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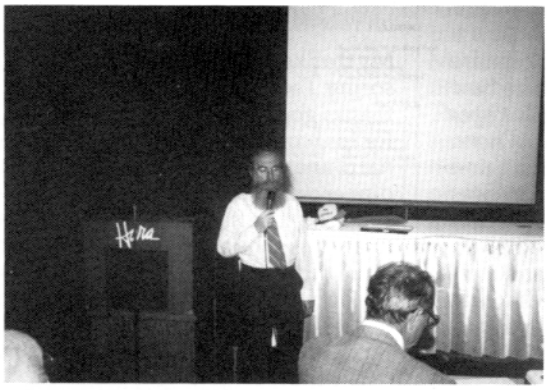
Volume 41, Number 5, May/June 1993

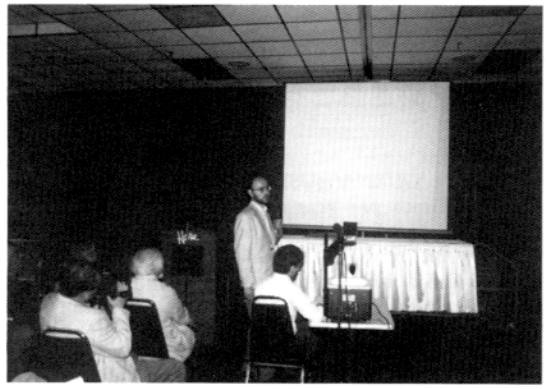
Digital Digest Forum Draws Record Crowd

Dayton Hamvention 93

Nearly two hundred Hams attended the "Digital Digest" forum this year at Dayton.



Ray Petit, W7GHM, gave Clover update report



Peter Helfert, DL3MAA, introduces PacTor to U.S. Hams

RTTY DIGITAL JOURNAL

Dale S. Sinner, W6IWO
Owner, Publisher, Editor

All Correspondence:
1904 Carolton Lane
Fallbrook, CA
92028-4614

Phone - FAX
(619) 723-3838

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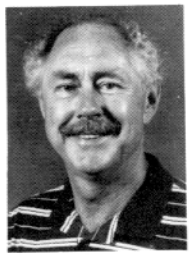


HITS & MISSES

Dale Sinner, W6IWO
1904 Carolton lane
Fallbrook, Ca 92028

Dayton Epilog

The digital gang really turned out this year for what was another exciting Hamvention. This may have been partly due to the block of rooms I was able to secure at the Radisson. Having a place to stay is half the battle of going to Dayton. The other half being arranging to get there.

It all started Thursday evening in the cocktail lounge of the Radisson hotel. Here is where they all seem to check in after traveling all day for a quick libation and lots of conversation with friends. Usually this lasts for a couple of hours after which everyone parts company to have dinner somewhere.

On Friday morning the hotel restaurant was filled with digital hams and that led to more greetings and conversation. Finally by noon everyone has left and is now waiting at the arena for the Hamvention to open. Others are lost in the flea market which encompasses most all of the arena parking area.

Friday evening found the gang having a great time in the RTTY Journal hospitality suite that opened in the early evening. Most everyone signs in on the blackboard and that night I counted 75 names listed. It was wall to wall hams and the conversation and stories swapped was at a max. It was very late when I went to bed that night.

Saturday it is back to the arena for more of the same as Friday. Now is the time for us to all buy or bargain for that special item we planned to obtain. At noon the Digital Digest forum took place and I am happy to report the forum was packed. The room assigned to us has seating for 140 and all seats were filled. All others attending were either standing or sitting on the floor for what was no doubt the best forum I have ever presented. Both Ray Petit, W7GHM, and Peter Helfert, DL3MAA, are excellent speakers. Ray gave his latest presentation on Clover and Peter brought us all up to speed on the new PacTor mode. Peter also introduced us to PacTor Level II that will soon be released.

Saturday evening is the highlight for the digital gang at the Radisson hotel. Here is where we hold the annual RTTY Journal dinner. This year we again broke all records. Over 120 were in attendance for a great meal and a program about the digital modes past and present presented by Bill Henry, K9GWT. You will read more about his talk in some of the other columns this month, so I won't expound further. Radhames Bonilla, HI3AD, played a very emotional tape that was sent to him by the XYL of our dear departed friend John Troost, TG9VT. We plan to show some slides of John's home and station next year.

After the dinner it is back again to the hospitality suite for more camaraderie. The room has obviously become too small for our group and the hotel is going to move us next year to a larger suite. So to those of you who felt cramped in the suite, next year you will feel much more comfortable.

Sunday is the final day of the Hamvention and everyone makes one more trip back to the arena for that last minute item they need and to say good by to their friends for another year.

Dayton is filled with great moments for everyone. I hope that many of you will return again next year and for those of you who have never been to Dayton, maybe you will join us next year. I hope to again have a block of rooms at my disposal, so obtaining a room should not be a chore. Watch for my announcement on rooms later in the year.

My thanks to AEA and HAL for co-sponsoring the hospitality suite. A special thanks goes to Steve Waterman, K4CJX, for his work in handling the RTTY Journal dinner again this year. As always the dinner was excellent and the service outstanding. The Radisson hotel has always treated us special and we hope they continue this policy. Faith Senie, N1JIT, won the door prize which was an SPT-1 tuning unit. This was Faith's first trip to Dayton, so the prize was a nice addition to her trip.

Digital Committee Report

The Digital Committee has completed it's recommendations to the BOD and since these recommendations are of special interest to all of us, I have published them in their entirety. Please read them

Continued on page 8

PACKET

Richard Polivka, N6NKO
5800 South St. #221
Lakewood, CA 90713

AN AMPLIFICATION

Last month, I discussed the problems I was having with getting files for the Linux system from Internet. Well, I put a message on a BBS that I co-sysop, talking about my frustration. I received a reply from someone who lives real close to me who said that he had almost the complete set of disks I needed. He did not have the text processing packages but those I can acquire elsewhere. What I will be covering in this issue, is the trials and tribulations of installing a package as complex as Linux using the supplied documentation and some brain power.

FROM THE TOP

The disk drive that I was going to install this on is a Maxtor XT-1065 which has a DOS fomatted size of 56 MB. This drive is run on an RLL controller and that boosts the capacity to almost 80 MB. First things first; time to low level format the drive. Once that is performed, then comes the time to start setting up the system.

I booted up using disk A1 in the 3 1/2" drive. During the boot process, the program saw my bus mouse on my ATI video card and called it a Logitech Bus Mouse. After the boot up procedure, the program called for a disk swap to A2. After that change, comes the time to partition the hard drive.

The hardest part of partitioning the hard drive is figuring out how much to allocate where and where to put it and in what order. To describe partitioning, think of a disk drive as a library. The partitions are the books. Your job is to figure out how many books are going to be in the library and how big the books are. In any UNIX file system, there are two main file systems and a swap partition. The swap partition acts as virtual memory. Since I have only 4 MB of RAM, the swap space will enlarge that size through the use of virtual memory. I opted to make the swap partition 4 MB in size. Now that gave me an effective RAM size of 8 MB. I ended up with three partitions. The first one was the root partition. The second partition was the swap partition and the third partition was the /usr partition. The /usr partition was made 63 MB in size, the root partition was made 10.5 MB in size, and the swap partition was made 4.1 MB in size. I sequenced them in, in the order of root, swap, and /usr. This way, when things get busy and the drive is swapping out programs, the disk heads are in the middle and do not have to travel that far to get to some information.

I ran into a problem that I was not aware of but it did not cause a hinderance. In the MS-DOS world, partition sizes on hard drives can be the size of the whole disk. Well, not in Linux. The software only will let the partitions be no larger than 64 MB in size. That is no big deal but when you have small real estate and want to build a mansion in the place of a two bedroom house, space management is needed quite rapidly.

With this space problem present, I was not able to load all of the software that I had. I have, at this time, the root system, the base system, the compiler and the X-windows system. If I get rid of the swap partition, it would JUST FIT. But, since I want the swap space, I had to decide what to put on and what to keep. Since all I wanted to do was to test the package and not do any hard core work with it yet, I opted to put in the root, base and X-windows systems. I was just able to make it all fit.

Well, lets get back to partitioning the hard drive. I have the sizes of each partition figured out, by empirical means, and now to enter the values. I called up FDISK. This program is not fancy to say the least but it blows the pants and skin off of the MS-DOS version of FDISK. Each disk partition has its own name as does each disk. The first hard drive is /dev/hda and the second hard drive is /dev/hdb. The partitions are numbered from the outside in on the hard disk and are numbered sequentially. As an example, the second partition on hard drive #1 would be referred to as /dev/hda2 and the fourth partition on the first hard drive is /dev/hda4.

To start, I made sure there was NO information in the area of the partition table on the hard drive. I printed out the table and it was full of jibberish. So, I promptly deleted all displayed partitions.

Now to start the process of putting in the new partition information. The first partition, /dev/hda1, was going to be the root file system. So I told the program that I wanted to add a new partition to the hard drive. It asked for the partition number. I gave it the number one since I was defining the first partition.

Then the program asked if this was to be a primary or extended partition. I responded that it was to be a primary partition. I was then prompted for the starting cylinder number. Since this was the first partition, the number was 1. It then asked if I wanted to specify how many cylinders or how large I want the partition to be in either kilobytes or megabytes. I told it 10566 KB. The second partition, /dev/hda2, was added the same way except that its size was to be 4131 KB. The third partition followed the other two that preceded it with the exception that I told it to go to the last cylinder on the hard drive. That gave me the third partition.

I printed out the information to make sure that it was all correct. I then told it to write the table to the disk. After the the table writing was done, I was instructed to reboot the computer using the A1 disk. This is to allow the operating system to get the partition information. After the reboot, you have to make a file system. This is like doing a hard disk format in DOS. You call up the command 'mkfs' and give it the partition name and how large it is in KB. This is done for all of the partitions that you made in the step before except for the swap partition. Swap partition uses the program 'mkswap' and 'swapon' to make the file system and to tell the operating system which partition to use as the swap partition.

Now that the partitions have their file systems initialized, it is now time to load the software.

LOADING

Once the partitions have their file systems defined, you have to make a disk that will be your boot floppy after all is installed. What you need to do is to take a blank disk and use the "format" command on it. This has to be done in a 3 1/2" 1.44MB drive because of the size. If this is drive B, then that drive will be /dev/fd1 and drive A will be /dev/fd0. Put aside the formatted disk until the installation program is called for.

To bring up the installation program, type "doinstall" followed by the names of the partitions that you want to use. From above, we decided that /dev/hda0 was to be the root partition and /dev/hda3 was to be the /usr partition. The command line to set all of this up would be "doinstall /dev/hda1 /dev/hda3 /usr". Now if I had another partition on the disk, I would use it for the X-Windows system. If I had /dev/hda4 defined as the X-windows system area, then the command line would look like "doinstall /dev/hda0 /dev/hda3 /usr /dev/hda4

/usr/X386". That would allow the X-windows system to have its own partition and allow for growth in both /usr and /usr/X386. Here again, future needs should be planned for and figured in when you plan to lay out your hard drive.

Next month, I will start covering how to get K5JB's version of NET running under Linux.

HORNET'S NEST (AK Dick, K0VKH)

When I first started in Ham Radio many years ago, I was told of a "Gentleman's Agreement" concerning where RTTY, AMTOR, and DX hang out on the bands. This agreement kept all in check and everyone followed it. NOT ANY MORE! Because of the arrogance to this agreement shown by the packeteers that populate the HF bands, regulation will have to replace the "Gentleman's Agreement". Too bad. Here is a proposal for people to think about. The DX band is no man's land for W/VE stations, except for when it is popular for a W/VE to be in that area. Packet gets 10 KHz, AMTOR gets 10 KHz, RTTY gets 10 KHz, and CLOVER gets 10 KHz. In those sections, all of the special services will have to compete with all else for the use of that section.

Let's analyze the results of that proposal. Packet takes 2.5 KHz of bandspace. That would allow for four packet channels. Pactor probably runs in the same space, so that would allow for four channels. Baudot can run in a 500 Hz bandwidth and that would allow for 20 channels. Baudot could be done using 250 Hz filters and allowing for 40 channels but the signal would need to be strong. Clover eats up a solid 500 Hz bandwidth and that would allow for 20 channels.

Now, everything has been channelized and formatted. This is what the HF packet community is pushing for, either directly or indirectly. Those few who have decided that what they what to do, advocating this will be best for all concerned, have dictated this policy. When Skipnet was above 14,100 on 20 meters, all was fine. When they moved down below 14.100 with their wideband operation and invaded the "Gentleman's Agreement" area, that was the end to what I knew as the "Gentleman's Agreement". Now there is a Pactor BBS system working from W land in the DX WINDOW on 20 meters. WHAT IS WRONG WITH THIS PICTURE???? Cooperation between the people who use these modes has disappeared. The "Gentleman's Agreement" was in place to let Baudot, AMTOR, and DX to work peaceably and together. Any user could roam the subband and find a quiet place and call CQ. Not anymore. All of this wideband garbage has moved in and shut everything down with automatic and semi-automatic stations that work when the operator is not around at all and the operator takes the credit. That is patently wrong. The machine should be rewarded, not the operator. The operator had no direct involvement in the transferance of any information. He or she did not take the copy and relay it personally, the machine did the work.

The best darn proposal that can come out of this whole thing is to only allow for the transmission of a digital signal that takes up NO MORE THAN 500 HZ of bandwidth on HF. If that precludes PACKET and PACTOR, so be it. They hog up bandwidth. That is a realist talking. Face it, there is only so much room on HF and if the bandwidth hogging modes want to be used, then they will have their own little piece of property to clutter up and leave the gentlemen alone.

Enuf said.

de **Richard, N6NKO** ■

Packet: n6nko@wb6ymh-2

Internet : richardp@owlsnest

MSOs

Dick Urhmacher, K0VKH
212 48th St.
Rapid City, SD 57702

Hi Gang! This will be an abbreviated MSO (Message Storage Operation) column this month, as I'm off to the Dayton HAMVENTION in a few days, and my cup runneth over! It's always good to head down the road to Dayton, as it's "where it's at," as far as Amateur Radio is concerned. Everyone should partake of this rich experience at least once, but I'll warn you in advance, it does become habit forming! This will be my 14th year in a row of attending this wonderful event, and I never tire of seeing friends and acquaintances, poking around in the Flea Market, twisting knobs on the new toys, and attending the seminars, meetings and hospitality rooms. Try it, you'll like it!

Although the following subject may well be better addressed in "The Hornet's Nest," as it's so broad in scope that it really applies to all modes and operating conditions in Amateur Radio. It is a subject that is frustrating to many of us, harmful to our Service, belittles us in the eyes of Amateurs world-wide, and is of the highest priority in FCC (Federal Communications Commission) enforcement actions. Yes, it's intentional interference to established communications.

One of Amateur Radio's most stalwart tenets is that once communications are established, those utilizing a particular frequency are free to use it, without intentional interference by others, until they are through using it.

To have any other way of frequency sharing, would most likely create the conditions we frequently observe on Channel 19, in the Citizens Radio Service. One where inconsiderate, probably uneducated, uncaring individuals purposely and willfully interfere with communications already in progress. It amuses some, provides a sick kind of entertainment to others, and probably occurs in many cases primarily because the transmitting station plainly doesn't take the time to determine if the frequency is already occupied.

Within the Amateur Radio Service, we are schooled from the very start of our Ham careers with the fact that "frequency sharing" is an essential and vital way of allocating a very limited number of frequency bands, to the maximum number of users. It's not a perfect system by any means, but it is a essentially fair way of distributing, yet fully utilizing our frequency allocations. Simply put, if you are utilizing a particular frequency for a QSO, it's yours to use until you are through with it. And, your use of that particular frequency should be essentially free from interference by other stations. This is not to say that you will not experience inadvertent interference from time to time, especially on the more popular bands. For example, I think it's rather naive to expect that you will have a QRM-free QSO on 20 Meters in the SSB portion, on a Sunday afternoon. There's just too much activity, to few frequencies, and to little sophistication in some receiver designs. However, one should be able to brave these conditions with the knowledge that no one will intentionally interfere with his QSO.

One only has to read the various Ham radio magazines to see that enforcement of this method of frequency sharing is of

very high priority by the Federal Communications Commission, and rightfully so. Those who intentionally interfere with other stations deprive others of their right to use that frequency on a first-come basis. The fines levied by the FCC are substantial, and frequently include revocation of the Amateur license.

Even with these severe punishments in place, we still see those who will risk their financial, personal and professional freedoms in order to purposely interfere with routine, mundane and innocuous communications that are the contents of many Ham QSO's. Why? It's like asking why some in our society sexually molest small children, (and from this authors viewpoint, those who intentionally interfere with established communications are of the same breed)! They derive some pleasure from harassing and intimidating others with their interference. They have some personal axe to grind, dislike some form of the mode being used, dislike the individual using the frequency, or become abusive and intolerant when someone else is found utilizing "their" frequency.

Intentional interference seems to be more prevalent, more intensive, and frequently more virulent in nature, when some form of traffic net, automated operation, (BBS, VHF/UHF repeater, MSO, etc), is involved. Those who purposely interfere feel that these operations are not of personal interest, and thus their actions are designed to threaten, intimidate and otherwise disrupt these communications, in hopes that they will cease. Or, in some cases, those who purposely interfere have some inward feeling of being "left out" of these operations, or a feeling of "not belonging," which motivates them towards these actions.

After operating a RTTY MSO on 20 Meters for 15 years, I have seen many forms of this purposeful interference. Some are subtle, some are very aggressive, and some very tenacious. And, I have found through experience that dealing with these individuals on a one-to-one basis is virtually impossible, probably aggravates the interference problems, and usually unsuccessful in eliminating the problem. The mentality, and thought processes of those who interfere, appreciate your noticing their efforts. In other words, they enjoy seeing their activities get under your skin! The more you react to their efforts on the air, the more they interfere. And, the level of interference, the use of profane language, the very intensity of the confrontation moves up a notch each and every time you respond to their interfering activities.

So, you say, what's a fellow to do when this deliberate and intentional interference appears on your frequency? First and foremost, it's important that you do not engage in a verbal shouting match with the interfering station. That's exactly how they get their kicks, by getting under your skin. I know it's hard to just ignore them, but in the short term, that's the very best course of action. Most of these individuals tire quickly of their games, when they find that their actions are not providing them with the gratification they expect. If you do not respond, they'll start searching around for someone else who will.

In cases of repeated, tenacious interference, I heartily recommend that you report those cases immediately to your nearest FCC Monitoring Station. I have found that the staff and personnel at these monitoring stations are friendly, willing to listen, and quite willing to enforce our communications laws. They have a very broad network of monitoring stations, with highly sophisticated equipment, capable of ferreting out and eliminating those who willfully interfere with established communications. You should be prepared to furnish explicit details concerning your interference complaint. For example, with respect to digital communications, small details can be very important. Was the interfering stations "shift" exactly 170 Hz; does his AFSK/FSK have any peculiar sound; what was his exact frequency; does he cause this interference during a certain time period; does he vocalize, or otherwise announce his intentions to interfere; etc. The more exact information you can provide to the Monitoring Station, the more chance that the source of your aggravation can be eliminated.

Let's face it. Your tax dollars pay for the operations of these Monitoring Stations. You should expect and demand that purposeful interference be eliminated, and from my experience, the FCC takes all interference complaints quite seriously. Do not hesitate to contact the FCC when repeated interference is making your life miserable, as that's the only way that it will be eliminated.

MSO RAMBLINGS:

Brownie, K5FL and MSO Sysop, tells me that he has a new lightning-fast 486/33 computer, and plans to use it with W9CD's popular "MSO" software. And, he also has recently purchased a new HAL PCI-4000 "CLOVER" system. Who says that digital modes are for the "young crowd"?? In his mid-eighties, Brownie exemplifies the amateur spirit, and has lots of fun doing it! ---The K4KOZ MSO, Boca Raton, FL, is back on the air. Sysop Frank and his new bride are attending the Dayton HAMVENTION, and congratulations from all on his recent marriage.

That's it for this month Gang. Spring is here, and Summer not far off. Time to dust off that fishing rod! --73--

de **Dick, K0VKH** ■

HARDWARE

Mike Candy, KI7FX
9111 A Utah Dr.
Fairchild, WA 99011

Greetings to all RTTY Journal readers. I have been asked to fill in this month for Jay who is taking a well deserved month off. With the BARTG Contest in Galapagos, the HamFest at Dayton and the excitement of CLOVER, he has been keeping very busy! I am a relative newcomer to Amateur Radio and digital modes, being active for the last 3 years. However, I've been working with computers and digital communications since the mid 70's in my work with Air Force Communications and still do a lot of tinkering with new computer/digital communications equipment. I recently had the opportunity to run the Kantronics KPC-3 through it's paces and give it a thorough workout. Its features are strong and it has a few nice surprises.. Read on!

