, pictures, and sound. As expected I received a very complete and detailed answer to my inquiry to Peter. All my initial difficulties were solved. Those now appearing are of the second order of magnitude, and will await an eyeball QSO with Peter at Dayton.

I still have been unsuccessful in raising a DX station on Clover, for a live chat. However from reading the list of stations that have checked into TY1PS, I was pleased to see that there are quite a number of DX stations that use Clover. It is just a matter of finding them. Hooking up with stateside stations, in this mode is no longer a problem for me. One I do have one major gripe. When connected to some mailboxes, if you do a (L)ist (B)ulletin command, you get a run-on string of numbers and letters on your screen, instead of the nice neat columnar listing to which we have all become accustomed. This presentation is all but impossible to interpret. As far as I am concerned, until this readout is presented in readable form, it is just about useless. Apparently there is a fix to this situation, as such a listing on TY1PS is of the conventional, readable type. I suppose some are not using the latest software.

At the beginning of March, I still await delivery, from HAL, of the multimode version of Clover, the PCI-4000/M,

which had been promised for February. It is obvious I must soon be operational on Pactor. From the QRMing I have experienced on Amtor and Clover, this mode is proliferating at a very fast rate. This is confirmed by the recent increase of DX Pactor reports in the weekly VK2SG RTTY DX Notes. Here is a recent sampling: 0048Z-14082 CE3NDN, 0800Z-14080 T91ENS, 0830Z-14071 OD5ZZ, 1506Z-21076 TU2BB, and 1532Z-14080 VU2YK. See also Chagos and Hong Kong in DX DOINGS above.

DIGITAL BAND PLANNING?

We now have Amtor, Pactor, and Clover vying for spectrum on 20 meters between 14064 and 14080 khz. Following exhortations for pulse type signals to stay below 14080 khz, steam RTTY seems to have successfully staked its claim between 14081 and 14090 khz. Amtor seems firmly planted between 14069 and 14080 khz. and as a result of an ADRS initiative last year, Clover is pretty much confined between 14064 and 14068 khz. There are some mailboxes that chose not to follow this voluntary band plan, but not too many.

Some Pactor users, still appear to act like free spirits, camping wherever the grass looks greenest, often ignoring existing activity on a particular frequency. The time honored "QRL?" does not work in a multimode environment. If I happen to be having a QSO on Amtor, and you ask QRL? in Pactor, I will not see your question. And so it goes with the other digital modes. What is the answer? As a minimum, I would hope people would respect the existance of activity when they can hear it. This does not, of course, take care of the "hidden transmitter" problem. I venture to guess that, in most cases, at least one side of a QSO can usually be heard. Another possible approach is the voluntary establishment of (pardon the expression) digital subbands. But aren't we already practicing a form of that?

I have not seen anything in several months on the status of digital band planning. What's happening?

HAVE DX NEWS?

I can be reached directly by dropping mail into my personal AMTOR mailbox, leaving a message in the W2TKU/4(1) mailbox (AMTOR or CLOVER), sending me a packet message addressed to W2JGR@WB0GDB.#STP.MN.USA.NA, finding me on RTTY, telephoning me at (612) 377 7269, or FAXing me at (612) 374 8161. (If you FAX me, please address it with my full name, as that FAX number serves a number of people.) When these high tech approaches fail, the U.S. Postal Service can find me. When I am not chasing DX, my WINLINK now listens on 14070 khz. Set your chirping to WJGR.

THANKS - Thanks to the following for all your information: DL5EBE, I5FLN, IK5AAX, K0IR, ON4UN, ON6TT, TY1PS, WB2CJL, WB2V, WA4JQS, W6GO,, WA0PUJ, W0YDB, ZS5S, 5B4JE, and 9X5LJ. Without you there would be no column.