KANTRONICS KPC-3

The Kantronics KPC-3 is a compact, full featured 1200 baud packet TNC. It supports a complete Personal Bulletin Board (PBBS), Kantronics Host Mode, KA-Node, WEFAX mode, Kiss Mode and Remote Access. It also has a standard 32k RAM chip installed, or you can get a 128k or 512k chip option. I was first impressed by it's small size - it's only 3/4 inch high, but has a full set of status LED's. This TNC is ideal for portable use, mainly because of it's small size, but also because it can run for 10 hours or more on a 9v battery. Changing the battery was easy, even with 56,000 people running for the finish line in the 1993 Spokane "Bloomsday" 12K Race: I was back on the air in less than 4 minutes. Normal power consumption is rated at less than 40ma,

and I left the LED's on during my testing. For real power savings, Kantronics has added the command LED OFF and CD INTERNAL to decrease the power consumption to less than 15ma. I had a deadline on this article before I could get the KPC-3 to run down the battery in low power mode. One quick note about the battery option - the user must install a 9v battery clip on to 2 (well marked) points on the PC board. I picked one up at a local electronics surplus store for 50 cents and soldered it to the main board in less than 5 minutes. Viola, it didn't work!

CUSTOMER SUPPORT

After checking and re-checking the manual to make sure there wasn't a jumper or switch that had to be installed to make the 9v option work, I called them and asked for some help. Don Rixon, one of the Technical Support representatives explained that some of the KPC-3's had a problem with a micro-switch in the power connector that blocked the 9v power switch from external power. The external power connectors work fine but I had to run this TNC from a 9v battery because of the upcoming "Bloomsday"/ARES event. Don was very helpful and offered to send me a new power connector to install myself, or I could return the KPC-3 and they would fix the problem and get it back to me quick. I decided to let them do the work, and mailed the unit back the same day. Don was very responsive to repairing the KPC-3 and since I shipped it to them 2nd day air, he returned it the same way. I had my KPC-3 back in my hands within a week! You can't ask for better support than that. Speaking of customer support, getting through to Kantronics can be a little trying on the nerves if you don't like busy signals. With any product, there are some folks who don't know that the answer to their question is in the manual! This keeps the phone lines at Kantronics busy and delays everyone. Kantronics is aware of this problem and has taken a giant leap ahead of their competitors by making their products easier to understand for first time users. The first step is their "NEWUSER" command interface. Instead of a new packetter being presented with lots of strange new commands to confuse them, the NEWUSER command set (default upon power-up) includes only 23 commands to become familiar with. When you are comfortable with the NEWUSER commands, you can switch to the normal "FULL" command set of over 130 commands! Kantronics has also stated that they will be shipping their TNC's with a complete serial cable to allow immediate computer/tnc connections without having to solder a cable at one end (like mine). Either way you look at it, Kantronics is pushing ahead and a second Technical Support line should be installed soon.

DOCUMENTATION

The KPC-3 comes with a complete Reference Manual and a Getting Started manual. Both manuals contain a lot of information - The Getting Started manual contains important excerpts from a very thorough Reference Manual. The "Getting Started" book is great for quick, up-and-running information and contains enough information for just about any situation including a section on interfacing the TNC to most radios. The more detailed Reference Manual is complete and includes sections on using the commands, operating modes and installation information. A new feature for Kantronics is the inclusion of an index at the end of the manual - This makes searching for a topic much quicker and easier. As much as I wanted to read through the manual, it wasn't easy. Kantronics is still using the plastic hoop binding system on their manuals which causes the pages to become torn and ragged, and the book hard to open after using it a few times. I sure wish they would change their binding system or use hoops that are large enough to fit the 133 page reference manual a little better. The binding system may be a bit rough, but it can't take away the fact that their manuals are always well organized and contain plenty of basic and advanced technical information.

ON-THE-AIR

Using the KPC-3 is a breeze. Deployed in the field it worked flawlessly. In the Shack, I have used the KPC-3 for everything from the local PacketCluster to mailboxing and mail reading on the local BBS. I am currently working on a project to interface the KPC-3 with my Land Line BBS - The Think Tank II. It allows (licensed Amateur) callers to dial into the LL BBS and experience packet for themselves on the KPC-3! If you do a lot of node hopping, BBS experimenting, or just reading mail, the KPC-3 works great. The most unique feature of this TNC is it's NEWUSER command set. Listening to our local repeater "TechNet" last week convinced me that people who are new to Packet Radio need a TNC that is easier, MUCH easier for them to get up and running. After listening to people asking for help with complicated TNC commands, I realized that the KPC-3 is really the answer for their problems. Personally, I like the capabilities of a full featured (complicated) TNC with PBBS support, KISS mode and HOST mode. It appears that Kantronics has found the solution with the KPC-3. It looks good, it's RF tight and solid and works well for everyone. What more could you ask for?

KAM PLUS?

I would appreciate your feedback on the KPC-3 and other Kantronics products. I just finished installing the KAM Plus option on my KAM and will be writing about this next time - PACTOR, here I come!

de Mike, KI7FX ■

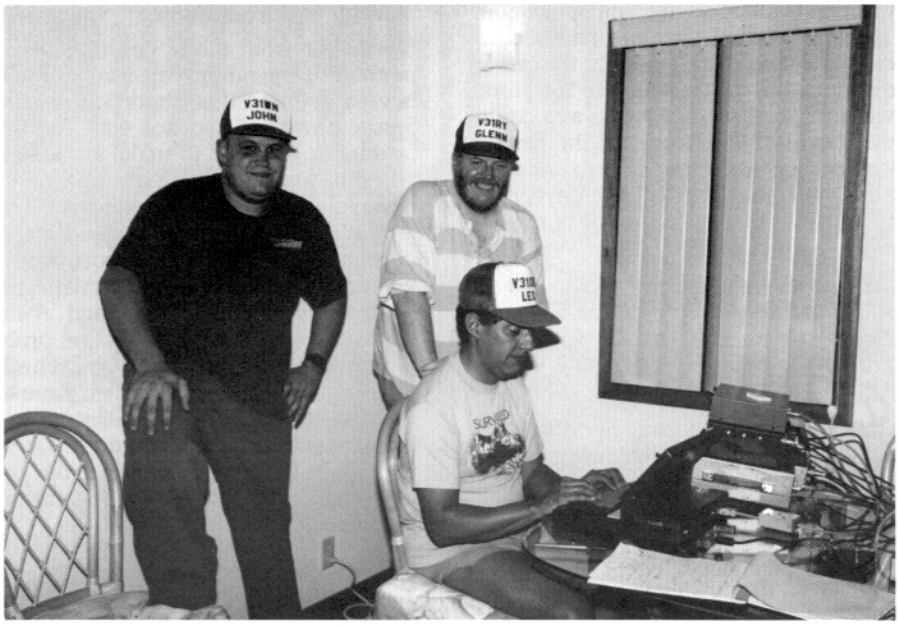
My Packet address is KI7FX @ WS7I.WA.NA or FidoNet 346/8.

Attention Mac Owners!

I have a copy of a new contest software for the Mac computer. The program is named Marathon and is out of St. Paul, MN. I would like for someone to review this product so that I can publish the review here in the RDJ. If you would be interested in reviewing this piece of software, please call or write the RDJ office.

Editor

BELIZE PLEASE!



V31RY operation. Operators L. to R. John, KT0F, Glenn, AE0Q, and Leo, WN0B (seated), share in the fun and excitement of being a DX station, instead of fighting the pileups. Great effort by this talented team.

The recent operation of V31RY in the BARTG RTTY contest by John (KT0F), Leo (WN0B) and I had its start two years ago. I was finding it hard to get excited about operating for a while. I'm in a townhouse with attic-dipoles, and you get kicked around the bands a lot, especially if one tries to work any DX... So I decided a trip to a DX location was needed, since I'd lived in Europe and operated with a few calls over there.

My first thought was to try Little Cayman Island, since there is a shack with antennas for rent. After checking on the flight times and connections, I found that it would take 4 days of precious vacation time just to get there and back! I started reading the NCJ publication; there is a column with operating tips for various Caribbean locations, but many of the handiest ones, with stations and antennas available, already have active RTTY operators. Finally, John (N0FAC) convinced me that Belize would be a good place to go; its not too far away, hadn't been on RTTY very much lately, and English is the official language!

Finding a travel partner was difficult, as none of my ham-friends could go last fall due to vacation schedules. I finally found Andy, a diver friend that wanted to go along, and a year ago we made travel arrangements for 8 nights on Ambergris Caye (pronounced KEY), a popular destination for the diving crowd. To get the most from our vacation time, we went over the Thanksgiving Holiday, so I accidentally ended up being DX during the CQWW CW contest. No great hardship, since I have enjoyed CW for 25 years, and like contesting, too!

I had recently started using the BMKMULTY RTTY program at home, and decided to get a laptop PC for the trip. Our Field Day group had been thinking of trying the 'CT' contest program, and the laptop worked just fine up in the Colorado mountains in late June. My home rig, a Ten Tec Corsair 2, is a little big for carry-on luggage, and I really didn't want to check the computer or rig, so I used that as an excuse to get a new Kenwood TS-450S/AT. With three CW filters installed, it checked out fine at home on RTTY and CW. A CP-1 T.U., R7 vertical, and Alpha-Delta 80-10m dipole rounded out the station (with pwr supply and MFJ-949D tuner).

Early in the summer I applied for the V31RY call. With the license in hand, and having sent a list of my gear to Belize Customs a few weeks before the trip, we were able to clear Customs on Sunday evening when we arrived. I put up the R7 the next morning with help from the hotel's gardener while Andy was out diving. With the vertical on a 10 ft mast, it was an easy two-man job. All the gear worked fine, even though I never got around to putting up the Alpha-Delta dipole. I had stuffed quite an assortment of tools, connectors, and wire into the shipping container with the power supply, antenna tuner and 200 ft of RG-8X coax, but never needed the emergency supplies.

By the end of the week, it seemed that I had worked most of the folks on RTTY that needed Belize, so Saturday morning I joined the madness on CW in the CQWW contest. In 14 hours I worked 1140 stations, and discovered how really great 'CT' is when you're on the other end of the pileup! That was a fun way to end the week; after a few more RTTY QSO's on Sunday evening, we took down the R7 in light rain, packed the station up, and left Ambergris Caye early Monday morning.

During our evening walks around San Pedro for dinner, I had started to think about returning for the BARTG RTTY contest in March. Being only 4 months away, I couldn't get the same room in the hotel, but did reserve another one at the front of the hotel, for good access to the antennas. Back in Denver, I posted a few messages on the local Packet BBS, and the DX Cluster, trying to find some hams to join the next trip; John (KT0F) and Leo (WN0B) expressed interest in going along, so the rush to get them callsigns and reservations began!

The necessary arrangements all fell into place, and we decided to take Leo's TS-440S for a spare rig, with three hams spending money and vacation time to operate there. If the laptop died, we had two keyers and paddles along, and would all be happy to work CW. I had seen a 30 amp battery-charger in the little hardware store in San Pedro (the town on Ambergris Caye), and we planned to use that if the power supply failed. The main transport around the island is by golf-cart, so batteries would be plentiful!

Leo had just gotten the latest version of the 'RTTY by WF1B' program, so I installed it on the PC and looked at the signals needed to use the CP-1 for a demodulator. Ahh, it uses completely different signals for TX/RX Data and PTT than BMKMULTY does, so I added a small switchbox in the cable from the PC to the CP-1, and wired up the extra pins on the laptop end. My previous wiring had worked well for CT and BMK, since they both use the DTR line for transmit data, and the mode switch in the CP-1 changed the signal from the CW key line to the FSK input of the TS-450. Oh well, just one of the many things to sort out when learning a new program!

After a VERY early flight out of Denver on Friday morning, we were all tired when the big single-engine Cessna finally landed in San Pedro. Customs at Belize International Airport was a breeze, but every connection had been running later and later, so it was already dark. Well, the

contest had started, so we put up the dipole, set up the station, and went to town for dinner! Not what any of us had planned for the beginning of a contest weekend, but we had all run out of steam. We finally got on the air 3 1/2 hours into the contest, and I stayed up all night since I work the midnight shift back in Denver.

Leo was the first one awake on Saturday, and took a few sunrise photos before he took over the keyboard. It took us all a while to learn the software; no one had ever run it on the air before, and John was a fresh recruit to RTTY, having only made one or two contacts from my QTH. A homemade template for the function keys, and liberal use of yellow 'stickies' plastered all around the laptop display got us through the weekend. Almost....

On Sunday afternoon, I was napping in the corner when someone yelled "Glenn, something's on fire!!!". I guess I responded with something about pulling the plug out of the wall, as I fell out of bed... With four hours left in the contest, the Heathkit 20 amp supply, made for an SB-104, had emitted a big puff of smoke, and it didn't seem prudent to turn it back on to watch it burn more parts. Heath HAD only rated it for 8 amps continuous output, but with a fan on the heatsink, and another blowing through the inside, all the parts had seemed pretty cool. Its the size of an Astron RS-20, with a massive transformer and overrated pass-transistors. Nothing had ever gotten warm on the last trip, and I had operated RTTY for a week. Well, the contest duty-cycle had found the weakest parts, and that was THAT!

Hmmm, on Saturday morning a ham from Iowa had stopped by our room; Ed (WA0RDZ/V31AA) spends all winter on the island, and lives only a few hundred yards from the hotel. He wasn't home when the supply blew, so we went to dinner and caught him on the way back. We borrowed the PS-50 from his Kenwood station, and promised to bring it right back after the contest was over. The last two hours seemed to fly by, with the usual chaos on 20 meters. We ended up with 650 QSOs, certainly not a record-breaking score, but it had been plenty of fun, with a little panic thrown in! The WF1B program worked fine in the BAUDOT-DRV (non-TNC) mode with the CP-1, once we all got the hang of it. The usual rule applied to us just like any other station in a RTTY contest - the biggest signal keeps the frequency! Being DX helps a lot, but running 100w to a vertical still means you will loose the battle sometimes. Ahhhh, contesting!

We were planning to get that big battery charger on Monday morning, when Ed mentioned that he had a spare Astron RS-50 on loan to the Medical Evacuation folks at the airport. They didn't need it any more, so we zipped across town in the hotel's golf-cart to retrieve it. San Pedro Town is less than a mile long north to south, and all three streets are sand, so the carts are ideal for transportation. There are probably no more than a dozen cars on Ambergris Caye; near the center of San Pedro, the Caye is only 200 yards wide! It seems that a big wave could wash everything away, but the Barrier Reef, a quarter-mile to the east and running the whole length of the Caye, protects the town. The reef is one of the big attractions for divers.

Leo was leaving Tuesday afternoon, and since I had already operated as V31RY in November, he and John shared the station for the next few days, using V31OB (Leo) and V31WN (John).

Almost every evening, horrible line noise appeared and pretty well ruined the bands until mid-morning. Ed had been trying to find the source since he arrived in late December. The noise level had been incredibly low in November; signals that sounded like S-9 would not show any bars on the TS-450 meter! The background level in Denver always reads around S-2, but Belize city is 35 miles from San Pedro, and there is almost no industry in Belize to make EMI noise! Using the dipole on 40m lowered it to S-9 (30db over 9 on the R7), but an hour or two of trying to copy CW through that was all any of us could take.

We would hear many Europeans and JA's calling when the QRN stopped for a split-second, but almost all the stations I worked on 40m were running a KW and a beam. It was disappointing, but at least during the day the higher bands were in fair shape. We worked over 2000 stations on CW, each using our own call, and I made a few more RTTY QSO's during the week.

This was a vacation trip as well as a DX trip, so all of us are pleased with the experience. We got to see a lot of Ambergris Caye, and Andy and I took a day-trip to Altoon Ha, the Mayan ruins on the mainland (yes, he came on this trip, too!). The Heathkit power supply has been retired from RTTY service, and I've already made hotel reservations for this November and March '94. I don't know who else will come along, but it shouldn't be TOO hard to find more adventuresome travelers!

Thanks to K8CMO for help with planning the first trip; WA0RDZ for loaning us the power supplies; and to Andy Leroux for helping haul all the gear down there on both trips!

QSL info is: V31RY via WN0B, V31OB via WN0B, and V31WN via KT0F

73 de **Glen, AE0Q/V31RY** ■

Hits & Misses Continued from page 2

over carefully. If you have comments or suggestions to what the DC has recommended, I urge you to write or call your Director with your input.

No matter what mode you operate or method of operation you use, you still have a voice in this important matter. Speak out now! Do not wait for the League or the FCC to make a decision without your input. Every one of us must take a stand at this juncture. The digital modes are growing rapidly and our ranks are exploding proportionally. This growth has caused overcrowding in our small segments of each band. A solution to our frequency spectrum problems will not be easily reached. Consequently, a consensus will have to reached that hopefully will meet our immediate needs. So again, I urge you to participate by writing or calling your Director and providing him with your input.

DAYTON PICTURES

Some of the pictures taken this year did not come out good. In the middle of the RTTY dinner I had to change film in the camera. Unfortunately, the new roll of film was bad and the pictures are no good. Also, there just was not enough room for many pictures in this issue but hopefully in the next issue I will have room for some of the good ones. I think I need to have someone take over the picture taking at Dayton next year. I have had bad luck the last two years now. It seems Murphy is always with me and my camera at Dayton. Maybe next year I can get Betsy, WV7Y, to take the pictures. She is an accomplished photographer and obviously, I am not. HI!

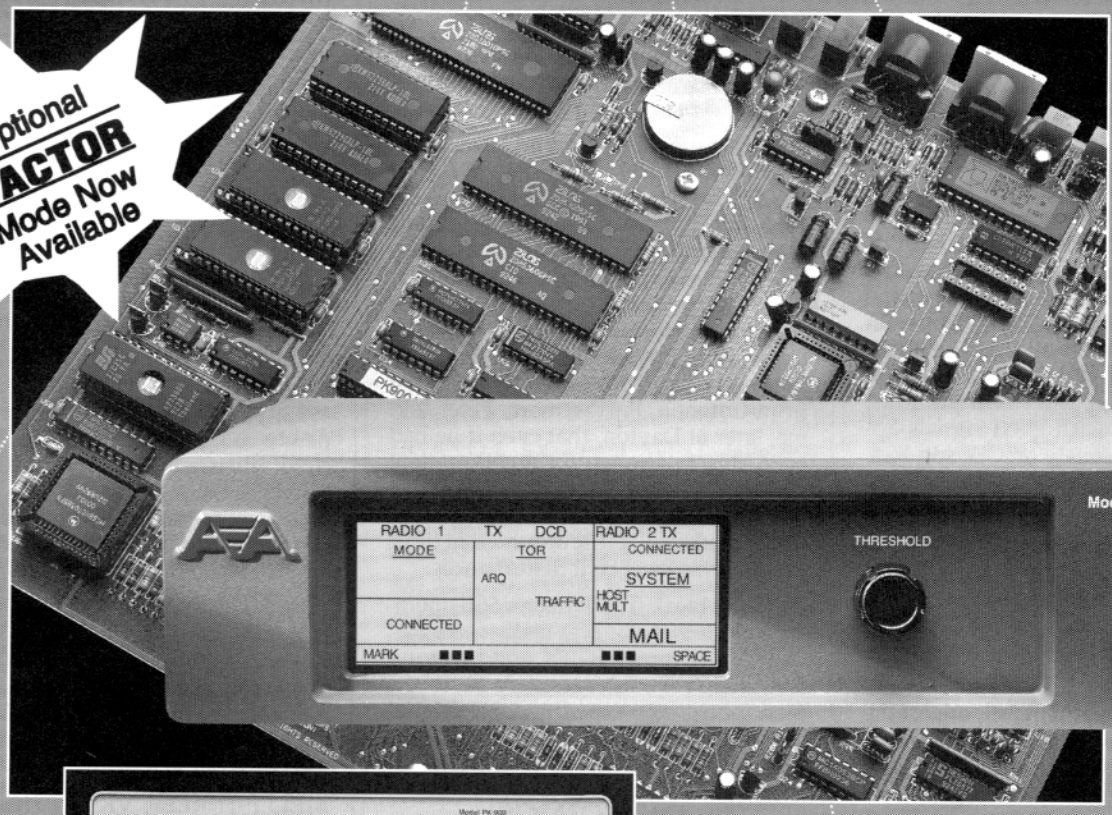
NEW COLUMNISTS

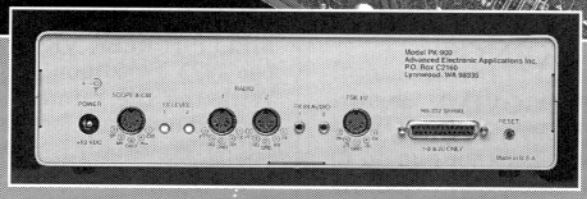
This month we have added two new writers to the staff of the RDJ. Phil Susman, KB0LUJ, who will be writing regularly on the PacTor mode. Phil's Bio can be found on page 19. Also, coming aboard is Mike Candy, KI7FX, who is taking over the Hardware column from Jay, WS7I. Jay is not leaving us just yet, he still has some unfinished projects and has consented to write on the Clover mode. As you may have noticed the RDJ has been expanded to 32 pages. I am hoping to continue this new policy but that can only happen if I continue to receive material.

Summer is here and that means vacation time. For all of us on the RDJ staff, it means no deadlines for two months. Consequently, your next issue of the RDJ will not reach you until late August. Until then, have a nice Summer.

de **Dale, W6IWO** ■

INTRODUCING THE PK-900... NEW FROM THE INSIDE OUT!





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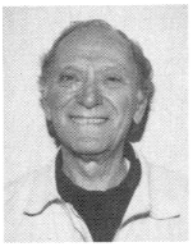


DX NEWS

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

It is a tale of hope and frustration...oft' told. We had waited 'lo on 10 years for Ghana to return to Amateur Radio. Last fall there were reports that this would happen in January 1993. Considering the turmoil that had surrounded the November 1992 elections, and in light of the past nature of the government there, this seemed highly unlikely. January came and went without any sign. But, in the last week of March, a group of Dutch radio amateurs on a humanitarian medical mission, from the DAGOE Foundation, made it happen. Two stations, signing 9G1AA, with good signals appeared simultaneously on CW and SSB. The big question, of course, would there by RTTY?

On 27 March I asked the 20 meter SSB operator if there would be any RTTY. His reply was positive..."Yes, toward the end of the expedition, in about 2-1/2 weeks." Hopes were high, and the word was passed.

A few days later, on 2 April, one of the locals here, Don,WB0MEJ, reported that he had been informed that the RTTY gear had been damaged beyond repair, during the 500 km ride to the hospital. There was no possibility of replacing it in time. This was a hard nut to swallow. What to do?

I immediately thought of our good friend Peter, TY1PS, in nearby Benin. (separated from 9G only by Togo, 5V). During a fortuitous RTTY contact, that very day, with Peter, he passed his FAX and fone numbers to me. I got back to the 15 meter SSB operator the next day to pass Peter's numbers to them, and to attempt to get telephone numbers, etc. of the group. The operator did not know the telephone number but he gave me the name of the hospital, the location, and some names for Peter to contact. He also copied Peter's data OK.

Peter thought that perhaps some of the RTTY ops in TU-land, or 5V-land could provide a replacement modem. Until I advised him of the location, he thought he might even be able to run in himself by bush taxi.

On 6 April the 17 meter SSB operator advised me they had been unable to make contact with Peter, and that now "RTTY was completely out of the question." This was later confirmed by the 10 meter SSB operator on 9 April.

Peter told me that he had been unable to get into the 9G phone system at all, no less the hospital. The bush drums were abolished 100 years ago, and the phone system was "very chancy." There was no way for him to contact them by radio as he is strictly a digital type. To drive to the site was impossible for him, as it was at the western border of Ghana, about 16 km from Ivory Coast, and about 600 km from Cotonou. Furthermore, Peter told me, later at Dayton, that even if he had been able to arrange for an equipment replacement, the delivery would have been questionable, as the Ghana border was closed to all traffic around that time, due to some local civil disturbances.

All is not bleak. The 17 meter SSB operator sounded like he was really sorry that they had to forego RTTY, and he promised that it would definitely be in the plan for the next expedition. He did not say when that would occur. So we will keep on hoping.

DX DOINGS

BOSNIA-HERCEGOVINA, 4N - 4N4ENS is very active, on RTTY, from this troubled land. Look for him on 20 meters around 0200-0430Z. QSL via DJ0JV. BARF80 reported that 4N4XX said that stations in Bosnia will start using the T9 prefix sometime in May.

BURKINA FASO, XT - If you haven't worked XT2BW yet, keep at it as he will be leaving at the end of 1993. QSL to WB2YQH.

ETHIOPIA, ET - Sid, ET3SID had promised "plenty of RTTY," and indeed he has kept that promise. Not only has he been handing out RTTY contacts, he is also on AMTOR, PACTOR and FAX. Although he appears occasionally during the week, he is most easily found during the weekends. 15 meters seems to be his favorite, but check 20 meters also around 1400-1600Z. If the band seems to be open check 10 meters between 1000 and 1400Z. Don't discount the early UTC day, as he sometimes pops up around 0500Z on 20 meters. He asks to be forgiven for his signal quality, as he sometimes experiences a 150 VAC line, causing RFI and distortion. QSL to Sid T. May, Box 60229, UNECA, Addis Ababa. Turnaround time has been on the order of a couple of weeks.

EQUATORIAL GUINEA, 3C - By the time you read this, Ed, 3C1TR may have forsaken SSB for RTTY and CW. If so, QSL to K8JP.

GHANA, 9G - Now that the ice has been broken by the three week operation in late March-mid April by 9G1AA, look for a parade of well known DXers to satisfy those who missed it, especially the RTTY gang. Who will be next?

ISREAL, 4X - Arie, 4X6UO took time out from his busy DXRTTY operating schedule to travel to Dayton for the annual bash. Arie is the most active RTTY station in 4X-land. Hardly a day goes by that he is not on the air. He mentioned briefly that some exciting things are being done there by satellite. We look forward to hearing more details about that. How about it, Arie?

KAZAKHSTAN, UL - As of 1 March 1993, several stations were reporting newly assigned prefixes. All UL callsigns will eventually be replaced by UN callsigns. UL prefixes wil go to Uzbekistan! Expect plenty of confusion before this is cleared up! Better ask his QTH when you QSO a UL station.

MAURITANIA, 5T - 5T5KH has been delighting the RTTY crowd on 15 meters quite frequently between 1900-2100Z. When the pileup on his frequency gets too thick, he listens up a few. Watch for his instructions as to where to listen. QSL Karl to WB8LFO.

MELLISH REEF, VK9Z - This September 1993 expedition is still on target. With the the number of operators deemed necessary for this major undertaking, the team has chartered a much larger vessel than previously planned. They will be going to the reef in the "Nina Q 1", a fast 63 foot vessel capable of carrying six thousand pounds of dxpedition gear. Eight operators are now planning to spend 10 days on the reef, operating 160-6 meters, including WARC bands. Modes will be SSB, CW and RTTY. Ken, V73C, is supplying the RTTY gear from his station.

Licenses and landing permission have been received. The impressive list of participants includes VK4CRR, VK2BJL, VK2BEX, P29DX, V73C, WA4DAN, and K5VT. One more operator is being sought. The projected cost is $30,000, of which $19,500 goes for the ship charter. Donations may be sent to Murray D. Adams, WA4DAN, 1993 Mellish Reef Dxpedition, 403 East 14th Street, Greenville, SC 27858, or to Bill Horner, VK4CRR, 1993 Mellish Reef Dxpedition, 26 Iron Street, Gympie, QLD 4570, Australia.

MONGOLIA, JT - As new stations take up the RTTY mode, this country is starting to again become one of the most wanted. We previously reported that Bat, JT1CS, was anxious to get back on RTTY. Lately, a communication to John, N0FAC, from Bat asked if there might be an AIR-1 Microlog available. Bat is willing to pay for it with IRC's. If you know where such gear might be available please advise N0FAC at his CBA. Incidentally, John took WA4MCZ's suggestion and sent his QSL card "via Japan". It succeeded. Turnaround time was two months.

MOUNT ATHOS, SV/A - This one blows hot or cold, depending upon who you believe. In a long message entitled "Monk Apollo Speaks About Mt. Athos" which was disseminated on the worldwide APlink system in late March, SV2ASP/A stated a firm position. He clearly stated "officially, why Mt. Athos is no longer heard on the air...." He goes on "....I have stopped broadcasting 15 months ago from Mt. Athos, because ARRL has officially recognized the illegal broadcasts of the German ham Drobnica Baldur DJ6SI....." While invoking the religious aspects pf life on Mt. Athos, he says, in so many words, that he will stay off the air until the ARRL discredits the DJ6SI operation. The message is quite clear. Since that time, several bulletins have reported that SV2ASP/A has been seen back in operation. And SV2DXC reported that Apollo had not received any RTTY gear from JA3PFZ. Any more reliable information???

NIGERIA, 5N - 5N3ZIP is waiting for a new call since he has moved in Nigeria. He is using K5DEA/5N4 until the new call arrives. Mike, N5PSI continues as his QSL Manager. Previous reports mistakenly said that Mike was manager for 5N0ZIP.

PAKISTAN, AP - Look for AP2KS on Saturdays on 20 meters around 1500-1600Z.

PETER I Is, 3Y - Preperations for this expedition, to be led by Ralph, 0IR are reaching a high degree of activity. Ralph, as Director of the South Sandwich DX Group will be assisted by Tony, WA4JQS as Director of Operations for the South Sandwich DX Group.. They will be accompanied by a core group of VP8SSI veterans, plus others yet to be named. Tony will be remembered as the leader of the eminently successful South Sandwich Dxpedition in early 1992. The landing date has been moved one day to February 1, 1994. As with all efforts of this nature, the cost is high, and each operator is contributing a substantial share. Additional contributions are needed. Send your check to Jerry Branson, AA6BB, or Joanie Branson, KA6V at 93787 Dorsey Lane, Junction City, OR 97448.

TADZHIK, UJ - A report from Ed, NT2X relates that a conversation with Alex, UJ8JCQ, revealed the following: The war still rages on in Tadzhikistan. Life in Dushanbe (the capital) has somewhat returned to normal (i.e. no shooting), but elsewhere in the country the bloody civil conflict still rages on. 70-80% of amateurs known to UJ8JCQ have left Tadzhikistan with little more than clothes on their backs, saving hemselves and their families. Lots of people have become refugees, and left to settle elsewhere (mostly in Russia). There are only five to seven active hams left in the whole country. For the last five months there has been no mail delivery. No mail came or left the country and there is no improvement in sight. The QSL bureau is no longer functioning in UJ-land. Hold on to your UJ cards until the situation is resolved.

In the meantime Michael Kaiser, DL8WN (ex. UJ8JCM) has been appointed as QSL manager for UJ8JMM, Furthermore, he will confirm QSOs for RJ8JM, UJ8JM, and UJ8JCM. His address is Michael Kaiser, P. O. Box 1802, D-6550, Bad Kreuznach, Germany. (Note that after 1 July 1993, the Zip code D-6550 will be replaced by D-55508.)

UGANDA, 5X - Paul, WF5T gave this country a good workout on RTTY in late April-early May as 5X1XT. Earlier in the year, Baldur DJ6SI gave us a taste, and whetted our appetites as 5X5WR. As Paul has advised, before he went on the trip, obtaining a license is routine, and presents no problem. We can expect more visitors to this beautiful country soon.

Just hope they carry laptops and TNC's.

PACTOR QRMING OF RTTY DX

Increasingly, RTTY DXers are being faced with the QRMing of rare DX stations by PACTOR bursts coming on in the middle of heavy activity. Just recently, on two successive nights, we observed signals of two rare RTTY stations, 4N4ENS on 14084.5 and 5X1XT on 14085.5, while working worldwide pileups, get smashed almost to oblivion by PACTOR bursts intruding on the frequency while it was in use. .

Please tell your PACTOR friends to avoid the weak signal RTTY DX slot above .080. There is plenty of spectrum below .080. for the burst type modes. Also please LISTEN before transmitting. A baudot QRL? is in order for the user of any mode above .080. As Don, CE3GDN says.."Let's apply the golden rule of digital radio...Don't call without listening first." Even though you have a stronger signal, you don't have the right to throw someone off the frequency

DXCC HONOR ROLL

For many months now, we knew that Gin, JA1ACB had made the DXCC Honor Roll but it was not official until published on page 85 of QST, April 1993.

Under the heading "Endorsements, RTTY" you will find Gin's total at 321...a remarkable number. Then look for his listing under "New Honor Roll Members". It may take a little searching, as you will find his call buried under "Mixed". Mixed??? Someone is a little mixed up. There is nothing "mixed" about RTTY. This category encompasses all digital modes and is as pure as the driven snow.

Achieving the Honor Roll on RTTY must be classified as one of the most difficult achievements in competitive amateur radio. I was so incensed by this misnomer, that I have petitioned the DX Advisory Committee (DXAC) to establish a RTTY category for DXCC Honor Roll. See sidebar for copy of my letter. A short letter from you to your DXAC representative, in support of this effort, will certainly help the cause. Send a copy to your ARRL Division Director.

DXCC COUNTRIES

Here is the latest recap of the total countries in the DXCC as of the end of April.

- 323 DXCC Countries as of 31 December 1992
- New DXCC Countries effective 1 January 1993

324 9A Croatia

325 S5 Slovenia

326 4N4 Bosnia-Hercegovina

- DXCC Country deleted 10 March 1993

325 /A,A15 Abu Ail (as of March 1991)

- DXCC Country deleted 13 April 1993

324 OK-OM Czechoslovakia (as of 1 January 1993)

- New DXCC Countries effective 1 January 1993

325 OK, OL Czech Republic

326 OM Slovak Republic

327 4N4, YU5 Macedonia (Former Yugoslav Republic)

- DXCC Country pending valid operation

328 P5 North Korea.

Do not send cards for the Czech and Slovak Republics, and Macedonia, prior to 1 June 1993. QSL cards received at the DXCC desk prior to 1 June will be returned without action.

MISCELLANIA

Some considerate soul, who prefers to remain anonymous, must have figured there were a few things that I needed to know about digital radio. Accordingly, I

received in the mail, from the ARRL, a copy of a new neat book entitled "Your RTTY/AMTOR Companion." It is authored by Steve Ford, WB8IMY. (A call to ARRL Publications, to learn the name of my benefactor revealed they only have a record of "shipped to", not "ordered from"...a strange accounting system!!.)

This book has a publication date of March 1993, so it is hot off the press. In his forward, Dave Sumner, K1ZZ, says "You'll discover in Your RTTY/AMTOR Companion that you don't need to be a digital expert to get started. All that is required is the capacity for awe and wonder!"

Steve Ford has done a nice job. He has written in a light breezy style, and packed the book full of easy to understand information about all the useful HF digital modes, including short tutorials on PacTOR and CLOVER. It's 133 pages contain some information even the old timers will find interesting. Chapter headings include 1)What's That Racket in my Radio? 2) Building Your Own RTTY/AMTOR station. 3)Your First RTTY Conversation. 4)Time to Start Chirping with AMTOR! 4)Exploring PacTOR and CLOVER. 6)RTTY/AMTOR Contesting.

There are lists of the popular contests, a Glossary of common terms, a RTTY/AMTOR Resource Guide which gives sources for books, hardware, software, etc.

I particularly enjoyed some of his sample RTTY exchanges with DX stations. There are numerous reference tables, such as a list of AMTOR APlink systems worldwide, commands for the RTTY mailboxes on the National Autostart Frequency (14085.6 Mhz MARK), etc.

Are you new to PacTOR, and want to know how to work a PacTOR mailbox? The answer is there. What do you need to get started in PacTOR? CLOVER? This little gem will point you in the right direction.

The book can be ordered from The American Radio Relay League, 225 Main St., Newington, CT 06111. It is priced at $8.00. Now if my benefactor would come forward and identify himself, I will personally thank him for sending me the book.

QSL cards from the 1990 YV0AA All Digital DXpedition keep dribbling in from YV5KAJ. OH2LU still has not received his, and wonders whether anyone has "cracked the code."

UNUSUAL DX CONVENTIONS

Mark your calendar August 27-29, 1993 for the New Orleans International DX Convention to be held at the Royal Sonesta Hotel in the heart of the historic French Quarter district. Program highlights include "DXpedition Planning" by KB5GL and W5ZPA , QSL card checking by ARRL, "Low Band DXing" by K5UR, "1991 Franz Joseph" by WA6MKB, "Palmyra and Kingman Reef" by N0AFW, "Optimizing DX Antennas" by W3LPL, and lots lots more, including a great banquet with prizes. No dealers or fleas...only DX. Meet the DXpeditioners and let them know how you feel about their operations. For detailed information and advance registration form (save $10.) write New Orleans International DX Convention, Inc., c/o Weston G. Strauch, W5VBX, 2238 Lake Oaks Parkway, New Orleans, LA 70122.

BARL (Bangladesh Amateur Radio League) is hosting the '93 SEANET Convention to be held in Dhaka, Bangladesh from 19-21 November 1993. Information can be obtained by leaving an APlink message for Saif, S21A at VK2AGE.NSW.AUS.OC.

The first Ukrainian International Hamfest under the motto "Who is UB5's" will be held August 1993 in Kharkov. For details write Igor L. Zeldin, UB5LCV, P.O. Box 4808, 310103 Kharkov, Ukraine. With the postal system the way it is over there, you would do better to send a APlink message to UB5LCV at UB5LMJ.KHA.UKR.EU.

"DX News" would like to receive reports from anyone attending these last two.

HAVE DX NEWS?

I can be reached directly by dropping mail into my AMTOR mailbox, leaving a message in the APLink box of CE3GDN(1), sending me a packet mes-

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

14 April 1993

DX Advisory Committee (DXAC)
American Radio Relay League
225 Main Street
Newington, CT 06111

Subject: Proposed Addition of DXCC Honor Roll

Gentlemen:

In recognition of its uniqueness as a mode, and the extreme difficulty of achieving it, I propose that a DXCC Honor Roll for Category "RTTY" be established.

The current DX Century Club Rules recognize Honor Roll status only for Mixed, Phone, and CW. (Section I, para. 1), subpara. (m).

Some time ago the DXCC rules were amended to recognize the achievement of RTTY DXCC status with endorsements. Since then, we have seen the slow climb of several amateurs towards the Honor Roll level.

Alas! When arriving at this high level of achievement, the distinction has all but been lost by categorizing it as "Mixed." (example: New Honor Roll Members, Mixed, 315/321, JA1ACB. Endorsements, RTTY, JA1ACB/321. QST p.85 April 1993).

To define achieving this pinnacle of the DX world, using the

single RTTY mode, as "Mixed", not only is a misnomer, but does a gross injustice to the achiever.

It is therefore respectfully requested that a "DXCC Honor Roll "RTTY", be established and that Section I, para 1), sub-para. (m) of the Rules be revised accordingly. Additionally, such listing should be published in QST at the earliest feasible date.

Respectfully submitted

Jules L. Freundlich

W2JGR

cc:KU0S, W0OZC

(Receipt card, postmarked April 20, was acknowledged by the ARRL advising that a copy was being circulated to each Committee member.)

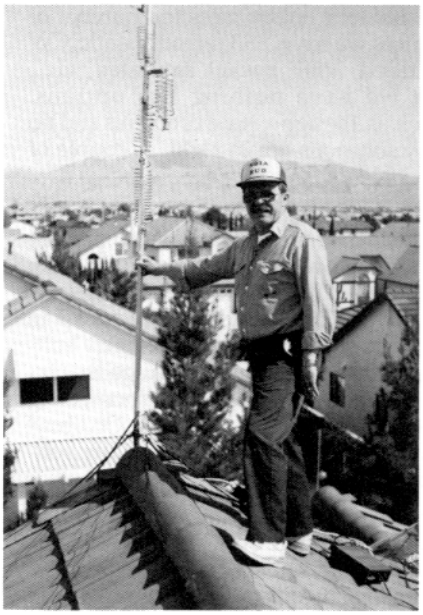
sage addressed to W2JGR @ WB0GDB.MN.USA.NA, finding me on RTTY, telephoning me at (612) 377 7269, or FAXing me at (612) 374 8161. If you FAX me, please address it with my full name, as that FAX number serves a number of people.) When these high tech approaches fail, the U.S. Postal Service can find me. When I am not chasing DX, my mailbox listens on 21074 during daylight hours and 14074 at night in the Central Time Zone. Set your chirping to WJGR.

THANKS - Thanks to the following for all your information: AA5AU, CE3GDN, K0IR, I5FLN, NT2X, N5PSI, N0FAC, S21A, TY1PS, UB5LCV, WA4JQS, WB2CJL, WA4DAN, WF5T, WB0MEJ, and ZS5S, Without you there would be no column.

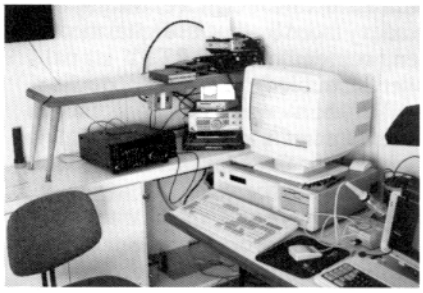
See you all next month. For now bye bye from Minnesota, PAX....73

de Jules, W2JGR ■

1. CE3GDN scans 7037, 7070, 14066, 14068, 14072, 14074, 14078, 21070, 21072, 21074, 21076, 21078, 24915, 28074, 28135.



Famous APlinker Bud, NOIA, Las Vegas, NV, making some antenna changes.