See you all next month. For now bye bye from Minnesota,

PAX....73 de Jules W2JGR

1. W2TKU/4 scans 7070, 7076, 14072, 14086, 14078, 21074, and 21080 khz. on AMTOR. On CLOVER, he scans 7066, 7068, 14066, 14068, and 21066 khz.

Part I--You Can't Get There from Here ...

A Mini-DXpedition to VP8

by Crawford MacKeand, WA3ZKZ, VP8CMY[1]

The Christmas holidays were over and in 1990 the sunspots were pretty good. There were only two days remaining until I retired, and on the first of January I could start a new existence where ham radio would be able to take a higher and therefore much more reasonable priority. And to add to my contentment I had just linked with a new country. Bob, VP8BFH, was on the other end of a very solid 529 ARQ signal. My log says that our first QSO was only half an hour, quite short for this rag-chewer, but somehow we hit a common chord and by the end of the QSO I was Bob's QSL Manager. After all, I was almost retired now, and had not yet accumulated all the minijobs that cause retirees to so irritate those colleagues who are still working. You know the guy I mean, who drops into the office and says "I don't know how I ever found time to work".

Correspondence and QSO's followed, and I came to know Bob and family pretty well. He had gone from Wales (GW land) to VP8 some eight years before and I was an ex-G, so there was plenty of common ground. To make a long story shorter, I had many pressing invitations from Bob to go and visit the Falklands and eventually I said to myself, this is not to be passed up, such an opportunity to visit with a ham family at the other end of the Americas isn't going to happen again. So in 1992 I accepted the generous invitation and headed down the road to the friendly travel agent.

Our initial conversation went roughly like this. "How can I help you Sir?" "Well, I'm planning a trip to the Falkland Islands and I'd like to get some information on the flights." "Let me get out the International Air Travel Guide. Hmmm ..... Where was that you said Sir?" "The Falkland Islands. They are off the coast of South America. It's a British Colony." "Funny. I don't see it in the book. What would the airport be called?" "Well the capital is called Stanley but I don't think the airport is there. I do have an ad from their local paper with some flight details."

I produced a copy of the Penguin News which Bob had sent me, which clearly showed flights from Chile, but we didn't seem to be getting anywhere very fast. So I called my niece in London and asked her to call the Falklands Government office there for me. Soon I had a big envelope with information on flights from Brize Norton in the South of England. And of course it's not in the travel guide. The Royal Air Force is not by any stretch of the imagination, a commercial airline. A weekly RAF TriStar would for a fee, quite a large fee, take a civilian via Ascension Island, (ZD8 but no stopovers allowed) on a 19 hour flight to VP8 land. They advised at least four or five months prebooking. I was getting ready to send off my check next day, when I ran into Bob on AMTOR and he said to try again with the route via Chile. I always put a lot of weight on good local info, so I headed back to the travel agent and leaned harder. Much harder. Eventually it was LAN-Chile, the Chilean national airline, that came up with good information. There is indeed no scheduled airline flying to the Falklands from Chile. But there is a local air outfit flying regular but non-scheduled flights. Apart from data not appearing in the big books, it seems that it also meant no foreign ticket sales. Cash on the barrel-head in Punta Arenas (or a wire transfer in U.S. dollars if you wanted to book ahead). I soon found out more than I ever realized was to be known about wire transfers including how to get a bank's street address at the bottom of the world! There were several more fences to climb including a hotel booking in Punta Arenas, Chile where I planned to spend a couple of days looking at Chilean Patagonia. Don CE3GDN, our trusty APLink relay was more than helpful, but enough of these preliminaries. One day in January I am on the road to Philadelphia Airport with a ride from good friend Jack W3IIW, and finally in the air en route from Philly to New York on a bumpy little commuter Skyvan.

The LAN-Chile flight to Miami and on to Santiago, Chile's capital, is pleasantly uneventful and I particularly note that I feel no pain on being inverted after passing the Equator. The movie isn't too wonderful, but the in-flight data and real-time video map presentation is something I have not seen in domestic travel. We are a few minutes late into Santiago and I have to run fast to get the local flight to Punta. Naturally it is at the extreme far end of the airport, but it is just a bit smaller than O'Hare, and with friendly and co-operative customs and airline help away we go again. It is a three hour flight to Punta in a LAN-Chile 737 with one stop. Chile is one long country. Just missed seeing the QE2 which had arrived from VP8 land and was all over the front page of the Santiago newspapers. After some spectacular views of the Andes and the glaciers and fjords and all the island chains that form much of Southern Chile, we land. I had arranged for two days to spare here, as I wanted to do a little sight-seeing, and also I was not super sure about all the faxing that had taken place with either the hotel or DAP Airlines. A 15 mile taxi ride into the center of town shows me a good sized and rather European looking small city. I check in without problems and set out to reconnoitre my latest surroundings. Punta Arenas is now the bustling capital of Chile's 12th District, although back in the 1860's it was just a remote prison settlement. But, like VK land, it shows no signs of its unconventional start in life. Wide shopping streets, government offices, banks and a fine central square, museums and hotels and warmly well dressed people, even though this is midsummer. About 150,000 folk of varied origins call Punta home. Many very Indian faces and many very Northern European ones make a fascinating mix.

I wanted to see something of the wildlife in the area, and would really have liked to visit Tierra del Fuego, which I could see from my hotel room across the Magellan Straits. But the nine seater plane is full so next day I rent a van with driver and head up the coast to the fjords. There is wildlife in plenty.. timid Guanacos, like llamas, and fast running birds like an emu, called a Nandu. Rare black necked swans swim in the cold waters. My driver is a gold mine of information, and as some of my mis-spent youth was mis-spent in Venezuela, my Spanish comes into good use, despite our differences in accent. We have our lunch in a pleasant inn at the side of the dusty gravel road overlooking a ferry which is busily transporting an oil rig supply truck across the fast moving current to the even remoter island across the channel. There is no access to most of these islands except by boat as the sudden high winds off the Andes make airplane and helicopter travel too hazardous. The meal is different. Not your typical stateside sandwich, but a working man's main meal. Chicken soup with eggs, beef boiled with spicy sausage and cabbage and pea pods, and finally papaya fruit with cream for dessert. And excellent ale. Thus revived, we continue, but this is where my well known talent for organization comes to the fore when my ancient but trusty camera decides to give me a problem. Back at the hotel I convert my bathroom into an impromptu darkroom and rapidly find out that I have taken many wonderful pictures the most economical way ..... with no film loaded in the camera! Oh well. But I had been old-fashioned enough to make some pen and ink sketches of the scenery as well, so all was not completely lost. Also I make up for the lapse by taking some photos in

the square. A crowd of brightly clad small and photogenic children are waiting for teacher to arrive and clambering all over the statue of Magellan. A local custom says you touch the big toe of one of the bronze Indians at the base if you want to return to Punta Arenas. This is clearly good inexpensive insurance, and after dinner I turn in early. This is not so easy, as it is still broad daylight at ten in the evening.

Next morning, the flight to Stanley starts with a delay of course; what flight doesn't? But after a few minutes the little two engined De Havilland Twin Otter takes off with an almost full load of passengers. Now I come to understand the cryptic remark by the young lady in the office in Punta. "It is a 20 seater," she said "but we have it equipped for only 16 seats, Senor." Most of the passengers are seamen, Spanish and Italian, joining ships in Stanley, but one of my traveling companions is an American who comes equipped with a normal American curiosity, which he did seem to regret. He opens a tiny hatch in the plywood bulkhead in front of his seat and reports " .... there's nothing in there except one humongous gas tank!" Given that the Twin Otter does not normally come with enough range to make Stanley and return in comfort, and given the unpredictable winds and weather of the far South, this seems a prudent use of space. Another intelligent economy is the provision of a very dry box lunch for the three to four hour trip, which arms us well for the absence of a toilet.