Bud's APlink station setup. Pictures, compliments of Richard, KE7XO

SOFTWARE

Jim Mortensen, N2HOS
65 Holly Place
Briarcliff Manor, NY 10510

NO SOFTWARE COLUMN!

Since returning from Dayton to Largo seven days ago I have successfully survived a vicious virus courtesy of the Hara Germ Center (and passed it on to Gen), moved by camel train to Briarcliff for an extended stay; then faced plumbing, computer, telephone and leaking roof problems and finally, received a call from Dale saying that he needed the column right away. And you wonder why I don't want to write about software this month?

During this same period, agents of change such as PC-Connection and Hal Communications shipped hardware and software additions to the Briarcliff system--change costing me time, sleep and lots of money. Things, as they say, are about normal. But on the other hand, the radio and computers worked from the moment we arrived. And right outside the door spring is bursting out all over, dazzling the eye, distracting the mind far more than the listed woes. Even the birds, rarely concerned with anything but where the next wild blueberry is coming from or where the neighbor's cat is going, brighten their song and color to match the display. Spring is the one thing that the politicians here have neither taxed nor destroyed. May yours be equally beautiful, wherever you are.

THE LESSONS OF DAYTON

The yellow pad filled up with notes during the three days of chaos. Information poured forth through all media ... brochures, forums, gossip, sales talks, dinner meetings, demonstrations, hospitality suites, contests, drawings, breakfast gatherings, lovely girls and multi-media computers. Digesting this Niagara of data during the hamfest is an impossible task. It is also an unnecessary waste of time. I quickly concluded that 98 percent of the volume represented old information. For example, while the combined RF hardware booths fill a space the size of a Barnum & Bailey tent, there was almost nothing new in the HF world. Oh there were some new HT's for the VHF/UHF crowd (big crowd!) that weighed no more than a teeny-weeny bikini. Much the same can be said about all other categories, yet the volume of information was unrestrained! Be that as it may, there were some things going on at Dayton that are very much worth noting ... and some things that have happened in the past that deserve to be repeated for the sake of posterity and for the edification of those who are recent arrivals on the digital scene.

Juicy rumors circulated about well known hardware and software manufacturers who could not deliver certain parts of their promises at Dayton. Technology moves too quickly for them, too, I guess. Hi! But I made every attempt to track down all worthwhile reports and to check out the rumors. So enjoy the lessons of Dayton ... old lessons and new. All, we hope, quite true. May these observations fill in the void if you were unable to attend.

GLEANINGS FROM HARA

1. Digital technology provided the only excitement in the HF spectrum. Clover and Pactor (and the upcoming Level II Pactor) lead the parade -- at a time when, by the end of this decade, digital modulation will be used by all modes on HF. The days of linear modulation (SSB and CW) are numbered. Believe it or not! Some panic at the thought of such progress there may soon me a movement to protect the SSB user who will no doubt suffer at the hands of those who use the new technology.

2. Computer (and computer-related) booths took the prize for attendance this year. From Friday afternoon 'til closing on Sunday, lookers and buyers stacked five or six deep at the counter and filled the aisles. Hams can't resist low-sounding prices. Computers rolled out the door. The boom goes on. More HF digital users on the way? You had better believe it is so.

Why do they buy here? "No-name" computers (often built on the spot) were priced equal to or a shade less than the equivalent Compaq, IBM or Dell product. Somehow the 1-3 year on-site service warranty from those big brands seems to justify some minor differences in price. In the same vein there were also buyers of old versions of major software products. As an example, Word Perfect 5.0 was (as I recall) about $59. Is that a bargain when a competitive upgrade of 5.2 can be had for $87? Did that dissuade the eager buyers? Not at all. So be it.

3. Shareware disks were big sellers, too. Thousands of choices served to confuse the tireless shopper, but no matter. The prices were so low it seemed a good deal (except that the same stuff is free on most modem BBS' ... in the latest version). Oh well, it is a great way for those distributors to sell tons of floppy disks. CD-Roms and disks kept the crowds happy as well. The drive pricing is too confusing to evaluate, as always, but the disks seemed low priced.

4. Digital communication booths were busy. The Clover demo, while not "live," was nonetheless impressive. And Peter's (TY1PS) Windows interface for the Express software for the Clover card is a masterwork. I couldn't resist joining the crowd!

The Pactor and AEA booths were filled up most of the time. AEA was showing but not selling either the Pactor upgrade roms (you could phone in the order) or the Windows Packratt (very pricey! Now in its second beta version, we are told). This new mode is obviously growing by leaps and bounds. The change in sounds on 20 meters is dramatic. The usual RTTY and AMTOR chirps, long dominant, are now at least equalled by the strange sounds of the two new guys on the block. There is a question, openly discussed, about how much longer AMTOR will be in general use. For example, APlink stations may not be able to scan all the modes and AMTOR could be the first to go. Progress is the big news in the digital world.

If there was any new software for the digital modes, I missed it. New Windows logging and transceiver control programs were noted, but none seemed quite polished. There may be something there soon. A certain contest software writer, however, promises to have a Windows version out within the not too distant future.

5. Outside, the flea market disappointed many. Friday's weather was perfect and the crowd was there. So were the 'scopes. I have never seen so many oscilloscopes in my life. But there wasn't much else. Dull, that's what it was. Had it not been for the one big tent full of thousands of parts, I wouldn't have made my annual purchase of plastic tie straps.

ONLY THE FACTS

The RTTY dinner was big, successful and fun. Bill Henry ended the evening with a provocative, historical review (after perusing the full 40 year's worth of old RTTY Journals) of HF digital progress and a look into its future. While there is no room here for a full report, a portion of it is cribbed from Bill's notes and very much paraphrased in the following few paragraphs.

A. Yes, it is true. The original FCC frequency authorization for FSK RTTY included 14.000-14.200 MHZ. That was back in February 1953. Think what we have forty years later! No wonder we need more efficient modes. At this rate of attrition we will find ourselves locked inside the 14.099-14.100 segment by the end of next year.

B. Vic Poor W5SMM was not born in a mailbox, despite the rumor. But he has been doing something to and for mailboxes since birth. Witness the article, "Autostart for the HF Bands" in a 1964 issue of the RTTY Journal! APlink and WINLINK are but later chapters of the early work (when his call was K3NIO).

C. While nobody accused the ARRL of being conservative or slightly behind the times, it is a fact -- it required 23 years for them to award DXCC to the RTTY users. Four directors, including the president, voted against the proposal.

D. AMTOR was first described by its author G3PLX in 1980.

E. While nobody accused the ARRL of being conservative or behind-the-times, it is true that normal endorsements for DXCC were not granted until 1983!

F. Pactor was first described in a 1991 issue.

G. While nobody accused the ARRL of being conservative or behind-the-times, it was noted that it took 36 years for them to add a RTTY contest to their schedule.

H. The ARRL Board in 1992 directed the Digital Advisory Committee to endorse the IARU bandplan for fully automatic HF (read packet) digital stations. Semi-automatic is to be "studied further."

I. While nobody accused the ARRL ... wait a minute! Does this sound like a broken record? And you wonder why we need a new voice to represent the digital community?

THE DIGITAL DILEMMA

The typical HF rig sold these days contains three times the bells and whistles needed for the ordinary phone QSO, the basic use of such equipment. We suffer the same fate and more in the digital world. Not only does the RF equipment provide more than we want or need, so does the computer and the newer TNC's. But that's not even the beginning of the dilemma. Diversity, the product of technological development, poses new problems ... or opportunities, depending on your point of view. No other segment of the amateur hobby faces the number of **choices** we have. SSB remains static, CW petrified, VHF packet saturated, etc.., but we have nothing but options. Choices, though, create problems and no easy solutions are in sight. A couple of examples.

What is it you want? Do you want a Windows program that runs packet, AMTOR and RTTY. Or would you like Pactor, RTTY and CW in DOS? Or, how about just Clover and Pactor Level II in a 16 bit board run by third party software? Or what about a package that includes them all, if you have room, a big wallet and lots of patience? Oh, boy! What a maze! Don't look for any software package that fill this need near term.

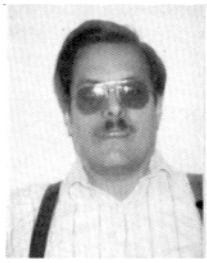
What is it that we do? Observe the bands and note another facet of the problem firsthand. Be objective, then guess how many keyboarders utilize more than 50% of the RTTY signal's capacity (or even 20% when you throw out the endless RY's and repeated ID's). Whatever your guess, the number points directly at the hardware/software/throughput quandary faced by the HF digital modes. Then, remember that RTTY signal's power is doubled, quadrupled, doubled again in the new modes. Yet, as you watch the screen, realize that with few exceptions the QSO content remains unruffled and unchanged. ID, Brag Sheet, Weather, Over-And-Out. CW talk in a hi-tech hi-speed world! And our overall utilization of our potential drops each month. How discouraging.

Where do we look for hope? There are two possible directions. Like the spotted owl, we can look to those in powerful places, who would protect the threatened keyboarder from the forces of technology. These Luddites who promise such an umbrella of hope (see Encyclopedia Brit. -- Luddites of Nottingham ca 1811) would tuck the new modes into subbands so that the traditional methods could survive (like AM in an SSB world). Or, we can take the high road and realize that we are blessed by technology. And challenged -- challenged as the HF digital operator has always been. Remember that the very first person on the air in 1953 in the RTTY mode, whoever that might have been, was someone not content with the simplicity of a microphone and transceiver. He or she wanted to complicate the hell out of life and do impossible things by adding a teleprinter, an interface, some crazy sounding signals; and later a computer, TNC, computer cards, complex signals and more. Folks of that sort have hope and faith ... and need no protection.

One expert put the answer rather bluntly. "A major user need is bandwidth efficient modes that support both high speed message processing and low speed DX and chat modes." Such a move would obviously help. But, asks another, if the new technology supports both ends of the speed spectrum, will the users respond? Will they pass more information? Will the typical QSO expand to fill the data vacuum? Can keyboarders be convinced they should send files as well as those slow, live transmissions? Will the daring among us experiment with new data . . . graphics? Digitized voice? Or, will we plod along with the 25 character message contained in the typical DX contact, the two second contest exchange and the 100 word, long winded QSO?

There are no easy answers. None were found at Dayton for I can speak only for myself and not for the large numbers of users who occupy the digital bands. I can theorize; get sweaty palms at the thought of passing understandable voice traffic at today's high speeds and narrow bandwidths, and recognizable sounds later on; the thought of compressed graphics chirping through the skies excites me; and even the traffic handlers sing a song of happiness. But a few thousand amateurs must themselves decide, speak up, take up the challenge, if they will. And prove to the world that the HF digital band operators deserve their license, their portion of the spectrum, their reputation for technical leadership ... and for being the nicest bunch of people on the air. Salut!

73 de **Jim, N2HOS** SK ■



PacTor

Phil Sussman, KB8LUJ
RR 1 BOX 31
Clayton, OH 45315

ED: See Phil's Bio on page 19

*** CONNECTED: KB8LUJ

This is a new column in the RTTY JOURNAL. Like most anything in its infancy, if properly nourished, it can grow and develop. My request of you, dear reader, is for assistance. PACTOR (if you didn't already know) is derived from the words PACKET and AMTOR. It is a new, exciting, and growing mode, with new users swelling the ranks every day. Information needs to be assembled and shared among us. If have an idea, an operating hint, a bug, a fix, a topic you would like to see covered, or whatever, please let me know.

My packet address is KB8LUJ @ WA8ZWJ.OH.NA or I may be found poking about 20 meter RTTY around 1700ET. You can send me a FAX anytime at 513-275-6387. And when all else fails, the USPS has been known to put letters into my box on occasion. I certainly do want to hear from you. Extra credit will be awarded accordingly. HI..

With so many digital modes in use, discriminating one from another can be pretty darn confusing. Just how does one tell them apart? The ear seems to offer the best hints. And you can get a help from the frequency, too. On 20 meters, a common digital operating area, packet operations are usually above 14.095 Mhz. Packet is two quickly oscillating tones with a duration of about a second. Two stations in packet communications are often described as sounding like two crickets sending back and forth at about a one second rate. Older RTTY, called BAUDOT (pro Baw-dough) can be commonly found from 14.080 to 14.095 MHz. Again there are two tones, but at a 170Hz frequency shift. They are more methodical and slower making them easier to recognize. BAUDOT transmissions are continuous with only one station transmitting at a time and no 'linking' of any sort. Transmission time is based upon the message length. AMTOR and PACTOR share the range of 14.060 to 14.083. Two stations communicating in AMTOR ARQ are said to be 'chirping' with two quickly oscillating tones at 100 baud at on on/off duration rate of about half a second. Two PACTOR stations communicating with each other also 'chirp' at either 100 or 200 baud; but, the rate of the sending station is about 1 second (0.96) and the linked station only gives a quick (less than 1/2 second) response. FEC transmissions, such as CQs or round tables, sound almost the same on FEC AMTOR or FEC PACTOR, with PACTOR transmitting continually while idle tones are interspersed on AMTOR, noticeably at the end. Stations calling CQ transmit about 10 to 60 seconds. Attempts to establish links via ARQ AMTOR or ARQ PACTOR also sound much alike. ARQ AMTOR tries to connect by cycling on and off at a rate of about twice a second. ARQ PACTOR tries to connect by cycling on and off at a rate of about once a second. Clover, although not as common, can be recognized by the appearance of four (rather than two) tones rapidly oscillating. It has a busy sweeping sort of sound. With a little practice, soon you too will be just as confused as the rest of us.

The ability of PACTOR to error correct, compress data, and speed change offers HF data users increased reliability. And the reasonable price of adding PACTOR to existing systems doesn't hurt. This is substantiated by the large number of users already using PACTOR, with more joining in every day. In my unscientific eavesdropping survey of PACTOR QSOs, there are many newcomers. So in my slightly biased opinion, PACTOR is the wave of the future. Is BAUDOT obsolete, PACKET overrun, or AMTOR kaput? Absolutely NOT. Each mode has its benefits and features. More operators have BAUDOT mode than any other. Indeed, other modes will survive. But as hardware and software become available and affordable, I believe many users will gravitate to PACTOR. All it takes is one PACTOR QSO to be convinced. Yes, PACTOR will become the popular mode of choice.

One advantage of PACTOR is the ability to use memory ARQ to make good packets out of those with errors. This increases throughput and makes PACTOR usable under deteriorating signal to noise ratios. PACTOR already has many advantages over AMTOR. But, are we getting all the advantage as promised in the original German specifications? Joe, N4IHP, a long time PACTOR user in Atlanta, GA.,

explains a shortcoming of most PACTOR TNCs is that few have memory ARQ with an A/D (analog to digital) converter. That results in about 5 db in decreased sensitivity, which is enough to lose a link under marginal conditions. With a strong signal most any PACTOR TNC runs pretty well; however, as the quality of the link decreases, so does its speed. The question is whether AEA or KAM use DSS in newer products to implement this scheme, which is widely used in Europe. More on this topic in the future.

Another project upon which I am engaged is to create a list of PACTOR BBSs. I have a few, but the list is by no means complete. So if you have a list of your own, please pass it along to me, and I will happily share it.

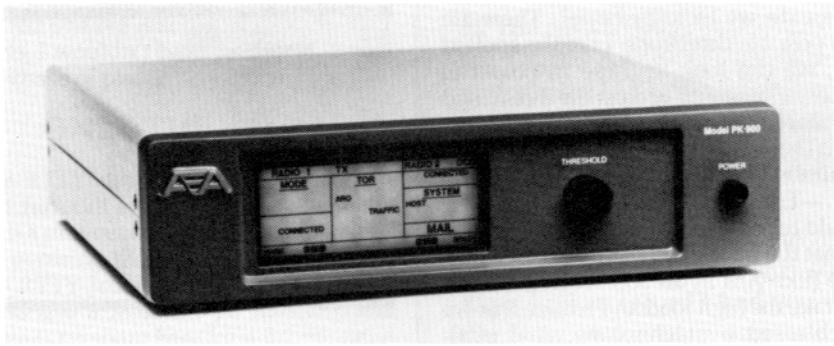
I heard several KAM users complain of software and lockup headaches. Also, there are some reports that AEA has glitches in their new PACTOR firmware as well, concerning echoing and backspacing? I have no first hand knowledge of what problems exist(ed) or what solutions have been advanced. If you have a problem, a solution, or can keep me advised of the latest software version available for your TNC, I would love to hear from you.

As this article is being written, the annual pilgrimage to the Dayton Hamvention is soon to begin. Many new and exciting developments are sure to follow. Did you heard, Peter Helfert, DL3MAA, one of the German innovators of PACTOR plans to give a presentation at Dayton? I hope to meet many of you there and plan to have a PACTOR report shortly thereafter.

Some future topics in the mill are a short description of PACTOR, how to get a PACTOR TNC hooked-up and running, some helpful operating tips, reports on PACTOR MSOs, graphics on PACTOR, and reports on PACTOR activities.

REVIEW - PK900 Part I

The first thing that strikes you when you open the shipping box, is the size of this unit. Its roughly a foot square and three inches tall (29.8cm x 29.8cm x 8.9cm) and weighs a bit over 4 1/2 pounds. (2 kg) You could easily fit a couple of TNCs into this package and indeed that is what AEA has done with the PK-900. It is a Dual-port Triple-processor Multi-mode Data controller capable of Morse, Baudot, ASCII, FAX, SSTV, Siam, TDM, Navtex, AMTOR, SEL-FEC, and PACTOR (optional) operation. It is arrayed with no less than 4 each, 5 pin DIN sockets, a 25 pin RS-232 connector, a 12 volt



DC power connector, and a couple of 1/8 inch phone jacks for good measure. It is packaged in an attractive, two tone gray case made of a substantial metal shell.

A marked difference of the PK-900, is the absence of light emitting diodes (LED) anywhere on the unit. Instead there is a backlight (light orange) liquid crystal display (LCD). For a guy who always watches LEDs flash back and forth, watching a display takes some getting used to. I counted 44 separate LCD words on the display; however, some partially illuminate at times. For example, when you make a connect the letters "DIS" disappear from the word "DISCONNECTED", leaving the word "CONNECTED" on the LCD. Also you will see the letters "UN" flash on and off from the word "UNACKNOWLEDGED". As a result, I found myself focusing on the display rather than noticing a LED flicker. It's a minor distraction until the novelty wears off, which takes about a week.

INSTALLATION

As with anything new, I am tempted to rush hooking things together and get on the air. But first, be sure your power supply can deliver the 1100 milliamps (1.1 amp) required to power the PK-900. The ICOM IC-761 which I used for testing can only supply 1 amp from its accessory connector. I recommend a separate power supply capable of delivering the rated current. Also, watch the polarity of the power plug. The center pin of the PK-900 power socket requires a positive voltage, which is clearly stated in the instructions and even illustrated on the rear of the unit. However, there are plenty of other power supplies which will fit that power plug and are wired in reverse. USE CARE!

The manual is typical AEA (big) from an operational standpoint. My count was 319 pages (with PACTOR update) composed of 8 1/2 x 11 sheets. They are NOT bound together but housed in a binder which allows easy updating. Each mode is discussed in turn, along with operating tips, and a lengthy command summary. There is plenty of information on interfacing the PK-900 to most any rig imaginable. Appendix 'E' is full of charts and wiring diagrams and helpful notes. Also there is a 9 page Table of Contents, but no index. A deficit in the manual is the specifications. Other than a listing of processors and capabilities, the only details given are the output level, keying, and the power supply requirements. There are features mentioned on the packing box that are glossed over in the manual. Where are specifics on sensitivity or filter bandwidth? There's no 'brag sheet' where the features are given and with an explanation of the derived benefits? Another shortage is the lack of a Theory of Operation, or a brief explanation of each mode. (especially PACTOR) Also missing from my manual was the ENTIRE Appendix 'B', the schematic diagram. (shown on page TOC-9 of Table of Contents) In fact the first page of Appendix 'C' (C-1) is printed on the reverse sheet of the last page of Appendix 'A' (A-111). It is nice to know the PK-900 uses a 3 volt lithium backup battery (PK-88 manual has an appendix page dedicated to this lithium), there are 4 crystals (4.00MHz, 4.19MHz, 4.91MHz and 12.2MHz), or the power fuse is a GMA-2. Also there was no parts list. There's a lot of information on how to use this unit, but little on the unit itself. In my case, when hooking up the rigs, it would have been most helpful to have some idea of the audio output component values. (read on) Granted the manual is already big, but too often these days, I feel, we lose a sense of some of the basics at the expense of a multitude of modes and features. I might also note that I received and installed the PACTOR upgrade, and that some of the manual revision pages that came with that upgrade were missing, too. On a product as nice as the PK-900, I expected more and better from the manual.