Part II appears next month.

(Crawford and his XYL are reputedly the only couple who moved to New Jersey for the weather. After 16 years of US citizenship they are still in the same general area, albeit across the border in DE. Maybe they were right. After all he was born (1931) and raised in York, England, then ventured after the army (radar) to Manchester. There he gained his EE, worked for the British Post Office and British Telcomms Research in their RTTY labs. The wanderlust won out early in life though and he went to YV as a field engineer. He engineered while there but also gained a wife. Then, for the weather, they moved to the US in 1968 where he ran the design engineering group in a Delaware chemical plant.

*His hamming began in 1971 when he was awarded the never used call of G4ARR, but before he could tag on a W2, the new law permitted him to get his own US ticket--first WA2ZVX in 1971, then WA3ZKZ in 1974. His first QSO as WA2ZVX was on RTTY, 20 meters, Xtal controlled, 850Hz shift. He has been on RTTY or other digital modes since. I would say that qualifies him as a serious veteran--*de Jim, N2hos).

1. Crawford MacKeand, WA3ZKZ, 115 S. Spring Valley Rd., Wilmington, DE 19807

THE LAST WORD

Read it first in the Journal. Another new mode! And, once again, the world learns about it from the pages of the RDJ. G-TOR, Kantronics' contribution to our thirst for higher throughput and simpler operation, is now heard on the bands. Congratulations are in order for their technical achievement. Thanks to them for turning to the pages of this magazine to announce it to the world.

Look At Your Label. On the very first line of our new laser label is your callsign and membership expiration date. If the date is a 1994 month, let me remind you once again about the change in rates taking place June 1, 1994. The basic membership is going up from $16 to $20. All other rates follow the same pattern. But there is a way to ease the pain. Look for the "Winter Sale" ad in this month's issue and take advantage of the multiple year savings. They disappear soon.

Check your label carefully. If there is an error of any kind, please drop us a note. And thanks to Al W2TKU, who completely revised our data base (imported into MS Access) and delivered the completed labels to Fallbrook . . . on time! It was an enormous task and required endless hours at the keyboard. He volunteered, too, sort of.

Lifetime Membership. Several members inquired about the cost of signing up with ADRS for life. We didn't ask their age, nor did we check the Sam data base, but came up with a price anyway. We are not professional actuaries, so the window is opening for but a brief time. Buy a lifetime membership in ADRS for $300 if you live in the North America, $350 anywhere else in the world. Add $50 to each price for first class mail service. The certificate sparkles! But buy it before June 1, 1994. Those are the rules. The opportunity won't be available again until next year, and then at a higher price..

Two Unique Advertising Pages appear for the first time this month. AEA introduces a technical support column that will appear in every issue. Richard Stuart WF7A, their CompuServe "voice" authors the series. I know from personal experience that he knows what he is talking about! In the center spread, Phil W0XI (President of Kantronics) and Glenn WB0SKX begin a basic digital tutorial series also scheduled to appear each month. The first chapter sets a very high standard as it delves into the mysteries of error correction. Thanks to both advertisers for bringing a very special benefit to RDJ readers. Save them all for future reference.

CompuServe. I should have mentioned last month that CIS is expanding service around the world. There are now French and German versions of Wincim, and there are many points of access within Europe. Thus the user's cost will no doubt soon be on a par with the US level. I am still amazed that a routine message travels to Europe or Africa (to those who call to European nodes) for no surcharge, merely as a part of the basic service charge. Talk about bargains.