In my test set-up, I used an ICOM IC-761 on port #1 and a Kenwood TR-7400A for VHF packet on port #2. It took a little longer than average for me to connect the rigs, but then again, there are two of them. The first order of business was to connect the computer. This was relatively simple as I used the cable provided by AEA to interface with a 386-25. A nice touch is that the RS232 cable

passes all 25 pins. That's very helpful if you are a person like myself who connects a lot of things to the COM ports. Most cables pass a limited number of pins, if they are even supplied at all. I fired up PROCOMM (a terminal program) at 2400 baud and after resetting the PK-900 (holding reset, turning power on, releasing reset) I hit one (*). The autobaud routine operated flawlessly, placing me in the command mode. I prefer to configure and test in the dumb terminal mode. Since host mode software for the PK-900 is on the way, I leave that topic for a later article. As I entered MYCALL, a message was returned "MYCALL was PK900/PK900, MYCALL now KB8LUJ/PK900". It was then I realized that several of the commands were dual and separate parameters could be entered for each port. A nice touch is the VOltage command which gives a digital indication of the PK-900's power supply condition. After doing a loopback test, as described in the manual, I began to connect the rigs.

The PK-900 limits operation of the second port to PACKET. So I first set about connecting the TR-7400. The directions and the wiring were clear and in a few minutes I had the cable wired up and connected. It was time to enter the CALibrate mode and set the AFSK output level. I typed CAL and then 'K' to cycle on the transmitter. Aided by a borrowed service monitor, I attempted to set the AFSK level to about 3 KHz deviation which cycling between MARK and SPACE (spacebar). I was not happy with what I saw on the monitor scope or what I heard. There was some sort of noise or hum riding on top of what should have been 'clean' tones. It did not take long to verify the source as the PK-900. Indeed, reducing the AFSK level to minimum did NOT eliminate the noise, which was deviating the carrier to almost one kilohertz. When I disconnected the white (mic hi) wire, the noise disappeared. I noticed the 3 KHz point of adjustment on the PK-900 AFSK Output control for port #2 was about 1/4 scale. So I tinkered around with adding resistance in series with the microphone line and increasing the AFSK output. As the resistance went up, the noise went down. With a value of 12K ohms, the noise generated less than 100 Hz deviation at minimum AFSK output and a little over 1/2 scale yielded 3 KHz. SUCCESS !! A quick connect to the local packet cluster verified what I already suspected; things were working fine.

I approached interfacing with the IC-761 a bit more cautiously. I am a firm believer in using FSK whenever possible. On most rigs, operating FSK allows you to use the narrow filters, silences the local microphone, and displays MARK frequency. BAUDOT being one of my favorite modes, I wanted a good setup. However SSB (and thus AFSK) operation are necessary for other modes. After gaining illumination about the noise problem on port #2, I decided to connect AFSK first and then FSK. Again with the excellent documentation and the proper 8 pin DIN connector for the accessory jack (Radio Shack 274-026), the interface cable was finished in short order. With the ICOM in SSB and terminated in a dummy load, I entered the CALibrate mode and hit 'K' to transmit. Whoops, both the IC-761 and the TR-7400 went into transmit. I quickly powered down the TR-7400 and tried again. With the AFSK control on Port #1 at minimum, I noticed about 5 watts RF output into the load. A separate monitor receiver and the service monitor scope confirmed my observation; noise was being transmitted. This time it took over 50K ohms in series with the white wire to eliminate the problem. Remember to type 'Q' to exit the CALibrate mode. I made a couple of quick contacts on AFSK BAUDOT, after disconnecting the microphone AND remembering to use LSB.

To use FSK a wire needs to be run from Pin #1 of the ICOM accessory jack to FSK-N (pin #4) of the PK-900 FSK 1/2 jack. AEA supplies a couple of 5 pin DIN plugs for this purpose. Using a short piece of shielded wire, I thought it would be a snap. I was wrong! The AEA supplied DIN connector did NOT take solder. I had no such problem with the Radio Shack DIN at the other end, but the AEA DIN stubbornly refused, even after scraping the side with an electrician's knife. Then the pin started to migrate. Armed with a 700 degree tip in my solder station and a mighty chemical arsenal, I was going to conquer this insubordinate plug. After ten minutes, a few chemicals, and a few well chosen words, the plug surrendered. I switched to FSK operation and ran a couple of more tests. Everything checked out perfectly.

I am a nut about grounding. Everything in the shack is tied to a common ground point. With flat head screws holding the covers, it was difficult to find a good point to connect a ground wire. Adding a ground screw may be a good idea.

With the hardware problems solved, and the hard work out of the way, now was the time to have some fun and put the PK-900 through its paces. I started by running a WEFAX program (more on that later) and printing a weather map. Then I set out to explore all the features and capabilities of the PK-900. I was not going to leave one mode untouched and I was not disappointed.

Since there needs to be room for other columns in this issue, I trust you will allow me the opportunity to continue in Part Two as I put the PK-900 through some interesting tests and discuss some interesting and unexpected results. It will be material worth reading.

I want to thank Jules, W2JGR, for his assistance and all who contributed their thoughts. Certainly this column can not exist without the help of others. If I stumble, please feel free to give me a hand. Thank you for sharing your time through reading, too.

Until next time, de **Phil, KB8LUJ**. May God Bless you and yours. Link d-o-w-n..

*** DISCONNECTED: KB8LUJ ■

-- -- -- Newcomer's Corner -- -- --

For Contesters

Every once in a while in a contest, when I call CQ, a station will call me, sign his call, and then send the message exchange without ever first establishing that I have heard his calling. The first time this happened I concluded that the caller just hit the wrong Function Key. But it still happens from time to time.

I think I have it figured out. This is probably packet ops that are trying their hand at RTTY contesting. Since packet doesn't need any acknowledgement of contact before sending a message, packet ops just simply send the whole ball of wax with each transmission.

Well, here is the way it's supposed to work: In a CW, SSB, or RTTY pileup, number one is to establish the contact. The one running the pile listens (watches) to select the station's callsign to come back to. He sends the caller's call, then the exchange, and finally turns it back to the caller. The caller acknowledges the message received, and then sends his exchange message and stands by for the "R-R TNX... QRZ? TEST DE ....." from the pile runner.

This method assures who is working who. In addition, the exchange is acknowledged both ways, and the callsigns are logged both ways. This method is 99.9 percent reliable and accurate. That 0.1 percent goof is possible because someone got the call clobbered in the QRM and is one source of duplicate QSO arguments that occur sometimes.

((73))

de **Rich, N6GG** ■

THE LINK

Jim Jennings, KE5HE
Rt 2 BOX 165E
Hearne, TX 77859

Report on the Dayton Hamvention

A fine time was had by all as usual. If you did not attend, please try to make it next year. Some of the items I recall are:

1. Ray Petit, W7GHM gave a very interesting DIGITAL DIGEST Forum talk on CLOVER. He mentioned that TY1PS sent a 150K executable file to K4CJX using the TY1PS EXPRESS program on HF/CLOVER (15 meters I think) in a little less than 30 minutes. That is a real technical advance in my opinion. This works out to be an average throughput of 667 bits/second.

2. The HAL booth was the popular meeting place for the APlink (WINlink) crowd. Their display of CLOVER attracted a lot of attention. Being able to discuss CLOVER tidbits with Ray, W7GHM was informative.

3. Discussions with AEA confirmed that all of their multimode controllers (PK-232, PK-900, and DSP-2232) are compatible with APlink (WINlink). I was told that even though the PK-900 uses an analog front end like the PK-232, it switches between a narrow and wide mode on HF. The narrow mode would be used for AMTOR or Pactor and the wide mode would be used for Packet. This may make the PK-900 the ideal choice for those of you that intend to upgrade to a unit with Pactor capability. I understand the Pactor ROMs are at additional cost on the PK-900 as with the PK-232. Although the PK-900 is a dual channel device one of the channels must be VHF packet so you can't run Pactor and AMTOR at the same time on a single PK-900.

4. Hans-Peter Helfert, DL6MAA (the inventor of Pactor) gave a very informative talk on Pactor during the second half of the DIGITAL DIGEST. (Dale Sinner, W6IWO, the fearless leader of the RTTY Journal was moderator for the DIGITAL DIGEST forum held on Saturday.

5. I didn't buy any radio gear, but I made up for it with a 17 inch multi-sync monitor for my computer and some software to do printed circuit boards and schematics. I will try to report on the software in a later column.

6. The RTTY Dinner was a big success, we all thank Steve Waterman, K4CJX, for taking care of the arrangements. John Troost, TG9VT (SK), was remembered via a very well done tape from his XYL. Thanks.

7. Bill Henry, K9GWT, gave a very good after dinner talk at the RTTY Dinner. Bill has taken the time to summarize the history of Amateur Radio Teletype as detailed in the RTTY Journal over the past 40 years. Bill was kind enough to send me his notes for the talk and I will excerpt some of that information for you.

Amateur Radio Teletype History (edited)

- 1946-47: VHF RTTY started on both coasts - AFSK on 2 meters.
- 1953: The RTTY magazine started by Merrill Swan, W6AEE. FCC authorizes HF FSK RTTY operation (Baudot - 60 wpm) on 80, 40 and 20 meters. 15 meters was added later in the year.
- RTTY magazine features articles about FSK generators and need for stable receivers.
- A article described the new Model 28 TTY machine.
- 1st Annual RTTY Sweepstakes Contest on 10/31/53 (won by W3PYW with 440 points).
- 1954: 2nd Annual RTTY Sweepstakes again won by W3PYW (W1AW submitted a log).
- 1955: 1st Annual RTTY Meeting, W3PYW again won the sweepstakes.
- FCC changes rules to permit 170 Hz shift.
- 1957: W5NRM/W9TCJ article about Autostart, the was the beginning of RBBS.
- 1958-63: Several articles by Irv Hoff, K8DKC on RTTY converters.
- 1964: Articles by Vic Poor, K3NIO - "A Second Look At Limiterless Reception" and "Autostart for the HF Bands". (Yes this is W5SMM the author of APlink/WINlink).
- 1966-70: Last issue of RTTY by Merrill Swan and first issue of RTTY Journal by Dusty Dunn, W8CQ.
- More technical articles on demodulators and the introduction of the SELCAL for RTTY.
- 1971: HAL introduces the 1st solid state video display for RTTY.
- ON4BX receives the 1st RTTY DXCC plaque from the RTTY Journal.
- 1972: FCC approves the use of higher RTTY speeds, all Baudot.
- 1974-75: More articles by Irv Hoff (now W6FFC). The one in 1975 on the Mainline UT-4 demodulator is a classic.
- 1976: HAL announced the ST-6000 Demodulator and DS-3000 display. This was the first commercial microprocessor controlled video RTTY terminal.
- ARRL finally decided to award DXCC for RTTY (5 years after the first DXCC plaque given by the RTTY Journal). Four directors voted against including Mr. Larry Price.
- 1977: Last issue by Dusty Dunn and first issue by Don Crumpton, W6KCW.
- Editor Don Crumpton is Silent Key. Don's XYL Dee Crumpton continues the RTTY Journal.
- 1979: HAL announced the DS-3100ASR - the first split-screen buffered "ASR" video terminal.
- Article by Drew White, K9CW - "A Microprocessor Controlled WHO ARE YOU"
- Macrotronics announced the M800 RTTY system for the TRS-80 (first commercially available system using a separate computer.)
- Kantronics announced the "Field Day" portable reader.
- FCC proposed and then dismissed a rule change to drop CW ID (Objections from ARRL?).
- 1980: FCC approved use of ASCII code - up to 300 baud on HF.
- Article by Peter Martinez, G3PLX - "AMTOR, An Improved Error-Free RTTY System".
- 1981: HAL announces new equipment, a MSO option for the DS3100 and a portable RTTY terminal.
- 1982: Tucson Amateur Packet Radio (TAPR) Club formed.

- FCC approved RTTY operation on 30 meters.
- Kantronics announced "The Interface" for the APPLE-II and VIC-20.
- HAL announced the ARQ-1000 AMTOR terminal.
- 1983: FCC proposed "no-code" amateur license.
- Article by Harold Thurlow, K8CV - "VIC-20 RTTY Interface".
- FCC removed CW ID requirement for RTTY.
- AEA announced the CP-1 Computer Patch Interface and the AMT-1 AMTOR Interface.
- ARRL offers RTTY endorsements for DXCC.
- 1984: FCC withdrew "no-code" license proposal.
- 1985: AEA introduced first PaKratt, the PK-64.
- 1986: HAL introduced the ST-8000 HF Modem.
- Last issue of RTTY Journal by Dee Crumpton (now N6ELP) and first issue by Dale Sinner, W6IWO.
- AEA introduced the PK-232 all-mode TNC.
- 1988: Vic Poor, W5SMM, devised APlink, HF AMTOR to VHF Packet software.
- 1989: ARRL finally sponsored a RTTY contest. This was 36 years after the first contest sponsored by RTTY magazine.
- ARRL petitioned FCC to make packet STA permanent and allowing automatic operation within sub-bands. (RM 7248)
- 1990: ARRL withdrew RM 7248
- AEA introduces first DSP modem, the DSP-2232.
- 1st CLOVER article in QEX by Ray Petit, W7GHM.
- AMTOR and APlink used for communications with 9K2DZ during DESERT SHIELD.
- CLOVER articles appeared in RTTY Journal.
- 1991: Pactor described, PacComm announces Pactor controller.
- ARRL/RTTY Journal Digital Questionnaire issued.
- 1992: ARRL Digital Committee met and endorsed semi-automatic HF operations.
- ARRL Board directed Digital Committee to endorse IARU bandplan for fully-automatic HF digital stations. "Semi-automatic" operation is "to be studied further".
- AEA and Kantronics announce Pactor up-dates.
- HAL ships first CLOVER-II PCI-4000 modems.
- 1993: ARRL petitioned FCC for fully-automatic HF digital operation in IARU sub-bands.
- FCC issued Docket 93-85 regarding RM-7649, 7669, 7675, 7676,7681, and 7904 regarding message content responsibility.
- Digital Committee met and again recommended semi-automatic HF BBS operation.
- FCC issued RM-8218 regarding fully-automated HF message relay stations.

(End of History by Bill Henry)

Summary of the Above

Bill made a number of comments about the future which I would like to share with you, but I will save those for next month as they need some discussion. Please read over the history cited above, it brings back some fond memories to a lot of us. We are also reminded again when reading it of the unreasonable bias that ARRL has in favor of CW. Folks, I am not biased against CW. However I will continue to insist that the League should open up to include in a more active way new and developing technology. The history shows clearly that the ARRL has been biased against HF digital. It took 36 years for the ARRL to sponsor a RTTY Contest. It took 5 years for the ARRL to approve RTTY DXCC. I am told that Irv Hoff's excellent series of technical articles on RTTY demodulators appeared in Ham Radio and RTTY Journal because QST had a "policy" of 1 RTTY article per year. The current position of the Board tells me that nothing has changed concerning the League's bias.

73 and GOD BLESS

de **Jim, KE5HE** ■

Biography

Phil Sussman; KB8LUJ

My venture into ham radio is actually a return. When I was 8 years old, I was always taking things apart and trying to understand them. Shortly thereafter I was a contractual repair service for the Bulova Watch Company (yes, once upon a time Bulova was in the radio business). I sometimes wonder if they knew that I was only 12 years old. I was interested in radio and electronics and was an avid SWL (short wave listener), receiving schedules from all over the world. Since I spent many summers in upstate New York, I built radios and did experimental radio studies on 27 MHz with the call sign KA2XWJ. I was the kid in the shack (and underfoot) with Coleman Nace (W8ZCS,sk) or Bill Handler W8ZRO) and learned a great deal from those gentlemen.

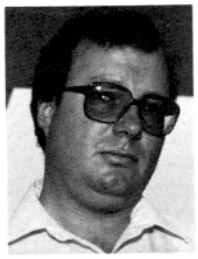
I learned Morse code in High School from Avery Allen, the electronics teacher, who thought everyone should know it. (Mr. Allen thought I was the best student in electronics that he ever had.) I was a friend of Hyde E. (Rube) Ruble,sk (founder of Srepco, Pioneer/Standard, etc) and was often in his shack as well. (Rube told me that I should keep up with technology. He was right!) At the time a Novice License was limited to one year and had few privileges. As I was content to yak on the rigs of these elder statesmen, thoughts of my own ham ticket faded away.

I devoted several years in working my way through the University of Dayton where I received two engineering degrees. I received training at the Dayton Police Academy, but was not happy with my lot. I worked for Systems Research (SRL), as a field service technician, and for over 25 years at Elektro Communications. My adventures in teaching started quite by accident at a YMCA electronics class and a local Sunday school, and I was roped into being a merit badge counselor for the Boy Scouts. I discovered that I enjoyed teaching and have been contributing in that regard ever since.

Somewhere along the way I found myself absorbing computer technology. At first I was repairing those old teletypes (remember the smell of the oil) which were used for time sharing. Then I was into hardware, software, and modems. Before long I was a FORTRAN programmer. Finally I escaped into the world of VHF FM radio, where I have remained.

Early in 1991, my wife re-kindled the ham flame when she said I needed a hobby. I think it was a recommendation she has come to regret. I heard the Morse Code test was going to be 'abolished', and since I still remembered the code I had learned 25 years previously, I decided to get my ticket before they did. Two weeks later I passed my NOVICE and received the call KB8LUJ in February of 1991. In May of the same year I upgraded to EXTRA.

I fell in love with the digital modes and restored an AEA CP-1 and an old VIC-20, from my SWLing days, for use on the ham bands. I have been into digital, following the growth and development of new digital modes. Usually you can find me haunting the 20 meter RTTY band around 2100Z. I do not consider myself a contester, but I have entered a few. I do not consider myself an avid DXer, but I still work DX now and then. Still I am a Novice at heart (aren't we all) and so I retained my old call as a reminder.



CLOVER

Jay Townsend, WS7I
P.O. BOX 644
Spokane, WA 99210

Spring has finally arrived in the Great Pacific Northwest, and it's been a very long time in coming. I wasn't sure that it was ever going to get over 65 degrees this year. Dayton has once again come and gone. Betsy and I enjoyed this year even more than last. A few friends didn't make it this year, but most of the gang was there. Bill Henry of Hal Communications gave an inspired dinner speech. The Dayton Digital dinner will long be remembered by all in attendance. Bill's predictions for the rest of this century need to be written down so that we can track the progress or lack thereof in the digital fields.

My mailbag had a couple of surprises in it this last month. Harold, KL7PG, writes about the disruption of the digital bands and all the new modes that continue to show up. One of Harold's main points was "Whatever became of the 'gentlemen's agreement' for mode operation in the [HF] bands?" I would of course agree. There were no other comments about my editorial column. Guess folks can only complain to others, but not to the source!

I received a response to my letter and follow up phone call to one of our advertisers about customer service. I think that the problem has been resolved and readers, users, and consumers need to be aware that many of us have "selective hearing" in certain situations. The 1990s have brought to Ham radio a very difficult time. Software and hardware and the complex interaction of the many pieces make problems so easy to have and yet so hard to handle. Over fifty percent of returns to manufactures are for problems in wiring, or lack of RTFM. By the way, RTFM is really -- Read The Factory Manual.

Had a nice note from AA4M/6 and also enjoyed seeing him at the Dayton Hamfest. You will read elsewhere that Mike, KI7FX is doing the hardware reviews. He and maybe even Dale haven't actually figured out that I am retiring! Clover will now be my focus in the Journal. There are a couple of projects that I will continue to completion and review as promised.

Interflex System has new versions of their software. They also have a version now for the new AEA PK-900 which is on the way to me. For more information contact them direct at 714.496.6639.

Now down to the serious or semi-serious part of this column. I have received a software update to the PCI-4000 (CLOVER) which makes the monitor function actually work. Discussions at Dayton with some of the developers seemed to indicate that it wasn't perfect yet, but I have been doing a lot of monitoring. On 7.084 you can copy up to four hours at a time of messages going from W0RLI and others to California. I have saved these to disk and all look perfect to me.

This was perhaps one of the only things that the CLOVER board didn't do well and was holding back some users. This feature lets you copy things on CLOVER about as easily as you can copy AMTOR stations. Most of the time both sides of the conversation/traffic can be monitored. This I forecast, will lead to more ragchews. Just as AMTOR became so popular when you could listen in to others, so will CLOVER.

Speaking of ragchews, while at Dayton it seemed to be the opinion of most that CLOVER is basically for volume traffic folks. NOT SO, say I, after spending about two hours in a ragchew with a gentleman in ZF land. Frank, ZF1RC and I had a real nice chat. This was not unlike my previous DX chew with JA3BN. I enjoyed a real conversation with Frank who lives in a place which we fly over frequently on the way to Ecuador. CLOVER worked amazingly well. One thing of note that I determined while in this ragchew which was rather fun, was the ability to hear signals in a wide part of the spectrum. As we were typing away andI awaited the response from the Cayman Islands, I noticed that an RTTY signal came up in the passband of the receiver. I was using the 2.4 Khz filter on the FT-1000 and heard the station fire up with a string of RYs. Yes, it was one of the "gentlemen" suggesting that this mode in this area of 20 meters was out of place. (Which I agree with) The problem was much like packet, the station attempting to jam us wasn't even on the right frequency. CLOVER shifted to a more robust mode and continued the QSO.