Three New Faces (sorry, no photos) brighten these pages this month, one each from TN, DE and NY. Wayne NZ4W devotes his space to a review of Joan (KA5ZTX) Medcalf's book about TNC's. We'll see more of him. He has already started on a multi-part look at the information highway, the baloney and reality. There may be more of the former than the latter. It should be most interesting. Wayne has written extensively for other radio publications. We are pleased to see him join our ranks. Crawford WA3ZKZ begins his grand tale of adventure. The first chapter of three gets us to the deep south of South America. "Little diary" is very well done and as I told him, after the first read--I wouldn't add or subtract a word. Thanks for the contribution, Crawford. Steve N2QCA is a New Yorker and works at IBM's Watson Labs, thus automatically qualifies to tackle a serious piece of propagation software. He is also a distinguished member of the Greater Briarcliff Thursday Morning Breakfast and Discussion Club (or whatever it is now called), a good teacher of hams-to-be in his radio club and a fairly serious digital operator. And he also plays hockey, which is not the sport of choice for the average middle-aging keyboarder! But then who's to say? Thanks for the extra effort around the goal, Steve.

Good News! Frank N2FF reports a full recovery from his health problems and, adds that he will be at Dayton. Not that he has taken any time away from the hobby! He is the "State Government Liaison" for the ARRL and engages fully in the battle between the state, or city or village and the poor ham who is told he has troubles with the very idea of a tower. He and a group of other dedicated amateurs founded RADIO (Radio Amateur Defense and Information Organization), a non-profit effort to make PRB-1 the law in New York state, just as it is in Florida. Success in New York could easily create a "domino" effect nationally. So, even if you don't live, work or ham in that state, they deserve your support. Contact R.A.D.I.O., PO Box 343, Williston Park, NY 11596. They are on our side!

Is Dayton, like Rome, Declining and Falling? Could be if we pay attention to the rumors. No shuttle buses from the hotels? Impossible, but that is the reported decision. Gridlock? Maybe worse. Cutting out half the forums so the "Information Highway" crowd from Washington can make a big splash there? Impossible, but we are certain the digital forum was moved--after years of standing-room only crowds, from prime time Saturday until a sleepy Sunday morning. All they had to offer was a limp excuse about not being able to get in touch with the Journal. Is it greed? Stupidity? Senility? Perhaps they have forgotten who pays their bills and produces their large profits. It could all change before the big weekend, if sanity prevails, but don't hold your breath.

de **Jim, N2HOS** SK ■

CLASSIFIED AD DEPARTMENT

First 30 words $7.50, additional words 10 cents each. Cash with Ad. Deadline for ads is the 1st of month of publication..

(Example - Ad arrives by the 1st of September, will appear in the September issue.)

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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 2465, New York, NY 11801 and you will receive a copy of this invaluable booklet by return mail, postage paid.

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 Learview Dr., Cedar Falls, IA. 50613 (319) 266-7040

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- Enhanced AMTOR- and PACTOR-listen modes show link and connect attempts;
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- Enhanced packet **MHEARD** function identifies TCP/IP, NET/ROM and <The-Net> stations;
- **MYALIAS** has been expanded to enable the "two-ham family" to use more than one packet callsign with their PK-232MBX;
- PACTOR "roundtable" operation has been enhanced with the **PTROUND** command;
- **EXPERT** command abbreviates the command list for easy viewing and selection;
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- SIAM (SIgnal Analysis Mode) now identifies PACTOR stations.

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- The STEP command now works to correct Doppler shift with satellite modems 13 and 44 (and Modem 23 for the DSP-2232.)

The price breakdown for the new firmware is:

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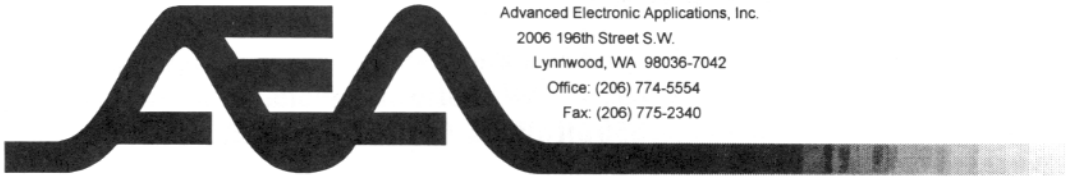