It's my opinion that CLOVER and PACTOR need to move out of the DX window parts of 20 meters. The area 14.080 to 14.090 at least should be left for RTTY and DXing. However, that in no way excuses deliberate QRM and jamming. CLOVER 14.096

Over the course of this rather exciting QSO, I heard a number of signals come up in my receiver passband. These signals had a very small effect on the CLOVER boards ability to process signals. It shifted modes and continued. The actual size of the signal that the board uses is much less than what you can hear, about 500 Hz.

Well my good friend, Rory, N7CR returned to Spokane from sea duty, just after Dayton. Rory runs the local APLINK station, which I have helped support over the last couple of years. Betsy invited him for dinner (you should see a radio officer just back from sea eat!) and we spent part of the evening talking about the digital modes and things that have been going on in the digital world. The next evening he appeared on the doorstep with a wad of hundred dollar bills and insisted on taking away my PCI-3000 board and the PCI-4000 board so that he could install them both his local N7CR station. I had to make a special phone call to get permission to let him have my demo PCI-4000 board.

Rory, has it all running and has also got WINLINK up and running with the system. (I await a new CLOVER board.) It's kind of hard to continue testing without the board, so luckily this time period between reviews will be pretty long.

While in Dayton I discussed with several people the moving of CLOVER users to frequencies other than .084 (LSB) and hopefully this will occur fairly soon so that keyboard DXing and rag chewing can continue. I also joined the new association that our software author for the RTTY Journal was pushing in the hospitality suite. While engaged in some heavy scotch drinking another contest was purposed. Jim should have the rules before too much longer.

By the way, Betsy, WV7Y is out of action for a couple of months with a surgery just completed. She is recovering nicely. Ted, HC5K and her weren't on quite the same page in the QSL card business. Ted, HC5K, is direct only to P.O. Box DX, Cuenca, Ecuador and NOT via KT1N. Which reminds me. Look for a couple of new classes in the CQWW RTTY. Single Operator -- Low Power and Multi-operator Low power. These were items of hot interest in the hospitality suite.

An interesting thing happened to me this last month. I was interested in joining BARTG (British Amateur Radio Teletype Group). An exchange was made with RTTY Journal subscription being paid by myself and my dues to the BARTG by a Ham in England. You might think of that sort of exchange as the problems of different money in different countries is always something that holds us back. HC8J QSL cards have still not been received from the printer. Look for them soon tho.

73, de **Jay WS7I, HC8J** ■

WS7I @ WB7NNF.WA.USA.NA

FidoNet 1:346/3.0

A Paid Advertisement

BMK-MULTY

Multi-mode software by G4BMK for IBM-PC or compatible.

By Steve Schnedler AC4IW, U.S. distributor of the BMK-MULTY software.

Brief Description

BMK-MULTY is an advanced "standalone" software package that provides superior transmit and receive performance on AMTOR, RTTY, CW and now PacTOR with an ordinary RTTY terminal unit (dumb T.U.) such as CP-1, CP-100, TU-170, TU-470, HD-3030, ST-6, ST-5000, ST-6000, CRI-100, CRI-200, Interface II, Dovetron, FSK-1000, etc. BMK-MULTY eliminates the TNC, as the data processing functions of a TNC are performed in software running in the PC. RF noise from the separate processor in ordinary TNCs is absolutely eliminated. (While a TNC is not needed, we do now have an adapter board that allows direct access to the modem part of a PK232, bypassing the data processor in the PK232 entirely. MBX option is not required.)

In addition to outstanding performance, the software feels quite natural and is very easy to use. Numerous operator convenience features include simple function key usage; split RX/TX windows on screen, plus type-ahead window; informative status lines; automatic callsign capture from received text (as well as AMTOR SELCAL capture); 36 easy-to-configure memory buffers, plus transmission of prepared text files; disk capture and review.

AMTOR and RTTY

The BMK-MULTY AMTOR implementation is without question the best available. When combined with a good terminal unit (in contrast to compromise modems found in multi-mode data controllers), performance is unmatched.

The software implements an advanced algorithm which synchronizes exceptionally rapidly even without idles/phasing characters, with retrospective printing of characters received while synchronizing, and remarkable resistance to false locks. Will copy a brief CQ call that pops out of the noise. Monitors both sides of an ARQ QSO without missing a single character from either side. Automatic selection of MODE-L, FEC or ARQ-QSO mode eliminates risk that incoming calls will be missed due to your system being in MODE-L.

RTTY mode implements a unique multi-sampling algorithm and has a very effective autoprint mode which minimizes garbage on screen without loss of valid data.

PacTOR

The highly-regarded BMK-MULTY software has now been extended to PacTOR, and is the world's first commercial implementation of PacTOR for use with a dumb terminal unit. BMK-MULTY is officially licensed and approved by the German developers of PacTOR, Spezielle Communications Systeme GmbH. With BMK-MULTY, there is no need for a hardware data controller (TNC) to run PacTOR. The PacTOR mode is fully implemented, and the simplicity and ease-of-operation which characterize BMK-MULTY AMTOR are also found in PacTOR.

PacTOR Memory-ARQ Operation

BMK-MULTY implements digital memory ARQ, which allows the reconstruction of valid received data from repeated corrupt packets. BMK-MULTY simultaneously applies a number of algorithms as repeated packets arrive, and the resultant text is accepted as soon as a rigorous 16-bit CRC calculation indicates validity. Digital memory-ARQ as implemented in BMK-MULTY is quite effective in practice, and a status indicator counts the number of reconstructed packets during a QSO.

There are other PacTOR systems which implement analog memory ARQ. Which is better, digital or analog memory ARQ, depends on band conditions. When pulling extremely weak signals out of the noise under conditions when multi-path dispersion is not excessive, analog memory ARQ is probably better. However, a typical band condition is characterized by rapid selective fading and multi-path dispersion. As is well known to RTTYers, such conditions can actually cause the order of bits to be reversed at the receiving end. When a repeat packet is transmitted, individual bits can become overlapped in time from one packet to the next. Analog memory ARQ actually makes the situation worse by attempting to combine a given bit from one packet with an adjacent bit from another packet. Under such conditions, the digital memory ARQ approach of BMK-MULTY is superior. On balance, there is little difference between the two. As a loose analogy, it's like asking whether a limiterless AM or a hard-limiting FM demodulator is better for RTTY. It depends.

Price and Ordering Information

Base package including AMTOR + RTTY + CW + Audio Spectrum Analyzer: $95.00. Base + Pactor: $145. Extended version also includes reception of HF WEFAX and SSTV: $125.00. Extended + Pactor: $165. Pactor alone: $50. PK232 adapter board $49. Amateur callsign required with order. Please specify 5¼ or 3½ inch disk format.

Above prices include disk and printed manual. (No printed manual for Pactor alone; manual on disk only.) Add $3.00 for shipping to U.S. addresses. VISA and MasterCard accepted. North Carolina residents please add 6% sales tax.

Schnedler Systems AC4IW
25 Eastwood Rd.
P.O. Box 5964
Asheville, North Carolina 28813
(704) 274-4646

CONTESTING

Richard Lawton, N6GG
14395 Bevers Wy
Pioneer, CA 95666

RTTY Contests - Coming Events

All rules + logsheets are in the RTTY Contester's Guide

Date:	Contest:
JUN 12-13	ANARTS WW RTTY Contest (Australia)
AUG 21-22	SARTG WW RTTY Contest (Sweden)
SEP 25-26	CQ/RTTY Journal RTTY Contest (USA)
OCT 16-17	JARTS WW RTTY Contest (Japan)
NOV 13-14	WAE RTTY Contest (Germany)

-- -- -- REMINDERS -- -- --

Mail your ARI DX Contest logs by June 2, 1993.

Mail to:
ARI Contest, I2UIY
P.O. Box 14
27043 Broni (PV)
ITALY

VOLTA RTTY Contest logs must be received by July 30, 1993.

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

-- -- -- COMING UP -- -- --

June 12-13 ANARTS WW RTTY Contest

Sponsored by Australian National Amateur Radio Teleprinter Society

Starts: 0000Z Saturday, and ends 0000Z Monday, a total of 48 hours. Not more than 30 hours of operating time allowed for single op stations. Off times may be taken at any time during contest period. Multi-op stations may operate the entire contest period.

Summary of operating times must be submitted with each score.

Bands: 80, 40, 20, 15, and 10M. (five bands)

Classes: (A) Single-op; (B) Multi-op; and (C) SWL.

Modes: All digital modes permitted; RTTY, AMTOR, FEC, and Packet.

Exchange: RST + Zone + Time (UTC).

Multipliers: Each ARRL DXCC Country, and each call district of VK, JA, VE, and W count as separate countries on each band. QSO's with one's own country is not valid for multiplier count. (W6 may work W7 or W5 for mult, but not W6.) Each continent QSO counts as a multiplier (maximum of six).

QSO points: Use Exchange Points Table to determine QSO points. (See the Table on page 20 of April '93 issue of RTTY Journal)

Scoring: Total exchange points times total multiplier count times the number of continents worked. (maximum of 6)

After the above calculations, world stations add 100 points for each VK QSO on 20M, 200 points for each VK QSO on 15M, 300 points for each QSO on 10M, 400 points for each VK QSO on 40M, and 500 points for each VK QSO on 80M.

Awards: Awards will be issued for 1st, 2nd, and 3rd place on world basis, and also on a country basis.

Logs: Separate logsheets are required for each band. Logs must show: BAND, DATE and TIME (UTC), CALLSIGN, MESSAGE Sent and Received, NEW MULTIPLIERS, and QSO POINTS. Summary sheet must show: Your callsign, name and address of operator, bands used, points claimed for each band, number of VK stations QSOed, total points claimed, and signature/s. Multi-op station logs must contain the signatures and callsigns of each operator.

Logsheets, summary sheets, multiplier and dupesheets, EXCHANGE POINTS TABLE, and a Band Use Chart for recording ON/OFF TIMES are all available for copying from the RTTY Contester's Guide, published by the RTTY Journal.

Logs must be received by the Contest Committee by September 1, 1993.

Mail to:
Contest Manager, VK2EG
Bill Storer
P.O. Box 860
Crows Nest, N.S.W.
AUSTRALIA

Comments: For single op stations, this is a 30 hour contest (out of the 48 hours). Multi-op stations may operate the full 48 hours. QSO points are determined by the Exchange Points Table. This table is based on the 40 CQ Zones and is arranged so that the further away the QSO is from your Zone, the higher the points scored. (**PLEASE NOTE:** CQ Zones DO NOT count as multipliers.) Table is in last month's issue of the RTTY Journal, page 20. All VK, JA, VE, and W call areas each count as separate countries on each band. This contest counts band multipliers, making the low bands more active, and giving more bonus QSO points, too. Don't forget to work the continents for additional mults. Try to keep track of your operating time, as single ops are only allowed a maximum of 30 hours out of the 48 hour period. Your Summary Sheet requires that you list your TIME ON/OFF records.

August 21-22 SARTG WW RTTY Contest

Sponsored by the Scandinavian Amateur Radio Teleprinter Group.

Starts: 3 contest periods; 0000-0800 UTC Saturday, 1600-2400 UTC Saturday, and 0800-1600 UTC Sunday.

Bands: 80, 40, 20, 15, and 10M. (five bands)

Classes: A) Single op, All Bands; B) Single op, Single Band; Multi-op, Single Tx, All Bands; D) SWLs, All Bands. NOTE: Single op, All Band stations may also enter as a single band entry of their choice, too.

Modes: RTTY only.

Exchange: RST + QSO number, starting with 001.

Multipliers: Each DXCC country on each band, including first contact with Australia, Canada, Japan and USA. Additionally, each call area in VK, VE, JA and W will count as one multiplier on each band.

QSO Points: QSO with own country, 5 points. QSO with other countries in own continent, 10 points. QSO with other continents, 15 points. In VK, VE, JA, and W, each call area will count as a separate country.

Scoring: Sum of QSO points x sum of multipliers = TOTAL SCORE.

Awards: To the top stations in each class, country, and district, if the number of QSOs is reasonable.

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

DATE/TIME (UTC), CALLSIGN, EXCHANGE MESSAGE SENT and RECEIVED, MULTIPLIERS, and QSO POINTS. Summary sheet must show scoring, class, your callsign, and name and address. Multi-op stations must show the callsigns and names of all operators involved. Your comments will be very much appreciated.

Mail logs to:

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

Comments: This contest has 3 separate operating periods, each 8 hours long, and separated by two 8 hour rest periods. The concept is quite unique and there can be no excuse of fatigue from the more senior ops.

Band multipliers mean that activity will be spread over all the bands.

August means summer conditions are still in effect in the Northern Hemispheres so the low bands will have plenty of static and the high bands will have mediocre propagation. But not to worry. Activity is usually high from all over the globe. Another unique item for this contest is that single ops can also enter as a single band entry, with the band of their own choosing. The exchange (RST + QSO serial number) means that you can keep track of your competition by comparing your number with his. If he suddenly appears with 10 more QSOs than you, it means you are either goofing off, or you've been playing around on the wrong band, or you got stuck in a pileup and wouldn't give up. Note that the first QSO with VK, VE, JA and W counts as a multiplier on each band. Also, each call district in VK, VE, JA and W will count as a multiplier. Separate logsheets are required for each band.

Some Feedback from ARRL About RTTY on 40M

In last month's column I told about an East Coast RTTY friend who received an **ARRL Official Observer (OO) Advisory Notice.** He was heard working European RTTY stations during the EA (Spanish) RTTY Contest with his 50 watt rig on 7040 kHz last February. The OO Notice stated that: **"Operating below 7080 kHz is considered out of the band and causing interference, violating the digital mode bandplan."** He asked me if this was a no-no.

I immediately sent a letter back, quoting January '93 QST page 64, explicitly showing that RTTY is allowed wherever CW is allowed. I also mentioned that the "RTTY International Window" is 7035-45 khz, and is clearly the place to work RTTY DX on 40M.

On April 22 I received a letter from Dave Sumner, K1ZZ, Exec. V.P. of ARRL, stating: "I'd like to make a couple of observations on your April column..... There's certainly nothing wrong with working RTTY DX on 7040 kHz. I've done it myself." He said: **"The OO your friend heard from was being a bit overzealous."** End of subject.

He went on, attempting to justify other things pertaining to the "Considerate Operator's Frequency Guide", including never ever listing AMTOR frequency bands, but now listing HF Packet frequencies, and the struggle to obtain worldwide concurrence on 40M operating patterns.

In my reply to K1ZZ I suggested that "ARRL should advise their OOs to back off pouncing on innocent RTTY ops, sending them citations for "out-of-the-band" operating that is, in fact, proper and legal. ARRL's OO program is a very good one and should be encouraged. But this kind of citation is certainly unwarranted and should not be condoned."

I also told him of the Japanese RTTY frequencies that were sent out by JARTS Contest Manager, JH1BIH, showing the 40M band as 7025-40 kHz.

I know that I will continue to work RTTY DX on the "RTTY International Window" of 7035-45 kHz, and I encourage others to do likewise. If that is where the DX band is, and our FCC laws say it's OK, then it's OK.

JARTS 1992 RTTY Results

Dale, W6IWO, sent me a copy of the JARTS '92 RTTY contest results, with a note about the world high score compared to the rest. In first place was P40RY, Eddie, aka G0AZT, which explains the 804 QSO's. Don, AA5AU took second with 463 QSO's and VE3FJB was third with 432 QSO's. (ED: Results next issue)

I think the reason Eddie clobbered the rest of the world (besides his contest savvy) was the superb QTH, and good north/south propagation, which is a big advantage on 10 and 15M. The 1993 announcement includes a basic rule change: band multipliers - really needed to increase the activity on 40 and 80M. This promises to be a great October contest.

-- -- -- Hint of the Month -- -- --

I have been mentioning using different receiving antennas for RTTY reception to help correct multipath errors. What I didn't mention is how I hook up separate receiving antennas to the transceiver.

I use a Kenwood TS-930S transceiver. On the rear apron there is an 8 pin DIN transverter receptacle, used for VHF/UHF transverters. When an 8 pin DIN plug is inserted, a tiny microswitch on the side of the receptacle actually switches the antenna input to the Signal Unit (RAT) from the regular tranceive antenna to the transverter output. This SPDT switch's NC contact is pin 8, and actually is the transceive antenna. The common of the switch goes to the Signal Unit (RAT). When the plug is inserted, the NO contact (pin 5) is now connected to the common. This pin 5 is the external receiving antenna input.

I have an external "Receiving Antenna Select" box, (1.5 x 2 x 4 inch) mounted under the shelf above the TS-930S. Using 3 sub-miniature coax cables (RG-174/U) about 2 feet long, from the transverter plug to the Box, I can select either the normal transceive antenna or any one of 3 different receiving antennas. Included inside this box is a 5 volt DIP SPDT relay (Magnacraft W118DIP-5) with a "relay kicker" circuit that drops the 12 volt TRANSMIT relay control voltage (pin 2) from 12 volts to 5 volts and at the same time "kicks" the relay to close extremely fast. This relay shorts the selected receive antenna to ground before the transmit signal comes on the air. It merely assures that the receiver frontend doesn't get blown away by the transmitter RF from its regular transceive antenna and picked up by the receive antenna.

The front panel of this little box has 2 knobs. One selects the receive antenna, and the other selects either the normal transceive antenna or the external receive antenna switch. No internal modifications to the TS-930S are required.

This little gadget has been in use here for over 10 years, and has been a great help for reception. Originally I designed it for 160M because I use a vertical antenna (my 100 foot top-loaded tower) for transmit. Vertical receiving antennas are terrible on 160 and 80M. Two reasons: a) static crashes, and b) radiating TV flyback transformers. I use a 160M horizontal, coax-fed dipole about 10 feet off the ground, strung around some trees on the property. Works great! On receive, the signal strength on the S meter will be 6 dB lower on the dipole, but the noise level drops by 12 dB, so I gain 6 dB in S/N ratio over the vertical. (The poor SWR of the low dipole is force-matched at the rig by using the 10 dB position on the RF attenuator switch of the '930. There's plenty of RF gain in the '930 to compensate for a mere 10 dB.)

If anyone would like a schematic of this circuit, drop me an SASE and I'll put you on my list.

((73))

See you in the pileups

de Rich, N6GG

P.S.

Drop me a line with an idea to share,

Or, drop me a line with an item to air

Drop me a line with anger to bear..

But, don't drop me ... 'cause I care

Preliminary Report to the ARRL Board of Directors

by the

ARRL Committee on Amateur Radio Digital Communications

March 28, 1993

INTRODUCTION

At the January 1993 meeting the ARRL Board of Directors directed this Committee to further study the issue of how to accommodate unattended semi-automatic operation in the HF amateur bands. At the same time the Board directed the ARRL staff to submit a petition to the FCC requesting rule making that would authorize unattended semi- and fully-automatic operation in specific HF subbands.

PREVIOUS RECOMMENDATIONS

While this Committee recommended unattended fully-automatic operation in certain HF subbands it did not contemplate that such subbands would be the only authorization for unattended operation. The Committee believes that crowding all forms of unattended operation into such a limited spectrum would render the subbands useless for all operations whether they be Packet AMTOR, Clover, Pactor, or RTTY. In addition, crowding all modes into these subbands would stifle the development of new technology.

CONCERNS REGARDING SEMI-AUTOMATIC OPERATION

The Committee understands the Board's concern regarding unlimited unattended semi-automatic operation and offers the suggestions below for reducing the risk of excessive spectrum use. To provide additional protection against abuse of unattended privileges, the Committee suggests the following recommendations be considered by the ARRL Board of Directors.

1. Unattended HF semi-automatic stations, operating outside of the subbands designated for unattended fully-automatic stations, shall not emit signals greater that 500 Hz in bandwidth (as defined in Subpart 47CFR97.3(a)(8).

This, in effect, more than triples the effective use of spectrum compared to wide-band modes such as 300 baud HF Packet.

2. The ARRL develop, through the Digital Committee and the digital community, guidelines and standards for semi-automatic digital stations to maximize the efficiency of message relay systems and minimize the unnecessary use of HF spectrum.

3. Beaconing by unattended semi-automatic stations should be illegal.

In addition, the Committee would like to draw the Board's attention to an important aspect of semi-automatic operation as defined in its June 1992 recommendation: No semi-automatic station will transmit a signal unless that transmission is initiated by a human operator. That operator has the responsibility (as has long been amateur practice) to avoid interference with others. It has been argued that since there is not an operator at both ends of a path that it is not possible to be absolutely sure that no interference will occur.

Unlike voice or CW operation where there can be long one-way transmissions, current digital modes (with the exception of RTTY) continuously transmit signals from both ends of a link which very greatly improves the probability of an operator observing any activity on the frequency. While it is not perfect, it's not seriously flawed either. The likelihood of interference is not seriously greater than from a purely manually operated station causing interference when attempting a contact.

SUMMARY

Through the use of 500 Hz narrow band modes, the elimination of beaconing, and the standardization of operating guidelines for all automatic stations, the committee feels amateurs not interested in message relay systems will be provided the protection contemplated by the ARRL Board of Directors at the July 1992 annual meeting. The Committee recommends that the petition be modified to include the use of semi-automatic message relay systems as discussed in previous recommendations, but with the additional protection of the use of a bandwidth not to exceed 500 Hz.

A more lengthy discussion of the issues is found in the attached appendix.

APPENDIX

DEFINITION OF THE ISSUE

At the request of the ARRL Board of Directors, the ARRL Digital Committee continued to study potential use of unattended semi- automatic HF message relay stations. Specifically, the Board asked the committee "...to continue its study of how additional digital communications can be accommodated in the HF bands while adequately protecting amateurs using other modes and pursuing other operating interests..."

The primary issue related to this question is that of authorizing the use of unattended semi-automatic HF message relay stations outside of the sub-bands identified in the February, 1993 petition to the FCC.

The Digital Committee recognizes that a rapid growth in interest of digital communications is taking place, encouraged by the availability of low cost multi-mode modems, computers and digitally-friendly transceivers, and the influx of young, computer-oriented amateurs. HF spectrum is at a premium and methods to ensure the most efficient use of limited HF spectrum, protection of all interests, and the encouragement of refinements in technology and operating systems are to be encouraged.

ADVANTAGES OF SEMI-AUTOMATIC STATIONS

There is significant merit in encouraging the use of semi- automatic relay stations:

1. Semi-automatic stations have taken the lead in developing and testing new, spectrum-efficient technologies such as Clover and Pactor;

2. Semi-automatic stations have taken the lead in developing and maintaining longhaul international networks;

3. Semi-automatic stations have become a center of the National Traffic System;

4. Semi-automatic stations are generally the only access available to amateurs in rural areas or on the high seas who have no access to VHF networks (fully-automatic HF systems tend to lock out individual users).

5. The robustness and high efficiency of the new high efficiency modes, if forced to exist with the existing and more fragile Packet mode in the proposed sub-bands, will compromise the existing HF Packet network until such time those operators move to the newer technologies.

PROTECTIONS

In light of the above considerations, the committee will recommend that the ARRL petition the FCC to permit unattended semi-automatic operation outside of the petition sub-bands, but that the following be considered in order to ensure compatibility with amateurs who are not interested in message relay systems:

1. Unattended, semi-automatic stations operating outside of the subbands should not be permitted to use a mode exceeding 500 Hz in bandwidth. The newer technologies already meet this requirement. The older, wide-band modes such as 300 baud HF Packet do not. This as much as triples the bandwidth available for other amateurs.

2. All beaconing by unattended semi-automatic stations should be banned.

3. The ARRL should develop, through the Digital Committee and interested amateurs, operating guidelines for the proper and efficient use of automatic stations. At the very least this would include interference-avoiding techniques, the optimal use of the WARC bands, limiting the relay of bulletins on HF, the use of scanning to reduce HF congestion, and other issues.

The committee also suggests the continued encouragement of the development of wire-line systems and other non-HF means for message relay to reduce congestion on HF bands.

WIDE BAND VERSUS NARROW BAND OPERATION

The Committee does not lightly dismiss the risks of opening up the spectrum to semi-automatic operation. Studying these risks has led the Committee to conclude that the harm to other users from semi-automatic stations would result primarily from Packet operations. This is because Packet as it is presently used is spectrally inefficient. Wide bandwidths are the norm, causing significant interference to operations on adjacent

channels, whether the occupant of the adjacent channel is another Packet station, a CW station or other mode. Because of this factor, the Committee feels that the risks versus benefits of allowing unattended Packet outside of regulatory subbands tends to weigh against doing so. However, this same test when applied to narrowband modes weighs significantly less heavily on the risk side -- both because there is inherently less interference potential from narrowband transmissions and because historically these modes tend less to operations that cause interference. The Committee is, therefore, recommending that existing 300 baud Packet or other wideband systems not be allowed to operate unattended outside the proposed automatic-control subbands, but that narrowband modes be permitted to operate in semi-automatic mode in the manner proposed in the Committee's June, 1992 report. (Note: this does not preclude the Packet community from developing more "friendly" systems to use for semi-automatic operation--at consequently lower risk to other users.) Note particularly that the proposed use of unattended stations outside of the proposed automatic-control subbands would absolutely prohibit undirected transmissions (beacons) or initiation of communications by the unattended station.

OPERATING GUIDELINES

The Committee believes that the advent of semi-automatic operation would require a commitment from the Committee and the League to promulgate semi-automatic operating guidelines. The Committee, working with the semi-automatic community, should be encouraged to formulate such guidelines. These guidelines should include, but are not limited to, the proper selection of frequency and proper techniques for managing links to minimize potential interference to other users of the spectrum. The latter guideline would ask of semi-automatic stations that they cease transmitting when link throughput or error rates reach certain levels. This is based in part on the assumption that poor link performance may be caused by the presence of other stations on the channel. Termination of the link by the unattended station provides a means of responding to this circumstance. It is also the case that attempting to maintain a link that is providing little in the way of error-free data is itself spectrally inefficient and therefore generally poor operating practice. It is the belief of the Committee that these operating issues are best addressed by education and peer pressure rather than by rule, in part because changing technology will quickly render any effective rule obsolete.

MIXED MODE OPERATIONS

The Committee has technically evaluated the prospect of operating semi-automated non-Packet stations within the proposed automatic-control subbands. The result of such operation would be highly detrimental to existing Packet operations. Because of the short symbol lengths of 300-baud signals, Packet stations must use wide receiver bandwidths to minimize the spreading effects of multipath. This leaves Packet stations more susceptible to adjacent-channel interference than the digital modes that use slower signalling rates. (Note: The combination of the wide transmitted bandwidths and the high degree of susceptibility to adjacent-channel interference is one reason why existing Packet-forwarding channels are spaced 2 kHz apart). Narrowband digital stations can be experiencing 10- to 20-dB signal-to-interference ratios from Packet stations on nearby frequencies--under which conditions throughput of the narrowband link will be excellent--while those same Packet stations are suffering debilitating interference from the narrowband operations. The inevitable result of putting existing Packet stations and narrowband stations in the same restricted subband will be that the narrowband stations "take over" the frequencies -- not from any malicious intent on the part of the narrowband stations, but merely because they are unable to detect the interference they cause to Packet stations making use of excessively wide receiver filters.

The automatic-control subband widths recommended by the Committee in the September 26, 1992 report to the Board were selected based on the assumption that semi-automatic operation would occur largely outside those subbands. It was not then and is not now the opinion of this Committee that all desirable unattended operations can coexist in the proposed subbands. Packet will be adversely affected by any attempt to do so.

The Committee recognizes that one desirable result of the crowding of automatic stations will be the pressure to develop more spectrum-efficient technologies. The Committee favors the introduction of spectrally-efficient technologies. But the disruption to automatic-forwarding Packet networks that would result from implementation of only the automatic control subbands would be immediate, near-total, and long-lasting. "Immediate" because a large number of APLINK and other computerized narrowband message relay stations would move to the automatic control subbands--which are already largely filled with Packet stations on 2-kHz channels--to take advantage of the improved service they could provide when removed from the local-control requirement. "Near total" for the technical reasons outlined above. "Long lasting" because there is not presently available a replacement for Packet in fully-automatic service.

The last point requires expansion. The unique characteristic of Packet that makes it suitable for fully automatic operation is its channel-sharing ability. Stations that initiate communications must be able to detect other users of the frequency (at least, other users of their own kind) and automatically act cooperatively to share the frequency. Other digital modes rely only on the initiating operator to perform this service, either by "ear" or by noting that the link activities indicate that the unattended station is receiving interference. Packet does this detection automatically. Therefore, existing and proposed fully automatic stations cannot abandon Packet until some replacement technology arises that addresses both the channel-sharing and spectral-efficiency issues.

It can be argued that controlled networks could provide fully automatic service without automatic frequency sharing with proper management. Aside from the additional administrative burden imposed on such networks by the lack of automatic sharing techniques, such an approach would severely limit flexibility. For example, a small, fully automatic network testing new technology would likely not find a place to operate as all existing channels are filled with message-handling stations. But if automatic channel sharing is available, as in Packet, adding stations to the frequency--even stations not participating in the same network--is simple, resulting merely in slightly lower throughput for the other stations on frequency. Lack of automatic channel sharing makes it much more difficult to accommodate such changes in network makeup.

MAXIMIZING "ENFRANCHISEMENT"

The Committee has as one of its guiding principles that no amateur be denied access to our common spectrum. Indeed, ensuring to the extent possible that all amateurs--digital operators and non-digital operators alike--have spectrum available for their legitimate desires is a fundamental goal of the Committee. From the perspective of digital operations, this requires accommodation of all legitimate applications of digital technology, which include applications best served by manually controlled operations, semi-automatic operations, and fully automatic operations. The Committee recognizes that the shifting usage patterns of various modes will result over time in friction at band plan boundaries, and that band plan realignments are from time to time required. The Committee does not accept as good operating practice, and will actively discourage, operation of digital stations--under any system of control--outside those portions of the ARRL and IARU band plans specified for digital operation.

This philosophy argues for maximum "enfranchisement" of digital stations, which we use here to mean accommodating stations that want to operate manually, semi-automatically, or automatically within the digital part of the band with a minimum of restrictions. Those restrictions that the Committee has recommended--including regulatory subbands for automatic-control and bandwidth limitation of semi-automatic stations--are intended to facilitate this enfranchisement while protecting other operations from unnecessary interference.

MAXIMIZING "THROUGHPUT"

Proper use of the available spectrum also calls for maximizing the amount of information that flows. The measure of this efficiency can be expressed broadly in bits-per-second-per-Hertz. That is, getting the maximum information rate in the minimum bandwidth. The Committee is vitally interested in assisting the amateur community to advance digital technology in that direction. It is the view of the Committee that a technology that provides 1) spectral efficiency, 2) robustness, and 3) automatic channel sharing, is highly desirable. Such a technology would better serve all digital applications, automatic, semi-automatic and manual alike, by allowing all amateurs to participate in the various digital applications, while making good use of the available spectrum.

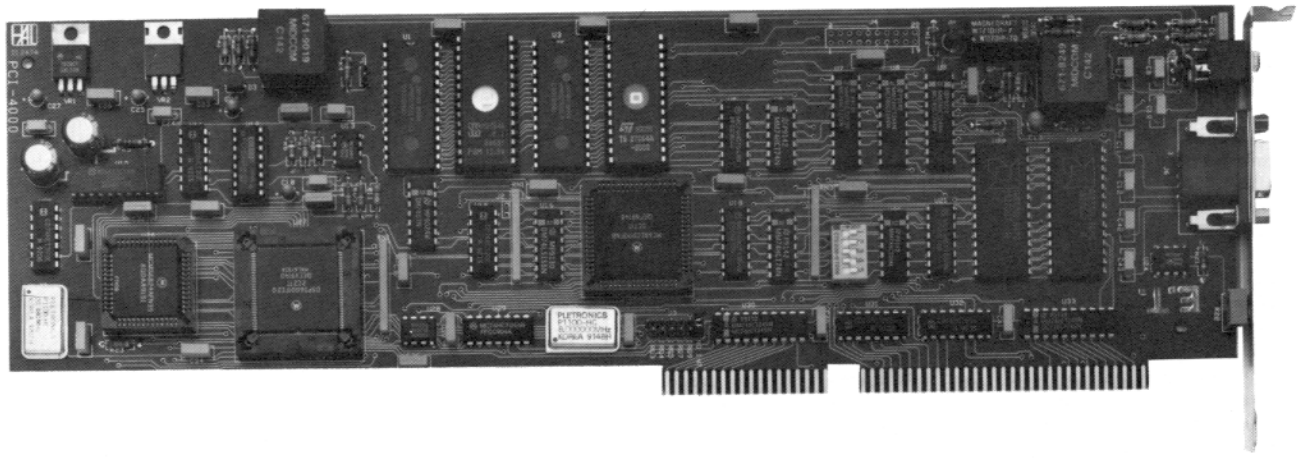
SUMMARY

The Committee believes that the recommendations that have been developed, including the modifications encompassed in this report, provide for the necessary protection of all amateurs, a nurturing environment for the development of new technologies, the vehicle to encourage efficient use of HF spectrum, and the support necessary to properly manage the growth in traffic handled by digital networks.

NEW!

HAL Announces the PCI-4000 PC-CLOVER System

For Fast, Bandwidth-Efficient HF Data



The PCI-4000 uses the latest development in HF data transfer methods–CLOVER-II. CLOVER-II is designed to maximize the amount of data which can be transferred in a narrow bandwidth over HF radio frequencies. It uses a combination of four tone frequencies with phase and amplitude modulation to achieve data transfer rates as high as 60 characters per second–about ten times faster than AMTOR. The PC-CLOVER system incorporates Reed-Solomon error correction, not simply a retransmission scheme. The PCI-4000 is a full-sized PC card which operates in a 80286-based PC or higher.

The PCI-4000 PC CLOVER system features:

- Higher throughput than RTTY, AMTOR, Packet, or PACTOR on similar HF channel
- Simple pull-down menu operation
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- Plugs into your PC (286, 386SX, 386, or 486 machines)
- Easy interface to your transceiver
- Automatically adapts to HF band conditions
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1992 CQWW RTTY CONTEST RESULTS

Legend: Call, CL (SOB = Single Op All Band, SOA = Single Op Assisted All Band, MOS = Multi Op Single Transmitter, MOM = Multi Op Multi Transmitter, Final Score, QSOs, Points, Zones, Countries, State and Canadian Provinces. Winners in Bold face type.

AFRICA

CALL	CL	SCORE	QSOs	PTS	Z	CTS	US/V
ASCENSION ISLAND							
EZD8LII	28	355426	840	2503	23	66	53
CANARY ISLANDS							
EA8CMR	MOS	963116	1048	3127	59	120	129
EA8ASI	SOB	158976	374	1104	33	62	49
MELILLA							
AM9TL	SOB	18894	94	282	19	42	6
NIGER							
5U7M	SOB	424804	582	1741	48	91	105
SOUTH AFRICA							
ZS6EZ	21	382630	772	2305	27	87	52
ZS6NW	14	97632	303	904	24	48	36

ASIA

CALL	CL	SCORE	QSOs	PTS	Z	CTS	US/V
ASIATIC RUSSIA							
UZ9CWA	MOS	2547575	1580	4525	108	348	107
UA0KZ	14	33615	178	405	18	28	37
HONG KONG							
VS6WO	SOB	295822	550	1402	54	109	48
VS6BG	28	95424	492	1136	22	62	0
ISRAEL							
4X6UO	SOB	186462	415	1151	44	118	0
JAPAN							
JL1ZCG	MOS	1110704	1015	2954	83	166	127
JJ3YBB	MOS	967779	903	2637	89	172	106
JH1QDB	SOB	397444	524	1483	65	117	86
JA2IVY	SOB	362255	476	1367	72	120	73
JH7QXJ	SOB	185193	372	1083	40	75	56
JA2ESR	SOB	99190	193	545	56	86	40
JE2UFF	21	84588	259	742	25	55	34
JH1BIH	14	62212	215	604	27	43	33
JH8JBX	14	31302	120	333	24	48	22
JA7MAD	21	30783	116	331	24	48	21
JA2NNF	14	24338	104	283	25	45	16
JA7SUR	SOB	22230	92	247	36	54	0
JF3LOP	SOB	20493	75	207	35	49	15
JA1WYQ	SOB	17520	78	219	26	42	12
JA3VXH	SOA	15660	64	180	31	42	14
JA4RTX	SOB	12218	53	149	32	45	5
JE2LPC	21	8710	49	134	23	30	12
JA2DHG	28	7904	53	152	17	16	19
JQ1NGT	SOB	6149	50	143	11	13	19
JA3BSH	21	5814	40	114	12	18	21
JR2CFD	3.5	153	10	17	4	3	2
JA7LMZ	3.5	6	3	3	1	1	0
KOREA							
HL9AX	MOS	122836	300	749	46	75	43
MALAYSIA							
9M2AX	SOB	41877	224	517	29	45	7
OMAN							
A45ZX	SOB	233382	470	1203	41	94	59
PAKISTAN							
AP/WA2WYR	SOB	61226	192	506	35	78	8

EUROPE

CALL	CL	SCORE	QSOs	PTS	Z	CTS	US/V
AUSTRIA							
OE3XCW/3	MOS	275550	376	1002	63	131	81
OE1MBB	SOB	123088	240	628	46	91	59
OE2OWM	14	63765	241	585	23	58	28
OE1TKW	SOB	17400	67	174	39	49	12
BALEARIC ISLANDS							
EA6PZ	SOB	321642	419	1503	43	98	73
BELGIUM							
OR0OST	MOS	2550	35	75	9	23	2
ON6CQ	14	968	21	44	6	15	1
ON4APU	7	48	4	8	2	4	0
BULGARIA							
LZ2TU	SOB	465412	587	1516	63	153	91
LZ1MC	21	247950	623	1653	27	70	53
LZ1BJ	21	193536	561	1536	23	55	48
LZ1IA	SOB	80652	181	429	56	108	24
CROATIA							
9A1CCY	MOS	368906	470	1327	55	126	97
9A1BHI	MOS	128590	297	770	29	57	81
CZECHOSLOVAKIA							
OK1DJO	21	48503	189	533	20	35	36
OK3RJB	MOS	30900	122	309	28	49	23
OK3RBK	14	18768	117	272	14	39	16
OK1MP	21	18096	81	232	18	30	30
DENMARK							
OZ5MJ	SOB	181068	290	764	57	107	73
OZ4FF	SOB	157645	289	769	48	90	67
OZ4HAM	MOM	55970	131	386	34	58	53
OZ7XE	14	2508	31	76	10	18	5
ENGLAND							
G4SKA	SOB	691899	739	2041	65	140	134
G0ARF	SOB	433273	556	1531	58	120	105
G3XVF	SOB	73788	167	429	41	90	41
G4XDD	14	17228	98	236	16	40	17
RUSSIA							
UA6LP	SOB	81263	195	611	39	80	14
FINLAND							
OH2AG	MOS	556100	652	1675	74	183	75
OH2OM	SOB	46860	142	355	34	70	28
OG2BP	28	23895	107	295	21	36	24
OG6UP	SOB	14960	69	176	26	41	18
OH5NHI	21	11036	66	178	16	24	22
OH5MN/2	SOB	4355	45	65	24	39	4
FRANCE							
FF0XX	MOS	1518940	1241	3460	76	201	162
F6EKX	MOS	581343	701	1767	65	131	133
F6IIE	SOB	178461	305	753	58	128	51
F1OBK	SOB	152736	303	688	52	103	67
F2AR	SOB	90944	222	448	47	102	54
F6FGY	21	70070	227	637	23	48	39
F11ALT	SOB	50000	181	400	33	87	5
F6DZD	SOB	28704	102	276	23	37	44
FD1PYI	21	127624	44	10	19	0	
GERMANY							
DK3GI	SOA	1088330	908	2531	87	205	138
DJ6JC	SOB	570878	610	1694	74	136	127
DL8UCC	SOB	124440	221	610	55	94	55
DL1EAL	SOB	96854	212	613	42	47	69
DL4JYT	SOB	92920	195	505	50	85	49
DA1SC	21	72100	244	700	20	43	40
DF3NA	SOB	66518	156	421	40	66	52
DJ9MH	SOB	33748	119	286	25	43	50
DL1BFZ	14	32712	153	376	20	47	20
DL6SWR	SOB	31752	108	294	34	49	25
DJ2YE	14	26676	138	342	17	40	21
DL9YCS	SOB	26000	89	250	34	45	25
DL3IT/P	SOB	25344	102	264	22	39	35
DF5BX	SOB	25305	88	241	34	40	31
DF1IK	7	22119	128	303	13	43	17
DL9GGA	SOB	21614	72	202	30	50	27
DL5SWB	SOB	19440	80	216	25	37	28
DJ9XB	28	18504	86	257	18	26	28
DJ6TK	SOB	17935	79	211	26	33	26
DL5NA	SOB	17100	64	180	36	40	19
DK5KJ	SOB	6832	47	112	21	28	12
DL0WW	MOS	4416	65	184	11	13	0