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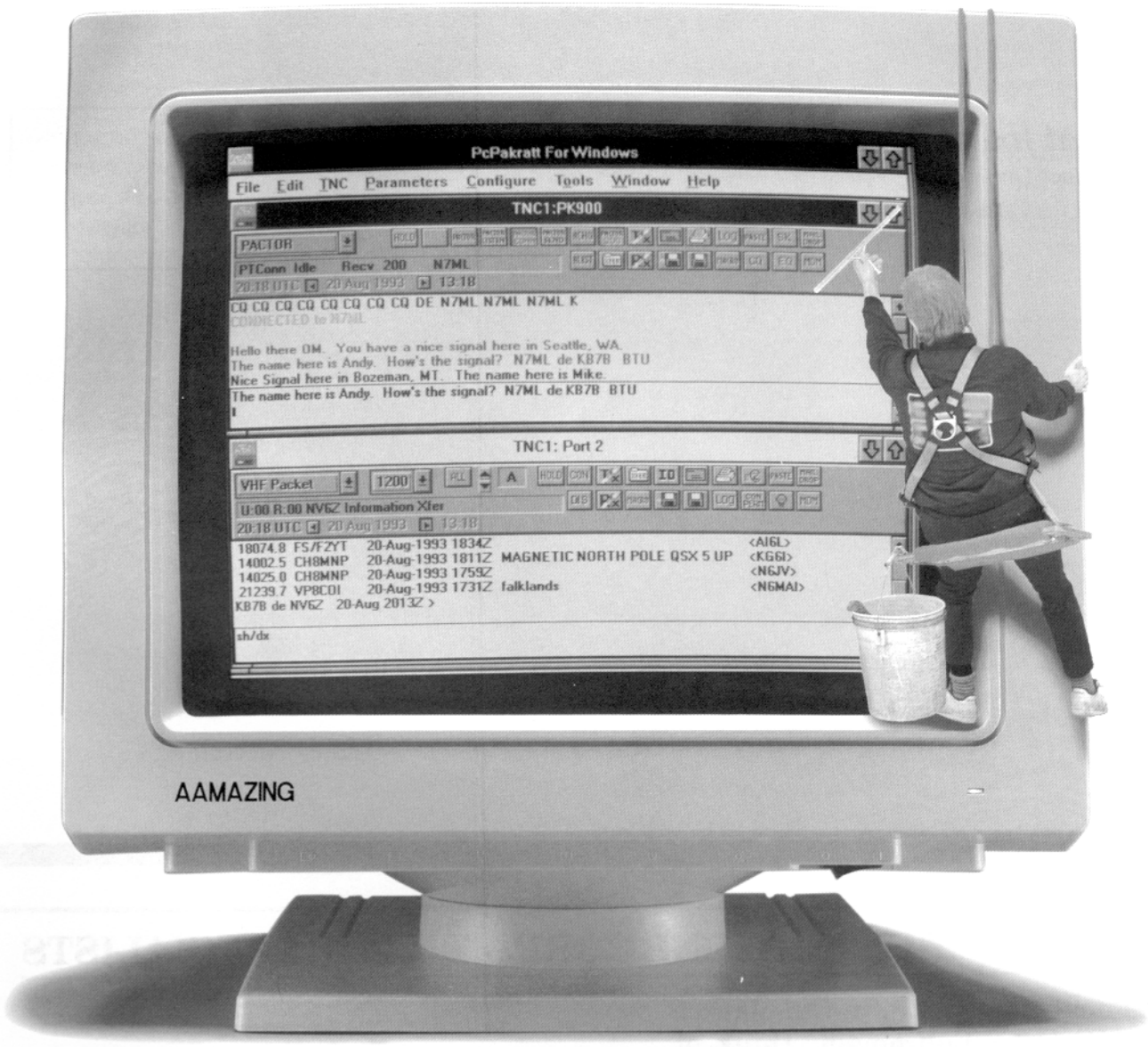

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