CALL	CL	SCORE	QSOs	PTS	Z	CTS	US/V
GREECE							
SV1SV	SOA	353346	515	1253	63	152	67
SV1NA	21	10192	82	196	13	29	10
GURNSEY							
GU3HFN	SOB	1223849	1081	3007	80	191	136
HUNGARY							
HA8EK	SOB	245080	428	1114	51	108	61
ITALY							
I2UIY	SOA	612808	617	1736	71	149	133
I2SVA	SOB	524828	631	1466	81	164	113
IK1HXN	MOS	296559	518	1191	76	173	0
IN3XUG	MOS	117117	295	693	34	70	65
IV3FSG	14	100650	314	825	25	59	38
I2HWI	SOB	68975	168	445	42	71	42
IV3KCB	21	53000	186	500	22	47	37
I2KFW	14	48598	205	517	15	46	33
IK1TWC	SOB	48508	148	362	36	66	32
IV3QBL	SOB	43344	109	301	0	0	0
IK4QJH	SOB	33166	144	322	38	65	0
IK0CNA	21	20670	111	318	10	35	20
I2DMI	SOB	15576	82	236	16	16	34
IK1SLE	SOB	13200	59	150	32	40	16
I0KHP	3.5	88	6	11	2	6	0
LATVIA							
YL2EO	14	2430	36	81	6	17	7
LIECHTENSTEIN							
HB0/HB9NL	SOB	145867	253	733	34	91	74
LITHUANIA							
LY1BZB	3.5	2976	45	93	6	24	2
LUXEMBOURG							
LX1TO	SOB	229194	383	1071	46	89	79
MOLDAVIA							
UO5OIS	14	20300	141	350	14	44	0
NORWAY							
LA7AJ	SOB	233864	344	943	47	140	61
LA3YU	SOB	130168	240	614	43	117	52
POLAND							
SP3PLD	MOS	220416	338	896	57	114	75
SP9BCH	14	77467	303	767	18	50	33
SP4MPH	SOB	49980	140	357	44	65	31
SP3SUN	28	27945	118	345	18	29	34
SP2JPG	SOB	24035	151	253	37	58	0
SP3BGD	21	16030	80	229	20	21	29
PORTUGAL							
CT1CKP	SOB	16376	85	184	24	60	5
ROMANIA							
YO6JN	SOB	210405	332	845	61	136	52
YO5BAT	21	8544	65	178	12	18	18
YO6ODN	28	4002	30	87	14	23	9
SCOTLAND							
GM3UTQ	SOB	338242	504	1291	53	131	78
GM0/WN1G	SOB	246560	403	1072	55	104	71
SLOVENIA							
YU3EA	SOB	511808	534	1454	75	215	62
YU3HR	14	231088	592	1616	25	69	49
YU3BQ	3.5	11781	111	231	8	35	8
YT3HM	21	1404	21	54	10	14	2
SPAIN							
AM3NY	SOB	692900	772	2132	69	139	117
AM3GCV	21	148304	426	1196	22	52	50
EA1QK	14	119660	360	965	23	59	42
EA7GXX	SOB	112128	214	584	43	72	77
AM1DVY	MOM	94844	209	524	42	81	58
AM5EYJ	SOB	52245	159	405	32	76	21
AM25DIHB	SOB	51986	149	374	35	63	41
EA2CNG	SOB	50800	153	400	31	53	43
AO1CTH	21	45652	170	452	19	41	41
EA1FFH	SOB	13432	111	184	32	41	0
AM1JO	SOB	6760	40	104	24	31	10
EC3CYB	21	5456	55	124	9	25	10
EA1EZA	28	4958	48	134	10	12	15
AO3DCR	21	3608	37	88	9	21	11
EA3FNI	28	2414	30	71	14	17	3
SWEDEN							
SM5FUG	SOB	598538	610	1658	77	172	112
SM4AAY	SOB	174211	389	1007	38	74	61
SM4DHF	SOB	153725	271	715	53	106	56
SM0HTO	28	137592	364	936	30	87	30
SM0AJU	14	115080	365	822	27	74	39
SM4GVR	SOB	240	614	38	78	40	
SM4RGD	21	28045	129	355	18	26	35
SWITZERLAND							
HB9DCQ	14	90083	284	757	24	64	31
TURKEY							
TA2FT	14	33810	172	483	16	41	13
UKRAINE							
UB4LWC	MOS	237244	419	1036	46	127	56
UB4KWV	MOS	140576	298	736	46	93	52
UB4HQ	SOB	486675	620	1575	70	162	77
UB4AR	14	8404	89	191	11	33	0
RB5VT	SOB	7616	59	119	19	28	17
WALES							
GW4KHQ	SOB	76050	176	450	41	81	47

NORTH AMERICA

ALASKA							
AL7NK	SOB	235662	540	1267	33	54	99
ANGUILLA							
VP2EE	SOB	247572	562	1196	35	55	117
CANADA							
VY2SS	SOB	1034351	1121	2659	69	176	144
VE3XO	SOB	812876	765	1973	84	204	124
VE7SZ	SOA	624012	800	1788	72	110	167
VE7ZZZ	MOS	562875	863	1975	57	104	124
VE3FJB	MOS	354270	497	1205	61	135	98
VE7KD	SOB	305286	550	1241	48	90	108
VE4AIY	SOB	267064	475	1064	51	96	104
VE6KRR	SOB	226566	426	921	50	70	126
VE6ZX	SOB	180180	391	858	38	57	115
VE2JR	SOB	164450	201	506	38	85	202
VE7OR	SOA	160576	344	772	45	62	101
VE2AXO	SOB	154874	303	734	46	92	73
VE7IRA	SOB	150976	305	674	52	68	104
VE7BTO	SOB	108852	252	564	47	68	78
VE5SF	SOB	108256	232	544	50	80	69
VE3UR	MOS	98747	221	517	45	60	86
VE2BOB	SOB	41322	120	291	37	57	48
VE7IN	7	34456	240	472	11	13	49
VE6JAV	SOB	32912	111	272	38	46	37
VE3RHJ	SOB	1632	122	48	10	10	14
DOMINICA							
J73WA	SOB	190284	420	942	42	71	89
DOMINICAN REPUBLIC							
HI8LEZ	SOB	33264	145	336	23	34	42
HAITI							
4V2PK	SOB	678151	810	1889	65	144	150
MEXICO							
XE1/JA1QXY	SOB	363394	625	1387	51	71	140
XE1BEF	14	28644	210	434	14	13	39
PANAMA							
HP1AC	SOB	1135226	324	743	38	56	88
HP1KZ	SOB	41985	136	311	30	45	60
PUERTO RICO							
WP4IIW	14	120663	431	981	20	56	47
KP4DDB	SOB	6825	42	105	21	23	21

CALL	CL	SCORE	QSOs	PTS	Z	CTS	US/V
USA							
K1IU	SOA	971412	911	2028	96	222	161
N4CC	SOB	733562	832	1702	93	196	142
AA5ZQ	SOB	648340	876	1684	81	145	159
AA6TT	SOA	641175	771	1545	87	178	150
W3FV	SOB	623298	709	1586	77	191	125
N6TU	MOS	553696	753	1331	91	150	175
NV1G	SOB	496014	638	1374	72	176	113
NO2T	SOA	494088	636	1384	66	161	130
N2LT	SOB	482174	570	1414	79	173	89
NT0V	SOB	479902	79	1387	65	141	140
AE6E	SOA	473850	647	1170	91	157	157
W9KDX	SOB	457378	609	1403	71	152	103
W0NA	MOS	446892	675	1338	73	145	116
AI7B	SOB	430905	649	1249	73	124	148
AB4MJ	SOB	421480	608	1285	67	138	123
WB8YJF	SOB	411320	508	1130	81	179	104
N2DL	SOB	379404	512	1171	68	160	96
AA0KA	SOB	355776	587	1088	68	120	139
WF5E	SOA	337674	551	1002	72	125	140
WA4MCZ	MOS	325710	461	987	73	147	110
WA7FAB	SOB	293564	514	929	67	113	136
N2FF	SOA	274995	416	873	71	147	97
K6WZ	SOB	269376	487	976	50	120	106
WA8ZZA	SOB	248920	376	889	67	139	74
W1BYH	SOB	228304	428	751	66	110	128
N8FEH	SOB	224190	364	795	64	127	91
KK4DK	SOB	214008	364	723	63	124	109
KF9CX	SOB	197380	347	710	65	118	95
KD1GG	SOA	191052	376	732	53	108	100
KK6PD	SOB	182368	414	656	60	93	125
KD2YG	SOB	180420	323	620	70	134	87
NN2G	14	175854	503	1113	27	83	48
KD4MM	SOB	172720	332	635	65	122	85
WB8MTT	SOB	161798	366	637	55	82	117
NI4H	SOB	157200	295	786	50	113	37
K0BJ	SOB	150349	292	599	66	107	78
K5KLA	SOB	147941	257	619	63	125	51
W8UMD	MOS	142240	283	635	52	105	67
WB1AEL	SOB	139302	284	654	52	95	66
K2PS	SOB	137708	293	692	48	92	59
N4ROL	SOB	133308	263	529	59	102	91
NA2M	SOB	128002	265	574	56	108	59
W6DBV	SOB	127986	289	514	62	75	112
N0BIW	SOB	125100	272	556	61	100	64
KE0KB	14	124265	462	857	27	68	50
KA5YSY	21	116621	417	839	29	68	42
WA1MPB/4	SOB	111606	225	534	56	108	45
WJ7S	21	111219	382	849	27	61	43
KC6RKC	SOB	110808	312	486	55	64	109
W2KHQ	SOB	108968	230	514	48	93	71
WM2U	SOB	108882	301	526	45	74	88
W2JGR/0	SOB	108853	297	547	50	77	72
N7KA	SOA	107632	225	496	57	96	64
W1VXV	SOB	105716	225	494	53	99	62
KB3TS	SOB	105408	215	488	57	104	55
WT3W	SOA	102612	228	503	52	91	61
WA6VZI	SOB	101010	230	518	47	74	74
AI0Y	SOB	97674	290	446	46	66	107
K0BX	SOA	93729	215	471	53	95	51
NR1J	SOB	92571	221	523	46	88	43
WA6UFY	SOB	92432	259	424	52	65	101
N1FIO	SOB	91956	207	474	46	95	53
W3KV	SOB	91675	172	475	56	80	57
KA2CDJ/4	SOB	91584	225	424	54	85	77
WA1IML	SOA	89006	201	466	46	90	55
KC7UP	SOB	88638	274	474	38	55	94
AA4M/6	21	85412	350	652	24	60	47
KB2SE	SOB	84420	184	420	53	97	51
W1BIH	SOB	83250	167	450	52	112	21
K7PB	SOB	81800	201	409	57	82	61
KD2YP	SOB	81002	177	401	59	94	49
N9NMC	SOB	80907	240	447	44	76	61
W4IF	SOB	80698	186	514	45	98	14
KC9UU	SOB	78260	198	430	45	83	54
KA3JFI	21	75816	266	648	25	63	29
AB8K	28	74259	268	669	23	60	28
N2QCA	SOB	68058	207	342	43	65	91
WY2E	14	68026	268	602	17	59	37
KF6HI	SOB	65550	213	345	47	54	89
W2ZPO	14	64750	264	518	24	59	42
W2UP	7	64329	301	523	20	56	47
N6MSQ	SOB	60310	171	370	53	58	52
WA5JWU	SOB	57600	204	320	45	53	82
KC4B	21	57404	197	508	24	67	22
AK9N	SOB	53138	147	326	48	47	68
WD4KXB	SOB	48672	136	312	44	75	37
AA5ZX	14	48496	301	433	20	42	50
KV5F	SOB	46760	166	334	38	63	39
N2HOQ	14	45339	191	381	24	53	42
KE4BM	SOB	43218	153	294	42	58	47
W7LHO	21	41256	172	382	25	54	29
WN1E	SOB	40150	152	275	36	48	62
W9KVF	SOB	39798	136	297	40	63	31
KA1CLV	SOB	38961	115	333	37	78	2
W9MKR	SOB	38458	114	287	43	69	22
NJ0M	7	38270	355	430	16	24	49
K4KIY	SOB	37023	139	301	30	55	38
KD7H	SOB	35670	136	246	47	43	55
KE9CU	SOB	34965	134	259	40	52	43
NN5T	SOB	34749	118	243	42	55	46
W3AOH/4	SOB	33990	111	309	36	63	11
K8CV	SOB	33354	121	306	31	55	23
WA8RXI	SOB	32760	140	260	32	49	45

CALL	CL	SCORE	QSOs	PTS	Z	CTS	US/V
N6TYV	14	31926	180	313	42	37	23
N7GVV	SOB	31654	128	238	37	49	47
N6WFK	14	29784	159	292	25	37	40
K4FPF	SOB	29070	105	255	30	60	24
N5NMX	28	27456	157	352	16	41	21
KA8OUT	SOB	26676	96	234	35	57	22
AA0GY	SOB	26445	130	205	36	37	56
KF0EF	SOB	23320	147	212	25	23	62
WW3S	SOB	21660	96	190	32	48	34
K2UVG	SOB	20296	88	172	39	47	32
WR1H	SOB	19920	78	166	23	33	64
W5TTE	SOB	19838	115	182	27	29	53
NW0F	SOB	19800	88	180	32	47	31
KI7Y	SOB	18360	99	180	27	30	45
KE2XF	SOB	17069	88	169	31	40	30
W0LYM/4	7	16320	139	204	14	29	37
KA3DSX	MOS	13110	84	138	28	32	35
KF0XV	SOB	12104	71	136	25	30	34
WD5CBL	SOB	11466	75	126	25	30	36
WB2JKJ	MOS	10730	139	145	12	7	55
WB7OND/4	SOB	9348	161	114	26	29	27
KD5VU	SOB	6450	148	86	25	28	22
N3RC	SOB	5655	138	87	22	29	14
W9ILY	SOB	5568	141	96	25	33	0
KI7T	7	4300	174	86	9	6	35
W1HFN	SOB	4200	135	75	20	24	12
N01J	21	4048	138	92	12	20	12
KR1Z	14	3960	136	99	10	25	5
WA6FIT	21	3268	129	76	15	22	6
AC4HF	SOB	2100	129	50	13	13	16
KB7PDL	SOB	1820	142	52	13	10	12
WV1D	14	1488	127	48	9	10	12
N7IXI	14	780	121	39	7	5	8
N2CQ	14	680	113	34	6	9	5
KG6AO	SOB	676	115	26	10	7	9
W4JLS	7	644	120	28	5	4	14
N0MLB	28	228	7	19	5	7	0
NA2Q	3.5	132	9	11	3	2	7
VIRGIN ISLANDS							
NP2R	SOB	349792	560	1286	45	99	128
OCEANIA							
AUSTRALIA							
VK2RT	MOS	151632	326	972	36	61	59
VK2BEX	SOB	96520	260	760	41	53	33
VK4WIE	MOS	71540	178	511	42	71	27
VK3EBP	14	24905	100	293	22	43	20
VK2BQQ	SOB	14620	75	215	23	24	21
VK2EG	SOB	7625	44	125	21	25	15
EAST KIRIBATI							
T32RA	MOM	1770131	1744	5191	69	118	154
HAWAII							
AH6JF	SOB	406808	649	1928	49	63	99
INDONESIA							
YC7BVY	21	5535	41	123	12	26	7
MARSHALL ISLANDS							
V7RTTY	SOB	509330	647	1922	62	83	120
NEW ZEALAND							
ZL3GQ	SOB	553410	653	1935	61	108	117
SOUTH AMERICA							
ARGENTINA							
LU3DSU	SOB	134577	266	787	39	59	73
ARUBA							
P40RY	MOS	3543090	2222	6635	91	220	223
BRAZIL							
PW2N	MOS	227755	376	1111	44	69	92
PY2PD	21	12900	85	215	14	19	27
CHILE							
CE6EZ	SOB	922867	972	2893	56	123	140
CE8ABF	14	107835	348	1027	20	47	38
COLOMBIA							
HK1LAQ	14	41230	199	589	17	49	4

CALL	CL	SCORE	QSOs	PTS	Z	CTS	US/V
ECUADOR							
HC5K	SOB	690378	733	2171	66	128	124
HC3AP	7	1800	25	75	7	5	12
NETHER. ANTILLES							
PJ2MI	21	329184	766	2286	24	65	55
PARAGUAY							
ZP5JCY	21	433532	8	71	2596	30	85
PERU							
OA4ZV	SOB	510880	301	2060	46	119	83
VENEZUELA							
4M5RY	14	270256	599	1778	23	73	56
4M5KWS	SOB	84480	158	768	26	57	27

MULTI-OPERATOR SINGLE TRANSMITTER

AFRICA

CANARY ISLANDS							
EG8CMR	MOS	963116	1048	3127	59	120	129

ASIA

ASIATIC RUSSIA							
UZ9CWA	MOS	2547575	1580	4525	108	348	107
JAPAN							
JL1ZCG	MOS	1110704	1015	2954	83	166	127
JJ3YBB	MOS	967779	903	2637	89	172	106
KOREA							
HL9AX	MOS	122836	300	749	46	75	43

EUROPE

AUSTRIA							
OE3XCW/3	MOS	275550	376	1002	63	131	81
BELGIUM							
OR0OST	MOS	2550	35	75	9	23	2
CROATIA							
9A1CCY	MOS	368906	470	1327	55	126	97
9A1BHI	MOS	128590	297	770	29	57	81
CZECHOSLOVAKIA							
OK3RJB	MOS	30900	122	309	28	49	23
DENMARK							
OZ4HAM	MOS	55970	131	386	34	58	53
FINLAND							
OH2AG	MOS	556100	652	1675	74	183	75
FRANCE							
FF0XX	MOS	1518940	1241	3460	76	201	162
F6EKX	MOS	581343	701	1767	65	131	133
GERMANY							
DL0WW	MOS	4416	65	184	11	13	0
ITALY							
IK1HXN	MOS	296559	518	1191	76	173	0
IN3XUG	MOS	117117	295	693	34	70	65
KALININGRAD							
UW2F	MOS	2847220	1767	4909	106	271	203

CALL	CL	SCORE	QSOs	PTS	Z	CTS	US/V
NETHERLANDS							
PI4COM	MOS	396387	518	1431	63	122	92
NORWAY							
LA1K	MOS	264578	471	1006	57	127	79
POLAND							
SP3PLD	MOS	220416	338	896	57	114	75
UKRAINE							
UB4LWC	MOS	237244	419	1036	46	127	56
UB4KWV	MOS	140576	298	736	46	93	52

NORTH AMERICA

CANADA							
VE7ZZZ	MOS	562875	863	1975	57	104	124
VE3FJB	MOS	354270	497	1205	61	135	98
VE3UR	MOS	98747	221	517	45	60	86
USA							
WA7EGA	MOS	979195	1148	1939	98	211	196
WF1B	MOS	903175	907	1985	89	214	152
W4AQL	MOS	805232	924	1706	99	211	162
N9ITX	MOS	768628	941	1981	79	184	125
N6TU	MOS	553696	753	1331	91	150	175
W0NA	MOS	446892	675	1338	73	145	116
WA4MCZ	MOS	325710	461	987	73	147	110
W8UMD	MOS	142240	283	635	52	105	67
KA3DSX	MOS	13110	84	138	28	32	35
WB2JKJ	MOS	10730	139	145	12	7	55

OCEANIA

AUSTRALIA							
VK2RT	MOS	151632	326	972	36	61	59
VK4WIE	MOS	71540	178	511	42	71	27

SO. AMERICA

ARUBA							
P40RY	MOS	3543090	2222	6635	91	220	223
BRAZIL							
PW2N	MOS	227755	376	1111	44	69	92

MULTI-OPERATOR MULTI TRANSMITTER

EUROPE

SPAIN							
AM1DVY	MOM	94844	209	524	42	81	58

NO. AMERICA

UNITED STATES							
W3LPL	MOM	3111748	2233	4556	116	326	241

OCEANIA

EAST KIRIBATI							
T32RA	MOM	1770131	1744	5191	69	118	154

CHECK LOGS: SM7CNA, SP2UUU, SM6BSK, SP2ERZ, HK3DDD, WA0SHF, VE1WH, W6JOX, W4MTE, F6DGH, UC2LEG, SM5EIT.

Results submitted by RDJ Contest Director Roy Gould, KT1N. Send all comments and suggestions to Roy at: P.O. BOX DX, Stow, MA 01775.

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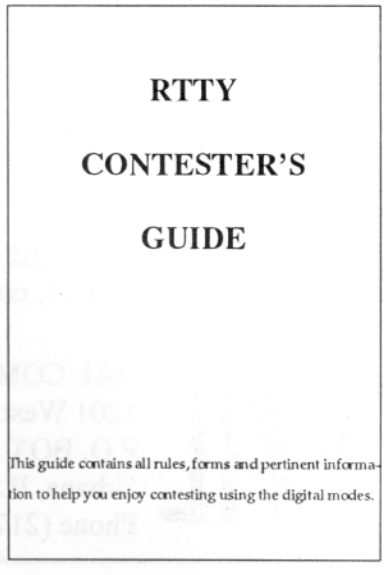

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